Little Dome C

Beyond EPICA Oldest Ice Drilling Site (75.29917 °S, 122.44516 °E)

Situation Report #35; Friday 06 January 2023

Personnel @LDC:
Saverio Panichi (ENEA, Camp Leader), Frank Wilhelms (AWI, Chief Driller), Robert Mulvaney (BAS, Chief Scientist), Markus Grimmer (UNIBE), Romilly Harris Stuart (LSCE), Matthias Hüther (AWI), Gunther Lawer (AWI), Johannes Lemburg (AWI), Martin Leonhardt (AWI), Florian Krauss (UNIBE), Michele Scalet (ENEA), Julien Westhoff (NBI), Andrea de Vito (ENEA)

Personnel @DC: Giuditta Celli (ENEA)

Weather at LDC 5 pm: sunny, 5 knots
Meteo at DC 5 pm: T = −33°C, Wind = SW 5 knots, Wind Chill T = −45°C

Fast drilling with a stable system

After changing back to the shorter 3.5 m long core barrel system yesterday morning, drilling has once again become stable, with all ten runs today being over 3 m in length, for a total today of over 33 m of nice quality ice core.

We are starting to see some signs that we may be reaching brittle ice – cores are occasionally cracking, especially when cut on the circular saw into 1 m long bag sections. As we get deeper, it is likely that we will find the cores become more brittle as the pressure in the air bubbles trapped in the ice rises. When the cores emerge from the drill barrel now, we can here the ice crackling and popping as pressure is released from the bubbles near the surface of the core. Rough handling of the ice core can initiate cracks that run through the ice, which is not ideal for later analysis. There will come a point soon where the cutting of the ice into 1 m bag lengths with the circular saw may cause sufficient damage that we need to stop cutting and bagging the cores, but simply leave them in trays in the drilled lengths and store them in the core buffer to relax until next season when hopefully they will be easier to cut and handle.

Inside the core buffer – three shipping containers welded together with a door at each end. The top of the containers is about 2 m under the snow, and this allows us to maintain a temperature inside around -35°C during the height of the local summer, and around -55°C during the winter. In the foreground are the racks of core troughs where we will place freshly drilled brittle zone cores, uncut after drilling, to allow them to relax for a year before further handling, cutting and bagging. At the far end of the container are the full boxes of core ready for transfer to the long-term storage at Concordia Station – each box contains six 1 m long cores and weighs around 50 kg. (Photo: Mulvaney, Leica SL2-S, 17mm, 1/30, f13 ISO5000)

As well as the drilling, there are always aspects of the science side projects going on in between the drilling shifts. For example, today Romilly collected a series of eight 30 cm shallow ice cores, which she then cuts into 1 cm samples for analysis of the stable water isotopes back in the laboratory in Paris. This is a part of a photogrammetry project that requires her to take approximately 100 photographs every evening of stakes set out along a 100 m transect of snow. Taken together the project intends to understand how the snow surface and the water isotopes change in response to the local meteorological conditions.

Meanwhile, Robert was out with Michele in the PistenBully Polar 300 (the larger and more powerful of our two PistenBullys) setting out further GPS and radar survey stations.

Speaking of PistenBullys, a quick word on how we make water (OK, not an obvious link). We clearly have a need for water for drinking and cooking, but we also need water for the washing up, the shower, the one flushing toilet, as well as the washing machine. Waste heat from the generator in the Italian ITASE living module (caravan) is used to circulate hot water through a melt tank attached to the outside of the module. Michele in the PistenBully pushes clean snow up to the edge of the melt tank, where it is shoveled in to melt and provide all the water we need for the camp.

Michele pushes clean snow towards the snow melt tank with the PB300. (Photo: Mulvaney, Leica Q2, 28mm, 1/2000, f8, ISO100)

The snow melt tank, attached to the end of the ITASE living module is almost submerged by snow pushed up by the PB300. (Photo: Mulvaney, Leica Q2, 28mm, 1/1600, f8, ISO100)

Saverio shovels snow into the melt tank in the evening sun. (Photo: Mulvaney, iPhone 7)

End of day statistics:

Individual runs of the drill were recorded as: 3.11, 3.31, 3.18, 3.29, 3.21, 3.22, 3.48, 3.27, 3.01, 3.50 m

Drillers' depth: 558.38 m; daily total 33.38 m

Loggers' depth: 562.45 m; daily total 33.55 m

RM and FW, 09 Jan 2023