ICDP-OSG at GFZ - DOWNHOLE LOGGING
SRSDP Kimberly 2011

The OSG downhole logging team of the Operational Support Group of the ICDP from 16-24-June-2011 successfully performed the measurements in the Kimberly borehole of the Snake River Scientific Drilling Project, Idaho, USA.
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Processing: Jochem Kück (as of 02-DEZ-2011)

Downhole logging measurements

- The theoretical vertical resolution of the sondes are:

GR (total natural gamma ray)	20 cm
SGR (spectrum natural gamma ray)	20 cm
MS (magnetic susceptibility)	20 cm
BS (sonic)	50 cm
DLL (resistivity)	80 cm
DIP (dip)	1 cm
DIP (caliper, orientation, mag. field)	5 cm
FAC40 (images)	0.05 cm

SRSDP Kimberly: max. driller depth = 1956 m, max. accessible depth for logging = 1900 m

Cased hole section (CH): 0 - 213 m cemented,
all other casings were HQ and/or NQ dril pipes used as protective guides for the wireline logging sondes, the were pulled up

Drilling sections (bit size): 213 - 1128 m -> bit size = 98 mm (HQ)
1128 - 1956 m -> bit size = 77 mm (NQ)

Data File Format:

SRSDP Kimberly composite.asc = ASCII (all data except images, waveforms & dipmeter)
SRSDP Kimberly composite.wcl = WellCAD (")
SRSDP Kimberly composite.pdf = Plot 1:5000 of the WellCAD file
SRSDP030,045,051 FAC oriented.lis or .wcl = FAC40 televiewer data, LIS & WellCAD format
SRSDP029,030,046,047,055 BS.lis = sonic full waveforms in LIS
SRSDP029,030,046,047,055 BS.wcl = sonic full waveforms WellCAD
SRSDP003,005,006,039,041,053,054.asc = complete dipmeter data in ASCII
absent value = -999.25 (missing value)

SRSDP Kimberly - OSG Logging Data Processing

GR_Master, total gamma ray:
all logs depth corrected according to tjis log where possible. As there is no continous log over the entire logged borehole section the Reference log was composed from several open hole logs and one cased hole log (uppermost 210 m) in the following way (GR = total Gamma Ray from telemetry-sonde):
OH: MS 049, DLL 034, DLL 015, DLL 026, DLL 021
CH: SGR-MS 018
Data is as measured, i.e. not corrected for casing effects (attenuation of the drill pipe).
The borehole section below 680 m is characterized by a very uniform GR profile with only very few peaks or other features significantly above the statictical noise, which are neccessary for a well-defined depth matching. Depth matching therefore in this section can be ambigous.

SGR, K, U and Th content:
SGR was run nearly entirely inside the drill pipes, correction for drill pipe attenuation and hole size was done with the EnCor (environmental corrections) module inside Geobase software.
Settings: hole size = 98 mm, water, ave. density = 2.9 g/cm^3, HQ pipe thickness = 5.6 mm.
In the section above 213 m data was not corrected.

MS, Magnetic Susceptibility**:**
data after chart based correction for bit size, the applied correction factors are:

213 - 1128 m	->	f_{corr} = 1.2
1128 - 1900 m	->	f_{corr} = 1.15

BS, Sonic, Vp: p-wave, Vs: s-wave (sonic velocities):
Vp was obtained with three different processing methods: the first arrival picking method in Geobase (denoted as Vp), first arrival picking in WellCAD (Vp-FAP), and Semblance Analysis of the waveforms (Vp_SA). All three methods show nearly identical results. Vs could only be estimated with the Semblance Analysis method.
The sonic measurements were not recorded continously but in 5 sections (top->bottom):
SRSDP055
SRSDP047
SRDSP046
SRSDP030
SRSDP029
The sonic waveform data (LIS file format) is also delivered here to allow further processing.

DLL, Resistivity**:**
Rd = deep measurement (> 190 cm); Rs = shallow measurement (≈ 60 cm), data as measured.
The DLL measurements were not recorded continously but in 4 sections (top->bottom):
SRSDP034
SRDSP014
SRSDP026

SRSDP021

DIP, Dipmeter:
Borehole caliper: CAL1&2(perpendicular) as measured, from DIP
Orientation: DEVI = deviation from vertical, DAZI = hole azimuth, AZIM = pad1 azimuth
Ftot (total magnetic field amplitude): calculated from Mx, My & Mz
The DIP measurements were not recorded continously but in 8 sections (top->bottom):
SRSDP054
SRSDP053
SRSDP041
SRDSP039
SRSDP036
SRSDP006
SRSDP005
SRSDP003
Note: the z-component is in sonde axial direction, z & y are perpendiculuar!
sw

FAC40, Televiewer:
Images, oriented to North: RUNT = runtime = radius, AMPL = amplitude = reflection strength
RUNT & AMPL enhanced = processed image with stronger contrast
Ftot calculated from Magx,y,z (uncalibrated)
Acoustic borehole caliper: CAL1&2 (perpendicular), V_{mud} = 1600 m/s
Rad1,2,3,4 = radius1+3 and radius2+4 are on opposite sides
Orientation: DEVI = borehole deviation from vertical, DAZI = borehole azimuth, AZIM = azimuth of Rad1
As the sonde contains no GR, depth correction where possible was done by comparison of the computed Ftot_FAC with Ftot from the DIP run, which is depth corrected according to the GR_Master.
Note: the z-component is in sonde axial direction, z & y are perpendiculuar!
The image data (LIS file format) is also delivered here to allow further processing.