DFN fracture file downloads are available for models referenced in the paper:

Exploring Hydraulic Fracture Stimulation Patterns in the FORGE Reservoir Using Multiple Stochastic DFN Realizations and Variable Stress Conditions by Aleta Finnila and Robert Podgorney

from PROCEEDINGS, 45th Workshop on Geothermal Reservoir Engineering, Stanford University, Stanford, California, February 10-12, 2020, SGP-TR-216

The FORGE team is making these fracture models available to researchers wanting a set of natural fractures in the FORGE reservoir for use in their own modeling work. They have been used to predict stimulation distances during hydraulic stimulation at the open toe section of well 16A(78)-32. These fracture sets are fully stochastic and do not contain the deterministic set that matches the pilot well 58-32 FMI data. Please refer to the paper above for details on their generation and usage.

Fractures are available for 30 DFN realizations in three different subsets:

1) The largest modeling region 1200 m x 1200 m x 1200 m including all the 2.1 million fractures generated (example filename: Region_1200m_20.fab)
    a. fab file format (each ~825 MB)
    b. fabgz file format (each ~290 MB)
2) A smaller 800 m x 800 m x 800 m region including all the 630 thousand fractures generated in that region (example filename: Filter_800m_Region_17.fabgz)
    a. fab file format (each ~290 MB)
    b. fabgz file format (each ~85 MB)
3) Fractures from the 800 m region but additionally filtered for size so only the largest fractures are retained further from the open hole section of 16A(78)-32 with approximately 5,000 fractures (example filenames: Filtered_800m_2.csv, Filtered_800m_30.ts or Filtered_800m_all_fab.zip)
    a. fab file format (each ~2 MB, combined 17 MB)
    b. fabgz file format (each ~650 KB, combined 19 MB)
    c. GOCAD ts file format (each ~6 MB, combined 18 MB)
    d. csv file format (each ~650 KB, combined 7 MB)

Notes:

The FAB and FABGZ file format are the native file format for the FracMan software.

The GOCAD format only includes fracture geometry, not hydraulic properties.

Subsets 1 and 2 files are only available as individual downloads for each of the 30 DFN realizations and file types. The last part of each filename includes the realization number (values are 1 to 30) so the file Region_1200m_13.fab is the correct filename for realization number 13.

Subset 3 has fractures filtered by size with all fractures having centers within 50 m of the open hole section included. Fractures having centers between 50 m and 200 m of the open hole section are retained if their fracture radius is greater than 50 m. Only fractures having a fracture radius of 100 m or more are retained if their center is located more than 200 m from the open hole section of 16A. Due to

their smaller file sizes these files are also available as one single download including all the 30 DFN realizations by file type (example filename: Filtered_800m_all_csv.zip)

The following tables show the DFN realization number which may be of specific interest for various modeling purposes. Different stress configurations are labeled using the convention "[Orientation]_[SHmax]_[Shmin]" where "Rec" stands for the recommended values, "Min" for minimum and "Max" for the maximum stress gradient. For instance, if the intent was to simulate the vertical hydraulic fracturing response of the open hole section of 16A(78)-32, then the realization number for the most likely stress condition (N25E_Rec_Rec_Rec) showing average (median) response to hydroshearing would be found on the top row of the Hydrosheared Fractures table in the column for Median Vertical Extent – yielding the realization number 20.

	Recommended	Minimum	Maximum
Pore Pressure [MPa/km]	9.7	N/A	N/A
Vertical Stress [MPa/km]	25.6	N/A	N/A
S_{Hmax} [MPa/km]	21.3	17.0	25.6
S_{hmin} [MPa/m]	17.0	13.8	N/A
Direction S_{Hmax}	N25E	N10E	N40E

	Hydrosheared Fractures								
	East-West Extent			North-South Extent			Vertical Extent		
Stress Condition	Median	Min	Max	Median	Min	Max	Median	Min	Max
N25E_Rec_Rec_Rec	8	1	6	5	18	28	20	23	11
N25E_Rec_Rec_Min	6	8	27	22	8	30	7	21	17
N25E_Rec_Min_Rec	25	21	6	19	17	10	14	2	1
N25E_Rec_Min_Min	2	12	18	26	18	11	21	15	2
N25E_Rec_Max_Rec	5	8	21	28	8	30	8	22	11
N25E_Rec_Max_Min	11	8	2	27	26	1	26	22	17
N10E_Rec_Rec_Rec	29	22	9	16	14	11	4	8	11
N10E_Rec_Rec_Min	20	2	18	5	7	6	21	10	19
N10E_Rec_Min_Rec	4	24	29	26	6	16	6	23	28
N10E_Rec_Min_Min	8	2	26	9	18	10	22	13	2
N10E_Rec_Max_Rec	16	22	13	15	3	23	1	7	19
N10E_Rec_Max_Min	8	16	6	29	7	3	14	13	29
N40E_Rec_Rec_Rec	28	6	18	22	14	20	20	10	2
N40E_Rec_Rec_Min	24	1	18	5	25	24	26	8	19
N40E_Rec_Min_Rec	12	21	24	7	6	9	8	30	17
N40E_Rec_Min_Min	7	1	29	10	25	24	19	10	25
N40E_Rec_Max_Rec	2	25	22	22	28	4	30	8	19
N40E_Rec_Max_Min	28	25	26	1	9	23	18	8	2

	Inflated Fractures								
	East-West Extent			North-South Extent			Vertical Extent		
Stress Condition	Median	Min	Max	Median	Min	Max	Median	Min	Max
N25E_Rec_Rec_Rec	14	15	22	17	12	30	22	25	5
N25E_Rec_Rec_Min	7	28	27	12	2	30	27	19	17
N25E_Rec_Min_Rec	7	4	26	20	3	22	13	26	25
N25E_Rec_Min_Min	7	24	3	29	3	28	14	30	12
N25E_Rec_Max_Rec	22	1	27	5	2	30	25	10	12
N25E_Rec_Max_Min	19	12	27	12	2	23	24	10	17
N10E_Rec_Rec_Rec	21	20	14	26	2	23	3	10	12
N10E_Rec_Rec_Min	15	20	13	5	16	23	15	6	12
N10E_Rec_Min_Rec	21	4	1	25	8	13	27	26	1
N10E_Rec_Min_Min	21	20	11	1	21	10	22	6	12
N10E_Rec_Max_Rec	21	29	13	7	21	3	1	23	11
N10E_Rec_Max_Min	15	11	9	4	15	3	8	6	11
N40E_Rec_Rec_Rec	27	1	14	13	2	19	8	20	10
N40E_Rec_Rec_Min	23	11	6	4	8	27	17	14	16
N40E_Rec_Min_Rec	5	19	22	26	11	30	1	23	8
N40E_Rec_Min_Min	28	27	5	19	14	24	23	20	25
N40E_Rec_Max_Rec	30	23	27	3	1	23	23	5	2
N40E_Rec_Max_Min	15	30	22	5	8	23	25	9	16

	Hull Volume			Grid Slab Volume		
Stress Condition	Median	Min	Max	Median	Min	Max
N25E_Rec_Rec_Rec	25	15	11	11	9	20
N25E_Rec_Rec_Min	28	19	27	9	17	29
N25E_Rec_Min_Rec	7	23	1	8	28	21
N25E_Rec_Min_Min	2	1	11	7	5	8
N25E_Rec_Max_Rec	14	2	17	22	3	25
N25E_Rec_Max_Min	18	19	27	24	20	25
N10E_Rec_Rec_Rec	27	20	11	10	3	1
N10E_Rec_Rec_Min	2	8	11	10	16	24
N10E_Rec_Min_Rec	25	2	1	17	4	30
N10E_Rec_Min_Min	13	20	11	1	2	25
N10E_Rec_Max_Rec	28	26	11	3	22	18
N10E_Rec_Max_Min	24	15	13	7	9	20
N40E_Rec_Rec_Rec	8	22	14	17	11	21
N40E_Rec_Rec_Min	13	8	4	27	13	18
N40E_Rec_Min_Rec	1	23	22	27	15	21
N40E_Rec_Min_Min	7	1	25	13	3	7
N40E_Rec_Max_Rec	26	10	27	20	19	27
N40E_Rec_Max_Min	28	9	26	17	9	22

	Ratio Hydrosheared Fractures								
	East-West to North-South			East-West to Vertical			North-South to Vertical		
Stress Condition	Median	Min	Max	Median	Min	Max	Median	Min	Max
N25E_Rec_Rec_Rec	15	28	18	22	11	6	6	11	23
N25E_Rec_Rec_Min	8	30	5	16	17	27	14	17	11
N25E_Rec_Min_Rec	7	23	28	5	1	2	19	1	2
N25E_Rec_Min_Min	15	11	18	3	2	10	16	2	11
N25E_Rec_Max_Rec	18	30	9	7	11	21	13	11	22
N25E_Rec_Max_Min	4	1	7	28	17	22	12	7	22
N10E_Rec_Rec_Rec	16	11	14	4	2	10	11	2	10
N10E_Rec_Rec_Min	8	10	18	21	19	10	23	29	10
N10E_Rec_Min_Rec	23	16	15	4	28	15	11	28	13
N10E_Rec_Min_Min	17	10	18	20	2	13	8	2	10
N10E_Rec_Max_Rec	30	23	26	10	19	13	18	19	13
N10E_Rec_Max_Min	14	3	7	14	29	6	14	29	13
N40E_Rec_Rec_Rec	28	20	18	28	16	29	6	2	20
N40E_Rec_Rec_Min	11	24	17	20	16	10	27	19	10
N40E_Rec_Min_Rec	25	11	6	27	21	26	22	6	26
N40E_Rec_Min_Min	5	24	29	5	25	13	23	25	10
N40E_Rec_Max_Rec	1	4	22	24	15	22	3	15	8
N40E_Rec_Max_Min	10	23	26	19	16	27	3	26	23

	Ratio Inflated Fractures								
	East-West to North-South			East-West to Vertical			North-South to Vertical		
Stress Condition	Median	Min	Max	Median	Min	Max	Median	Min	Max
N25E_Rec_Rec_Rec	26	3	22	10	24	23	20	12	30
N25E_Rec_Rec_Min	4	28	2	16	28	19	13	2	19
N25E_Rec_Min_Rec	19	15	26	18	25	26	9	3	23
N25E_Rec_Min_Min	25	27	3	9	24	16	14	3	30
N25E_Rec_Max_Rec	11	30	2	19	12	6	17	2	22
N25E_Rec_Max_Min	14	30	2	20	12	27	30	2	9
N10E_Rec_Rec_Rec	27	29	2	5	29	14	4	12	10
N10E_Rec_Rec_Min	25	3	13	15	12	7	21	12	10
N10E_Rec_Min_Rec	14	11	1	24	11	29	9	1	26
N10E_Rec_Min_Min	27	29	15	8	12	15	29	12	10
N10E_Rec_Max_Rec	16	29	13	21	29	6	2	15	23
N10E_Rec_Max_Min	14	11	24	18	11	6	14	24	6
N40E_Rec_Rec_Rec	20	19	14	23	10	7	8	2	9
N40E_Rec_Rec_Min	4	5	8	10	5	18	30	16	14
N40E_Rec_Min_Rec	14	30	26	9	25	23	18	8	30
N40E_Rec_Min_Min	28	27	14	11	25	5	1	14	20
N40E_Rec_Max_Rec	3	23	8	30	2	5	6	2	5
N40E_Rec_Max_Min	24	23	22	26	16	22	18	16	23