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Comparing surface atmospheric variables from ERA40 and CORE as drivers of OGCMs for the period 1958 to 2004

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Surface forcing of "ocean only" general circulation models fully determines the time variability and relevance of the solution. Air temperature, specific humidity, and wind components at a given height above the sea play an important role as they are used to estimate wind stress, evaporation and sensible heat flux through bulk formulae. This presentation focuses on the disagreements between the ERA40 and CORE dataset for these variables and their effects on global inter-annual simulations. This is done in three steps. First, averaged values, trends and time variability of variables from each dataset are compared. Then, bulk estimates of net heat flux computed for each dataset and the same given reference climatic SST, are analysed. Last, two coarse resolution global OGCM simulations at 2° resolution are performed with the two datasets from 1958 to 2004. The CORE dataset has stronger winds and moister air than ERA40 while air temperature is comparable. The two datasets also show a very similar time variability pattern. Surprisingly, computation of bulk fluxes with the fixed SST shows that the warming effect of moister air is able override the cooling effect of evaporation due to stronger winds. In this configuration, CORE leads to less turbulent heat loss than ERA40 except at low latitudes. Results from the simulations, in which the SST is freely evolving, show an inverse trend as the CORE forcing yields the strongest input of heat in the equatorial region, which is associated with a cooler SST. Forcing with ERA40 enhances the meridional overturning and leads to a better global dynamic and thermodynamic behavior of the ocean.