Geophysical Research Abstracts, Vol. 8, 04055, 2006
SRef-ID: 1607-7962/gra/EGU06-A-04055

Limitations on the use of adjoints in eddy resolving ocean general circulation models

F. McLay (1,2) J. Marotzke (2)

(1) University of Southampton, (2) Max Planck Institute for Meteorology

Climate sensitivities in coarse resolution ocean models can be successfully calculated using adjoint models. At higher resolution the presence of chaotic eddies is expected to lead to unrealistically high adjoint sensitivities, but previous studies disagree as to whether this is in fact the case.

Here we use the MIT ocean general circulation model and its adjoint to look at the sensitivity of the time mean heat content of a zonally reentrant channel to the sea surface temperature, zonal wind stress, and vertical diffusivity in eddy resolving and non eddy resolving models. Sensitivities calculated by the adjoint model are compared with integrations of the full non linear forward model with perturbed forcing. At both resolutions the sensitivities calculated by the adjoint model can be used to predict the result of perturbations to the full forcing field to within 20% after 2 years. Although in the high resolution model there are areas of extremely high adjoint sensitivity, that may not be physically realistic, these results show that some useful information is retained in the adjoint model solution even at this time scale.