Geophysical Research Abstracts
Vol. 12, EGU2010-8259, 2010
EGU General Assembly 2010

Single and Double ITCZ and the Influence of Eddies on the Zonal Mean Tropical Circulation

Eileen Dahms (1), Hartmut Borth (2), Frank Lunkeit (2), and Klaus Fraedrich (2)

(1) KlimaCampus, University of Hamburg, Germany (eileen.dahms@zmaw.de), (2) KlimaCampus, University of Hamburg, Germany

A spectral aqua-planet atmospheric general circulation model (AGCM) is forced with a series of zonally constant sea surface temperature (SST) distributions which are symmetric about the equator. For every oceanic forcing the AGCM is run twice, a first time keeping all spectral modes and a second time only the zonally symmetric ones. Parameterizations and boundary conditions remain the same in all cases thus allowing a consistent comparison of 3-D and 2-D flows.
The comparative study shows that the structure of the tropical mean state of the full model is basically captured by the zonally symmetric model and that eddy fields merely modify this structure. This suggests that the structure of the tropical mean state is mainly determined by the shape of the effective SST forcing.
In addition the strength of the Hadley circulation is not modified substantially for well pronounced single ITCZ states, so that the underestimation of the Hadley circulation often found in idealized zonally symmetric models is not only due to the neglect of large-scale eddy fields. Both the full as well as the zonally symmetric model show the phenomenon of ITCZ splitting if the SST distribution gets flat enough at the equator. So ITCZ splitting is not necessarily induced by eddy fields and can be explained by purely zonally symmetric mechanisms.