Geophysical Research Abstracts, Vol. 8, 02219, 2006
SRef-ID:

Antiphase Nordic Sea overflows in the Holocene North Atlantic

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We compare two Holocene records of deep flow vigour in the North Atlantic, using the mean grain size of the sortable silt fraction (SS) as a proxy for near-bottom flow speed. The first site, NEAP 15K/16B located at 2850 m on Gardar Drift (Bianchi and McCave, 1999, *Nature* 397, 515-517) is influenced by Iceland-Scotland Overflow Water (ISOW); the second site, MD95-2024 at 3539 m from the Labrador Sea (Orphan Knoll), is presently affected by Denmark Strait Overflow Water (DSOW) comprising the lower stratum of the Western Boundary Undercurrent. The records have comparable average sample resolutions (62 years at Orphan Knoll and 83 years at Gardar Drift) and spectral analyses reveal similar pacings in the millennial band of $\sim$1.5 ka. Further examination of the two records indicates clearly opposing deep water flow trends at centennial to millennial time-scales. At times of high flow speed at Gardar Drift, the Orphan Knoll site is characterized by weaker flow speed, and vice versa. The opposing trends at the two sites may be explained by variations in either the flux or/and the density structure of the lower water column. The latter (density variations due to lower temperature and / or more unlikely, salinity) is unlikely, since bottom water temperatures remained fairly uniform during the Holocene, suggesting a persistent dominance of DSOW at Orphan Knoll. The observed opposing deep water flow trends are therefore best explained by variations in fluxes of DSOW and ISOW, due to variations in control of the overflow. This flux explanation is supported by modelling work of Biastoch et al. (2003) suggesting a cause in greater wind stress driving stronger DSOW overflow.