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Pervasive millennial-scale changes in inflow of the main (eastern) and secondary (western) branches of North Atlantic Drift waters to the Nordic Seas during the Holocene

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Terrestrial and ice-core data from circa-North Atlantic locations point to a pervasive millennial-scale variability of Holocene climate in relation with changes in the mode of atmospheric and oceanic circulation. Heat transport through the surface North Atlantic Drift (NAD) component of the meridional overturning circulation is thought to be largely involved in this recurrent climate anomalies and their transmission to distant areas, yet marine proxies from sediment cores lack firm evidences for such changes in transport of warm and saline waters to the Arctic Ocean.

Abundance records of selected coccolith species from two high resolution marine cores retrieved off Norway and northern Iceland are indicative of rapid high amplitude changes in the flow of the main (Norwegian Current - NC) and secondary (North Iceland Irminger Current – NIIC) branches of the NAD to the Nordic Seas. The paleoceanographical significance of the recorded changes in concentrations of selected taxa is discussed in view of available information on their ecology and biogeographical distribution in the North Atlantic. Our Norwegian Sea record strikingly matches win-

ter precipitation records over Scandinavia and sea-salt fluxes over Greenland, hereby suggesting a common atmospheric forcing: the location and intensity of the westerlies and the associated changes in mid- to high latitude pressure gradients. High amplitude, millennial scale changes in transport volume of Atlantic waters across the Denmark Strait and the Iceland-Scotland Channel display an apparent opposite pattern. This suggests that the intensity of the arctic and polar water flow carried by the East Greenland Current on the western side of the North Atlantic (which counteracts the Irminger-Atlantic flow to northern Iceland) was positively correlated to the input of Atlantic water in the eastern Nordic Seas throughout the last 10 000 years.

Recent GCM simulation of the present circulation in the polar and subpolar North Atlantic additionally indicates that this opposite pattern of Atlantic water flow to the Nordic Seas is primarily driven by a NAO-like atmospheric circulation scheme.