Geophysical Research Abstracts
Vol. 12, EGU2010-12425, 2010
EGU General Assembly 2010

Impact of Different Ocean Reanalyses on Decadal Climate Prediction

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Decadal or near-term climate prediction needs to take into account both external forcing and internal climate variability. Much of the memory of variations on decadal and longer time-scales in the Earth system is thought to lie in surface and subsurface layers of the ocean. Hence, in a forecast system accurate initialization of the ocean is crucial when aiming at better skill with respect to pure climate projection efforts. We apply a recent version of the Earth system model from the Max Planck Institute for Meteorology (MPI-M) in Hamburg to study the impact of different ocean state estimates (GECCO, SODA, ECMWF-ORA-S3) on decadal predictability. Anomalies of the observational estimates are assimilated into our coupled model. The assimilation runs are then used to initialize 10-year-long hindcast from 1959 to 2001 (43 hindcasts for each state estimate). Here, we present prediction skill for various climate parameters such as sea surface temperature and upper-levels heat content. In addition, we compare variations in the Atlantic meridional overturning circulation (MOC) within the model experiments, that is, between assimilation run and respective hindcasts of each reanalysis product. Results are compared to available observations and other initialization techniques performed at the MPI-M (Matei et al., 2010).