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ASSESSMENT OF THE SOUTHERN OCEAN SOLUTION IN THE ECCO₂ DATA SYNTHESSES

Global ocean circulation models often do not adequately resolve high latitude processes, hence the characteristics and flow of deep and bottom waters often remain unrealistic. We present the assesment of the optimized solution of the ECCO₂ data synthesis with respect to various Southern Ocean metrics as well as sensitivity experiments. The sensitivity studies were not only performed in order to determine the impact on the hydrography of the Southern Ocean, the Antarctic Circumpolar Current (ACC), and the global overturning but also to further improve the model solution. The sensitivity experiments comprise runs with increased salt fluxes and with imposed southern boundary conditions representing the freshwater input from ice shelf-ocean interactions. While the optimized solution serves as a baseline experiment, the first sensitivity experiment simulates the increase of salinity fluxes due to brine rejection during sea ice formation in future climate scenarios with changes in sea ice conditions. The second experiment investigates the impact of freshwater introduced in the southern hemisphere in individual basins on both regional and global scales. Excess evaporation enhances salt fluxes and modifies the hydrography considerably. In turn bottom water production increased, strengthens the ACC and the meridional overturning. Additional freshwater stabilizes the water column and results in a reduction of the ACC transport as well as the meridional overturning.

Poster presentation

Presentation is given by student: No

Session #:036

Date: 03-05-2008

Time: 17:30 - 19:30

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