

Fidelity and predictability of decadal climate variations in ECHAM/MPIOM: Impact of different ocean reanalyses

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We study the impact of three ocean state estimates (GECCO, SODA, [ECMWF]-ORA-S3) on decadal predictability in one particular forecast system, the Earth system model from the Max Planck Institute for Meteorology (MPI-M) in Hamburg. The forecast procedure follows two steps. First, anomalies of temperature and salinity of the observational estimates are assimilated into our coupled model. Second, the assimilation runs are then used to initialize 10-year-long hindcasts/forecasts starting from each year between 1960 and 2001. The impact of the individual ocean state estimates is evaluated both by the extent to which climate variations from the ocean state estimates are adopted by the forecast system ('fidelity') and by the prediction skill of the corresponding hindcast experiments. The evaluation focuses on North Atlantic (NA) sea surface temperature (SST), upper-level (0-700~m) NA ocean heat content (OHC) and the Atlantic meridional overturning circulation (MOC). The ORA-S3 reanalysis gives the best results for our forecast system as measured by both overall fidelity of the assimilation procedure and predictions of upper-level OHC in the North Atlantic.