



Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology
Commission technique mixte OMM-COI d'océanographie et de météorologie maritime
<http://www.jcomm.info>

JCOMM Technical Workshop on Wave Measurements from Buoys

2 - 3 October 2008, New York, United States

SUMMARY OF THE WORKSHOP

1. Introduction.

The background to convening the workshop was as follows:

- The JCOMM Expert Team on Wind Waves and Storm Surges (ETWS) wished to extend the very limited network of in situ wave observations from moored buoys to other regions;
- In particular, the ETWS was keen to develop significant numbers of in situ wave observations from the deep oceans, possibly using a co-ordinated network of drifting buoys;
- These wishes stemmed from a desire to
 - Improve the opportunities for the validation of satellite wave measurements;
 - Improve the opportunities for the validation of global wave models;
 - Improve the density of wave measurements ahead of hurricanes, and for similar process-related studies;
- Additionally the ETWS was concerned to understand the systematic differences that had been found to exist between two major populations of similar wave measuring buoys, namely the US and Canadian coastal networks;
- The Data Buoy Co-operation Panel (DBCP) was keen to work with the ETWS to make practical progress in tackling the issues;
- The opportunity existed to involve acknowledged experts from the oil and gas industries by holding the meeting in conjunction with the OGP met-ocean meeting in New York in October;
- This would be timely in allowing a proposal for further work to be submitted to the DBCP at its annual session in mid October.

2. Outcome of the meeting.

2.1 Moored Buoys

- Wave buoy data geographical coverage is still very limited, especially as far as any measure of wave directionality is concerned.
- There is no “perfect” or gold standard wave measurement system presently available against which to inter-compare other types of wave measurement. However, the

Datawell sensors were viewed in consensus as the best available and should form the basis for comparisons. If measurement technology improves the standard can be update some time in the future.

- Continuity of the established buoy networks and expansion of directional measurements is a priority both for operational and climate assessment requirements.
- Expanding wave observing capabilities to other parts of the worlds could be desirable from an operational point of view for the areas of interest (where waves are a key parameter for marine activities)
- Establishment of guidelines of best practices for wave measurements from buoys would be an important step in making the buoy measurements consistent across various networks and instrumentation types.
- There is the real need to inter-compare various buoy networks, platforms, and instrumentation to establish consistency for the “first 5 standard” wave measurements.
 - Development of standardised procedures for the buoy inter-comparison will be required.
 - In principle, a proper wave measuring device should reliably estimate the so called “first 5” for directional wave sensors.
 - collocate different buoys with a reference standard (the consensus was for a Datawell waverider buoy) for a least a year at one or more reference sites; sites at Duck, NC and Scripps (US West Coast) were identified as leading candidates, but the Gulf of Mexico, Oahu, NW Australia and the North Sea were also noted as possibilities.
 - The concept of moving intercomparison technology was endorsed, i.e. having easily deployed sensors such as the DW which could be moved to individual sites for periods of time to compare with existing measurements there.
- For buoys not designed to follow wave slope/particle motion, a more promising approach in long term may be to do away with the assumptions and transfer function correction, and instead measure buoy motion and then observe waves directly like from a fixed platform. Research into new measurement technology to measure waves from these platforms, particularly the OceanSites moorings, is a very high priority.
- The meeting agreed with the WIGOS Concept of Operations (CONOPS) recommendation that all wave observational data and metadata should adhere to WIGOS standards for instruments and methods of observation.
- The meeting agreed with the development of best practices and standards documents related to waves and to development of wave metadata within the Meta-T framework
- There is a need to raise awareness of transfer function problems.
- There is a need to raise awareness of sensor options, quality, prospects.
- The DBCP could well be willing to initiate a pilot project to develop procedures and protocols for the continuous testing and evaluation of buoy wave measurements.
- If the pilot project proposal is accepted, the DBCP would likely be willing to set aside up to \$30k per year for 3 years to support the project, provided that matching contributions (in-kind or cash) could be identified from other interested parties;

- The DBCP could also promote the recommendations of the New York wave workshop which are outside the scope of the test and evaluation Pilot Project, including expansion of the moored buoy network of wave measurement and assessment of emerging technologies.
- The ETWS chair agreed to draw up a 'strawman' proposal (this document) to be circulated for comment amongst participants, with a view to presenting it to the DBCP in Cape Town.

2.2 Drifting Buoys

- Un-drogued drifting buoys are recognised as being good wave followers with relatively uncomplicated transfer functions;
- Two technologies were identified that might yield high quality 2-D wave spectra from drifters:
 - Upward looking ADCP to infer 2-D spectra from wave orbital velocities;
 - Specialised GPS to measure motion of drifter at periods of <100s;
- The ADCP technique was seen as being expensive (~\$30k), whereas the GPS hardware was inexpensive (~\$500);
- The GPS technique would require the development of specialised software: some companies had already been active in this field (e.g. JMA/JAXA, Datawell, CCD);
- The DBCP's long experience in transitioning buoy technology from the lab to the operational arena, and in maintaining a global fleet of >1250 drifters built, reporting and archiving to a common standard suggests that they would, in the first instance at least, be a good choice to pursue wave measurements from drifters.
- Moreover the DBCP evaluates technologies impartially without showing favour to any particular nation, organization or manufacturer.
- The DBCP could well be willing to initiate a pilot project to:
 - Intercompare GPS drifter wave measurements with recognised industry standards through a careful test and evaluation programme;
 - In the event that good results are obtained, to sponsor the construction and deployment of up to 50 GPS wave drifters so as to develop confidence in the use of this technology;
- If the pilot project proposal is accepted, the DBCP would likely be willing to set aside up to \$30k per year for 3 years to support the project, provided that matching contributions (in-kind or cash) could be identified from other interested parties;
- The DBCP chair agreed to draw up a 'strawman' proposal (this document) to be circulated for comment amongst participants, with a view to presenting it to the DBCP in Cape Town.