

Coastal Antarctic ice cores record regional climate changes - examples from Dronning Maud Land

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Ice cores from the Antarctic ice sheet are fundamental archives to study past changes and predict future changes in the Earth's climate system and bio-geochemical cycles. However, there are many gaps in our knowledge that still need to be filled, especially to meet the challenge of understanding how the Earth's biogeochemical and climate systems interact with each other, and how they will respond to ongoing human-induced changes. Fundamental knowledge on for example the variability of temperature and precipitation in the recent past are lacking due to the limitations in spatial and temporal coverage of instrumental records. During the past decades Norwegian scientists in collaboration with international colleagues have collected and analyzed shallow ice cores from coastal Dronning Maud Land (DML) as part of projects focusing on spatial variability of surface mass balance (SMB) on decadal time-scales. The longest ice core record from the DML coastal area is one 100-m long ice core drilled in the eastern part of Fimbulisen (Fig. 1), western DML, as a part of the EPICA pre-site surveying in 2000 suggesting that SMB and $\delta^{18}\text{O}$ variability are not in phase during the past 250 years. While there is a significant increase in $\delta^{18}\text{O}$ at this coastal site since about 1920, SMB has decreased (Divine et al., 2009; Schlosser et al., 2014). This implies that factors other than temperature are important and thus remain to be investigated further. The results from this unique long ice core will be compared to records of stable isotopes and major ions from recently drilled shallow ice cores, taken on three ice rises (Fig. 1) in the vicinity of Fimbulisen covering the last few decades. Our hope is that these data can provide essential information on regional changes in key climate variables such as precipitation, temperature and sea ice cover, as well as changes in climate forcing and biogeochemical cycles. Quantitative studies will be conducted to evaluate the relationships between the resulting climate proxy records and the relevant climate and climate forcing variables.

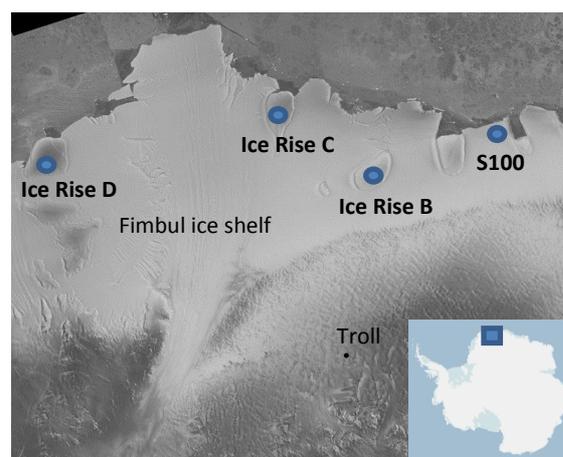


Figure 1. Map of Fimbulisen in Dronning Maud Land with the ice core locations. The underlying image is Radarsat 1997.

References

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