Report of the 18th Symposium on the Coastal Environment

Andre van der Westhuysen, Program Chair, April 6, 2020

The 18th Symposium on the Coastal Environment was held during Jan 13-16, 2020, as part of the 100th AMS Annual Meeting in Boston, MA. The symposium comprised the following sessions, four of which were submitted by the community:

- Coupled Forecasting of Extreme Weather and Coastal Flood Events
- Hazard Assessment and Prediction in the Coastal Marine Environment (including coastal fog and meteotsunamis)
- Downscaling Models (Parcel-Scale)- Atmosphere, Land, and Ocean (submitted)
- 50 Years of Marine Wind and Wave Forecasting (submitted)
- Machine learning and Big Data applications in the coastal environment
- Artificial intelligence applications in the coastal environment (Joint Session with STAC Committee on Artificial Intelligence Applications)
- Precision Navigation: Increasing the safety and efficiency of U.S. seaports (submitted)
- CASPER Special Session: Coastal air-sea interaction affecting electromagnetic wave propagation (submitted)
- Posters on the Coastal Environment

The large number of submitted sessions is seen as a very positive sign. It shows involvement from the coastal community, and should be encouraged for future symposia. This year's symposium drew a record number of abstracts, totaling 75 oral presentations and 13 posters, which we attribute in part to the occasion of the 100th Annual Meeting. Likewise, attendance was at a record height, with audiences of up to 60 for the most popular sessions.

Highlights of the symposium were:

1. *Coupled Forecasting of Extreme Weather and Coastal Flood Events*

This symposium topic continued to be popular amongst both presenters and attendees. A total of 24 oral talks and 3 posters were presented by government, academia and students. The applications ranged from theoretical advancements, to new academic models including aspects such as sediment transport, and descriptions of operational system upgrades. A special session was devoted to NOAA's COASTAL Act project, in which various modeling and data management activities were presented that make up a high-precision hindcasting model for inundation from major landfalling hurricanes. A specific aspect of coupled surge modeling that attracted significant interest is coupling to riverine flow, in order to account for compound flooding.

2. *50 Years of Marine Wind and Wave Forecasting*

This was a unique session submitted to celebrate the occasion of the 50th anniversary of a seminal Ph.D thesis by Dr. Vincent Cardone (AMS Fellow, 2001) on the topic of wind forecasting and the resulting prediction of wind-generated ocean waves. This special session

featured four invited speakers who are former collaborators of Dr. Cardone and authorities in the field of wind-wave modeling, namely Donald Resio, Hans Graber, Andrew Cox, and Charles Linwood Vincent. These talks covered topics ranging from the history of wind-wave modeling for scientific and engineering applications, the wide-ranging impact of Dr. Cardone's work, to the current status of the field and an outlook. The session was well attended, and fitted well with the retrospective theme of the 100th Annual Meeting, providing a unique overview of this sub-discipline in ocean and coastal science.

3. *Precision Navigation: Increasing the safety and efficiency of U.S. seaports*

This was another submitted session with board application to the coastal community. The International Maritime Organization (IMO) has made it compulsory to fit the Electronic Chart and Display System (ECDIS) to all new passenger and cargo vessels by August 2017. As a result, government organizations, such as NOAA's National Ocean Service and National Weather Service (Ocean Prediction Center) have been developing forecast products such as atmospheric, wave and ocean current conditions according to these dissemination standards for the use in the shipping industry. This special session contained a number of talks on the subject of these standards and the forecast products that are being developed. In addition, the increased use of these metocean data in the coastal shipping community was highlighted by a discussion of their use in the calculation of ship motions, in to predict the seabed clearance under the keels of large vessels entering the Port of Long Beach, CA.

4. *Artificial intelligence applications in the coastal environment*

An interest that is growing strongly in the community is the application of artificial intelligence/machine learning to coastal modeling problems such as inundation modeling, ocean wave modeling, and classification problems (e.g. coastal land cover mapping). These methods have the potential to either supplement current physics-based model products with postprocessing (e.g. wave system classification), or replace these physics-based model entirely (e.g. machine learning-based coastal surge modeling). In this regard, the joint session with the STAC Committee on Artificial Intelligence Applications to Environmental Science is fruitful, and worthwhile continuing in the future.

Suggestions for future symposia:

- *Invited speakers*: The practice of inviting one or more speakers who are authorities in their field was found to be effective in attracting attention to the symposium, for example in the special session on 50 years of wind and wave modeling. It is therefore recommended to continue this in the future, strategically selecting a prominent speaker in alignment with the symposium theme.
- *Break-out sessions*: A novel suggestion by one of the committee members is to incorporate one or more break-out session on a current topic of particular interest to the community. The thought is to leverage the presence of many experts at the same symposium to have productive discussions on such topics.
- *Plenary panel discussion*: A similar, but more focused approach would be to arrange a plenary panel discussion at the end of the symposium, with panelists invited from the

various sessions. This was not pursued at the 18th Symposium, but has been successful in the past.