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The Beyond EPICA –oldest ice core drilling operation

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Beyond EPICA –oldest ice core drilling group (presented by Frank Wilhelms)

O. Alemany, S. Banfi, C. Barbante, G. Bianchi Fasani, G. Boeckmann, B. Broy, D. Dahl-Jensen, R. Duphil, H. Fischer, S. Bo Hansen, M. Hüther, I. Koldtoft, R. Mulvaney, A. Patoir, L. Piard, T. Popp, P. Possenti, K. Poupon, J. Rix, B. Seth, J. Vaele, C. Venier, C. Wesche, J. Westhoff, F. Wilhelms

Beyond EPICA –oldest ice core is a joint response of twelve partners from ten European nations towards the IPICS oldest ice challenge with further support by a Horizon 2020 European Commission Research and Innovation Action. An extensive pre-site survey, suggesting an age of about one-and-a-half million years and a resolution of at least about ten thousand years per metre, identified a drill site at Little Dome C (LDC, 75.29917°S, 122.44516°E) 40 km south-west of the French-Italian Concordia station in accord with the objectives set out for an oldest ice drilling site.

During the 2019/20 field season we started the construction of a drilling camp at LDC and built a drill shelter and housing tents. During the 2021/22 field season the infrastructure was complemented by the installation of the drill area, a 120 m casing into the pilot hole and the core storage area.

For the up-coming seasons, we plan to drill to bedrock (2800 m) and to replicate the lowermost section, which is older than 700 kyr. The harsh environmental conditions due to high altitude and low night time temperatures limit the daily operable time and the length of the field season.

Besides the established EGRIP drill system, we will deploy newly built components with up to 4.5 m core barrel length, overworked details and new electronics, with up to about triple the power by rising the electric tension to 750 V in a shielded cable and communication over the cable with wireline modems at about 30 kBaud data rate. For the up to 13.8 m long drill, we extended the tower and opened the roof of the drill tent. The new components are compatible with the existing EGRIP equipment, which incorporates optimized redundancy and increases the reliability.

We will report on the installation of the drilling camp at LDC and the planned implementation of the drilling operation to bedrock during the upcoming field seasons.

Primary authors: Mr PATOIR, Armand (French Polar Institute Paul-Émile Victor, Plouzané, France); Mrs SETH, Barbara (University of Bern); Mr BROY, Benjamin (Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung, Bremerhaven Germany); Mr BARBANTE, Carlo (Institute of Polar Sciences –CNR, Venice-Mestre, Italy; Ca'Foscari University of Venice, Venice, Italy); Mrs VENIER, Chiara (Institute of Polar Sciences –CNR, Venice-Mestre, Italy); Mrs WESCHE, Christine (Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung, Bremerhaven Germany); Mrs DAHL-JENSEN, Dorthe (Physics of Ice, Climate and Earth, Niels Bohr Institute, University of Copenhagen, Copenhagen, Denmark); WILHELMS, Frank (Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung; Geoscience Center –University of Göttingen, Göttingen, Germany); Mr BIANCHI FASANI, Gianluca (Centro di Ricerca Casaccia, ENEA Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile, Rome, Italy); Mr BOECKMANN, Grant (Physics of Ice, Climate and Earth, Niels Bohr Institute, University of Copenhagen, Copenhagen, Denmark); FISCHER, Hubertus (University of Bern); KOLDTOFT, Iben (Ice and Climate, NBI, UCPH); WESTHOFF, Julien (University of Copenhagen); Mr RIX, Julius (British Antarctic Survey); Mr POUPON, Kilian (French Polar Institute Paul-Émile Victor, Plouzané, France); Mr PIARD, Luc (Université Grenoble Alpes, CNRS, IRD, IGE, Grenoble, France); Mr HÜTHER, Matthias (Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung, Bremerhaven)

Germany); Mr ALEMANY, Olivier (Université Grenoble Alpes, CNRS, IRD, IGE, Grenoble, France); Mr POSSENTI, Philippe (Université Grenoble Alpes, CNRS, IRD, IGE, Grenoble, France); MULVANEY, Robert (British Antarctic Survey); Mr VAELE, Robert (British Antarctic Survey, Cambridge, UK); Mr DUPHIL, Romain (Université Grenoble Alpes, CNRS, IRD, IGE, Grenoble, France); Mr BANFI, Stefano (Università di Milano —Bicocca, Milano, Italy; INFN Milano-Bicocca, Milano, Italy); Mr HANSEN, Steffen Bo (Physics of Ice, Climate and Earth, Niels Bohr Institute, University of Copenhagen, Copenhagen, Denmark); Mr POPP, Trevor (Physics of Ice, Climate and Earth, Niels Bohr Institute, University of Copenhagen, Copenhagen, Denmark)

Presenter: WILHELMS, Frank (Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung; Geoscience Center –University of Göttingen, Göttingen, Germany)

Track Classification: Advances in drilling engineering and borehole observations