Geophysical Research Abstracts
Vol. 16, EGU2014-13133, 2014
EGU General Assembly 2014

Climate dynamics of a coupled Aquaplanet

Josiane Salameh (1,2), Peter Korn (1), and Jochem Marotzke (1)

(1) Max Planck Institute for Meteorology, Hamburg, Germany (josiane.salameh@mpimet.mpg.de), (2) IMPRS-ESM, Hamburg, Germany

Aquaplanet simulations, an idealized configuration of the current earth with all the landmasses removed, are usually conducted with stand-alone atmospheric General Circulation Models (GCM) and constitute a classical and well-established numerical test case. In contrast, there are only few studies that investigate the Aquaplanet configuration within a coupled Atmosphere-Ocean GCM, which show an extreme disparity regarding the final climate state. The range of states discovered lies between a warm climate qualified with a lack of sea-ice formation, a cold climate where sea-ice extends around the poles and a snowball Earth fully ice covered. In one research, these long time integrations even showed sensitivity to initial conditions and resulted in a multiple equilibrium. The climate of a coupled Aquaplanet remains an open question. Thus, the originality behind considering the coupled Aquaplanet setup, highlights the ocean's impact and allows us to directly interpret the large scale atmospheric-oceanic circulations and their feedbacks without any land interference. In order to achieve a higher physical understanding of the influence of Earth rotation rate, we will show a comparative analysis of a set of coupled Aquaplanet simulations with variable rotation rates, which are executed on the coupled GCM ICON based on an icosahedral triangular grid. The imprints of the rotation rate on the global circulation are discussed through diagnosing the winds and currents distribution, the Hadley cell's magnitude and extent, the meridional overturning circulation, the hydrological cycle and the partition of oceanic and atmospheric heat transport.