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Session 1 Discussion Notes

Christopher Brown
Marine Information Resources Corporation

Session I Notes
Use of wave information in support of marine operations

These notes are intended as a supplement to the Session I presentation. The following discussion points were captured by workshop rapporteurs:

- Wave energy converter (WEC) arrays have the potential to alter nearshore wave propagation, circulation, and sediment transport, all of which may have effects on ecological processes, shallow water processes, and socioeconomic services.

- Wave and hydrodynamics model simulations were used to quantify the potential effects of wave energy converter (WEC) arrays on nearshore wave propagation and circulation patterns in coastal Santa Cruz, CA. Results from the wave and hydrodynamics model were integrated with bathymetry and seabed characteristics to assess the risk of seabed stability alterations.

- The wave model, Simulating WAves Nearshore (SWAN), has been modified by Sandia National Laboratories (SNL) to account for the frequency and directionally dependent power absorption of WECs.

- Wave models and *in-situ* data can be used to create maps of seabed mobility risk (high versus low) for use by planners interested in siting structures such as wave energy converters.

- It is important to understand and validate a model's assumptions and boundary conditions with measurements.

- Different types of wave information are needed for a variety of users. While some operators require general wave information, others require statistics derived from long-term wave records.

- Key observations include significant wave height (m), dominant wave direction (degrees), wave period (s), 1D frequency spectral wave energy density (m^2/Hz) and 2D frequency-direction spectral wave energy density (m^2/Hz).

- Users may be interested in observations of sea, swell, wave steepness, surf and wave-induced nearshore currents.

- The observations of waves must be complemented by information on bathymetry and winds. Shallow water requires current bathymetry, which might be retrieved using imagery. High quality wind observations are essential for accurate Wavewatch III model forecasting.

- Buoy measurements and coastal radar systems provide valuable wave observations that meet user needs from mariners, wave enthusiasts, and city planners to coastal engineers and climatologists.

- Oceanographers and engineers rely on directional wave measurements to advance wave-modeling technologies.

- The real-time nature of wave information is particularly important owing to the response time of sea state parameters that are in sync with changes in wind speeds and directions.

- Archives of model input and output can be used for many applications including the assessment of sediment transport resulting from the installation of wave energy converters.

- Projects relevant to reference model development by Sandia National Laboratories in partnership with several national laboratories, academic institutions, and industry have data that could be archived in the NOAA Coastal and Ocean Model Testbed. The modeling effort in support of Wave Energy Conversion in Monterey Bay is applicable to other coasts.

- Wave data and information needs to be archived for subsequent use by researchers, especially those involved in resilience assessments. The archives need to use standard formats, especially to save information for extreme events such as tropical cyclones. Wave data from Hurricane Camille (1969), the second of three catastrophic Category 5 hurricanes to make landfall in the United States during the 20th century, are not readily available.

- Metadata is a crucial component of archived wave data.

- Funding agencies should require as part of any coastal project, the archival of wave data that are collected by project engineers and scientist. The archives should be made available for later use by community researchers.