

# IODP EXP 358 Daily Geomechanics Report

## Report #090 20190207

### RTG Team

|                              |  |
|------------------------------|--|
| RTG Supervisor(s)            | David Castillo / Thomas Finkbeiner / Demian Saffer |
| RTG Watch Lead (00:00-12:00) | Kan Aoike  |
| RTG Watch Lead (12:00-24:00) | Emily Wisbey                                       |

### Well Status

|                                    |  |                 |   |
|------------------------------------|--|-----------------|---|
| Site Name:                         | C0002  | Hole Name:      | S                                       |
| Water Depth:                       | 1,939.0 m  | RT-MSL:         | 28.5 m                                  |
| 0600h Hole Depth:                  | 4,881.0 mBRT<br>(4,879.0) (mTVD)   | Section TD:     | 6,000.0 mBRT<br>(5,998.0) (mTVD)        |
| Section #:                         | 1  | CSG Depth/Size: | 4,769~4,775 mBRT<br>11-3/4" ESET inches |
| Static MW:                         | 1.35 sg  | Current ECD:    | 1.39 sg                                 |
| FIT/LOT/ XLOT:                     | N/A<br>Note: 1.46sg FIT @ 4,757mBRT  |                 |   |
| Current formation/<br>lithology:   | Shale  |                 |   |
| Sensor Offsets<br>from the Bit:    | Xceed 675 (D+): 4.159 m<br>MicroScope 675 (Resistivity: 26.710 m)<br>ARC-6 (APWD: 31.197 m, Resistivity: 31.909 m, GR: 31.960 m)<br>TeleScope 675 (IWOB: 36.072 m, D+): 39.437 m)<br>SonicScope 675 (Sonic: 49.627 m)<br>seismicVISION 675 (Hydrophone: 55.890 m)  |                 |   |
| Other BHA Offsets<br>from the Bit: | 8-1/2" PDC Bit (AxeBlade XZ716): 0~0.258 m<br>Xceed675 8-3/8" Stabilizers: 0.258~8.027 m<br>Lower C-Link 675: 8.027~10.971 m<br>675ERT7850 Motor: 12.797~21.163 m<br>Upper C-Link 675: 21.871~24.413 m<br>MicroScope 675: 24.413~29.572 m<br>ARC-6: 29.572~35.243 m<br>TeleScope 675: 35.243~43.795 m<br>SonicScope 675: 43.795~53.745 m<br>seismicVISION 675: 53.745~58.199 m<br>6.75" Collars + XOs: 59.112~198.355 m<br>Drilling Jar: 198.355~208.090 m<br>6.75" Collars + XOs: 208.090~227.546 m |                 |   |
| Current Operations:                | Continued to drill ahead. Bit depth 4881.0 mBRT as of 0600 Feb.8.  |                 |   |

### Geomechanics Alert

|  |  |
|--|--|
| <b>GREEN</b>                                   | <p><b>Green</b> = Projected model remains accurate<br/> <b>White</b> = Unanticipated deviation from model which <i>should not</i> affect drilling<br/> <b>Yellow</b> = Unanticipated deviation from model which <i>may</i> affect drilling<br/> <b>Red</b> = Imminent requirement to stop drilling</p>   |
| <b>Basis for Alert Level + Recommendations</b> | <p><b>1.35 sg</b> remains recommended MW for C2S.</p> <p>If we find earth stress gradients increases with depth (and UCS does not increase as quickly), RTG may recommend increasing the MW slightly (e.g., +0.01 SG increments) with Watch Leaders and Supervisors closely monitoring. This process could be repeated based on real-time learnings. Any subsequent increase in MW in C2S would not pose a serious risk of drilling fluid invasion in the shallower sections if FracSeal was applied generously.</p> |

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### Principal Findings

N/A

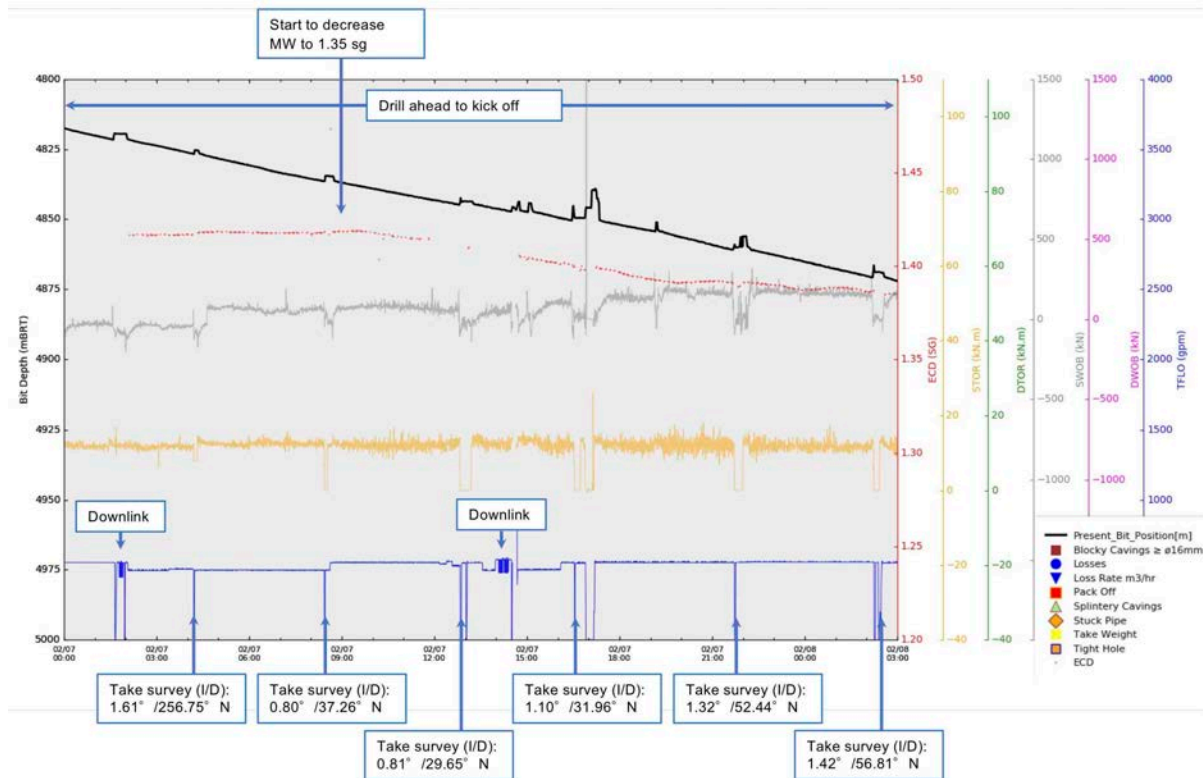
### Observations Summary

|                            |   |
|----------------------------|---|
| <b>Fracture Gradient</b>   | N/A   |
| <b>Pore Pressure</b>       | No indication suggesting abnormal pressure has been observed. |
| <b>Wellbore Breakout</b>   | To be updated in the next DGEM                                |
| <b>Tensile Failure</b>     | N/A   |
| <b>Drilling Parameters</b> | N/A   |
| <b>Other</b>               | N/A   |

### Analysis

#### Drilling Experience Analysis

Continued to drill ahead without any obvious borehole problem but with lower ROP than expected (~3 m/h). ECD descended to 1.39 sg along with reducing MW to 1.35 sg.



**Figure 1 Drilling Experiences over last 27hrs**

Due to a technical reason, DWOP and DTOR are not plotted. DTOR and DWOB levels were generally 1/2 of STOR and 1/3 of SWOB, respectively.

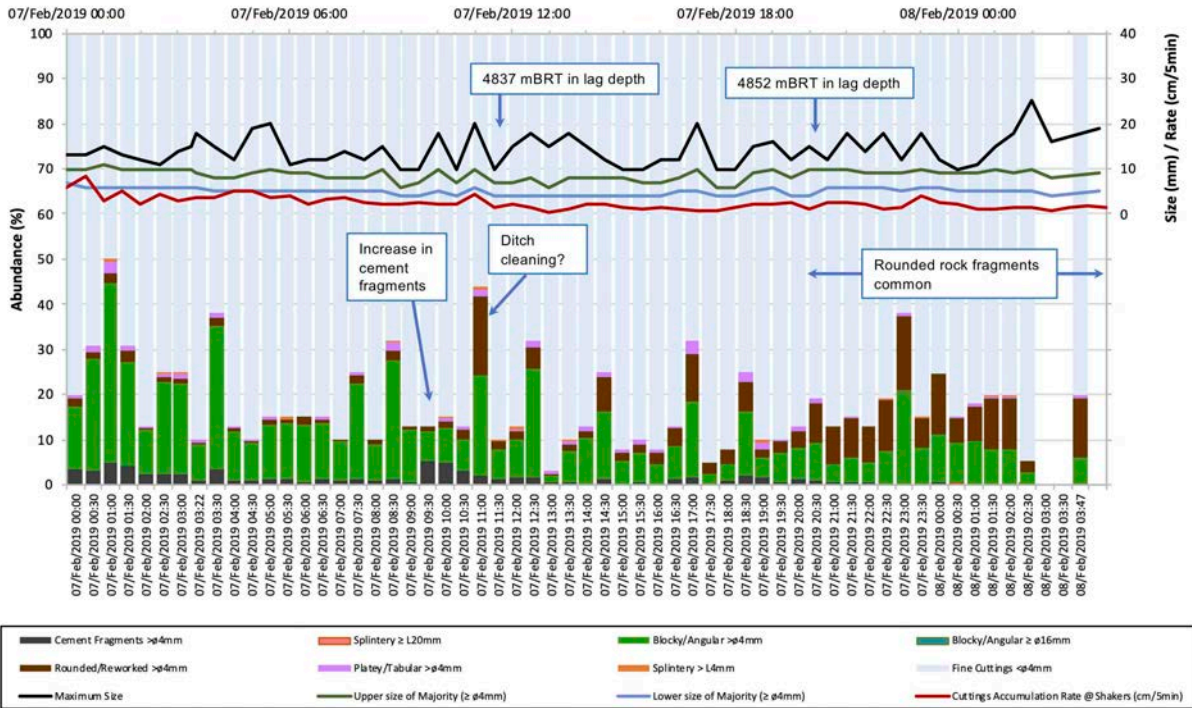
#### Cuttings and Cavings Analysis

Fine cuttings comprised 70~90 % of shaker samples in general (Figs. 2 & 3). Most rock fragments  $\geq \varnothing 4$  mm were angular~blocky in shape and up to  $\varnothing 10$  mm in diameter until 2030hrs, whilst rounded rock fragments became common after that interval, below a lag depth of 4852 mBRT (Fig. 4). A depth of 4837 mBRT is expected to be the top of “gauge” hole on the basis of LWD resistivities (Fig. 5).

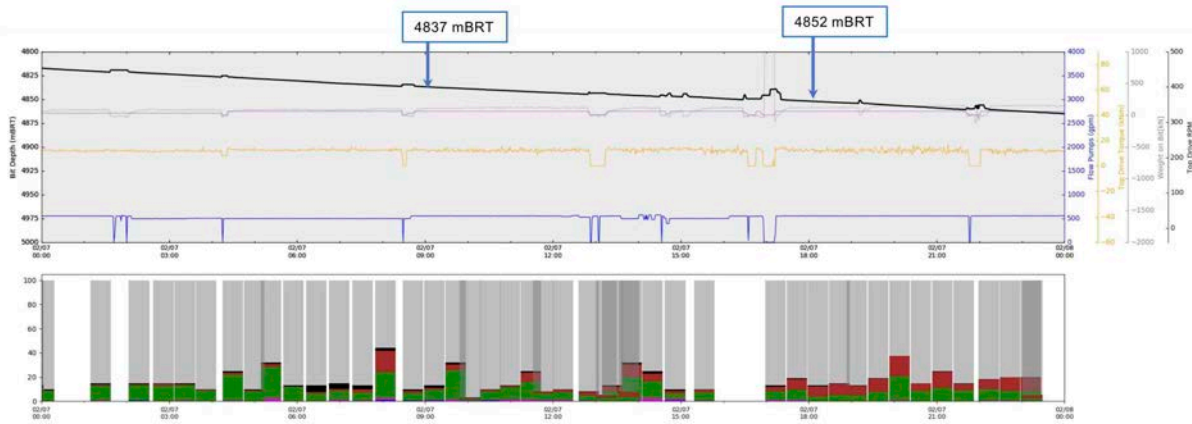
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### EXP 358 - C2S - Section #1 - RTG 400cc Samples - 27hr Period



**Figure 2 Occurrence of cuttings/cavings > ø 4mm (taken from 400cc RTG Samples) over last 27 hrs. Not corrected for lag time.**



**Figure 3 Lag corrected occurrence of cuttings/cavings > ø 4mm (taken from 400cc RTG Samples) over last 24 hrs.**

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Figure 4 Example of cuttings/cavings > ø 4mm (taken from 400cc RTG Samples).

## LWD Data Analysis

Low resistivities in the interval down to 4837 mBRT indicate an enlarged hole. In contrast, higher resistivities below 4837 mBRT are indicative of relatively good hole; although, MicroScope resistivity images suggests that the presence of apparent borehole breakouts. We will examine if they are real borehole breakouts or artifacts caused by tool rotation. Further interpretation will be shown in the next DGEM.

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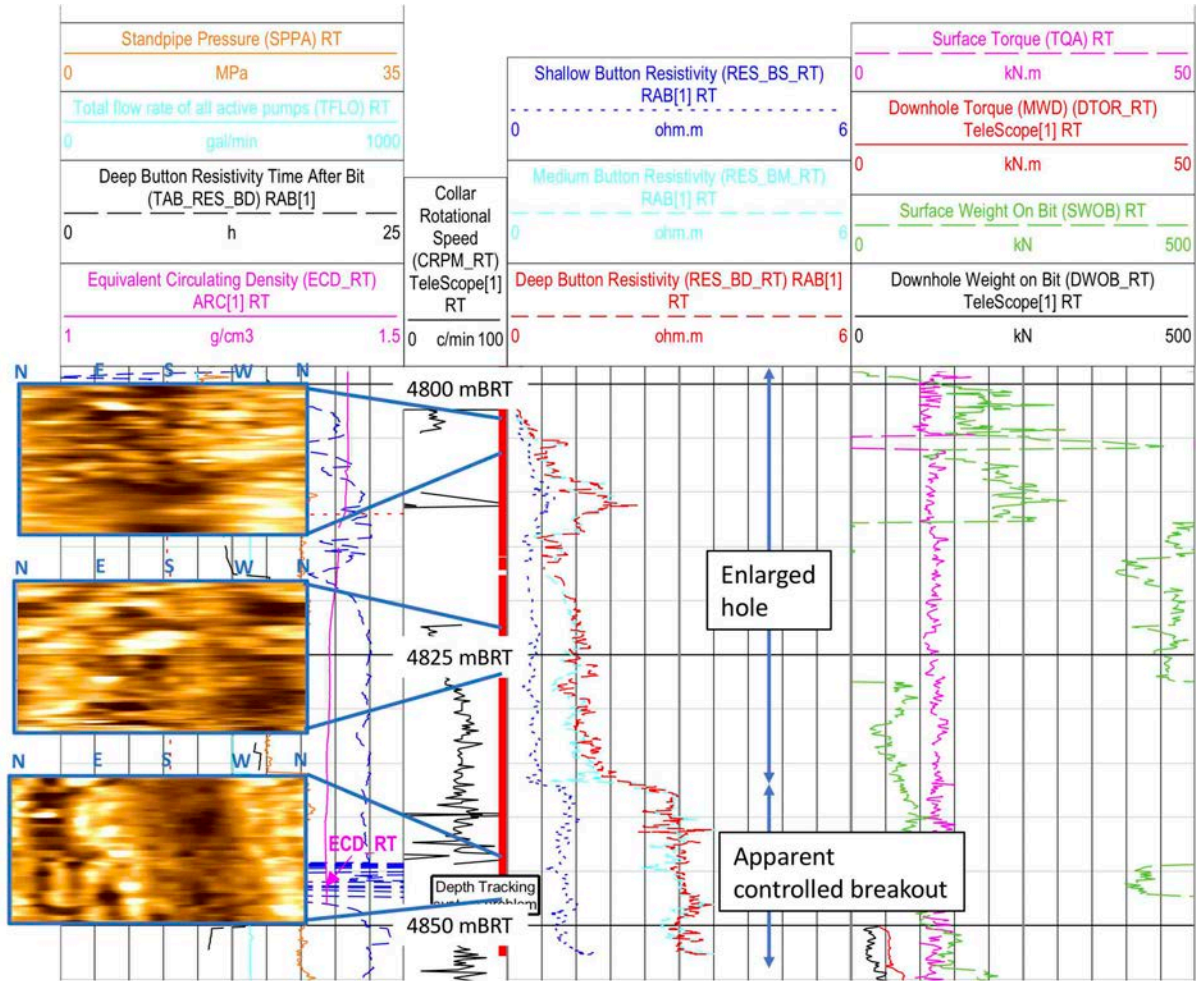


Figure 5 Realtime LWD data plots for the interval between 4800 to 4851 mBRT and cropped MicroScope images of three intervals.

### SFIB Analysis

Modelling ongoing followed by update in the next DGEM.

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### Geomechanical Model Review

No change in the current stress model. MW has been reduced to 1.35 sg.

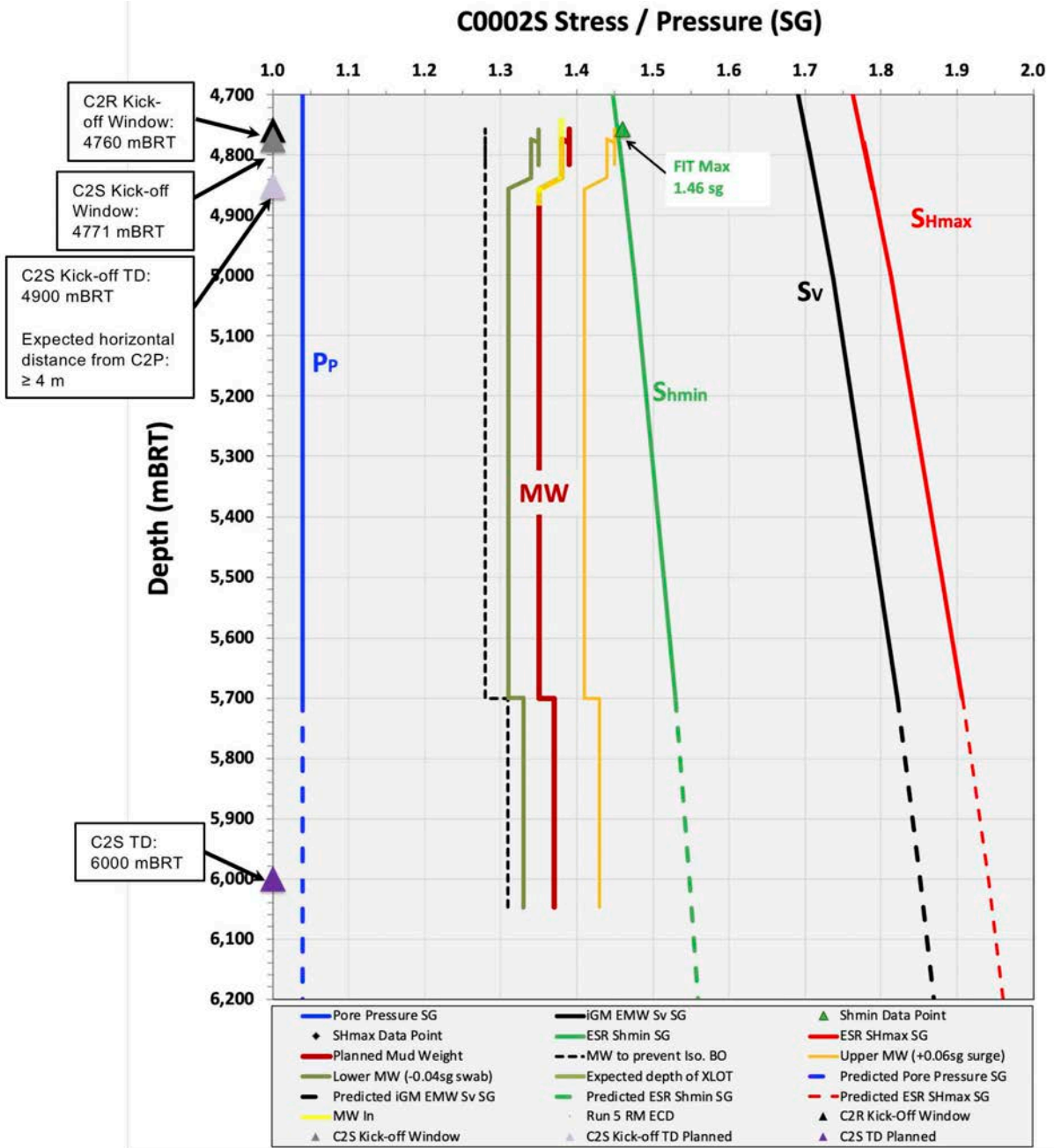


Figure 6 Current stress model for C2S