PMEL Ocean Climate Station Program

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http://www.pmel.noaa.gov/OCS/

Total in situ networks (Feb 08)

- Continuous satellite measurements of sea surface temperature, height, winds, and colour
- 48% Global reference mooring network
- 29 moorings planned

60%
PMEL Ocean Climate Stations are a contribution to the global network of OceanSITES timeseries reference sites

OceanSITES network

- Existing flux reference sites
- Planned flux reference sites

http://www.oceansites.org/
NOAA PMEL Ocean Climate Stations have been engineered to survive and to continue monitoring air-sea interactions during extreme weather and ocean conditions.
NOAA Strategic Plan - Mission Goal (Climate):
A predictive understanding of the global climate system on time scales of weeks to decades, with quantified uncertainties sufficient for making informed and reasoned decisions.

NOAA Research Plan - (Climate goal):
Develop an integrated global observation and data management system for routine delivery of information, including attribution of the state of the climate.

Priority Research Activities - (Climate goal):
- Completing the ocean observing systems. (*OceanSITES time series reference site network*)
- Collecting and delivering regular, systematic, and reliable climate data and information
- Producing reference data sets that provide improved climate information
- Conducting observational, diagnostic, and modeling research to improve understanding of physical mechanisms and processes of climate variability and predictability.

PMEL Ocean Climate Station Project Goals:
- Assess biases and uncertainties in the ocean “weather maps”
- Detect rapid variations and episodic events, as well as long-term changes in climate system
- Identify mechanisms and relationships within the climate system.
Critical factors for starting a new reference station:

• *Scientific interest in the site*
• *Feasibility*
• *Endorsement by international OceanSITES steering panel*
Cold dry air blowing over warm Kuroshio Extension causes large sensible and latent heat loss.

NCEP/NCAR reanalysis annual mean latent heat loss. Units are W/m$^2$. OceanSITES network circa 2003.

The largest sink of carbon in the North Pacific is in the Kuroshio Extension region

How is Carbon Flux affected by Kuroshio Extension variations? Mode water formation? What are the roles of physical and biological pumps?

What is the influence of these processes on ocean acidification?
KEO is both an element of the global network of OceanSITES time series reference sites...

...and an element of the Kuroshio Extension System Study (KESS).

Moving forward: In 2006, a partnership between PMEL and JAMSTEC was formed to improve the capacity to monitor air-sea interaction in eastern North Pacific.
What is influence of Kuroshio Extension front?

Radiative Heat Flux = net solar radiation + net longwave radiation

Turbulent (latent and sensible) heat fluxes computed from state variables using bulk algorithm. Uncertainty ~ 10-15 W/m² (target for climate reference)

Net Surface Heat Flux = Turbulent Heat Fluxes + Radiative Heat Fluxes
Mean bias in NRA1 latent heat loss is 38 W/m$^2$

Mean bias in NRA2 latent heat loss is 60 W/m$^2$ (yikes!)
• Of all the state variables, NRA specific humidity contributes the largest error and biases to the latent heat flux.

• During wintertime, when prevailing winds are northerly, NRA specific humidity is too large. During summertime, when prevailing winds are southerly, humidity is too low. This suggests improper boundary layer modification.
First ocean acidification mooring in the Gulf of Alaska at Station Papa

http://www.pmel.noaa.gov/stnP/

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Ocean Climate Stations provide high quality *in situ* data to:

- assess biases and uncertainties in the ocean “weather maps”,
- detect rapid variations and episodic events, as well as long-term changes in the climate system, and
- identify mechanisms and relationships within the climate system.

The NOAA PMEL Ocean Climate Station program has two stations at present (KEO and Papa) and has helped initiate JKEO. These stations are OceanSITES time series reference sites, a network within the Global Ocean Observing System.

The NOAA PMEL Ocean Climate Station program is a new and growing program. We are prepared to expand into the global oceans to help complete the network of reference sites.

The NOAA PMEL Ocean Climate Station program encourages broad use of the data and welcomes collaboration.