**Oman Drilling Project – CM2B – Lead Scientist On-Site Log (LSOS).**

**17th December 2017 to 4th January 2018**

This is an electronic version of the blue on-site logbook.

**CM2 22.910997ºN, 58.33581ºE, Altitude 713 m**

Hole CM2B. Vertical hole

***Overview***

**DAILY UPDATES**

**17th December 2017, Sunday**

**On-site:**

**LSOS: Juerg Matter**

Arrived on site:

Rig started:

Rotation started:

Summary of the day:

Mobilization of wireling diamond coring rig at site CM2 and simultaneous mobilization of rotary drill rig at site CM1. We faced some logisitical challenges between the two drilling companies. We had to wait from 08:00 to 14:00 for a Lalbuksh truck that could transport the 7.6 m rods from CM2A to CM1, which delayed mobilization for both sites by several hours. We finalized loading of core boxes for transportation to Muscat at 19:00.

We also faced some challenges with the road (parts were flooded) due to the heavy storm on 16th December. JCB could improve road significantly after storm [one part had been washed away completely and needed to be built up again].

**18th December 2017, Monday**

**On-site:**

**LSOS: Juerg Matter**

Arrived on site:

Rig started:

Rotation started:

Summary of the day:

CM1 site: [Rotary] Drill rig positioned, everything installed and ready for drilling to start. We are just waiting for drilling permit (expected to be ready on 19th December).

CM2 site: [Coring] Drill rig positioned. Core characterization tent and infrastructure installed. Drill rig has some issues with ongoing stop 🡪 electrician is fixing it. Coring will start on 19th December.

**19th December 2017, Tuesday**

**On-site: NW, JMM, TM, JMG, HB, MR, YY, KH**

**LSOS: Juerg Matter**

Arrived on site: 06:55

Rig started:

Rotation started:

Summary of the day:

Drillers arrived 07:05

Mud pits have to be filled with water and EZ-Mud mixed in.

Spud in CM2B @ 08:15. Rotation started [again] 08:25

Highly weathered (most likely gabbro) from 1z to 8Z (12.00 m). First “fresh” dunite core was recovered at 12.00 [- 13.00] m depth at the end of the day.

**20th December 2017, Wednesday**

**On-site: NW, JMM, TM, JMG, HB, MR, YY, KH**

**LSOS: Juerg Matter**

Arrived on site: 07:15

Rig started:

Rotation started:

Summary of the day:

Reaming and installing HW casing until 9am; Cased the drill hole up to 11.60 m depth.

POOH @ 11:10 to change the drill bit – new bit is 8 – 11 hardness. Again started after 10 mins.

Drilling problem: core crushing leading to vanishing of core. Driller reminded about it.

**21st December 2017, Thursday**

**On-site: NW, JMM, TM, JMG, RS, MR, YY, KH (MK at CM1B site)**

**LSOS: Juerg Matter**

Arrived on site: 07:15

Rig started:

Rotation started: 07:35

Summary of the day:

Ministry requested one sample of each typical lithology

🡪 similar to thin section sample, we provide them with working half piece of ~5 cm.

🡪 Ministry sample taken where we took thin section sample.

16Z to 22Z quite fresh dunite with serpentine veins. Occasionally a thin layer of chromite was observed. Some parts of certain core sections was heavily fractured with cataclastite formed.

**23rd December 2017, Saturday**

**On-site: NW, JC, KM, RS, YY, KH, BP (MK @ CM1B)**

**LSOS: Jude Coggon**

Arrived on site: 07:15

Rig started:

Rotation started: already started

Summary of the day:

~09:40 Eiichi arrived with his 3 students and Japanese film crew. Filming outcrops and coreflow.

Extra sample taken @ 23Z2 17-19 cm for Katsu to have T/S made for film crew.

23Z to 33Z dominantly weak to moderately serpentinized dunite with some zone of impregnated plagioclase. Some core show quite fresh dunite. There are some zones of highly fractured/faults. KM

**24th December 2017, Sunday**

**On-site: NW, JC, KM, RS, YY, KH, BP (MK @ CM1B)**

**LSOS: Jude Coggon**

Arrived on site: 07:10

Rig started: 07:17

Rotation started: 07:28

Summary of the day:

Fluid return is ~50%

13:45 Rig Sys P: 200 kgcm-2 Pull Down: 45kgcm-2

TV crew with us again. Omani companions [GeoSolutions brothers etc.] cooked us a BBQ for lunch!

We had relatively fresh dunite in the morning, although the cores are frequently fractured. Then we got an exciting core of alternative layers between gabbro and dunite at 74 m!! These cores are highly altered but their colour contrasts are so nice to represent the Moho Transition Zone!! We are all happy to get them, subsequently we had gabbroic rock with some ultramafic layers (maybe troctolite or wehrlite). We finished in serpentinised dunite today. KM

**25th December 2017, Monday**

**On-site: NW, JC, KM, RS, BP, KH, YY, MK (no rotary drilling this am as waiting for engineer again)**

**LSOS: Jude Coggon**

Arrived on site: 07:11

Rig started: already started

Rotation started: ~07:25

Summary of the day:

Cover on guider plate bearing immediately below foot clamp has worn out so bearings are loose. Checked it. Bearing is ok but the cover/net above it is broken so it needs to be welded or replaced at some point of time. For the moment there is no problem.

Added a new joint of the HW casing pipe and started reaming as the stick up pipe is going down. New casing depth (HW): 13.1 m (extended by 1.50 m) (40 cm height of casing above ground).

~12:40 Geosolutions (Fahad) brought us cake for Christmas!

~13:10 Started drilling again

We had highly serpentinised dunite with few impregnated minerals such as plagioclase and cpx. These cores are intensely serpentinised so that primary texture such as coarse granular can be identified in a few cores. It seems that serpentinisation became somehow slightly weaker toward the bottom. KM

**26th December 2017, Tuesday**

**On-site: NW, JC, KM, RS, BP, KH, YY (MK @ CM1B)**

**LSOS: Jude Coggon**

Arrived on site: 07:11

Rig started: already started

Rotation started: ~07:30

Summary of the day:

We had moderate to intensely serpentinised dunite with variable plagioclase impregnations. In lee serpentinised sections, rare grains of greenish olivine, aong with a few spinel and opx were observed. Highlight of the day occurs in core 58-3 (0-55 cm from the top of the [section]) where abundant LARGE chromites (1-5 mm width) occur in the dunite. Most of these chromites are rimmed by plagioclase. BP

**27th December 2017, Wednesday**

**On-site: NW, JC, KM, RS, BP, KH, YY (MK @ CM1B)**

**LSOS: Jude Coggon**

Arrived on site: 07:13

Rig started: already started

Rotation started: already started

Summary of the day:

We started with relatively fresh dunite with harzburgite layer in the core 60Z. This is the first occurrence of harzburgite, althought we had a few thin layers in less than 5 cm thickness before. We got more harzburgite in the next couple of core with less serpentinised conditions. Serpentinisation seems to be more common in dunite, but primary boundary between harzburgite and dunite can be observed. In the afternoon we drilled a thick dunite layer (more than 3 m) which are quite serpentinised and disrupted by drilling, resulting in low recovery rate in this interval. At the last two cores we had pretty greenish harzburgite as well as dunite with blackish serpentinite veins. We have almost drilled through the Moho Transition Zone today! KM

**28th December 2017, Thursday**

**On-site: NW, JC, KM, RS, BP, KH, YY**

**LSOS: Jude Coggon**

Arrived on site: 07:14

Rig started: already started

Rotation started: 07:19

Summary of the day:

1 m of backfill to be cleared first.

We had harzburgite in all cores today. Although we expected to have a 100% harzburgite at each time, there were always dunite layers in a few centimeters to a few tens of centimeters thickness. Note that we have a unique pinkish vein in 69Z which might be Rodingite (not sure though). The cores are more or less greenish, suggesting that the degree of serpentinisation is not so high.

This is my final description for Phase 2 at CM2B.

Thank you all for your collaboration!! Katsu Michibayashi

Mantle Boy, forever

**30th December 2017, Saturday**

**On-site: NW, JC, RS, BP, SC, KH (AE arrived late morning from MCT)**

**LSOS: Jude Coggon**

Arrived on site: 07:14

Rig started: already started

Rotation started: 07:20

Summary of the day:

The cores today are mostly harzburgites. At times dunitic patches / thin dunite layers occur in this harzburgites. After getting several fractured cores, a 2.78 m long harzburgite core was obtained! This is the longest intact piece of the Oman Drilling Project. Everybody was so happy!!! The mantle was finally showing us some LOVE! ☺ We hope to get more good cores tomorrow. To the upper mantle and beyond… BP ☺

**31st December 2017, Sunday**

**On-site: NW, JC, RS, BP, SC, KH, AE**

**LSOS: Jude Coggon**

Arrived on site: 07:15

Rig started: already started

Rotation started: 07:17

Summary of the day:

Today was a good day for coring. We got competent cores, most of which are harzburgites. These harzburgites are weak to moderately serpentinised. At times, dunite layers of patches also occur within these harzburgites. In a few cores, we also got 10-15 cm thick light green serpentinites. With the variety of samples that we got, I think everybody will be excited to examine these rocks in detail. BP ☺

**1st January 2018, Monday**

**On-site: NW, JC, RS, BP, SC, KH, AE**

**LSOS: Jude Coggon**

Arrived on site: 07:15

Rig started: already started

Rotation started: 07:20?

Summary of the day:

~10:20 – 11:30 Terri Cook and Lon Abbott of Colorado University visited the site [friends of Alexis Templeton – Terri writes science outreach articles]

New Year, no chill and still drilling! In the morning we got mainly harzburgites but fragmented along serpentinised fault zones. The most exciting core of the day came up just before 3 pm. The core measures 3.005 m and is the LONGEST SINGLE and INTACT piece ever recovered in the Oman DP. It is dominantly composed of beautiful (pronounce in Tomo’s voice) weakly serpentinised, green harzburgite with few serpentine veins. And just when the day was about to end, a coarse grained/pegmatitic vein was observed in the last core of harzburgites. The team also worked real hard today, packing almost 10 boxes of cores. What a good way to start 2018! BP ☺

**2nd January 2018, Tuesday**

**On-site: NW, JC, RS, BP, GA, SC, KH, AE**

**LSOS: Jude Coggon**

Arrived on site: 07:10

Rig started: already started

Rotation started: already started

Summary of the day:

We mostly got weak to moderately serpentinised harzburgites. Some of these harzburgites contain coarse pyroxenes up to 8 mm in width. At times, thin dunitic layers/patches occur in these harzburgites. The highlight for today’s drilling is the well preserved occurrences of different white, green and black veins within the harzburgites. These veins show complex cross cutting relationships and possible offset/displacement. The last two sentences is my official shoutout to Aled and other alteration guys. BP ☺

**3rd January 2018, Wednesday**

**On-site: NW, JC, RS, BP, GA, SC, KH, AE**

**LSOS: Jude Coggon**

Arrived on site: 07:13

Rig started: already started

Rotation started: already started

Summary of the day:

10:15 116Z Core catcher is not able to lift up the full core so run in again to lift the remaining 1.04 m core from the bottom. No drilling, just lifting the core again as it slips in the core catcher. NW

Today we mostly got competent and at times fractured cores of harzburgites with minimal dunite. In the less serpentinised cores, crosscutting relationships of different veins are very well preserved. The onset of serpentinisation is easily recognizable die to colour contrast in the cores. The more serpentinised portions are often black/darker in colour than the greenish fresher ones. We hope to hit the 300 m target tomorrow! Go, go, go!!! BP ☺

**4th January 2018, Thursday**

**On-site: NW, JC, BP, GA, SC, KH, AE**

**LSOS: Jude Coggon**

Arrived on site: 07:20 (got stuck behind goat truck, then water truck!)

Rig started: already started

Rotation started: already started

Summary of the day:

~11:10 Eric Ellison arrived direct from MCT to take some contamination control samples for microbiology team (related to w-r core samples taken at CM1A and CM2B by JMM and JC).

[12:08 Final core 129Z – reached planned bottom depth of 300 m – BOREHOLE CM2B COMPLETED!!]

13:52 Rig off – finished POOHing

16:15 Measured water level @ 13.9 m

Total casing depth = 13.1 m

**6th January 2018, Saturday**

Packed up tent, tarp and kit. Repitched tent at BA3. Drillers moved rig etc.