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Norwegian fjord sediments reveal NAO related winter temperature and precipitation changes of the past 2800 years

Johan Faust (1), Karl Fabian (1), Jacques Giraudeau (3), Jochen Knies (1,2)

(1) Geological Survey of Norway, 7491 Trondheim, Norway, (2) CAGE – Centre for Arctic Gas Hydrate, Environment and Climate, Department of Geology, UiT the Arctic University of Norway, 9037 Tromsø, Norway, (3) Universite de Bordeaux UMR CNRS 5805 EPOC, 33615 Pessac cedex , France

The North Atlantic Oscillation (NAO) is the leading mode of atmospheric circulation variability in the North Atlantic region. Associated shifts of storm tracks, precipitation and temperature patterns affect energy supply and demand, fisheries and agricultural, as well as marine and terrestrial ecological dynamics. Long-term NAO reconstructions are crucial to better understand NAO variability in its response to climate forcing factors, and assess predictability and possible shifts associated with ongoing climate change.
Fjord deposits have a great potential for providing high-resolution sedimentary records that reflect local terrestrial and marine processes and, therefore, offer unique opportunities for the investigation of sedimentological and geochemical climatically induced processes. A recent study of instrumental time series revealed NAO as main factor for a strong relation between winter temperature, precipitation and river discharge in central Norway over the past 50 years. Here we use the gained knowledge to establish the first high resolution NAO proxy record from marine sediments. By comparing geochemical measurements from a short sediment core with instrumental data we show that marine primary productivity proxies are sensitive to NAO changes. Conditioned on a stationary relation between our climate proxy and the NAO we establish the first high resolution NAO proxy record (NAO-TFJ) from marine sediments covering the past 2,800 years. The NAO-TFJ shows distinct co-variability with climate changes over Greenland, solar activity and Northern Hemisphere glacier dynamics as well as climatically associated paleo-demographic trends.