Geophysical Research Abstracts,
Vol. 11, EGU2009-10129, 2009
EGU General Assembly 2009

Southern Ocean variability derived from GRACE retrievals, model simulations and in-situ measurements

C. Böning, R. Timmermann, A. Macrander, J. Schröter, and O. Boebel

Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany (carmen.boening@awi.de)

The Gravity Recovery and Climate Experiment (GRACE) provides estimates of the Earth's static and time-variant gravity field. Solutions from various processing centres (GFZ, CSR, GRGS, JPL etc.) enable us to determine mass redistributions on the globe. Given that land signals are generally large compared to anomalies over the ocean, an assessment of the latter requires a particularly careful filtering of the data. We utilized the Finite Element Sea-Ice Ocean Model (FESOM) to develop a filtering algorithm which relies on the spatial coherency of ocean bottom pressure (OBP) anomalies. Taking large-scale circulation patterns into account, the new filter yields an improved representation of OBP (i.e. ocean mass) variability in the filtered GRACE data.

In order to investigate the representation of Antarctic Circumpolar Current (ACC) variability in the pattern-filtered GRACE retrievals, an analysis of OBP anomalies in FESOM results and in-situ measurements has been performed. A bottom pressure recorder array in the ACC region south of Africa (36°S-58°S, 1°W-7°E) provides data from 2002-2008. Based on anomalies of OBP gradients between individual instruments, these in-situ measurements give an estimate of the overall transport variability as well as of the movement of ACC fronts and transport redistribution between different sectors of the ACC. The validation of simulated and satellite-derived OBP anomaly gradients against these data yields a measure for the representation of this variability in FESOM and GRACE. Furthermore, model simulations are used to assess the relation between transport variations in individual filaments of the Southern Ocean and total transport variability in this and other sectors of the ACC.