

Foulger Consulting

**1025 Paradise Way
Palo Alto, CA 943062637, USA**
Tel: 650/4932553
Cell: 650/9968886
FAX: 866/5326907
gillian@foulgerconsulting.com
<http://www.foulgerconsulting.com/>

February 28, 2015

FINAL REPORT TO ALTA ROCK ENERGY INC.

**PROCESSING OF INDUCED EARTHQUAKES ASSOCIATED WITH THE NEWBERRY EGS
INJECTION SEPTEMBER - DECEMBER, 2014**

GILLIAN R. FOULGER & BRUCE R. JULIAN



Executive summary

We worked as part of an effective collaborative seismic team throughout the 2014 Newberry stimulation project. We liaised with personnel of AltaRock Energy Inc., Lawrence Berkeley National Laboratory (LBNL) and Instrumental Software Technologies, Inc. (ISTI) throughout the 5-month project. Initial problems with data transfer were solved in the first few weeks and did not materially delay progress in processing the data.

Two stimulations performed in Well NWD 55-29 generated 397 locatable earthquakes. AltaRock divided the stimulations into 5 stages (Stimulation 1) and 6 stages (Stimulation 2).

Four sets of earthquake locations are available:

- 1. locations calculated by LBNL;*
- 2. locations calculated by ISTI;*
- 3. locations calculated by Foulger Consulting using ISTI arrival-time measurements and our own program qloc;*
- 4. locations calculated using 100 sets of high-quality arrival-time measurements made as part of the Foulger Consulting moment-tensor analysis.*

The locations form a hypocentral cluster around Well NWD 55-29. The diameter of the cluster reduces as the quality of the locations increases. The LBNL locations form an epicentral cluster with a diameter of ~ 600 m. The ISTI locations, which are based on more intense hand-processing of the events, form a cluster ~ 650 x 305 m in size. Relocation of these events using the same measurements but a different location program changed the dimensions of the epicentral cluster to ~ 500 x 390 m. Such variations are typical between different data-processing- and computer-program performance in the earthquake-location discipline.

By far the most accurate locations are those derived as a pre-requisite for calculation of moment tensors. These locations formed an epicentral cluster ~ 400 x 200 m in size. Relative locations of both the entire dataset and the 100 moment-tensor events collapsed the size of the cluster still further and show that it comprises a tubular-shaped zone ~ 200 m in diameter and ~ 800 m tall running quasi-parallel to the wellbore. This tubular seismogenic zone is tilted and displaced relative to the wellbore such that its upper end is centered ~ 0.1 km north of the wellbore and its lower end is ~ 100 m south of the wellbore and ~ 100 m deeper.

The earthquakes induced by Stimulation 1 occurred in the depth interval ~ 100 m below the bottom of the borehole to ~ 600 m above the bottom of the borehole. Those induced by Stimulation 2 occurred in the depth interval ~ 400 m above the bottom of the borehole to ~ 800 m above the bottom of the borehole. Both the entire data set and the moment-tensor events shallowed throughout Stimulation 1, and deepened throughout Stimulation 2.

It is possible that the misfit of the seismogenic zone with the wellbore is caused by systematic errors in the crustal model used. Errors in the locations of the best-located (moment-tensor) events of up to a small number of hundreds of meters are expected theoretically. Another possible estimate for the errors may be made if it is assumed that the early, deep events were in truth co-located with the bottom of the borehole. This assumption suggests errors of 70 m in the NS direction, 20 m in the EW direction and ~ 90 m in depth for those events. Larger errors would be associated with the shallower events if the tilt of the seismogenic tube away from the wellbore is due to additional, systematic error.

Calculated travel times for the microearthquakes provide no evidence that these data could be used to improve significantly the one-dimensional crustal model currently in use. Nevertheless, scatter in the measurements about the mean indicate that three-dimensional structural variations are significant.



Calculating a three-dimensional tomographic crustal structure using the combined earthquake data from 2012 and 2014 would likely bring about improvements. Ideally, calibration shots would be fired with a seismometer or seismometer string in Well NWD 55-29.

Calibration of the Newberry seismic stations was confirmed by a large quarry blast detonated 10 November, 2014, enhancing confidence in the moment-tensor results. The moment tensors showed that the general orientation of the T axes ($\sim \sigma_3$) during Stimulation 1 is southwesterly-to-southeasterly, in upper-hemisphere projection, and plunging at $\sim 45^\circ \pm 45^\circ$. The P axes ($\sim \sigma_1$) trended quasi-horizontally with azimuths ranging from westerly clockwise through south-easterly. During Stimulation 2, the T axes trended more westerly, and P axes trending in the northeasterly direction, where they were most abundant during Stimulation 1, were rare. Source types ranged from +Dipole to -Dipole, with the most extreme implosive sources being more extreme than the most extreme explosive mechanisms. The distribution in source-type space was similar during both stimulations. Implosive mechanisms dominated slightly. There were systematic variations in the volumetric components with time. The sizes of the largest volumetric components, both implosive and explosive, reduced with time throughout each stimulation.

Significant disagreement between our moment tensors and fault-plane solutions determined by the PNSN can partly be explained by the use of different data. This issue warrants further study.

Further work that could be done includes:

- derivation of a three-dimensional crustal model using tomography;*
- conducting an explosion-calibration experiment with a sensor or sensor string in the NWD 55-29 wellbore;*
- re-analyzing the two earthquakes for which PNSN derived different focal mechanisms; and*
- calculating more moment tensors for the later operational stages of the stimulations.*



TABLE OF CONTENTS

1 Preamble 5

2 Task 1 – Planning, conference calls, discussion of work, correspondence, followup 6

3 Task 2 – System Setup 6

4 Task 3 – Quality control of prepicked MEQs for relocation and moment tensor calculation 6

5 Task 4 –Improved locations and relative locations 7

 5.1 *Comments on absolute locations 7*

 5.2 *Absolute locations–LBNL catalog 7*

 5.3 *Absolute locations–ISTI catalog 9*

 5.4 *Absolute locations–ISTI arrival-time measurements, Foulger Consulting location program qloc 10*

 5.5 *Absolute locations–Foulger Consulting arrival-time measurements for moment-tensor derivation .. 11*

 5.6 *Relative locations 14*

 5.7 *Relative locations: the entire catalog 15*

 5.8 *Relative locations: moment-tensor earthquakes only 19*

 5.9 *Relative locations: interpretation of results 24*

6 Possible improvement of the local crustal model 24

 6.1 *The current one-dimensional crustal model 24*

 6.2 *Quarry Blasts 25*

 6.3 *Local Earthquakes 26*

7 Errors in the locations 28

8 Task 5 Moment tensors 30

 8.1 *Instrument polarities and orientations 30*

 8.2 *Derivation of moment tensors 36*

 8.3 *Comparison of our moment-tensor results with fault-plane solutions derived by the Pacific Northwest Seismic Network (PNSN), for two of the larger earthquakes 42*

 8.3.1 *The earthquake of 20141119 04:41 GMT 42*

 8.3.2 *The earthquake of 20141004 18:51 GMT 45*

 8.4 *Summary of the main results from moment tensor inversion 47*

9 Further work 48

10 Appendix 1: Numerical moment tensor results for the 100 solutions calculated 49

11 Appendix 2: Graphical plots illustrating the 100 moment tensors derived 51



1 Preamble

The remit of work tasked to *Foulger Consulting* on this project comprised advanced processing of microearthquakes induced by hydraulic stimulation of Well NWD 55-29 as part of the Newberry EGS project. Our work was divided into six Tasks:

1. Task 1 – Planning, conference calls, discussion of work, correspondence, follow-up
2. Task 2 – System Setup
3. Task 3 – Quality control of pre-picked MEQs and preparation for relocation and moment tensor calculation
4. Task 4 –Event relocations
5. Task 5 - Moment tensor calculations
6. Task 6 –Reporting

Over the period of performance, September 2014 through January 2015, these tasks were fully completed as per the details laid out in our Estimate of Work dated 18 August, 2014. We report on each Task in the following sections.

AltaRock Inc. provided us with information on operational activities during the stimulation. The data given in Table 1 in particular were used to guide our processing. In the case of some analyses, in particular relative locations and moment-tensor analysis, we subdivided results according to the stage of operations in order to explore possible variations in the behavior and type of induced seismicity as wellhead operations changed.

Table 1: Details of operational stages during hydraulic stimulation of Well NWD 55-29 at Newberry. §i indicates that one event was a duplicate, for quality control purposes.

Stimulation stage	End time	Start time	Operational stage	Number of moment tensors derived
Stimulation 1				
#1:	(2014,10,13,16,20,0)	(2014,09,26,00,00,0)	pre-diverter	64 [§]
#2:	(2014,10,14,16,10,0)	(2014,10,13,16,20,0))	post-diverter	1
#3:	(2014,10,15,22,30,0)	(2014,10,14,16,10,0))	pre-shut-in	2
#4:	(2014,10,23,9,30,0)	(2014,10,15,22,30,0))	pre-flowback	4
#5:	(2014,11,11,9,30,0)	(2014,10,23,9,30,0))	after flowback	3
Stimulation 2				
#1:	(2014,11,15,16,0,0)	(2014,11,11,9,30,0))	before high pressure	0
#2:	(2014,11,18,12,38,0)	(2014,11,15,16,0,0))	pre-diverter	15
#3:	(2014,11,19,13,15,0)	(2014,11,18,12,38,0))	post-diverter	2
#4:	(2014,11,20,18,30,0)	(2014,11,19,13,15,0))	pre-shut-in	2
#5:	(2014,11,24,10,10,0)	(2014,11,20,18,30,0))	pre-flowback	3
#6:	(2014,11,24,10,10,0))		after flowback	4



2 Task 1 – Planning, conference calls, discussion of work, correspondence, followup

We participated in conference calls and planning correspondence prior to the start of the project, earlier in 2014. After the onset of the project, we participated in conference calls approximately weekly, and dealt with ~ 450 emails related to the project, responding where appropriate. We maintained close communication with *AltaRock*, primarily through Trenton Cladouhos, and other sub-contractors including LBNL (Ernie Majer) and ISTI (Paul Friberg and others).

3 Task 2 – System Setup

Having worked on similar projects with *AltaRock* in the past, and since ISTI and LBNL provided us with the primary data in suitable formats, initial system setup for the current project was simple and required only about half a day of work. It involved setting up directory trees, establishing current station location and calibration files, deciding upon a one-dimensional crustal model, and setting up a system for transfer of the data to us via the specified servers and file-transfer facilities.

As the project got underway, a number of teething problems emerged that included truncated waveforms, gross timing errors, improper AH format files and damaged channel codes. We worked effectively with ISTI, who were highly responsive, and these problems were ironed out in a small number of weeks. As a result, the impact on progress was minimal. Such problems are inevitable when implementing new workflows and data exchange.

During our work, we used the MEQ location catalog posted on the internet by LBNL¹, along with the magnitudes given there, as a primary reference list for event selection for moment-tensor calculations. For locations, we used the catalog of arrival-time measurements provided by ISTI, which was produced after hand-processing of the automatically-picked seismograms. ISTI also provided us with event waveforms in a format suitable for importing into our in-house software.

4 Task 3 – Quality control of prepicked MEQs for relocation and moment tensor calculation

At the request of *AltaRock* we focused on obtaining high-quality locations and moment tensors for the largest and best-recorded earthquakes. We quality controlled and re-measured arrival times for individual earthquakes as follows. This process provides data for accurate individual locations, and moment tensors.

1. The waveforms were imported into the *Foulger Consulting* interactive seismogram processing program *epick*;
2. In a first sweep through the data, *P*- and *S*-wave arrival times were measured and an initial location calculated;
3. In a second sweep through the data, each channel was re-processed, rotating the Z, E, and N channels to the earthquake epicenter, and displaying U (up), R (radial) and T (transverse) seismograms;
4. The seismograms were filtered with a 5-Hz high-frequency cut-off, *P*- and *S*-wave polarities and amplitudes were measured, and additional *S*-wave measurements were added where enhancement by the rotation process made this possible;
5. Each earthquake was relocated, the residuals examined, and arrival-time measurements with large residuals were checked and corrected where appropriate;

¹ <http://fracture.lbl.gov/Newberry/locations.txt>



6. Following moment-tensor calculation, arrivals with inconsistent polarities were re-examined with a view to identifying and correcting any arrival-time measurements that were identifiably in error by half a wavelength.

As the project proceeded, we provided the results to Trenton Cladouhos of *AltaRock* electronically, by email attachment, on a weekly basis.

5 Task 4 –Improved locations and relative locations

5.1 Comments on absolute locations

The art of locating earthquakes is imprecise. Calculated absolute locations depend on many details of the workings of individual location programs, including how the issues of starting-guesses, non-uniform station elevations, ray-tracing and outlier rejection are handled. By far the largest source of error in locations is error in the crustal model used. Errors in arrival-time measurements and station locations are typically much smaller in the case of reasonably well-processed data.

Because the origin time of an earthquake is unknown, and has to be calculated along with the three spatial co-ordinates of the location, the program does not have available as primary data the travel times of seismic waves from the source to the receivers. Instead it must use the *differences in arrival times* between seismometers. As a result, in general, a model with higher wave-speeds will result in deeper hypocenters than a model with lower wave-speeds. It follows that imperfect knowledge of the crustal structure of a study area may result in systematically biased calculated hypocentral depths. Ignorance of three-dimensionality of the crustal structure will also bias horizontal locations.

We examined four sets of absolute locations:

1. the locations calculated by the Lawrence Berkeley National Laboratory (LBNL);
2. the locations calculated by Instrumental Software Technologies, Inc. (ISTI);
3. locations obtained using the ISTI arrival-time measurements and our own in-house location program *qloc*; and
4. locations calculated as part of the moment-tensor derivation process. As described in Section 4, this involved careful re-measurement of arrival times, measurement of *S*-wave arrival times on rotated traces, iterative scrutiny, and correction and elimination of outliers and incorrect phase identifications.

We describe these location sets in the following sub-sections.

5.2 Absolute locations–LBNL catalog

Figure 1 shows locations of the 350-earthquake set located by LBNL, downloaded from their webpage¹ on 8 February, 2015. The earthquakes listed there occurred 28 September - 15 December, 2014. The locations form a diffuse cluster distributed throughout a region ~ 600 m in diameter around the well.

Intensive post-processing of the seismic data shows that the best-located earthquakes form a much smaller cluster around the well, suggesting that there are errors of up to ~ 500 m in the horizontal direction. The hypocentral depths of some earthquakes are as shallow as ~ 1.5 km a.s.l., i.e. near the surface, suggesting that the errors in hypocentral depth are up to ~ 2.2 km.



2014 LBL Catalog

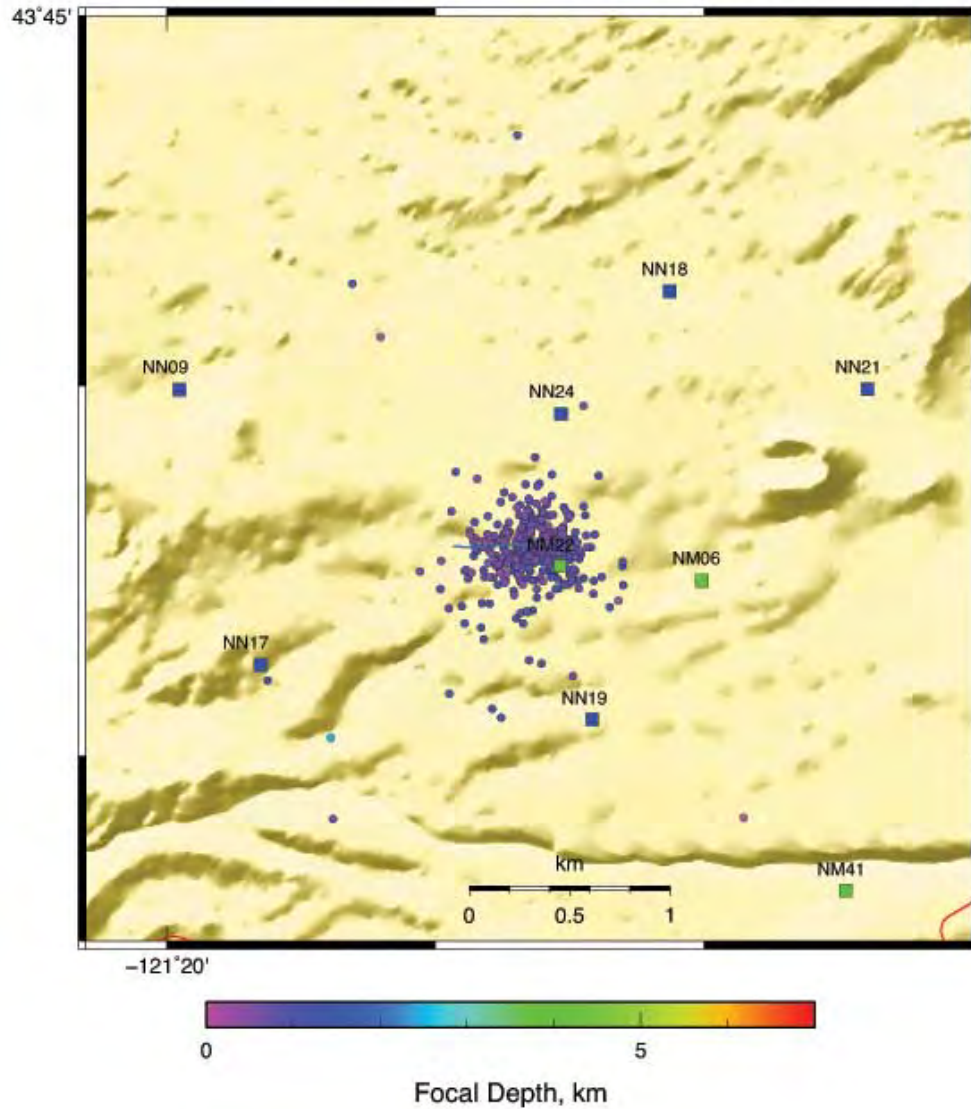


Figure 1: Estimated hypocenters of 350 MEQs recorded 28 September - 15 December, 2014 within the NMSA, as given in the LBNL catalog¹. Blue line: well NWD 55-29; green squares: surface seismometers; blue squares: borehole seismometers.



5.3 Absolute locations—ISTI catalog

Figure 2 shows locations of the 397-earthquake set located by ISTI, using their own operator-measured arrival time data and location software. The epicentral distribution is more compact than that produced by LBNL and forms a NE-orientated cluster $\sim 650 \times 350$ m in size.

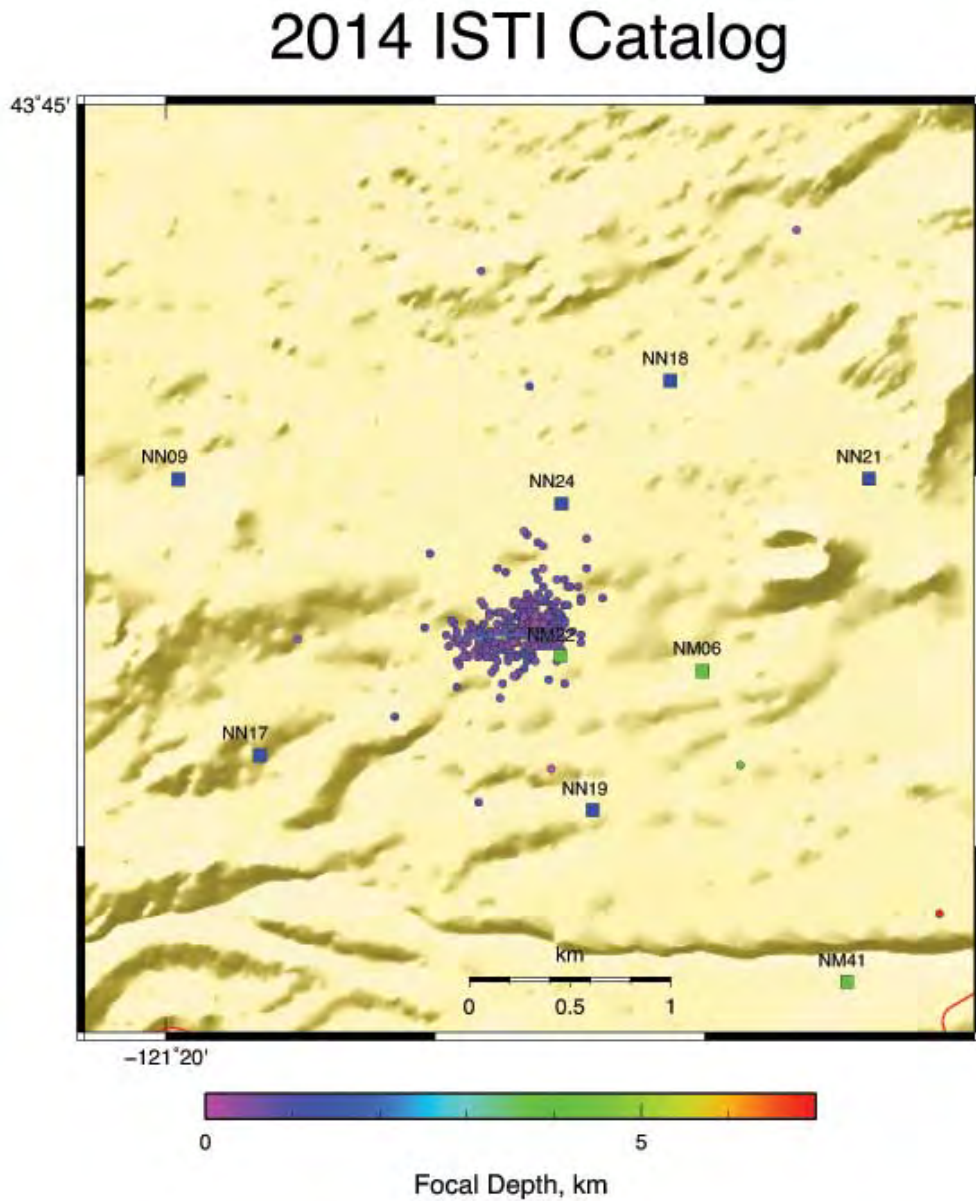


Figure 2: Hypocenters of 397 microearthquakes within the NMSA network in the catalog of ISTI. Well NWD 55-29 is shown in blue.



5.4 Absolute locations—ISTI arrival-time measurements, Foulger Consulting location program *qloc*

We re-located all the earthquakes hand-picked by ISTI using our in-house location program *qloc*. The resulting locations are shown in Figure 3. A significantly different epicentral distribution is shown. The epicentral zone is more compact and the NE-orientated elongation less extreme. The epicentral zone has dimensions of ~ 550 x 390 m. As was the case with the ISTI locations (Figure 2), a few epicenters locate outside of the main cluster. A smaller number of events locate at moderate distances from the main cluster (up to ~ 1 km) but two earthquakes located at ~ 2 km from the cluster, to the N and the NE, remain. Review of these two location outliers would be required to ascertain whether they are in error or whether these locations are approximately correct.

2014 ISTI Picks

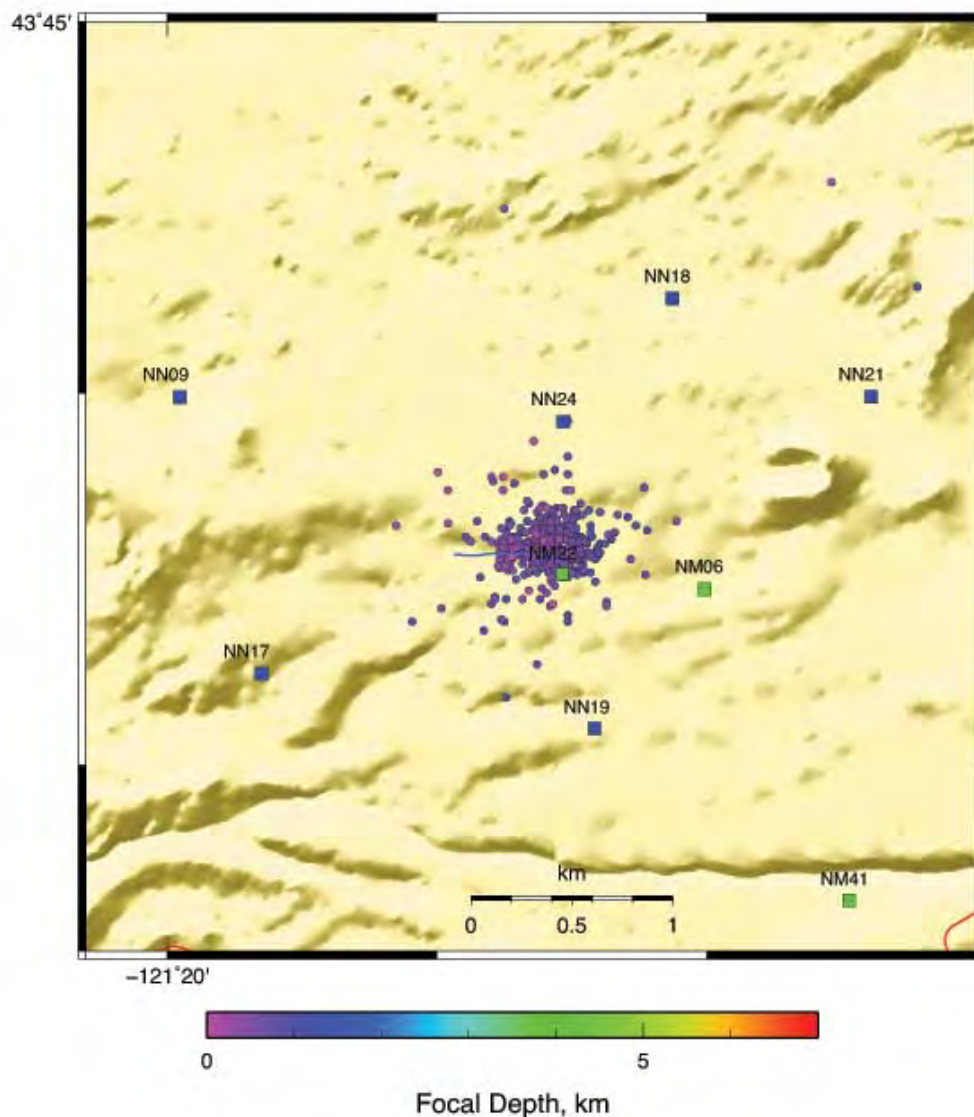


Figure 3: All earthquakes located using ISTI arrival-time measurement and the *Foulger Consulting* location program *qloc*. Well NWD 55-29 is shown in blue.



A plot showing hypocentral depths as a function of time for the *qloc* locations is shown in Figure 4. Two sequences of earthquakes occurred, one lasting from late September to approximately 26 October, and the other lasting approximately 15 November to mid-December. These two sequences are associated with the two stimulations that were performed (Table 1).

The hypocentral depths of earthquakes during the first sequence shallowed in general with time. At the onset of the stimulation they were deeper than 1 km b.s.l. This depth of activation rapidly expanded to include the interval $\sim 0.5 - 1.4$ km b.s.l. but thereafter reduced and towards the end of the sequence events were mostly restricted to the depth interval $\sim 0.5 - 0.9$ km b.s.l.

Depths of activation at the onset of the second sequence occupied the range $\sim 0.2 - 0.9$ km b.s.l., deepening with time to $\sim 0.6 - 1.1$ km b.s.l.

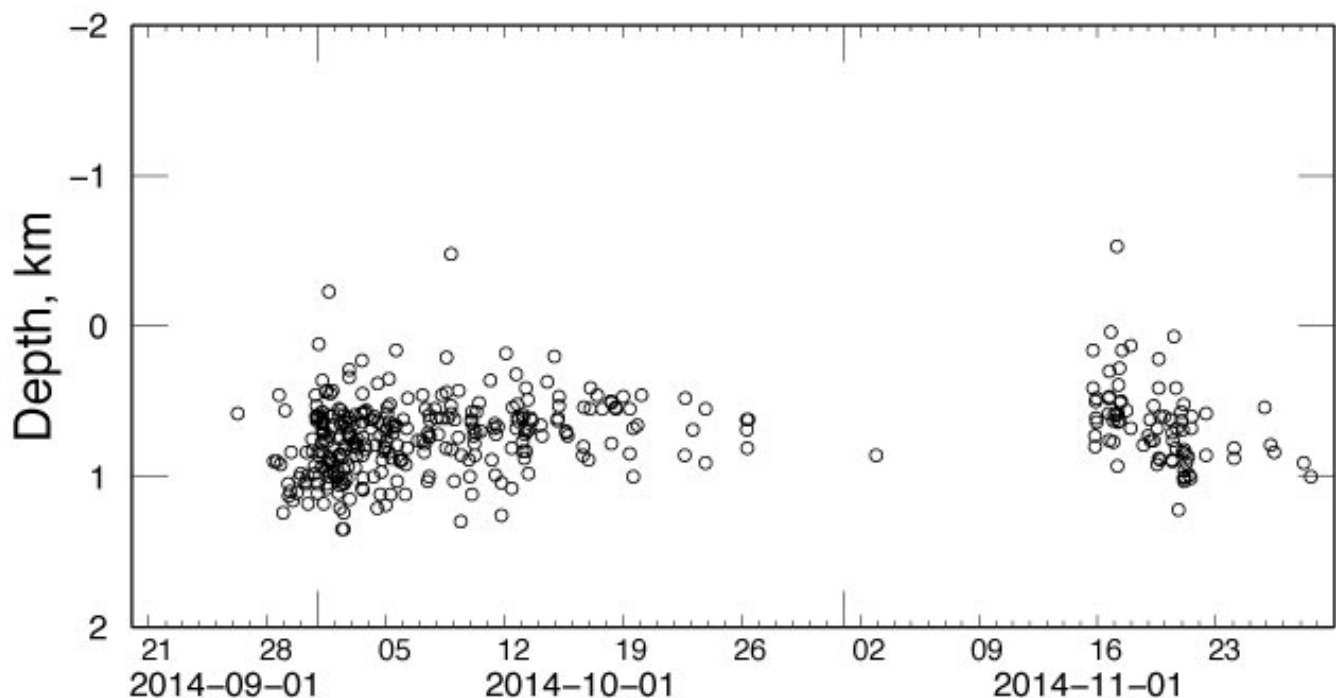


Figure 4: Estimated depths, with respect to sea level, of the earthquakes within the NMSA network as a function of time. These depths were obtained by using *qloc* to invert *P*- and *S*-phase arrival times measured by ISTI.

5.5 Absolute locations—Foulger Consulting arrival-time measurements for moment-tensor derivation

We processed a total of 100 earthquakes for the purpose of moment-tensor derivation. Figure 5 shows a map of these earthquakes. These locations are exceptionally accurate, being a by-product of the moment-tensor derivation process. The epicenters lie in a linear zone trending WNW and is more compact than epicentral maps derived using less-intensively processed data. The epicentral zone is $\sim 450 \times 230$ m in size. Details of the epicentral distribution are more easily seen in the expanded view shown in Figure 6.



A plot showing these hypocentral depths as a function of time is shown in Figure 7. The main features of shown in this figure reflect those apparent in the plot for the entire dataset (Figure 4), but with less scatter.

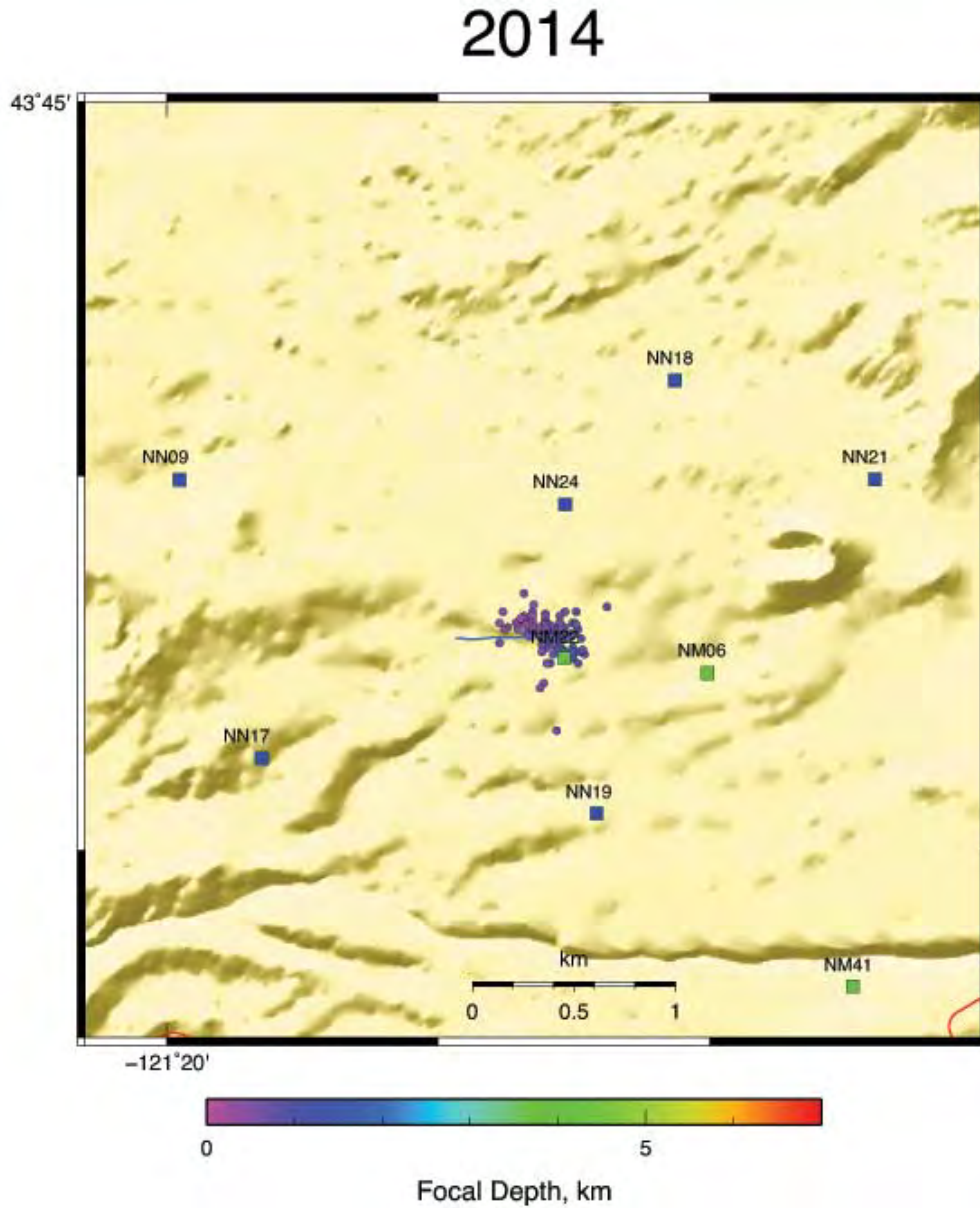


Figure 5: High quality hypocenters of the 100 moment tensor events. Well NWD 55-29 is shown in blue.

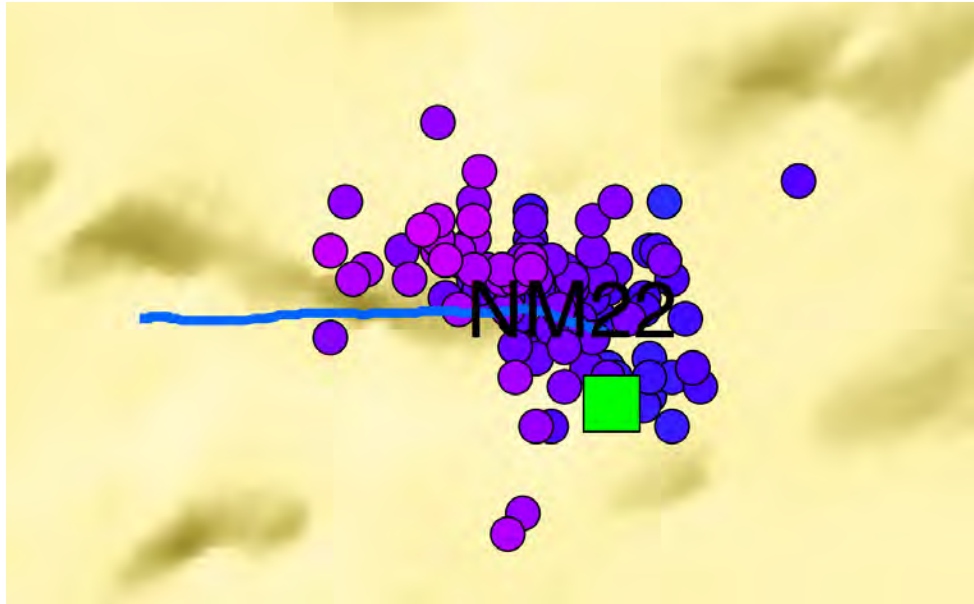


Figure 6: Expanded view of the locations of the 100 moment-tensor locations.

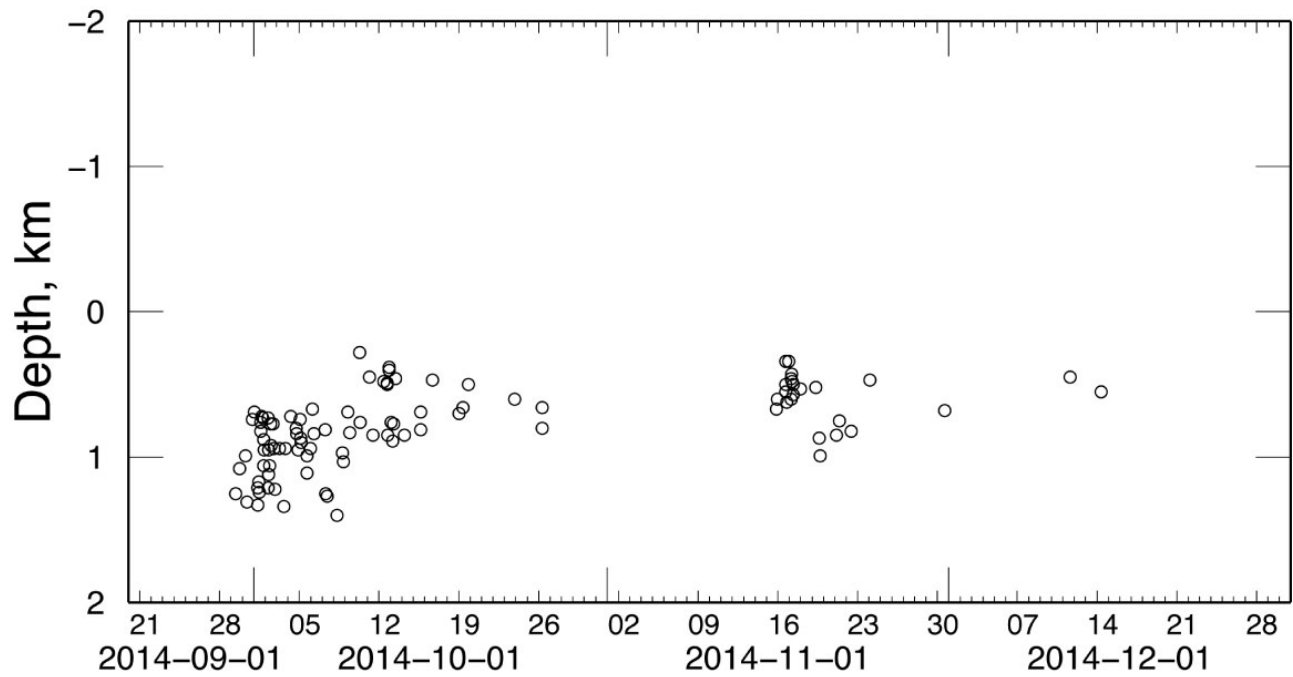


Figure 7: Estimated depths, with respect to sea level, of the 100 moment-tensor events as a function of time.



5.6 Relative locations

We calculated relative locations for two sets of the data:

1. the entire catalog, using ISTI arrival-time measurements; and
2. the 100 moment-tensor events only, using *Foulger Consulting* arrival-time measurements.

We report on the results in the following two sections.

We used program *hypocc*, a relative-location program based on the approach of Waldhauser & Ellsworth [2000] but written by Bruce Julian in the C programming language. This carries with it many advantages, including extreme speed. That speed enabled us to explore numerous run-time options to obtain the best possible result with the Newberry data.

Absolute hypocenter location methods such as the method used by ISTI, and our *qloc* program, analyze one earthquake at a time. The results contain systematic errors caused by unknowns in the crustal velocity model. The relative location method works on a different principle, locating many earthquakes simultaneously, using as data the *differences* between the seismic-wave arrival times at common stations for pairs of earthquakes. The program divides the earthquakes into discrete “clusters” of closely grouped earthquakes, and relocates the events in each cluster relative to one another. This method greatly reduces the effect of systematic errors in the crustal model, and provides much higher resolution of the locations of nearby earthquakes relative to other earthquakes in the same cluster.

It is important to realize that the absolute location of the cluster is not improved by the relative location process. In order to fix the absolute location of clusters, we pinned them to particularly well-located events—one or two in each cluster (Table 2). The location of each cluster as a whole is not better than the locations of these selected well-located events.

Table 2: List of absolute locations used. Magnitudes are taken from the LBNL online catalog.

1.	2014	10	01	14	53	20.145	43.726509	-121.309105	0.82	$M_L=1.38$	(MT/ <i>qloc</i> location)
2.	2014	10	01	08	08	57.998	43.725528	-121.308941	1.21	$M_L=0.85$	(MT/ <i>qloc</i> location)
3.	2014	11	17	05	40	30.555	43.726840	-121.311413	0.48	$M_L=0.64$	(MT/ <i>qloc</i> location)
4.	2014	11	21	02	55	53.285	43.726256	-121.310840	0.85	$M_L=0.57$	(MT/ <i>qloc</i> location)
5.	2014	10	01	14	53	04.914	43.725682	-121.308804	0.87	$M_L=1.38$	(same event as 1. except ISTI location)
6.	2014	11	17	05	40	30.581	43.725918	-121.312329	0.39	$M_L=0.64$	(same event as 3. except ISTI location)

We explored the performance of multiple *hypocc* program runs, systematically varying three input parameters in particular. These were:

- *minclust*—the minimum number of earthquakes to define a cluster;
- *maxit*—the maximum allowed number of relocation iterations;
- *minlinks*—the minimum number of “links” (i.e., measured station/phases in common between pairs of earthquakes) needed for an earthquake to be passed to the final relocated set; and
- *maxsep*—the maximum separation allowed between linked pairs of earthquakes.



We report below the results of seven different inversions, using different data subsets and run parameters.

5.7 *Relative locations: the entire catalog*

We relocated the entire catalog using the hand-measured arrival times provided by ISTI. Of the many inversions we performed and examined, we selected three as illustrating the robust results of the analysis (Table 3). The number of earthquakes relocated is much smaller than the original number in the catalog. This results from elimination of more poorly recorded events (*e.g.*, ones with fewer measured arrival times) by the relative-location run-time options set. The process is a trade-off between deriving the best-quality result, and reducing the number of earthquakes greatly. Typically, the most focusing of structures is achieved by selecting the highest-quality events, and increased scatter occurs as larger numbers of earthquakes are retained.

Table 3: Details of relative location inversions performed on the entire dataset, using arrival-time measurements made by ISTI.

	Run #	# events in original set	Minclust	maxit	Minlinks	Maxsep (km)	# clusters	# events	Absolute location (event # in Table 2)
All	5	397	10	5	16	0.15	1	49	5
Stim 1	6	299	10	5	16	0.15	1	34	5
Stim 2	7	98	10	10	14	0.15	1	11	6

The results are shown in Figure 8, Figure 9 and Figure 10.

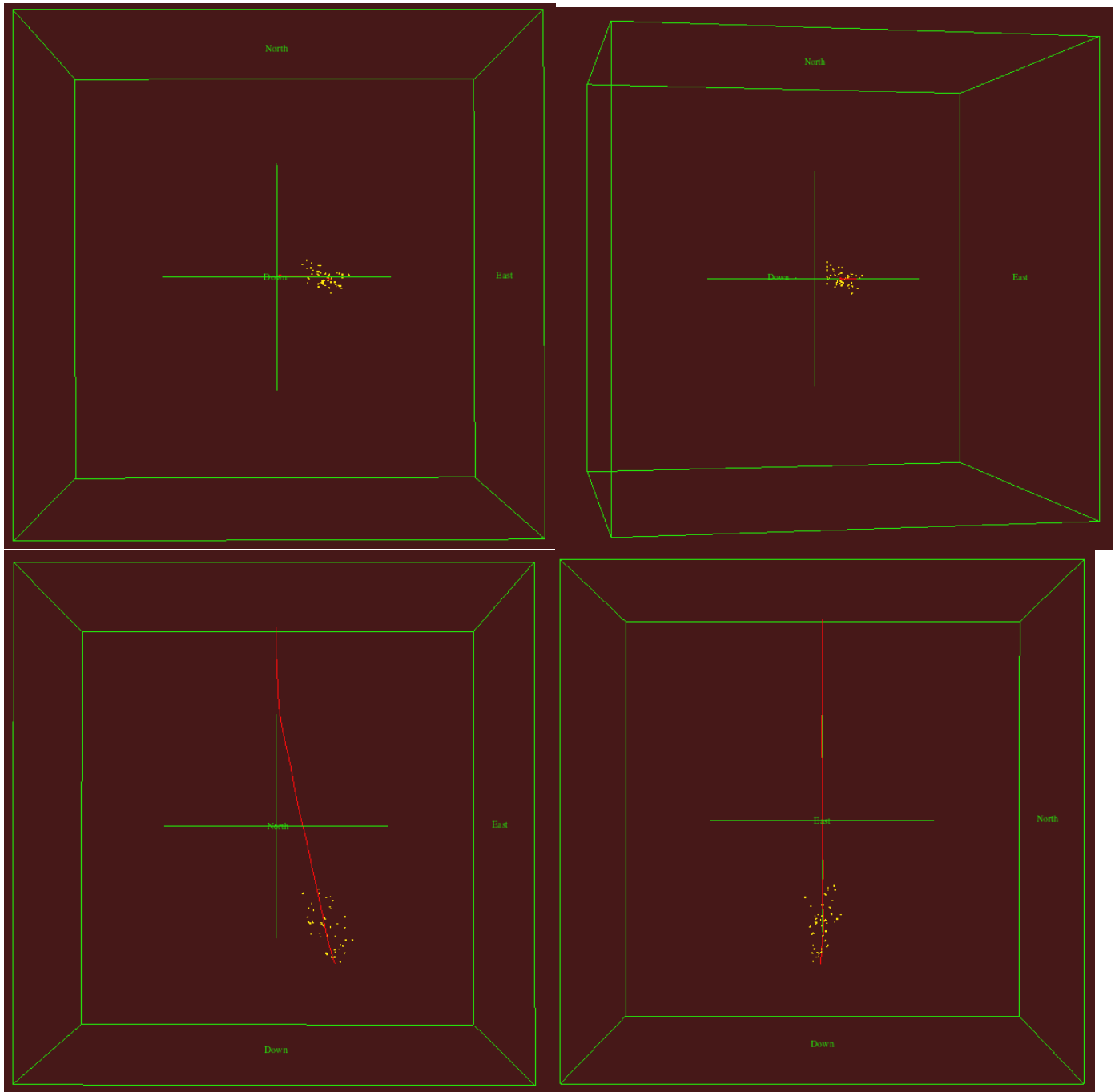


Figure 8: Results of *hypoc* Run 5. Top left: Map view, top right: view looking directly down the lower part of well NWD 55-29, bottom left: horizontal cross section looking north, bottom right: horizontal cross section looking west. The green box is 4 x 4 x 4 km in size. Each arm of the central green cross is 1 km long. The red line is well NWD 55-29, which extends from the surface and is 3 km deep. Its top ~ 1 km is quasi-vertical and its bottom ~ 2 km is deviated to the east.

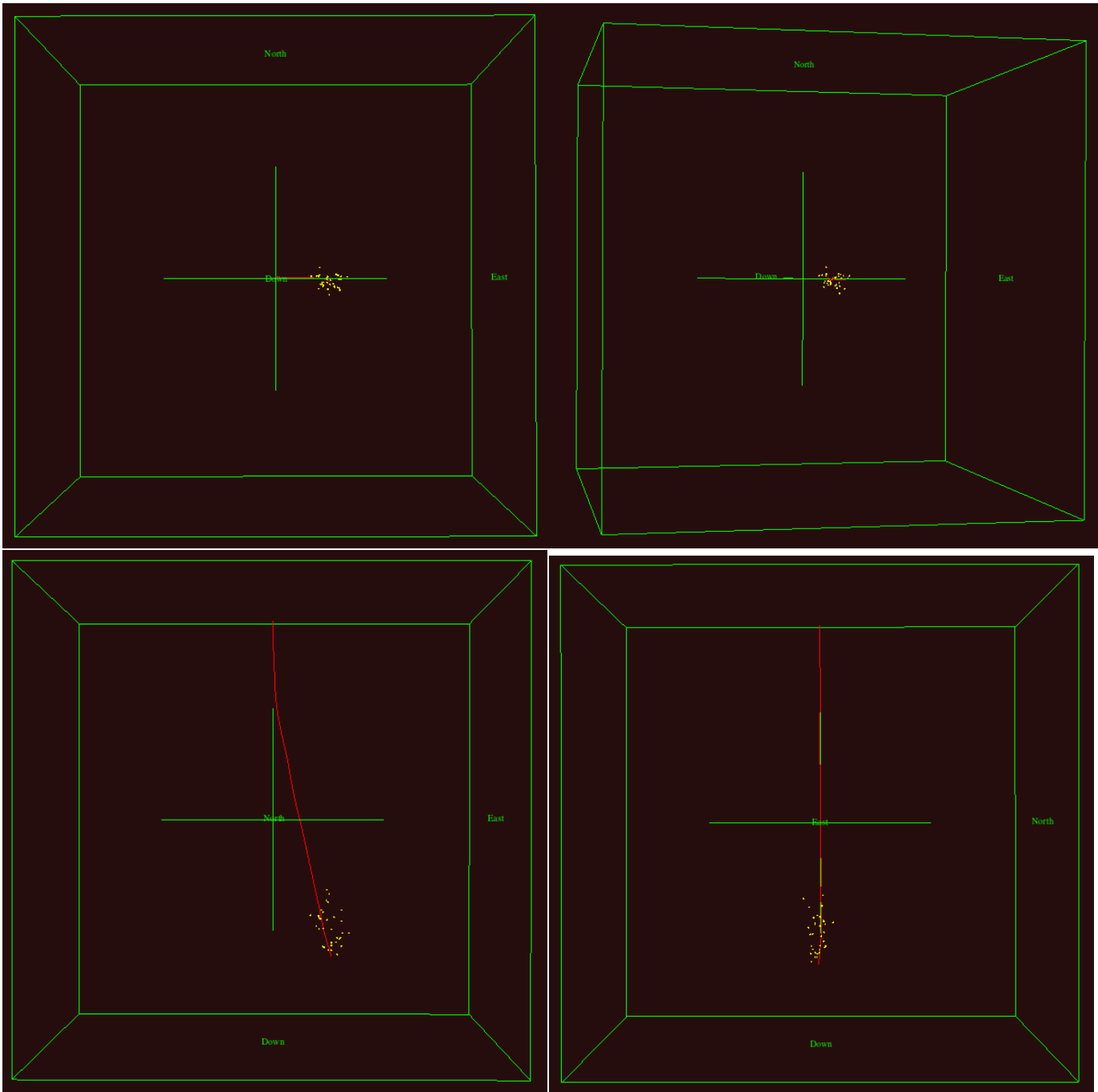


Figure 9: Same as Figure 8 except for Run 6.

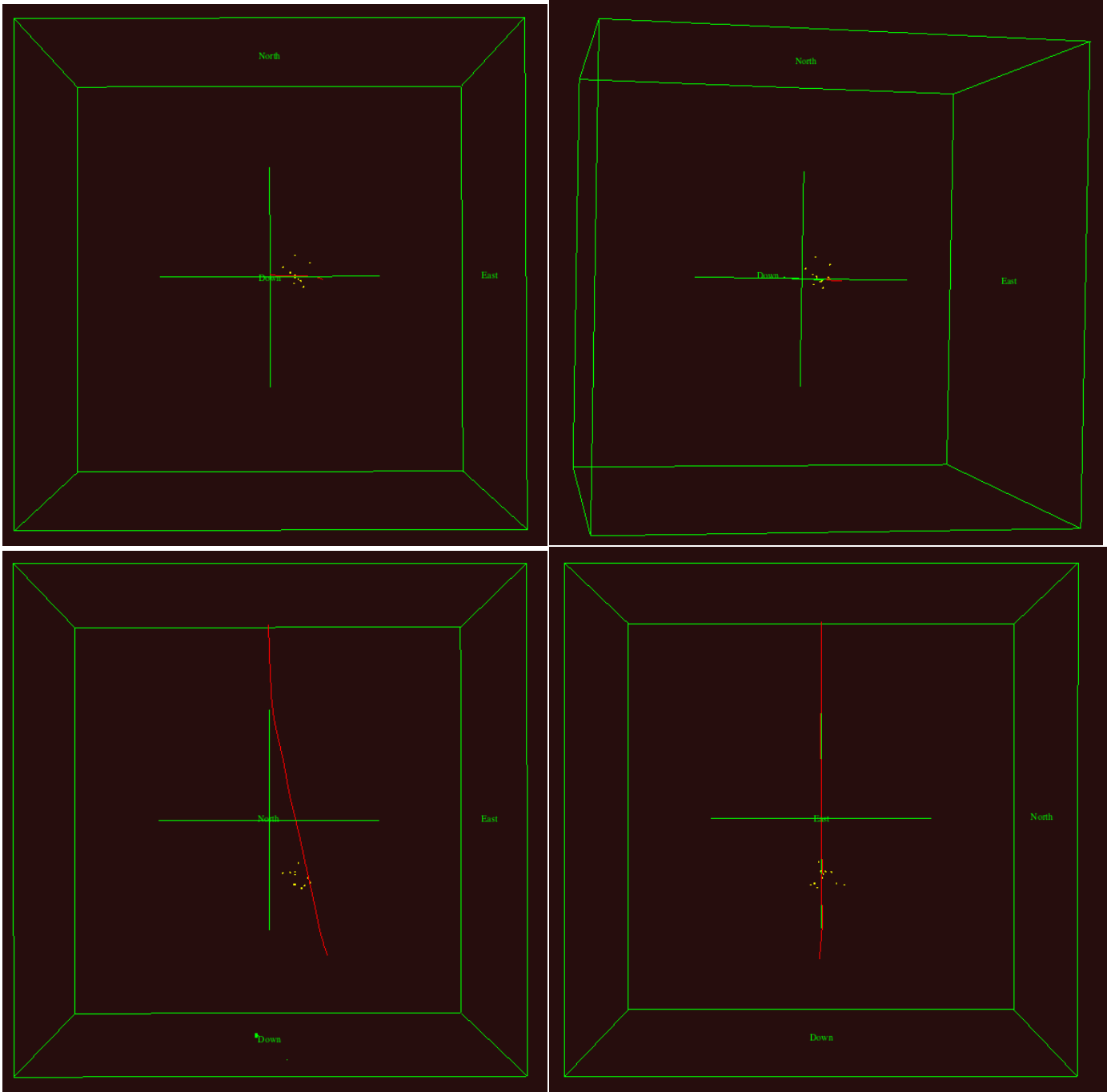


Figure 10: Same as Figure 8 except for Run 7.



5.8 Relative locations: moment-tensor earthquakes only

We calculated relative locations for the 100 events that were carefully processed by hand for derivation of moment tensors. This processing was done to a higher standard than is typically done just for the purpose of locating an earthquake, and resulted in many more *S*-wave arrival time measurements and more rigorous outlier-elimination. We performed many inversions, and selected four as illustrating the robust results of the analysis (Table 4).

Table 4: Details of relative location inversions performed on the 100 earthquakes processed by *Foulger Consulting* for moment-tensor inversion.

	Run #	# events in original set	Minclust	maxit	Minlinks	Maxsep (km)	# clusters	# events in cluster 1/2	Absolute location (event # in Table 2)
All events	1	100	5	5	20	0.15	2	41/11	1/2
All events	2	100	5	5	22	0.15	2	14/7	1/2
Stim 1	3	74	5	5	20	0.15	2	20/11	1/2
Stim 2	4	26	5	5	20	0.15	1	17	3&4

The results are shown in Figure 11, Figure 12, Figure 13 and Figure 14.

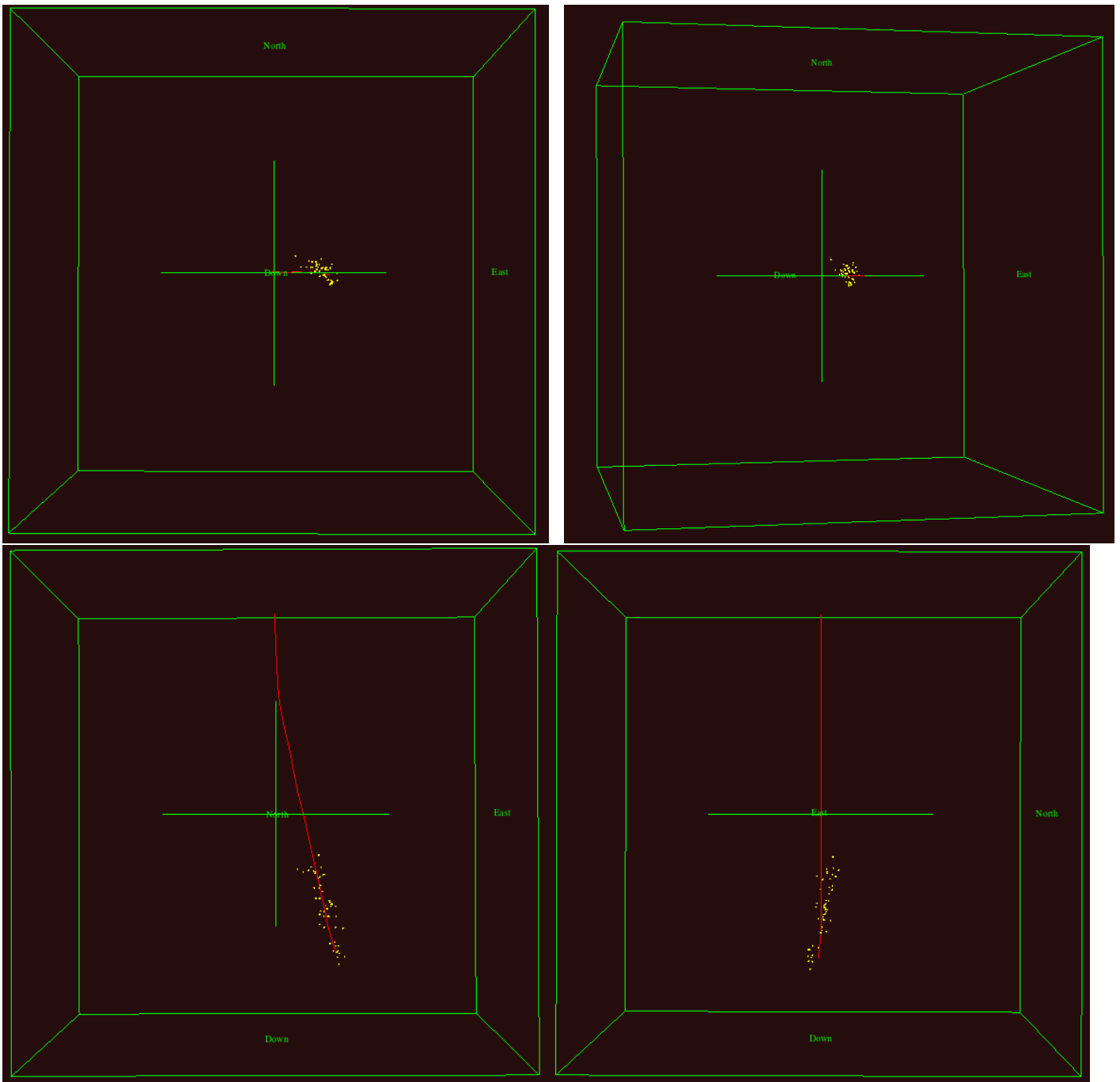


Figure 11: Same as Figure 8 except for Run 1.

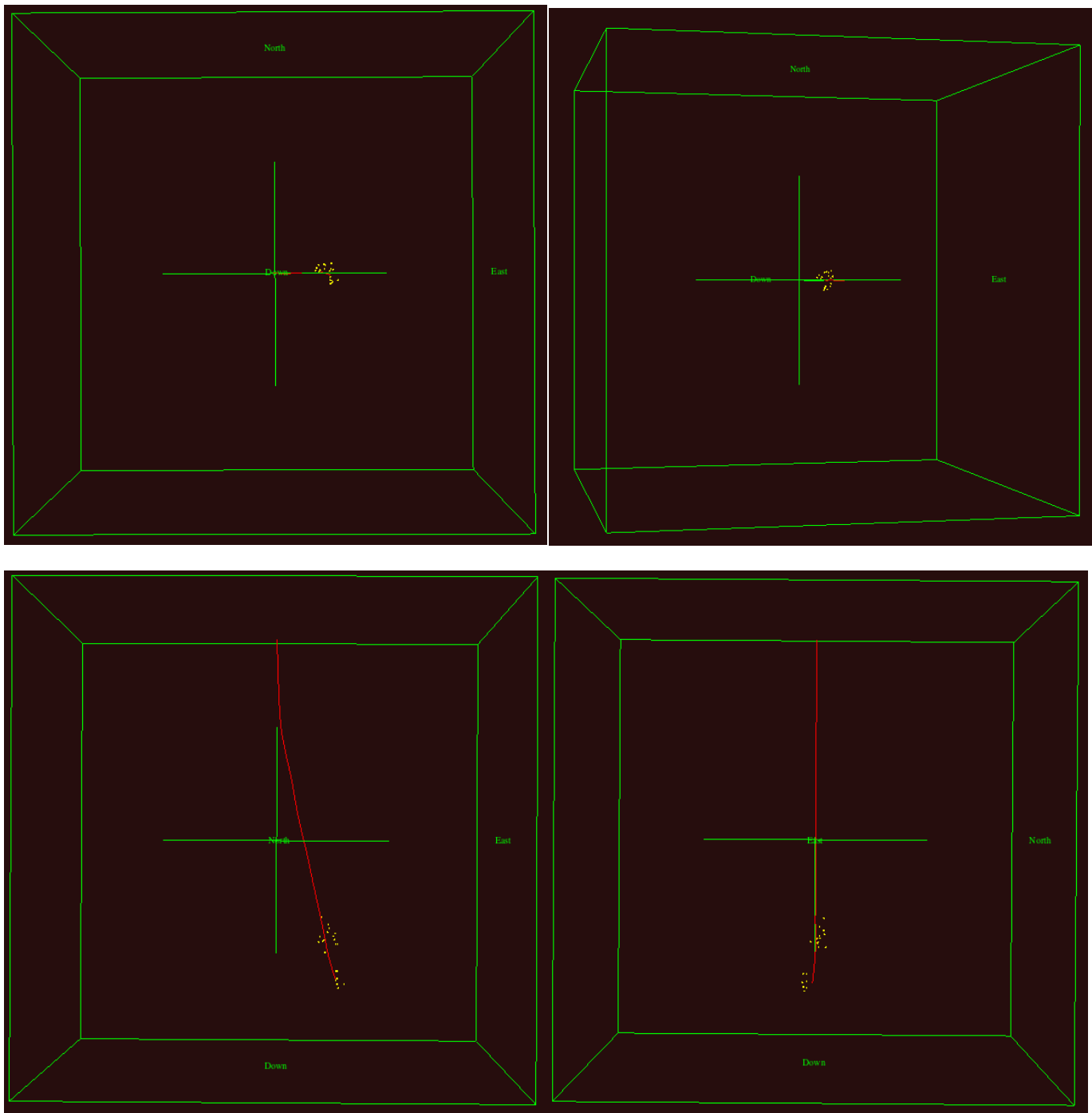


Figure 12: Same as Figure 8 except for Run 2.

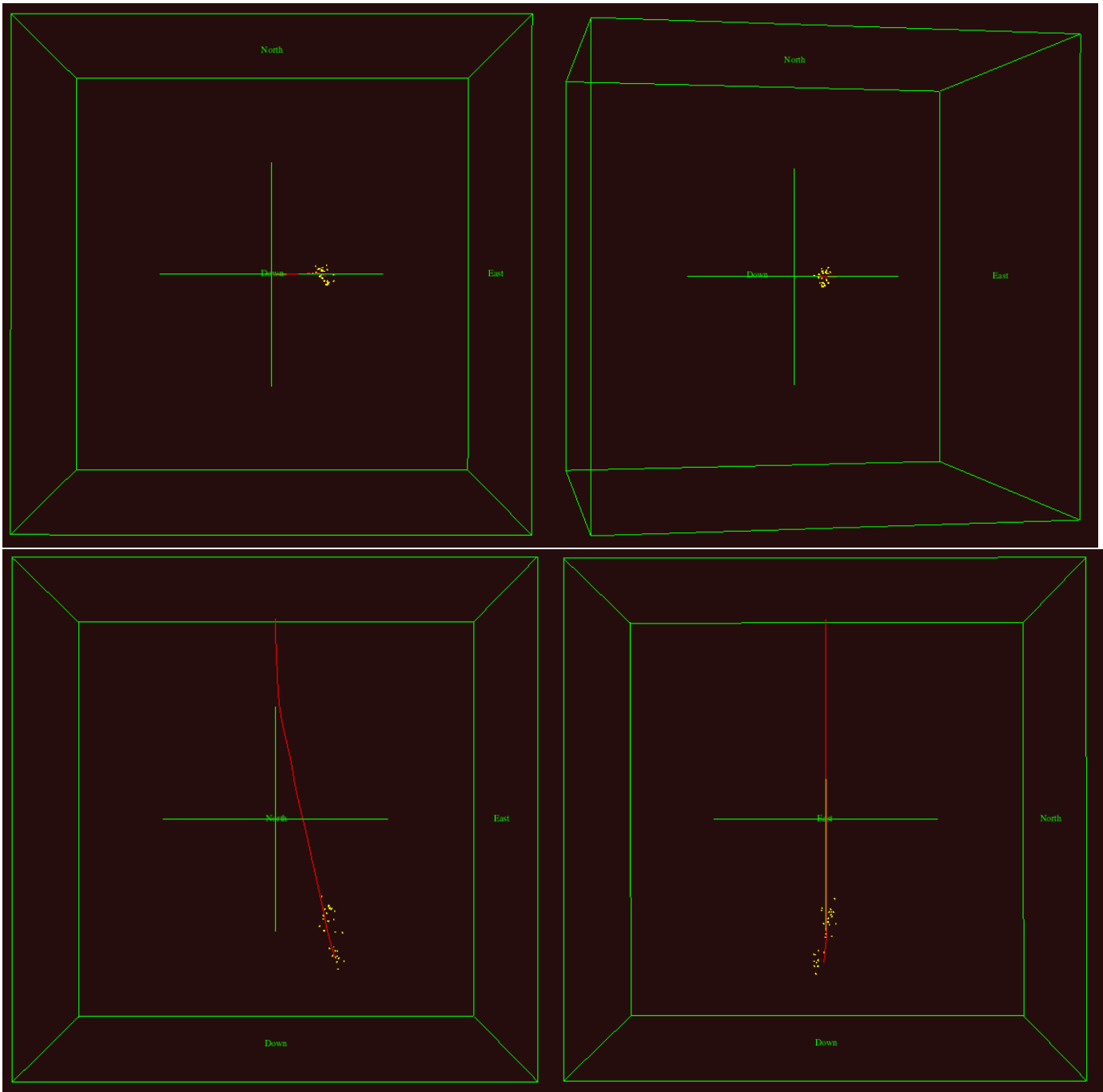


Figure 13: Same as Figure 8 except for Run 3.

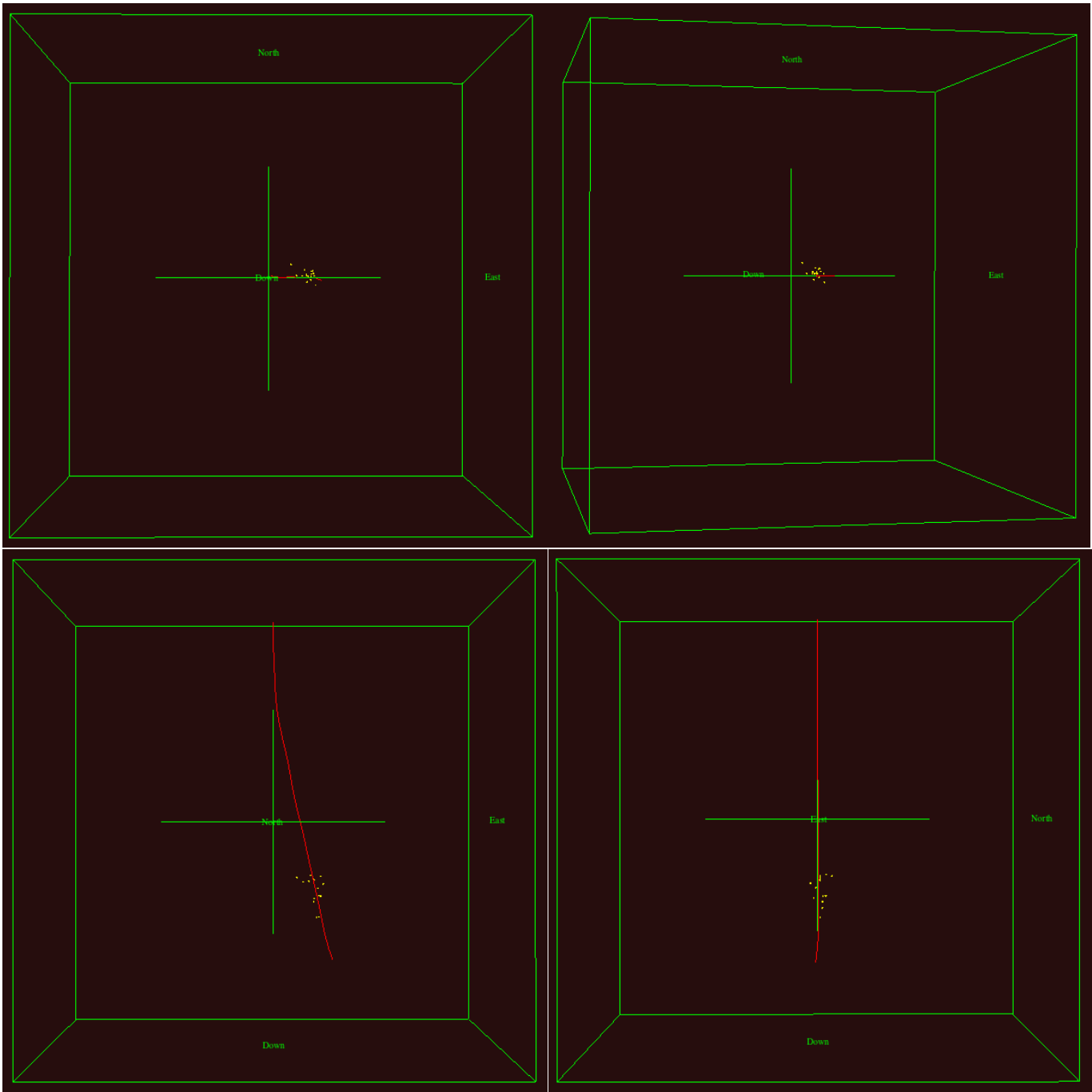


Figure 14: Same as Figure 8 except for Run 4.



5.9 Relative locations: interpretation of results

The results show a coherent picture, with general agreement between the different program runs. The main difference between different runs of the whole data set is the amount of scatter. The best quality results comprise Runs 1, 3 and 4, conducted using the moment-tensor events.

The basic results may be summarized:

1. The earthquakes lie in a tube-shaped volume around the bottom ~ 800 m of the borehole.
2. Studying the event distribution by rotating the earthquake cloud in three-dimensional visualization software reveals that the tube does not follow exactly the trajectory of the well—its upper end is somewhat north of the well and its lower end somewhat south of the well. Also the earthquakes extend a little deeper than the bottom of the well. However, this misfit with the borehole is within the likely errors of the earthquake locations. This means that it is possible that the earthquakes form a tube centered on the borehole, but this cannot be ascertained for certain because of limitations in assessing the location errors (Section 7).
3. The best located earthquakes (the moment tensor events) suggest the diameter of the seismogenic tube is up to ~ 200 m.
4. The events associated with Stimulation 1 extend from ~ 100 m below the bottom of the borehole to ~ 600 m above the bottom of the borehole.
5. The events associated with Stimulation 2 extend from ~ 400 m above the bottom of the borehole to ~ 800 m above the bottom of the borehole.

The numerical results of the relative location work have been provided to *AltaRock* by email attachment to Trenton Cladouhos.

6 Possible improvement of the local crustal model

6.1 The current one-dimensional crustal model

The one-dimensional model we currently use to locate MEQs in the Newberry area is given in Table 5 and shown graphically in Figure 15. This model was derived from explosions fired in the Newberry area in 2010, as part of an earlier phase of the Newberry Volcano EGS Demonstration Project, combined with legacy explosion data from regional experiments.

Table 5: Crustal model NB2, the best one-dimensional model currently available for the Newberry EGS area, and used for the earthquake locations reported here.

Depth to top of layer (km)	V_P (km/s)	V_S (km/s)
0.300	2.034	1.236
0.150	3.33	2.015
0.150	3.507	2.122
0.150	3.673	2.222
0.25	3.767	2.279
0.90	3.80	2.299
200.0	4.70	2.843

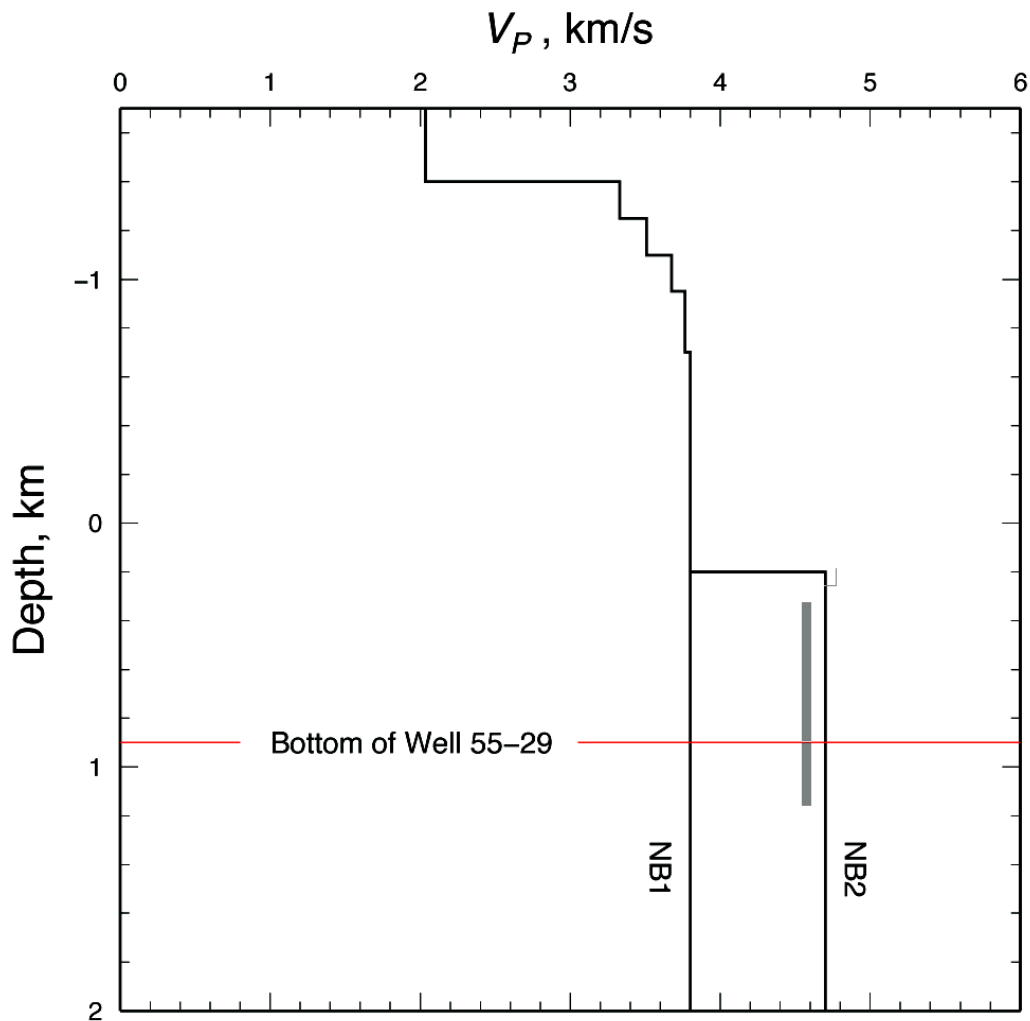


Figure 15: Two candidate crustal models studied for the Newberry area under previous contracts. Model NB2 is the preferred model and the one used for the work reported here.

6.2 Quarry Blasts

We examined recordings of quarry blasts on the stations of the NMSA to investigate whether the current one-dimensional model can be improved. Analysis in an earlier report showed that P phases from a large ripple-fired quarry blast about 12 km southwest of well NWD 55-29, on August 20, 2012, scatter by about 0.3 s and are early, by several tenths of a second, with respect to extrapolated travel-time curves for smaller distances. Data from another blast at the same quarry, on November 10, 2014, confirmed this.

The observed station-to-station patterns of P arrival times from the blasts of 08/20/2012 and 11/10/2014 are similar. Table 6 shows the travel times for the 08/20/2012 blast (t_l), computed using the “main blast” origin time, and the relative arrival times for the 11/10/2014 blast, relative to an arbitrary reference (the true blast time is unknown). The data are consistent to within about 24 milliseconds (Table 6). The differences between the times have a standard deviation of 0.024 s.



Table 6: Comparison of arrival times t_1 and t_2 from quarry blasts 1 and 2 (1 = 2012/08/20 17:15:59.3557, 2 = 2014/11/10 21:10:20).

Station	Distance (km)	Phase	t_1 (s)	t_2 (s)	t_2-t_1 (s)
NM06	12.798	<i>P</i>	3.416	5.179	1.763
NM22	12.302	<i>P</i>	3.302	5.040	1.738
NM42	15.973	<i>P</i>	4.006	5.731	1.725
NN07	13.590	<i>P</i>	3.393	5.171	1.778
NN09	11.611	<i>P</i>	3.025	4.792	1.767
NN18	13.636	<i>P</i>	3.427	5.178	1.750
NN19	11.937	<i>P</i>	3.105	4.876	1.771
NN21	14.046	<i>P</i>	3.424	5.228	1.804
					1.762±0.024

6.3 Local Earthquakes

Hydraulic stimulation of well 55-29 has induced hundreds of microearthquakes, which provide seismic data that might be useful for refining models of local crustal structure. Such refinements might consist of modifications to the one-dimensional plane-layered model currently used, or derivation of three-dimensional models using tomographic methods. To assess these possibilities, we analyzed arrival times of seismic *P* and *S* phases from the 100 events analyzed for moment-tensor derivation.

Figure 16 shows these travel times as functions of epicentral distance for six different ranges of focal depths.

The “clumps” of data evident on these plots correspond to different seismometer stations, for each of which the observations are repeatable, but which differ from one other because of differences in station elevation and local structure. The data scatter symmetrically about the theoretical curves, as is expected because the locations and origin times of the events were determined from these same data by least-squares fitting. The data clumps are much smaller than this scatter, indicating a high degree of repeatability in the observations. The primary cause of the differences between data from different stations seen is variation in the station elevations. Figure 16 thus clearly underlines the magnitude of the effect of varying station elevations and the importance of accounting correctly for this factor.

Figure 17 shows the same data, corrected to account for the station elevations of up to 1700 m a.s.l. (corresponding to the plotted travel-time curves). The variation between the data clumps has virtually disappeared, and the clumps all lie on the theoretical curves.

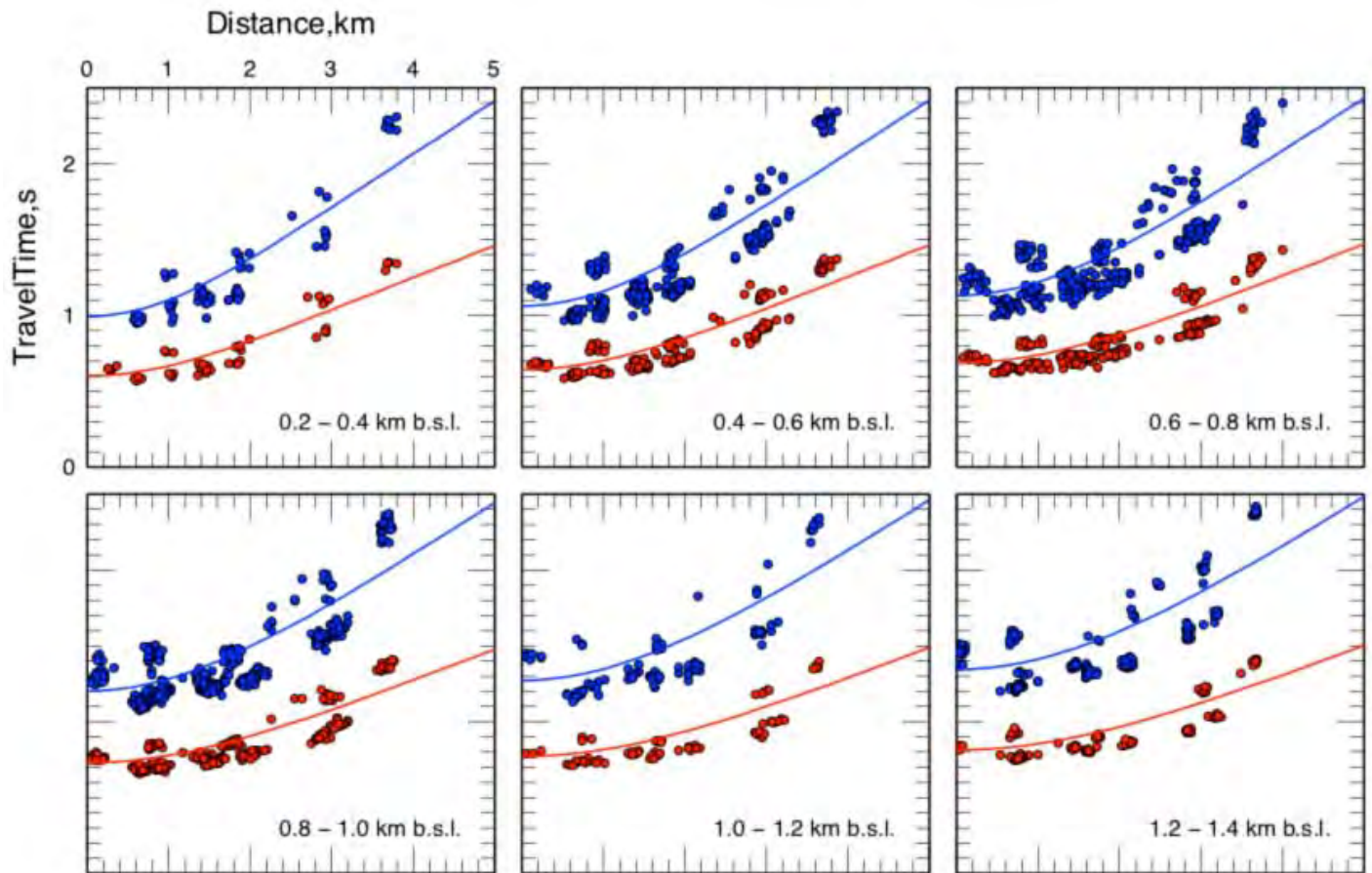


Figure 16: Circles: Travel times of 1032 *P* phases (red) and 1507 *S* phases (blue) from the 100 MEQs that were analyzed for moment-tensor calculations. Each panel shows data for MEQs in a different depth range, as indicated. Curves: Theoretical travel times for sources at the mid-points of each depth range and for stations 1700 m a.s.l. in the plane-layered model NB2 (Table 5 and Figure 15) that was used to estimate hypocenter locations.

There is little indication of any systematic difference between the theoretical and observed travel times, and thus little suggestion that these data could be used to significantly improve the one-dimensional model NB2. The remaining scatter in Figure 17 is, nevertheless, still much larger than the precision of measurement, indicating that lateral variations are significant. The restricted spatial extent of these 2014 microearthquakes, probably renders them inadequate to usefully estimate three-dimensional structure unless they are supplemented by other information. It would be worthwhile to combine this dataset with observed travel times from the spatially more scattered MEQs that were induced by operations in earlier years. Together, the entire dataset might be adequate for useful tomographic inversion (Section 9).

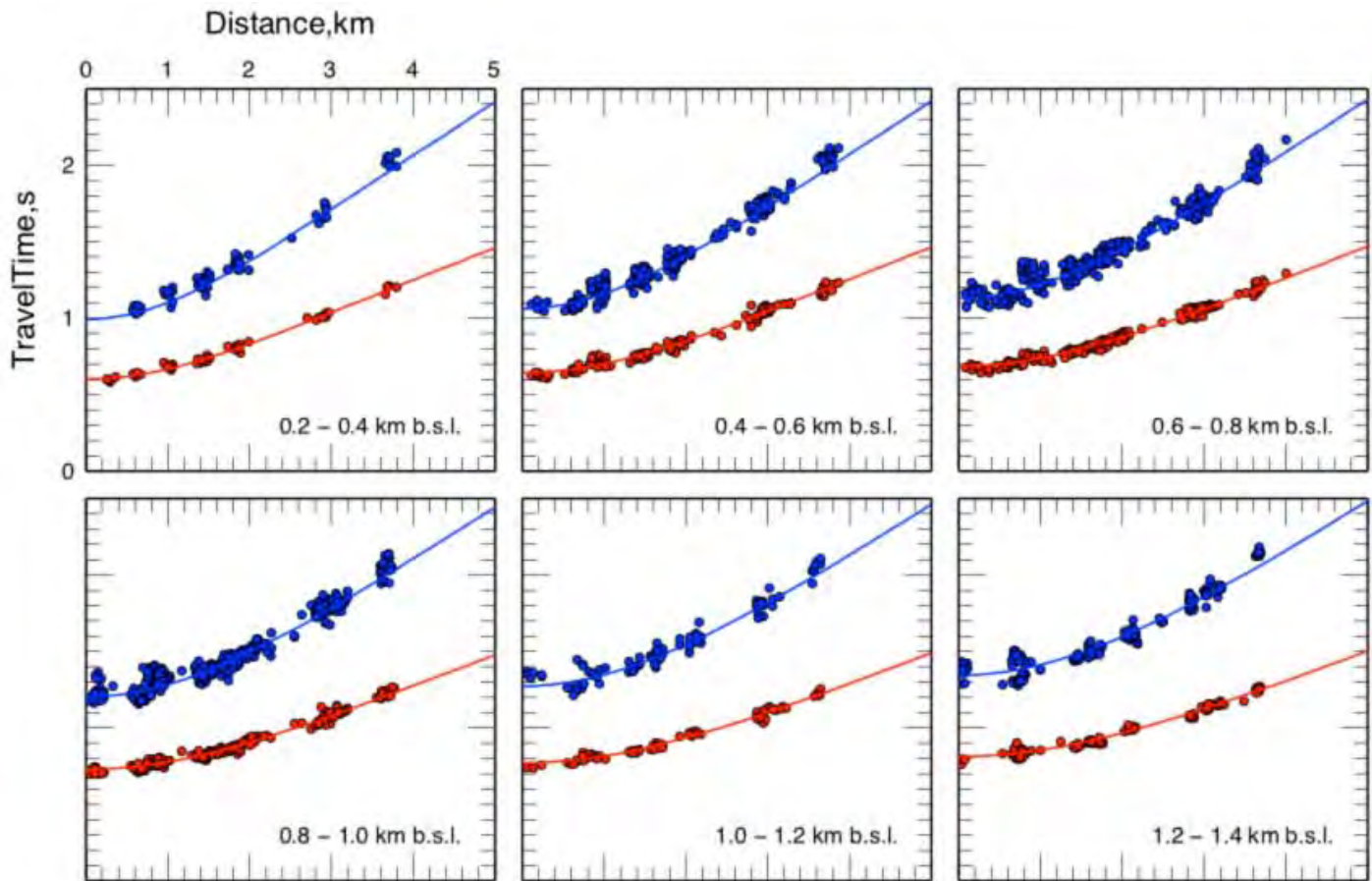


Figure 17: Like Figure 16, but with the observed data corrected to nominal station elevations of 1700 m a.s.l. The differences between seismometer stations are reduced, but differences related to local structure remain.

7 Errors in the locations

Foulger Consulting has reported to AltaRock in the past on the probable errors associated with computed earthquake locations at the Newberry project, *e.g.*, in our report of 18 March, 2013 on the hydraulic stimulation of Well NWG 55-29 between 17 October 2012 and the end of February 2013, and in our report of 9 October, 2010, on calibration shooting at Newberry conducted by the USGS 29 - 31 July, 2010. We reiterate some of the points made in those reports, and summarize the situation as it relates to the MEQ locations described in the current report.

Calculating relative locations reduces the errors in the locations of earthquakes relative to one another. However, it does not improve the absolute location of any one earthquake beyond that of the best-located earthquake in the cluster. The absolute locations of the earthquakes considered to be best located are given in Table 2.

Uncertainties in absolute earthquake locations arise from two main sources:

1. random errors, resulting from errors in measuring arrival-times, and



2. systematic errors, resulting from imperfect knowledge of crustal structure.

The Newberry MEQ network is of high quality, comprising well-calibrated three-component sensors in low-noise environments in boreholes. A relatively good one-dimensional crustal model is available, which is particularly well constrained in the upper ~ 700 m where seismic wave-speeds are lowest. This is a fairly good position for determining accurate earthquake locations. Nevertheless, it is not sufficient to attain accuracies of a few meters.

Foulger Consulting has conducted previous studies of the probable errors in locations calculated using this network. Random errors of measurement are likely to introduce location errors of meters to tens of meters. Systematic errors, most notably from uncertainties in the crustal model, are much larger, and may introduce errors of up to a small number of hundreds of meters.

In the case of the Newberry project, we used a one-dimensional crustal seismic structure (Section 6.1). Not only must this be imperfect, but in addition the true structure in volcanic areas is invariably three-dimensional. Errors in derived focal depths are larger than horizontal errors, typically by a factor of about 1.5 to 2, because in local-scale experiments such as this, stations typically cannot be deployed beneath the earthquakes. As a consequence, the distances of the earthquakes from the sensors (i.e., the focal depths) are the most poorly constrained spatial parameters. Measures of data fit such as the RMS arrival-time residual, and the formal uncertainties in the horizontal and vertical hypocentral coordinates (commonly denoted ERH and ERZ), give overly optimistic indications of systematic model-related errors. (In the LBNL catalog, ERH varies from about 0.1 to 1.0 km, and ERZ varies from about 0.3 to several kilometers. For the locations derived using the program *qloc*, which uses a more realistic statistical model, ERH is 0.4 - 1 km and ERZ is 0.45 - 1.1 km.)

What can be said about the location errors for the 2014 hydrofracture-induced earthquakes? The seismically activated volume, as defined by the 100 best-located earthquakes (the moment-tensor events) comprises a tube-like zone in the vicinity of the lower part of the wellbore. It is tilted at a few degrees, and displaced with respect to the wellbore. Its upper part lies ~ 100 m north of the wellbore and its lower part ~ 75 m south of the wellbore. Its lower end extends to ~ 100 m below the bottom of the wellbore. Unknowns in the crustal model, both one- and three-dimensional, could easily cause this tilt and displacement, and it is quite possible that the activated zone surrounds the wellbore symmetrically.

A further estimate that could be made is to assume that the deepest well-located moment-tensor event occurred at the bottom of the borehole, and that the difference in its location from that point is a measure of the error in location. The calculated relative location of this earthquake, which occurred early on in Stimulation 1, differs from the bottom of the borehole as follows:

- 68 m further S
- 19 m further E
- 91 m deeper

These are credible errors for the best-located earthquakes, notwithstanding that the assumption of true collocation with the bottom of the borehole could be wrong.

If the entire activated volume were corrected for these displacements, the observed tilt with respect to the wellbore would remain. Nevertheless, this tilt might be an artifact of unmodeled three-dimensionality of the



crustal structure.

As mentioned in earlier reports, an effective, and possibly the only way, to largely eliminate these systematic errors is to directly measure the travel times of seismic waves between the seismically activate volume and the seismometer stations using calibration explosions. If such an experiment is performed in future, the earthquakes reported here and in earlier reports could be relocated.

8 Task 5 Moment tensors

8.1 Instrument polarities and orientations

A quarry blast about 12 km southwest of the Newberry seismic network, detonated at about 21:10:20 UTC on 10 November, 2014, enabled us to check the polarities and orientations of the seismometers. This information is needed in order to use polarities and amplitude ratios to study source mechanisms. The quarry location is 43.652318° N, 121.423070° W (information provided by Trenton Cladouhos), which is 11.9 km southwest (azimuth 227°) of the Well 55-29 well head.

Vertical-component polarities: The vertical-component seismograms of the blast (Figure 18 to Figure 20) show clear upward first motions, as expected for an explosion, at all stations except NN17, NN08, and NN03, which appeared to be malfunctioning at the time and did not record the blast. Waveforms from the functioning stations are similar to one another, except for NN21 and NN40, which are deficient in high frequencies. This possibly indicates defects in the electronics or in the mechanical installation of the sensors.

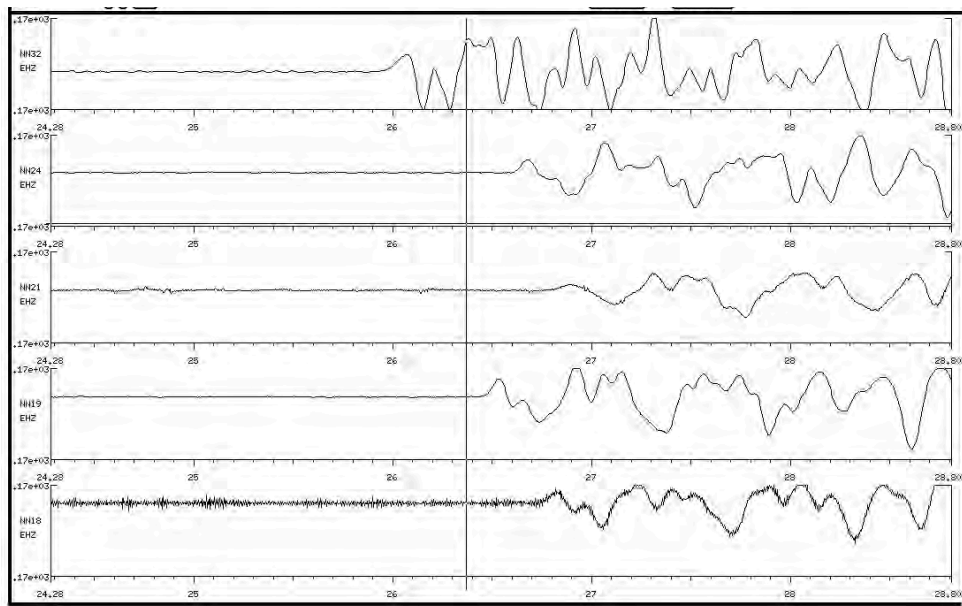


Figure 18: Vertical-component seismograms of the 11/10/2014 quarry blast from stations NN32, NN24, NN21, NN19, and NN18. All first motions are upward, as expected.

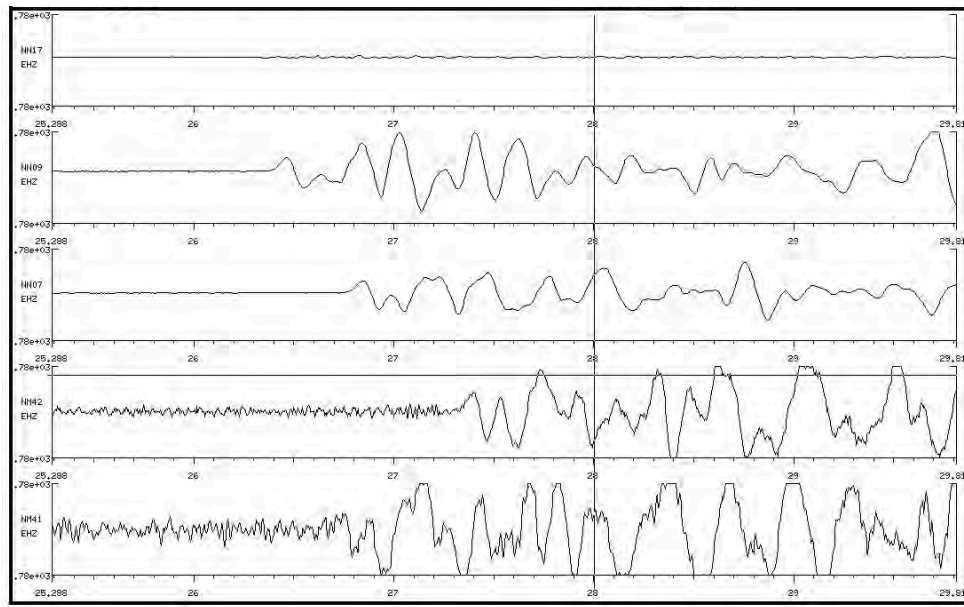


Figure 19: Vertical-component seismograms from stations NN17, NN09, NN07, NM42, and NM41. All except NN17 have upward first motions, as expected.

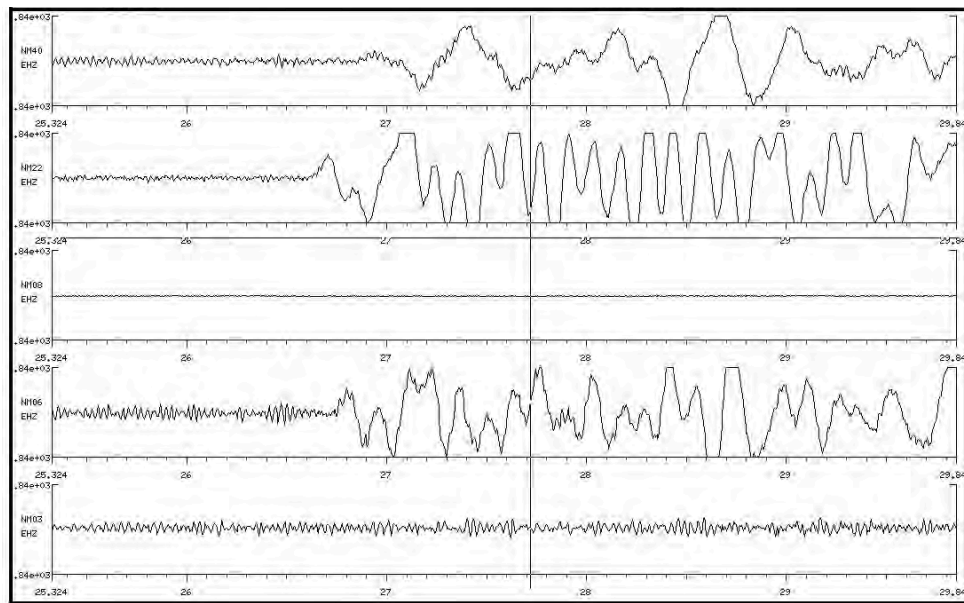


Figure 20: Vertical-component seismograms from stations NM40, NM22, NM08, NM06, and NM03. NM40, NM22, and NM06 have upward first motions, as expected.



Horizontal-component orientations and polarities: Regional signals such as those from quarry blasts are poorly suited for determining the polarities and orientations of horizontal-component sensors because *P*-phase signals involve weak horizontal motion. Nevertheless, we have been able to obtain useful information for most stations of the Newberry network.

P-phase first motions are expected to be away from an explosion, so for an event to the southwest first motions should be to the north and east. The north-component signals for 12 stations are in accord with this expectation. Those for stations NM40, NM08 and NM06 cannot be determined reliably because of noise (Figure 21 to Figure 23).

The east-component seismograms indicate that one station, NN09, has incorrect polarity. All the others appear to have correct polarity although the signals are weak at NM42, NM41, NM40, NM06, and NM03 (Figure 24 to Figure 26).

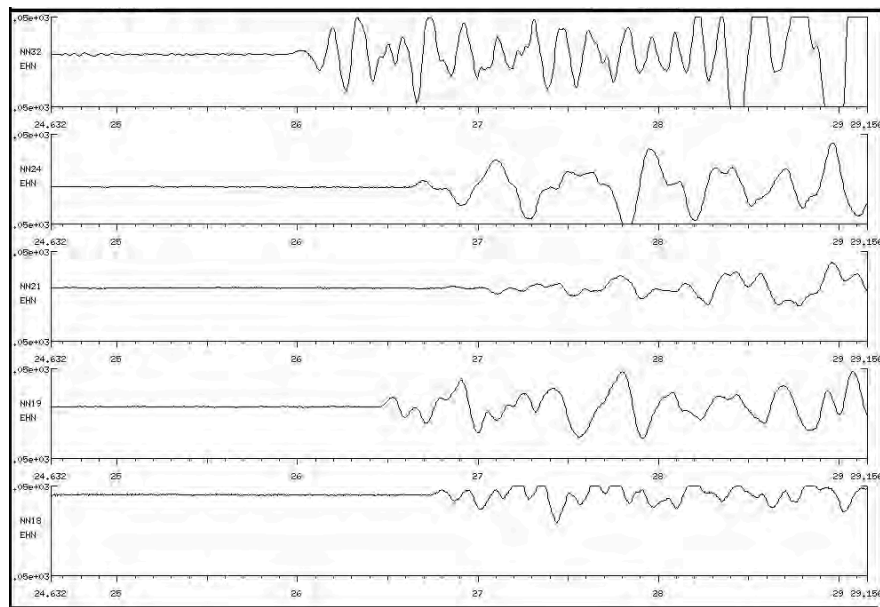


Figure 21: North-component seismograms of the 11/10/2014 quarry blast from stations NN32, NN24, NN21, NN19, and NN18. All first motions are to the north, as expected.

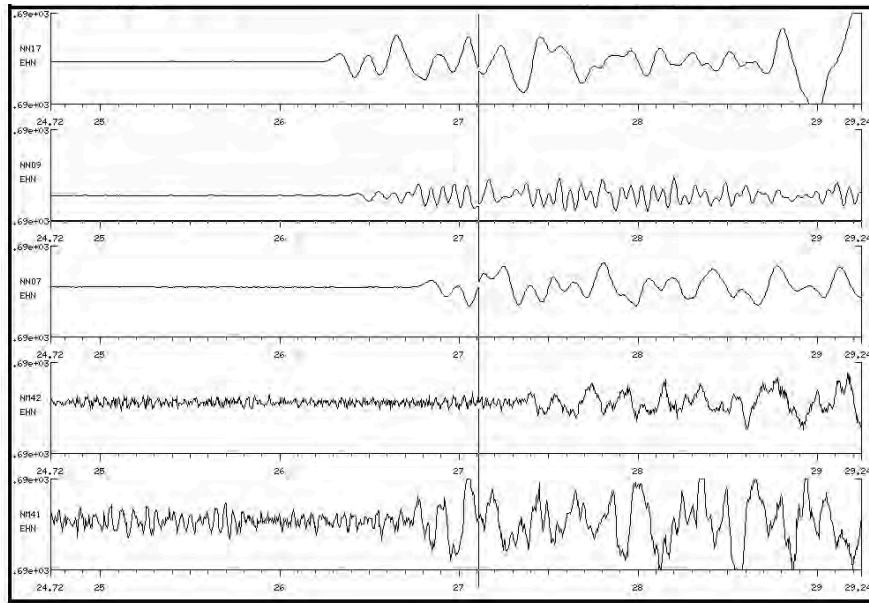


Figure 22: North-component seismograms of the 11/10/2014 quarry blast from stations NN17, NN09, NN07, NM42 and NM41. All first motions are to the north, as expected.

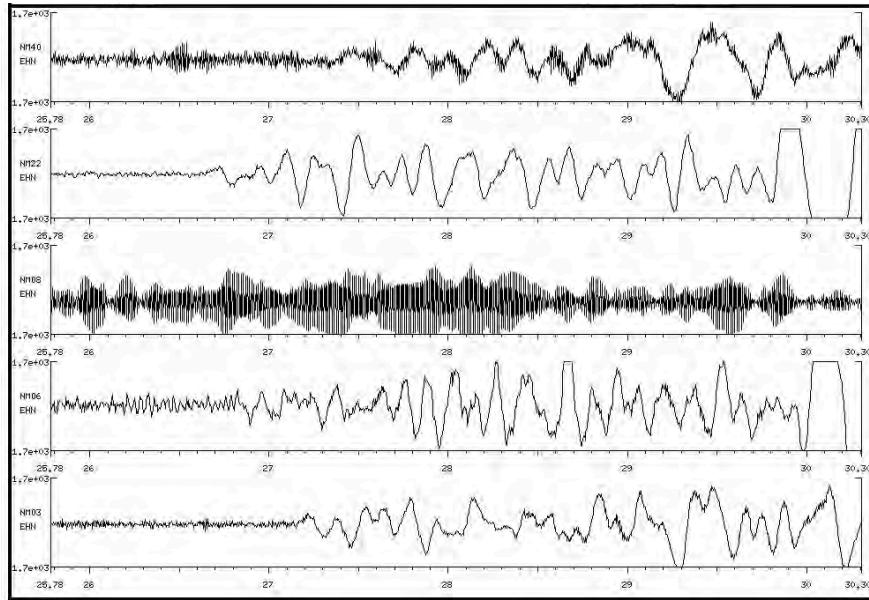


Figure 23: North-component seismograms of the 11/10/2014 quarry blast from stations NM40, NM22, NM08, NM06 and NM03. First motions for NM22 and NM03 are to the north, as expected. Signals from NM40, NM08, and NM06 are too noisy to be useful.

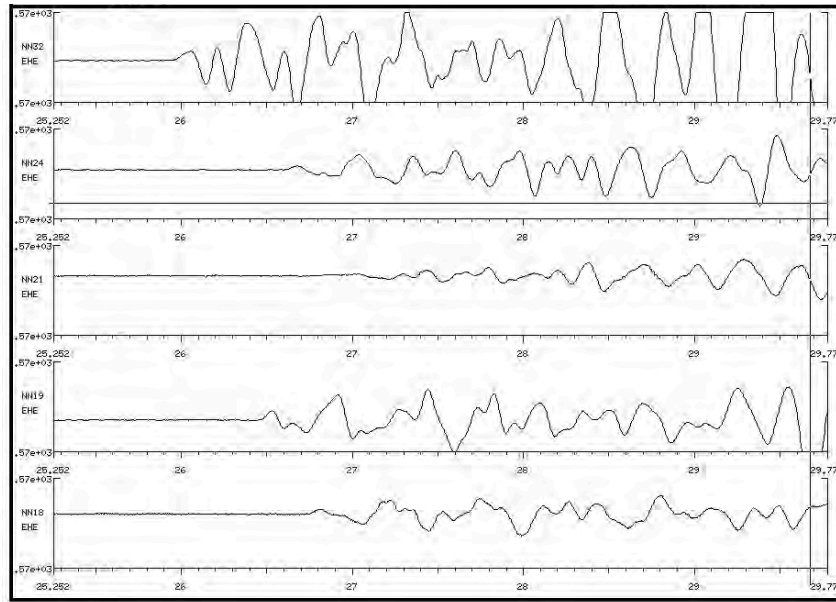


Figure 24: East-component seismograms of the 11/10/2014 quarry blast from stations NN32, NN24, NN21, NN19 and NN18. All first motions are to the east, as expected.

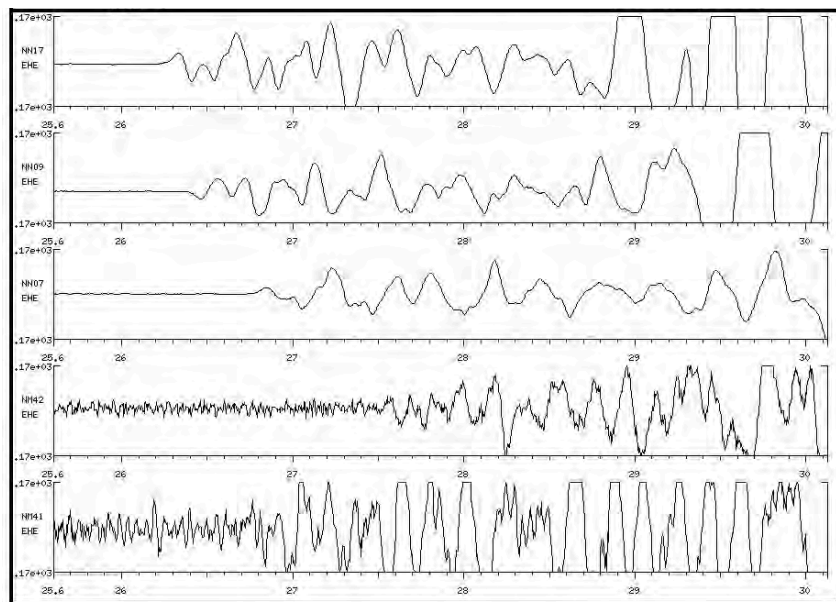


Figure 25: East-component seismograms of the 11/10/2014 quarry blast from stations NN17, NN09, NN07, NM42 and NM41. First motions for NN17 and NN07 are to the east, as expected. Those for NM42 and NM41 are noisy, but probably to the east. The first motion for NN09 is to the west, indicating that the instrument is either wired incorrectly or installed incorrectly.

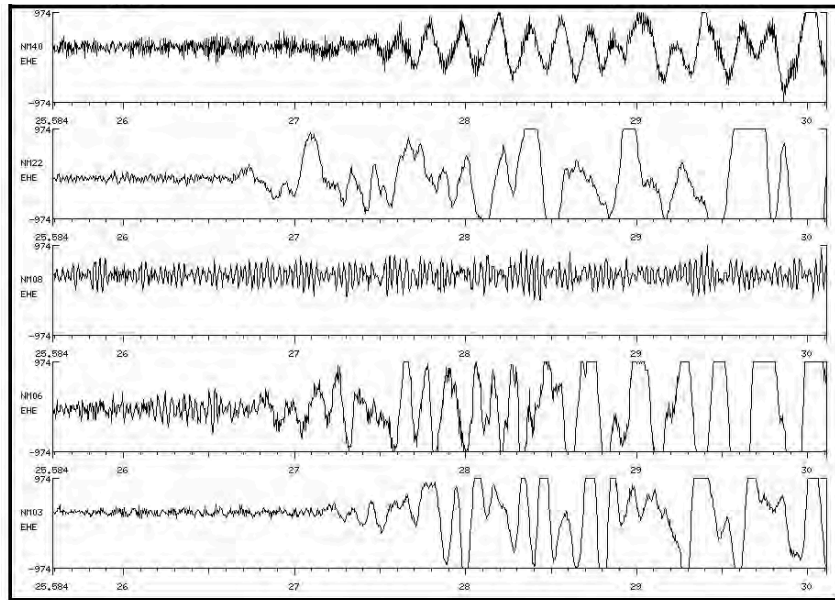


Figure 26: East-component seismograms of the 11/10/2014 quarry blast from stations NM40, NM22, NM08, NM06 and NM03. The first motions for NM22 is to the east, as expected. Those from NM40, NM06 and NM03 are noisy, but probably to the east. Station NM08 appears to be malfunctioning.

Table 7 summarizes the results of the polarity measurements made for this blast.

Table 7: Observed *P*-phase polarities for blast of 10 November, 2014 at 21:10:20 UTC.

Station	V	N	E
NN32	+	+	+
NN24	+	+	+
NN21	+	+	+
NN19	+	+	+
NN18	+	+	+
NN17	BAD	+	+
NN09	+	+	-
NN07	+	+	+
NM42	+	+	+?
NM41	+	+	+?
NM40	+	?	+?
NM22	+	+	+
NM08	BAD	BAD	BAD
NM06	+	+?	+?
NM03	BAD	+	+?



8.2 Derivation of moment tensors

At the request of *AltaRock*, we focused on obtaining high-quality locations and moment tensors for the 100 largest earthquakes. We used the magnitudes published by LBNL on their webpage¹ to identify which earthquakes these were.

The data-processing procedure was as follows. In addition to providing data for accurate moment-tensor derivation, it also provided greatly improved arrival time measurements for locations (Section 5).

1. The waveforms were imported into the *Foulger Consulting* interactive seismogram processing program *epick*;
2. In a first sweep through the data, *P*- and *S*-wave arrival times were measured and an initial location calculated;
3. In a second sweep through the data, each channel was re-processed, rotating the Z, E, and N channels to the earthquake epicenter, and displaying U, R (radial) and T (transverse) seismograms;
4. The seismograms were filtered with a 5-Hz high-frequency cut-off and *P*- and *S*-wave polarities and amplitudes were measured. Additional *S*-wave measurements were added where enhancement by the rotation process made this possible;
5. The earthquake was relocated, the residuals examined, and arrival-time measurements with large residuals were checked and corrected or eliminated if appropriate;
6. The data were imported into our moment-tensor interface *eqmec*, via which the moment-tensor inversion program *focmec* is run;
7. The moment tensor that fit best the data and was stable across several subsets of the selected data was identified;
8. In some cases, the original waveforms were re-examined and outliers checked. Where polarities were identified in the moment-tensor inversion to be inverted, the waveform was checked to see if there was evidence that the measurement had been made half a wavelength in error. In some cases corrections were made and the data were re-processed from Step 5 onward.

We derived a total of 100 moment tensors (Appendix 1). Two of these were for the same earthquake (event 20141012 21:10:23) and were derived independently and at different times. This provided a useful test of repeatability. Deciding what subset of the data measured to use for the final chosen moment tensor is to some extent subjective and if the earthquake is only weakly constrained different solutions may be obtained for different processing efforts. The numerical results of the entire moment-tensor catalog are given in Appendix 1, and graphical results are given in Appendix 2. We have provided the decomposition data of these moment tensors to Trenton Cladouhos of *AltaRock* electronically, by email attachment.

Previous research shows that the error in the source types detected by moment tensors are elongated in the \pm Dipole direction. This means that the volumetric components (vertical axis in the source-type plots) are somewhat better constrained than the shear components (horizontal axis in the source-type plots). In the case of this study, we assessed uncertainties in the results qualitatively. We assigned individual moment tensors quality flags of excellent, good, moderate and poor on the basis of how many consistent data constrained the result, and how stable the result was when a suite of solutions were obtained using sub-sets of the final selected data.

We divided the results up according to stimulation stage. The numbers of moment tensors derived for events occurring during each stage are shown in Table 1. Very few events occurred during some stages and thus only a selection of possible stage plots are shown below.



The results for Stimulation 1 are shown in Figure 27 (74 moment tensors). The T axes, corresponding approximately to the direction of σ_3 , form a cluster centered southerly on the upper hemisphere plot and thus plunge northerly at $\sim 45^\circ$ (Figure 27 left panel). The P axes ($\sim \sigma_1$) lie quasi-horizontally with azimuths that range from westerly clockwise through south-easterly.

The earthquake source types (Figure 27 right panel) form a distribution ranging from +Dipole to -Dipole, with a slight shortfall of earthquakes at the extreme +Dipole end. This distribution is commonly seen in shear tectonic regimes and has been reported for The Geysers and Long Valley, both in California. As for these other areas, the Newberry mechanisms range from implosive (-Dipole) to explosive (+Dipole).

In addition to earthquakes being absent at the extreme +Dipole (explosive) end, there is also a dominance in the number of implosive earthquakes. Thus, overall, the earthquakes were dominantly volume-decreasing. Further analysis would be needed to see if this is also reflected if the sizes (scalar moments) are also taken into account.

Figure 28 shows similar results for Stimulation 2 (26 moment tensors). The orientations of the T axes are somewhat more westerly than was the case for Stimulation 1, and there is a dearth of P axes in the northeasterly direction, where they were most abundant during Stimulation 1. The variation in source type is similar to that seen for Stimulation 1.

In Figure 29, Figure 30 and Figure 31, the results for Stimulation 1, Stages 1, 4 and 5 are shown separately. Very small numbers of earthquakes occurred during Stages 4 and 5 and it is not possible, on the basis of these small datasets to be sure if the style of seismicity was different. There is at any rate no evidence that it was radically different from Stage 1.

In Figure 32, Figure 33 and Figure 34, separate results are shown for Stimulation 2, Stages 2, 5 and 6. Two of the T axes for events that occurred during Stage 5 are quasi-vertical, and the other plunges to the west at $\sim 45^\circ$, comprising an unusual set compared with the results as a whole. However, this set comprises just three moment tensors which is insufficient to be sure that the distribution is significantly unusual.

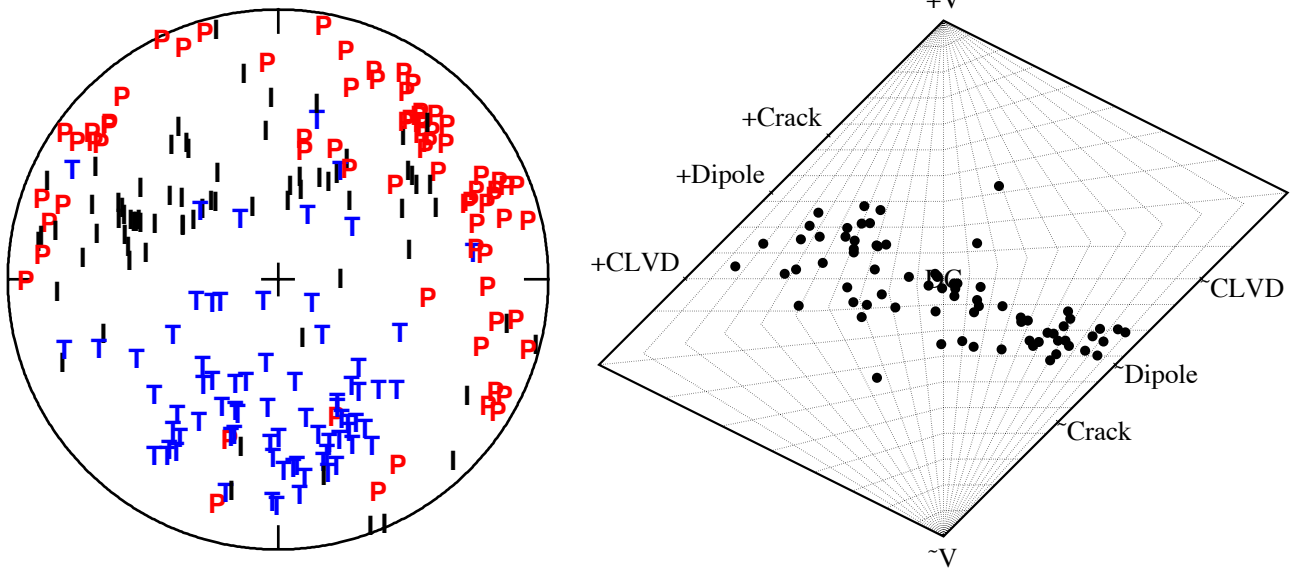


Figure 27: Plot showing the results of the moment-tensor analysis for all the events processed that occurred during Stimulation 1 (Table 1). Left panel: “orientation type” plot showing the P-, T- and I-axes, approximately corresponding to the directions of σ_1 , σ_3 and σ_2 . Right panel: “source type” plot showing volumetric and shear components in the sources.

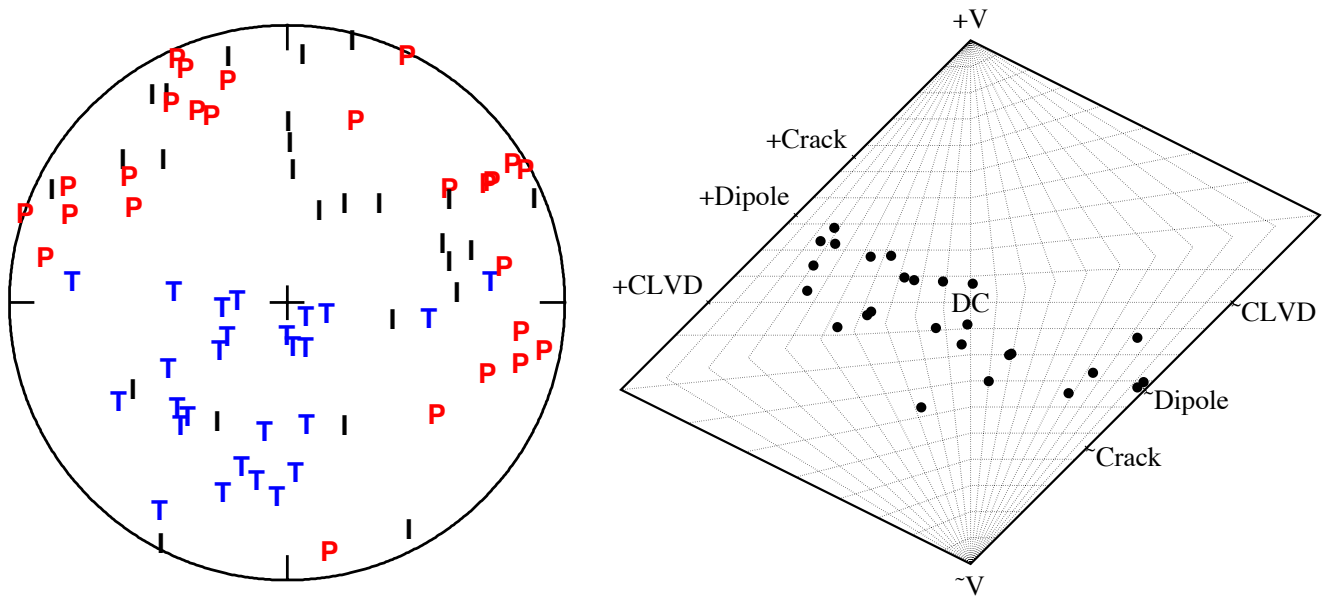


Figure 28: Same as Figure 27 except for events that occurred during Stimulation 2 (Table 1).

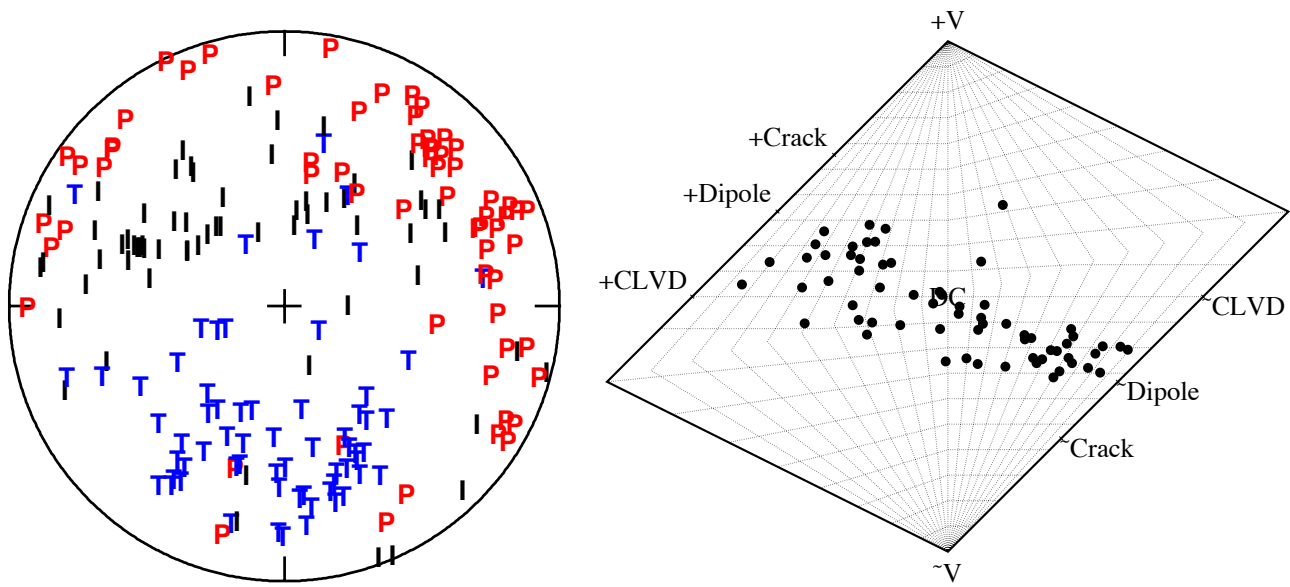


Figure 29: Same as Figure 27 except for events that occurred during Stimulation 1, Stage 1 (Table 1).

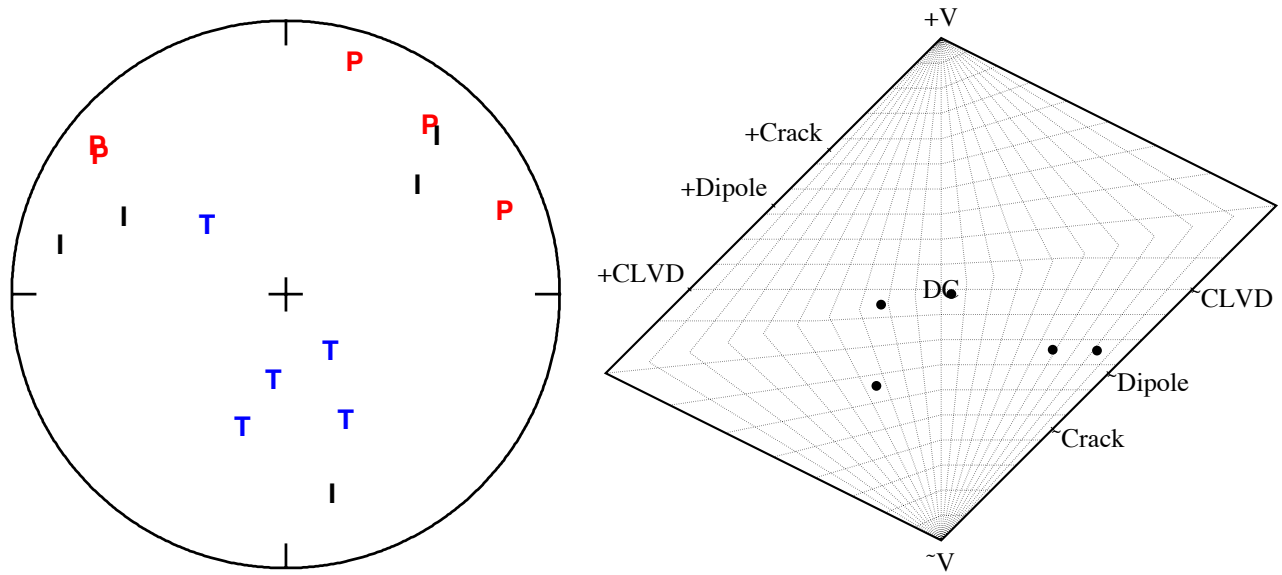


Figure 30: Same as Figure 27 except for events that occurred during Stimulation 1, Stage 4 (Table 1).

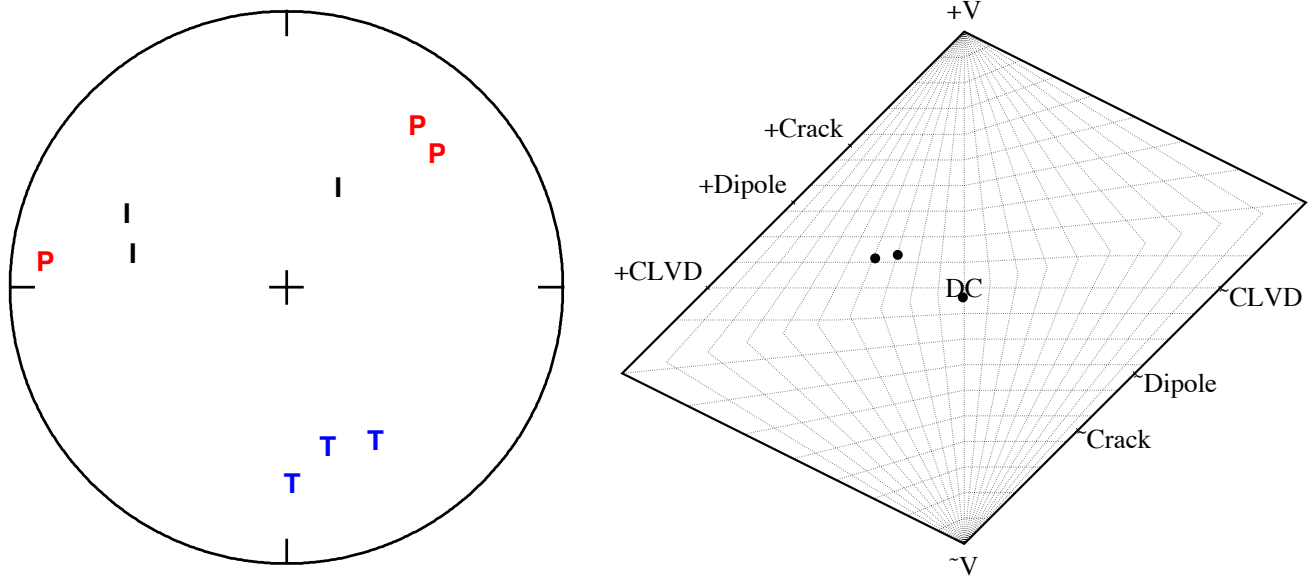


Figure 31: Same as Figure 27 except for events that occurred during Stimulation 1, Stage 5 (Table 1).

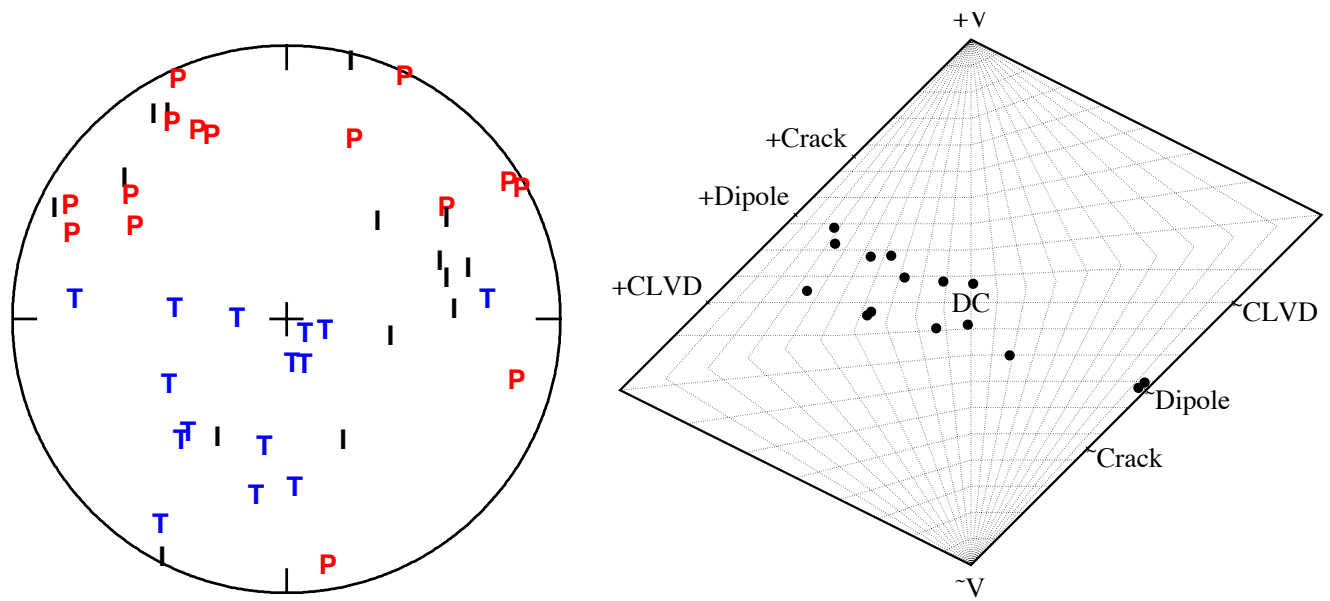


Figure 32: Same as Figure 27 except for events that occurred during Stimulation 2, Stage 2 (Table 1).

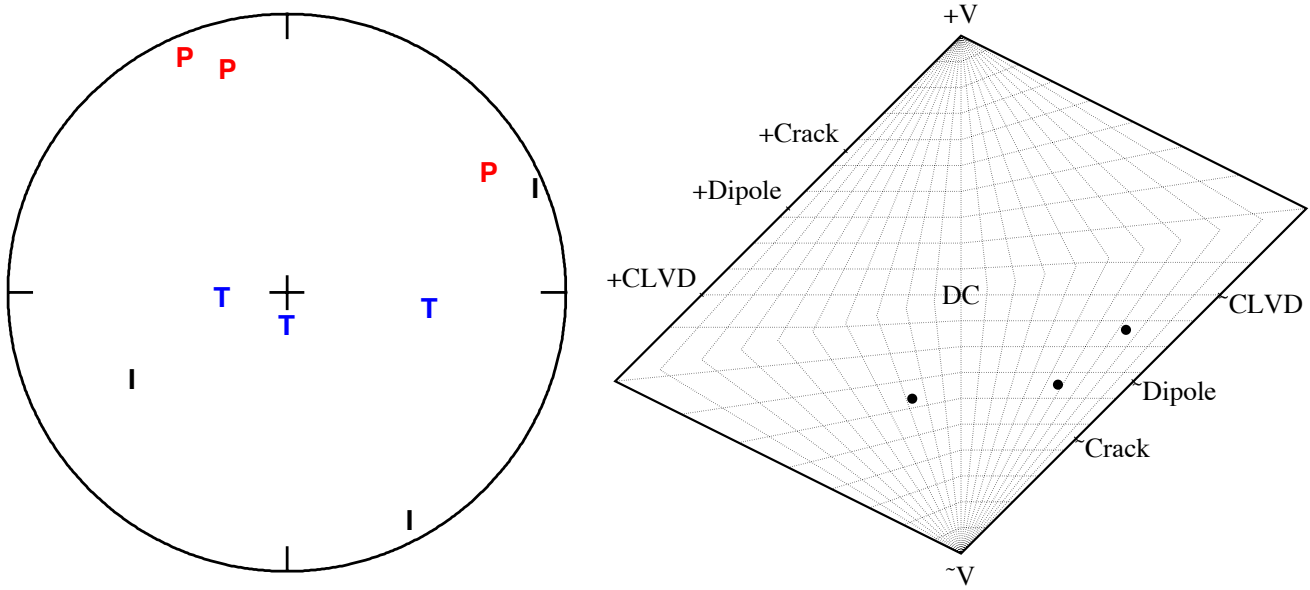


Figure 33: Same as Figure 27 except for events that occurred during Stimulation 2, Stage 5 (Table 1).

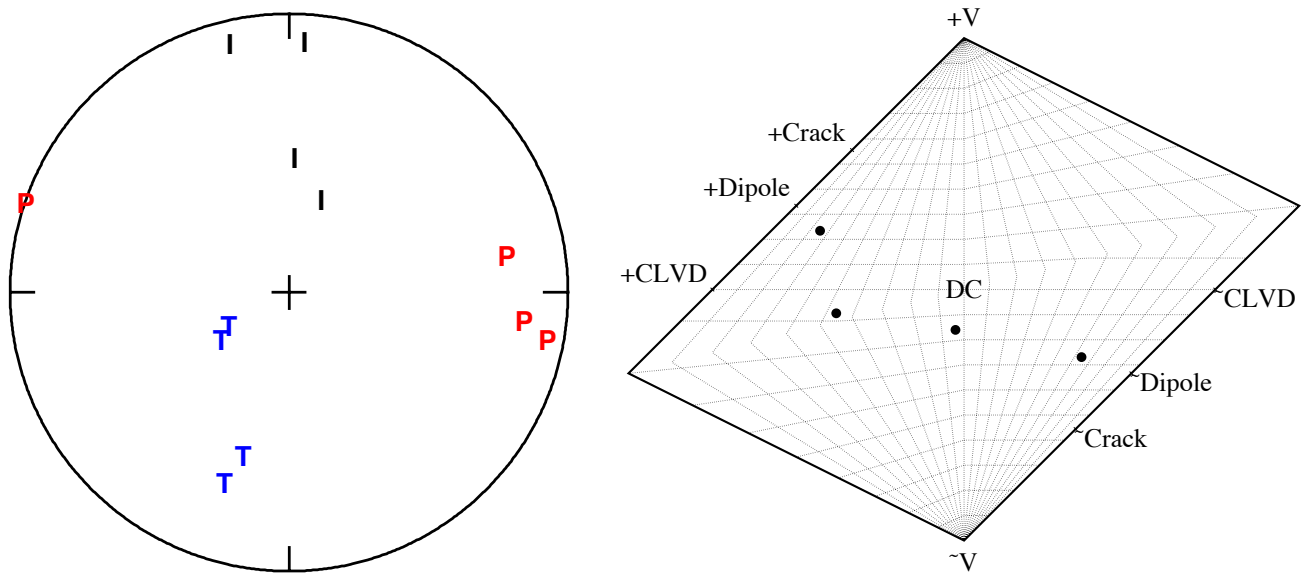


Figure 34: Same as Figure 27 except for events that occurred during Stimulation 2, Stage 6 (after flowback – Table 1).

We explored variations through time in source type by plotting the volumetric and shear components of the moment tensors as a function of time (Figure 35). Little systematic variation in the shear component with time is observable in the results. In contrast, the volumetric component in the moment tensors varied systematically during both stimulations. Large volumetric components, both implosive and explosive, occurred early on in the stimulations, reducing with time as the stimulation proceeded. This pattern is seen in both stimulations. At the very end of each stimulation, the pattern of reduction of volumetric component



reversed and single events with large volumetric components occurred. This last inference is based on just a single event toward the end of each stimulation, however.

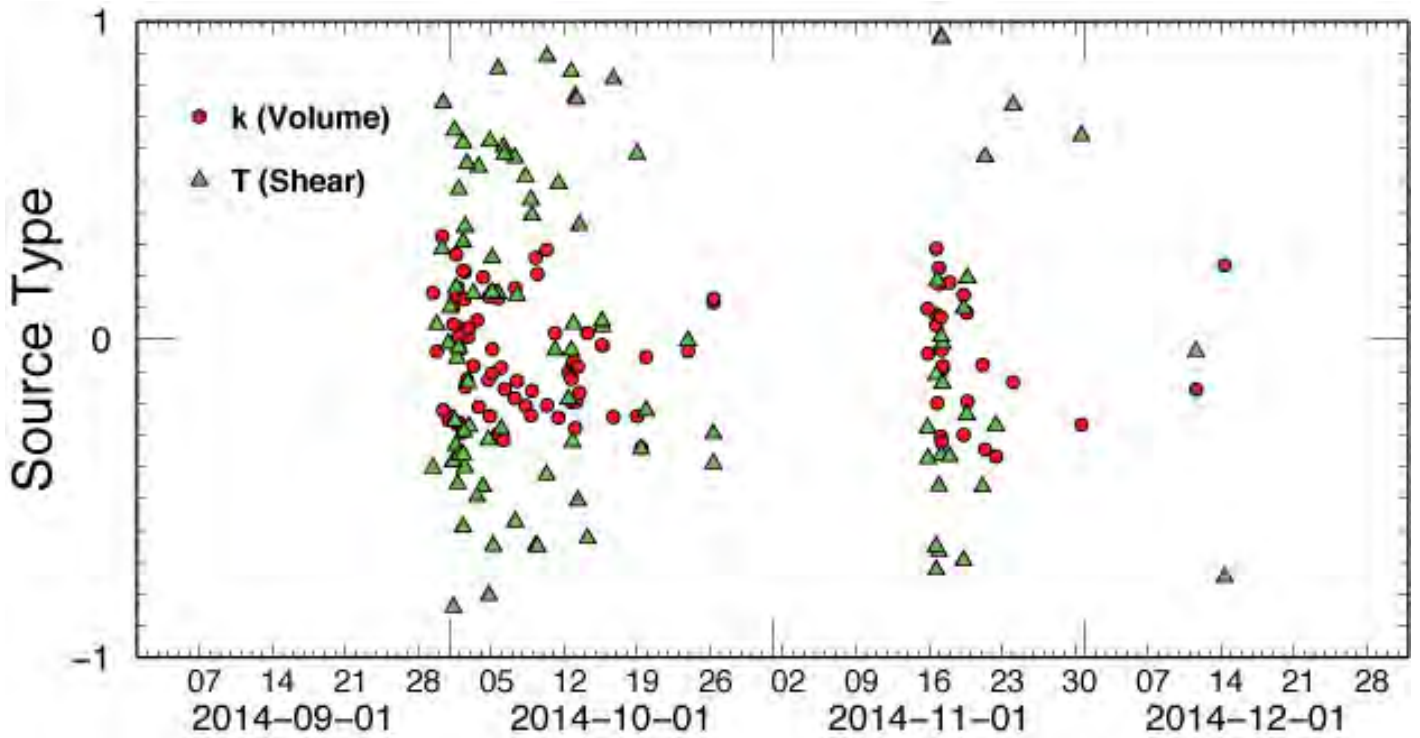


Figure 35: Plot showing the volumetric (k) and shear (T) components of the earthquake moment tensors as a function of time.

8.3 Comparison of our moment-tensor results with fault-plane solutions derived by the Pacific Northwest Seismic Network (PNSN), for two of the larger earthquakes

8.3.1 The earthquake of 20141119 04:41 GMT

The fault-plane solution derived by PNSN and the moment tensor derived by Foulger Consulting for this earthquake are shown in Figure 36 and Figure 37. The two are significantly different and so the reasons for this were investigated. The following points can be made:

1. The PNSN mechanism is presumably constrained to be shear (double-couple), which the *Foulger Consulting* solution is not.
2. The PNSN mechanisms are plotted in lower hemisphere projection, whereas the *Foulger Consulting* solutions are plotted in upper hemisphere projection. This means the stations are flipped to the opposite side of the plot in the two solutions. This must be bourn in mind when comparing Figure 36 and Figure 37.
3. The calculated epicenters are similar for the two events, but the depths are different. PNSN uses the average station elevation as the vertical datum, so 0.0 km depth would be about 1.6 km a.s.l.,



considering that the average ground surface is 1.8 km and the borehole sensors are 250 m below the ground surface. PNSN gives a depth of 1.8 km for this earthquake, whereas *Foulger Consulting* calculates a depth of 0.428 km b.s.l. Thus, the PNSN depth is ~ 0.2 km shallower than the *Foulger Consulting* depth. For different hypocentral depths, the stations will plot at different distances from the centers of the plots, which will immediately cause data distributions on the focal sphere to vary and different mechanisms to be obtained.

4. All the polarity readings in common with both results agree, namely NN17, NN19, NN21 and NN32.
5. The PNSN solution shows stations SVIC and TMBU almost in the same place and disagreeing. The solution assumes TMBU is correct. There are also two stations to the east of the earthquake that are co-located but disagree.
6. The two solutions have very similar P-polarity distributions but with the *Foulger Consulting* solution having more data, including S polarities and ratios.
7. The PNSN solution has a large part of the focal sphere—the area to the NW—devoid of data. In such cases a wide range of solutions is possible.
8. It is surprisingly difficult to constrain non-shear components where only P polarities are available, as we have pointed out in published papers.

Although these two PNSN and *Foulger Consulting* mechanisms are very different, close inspection of the data shows that the P polarity data used by PNSN are similar to those used by *Foulger Consulting*. The data used by PNSN are roughly consistent with the solution obtain by *Foulger Consulting*. This illustrates how difficult it is to constrain focal mechanisms tightly if only P polarities are used, with no additional data.



Magnitude: 2.3
 Sun November 16, 2014 08:41:52 PM (PST)
 Event Id: 60918137

Overview	Maps	Technical Data	Waveforms
----------	------	----------------	-----------

Focal Mechanism

[More Information](#)

Solution 1

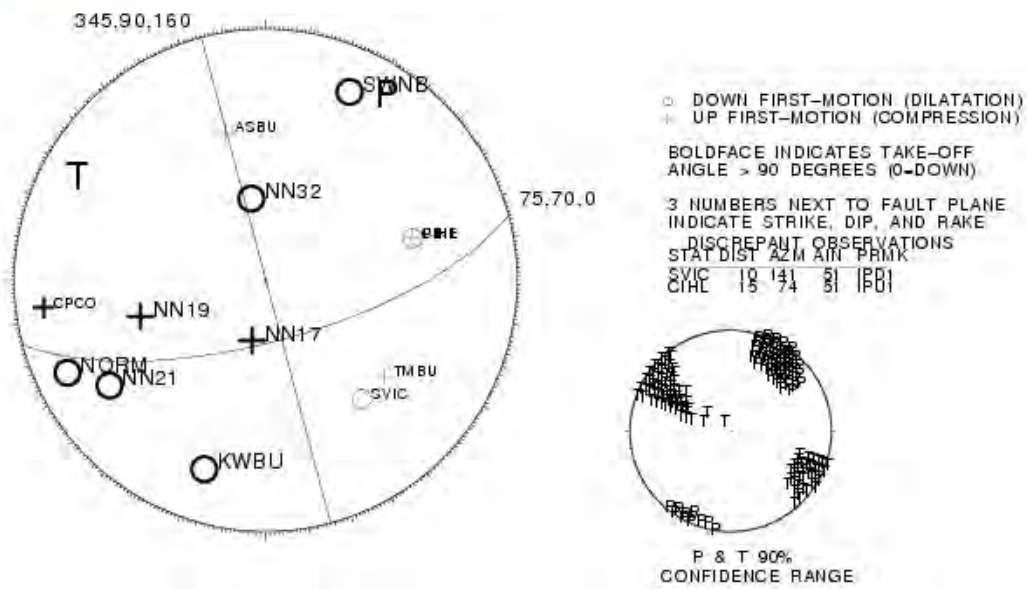


Figure 36: The PNSN mechanism for the earthquake of 20141119 04:41 GMT

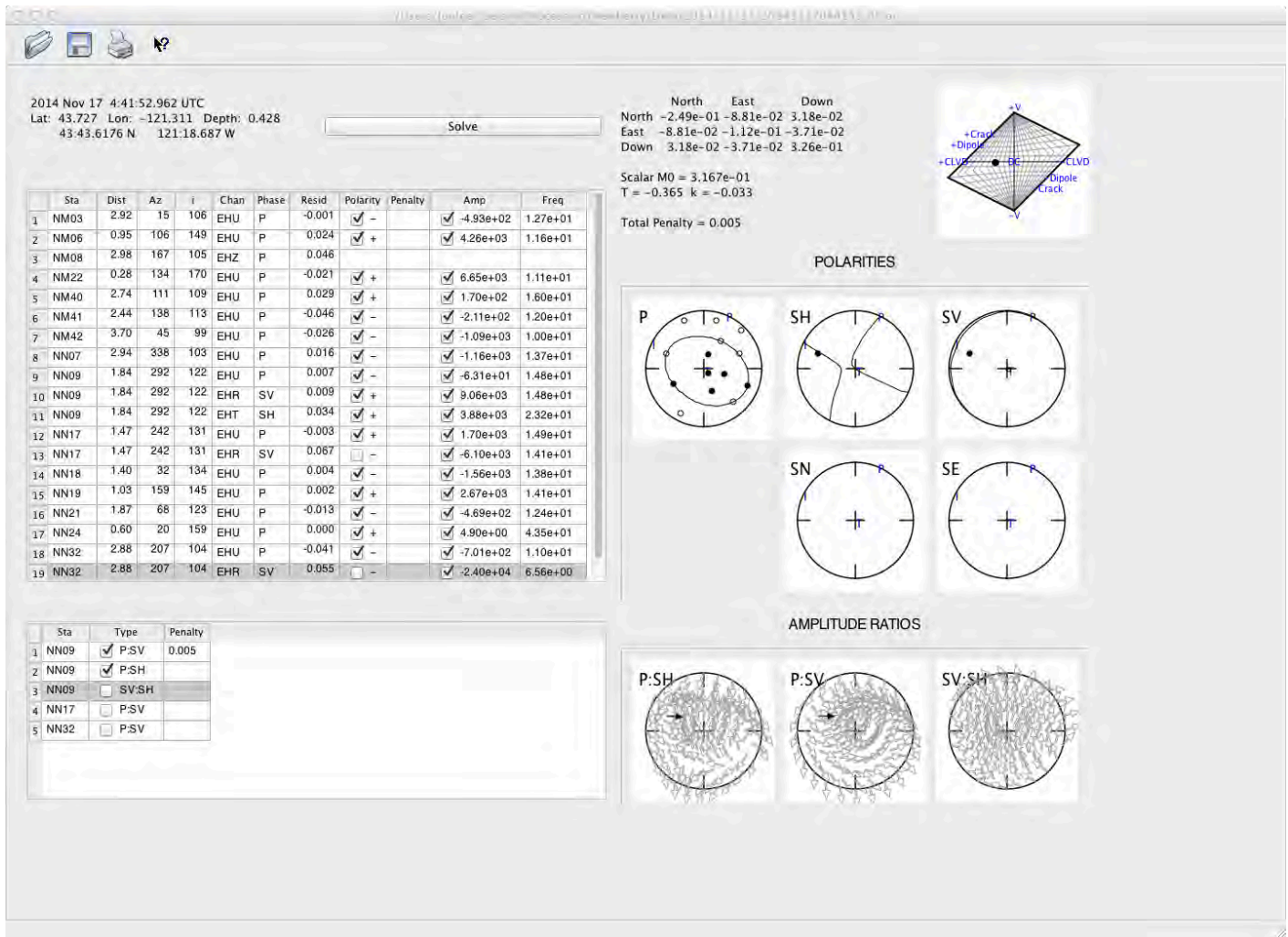


Figure 37: The moment tensor derived by *Foulger Consulting* for the earthquake of 20141119 04:41 GMT.

8.3.2 The earthquake of 20141004 18:51 GMT

Similar comments to those given for the earthquake at 20141119 04:41 GMT pertain and may be summarized as follows:

1. The *Foulger Consulting* mechanism is constrained by an unusually large amount of data, including 10 P polarities, 15 S polarities and 13 amplitude ratios. It is thus superior to the PNSN solution.
2. All the polarity readings in common to the *Foulger Consulting* and PNSN solutions agree, namely NN17, NN19, NN21 and NN32.
3. The *Foulger Consulting* solution considers the reading at station NM32 to be discordant.
4. As with the earthquake at 20141119 04:41 GMT, comparison of the two solutions shows that the distribution of P polarities is very similar but with the *Foulger Consulting* solution having more data, including S polarities and amplitude ratios.



- 5. As for the first earthquake, the PNSN solution has a large part of the focal sphere devoid of data and relies on P polarities only. Under such circumstances a suite of shear (double couple) mechanisms is always possible. Inspection of the PNSN solution shows just one of these solutions is illustrated.

These discrepancies could be investigated further, as described in Section 9, "Further work".

Magnitude: 2.0
 Sat October 4, 2014 11:51:11 AM (PDT)
 Event Id: 60884807

Overview	Maps	Technical Data	Waveforms
----------	------	----------------	-----------

Focal Mechanism

[More Information](#)

Solution 1

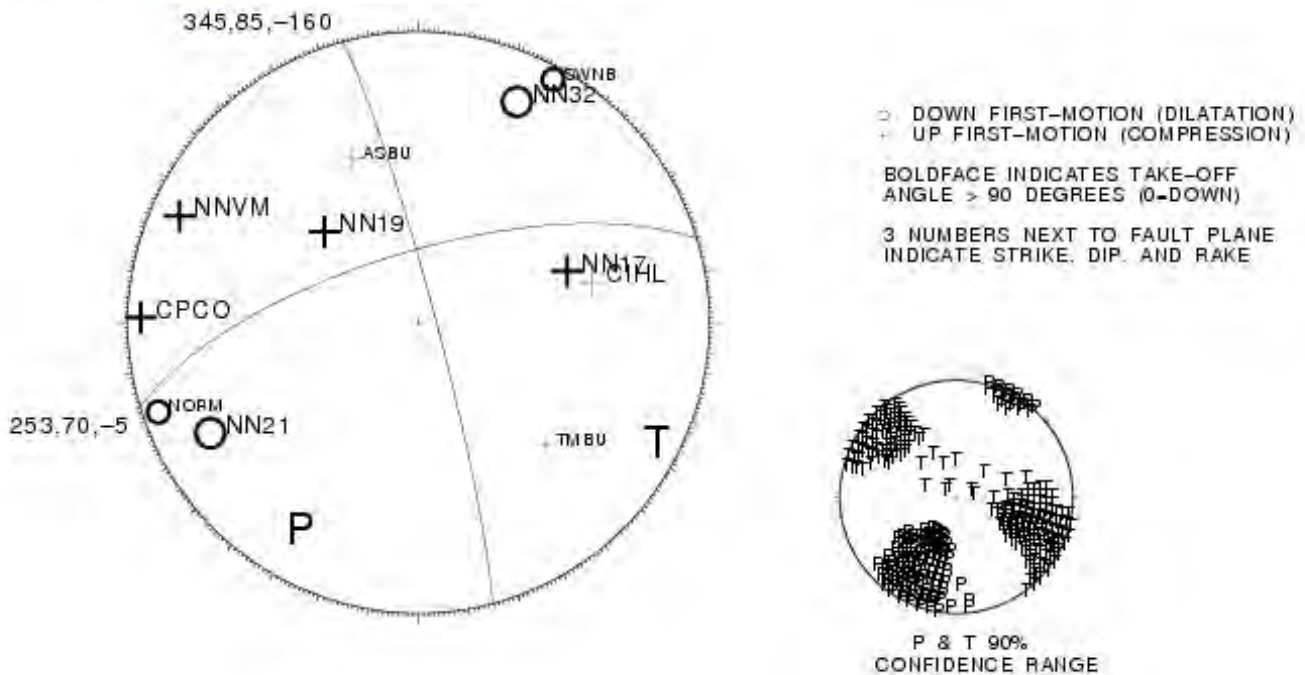


Figure 38: The PNSN mechanism for the earthquake of 20141004 18:51 GMT

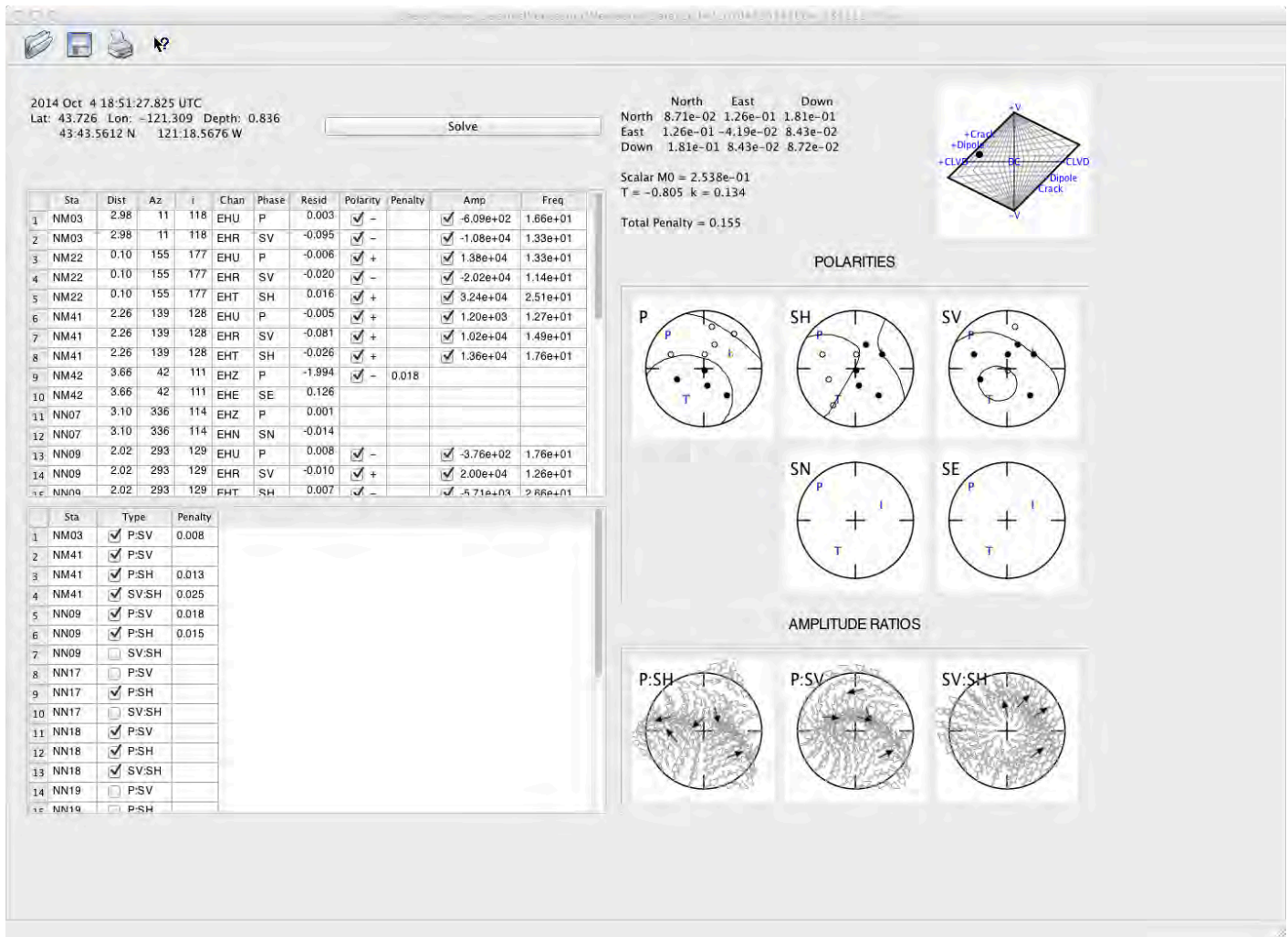


Figure 39: The *Foulger Consulting* mechanism for the earthquake of 20141004 18:51 GMT

8.4 Summary of the main results from moment tensor inversion

The main findings may be summarized as follows:

1. The general orientation of the T axes ($\sim \sigma_3$) of the 74 moment tensors derived for Stimulation 1 is to trend southwesterly-to-southeasterly and to plunge at $\sim 45^\circ \pm 45^\circ$. The P axes ($\sim \sigma_1$) lie quasi-horizontally with azimuths ranging from westerly clockwise through southeasterly.
2. In the case of Stimulation 2, the T axes trend somewhat more westerly than for Stimulation 1. P axes trend in the northeasterly direction, where they were most abundant during Stimulation 1, were rare.
3. The source types range from +Dipole to -Dipole. The most extreme explosive mechanisms are slightly less extreme than the most extreme implosive mechanisms. The distribution is similar for both stimulations.
4. There are somewhat more implosive mechanisms than explosive mechanisms.



5. Rather few earthquakes occurred during some operation stages defined by *AltaRock* and as a result the ability of the dataset to explore possible variations in moment tensors with operational activities is limited.
6. Study of variations through time in source type showed little systematic variation in the shear component with time, but systematic variations in the volumetric components. The sizes of the largest volumetric components, both implosive and explosive, reduced with time throughout each stimulation. This is seen in source-type plots for the different operational stages, and in a plot of k and T vs. time.
7. There was significant disagreement between our moment tensors and fault-plane solutions determined by the PNSN for two of the larger earthquakes. These disagreements can partly be explained by the use of different data (we did not use PNSN stations and PNSN did not use all of the *AltaRock* stations) and by the PNSN constraining their results to be double couples. This issue warrants further study (Section 9).

9 Further work

Additional work that could be done includes:

1. Improvement of the crustal model by calculation of a three-dimensional tomographic model using MEQ data from both the 2014 stimulations and the 2012 stimulation, which induced earthquakes at a shallower depth.
2. Conducting a calibration experiment, with a sensor or sensor string in the wellbore, to measure station corrections, and relocating the earthquakes using these corrections.
3. Re-analyzing the earthquakes of 20141119 04:41 GMT and 20141004 18:51 GMT, for which fault-plane solutions were derived by PNSN, with the addition of data from PNSN stations. Data from these stations were not used in the moment-tensor analysis that we report here. Re-derivation of moment tensors using both sets of data might cast further light on why our moment tensors are different from the PNSN fault-plane solutions. This in turn might cast light on the puzzling finding that the orientations of the T axes revealed by our moment tensors are different from that expected from regional geological observations and wellbore data.
4. Calculate more moment tensors, in particular for the later operational stages of each stimulation. This would improve constraint on the possible systematic changes in source type with time for each stimulation that are suggested by the present set of results.



10 Appendix 1: Numerical moment tensor results for the 100 solutions calculated

N=North, E=East, D=Down. * = duplicated event.

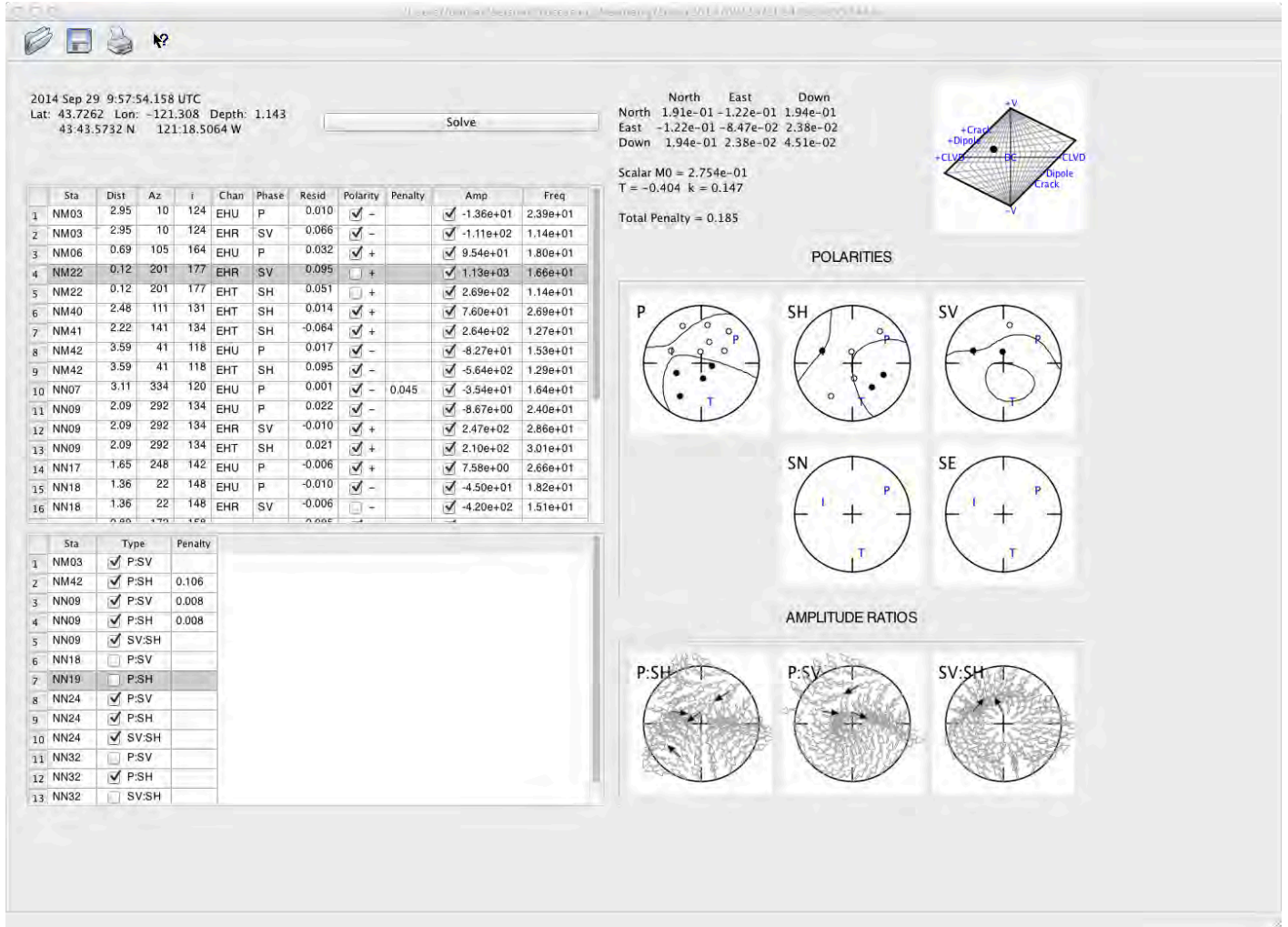
NN	NE	EE	ND	ED	DD	Year	Mo	Day	Hr	min	Sec	Quality
1.91E-01	-1.22E-01	-8.47E-02	1.94E-01	2.39E-02	4.51E-02	2014	9	29	9	57	54.158	excellent
5.00E-02	-1.93E-01	-1.24E-01	1.75E-01	2.48E-02	3.99E-02	2014	9	29	18	3	37.66	excellent
-2.62E-03	-3.15E-02	2.95E-01	-1.53E-01	-1.21E-01	9.10E-02	2014	9	30	6	45	0.821	moderate
6.49E-02	-9.50E-02	-2.84E-01	6.74E-02	1.45E-01	-3.58E-02	2014	9	30	9	23	48.626	good
-2.67E-01	1.32E-01	-6.40E-02	6.06E-02	1.03E-01	7.79E-02	2014	9	30	21	30	43.503	excellent
-1.78E-01	-1.05E-01	-1.51E-01	7.11E-02	1.06E-01	1.06E-01	2014	10	1	1	3	14.495	excellent
1.48E-01	-1.18E-01	-1.49E-01	1.58E-01	-3.13E-02	9.55E-02	2014	10	1	8	8	57.998	excellent
7.94E-02	1.61E-01	-4.69E-02	1.56E-01	1.14E-01	1.20E-02	2014	10	1	8	49	42.74	poor
-3.26E-02	2.22E-01	-3.37E-01	1.64E-02	7.16E-02	9.88E-03	2014	10	1	10	50	55.107	excellent
2.00E-01	-1.41E-01	-1.46E-01	1.40E-01	-8.71E-03	7.41E-02	2014	10	1	12	3	31.644	good
1.58E-01	3.47E-02	6.67E-02	2.48E-01	6.32E-02	8.34E-02	2014	10	1	14	53	20.145	excellent
-1.04E-01	1.46E-01	-2.54E-01	1.25E-01	-1.33E-02	7.34E-02	2014	10	1	15	1	54.95	excellent
-2.21E-01	-8.13E-02	-2.19E-02	-1.52E-01	3.52E-02	2.20E-01	2014	10	1	16	56	11.343	good
2.17E-01	-3.67E-02	-6.42E-02	2.35E-01	7.20E-02	3.18E-02	2014	10	1	19	5	32.705	excellent
3.03E-02	-1.92E-01	-9.50E-02	1.99E-01	1.07E-02	7.11E-02	2014	10	1	20	47	39.521	excellent
-9.49E-02	8.22E-02	-5.35E-02	-2.24E-01	4.96E-02	-1.40E-01	2014	10	1	21	29	35.768	good
1.28E-01	1.27E-01	-6.92E-02	8.79E-02	1.45E-01	-8.42E-02	2014	10	1	22	13	54.151	good
1.62E-01	4.20E-02	-2.04E-01	2.16E-01	-2.04E-02	7.76E-02	2014	10	2	6	39	2.998	excellent
-1.46E-02	9.64E-02	-3.98E-01	2.60E-02	1.69E-01	-4.69E-03	2014	10	2	6	48	7.652	excellent
-1.17E-01	1.71E-01	-1.99E-01	1.39E-01	-2.43E-02	1.64E-02	2014	10	2	7	7	19.637	excellent
3.77E-01	-1.27E-02	-1.42E-01	1.29E-01	8.11E-02	3.59E-02	2014	10	2	7	22	3.575	good
5.18E-02	-1.72E-01	-2.48E-02	2.09E-01	-2.97E-02	1.02E-01	2014	10	2	9	4	8.647	good
2.41E-01	-7.30E-02	-9.79E-02	1.73E-01	4.30E-02	8.35E-02	2014	10	2	11	1	58.257	excellent
-6.57E-02	-1.85E-01	-1.14E-01	1.69E-01	4.18E-02	2.83E-02	2014	10	2	12	39	24.317	good
-2.17E-01	-2.31E-01	4.01E-02	5.04E-02	7.21E-02	3.58E-02	2014	10	2	16	12	35.315	poor
2.31E-03	-1.80E-01	-9.21E-02	2.20E-01	-4.35E-03	9.59E-02	2014	10	2	18	54	3.152	good
1.42E-01	-1.37E-01	-1.64E-01	1.72E-01	1.08E-02	5.38E-02	2014	10	2	20	37	6.043	good
6.07E-03	-2.23E-01	-9.16E-02	1.94E-01	3.37E-02	-6.18E-04	2014	10	3	6	6	37.324	excellent
2.45E-01	-8.11E-02	-1.97E-01	1.74E-01	1.62E-02	1.51E-02	2014	10	3	15	27	57.661	good
-5.77E-02	-1.66E-01	-1.43E-01	1.46E-01	7.81E-02	-1.95E-02	2014	10	3	18	55	9.929	moderate
1.68E-01	-3.35E-02	-9.83E-03	2.95E-01	3.54E-02	9.35E-02	2014	10	4	5	29	8.258	moderate
-1.03E-01	1.33E-01	-1.19E-01	1.48E-01	5.51E-02	1.07E-01	2014	10	4	17	33	7.355	excellent
8.71E-02	1.26E-01	-4.19E-02	1.81E-01	8.43E-02	8.72E-02	2014	10	4	18	51	27.825	excellent
-4.16E-01	-1.86E-04	4.65E-02	1.89E-01	-7.14E-02	1.64E-02	2014	10	4	21	29	47.537	moderate
-1.37E-01	-1.84E-01	-5.91E-02	1.61E-01	-1.12E-02	9.22E-02	2014	10	5	2	6	16.967	excellent
-2.45E-02	-1.88E-01	-1.23E-01	1.69E-01	9.68E-03	1.19E-01	2014	10	5	2	14	37.168	excellent
5.30E-02	6.78E-02	-1.18E-01	1.62E-01	7.51E-02	2.21E-01	2014	10	5	4	7	30.276	excellent
-2.29E-01	1.61E-01	-7.21E-02	-9.28E-02	8.01E-02	-3.22E-02	2014	10	5	15	55	21.007	good
2.87E-01	-3.71E-02	-1.79E-01	9.26E-02	1.26E-01	2.27E-02	2014	10	5	16	7	32.777	excellent
-1.87E-01	9.00E-02	-9.47E-02	-1.45E-01	-2.49E-02	1.99E-01	2014	10	5	23	22	16.499	good
-8.06E-02	-9.30E-02	-2.67E-01	6.01E-02	1.63E-01	-2.04E-02	2014	10	6	4	2	55.789	good
-3.56E-01	1.59E-01	1.19E-01	5.15E-02	2.88E-02	4.70E-02	2014	10	6	6	13	48.626	excellent
1.32E-01	1.00E-01	-3.87E-01	3.12E-02	9.89E-02	1.91E-02	2014	10	7	6	12	8.593	good
2.45E-01	-1.19E-01	-1.14E-01	1.67E-01	-1.16E-02	4.69E-02	2014	10	7	7	26	23.18	good
4.38E-02	2.44E-01	-1.80E-01	4.37E-02	9.99E-02	-2.18E-05	2014	10	7	10	47	20.916	good
2.55E-02	1.51E-01	-2.81E-01	1.69E-02	1.79E-01	-4.14E-04	2014	10	8	7	5	5.941	poor
-7.82E-03	2.19E-01	-2.87E-01	2.80E-02	1.01E-01	-8.51E-03	2014	10	8	19	8	20.619	excellent
-1.75E-01	-2.00E-01	-6.44E-02	1.28E-01	-1.70E-02	6.96E-02	2014	10	8	21	16	58.2	good
2.44E-02	7.10E-02	-2.43E-02	-8.64E-02	-1.62E-01	3.13E-01	2014	10	9	6	24	33.418	excellent
7.44E-02	8.69E-02	-6.60E-02	-1.45E-01	-9.86E-02	1.98E-01	2014	10	9	10	16	9.945	moderate



6.24E-02	7.90E-02	1.39E-01	1.64E-01	1.16E-01	8.12E-02	2014	10	10	6	54	56.708	good
-7.19E-02	1.81E-01	-1.77E-01	8.89E-02	-9.17E-02	2.76E-02	2014	10	10	8	4	29.986	good
-1.43E-01	-1.36E-01	3.35E-03	1.56E-01	-5.83E-02	1.55E-01	2014	10	11	3	29	5.667	good
3.71E-03	3.87E-02	-3.57E-01	5.61E-02	2.09E-01	2.16E-02	2014	10	11	10	53	26.502	good
-1.35E-01	-1.17E-01	-4.10E-02	2.00E-01	-5.35E-02	8.30E-02	2014	10	12	10	12	29.632	good
-4.88E-01	-1.02E-01	5.62E-02	5.97E-02	-1.84E-03	1.29E-01	2014	10	12	16	37	43.287	excellent
4.02E-02	-1.23E-01	-2.57E-01	1.61E-01	1.97E-02	9.60E-02	2014	10	12	16	47	1.137	excellent
2.03E-01	-2.42E-02	-3.05E-01	1.71E-01	-4.33E-02	1.58E-02	2014	10	12	18	33	4.693	moderate
-2.21E-01	1.54E-01	4.96E-02	9.04E-02	8.19E-02	7.60E-02	2014	10	12	21	10	23.311	good*
3.23E-02	2.19E-01	-1.53E-01	1.15E-01	4.44E-02	5.91E-02	2014	10	12	21	10	23.33	excellent*
-5.87E-02	-1.25E-01	-2.80E-01	6.12E-02	1.41E-01	6.33E-03	2014	10	13	0	57	6.717	good
2.61E-02	-1.18E-01	-2.89E-01	8.03E-02	1.23E-01	4.15E-02	2014	10	13	4	12	29.126	excellent
6.35E-02	3.63E-02	-1.12E-01	2.56E-01	9.89E-02	-4.32E-02	2014	10	13	6	40	26.151	poor
-1.16E-01	-1.39E-01	-1.17E-01	1.51E-01	5.54E-02	7.56E-02	2014	10	13	10	22	29.084	excellent
-1.13E-01	-2.73E-02	-2.41E-01	5.66E-02	5.18E-02	3.75E-01	2014	10	14	5	46	13.914	excellent
-1.27E-01	-1.70E-01	3.34E-02	1.57E-01	-5.42E-02	7.86E-02	2014	10	15	15	3	44.602	excellent
-5.10E-02	-1.76E-01	-8.51E-02	1.95E-01	1.28E-03	1.20E-01	2014	10	15	15	37	25.945	excellent
-4.01E-01	-1.33E-01	-3.89E-03	1.17E-01	1.60E-02	6.35E-02	2014	10	16	16	53	27.374	good
-4.20E-02	-1.46E-01	-3.20E-01	-5.38E-04	1.43E-01	5.83E-02	2014	10	18	23	57	3.695	good
-1.86E-01	8.58E-02	-2.76E-01	1.40E-01	-1.35E-02	6.01E-02	2014	10	19	9	7	50.325	good
6.16E-03	1.50E-01	-1.76E-01	1.99E-01	1.95E-03	1.17E-01	2014	10	19	20	4	10.756	good
-1.40E-02	-2.15E-01	-6.15E-02	2.27E-01	1.12E-03	3.93E-02	2014	10	23	21	2	22.252	good
1.09E-01	-1.25E-01	-7.65E-02	2.14E-01	2.17E-02	9.47E-02	2014	10	26	7	29	26.068	poor
2.66E-01	1.18E-02	-2.05E-01	1.72E-01	-4.86E-02	6.51E-02	2014	10	26	7	37	35.648	good
-2.13E-01	2.39E-02	8.73E-02	-5.33E-02	1.63E-01	2.20E-01	2014	11	15	21	8	12.847	good
-1.02E-01	-9.09E-02	-2.18E-01	8.29E-02	-2.86E-02	2.76E-01	2014	11	15	22	40	3.616	good
-1.13E-01	-5.93E-02	-1.91E-01	1.08E-01	-4.33E-03	3.53E-01	2014	11	16	16	22	8.621	excellent
-1.49E-01	8.76E-02	2.02E-01	7.87E-02	-1.51E-01	1.52E-02	2014	11	16	16	44	39.138	excellent
-8.10E-03	3.84E-02	-4.69E-02	3.87E-02	-1.26E-01	5.39E-01	2014	11	16	16	45	9.72	excellent
-2.70E-01	1.51E-01	-2.26E-02	7.18E-02	8.81E-02	8.50E-02	2014	11	16	18	52	9.588	moderate
9.00E-02	-3.23E-02	-8.10E-02	2.10E-01	8.45E-02	1.75E-01	2014	11	16	23	2	40.34	excellent
2.19E-01	1.91E-02	-6.36E-02	2.30E-01	-5.18E-02	1.16E-01	2014	11	16	23	9	57.924	excellent
-2.52E-01	1.28E-01	-4.56E-02	1.39E-01	-5.85E-02	-5.26E-02	2014	11	17	3	34	37.422	good
-8.58E-02	1.70E-01	1.80E-02	1.66E-01	4.79E-02	1.28E-01	2014	11	17	3	41	42.731	excellent
-2.49E-01	-8.81E-02	-1.12E-01	3.18E-02	-3.71E-02	3.26E-01	2014	11	17	4	41	52.962	excellent
-9.76E-02	1.35E-01	-1.60E-01	9.05E-02	-1.08E-01	-7.58E-02	2014	11	17	5	40	30.556	poor
-6.71E-02	5.92E-02	-2.61E-01	-1.98E-02	1.39E-01	2.36E-01	2014	11	17	7	47	43.425	excellent
1.11E-01	1.13E-01	-2.27E-01	1.51E-01	-4.51E-02	4.24E-02	2014	11	17	7	48	23.805	excellent
-1.09E-01	-7.56E-02	2.84E-01	6.33E-02	1.56E-01	1.75E-02	2014	11	17	23	31	42.142	good
-1.45E-03	1.66E-01	1.30E-01	6.64E-02	1.91E-01	2.16E-02	2014	11	19	7	51	31.118	good
-8.25E-02	-1.21E-01	-2.77E-01	1.42E-01	4.11E-02	3.23E-02	2014	11	19	7	51	48.116	good
2.26E-01	5.21E-02	-2.14E-01	1.54E-01	-3.93E-02	6.90E-02	2014	11	19	15	3	58.695	excellent
-1.52E-02	1.40E-01	-2.13E-01	4.02E-02	1.97E-01	1.75E-02	2014	11	19	17	4	49.464	good
1.03E-01	8.32E-02	-2.25E-01	1.65E-01	6.43E-02	4.67E-02	2014	11	21	2	55	53.285	good
-3.77E-01	1.34E-01	-1.29E-01	7.08E-02	-2.17E-02	4.15E-02	2014	11	21	9	57	35.096	good
-2.18E-01	-7.00E-02	-2.67E-01	3.09E-02	1.28E-01	5.80E-02	2014	11	22	10	19	32.207	poor
-2.86E-01	8.98E-02	7.58E-02	1.24E-01	-7.16E-02	6.74E-02	2014	11	24	2	2	3.454	good
2.31E-02	1.84E-01	-4.53E-01	5.48E-02	1.64E-02	1.30E-02	2014	11	30	15	31	42.837	good
-4.91E-02	-1.55E-02	-2.55E-01	7.82E-02	1.82E-01	1.44E-01	2014	12	11	15	53	21.233	moderate
-1.21E-02	3.37E-02	-6.21E-02	7.25E-02	1.59E-01	3.95E-01	2014	12	14	8	41	11.396	moderate



11 Appendix 2: Graphical plots illustrating the 100 moment tensors derived





2014 Sep 29 18: 3:37.660 UTC
 Lat: 43.7263 Lon: -121.31 Depth: 1.059
 43.43.5798 N 121.18.6042 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.96	12	123	EHU	P	0.015		-1.19e+01	4.12e+01
2	NM06	0.82	104	160	EHU	P	0.031		7.41e+01	1.94e+01
3	NM22	0.15	143	176	EHU	P	-0.008		6.25e+01	1.58e+01
4	NM22	0.15	143	176	EHR	SV	0.075		9.32e+02	1.18e+01
5	NM22	0.15	143	176	EHT	SH	0.084		-4.15e+02	1.33e+01
6	NM42	3.67	43	116	EHU	P	0.003		-5.35e+01	2.72e+01
7	NM42	3.67	43	116	EHT	SH	0.070		-3.98e+02	1.34e+01
8	NN07	3.05	337	120	EHU	P	0.002		-3.13e+01	1.64e+01
9	NN09	1.96	293	135	EHU	P	0.019		2.46e+00	3.02e+01
10	NN09	1.96	293	135	EHR	SV	0.016	0.000	2.52e+02	1.75e+01
11	NN09	1.96	293	135	EHT	SH	0.054		1.36e+02	3.87e+01
12	NN17	1.54	246	143	EHU	P	-0.008		7.53e+00	2.06e+01
13	NN17	1.54	246	143	EHR	SV	0.036		9.19e+01	3.45e+01
14	NN17	1.54	246	143	EHT	SH	0.038		2.83e+02	9.92e+00
15	NN19	1.41	27	146	EHU	P	-0.015		-2.94e+01	1.72e+01

North East Down
 North 5.00e-02 -1.93e-01 1.75e-01
 East -1.93e-01 -1.24e-01 2.48e-02
 Down 1.75e-01 2.48e-02 3.99e-02

Scalar M0 = 2.798e-01
 T = 0.046 k = -0.039

Total Penalty = 0.191

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty	
1	NM42	<input type="checkbox"/> P:SH	
2	NN09	<input checked="" type="checkbox"/> P:SV	0.005
3	NN09	<input checked="" type="checkbox"/> P:SH	0.006
4	NN09	<input checked="" type="checkbox"/> SV:SH	0.025
5	NN17	<input checked="" type="checkbox"/> P:SV	
6	NN17	<input checked="" type="checkbox"/> P:SH	0.041
7	NN17	<input type="checkbox"/> SV:SH	
8	NN18	<input type="checkbox"/> P:SV	
9	NN19	<input type="checkbox"/> P:SH	
10	NN24	<input checked="" type="checkbox"/> P:SV	
11	NN24	<input checked="" type="checkbox"/> P:SH	
12	NN24	<input checked="" type="checkbox"/> SV:SH	
13	NN32	<input checked="" type="checkbox"/> P:SV	0.026
14	NN32	<input checked="" type="checkbox"/> P:SH	
15	NN32	<input checked="" type="checkbox"/> SV:SH	0.061



2014 Sep 30 6:45: 0.821 UTC
 Lat: 43.7266 Lon: -121.309 Depth: 0.917
 43:43.5942 N 121:18.5214 W

Solve

North East Down
 North -2.62e-03 -3.15e-02 -1.53e-01
 East -3.15e-02 2.95e-01 -1.21e-01
 Down -1.53e-01 -1.21e-01 9.10e-02

Scalar M0 = 2.944e-01
 T = 0.286 k = 0.324

Total Penalty = 0.057

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.91	10	120	EHR	SV	0.036	✓ +	1.60e+02	1.09e+01
2	NM03	2.91	10	120	EHT	SH	0.077	✓ +	7.92e+01	1.48e+01
3	NN07	3.07	334	116	EHU	P	-0.003	✓ +	1.50e+01	1.55e+01
4	NN07	3.07	334	116	EHR	SV	-0.015	✓ +	2.73e+01	1.12e+01
5	NN07	3.07	334	116	EHT	SH	0.007	✓ -	-2.14e+01	1.61e+01
6	NN09	2.06	291	130	EHU	P	0.015	✓ +	3.11e+01	1.87e+01
7	NN09	2.06	291	130	EHR	SV	0.018	✓ -	-3.65e+01	2.48e+01
8	NN09	2.06	291	130	EHT	SH	0.049	☐ -	-8.60e+01	1.87e+01
9	NN17	1.65	247	138	EHU	P	0.003	✓ -	-1.68e+00	2.87e+01
10	NN17	1.65	247	138	EHR	SV	-0.088	✓ -	-2.19e+01	1.45e+01
11	NN17	1.65	247	138	EHT	SH	-0.007	✓ +	7.17e+01	1.43e+01
12	NN18	1.33	23	146	EHU	P	0.002	✓ +	1.47e+01	1.84e+01
13	NN18	1.33	23	146	EHR	SV	-0.012	✓ + 0.038	1.99e+01	1.97e+01
14	NN18	1.33	23	146	EHT	SH	0.013	✓ +	4.56e+01	9.36e+00
15	NN19	0.93	171	155	FH11	P	0.019	✓ -	-8.29e+00	1.81e+01

Sta	Type	Penalty
1	✓ SV-SH	
2	✓ P-SV	
3	✓ P-SH	
4	✓ SV-SH	
5	☐ P-SV	
6	☐ P-SH	
7	☐ SV-SH	
8	✓ P-SV	
9	✓ P-SH	
10	✓ SV-SH	
11	☐ P-SV	
12	☐ P-SH	
13	☐ SV-SH	
14	✓ P-SV	0.019
15	☐ P-SH	

POLARITIES

AMPLITUDE RATIOS



2014 Sep 30 9:23:48.626 UTC
 Lat: 43.7261 Lon: -121.309 Depth: 1.305
 43:43.5642 N 121:18.5634 W

North East Down
 North 6.49e-02 -9.50e-02 6.74e-02
 East -9.50e-02 -2.84e-01 1.45e-01
 Down 6.74e-02 1.45e-01 -3.58e-02

Scalar M0 = 2.789e-01
 T = 0.744 k = -0.223

Total Penalty = 0.148

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.97	11	127	EHU	P	0.014	<input checked="" type="checkbox"/> -		
2	NM06	0.76	103	163	EHU	P	0.023	<input type="checkbox"/> +	1.52e+01	1.70e+01
3	NM06	0.76	103	163	EHR	SV	0.078	<input checked="" type="checkbox"/> +	8.82e+01	1.32e+01
4	NM06	0.76	103	163	EHT	SH	0.089	<input type="checkbox"/> -	-7.00e+02	1.20e+01
5	NM22	0.10	159	178	EHR	SV	0.037	<input checked="" type="checkbox"/> +	8.17e+02	1.54e+01
6	NM22	0.10	159	178	EHT	SH	0.074	<input type="checkbox"/> -	-4.81e+02	1.32e+01
7	NM42	3.66	42	120	EHU	P	0.018	<input checked="" type="checkbox"/> -	-1.13e+02	1.47e+01
8	NM42	3.66	42	120	EHT	SH	0.084	<input checked="" type="checkbox"/> -	-3.16e+02	1.61e+01
9	NN07	3.09	336	123	EHU	P	0.013	<input checked="" type="checkbox"/> -	-3.00e+01	1.57e+01
10	NN09	2.03	293	137	EHU	P	0.006	<input checked="" type="checkbox"/> +	1.49e+01	1.09e+01
11	NN09	2.03	293	137	EHR	SV	-0.013	<input checked="" type="checkbox"/> +	2.52e+02	2.34e+01
12	NN09	2.03	293	137	EHT	SH	0.025	<input checked="" type="checkbox"/> +	1.73e+02	3.30e+01
13	NN17	1.58	248	146	EHU	P	-0.001	<input checked="" type="checkbox"/> +	7.60e+00	2.17e+01
14	NN17	1.58	248	146	EHT	SH	0.024	<input checked="" type="checkbox"/> +	2.60e+02	8.34e+00
15	NN18	1.41	25	149	EHU	P	-0.014	<input checked="" type="checkbox"/> -	-2.68e+01	1.61e+01

Sta	Type	Penalty
1	NM06 <input type="checkbox"/> P:SV	
2	NM06 <input type="checkbox"/> P:SH	
3	NM06 <input type="checkbox"/> SV:SH	
4	NM42 <input checked="" type="checkbox"/> P:SH	
5	NN09 <input checked="" type="checkbox"/> P:SV	
6	NN09 <input checked="" type="checkbox"/> P:SH	
7	NN09 <input checked="" type="checkbox"/> SV:SH	
8	NN17 <input checked="" type="checkbox"/> P:SH	0.035
9	NN18 <input type="checkbox"/> P:SV	
10	NN19 <input type="checkbox"/> P:SH	
11	NN24 <input checked="" type="checkbox"/> P:SV	0.058
12	NN24 <input type="checkbox"/> P:SH	
13	NN24 <input type="checkbox"/> SV:SH	
14	NN32 <input checked="" type="checkbox"/> P:SV	0.001
15	NN32 <input checked="" type="checkbox"/> P:SH	

POLARITIES

AMPLITUDE RATIOS



2014 Sep 30 21:30:43.503 UTC
 Lat: 43.7267 Lon: -121.31 Depth: 0.744
 43:43.602 N 121:18.5856 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.91	12	116	EHU	P	-0.002		-4.76e+01	1.59e+01
2	NM06	0.81	107	157	EHU	P	0.016	0.016	3.47e+02	1.39e+01
3	NM06	0.81	107	157	EHR	SV	0.102		1.09e+03	1.67e+00
4	NM06	0.81	107	157	EHT	SH	0.150	0.016	-1.51e+03	1.73e+01
5	NM22	0.18	158	175	EHU	P	-0.018		5.40e+02	1.40e+01
6	NM22	0.18	158	175	EHT	SH	0.024		7.94e+02	2.21e+01
7	NM42	3.62	43	109	EHU	P	-0.013		-1.01e+02	1.32e+01
8	NM42	3.62	43	109	EHR	SV	0.033		-6.90e+02	1.51e+01
9	NM42	3.62	43	109	EHT	SH	-0.051		3.01e+02	1.94e+01
10	NN07	3.02	336	113	EHU	P	0.009		-1.06e+02	1.56e+01
11	NN09	1.97	291	128	EHU	P	0.017		-1.13e+01	2.88e+01
12	NN09	1.97	291	128	EHR	SV	0.006		8.37e+02	1.78e+01
13	NN09	1.97	291	128	EHT	SH	0.041		7.07e+02	2.36e+01
14	NN17	1.58	245	137	EHU	P	0.003		4.49e+01	2.74e+01
15	NN17	1.58	245	137	EHR	SV	0.018		5.95e+02	1.46e+01

North East Down
 North -2.67e-01 1.32e-01 6.06e-02
 East 1.32e-01 -6.40e-02 1.03e-01
 Down 6.06e-02 1.03e-01 7.79e-02

Scalar M0 = 2.690e-01
 T = -0.012 k = -0.253

Total Penalty = 0.198

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	<input type="checkbox"/> P:SV	
2	<input checked="" type="checkbox"/> P:SH	
3	<input type="checkbox"/> SV:SH	
4	<input checked="" type="checkbox"/> P:SV	0.068
5	<input checked="" type="checkbox"/> P:SH	0.022
6	<input type="checkbox"/> SV:SH	
7	<input checked="" type="checkbox"/> P:SV	
8	<input checked="" type="checkbox"/> P:SH	0.022
9	<input type="checkbox"/> SV:SH	
10	<input type="checkbox"/> P:SV	
11	<input type="checkbox"/> P:SH	
12	<input checked="" type="checkbox"/> SV:SH	0.013
13	<input type="checkbox"/> P:SV	
14	<input checked="" type="checkbox"/> P:SH	
15	<input type="checkbox"/> SV:SH	



2014 Oct 1 1: 3:14.495 UTC
 Lat: 43.7265 Lon: -121.31 Depth: 0.69
 43:43.5912 N 121:18.5988 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq	
1	NM03	2.94	12	114	EHU	P	0.002	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -2.15e+01	4.09e+01	
2	NM03	2.94	12	115	EHT	SH	-0.076	<input type="checkbox"/> +	<input checked="" type="checkbox"/> 1.83e+02	1.45e+01	
3	NM06	0.82	105	156	EHU	P	0.022	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 9.74e+01	1.43e+01	
4	NM06	0.82	105	156	EHR	SV	0.089	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 5.12e+02	1.31e+01	
5	NM22	0.17	150	175	EHU	P	-0.016	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 2.98e+02	1.38e+01	
6	NM22	0.17	150	175	EHT	SH	-0.005	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 7.76e+02	1.27e+01	
7	NM42	3.65	43	108	EHU	P	-0.022	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -8.53e+01	1.09e+01	
8	NM42	3.65	43	108	EHR	SV	0.033	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -4.81e+02	1.51e+01	
9	NM42	3.65	43	108	EHT	SH	-0.058	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 1.77e+02	1.71e+01	
10	NN07	3.03	336	111	EHU	P	0.005	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -3.51e+01	1.60e+01	
11	NN07	3.03	336	111	EHT	SH	0.018	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -1.14e+02	2.14e+01	
12	NN09	1.96	292	127	EHU	P	0.016	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 4.24e+01	1.74e+01	
13	NN09	1.96	292	127	EHR	SV	0.013	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 4.09e+02	2.48e+01	
14	NN09	1.96	292	127	EHT	SH	0.048	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 0.011	<input checked="" type="checkbox"/> 3.14e+02	2.78e+01
15	NN17	1.55	246	136	EHU	P	-0.001	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 1.82e+01	2.34e+01	

Scalar M0 = 2.454e-01
 T = 0.100 k = -0.242
 Total Penalty = 0.157

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P-SH

P-SV

SV-SH

Sta	Type	Penalty
1	NM03 <input type="checkbox"/> P-SH	
2	NM06 <input type="checkbox"/> P-SV	
3	NM42 <input type="checkbox"/> P-SV	
4	NM42 <input type="checkbox"/> P-SH	
5	NM42 <input checked="" type="checkbox"/> SV-SH	
6	NN07 <input type="checkbox"/> P-SH	
7	NN09 <input checked="" type="checkbox"/> P-SV	0.010
8	NN09 <input checked="" type="checkbox"/> P-SH	0.061
9	NN09 <input type="checkbox"/> SV-SH	
10	NN17 <input checked="" type="checkbox"/> P-SV	0.018
11	NN17 <input checked="" type="checkbox"/> P-SH	0.000
12	NN17 <input checked="" type="checkbox"/> SV-SH	0.035
13	NN18 <input type="checkbox"/> P-SV	
14	NN18 <input checked="" type="checkbox"/> P-SH	
15	NN18 <input type="checkbox"/> SV-SH	



2014 Oct 1 8: 8:57.998 UTC
 Lat: 43.7255 Lon: -121.309 Depth: 1.208
 43:43.5312 N 121:18.5346 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	3.03	10	124	EHU	P	-0.004		-1.11e+01	1.76e+01
2	NM03	3.03	10	124	EHR	SV	0.053		-1.92e+02	2.49e+01
3	NM03	3.03	10	124	EHT	SH	-0.062		-1.56e+02	1.07e+01
4	NM06	0.72	99	164	EHU	P	0.038		7.21e+01	1.77e+01
5	NM06	0.72	99	164	EHT	SH	0.088		2.66e+02	1.98e+01
6	NM22	0.03	185	179	EHZ	P	-0.031		8.90e+01	1.49e+01
7	NM22	0.03	185	179	EHR	SV	0.067		7.62e+02	1.59e+01
8	NM22	0.03	185	179	EHT	SH	0.050		7.66e+02	9.83e+00
9	NM40	2.49	109	132	EHT	SH	-0.004	0.047	1.61e+02	1.31e+01
10	NM41	2.19	139	136	EHT	SH	-0.069		2.38e+02	1.08e+01
11	NM42	3.68	41	118	EHZ	P	0.004		-7.38e+01	1.78e+01
12	NM42	3.68	41	118	EHR	SV	0.089		5.06e+02	1.58e+01
13	NM42	3.68	41	118	EHT	SH	0.081		-4.28e+02	8.49e+00
14	NN07	3.17	336	121	EHU	P	0.012	0.024	-2.34e+01	1.92e+01
15	NN07	3.17	336	121	EHR	SV	-0.033		-1.04e+02	1.59e+01

North East Down
 North 1.48e-01 -1.18e-01 1.58e-01
 East -1.18e-01 -1.49e-01 -3.13e-02
 Down 1.58e-01 -3.13e-02 9.55e-02

Scalar M0 = 2.574e-01
 T = -0.385 k = 0.102

Total Penalty = 0.356

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P:SV	0.031
2	<input checked="" type="checkbox"/> P:SH	0.005
3	<input type="checkbox"/> SV:SH	
4	<input type="checkbox"/> P:SH	
5	<input type="checkbox"/> P:SV	
6	<input type="checkbox"/> P:SH	
7	<input type="checkbox"/> SV:SH	
8	<input type="checkbox"/> P:SV	
9	<input checked="" type="checkbox"/> P:SH	0.005
10	<input type="checkbox"/> SV:SH	
11	<input type="checkbox"/> P:SV	
12	<input checked="" type="checkbox"/> P:SV	0.002
13	<input checked="" type="checkbox"/> P:SH	0.006
14	<input checked="" type="checkbox"/> SV:SH	0.028
15	<input type="checkbox"/> P:SV	



2014 Oct 1 8:49:42.740 UTC
 Lat: 43.7253 Lon: -121.309 Depth: 1.322
 43:43.5162 N 121:18.5268 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	3.05	10	126	EHU	P	0.011		-1.56e+01	2.40e+01
2	NM03	3.05	10	126	EHR	SV	-0.003		-2.78e+02	2.27e+01
3	NM06	0.70	96	165	EHU	P	0.036	0.043	4.55e+01	1.33e+01
4	NM06	0.70	96	165	EHR	SV	0.117		-4.96e+02	1.40e+01
5	NM06	0.70	96	165	EHT	SH	0.095		-1.12e+03	1.29e+01
6	NM22	0.01	254	180	EHR	SV	0.047		7.35e+02	1.65e+01
7	NM22	0.01	254	180	EHT	SH	0.042		6.74e+02	1.41e+01
8	NM40	2.47	108	134	EHT	SH	-0.028		1.71e+02	1.53e+01
9	NM41	2.16	139	138	EHT	SH	-0.080		1.54e+02	1.70e+01
10	NM42	3.69	40	120	EHU	P	0.013		-1.15e+02	1.45e+01
11	NM42	3.69	40	120	EHR	SV	0.077		5.16e+02	1.48e+01
12	NM42	3.69	40	120	EHT	SH	0.085		-4.88e+02	1.35e+01
13	NN07	3.20	336	123	EHU	P	0.008		-2.29e+01	1.61e+01
14	NN09	2.11	295	136	EHU	P	0.015		-1.62e+01	1.77e+01
15	NN09	2.11	295	136	EHR	SV	-0.019		1.69e+02	2.63e+01

North East Down
 North 7.94e-02 1.61e-01 1.56e-01
 East 1.61e-01 -4.69e-02 1.14e-01
 Down 1.56e-01 1.14e-01 1.20e-02

Scalar M0 = 2.599e-01
 T = -0.843 k = 0.047

Total Penalty = 0.111

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty	
1	NM03	<input type="checkbox"/> P-SV	
2	NM06	<input checked="" type="checkbox"/> P-SV	
3	NM06	<input type="checkbox"/> P-SH	
4	NM06	<input type="checkbox"/> SV-SH	
5	NM42	<input type="checkbox"/> P-SV	
6	NM42	<input checked="" type="checkbox"/> P-SH	
7	NM42	<input type="checkbox"/> SV-SH	
8	NN09	<input checked="" type="checkbox"/> P-SV	
9	NN09	<input type="checkbox"/> P-SH	
10	NN09	<input type="checkbox"/> SV-SH	
11	NN17	<input type="checkbox"/> P-SV	
12	NN17	<input type="checkbox"/> P-SH	
13	NN17	<input type="checkbox"/> SV-SH	
14	NN18	<input type="checkbox"/> P-SV	
15	NN18	<input checked="" type="checkbox"/> P-SV	0.026



2014 Oct 1 10:50:55.107 UTC
 Lat: 43.7257 Lon: -121.308 Depth: 1.144
 43.43.5414 N 121.18.507 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1 NM03	3.00	10	124	EHU	P	0.023	<input checked="" type="checkbox"/> -		-4.66e+00	3.92e+01
2 NM03	3.00	10	124	EHR	SV	-0.080	<input type="checkbox"/> +		1.61e+02	1.96e+01
3 NM06	0.68	101	164	EHT	SH	0.116	<input checked="" type="checkbox"/> -		-6.18e+02	1.09e+01
4 NM22	0.07	218	178	EHU	P	-0.047	<input checked="" type="checkbox"/> +		1.32e+02	9.46e+00
5 NM22	0.07	218	178	EHR	SV	0.073	<input type="checkbox"/> +		9.06e+02	1.39e+01
6 NM22	0.07	218	178	EHT	SH	0.054	<input checked="" type="checkbox"/> +		9.67e+01	1.35e+01
7 NM41	2.18	140	135	EHT	SH	0.085	<input type="checkbox"/> -		-3.64e+02	1.39e+01
8 NM42	3.64	40	118	EHU	P	0.025	<input checked="" type="checkbox"/> +		2.27e+02	9.58e+00
9 NM42	3.64	40	118	EHR	SV	0.042	<input checked="" type="checkbox"/> -		-2.14e+02	1.62e+01
10 NM42	3.64	40	118	EHT	SH	0.080	<input checked="" type="checkbox"/> -		-5.76e+02	1.29e+01
11 NN07	3.16	335	120	EHU	P	-0.001	<input checked="" type="checkbox"/> -		-4.99e+01	1.66e+01
12 NN09	2.11	293	134	EHZ	P	0.014	<input type="checkbox"/> +			
13 NN09	2.11	293	134	EHR	SV	-0.011	<input checked="" type="checkbox"/> +		2.62e+02	2.43e+01
14 NN09	2.11	293	134	EHT	SH	0.028	<input checked="" type="checkbox"/> +	0.062	1.93e+02	2.71e+01
15 NN17	1.63	250	142	EHU	P	0.003	<input checked="" type="checkbox"/> +		8.98e+00	2.97e+01

North East Down
 North -3.26e-02 2.22e-01 1.64e-02
 East 2.22e-01 -3.37e-01 7.16e-02
 Down 1.64e-02 7.16e-02 9.88e-03

Scalar M0 = 3.349e-01
 T = 0.657 k = -0.260

Total Penalty = 0.163

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1 NM03	<input checked="" type="checkbox"/> P:SV	0.003
2 NM42	<input type="checkbox"/> P:SV	
3 NM42	<input type="checkbox"/> P:SH	
4 NM42	<input checked="" type="checkbox"/> SV:SH	
5 NN09	<input type="checkbox"/> SV:SH	
6 NN17	<input checked="" type="checkbox"/> P:SV	0.002
7 NN17	<input checked="" type="checkbox"/> P:SH	0.015
8 NN17	<input type="checkbox"/> SV:SH	
9 NN18	<input checked="" type="checkbox"/> P:SV	0.003
10 NN18	<input checked="" type="checkbox"/> P:SH	0.016
11 NN18	<input checked="" type="checkbox"/> SV:SH	0.018
12 NN19	<input type="checkbox"/> P:SH	
13 NN21	<input checked="" type="checkbox"/> P:SV	
14 NN21	<input checked="" type="checkbox"/> P:SH	0.005
15 NN21	<input checked="" type="checkbox"/> SV:SH	0.003



2014 Oct 1 12: 3:31.644 UTC
 Lat: 43.7254 Lon: -121.309 Depth: 1.207
 43:43.524 N 121:18.5202 W

North East Down
 North 2.00e-01 -1.41e-01 1.40e-01
 East -1.41e-01 -1.46e-01 -8.71e-03
 Down 1.40e-01 -8.71e-03 7.41e-02

Scalar M0 = 2.703e-01
 T = -0.255 k = 0.132

Total Penalty = 0.152

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	3.04	10	124	EHU	P	0.001		-3.10e+01	2.01e+01
2	NM03	3.04	10	124	EHR	SV	0.014		-7.96e+02	2.88e+01
3	NM06	0.69	98	164	EHZ	P	0.054			
4	NM22	0.03	230	179	EHN	SN	-0.026			
5	NM40	2.47	109	132	EHN	SN	0.002			
6	NM42	3.67	40	118	EHU	P	0.000		-2.45e+02	1.31e+01
7	NM42	3.67	40	118	EHR	SV	0.102		1.14e+03	1.44e+01
8	NM42	3.67	40	118	EHT	SH	0.090		-1.10e+03	1.13e+01
9	NN07	3.19	335	121	EHU	P	0.004		-6.98e+01	1.67e+01
10	NN07	3.19	335	121	EHR	SV	0.034		4.11e+02	1.48e+01
11	NN09	2.11	294	135	EHU	P	0.016		-4.98e+01	1.93e+01
12	NN09	2.11	294	135	EHR	SV	-0.011		4.66e+02	2.54e+01
13	NN09	2.11	294	135	EHT	SH	0.025		8.40e+02	1.55e+01
14	NN17	1.60	251	144	EHU	P	0.003		1.40e+01	2.62e+01
15	NN17	1.60	251	144	EHR	SV	-0.024		-1.88e+02	2.92e+01

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P-SV	0.004
2	<input type="checkbox"/> P-SV	
3	<input checked="" type="checkbox"/> P-SH	
4	<input type="checkbox"/> SV-SH	
5	<input checked="" type="checkbox"/> P-SV	0.016
6	<input checked="" type="checkbox"/> P-SV	0.008
7	<input checked="" type="checkbox"/> P-SH	
8	<input checked="" type="checkbox"/> SV-SH	0.020
9	<input checked="" type="checkbox"/> P-SV	0.049
10	<input checked="" type="checkbox"/> P-SH	
11	<input type="checkbox"/> SV-SH	
12	<input type="checkbox"/> P-SV	
13	<input checked="" type="checkbox"/> P-SV	
14	<input type="checkbox"/> P-SV	
15	<input checked="" type="checkbox"/> P-SH	0.052

POLARITIES

AMPLITUDE RATIOS



2014 Oct 1 14:53:20.145 UTC
 Lat: 43.7265 Lon: -121.309 Depth: 0.824
 43:43.5906 N 121:18.546 W

North East Down
 North 1.58e-01 3.47e-02 2.48e-01
 East 3.47e-02 6.67e-02 6.32e-02
 Down 2.48e-01 6.32e-02 8.34e-02

Scalar M0 = 2.915e-01
 T = -0.331 k = 0.266

Total Penalty = 0.166

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.92	11	118	EHU	P	0.005		-6.17e+01	1.73e+01
2	NM03	2.92	11	118	EHR	SV	-0.063		-7.76e+02	1.36e+01
3	NM06	0.75	107	160	EHU	P	0.016		7.31e+02	1.24e+01
4	NM06	0.75	107	160	EHR	SV	0.069	0.000	2.30e+03	2.17e+01
5	NM06	0.75	107	160	EHT	SH	0.083		1.02e+03	1.21e+01
6	NM08	2.90	170	118	EHR	SV	0.089			
7	NM22	0.14	175	176	EHU	P	-0.010		1.16e+03	1.52e+01
8	NM22	0.14	175	176	EHR	SV	0.035		4.58e+03	8.85e+00
9	NM22	0.14	175	176	EHT	SH	-0.003		3.18e+03	1.54e+01
10	NM40	2.54	111	124	EHU	P	0.040			
11	NM40	2.54	111	124	EHN	SN	-0.036		-2.66e+02	2.14e+01
12	NM40	2.54	111	124	EHT	SH	-0.027		1.97e+02	1.21e+01
13	NM42	3.60	42	111	EHU	P	0.001		-2.99e+02	1.11e+01
14	NM42	3.60	42	111	EHR	SV	0.096		-1.58e+03	1.71e+01
15	NM42	3.60	42	111	EHT	SH	-0.022		6.57e+02	8.29e+00

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P-SV	
2	<input type="checkbox"/> P-SV	
3	<input type="checkbox"/> P-SH	
4	<input type="checkbox"/> SV-SH	
5	<input type="checkbox"/> P-SV	
6	<input checked="" type="checkbox"/> P-SH	
7	<input type="checkbox"/> SV-SH	
8	<input type="checkbox"/> P-SV	
9	<input checked="" type="checkbox"/> P-SH	
10	<input type="checkbox"/> SV-SH	
11	<input checked="" type="checkbox"/> P-SV	0.037
12	<input checked="" type="checkbox"/> P-SH	0.027
13	<input type="checkbox"/> SV-SH	
14	<input type="checkbox"/> P-SV	
15	<input type="checkbox"/> P-SH	

POLARITIES

AMPLITUDE RATIOS



2014 Oct 1 15: 1:54.950 UTC
 Lat: 43.7272 Lon: -121.31 Depth: 0.742
 43.43.632 N 121.18.6072 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.86	13	117	EZH	P	0.021	✓ -	✓ -6.90e+00	2.05e+01
2	NM06	0.86	110	156	EHU	P	0.037	✓ +	✓ 1.23e+02	1.88e+01
3	NM06	0.86	110	156	EHR	SV	0.074	✓ +	✓ 2.60e+02	1.19e+01
4	NM22	0.24	157	173	EHU	P	-0.014	✓ +	✓ 1.83e+02	1.48e+01
5	NM22	0.24	157	173	EHT	SH	0.015	✓ +	✓ 1.78e+02	2.24e+01
6	NM40	2.65	112	120	EHT	SH	0.113	✓ +		
7	NM42	3.60	44	109	EHU	P	-0.048	✓ -	✓ -1.02e+02	7.56e+00
8	NM42	3.60	44	109	EHR	SV	0.049	✓ -	✓ -1.84e+02	1.34e+01
9	NM42	3.60	44	109	EHT	SH	0.053	✓ -	✓ -2.69e+02	6.79e+00
10	NN07	2.96	336	113	EHU	P	0.018	✓ -	✓ -1.54e+01	1.65e+01
11	NN07	2.96	336	113	EHT	SH	0.036	✓ -	✓ -4.39e+01	2.37e+01
12	NN09	1.93	290	129	EHU	P	0.014	✓ +	✓ 1.54e+01	1.66e+01
13	NN09	1.93	290	129	EHR	SV	0.004	✓ +	✓ 1.40e+02	1.03e+01
14	NN09	1.93	290	129	EHE	SE	0.000			
15	NN17	1.57	243	137	EHU	P	0.001	✓ +	✓ 5.85e+00	3.40e+01

North East Down
 North -1.04e-01 1.46e-01 1.25e-01
 East 1.46e-01 -2.54e-01 -1.33e-02
 Down 1.25e-01 -1.33e-02 7.33e-02

Scalar M0 = 2.783e-01
 T = 0.164 k = -0.265

Total Penalty = 0.162

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P:SH

P:SV

SV:SH

Sta	Type	Penalty
1	NM06 <input type="checkbox"/> P-SV	
2	NM42 <input checked="" type="checkbox"/> P-SV	
3	NM42 <input checked="" type="checkbox"/> P-SH	
4	NM42 <input checked="" type="checkbox"/> SV-SH	
5	NN07 <input type="checkbox"/> P-SH	
6	NN09 <input type="checkbox"/> P-SV	
7	NN17 <input checked="" type="checkbox"/> P-SH 0.013	
8	NN18 <input checked="" type="checkbox"/> P-SV 0.061	
9	NN19 <input checked="" type="checkbox"/> P-SV 0.000	
10	NN21 <input type="checkbox"/> SV-SH	
11	NN24 <input checked="" type="checkbox"/> P-SV 0.044	
12	NN24 <input checked="" type="checkbox"/> P-SH 0.044	
13	NN24 <input checked="" type="checkbox"/> SV-SH 0.000	
14	NN32 <input type="checkbox"/> P-SH	



2014 Oct 1 16:56:11.343 UTC
 Lat: 43.7267 Lon: -121.308 Depth: 0.718
 43:43.5996 N 121:18.4938 W

Solve

North East Down
 North -2.21e-01 -8.13e-02 -1.52e-01
 East -8.13e-02 -2.19e-02 3.52e-02
 Down -1.52e-01 3.52e-02 2.20e-01

Scalar $M_0 = 2.825e-01$
 $T = -0.058$ $k = -0.026$

Total Penalty = 0.198

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM22	0.17	200	175	EHT	SH	0.031	✓ +		
2	NM42	3.54	41	109	EHT	SH	-0.014	✓ +		
3	NN07	3.07	334	111	EHU	P	0.016	✓ +	4.40e-01	2.16e+01
4	NN07	3.07	334	111	EHT	SH	-0.005	✓ -	-3.90e+01	2.24e+01
5	NN09	2.09	290	125	EHU	P	-0.006	✓ +	1.07e+01	2.04e+01
6	NN09	2.09	290	125	EHR	SV	0.023	✓ +	3.88e+01	1.79e+01
7	NN09	2.09	290	125	EHT	SH	-0.014	✓ +	2.32e+01	2.01e+01
8	NN17	1.69	247	134	EHU	P	0.003	✓ +	6.58e-01	8.69e+01
9	NN17	1.69	247	134	EHR	SV	-0.005	✓ +	4.71e+01	1.44e+01
10	NN17	1.69	247	134	EHT	SH	-0.012	✓ +	4.14e+01	1.41e+01
11	NN18	1.31	22	143	EHU	P	0.002	✓ +	1.25e+01	1.83e+01
12	NN18	1.31	22	143	EHR	SV	-0.005	✓ +	4.46e+01	1.28e+01
13	NN18	1.31	22	143	EHT	SH	0.001	✓ -	-2.14e+01	1.92e+01
14	NN19	0.93	174	152	EHU	P	0.009			
15	NN19	0.93	174	152	EHR	SV	0.049	✓ +	4.95e+01	2.40e+01

Sta	Type	Penalty
1	✓ P-SH	0.021
2	✓ P-SV	0.000
3	✓ P-SH	0.000
4	✓ SV-SH	
5	✓ P-SV	0.007
6	✓ P-SH	
7	✓ SV-SH	0.077
8	☐ P-SV	
9	✓ P-SH	
10	✓ SV-SH	0.062
11	☐ SV-SH	
12	☐ P-SV	
13	✓ P-SH	0.000
14	☐ SV-SH	

North East Down
 North -2.21e-01 -8.13e-02 -1.52e-01
 East -8.13e-02 -2.19e-02 3.52e-02
 Down -1.52e-01 3.52e-02 2.20e-01

+Crack
 +Dipole
 -CLVD
 -CLVD
 Dipole
 Crack

POLARITIES

P SH SV

SN SE

AMPLITUDE RATIOS

P-SH P-SV SV-SH



2014 Oct 1 19: 5:32.705 UTC
 Lat: 43.7273 Lon: -121.308 Depth: 0.911
 43.43.6374 N 121.18.48 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.82	9	121	EHU	P	0.033	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -4.74e+01	1.73e+01
2	NM03	2.82	9	121	EHR	SV	-0.055	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -6.58e+02	1.41e+01
3	NM03	2.82	9	121	EHT	SH	-0.050	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -2.72e+02	2.12e+01
4	NM06	0.70	116	162	EHN	SN	0.143			
5	NM06	0.70	116	162	EHE	SE	0.099			
6	NM42	3.48	42	115	EHN	SN	0.088			
7	NM42	3.48	42	115	EHE	SE	0.106			
8	NN07	3.02	333	117	EHN	SN	0.003			
9	NN07	3.02	333	117	EHE	SE	0.041			
10	NN09	2.08	288	130	EHU	P	0.011	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -2.80e+00	9.55e+00
11	NN09	2.08	288	130	EHR	SV	-0.031	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 1.01e+03	1.90e+01
12	NN09	2.08	288	130	EHT	SH	0.015	<input checked="" type="checkbox"/> + 0.072	<input checked="" type="checkbox"/> 9.67e+02	2.60e+01
13	NN17	1.73	245	137	EHU	P	-0.023	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 7.86e+01	2.06e+01
14	NN17	1.73	245	137	EHR	SV	-0.017	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 1.16e+03	2.36e+01
15	NN17	1.73	245	137	EHT	SH	-0.030	<input type="checkbox"/> +	<input checked="" type="checkbox"/> 2.94e+05	1.60e+01

North East Down
 North 2.17e-01 -3.67e-02 2.35e-01
 East -3.67e-02 -6.42e-02 7.20e-02
 Down 2.35e-01 7.20e-02 3.18e-02

Scalar M0 = 2.962e-01
 T = -0.453 k = 0.163

Total Penalty = 0.180

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P:SH

P:SV

SV:SH

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P:SV	
2	<input checked="" type="checkbox"/> P:SH	
3	<input checked="" type="checkbox"/> SV:SH	
4	<input checked="" type="checkbox"/> P:SV	0.000
5	<input checked="" type="checkbox"/> P:SH	0.001
6	<input checked="" type="checkbox"/> SV:SH	0.093
7	<input type="checkbox"/> P:SV	
8	<input type="checkbox"/> P:SH	
9	<input type="checkbox"/> SV:SH	
10	<input checked="" type="checkbox"/> P:SV	
11	<input type="checkbox"/> P:SH	
12	<input type="checkbox"/> SV:SH	
13	<input type="checkbox"/> P:SV	
14	<input checked="" type="checkbox"/> P:SH	
15	<input type="checkbox"/> SV:SH	



2014 Oct 1 20:47:39.521 UTC
 Lat: 43.7266 Lon: -121.309 Depth: 0.876
 43:43.5936 N 121:18.5358 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM06	0.74	107	160	EHT	SH	0.069	<input checked="" type="checkbox"/> +	9.02e+01	1.22e+01
2	NM22	0.15	181	176	EHT	SH	-0.004	<input checked="" type="checkbox"/> +	1.79e+02	2.18e+01
3	NN07	3.06	335	116	EHU	P	0.009	<input checked="" type="checkbox"/> -	-1.84e+01	1.62e+01
4	NN09	2.04	291	130	EHU	P	0.005	<input checked="" type="checkbox"/> +	4.21e+00	1.58e+01
5	NN09	2.04	291	130	EHR	SV	-0.024	<input checked="" type="checkbox"/> +	9.55e+01	2.76e+01
6	NN09	2.04	291	130	EHT	SH	0.011	<input checked="" type="checkbox"/> +	8.63e+01	2.80e+01
7	NN17	1.63	247	138	EHU	P	-0.006	<input checked="" type="checkbox"/> +	4.28e+00	2.85e+01
8	NN17	1.63	247	138	EHR	SV	0.007	<input checked="" type="checkbox"/> +	7.28e+01	2.75e+01
9	NN17	1.63	247	138	EHT	SH	0.003	<input checked="" type="checkbox"/> -	-4.63e+01	2.30e+01
10	NN18	1.34	24	145	EHU	P	0.001	<input checked="" type="checkbox"/> -	-2.66e+01	1.49e+01
11	NN18	1.34	24	145	EHR	SV	0.022	<input type="checkbox"/> -	-1.32e+02	1.27e+01
12	NN18	1.34	24	145	EHT	SH	0.066	<input checked="" type="checkbox"/> -	-7.39e+01	2.29e+01
13	NN19	0.93	170	155	EHU	P	0.005	<input checked="" type="checkbox"/> +	3.28e+01	1.64e+01
14	NN19	0.93	170	155	EHT	SH	0.049	<input checked="" type="checkbox"/> -	-2.28e+02	1.91e+01
15	NN21	1.70	64	138	EHU	P	-0.003	<input checked="" type="checkbox"/> -	-2.19e+00	1.39e+01

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P-SV	0.002
2	<input checked="" type="checkbox"/> P-SH	0.006
3	<input checked="" type="checkbox"/> SV-SH	0.022
4	<input checked="" type="checkbox"/> P-SV	
5	<input checked="" type="checkbox"/> P-SH	
6	<input checked="" type="checkbox"/> SV-SH	
7	<input type="checkbox"/> P-SV	
8	<input checked="" type="checkbox"/> P-SH	0.110
9	<input type="checkbox"/> SV-SH	
10	<input type="checkbox"/> P-SH	
11	<input checked="" type="checkbox"/> P-SV	0.026
12	<input checked="" type="checkbox"/> P-SH	0.026
13	<input checked="" type="checkbox"/> SV-SH	
14	<input type="checkbox"/> P-SH	

North East Down
 North 3.03e-02 -1.92e-01 1.99e-01
 East -1.92e-01 -9.50e-02 1.07e-02
 Down 1.99e-01 1.07e-02 7.11e-02

Scalar M0 = 2.900e-01
 T = -0.025 k = 0.007

Total Penalty = 0.200

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P:SH

P:SV

SV:SH



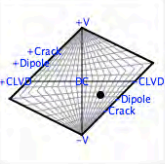
2014 Oct 1 21:29:35.768 UTC
 Lat: 43.7266 Lon: -121.308 Depth: 1.028
 43:43.596 N 121:18.5022 W

Solve

North East Down
 North -9.49e-02 8.22e-02 -2.24e-01
 East 8.22e-02 -5.35e-02 4.96e-02
 Down -2.24e-01 4.96e-02 -1.40e-01

Scalar M0 = 2.740e-01
 T = 0.472 k = -0.261

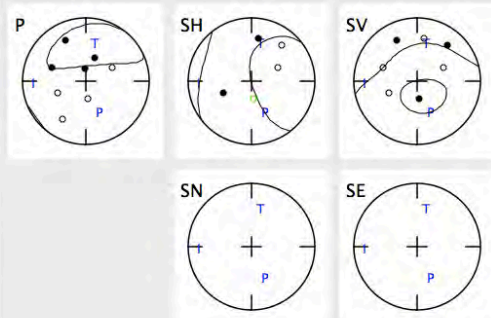
Total Penalty = 0.503



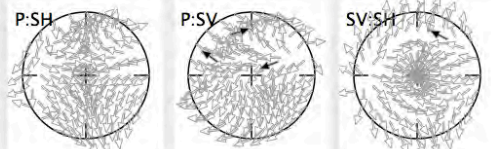
Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.90	10	123	EHR SV	-0.036	✓ -	0.052	✓ -8.05e+01	1.14e+01
2	NM03	2.90	10	123	EHT SH	-0.064	✓ +		✓ 2.59e+01	1.37e+01
3	NM42	3.56	41	116	EHR SV	-0.037	✓ +		✓ 3.28e+01	9.16e+00
4	NM42	3.56	41	116	EHT SH	0.043	✓ -		✓ -5.39e+01	1.70e+01
5	NN07	3.08	334	119	EHU P	0.010	✓ +		✓ 1.41e+00	2.11e+01
6	NN07	3.08	334	119	EHR SV	-0.036	✓ +		✓ 2.19e+01	1.00e+01
7	NN07	3.08	334	119	EHT SH	0.008	✓ -		✓ -1.42e+01	2.23e+01
8	NN09	2.08	291	132	EHU P	0.006	✓ +		✓ 5.02e+00	1.66e+01
9	NN09	2.08	291	132	EHR SV	0.003	✓ -		✓ -2.74e+01	2.44e+01
10	NN09	2.08	291	132	EHT SH	0.035	✓ -		✓ -6.73e+01	1.60e+01
11	NN17	1.67	247	140	EHU P	0.004	✓ -		✓ -1.06e+00	3.02e+01
12	NN17	1.67	247	140	EHR SV	0.003	✓ -		✓ -7.93e+01	9.49e+00
13	NN17	1.67	247	140	EHT SH	-0.010	✓ +		✓ 3.23e+01	1.77e+01
14	NN18	1.32	22	148	EHU P	0.005	✓ +		✓ 1.03e+01	1.88e+01
15	NN18	1.32	22	148	EHR SV	-0.017	✓ +		✓ 2.30e+01	2.35e+01

Sta	Type	Penalty
1	NM03	<input type="checkbox"/> SV:SH
2	NM42	<input checked="" type="checkbox"/> SV:SH
3	NN07	<input checked="" type="checkbox"/> P:SV
4	NN07	<input type="checkbox"/> P:SH
5	NN07	<input type="checkbox"/> SV:SH
6	NN09	<input checked="" type="checkbox"/> P:SV
7	NN09	<input type="checkbox"/> P:SH
8	NN09	<input type="checkbox"/> SV:SH
9	NN17	<input type="checkbox"/> P:SV
10	NN17	<input type="checkbox"/> P:SH
11	NN17	<input type="checkbox"/> SV:SH
12	NN18	<input type="checkbox"/> P:SV
13	NN18	<input type="checkbox"/> P:SH
14	NN18	<input type="checkbox"/> SV:SH
15	NN18	<input type="checkbox"/> P:SV

POLARITIES



AMPLITUDE RATIOS





2014 Oct 1 22:13:54.151 UTC
 Lat: 43.7265 Lon: -121.308 Depth: 0.955
 43.43.5888 N 121.18.4872 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM22	0.15	206	176	EHT	SH	0.097	<input checked="" type="checkbox"/> +	5.76e+02	1.38e+01
2	NM42	3.55	41	115	EHU	P	0.008	<input checked="" type="checkbox"/> -	-5.57e+01	1.58e+01
3	NN07	3.10	334	117	EHU	P	-0.001	<input checked="" type="checkbox"/> -	-9.94e+00	1.88e+01
4	NN07	3.10	334	117	EHR	SV	-0.024	<input checked="" type="checkbox"/> -	-5.07e+01	1.09e+01
5	NN09	2.10	291	130	EHU	P	0.010	<input checked="" type="checkbox"/> -	-3.94e+00	2.04e+01
6	NN09	2.10	291	130	EHR	SV	0.003	<input checked="" type="checkbox"/> +	6.21e+01	2.79e+01
7	NN09	2.10	291	130	EHT	SH	0.043	<input type="checkbox"/> +	6.08e+01	2.64e+01
8	NN17	1.69	248	138	EHU	P	-0.009	<input checked="" type="checkbox"/> +	3.11e+00	2.90e+01
9	NN17	1.69	248	138	EHR	SV	0.024	<input type="checkbox"/> +	5.92e+01	1.66e+01
10	NN17	1.69	248	138	EHT	SH	-0.001	<input type="checkbox"/> -	-2.83e+01	1.94e+01
11	NN18	1.32	21	146	EHU	P	-0.002	<input checked="" type="checkbox"/> -	-3.40e+01	1.85e+01
12	NN18	1.32	21	146	EHR	SV	0.041	<input checked="" type="checkbox"/> -	-9.81e+01	1.32e+01
13	NN19	0.91	174	156	EHU	P	0.003	<input checked="" type="checkbox"/> +	3.36e+01	1.77e+01
14	NN19	0.91	174	156	EHR	SV	0.001	<input checked="" type="checkbox"/> -	-1.08e+02	1.40e+01
15	NN24	0.62	355	163	EHU	P	-0.009	<input checked="" type="checkbox"/> -	-2.70e+01	1.92e+01
16	NN24	0.62	355	163	EHR	SV	-0.018	<input checked="" type="checkbox"/> +	1.25e+02	2.54e+01

North East Down
 North 1.28e-01 1.27e-01 8.79e-02
 East 1.27e-01 -6.92e-02 1.45e-01
 Down 8.79e-02 1.45e-01 -8.41e-02

Scalar M0 = 2.426e-01
 T = -0.362 k = -0.031

Total Penalty = 0.128

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P:SH

P:SV

SV:SH

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P:SV	
2	<input checked="" type="checkbox"/> P:SV	0.001
3	<input checked="" type="checkbox"/> P:SH	0.036
4	<input type="checkbox"/> SV:SH	
5	<input type="checkbox"/> P:SV	
6	<input checked="" type="checkbox"/> P:SH	0.074
7	<input type="checkbox"/> SV:SH	
8	<input checked="" type="checkbox"/> P:SV	
9	<input type="checkbox"/> P:SV	
10	<input type="checkbox"/> P:SV	
11	<input checked="" type="checkbox"/> P:SH	
12	<input type="checkbox"/> SV:SH	
13	<input checked="" type="checkbox"/> SV:SH	0.017



2014 Oct 2 6:39: 2.998 UTC
 Lat: 43.7265 Lon: -121.311 Depth: 0.733
 43:43.5918 N 121:18.6318 W

Solve

North East Down
 North 1.62e-01 4.20e-02 2.16e-01
 East 4.20e-02 -2.04e-01 -2.04e-02
 Down 2.16e-01 -2.04e-02 7.76e-02

Scalar M0 = 2.927e-01
 T = -0.590 k = 0.035

Total Penalty = 0.157

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.94	13	116	EHU	P	0.000	<input checked="" type="checkbox"/> -	1.58e+01	5.63e+01
2	NM06	0.87	105	156	EHU	P	0.004	<input checked="" type="checkbox"/> +	1.53e+02	1.15e+01
3	NM06	0.87	105	156	EHR	SV	0.105	<input checked="" type="checkbox"/> +	3.67e+02	1.95e+01
4	NM06	0.87	105	156	EHT	SH	0.074	<input checked="" type="checkbox"/> +	1.92e+02	1.80e+01
5	NM22	0.19	139	174	EHU	P	-0.013	<input checked="" type="checkbox"/> +	1.94e+02	1.42e+01
6	NM22	0.19	139	174	EHR	SV	0.066	<input checked="" type="checkbox"/> +	1.10e+03	1.33e+01
7	NM22	0.19	139	174	EHT	SH	0.014	<input checked="" type="checkbox"/> +	5.86e+02	1.32e+01
8	NM41	2.36	139	124	EHR	SV	0.045	<input type="checkbox"/> -	-3.40e+02	1.05e+01
9	NM41	2.36	139	124	EHT	SH	0.026	<input type="checkbox"/> -	-4.78e+02	7.98e+00
10	NM42	3.68	43	109	EHU	P	0.006	<input checked="" type="checkbox"/> -	-3.87e+01	1.67e+01
11	NM42	3.68	43	109	EHR	SV	0.059	<input checked="" type="checkbox"/> -	-2.94e+02	1.70e+01
12	NM42	3.68	43	109	EHT	SH	0.107	<input checked="" type="checkbox"/> -	-4.14e+02	1.33e+01
13	NN07	3.01	337	113	EHU	P	0.006	<input checked="" type="checkbox"/> -	-3.73e+01	1.62e+01
14	NN09	1.92	293	129	EHU	P	0.015	<input checked="" type="checkbox"/> -	-2.03e+00	2.35e+01
15	NN09	1.92	293	129	EHR	SV	0.009	<input checked="" type="checkbox"/> +	3.94e+02	1.89e+01

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P-SV	
2	<input type="checkbox"/> P-SH	
3	<input type="checkbox"/> SV-SH	
4	<input checked="" type="checkbox"/> SV-SH	0.064
5	<input checked="" type="checkbox"/> P-SV	
6	<input checked="" type="checkbox"/> P-SH	
7	<input checked="" type="checkbox"/> SV-SH	
8	<input checked="" type="checkbox"/> P-SV	0.048
9	<input checked="" type="checkbox"/> P-SH	0.008
10	<input type="checkbox"/> SV-SH	
11	<input type="checkbox"/> P-SV	
12	<input type="checkbox"/> P-SH	
13	<input checked="" type="checkbox"/> SV-SH	0.004
14	<input type="checkbox"/> P-SH	
15	<input checked="" type="checkbox"/> P-SV	

POLARITIES

AMPLITUDE RATIOS



2014 Oct 2 6:48: 7.652 UTC
 Lat: 43.7257 Lon: -121.308 Depth: 1.175
 43:43.5444 N 121:18.4878 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.99	9	124	EHU	P	0.004	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -3.58e+01	1.91e+01
2	NM03	2.99	9	124	EHR	SV	0.028	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -7.66e+02	1.03e+01
3	NM06	0.66	101	165	EHZ	P	0.022	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -5.27e+01	1.73e+01
4	NM06	0.66	101	165	EHN	SN	0.070	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -7.36e+02	1.25e+01
5	NM22	0.09	229	178	EHZ	P	-0.003	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 1.26e+02	1.42e+01
6	NM22	0.09	229	178	EHN	SN	-0.014	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -5.26e+02	1.35e+01
7	NM41	2.16	141	136	EHE	SE	-0.010	<input checked="" type="checkbox"/> -		
8	NM42	3.62	40	118	EHU	P	-0.002	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -3.04e+02	1.11e+01
9	NM42	3.62	40	118	EHR	SV	0.107	<input type="checkbox"/> +	<input checked="" type="checkbox"/> 1.60e+03	1.54e+01
10	NM42	3.62	40	118	EHT	SH	0.105	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -1.46e+03	1.25e+01
11	NN07	3.17	334	120	EHU	P	0.004	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -9.66e+01	1.68e+01
12	NN07	3.17	334	120	EHR	SV	0.039	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 4.93e+02	1.48e+01
13	NN09	2.13	293	134	EHU	P	0.017	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -5.88e+01	2.07e+01
14	NN09	2.13	293	134	EHR	SV	-0.017	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 6.69e+02	2.67e+01
15	NN09	2.13	293	134	EHT	SH	0.025	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 1.12e+03	1.98e+01

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P-SV	0.040
2	<input checked="" type="checkbox"/> P-SV	0.025
3	<input type="checkbox"/> P-SV	
4	<input checked="" type="checkbox"/> P-SH	0.018
5	<input type="checkbox"/> SV-SH	
6	<input checked="" type="checkbox"/> P-SV	
7	<input checked="" type="checkbox"/> P-SV	
8	<input type="checkbox"/> P-SH	
9	<input type="checkbox"/> SV-SH	
10	<input checked="" type="checkbox"/> P-SV	0.037
11	<input checked="" type="checkbox"/> P-SH	0.035
12	<input checked="" type="checkbox"/> SV-SH	0.011
13	<input type="checkbox"/> P-SV	
14	<input checked="" type="checkbox"/> P-SV	0.004
15	<input checked="" type="checkbox"/> P-SV	

North East Down
 North -1.46e-02 9.64e-02 2.59e-02
 East 9.64e-02 -3.98e-01 1.69e-01
 Down 2.59e-02 1.69e-01 -4.69e-03

Scalar M0 = 3.432e-01
 T = 0.619 k = -0.293

Total Penalty = 0.198

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P-SH

P-SV

SV-SH



2014 Oct 2 7: 7:19.637 UTC
 Lat: 43.7263 Lon: -121.309 Depth: 0.885
 43:43.5774 N 121:18.546 W

North East Down
 North -1.16e-01 1.71e-01 1.39e-01
 East 1.71e-01 -1.99e-01 -2.43e-02
 Down 1.39e-01 -2.43e-02 1.64e-02

Scalar M0 = 2.753e-01
 T = 0.306 k = -0.274

Total Penalty = 0.184

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.95	11	119	EHU	P	0.011	✓ -	✓ -5.39e+01	1.75e+01
2	NM03	2.95	11	119	EHR	SV	-0.048	✓ -	✓ -1.43e+03	9.59e+00
3	NM06	0.75	105	160	EHU	P	0.031	✓ +	✓ 6.53e+02	1.55e+01
4	NM06	0.75	105	160	EHR	SV	0.097	✓ +	✓ 2.33e+03	2.11e+01
5	NM06	0.75	105	160	EHT	SH	0.142	✓ -	✓ -6.99e+03	1.22e+01
6	NM22	0.12	174	177	EHU	P	-0.013	✓ +	✓ 1.02e+03	1.53e+01
7	NM22	0.12	174	177	EHT	SH	-0.015	✓ + 0.000	✓ 2.71e+03	1.90e+01
8	NM41	2.26	140	129	EHT	SH	-0.082	✓ +	✓ 1.35e+03	1.38e+01
9	NM42	3.62	42	113	EHU	P	0.011	✓ -	✓ -3.06e+02	1.14e+01
10	NM42	3.62	42	113	EHR	SV	0.077	✓ -	✓ -1.40e+03	1.81e+01
11	NM42	3.62	42	113	EHT	SH	-0.020	✓ +	✓ 6.95e+02	1.12e+01
12	NN07	3.08	335	116	EHU	P	0.011	✓ -	✓ -1.92e+02	1.34e+01
13	NN07	3.08	335	116	EHR	SV	-0.036	✓ +	✓ 2.79e+02	2.11e+01
14	NN09	2.04	292	130	EHU	P	0.013	✓ -	✓ -2.74e+01	1.98e+01
15	NN09	2.04	292	130	EHR	SV	-0.008	✓ +	✓ 1.45e+03	2.39e+01

Sta	Type	Penalty
1	<input type="checkbox"/> P-SV	
2	<input checked="" type="checkbox"/> P-SV	0.034
3	<input checked="" type="checkbox"/> P-SH	0.054
4	<input checked="" type="checkbox"/> SV-SH	0.080
5	<input checked="" type="checkbox"/> P-SV	
6	<input checked="" type="checkbox"/> P-SH	
7	<input checked="" type="checkbox"/> SV-SH	
8	<input type="checkbox"/> P-SV	
9	<input type="checkbox"/> P-SV	
10	<input type="checkbox"/> P-SH	
11	<input type="checkbox"/> SV-SH	
12	<input checked="" type="checkbox"/> P-SV	0.000
13	<input type="checkbox"/> P-SH	
14	<input type="checkbox"/> SV-SH	
15	<input checked="" type="checkbox"/> P-SV	0.000

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P-SH

P-SV

SV-SH



2014 Oct 2 7:22: 3.575 UTC
 Lat: 43.7266 Lon: -121.309 Depth: 1.003
 43.43.5984 N 121.18.5478 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.91	11	122	EHU	P	0.024	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 1.49e+01	2.06e+01
2	NM06	0.76	108	161	EHU	P	0.039	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -1.10e+02	1.06e+01
3	NM22	0.16	175	176	EHE	SE	0.065			
4	NM42	3.59	42	115	EHZ	P	-0.010	<input checked="" type="checkbox"/> -		
5	NN07	3.05	335	118	EHZ	P	-0.003	<input type="checkbox"/> -		
6	NN09	2.02	291	133	EHU	P	0.025	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 7.53e+00	2.08e+01
7	NN09	2.02	291	133	EHR	SV	0.009	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 1.49e+02	2.58e+01
8	NN09	2.02	291	133	EHT	SH	0.047	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 8.98e+01	2.90e+01
9	NN17	1.62	246	140	EHU	P	-0.009	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 4.58e+00	3.04e+01
10	NN17	1.62	246	140	EHR	SV	0.018	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 7.18e+01	1.91e+01
11	NN17	1.62	246	140	EHE	SE	-0.001			
12	NN18	1.34	25	147	EHU	P	-0.016	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -1.48e+01	1.80e+01
13	NN18	1.34	25	147	EHR	SV	0.004	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -1.79e+02	1.50e+01
14	NN19	0.94	169	156	EHU	P	-0.009	<input checked="" type="checkbox"/> +		
15	NN24	0.60	2	164	EHU	P	-0.013	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -1.09e+01	2.59e+01
16	NN24	0.60	2	164	EHR	SV	-0.028	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 1.37e+02	1.72e+01
17	NN24	0.60	2	164	EHT	SH	-0.052	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -7.79e+01	1.88e+01
18	NN32	2.93	210	120	EHU	P	-0.045	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 3.73e+00	1.50e+01

North East Down
 North 3.77e-01 -1.27e-02 1.29e-01
 East -1.27e-02 -1.42e-01 8.11e-02
 Down 1.29e-01 8.11e-02 3.59e-02

Scalar M0 = 3.242e-01
 T = -0.361 k = 0.215

Total Penalty = 0.170

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P:SH

P:SV

SV:SH

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P:SV	
2	<input checked="" type="checkbox"/> P:SH	
3	<input checked="" type="checkbox"/> SV:SH	
4	<input checked="" type="checkbox"/> P:SV	0.110
5	<input checked="" type="checkbox"/> P:SV	0.013
6	<input checked="" type="checkbox"/> P:SV	
7	<input checked="" type="checkbox"/> P:SH	0.047
8	<input type="checkbox"/> SV:SH	
9	<input type="checkbox"/> P:SV	
10	<input type="checkbox"/> P:SH	
11	<input type="checkbox"/> SV:SH	



2014 Oct 2 9: 4: 8.647 UTC
 Lat: 43.7254 Lon: -121.308 Depth: 1.063
 43:43:52.16 N 121:18:46.02 W

North East Down
 North 5.18e-02 -1.72e-01 2.09e-01
 East -1.72e-01 -2.48e-02 -2.97e-02
 Down 2.09e-01 -2.97e-02 1.02e-01

Scalar M0 = 2.846e-01
 T = -0.289 k = 0.126

Total Penalty = 0.028

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	3.03	8	122	EHU	P	0.027	<input checked="" type="checkbox"/> -		
2	NM42	3.62	39	116	EHU	P	-0.002	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -2.34e+01	1.22e+01
3	NN07	3.22	334	118	EHU	P	-0.008	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -8.18e+00	1.82e+01
4	NN09	2.19	293	131	EHU	P	0.002	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 0.001 <input checked="" type="checkbox"/> 7.77e-01	2.81e+01
5	NN09	2.19	293	131	EHR	SV	-0.027	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 0.019 <input checked="" type="checkbox"/> 8.56e+01	2.51e+01
6	NN09	2.19	293	131	EHT	SH	0.013	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 0.007 <input checked="" type="checkbox"/> 3.86e+01	1.92e+01
7	NN17	1.68	252	140	EHU	P	-0.001	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 4.13e+00	2.95e+01
8	NN17	1.68	252	140	EHE	SE	0.013			
9	NN18	1.43	18	146	EHZ	P	-0.004	<input checked="" type="checkbox"/> -		
10	NN19	0.79	176	160	EHZ	P	0.008	<input checked="" type="checkbox"/> +		
11	NN21	1.68	59	141	EHZ	P	-0.007	<input checked="" type="checkbox"/> -		
12	NN24	0.75	353	161	EHU	P	-0.002	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -7.60e+00	2.57e+01
13	NN24	0.75	353	161	EHR	SV	-0.016	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 9.38e+01	6.81e+01
14	NN24	0.75	353	161	EHT	SH	-0.019	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -5.76e+01	1.94e+01
15	NN32	2.88	214	121	EHU	P	-0.013	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 3.78e+00	1.46e+01
16	NN32	2.88	214	121	EHR	SV	0.032	<input type="checkbox"/> -	<input checked="" type="checkbox"/> -7.85e+01	1.61e+01
17	NN32	2.88	214	121	EHT	SH	0.032	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -3.22e+01	2.67e+01

Sta	Type	Penalty	
1	NN09	<input checked="" type="checkbox"/> P:SV	
2	NN09	<input checked="" type="checkbox"/> P:SH	
3	NN09	<input checked="" type="checkbox"/> SV:SH	
4	NN24	<input checked="" type="checkbox"/> P:SV	
5	NN24	<input checked="" type="checkbox"/> P:SH	
6	NN24	<input checked="" type="checkbox"/> SV:SH	
7	NN32	<input type="checkbox"/> P:SV	
8	NN32	<input checked="" type="checkbox"/> P:SH	
9	NN32	<input type="checkbox"/> SV:SH	

POLARITIES

AMPLITUDE RATIOS



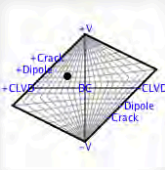
2014 Oct 2 11: 1:58.257 UTC
 Lat: 43.7267 Lon: -121.31 Depth: 0.794
 43:43.6026 N 121:18.6042 W

Solve

North East Down
 North 2.41e-01 -7.30e-02 1.73e-01
 East -7.30e-02 -9.79e-02 4.30e-02
 Down 1.73e-01 4.30e-02 8.35e-02

Scalar M0 = 2.727e-01
 T = -0.402 k = 0.212

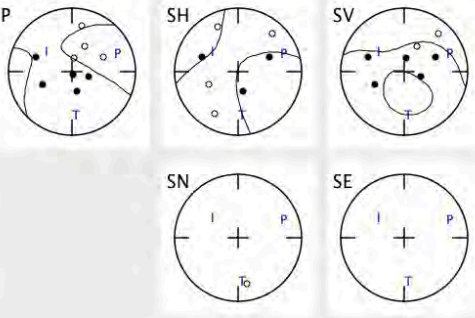
Total Penalty = 0.171



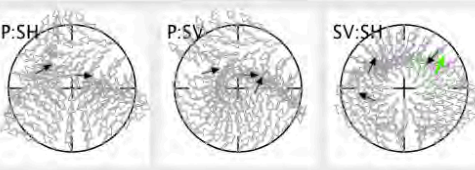
Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.92	13	117	EHU	P	0.022	0.025	-4.09e+01	3.11e+01
2	NM06	0.84	107	157	EHU	P	0.020		7.52e+02	1.47e+01
3	NM06	0.84	107	157	EHR	SV	0.073		1.61e+03	1.21e+01
4	NM06	0.84	107	157	EHT	SH	0.143		-3.59e+03	1.24e+01
5	NM08	2.93	169	117	EHN	SN	0.109	0.006		
6	NM22	0.19	151	175	EHU	P	-0.020		9.01e+02	1.44e+01
7	NM42	3.64	43	110	EHZ	P	-2.004			
8	NM42	3.64	43	110	EHR	SV	0.034		-1.51e+03	1.27e+01
9	NM42	3.64	43	110	EHT	SH	0.036		-1.66e+03	5.74e+00
10	NN07	3.01	336	114	EHU	P	0.005		-1.24e+02	1.61e+01
11	NN07	3.01	336	114	EHT	SH	-0.062	0.026	-4.50e+02	6.95e+00
12	NN09	1.95	292	130	EHU	P	0.013		6.60e+01	1.86e+01
13	NN09	1.95	292	130	EHR	SV	-0.014		1.18e+03	1.09e+01
14	NN09	1.95	292	130	EHT	SH	0.027		5.30e+02	1.62e+01
15	NN17	1.55	245	138	EHU	P	-0.002		4.92e+01	2.78e+01

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P-SV	
2	<input type="checkbox"/> P-SH	
3	<input type="checkbox"/> SV-SH	
4	<input checked="" type="checkbox"/> SV-SH	0.066
5	<input type="checkbox"/> P-SH	
6	<input checked="" type="checkbox"/> P-SV	
7	<input checked="" type="checkbox"/> P-SH	
8	<input checked="" type="checkbox"/> SV-SH	
9	<input type="checkbox"/> P-SV	
10	<input type="checkbox"/> P-SH	
11	<input checked="" type="checkbox"/> SV-SH	
12	<input type="checkbox"/> P-SV	
13	<input type="checkbox"/> P-SV	
14	<input type="checkbox"/> P-SH	
15	<input type="checkbox"/> SV-SH	

POLARITIES



AMPLITUDE RATIOS





2014 Oct 2 12:39:24.317 UTC
Lat: 43.7264 Lon: -121.31 Depth: 0.897
43.43.5864 N 121.18.5892 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1 NM03	2.94	12	119	EHU	P	-0.002	✓ -		✓ -1.05e+01	5.71e+01
2 NM06	0.81	105	159	EHU	P	0.032	✓ +		✓ 1.52e+02	1.84e+01
3 NM06	0.81	105	159	EHR	SV	0.069	✓ +		✓ 3.77e+02	1.34e+01
4 NM06	0.81	105	159	EHT	SH	0.132	✓ -		✓ -1.09e+03	1.71e+01
5 NM22	0.15	153	176	EHZ	P	-0.019	✓ +		✓ 2.43e+02	1.53e+01
6 NM42	3.65	43	113	EHU	P	0.005	✓ -		✓ -4.76e+01	1.25e+01
7 NM42	3.65	43	113	EHR	SV	0.041	✓ -	0.003	✓ -2.88e+02	1.34e+01
8 NM42	3.65	43	113	EHT	SH	-0.038	✓ +	0.001	✓ 1.20e+02	1.26e+01
9 NN07	3.04	336	116	EHZ	P	0.008	✓ -		✓ -3.25e+01	1.54e+01
10 NN07	3.04	336	116	EHE	SE	0.013	✓ -		✓ -9.06e+01	2.18e+01
11 NN09	1.98	292	131	EHU	P	0.026	✓ +		✓ 8.49e+00	1.78e+01
12 NN09	1.98	292	131	EHR	SV	-0.023	✓ +		✓ 2.47e+02	1.69e+01
13 NN09	1.98	292	131	EHT	SH	0.016	✓ +		✓ 1.73e+02	3.42e+01
14 NN17	1.56	246	140	EHU	P	-0.003	✓ +		✓ 1.18e+01	3.03e+01
15 NN17	1.56	246	140	EHR	SV	0.012	✓ +		✓ 2.06e+02	1.45e+01

North East Down
North -6.57e-02 -1.85e-01 1.69e-01
East -1.85e-01 -1.14e-01 4.18e-02
Down 1.69e-01 4.18e-02 2.83e-02

Scalar M0 = 2.714e-01
T = 0.353 k = -0.150

Total Penalty = 0.188

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1 NM06	<input checked="" type="checkbox"/> P-SV	
2 NM06	<input type="checkbox"/> P-SH	
3 NM06	<input type="checkbox"/> SV-SH	
4 NM42	<input type="checkbox"/> P-SV	
5 NM42	<input type="checkbox"/> P-SH	
6 NM42	<input checked="" type="checkbox"/> SV-SH	
7 NN09	<input checked="" type="checkbox"/> P-SV	
8 NN09	<input checked="" type="checkbox"/> P-SH	
9 NN09	<input checked="" type="checkbox"/> SV-SH	
10 NN17	<input checked="" type="checkbox"/> P-SV	0.011
11 NN17	<input checked="" type="checkbox"/> P-SH	0.013
12 NN17	<input checked="" type="checkbox"/> SV-SH	0.085
13 NN18	<input type="checkbox"/> P-SV	
14 NN18	<input type="checkbox"/> P-SH	
15 NN18	<input type="checkbox"/> SV-SH	



2014 Oct 2 16:12:35.315 UTC
 Lat: 43.7265 Lon: -121.309 Depth: 0.765
 43:43.5894 N 121:18.5628 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NN07	3.05	335	113	EHR	P	0.010	<input checked="" type="checkbox"/> -	-4.23e+00	1.94e+01
2	NN07	3.05	335	113	EHR	SV	0.010	<input checked="" type="checkbox"/> -	-3.11e+01	1.67e+01
3	NN09	2.01	292	128	EHZ	P	0.022	<input checked="" type="checkbox"/> +		
4	NN17	1.59	246	137	EHR	P	-0.026	<input checked="" type="checkbox"/> +	2.76e+00	2.00e+01
5	NN17	1.59	246	137	EHR	SV	-0.001	<input checked="" type="checkbox"/> +	5.25e+01	1.50e+01
6	NN17	1.59	246	137	EHT	SH	0.031	<input checked="" type="checkbox"/> +	9.12e+01	1.29e+01
7	NN18	1.36	25	142	EHR	P	-0.001	<input checked="" type="checkbox"/> -	-3.10e+00	2.04e+01
8	NN18	1.36	25	142	EHT	SH	0.072	<input checked="" type="checkbox"/> -	-4.94e+01	1.90e+01
9	NN19	0.93	168	153	EHR	P	0.010	<input checked="" type="checkbox"/> +	1.49e+01	2.41e+01
10	NN19	0.93	168	153	EHT	SH	0.054	<input checked="" type="checkbox"/> -	-1.35e+02	1.22e+01
11	NN24	0.62	4	162	EHR	P	-0.009	<input checked="" type="checkbox"/> -	-3.09e+00	2.09e+01
12	NN24	0.62	4	162	EHR	SV	-0.023	<input checked="" type="checkbox"/> +	7.34e+01	2.06e+01
13	NN32	2.91	210	114	EHR	SV	0.024	<input type="checkbox"/> -	6.54e+01	1.51e+01

Scalar M0 = 2.935e-01
 T = 0.553 k = -0.127
 Total Penalty = 0.006

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P-SH

P-SV

SV-SH

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P-SV	
2	<input checked="" type="checkbox"/> P-SV	
3	<input checked="" type="checkbox"/> P-SH	
4	<input checked="" type="checkbox"/> SV-SH	
5	<input type="checkbox"/> P-SH	
6	<input checked="" type="checkbox"/> P-SH	0.006
7	<input checked="" type="checkbox"/> P-SV	



2014 Oct 2 18:54: 3.152 UTC
 Lat: 43.7264 Lon: -121.31 Depth: 0.699
 43:43.5828 N 121:18.5874 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.95	12	115	EHU	P	-0.013	<input checked="" type="checkbox"/> -	-2.10e+01	1.51e+01
2	NM22	0.14	152	176	EHU	P	-0.007	<input checked="" type="checkbox"/> +	3.18e+02	1.61e+01
3	NM22	0.14	152	176	EHT	SH	0.024	<input checked="" type="checkbox"/> +	6.96e+02	2.32e+01
4	NM42	3.65	43	108	EHU	P	0.018	<input checked="" type="checkbox"/> -		
5	NN07	3.05	336	111	EHZ	P	0.006	<input checked="" type="checkbox"/> -		
6	NN09	1.98	292	127	EHU	P	0.010	<input checked="" type="checkbox"/> -	-2.06e+01	2.08e+01
7	NN09	1.98	292	127	EHR	SV	0.002	<input checked="" type="checkbox"/> +	4.48e+02	2.40e+01
8	NN09	1.98	292	127	EHT	SH	0.039	<input checked="" type="checkbox"/> +	5.84e+02	2.52e+01
9	NN17	1.56	246	136	EHU	P	-0.010	<input checked="" type="checkbox"/> +	2.53e+01	2.41e+01
10	NN17	1.56	246	136	EHR	SV	0.012	<input checked="" type="checkbox"/> +	4.52e+02	2.59e+01
11	NN17	1.56	246	136	EHT	SH	0.022	<input checked="" type="checkbox"/> -	-4.91e+02	1.88e+01
12	NN18	1.39	26	141	EHU	P	0.001	<input checked="" type="checkbox"/> -	-7.16e+01	1.69e+01
13	NN18	1.39	26	141	EHR	SV	-0.007	<input type="checkbox"/> -	-6.70e+02	1.29e+01
14	NN18	1.39	26	141	EHT	SH	0.071	<input checked="" type="checkbox"/> -	-5.96e+02	2.05e+01
15	NN19	0.92	166	152	EHU	P	0.005	<input checked="" type="checkbox"/> +	2.56e+02	1.89e+01

Scalar $M_0 = 2.998e-01$
 $T = -0.135$ $k = 0.007$

Total Penalty = 0.111

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P:SV	0.019
2	<input checked="" type="checkbox"/> P:SH	0.018
3	<input checked="" type="checkbox"/> SV:SH	0.006
4	<input checked="" type="checkbox"/> P:SV	
5	<input checked="" type="checkbox"/> P:SH	0.013
6	<input checked="" type="checkbox"/> SV:SH	0.056
7	<input type="checkbox"/> P:SV	
8	<input type="checkbox"/> P:SH	
9	<input type="checkbox"/> SV:SH	
10	<input type="checkbox"/> P:SV	
11	<input type="checkbox"/> P:SH	
12	<input type="checkbox"/> SV:SH	
13	<input checked="" type="checkbox"/> P:SV	
14	<input checked="" type="checkbox"/> P:SH	
15	<input checked="" type="checkbox"/> SV:SH	



2014 Oct 2 20:37: 6.043 UTC
 Lat: 43.7252 Lon: -121.309 Depth: 1.223
 43:43.5114 N 121:18.51 W

North East Down
 North 1.42e-01 -1.37e-01 1.72e-01
 East -1.37e-01 -1.64e-01 1.08e-02
 Down 1.72e-01 1.08e-02 5.38e-02

Scalar M0 = 2.711e-01
 T = -0.274 k = 0.036

Total Penalty = 0.116

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	3.06	9	124	EHU	P	-0.007		-2.55e+01	1.80e+01
2	NM03	3.06	9	124	EHR	SV	0.070			
3	NM22	0.04	277	179	EHU	P	-0.005		2.41e+02	1.45e+01
4	NM22	0.04	277	179	EHR	SV	0.072		2.00e+03	1.32e+01
5	NM22	0.04	277	179	EHT	SH	0.067		7.21e+02	1.56e+01
6	NM42	3.68	40	119	EHZ	P	0.024		-1.85e+02	1.62e+01
7	NM42	3.68	40	119	EHR	SV	0.091		1.94e+03	1.22e+01
8	NM42	3.68	40	119	EHT	SH	0.082		-1.13e+03	1.45e+01
9	NN07	3.21	335	121	EHU	P	-0.001		-7.34e+01	1.71e+01
10	NN07	3.21	335	121	EHR	SV	0.026		3.68e+02	1.34e+01
11	NN07	3.21	335	121	EHT	SH	0.003	0.018	2.44e+02	2.06e+01
12	NN09	2.13	295	135	EHU	P	0.021		-1.34e+01	2.43e+01
13	NN09	2.13	295	135	EHR	SV	-0.025		6.65e+02	1.84e+01
14	NN09	2.13	295	135	EHT	SH	0.005		8.36e+02	1.37e+01
15	NN17	1.61	252	144	EHU	P	0.002		1.71e+01	2.78e+01

2014 Oct 2 20:37: 6.043 UTC

Sta	Type	Penalty	
1	NM42	<input type="checkbox"/> P.SV	
2	NM42	<input type="checkbox"/> P.SH	
3	NM42	<input type="checkbox"/> SV.SH	
4	NN07	<input type="checkbox"/> P.SV	
5	NN07	<input checked="" type="checkbox"/> P.SH	
6	NN07	<input type="checkbox"/> SV.SH	
7	NN09	<input type="checkbox"/> P.SV	
8	NN09	<input checked="" type="checkbox"/> P.SH	0.035
9	NN09	<input checked="" type="checkbox"/> SV.SH	0.000
10	NN17	<input checked="" type="checkbox"/> P.SV	0.001
11	NN18	<input type="checkbox"/> P.SV	
12	NN19	<input type="checkbox"/> P.SH	
13	NN24	<input checked="" type="checkbox"/> P.SV	
14	NN24	<input checked="" type="checkbox"/> P.SH	
15	NN24	<input checked="" type="checkbox"/> SV.SH	0.000

CLVD
 Dipole
 Crack
 Dipole
 Crack

POLARITIES

P SH SV
 SN SE

AMPLITUDE RATIOS

P:SH P:SV SV:SH



2014 Oct 3 6: 6:37.324 UTC
 Lat: 43.7261 Lon: -121.31 Depth: 0.944
 43.43.5678 N 121.18.6168 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.98	13	120	EHU	P	0.008	<input checked="" type="checkbox"/> -	-3.06e+01	1.86e+01
2	NM03	2.98	13	120	EHT	SH	-0.018	<input checked="" type="checkbox"/> -	-7.11e+02	1.19e+01
3	NM06	0.84	102	159	EHU	P	0.017	<input checked="" type="checkbox"/> +	4.17e+02	1.32e+01
4	NM06	0.84	102	159	EHR	SV	0.134	<input checked="" type="checkbox"/> -	-2.82e+03	9.57e+00
5	NM06	0.84	102	159	EHT	SH	0.128	<input type="checkbox"/> -	-3.06e+03	1.12e+01
6	NM22	0.15	133	176	EHU	P	-0.037	<input checked="" type="checkbox"/> +	6.83e+02	1.14e+01
7	NM22	0.15	133	176	EHT	SH	0.145	<input checked="" type="checkbox"/> +	3.94e+03	1.00e+01
8	NM42	3.70	43	113	EHU	P	0.010	<input checked="" type="checkbox"/> -	-1.91e+02	1.29e+01
9	NM42	3.70	43	113	EHR	SV	0.070	<input checked="" type="checkbox"/> -	-9.17e+02	1.27e+01
10	NM42	3.70	43	113	EHT	SH	0.124	<input checked="" type="checkbox"/> -	-8.19e+02	1.26e+01
11	NN07	3.06	337	117	EHZ	P	0.005	<input checked="" type="checkbox"/> -	-8.98e+01	1.38e+01
12	NN09	1.96	294	133	EHU	P	0.017	<input checked="" type="checkbox"/> +	1.36e+01	1.66e+01
13	NN09	1.96	294	133	EHR	SV	-0.013	<input type="checkbox"/> +	5.09e+02	2.64e+01
14	NN09	1.96	294	133	EHT	SH	0.015	<input checked="" type="checkbox"/> +	4.95e+02	2.61e+01
15	NN17	1.51	247	142	EHU	P	0.003	<input checked="" type="checkbox"/> +	3.21e+01	2.57e+01

North East Down
 North 6.07e-03 -2.23e-01 1.94e-01
 East -2.23e-01 -9.16e-02 3.37e-02
 Down 1.94e-01 3.37e-02 -6.18e-04

Scalar M0 = 3.046e-01
 T = 0.144 k = -0.084

Total Penalty = 0.117

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P:SH

P:SV

SV:SH

Sta	Type	Penalty
1	NM03 <input type="checkbox"/> P:SH	
2	NM06 <input checked="" type="checkbox"/> P:SV	
3	NM06 <input type="checkbox"/> P:SH	
4	NM06 <input type="checkbox"/> SV:SH	
5	NM42 <input type="checkbox"/> P:SV	
6	NM42 <input type="checkbox"/> P:SH	
7	NM42 <input checked="" type="checkbox"/> SV:SH	
8	NN09 <input checked="" type="checkbox"/> P:SV	0.005
9	NN09 <input checked="" type="checkbox"/> P:SH	0.001
10	NN09 <input checked="" type="checkbox"/> SV:SH	0.055
11	NN17 <input checked="" type="checkbox"/> P:SV	0.008
12	NN17 <input checked="" type="checkbox"/> P:SH	0.003
13	NN17 <input checked="" type="checkbox"/> SV:SH	0.046
14	NN18 <input type="checkbox"/> P:SV	
15	NN19 <input type="checkbox"/> P:SV	



2014 Oct 3 15:27:57.661 UTC
 Lat: 43.7253 Lon: -121.309 Depth: 1.325
 43:43.515 N 121:18.5124 W

North East Down
 North 2.45e-01 -8.11e-02 1.74e-01
 East -8.11e-02 -1.97e-01 1.62e-02
 Down 1.74e-01 1.62e-02 1.51e-02

Scalar M0 = 2.944e-01
 T = -0.496 k = 0.060

Total Penalty = 0.181

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1 NM03	3.05	10	126	EHU	P	-0.012	✓ -		✓ -1.59e+01	5.21e+01
2 NM03	3.05	10	126	EHR	SV	0.010	✓ -		✓ -5.50e+02	2.24e+01
3 NM06	0.68	96	165	EHU	P	0.021	✓ -	0.003	✓ -1.85e+01	1.70e+01
4 NM06	0.68	96	165	EHR	SV	0.117	✓ -		✓ -1.14e+03	1.39e+01
5 NM06	0.68	96	165	EHT	SH	0.069	✓ +		✓ 2.84e+02	3.27e+01
6 NM22	0.03	266	179	EHR	SV	0.076	✓ +	0.025	✓ 1.32e+03	1.95e+01
7 NM22	0.03	266	179	EHT	SH	0.036	✓ +		✓ 1.75e+03	1.21e+01
8 NM40	2.45	108	134	EHT	SH	-0.001	✓ +			
9 NM41	2.14	139	138	EHT	SH	-0.034	✓ +		✓ 3.14e+02	1.66e+01
10 NM42	3.68	40	120	EHU	P	0.017	✓ -		✓ -2.07e+02	1.45e+01
11 NM42	3.68	40	120	EHR	SV	0.114	✓ +		✓ 1.13e+03	1.45e+01
12 NM42	3.68	40	120	EHT	SH	0.114	✓ -		✓ -1.08e+03	1.16e+01
13 NN07	3.21	335	123	EHU	P	0.009	✓ -	0.027	✓ -5.98e+01	1.71e+01
14 NN07	3.21	335	123	EHR	SV	-0.020	✓ -		✓ -2.28e+02	1.55e+01
15 NN09	2.13	294	136	EHU	P	0.019	✓ -		✓ -3.99e+01	2.07e+01

Sta	Type	Penalty
1 NM03	✓ P-SV	0.009
2 NM06	✓ P-SV	
3 NM06	✓ P-SH	0.044
4 NM06	SV-SH	
5 NM42	P-SV	
6 NM42	✓ P-SH	
7 NM42	SV-SH	
8 NN07	P-SV	
9 NN09	P-SV	
10 NN09	P-SH	
11 NN09	✓ SV-SH	
12 NN17	✓ P-SV	
13 NN17	✓ P-SH	0.014
14 NN17	SV-SH	
15 NN18	P-SV	

CLVD
 +Crack
 +Dipole
 -Crack
 -Dipole

POLARITIES

P SH SV
 SN SE

AMPLITUDE RATIOS

P-SH P-SV SV-SH



2014 Oct 3 18:55: 9.929 UTC
 Lat: 43.7264 Lon: -121.31 Depth: 0.943
 43.43.5864 N 121.18.603 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.95	12	120	EHZ	P	-1.955			
2	NM42	3.66	43	114	EHZ	P	0.030			
3	NN07	3.04	336	117	EHU	P	-1.976	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -5.66e+01	1.68e+01
4	NN07	3.04	336	117	EHT	SH	0.019	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -1.10e+02	2.31e+01
5	NN09	1.96	292	132	EHU	P	0.008	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 1.03e+01	1.27e+01
6	NN09	1.96	292	132	EHR	SV	-0.016	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 5.08e+02	1.20e+01
7	NN09	1.96	292	132	EHT	SH	0.022	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 4.01e+02	4.32e+01
8	NN17	1.54	246	141	EHU	P	0.000	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 1.75e+01	2.46e+01
9	NN17	1.54	246	141	EHR	SV	0.015	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 4.40e+02	1.37e+01
10	NN17	1.54	246	141	EHT	SH	0.007	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -4.92e+02	1.77e+01
11	NN18	1.39	27	145	EHU	P	-0.003	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -7.63e+01	1.73e+01
12	NN18	1.39	27	145	EHR	SV	-0.072	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 2.08e+02	1.72e+01
13	NN19	0.94	165	155	EHU	P	0.010	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 2.19e+02	1.91e+01
14	NN19	0.94	165	155	EHT	SH	0.020	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 9.71e+01	4.98e+01
15	NN21	1.79	65	137	EHZ	P	0.003			
16	NN24	0.63	9	163	EHZ	P	-0.006			
17	NN24	0.63	9	163	EHN	SN	-0.043			
18	NN32	2.88	209	119	EHZ	P	-0.018			

Scalar M0 = 2.588e-01
 T = 0.541 k = -0.213
 Total Penalty = 0.072

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	<input type="checkbox"/> P-SH	
2	<input checked="" type="checkbox"/> P-SV	
3	<input checked="" type="checkbox"/> P-SH	
4	<input checked="" type="checkbox"/> SV-SH	
5	<input checked="" type="checkbox"/> P-SV	
6	<input checked="" type="checkbox"/> P-SH	0.012
7	<input checked="" type="checkbox"/> SV-SH	0.060
8	<input checked="" type="checkbox"/> P-SV	
9	<input type="checkbox"/> P-SH	



2014 Oct 4 21:29:47.537 UTC
Lat: 43.7275 Lon: -121.306 Depth: 0.955
43.43.65 N 121.18.3792 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq			
1	NM22	0.33	220	171	EHT	SH	0.042	<input type="checkbox"/>	+				
2	NN07	3.06	330	117	EHU	P	0.051	<input checked="" type="checkbox"/>	-	✓	-3.15e+01	1.78e+01	
3	NN09	2.21	287	129	EHU	P	0.005	<input checked="" type="checkbox"/>	-	✓	-2.19e+01	1.92e+01	
4	NN09	2.21	287	129	EHR	SV	-0.040	<input checked="" type="checkbox"/>	+	0.021	✓	1.29e+02	2.13e+01
5	NN09	2.21	287	129	EHT	SH	-0.010	<input type="checkbox"/>	+		✓	1.20e+02	1.76e+01
6	NN17	1.87	246	135	EHU	P	-0.020	<input checked="" type="checkbox"/>	+		✓	5.45e+00	2.92e+01
7	NN17	1.87	246	135	EHR	SV	-0.049	<input checked="" type="checkbox"/>	+		✓	1.11e+02	2.42e+01
8	NN17	1.87	246	135	EHT	SH	-0.058	<input checked="" type="checkbox"/>	-		✓	-1.25e+02	1.47e+01
9	NN18	1.17	17	150	EHU	P	0.043	<input checked="" type="checkbox"/>	-		✓	-2.77e+01	1.74e+01
10	NN18	1.17	17	150	EHT	SH	0.043	<input checked="" type="checkbox"/>	+		✓	9.97e+01	1.64e+01
11	NN19	1.02	183	153	EHU	P	-0.005	<input checked="" type="checkbox"/>	+		✓	7.63e+01	1.70e+01
12	NN19	1.02	183	153	EHR	SV	0.034	<input checked="" type="checkbox"/>	+		✓	2.90e+02	1.67e+01
13	NN19	1.02	183	153	EHT	SH	0.011	<input checked="" type="checkbox"/>	-		✓	-2.84e+02	1.55e+01
14	NN21	1.47	65	144	EHZ	P	-0.049	<input checked="" type="checkbox"/>	-				
15	NN24	0.55	338	165	EHU	P	-0.002	<input checked="" type="checkbox"/>	-		✓	-2.61e+01	1.81e+01
16	NN24	0.55	338	165	EHR	SV	-0.029	<input checked="" type="checkbox"/>	+		✓	2.41e+02	2.13e+01

North East Down
North -4.16e-01 -1.86e-04 1.89e-01
East -1.86e-04 4.65e-02 -7.14e-02
Down 1.89e-01 -7.14e-02 1.64e-02

Scalar M0 = 3.585e-01
T = 0.623 k = -0.241

Total Penalty = 0.160

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P:SV	0.125
2	<input type="checkbox"/> P:SH	
3	<input type="checkbox"/> SV:SH	
4	<input checked="" type="checkbox"/> P:SV	
5	<input checked="" type="checkbox"/> P:SH	
6	<input checked="" type="checkbox"/> SV:SH	
7	<input checked="" type="checkbox"/> P:SH	
8	<input checked="" type="checkbox"/> P:SV	
9	<input checked="" type="checkbox"/> P:SH	
10	<input checked="" type="checkbox"/> SV:SH	
11	<input checked="" type="checkbox"/> P:SV	0.014
12	<input type="checkbox"/> P:SH	
13	<input type="checkbox"/> SV:SH	



2014 Oct 4 5:29: 8.258 UTC
 Lat: 43.7264 Lon: -121.31 Depth: 0.736
 43:43.5828 N 121:18.5808 W

Solve

North East Down
 North 1.68e-01 -3.35e-02 2.95e-01
 East -3.35e-02 -9.83e-03 3.54e-02
 Down 2.95e-01 3.54e-02 9.35e-02

Scalar M0 = 3.288e-01
 T = -0.464 k = 0.196

Total Penalty = 0.152

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM06	0.79	105	158	EHU	P	0.032	<input checked="" type="checkbox"/> +	5.59e+01	2.08e+01
2	NM22	0.14	155	176	EHU	P	-0.015	<input checked="" type="checkbox"/> +	2.14e+02	1.51e+01
3	NM22	0.14	155	176	EHT	SH	-0.030	<input checked="" type="checkbox"/> +	6.14e+02	1.16e+01
4	NM40	2.58	110	121	EHT	SH	-0.006	<input checked="" type="checkbox"/> +	5.33e+01	2.62e+01
5	NM41	2.30	140	125	EHR	SV	0.030	<input type="checkbox"/> -	-2.92e+02	1.07e+01
6	NM41	2.30	140	125	EHT	SH	-0.062	<input checked="" type="checkbox"/> +	3.54e+02	1.72e+01
7	NM42	3.65	42	109	EHU	P	-0.011	<input checked="" type="checkbox"/> -	-4.48e+01	1.78e+01
8	NM42	3.65	42	109	EHR	SV	0.071	<input checked="" type="checkbox"/> -	-2.69e+02	1.78e+01
9	NM42	3.65	42	109	EHT	SH	0.143	<input checked="" type="checkbox"/> -	-4.70e+02	1.26e+01
10	NN07	3.05	336	112	EHU	P	0.008	<input checked="" type="checkbox"/> -	-2.69e+01	1.52e+01
11	NN07	3.05	336	112	EHR	SV	-0.030	<input type="checkbox"/> +	4.75e+01	2.19e+01
12	NN07	3.05	336	112	EHT	SH	0.017	<input checked="" type="checkbox"/> -	-7.38e+01	2.50e+01
13	NN09	1.99	292	127	EHU	P	0.015	<input checked="" type="checkbox"/> + 0.016	1.30e+01	1.78e+01
14	NN09	1.99	292	127	EHR	SV	0.015	<input checked="" type="checkbox"/> +	2.79e+02	2.03e+01
15	NN09	1.99	292	127	EHT	SH	0.046	<input type="checkbox"/> +	1.68e+02	2.07e+01

Sta	Type	Penalty
1	NM41	<input type="checkbox"/> SV:SH
2	NM42	<input checked="" type="checkbox"/> P:SV 0.022
3	NM42	<input checked="" type="checkbox"/> P:SH 0.076
4	NM42	<input type="checkbox"/> SV:SH
5	NN07	<input type="checkbox"/> P:SV
6	NN07	<input checked="" type="checkbox"/> P:SH
7	NN07	<input type="checkbox"/> SV:SH
8	NN09	<input checked="" type="checkbox"/> P:SV 0.017
9	NN09	<input checked="" type="checkbox"/> P:SH 0.020
10	NN09	<input type="checkbox"/> SV:SH
11	NN17	<input type="checkbox"/> P:SV
12	NN17	<input type="checkbox"/> P:SH
13	NN17	<input type="checkbox"/> SV:SH
14	NN18	<input checked="" type="checkbox"/> P:SV
15	NN18	<input checked="" type="checkbox"/> P:SH

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P:SH

P:SV

SV:SH



2014 Oct 4 17:33: 7.355 UTC
 Lat: 43.7266 Lon: -121.31 Depth: 0.792
 43:43.596 N 121:18.5748 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.92	12	117	EHU	P	0.001	<input checked="" type="checkbox"/> -	-1.17e+02	1.57e+01
2	NM03	2.92	12	117	EHR	SV	-0.064	<input checked="" type="checkbox"/> -	-2.30e+03	1.37e+01
3	NM03	2.92	12	117	EHE	SE	0.009	<input checked="" type="checkbox"/> -		
4	NM08	2.91	169	117	EHN	SN	0.039	<input checked="" type="checkbox"/> +	1.64e+02	1.67e+01
5	NM22	0.16	161	175	EHU	P	-0.013	<input checked="" type="checkbox"/> +	3.02e+03	1.37e+01
6	NM22	0.16	161	175	EHR	SV	0.067	<input checked="" type="checkbox"/> +	1.43e+04	1.29e+01
7	NM22	0.16	161	175	EHT	SH	0.015	<input checked="" type="checkbox"/> -	-4.67e+03	2.08e+01
8	NM42	3.62	43	111	EHU	P	0.001	<input checked="" type="checkbox"/> -	-8.15e+02	1.07e+01
9	NM42	3.62	43	111	EHR	SV	0.062	<input checked="" type="checkbox"/> -	-4.24e+03	1.21e+01
10	NM42	3.62	43	111	EHT	SH	-0.019	<input checked="" type="checkbox"/> +	1.46e+03	9.47e+00
11	NN07	3.03	336	114	EHU	P	0.006	<input checked="" type="checkbox"/> -	-5.47e+02	1.37e+01
12	NN09	1.99	292	129	EHU	P	0.010	<input checked="" type="checkbox"/> -	-1.12e+02	2.02e+01
13	NN09	1.99	292	129	EHR	SV	-0.006	<input checked="" type="checkbox"/> +	4.60e+03	1.01e+01
14	NN17	1.58	246	137	EHU	P	-0.008	<input checked="" type="checkbox"/> +	4.76e+02	1.84e+01
15	NN17	1.58	246	137	EHR	SV	0.015	<input checked="" type="checkbox"/> +	3.74e+03	1.63e+01

North East Down
 North -1.03e-01 1.33e-01 1.48e-01
 East 1.33e-01 -1.18e-01 5.51e-02
 Down 1.48e-01 5.51e-02 1.07e-01

Scalar M0 = 2.461e-01
 T = -0.316 k = -0.128

Total Penalty = 1.108

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P:SH

P:SV

SV:SH

Sta	Type	Penalty
1	<input type="checkbox"/> P:SV	
2	<input checked="" type="checkbox"/> P:SV	
3	<input checked="" type="checkbox"/> P:SH	
4	<input checked="" type="checkbox"/> SV:SH	
5	<input checked="" type="checkbox"/> P:SV	0.069
6	<input type="checkbox"/> P:SV	
7	<input checked="" type="checkbox"/> P:SH	0.072
8	<input type="checkbox"/> SV:SH	
9	<input type="checkbox"/> P:SV	
10	<input type="checkbox"/> P:SH	
11	<input checked="" type="checkbox"/> SV:SH	0.025
12	<input checked="" type="checkbox"/> P:SV	
13	<input type="checkbox"/> P:SH	0.724
14	<input type="checkbox"/> SV:SH	
15	<input type="checkbox"/> P:SH	



2014 Oct 4 18:51:27.825 UTC
 Lat: 43.726 Lon: -121.309 Depth: 0.836
 43:43.5612 N 121:18.5676 W

Solve

North East Down
 North 8.71e-02 1.26e-01 1.81e-01
 East 1.26e-01 -4.19e-02 8.43e-02
 Down 1.81e-01 8.43e-02 8.72e-02

Scalar M0 = 2.538e-01
 T = -0.805 k = 0.134

Total Penalty = 0.155

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.98	11	118	EHU	P	0.003		6.09e+02	1.66e+01
2	NM03	2.98	11	118	EHR	SV	-0.095		-1.08e+04	1.39e+01
3	NM22	0.10	155	177	EHU	P	-0.006		1.38e+04	1.33e+01
4	NM22	0.10	155	177	EHR	SV	-0.020		-2.02e+04	1.14e+01
5	NM22	0.10	155	177	EHT	SH	0.016		3.24e+04	2.51e+01
6	NM41	2.26	139	128	EHU	P	-0.005		1.20e+03	1.27e+01
7	NM41	2.26	139	128	EHR	SV	-0.081		1.02e+04	1.49e+01
8	NM41	2.26	139	128	EHT	SH	-0.026		1.36e+04	1.76e+01
9	NM42	3.66	42	111	EHZ	P	-1.994			
10	NM42	3.66	42	111	EHE	SE	0.126			
11	NN07	3.10	336	114	EHZ	P	0.001			
12	NN07	3.10	336	114	EHN	SN	-0.014			
13	NN09	2.02	293	129	EHU	P	0.008		-3.76e+02	1.76e+01
14	NN09	2.02	293	129	EHR	SV	-0.010		2.00e+04	1.26e+01
15	NN09	2.02	293	129	EHT	SH		0.018	-5.71e+03	2.86e+01

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P:SV	0.008
2	<input checked="" type="checkbox"/> P:SV	
3	<input checked="" type="checkbox"/> P:SH	0.013
4	<input checked="" type="checkbox"/> SV:SH	0.025
5	<input checked="" type="checkbox"/> P:SV	0.018
6	<input checked="" type="checkbox"/> P:SH	0.015
7	<input type="checkbox"/> SV:SH	
8	<input type="checkbox"/> P:SV	
9	<input checked="" type="checkbox"/> P:SH	
10	<input type="checkbox"/> SV:SH	
11	<input checked="" type="checkbox"/> P:SV	
12	<input checked="" type="checkbox"/> P:SH	
13	<input checked="" type="checkbox"/> SV:SH	
14	<input type="checkbox"/> P:SV	
15	<input type="checkbox"/> P:SH	

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P:SH

P:SV

SV:SH



2014 Oct 5 2: 6:16.967 UTC
 Lat: 43.726 Lon: -121.31 Depth: 0.705
 43:43.5588 N 121:18.5808 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.99	12	114	EHU	P	0.018		-5.15e+00	3.02e+01
2	NM06	0.78	102	158	EHU	P	0.013		2.05e+02	1.12e+01
3	NM06	0.78	102	158	EHR	SV	0.174		-8.16e+02	1.76e+01
4	NM06	0.78	102	158	EHT	SH	0.094		2.14e+02	1.81e+01
5	NM22	0.10	145	177	EHU	P	-0.016		2.74e+02	1.25e+01
6	NM22	0.10	145	177	EHT	SH	0.024		4.12e+02	1.66e+01
7	NM42	3.68	42	108	EHU	P	0.010		-7.91e+01	1.61e+01
8	NN07	3.09	336	111	EHU	P	-0.011		-2.00e+01	1.84e+01
9	NN09	2.01	293	126	EHU	P	0.027		-1.43e+01	4.39e+01
10	NN09	2.01	293	126	EHR	SV	-0.019	0.008	2.20e+02	2.71e+01
11	NN09	2.01	293	126	EHT	SH	0.017	0.004	1.44e+02	1.21e+01
12	NN17	1.55	248	136	EHU	P	-0.008		8.64e+00	2.87e+01
13	NN17	1.55	248	136	EHR	SV	0.024		1.76e+02	2.03e+01
14	NN17	1.55	248	136	EHT	SH	0.017		-2.16e+02	1.76e+01
15	NN18	1.43	25	140	EHU	P	-0.006		-4.44e+01	1.67e+01

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P:SV	0.108
2	<input type="checkbox"/> P:SH	
3	<input type="checkbox"/> SV:SH	
4	<input checked="" type="checkbox"/> P:SV	
5	<input checked="" type="checkbox"/> P:SH	
6	<input checked="" type="checkbox"/> SV:SH	
7	<input checked="" type="checkbox"/> P:SV	0.029
8	<input checked="" type="checkbox"/> P:SH	0.002
9	<input type="checkbox"/> SV:SH	
10	<input type="checkbox"/> P:SH	
11	<input type="checkbox"/> P:SH	
12	<input type="checkbox"/> P:SH	
13	<input checked="" type="checkbox"/> P:SV	
14	<input checked="" type="checkbox"/> P:SH	
15	<input checked="" type="checkbox"/> SV:SH	

North East Down
 North -1.36e-01 -1.84e-01 1.61e-01
 East -1.84e-01 -5.91e-02 -1.12e-02
 Down 1.61e-01 -1.12e-02 9.22e-02

Scalar M0 = 2.741e-01
 T = 0.255 k = -0.107

Total Penalty = 0.679

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P:SH

P:SV

SV:SH



2014 Oct 5 2:14:37.168 UTC
Lat: 43.7259 Lon: -121.31 Depth: 0.869
43:43:55.1 N 121:18:59.28 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	3.01	12	118	EHU	P	-0.012	✓ -	✓ -5.88e+00	2.52e+01
2	NM06	0.80	100	159	EHU	P	0.023	✓ +	✓ 1.05e+02	1.61e+01
3	NM06	0.80	100	159	EHR	SV	0.097	✓ +	✓ 3.01e+02	1.79e+01
4	NM22	0.10	133	177	EHU	P	-0.021	✓ +	✓ 2.21e+02	1.45e+01
5	NM42	3.70	42	112	EHU	SH	0.017	✓ -	✓ -3.90e+01	2.83e+01
6	NM42	3.70	42	112	EHT	SH	0.108	✓ -	✓ -2.65e+02	1.19e+01
7	NN07	3.10	337	115	EHU	P	0.005	✓ -	✓ -2.51e+01	1.89e+01
8	NN07	3.10	337	115	EHT	SH	0.012	✓ -	✓ -5.26e+01	1.84e+01
9	NN09	2.00	294	130	EHU	P	0.021	✓ +	✓ 1.47e+01	1.71e+01
10	NN09	2.00	294	130	EHR	SV	0.009	✓ +	✓ 1.65e+02	3.45e+01
11	NN09	2.00	294	130	EHT	SH	0.022	✓ +	✓ 1.25e+02	3.37e+01
12	NN17	1.53	248	140	EHU	P	0.001	✓ +	✓ 7.84e+00	3.19e+01
13	NN17	1.53	248	140	EHT	SH	0.010	✓ -	✓ -2.49e+02	1.75e+01
14	NN18	1.45	26	142	EHU	P	-0.009	✓ -	✓ -2.29e+01	1.69e+01
15	NN19	0.87	164	156	EHU	P	0.007	✓ +	✓ 7.90e+01	1.92e+01
16	NN19	0.87	164	156	EHT	SH	0.046	✓ -	✓ -2.60e+02	1.32e+01

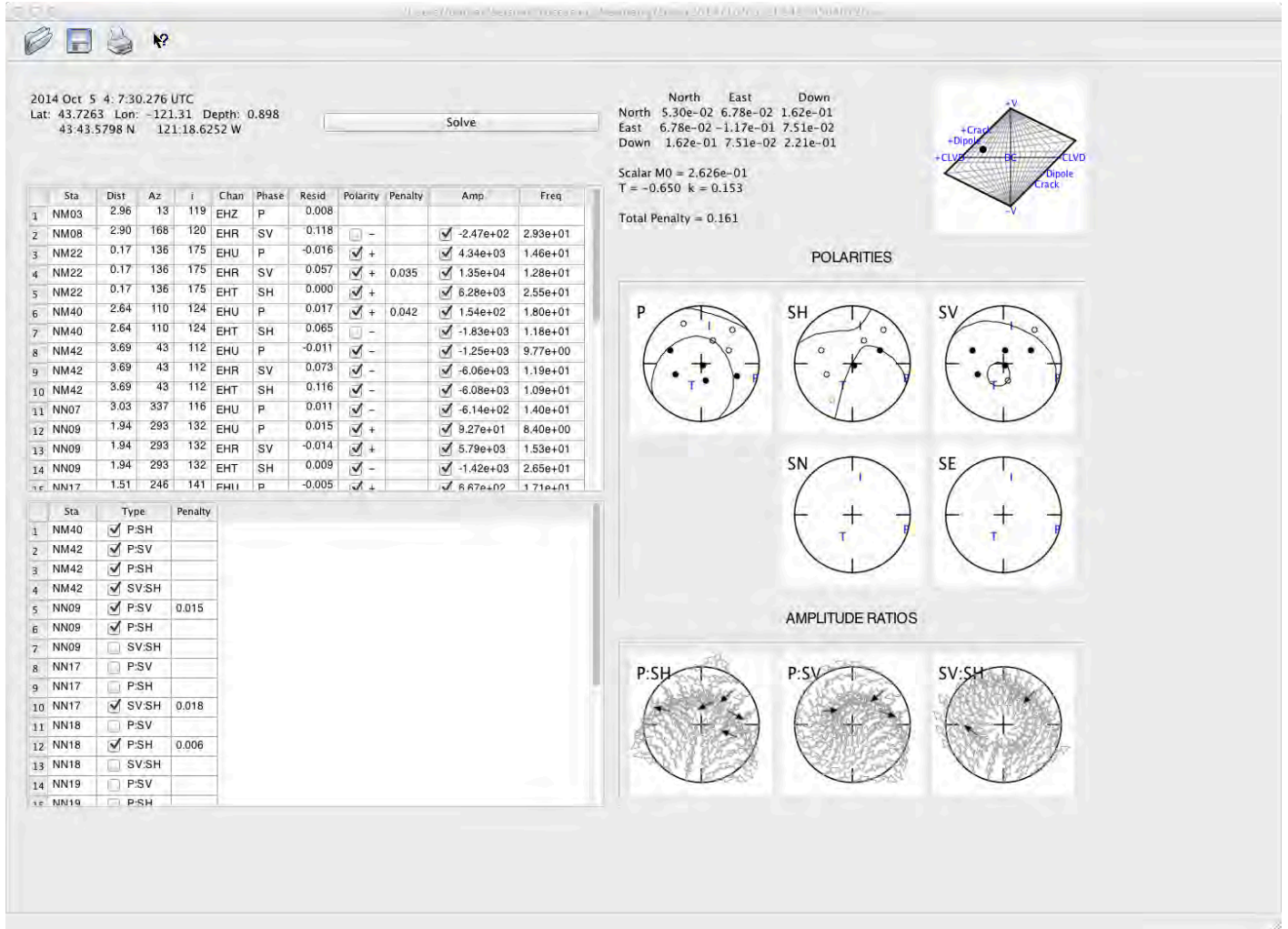
North East Down
North -2.45e-02 -1.88e-01 1.69e-01
East -1.88e-01 -1.23e-01 9.68e-03
Down 1.69e-01 9.68e-03 1.19e-01

Scalar M0 = 2.810e-01
T = 0.149 k = -0.032

Total Penalty = 0.079

POLARITIES

AMPLITUDE RATIOS





2014 Oct 5 15:55:21.007 UTC
 Lat: 43.7261 Lon: -121.308 Depth: 1.111
 43.43.5666 N 121.18.471 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq	
1	NM03	2.95	9	124	EHU	P	0.015	<input checked="" type="checkbox"/> -			
2	NM22	0.13	222	177	EHR	SV	0.083	<input checked="" type="checkbox"/> +			
3	NM42	3.57	40	118	EHU	P	-0.003	<input checked="" type="checkbox"/> -	0.005		
4	NM42	3.57	40	118	EHR	SV	0.032	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -3.16e+01	1.24e+01	
5	NM42	3.57	40	118	EHT	SH	0.063	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> 0.036	<input checked="" type="checkbox"/> -1.76e+02	1.08e+01
6	NN07	3.14	334	119	EHU	P	-0.006	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -1.22e+01	1.66e+01	
7	NN07	3.14	334	120	EHT	SH	-0.006	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> 0.017	<input checked="" type="checkbox"/> -5.21e+01	1.96e+01
8	NN09	2.14	292	133	EHU	P	0.003	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 0.016	<input checked="" type="checkbox"/> 1.36e+01	2.11e+01
9	NN09	2.14	292	133	EHR	SV	-0.019	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 1.08e+02	2.26e+01	
10	NN09	2.14	292	133	EHT	SH	0.021	<input type="checkbox"/> +	<input checked="" type="checkbox"/> 5.26e+01	4.25e+01	
11	NN17	1.69	249	141	EHU	P	0.000	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 3.75e+00	3.01e+01	
12	NN17	1.69	249	141	EHT	SH	-0.016	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 3.05e+01	2.03e+01	
13	NN18	1.36	20	148	EHU	P	-0.001	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> 0.001	<input checked="" type="checkbox"/> -2.55e+00	2.23e+01
14	NN18	1.36	20	148	EHR	SV	-0.009	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> 0.007	<input checked="" type="checkbox"/> -1.57e+02	1.16e+01
15	NN18	1.36	20	148	EHT	SH	-0.039	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> 0.001	<input checked="" type="checkbox"/> -2.16e+01	2.16e+01

North East Down
 North -2.29e-01 1.61e-01 -9.28e-02
 East 1.61e-01 -7.21e-02 8.01e-02
 Down -9.28e-02 8.01e-02 -3.22e-02

Scalar M0 = 2.648e-01
 T = 0.850 k = -0.298

Total Penalty = 0.186

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P:SH

P:SV

SV:SH

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P:SV	0.005
2	<input checked="" type="checkbox"/> P:SH	0.015
3	<input checked="" type="checkbox"/> SV:SH	0.025
4	<input type="checkbox"/> P:SH	
5	<input type="checkbox"/> P:SV	
6	<input type="checkbox"/> P:SH	
7	<input type="checkbox"/> SV:SH	
8	<input checked="" type="checkbox"/> P:SH	
9	<input checked="" type="checkbox"/> P:SV	
10	<input checked="" type="checkbox"/> P:SH	
11	<input checked="" type="checkbox"/> SV:SH	
12	<input type="checkbox"/> SV:SH	
13	<input checked="" type="checkbox"/> P:SV	
14	<input type="checkbox"/> P:SH	
15	<input checked="" type="checkbox"/> SV:SH	0.045



2014 Oct 5 16: 7:32.777 UTC
 Lat: 43.7262 Lon: -121.308 Depth: 0.987
 43:43.572 N 121:18.5088 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1 NM03	2.95	10	121	EHU	P	0.029	✓ +		2.58e+01	2.16e+01
2 NM06	0.70	105	162	EHR	SV	0.123	✓ +		1.50e+02	1.09e+01
3 NM22	0.11	199	177	EHU	P	-0.003	✓ +		1.35e+02	1.54e+01
4 NM22	0.11	199	177	EHR	SV	0.107	☐ +		1.08e+03	1.04e+01
5 NM42	3.60	41	115	EHU	P	-0.001	✓ -		-6.80e+01	1.71e+01
6 NM42	3.60	41	115	EHR	SV	0.029	✓ -		-4.58e+02	1.17e+01
7 NM42	3.60	41	115	EHT	SH	0.075	✓ -		-1.04e+03	1.17e+01
8 NN07	3.11	335	117	EHU	P	-0.005	☐ -		-2.89e+01	1.93e+01
9 NN07	3.11	335	117	EHT	SH	0.002	☐ -		-1.48e+02	1.99e+01
10 NN09	2.09	292	131	EHU	P	0.002	✓ +		5.89e+01	2.01e+01
11 NN09	2.09	292	131	EHR	SV	-0.003	☐ +		4.16e+02	1.75e+01
12 NN09	2.09	292	131	EHT	SH	0.040	✓ +		3.54e+02	1.91e+01
13 NN17	1.65	248	140	EHU	P	0.001	✓ +		1.03e+01	2.77e+01
14 NN18	1.36	22	146	EHU	P	-0.010	✓ -		-2.88e+01	1.99e+01
15 NN18	1.36	22	146	EHR	SV	-0.038	✓ +	0.085	8.91e+01	1.62e+01

Sta	Type	Penalty
1 NM42	<input checked="" type="checkbox"/> P:SV	
2 NM42	<input checked="" type="checkbox"/> P:SH	
3 NM42	<input checked="" type="checkbox"/> SV:SH	
4 NN07	<input type="checkbox"/> P:SH	
5 NN09	<input checked="" type="checkbox"/> P:SV	
6 NN09	<input checked="" type="checkbox"/> P:SH	
7 NN09	<input checked="" type="checkbox"/> SV:SH	
8 NN18	<input type="checkbox"/> P:SV	
9 NN18	<input type="checkbox"/> P:SH	
10 NN18	<input checked="" type="checkbox"/> SV:SH	0.085
11 NN19	<input type="checkbox"/> P:SV	
12 NN19	<input checked="" type="checkbox"/> P:SH	
13 NN19	<input type="checkbox"/> SV:SH	
14 NN21	<input type="checkbox"/> P:SV	
15 NN21	<input type="checkbox"/> P:SH	

North	East	Down
2.87e-01	-3.71e-02	9.26e-02
East	-3.71e-02	-1.79e-01
Down	9.26e-02	1.26e-01

Scalar M0 = 2.885e-01
 T = 0.144 k = 0.129

Total Penalty = 0.174

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P:SH

P:SV

SV:SH



2014 Oct 5 23:22:16.499 UTC
 Lat: 43.7259 Lon: -121.308 Depth: 0.872
 43.43.5552 N 121.18.4728 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.97	9	119	EHR	SV	-0.003			
2	NM22	0.12	228	177	EHU	P	0.007		3.38e+02	1.43e+01
3	NM42	3.59	40	113	EHU	P	0.039		1.06e+02	1.32e+01
4	NM42	3.59	40	113	EHR	SV	0.041		-4.09e+02	9.53e+00
5	NM42	3.59	40	113	EHT	SH	-0.008		1.53e+02	2.07e+01
6	NN07	3.16	334	114	EHU	P	-0.002		-9.24e+00	1.73e+01
7	NN07	3.16	334	114	EHR	SV	0.051		-2.54e+02	1.91e+01
8	NN07	3.16	334	114	EHT	SH	0.006	0.052	-9.29e+01	2.45e+01
9	NN09	2.15	292	128	EHU	P	0.007		3.87e+01	1.99e+01
10	NN09	2.15	292	128	EHR	SV	0.009		2.03e+02	2.16e+01
11	NN09	2.15	292	128	EHT	SH	-0.014		9.26e+01	1.80e+01
12	NN17	1.68	250	137	EHU	P	-0.008		4.70e+00	2.22e+01
13	NN17	1.68	250	137	EHR	SV	0.006		2.47e+02	1.38e+01
14	NN17	1.68	250	137	EHT	SH	0.009		1.32e+02	1.63e+01
15	NN18	1.38	20	144	EHU	P	-0.001		3.94e+01	1.81e+01

North East Down
 North -1.87e-01 8.99e-02 -1.45e-01
 East 8.99e-02 -9.47e-02 -2.49e-02
 Down -1.45e-01 -2.49e-02 1.99e-01

Scalar M0 = 2.673e-01
 T = -0.283 k = -0.089

Total Penalty = 0.181

POLARITIES

P

SH

SV

SN

SE

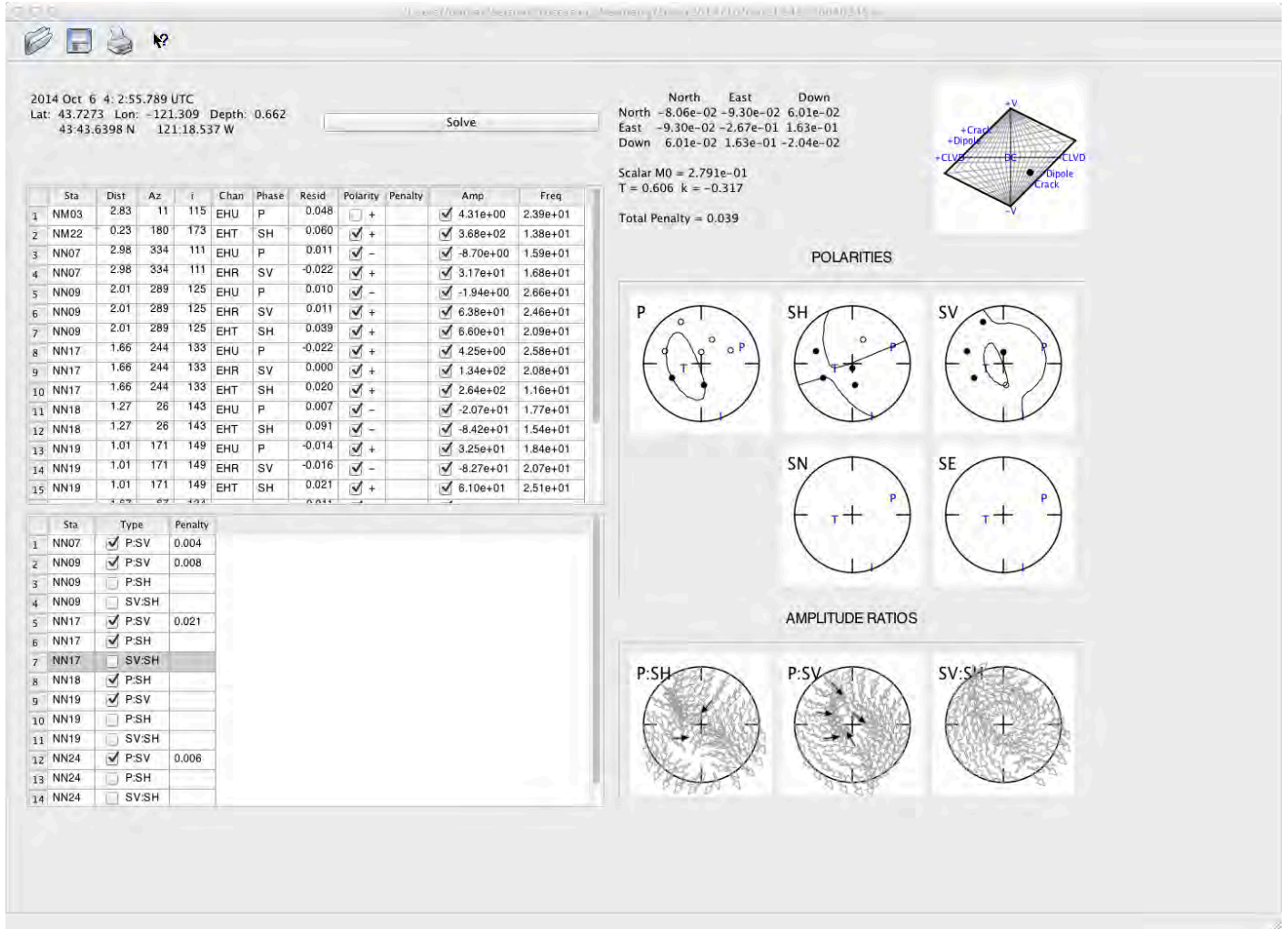
AMPLITUDE RATIOS

P-SH

P-SV

SV-SH

Sta	Type	Penalty
1	NM42 <input type="checkbox"/> P-SV	
2	NM42 <input checked="" type="checkbox"/> P-SH	
3	NM42 <input type="checkbox"/> SV-SH	
4	NN07 <input type="checkbox"/> P-SV	
5	NN07 <input type="checkbox"/> P-SH	
6	NN07 <input type="checkbox"/> SV-SH	
7	NN09 <input type="checkbox"/> P-SV	
8	NN09 <input checked="" type="checkbox"/> P-SH	0.024
9	NN09 <input type="checkbox"/> SV-SH	
10	NN17 <input checked="" type="checkbox"/> P-SV	
11	NN17 <input checked="" type="checkbox"/> P-SH	0.000
12	NN17 <input type="checkbox"/> SV-SH	
13	NN18 <input type="checkbox"/> P-SV	
14	NN18 <input type="checkbox"/> P-SH	
15	NN18 <input type="checkbox"/> SV-SH	





2014 Oct 6 6:13:48.626 UTC
 Lat: 43.7258 Lon: -121.31 Depth: 0.821
 43:43:5462 N 121:18:5982 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM06	0.80	100	158	EHU	P	0.025	<input checked="" type="checkbox"/> +	7.77e+01	1.57e+01
2	NM06	0.80	100	158	EHR	SV	-0.103	<input checked="" type="checkbox"/> +	1.23e+02	1.84e+01
3	NM06	0.80	100	158	EHT	SH	0.139	<input checked="" type="checkbox"/> -	-3.29e+02	1.90e+01
4	NM22	0.10	126	177	EHU	P	-0.014	<input checked="" type="checkbox"/> +	1.56e+02	1.68e+01
5	NM42	3.71	42	110	EHU	P	0.011	<input checked="" type="checkbox"/> -	-1.43e+01	1.68e+01
6	NM42	3.71	42	110	EHR	SV	0.048	<input checked="" type="checkbox"/> -	-1.04e+02	1.52e+01
7	NM42	3.71	42	110	EHT	SH	0.032	<input type="checkbox"/> -	-1.57e+02	7.94e+00
8	NN07	3.11	337	114	EHU	P	0.005	<input checked="" type="checkbox"/> -	-1.27e+01	1.68e+01
9	NN09	2.00	294	129	EHU	P	0.019	<input checked="" type="checkbox"/> -	-4.80e+00	2.52e+01
10	NN09	2.00	294	129	EHR	SV	0.003	<input checked="" type="checkbox"/> +	5.47e+01	1.78e+01
11	NN09	2.00	294	129	EHT	SH	0.027	<input type="checkbox"/> +	6.65e+02	4.82e+01
12	NN17	1.52	249	139	EHU	P	0.004	<input checked="" type="checkbox"/> +	2.24e+00	3.02e+01
13	NN17	1.52	249	139	EHR	SV	0.027	<input type="checkbox"/> +	3.20e+01	2.46e+01
14	NN17	1.52	249	139	EHE	SE	0.011	<input type="checkbox"/>		
15	NN18	1.46	26	141	EHU	P	-0.005	<input checked="" type="checkbox"/> -	-1.57e+01	2.27e+01

North East Down
 North -3.56e-01 1.59e-01 5.14e-02
 East 1.59e-01 1.19e-01 2.88e-02
 Down 5.14e-02 2.88e-02 4.70e-02

Scalar M0 = 3.166e-01
 T = 0.583 k = -0.156

Total Penalty = 0.051

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P:SV	
2	<input checked="" type="checkbox"/> P:SH	
3	<input checked="" type="checkbox"/> SV:SH	
4	<input checked="" type="checkbox"/> P:SV	
5	<input type="checkbox"/> P:SH	
6	<input type="checkbox"/> SV:SH	
7	<input checked="" type="checkbox"/> P:SV	0.002
8	<input type="checkbox"/> P:SH	
9	<input type="checkbox"/> SV:SH	
10	<input type="checkbox"/> P:SV	
11	<input type="checkbox"/> P:SH	
12	<input checked="" type="checkbox"/> P:SV	
13	<input checked="" type="checkbox"/> P:SH	
14	<input checked="" type="checkbox"/> SV:SH	
15	<input type="checkbox"/> P:SV	



2014 Oct 7 6:12: 8.593 UTC
 Lat: 43.7264 Lon: -121.311 Depth: 0.805
 43.43.5864 N 121.18.6594 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq	
1	NM06	0.90	103	156	EHU	P	0.042				
2	NM06	0.90	103	156	EHR	SV	0.091	<input checked="" type="checkbox"/> +	2.23e+02	2.39e+01	
3	NM06	0.90	103	156	EHT	SH	0.116	<input type="checkbox"/> -	-6.81e+02	1.46e+01	
4	NM42	3.71	44	110	EHU	P	0.040	<input checked="" type="checkbox"/> +	0.073	1.25e+02	1.26e+01
5	NM42	3.71	44	110	EHT	SH	0.107	<input checked="" type="checkbox"/> -		-2.59e+02	9.47e+00
6	NN07	3.01	338	114	EHU	P	0.012	<input checked="" type="checkbox"/> -	0.000	-1.91e+01	1.51e+01
7	NN09	1.89	293	131	EHU	P	0.003	<input checked="" type="checkbox"/> -		-1.00e+01	4.85e+00
8	NN09	1.89	293	131	EHR	SV	0.036	<input checked="" type="checkbox"/> +		1.23e+02	1.91e+01
9	NN09	1.89	293	131	EHT	SH	0.061	<input checked="" type="checkbox"/> +		1.11e+02	2.06e+01
10	NN17	1.47	245	140	EHU	P	0.003	<input checked="" type="checkbox"/> +		6.14e+00	2.46e+01
11	NN17	1.47	245	140	EHR	SV	0.029	<input checked="" type="checkbox"/> +		1.08e+02	2.61e+01
12	NN17	1.47	245	140	EHT	SH	0.011	<input checked="" type="checkbox"/> -		-1.04e+02	1.56e+01
13	NN18	1.43	30	142	EHU	P	-0.015	<input checked="" type="checkbox"/> -		-3.13e+01	2.00e+01
14	NN18	1.43	30	142	EHT	SH	0.041	<input checked="" type="checkbox"/> -		-1.38e+02	1.44e+01
15	NN19	0.96	160	153	EHU	P	-0.018	<input checked="" type="checkbox"/> +		5.49e+01	1.91e+01

North East Down
 North 1.32e-01 1.00e-01 3.12e-02
 East 1.00e-01 -3.87e-01 9.89e-02
 Down 3.12e-02 9.89e-02 1.91e-02

Scalar M0 = 3.237e-01
 T = 0.573 k = -0.185

Total Penalty = 0.158

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	NM06 <input type="checkbox"/> SV-SH	
2	NM42 <input type="checkbox"/> P-SH	
3	NN09 <input checked="" type="checkbox"/> P-SV	0.062
4	NN09 <input type="checkbox"/> P-SH	
5	NN09 <input type="checkbox"/> SV-SH	
6	NN17 <input checked="" type="checkbox"/> P-SV	0.000
7	NN17 <input checked="" type="checkbox"/> P-SH	0.024
8	NN17 <input type="checkbox"/> SV-SH	
9	NN18 <input type="checkbox"/> P-SH	
10	NN19 <input checked="" type="checkbox"/> P-SV	0.000
11	NN19 <input type="checkbox"/> P-SH	
12	NN19 <input type="checkbox"/> SV-SH	
13	NN24 <input checked="" type="checkbox"/> P-SV	
14	NN32 <input checked="" type="checkbox"/> P-SH	



2014 Oct 7 7:26:23.180 UTC
Lat: 43.7251 Lon: -121.308 Depth: 1.23
43:43.5042 N 121:18.4896 W

Solve

North East Down
North 2.45e-01 -1.19e-01 1.67e-01
East -1.19e-01 -1.14e-01 -1.16e-02
Down 1.67e-01 -1.16e-02 4.69e-02

Scalar M0 = 2.822e-01
T = -0.574 k = 0.162

Total Penalty = 0.139

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
12	NN17	1.63	253	144	EHU	P	-0.012	<input checked="" type="checkbox"/> +	3.92e+00	1.90e+01
13	NN17	1.63	253	144	EHR	SV	0.008	<input checked="" type="checkbox"/> +	8.30e+01	2.40e+01
14	NN17	1.63	253	144	EHT	SH	0.007	<input checked="" type="checkbox"/> +	2.22e+02	9.67e+00
15	NN18	1.47	19	147	EHU	P	-0.008	<input checked="" type="checkbox"/> -	-1.99e+01	1.86e+01
16	NN18	1.47	19	147	EHR	SV	-0.017	<input checked="" type="checkbox"/> -	-1.91e+02	1.48e+01
17	NN19	0.76	173	162	EHU	P	0.010	<input checked="" type="checkbox"/> +	3.82e+01	1.53e+01
18	NN19	0.76	173	162	EHT	SH	0.073	<input checked="" type="checkbox"/> -	-1.44e+02	1.87e+01
19	NN21	1.73	59	143	EHU	P	-0.017	<input checked="" type="checkbox"/> -	-8.20e+00	1.62e+01
20	NN24	0.78	356	162	EHU	P	-0.018	<input checked="" type="checkbox"/> -	-2.36e+01	2.07e+01
21	NN24	0.78	356	162	EHR	SV	-0.052	<input checked="" type="checkbox"/> +	2.40e+02	1.96e+01
22	NN24	0.78	356	162	EHT	SH	-0.060	<input checked="" type="checkbox"/> -	-9.85e+01	1.74e+01
23	NN32	2.83	213	125	EHU	P	-0.012	<input checked="" type="checkbox"/> +	1.05e+01	1.26e+01
24	NN32	2.83	213	125	EHR	SV	0.039	<input checked="" type="checkbox"/> -	-1.75e+02	1.31e+01
25	NN32	2.83	213	125	EHT	SH	0.041	<input checked="" type="checkbox"/> -	-5.15e+01	2.87e+01

Sta	Type	Penalty
3	<input checked="" type="checkbox"/> P:SV	0.037
4	<input checked="" type="checkbox"/> P:SH	0.033
5	<input checked="" type="checkbox"/> SV:SH	0.053
6	<input checked="" type="checkbox"/> P:SV	0.000
7	<input type="checkbox"/> P:SH	
8	<input type="checkbox"/> SV:SH	
9	<input type="checkbox"/> P:SV	
10	<input type="checkbox"/> P:SH	
11	<input checked="" type="checkbox"/> P:SV	
12	<input checked="" type="checkbox"/> P:SH	
13	<input checked="" type="checkbox"/> SV:SH	
14	<input type="checkbox"/> P:SV	
15	<input checked="" type="checkbox"/> P:SH	
16	<input type="checkbox"/> SV:SH	

POLARITIES

AMPLITUDE RATIOS



2014 Oct 7 10:47:20.916 UTC
 Lat: 43.7253 Lon: -121.308 Depth: 1.273
 43:43.515 N 121:18.5028 W

Solve

North East Down
 North 4.38e-02 2.44e-01 4.36e-02
 East 2.44e-01 -1.80e-01 9.99e-02
 Down 4.36e-02 9.99e-02 -2.18e-05

Scalar M0 = 2.980e-01
 T = 0.137 k = -0.131

Total Penalty = 0.182

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	3.05	9	125	EHU	P	0.026	<input checked="" type="checkbox"/> +	1.46e+01	1.95e+01
2	NM03	3.05	9	125	EHR	SV	0.008	<input checked="" type="checkbox"/> -	-2.05e+02	1.71e+01
3	NM06	0.67	97	165	EHR	SV	0.137	<input type="checkbox"/> -	-4.85e+02	1.41e+01
4	NM06	0.67	97	165	EHT	SH	0.114	<input checked="" type="checkbox"/> -	-8.66e+02	1.21e+01
5	NM22	0.05	267	179	EHR	SV	0.056	<input type="checkbox"/> +	9.44e+02	1.14e+01
6	NM22	0.05	267	179	EHT	SH	0.038	<input type="checkbox"/> +	3.60e+02	1.21e+01
7	NM41	2.14	140	138	EHT	SH	0.085	<input type="checkbox"/> -	-3.15e+02	1.44e+01
8	NM42	3.67	40	119	EHU	P	0.011	<input checked="" type="checkbox"/> -	-7.51e+01	1.48e+01
9	NM42	3.67	40	119	EHR	SV	0.088	<input type="checkbox"/> +	4.70e+02	1.45e+01
10	NM42	3.67	40	119	EHT	SH	0.096	<input checked="" type="checkbox"/> -	-4.70e+02	1.16e+01
11	NN07	3.21	335	122	EHZ	P	0.002	<input checked="" type="checkbox"/> -	-2.81e+01	1.73e+01
12	NN09	2.14	294	135	EHU	P	0.018	<input checked="" type="checkbox"/> -	-6.41e+00	2.00e+01
13	NN09	2.14	294	135	EHR	SV	-0.018	<input checked="" type="checkbox"/> +	1.32e+02	2.55e+01
14	NN09	2.14	294	135	EHT	SH	0.022	<input type="checkbox"/> +	9.64e+01	3.01e+01
15	NN17	1.62	252	144	EHU	P	-0.002	<input checked="" type="checkbox"/> +	4.90e+00	2.15e+01

Sta	Type	Penalty
1	NM03 <input checked="" type="checkbox"/> P.SV	
2	NM06 <input type="checkbox"/> SV.SH	
3	NM42 <input checked="" type="checkbox"/> P.SV	0.020
4	NM42 <input type="checkbox"/> P.SH	
5	NM42 <input type="checkbox"/> SV.SH	
6	NN09 <input checked="" type="checkbox"/> P.SV	0.059
7	NN09 <input type="checkbox"/> P.SH	
8	NN09 <input type="checkbox"/> SV.SH	
9	NN17 <input checked="" type="checkbox"/> P.SH	0.062
10	NN18 <input checked="" type="checkbox"/> P.SV	0.039
11	NN19 <input checked="" type="checkbox"/> P.SV	
12	NN21 <input checked="" type="checkbox"/> P.SH	
13	NN24 <input checked="" type="checkbox"/> P.SV	
14	NN24 <input checked="" type="checkbox"/> P.SH	
15	NN24 <input checked="" type="checkbox"/> SV.SH	

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P:SH

P:SV

SV:SH



2014 Oct 8 7: 5: 5.941 UTC
 Lat: 43.7272 Lon: -121.308 Depth: 1.396
 43:43.635 N 121:18.4878 W

North East Down
 North 2.55e-02 1.51e-01 1.69e-02
 East 1.51e-01 -2.81e-01 1.79e-01
 Down 1.69e-02 1.79e-01 -4.14e-04

Scalar M0 = 3.079e-01
 T = 0.511 k = -0.209

Total Penalty = 0.113

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM06	0.71	115	165	EHU	P	✓ -		3.61e+01	8.42e+00
2	NM06	0.71	115	165	EHT	SH	☐ -		4.37e+02	1.69e+01
3	NM42	3.49	42	123	EHU	P	✓ -		1.76e+02	9.97e+00
4	NN09	2.08	289	138	EHU	P	✓ +		7.55e-01	2.02e+01
5	NN09	2.08	289	138	EHR	SV	✓ -		3.40e+01	2.63e+01
6	NN09	2.08	289	138	EHT	SH	☐ +		4.46e+01	9.56e+00
7	NN17	1.72	245	144	EHU	P	✓ +		3.01e+00	3.22e+01
8	NN17	1.72	245	144	EHR	SV	✓ +		5.44e+01	1.58e+01
9	NN17	1.72	245	144	EHT	SH	✓ -		9.72e+01	1.68e+01
10	NN18	1.25	23	153	EHU	P	✓ -		1.16e+01	1.93e+01
11	NN19	1.00	175	158	EHU	P	✓ -		3.10e+01	1.79e+01
12	NN19	1.00	175	158	EHR	SV	✓ +		8.10e+01	1.89e+01
13	NN19	1.00	175	158	EHT	SH	☐ -		1.67e+02	1.19e+01
14	NN21	1.61	66	147	EHT	SH	✓ -		8.58e+01	1.23e+01
15	NN24	0.54	354	168	EHU	P	✓ -		7.09e+00	2.68e+01
16	NN24	0.54	354	168	EHR	SV	✓ +		1.12e+02	2.13e+01
17	NN32	3.03	211	125	EHR	SV	✓ -		1.16e+02	1.61e+01

Sta	Type	Penalty
1	NM06	☐ P:SH
2	NN09	✓ P:SV 0.003
3	NN09	☐ P:SH
4	NN09	☐ SV:SH
5	NN17	☐ P:SV
6	NN17	✓ P:SH 0.111
7	NN17	☐ SV:SH
8	NN19	✓ P:SV
9	NN19	☐ P:SH
10	NN19	☐ SV:SH
11	NN24	✓ P:SV

POLARITIES

AMPLITUDE RATIOS



2014 Oct 8 19: 8.20.619 UTC
 Lat: 43.7257 Lon: -121.308 Depth: 0.964
 43:43.5408 N 121:18.465 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	3.00	9	120	EHU	P	0.055	<input checked="" type="checkbox"/> +	8.25e+00	5.03e+01
2	NM22	0.11	243	177	EHT	SH	0.101	<input checked="" type="checkbox"/> +	5.97e+02	1.36e+01
3	NN07	3.19	334	116	EHU	P	-0.015	<input checked="" type="checkbox"/> -	-1.54e+01	1.68e+01
4	NN07	3.19	334	116	EHR	SV	0.031	<input checked="" type="checkbox"/> +	1.12e+02	1.46e+01
5	NN09	2.17	293	129	EHU	P	0.006	<input checked="" type="checkbox"/> -	-2.26e+01	2.14e+01
6	NN09	2.17	293	129	EHR	SV	-0.011	<input checked="" type="checkbox"/> +	9.50e+01	2.77e+01
7	NN09	2.17	293	129	EHT	SH	0.026	<input type="checkbox"/> +	7.23e+01	2.58e+01
8	NN17	1.68	251	139	EHU	P	-0.006	<input checked="" type="checkbox"/> +	4.09e+00	2.81e+01
9	NN17	1.68	251	139	EHT	SH	-0.002	<input checked="" type="checkbox"/> -	-7.25e+01	1.87e+01
10	NN18	1.40	19	145	EHU	P	-0.007	<input checked="" type="checkbox"/> -	-3.69e+01	1.73e+01
11	NN19	0.82	175	158	EHU	P	0.017	<input checked="" type="checkbox"/> +	0.001 3.74e+01	1.70e+01
12	NN19	0.82	175	158	EHR	SV	0.024	<input checked="" type="checkbox"/> +	-1.55e+02	1.96e+01
13	NN19	0.82	175	158	EHT	SH	0.094	<input type="checkbox"/> -	-2.17e+02	1.48e+01
14	NN21	1.67	60	140	EHU	P	-0.017	<input checked="" type="checkbox"/> -	-2.68e+01	1.58e+01
15	NN24	0.71	353	161	EHU	P	-0.010	<input checked="" type="checkbox"/> -	-3.02e+01	1.80e+01

North East Down
 North -7.82e-03 2.19e-01 2.80e-02
 East 2.19e-01 -2.87e-01 1.01e-01
 Down 2.80e-02 1.01e-01 -8.51e-03

Scalar M0 = 3.168e-01
 T = 0.439 k = -0.240

Total Penalty = 0.147

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P-SV	0.114
2	<input checked="" type="checkbox"/> P-SV	0.021
3	<input type="checkbox"/> P-SH	
4	<input type="checkbox"/> SV-SH	
5	<input checked="" type="checkbox"/> P-SH	0.002
6	<input checked="" type="checkbox"/> P-SV	0.001
7	<input type="checkbox"/> P-SH	
8	<input type="checkbox"/> SV-SH	
9	<input checked="" type="checkbox"/> P-SV	
10	<input checked="" type="checkbox"/> P-SH	
11	<input checked="" type="checkbox"/> SV-SH	
12	<input type="checkbox"/> P-SV	
13	<input type="checkbox"/> P-SH	
14	<input checked="" type="checkbox"/> SV-SH	0.008



2014 Oct 8 21:16:58.200 UTC
 Lat: 43.7264 Lon: -121.309 Depth: 1.034
 43.43.5858 N 121.18.537 W

North East Down
 North -1.75e-01 -2.00e-01 1.28e-01
 East -2.00e-01 -6.44e-02 -1.70e-02
 Down 1.28e-01 -1.70e-02 6.96e-02

Scalar M0 = 2.769e-01
 T = 0.391 k = -0.162

Total Penalty = 0.119

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
2	NM06	0.74	106	162	EHR SV	0.122	✓ -		7.54e+02	1.31e+01
3	NM06	0.74	106	162	EHT SH	0.114	☐ -		4.81e+02	1.79e+01
4	NM22	0.13	180	177	EHU P	-0.019	✓ +		1.22e+02	1.69e+01
5	NN07	3.07	335	119	EHU P	0.014	✓ -		3.42e+01	1.59e+01
6	NN09	2.04	292	133	EHU P	0.029	✓ +		1.65e+01	8.84e+00
7	NN09	2.04	292	133	EHR SV	-0.046	✓ +		1.17e+02	2.49e+01
8	NN09	2.04	292	133	EHT SH	-0.010	✓ +		8.24e+01	3.08e+01
9	NN17	1.62	247	141	EHU P	-0.014	✓ +	0.014	5.02e+00	2.84e+01
10	NN17	1.62	247	141	EHT SH	-0.028	✓ -	0.016	1.49e+02	1.84e+01
11	NN18	1.36	24	147	EHU P	-0.004	✓ -		2.23e+01	1.85e+01
12	NN18	1.36	24	147	EHR SV	-0.012	☐ -		2.19e+02	1.46e+01
13	NN19	0.92	170	157	EHU P	0.003	✓ +		5.43e+01	1.84e+01
14	NN19	0.92	170	157	EHT SH	0.021	✓ -		1.42e+02	1.54e+01
15	NN21	1.71	64	140	EHU P	-0.016	☐ +		4.98e+00	2.05e+01
16	NN24	0.63	1	164	EHU P	-0.013	✓ -		4.79e+00	3.94e+01
17	NN24	0.63	1	164	EHR SV	-0.066	✓ +		2.12e+02	2.66e+01
18	NN32	2.92	211	120	EHU P	-0.009	✓ -		1.98e+01	1.43e+01
19	NN32	2.92	211	120	EHT SH	0.034	✓ -		4.54e+01	2.29e+01

Sta	Type	Penalty
1	✓ P:SV	0.078
2	☐ P:SH	
3	☐ SV:SH	
4	✓ P:SV	
5	✓ P:SH	
6	✓ SV:SH	
7	✓ P:SH	0.011
8	☐ P:SV	
9	✓ P:SH	
10	✓ P:SV	
11	✓ P:SH	

CLVD
 +Crack
 +Dipole
 -CLVD
 Dipole
 Crack

POLARITIES

P SH SV

SN SE

AMPLITUDE RATIOS

P:SH P:SV SV:SH



2014 Oct 9 6:24:33.418 UTC
 Lat: 43.7271 Lon: -121.309 Depth: 0.688
 43.43.6272 N 121.18.555 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM22	0.21	173	174	EHU	P	-0.010	<input checked="" type="checkbox"/>	3.68e+02	1.44e+01
2	NM42	3.56	43	108	EHR	SV	0.030	<input type="checkbox"/>	-1.86e+02	1.42e+01
3	NM42	3.56	43	108	EHT	SH	0.069	<input checked="" type="checkbox"/>	-5.08e+02	8.09e+00
4	NN07	2.99	335	112	EHU	P	0.001	<input checked="" type="checkbox"/>	-3.21e+01	1.69e+01
5	NN07	2.99	335	112	EHT	SH	0.028	<input checked="" type="checkbox"/>	7.83e+01	2.37e+01
6	NN09	1.99	290	126	EHU	P	0.004	<input checked="" type="checkbox"/>	-2.29e+01	1.79e+01
7	NN09	1.99	290	126	EHR	SV	0.000	<input checked="" type="checkbox"/>	3.15e+02	1.08e+01
8	NN09	1.99	290	126	EHT	SH	0.033	<input checked="" type="checkbox"/>	9.64e+01	2.25e+01
9	NN17	1.63	244	134	EHU	P	-0.003	<input checked="" type="checkbox"/>	3.73e+00	2.71e+01
10	NN17	1.63	244	134	EHT	SH	0.025	<input checked="" type="checkbox"/>	-2.10e+02	2.02e+01
11	NN18	1.30	26	143	EHU	P	0.006	<input checked="" type="checkbox"/>	5.94e+01	1.78e+01
12	NN18	1.30	26	143	EHR	SV	0.022	<input type="checkbox"/>	-5.91e+02	1.29e+01
13	NN19	1.00	169	150	EHU	P	0.019	<input checked="" type="checkbox"/>	6.67e+01	2.03e+01
14	NN19	1.00	169	150	EHR	SV	-0.015	<input checked="" type="checkbox"/>	5.19e+02	1.86e+01
15	NN21	1.70	67	134	EHU	P	-0.012	<input checked="" type="checkbox"/>	2.85e+01	1.54e+01

North East Down
 North 2.44e-02 7.10e-02 -8.64e-02
 East 7.10e-02 -2.43e-02 -1.62e-01
 Down -8.64e-02 -1.62e-01 3.13e-01

Scalar M0 = 2.970e-01
 T = -0.650 k = 0.256

Total Penalty = 0.162

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	NM42 <input type="checkbox"/> SV-SH	
2	NN07 <input type="checkbox"/> P-SH	
3	NN09 <input checked="" type="checkbox"/> P-SV	
4	NN09 <input checked="" type="checkbox"/> P-SH	
5	NN09 <input checked="" type="checkbox"/> SV-SH	
6	NN17 <input checked="" type="checkbox"/> P-SH	0.015
7	NN18 <input type="checkbox"/> P-SV	
8	NN19 <input checked="" type="checkbox"/> P-SV	0.091
9	NN21 <input type="checkbox"/> P-SV	
10	NN24 <input type="checkbox"/> P-SV	
11	NN24 <input checked="" type="checkbox"/> P-SH	0.009
12	NN24 <input type="checkbox"/> SV-SH	
13	NN32 <input checked="" type="checkbox"/> P-SV	
14	NN32 <input checked="" type="checkbox"/> P-SH	0.001
15	NN32 <input checked="" type="checkbox"/> SV-SH	0.017



2014 Oct 9 10:16: 9.945 UTC
 Lat: 43.7262 Lon: -121.311 Depth: 0.847
 43:43.5744 N 121:18.6756 W

North East Down
 North 7.44e-02 8.69e-02 -1.45e-01
 East 8.69e-02 -6.60e-02 -9.86e-02
 Down -1.45e-01 -9.86e-02 1.98e-01

Scalar M0 = 2.509e-01
 T = -0.652 k = 0.205

Total Penalty = 0.068

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.99	14	118	EHU	P	0.019		1.17e+01	2.20e+01
2	NM06	0.92	102	156	EHU	P	0.013		1.38e+02	1.40e+01
3	NM06	0.92	102	156	EHT	SH	0.120		-5.78e+02	1.84e+01
4	NM42	3.74	44	111	EHU	P	0.049		1.35e+02	1.47e+01
5	NM42	3.74	44	111	EHT	SH	0.030		-2.54e+02	5.90e+00
6	NN07	3.02	338	115	EHU	P	0.002		-1.90e+01	1.80e+01
7	NN07	3.02	338	115	EHT	SH	-0.002		-5.16e+01	2.29e+01
8	NN17	1.44	245	141	EHU	P	-0.004	0.018	6.21e+00	3.06e+01
9	NN17	1.44	245	141	EHR	SV	0.034		2.41e+01	3.18e+01
10	NN17	1.44	245	141	EHT	SH	0.014	0.001	-1.97e+02	1.55e+01
11	NN18	1.46	30	142	EHU	P	-0.029		-2.73e+01	1.78e+01
12	NN18	1.46	30	142	EHR	SV	-0.051		-2.90e+02	1.30e+01
13	NN18	1.46	30	142	EHT	SH	0.022		-1.06e+02	1.39e+01
14	NN19	0.95	158	154	EHU	P	-0.001		4.99e+01	1.93e+01
15	NN19	0.95	158	154	EHT	SH	0.043		-2.49e+02	1.23e+01

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P:SH	0.031
2	<input checked="" type="checkbox"/> P:SH	
3	<input type="checkbox"/> P:SH	
4	<input type="checkbox"/> P:SV	
5	<input checked="" type="checkbox"/> P:SH	0.018
6	<input type="checkbox"/> SV:SH	
7	<input type="checkbox"/> P:SV	
8	<input type="checkbox"/> P:SH	
9	<input checked="" type="checkbox"/> SV:SH	
10	<input checked="" type="checkbox"/> P:SH	
11	<input type="checkbox"/> P:SH	
12	<input checked="" type="checkbox"/> P:SV	
13	<input checked="" type="checkbox"/> P:SH	
14	<input checked="" type="checkbox"/> SV:SH	

CLVD
 +Crack
 +Dipole
 -Crack
 -Dipole

POLARITIES

P SH SV
 SN SE

AMPLITUDE RATIOS

P:SH P:SV SV:SH



2014 Oct 10 6:54:56.708 UTC
 Lat: 43.727 Lon: -121.312 Depth: 0.277
 43:43.62 N 121:18.6996 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
13 NN09	1.82	292	115	EHT	SH	0.055	<input type="checkbox"/> +		7.13e+01	3.39e+01
14 NN17	1.45	242	126	EHU	P	-0.011	<input type="checkbox"/> +		4.58e+00	2.37e+01
15 NN17	1.45	242	126	EHR	SV	0.062	<input checked="" type="checkbox"/> -	0.005	-4.30e+02	2.63e+02
16 NN17	1.45	242	126	EHT	SH	0.033	<input checked="" type="checkbox"/> -		-1.76e+02	1.64e+01
17 NN18	1.41	33	129	EHU	P	-0.013	<input checked="" type="checkbox"/> -		-4.75e+01	1.58e+01
18 NN18	1.41	33	129	EHR	SV	0.005	<input checked="" type="checkbox"/> -		-2.50e+02	1.56e+01
19 NN18	1.41	33	129	EHT	SH	0.068	<input type="checkbox"/> -		-2.13e+02	2.10e+01
20 NN19	1.04	159	141	EHU	P	-0.005	<input checked="" type="checkbox"/> +		6.36e+01	1.64e+01
21 NN19	1.04	159	141	EHT	SH	-0.034	<input checked="" type="checkbox"/> +		8.54e+01	9.33e+00
22 NN21	1.89	69	116	EHU	P	-0.034	<input checked="" type="checkbox"/> -	0.031	-1.98e+01	1.56e+01
23 NN21	1.89	69	116	EHT	SH	0.022	<input checked="" type="checkbox"/> +		4.58e+01	2.21e+01
24 NN24	0.61	22	156	EHU	P	-0.004	<input checked="" type="checkbox"/> -		-3.32e+01	2.05e+01
25 NN24	0.61	22	156	EHR	SV	0.004	<input checked="" type="checkbox"/> +		2.76e+02	2.77e+01
26 NN24	0.61	22	156	EHT	SH	0.007	<input checked="" type="checkbox"/> -		-1.87e+01	3.55e+01

North East Down
 North 6.23e-02 7.90e-02 1.64e-01
 East 7.90e-02 1.39e-01 1.16e-01
 Down 1.64e-01 1.16e-01 8.12e-02

Scalar M0 = 2.478e-01
 T = -0.425 k = 0.282

Total Penalty = 0.138

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1 NM06	<input type="checkbox"/> P-SH	
2 NM42	<input checked="" type="checkbox"/> P-SH	
3 NN07	<input checked="" type="checkbox"/> P-SH	0.020
4 NN09	<input type="checkbox"/> P-SV	
5 NN09	<input type="checkbox"/> P-SH	
6 NN09	<input type="checkbox"/> SV-SH	
7 NN17	<input type="checkbox"/> P-SV	
8 NN17	<input type="checkbox"/> P-SH	
9 NN17	<input type="checkbox"/> SV-SH	
10 NN18	<input checked="" type="checkbox"/> P-SV	
11 NN18	<input type="checkbox"/> P-SH	
12 NN18	<input type="checkbox"/> SV-SH	
13 NN19	<input type="checkbox"/> P-SH	
14 NN21	<input checked="" type="checkbox"/> P-SH	0.067
15 NN24	<input checked="" type="checkbox"/> P-SV	



2014 Oct 10 8: 4:29.986 UTC
Lat: 43.7267 Lon: -121.31 Depth: 0.713
43:43.6026 N 121:18.576 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.91	12	115	EHU	P	0.007	<input checked="" type="checkbox"/> -	-2.66e+00	3.14e+01
2	NM06	0.80	107	157	EHU	P	0.040	<input checked="" type="checkbox"/> +	6.16e+01	2.09e+01
3	NM06	0.80	107	157	EHR	SV	0.074	<input checked="" type="checkbox"/> +	9.74e+01	2.55e+01
4	NM22	0.17	162	175	EHU	P	-0.001	<input checked="" type="checkbox"/> +	9.77e+00	1.96e+01
5	NM42	3.61	43	109	EHU	P	0.040	<input checked="" type="checkbox"/> +	1.34e+02	1.04e+01
6	NM42	3.61	43	109	EHR	SV	0.037	<input checked="" type="checkbox"/> -	-1.13e+02	1.56e+01
7	NM42	3.61	43	109	EHT	SH	-0.043	<input checked="" type="checkbox"/> +	4.70e+01	1.08e+01
8	NN07	3.02	336	112	EHU	P	0.000	<input checked="" type="checkbox"/> -	-1.24e+01	1.38e+01
9	NN07	3.02	336	112	EHT	SH	-0.078	<input type="checkbox"/> -	-5.60e+01	1.50e+01
10	NN09	1.98	291	127	EHU	P	0.019	<input checked="" type="checkbox"/> -	-2.39e+00	2.28e+01
11	NN09	1.98	291	127	EHR	SV	0.001	<input checked="" type="checkbox"/> +	1.07e+02	2.31e+01
12	NN09	1.98	291	127	EHT	SH	0.041	<input type="checkbox"/> +	6.88e+01	2.77e+01
13	NN17	1.59	245	136	EHU	P	-0.012	<input checked="" type="checkbox"/> +	0.041 4.21e+00	1.93e+01
14	NN17	1.59	245	136	EHR	SV	-0.021	<input checked="" type="checkbox"/> +	6.77e+01	9.47e+00
15	NN17	1.59	245	136	EHT	SH	0.026	<input checked="" type="checkbox"/> -	-8.40e+01	1.80e+01

North East Down
North -7.19e-02 1.81e-01 8.89e-02
East 1.81e-01 -1.77e-01 -9.17e-02
Down 8.89e-02 -9.17e-02 2.76e-02

Scalar M0 = 2.604e-01
T = 0.891 k = -0.208

Total Penalty = 0.124

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P:SV	0.003
2	<input checked="" type="checkbox"/> P:SV	0.000
3	<input checked="" type="checkbox"/> P:SH	0.000
4	<input checked="" type="checkbox"/> SV:SH	0.000
5	<input type="checkbox"/> P:SH	
6	<input type="checkbox"/> P:SV	
7	<input type="checkbox"/> P:SH	
8	<input type="checkbox"/> SV:SH	
9	<input type="checkbox"/> P:SV	
10	<input type="checkbox"/> P:SH	
11	<input type="checkbox"/> SV:SH	
12	<input checked="" type="checkbox"/> P:SV	0.004
13	<input type="checkbox"/> P:SH	
14	<input type="checkbox"/> SV:SH	
15	<input checked="" type="checkbox"/> P:SV	0.000



2014 Oct 11 3:29: 5.667 UTC
 Lat: 43.7264 Lon: -121.31 Depth: 0.504
 43.43.5846 N 121.18.5856 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.94	12	108	EHU	P	0.007		-1.23e+01	1.01e+01
2	NM22	0.15	153	175	EHU	P	-0.014		2.84e+02	1.44e+01
3	NM42	3.65	43	102	EHU	P	-0.024		-1.11e+02	1.07e+01
4	NM42	3.65	43	102	EHR	SV	0.120	0.007	-2.78e+02	2.42e+01
5	NM42	3.65	43	102	EHT	SH	0.118		2.19e+02	1.07e+01
6	NN07	3.05	336	105	EHU	P	-0.007		-2.88e+01	1.32e+01
7	NN07	3.05	336	105	EHR	SV	0.027		-1.80e+02	2.16e+01
8	NN07	3.05	336	105	EHT	SH	-0.002		-1.46e+02	1.33e+01
9	NN09	1.98	292	121	EHU	P	0.011		2.00e+00	2.32e+01
10	NN09	1.98	292	121	EHR	SV	-0.014	0.018	1.25e+02	1.09e+01
11	NN09	1.98	292	121	EHT	SH	0.019	0.023	1.07e+02	4.00e+01
12	NN17	1.56	246	131	EHU	P	-0.009		1.13e+01	3.06e+01
13	NN17	1.56	246	131	EHR	SV	0.035		-1.02e+03	1.17e+01
14	NN17	1.56	246	131	EHT	SH	-0.001	0.001	-4.62e+02	1.18e+01
15	NN18	1.39	26	136	EHU	P			-6.46e+01	1.58e+01

Sta	Type	Penalty
1	NM42 P.SV	
2	NM42 P.SH	
3	NM42 SV.SH	
4	NN07 P.SV	0.004
5	NN07 P.SH	
6	NN07 SV.SH	
7	NN09 P.SV	
8	NN09 P.SH	
9	NN09 SV.SH	
10	NN17 P.SV	
11	NN17 P.SH	0.008
12	NN17 SV.SH	
13	NN18 P.SV	
14	NN18 P.SH	
15	NN18 SV.SH	

North East Down
 North -1.43e-01 -1.36e-01 1.56e-01
 East -1.36e-01 3.35e-03 -5.83e-02
 Down 1.56e-01 -5.83e-02 1.55e-01

Scalar M0 = 2.611e-01
 T = -0.033 k = 0.020

Total Penalty = 0.157

POLARITIES

AMPLITUDE RATIOS



2014 Oct 11 10:53:26.502 UTC
 Lat: 43.726 Lon: -121.309 Depth: 0.885
 43:43.5606 N 121:18.5628 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.98	11	119	EHU	P	-0.001	✓ -	✓ -5.63e+00	2.29e+01
2	NM06	0.76	102	160	EHU	P	0.015	☐ +	✓ 1.05e+02	1.49e+01
3	NM06	0.76	102	160	EHR	SV	0.091	✓ +	✓ 3.24e+02	2.31e+01
4	NM06	0.76	102	160	EHT	SH	0.134	☐ -	✓ -1.07e+03	1.56e+01
5	NM22	0.09	158	177	EHU	P	-0.014	✓ +	✓ 8.72e+01	1.74e+01
6	NM41	2.25	139	129	EHT	SH	0.067	☐ -	✓ -3.24e+02	1.04e+01
7	NM42	3.66	42	112	EHU	P	0.014	✓ -	✓ -8.38e+01	1.29e+01
8	NM42	3.66	42	112	EHT	SH	0.140	✓ -	✓ -3.74e+02	1.01e+01
9	NN07	3.10	336	115	EHU	P	0.014	✓ -	✓ -2.11e+01	1.59e+01
10	NN09	2.03	293	130	EHU	P	0.012	✓ -	✓ -3.56e+00	2.39e+01
11	NN09	2.03	293	130	EHR	SV	-0.008	✓ +	✓ 1.47e+02	1.92e+01
12	NN09	2.03	293	130	EHT	SH	0.032	✓ + 0.007	✓ 1.44e+03	6.37e+01
13	NN17	1.57	248	139	EHU	P	-0.002	✓ +	✓ 6.63e+00	2.63e+01
14	NN17	1.57	248	139	EHR	SV	0.005	✓ +	✓ 2.03e+02	1.92e+01
15	NN17	1.57	248	139	EHT	SH	-0.001	✓ -	✓ -1.55e+02	1.69e+01

North East Down
 North 3.71e-03 3.87e-02 5.61e-02
 East 3.87e-02 -3.57e-01 2.09e-01
 Down 5.61e-02 2.09e-01 2.16e-02

Scalar M0 = 3.353e-01
 T = 0.489 k = -0.246

Total Penalty = 0.191

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P:SH

P:SV

SV:SH

Sta	Type	Penalty
1	NM06 <input type="checkbox"/> P:SV	
2	NM06 <input type="checkbox"/> P:SH	
3	NM06 <input type="checkbox"/> SV:SH	
4	NM42 <input checked="" type="checkbox"/> P:SH	0.001
5	NN09 <input checked="" type="checkbox"/> P:SV	0.005
6	NN09 <input checked="" type="checkbox"/> P:SH	0.017
7	NN09 <input type="checkbox"/> SV:SH	
8	NN17 <input checked="" type="checkbox"/> P:SV	0.087
9	NN17 <input checked="" type="checkbox"/> P:SH	0.088
10	NN17 <input checked="" type="checkbox"/> SV:SH	0.004
11	NN18 <input type="checkbox"/> P:SH	
12	NN19 <input checked="" type="checkbox"/> P:SV	0.004
13	NN19 <input type="checkbox"/> P:SH	
14	NN19 <input type="checkbox"/> SV:SH	
15	NN24 <input checked="" type="checkbox"/> P:SV	0.006



2014 Oct 12 10:12:29.632 UTC
 Lat: 43.7268 Lon: -121.311 Depth: 0.483
 43:43.6104 N 121:18.666 W

North East Down
 North -1.35e-01 -1.17e-01 2.00e-01
 East -1.17e-01 -4.10e-02 -5.34e-02
 Down 2.00e-01 -5.34e-02 8.30e-02

Scalar M0 = 2.644e-01
 T = -0.188 k = -0.102

Total Penalty = 0.119

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.92	14	108	EHU	P	0.012		-6.62e+00	2.51e+01
2	NM03	2.92	14	108	EHR	SV	0.016		2.68e+02	1.71e+01
3	NM06	0.92	106	151	EHU	P	0.023		1.61e+02	1.40e+01
4	NM06	0.92	106	151	EHT	SH	0.059		3.58e+02	1.62e+01
5	NM22	0.25	136	172	EHU	P	-0.018		1.92e+02	1.42e+01
6	NM42	3.69	44	101	EHU	P	-0.008		-5.75e+01	2.45e+01
7	NN07	2.96	338	105	EHU	P	0.003		-3.17e+01	1.37e+01
8	NN07	2.96	338	105	EHT	SH	0.007		-1.28e+02	1.80e+01
9	NN09	1.87	292	123	EHZ	P	0.010			
10	NN09	1.87	292	123	EHR	SV	-0.018	0.025	1.66e+02	1.58e+01
11	NN09	1.87	292	123	EHT	SH	0.041	0.046	1.11e+02	3.55e+01
12	NN17	1.49	243	132	EHU	P	-0.004	0.006	6.53e+00	2.36e+01
13	NN17	1.49	243	132	EHR	SV	0.049		-7.09e+02	8.92e+00
14	NN17	1.49	243	132	EHT	SH	0.018		-3.24e+02	1.19e+01
15	NN18	1.40	31	136	EHU	P	-0.004		-6.93e+01	1.74e+01

2014 Oct 12 10:12:29.632 UTC

Sta	Type	Penalty	
1	NM03	<input type="checkbox"/> P-SV	
2	NM06	<input type="checkbox"/> P-SH	
3	NN07	<input checked="" type="checkbox"/> P-SH	
4	NN09	<input checked="" type="checkbox"/> SV-SH	0.029
5	NN17	<input checked="" type="checkbox"/> P-SV	
6	NN17	<input checked="" type="checkbox"/> P-SH	0.012
7	NN17	<input type="checkbox"/> SV-SH	
8	NN18	<input type="checkbox"/> P-SV	
9	NN18	<input checked="" type="checkbox"/> P-SH	
10	NN18	<input type="checkbox"/> SV-SH	
11	NN19	<input type="checkbox"/> P-SH	
12	NN21	<input type="checkbox"/> P-SH	
13	NN24	<input checked="" type="checkbox"/> P-SV	
14	NN32	<input type="checkbox"/> P-SV	
15	NN32	<input checked="" type="checkbox"/> P-SH	

POLARITIES

P SH SV SN SE

AMPLITUDE RATIOS

P:SH P:SV SV:SH



2014 Oct 12 16:37:43.287 UTC
 Lat: 43.7267 Lon: -121.31 Depth: 0.497
 43:43.6032 N 121:18.6036 W

Solve

North East Down
 North -4.88e-01 -1.02e-01 5.97e-02
 East -1.02e-01 5.62e-02 -1.84e-03
 Down 5.97e-02 -1.84e-03 1.29e-01

Scalar M0 = 3.782e-01
 T = 0.842 k = -0.197

Total Penalty = 0.082

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.92	12	108	EHU	P	-0.003	✓ -	✓ 6.76e+01	1.88e+01
2	NM03	2.92	12	109	EHR	SV	0.086	✓ +	✓ 5.39e+03	1.26e+01
3	NM06	0.83	107	153	EHU	P	0.021	✓ +	✓ 2.48e+03	1.29e+01
4	NM06	0.83	107	153	EHT	SH	0.069	✓ +	✓ 1.59e+03	1.78e+01
5	NM22	0.19	152	174	EHU	P	-0.019	✓ +	✓ 3.36e+03	1.33e+01
6	NM41	2.35	140	117	EHU	P	-0.009	✓ -	✓ 2.98e+02	1.43e+01
7	NM41	2.35	140	117	EHT	SH	0.010	✓ -	✓ 4.42e+03	2.15e+01
8	NM42	3.64	43	102	EHU	P	-0.012	✓ -	✓ 6.18e+02	1.05e+01
9	NM42	3.64	43	102	EHT	SH	0.094	□ -	✓ 5.88e+03	1.03e+01
10	NN07	3.01	336	105	EHU	P	0.001	✓ -	✓ 4.20e+02	1.44e+01
11	NN07	3.01	336	105	EHT	SH	0.027	✓ -	✓ 1.53e+03	1.98e+01
12	NN09	1.95	292	122	EHU	P	0.009	✓ +	✓ 3.78e+02	1.81e+01
13	NN09	1.95	292	122	EHR	SV	0.002	✓ +	✓ 1.95e+03	1.20e+01
14	NN09	1.95	292	122	EHT	SH	0.034	□ +	✓ 1.66e+03	1.93e+01
15	NN17	1.55	245	131	EHU	P	-0.001	✓ +	✓ 5.92e+01	2.83e+01

Sta	Type	Penalty	
1	NM03	<input type="checkbox"/> P-SV	
2	NM06	<input checked="" type="checkbox"/> P-SH	
3	NM41	<input checked="" type="checkbox"/> P-SH	
4	NM42	<input type="checkbox"/> P-SH	
5	NN07	<input checked="" type="checkbox"/> P-SH	
6	NN09	<input checked="" type="checkbox"/> P-SV	0.027
7	NN09	<input type="checkbox"/> P-SH	
8	NN09	<input type="checkbox"/> SV-SH	
9	NN17	<input checked="" type="checkbox"/> P-SH	
10	NN18	<input type="checkbox"/> P-SV	
11	NN18	<input type="checkbox"/> P-SH	
12	NN18	<input type="checkbox"/> SV-SH	
13	NN19	<input checked="" type="checkbox"/> P-SV	0.016
14	NN21	<input checked="" type="checkbox"/> P-SV	0.038
15	NN24	<input type="checkbox"/> P-SV	

POLARITIES

AMPLITUDE RATIOS



2014 Oct 12 16:47: 1.137 UTC
 Lat: 43.7278 Lon: -121.311 Depth: 0.564
 43.43.6686 N 121.18.6396 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
7	NN09	1.86	289	125	EHU	P	0.007	<input checked="" type="checkbox"/> -	8.93e+00	1.80e+01
8	NN09	1.86	289	125	EHR	SV	0.004	<input checked="" type="checkbox"/> +	1.38e+02	1.33e+01
9	NN09	1.86	289	125	EHT	SH	0.037	<input checked="" type="checkbox"/> +	8.17e+01	1.94e+01
10	NN17	1.57	240	133	EHU	P	-0.018	<input checked="" type="checkbox"/> + 0.013	4.33e+00	2.74e+01
11	NN17	1.57	240	133	EHR	SV	0.021	<input type="checkbox"/> -	3.49e+02	1.16e+01
12	NN17	1.57	240	133	EHT	SH	0.045	<input type="checkbox"/> +	2.48e+02	1.26e+01
13	NN18	1.29	32	140	EHU	P	0.005	<input checked="" type="checkbox"/> -	1.94e+01	1.62e+01
14	NN18	1.29	32	140	EHT	SH	0.061	<input checked="" type="checkbox"/> -	3.61e+02	1.22e+01
15	NN19	1.10	164	145	EHU	P	-0.020	<input checked="" type="checkbox"/> +	6.08e+01	1.93e+01
16	NN19	1.10	164	145	EHT	SH	-0.034	<input checked="" type="checkbox"/> +	4.56e+01	1.84e+01
17	NN21	1.78	70	129	EHU	P	-0.003	<input checked="" type="checkbox"/> -	3.78e+00	1.77e+01
18	NN21	1.78	70	129	EHT	SH	0.036	<input checked="" type="checkbox"/> +	4.84e+01	1.82e+01
19	NN24	0.49	17	164	EHU	P	-0.007	<input checked="" type="checkbox"/> -	1.09e+01	2.52e+01
20	NN24	0.49	17	164	EHR	SV	-0.032	<input checked="" type="checkbox"/> +	3.37e+02	1.96e+01
21	NN24	0.49	17	164	EHT	SH	-0.013	<input checked="" type="checkbox"/> + 0.024	1.55e+02	3.22e+01

Sta	Type	Penalty
1	NM06 <input type="checkbox"/> P:SH	
2	NN07 <input checked="" type="checkbox"/> P:SH	
3	NN09 <input checked="" type="checkbox"/> P:SV 0.068	
4	NN09 <input checked="" type="checkbox"/> P:SH 0.068	
5	NN09 <input checked="" type="checkbox"/> SV:SH	
6	NN17 <input checked="" type="checkbox"/> P:SV	
7	NN17 <input checked="" type="checkbox"/> P:SH 0.000	
8	NN17 <input type="checkbox"/> SV:SH	
9	NN18 <input type="checkbox"/> P:SH	
10	NN19 <input checked="" type="checkbox"/> P:SH	
11	NN21 <input type="checkbox"/> P:SH	
12	NN24 <input checked="" type="checkbox"/> P:SV 0.026	
13	NN24 <input checked="" type="checkbox"/> P:SH 0.007	
14	NN24 <input type="checkbox"/> SV:SH	

North East Down
 North 4.02e-02 -1.23e-01 1.61e-01
 East -1.23e-01 -2.56e-01 1.97e-02
 Down 1.61e-01 1.97e-02 9.60e-02

Scalar M0 = 2.824e-01
 T = -0.034 k = -0.125

Total Penalty = 0.206

POLARITIES

AMPLITUDE RATIOS



2014 Oct 12 18:33: 4.693 UTC
 Lat: 43.7256 Lon: -121.309 Depth: 0.849
 43:43:533 N 121:18:5412 W

Solve

North East Down
 North 2.03e-01 -2.42e-02 1.71e-01
 East -2.42e-02 -3.05e-01 -4.33e-02
 Down 1.71e-01 -4.33e-02 1.57e-02

Scalar M0 = 3.143e-01
 T = -0.322 k = -0.079

Total Penalty = 0.181

POLARITIES

AMPLITUDE RATIOS

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM42	3.68	41	111	EHU	P	0.004	✓ -	✓ -1.31e+02	1.17e+01
2	NM42	3.68	41	111	EHR	SV	0.070	✓ -	✓ -2.49e+02	1.95e+01
3	NN07	3.16	336	114	EHU	P	0.005	✓ -	✓ -2.44e+01	1.66e+01
4	NN07	3.16	336	114	EHT	SH	-0.008	☐ -	✓ -7.73e+01	2.54e+01
5	NN09	2.08	294	129	EHU	P	0.011	✓ -	✓ -1.08e+00	2.74e+01
6	NN09	2.08	294	129	EHR	SV	0.000	✓ +	✓ 1.03e+02	3.21e+01
7	NN09	2.08	294	129	EHT	SH	0.029	✓ +	✓ 9.50e+01	3.09e+01
8	NN17	1.58	250	139	EHU	P	-0.002	✓ + 0.086	✓ 9.71e+00	2.58e+01
9	NN17	1.58	250	139	EHR	SV	0.022	✓ +	✓ 1.71e+02	1.51e+01
10	NN17	1.58	250	139	EHT	SH	0.009	✓ -	✓ -2.88e+02	1.89e+01
11	NN18	1.45	23	142	EHU	P	-0.004	✓ -	✓ -3.26e+01	1.72e+01
12	NN18	1.45	23	142	EHR	SV	0.004	✓ -	✓ -3.18e+02	1.91e+01
13	NN19	0.82	168	157	EHU	P	0.010	✓ +	✓ 8.13e+01	1.79e+01
14	NN19	0.82	168	157	EHT	SH	0.032	✓ +	✓ 5.28e+01	2.11e+01
15	NN21	1.76	61	136	EHU	P	0.001	✓ -	✓ -1.13e+01	1.89e+01

Sta	Type	Penalty
1	NM42	✓ P:SV
2	NN07	☐ P:SH
3	NN09	☐ P:SV
4	NN09	☐ P:SH
5	NN09	✓ SV:SH
6	NN17	☐ P:SV
7	NN17	☐ P:SH
8	NN17	✓ SV:SH
9	NN18	☐ P:SV
10	NN19	✓ P:SH
11	NN21	☐ P:SH
12	NN24	☐ P:SV
13	NN24	☐ P:SH
14	NN24	✓ SV:SH
15	NN32	☐ P:SV



2014 Oct 12 21:10:23.311 UTC
 Lat: 43.7274 Lon: -121.311 Depth: 0.467
 43:43.647 N 121:18.6408 W

North East Down
 North -2.21e-01 1.54e-01 9.04e-02
 East 1.54e-01 4.96e-02 8.19e-02
 Down 9.04e-02 8.19e-02 7.60e-02

Scalar M0 = 2.593e-01
 T = 0.154 k = -0.107

Total Penalty = 0.171

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1 NM06	0.91	111	151	EHU	P	0.039	✓ +		✓ 1.97e+02	1.82e+01
2 NM06	0.91	111	151	EHT	SH	0.055	✓ +		✓ 3.55e+02	1.19e+01
3 NM22	0.28	151	171	EHU	P	-0.023	✓ +		✓ 3.47e+02	1.50e+01
4 NM22	0.28	151	171	EHT	SH	0.059	☐ -		✓ -1.16e+03	1.07e+01
5 NM42	3.61	45	101	EHR	SV	0.118	✓ -		✓ -2.04e+02	1.40e+01
6 NN07	2.91	336	105	EHU	P	0.013	✓ -		✓ -2.46e+01	1.55e+01
7 NN07	2.91	336	105	EHT	SH	0.018	✓ -		✓ -1.29e+02	1.19e+01
8 NN09	1.87	290	122	EHU	P	0.018	✓ +		✓ 2.43e+00	3.16e+01
9 NN09	1.87	290	122	EHR	SV	0.007	✓ +		✓ 1.06e+02	2.64e+01
10 NN09	1.87	290	122	EHT	SH	0.034	☐ +		✓ 1.17e+02	3.13e+01
11 NN17	1.55	241	130	EHU	P	-0.011	✓ +		✓ 7.24e+00	3.42e+01
12 NN17	1.55	241	130	EHR	SV	0.022	✓ -		✓ -7.16e+02	1.64e+01
13 NN17	1.55	241	130	EHT	SH	0.003	✓ -		✓ -3.67e+02	1.31e+01
14 NN18	1.32	31	137	EHU	P	-0.019	☐ +		✓ 1.38e+01	2.68e+01
15 NN18	1.32	31	137	EHR	SV	0.005	☐ -		✓ -5.04e+02	1.09e+01

Sta	Type	Penalty
1 NM06		
2 NM22	☐ P:SH	
3 NN07	☐ P:SH	
4 NN09	✓ P:SV	0.004
5 NN09	✓ P:SH	0.025
6 NN09	☐ SV:SH	
7 NN17	☐ P:SV	
8 NN17	☐ P:SH	
9 NN17	✓ SV:SH	0.000
10 NN18	✓ P:SV	0.077
11 NN18	☐ P:SH	
12 NN18	☐ SV:SH	
13 NN21	✓ P:SH	0.005
14 NN24	✓ P:SV	0.025
15 NN32	☐ P:SH	

POLARITIES

AMPLITUDE RATIOS



2014 Oct 12 21:10:23.330 UTC
 Lat: 43.7272 Lon: -121.311 Depth: 0.305
 43:43.632 N 121:18.6822 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM06	0.95	108	146	EHU	P	0.036			
2	NM06	0.95	108	146	EHT	SH	0.076			
3	NM22	0.29	138	169	EHU	P	-0.028		2.88e+02	1.62e+01
4	NM42	3.67	45	95	EHU	P	0.013		2.84e+02	1.14e+01
5	NM42	3.67	45	95	EHR	SV	0.085		-2.20e+02	2.00e+01
6	NM42	3.67	45	95	EHT	SH	0.098		3.90e+01	1.06e+01
7	NN07	2.92	338	97	EHU	P	0.002		-1.30e+01	1.52e+01
8	NN07	2.92	338	97	EHR	SV	0.040		-1.01e+02	1.75e+01
9	NN07	2.92	338	97	EHT	SH	0.013		-9.99e+01	1.86e+01
10	NN09	1.83	291	116	EHR	SV	0.004		9.53e+01	1.61e+01
11	NN09	1.83	291	116	EHT	SH	0.060		7.32e+01	3.66e+01
12	NN17	1.49	241	127	EHU	P	0.006		6.20e+00	3.11e+01
13	NN17	1.49	241	127	EHR	SV	0.068	0.018	-5.77e+02	1.60e+01
14	NN17	1.49	241	127	EHT	SH	0.032		-3.04e+02	1.18e+01
15	NN18	1.37	33	131	EHU	P	-0.022		7.71e+00	2.38e+01

North East Down
 North 3.23e-02 2.19e-01 1.15e-01
 East 2.19e-01 -1.53e-01 4.44e-02
 Down 1.15e-01 4.44e-02 5.91e-02

Scalar M0 = 2.774e-01
 T = 0.048 k = -0.069

Total Penalty = 0.018

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	NN07	<input type="checkbox"/> P:SH
2	NN09	<input type="checkbox"/> SV:SH
3	NN17	<input type="checkbox"/> P:SV
4	NN17	<input type="checkbox"/> P:SH
5	NN17	<input type="checkbox"/> SV:SH
6	NN18	<input checked="" type="checkbox"/> P:SV
7	NN18	<input checked="" type="checkbox"/> P:SH
8	NN18	<input checked="" type="checkbox"/> SV:SH
9	NN19	<input type="checkbox"/> P:SH
10	NN21	<input checked="" type="checkbox"/> P:SH
11	NN24	<input checked="" type="checkbox"/> P:SV
12	NN24	<input checked="" type="checkbox"/> P:SH
13	NN24	<input checked="" type="checkbox"/> SV:SH
14	NN32	<input type="checkbox"/> P:SH



2014 Oct 13 0:57: 6.717 UTC
 Lat: 43.7267 Lon: -121.31 Depth: 0.759
 43:43.5996 N 121:18.6006 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.92	12	117	EHU	P	0.007	-	-3.29e+01	2.18e+01
2	NM08	2.93	169	116	EHT	SH	0.046	-	-6.01e+01	4.76e+01
3	NM22	0.18	152	175	EHU	P	-0.016	+	1.17e+03	1.31e+01
4	NM22	0.18	152	175	EHT	SH	0.023	+	1.97e+03	2.01e+01
5	NM42	3.64	43	110	EHU	P	-0.003	-	-3.80e+02	1.15e+01
6	NN07	3.01	336	113	EHU	P	0.003	-	-1.49e+02	1.54e+01
7	NN07	3.01	336	113	EHT	SH	0.016	-	-4.36e+02	2.24e+01
8	NN09	1.96	292	129	EHU	P	0.003	+	9.06e+01	1.74e+01
9	NN09	1.96	292	129	EHR	SV	-0.008	+	1.48e+03	2.15e+01
10	NN09	1.96	292	129	EHT	SH	0.029	+	1.20e+03	1.58e+01
11	NN17	1.56	245	137	EHZ	P	-0.006	+	6.22e+01	2.63e+01
12	NN17	1.56	245	137	EHR	SV	0.047	-	-3.24e+03	1.19e+01
13	NN17	1.56	245	137	EHT	SH	0.012	-	-1.98e+03	1.91e+01
14	NN18	1.37	28	142	EHU	P	0.001	-	-2.03e+02	1.76e+01
15	NN18	1.37	28	142	EHR	SV	0.033	-	-2.76e+03	1.45e+01
16	NN19	0.96	165	152	EHU	P	0.010	+	5.03e+02	1.87e+01

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P-SH	0.086
2	<input checked="" type="checkbox"/> P-SV	0.017
3	<input checked="" type="checkbox"/> P-SH	0.013
4	<input checked="" type="checkbox"/> SV-SH	0.017
5	<input type="checkbox"/> P-SV	
6	<input checked="" type="checkbox"/> P-SH	
7	<input type="checkbox"/> SV-SH	
8	<input type="checkbox"/> P-SV	
9	<input type="checkbox"/> P-SH	
10	<input type="checkbox"/> P-SH	
11	<input checked="" type="checkbox"/> P-SV	0.047
12	<input checked="" type="checkbox"/> P-SH	
13	<input type="checkbox"/> SV-SH	

North East Down
 North -5.87e-02 -1.25e-01 6.12e-02
 East -1.25e-01 -2.80e-01 1.41e-01
 Down 6.12e-02 1.41e-01 6.33e-03

Scalar M0 = 2.834e-01
 T = 0.763 k = -0.280

Total Penalty = 0.179

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P-SH

P-SV

SV-SH



2014 Oct 13 4:12:29.126 UTC
 Lat: 43.7265 Lon: -121.31 Depth: 0.795
 43:43.5906 N 121:18.6072 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.94	12	117	EHU	P	0.001		-1.92e+01	2.01e+01
2	NM22	0.17	147	175	EHU	P	-0.008		5.10e+02	1.46e+01
3	NM22	0.17	147	175	EHR	SV	0.054		2.33e+03	9.24e+00
4	NM22	0.17	147	175	EHT	SH	0.015		1.25e+03	1.56e+01
5	NM42	3.66	43	110	EHU	P	0.009		-1.52e+02	1.33e+01
6	NM42	3.66	43	110	EHR	SV	0.057		-9.23e+02	1.04e+01
7	NM42	3.66	43	110	EHT	SH	-0.024		5.55e+02	1.06e+01
8	NN07	3.03	336	114	EHU	P	0.004	0.041	-1.18e+02	1.59e+01
9	NN07	3.03	336	114	EHT	SH	0.046	0.025	4.32e+02	1.08e+01
10	NN09	1.95	292	130	EHU	P	0.010		9.92e+00	2.63e+01
11	NN09	1.95	292	130	EHR	SV	-0.012		1.08e+03	1.72e+01
12	NN09	1.95	292	130	EHT	SH	0.025		7.37e+02	1.51e+01
13	NN17	1.54	245	138	EHU	P	-0.003		3.22e+01	2.49e+01
14	NN17	1.54	245	138	EHR	SV	0.028		3.66e+02	1.95e+01
15	NN17	1.54	245	138	EHT	SH	0.021		-6.25e+02	2.14e+01

North East Down
 North 2.61e-02 -1.18e-01 8.03e-02
 East -1.18e-01 -2.89e-01 1.23e-01
 Down 8.03e-02 1.23e-01 4.15e-02

Scalar M0 = 2.802e-01
 T = 0.755 k = -0.196

Total Penalty = 0.189

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	NM42 <input type="checkbox"/> P:SV	
2	NM42 <input type="checkbox"/> P:SH	
3	NM42 <input type="checkbox"/> SV:SH	
4	NN07 <input checked="" type="checkbox"/> P:SH	0.007
5	NN09 <input checked="" type="checkbox"/> P:SV	
6	NN09 <input checked="" type="checkbox"/> P:SH	
7	NN09 <input checked="" type="checkbox"/> SV:SH	
8	NN17 <input checked="" type="checkbox"/> P:SV	0.041
9	NN17 <input checked="" type="checkbox"/> P:SH	0.013
10	NN17 <input type="checkbox"/> SV:SH	
11	NN18 <input type="checkbox"/> P:SV	
12	NN18 <input checked="" type="checkbox"/> P:SH	0.041
13	NN18 <input type="checkbox"/> SV:SH	
14	NN19 <input type="checkbox"/> P:SH	
15	NN24 <input checked="" type="checkbox"/> P:SV	



2014 Oct 13 6:40:26.151 UTC
 Lat: 43.7262 Lon: -121.309 Depth: 0.744
 43:43.5708 N 121:18.5268 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM22	0.11	188	177	EHT	SH	-0.079	✓ +	3.41e+01	1.89e+01
2	NN07	3.10	335	112	EHU	P	-0.004	✓ -	-9.34e+00	1.36e+01
3	NN07	3.10	335	112	EHR	SV	-0.026	✓ -	-4.67e+01	1.50e+01
4	NN09	2.07	292	126	EHZ	P	0.018			
5	NN09	2.07	292	126	EHR	SV	-0.017	✓ +	5.61e+01	2.25e+01
6	NN09	2.07	292	126	EHT	SH	0.018	□ +	5.97e+01	1.76e+01
7	NN17	1.63	248	136	EHU	P	0.001	✓ +	1.96e+00	2.75e+01
8	NN17	1.63	248	136	EHR	SV	0.010	✓ +	7.25e+01	1.84e+01
9	NN17	1.63	248	136	EHT	SH	0.007	✓ -	-6.33e+01	1.83e+01
10	NN18	1.38	23	142	EHU	P	0.000	✓ -	-1.29e+01	1.59e+01
11	NN19	0.89	170	154	EHU	P	0.010	✓ +	2.18e+01	1.64e+01
12	NN19	0.89	170	154	EHR	SV	0.010	✓ -	-2.82e+01	1.84e+01
13	NN19	0.89	170	154	EHT	SH	0.047	✓ +	4.45e+01	2.64e+01
14	NN21	1.71	63	135	EHU	P	0.005	✓ -	-1.79e+01	1.70e+01
15	NN21	1.71	63	135	EHR	SV	-0.024	✓ +	4.15e+01	1.26e+01

North East Down
 North 6.35e-02 3.63e-02 2.56e-01
 East 3.63e-02 -1.12e-01 9.89e-02
 Down 2.56e-01 9.89e-02 -4.32e-02

Scalar M0 = 2.926e-01
 T = -0.507 k = -0.086

Total Penalty = 0.195

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	✓ P-SV	
2	□ SV-SH	
3	□ P-SV	
4	✓ P-SH	0.104
5	□ SV-SH	
6	□ P-SV	
7	□ P-SH	
8	✓ SV-SH	0.091
9	□ P-SV	
10	✓ P-SH	
11	□ SV-SH	
12	✓ P-SV	
13	✓ P-SH	
14	✓ SV-SH	
15	✓ P-SH	



2014 Oct 13 10:22:29.084 UTC
 Lat: 43.7266 Lon: -121.311 Depth: 0.456
 43:43.596 N 121:18.6546 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.94	14	106	EHU	P	0.012	✓ -		
2	NM06	0.90	105	151	EHZ	P	0.037			
3	NM22	0.22	134	173	EHU	P	-0.019	✓ +	1.67e+02	1.47e+01
4	NM42	3.70	44	100	EHU	P	0.000	✓ -	-8.22e+01	1.48e+01
5	NM42	3.70	44	100	EHR	SV	0.099	✓ -	-2.22e+02	1.51e+01
6	NN07	2.99	338	104	EHU	P	-0.004	✓ -	-2.02e+01	1.44e+01
7	NN07	2.99	338	104	EHT	SH	-0.003	✓ -	-9.60e+01	1.95e+01
8	NN09	1.89	293	121	EHU	P	0.021	✓ +	9.55e+00	1.07e+01
9	NN09	1.89	293	121	EHR	SV	0.012	✓ +	1.12e+02	1.51e+01
10	NN09	1.89	293	121	EHT	SH	0.033	✓ +	1.08e+02	3.47e+01
11	NN17	1.49	244	132	EHU	P	-0.005	✓ +	7.23e+00	3.03e+01
12	NN17	1.49	244	132	EHR	SV	0.044	✓ -	-7.33e+02	1.72e+01
13	NN17	1.49	244	132	EHT	SH	0.017	✓ -	-3.01e+02	1.82e+01
14	NN18	1.41	30	135	EHU	P	-0.016	✓ -	-6.26e+01	1.42e+01
15	NN18	1.41	30	135	EHT	SH	0.045	✓ -	-4.16e+02	1.34e+01
16	NN19	0.97	161	147	EHU	P	0.005	✓ +	3.60e+01	1.79e+01

Sta	Type	Penalty
1	NM42	<input type="checkbox"/> P:SV
2	NN07	<input checked="" type="checkbox"/> P:SH 0.044
3	NN09	<input checked="" type="checkbox"/> P:SV 0.014
4	NN09	<input checked="" type="checkbox"/> P:SH
5	NN09	<input checked="" type="checkbox"/> SV:SH 0.037
6	NN17	<input type="checkbox"/> P:SV
7	NN17	<input checked="" type="checkbox"/> P:SH 0.023
8	NN17	<input type="checkbox"/> SV:SH
9	NN18	<input type="checkbox"/> P:SH
10	NN19	<input checked="" type="checkbox"/> P:SH
11	NN21	<input checked="" type="checkbox"/> P:SH 0.055
12	NN24	<input checked="" type="checkbox"/> P:SV
13	NN32	<input checked="" type="checkbox"/> P:SH

North East Down
 North -1.16e-01 -1.39e-01 1.51e-01
 East -1.39e-01 -1.17e-01 5.54e-02
 Down 1.51e-01 5.54e-02 7.56e-02

Scalar M0 = 2.484e-01
 T = 0.359 k = -0.169

Total Penalty = 0.173

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P:SH

P:SV

SV:SH



2014 Oct 14 5:46:13.914 UTC
 Lat: 43.7259 Lon: -121.309 Depth: 0.788
 43:43:55.16 N 121:18:56.34 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	3.00	11	116	EHU	P	0.013	<input checked="" type="checkbox"/> -		
2	NM06	0.76	101	159	EHU	P	0.023	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 1.69e+02	1.59e+01
3	NM06	0.76	101	159	EHR	SV	0.111	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 6.38e+02	2.21e+01
4	NM06	0.76	101	159	EHT	SH	0.146	<input type="checkbox"/> -	<input checked="" type="checkbox"/> -1.93e+03	1.55e+01
5	NM22	0.08	153	178	EHU	P	-0.018	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 2.15e+02	1.57e+01
6	NM22	0.08	153	178	EHT	SH	0.001	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 4.95e+02	2.35e+01
7	NM41	2.24	139	127	EHT	SH	-0.053	<input checked="" type="checkbox"/> +		
8	NM42	3.67	42	110	EHU	P	-0.001	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -6.17e+01	1.24e+01
9	NM42	3.67	42	110	EHT	SH	0.140	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -5.52e+02	1.26e+01
10	NN07	3.12	336	113	EHU	P	0.001	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -2.56e+01	1.59e+01
11	NN07	3.12	336	113	EHT	SH	0.002	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -1.12e+02	2.17e+01
12	NN09	2.04	294	128	EHU	P	0.016	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 1.39e+01	2.09e+01
13	NN09	2.04	294	128	EHR	SV	0.000	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 2.71e+02	2.55e+01
14	NN09	2.04	294	128	EHT	SH	0.036	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 1.79e+02	2.79e+01
15	NN17	1.57	249	138	EHU	P	0.007	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 1.17e+01	3.11e+01

North East Down
 North -1.13e-01 -2.73e-02 5.66e-02
 East -2.73e-02 -2.41e-01 5.17e-02
 Down 5.66e-02 5.17e-02 3.75e-01

Scalar M0 = 3.352e-01
 T = -0.626 k = 0.019

Total Penalty = 0.153

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P:SH

P:SV

SV:SH

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P:SV	0.034
2	<input type="checkbox"/> P:SH	
3	<input type="checkbox"/> SV:SH	
4	<input type="checkbox"/> P:SH	
5	<input checked="" type="checkbox"/> P:SH	0.061
6	<input checked="" type="checkbox"/> P:SV	0.016
7	<input checked="" type="checkbox"/> P:SH	0.040
8	<input type="checkbox"/> SV:SH	
9	<input checked="" type="checkbox"/> P:SV	
10	<input type="checkbox"/> P:SH	
11	<input type="checkbox"/> SV:SH	
12	<input checked="" type="checkbox"/> P:SV	
13	<input checked="" type="checkbox"/> P:SH	
14	<input checked="" type="checkbox"/> SV:SH	
15	<input checked="" type="checkbox"/> P:SH	



2014 Oct 15 15: 3:44.602 UTC
 Lat: 43.7259 Lon: -121.309 Depth: 0.805
 43:43.5528 N 121:18.549 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq	
1	NN07	3.12	336	113	EHU	P	0.008	<input checked="" type="checkbox"/> -	-2.24e+01	1.64e+01	
2	NN07	3.12	336	113	EHR	SV	-0.043	<input type="checkbox"/> +	3.53e+01	1.73e+01	
3	NN07	3.12	336	113	EHT	SH	0.001	<input checked="" type="checkbox"/> -	-8.42e+01	1.37e+01	
4	NN09	2.05	293	128	EHU	P	0.008	<input checked="" type="checkbox"/> -	-3.05e+00	1.29e+01	
5	NN09	2.05	293	128	EHR	SV	-0.023	<input checked="" type="checkbox"/> +	1.86e+02	2.18e+01	
6	NN09	2.05	293	128	EHT	SH	0.022	<input checked="" type="checkbox"/> +	0.028	1.12e+02	1.83e+01
7	NN17	1.59	249	138	EHU	P	-0.004	<input checked="" type="checkbox"/> +	7.75e+00	2.71e+01	
8	NN17	1.59	249	138	EHR	SV	0.019	<input checked="" type="checkbox"/> +	1.09e+02	1.44e+01	
9	NN17	1.59	249	138	EHT	SH	0.005	<input checked="" type="checkbox"/> -	-3.49e+02	2.21e+01	
10	NN18	1.42	24	142	EHU	P	0.005	<input checked="" type="checkbox"/> -	-4.72e+01	2.20e+01	
11	NN18	1.42	24	142	EHR	SV	0.009	<input type="checkbox"/> -	-5.13e+02	1.33e+01	
12	NN19	0.86	168	155	EHU	P	0.009	<input checked="" type="checkbox"/> +	1.03e+02	1.85e+01	
13	NN19	0.86	168	155	EHT	SH	0.049	<input checked="" type="checkbox"/> -	-2.98e+02	1.17e+01	
14	NN21	1.75	62	136	EHU	P	-0.002	<input checked="" type="checkbox"/> -	-1.79e+01	1.59e+01	
15	NN21	1.75	62	136	EHR	SV	-0.044	<input checked="" type="checkbox"/> +	1.41e+02	1.07e+01	

Sta	Type	Penalty
1	<input type="checkbox"/> P-SV	
2	<input type="checkbox"/> P-SH	
3	<input type="checkbox"/> SV-SH	
4	<input checked="" type="checkbox"/> P-SV	
5	<input checked="" type="checkbox"/> P-SH	
6	<input checked="" type="checkbox"/> SV-SH	
7	<input checked="" type="checkbox"/> P-SV	0.027
8	<input checked="" type="checkbox"/> P-SH	0.003
9	<input type="checkbox"/> SV-SH	
10	<input type="checkbox"/> P-SV	
11	<input checked="" type="checkbox"/> P-SH	0.013
12	<input checked="" type="checkbox"/> P-SV	0.015
13	<input type="checkbox"/> P-SH	
14	<input type="checkbox"/> SV-SH	
15	<input checked="" type="checkbox"/> P-SV	

North East Down
 North -1.27e-01 -1.70e-01 1.57e-01
 East -1.70e-01 3.34e-02 -5.42e-02
 Down 1.57e-01 -5.42e-02 7.86e-02

Scalar M0 = 2.607e-01
 T = 0.055 k = -0.018

Total Penalty = 0.188

POLARITIES

AMPLITUDE RATIOS



2014 Oct 15 15:37:25.945 UTC
 Lat: 43.7254 Lon: -121.31 Depth: 0.687
 43:43.5264 N 121:18.5784 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM40	2.55	108	121	EHT SH	0.020	✓ +		9.44e+01	1.97e+01
2	NM41	2.22	138	125	EHT SH	-0.043	✓ +		3.63e+02	1.54e+01
3	NM42	3.72	41	107	EHU P	0.045	✓ +		2.73e+02	1.25e+01
4	NN07	3.15	337	110	EHU P	-0.007	✓ -		-5.18e+01	1.51e+01
5	NN07	3.15	337	110	EHT SH	0.005	✓ -		-1.25e+02	2.04e+01
6	NN09	2.04	295	125	EHU P	0.015	✓ +		4.62e+00	2.08e+01
7	NN09	2.04	295	125	EHR SV	0.006	✓ +		2.62e+02	2.45e+01
8	NN09	2.04	295	125	EHT SH	0.042	✓ +		1.66e+02	2.52e+01
9	NN17	1.53	250	136	EHU P	-0.001	✓ +		1.84e+01	2.44e+01
10	NN17	1.53	250	136	EHR SV	0.016	✓ +		4.20e+02	1.48e+01
11	NN17	1.53	250	136	EHT SH	0.023	✓ -		-4.82e+02	1.55e+01
12	NN18	1.48	24	138	EHU P	-0.006	✓ -		-6.35e+01	1.61e+01
13	NN18	1.48	24	138	EHR SV	0.020	✓ -		-5.57e+02	1.21e+01
14	NN19	0.82	165	155	EHU P	0.012	✓ +		2.31e+02	1.79e+01
15	NN19	0.82	165	155	EHT SH	0.073	✓ -		-7.48e+02	1.42e+01

North East Down
 North -5.10e-02 -1.76e-01 1.95e-01
 East -1.76e-01 -8.50e-02 1.28e-03
 Down 1.95e-01 1.28e-03 1.20e-01

Scalar M0 = 2.847e-01
 T = 0.039 k = -0.019

Total Penalty = 0.144

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	<input type="checkbox"/> P-SH	
2	<input checked="" type="checkbox"/> P-SV	
3	<input checked="" type="checkbox"/> P-SH	
4	<input checked="" type="checkbox"/> SV-SH	
5	<input checked="" type="checkbox"/> P-SV	0.004
6	<input checked="" type="checkbox"/> P-SH	0.028
7	<input checked="" type="checkbox"/> SV-SH	0.113
8	<input type="checkbox"/> P-SV	
9	<input type="checkbox"/> P-SH	
10	<input type="checkbox"/> P-SH	
11	<input checked="" type="checkbox"/> P-SV	
12	<input checked="" type="checkbox"/> P-SH	
13	<input checked="" type="checkbox"/> SV-SH	
14	<input checked="" type="checkbox"/> P-SH	



2014 Oct 16 16:53:27.374 UTC
 Lat: 43.7266 Lon: -121.31 Depth: 0.471
 43:43.593 N 121:18.6282 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM42	3.67	43	101	EHU	P	0.020	<input checked="" type="checkbox"/> -	-5.70e+01	2.00e+01
2	NN07	3.01	337	104	EZH	P	0.003	<input checked="" type="checkbox"/> -	-2.85e+01	1.42e+01
3	NN07	3.01	337	104	EHT	SH	0.005	<input checked="" type="checkbox"/> -	-1.15e+02	1.79e+01
4	NN09	1.93	292	121	EHU	P	0.012	<input checked="" type="checkbox"/> +	3.38e+00	2.19e+01
5	NN09	1.93	292	121	EHR	SV	0.000	<input checked="" type="checkbox"/> +	1.04e+02	2.41e+01
6	NN09	1.93	292	121	EHT	SH	0.028	<input checked="" type="checkbox"/> +	1.04e+02	3.43e+01
7	NN17	1.52	245	131	EHU	P	-0.007	<input checked="" type="checkbox"/> + 0.010	5.83e+00	2.87e+01
8	NN17	1.52	245	131	EHT	SH	0.019	<input type="checkbox"/> -	-3.52e+02	1.53e+01
9	NN18	1.40	29	135	EHU	P	-0.010	<input checked="" type="checkbox"/> -	-5.35e+01	1.44e+01
10	NN18	1.40	29	135	EHR	SV	-0.001	<input type="checkbox"/> -	-3.78e+02	1.55e+01
11	NN18	1.40	29	135	EHT	SH	0.022	<input checked="" type="checkbox"/> +	7.47e+01	2.65e+01
12	NN19	0.96	163	148	EHU	P	0.013	<input checked="" type="checkbox"/> +	6.67e+01	1.77e+01
13	NN19	0.96	163	148	EHT	SH	0.052	<input checked="" type="checkbox"/> -	-4.17e+02	1.28e+01
14	NN21	1.82	66	126	EHU	P	-0.009	<input checked="" type="checkbox"/> -	-2.02e+01	1.44e+01
15	NN21	1.82	66	126	EHT	SH	0.065	<input type="checkbox"/> -	-3.03e+02	9.90e+00

North East Down
 North -4.01e-01 -1.33e-01 1.17e-01
 East -1.33e-01 -3.89e-03 1.59e-02
 Down 1.17e-01 1.59e-02 6.35e-02

Scalar M0 = 3.377e-01
 T = 0.818 k = -0.244

Total Penalty = 0.166

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P:SH	
2	<input checked="" type="checkbox"/> P:SV	0.015
3	<input type="checkbox"/> P:SH	
4	<input type="checkbox"/> SV:SH	
5	<input checked="" type="checkbox"/> P:SH	
6	<input type="checkbox"/> P:SV	
7	<input checked="" type="checkbox"/> P:SH	
8	<input type="checkbox"/> SV:SH	
9	<input checked="" type="checkbox"/> P:SH	
10	<input type="checkbox"/> P:SH	
11	<input checked="" type="checkbox"/> P:SV	0.038
12	<input checked="" type="checkbox"/> P:SH	0.096
13	<input type="checkbox"/> SV:SH	
14	<input type="checkbox"/> P:SH	



2014 Oct 18 23:57: 3.695 UTC
Lat: 43.7268 Lon: -121.312 Depth: 0.696
43:43.6104 N 121:18.7104 W

Solve

North East Down
North -4.20e-02 -1.46e-01 -5.38e-04
East -1.46e-01 -3.20e-01 1.43e-01
Down -5.38e-04 1.43e-01 5.83e-02

Scalar M0 = 3.091e-01
T = 0.585 k = -0.241

Total Penalty = 0.186

POLARITIES

P SH SV

SN SE

AMPLITUDE RATIOS

P:SH P:SV SV:SH

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.94	15	115	EHR	SV	0.022	✓ +	4.00e+02	1.81e+01
2	NM22	0.29	128	171	EHR	SV	0.051	✓ +	5.42e+02	1.41e+01
3	NM22	0.29	128	171	EHT	SH	-0.009	✓ +	6.47e+02	1.47e+01
4	NN09	1.81	293	130	EHU	P	0.013	✓ +	2.60e+01	1.82e+01
5	NN09	1.81	293	130	EHR	SV	-0.010	✓ +	2.77e+02	2.25e+01
6	NN09	1.81	293	130	EHT	SH	0.027	✓ +	2.33e+02	2.81e+01
7	NN17	1.43	242	139	EHU	P	-0.012	✓ + 0.005	1.41e+01	2.53e+01
8	NN17	1.43	242	139	EHT	SH	-0.066	✓ +	1.55e+02	1.73e+01
9	NN18	1.43	33	140	EHU	P	0.005	✓ -	-8.25e+01	1.61e+01
10	NN19	1.03	157	150	EHU	P	0.008	✓ +	4.68e+01	1.74e+01
11	NN19	1.03	157	150	EHR	SV	0.071	✓ +	2.04e+02	2.81e+01
12	NN19	1.03	157	150	EHT	SH	-0.007	✓ +	2.67e+02	1.92e+01
13	NN21	1.91	68	130	EHU	P	-0.006	✓ -	-4.32e+01	1.26e+01
14	NN24	0.63	22	161	EHU	P	-0.008	✓ -	-1.03e+02	2.25e+01
15	NN24	0.63	22	161	EHR	SV	-0.039	✓ +	4.53e+02	3.11e+01
16	NN32	2.85	206	113	EHU	P	-0.003	✓ -	-2.30e+01	1.88e+01
17	NN32	2.85	206	113	EHR	SV	0.027	✓ -	-4.56e+02	3.00e+01

Sta	Type	Penalty	
1	NM22	<input type="checkbox"/> SV-SH	
2	NN09	<input checked="" type="checkbox"/> P-SV	
3	NN09	<input checked="" type="checkbox"/> P-SH	
4	NN09	<input checked="" type="checkbox"/> SV-SH	
5	NN17	<input checked="" type="checkbox"/> P-SH	0.018
6	NN19	<input type="checkbox"/> P-SV	
7	NN19	<input type="checkbox"/> P-SH	
8	NN19	<input checked="" type="checkbox"/> SV-SH	0.060
9	NN24	<input checked="" type="checkbox"/> P-SV	0.102
10	NN32	<input type="checkbox"/> P-SV	
11	NN32	<input checked="" type="checkbox"/> P-SH	
12	NN32	<input type="checkbox"/> SV-SH	



2014 Oct 19 9: 7:50.325 UTC
 Lat: 43.7259 Lon: -121.313 Depth: 0.656
 43.43.5534 N 121.18.7752 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM06	1.04	98	150	EHU	P	0.049	✓ + 0.001	✓ 4.83e+01	1.39e+01
2	NM06	1.04	98	150	EHR	SV	-0.121	✓ +	✓ 1.97e+02	2.36e+01
3	NM06	1.04	98	150	EHT	SH	0.132	✓ -	✓ -7.00e+02	1.59e+01
4	NM22	0.33	103	170	EHU	P	-0.025	✓ +	✓ 3.32e+01	1.44e+01
5	NM22	0.33	103	170	EHT	SH	-0.046	✓ +	✓ 2.59e+02	1.54e+01
6	NN07	3.01	341	110	EHU	P	0.015	✓ -	✓ -2.08e+01	1.66e+01
7	NN07	3.01	341	110	EHT	SH	0.035	✓ -	✓ -4.01e+01	1.61e+01
8	NN09	1.78	297	130	EHZ	P	0.024	✓ -	✓ -8.17e-01	2.98e+01
9	NN09	1.78	297	130	EHR	SV	0.010	✓ +	✓ 1.04e+02	1.92e+01
10	NN09	1.78	297	130	EHT	SH	0.048	✓ +	✓ 9.17e+01	2.71e+01
11	NN17	1.31	244	141	EHU	P	-0.015	✓ +	✓ 1.80e+00	1.79e+01
12	NN17	1.31	244	141	EHT	SH	0.021	✓ -	✓ -1.60e+02	1.41e+01
13	NN18	1.56	34	136	EHU	P	-0.009	✓ -	✓ -3.14e+01	1.74e+01
14	NN18	1.56	34	136	EHT	SH	0.037	✓ -	✓ -1.66e+02	1.30e+01
15	NN19	0.97	150	150	EHU	P	0.005	✓ +	✓ 1.98e+01	1.97e+01

North East Down
 North -1.86e-01 8.58e-02 1.40e-01
 East 8.58e-02 -2.76e-01 -1.35e-02
 Down 1.40e-01 -1.35e-02 6.01e-02

Scalar M0 = 2.902e-01
 T = -0.344 k = -0.341

Total Penalty = 0.094

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	<input type="checkbox"/> P:SV	
2	<input type="checkbox"/> P:SH	
3	<input type="checkbox"/> SV:SH	
4	<input checked="" type="checkbox"/> P:SH	0.007
5	<input type="checkbox"/> P:SH	
6	<input type="checkbox"/> P:SV	
7	<input type="checkbox"/> P:SH	
8	<input type="checkbox"/> SV:SH	
9	<input checked="" type="checkbox"/> P:SH	
10	<input type="checkbox"/> P:SH	
11	<input checked="" type="checkbox"/> P:SV	
12	<input checked="" type="checkbox"/> P:SH	
13	<input checked="" type="checkbox"/> SV:SH	
14	<input type="checkbox"/> P:SH	
15	<input checked="" type="checkbox"/> P:SV	0.039

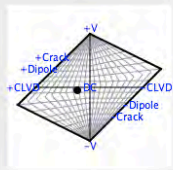


2014 Oct 19 20: 4:10.756 UTC
 Lat: 43.7265 Lon: -121.312 Depth: 0.497
 43:43.5876 N 121:18.7068 W

North East Down
 North 6.16e-03 1.50e-01 1.99e-01
 East 1.50e-01 -1.76e-01 1.95e-03
 Down 1.99e-01 1.95e-03 1.16e-01

Scalar M0 = 2.903e-01
 T = -0.224 k = -0.055

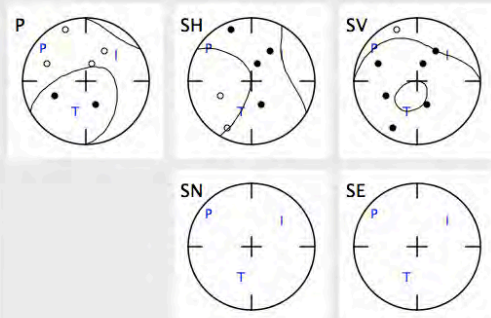
Total Penalty = 0.175



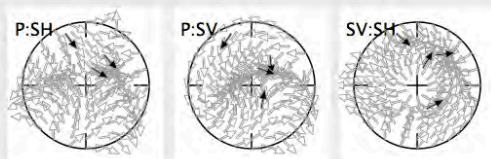
Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NN07	2.98	339	105	EHU	P	-0.003	✓ -	-1.47e+01	1.21e+01
2	NN07	2.98	339	105	EHR	SV	0.003	✓ -	-4.83e+01	9.45e+00
3	NN07	2.98	339	105	EHT	SH	0.075	✓ +	5.38e+01	1.41e+01
4	NN09	1.83	294	124	EHU	P	0.003	✓ -	-2.91e+00	1.55e+01
5	NN09	1.83	294	124	EHR	SV	-0.004	✓ +	7.38e+01	1.54e+01
6	NN09	1.83	294	124	EHT	SH	0.032	✓ +	7.93e+02	3.31e+01
7	NN17	1.42	243	135	EHU	P	0.001	✓ +	4.22e+00	2.73e+01
8	NN17	1.42	243	135	EHR	SV	0.012	✓ +	9.12e+01	1.48e+01
9	NN17	1.42	243	135	EHT	SH	-0.007	✓ -	-4.27e+01	1.04e+01
10	NN18	1.46	32	134	EHU	P	-0.009	✓ -	-9.46e+00	1.64e+01
11	NN18	1.46	32	134	EHR	SV	-0.046	✓ +	4.44e+00	2.09e+01
12	NN18	1.46	32	134	EHT	SH	-0.033	✓ +	4.54e+01	1.01e+01
13	NN19	0.99	157	147	EHU	P	0.009	✓ +	4.29e+01	1.74e+01
14	NN19	0.99	157	147	EHR	SV	-0.002	✓ +	3.41e+01	2.09e+01
15	NN19	0.99	157	147	EHT	SH	-0.063	✓ +	8.05e+01	7.57e+00

Sta	Type	Penalty
1	✓ P-SV	0.042
2	✓ P-SH	
3	✓ SV-SH	0.028
4	☐ P-SV	
5	☐ P-SH	
6	☐ SV-SH	
7	☐ P-SV	
8	☐ P-SH	
9	☐ SV-SH	
10	✓ P-SV	
11	✓ P-SH	
12	✓ SV-SH	
13	✓ P-SV	
14	☐ P-SH	
15	✓ SV-SH	0.046

POLARITIES



AMPLITUDE RATIOS





2014 Oct 26 7:29:26.068 UTC
 Lat: 43.7262 Lon: -121.31 Depth: 0.659
 43:43.5726 N 121:18.6252 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM22	0.16	133	175	EHU	P	-0.017		✓ -3.26e+01	2.07e+01
2	NM22	0.16	133	175	EHT	SH	0.054		✓ 5.87e+01	1.94e+01
3	NN07	3.05	337	110	EHU	P	-0.003	0.040	✓ -7.20e+00	1.45e+01
4	NN09	1.94	293	126	EHU	P	-0.005		✓ -2.35e+00	1.32e+01
5	NN09	1.94	293	126	EHR	SV	0.015		✓ 8.95e+01	2.04e+01
6	NN09	1.94	293	126	EHT	SH	0.046		✓ 5.62e+01	1.86e+01
7	NN17	1.51	246	136	EHU	P	0.006		✓ 2.96e+00	2.71e+01
8	NN17	1.51	246	136	EHR	SV	0.040		✓ 6.66e+01	1.80e+01
9	NN18	1.43	28	139	EHU	P	0.003		✓ -1.64e+01	1.61e+01
10	NN18	1.43	28	139	EHR	SV	0.006		✓ -1.32e+02	1.03e+01
11	NN19	0.92	162	152	EHU	P	-0.005		✓ 5.18e+01	1.22e+01
12	NN19	0.92	162	152	EHT	SH	0.088		✓ -2.24e+02	1.22e+01
13	NN21	1.83	65	131	EHU	P	0.009		✓	
14	NN21	1.83	65	131	EHT	SH	0.013		✓ 4.54e+01	1.90e+01
15	NN24	0.66	11	160	EHU	P	0.003		✓ -1.08e+01	2.11e+01
16	NN24	0.66	11	160	EHR	SV	-0.036		✓ 2.01e+02	1.24e+01
17	NN24	0.66	11	160	EHT	SH	0.004		✓ -3.18e+01	2.50e+01

North East Down
 North 1.09e-01 -1.25e-01 2.14e-01
 East -1.25e-01 -7.65e-02 2.17e-02
 Down 2.14e-01 2.17e-02 9.47e-02

Scalar M0 = 2.739e-01
 T = -0.298 k = 0.128

Total Penalty = 0.106

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P:SH

P:SV

SV:SH

Sta	Type	Penalty
1	✓ P:SV	
2	✓ P:SH	
3	✓ SV:SH	
4	✓ P:SV	0.066
5	□ P:SV	
6	□ P:SH	
7	✓ P:SV	
8	✓ P:SH	
9	✓ SV:SH	
10	□ P:SV	
11	✓ P:SH	
12	□ SV:SH	



2014 Oct 26 7:37:35.648 UTC
 Lat: 43.7259 Lon: -121.31 Depth: 0.784
 43:43.5546 N 121:18.6192 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM22	0.13	125	176	EHU	P	-0.011	✓ +	✓ 1.45e+02	1.56e+01
2	NM22	0.13	125	176	EHR	SV	0.041	✓ -	✓ -1.69e+02	1.09e+01
3	NM22	0.13	125	176	EHT	SH	0.020	✓ +	✓ 4.19e+01	1.15e+01
4	NN07	3.08	337	113	EHU	P	0.003	✓ -	0.040 ✓ -6.71e+00	1.90e+01
5	NN09	1.97	294	129	EHZ	P	0.023			
6	NN09	1.97	294	129	EHR	SV	-0.011	✓ +	✓ 1.25e+02	1.98e+01
7	NN09	1.97	294	129	EHT	SH	0.022	✓ +	✓ 7.96e+01	1.83e+01
8	NN17	1.50	248	139	EHU	P	-0.005	✓ +	✓ 7.86e+00	2.68e+01
9	NN17	1.50	248	139	EHR	SV	0.014	✓ +	✓ 1.02e+02	1.79e+01
10	NN17	1.50	248	139	EHT	SH	0.005	✓ -	✓ -1.48e+02	1.73e+01
11	NN18	1.46	27	141	EHU	P	-0.010	✓ -	✓ -2.26e+01	1.74e+01
12	NN18	1.46	27	141	EHR	SV	-0.027	✓ -	✓ -1.68e+02	1.31e+01
13	NN18	1.46	27	141	EHT	SH	0.053	✓ -	✓ -1.25e+02	1.59e+01
14	NN19	0.89	162	154	EHU	P	0.009	✓ +	✓ 6.29e+01	1.86e+01
15	NN19	0.89	162	155	EHR	SV	0.089	✓ -	✓ -1.10e+02	1.05e+01

North East Down
 North 2.66e-01 1.18e-02 1.72e-01
 East 1.18e-02 -2.05e-01 -4.86e-02
 Down 1.72e-01 -4.86e-02 6.51e-02

Scalar M0 = 3.007e-01
 T = -0.390 k = 0.116

Total Penalty = 0.184

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> SV:SH	
2	<input type="checkbox"/> P:SV	
3	<input type="checkbox"/> P:SH	
4	<input type="checkbox"/> SV:SH	
5	<input checked="" type="checkbox"/> P:SV	
6	<input checked="" type="checkbox"/> P:SH	
7	<input checked="" type="checkbox"/> SV:SH	
8	<input type="checkbox"/> P:SV	
9	<input type="checkbox"/> P:SH	
10	<input type="checkbox"/> SV:SH	
11	<input checked="" type="checkbox"/> P:SV	0.005
12	<input checked="" type="checkbox"/> P:SH	
13	<input checked="" type="checkbox"/> SV:SH	0.032
14	<input type="checkbox"/> P:SV	
15	<input type="checkbox"/> P:SH	



2014 Nov 15 21: 8:12.847 UTC
 Lat: 43.7266 Lon: -121.31 Depth: 0.675
 43:43.5984 N 121:18.6096 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.93	13	114	EZH	P	0.022	<input type="checkbox"/>	3.89e+00	1.99e+01
2	NM03	2.93	13	114	EHR	SV	0.025	<input checked="" type="checkbox"/>	2.35e+02	1.36e+01
3	NM06	0.84	106	156	EHU	P	0.042	<input checked="" type="checkbox"/>	4.57e+01	1.91e+01
4	NM06	0.84	106	156	EHT	SH	-0.085	<input checked="" type="checkbox"/>	-1.47e+02	1.88e+01
5	NM22	0.18	148	174	EHU	P	0.004	<input checked="" type="checkbox"/>	1.78e+02	1.73e+01
6	NM40	2.63	111	119	EHR	SV	-0.023	<input checked="" type="checkbox"/>	-5.26e+01	1.22e+01
7	NM40	2.63	111	119	EHT	SH	-0.018	<input checked="" type="checkbox"/>	-6.60e+01	1.60e+01
8	NM42	3.65	43	107	EHU	P	0.028	<input checked="" type="checkbox"/>	1.66e+02	1.07e+01
9	NM42	3.65	43	107	EHR	SV	0.014	<input checked="" type="checkbox"/>	-1.47e+02	1.63e+01
10	NM42	3.65	43	107	EHT	SH	-0.061	<input checked="" type="checkbox"/>	1.26e+02	1.30e+01
11	NN07	3.01	336	111	EHU	P	-0.004	<input checked="" type="checkbox"/>	-3.93e+00	1.38e+01
12	NN07	3.01	336	111	EHT	SH	0.013	<input checked="" type="checkbox"/>	-3.83e+01	2.61e+01
13	NN09	1.95	292	127	EHU	P	0.004	<input checked="" type="checkbox"/>	2.02e+01	1.61e+01
14	NN09	1.95	292	127	EHR	SV	0.070	<input type="checkbox"/>	-2.34e+02	1.53e+01
15	NN09	1.95	292	127	EHT	SH	0.072	<input type="checkbox"/>	-1.50e+02	2.17e+01

North East Down
 North -2.12e-01 2.39e-02 -5.33e-02
 East 2.39e-02 8.73e-02 1.63e-01
 Down -5.33e-02 1.63e-01 2.20e-01

Scalar M0 = 2.838e-01
 T = -0.279 k = 0.096

Total Penalty = 0.202

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty	
1	NM03	<input type="checkbox"/> P-SV	
2	NM06	<input checked="" type="checkbox"/> P-SH	
3	NM40	<input type="checkbox"/> SV-SH	
4	NM42	<input checked="" type="checkbox"/> P-SV	
5	NM42	<input type="checkbox"/> P-SH	
6	NM42	<input type="checkbox"/> SV-SH	
7	NN07	<input checked="" type="checkbox"/> P-SH	
8	NN09	<input type="checkbox"/> P-SV	
9	NN09	<input type="checkbox"/> P-SH	
10	NN09	<input type="checkbox"/> SV-SH	
11	NN17	<input type="checkbox"/> P-SV	
12	NN17	<input type="checkbox"/> P-SH	
13	NN17	<input type="checkbox"/> SV-SH	
14	NN18	<input type="checkbox"/> P-SV	
15	NN18	<input checked="" type="checkbox"/> P-SV	0.042



2014 Nov 15 22:40: 3.616 UTC
Lat: 43.7274 Lon: -121.313 Depth: 0.605
43:43.641 N 121:18.7608 W

Solve

North East Down
North -1.02e-01 -9.09e-02 8.29e-02
East -9.09e-02 -2.18e-01 -2.86e-02
Down 8.29e-02 -2.86e-02 2.76e-01

Scalar M0 = 2.878e-01
T = -0.376 k = -0.045

Total Penalty = 0.188

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.90	17	112	EZH	P	-0.013			
2	NM06	1.06	107	149	EHU	P	0.025	<input checked="" type="checkbox"/>	6.59e+01	1.67e+01
3	NM06	1.06	107	149	EHR	SV	0.097	<input checked="" type="checkbox"/>	2.18e+02	1.99e+01
4	NM06	1.06	107	149	EHT	SH	0.025	<input checked="" type="checkbox"/>	1.07e+02	1.72e+01
5	NM22	0.38	128	168	EHU	P	-0.025	<input checked="" type="checkbox"/>	1.54e+02	1.41e+01
6	NM41	2.54	137	118	EHT	SH	-0.017	<input type="checkbox"/>	-2.57e+02	1.53e+01
7	NM42	3.74	46	105	EHU	P	0.027	<input checked="" type="checkbox"/>	-4.93e+01	1.75e+01
8	NM42	3.74	46	105	EHT	SH	0.054	<input checked="" type="checkbox"/>	-1.56e+02	1.55e+01
9	NN07	2.86	340	111	EHU	P	0.037	<input checked="" type="checkbox"/>	-2.94e+01	1.36e+01
10	NN07	2.86	340	111	EHT	SH	0.078	<input checked="" type="checkbox"/>	-5.61e+01	1.72e+01
11	NN09	1.73	292	130	EHU	P	-0.030	<input checked="" type="checkbox"/>	-5.12e+00	8.59e+00
12	NN09	1.73	292	130	EHR	SV	-0.002	<input checked="" type="checkbox"/>	1.11e+02	1.36e+01
13	NN09	1.73	292	130	EHT	SH	0.072	<input checked="" type="checkbox"/>	1.12e+02	2.65e+01
14	NN17	1.40	239	138	EHU	P	0.014	<input checked="" type="checkbox"/>	4.54e+00	2.50e+01
15	NN17	1.40	239	138	EHR	SV	-0.004	<input checked="" type="checkbox"/>	1.02e+02	1.15e+01

Sta	Type	Penalty
1	NM06 <input checked="" type="checkbox"/> P-SV	
2	NM06 <input type="checkbox"/> P-SH	
3	NM06 <input checked="" type="checkbox"/> SV-SH	0.094
4	NM42 <input type="checkbox"/> P-SH	
5	NN07 <input checked="" type="checkbox"/> P-SH	
6	NN09 <input checked="" type="checkbox"/> P-SV	0.017
7	NN09 <input checked="" type="checkbox"/> P-SH	0.017
8	NN09 <input type="checkbox"/> SV-SH	
9	NN17 <input type="checkbox"/> P-SV	
10	NN17 <input type="checkbox"/> P-SH	
11	NN17 <input type="checkbox"/> SV-SH	
12	NN18 <input type="checkbox"/> P-SV	
13	NN18 <input checked="" type="checkbox"/> P-SH	
14	NN18 <input type="checkbox"/> SV-SH	
15	NN21 <input checked="" type="checkbox"/> P-SV	0.060

POLARITIES

AMPLITUDE RATIOS



2014 Nov 16 16:22: 8.621 UTC
Lat: 43.7268 Lon: -121.311 Depth: 0.499
43:43.6074 N 121:18.66 W

North East Down
North -1.13e-01 -5.93e-02 1.08e-01
East -5.93e-02 -1.91e-01 -4.33e-03
Down 1.08e-01 -4.33e-03 3.53e-01

Scalar M0 = 3.196e-01
T = -0.651 k = 0.044

Total Penalty = 0.129

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.93	14	108	EHU	P	0.021	✓ -	✓ -5.91e+00	2.26e+01
2	NM06	0.91	106	151	EHU	P	0.024	✓ +	✓ 1.64e+02	1.22e+01
3	NM06	0.91	106	151	EHR	SV	0.058	✓ +	✓ 4.78e+02	7.66e+00
4	NM22	0.24	136	172	EHU	P	-0.019	✓ +	✓ 2.36e+02	1.25e+01
5	NM41	2.40	138	117	EHT	SH	-0.006	✓ +	✓ 9.67e+01	1.89e+01
6	NM42	3.69	44	102	EHU	P	-0.047	✓ -	✓ -8.12e+01	8.55e+00
7	NM42	3.69	44	102	EHT	SH	0.054	✓ -	✓ -2.20e+02	1.56e+01
8	NN07	2.97	338	106	EHU	P	0.010	✓ -	✓ -3.25e+01	1.58e+01
9	NN07	2.97	338	106	EHR	SV	-0.004	✓ +	✓ 3.53e+01	2.36e+01
10	NN07	2.97	338	106	EHT	SH	-0.006	✓ -	✓ -4.23e+01	1.08e+01
11	NN09	1.88	292	123	EHU	P	0.005	✓ -	✓ -4.11e+00	1.64e+01
12	NN09	1.88	292	123	EHR	SV	-0.011	✓ +	✓ 2.00e+02	1.62e+01
13	NN09	1.88	292	123	EHT	SH	0.026	✓ +	✓ 1.18e+02	1.71e+01
14	NN17	1.49	243	133	EHU	P	-0.008	✓ +	✓ 9.72e+00	2.30e+01
15	NN17	1.49	243	133	EHR	SV	0.008	✓ +	✓ 1.48e+02	1.56e+01

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P-SV	0.077
2	<input type="checkbox"/> P-SH	
3	<input checked="" type="checkbox"/> P-SV	
4	<input checked="" type="checkbox"/> P-SH	
5	<input checked="" type="checkbox"/> SV-SH	
6	<input checked="" type="checkbox"/> P-SV	0.014
7	<input checked="" type="checkbox"/> P-SH	0.032
8	<input type="checkbox"/> SV-SH	
9	<input checked="" type="checkbox"/> P-SV	
10	<input type="checkbox"/> P-SH	
11	<input type="checkbox"/> SV-SH	
12	<input type="checkbox"/> P-SV	
13	<input checked="" type="checkbox"/> P-SH	0.003
14	<input type="checkbox"/> SV-SH	
15	<input checked="" type="checkbox"/> P-SV	

POLARITIES

AMPLITUDE RATIOS



2014 Nov 16 16:44:39.138 UTC
 Lat: 43.7266 Lon: -121.311 Depth: 0.616
 43:43.5954 N 121:18.6342 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.94	13	112	EHU	P	0.038	<input checked="" type="checkbox"/> -	-7.81e+00	4.18e+01
2	NM06	0.87	105	154	EHU	P	-0.024	<input checked="" type="checkbox"/> +	2.51e+02	1.32e+01
3	NM22	0.20	139	174	EHU	P	-0.019	<input checked="" type="checkbox"/> +	4.75e+02	1.55e+01
4	NM41	2.36	139	121	EHT	SH	0.026	<input checked="" type="checkbox"/> -		
5	NM42	3.68	43	105	EHU	P	-0.016	<input checked="" type="checkbox"/> +	1.70e+01	2.10e+01
6	NM42	3.68	43	105	EHT	SH	0.059	<input checked="" type="checkbox"/> -	-5.11e+02	9.49e+00
7	NN07	3.00	337	109	EHU	P	0.003	<input checked="" type="checkbox"/> -	-7.22e+01	1.42e+01
8	NN07	3.00	337	109	EHT	SH	0.061	<input checked="" type="checkbox"/> +	4.32e+02	1.27e+01
9	NN09	1.92	292	126	EHU	P	0.007	<input checked="" type="checkbox"/> -	-9.06e+00	2.21e+01
10	NN09	1.92	292	126	EHR	SV	-0.034	<input checked="" type="checkbox"/> +	3.92e+02	1.38e+01
11	NN09	1.92	292	126	EHT	SH	0.002	<input checked="" type="checkbox"/> +	2.51e+02	1.55e+01
12	NN17	1.51	245	135	EHU	P	-0.010	<input checked="" type="checkbox"/> +	2.08e+01	2.23e+01
13	NN17	1.51	245	135	EHR	SV	0.033	<input checked="" type="checkbox"/> -	-1.19e+03	1.64e+01
14	NN17	1.51	245	135	EHT	SH	0.001	<input checked="" type="checkbox"/> -	-5.62e+02	1.30e+01
15	NN18	1.40	29	139	FH11	P	-0.007	<input checked="" type="checkbox"/> -	-7.04e+01	1.62e+01

North East Down
 North -1.49e-01 8.76e-02 7.87e-02
 East 8.76e-02 2.02e-01 -1.51e-01
 Down 7.87e-02 -1.51e-01 1.52e-02

Scalar M0 = 2.611e-01
 T = -0.112 k = 0.079

Total Penalty = 0.152

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	NM42 <input type="checkbox"/> P-SH	
2	NN07 <input type="checkbox"/> P-SH	
3	NN09 <input type="checkbox"/> P-SV	
4	NN09 <input type="checkbox"/> P-SH	
5	NN09 <input type="checkbox"/> SV-SH	
6	NN17 <input checked="" type="checkbox"/> P-SV	
7	NN17 <input checked="" type="checkbox"/> P-SH	
8	NN17 <input checked="" type="checkbox"/> SV-SH	
9	NN18 <input checked="" type="checkbox"/> P-SV	0.015
10	NN18 <input type="checkbox"/> P-SH	
11	NN18 <input type="checkbox"/> SV-SH	
12	NN19 <input checked="" type="checkbox"/> P-SV	
13	NN19 <input checked="" type="checkbox"/> P-SH	0.053
14	NN19 <input checked="" type="checkbox"/> SV-SH	0.013
15	NN21 <input type="checkbox"/> P-SV	



2014 Nov 16 16:45: 9.720 UTC
Lat: 43.7268 Lon: -121.313 Depth: 0.344
43:43.6086 N 121:18.7734 W

North East Down
North -8.09e-03 3.84e-02 3.87e-02
East 3.84e-02 -4.69e-02 -1.26e-01
Down 3.87e-02 -1.26e-01 5.39e-01

Scalar M0 = 4.063e-01
T = -0.727 k = 0.285

Total Penalty = 0.133

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1 NM03	2.96	17	101	EHU	P	0.007	✓ +		2.39e+01	1.62e+01
2 NM06	1.06	104	144	EHU	P	0.015	✓ +		1.56e+02	1.39e+01
3 NM06	1.06	104	144	EHT	SH	0.053	✓ +		1.21e+02	1.75e+01
4 NM22	0.36	119	167	EHU	P	-0.001	✓ +		2.08e+02	1.69e+01
5 NM40	2.84	109	103	EHU	P	0.002	✓ +		6.65e+00	2.17e+01
6 NM40	2.84	109	103	EHT	SH	-0.040	✓ -		-6.16e+01	1.19e+01
7 NM41	2.51	136	108	EHT	SH	-0.021	✓ -		-4.98e+02	1.59e+01
8 NM42	3.79	46	96	EHU	P	-0.004	✓ +		1.03e+02	1.04e+01
9 NM42	3.79	46	96	EHR	SV	0.090	✓ +		6.05e+02	1.68e+01
10 NM42	3.79	46	96	EHT	SH	0.001	✓ -		-2.23e+02	1.37e+01
11 NN07	2.91	340	99	EHU	P	-0.007	✓ -		-3.24e+01	1.42e+01
12 NN07	2.91	340	99	EHR	SV	-0.033	✓ +		4.25e+01	1.30e+01
13 NN07	2.91	340	99	EHT	SH	0.071	✓ +		1.84e+02	1.60e+01
14 NN09	1.74	294	121	EHU	P	0.030	✓ -		-2.29e+00	2.19e+01
15 NN09	1.74	294	121	EHR	SV	0.017	✓ +		1.68e+02	1.30e+01

Sta	Type	Penalty
1 NM06	<input type="checkbox"/> P-SH	
2 NM40	<input checked="" type="checkbox"/> P-SH	0.011
3 NM42	<input checked="" type="checkbox"/> P-SH	0.012
4 NN07	<input checked="" type="checkbox"/> P-SV	
5 NN07	<input checked="" type="checkbox"/> P-SH	
6 NN07	<input checked="" type="checkbox"/> SV-SH	
7 NN09	<input checked="" type="checkbox"/> P-SV	0.009
8 NN09	<input checked="" type="checkbox"/> P-SH	0.024
9 NN09	<input type="checkbox"/> SV-SH	
10 NN17	<input type="checkbox"/> P-SH	
11 NN18	<input type="checkbox"/> P-SV	
12 NN18	<input type="checkbox"/> P-SH	
13 NN18	<input type="checkbox"/> SV-SH	
14 NN19	<input type="checkbox"/> P-SV	
15 NN19	<input type="checkbox"/> P-SH	

POLARITIES

AMPLITUDE RATIOS



2014 Nov 16 18:52: 9.588 UTC
 Lat: 43.7274 Lon: -121.311 Depth: 0.6
 43:43.641 N 121:18.651 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM06	0.92	110	153	EHU	P	0.028	✓ + 0.010	✓ 1.99e+02	1.84e+01
2	NM06	0.92	110	153	EHT	SH	-0.042	✓ + 0.002	✓ 1.62e+02	1.59e+01
3	NM22	0.28	147	171	EHU	P	-0.027	✓ +	✓ 2.07e+02	1.58e+01
4	NM22	0.28	147	171	EHT	SH	-0.012	✓ +	✓ 6.72e+02	1.48e+01
5	NM42	3.63	45	105	EHU	P	0.053	✓ +	✓ 8.92e+01	1.06e+01
6	NM42	3.63	45	105	EHT	SH	0.089	✓ -	✓ -1.91e+02	1.16e+01
7	NN07	2.92	337	110	EHU	P	0.019	✓ -	✓ -2.48e+01	1.45e+01
8	NN07	2.92	337	110	EHR	SV	0.092	✓ +	✓ 1.46e+02	8.92e+00
9	NN07	2.92	337	110	EHT	SH	0.093	✓ +	✓ 1.96e+02	1.21e+01
10	NN09	1.86	290	126	EHU	P	0.020	✓ + 0.013	✓ 5.25e+00	1.79e+01
11	NN09	1.86	290	126	EHR	SV	0.002	✓ +	✓ 1.41e+02	1.84e+01
12	NN09	1.86	290	126	EHT	SH	0.035	✓ +	✓ 1.11e+02	1.98e+01
13	NN17	1.53	241	134	EHU	P	-0.012	✓ +	✓ 9.73e+00	2.83e+01
14	NN17	1.53	241	134	EHR	SV	0.019	✓ -	✓ -5.33e+02	1.56e+01
15	NN17	1.53	241	134	EHT	SH	-0.008	✓ -	✓ -3.01e+02	1.20e+01

North East Down
 North -2.70e-01 1.51e-01 7.18e-02
 East 1.51e-01 -2.26e-02 8.81e-02
 Down 7.18e-02 8.81e-02 8.50e-02

Scalar M0 = 2.759e-01
 T = 0.186 k = -0.201

Total Penalty = 0.173

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	✓ P-SH	
2	✓ P-SH	0.069
3	□ P-SH	
4	□ P-SV	
5	□ P-SH	
6	□ SV-SH	
7	□ P-SV	
8	□ P-SH	
9	□ SV-SH	
10	□ P-SV	
11	□ P-SH	
12	□ SV-SH	
13	□ P-SV	
14	✓ P-SH	0.056
15	□ SV-SH	



2014 Nov 16 23: 2:40.340 UTC
 Lat: 43.7271 Lon: -121.311 Depth: 0.337
 43:43.626 N 121:18.6528 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.89	14	101	EHU	P	-0.014		-9.30e+01	1.29e+01
2	NM22	0.26	143	171	EHU	P	-0.015		3.23e+03	1.17e+01
3	NM40	2.70	111	105	EHU	P	0.026	0.025	1.09e+02	2.10e+01
4	NM42	3.65	44	96	EHU	P	-0.021		-5.70e+02	1.18e+01
5	NM42	3.65	44	96	EHT	SH	0.067		-2.78e+03	1.57e+01
6	NN09	1.87	291	117	EHU	P	0.020		6.14e+01	1.91e+01
7	NN09	1.87	291	117	EHR	SV	0.012		2.96e+03	1.09e+01
8	NN09	1.87	291	117	EHT	SH	0.005		-8.96e+02	2.56e+01
9	NN17	1.51	242	127	EHU	P	-0.009		4.38e+02	1.71e+01
10	NN17	1.51	242	127	EHR	SV	0.047		-7.35e+03	1.73e+01
11	NN17	1.51	242	127	EHT	SH	0.019		-4.11e+03	1.18e+01
12	NN18	1.36	31	132	EHU	P	0.010		-6.26e+02	1.50e+01
13	NN18	1.36	31	132	EHR	SV	0.020		-5.69e+03	1.43e+01
14	NN18	1.36	31	132	EHT	SH	0.071		-5.13e+03	1.69e+01
15	NN19	1.03	162	142	FHII	P	-0.005		1.92e+03	1.34e+01

North East Down
 North 9.00e-02 -3.23e-02 2.10e-01
 East -3.23e-02 -8.10e-02 8.45e-02
 Down 2.10e-01 8.45e-02 1.75e-01

Scalar M0 = 2.738e-01
 T = -0.462 k = 0.174

Total Penalty = 0.135

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	NM42 <input checked="" type="checkbox"/> P-SH	
2	NN09 <input checked="" type="checkbox"/> P-SV	
3	NN09 <input checked="" type="checkbox"/> P-SH	
4	NN09 <input checked="" type="checkbox"/> SV-SH	
5	NN17 <input type="checkbox"/> P-SV	
6	NN17 <input type="checkbox"/> P-SH	
7	NN17 <input type="checkbox"/> SV-SH	
8	NN18 <input type="checkbox"/> P-SV	
9	NN18 <input checked="" type="checkbox"/> P-SH	0.110
10	NN18 <input type="checkbox"/> SV-SH	
11	NN19 <input type="checkbox"/> P-SV	
12	NN19 <input type="checkbox"/> P-SH	
13	NN19 <input type="checkbox"/> SV-SH	
14	NN21 <input type="checkbox"/> P-SH	
15	NN24 <input checked="" type="checkbox"/> P-SV	



2014 Nov 16 23: 9:57.924 UTC
 Lat: 43.7267 Lon: -121.311 Depth: 0.347
 43:43.6038 N 121:18.6798 W

Solve

North East Down
 North 2.19e-01 1.91e-02 2.30e-01
 East 1.91e-02 -6.36e-02 -5.18e-02
 Down 2.30e-01 -5.18e-02 1.16e-01

Scalar M0 = 2.976e-01
 T = -0.666 k = 0.224

Total Penalty = 0.187

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.94	14	101	EHR	SV	-0.033	✓ -	-2.18e+01	1.78e+01
2	NM22	0.25	131	171	EHU	P	-0.013	✓ +	2.83e+02	1.32e+01
3	NM42	3.71	44	96	EHR	SV	0.090	✓ -	-1.90e+02	1.56e+01
4	NM42	3.71	44	96	EHT	SH	0.031	✓ -	-2.50e+02	1.53e+01
5	NN09	1.85	293	118	EHU	P	0.003	✓ -	-5.12e+00	1.73e+01
6	NN09	1.85	293	118	EHR	SV	-0.015	✓ + 0.015	1.79e+02	1.22e+01
7	NN09	1.85	293	118	EHT	SH	0.041	✓ + 0.012	1.26e+02	2.72e+01
8	NN17	1.46	243	129	EHU	P	-0.001	✓ +	9.30e+00	2.84e+01
9	NN17	1.46	243	129	EHR	SV	0.021	✓ +	1.54e+02	2.00e+01
10	NN17	1.46	243	129	EHT	SH	-0.076	☐ +	5.59e+01	1.31e+01
11	NN18	1.42	32	131	EHU	P	-0.004	✓ -	-4.42e+01	1.70e+01
12	NN18	1.42	32	131	EHR	SV	-0.002	✓ -	-3.41e+02	1.33e+01
13	NN18	1.42	32	131	EHT	SH	0.026	✓ +	1.54e+02	1.66e+01
14	NN19	1.00	159	144	EHU	P	0.010	✓ +	6.55e+01	1.66e+01
15	NN19	1.00	159	144	EHT	SH	0.062	☐ -	-3.04e+02	1.47e+01

Sta	Type	Penalty
1	<input type="checkbox"/> P-SV	
2	<input checked="" type="checkbox"/> P-SH	0.117
3	<input checked="" type="checkbox"/> SV-SH	
4	<input type="checkbox"/> P-SV	
5	<input type="checkbox"/> P-SH	
6	<input type="checkbox"/> SV-SH	
7	<input checked="" type="checkbox"/> P-SV	
8	<input checked="" type="checkbox"/> P-SH	
9	<input checked="" type="checkbox"/> SV-SH	
10	<input type="checkbox"/> P-SH	
11	<input checked="" type="checkbox"/> P-SV	0.004
12	<input checked="" type="checkbox"/> P-SH	0.004
13	<input checked="" type="checkbox"/> SV-SH	
14	<input checked="" type="checkbox"/> P-SV	0.018
15	<input checked="" type="checkbox"/> P-SH	0.018

POLARITIES

AMPLITUDE RATIOS



2014 Nov 17 3:34:37.422 UTC
 Lat: 43.7283 Lon: -121.311 Depth: 0.527
 43:43.6992 N 121:18.6774 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.77	15	112	EHU	P	0.023	<input checked="" type="checkbox"/> -	-2.21e+01	1.79e+01
2	NM06	0.99	115	149	EHU	P	-0.036	<input checked="" type="checkbox"/> +	2.98e+02	3.59e+01
3	NM06	0.99	115	149	EHR	SV	0.075	<input checked="" type="checkbox"/> +	1.55e+03	8.63e+02
4	NM06	0.99	115	149	EHT	SH	0.038	<input checked="" type="checkbox"/> +	1.41e+03	1.61e+01
5	NM22	0.39	151	167	EHU	P	-0.026	<input checked="" type="checkbox"/> +	3.88e+02	1.56e+01
6	NM22	0.39	151	167	EHT	SH	-0.027	<input checked="" type="checkbox"/> +	1.59e+03	1.51e+01
7	NM40	2.78	114	112	EHU	P	0.046	<input checked="" type="checkbox"/> -		
8	NM40	2.78	114	112	EHT	SH	0.018	<input checked="" type="checkbox"/> -	-2.96e+02	1.85e+01
9	NM42	3.58	46	103	EHU	P	-0.010	<input checked="" type="checkbox"/> -	-9.63e+01	1.07e+01
10	NM42	3.58	46	103	EHR	SV	0.136	<input checked="" type="checkbox"/> -	-7.50e+02	2.05e+01
11	NN07	2.80	337	109	EHU	P	0.033	<input checked="" type="checkbox"/> -	-5.40e+01	1.34e+01
12	NN07	2.80	337	109	EHR	SV	0.094	<input checked="" type="checkbox"/> -	-3.70e+02	1.54e+01
13	NN07	2.80	337	109	EHT	SH	0.066	<input checked="" type="checkbox"/> - 0.014	-2.89e+02	1.31e+01
14	NN09	1.80	287	126	EHU	P	0.019	<input checked="" type="checkbox"/> -	-2.48e+00	2.70e+01
15	NN09	1.80	287	126	EHR	SV	0.003	<input type="checkbox"/> +	2.92e+02	1.54e+01

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P-SV	0.012
2	<input checked="" type="checkbox"/> P-SH	0.008
3	<input type="checkbox"/> SV-SH	
4	<input checked="" type="checkbox"/> P-SH	0.013
5	<input checked="" type="checkbox"/> P-SV	0.019
6	<input type="checkbox"/> P-SV	
7	<input type="checkbox"/> P-SH	
8	<input type="checkbox"/> SV-SH	
9	<input type="checkbox"/> P-SV	
10	<input type="checkbox"/> P-SH	
11	<input type="checkbox"/> SV-SH	
12	<input checked="" type="checkbox"/> P-SV	0.007
13	<input checked="" type="checkbox"/> P-SH	
14	<input type="checkbox"/> SV-SH	
15	<input type="checkbox"/> P-SV	

North East Down
 North -2.52e-01 1.28e-01 1.39e-01
 East 1.28e-01 -4.56e-02 -5.85e-02
 Down 1.39e-01 -5.85e-02 -5.26e-02

Scalar M0 = 2.704e-01
 T = 0.951 k = -0.306

Total Penalty = 0.155

POLARITIES

AMPLITUDE RATIOS



2014 Nov 17 3:41:42.731 UTC
 Lat: 43.7265 Lon: -121.313 Depth: 0.457
 43:43.5894 N 121:18.7572 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.99	16	106	EHU	P	0.017	<input checked="" type="checkbox"/> -	-1.63e+00	3.59e+01
2	NM03	2.99	16	106	EHR	SV	-0.015	<input type="checkbox"/> +	1.27e+02	1.05e+01
3	NM03	2.99	16	106	EHT	SH	-0.014	<input type="checkbox"/> -	-1.18e+02	1.19e+01
4	NM06	1.03	102	147	EHU	P	0.044	<input checked="" type="checkbox"/> +	3.40e+01	2.45e+01
5	NM06	1.03	102	147	EHR	SV	0.092	<input checked="" type="checkbox"/> +	2.37e+02	1.30e+01
6	NM06	1.03	102	147	EHT	SH	0.054	<input checked="" type="checkbox"/> +	1.37e+02	1.21e+01
7	NM22	0.33	115	169	EHU	P	-0.011	<input checked="" type="checkbox"/> +	3.82e+01	1.77e+01
8	NM42	3.80	45	100	EHU	P	0.011	<input checked="" type="checkbox"/> +	1.52e+01	1.33e+01
9	NM42	3.80	45	100	EHR	SV	0.065	<input checked="" type="checkbox"/> -	-1.08e+02	1.36e+01
10	NM42	3.80	45	100	EHT	SH	-0.009	<input checked="" type="checkbox"/> +	4.62e+01	1.90e+01
11	NN07	2.95	340	104	EHU	P	0.005	<input checked="" type="checkbox"/> -	-1.82e+01	1.51e+01
12	NN07	2.95	340	104	EHR	SV	-0.035	<input checked="" type="checkbox"/> + 0.051	3.37e+01	1.11e+01
13	NN07	2.95	340	104	EHT	SH	0.001	<input type="checkbox"/> -	-9.27e+00	9.94e+00
14	NN09	1.77	295	124	EHU	P	0.015	<input type="checkbox"/> +	5.29e+00	1.55e+01
15	NN09	1.77	295	124	EHR	SV	0.025	<input checked="" type="checkbox"/> +	1.20e+02	1.88e+01

North East Down
 North -8.58e-02 1.70e-01 1.66e-01
 East 1.70e-01 1.80e-02 4.79e-02
 Down 1.66e-01 4.79e-02 1.28e-01

Scalar M0 = 2.662e-01
 T = 0.010 k = 0.070

Total Penalty = 0.180

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P:SH

P:SV

SV:SH

Sta	Type	Penalty
1	NM03	<input type="checkbox"/> P-SV
2	NM03	<input type="checkbox"/> P-SH
3	NM03	<input type="checkbox"/> SV-SH
4	NM06	<input checked="" type="checkbox"/> P-SV
5	NM06	<input checked="" type="checkbox"/> P-SH
6	NM06	<input checked="" type="checkbox"/> SV-SH
7	NM42	<input checked="" type="checkbox"/> P-SV
8	NM42	<input checked="" type="checkbox"/> P-SH
9	NM42	<input checked="" type="checkbox"/> SV-SH
10	NN07	<input type="checkbox"/> P-SV
11	NN07	<input type="checkbox"/> P-SH
12	NN07	<input type="checkbox"/> SV-SH
13	NN09	<input type="checkbox"/> P-SV
14	NN09	<input type="checkbox"/> P-SH
15	NN09	<input type="checkbox"/> SV-SH



2014 Nov 17 4:41:52.962 UTC
 Lat: 43.727 Lon: -121.311 Depth: 0.428
 43.43.6176 N 121.18.687 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.92	15	106	EHU	P	-0.001	<input checked="" type="checkbox"/> -	4.93e+02	1.27e+01
2	NM06	0.95	106	149	EHU	P	0.024	<input checked="" type="checkbox"/> +	4.26e+03	1.16e+01
3	NM08	2.98	167	105	EHZ	P	0.046			
4	NM22	0.28	134	170	EHU	P	-0.021	<input checked="" type="checkbox"/> +	6.65e+03	1.11e+01
5	NM40	2.74	111	109	EHU	P	0.029	<input checked="" type="checkbox"/> +	1.70e+02	1.60e+01
6	NM41	2.44	138	113	EHU	P	-0.046	<input checked="" type="checkbox"/> -	-2.11e+02	1.20e+01
7	NM42	3.70	45	99	EHU	P	-0.026	<input checked="" type="checkbox"/> -	-1.09e+03	1.00e+01
8	NN07	2.94	338	103	EHU	P	0.016	<input checked="" type="checkbox"/> -	-1.16e+03	1.37e+01
9	NN09	1.84	292	122	EHU	P	0.007	<input checked="" type="checkbox"/> -	-6.31e+01	1.48e+01
10	NN09	1.84	292	122	EHR	SV	0.009	<input checked="" type="checkbox"/> +	9.06e+03	1.48e+01
11	NN09	1.84	292	122	EHT	SH	0.034	<input checked="" type="checkbox"/> +	3.88e+03	2.32e+01
12	NN17	1.47	242	131	EHU	P	-0.003	<input checked="" type="checkbox"/> +	1.70e+03	1.49e+01
13	NN17	1.47	242	131	EHR	SV	0.067	<input type="checkbox"/> -	-6.10e+03	1.41e+01
14	NN18	1.40	32	134	EHU	P	0.004	<input checked="" type="checkbox"/> -	-1.56e+03	1.38e+01
15	NN19	1.03	159	145	EHU	P	0.002	<input checked="" type="checkbox"/> +	2.67e+03	1.41e+01
16	NN21	1.87	68	123	EHU	P	-0.013	<input checked="" type="checkbox"/> -	-4.69e+02	1.24e+01
17	NN24	0.60	20	159	EHU	P	0.000	<input checked="" type="checkbox"/> +	4.90e+00	4.35e+01
18	NN32	2.88	207	104	EHU	P	-0.041	<input checked="" type="checkbox"/> -	-7.01e+02	1.10e+01
19	NN32	2.88	207	104	EHR	SV	0.085	<input type="checkbox"/> -	-2.40e+04	6.56e+00

North East Down
 North -2.49e-01 -8.81e-02 3.18e-02
 East -8.81e-02 -1.12e-01 -3.71e-02
 Down 3.18e-02 -3.71e-02 3.26e-01

Scalar M0 = 3.167e-01
 T = -0.365 k = -0.033

Total Penalty = 0.005

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P-SV	0.005
2	<input checked="" type="checkbox"/> P-SH	
3	<input type="checkbox"/> SV-SH	
4	<input type="checkbox"/> P-SV	
5	<input type="checkbox"/> P-SV	



2014 Nov 17 5:40:30.556 UTC
Lat: 43.7268 Lon: -121.311 Depth: 0.478
43:43.6104 N 121:18.6846 W

North East Down
North -9.76e-02 1.35e-01 9.04e-02
East 1.35e-01 -1.60e-01 -1.08e-01
Down 9.04e-02 -1.08e-01 -7.58e-02

Scalar M0 = 2.418e-01
T = 0.948 k = -0.325

Total Penalty = 0.192

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.93	15	108	EZH	P	0.006	<input checked="" type="checkbox"/> -	-1.75e+00	3.49e+01
2	NM03	2.93	15	108	EHR	SV	-0.004	<input type="checkbox"/> +	1.10e+02	1.21e+01
3	NM06	0.94	106	150	EHU	P	0.016	<input checked="" type="checkbox"/> -	-1.16e+02	8.47e+00
4	NM06	0.94	106	150	EHR	SV	0.077	<input checked="" type="checkbox"/> +	2.38e+02	9.95e+00
5	NM06	0.94	106	150	EHT	SH	0.045	<input checked="" type="checkbox"/> +	1.75e+02	2.24e+01
6	NM22	0.27	132	171	EHT	SH	-0.016	<input checked="" type="checkbox"/> + 0.003	2.59e+02	1.02e+01
7	NM42	3.70	45	101	EHU	P	0.028	<input checked="" type="checkbox"/> +	4.19e+01	1.11e+01
8	NM42	3.70	45	101	EHR	SV	0.060	<input checked="" type="checkbox"/> -	-9.04e+01	1.05e+01
9	NM42	3.70	45	101	EHT	SH	0.005	<input checked="" type="checkbox"/> -	-1.10e+02	9.04e+00
10	NN07	2.95	338	105	EHU	P	-0.008	<input checked="" type="checkbox"/> -	-1.09e+01	1.30e+01
11	NN07	2.95	338	105	EHR	SV	-0.033	<input type="checkbox"/> +	2.23e+01	1.92e+01
12	NN07	2.95	338	105	EHT	SH	-0.001	<input type="checkbox"/> -	-3.27e+01	1.58e+01
13	NN09	1.84	292	123	EHU	P	0.011	<input checked="" type="checkbox"/> -	-3.16e+00	2.00e+01
14	NN09	1.84	292	123	EHR	SV	-0.011	<input checked="" type="checkbox"/> +	5.34e+01	1.69e+01
15	NN09	1.84	292	123	EHT	SH	0.044	<input type="checkbox"/> +	3.68e+01	3.89e+01

Sta	Type	Penalty
1	NM03	<input type="checkbox"/> P-SV
2	NM06	<input checked="" type="checkbox"/> P-SV
3	NM06	<input checked="" type="checkbox"/> P-SH
4	NM06	<input checked="" type="checkbox"/> SV-SH
5	NM42	<input checked="" type="checkbox"/> P-SV
6	NM42	<input checked="" type="checkbox"/> P-SH
7	NM42	<input checked="" type="checkbox"/> SV-SH
8	NN07	<input type="checkbox"/> P-SV
9	NN07	<input type="checkbox"/> P-SH
10	NN07	<input type="checkbox"/> SV-SH
11	NN09	<input type="checkbox"/> P-SV
12	NN09	<input type="checkbox"/> P-SH
13	NN09	<input type="checkbox"/> SV-SH
14	NN17	<input type="checkbox"/> P-SV
15	NN17	<input type="checkbox"/> P-SH

POLARITIES

AMPLITUDE RATIOS



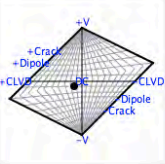
2014 Nov 17 7:47:43.425 UTC
 Lat: 43.7262 Lon: -121.311 Depth: 0.498
 43:43.5696 N 121:18.6642 W

Solve

North East Down
 North -6.71e-02 5.92e-02 -1.98e-02
 East 5.92e-02 -2.60e-01 1.39e-01
 Down -1.98e-02 1.39e-01 2.36e-01

Scalar M0 = 2.954e-01
 T = -0.137 k = -0.092

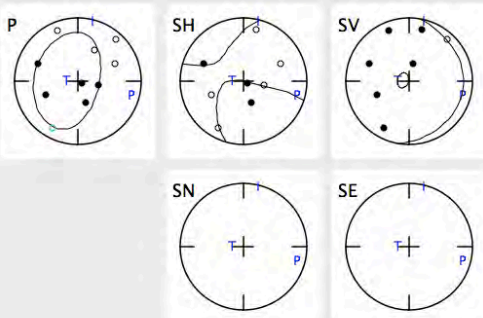
Total Penalty = 0.142



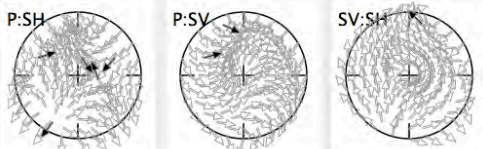
Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.99	14	108	EHU	P	0.032	<input type="checkbox"/> +	7.56e+00	2.34e+01
2	NM03	2.99	14	108	EHR	SV	-0.015	<input checked="" type="checkbox"/> +	7.15e+01	1.75e+01
3	NM03	2.99	14	108	EHT	SH	-0.025	<input checked="" type="checkbox"/> -	-8.49e+01	1.49e+01
4	NM06	0.90	101	152	EHU	P	0.045	<input checked="" type="checkbox"/> +	3.65e+01	1.66e+01
5	NM06	0.90	101	152	EHT	SH	0.026	<input checked="" type="checkbox"/> -	-6.93e+01	1.04e+01
6	NM22	0.20	121	173	EHU	P	-0.007	<input checked="" type="checkbox"/> +	3.17e+01	1.88e+01
7	NM22	0.20	121	173	EHT	SH	0.003	<input checked="" type="checkbox"/> +	1.77e+02	1.44e+01
8	NM42	3.74	43	101	EHU	P	-0.007	<input checked="" type="checkbox"/> -	-2.59e+01	1.57e+01
9	NM42	3.74	43	101	EHR	SV	0.088	<input checked="" type="checkbox"/> -	-5.47e+01	3.10e+01
10	NM42	3.74	43	101	EHT	SH	0.083	<input type="checkbox"/> +	1.03e+02	2.37e+01
11	NN07	3.03	338	105	EHU	P	0.006	<input checked="" type="checkbox"/> -	-8.65e-01	1.85e+01
12	NN07	3.03	338	105	EHR	SV	-0.023	<input checked="" type="checkbox"/> +	6.86e+00	2.38e+01
13	NN07	3.03	338	105	EHT	SH	-0.003	<input type="checkbox"/> -	-2.24e+01	1.65e+01
14	NN09	1.90	294	123	EHU	P	0.010	<input checked="" type="checkbox"/> +	1.49e+00	1.81e+01
15	NN09	1.90	294	123	EHR	SV	0.007	<input checked="" type="checkbox"/> +	2.55e+01	1.75e+01

Sta	Type	Penalty
1	NM03 <input type="checkbox"/> P-SV	
2	NM03 <input type="checkbox"/> P-SH	
3	NM03 <input checked="" type="checkbox"/> SV-SH	0.037
4	NM06 <input checked="" type="checkbox"/> P-SH	
5	NM22 <input type="checkbox"/> P-SH	
6	NM42 <input type="checkbox"/> P-SV	
7	NM42 <input type="checkbox"/> P-SH	
8	NM42 <input type="checkbox"/> SV-SH	
9	NN07 <input checked="" type="checkbox"/> P-SV	
10	NN07 <input type="checkbox"/> P-SH	
11	NN07 <input type="checkbox"/> SV-SH	
12	NN09 <input checked="" type="checkbox"/> P-SV	0.074
13	NN09 <input checked="" type="checkbox"/> P-SH	
14	NN09 <input type="checkbox"/> SV-SH	
15	NN17 <input type="checkbox"/> P-SV	

POLARITIES



AMPLITUDE RATIOS





2014 Nov 17 7:48:23.805 UTC
 Lat: 43.7267 Lon: -121.312 Depth: 0.53
 43:43.6026 N 121:18.7092 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.95	15	109	EHR	SV	-0.002	<input type="checkbox"/> +	6.76e+01	1.64e+01
2	NM06	0.97	104	150	EHU	P	0.047	<input checked="" type="checkbox"/> +	1.22e+01	1.67e+01
3	NM06	0.97	104	150	EHR	SV	0.086	<input checked="" type="checkbox"/> +	1.60e+02	1.75e+01
4	NM06	0.97	104	150	EHT	SH	0.039	<input checked="" type="checkbox"/> +	1.03e+02	1.12e+01
5	NM22	0.28	125	171	EHT	SH	0.000	<input checked="" type="checkbox"/> +	1.61e+02	2.08e+01
6	NM42	3.74	45	102	EHU	P	0.028	<input checked="" type="checkbox"/> +	6.91e+01	1.02e+01
7	NM42	3.74	45	102	EHR	SV	0.073	<input checked="" type="checkbox"/> -	-8.42e+01	1.13e+01
8	NM42	3.74	45	102	EHT	SH	-0.003	<input checked="" type="checkbox"/> -	-3.43e+01	1.79e+01
9	NN07	2.95	339	107	EHU	P	0.024	<input checked="" type="checkbox"/> -	-4.23e+00	1.43e+01
10	NN07	2.95	339	107	EHR	SV	0.028	<input checked="" type="checkbox"/> -	-2.63e+01	9.98e+00
11	NN07	2.95	339	107	EHT	SH	0.048	<input type="checkbox"/> -	-2.15e+01	1.95e+01
12	NN09	1.82	293	125	EHZ	P	0.004	<input checked="" type="checkbox"/> -	-8.82e-01	1.95e+01
13	NN09	1.82	293	125	EHR	SV	-0.032	<input checked="" type="checkbox"/> +	2.79e+01	2.63e+01
14	NN09	1.82	293	125	EHT	SH	-0.018	<input checked="" type="checkbox"/> -	-1.09e+01	1.82e+01
15	NN17	1.43	242	135	FH11	P	0.001	<input checked="" type="checkbox"/> +	2.99e+00	2.89e+01

North East Down
 North 1.11e-01 1.13e-01 1.51e-01
 East 1.13e-01 -2.27e-01 -4.51e-02
 Down 1.51e-01 -4.51e-02 4.24e-02

Scalar M0 = 2.657e-01
 T = -0.011 k = -0.084

Total Penalty = 0.271

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	NM06 <input checked="" type="checkbox"/> P-SV	0.007
2	NM06 <input checked="" type="checkbox"/> P-SH	0.027
3	NM06 <input type="checkbox"/> SV-SH	
4	NM42 <input type="checkbox"/> P-SV	
5	NM42 <input type="checkbox"/> P-SH	
6	NM42 <input type="checkbox"/> SV-SH	
7	NN07 <input checked="" type="checkbox"/> P-SV	
8	NN07 <input type="checkbox"/> P-SH	
9	NN07 <input type="checkbox"/> SV-SH	
10	NN09 <input type="checkbox"/> P-SV	
11	NN09 <input type="checkbox"/> P-SH	
12	NN09 <input checked="" type="checkbox"/> SV-SH	
13	NN17 <input checked="" type="checkbox"/> P-SV	0.026
14	NN17 <input checked="" type="checkbox"/> P-SH	0.007
15	NN17 <input type="checkbox"/> SV-SH	



2014 Nov 17 23:31:42.142 UTC
 Lat: 43.7255 Lon: -121.31 Depth: 0.532
 43:43.5282 N 121:18.6192 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	3.06	12	108	EHU	P	0.011	<input checked="" type="checkbox"/> -	-1.61e+01	2.46e+01
2	NM03	3.06	12	108	EHT	SH	-0.082	<input checked="" type="checkbox"/> -	-2.11e+02	1.42e+01
3	NM06	0.83	97	154	EHU	P	0.017	<input checked="" type="checkbox"/> -	-2.12e+02	1.38e+01
4	NM06	0.83	97	154	EHR	SV	0.098	<input checked="" type="checkbox"/> + 0.020	3.33e+03	1.85e+01
5	NM22	0.11	104	176	EHU	P	-0.024	<input checked="" type="checkbox"/> +	3.46e+02	1.29e+01
6	NM22	0.11	104	176	EHT	SH	0.016	<input checked="" type="checkbox"/> +	2.13e+03	1.51e+01
7	NM42	3.76	42	102	EHU	P	-0.023	<input checked="" type="checkbox"/> -	-1.20e+02	1.15e+01
8	NM42	3.76	42	102	EHR	SV	0.107	<input checked="" type="checkbox"/> -	-9.16e+02	2.07e+01
9	NM42	3.76	42	102	EHT	SH	0.125	<input checked="" type="checkbox"/> +	1.13e+03	1.79e+01
10	NN07	3.13	338	105	EHU	P	0.015	<input checked="" type="checkbox"/> -	-3.27e+01	1.61e+01
11	NN07	3.13	338	105	EHR	SV	0.034	<input type="checkbox"/> -	-2.72e+02	2.26e+01
12	NN07	3.13	338	105	EHT	SH	0.047	<input checked="" type="checkbox"/> -	-2.08e+02	1.88e+01
13	NN09	1.99	296	122	EHZ	P	0.001	<input checked="" type="checkbox"/> +	5.36e+01	1.64e+01
14	NN09	1.99	296	122	EHN	SN	0.028	<input type="checkbox"/> +	8.53e+02	2.66e+01
15	NN09	1.99	296	122	FHF	SF	0.025	<input type="checkbox"/> -	-1.14e+03	1.10e+01

Sta	Type	Penalty
1	NM03	<input type="checkbox"/> P-SH
2	NM06	<input checked="" type="checkbox"/> P-SV 0.050
3	NM42	<input checked="" type="checkbox"/> P-SV 0.012
4	NM42	<input checked="" type="checkbox"/> P-SH
5	NM42	<input checked="" type="checkbox"/> SV-SH 0.027
6	NN07	<input checked="" type="checkbox"/> P-SV 0.002
7	NN07	<input type="checkbox"/> P-SH
8	NN07	<input type="checkbox"/> SV-SH
9	NN17	<input type="checkbox"/> P-SV
10	NN17	<input type="checkbox"/> P-SH
11	NN17	<input type="checkbox"/> SV-SH
12	NN18	<input type="checkbox"/> P-SH
13	NN19	<input checked="" type="checkbox"/> P-SV
14	NN19	<input type="checkbox"/> P-SH
15	NN19	<input type="checkbox"/> SV-SH

North East Down
 North -1.09e-01 -7.56e-02 6.33e-02
 East -7.56e-02 2.84e-01 1.56e-01
 Down 6.33e-02 1.56e-01 1.75e-02

Scalar M0 = 2.837e-01
 T = -0.368 k = 0.179

Total Penalty = 0.166

POLARITIES

AMPLITUDE RATIOS



2014 Nov 19 7:51:31.118 UTC
 Lat: 43.7262 Lon: -121.31 Depth: 0.466
 43:43.5702 N 121:18.5814 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.97	12	107	EHU	P	0.030	✓ +	1.25e+01	1.84e+01
2	NM06	0.79	103	154	EHU	P	0.084	✓ -	-1.79e+02	1.27e+01
3	NM06	0.79	103	154	EHT	SH	0.080	✓ +	1.43e+02	1.54e+01
4	NM42	3.66	42	101	EHT	SH	0.094	✓ +	7.02e+01	1.12e+01
5	NN07	3.07	336	103	EHU	P	-0.004	✓ -	-1.19e+01	1.54e+01
6	NN07	3.07	336	103	EHR	SV	0.012	✓ - 0.043	-5.13e+01	1.34e+01
7	NN07	3.07	336	103	EHT	SH	-0.040	✓ - 0.015	-3.63e+01	9.11e+00
8	NN09	2.00	293	119	EHU	P	0.015	✓ +	1.24e+01	1.17e+01
9	NN09	2.00	293	119	EHR	SV	-0.010	✓ +	3.83e+01	2.10e+01
10	NN09	2.00	293	119	EHT	SH	0.006	✓ -	-8.55e+00	2.34e+01
11	NN17	1.56	247	130	EHU	P	0.001	✓ +	2.45e+00	3.10e+01
12	NN17	1.56	247	130	EHR	SV	0.015	✓ +	6.18e+01	1.64e+01
13	NN17	1.56	247	130	EHT	SH	-0.022	✓ -	-1.12e+02	8.23e+00
14	NN18	1.41	26	135	EHU	P	-0.002	✓ -	-2.46e+01	1.76e+01
15	NN18	1.41	26	135	EHR	SV	-0.010	✓ -	-1.43e+02	1.17e+01

North East Down
 North -1.45e-03 1.66e-01 6.64e-02
 East 1.66e-01 1.30e-01 1.91e-01
 Down 6.64e-02 1.91e-01 2.16e-02

Scalar M0 = 2.778e-01
 T = -0.696 k = 0.139

Total Penalty = 0.171

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P-SH	
2	<input type="checkbox"/> P-SV	
3	<input type="checkbox"/> P-SH	
4	<input checked="" type="checkbox"/> SV-SH	0.017
5	<input checked="" type="checkbox"/> P-SV	
6	<input type="checkbox"/> P-SH	
7	<input type="checkbox"/> SV-SH	
8	<input type="checkbox"/> P-SV	
9	<input type="checkbox"/> P-SH	
10	<input checked="" type="checkbox"/> SV-SH	0.096
11	<input checked="" type="checkbox"/> P-SV	
12	<input checked="" type="checkbox"/> P-SH	
13	<input checked="" type="checkbox"/> SV-SH	
14	<input type="checkbox"/> P-SH	
15	<input checked="" type="checkbox"/> P-SV	



2014 Nov 19 7:51:48.116 UTC
 Lat: 43.7265 Lon: -121.31 Depth: 0.519
 43:43.5882 N 121:18.6198 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.95	13	109	EHR	SV	0.009	<input type="checkbox"/> +		
2	NM06	0.85	104	153	EHU	P	0.050	<input checked="" type="checkbox"/> +	0.022	<input checked="" type="checkbox"/> 6.64e+01 1.84e+01
3	NM06	0.85	104	153	EHR	SV	0.099	<input checked="" type="checkbox"/> +		<input checked="" type="checkbox"/> 2.52e+02 1.22e+01
4	NM06	0.85	104	153	EHE	SE	0.055	<input checked="" type="checkbox"/> -		<input checked="" type="checkbox"/> -1.10e+02 1.21e+01
5	NM22	0.18	141	174	EHZ	P	-0.019	<input type="checkbox"/> +		
6	NM22	0.18	141	174	EHR	SV	0.045	<input type="checkbox"/> +		<input checked="" type="checkbox"/> 6.32e+02 9.33e+00
7	NM22	0.18	141	174	EHT	SH	-0.009	<input checked="" type="checkbox"/> +		<input checked="" type="checkbox"/> 2.72e+02 1.19e+01
8	NM42	3.67	43	103	EHR	SV	0.069	<input checked="" type="checkbox"/> -		<input checked="" type="checkbox"/> -1.36e+02 1.00e+01
9	NN07	3.02	337	106	EHU	P	0.013	<input checked="" type="checkbox"/> -		<input checked="" type="checkbox"/> -1.32e+01 1.78e+01
10	NN07	3.02	337	106	EHR	SV	0.030	<input checked="" type="checkbox"/> -		<input checked="" type="checkbox"/> -6.32e+01 1.28e+01
11	NN07	3.02	337	106	EHT	SH	-0.018	<input checked="" type="checkbox"/> -		<input checked="" type="checkbox"/> -3.52e+01 9.52e+00
12	NN09	1.94	293	122	EHU	P	0.012	<input checked="" type="checkbox"/> -		<input checked="" type="checkbox"/> -1.34e+01 1.04e+01
13	NN09	1.94	293	122	EHR	SV	0.000	<input checked="" type="checkbox"/> +		<input checked="" type="checkbox"/> 3.74e+01 1.76e+01
14	NN09	1.94	293	122	EHT	SH	0.041	<input checked="" type="checkbox"/> +		<input checked="" type="checkbox"/> 2.59e+01 1.93e+01
15	NN17	1.52	245	133	EHZ	P	-0.002	<input type="checkbox"/> +		<input checked="" type="checkbox"/> 4.56e+00 2.97e+01

North East Down
 North -8.25e-02 -1.21e-01 1.42e-01
 East -1.21e-01 -2.77e-01 4.11e-02
 Down 1.42e-01 4.11e-02 3.23e-02

Scalar M0 = 2.806e-01
 T = 0.097 k = -0.301

Total Penalty = 0.145

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	NM06 <input type="checkbox"/> P-SV	
2	NM22 <input type="checkbox"/> SV-SH	
3	NN07 <input checked="" type="checkbox"/> P-SV	
4	NN07 <input checked="" type="checkbox"/> P-SH	
5	NN07 <input checked="" type="checkbox"/> SV-SH	
6	NN09 <input checked="" type="checkbox"/> P-SV	
7	NN09 <input checked="" type="checkbox"/> P-SH	
8	NN09 <input checked="" type="checkbox"/> SV-SH	
9	NN17 <input type="checkbox"/> P-SV	
10	NN17 <input type="checkbox"/> P-SH	
11	NN17 <input type="checkbox"/> SV-SH	
12	NN18 <input type="checkbox"/> P-SH	
13	NN19 <input checked="" type="checkbox"/> P-SH	
14	NN24 <input checked="" type="checkbox"/> P-SV 0.023	
15	NN32 <input type="checkbox"/> P-SV	



2014 Nov 19 15: 3:58.695 UTC
 Lat: 43.7265 Lon: -121.311 Depth: 0.867
 43:43.5876 N 121:18.6528 W

Solve

North East Down
 North 2.26e-01 5.21e-02 1.54e-01
 East 5.21e-02 -2.14e-01 -3.93e-02
 Down 1.54e-01 -3.93e-02 6.90e-02

Scalar M0 = 2.807e-01
 T = -0.237 k = 0.084

Total Penalty = 0.199

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM06	0.89	104	157	EHU	P	0.033	✓ +	7.33e+01	1.78e+01
2	NM06	0.89	104	157	EHR	SV	0.083	✓ +	1.79e+02	2.11e+01
3	NM06	0.89	104	157	EHT	SH	0.050	✓ +	1.66e+02	1.86e+01
4	NM22	0.21	131	174	EHU	P	-0.018	✓ +	5.63e+01	1.48e+01
5	NM22	0.21	131	174	EHT	SH	0.014	✓ -	-7.60e+02	1.22e+01
6	NM42	3.70	44	112	EHR	SV	0.067	✓ -	-1.64e+02	2.05e+01
7	NM42	3.70	44	112	EHT	SH	-0.057	✓ +	1.23e+02	1.33e+01
8	NN07	3.01	338	116	EHU	P	0.020	✓ -	-1.86e+01	1.74e+01
9	NN07	3.01	338	116	EHT	SH	0.056	✓ +	9.78e+01	2.02e+01
10	NN09	1.90	293	132	EHU	P	0.011	✓ -	-2.14e+01	5.12e+00
11	NN09	1.90	293	132	EHR	SV	0.007	✓ +	1.52e+02	3.07e+01
12	NN09	1.90	293	132	EHT	SH	0.030	✓ +	1.54e+02	1.82e+01
13	NN17	1.48	245	141	EHU	P	-0.011	✓ +	6.26e+00	2.14e+01
14	NN17	1.48	245	141	EHR	SV	0.017	✓ +	1.13e+02	2.07e+01
15	NN17	1.48	245	141	EHT	SH	-0.010	✓ -	-2.95e+02	1.47e+01

Sta	Type	Penalty
1	✓ P-SV	
2	□ P-SH	
3	□ SV-SH	
4	□ SV-SH	
5	□ P-SH	
6	□ P-SV	
7	□ P-SH	
8	□ SV-SH	
9	✓ P-SV	0.015
10	✓ P-SH	
11	✓ SV-SH	0.065
12	✓ P-SV	
13	✓ P-SH	
14	✓ SV-SH	
15	✓ P-SV	

POLARITIES

AMPLITUDE RATIOS



2014 Nov 19 17: 4:49.464 UTC
 Lat: 43.7264 Lon: -121.309 Depth: 0.977
 43:43.5846 N 121:18.5586 W

North East Down
 North -1.52e-02 1.40e-01 4.02e-02
 East 1.40e-01 -2.13e-01 1.97e-01
 Down 4.02e-02 1.97e-01 1.75e-02

Scalar M0 = 2.880e-01
 T = 0.194 k = -0.196

Total Penalty = 0.152

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM22	0.13	167	177	EHU	P	-0.016	0.017	-6.93e+01	3.88e+01
2	NM22	0.13	167	177	EHR	SV	0.009		1.37e+03	1.31e+01
3	NM22	0.13	167	177	EHT	SH	0.086		-9.38e+02	1.37e+01
4	NM42	3.62	42	115	EHR	SV	0.068		-3.83e+02	1.72e+01
5	NM42	3.62	42	115	EHT	SH	0.081		-5.65e+02	1.11e+01
6	NN07	3.06	335	118	EHU	P	0.031		-5.83e+01	1.64e+01
7	NN07	3.06	335	118	EHT	SH	0.044		1.53e+02	2.43e+01
8	NN09	2.02	292	132	EHU	P	0.022		1.12e+01	1.71e+01
9	NN09	2.02	292	132	EHR	SV	-0.021		3.76e+02	2.57e+01
10	NN09	2.02	292	132	EHT	SH	0.006		3.68e+02	2.68e+01
11	NN17	1.60	247	140	EHU	P	-0.034		2.09e+01	2.47e+01
12	NN17	1.60	247	140	EHR	SV	-0.011		2.35e+02	1.97e+01
13	NN17	1.60	247	140	EHT	SH	-0.023		-3.90e+02	1.86e+01
14	NN18	1.37	25	146	EHU	P	0.016		-4.96e+01	1.71e+01
15	NN18	1.37	25	146	EHR	SV	-0.008		-4.01e+02	1.48e+01

Sta	Type	Penalty
1	NM42 SV:SH	
2	NN07 P:SH	
3	NN09 P:SV	
4	NN09 P:SH	
5	NN09 SV:SH	
6	NN17 P:SV	
7	NN17 P:SH	
8	NN17 SV:SH	0.035
9	NN18 P:SV	
10	NN18 P:SH	0.022
11	NN18 SV:SH	
12	NN19 P:SH	
13	NN24 P:SV	
14	NN24 P:SH	0.077
15	NN24 SV:SH	

Crack Dipole CLVD Dipole Crack

POLARITIES

P SH SV SN SE

AMPLITUDE RATIOS

P:SH P:SV SV:SH



2014 Nov 21 2:55:53.285 UTC
 Lat: 43.7262 Lon: -121.311 Depth: 0.853
 43:43.575 N 121:18.6498 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq	
1	NM03	2.98	13	118	EHU	P	0.029	✓ +	0.039	✓ 1.40e+01	1.66e+01
2	NM06	0.88	102	157	EHU	P	0.042	✓ +	0.018	✓ 2.08e+01	1.89e+01
3	NM06	0.88	102	157	EHR	SV	0.099	✓ +		✓ 8.49e+01	1.41e+01
4	NM06	0.88	102	157	EHT	SH	0.051	✓ +		✓ 1.27e+02	1.64e+01
5	NM22	0.19	127	175	EHU	P	-0.019	✓ +		✓ 7.61e+01	1.48e+01
6	NM22	0.19	127	175	EHR	SV	-0.011	✓ +	0.027	✓ 1.28e+02	1.42e+01
7	NM22	0.19	127	175	EHT	SH	0.031	☐ -		✓ -4.48e+02	9.04e+00
8	NM42	3.72	43	111	EHU	P	-0.005	✓ -		✓ -2.30e+01	1.27e+01
9	NM42	3.72	43	111	EHR	SV	0.054	✓ -		✓ -1.37e+02	1.59e+01
10	NM42	3.72	43	111	EHT	SH	0.026	✓ -		✓ -1.91e+02	9.52e+00
11	NN07	3.03	338	115	EHU	P	-0.008	✓ -		✓ -1.55e+01	1.32e+01
12	NN07	3.03	338	115	EHR	SV	-0.003	✓ -		✓ -5.00e+01	1.27e+01
13	NN07	3.03	338	115	EHT	SH	0.013	☐ -		✓ -1.51e+01	1.82e+01
14	NN09	1.91	294	132	EHU	P	0.024	✓ -		✓ -7.83e-01	2.57e+01
15	NN09	1.91	294	132	EHR	SV	-0.004	✓ +		✓ 9.29e+01	2.11e+01

North East Down
 North 1.03e-01 8.32e-02 1.65e-01
 East 8.32e-02 -2.25e-01 6.43e-02
 Down 1.65e-01 6.43e-02 4.67e-02

Scalar M0 = 2.647e-01
 T = -0.464 k = -0.080

Total Penalty = 0.172

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	NM06 <input type="checkbox"/> P-SV	
2	NM06 <input type="checkbox"/> P-SH	
3	NM06 <input checked="" type="checkbox"/> SV-SH	0.021
4	NM42 <input checked="" type="checkbox"/> P-SV	
5	NM42 <input checked="" type="checkbox"/> P-SH	
6	NM42 <input checked="" type="checkbox"/> SV-SH	
7	NN07 <input checked="" type="checkbox"/> P-SV	
8	NN07 <input type="checkbox"/> P-SH	
9	NN07 <input type="checkbox"/> SV-SH	
10	NN09 <input type="checkbox"/> P-SV	
11	NN09 <input type="checkbox"/> P-SH	
12	NN09 <input type="checkbox"/> SV-SH	
13	NN17 <input type="checkbox"/> P-SV	
14	NN17 <input type="checkbox"/> P-SH	
15	NN17 <input type="checkbox"/> SV-SH	



2014 Nov 21 9:57:35.096 UTC
 Lat: 43.7273 Lon: -121.311 Depth: 0.76
 43:43.6398 N 121:18.6504 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.86	14	117	EHU	P	0.011	<input checked="" type="checkbox"/> -	-4.08e+01	1.59e+01
2	NM06	0.92	110	155	EHU	P	-0.006	<input checked="" type="checkbox"/> +	6.39e+02	1.15e+01
3	NM06	0.92	110	155	EHR	SV	0.133	<input checked="" type="checkbox"/> +	7.29e+02	1.90e+01
4	NM06	0.92	110	155	EHT	SH	0.101	<input checked="" type="checkbox"/> -	-2.83e+03	1.24e+01
5	NM22	0.28	147	172	EHU	P	-0.016	<input checked="" type="checkbox"/> +	8.60e+02	1.34e+01
6	NM22	0.28	147	172	EHR	SV	0.018	<input checked="" type="checkbox"/> +	1.38e+03	1.78e+01
7	NM40	2.71	112	120	EHU	P	0.023	<input checked="" type="checkbox"/> -	-1.61e+02	9.13e+00
8	NM40	2.71	112	120	EHT	SH	0.020	<input checked="" type="checkbox"/> -	-6.77e+02	1.24e+01
9	NM42	3.63	45	110	EHU	P	0.004	<input checked="" type="checkbox"/> -	-2.38e+02	1.20e+01
10	NN07	2.92	337	114	EHU	P	0.022	<input checked="" type="checkbox"/> -	-1.08e+02	1.48e+01
11	NN07	2.92	337	114	EHT	SH	0.083	<input checked="" type="checkbox"/> +	1.05e+03	9.96e+00
12	NN09	1.87	290	130	EHU	P	0.012	<input checked="" type="checkbox"/> +	3.51e+01	1.51e+01
13	NN09	1.87	290	130	EHR	SV	0.002	<input checked="" type="checkbox"/> +	9.86e+02	1.32e+01
14	NN09	1.87	290	130	EHT	SH	0.063	<input checked="" type="checkbox"/> +	1.95e+02	2.00e+01
15	NN17	1.53	242	138	FH11	P	-0.012	<input checked="" type="checkbox"/> +	4.06e+01	1.99e+01

North East Down
 North -3.77e-01 1.34e-01 7.08e-02
 East 1.34e-01 -1.29e-01 -2.17e-02
 Down 7.08e-02 -2.17e-02 4.15e-02

Scalar M0 = 3.221e-01
 T = 0.574 k = -0.347

Total Penalty = 0.176

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P:SH

P:SV

SV:SH

Sta	Type	Penalty
1	NM06 <input type="checkbox"/> P-SV	
2	NM06 <input checked="" type="checkbox"/> P-SH	
3	NM06 <input type="checkbox"/> SV-SH	
4	NM22 <input type="checkbox"/> P-SV	
5	NM40 <input checked="" type="checkbox"/> P-SH	
6	NN07 <input type="checkbox"/> P-SH	
7	NN09 <input type="checkbox"/> P-SV	
8	NN09 <input type="checkbox"/> P-SH	
9	NN09 <input type="checkbox"/> SV-SH	
10	NN17 <input checked="" type="checkbox"/> P-SH	
11	NN18 <input type="checkbox"/> P-SV	
12	NN19 <input checked="" type="checkbox"/> P-SH 0.016	
13	NN21 <input type="checkbox"/> P-SH	
14	NN24 <input checked="" type="checkbox"/> P-SV	
15	NN24 <input checked="" type="checkbox"/> P-SH 0.003	



2014 Nov 22 10:19:32.207 UTC
 Lat: 43.726 Lon: -121.31 Depth: 0.82
 43:43.5594 N 121:18.5862 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM06	0.79	102	159	EHR	SV	0.012	✓ +	4.09e+02	7.95e+00
2	NM06	0.79	102	159	EHT	SH	-0.016	✓ +	1.77e+02	6.99e+00
3	NM22	0.11	142	177	EHU	P	-0.014	✓ +	1.58e+02	1.27e+01
4	NM22	0.11	142	177	EHR	SV	0.059	✓ +	3.36e+02	1.02e+01
5	NM22	0.11	142	177	EHT	SH	0.047	✓ -	-5.59e+02	8.11e+00
6	NN07	3.09	336	114	EHU	P	0.016	✓ -	-2.69e+01	1.45e+01
7	NN07	3.09	336	114	EHR	SV	-0.007	✓ -	-6.38e+01	1.00e+01
8	NN07	3.09	336	114	EHT	SH	0.021	✓ -	-3.29e+01	1.46e+01
9	NN09	2.00	294	129	EHU	P	-0.007	✓ +	5.89e+00	6.93e+00
10	NN09	2.00	294	129	EHR	SV	0.001	✓ +	9.65e+01	1.79e+01
11	NN09	2.00	294	129	EHT	SH	0.033	✓ +	6.41e+01	1.64e+01
12	NN17	1.54	248	139	EHU	P	0.004	✓ +	4.51e+00	2.26e+01
13	NN17	1.54	248	139	EHR	SV	0.032	✓ +	1.06e+02	2.27e+01
14	NN17	1.54	248	139	EHT	SH	-0.004	✓ +	2.67e+01	1.86e+01
15	NN18	1.43	28	142	FH11	P	-0.003	✓ -	-3.06e+01	1.57e+01

North East Down
 North -2.18e-01 -7.00e-02 3.09e-02
 East -7.00e-02 -2.67e-01 1.28e-01
 Down 3.09e-02 1.28e-01 5.80e-02

Scalar M0 = 2.884e-01
 T = -0.270 k = -0.368

Total Penalty = 0.164

POLARITIES

P

SH

SV

SN

SE

AMPLITUDE RATIOS

P:SH

P:SV

SV:SH

Sta	Type	Penalty
1	NM06 ✓ SV:SH	0.003
2	NN07 <input type="checkbox"/> P:SV	
3	NN07 <input type="checkbox"/> P:SH	
4	NN07 <input type="checkbox"/> SV:SH	
5	NN09 ✓ P:SV	0.038
6	NN09 ✓ P:SH	
7	NN09 <input type="checkbox"/> SV:SH	
8	NN17 ✓ P:SV	
9	NN17 ✓ P:SH	
10	NN17 ✓ SV:SH	
11	NN18 <input type="checkbox"/> P:SV	
12	NN18 <input type="checkbox"/> P:SH	
13	NN18 <input type="checkbox"/> SV:SH	
14	NN19 <input type="checkbox"/> P:SH	
15	NN21 <input type="checkbox"/> SV:SH	



2014 Nov 24 2: 2: 3.454 UTC
 Lat: 43.727 Lon: -121.312 Depth: 0.408
 43:43.617 N 121:18.7338 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	2.93	16	104	EZH	P	0.005			
2	NM06	1.01	105	147	EHU	P	0.005	<input checked="" type="checkbox"/>	1.84e+02	1.43e+01
3	NM06	1.01	105	147	EHR	SV	0.143	<input checked="" type="checkbox"/>	-2.74e+03	2.76e+01
4	NM06	1.01	105	147	EHT	SH	0.148	<input checked="" type="checkbox"/>	-1.80e+03	1.54e+01
5	NM22	0.33	128	169	EHU	P	-0.015	<input checked="" type="checkbox"/>	2.95e+02	1.45e+01
6	NM40	2.80	110	107	EHU	P	0.074			
7	NM40	2.80	110	107	EHT	SH	-0.092	<input type="checkbox"/>	1.10e+02	1.64e+01
8	NM41	2.48	137	111	EHR	SV	-0.010	<input type="checkbox"/>	-8.13e+02	1.51e+01
9	NM41	2.48	137	111	EHT	SH	0.030	<input checked="" type="checkbox"/>	-2.76e+02	1.76e+01
10	NM42	3.74	45	98	EHU	P	-0.027	<input type="checkbox"/>	4.51e+02	9.27e+00
11	NM42	3.74	45	98	EHR	SV	0.061	<input type="checkbox"/>	1.51e+03	1.03e+01
12	NM42	3.74	45	98	EHT	SH	0.060	<input type="checkbox"/>	-5.52e+02	1.10e+01
13	NN07	2.92	339	102	EHU	P	-0.001	<input checked="" type="checkbox"/>	-4.34e+01	1.52e+01
14	NN07	2.92	339	102	EHR	SV	0.016	<input checked="" type="checkbox"/>	-2.06e+02	9.36e+00
15	NN07	2.92	339	102	EHT	SH	0.044	<input checked="" type="checkbox"/>	-1.54e+02	2.29e+01

North East Down
 North -2.86e-01 8.98e-02 1.24e-01
 East 8.98e-02 7.58e-02 -7.16e-02
 Down 1.24e-01 -7.16e-02 6.74e-02

Scalar M0 = 2.732e-01
 T = 0.737 k = -0.135

Total Penalty = 0.224

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	NM06	<input type="checkbox"/> P-SV
2	NM06	<input type="checkbox"/> P-SH
3	NM06	<input checked="" type="checkbox"/> SV-SH
4	NM41	<input type="checkbox"/> SV-SH
5	NM42	<input type="checkbox"/> P-SV
6	NM42	<input type="checkbox"/> P-SH
7	NM42	<input type="checkbox"/> SV-SH
8	NN07	<input type="checkbox"/> P-SV
9	NN07	<input type="checkbox"/> P-SH
10	NN07	<input checked="" type="checkbox"/> SV-SH
11	NN09	<input type="checkbox"/> P-SV
12	NN09	<input type="checkbox"/> P-SH
13	NN09	<input type="checkbox"/> SV-SH
14	NN17	<input type="checkbox"/> P-SV
15	NN17	<input type="checkbox"/> P-SH



2014 Nov 30 15:31:42.837 UTC
 Lat: 43.722 Lon: -121.309 Depth: 0.674
 43:43.3206 N 121:18.5634 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq	
1	NM03	3.42	10	109	EHU	P	0.014	<input type="checkbox"/> -	<input checked="" type="checkbox"/> -3.92e+01	1.52e+01	
2	NM22	0.36	8	169	EHU	P	-0.023	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 2.37e+01	1.41e+01	
3	NM22	0.36	8	169	EHR	SV	0.006	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> 0.044	<input checked="" type="checkbox"/> -7.78e+02	1.07e+01
4	NM22	0.36	8	169	EHT	SH	0.005	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> 0.015	<input checked="" type="checkbox"/> -1.99e+02	2.68e+01
5	NM40	2.43	100	122	EHT	SH	0.072	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -8.35e+01	1.21e+01	
6	NM42	4.00	37	105	EHU	P	0.029	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 0.000	<input checked="" type="checkbox"/> 9.17e+01	1.00e+01
7	NM42	4.00	37	105	EHR	SV	0.083	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -1.08e+02	2.01e+01	
8	NN07	3.51	339	106	EHU	P	0.006	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -1.38e+01	1.38e+01	
9	NN07	3.51	339	106	EHR	SV	0.009	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> 0.008	<input checked="" type="checkbox"/> -9.43e+01	1.57e+01
10	NN09	2.24	304	121	EHU	P	0.016	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -6.91e+00	1.92e+01	
11	NN09	2.24	304	121	EHR	SV	-0.019	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 1.60e+02	2.49e+01	
12	NN09	2.24	304	121	EHT	SH	0.016	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 9.10e+01	2.01e+01	
13	NN17	1.47	265	138	EHU	P	-0.007	<input type="checkbox"/> +	<input checked="" type="checkbox"/> 9.85e+00	2.41e+01	
14	NN17	1.47	265	138	EHR	SV	-0.002	<input checked="" type="checkbox"/> +	<input checked="" type="checkbox"/> 3.06e+02	2.07e+01	
15	NN17	1.47	265	138	EHT	SH	-0.032	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -1.42e+02	2.50e+01	

North East Down
 North 2.31e-02 1.84e-01 5.48e-02
 East 1.84e-01 -4.53e-01 1.64e-02
 Down 5.48e-02 1.64e-02 1.30e-02

Scalar M0 = 3.745e-01
 T = 0.640 k = -0.269

Total Penalty = 0.107

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	NM22 <input checked="" type="checkbox"/> P-SV	
2	NM22 <input checked="" type="checkbox"/> P-SH	
3	NM22 <input checked="" type="checkbox"/> SV-SH	
4	NM42 <input type="checkbox"/> P-SV	
5	NN07 <input type="checkbox"/> P-SV	
6	NN09 <input type="checkbox"/> P-SV	
7	NN09 <input type="checkbox"/> P-SH	
8	NN09 <input checked="" type="checkbox"/> SV-SH	
9	NN17 <input type="checkbox"/> P-SV	
10	NN17 <input type="checkbox"/> P-SH	
11	NN17 <input type="checkbox"/> SV-SH	
12	NN18 <input checked="" type="checkbox"/> P-SH	
13	NN19 <input checked="" type="checkbox"/> P-SV	
14	NN19 <input type="checkbox"/> P-SH	
15	NN19 <input type="checkbox"/> SV-SH	



2014 Dec 11 15:53:21.233 UTC
 Lat: 43.7239 Lon: -121.31 Depth: 0.454
 43:43.4334 N 121:18.624 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NN07	3.29	339	101	EHU	P	-0.001	<input checked="" type="checkbox"/> -	-4.45e+01	1.41e+01
2	NN07	3.29	339	101	EHR	SV	0.061	<input checked="" type="checkbox"/> +	1.18e+02	8.55e+00
3	NN07	3.29	339	101	EHT	SH	0.060	<input checked="" type="checkbox"/> +	6.32e+01	1.62e+01
4	NN09	2.06	300	118	EHU	P	0.008	<input checked="" type="checkbox"/> + 0.018	6.53e+00	1.27e+01
5	NN09	2.06	300	118	EHR	SV	-0.006	<input checked="" type="checkbox"/> +	7.04e+01	1.99e+01
6	NN09	2.06	300	118	EHT	SH	0.006	<input checked="" type="checkbox"/> +	4.30e+01	1.39e+01
7	NN17	1.42	256	133	EHU	P	-0.006	<input checked="" type="checkbox"/> +	5.84e+00	3.01e+01
8	NN17	1.42	256	133	EHR	SV	0.001	<input checked="" type="checkbox"/> +	1.85e+02	1.39e+01
9	NN17	1.42	256	133	EHT	SH	0.025	<input checked="" type="checkbox"/> -	-1.31e+02	1.79e+01
10	NN18	1.66	24	128	EHU	P	0.000	<input checked="" type="checkbox"/> -	-2.65e+01	1.83e+01
11	NN18	1.66	24	128	EHR	SV	-0.033	<input type="checkbox"/> -	-1.59e+02	1.13e+01
12	NN19	0.68	156	156	EHU	P	0.008	<input checked="" type="checkbox"/> +	4.77e+01	1.91e+01
13	NN19	0.68	156	156	EHR	SV	0.061	<input checked="" type="checkbox"/> +	1.78e+02	1.30e+01
14	NN19	0.68	156	156	EHT	SH	-0.003	<input checked="" type="checkbox"/> +	1.04e+02	1.19e+01
15	NN24	0.92	8	149	EHU	P	-0.005	<input checked="" type="checkbox"/> -	-1.04e+01	2.13e+01

North East Down
 North -4.91e-02 -1.55e-02 7.82e-02
 East -1.55e-02 -2.55e-01 1.82e-01
 Down 7.82e-02 1.82e-01 1.44e-01

Scalar M0 = 2.893e-01
 T = -0.038 k = -0.158

Total Penalty = 0.099

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P-SV	
2	<input checked="" type="checkbox"/> P-SH	
3	<input checked="" type="checkbox"/> SV-SH	
4	<input type="checkbox"/> P-SV	
5	<input checked="" type="checkbox"/> P-SH	0.027
6	<input type="checkbox"/> SV-SH	
7	<input type="checkbox"/> P-SV	
8	<input type="checkbox"/> P-SH	
9	<input type="checkbox"/> SV-SH	
10	<input type="checkbox"/> P-SV	
11	<input checked="" type="checkbox"/> P-SV	
12	<input type="checkbox"/> P-SH	
13	<input type="checkbox"/> SV-SH	
14	<input type="checkbox"/> P-SV	
15	<input type="checkbox"/> P-SH	



2014 Dec 14 8:41:11.396 UTC
 Lat: 43.7241 Lon: -121.31 Depth: 0.554
 43:43.4436 N 121:18.6126 W

Solve

Sta	Dist	Az	i	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NM03	3.21	12	107	EHU	P	0.002		-2.44e+01	1.14e+01
2	NM03	3.21	12	107	EHR	SV	-0.009		9.98e+01	1.46e+01
3	NM03	3.21	12	107	EHT	SH	-0.030		-9.87e+01	1.30e+01
4	NM22	0.16	38	175	EHU	P	-0.010		3.62e+01	1.54e+01
5	NM40	2.55	105	117	EHT	SH	0.042	0.036	-1.29e+02	1.01e+01
6	NM42	3.87	40	102	EHU	P	0.003		-1.95e+01	1.09e+01
7	NM42	3.87	40	102	EHR	SV	0.085		-1.26e+02	8.35e+00
8	NN07	3.27	339	105	EHU	P	-0.014		-1.18e+01	1.28e+01
9	NN07	3.27	339	105	EHT	SH	0.022		-1.52e+01	1.65e+01
10	NN09	2.07	299	121	EHU	P	0.017		1.88e+00	2.17e+01
11	NN09	2.07	299	121	EHR	SV	0.004		6.84e+01	2.83e+01
12	NN09	2.07	299	121	EHT	SH	0.007		4.90e+01	1.26e+01
13	NN17	1.44	255	135	EHU	P	-0.012		3.69e+00	2.17e+01
14	NN17	1.44	255	135	EHR	SV	0.000		1.04e+02	2.22e+01
15	NN17	1.44	255	135	EHT	SH	0.019		-1.66e+02	1.97e+01
16	NN18	1.64	23	132	EHU	P	0.011	0.051	-1.92e+01	1.71e+01

North East Down
 North -1.21e-02 3.37e-02 7.25e-02
 East 3.37e-02 -6.21e-02 1.59e-01
 Down 7.25e-02 1.59e-01 3.95e-01

Scalar M0 = 3.344e-01
 T = -0.747 k = 0.233

Total Penalty = 0.198

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty
1	<input checked="" type="checkbox"/> P.SV	
2	<input checked="" type="checkbox"/> P.SH	
3	<input checked="" type="checkbox"/> SV.SH	
4	<input checked="" type="checkbox"/> P.SV	
5	<input checked="" type="checkbox"/> P.SH	
6	<input checked="" type="checkbox"/> P.SV	0.112
7	<input type="checkbox"/> P.SH	
8	<input type="checkbox"/> SV.SH	
9	<input type="checkbox"/> P.SV	
10	<input type="checkbox"/> P.SH	
11	<input type="checkbox"/> SV.SH	
12	<input checked="" type="checkbox"/> P.SH	
13	<input type="checkbox"/> P.SH	



2014 Oct 23 21: 2:22.252 UTC
 Lat: 43.725 Lon: -121.31 Depth: 0.601
 43:43.5012 N 121:18.5988 W

Solve

Sta	Dist	Az	f	Chan	Phase	Resid	Polarity	Penalty	Amp	Freq
1	NN07	3.18	338	107	EHU	P	0.000	0.004	-7.40e+00	1.75e+01
2	NN07	3.18	338	107	EHT	SH	0.036		6.64e+01	1.24e+01
3	NN09	2.03	296	123	EHU	P	0.007		3.10e+00	2.20e+01
4	NN09	2.03	296	123	EHR	SV	-0.010		-2.68e+02	1.46e+01
5	NN09	2.03	296	123	EHT	SH	-0.002		5.34e+01	2.12e+01
6	NN17	1.49	251	135	EHU	P	-0.003		2.34e+00	3.69e+01
7	NN17	1.49	251	135	EHT	SH	-0.009		-1.32e+02	1.33e+01
8	NN18	1.53	24	135	EHU	P	0.004		-4.96e+00	1.80e+01
9	NN19	0.78	162	155	EHU	P	0.001		3.61e+01	1.23e+01
10	NN19	0.78	162	155	EHT	SH	0.095		-1.71e+02	1.57e+01
11	NN24	0.79	7	155	EHU	P	-0.004		-2.78e+01	2.46e+01
12	NN24	0.79	7	155	EHR	SV	-0.036		1.56e+02	1.93e+01
13	NN24	0.79	7	155	EHT	SH	-0.043		-5.70e+01	1.98e+01
14	NN32	2.74	211	112	EHU	P	-0.010		-1.24e+01	1.56e+01
15	NN32	2.74	211	112	EHR	SV	0.053		-1.33e+02	1.46e+01
16	NN32	2.74	211	112	EHT	SH	0.058		-4.61e+01	1.63e+01

North East Down
 North -1.40e-02 -2.15e-01 2.26e-01
 East -2.15e-01 -6.15e-02 1.12e-03
 Down 2.26e-01 1.12e-03 3.93e-02

Scalar M0 = 3.167e-01
 T = -0.004 k = -0.037

Total Penalty = 0.008

POLARITIES

AMPLITUDE RATIOS

Sta	Type	Penalty	
1	NN07	<input type="checkbox"/> P:SH	
2	NN09	<input checked="" type="checkbox"/> P:SV	
3	NN09	<input checked="" type="checkbox"/> P:SH	
4	NN09	<input checked="" type="checkbox"/> SV:SH	
5	NN17	<input checked="" type="checkbox"/> P:SH	0.004
6	NN19	<input type="checkbox"/> P:SH	
7	NN24	<input checked="" type="checkbox"/> P:SV	
8	NN24	<input checked="" type="checkbox"/> P:SH	
9	NN24	<input checked="" type="checkbox"/> SV:SH	
10	NN32	<input type="checkbox"/> P:SV	
11	NN32	<input type="checkbox"/> P:SH	
12	NN32	<input type="checkbox"/> SV:SH	