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Strongly coupled data assimilation with the coupled ocean-atmosphere model AWI-CM: comparison with the weakly coupled data assimilation

We compare the results of strongly coupled data assimilation and weakly coupled data assimilation by analyzing the assimilation effect on the prediction of the ocean as well as the atmosphere variables. The AWI climate model (AWI-CM), which couples the ocean model FESOM and the atmospheric model ECHAM, is coupled with the parallel data assimilation framework (PDAF, http://pdaf.awi.de). The satellite sea surface temperature is assimilated. For the weakly coupled data assimilation, only the ocean variables are directly updated by the assimilation while the atmospheric variables are influenced through the model. For the strongly coupled data assimilation, both the ocean and the atmospheric variables are directly updated by the assimilation algorithm. The results are evaluated by comparing the estimated ocean variables with the dependent/independent observational data, and the estimated atmospheric variables with the ERA-interim data. In the ocean, both the WCDA and the SCDA improve the prediction of the temperature and SCDA and WCDA give the same RMS error of SST. In the atmosphere, WCDA gives slightly better results for the 2m temperature and 10m wind velocity than the SCDA. In the free atmosphere, SCDA yields smaller errors for the temperature, wind velocity and specific humidity than the WCDA in the Arctic region, while in the tropical region, the error are larger in general.

Which theme does your abstract refer to?

Coupled data assimilation (ocean, atmosphere, sea-ice, waves, biogeochemistry, etc)

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