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Reconstructing coastal environmental condition in the eastern Norwegian Sea by means of Arctica islandica sclerochronological records

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Paleo archives are fundament in improving our knowledge of the natural climate variability. Established marine proxy records for the ocean, especially for high latitudes, are both sparsely distributed and are poorly resolved in time. The identification and development of new archives and proxies for studying key ocean processes at annual to sub-annual resolution that can extend the marine instrumental record is therefore a clear priority for marine climate science. The bivalve species Arctica islandica is a unique paleoclimatic archive with an exceptional longevity combined with high temporal resolution, due to accretion of annual growth increments. The aim of this study is to use sclerochronological records of A. islandica to extend instrumental hydrographic records and increase our understanding of a variability of a Norwegian Coastal Current (NCC). The NCC transports warm, low-salinity water northwards, which eventually plays role for the Arctic halocline. Moreover, previous investigations showed the connection of properties and variability of the NCC with catches of commercially valuable fishes. The knowledge of the variability of the NCC is also essential for possible future prediction climate conditions and fish stock variability in the region.
In this study we use shells of Arctica islandica collected off the coast of Eggum (Lofoten, Norway). The material was obtained from the depth 5-10 m by dredging along the seabed and by means of scuba divers. We examine the growth patterns of living and subfossil shells. Ongoing work mainly focuses on the construction of a composite growth chronology based on increment-width time series. The results we will compare with existing time series of the environment and climatic parameters to determine the controlling factors and test the applicability of growth chronology in a climate reconstruction. Furthermore, we will perform geochemical analyses of the stable isotope composition (δ18O and δ13C) in shell carbonate to identify seasonal signals and reconstruct the surface water temperature on a sub-annual time-scale.