COASTAL ANTARCTIC LAKES: IMPORTANT ARCHIVES TO INFER FLUCTUATIONS IN THE MOISTURE BALANCE, UV RADIATION, SEA-ICE EXTENT AND ICE SHEET THICKNESS

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With a few exceptions, lakes in continental Antarctica are confined to the sparse ice-free coastal oases. Based on their evolutionary history, two types of water bodies can be recognized, namely isolation lakes and proglacial lakes. Isolation lakes emerge from the sea after isostatic uplift due to melting of the continental ice sheet. Proglacial lakes are formed after melting of the ice sheet, filling the emerged basins with dilute and ultra-oligotrophic melting water. Sediment cores from both types of lakes constitute important archives to infer changes in:

The moisture balance: diatom based weighted averaging (WA) transfer functions for salinity and water depth applied to sediment cores from both isolation and proglacial lakes help to reconstruct changes in the moisture balance in the Larsemann Hills during more than 40,000 years.

UV radiation: shallow-water cyanobacteria produce scytonemin, a natural sunscreen that protects the organism against UV-radiation. Long-term changes in scytonemin abundance in Lake Reid were analyzed using HPLC, and combined with the WA diatom-based depth reconstruction, enabled us to reconstruct fluctuations in UV radiation during the last 40,000 years.

Sea-ice extent: diatom and pigment data in marine sediments of isolation lakes reveal that in the Mid-Holocene coastal Antarctic waters were more productive today, which is in agreement with a warmer period (Hypsithermal) inferred from ice cores and marine sediment cores from the continental shelf in the Southern Ocean.

Ice sheet thickness: by dating the transitions between marine and lacustrine sediments a relative sea-level curve can be constructed. This sea-level curve contains information on the deglaciation history, the ice sheet thickness in the region and its contribution to global sea-level rise after the Last Glacial Maximum (LGM).