Priorities for Wind-Waves Research

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The Australian Forum for Operational Oceanography (FOO), started in 2015, established a working group to focus on wind-waves. One of the aims of this working group was to identify the key priorities of wind-waves research. This undertaking has been driven by Australian needs, but Australia is just one part of the larger international waves community; results of this process are also relevant to other marine-focused nations.

The process to identify research priorities engaged both researchers and stakeholders in a democratic, collaborative, and iterative

process. The main steps were 1) soliciting possible research questions via an online survey, 2) reviewing and editing the questions at a face-to-face workshop, and 3) ranking the research questions.

A total of 360 survey invitations were emailed to possible participants, with 69 respondents. Half of these were from research organizations, and the remainder from private industry, service providers, or government. The survey gathered a list of ideas that were consolidated to 155 suggestions, which were further reviewed by participants at a wind-waves research symposium and then ranked via a voting process. A second round of online voting was then undertaken that specifically targeted the industry and stakeholder community. The top five priorities were identified, and are referred to here as “tier 1” priorities. A further 10 priorities were identified, and are referred to here as “tier 2,” providing a total of 15 top-ranked priorities.

Tier 1 priorities

1. Enhanced and updated nearshore and coastal bathymetry
2. Improved understanding of extreme sea states.

* An assessment of the “feasibility” of each priority. The size of the circles and the numbers within the circles represent the priority ranking. Relative cost ranges from 1 (low cost) to 9 (high cost) and relative difficulty ranges from 1 (low difficulty) to 9 (high difficulty).

3. Maintain and enhance the in situ buoy network
4. Improved data access and sharing
5. Ensemble and probabilistic wave modeling and forecasting

Tier 2 priorities

6. Advancement of remote-sensing capabilities to measure wave conditions in coastal environments
7. Improved understanding of wave-induced currents and transport
8. Long-term beach/coastline monitoring
9. Nearshore modeling and forecasting
10. Development of wave data assimilation
11. Development of a standardized data and QA/QC specification for wave observations
12. Better engagement of maritime industries with research
13. Improved understanding and prediction of coastal wave impacts

14. Improved understanding of the effect of future climate variability and change on coastal areas
15. Improved modeling of swell propagation

A common thread running through many of these priorities is the nearshore—6 out of the top 15 priorities refer directly to the coast. This is perhaps not surprising; Australia is a distinctly coastal-focused nation. On the other hand, the scope and size of priorities differ considerably. This range of sizes and scopes can be seen as a benefit: feasibility and cost are relevant factors in determining priorities for funding in addition to importance. While the assessment of these factors for research-focused priorities is almost impossible, it is possible to estimate the cost and feasibility of the other priorities. The priorities fall into three clusters. The first cluster includes the major infrastructure activities (1, 3, and 8). These are the most expensive items, but also the most straightforward, and they appear in the lower-right corner of the figure. A second cluster includes research-enabling activities (4, 11, and 12). These are less expensive, but less straightforward and focus more on community activity. These appear near the lefthand side of the figure. The third cluster includes task-related activities (5, 9, and 10). These are of intermediate cost, but they involve some level of difficulty, perhaps incorporating some research. These appear in the upper-middle portion of the plot. This figure can give an indication of the “low-hanging fruit”—that is, high priority, low cost, and easy to do. Depending on where one draws the line, the second cluster including the community-based research enablers falls into this category.

Research priorities can guide funders and other organizations as to how they might prioritize their activities in the medium term. Progress is already being made on many of these activities. The challenge will be to ensure that these priorities are supported and regularly reviewed in terms of their progress and continuing validity. ••

≡ METADATA

BAMS: What would you like readers to learn from this article?

Diana Greenslade (BOM, Australia): *The key message is really the 15 top priorities. Also I'd like readers to understand the process that we went through to determine these priorities. This was via a democratic process (i.e., voting) involving the whole research and end-user community.*

BAMS: What led to the formulation of the process in this democratic manner?

DG: *I had recently returned to Australia from a two-year stint working in Paris with the Future Earth Interim Secretariat. During my time with Future Earth, one of my roles was to coordinate a major international activity to determine the top priorities in global sustainability research. I thought that the technique we used in that activity would also work well with the national wave research priorities working group, and I could also apply some of the lessons learned from the Future Earth experience.*

BAMS: What surprised you about how the process worked?

DG: *I was pleasantly surprised that people were prepared to engage with this somewhat unorthodox process. I was also pleasantly surprised that this “voting” on research actually came up with very sensible results. It's worth noting that the top wave research priority is not actually wave research.*

BAMS: What was the biggest challenge you encountered in setting these priorities?

DG: *At first, some participants resisted the idea of voting on priorities, rather than coming to consensus as a group, or determining research priorities with a top-down approach by senior scientists. I also have to add that the logistics of dealing with such a large number of coauthors were also quite challenging: changes of email addresses, changes of institutions, retirements, etc.*

BAMS: What's next? How will you follow up?

DG: *We have already seen some new infrastructure (two new wave buoys) being put in place partly on the basis of the results of this work. I hope we continue to see new research activities, new infrastructure, or new community activities that are guided by these priorities. I have also seen some related processes start up as well. Following the success of this, one of the coauthors has now initiated a similar process for the related area of coastal geoscience and engineering.*

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