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Evaluation of ocean surface fluxes in the CMIP5 multimodel ensemble

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The exchange of energy, matter and momentum at the Earth surface is a major driver for atmospheric dynamics. There are still large uncertainties in our knowledge of surface (ocean and land) fluxes. Recent reviews of the current knowledge from both, observations and reanalysis data (Trenberth et al., 2011; Stephens et al., 2012) have revealed larger discrepancies in the estimates of the global mean surface water and energy fluxes.

Coordinated model experiments, like e.g. the Coupled Model Intercomparison Project (CMIP) are devoted to compare results from current state-of-the-art climate models in a coherent manner. The recently conducted CMIP5 exercise (Taylor et al., 2012) has produced a rich set of model output in a standardize way.

To evaluate the performances of different models, satellite or insitu observations can be used. The present paper presents results from the analysis of the evaluation of eight different surface water and energy flux components for the evaluation of results from two different CMIP5 experiments (AMIP, HISTORICAL). Results from all models are analyzed in a standardized way and evaluated against observations from four different global datasets of ocean surface fluxes, including the recently released HOAPS 3.2 climatology distributed by the EUMETSAT CMSAF.

The study results indicate that uncertainties (inconsistencies) between different observational datasets are still large, which complicates the evaluation of different models. It is shown that the differences resulting from the choice of different observational datasets are larger than the intra-model differences. The results indicate that the further progress in using observational datasets for the evaluation of ocean surface fluxes might depend on further progress in achieving consistent observations of ocean surface fluxes and/or their uncertainty characterization.