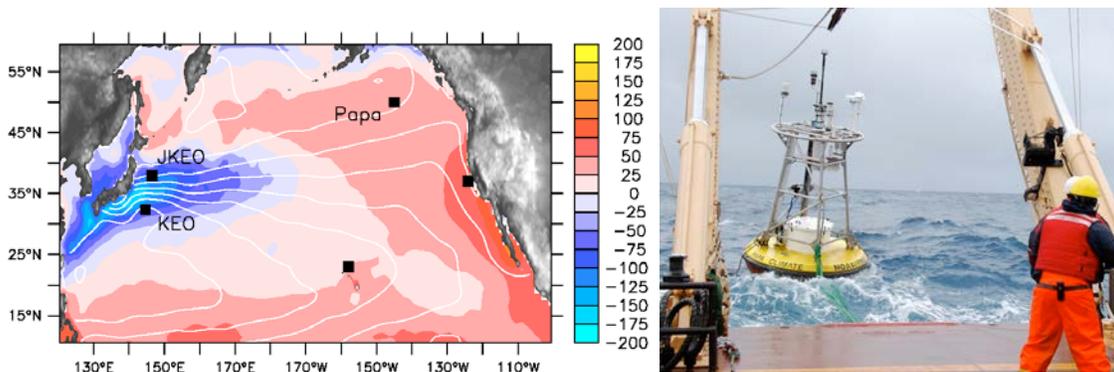


## PMEL Ocean Climate Stations

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### Project Summary

The Ocean Climate Stations project (OCS) at NOAA's Pacific Marine Environmental Laboratory (PMEL) maintains two deep ocean surface moorings – Station Papa at 50°N, 145°W in the Gulf of Alaska, and the Kuroshio Extension Observatory (KEO) at 32.3°N, 144.5°E in the Northwest Pacific Ocean (see Fig. 1). Both moorings carry a suite of sensors to monitor the air-sea exchanges of carbon dioxide, heat, and freshwater; wind; upper ocean temperature, salinity, and currents; ocean acidification; and important aspects of the carbon cycle in the surface water. These moorings are a NOAA contribution to the global network of Ocean Sustained Interdisciplinary Time series Environmental Observatory (OceanSITES) stations. Their high-resolution, high-quality data provide reference time series for assessing uncertainties in a satellite, numerical weather prediction, and other data products, and for analyzing processes affecting weather, climate, the ocean environment, the carbon cycle, and ocean acidification.



*Figure 1. (left) The network of OceanSITES reference stations in the North Pacific are shown relative to the mean net air-sea heat flux in Watts per meter square and mean sea level height contours. (right) The Papa-2010 buoy just prior to recovery on board the Canadian R/V John P Tully.*

Both OCS reference stations are in distinct oceanic regimes. The KEO 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 basin. The Station Papa mooring is extending a time series of observations at the site where a weather ship was stationed from 1949-1981, and which has been regularly visited since, making it one of the longest time series in existence. Station Papa is also in a region where the impacts of ocean acidification, resulting from increasing levels of atmospheric carbon dioxide, are expected to be felt first.

Both 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 to help maintain the NOAA KEO mooring and to help initiate a new JAMSTEC KEO mooring (JKEO) north of the Kuroshio Extension (Fig. 1). In 2012, KEO mooring deployment and recovery operations will be performed aboard the JAMSTEC ship Mirai, with shiptime provided by JAMSTEC. In 2011, KEO mooring operations were performed aboard the salvage ship SAFEGUARD, with shiptime provided by the US Navy's Military Sealift Command. We expect that KEO operations in 2013 will be performed again on one of these two ships. Station Papa was initially funded 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 the mooring. Since the initial deployment in 2007, Station Papa mooring operations have been performed aboard the R/V John P Tully, with shiptime provided by the Canadian Department of Fisheries and Oceans, Pacific Region, Line-P program.

Surface and subsurface data are transmitted via satellite in near-realtime. OCS data are made available through data pages within the project website: <http://www.pmel.noaa.gov/OCS/> in a variety of formats including text, plots, netcdf and version 1.2 OceanSITES data format. The OCS data are served through the PMEL OceanSITES Data Assembly Center (DAC) and also through the OceanSITES Global DAC (GDAC). A subset of the surface meteorological data is also made publicly available in near-realtime through the Global Telecommunications System, used by operational data centers. The data serve researchers in U.S. and international government agencies, research institutions, and universities. In FY11, there were 192 download requests from the OCS data display and delivery page alone. 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.