



Comparison of energetics in the SPEEDY model and ERA Interim reanalyses

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Climate models are regularly compared to reanalysis datasets in order to verify their ability to simulate the present-day climate. A successful reproduction of the current climate conditions provides confidence into models' results for future. A critical area of many climate models are the tropics. The tropical circulation can be represented by various motions which are to a large extent unbalanced; i.e. it can be represented as a combination of inertio-gravity motions. Such representation is provided by the 3D normal-mode analysis which is undertaken in this study.

We employ the ICTP AGCM model, known as SPEEDY, for a 30-year climate simulation (January 1981 to December 2010). SPEEDY is a simplified climate model which nevertheless successfully reproduces main features of the general circulation and hydrology. This is shown by comparing the outputs of SPEEDY with the ERA Interim reanalysis on the same spatial and temporal resolution. The comparison is performed for the temperature, wind and precipitation fields and it confirms capacity of the SPEEDY model for climate simulations.

The output wind and geopotential from SPEEDY are projected on three-dimensional orthogonal normal-mode functions in order to evaluate the model energetics. The projection allows us to distinguish between the energy in the balanced state, represented by the quasi-geostrophic motions, and in the unbalanced state, represented by inertio-gravity motions. The energy in different scales and motion types is then compared to ERA Interim data at the same resolution.