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Impact of ERA-Interim forcing fields corrections on ocean state eddy-permitting OGCM simulation (1989-2010)

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In this work the impact of heat, momentum and precipitation forcing field corrections on 22-year simulations (1989-2010) is presented. The simulations are performed with the eddy-permitting Ocean General Circulation Model (OGCM) NEMO v3.2.1 at 1/4 degree of horizontal resolution, coupled with the Louvain-La Neuve sea-ice model (LIM2). The CORE bulk formulation was adopted as forcing method; the experiments were forced by 3-hourly ERA-Interim turbulent and radiative fluxes and daily freshwater fluxes of precipitation and snow. The general approach is to compare ERA-Interim fields with observational datasets for certain periods to deduce spatially-varying climatological corrective factors.
Large-scale short-wave (SW) and downward long-wave (LW) radiation fluxes have been corrected by means of a large-scale climatological correction coefficient derived by the GEWEX Surface Radiation Budget (SRB) dataset, which consists in satellite-derived measurements of longwave and shortwave radiation at the surface for the period 1995-2007. The correction has the primary goal of reducing the systematic ERA-Interim SW and LW radiative fluxes underestimation within the Tropics, with respect to the GEWEX-SRB dataset. For the period from 1995 to 2007 the experiment with the climatological correction is verified also against the experiment that directly uses GEWEX data as forcing radiation dataset.
With regards to scatterometer climatologies, wind stress fields calculated from ERA-Interim winds were found systematically underestimated within the 40S-40N latitudinal belt and overestimated polewards. For this reason, two alternative approaches are evaluated: i) the correction of 10 meter wind speed prior to the wind stress calculation – to recover from ERA-Interim wind biases; ii) the correction of the wind stress after the CORE bulk formula application – to recover from the bulk formula weaknesses. Both corrective coefficients are derived from the SCOW QuickScat monthly climatology averaged over the period 1999-2009.
Finally, since ERA-Interim exhibits a systematic overestimation of precipitation in the ITCZs and underestimation in mid- and high- latitude areas, ERA-Interim precipitation fluxes have been corrected by means of a climatological monthly coefficient, computed within the period 1989-2008 by comparison between ERA-Interim and the Remote Sensing Systems (REMSS) Passive Microwave Water Cycle (PMWC) precipitation product.
Results and improvements that forcing fields corrections have on the model representation of the ocean state are presented and discussed.