

MEMO

High-Fidelity Resource Characterization

Wave measurements at Lakeside, Oregon

NREL researchers are undertaking a multi-year research project to collect measurements at various locations around the United States to better understand wave and tidal characteristics. Oregon was selected as one of eight sites after an exhaustive study to determine the most suitable locations along the coastline. The research project is designed to better understand the wave resource characteristics in regions that have a high-density wave resource. Researchers selected measurement locations in shallow water because the data will be used to validate state-of-the-art wave resource models. Although there are many buoys along the U.S. coastline, few of these buoys are in shallow water along the West Coast. The proposed Oregon measurements will provide critical inputs for validating models and developing a wave classification scheme that accurately represents the U.S. West Coast.

Numerical wave models are highly valuable tools for wave characterization. However, as useful and accurate as these tools are, important questions about their accuracy in shallow water (<100 meters) along the U.S. West Coast still exist. In particular, these models are known to under-predict the amplitude of large waves during large storm events (“extreme events”). Measurements from NREL’s research project will improve our understanding of the U.S. West Coast wave characteristics in shallow waters and during storms, and the findings will be codified in a wave-classification scheme.

The proposed measurement in Oregon is along the central coast, offshore of Lakeside and Reedsport. The measurement will collect data for 1 year, at which time all measurement equipment will be removed. The measurement equipment will include two Datawell MKIII wave buoys, as shown in Figure 2, and one Nortek AST acoustic wave and current (AWAC) profiler (Figure 4) mounted on a Sea Spider or similar bottom lander (Figure 5). The proposed locations for the measurements are detailed in Table 1 and illustrated in Figure 1. One buoy and the AWAC will be installed at the Reedsport location, and the other buoy will be deployed at the Lakeside location.

Table 1: Measurement Locations

	Latitude	Longitude	Instruments
Lakeside	43.760 north	124.224 west	MKIII
Reedsport	43.586 north	124.290 west	MKIII + AWAC

The map below shows a section of the central Oregon coastline near Reedsport and Lakeside, where NREL researchers propose performing wave measurements. The two yellow balloons indicate the proposed measurement locations. The cyan balloon shows the location of an existing deep-water buoy. The green box indicates the location of REFSSA #4 from Part 5 of the Oregon Territorial Sea Plan.

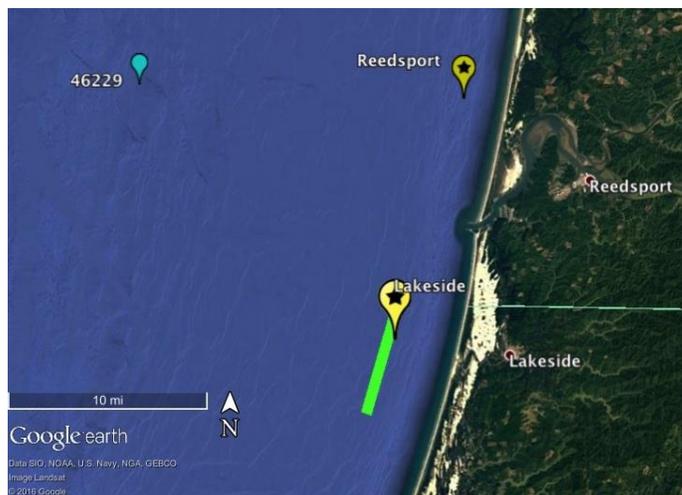


Figure 1: Map of measurement deployment sites

Both of the Datawell MKIII buoys will be deployed as shown in Figure 2. The buoy is approximately 3' in diameter and weighs nearly 500 lbs. It floats in the ocean, half-submerged, within an anti-spin triangle with an antenna on top to enable cellular communication. For this deployment, the buoy will be moored and anchored as shown in Figure 3. The anchor weight may be chain (as illustrated) or several railroad wheels, depending on the ocean dynamics in Oregon.



Figure 2: Datawell MKIII buoy

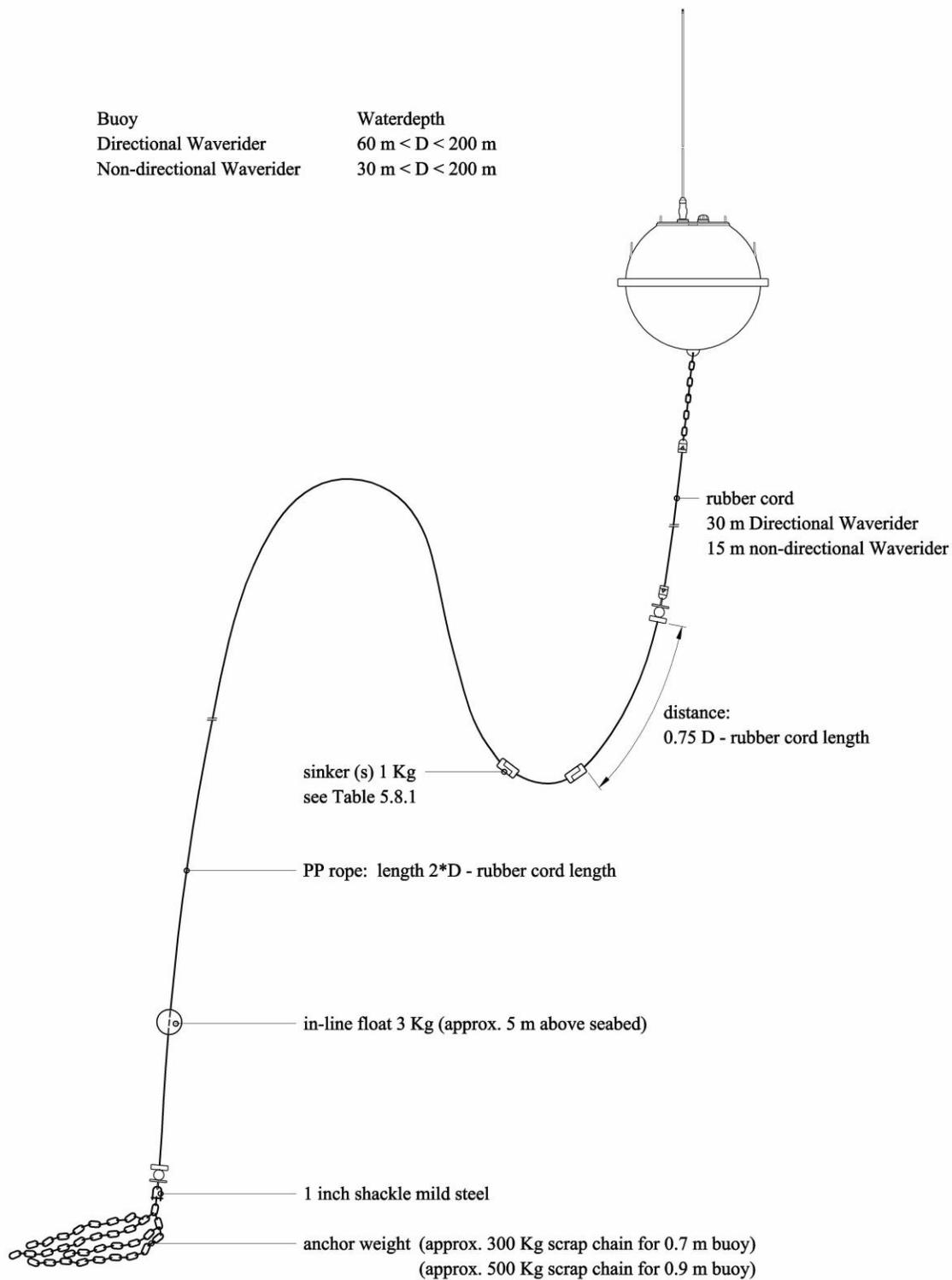


Figure 3: Mooring and anchor configuration for Datawell buoy

The AWAC profiler is pictured in Figure 4 below. It is approximately 7.5” in diameter and 7” tall.

For this deployment, the AWAC will be mounted onto a Teledyne Oceanscience Sea Spider, which is pictured in Figure 5. The photo shows the deployment-ready configuration, complete with twin pop-up buoys for recovery of the instrumentation, and the yellow acoustic release on the deck, which safely and gently deploys the lander after it is lowered to the sea floor. The AWAC is mounted on the platform (barely visible on the green plate in the photo). The Sea Spider platform is 58” wide and 21” tall. It is made of fiberglass and weighs approximately 190 lbs.

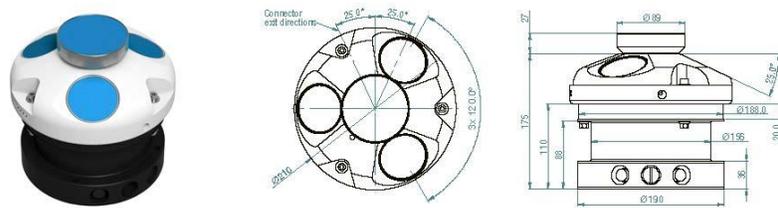


Figure 4: Nortek AWAC AST instrument



Figure 5: Sea Spider bottom lander