Geophysical Research Abstracts, Vol. 9, 02791, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-02791

Decadal Near Surface Temperature Variability in the Tropical Pacific in a Global Ocean Model Hierarchy

J. F. Lübbecke, A. Biastoch and C. W. Böning

IfM-Geomar, Leibniz-Institute for Marine Sciences, Kiel, Germany,
(jluebbecke@ifm-geomar.de)

A set of experiments utilising different implementations of the global ORCA-LIM model with horizontal resolutions of 2°, 0.5° and 0.25° is used to investigate tropical and extra-tropical influences on equatorial Pacific SST variability at interannual to decadal time scales. The model experiments use a bulk forcing methodology building on the global forcing data set for 1958 to 2000 developed by Large and Yeager (2004) that is based on a blend of atmospheric reanalysis data and satellite products. While the salient features of the mean (sub)tropical Pacific circulation are captured in all model versions, the simulation of both the structure and transports of the western boundary current regime and the equatorial zonal current system is much improved with the enhanced horizontal resolution.

The study addresses the question of remotely forced contributions to the equatorial temperature variability, i.e., the possible role of low-frequency changes in the transports of the Subtropical Cells (STCs), by focusing on the temperature variability below the mixed layer (instead of SST which has limited prognostic character in ocean models using bulk surface forcing). In a sequence of sensitivity experiments using different combinations of climatological and interannually varying forcing for the surface heat and momentum fluxes, these near surface temperature (NST) variations are shown to be mainly related to wind-driven changes in the circulation. Inspection of the roles of the Equatorial Undercurrent and the Subtropical Cells, and of the role of interior vs. western boundary current changes within the Subtropical Cells, are addressed by additional model runs with interannually varying forcing confined to the equatorial or off-equatorial region; they confirm that the extra-tropical variability has an effect on equatorial NSTs at decadal time scales.