Geophysical Research Abstracts, Vol. 9, 07479, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-07479


# Is there a too strong model cloud feedback in GCMs?

**J. Karlsson**, G. Svensson, H. Rodhe
Department of Meteorology, Stockholm University, Sweden

The subtropical marine region is subject to large-scale subsidence that damp vertical cloud-growth. The cloud scene of this region is thus dominated by low stratiform and cumulus clouds both having a net cooling effect on climate. In the eastern parts of the sub-tropical oceans, large persistent decks of low marine stratocumulus are found. When the trade-winds advect the clouds equatorward the inversion capped boundary layer deepens and the there is a transition from stratocumulus to - less covering - trade-wind cumulus.

We have investigated how current global climate models manage to simulate marine low level clouds, their occurrence and radiative properties, and how this can be related to TOA radiative fluxes. In an effort to isolate the effect of low cloudiness in the models, we have constrained our analysis to the marine parts of the subtropics. By this we avoid the deep convection of the intertropical convergence zone (ITCZ) and the storm-tracks of the extratropics.

Late 20th century climate in 9 coupled ocean-atmosphere GCMs, all contributing with output for the IPCC Assesment Report (AR4), has been analysed and compared to observations of cloudiness (ISCCP D2) and top of the atmosphere radiation fluxes (ERBE).

The analysis shows that all models underestimate the fraction of low cloudiness compared to ISCCP data in the subtropical region. Further, all models have an excessive cloud radiative cooling compared to ERBE data, mainly due to too strong cloud reflectivity in the models.

This combination of results suggests that models, for a given change in low level clouds, have a too strong radiative response, i.e. feedbacks in models associated with low cloudiness might be overestimated, regardless of sign.