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# Climate variability in the subarctic-north atlantic area from the last two millenia to present from hight resolution arctic records: geographical pattern and forcing factors.

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The Arctic is a key region for its sensitivity to climate change. The North Atlantic area is rich in paleoclimate records and as such is particularly well studied. This project aims to define higher resolution of climate variability, from millennial to decadal scale, of the Subarctic-North Atlantic area from temperature and precipitation proxies. The study is based on ARCTIC2K database as made available by the international consortium PAGES, ARCSS group database, and also makes use of additional records found in the literature. Climate variations are studied from the last two millennia to present from annual records (ice core and lake sediment) which allow identifying large-scale temporal variability (millennia and multi-centennial) but also high-resolution variations such as decadal time-scales. The use of different time series analysis and processing methods (wavelet transform, cross wavelet multi-resolution analysis...) allows more accurate study of climate variability than more usual trend-assessment-based or basic smoothing techniques. Thanks to such approaches different modes of variability present in paleoclimate records from continental and glacial series can be characterized, including their nonlinear characteristics. Signal processing-derived methods are used for describing variability of records with periodic or aperiodic components, noise, progressive or abrupt changes (progressive transitions, singularities and breaks).

The main objective of this study is the determination of variability and changes present in paleoclimate records and the identification of the natural causes of climate variability: oceanic/atmospheric forcing (e.g. subpolar gyre, etc.) and external solar forcing. The expression of the anthropogenic influence on the natural climate variability in the North Atlantic-Arctic area is also the subject of special attention. Result comparison for all records allows identification of possible common frequencies between the various records, highlight the major differences between them, and definition of a global frequency pattern of climate variability in the Arctic-North Atlantic area from the last two millennia to present. A focus on geographical pattern of forcing is also made to propose new constraints on climate modeling.