PacWave Ocean Data Systems – EARTH Workshop 2025

Presenter: Brett Hembrough | Marine Operations Manager, PacWave – Oregon State University
Session: Monday, July 28, 11:30–12:00 – Data Exploration: PacWave Buoy Data
Website: www.pacwaveenergy.org

FLOATr MetOcean Buoy

(Fixed Location Ocean and Atmospheric Tracking)
An autonomous buoy that monitors real-time marine weather and ocean conditions from a fixed location. It also tracks underwater currents and solar charging performance. Data are transmitted hourly to shore.

Sensors:
- Wind, air temp, barometric pressure
- Sea surface temperature, salinity, dissolved oxygen
- GPS drift, pyranometers (solar availability)
- Downward-looking ADCP (for water column current profiles)

System Features: Solar-powered, cellular-linked, autonomous
Educational Use: Weather/ocean analysis, air-sea interactions, subsurface current studies
*Also deployed at PacWave North

Sofar Spotter Buoys

Compact, solar-powered, GPS-tracked buoys that drift with surface currents and report real-time wave data.

Dashboard: https://spotters.sofarocean.com/?user-filter=1531

Measures: Wave conditions, sea surface temp, GPS drift
Educational Use: Ocean drift tracking, data comparison, real-time monitoring
*Also deployed at PacWave North

CDIP Waverider Buoys (PacWave South)

These precision buoys are the cornerstone of wave monitoring at PacWave. They measure and record wave height, direction, and frequency content—critical for understanding energy potential and sea conditions.

Links:
- Station 277: https://cdip.ucsd.edu/m/products/?stn=277p1
- Station 278: https://cdip.ucsd.edu/m/products/?stn=278p1
- Station 280: https://cdip.ucsd.edu/m/products/?stn=280p1
- Spectral Plot:

https://cdip.ucsd.edu/themes/cdip?pb=1&d2=p70&u2=s:277:st:1:v:compendium:max_frq:0.33:dt:202507:t:plot:os:278

Measures: Wave height, direction, period, energy spectrum
Educational Use: Wave energy comparisons, spectral analysis, storm pattern studies

Regional Buoy Network (NDBC)

NOAA buoys provide broader context for comparing offshore and nearshore conditions.

Local Waveriders:
- 46280: https://www.ndbc.noaa.gov/station_page.php?station=46280
- 46281: https://www.ndbc.noaa.gov/station_page.php?station=46281
- 46283: https://www.ndbc.noaa.gov/station_page.php?station=46283

Nearby Stations:
- 46094: https://www.ndbc.noaa.gov/station_page.php?station=46094
- 46050: https://www.ndbc.noaa.gov/station_page.php?station=46050
- NWPO3: https://www.ndbc.noaa.gov/station_page.php?station=nwpo3
- 46098: https://www.ndbc.noaa.gov/station_page.php?station=46098
- 46089: https://www.ndbc.noaa.gov/station_page.php?station=46089

Open Data Repositories

OpenEI Portal: https://openei.org

PacWave shares its sensor datasets through national repositories for public use.

PacWave Raw Data: https://data.openei.org/s3_viewer?bucket=marine-energy-data&prefix=pacwave%2F

Nortek Signature 250 – AWAC

This seafloor-mounted instrument measures underwater currents and wave forces below the surface.

Measures:
- Current profiles
- Wave height, direction, orbital velocities
- Acoustic backscatter

Educational Use: Subsurface force analysis, fixed vs. buoy comparisons

Classroom Activity Ideas

- Storm Tracker – Compare wave height across buoys before/during/after storms
- Wave Spectra Detective – Analyze CDIP plots for energy peaks
- Drift Mapping – Track Spotter buoy motion
- Current Profiler – Examine changes in subsurface current
- Sensor Comparison – Fixed vs. drifting measurements
- Mooring Design – Discuss different mooring system layouts