

Sedimentary sequences below the Ekström Ice Shelf, Dronning Maud Land, Antarctica: A pre-site survey for deep drilling (Sub-EIS-Obs)

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Content

During the last season and ongoing planning, pre-site surveys are operated at the Ekströmisen, Dronning Maud Land, close to the Neumayer-Station III, with the primary target to build a stratigraphic age framework of the under-shelf-ice-sediments. These sediments are overlying the Explora Wedge [1], [2], a syn- or post-rift volcanic deposit, and dipping north- to north-eastward. Expected ages could range from Late Mesozoic to Quaternary. From new vibroseismic profiles we will select sites for short core seafloor sampling of the oldest and of the youngest sediment sequences to confine their age time span.

After that, we could select one or several sites for potential deep drillings (several hundred-meter-deep) with the support of international partner, if we could rise interest. The deep drillings should recover the sediments overlying the Explora Escarpment, and should discover the nature of the Explora Wedge as well. We expect that the overlying sediment sequences could reveal the history of polar amplification and climate changes in this part of Antarctica, the build-up of the East Antarctic Ice Sheet during past warmer climates and its Cenozoic and future dynamic and variability.

The plan for seasons 2017/18 and 2018/19 are the testing of different sea floor sampling techniques through Hot Water Drill (HWD) holes. To select the drill sites for this shallow coring additional high resolution seismic will be acquired as well.

Having holes through the shelf ice and sampling the sea floor will provide the unique opportunity for further piggy bag experiments consisting of multi-disciplinary nature. Experiments and measuring setup for oceanography, sea and shelf ice physics, geophysics, geology, hydrography, and biogeochemistry could be planned to characterize the sea-ice and shelf ice system, underlying water column, and the sediments. Video characterization underneath the shelf ice and at the seafloor, sediment trap deployment, seafloor mapping with an AUV (Leng, DFKI, ROBEX) could lead as well to innovative new interdisciplinary observations and discoveries of the sub-ice environment and ecosystem [3].

References:

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[2] Kristoffersen, Y., Hofstede, C., Diez, A., Blenkner, R., Lambrecht, A., Mayer, C. & Eisen, O., (2014), Reassembling Gondwana: A new high quality constraint from vibroseis exploration of the sub-ice shelf geology of the East Antarctic continental margin, *J. Geophys. Res. Solid Earth*, 9171-9182, 119

[3] Kuhn, G. & Gaedicke, C., (2015), A plan for interdisciplinary process-studies and geoscientific observations beneath the Ekström Ice Shelf (Sub-EIS-Obs), *Polarforschung*, 99-102, 84