Geophysical Research Abstracts, Vol. 9, 08477, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-08477

Impact of an improved radiation scheme in the MAECHAM5 General Circulation Model, uncoupled and coupled with the chemistry module Messy

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The spectral resolution of the shortwave radiation parameterization used in the MAECHAM5 general circulation model has been increased and extended in the UV-B and UV-C bands. Two 20-years simulations with the MAECHAM5 middle atmosphere general circulation model are performed in order to evaluate the temperature changes and the dynamical feedbacks arising from the newly introduced parameterization. The simulation with the upgraded radiation parameterization, reports a significant warming of almost the entire atmosphere, largest at 1 hPa at the stratopause, and stronger zonal mean zonal winds in the middle atmosphere which alleviates the cold bias present in the model when the standard radiation scheme is used. The stronger zonal mean zonal winds induce a dynamical feedback that results in a dynamical warming/cooling of the polar winter/summer mesosphere, caused by an increased downward/upward circulation in the winter/summer hemisphere. A warming occurs in the troposphere and contribute to a possible improvement of the model temperature climatology. Preliminary results with the MAECHAM5/Messy chemistry climate model and the new radiation scheme are also shown.