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System architecture of the upcoming BE-OI ice-coring-drill drive-chain

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The upcoming deep ice-coring project Beyond EPICA Oldest Ice (BE-OI) in Antarctica requires a robust and capable electrical drive-chain. The design goal was to increase the useable mechanical power of the drill motor as well as the data transfer between the surface and the downhole section by keeping the system as compatible as possible to existing drill systems.

The system consists of a brushless-direct-drive electrical motor with controller, a high voltage DC power supply and modem pair, which operates over a 4 km long steel armoured coaxial cable. Component tests were conducted by shallow coring of about 100 m at Neumayer 3 (2016) and 80 m EastGRIP (2017). Additionally a full drive-chain test deployment was performed in the EDML borehole up to 2600m depth in December 2018.

Author: Mr HÜTHER, Matthias (Alfred Wegener Institute for Polar and Marine Research)

Co-authors: WILHELMS, Frank (Alfred-Wegener-Institute); TELL, Jan; Mr BROY, Benjamin (Alfred-Wegener-Institut, Helmholtz-Zentrum für Polar- und Meeresforschung); SCHIWEK, Svenja (Alfred Wegener Institute); LEHMANN, Josef (Cipunet®)

Presenters: Mr HÜTHER, Matthias (Alfred Wegener Institute for Polar and Marine Research); LEHMANN, Josef (Cipunet®)

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