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Historical ocean temperature and salinity analyses for climate studies

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Ocean temperature and salinity analyses have been conducted for various purposes of climate studies. A sea surface temperature (SST) analysis was originally developed and the analysis is available from the middle of the 19th century. A historical subsurface temperature and salinity analysis is the one that presents monthly temperature and salinity changes since 1945. In this analysis, the SST analysis is used to obtain feasible fields of mixed-layer temperatures. The ocean model was also introduced to the ocean analysis on the basis of the data assimilation theory.

The analysis outputs show global warming signals, interannual-to-interdecadal changes, and a good agreement with sea level data independent of the ocean analysis. However, the oceanographical observations are generally sparse, and hence we necessarily take the accuracy of the ocean analyses into consideration. It will be discussed how accurate the ocean analyses are by using analysis errors objectively estimated in this study and a cross validation technique. In addition, ongoing studies and future plans will be introduced.