Little Dome C

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

Situation Report #20, 6th 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 = −32,9 °C, Wind speed =2.8 m/s, Windchill T = −43°C, Humidity = 69 %

The drilling season is heating up (metaphorically, of course, as the Antarctic Plateau remains amazingly chilly!), and the international team at Little Dome C is shifting gears into another exciting phases of the Beyond EPICA – Oldest Ice project.

Today, the team commenced preparations for a major technical changes: the borehole deviation at a depth of 2,350 meters. This isn't just about drilling deeper; it's about a strategic turn to acquire a second, crucial sample of ice. This highly-sought-after core is expected to contain ice from the impressive age range of 800,000 to 1.5 million years ago, allowing for new analyses of the climate record during a pivotal period in Earth's history known as the Mid-Pleistocene Transition (MPT).

To put it simply (I hope!) , the MPT represents one of the most profound and puzzling shifts in Earth's climate system over the last few million years. Before the MPT, which lasted roughly from 1.25 to 0.7 million years ago, the planet's ice age cycles were relatively shorter and milder, occurring approximately every 41,000 years, paced by a wobble in the Earth's axial tilt (obliquity).

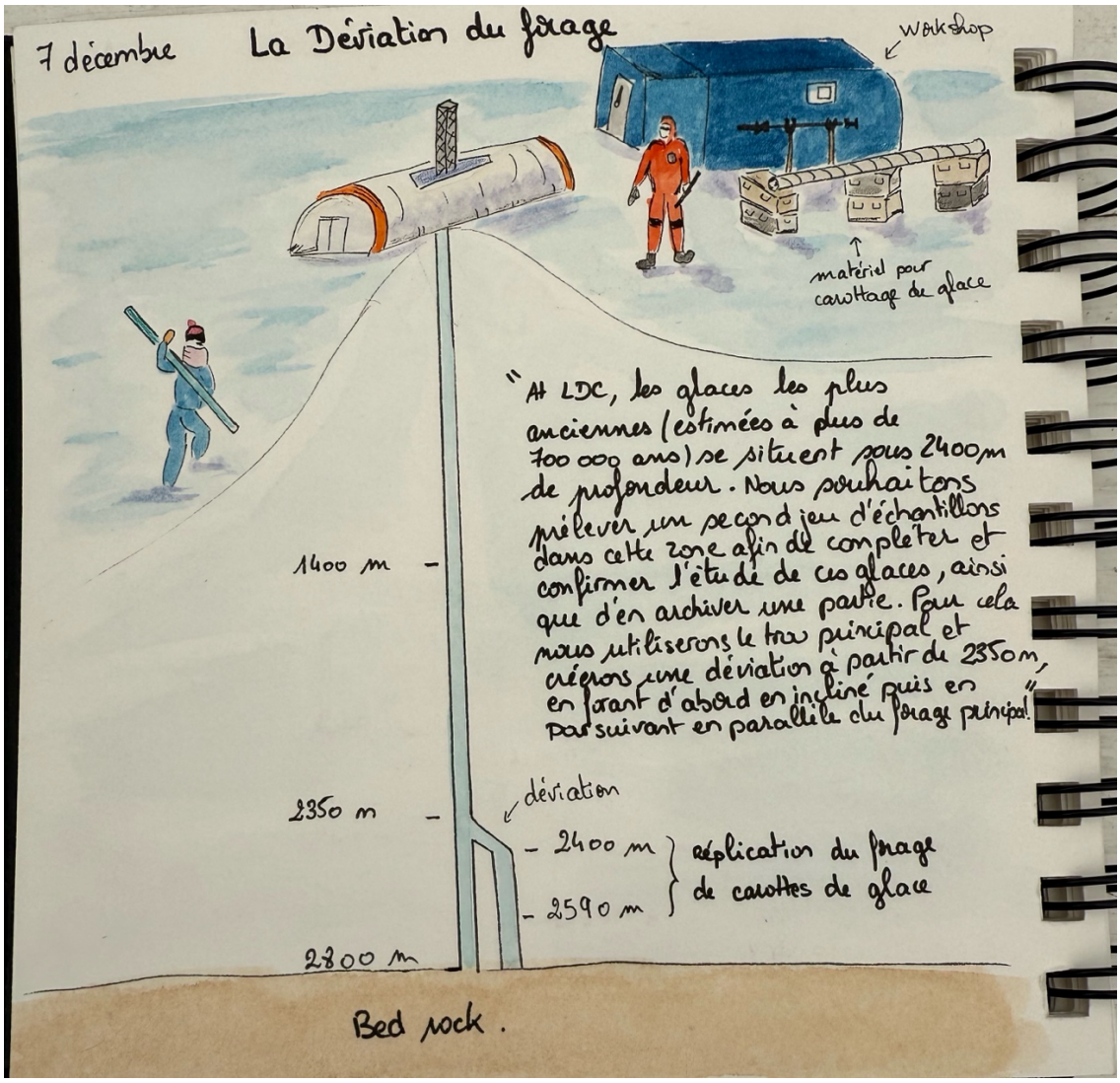
But during the MPT, something fundamental changed. In a shift that scientists are still working to fully understand, the climate cycles lengthened dramatically, becoming more intense, and settling into the roughly 100,000-year rhythm that characterizes the last 700,000 years. The deep ice from Little Dome C is expected to capture pristine air bubbles, water isotopes and other chemical signatures from this time, providing an unprecedented view into the atmospheric greenhouse gas concentrations and temperatures that drove this major transition. Understanding what caused this shift is absolutely essential for improving our models of future climate change.

The deviation procedure itself – designed by our Danish colleagues but never tried before in a deep hole – is a high-stakes undertaking, as one of the critical challenges will be successfully maintaining the precise orientation of the drill and borehole as the trajectory is adjusted to target the new ice layer. This is precision work at a depth of nearly two and a half kilometers!

While the drill engineers tackle this deep-ice maneuver, the science support team on the surface is ensuring that all systems are optimized and ready for the moment the first new cores emerge. Today, the

logging table—the 20-meter-long bench where the newly retrieved ice is first processed—was realigned using a laser level. This meticulous work is vital to maintain the integrity of the fragile ice cores.

Once a core section is brought up, the clock starts! On the logging table, the ice cores are **cleaned, measured, cataloged, photographed**, and then **sectioned into one-meter lengths, always keeping an eye to the orintation of the core! If we incidentally flip an ice core we reverse the time direction !!**. From the logging table, ice core sections are moved to the scientific trench (always keeping the orientation!) for initial, non-destructive analyses, such as **DEP (see previous sitres)**, and then for the crucial **longitudinal cutting** that splits the core in half. This half-and-half division is key to the project's logistics and legacy: one half of the core section will be immediately prepared for **shipment to Europe** for further detailed analysis, while the other half will be carefully preserved and stored in the famous **Balloon Cave** at Concordia Station, serving as the **archival vault** for future research.



The deviation of the drilling in a nutshell, as perfectly illustrated by Marion, our nurse. We all try to keep Marion as inactive as possible concerning medical issues, and she returns the favor with beautiful watercolors about camp life, drawn in her now-famous spiral notebook. Illustration M. Lahuec

The storage cave near Concordia Station. Behind the small door on the left is the entrance to a snow cave, approximately 40 meters long, where the Beyond EPICA samples are stored for the future. On the right is the view from the bottom of the ramp. Photo by C. Barbante.

CB, GBF, BS & MH; LDC, 06.12.2025