Supplemental data memo in C0002S

4th March, 2019

Exp358 LSSs

This is a supplimental and quick memo to help using the logging data. It includes personal communication between Schulumberger data processor. Refer to the IODP expedition 358 proceedings for the official information.

Depth index

mBRT: meter below rotary table (rig floor)

mbsf: meter below sea floor

MSL: mean sea level

MD: Measured depth, linear length from the rig floor

TVDSS: True Vertical Depth SubSea, vertical depth from MSL

Well summary

Expedition:	358
Hole:	C0002S (sidetrack from C0002R)
Location (Well head):	33°18.0507'N, 136°38.2029'E
	X/Y: 652382.39 / 3685834.62
Water Depth:	1967.5 mBRT (1939.0 mMSL)
Rig floor to MSL Elevation:	28.5 m
Coordinate:	WGS84-N53
Grid North:	0.89 (degree)
Magnetic Declination:	-7.16 (degree)
Magnetic Inclination:	47.02 (degree)
Total magnetic force:	46164.86 (nT)
Horizontal component:	31432.0 nT
Vertical component:	33632.0 nT

A window was opened from the expandable casing in C0002R after setting a whipstock (Figure 1). Sidetack hole was kicked off from the window at 4769.04 to 4775.06mBRT (2801.54 to 2807.56mbsf) with a bottom hole assembly (BHA) composed of an 8-1/2” bit, a MudMotor and a TeleScope in Run1.

Run 1

BHA: 8-1/2"Bit + Mud Motor + TeleScope

Mud type: KNPP

Mud weight (sg): 1.39

Logging data quality control

Time-base DWOB and DTOR were measured at TeleScope.

Run 2

BHA: 8-1/2"Bit + RSS + Mud Motor + MicroScope + arcVISION + TeleScope + SonicScope + SeismicVISION

Mud type: KNPP

Mud weight (sg): 1.38

Mud Potassium content: 1.47%

Mud resistivity: 0.07 ohm.m@21.2degC

Mud filtrate: 0.05 ohm.m@21.5degC

Mud cake: 0.07 ohm.m@21.4degC

Max hole deviation: 2.89 deg

Logging data quality control

Data quality control was performed by monitoring real time data and recovered memory data. Logging staff scientists (LSS) assessed real time measurements while drilling (MWD) and logging while drilling (LWD) data in terms of realistic values for the drilling condition, lithology and hole environment status and comparing with the logs in C0002Q and C0002 obtained during the IODP expedition 338 and 348.

During drilling no MWD signal could be demodulated. Therefore, there are no DWOB and DTOR in real-time data. The QA/QC is not done for time-base resistivity and borehole image data.

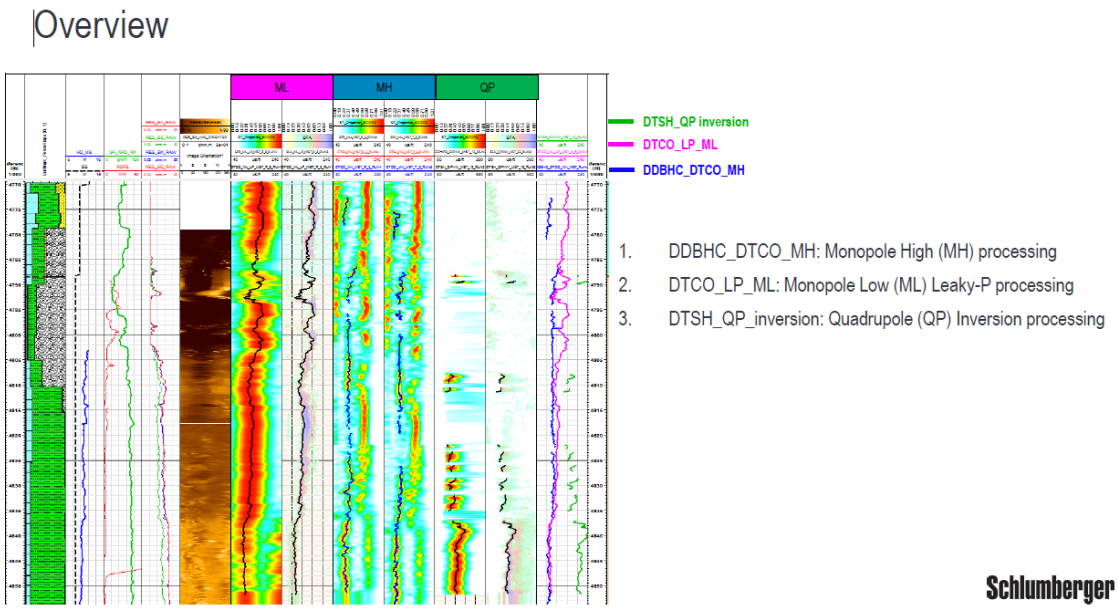
Data processing

Schlumberger LWD field engineers applied borehole environment correction with 8.5 inch (bit size) borehole diameter and mud properties.

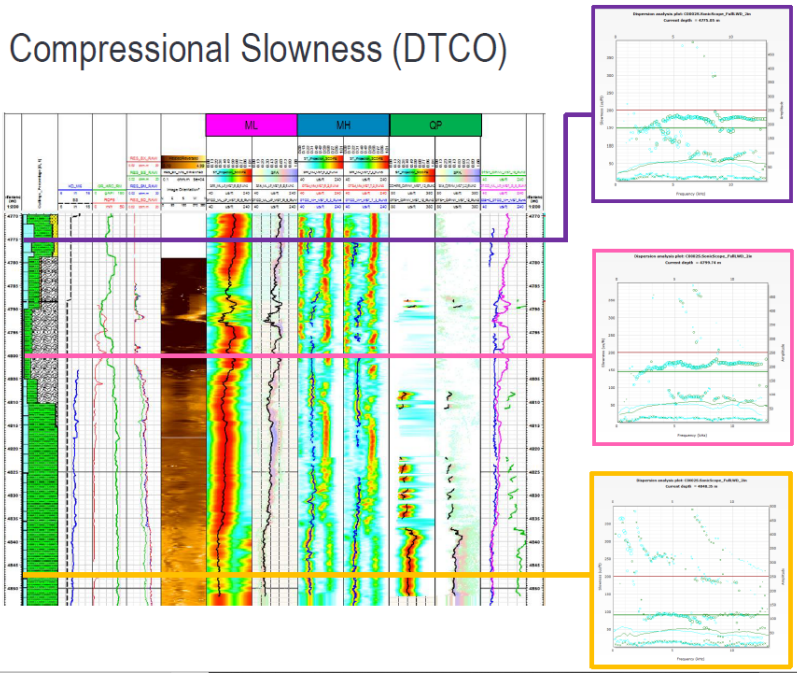
LSS applied depth shift of -1967.5 m from the rig floor to the sea floor to all the logs with Schlumberger Techlog 2017.2. Borehole dynamic and static images are generated with 256 gradation by LSS. 1m is used for the dynamic window.

The all raw data were sent to Schlumberger Information Solution (SIS) on-shore. Borehole diameters are estimated from arcVISION and MicroScope resistivities. Borehole shape is estimated by use of MicroScope resistivity. Compressional and shear velocities are obtained from the processing of the SonicScope data. Checkshot results are obtained from the processing of seisimicVISION data.

Additional notes from Schlumberger SIS



Compressional Slowness (DTCO)



1. Above 4783mBRT, DTCO from ML is too slow, which MAY not read formation correctly.
2. 4783mBRT to 4873mBRT, MH show weak signal in high frequency, while ML show relative strong dispersive response.
3. Below 4837m, DTCO from MH and ML show similar result.

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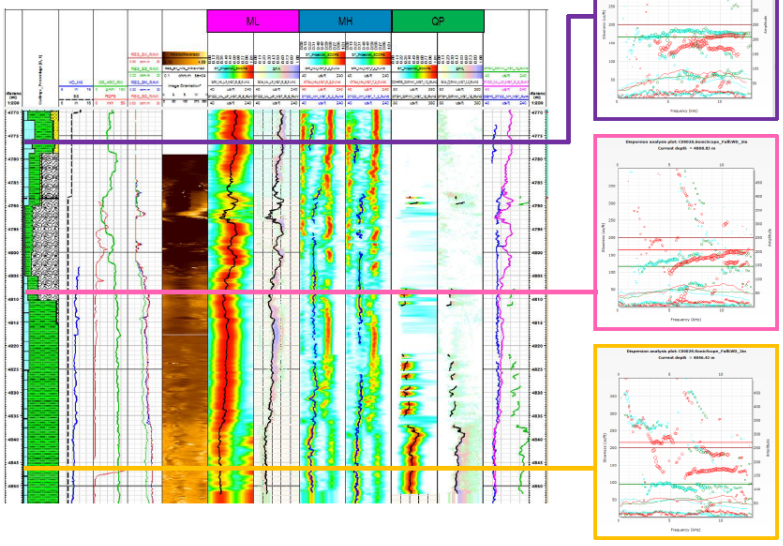
Shear Slowness (DTSH)



1. As there is almost no signal from MH, QP wavefrom was used to obtain DTSH
2. QP signal shows relative weak signal above 4837mBRT. It's difficult to obtain continuous DTSH from QP

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End of the note.

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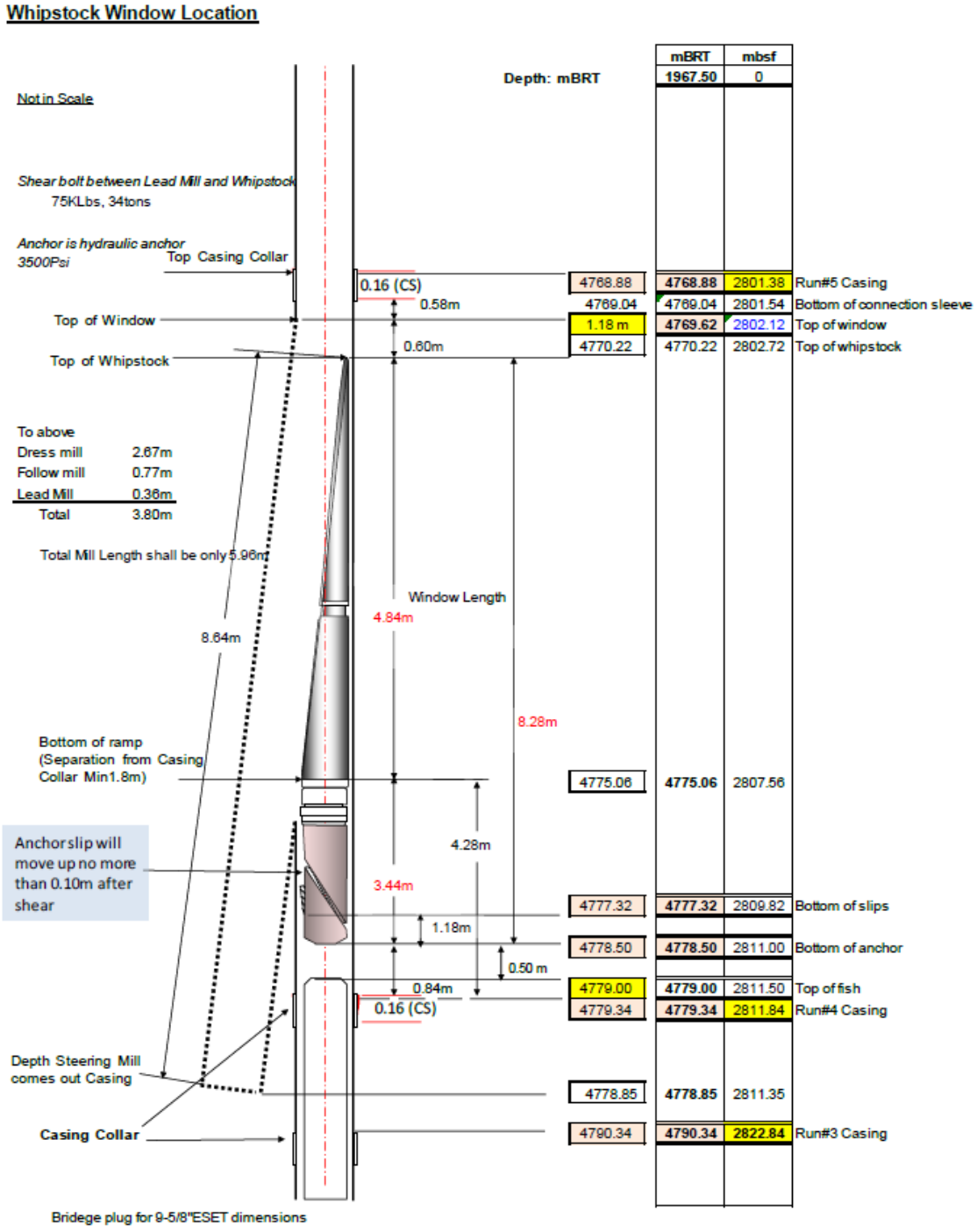

Figure 1: Whipstock setting depth.

Appendix 1: Acronyms in drilling parameters and LWD data

Drilling parameters at surface

ROP5 [m/hr] : Rate of penetration averaged over the last 5 ft (1.5 m)

RPM [c/min] : Rotations per minute

SPPA [MPa] : Standpipe pressure

SWOB [kN] : Surface Weight on Bit

STOR [kN.m] : Surface Torque

TFLO [gal/min] : Total flow rate of all active pumps

TeleScope

DWOB [kN] : Downhole Weight on Bit

DTOR [kN.m] : Downhole Torque

arcVISION

GR [gAPI] : Gamma Ray

A16L / H [ohom.m] : Attenuation Resistivity 16 inch spacing at 400 KHz/2MHz

A22L / H [ohom.m] : Attenuation Resistivity 22 inch spacing at 400 KHz/2MHz

A28L / H [ohom.m] : Attenuation Resistivity 28 inch spacing at 400 KHz/2MHz

A34L / H [ohom.m] : Attenuation Resistivity 34 inch spacing at 400 KHz/2MHz

A40L / H [ohom.m] : Attenuation Resistivity 40 inch spacing at 400 KHz/2MHz

P16L / H [ohom.m] : Phase Shift Resistivity 16 inch spacing at 400 KHz/2MHz

P22L / H [ohom.m] : Phase Shift Resistivity 22 inch spacing at 400 KHz/2MHz

P28L / H [ohom.m] : Phase Shift Resistivity 28 inch spacing at 400 KHz/2MHz

P34L / H [ohom.m] : Phase Shift Resistivity 34 inch spacing at 400 KHz/2MHz

P40L / H [ohom.m] : Phase Shift Resistivity 40 inch spacing at 400 KHz/2MHz

DHAP [MPa] : Downhole Annulus Pressure

ECD [g/cm3] : Equivalent Circulation Density

DHAT [degC] : Downhole Annulus Temperature

MicroScope

RES_BIT [ohm.m] : Bit Resistivity

RES_TRD [ohm.m] : Resistivity Toroidal Receiver Deep

RES_TRX [ohm.m] : Resistivity Toroidal Receiver extra Deep

RES_BS [ohom.m] : Shallow button resistivity

RES_BD [ohom.m] : Deep button resistivity

RES_BM [ohom.m] : Medium button resistivity

RES_BX [ohom.m] : Extra deep button resistivity

BS [in] : Bit Size

P1AZ [deg] : Pad 1 Azimuth in Horizontal Plane (0 = True North)

P1NO [deg] : Pad 1 Azimuth in Plane Orthogonal to Tool Axis (0 = True North)

RB [deg] : Relative Bearing

SonicScope

DTCO_ML_LP_R [us/ft] : Compressional slowness

DTSH_QPINV [us/ft] : Shear slowness

TICO_ML_LP_R6 [us] : Compressional integrated transit time for reference receiver

TISH_QPINV_R6 [us] : Inverted shear integrated transit time for reference receiver

WFA_MHT : Monopole raw sonic waveform in 2” spacing (See appendix 2)

WFA_MHS : Monopole raw sonic waveform in 6” spacing (See appendix 2)

WFA_QPT : Quadrupole raw sonic waveform in 2” spacing (See appendix 2)

WFA_QPT : Quadrupole raw sonic waveform in 6” spacing (See appendix 2)

WFA_MHT_MAVG_R_FILT : Filtered waveform

Appendix 2: Time stamp of time-base data

Use “Time” as a reference for time-based LAS. Time Index by Schlumberger Maxwell acquisition system takes OLE Automation Date, that is “December 30, 1899” as a reference day. Techlog takes “January 01, 1900” as a reference day, therefore, there are 2-day gap in-between. Time-based LAS includes two kinds of “Time stamp”, “Time_1900 (OLE Automation Date)” and “Time (2 days ahead index)”. The latter is the actual date.

Appendix 3: SonicScope waveform data

	Data array in DLIS	Depth sampling*	Time sampling	Number of samples
Monopole waveforms	WFA_MHT	5.08cm (2”)	20 micro sec	256
	WFA_MHS	15.24cm (6”)	20 micro sec	256
Quadrupole waveforms	WFA_QPT	5.08cm (2”)	40 micro sec	256
	WFA_QPS	15.24cm (6”)	40 micro sec	256

* 5.08cm (2”) is used for data processing in Run2 C0002Q.

Configuration of Transmitters and receivers in SonicScope675

Number of receiver stations: 12

Receiver spacing: 10.16cm (4in)

Spacing monopole transmitter to the nearest receiver: 2.44m (8ft)

Spacing quadrupole transmitter to the nearest receiver: 2.16m (7.09ft)

Ascii data format (csv)

[Line 1] TDEP,WFA_MHT[0],WFA_MHT[1],WFA_MHT[2],…,WFA_MHT[3071]

[Line 2] 4820.1072,-0.53125,-0.015625,0.2604167,…

…

Depth from the rig floor (m), Time series of waveform amplitude at Receiver 1 (256 samples), Time series of waveform amplitude at Receiver 2 (256 samples),…, Time series of waveform amplitude at Receiver 12 (256 samples)