



Paleoenvironmental changes during the past 2000 years, evidence from Kongsfjorden, Svalbard

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Over the past decades the Arctic has received more attention due to the rapid warming that is more pronounced there than elsewhere on the globe. Instrumental time series are too short to capture the range of natural variability in the Arctic and we therefore have to rely on proxy records to describe the whole range of natural variability. In this context the late-Holocene climate variations are particularly important because natural forcings and the Earth's boundary conditions have been approximately similar to those operating today. Documenting past natural climate variability has therefore a vital role to play in understanding the present climate and predicting future change.

Here we present a high resolution marine record from Kongsfjorden covering the last c. 2000 years. The core site is located in Kongsfjorden situated on the western coast of Spitsbergen (Svalbard). We focus on this region because it lies along the path of inflow of warmer and saline subsurface waters via the West Spitsbergen Current which is one of the important heat sources for the Arctic Ocean. This current is a major regulator of environmental changes and for example sea-ice distribution in the west Svalbard area. Therefore quantification of its spatially and temporally variations through time are essential for understanding past environmental and climate changes. We have investigated faunal variations in benthic foraminifera from the upper 60 cm (covering the last two millennia) of a gravity core (510 cm total length) sampled with one-cm density. Chronology of the gravity core is established by AMS radiocarbon dating. The core was in addition investigated for grain size analysis and x-ray. The sediment analysis and x-ray show the upper part of the core contains large amounts of IRD from 7 cm – 25 cm corresponding to an age of 150-700 cal yr. It indicates that abundant icebergs melted over the core site depositing IRD. Further down core (1000-1800 cal yr) there is a significant dominance of fine grained sediment and decrease in ice rafting indicating less influence from glaciers. The foraminiferal species composition show decreasing content of agglutinated foraminifera down core caused by their low preservation potential. For this core site it confirms the importance of calcareous foraminifera as a fossil record tool. The two dominant species in the core are *Elphidium excavatum* and *Nonionellina labradorica*. During the last 2000 years the percentage of *E. excavatum* shows a general tendency to decrease while *N. labradorica* increases toward present. *Elphidium excavatum* is typical for arctic glaciomarine environments close to glaciers and ice caps, indicating harsh conditions (cold bottom waters temperatures, lower salinity) and probably extensive ice cover. *Nonionellina labradorica* indicates the vicinity of oceanographic fronts and high productivity. Another species *Islandiella* spp., often associated with increased productivity and presence of the sea ice edge, shows significant increase in percentage from 1000 to 800 cal yr BP. From 600 to 400 cal yr BP *Bucella* spp. start to decline suggesting increased sea ice cover and diminished influence of the Coastal Current on the inner shelf of Svalbard.