Geophysical Research Abstracts, Vol. 8, 04139, 2006
SRef-ID: 1607-7962/gra/EGU06-A-04139

A global finite element ocean model: Circulation and bottom pressure anomalies in the South Atlantic

C. Böning, R. Timmermann, S. Danilov, J. Schröter and Olaf Boebel
Alfred Wegener Institute for Polar and Marine Research (cboening@awi-bremerhaven.de)

In the framework of a research project related to the GRACE mission that aims at a more accurate determination of the geoid an investigation of bottom pressure anomalies and circulation in the South Atlantic is performed. For this purpose we use bottom pressure data recorded by Pressure Inverted Echo Sounders (PIES), radar altimeter data and gravity data provided by satellite geodesy. The PIES are positioned at crossover points of the satellite tracks and arranged in triangles in a region between 40° S and 60° S and 25° E and 35° W. To estimate the transport variations associated with bottom pressure variability we utilize a three-dimensional finite-element hydrostatic primitive-equation coupled sea-ice/ocean model (FESOM) which has recently been developed at the AWI. The time-stepping is implicit which allows for relatively long time-steps. Linear functions are used for horizontal velocitiy and tracers, and for surface elevation on surface triangles. The 3D finite-element mesh is based on an unstructured 2D surface mesh and a vertical discretization on z-levels using a continuous representation of bottom topography. In order to obtain results that consider mesoscale phenomena the mesh is refined to a 1/4° resolution in the specified area. First experiments have been performed on a global mesh with 2° horizontal resolution. Time-series of bottom pressure data are used to optimize and validate the model against observations. The correlation between bottom pressure (gradient) anomalies and the simulated transport of the Antarctic Circumpolar Current (either total transport or transport of invidual filaments) on daily to decadal time scales is analyzed. Model estimations of mass redistribution associated with ACC transport variability will be used to verify the gravity measurements and thus contribute to improved representation of the geoid.