



Internal ocean variability responsible for the Medieval Warm Period – Little Ice Age transition ?

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A number of experiments with ocean circulation models and evidence from proxy data suggests that switches in North Atlantic meridional overturning circulation (MOC) are related to global ocean-wide changes in heat transport and temperature distribution. Areas of contrasting sea surface temperature (SST) anomalies in close vicinity of each other clearly indicate that atmospheric heat transport is not the only controlling factor determining ocean changes.

In our study we present results from an ocean circulation model experiment and paleoceanographic data from the North Atlantic focusing on the question which mechanism may have been responsible for triggering the transition from the Medieval Warm Period (MWP) to the Little Ice Age (LIA). Our proxy data include information on surface water circulation changes at low-latitudes (NE Caribbean) and in subpolar gyre areas of the East- and West Greenland Current. Moreover, additional information from the Northeastern Caribbean is provided for the Antarctic Intermediate Water depth stratum. All our records demonstrate widespread changes in the multi-centennial mode of dominating upper ocean circulation and salinity anomaly patterns starting at about AD 1200, i.e. prior to the Wolf (AD 1290-1340) and Spörer (AD 1420-1500) solar minimum. These changes virtually coincide with a recently reported decrease in ENSO activity and southward migration of zonal systems. Analysis of a 1500 year long control run with the MPIOM1 ocean model forced with random atmospheric forcing shows that internally generated century-long anomalies bears resemblance to circulation changes from the paleoceanographic evidence. We thus suggest that the

MWP-LIA transition was most likely forced by an internal ocean switch from one MOC mode to another.