

PMEL Ocean Climate Stations

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Project Summary

The NOAA Climate Observation Division provides global climate analysis products which include air-sea exchanges of heat, momentum, and freshwater; carbon dioxide uptake and outgassing by ocean; ocean temperature and salinity, and surface currents. High quality, *in situ* time series reference data are necessary to assess and reduce the errors and uncertainties in these products and the models that generate these and other products. The Ocean Sustained Interdisciplinary Time series Environmental Observatory (OceanSITES) is a global network of reference station moorings that provide long, high-resolution time series for this purpose. The reference station moorings maintained by the Ocean Climate Stations (OCS) program contribute to this global OceanSITES network of reference stations.

OCS currently maintains two reference station moorings (Figure 1): The Kuroshio Extension Observatory (KEO) at 32.3°N, 144.5°E, and Station Papa at 50°N, 145°W. The KEO surface mooring is located in the Kuroshio Extension recirculation gyre, which has some of the largest air-sea heat, moisture and carbon dioxide fluxes found in the entire Pacific basin. The Station Papa mooring is located in the Gulf of Alaska, at the site where a weather ship was stationed from 1949-1981, and where the impacts of ocean acidification resulting from increasing levels of atmospheric carbon dioxide, will likely be felt first.

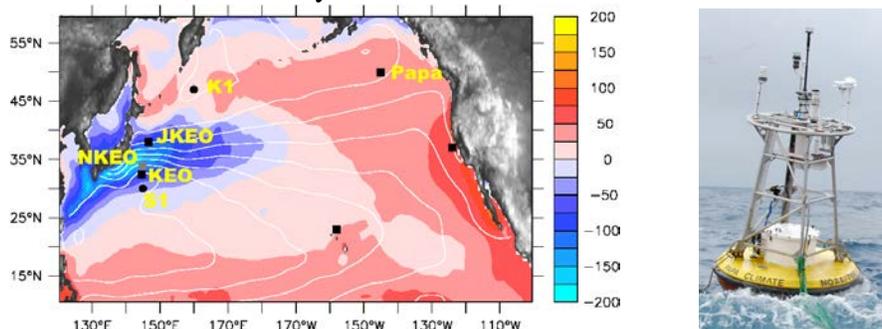


Figure 1: (a) The network of OceanSITES flux (black squares) and subsurface biogeochemical (black circles) reference stations in the North Pacific shown on a map of the mean net air-sea heat flux in Watts per square meter. Mean sea level height contours are shown in white and can be interpreted as streamlines of the surface geostrophic flow. The new Hot-Spot KEO (NKEO) flux mooring is also shown (grey square). (b) The Papa mooring shortly before recovery.

All OCS moorings carry a suite of sensors to monitor air-sea heat, moisture, momentum, and CO₂ fluxes, as well as the upper ocean temperature, salinity, and near-surface currents. Surface and subsurface data are telemetered to shore in near real-time and a subset of the surface meteorological data are also made publicly available in near real-time through the Global Telecommunications System (GTS), used by operational data centers. The Carbon components of the OCS moorings are described separately in the progress report for Sutton's "High-

Resolution Ocean and Atmosphere pCO₂ Time Series Measurements” project. OCS data are made available through the project website: www.pmel.noaa.gov/OCS/ in a variety of formats, including ASCII and netCDF. In FY12, there were 180 download requests from the OCS data display and delivery page alone. The OCS data are also served through the PMEL OceanSITES Data Assembly Center (DAC). With the FY12 Add-task, the OCS group is working to make the data available through the OceanSITES Global DAC (GDAC) in the standard OceanSITES format, i.e. as deployment files with all sensor data (primary, secondary and full meta data) included. Voluntary usage descriptions included model, sensor and satellite data validation, assessment studies, mooring design, forecast verification, research (air-sea interactions, mixing processes, nutrient transport, mixed layer saturation), and student projects. The data serve a broad community of researchers and operational centers in the US and internationally.

The OCS group values international partnerships. All stations were initiated during large collaborative process studies, and have strong international partners. KEO was first deployed in June 2004 as part of the National Science Foundation (NSF) funded Kuroshio Extension System Study (KESS). At the conclusion of KESS, a partnership with the Japan Agency for Marine-Earth Science and Technology (JAMSTEC) was formed. The mooring deployment and recovery operations have been performed on charter and partner cruises, including a KEO turnaround cruise in November 2011 aboard the Military Sealift Command (MSC) USNS SAFEGUARD and a turnaround in July 2012 aboard JAMSTEC’s R/V MIRAI. Station Papa was initially funded in 2007 through an NSF grant to Dr. Steve Emerson (University of Washington) to study the North Pacific Carbon Cycle. At the conclusion of the NSF process study, NOAA Office of Climate Observations took over support of this site. The Canadian Fisheries and Oceans Canada, Pacific Region, Line-P program, has provided ship time on the JOHN P TULLY for the Station Papa mooring maintenance. More recently, NSF has funded a wave measuring mooring to be deployed next to the NOAA Station P mooring from June 2010 – June 2014. NSF Ocean Observatory Initiative (OOI) will deploy a cluster of subsurface profiler moorings near the NOAA Station P mooring beginning summer 2013. Likewise, KEO has been a central mooring of the 1-billion yen Japanese process study “Hot-Spot”. In July 2012, JAMSTEC deployed a new KEO mooring in the center of the Kuroshio Extension jet, north of the NOAA KEO site. It is an exciting time in the NOAA OCS program.