



Linking the Holocene glacial and oceanographic variability in northern Spitsbergen

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The Svalbard area can be considered as a key region for Arctic heat transfer. The archipelago is located where relatively warm Atlantic Water is reaching further north than at any other Arctic location at similar latitudes. The Holocene variability of Atlantic Water advection is well documented for the western coasts of Spitsbergen whereas records from northern Svalbard are still rare. Here we present a sedimentary record from Woodfjorden in northern Spitsbergen where the influence of Atlantic Water is fading out and glaciers are responding much more sensitive to oceanographic variations than at the western coasts of Spitsbergen. We analyzed the foraminiferal fauna and the distribution of Ice Rafted Debris (IRD) to trace the interplay between the oceanographic and glacial variability, respectively.

The appearance of *Nonionellina labradorica*, a species which is adapted to warm Atlantic Water, shows that the advection of Atlantic-derived water correlates positively with summer insolation. The amount of IRD – increasing during the Allerød interstadial – diminished subsequently with intensifying inflow of Atlantic Water. During the Mid-Holocene, the strong influence of these relative warm water masses concurs with very low IRD values, possibly reflecting the retreat of tidewater glaciers from the coast to a further inland position disconnecting glacier dynamics from the respective marine archives at that time. With declining inflow of Atlantic Water during the late Holocene sea ice expanded, indicated by increased percentages of *Islandiella norcrossi*. The appearance of this species shows a similar trend as reported for sea-ice biomarkers in the eastern Fram Strait. Thus, variations of Atlantic Water inflow directly affected glacial activity as well as sea-ice coverage. Combining marine and terrestrial proxies enabled us to reconstruct regional (sea-ice) as well as local (glacial expansion) changes over time.