



The Holocene Turnover - A global climatic shift at ~ 4 Ka

Ø. Paasche (1) and J. Bakke (2)

(1) Bjerknes Centre for Climate Research, Allégaten 55, 5007 Bergen, Norway, (2) Department of Geography, University of Bergen, Fosswinkelsgate 6, 5020 Bergen, Norway

During the Holocene there was arguably only one global climate shift that involved significant reorganizations of ocean and atmosphere circulation patterns as well as various terrestrial systems. Based on a recent compilation of glacier records we posit that this significant climatic transition occurred ~ 4000 cal yrs BP and we refer to it as 'the Holocene Turnover' (Paasche et al., 2004). As opposed to the discussions concerning timing, magnitude and the spatial extent of climatic episodes such as 'The Little Ice Age' (LIA) and the 'Medieval Warm Period' (MWP) (e.g. Bradley et al., 2003), we demonstrate in this study that the Holocene Turnover seems to represent a dynamical adjustment that subsequently resulted in the establishment of a new climate regime or mode rather than being a multi-decadal or centennial deviation from mean conditions.

Glaciers all over Scandinavia, including Spitsbergen, reformed and advanced shortly after 5-4 ka and without exception they still exist today. A number of glacier records from South America corroborate the very same pattern, underlying the global imprint of this transition. Moreover, a number of observations from the North Atlantic suggest that the overall trend indicates that the climate not only became cooler at that time, but also that the winter precipitation increased, at least over Western Scandinavia. Ice core data from Greenland are among the many land records that demonstrate such cooling (Dahl-Jensen et al., 1998). Several high-resolution marine records from the Nordic Seas reveal cooler surface waters and alternating currents (Risebrobakken et al., 2004). The onset of the Holocene Turnover coincides with reduced temperature difference between the eastern and western part of the North Sea (Andersen et al., 2004).

Here we seek to synthesise available data, with special emphasis on glacier records, in order to better document and understand what the forcing mechanisms for the Holocene Turnover might have been.