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CDIP wave observations during a strong El Niño year

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Table 1.
Maximum recorded wave height at eight West Coast stations during the 10-11 December 2015 storm. The time of occurrence, significant wave height, peak period and water depth are also shown.

Station name	PST hr DD-HH	Hs (m)	Tp (s)	Depth (m)	Hmax (m)
Astoria Canyon, OR	10-21	10.50	16.7	183	16.58
Clatsop Spit, OR	11-01	10.77	18.2	25	16.61
Umpqua, OR	10-21	11.28	18.2	183	19.00
Humboldt North Spit, CA	10-22	9.92	18.2	113	16.77
Cape Mendocino, CA	10-23	10.86	18.2	317	19.48
Point Reyes, CA	11-04	9.85	18.2	550	16.20
Point Sur, CA	11-07	9.95	18.2	336	17.46
Harvest, CA	11-14	8.09	18.2	549	11.93

PST hr: Pacific Standard Time day and hour in December 2015 of maximum height

Hs: Largest recorded significant wave height

Tp: Peak period corresponding to the measured Hs

Hmax: Largest recorded wave height

In a strong El Niño year, unusually energetic wave events are to be expected. But whatever the cause, there was an unusually large storm wave occurrence along the west coast of the United States in early December 2015, centered on the Oregon-California border. A complete record of that event was obtained by the wave measurement buoys of the Coastal Data Information Program (CDIP). CDIP, a program managed by the Scripps Institution of Oceanography (SIO) at the University of California, San Diego, operates a network of 65 wave measurement buoys along the coastlines of the United States. This program is funded by the U.S. Army Corps of Engineers (USACE) with cost-sharing from the California Department of Parks and Recreation, Division of Boating and Waterways. Eight of the CDIP Datawell Waverider buoys are located along the coastline in southern Oregon as well as northern and central California and were well-positioned to monitor the development of the December storm, as described in Table 1. The locations are shown in Figure 1. The data streams from these buoys were transmitted to a satellite and then retransmitted to SIO.

The data from this transmission system are converted into a variety of standardized products and are available in near-real time at <http://cdip.ucsd.edu>. The wave height time histories of the eight buoys at the times of their peak values are shown in Figure 2.

The National Data Buoy Center (NDBC) maintains wind buoy number 46002, offshore of the eight CDIP buoys, as shown on Figure 1. During the afternoon and evening of 10 December this buoy measured mean wind speeds up to 15 meters/sec and gusts of nearly

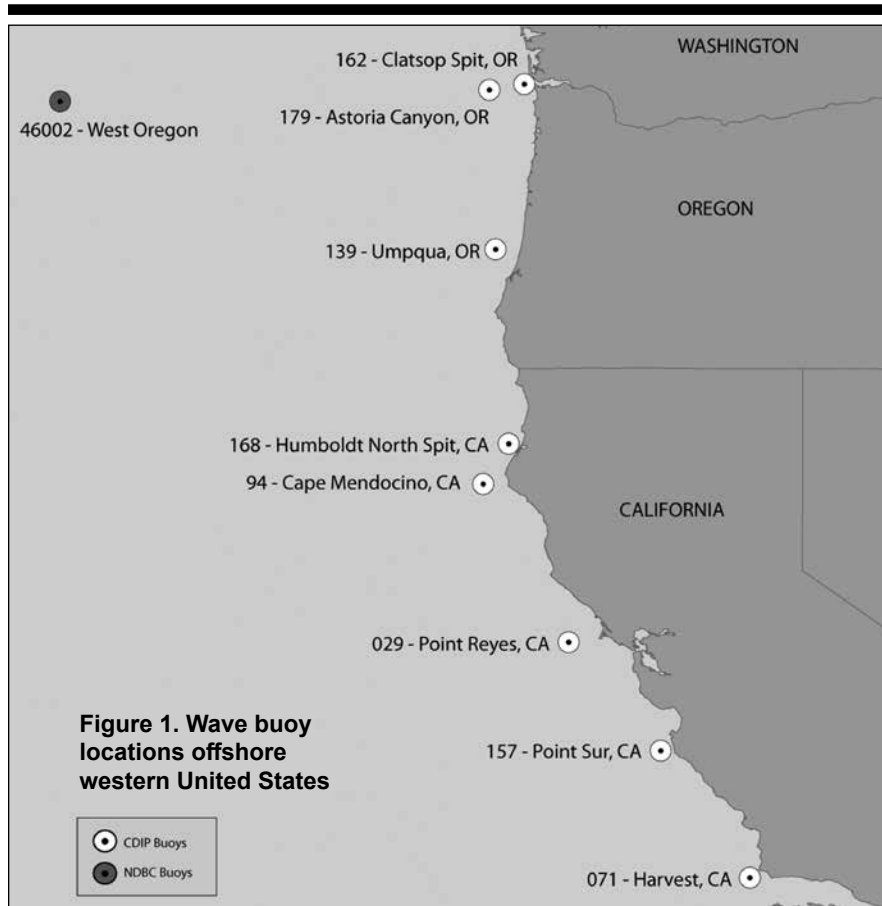


Figure 1. Wave buoy locations offshore western United States

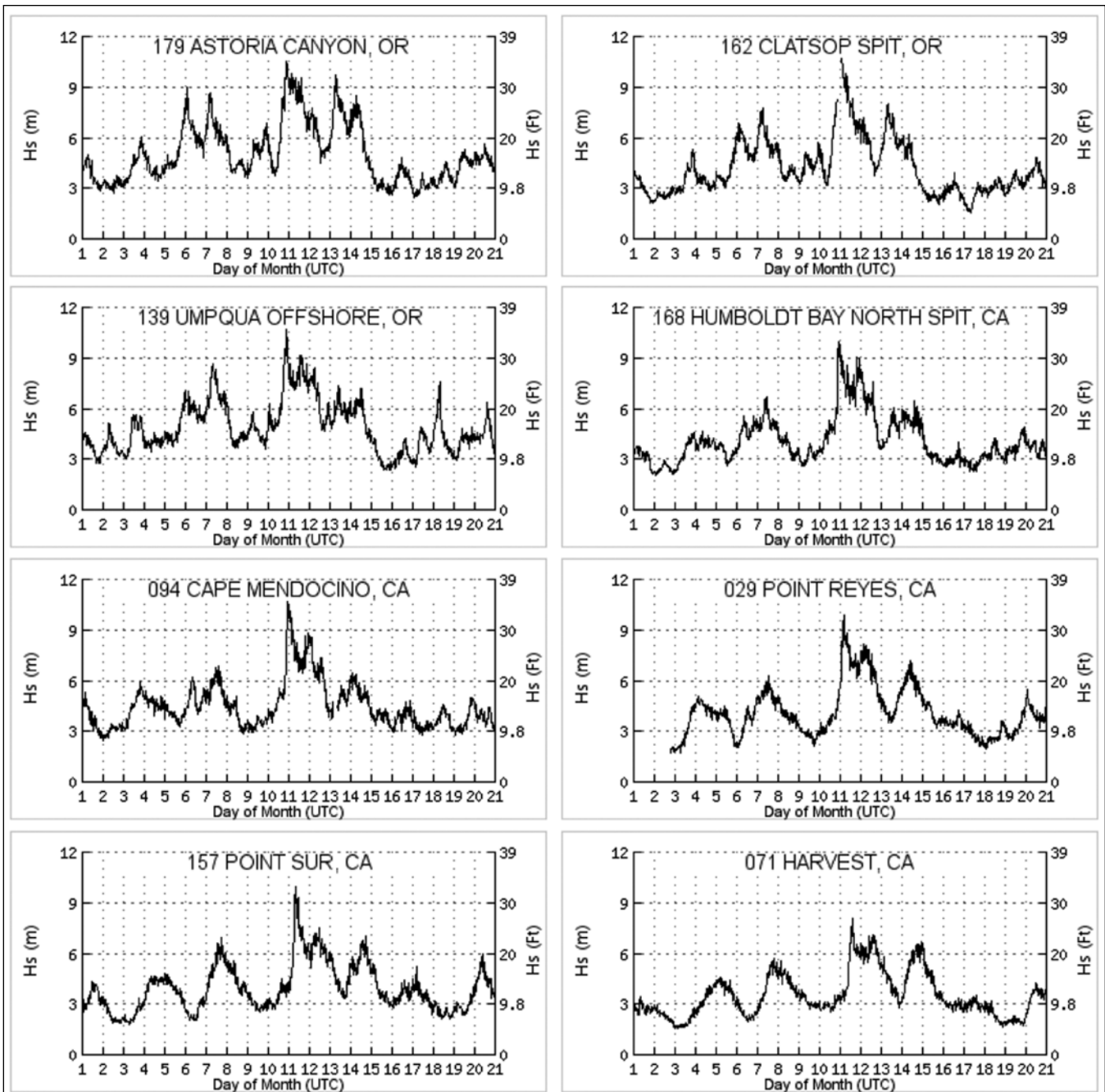


Figure 2. Significant wave height (Hs) measured by CDIP wave buoys during December 2015.

20 meters/sec, with a SSE heading. This was the wind forcing that generated these very large waves. The Umpqua and Cape Mendocino buoys peaked at heights greater than 19 meters and all except Harvest exceeded 16 meters. The Cape Mendocino peak value came within one meter of the record wave height for the CDIP system, set at the Harvest buoy, the southernmost of these stations, in February 2008.