Geophysical Research Abstracts
Vol. 14, EGU2012-8077, 2012
EGU General Assembly 2012

Numerical simulation of convectively generated gravity waves in West Africa and comparisons with observations

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Convective clouds in the ITCZ (Intertropical Convergence Zone) are a major source of nonstationary gravity waves, that propagate to the stratosphere and result in upward displacements at low levels, which induces new convection. Simulations of wind fields are performed by the mesoscale meteorological model WRF (Advanced Research Weather Research and Forecasting) over a period of 2 days during active thunderstorm days. Simulations are carried out in a domain covering the ITCZ in West Africa using 2 nested grids with horizontal grid spacing of 27 and 9 km respectively. Simulations are driven by ECMWF winds (defined by 91 levels from surface to 80 km), using 100 levels from surface to 50 Pa and a sponge layer above 45 km. The waves characteristics are compared to observations at the CTBT (Comprehensive Test Ban Treaty) infrasound station in Ivory Coast. The aim of this study is to further understand the mechanisms of wave generation by deep convection and propagation to the stratosphere. In a second part, we also study the effects of gravity waves on the dynamics of the tropical atmosphere and perform sensitivity simulations to the top height of the model.