

From Earth to Super-Earth atmospheres: Adaptation of MITgcm to be applicable to terrestrial exoplanets.

Ludmila Carone, Rony Keppens, Leen Decin and Carl Shaun

KU Leuven

It is our objective within an IDO-project (KU Leuven funding interdisciplinary research) to develop a global circulation model (GCM) that can be applied to extrasolar planets, for which now a number of observations exist that constrain the atmospheric properties of gas giants and brown dwarfs. A short overview of these observations will be presented.

We have adopted the open source MITgcm developed for the Earth as a start-point for our modeling efforts. The model was complemented with an idealized thermal forcing by Held&Suarez, 1994, and, Williamson et. al., 1998, to reproduce the structure of the Earth's annual troposphere and stratosphere.

This model was extended to different parameter regimes by changing the planetary rotation period, the surface gravities and the planetary radius to prepare a set-up suitable for terrestrial exoplanets. The results of this parameter study are very promising, as they match similar studies conducted with other GCMs and generally agree with large scale circulation patterns found on other Solar System planets. In the end, it is our goal to compare our modeling results with observations of exoplanets. It will be shown how this may be achieved.