3rd International Conference on Earth System Modelling
Vol. , 3ICESM-351, 2012
3rd International Conference on Earth System Modelling

Evaluation of MPI-ESM ocean surface freshwater fluxes using HOAPS satellite data

A. Andersson (1) and S. Bakan (2)

(1) Deutscher Wetterdienst, Satellite Application Facility on Climate Monitoring, Offenbach, Germany, (2) Max Planck Institute for Meteorology, Hamburg, Germany

The global water cycle is a key component of the global climate system as it describes and links many important processes such as evaporation, convection, cloud formation and precipitation. Through latent heat release, it is also closely connected to the global energy cycle and its changes. The difference between precipitation and evaporation yields the freshwater flux, which indicates if a particular region of the earth receives more water through precipitation than it loses through evaporation or vice versa.
Today several satellite-based data set of atmospheric and ocean surface parameters exist that cover a time period of nearly twenty years. With the availability of such long term satellite data records the evaluation of model simulations on climatological scale has become possible. In particular the ocean surface freshwater flux parameters are key variables in the climate system, and their representation in climate model systems is essential for the successful modelling of the earth system.
The HOAPS climatology (Hamburg Ocean Atmosphere Parameters and Fluxes from Satellite Data; http://www.hoaps.org) contains fields of precipitation, surface fluxes and atmospheric parameters over the global ice-free ocean between 1987 and 2005. All basic state variables needed for the derivation of the fluxes are calculated from intercalibrated SSM/I brightness temperatures and the AVHRR Pathfinder V5 SST.
The HOAPS data set is used to evaluate precipitation and ocean surface freshwater flux parameters from the MPI-ESM. Recent CMIP5 “amip” and “historical” experiments are compared with the satellite-based HOAPS data on climatological scale. The historical runs from the coupled model exhibit generally larger and more distinct deviations compared to the amip runs that use prescribed SST fields. Particularly in the tropical regions the difference patterns may be related to SST biases. Seasonal biases between the data sets are evident for each hemisphere.