Supporting Ocean Users with Coastal and Ocean Observing

Fiona Langenberger, Communications & Program Coordinator
February 22, 2020  | Waikīkī Swim Club
OVERVIEW

Presentation Outline

- Introduction to PacIOOS
- Coastal and Ocean Observations
- Coastal, Ocean, and Atmospheric Forecasts
- Data Visualizations with Examples
Regional Associations

- U.S. IOOS is part of NOAA
- 11 Regional Associations
- Stakeholder Driven
MISSION - PacIOOS empowers ocean users and stakeholders throughout the Pacific Islands by providing accurate and reliable coastal and ocean information, tools, and services that are easy to access and use.
Real-time Wave Observations

- Wave Height
- Direction
- Period
- Sea Surface Temperature
- [Surface Currents*]
Real-time Wave Observations

- Wave Height
- Direction
- Period
- Sea Surface Temperature
- [Surface Currents*]
Real-time Wave Observations

Photo Credit: Young Brothers, Ltd.

Photo Credit: J. Biggs

Photo Credit: Waikiki Rough Water Swim
Real-time Sea Surface Currents Observations
Real-time Sea Surface Currents Observations

Photo Credit: USARPAC
Water Quality Monitoring: Nearshore Sensors and Buoys

✧ Temperature
✧ Salinity
✧ Chlorophyll
✧ Turbidity
✧ Depth
✧ Dissolved Oxygen★
✧ pH★
✧ CO₂★
Water Quality Monitoring: Nearshore Sensors and Buoys

Photo Credit: K. Rhodes
COASTAL & OCEAN OBSERVATIONS

Water Quality Sensor Partnership Program

Maunalua Bay

Kewalo Basin

"Loaner" Program

Palmyra Atoll

Pohnpei, FSM
Animal Tracking
New Generation of Tags – Sharks as “Oceanographers”

- GPS position
- Depth
- Temperature
- Salinity
- Dissolved oxygen

Photo Credit: M. Royer
Weather Observations

- Real-time data at Honolulu Harbor Entrance
- Smaller scale, low-cost station
- In collaboration with Hawai‘i Pilots Association and Department of Transportation Harbors Division
- Wind Speed & Direction
- Air Temperature
- Rainfall
- Humidity
- Air Pressure
Weather Observations

Photo Credit: H. Kerkering
Atmospheric Forecast

- Air Temperature
- Wind
- Rain
- Humidity
- Pressure

Weather Research and Forecasting (WRF) Model

WRF Model

PacIOOS
Wave Forecasts

Wave height  |  Wave direction  |  Wave period
Wave Forecasts

Wave height  |  Wave direction  |  Wave period
Ocean Circulation Model

✧ Water Temperature
✧ Salinity
✧ Velocity
✧ Sea Surface Height
Wave Run-up, High Sea Level, and Harbor Surge Forecasts
DATA MANAGEMENT & VISUALIZATION

Photo Credit: NOAA
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<td>Tide Model for the Pacific Ocean (Barotropic): Tidal Elevation</td>
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DATA MANAGEMENT & VISUALIZATION

PacIOOS Website

http://pacioos.org

by observing we learn

PacIOOS empowers ocean users and stakeholders in the Pacific Islands by providing accurate and reliable coastal and ocean information, tools, and services that are easy to access and use.

ONLINE MAPPING

PacIOOS Voyager

PacIOOS Voyager is a free, interactive, online mapping experience. Explore...

SHARK TRACKING

Tiger Shark Tracking

Check out recent tracks of Hawaii tiger sharks who were fitted with the latest...

FEATURED TOOL

Weather Observations

Real-time weather observations from the ISMB weather station at Moku o Lānā'i.
DATA MANAGEMENT & VISUALIZATION

Quick & Easy Access

Wave buoy observations

Wave forecast
Quick & Easy Access

**Weather Observations**: Honolulu Harbor, O‘ahu

**Nearshore Sensor Observations**: Hawai‘i Yacht Club, O‘ahu

**NOTE**: Click on the plot below for data at a specific time.

**Start Date**: [Select date]
**Time Window**: [7 days]
**Temperature**: [°C]
PacIOOS Voyager

Data Management & Visualization

http://pacioos.org/voyager
Currents in Waikīkī

Currents are a combination of:

1. Tidal motion
   - Typically two high and two low tides per day
   - Tidal currents are about 0.5 knots
   - Result in alongshore currents

2. Wave-induced flows
   - Nearshore, inner reef dynamics

3. Large-scale oceanic flow
   - Off-shore circulation is mainly wind-driven
   - Hawaii is a region of high eddy (circular) motions

Modeled Currents
Currents in Waikīkī

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Currents in Waikīkī

Headland Eddy

- When flow encounters change in coastline, e.g., flow through Kaʻiwi Channel passing Diamond Head

Tidal & Wave-induced flows

Recirculation?

Large-scale flow from Eddy North of Oʻahu
DATA MANAGEMENT & VISUALIZATION

Currents in Waikīkī

Regional Ocean Modeling System
  - South Shore Grid
DATA MANAGEMENT & VISUALIZATION

Currents in Waikīkī

Regional Ocean Modeling System
- South Shore Grid
- Waikīkī Grid
Currents in Waikīkī

Regional Ocean Modeling System
- South Shore Grid
- Waikīkī Grid

Weather Model
- O’ahu Grid
DATA MANAGEMENT & VISUALIZATION

Currents in Waikīkī

Regional Ocean Modeling System
- South Shore Grid
- Waikīkī Grid

Weather Model
- Oʻahu Grid

Wave Model
- Oʻahu Grid
STAY CONNECTED
http://pacioos.org
SIGN UP FOR OUR MONTHLY NEWSLETTER

Photo Credit: NOAA