2021-2030 United Nations Decade of the Ocean Science for Sustained Development
Satellite Activity: Satellite Monitoring of Pelagic Sargassum
Executive Summary

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The United Nations has proclaimed a Decade of Ocean Science between 2021 and 2030, which is geared towards a sustainable development in support of efforts to reverse the cycle of decline in ocean health and to gather stakeholders worldwide behind a common framework to ensure that ocean science can support countries in creating improved conditions for sustainable development. At this moment, as part of the efforts being conducted during the UN Decade of the Ocean for the Outcome "A Safe Ocean", there are 19 Satellite Activities, which include topics such as tsunamis, micro-plastics, sea level rise, and fisheries. What follows is the Executive Summary of Pelagic Sargassum, one of the Satellite Activities linked to the "A Safe Ocean" official Outcome.

This Activity was held on April 6, 2022, in a virtual setting hosted by the Atlantic Oceanographic and Meteorological Laboratory of the National Oceanic and Atmospheric Administration. The Activity was composed of 8 presentations (see list) and 1 demonstration given by experts from a diverse and prestigious group of institutions, which was followed by a period of questions and answers, and discussion. A total of 97 participants attended this Activity. This Activity served to bring together a large group of researchers and stakeholders carrying out Sargassum research and monitoring.

During the Activity the presenters synthesized the main highlights of several efforts geared towards monitoring Sargassum from space, validation procedures, pathways, assessments of spatio-temporal variability and coastal risk inundation in the Caribbean region, Gulf of Mexico, and US Southeast coast. The monitoring of Sargassum is important in several aspects. For example, decomposing Sargassum releases hydrogen sulfide gas and ammonia, which can cause respiratory, skin and neurocognitive symptoms in humans. In addition Sargassum contains concentration of Arsenic and heavy metals that represent a risk for human and animal health. Since 2011 large amounts of Sargassum bloom and grow in the tropical Atlantic and travel into the Caribbean region, Gulf of Mexico, and US east coast in amounts that have exceeded 20M tons during the 2018 event. The understanding of the bloom and growth of Sargassum is critical to conduct modeling studies and monitoring efforts, helping to mitigate the impact in economy, tourism, coastal ecosystems and public health. The first advances have been made to overcome some of the difficulties to reproduce growth conditions in laboratory experiments, where motion (water circulation) appears to be key for the continuous growth of Sargassum. Satellite data schemes used together with sargassum cluster distribution analysis, show the importance of ocean currents, particularly mesoscale eddies, and wind field analysis, which provide insights of until recently unknown pathways of Sargassum in the tropical Atlantic Ocean, and water mass (e.g. temperature) and dynamics properties that may affect coastal inundation. Making use of models that can reproduce the most important ocean and atmospheric parameters involved in

transports, pilot Sargassum monitoring and forecast tools are now or will soon be available on a daily and weekly basis for high resolution (1km-20m) detection and short term (1-5 day) forecasts. On a seasonal time scale, a first effort of a forecasting system is currently being evaluated and expected to be improved once more progress is made to understand Sargassum physiology (for growth and decay modeling), representation of macronutrient balance in the tropical Atlantic, and observability of the phenomenon at large scales. Validation methods using coastal and open ocean observations from citizen science volunteer contributions, experiments, and opportunistic detections, show the robustness of current satellite monitoring efforts for the open ocean and coastal risks, which in turn will be benefited from more in-depth classification of Sargassum areal extend and amounts using, for example, Artificial Intelligence methods. The products presented during this Satellite Activity are currently being used to monitor potential risks in coastal areas. Interaction with local governments and decision makers was identified as a key priority to make results from research more impactful for society, including benefits in health and local economies.

List of Presentations:
Why is Sargassum Important?, by Joaquin Trinanes (Organizer, University of Santiago, Spain, and NOAA)
Science of Sargassum, Biology, by Brigitta I. van Tussenbroek (Universidad Autonoma de Mexico, Mexico)
Science of Sargassum, Transport, by F. Javier Beron-Vera (University of Miami, USA)
In-Situ Monitoring Efforts, by Lowell A. R. Iporac (Florida International University, USA)
Satellite Monitoring Efforts, by Chuanmin Hu (University of South Florida, USA)
Satellite Product Validation, by Nathan Putman (LGL Ecological, USA)
Synoptic Integrated Forecast Systems, by Marion Sutton (CLS, France)
Seasonal Integrated Forecast Systems, by Julien Jouanno (IRD, France)
Demonstration Tools, by Joaquin Trinanes (University of Santiago, Spain, and NOAA)
Link to selected presentations: here

Important Links:
The UN Decade of the Ocean: link
Satellite Activities during the UN Decade of the Ocean: link
Satellite Monitoring of Pelagic Sargassum: link
Sargassum Inundation Risk: link
Sargassum Bulletins: link