Using TOPEX/POSEIDON sea level observations to test the sensitivity of an ocean model to wind forcing

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It has been demonstrated that current-generation global ocean general circulation models (OGCM) are able to simulate large-scale sea level variations fairly well. In this study, a GFDL/MOM-based OGCM was used to investigate its sensitivity to different wind forcing. Simulations of global sea level using wind forcing from the ERS-1 Scatterometer and the NMC operational analysis were compared to the observations made by the T/P TOPEX/POSEIDON (**T/P**) radar altimeter for a two year period. The OGCM has a horizontal resolution of 2 degrees in longitude and 1 degree in latitude, and 22 vertical levels. It was spun-up for 10 years using climatological air-sea fluxes before forced by the real-time wind of NMC and ERS-1. A 10-day running mean filter was applied to both simulations for Comparison to the "T/P" data which was sampled at 10-day intervals.

The global RMS difference between the OGCM simulation and the T/P observation is 4.2 cm with the NMC wind, and 3.3 cm with the ERS-1 wind. This implies that the model simulation has improved by 2.6 cm in a global RMS sense with the use of the ERS-1 wind forcing. The improvement is most pronounced in the Southern Ocean, where large-scale barotropic variabilities are primarily driven by wind and the improvement can be as large as 10 cm. Other areas of significant improvement include the western and central North Pacific, the western subtropical South Pacific and South Indian Oceans. The result of the study has demonstrated the sensitivity of the OGCM to the quality of wind forcing, as well as the synergistic use of two space-borne sensors in advancing the study of wind-driven ocean dynamics.