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Late Holocene Hydrographic variability in the Antarctic Circumpolar Current

Juanita Sekkingstad (1), Ulysses Ninnemann (1,2), Helga Kleiven (1,2)

(1) Department of Earth Science, University of Bergen, Allegaten 41, 5007 Bergen, Norway , (2) Bjerknes Centre for Climate Research, Allegaten 55, 5007 Bergen, Norway

The Southern Ocean, and in particular the Antarctic Circumpolar Current (ACC), has warmed more rapidly than the global ocean over recent decades suggesting that this region may be especially sensitive to climate perturbations. Numerical models suggest such changes, if continued, could eventually affect a wide range of ocean impacts, ranging from changes in ACC transports and inter-ocean exchanges to altered global overturning circulation. Given the brevity of the observational records, extended (proxy) records of low frequency climate and ACC variability are required in order to assess climate-ocean coupling on centennial and longer timescales and to understand the scale and implications of recent changes relative natural variability.

Here we reconstruct surface and deep ocean physical property variability during the late-Holocene using oxygen isotopes in planktonic (*N. pachyderma* s. and *G. inflata*) and benthic (*U.peregrina and C.wuellerstorfi*) foraminifera taken from a sediment core recovered from the Scotia Sea. The core site GS08-151-01MC (53.4˚S, 54.7˚W, 3042m), located near the modern position of the Subantarctic front (SAF) just east of the Drake Passage, provides a sub-centennially sampled monitor of SAF variability (properties and position) during the late Holocene. Our *N. pachyderma* (s.) δ^{18}O record documents persistent centennial scale variability throughout the past 4.6 kyr. The scale of these changes (0.2‰ suggests that centennial-scale natural variability in temperature (or salinity) was $\sim$1˚C (0.65 PSU). Notably, our results document a particularly strong and persistent cold (high salinity) event approximately coeval with the Medieval Warm Period. This anomaly appears similar to that found at other Southern Ocean sites strongly influenced by atmospheric systems. We discuss how the sense and timing of these changes is consistent with various ocean-atmospheric teleconnection patterns found in numerical models.