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Thermosteric and halosteric sea level rise for 1955-2003

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World Ocean Database (WOD) and World Ocean Atlas (WOA) are an important source for empirical estimates of steric sea level changes during the second half of the twentieth century. The number of available ocean temperature measurements is about 7 million which is approximately 3.5 times more than for salinity. Thus, most research has estimated only the contribution due to temperature change (i.e., the thermosteric component). We have conducted a series of computations using only pairs of simultaneously observed temperature and salinity. Preliminary results show that the halosteric changes may have nearly the same magnitude as the thermosteric changes at much vaster geographical extent compared to our previous finding for the subpolar gyre of the North Atlantic. We continue our research to provide the best possible estimate of near-global change in ocean salinity and halosteric sea level.

Regarding the thermosteric sea level change, the decadal variability is the most prominent feature of the global time series. For instance, the rate of thermal expansion was of the same order (1.0-1.5 mm/yr) during the 1970s and 1990s in contrast to the sharp drop in thermosteric sea level (approximately -3.0 mm/yr) during 1980-1983. The overall increase of sea level due to ocean warming of the upper 3000-m layer is 0.4 mm/yr for the 1955/59-1994/98 period.