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Ocean Waves Workshop

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## Ocean Waves Workshop 2019 Session 2 Notes

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Raghukumar, Kaus and McWilliams, Sam, "Ocean Waves Workshop 2019 Session 2 Notes" (2019). *Ocean Waves Workshop*. 3.

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## Session 2 – Sensors and Networks Supporting Maritime Operations

Rapporteurs: <sup>1</sup>Kaus Raghukumar, Ph.D., and <sup>1</sup>Sam McWilliams, E.I.T.  
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Networks of buoys and stations measure, process, and transmit important meteorological and oceanographic data from coastal marine areas to shore side processing centers. These important data are then made available to the public for maritime and aviation applications.

Obsolete sensors at operational centers such as NDBC and Navy ranges should be replaced with state-of-the-art sensors. A technology refresh should include NDBC buoys and Coastal-Marine Automated Network (C-MAN) stations.

NDBC is currently updating the hardware on their wave/weather buoys. The hardware being updated consists of new processors that are more power efficient (0.198 Wh currently versus 0.65 Wh previously). The sensing element (IMU for waves, anemometer for winds) remain the same, as do the processing algorithms.

Historical data may or may not be helpful in supporting maritime operations. If the environmental observations are outdated (or historical), they may prove useless or detrimental.

Engineering efforts should be conducted to increase the life of buoys.

Automated servicing of buoys using Unmanned Surface Vehicles can reduce costs and improve efficiency, but are not currently being considered by NDBC.

Key changes to data quality and collection methodologies are often contained in the metadata. Work to improve metadata reporting is ongoing.

Data transfer is a key component to supporting decision makers. Innovative nanosatellite constellations focused on communications such as Kinéis may help ensure connectivity with sensors and facilitate access to the correct data at the right time and from the right location.

New technologies are due to digital innovations. Smart networks demand more data and operate at faster rates. Leverage programs such as DARPA's Ocean of Things and Geospatial Cloud Analytics.

Enhance Navy ranges with sensors and models. Networks of real-time sensors and models can support the planning and execution of training and operations. Real-time data is especially useful to support testing and evaluation of new capabilities such as unmanned vehicles.

Observations during extreme events will lead to improved parameterizations in models to help plan for and prevent wave-related damages.

New low-cost wave buoys such as the WindSpotter® measure waves using GPS and winds using the tail of the wave spectrum. These buoys can be deployed as swarms to aid in ship operations.

Data bandwidth is currently limited by Iridium connections, but there is a possibility of transitioning data communication to CubeSat constellations.

The utility of these kinds of innovative buoys to the Navy can be demonstrated during field trials such as the annual Advanced Naval Technology Exercise or ANTX.