

Southern Ocean hydrography and circulation: The Southern Ocean State Estimate (SOSE) resourceMatthew Mazloff[†];[†] SIO-UCSD, USALeading author: mmazloff@ucsd.edu

With the central purpose of attaining a best estimate of the state of the Southern Ocean in the early 21st Century, an eddy-permitting general circulation model is fit by constrained least-squares to a large observational data set during 2005-2009. Data used include Argo float profiles, CTD sections, instrument mounted seal profiles, XBTs, altimetry, radiometer observed sea surface temperature, and NSIDC sea-ice cover. An adjoint model is used to determine descent directions in minimizing a misfit function each of whose elements has been weighted by an estimate of the approximate observational plus model error. The model is brought into near-agreement with the data by adjusting its control vector, here consisting of initial, northern, and meteorological boundary conditions. Although total consistency has not yet been achieved, the existing solution is in good agreement with the great majority of the observations, and thus can be used to quantitatively estimate the properties of the Southern Ocean circulation. That this estimate of the Southern Ocean state has been extended through 2009 is of great value as it synthesizes the observations taken during the International Polar Year (IPY), which are inherently disparate in space, time, and type. By providing full spatial and temporal coverage, the state estimate gives context to IPY process studies, and may be used as a planning tool for future observational programs. The solution is available to the general scientific community, and is benefiting a significant user base. Here we highlight work that utilizes the Southern Ocean state estimate resource.