

## Long Term Observations of Deep Ocean Temperature and Salinity from Moorings: Data Availability and Challenges

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In 2011 the international OceanSITES program began an effort to collect sustained time series of temperature and salinity in the deep ocean. The collection of these time series was motivated by the need to better understand the deep ocean and by the desire to improve ocean models by providing accurate time series at fixed locations to evaluate their simulations of the deep ocean. OceanSITES sought contributions of stable, well-calibrated temperature/salinity (T/S) recorders from donors and built up a pool of about 50 instruments. Together with instruments from individual investigators, the collection of deep T/S recorders has been deployed at a number of the existing OceanSITES. Instruments are replaced with fresh units when the moorings are serviced, and the manufacturer of the T/S recorders has been contributing very accurate calibrations of the recovered recorders. The locations around the world from which these deep ocean T/S time series are available are shown, and information about the data assembly centers that freely share OceanSITES data is provided; more information is available at <http://oceansites.org>. We present and explore deep T/S time series from some of the sites. In particular, we draw on data from the WHOTS (Woods Hole Hawaii Ocean Time Series) site north of Oahu, where deep T/S time series are also available from the ALOHA Cabled Observatory (ACO) and where full-water-column HOT CTD profiles provide near-monthly in situ calibrations tied to state-of-the-art laboratory calibration facilities. The quality control methods for the deep T/S time series are discussed along with the challenges to be faced in maintaining deep T/S observing capabilities of the quality needed to improve ocean and climate models. The WHOTS moorings are deployed at two nearby sites to allow a period of one to several days overlap of the time series during maintenance cruises. Deep T/S data from these overlapping periods along with full-record simultaneous data from the ACO illustrate reveal surprising large and statistically significant spatial temperature differences over O(10 km), both on short and long time scales.