



Rapid Adjustment across Scales using the ICON-GCM and ICON-LEM.

C. Nam and J. Quaas

Universitaet Leipzig, Institute for Meteorology, Leipzig, Germany (christine.nam@uni-leipzig.de)

Rapid adjustments to increasing CO₂ concentrations are an important, yet uncertain, component of the climate's total response. Rapid adjustments, however, vary considerably amongst CMIP5 general circulation models due to the fact clouds, turbulence, their coupling, and the resulting dynamical response are not calculated reliably by general circulation models [Gregory and Webb, 2008; Vial et al., 2013; & Sherwood et al., 2015]. This motivates the use of a cloud resolving model, which resolves clouds and turbulence, to better understand rapid adjustments.

This study determines whether large-eddy simulations, can in principle, be used to constrain rapid adjustments in general circulation models given that large-eddy models can only be run on over limited-area, run for a short period of time, and are influenced by boundary conditions. Using the newly developed ICON (Icosahedral non-hydrostatic) general circulation model (GCM) and large-eddy model (LEM) developed by the Max-Planck Institute for Meteorology (MPI) and Deutsche Wetterdienst (DWD), we address these three concerns.