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Historical high-resolution dynamic sea level variations

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To investigate future changes in the dynamics of the ocean and therefore in dynamic sea level, ocean models need to be able to adequately represent oceanic dynamical processes. Therefore, resolving ocean eddies and representing boundary currents is of major importance. In this study, we investigate historical variations in dynamical sea surface height using the strongly eddying global version of the Parallel Ocean Program (POP). First, differences in high and low-resolution ocean model results (0.1 vs. 1.0 degree) were analyzed using a climatological atmospheric forcing dataset. Second, we forced the high-resolution model by atmospheric conditions over the period from 1950 to 2000 that are derived from a simulation using the ECHAM5-OM1 model (within the ESSENCE project, see www.knmi.nl/∼sterl/Essence/). In general, the large-scale ocean fields of the POP model simulation agree well with those of the low-resolution ocean model (MPI-OM) results. Variations occur due to the different models used and, especially, due to the capability of the high-resolution POP model to resolve eddies. A comparison of high-resolution ocean model results with in-situ measurements, such as dynamic topography provided by altimetry, and salinity and temperature provided by the WOA2013, also show good agreement.