

A combined census of waters by surface origin and ventilationAgeGeoffrey Gebbie[†];[†] Woods Hole Oceanographic Institution, USALeading author: ggebbie@whoi.edu

A long-time outstanding question in physical oceanography is to explain the volume of water present in classes defined by hydrographic properties, such as the temperature-salinity census of Worthington in the late 1970's. A mechanistic understanding of such an observational census depends upon an ability to determine where interior waters got their properties (presumably at or near the sea surface for many tracers) and knowledge of how long ago that water was at the surface. A recent extension of the Total Matrix Intercomparison (TMI) inverse method allows this information to be gleaned from the already-collected suite of hydrographic climatologies from the WOCE experiment. Besides knowledge of the surface origin of waters, radioactively-decaying tracers are used to constrain the rates of spreading. The net result is a "combined census" of interior ocean waters in terms of the range of surface origins, the volume from each surface origin, and the ventilation age distribution (or time elapsed since communication with the surface) as a function of surface origin. With this census, the long-term net effect of advective and diffusive processes in the ventilation of the ocean is quantified.