Geophysical Research Abstracts, Vol. 8, 02937, 2006
SRef-ID: 1607-7962/gra/EGU06-A-02937

Detecting potential changes in the meridional overturning circulation at 26N in the Atlantic

J. Baehr (1), K. Keller (2), J. Marotzke (1)

(1) Max Planck Institute for Meteorology, Hamburg, Germany; johanna.baehr@dkrz.de, (2) Department of Geosciences, The Pennsylvania State University

We 'deploy' an oceanic monitoring array into a numerical model (ECHAM5/ MPI-OM), and test the array's ability to detect changes in the North Atlantic meridional overturning circulation (MOC). The observing array simulates the measurements of density and wind stress. The detection approach is based on the assumption that the natural variability of the MOC is known from an independent source, the control run. Our detection method accounts for the effects of observation errors, infrequent observations, and autocorrelated internal variability. With an assumed observation error of 1 Sv, continuous observation for approximately 60 years yields detection with 95 percent reliability. Higher observation errors and lower observation frequencies result in lower detection frequencies: Observing continuously with an observation error of 3 Sv results in a detection time of about 90 years, and repeated hydrographic transects every 10 years, with an observation error of 6 Sv, result in a detection time of about 100 years. Changes in the meridional heat transport at 26N can be detected with a detection time of about 120 years, assuming an observation error of 0.2 PW, and additionally assuming a hydrographic transect every 5 years. For the detection analysis, we analyze a set of three realizations of a climate change scenario (IPCC A1B), in which - within the considered time-horizon of 200 years - the MOC weakens, but does not collapse. The simulated array mimics the continuous monitoring system deployed in the framework of the UK Rapid Climate Change program.