Measurement of Circulation Tracers, CFCs/SF_6, for U.S. Geotraces Alaska-Tahiti Section

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The objectives are to use the circulation tracers to put bounds on time scales of ventilation and biogeochemical processes of interest for Geotraces. Also, to use these data to place the Geotraces data into the historical context as regards circulation and biogeochemical processes. Shipboard measurements of chlorofluorocarbons/sulfur hexafluoride, CFCs/SF_6, will be used to constrain rates needed for TEIs measured as part of Geotraces. From hydrographic and CFCs/SF_6 data, we will calculate ages, AOU, AOUR and rates of other biogeochemical processes. Time scale information will help distinguish between the processes affecting the TEIs. There is spatial and temporal variability in these processes, and in speciation of TEIs. It is helpful to consider the circulation and sources of water to understand the TEI processes. For example, we want to distinguish the contribution to AOU from subduction versus vertically from above. These contributions will differ in different regimes. As will spatial and temporal scales of regeneration. The “J term” will be estimated from circulation tracers and compared to J terms estimated from TEIs. The historical data will be useful to evaluate how ventilation and sources have changed. The Alaska-Tahiti transect will be along longitude150W, known as P16; it was occupied several times in the past by WOCE, Clivar, GoShip programs. The proposed Pacific transect is complex as it crosses many circulation regimes and water masses including: highly ventilated and productive Subarctic gyre, ventilated and oligotrophic subtropical gyre, the North Pacific OMZ that is biggest and strongest, equatorial currents carrying ventilated water eastward into the highly productive region, South Pacific OMZ, and equatorward edge of South Pacific subtropical gyre. In summary, measurement of circulation tracers on the proposed Pacific transect will contribute data to constrain rates for processes important for understanding TEIs.