

## Little Dome C

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

### Situation Report #19, 5<sup>th</sup> December 2025

#### Personnel @LDC:

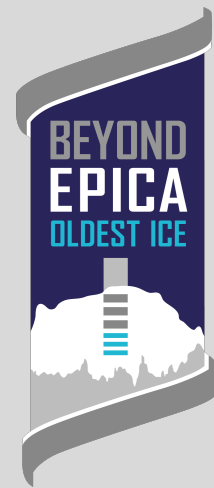
Carlo Barbante (UNIVE, CNR-ISP, PI in the field), Gianluca Bianchi Fasani (ENEA, Camp Leader), Katrin Ederer (AWI), Matthias Hüther (AWI, Chief Driller), Marion Lahuec (IPEV), Gunther Lawer (AWI), Johannes Lemburg (AWI), Barbara Seth (UNIBE), Philippe Possenti (CNRS), Chiara Venier (CNR-ISP), Sergio Zannini (ENEA), Mohammad Vafadarmianvelayat (AWI)

#### Personnel @DC:

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**Weather at LDC:** sunny and cold

**Meteo at DC 09 pm:** T = -29,3 °C, Wind speed = 4.2 kt, Windchill T = -37°C, Humidity = 66 %



The Beyond EPICA team at Little Dome C had another absolutely non-stop day yesterday, driven by the determination to retrieve a core of the bedrock.

The entire team was focused on one thing: testing further modifications to the rock drill configuration. This phase, a critical step toward achieving our goal of obtaining a bedrock core, was allotted about two weeks in our pre-campaign planning. We had set this day as our self-imposed deadline—the last day for these intensive trials before moving on to the attempt to deviate the main borehole and retrieve a parallel core from the deepest section.

Yesterday, we executed three coring runs of the drill. To maximize our chances of success, we introduced a new element, utilizing glycol to improve cutting and recovery conditions. The reason for using glycol were the unsuccessful approaches of drilling deeper into the ice-sediment mix without just grinding the top of the bottom ice, producing some meltwater in this way and getting stuck with the drill head – and with our rock drilling setup we were not capable of getting rid of the so produced water at the drill head.

Unfortunately, the pumping capacity of the rock drill pump was significantly insufficient at depth to generate a flow rate high enough to remove the water. However, following consultation with our colleagues in Copenhagen—Steff, Grant, Kevin, and Julien—we decided to introduce glycol to the bottom of the hole in the hope of achieving better penetration.

Two of today's runs returned empty, although we further added glycol to each run and also tried different drill heads. Success was fleeting but informative: only one run yielded any material, pulling up a mixture of ice and a few precious little pebbles.

The extraction itself proved just how challenging this deep-down work is. To free the drill head, we had to apply a massive 1.8 tonnes of pulling force on the cable. Twice today, this was still not enough and we had to apply the super banger; this part of the drill allows to give a sudden extra force on the pull – and it did the trick and freed the drill!

However, the enormous stress resulted in damage to the three pins in the shaft connector holding the complete drill assembly below the motor section, but fortunately they only bent and did not break, and they were promptly and expertly replaced by the drill team.



While we didn't recover the compact, solid rock core that was the ultimate target, what we did retrieve is a remarkable scientific achievement. The handful of bedrock samples, even if fragmented and mixed with basal ice, will provide our Basal Ice and Geology Team with extraordinary information. They can now determine the composition of the bedrock beneath the ice sheet at Little Dome C and, and figure out when the rock was last exposed to the atmosphere before being entombed by millions of years of ice.

Following up on last year's initial success, this recovery of bedrock material is considered another remarkable success by the entire community. It guarantees that the Beyond EPICA project will continue to deliver extraordinary scientific insights into the deep past, regardless of the core geometry.

The remainder of the operation proceeded smoothly, leaving us in an excellent position to move forward with the next, equally challenging phase of the project.



The three pins that stoically withstood the formidable power of the Super Banger. Photo B. Seth





Gianluca and Sergio after a restless fight with one of the burners of the bathroom module. Photo, C. Barbante

CB, GBF, BS & MH; LDC, 05.12.2025

