

Island Modeling Using Unstructured Grid during a Tropical Storm

Mourani Sinha, Ravi Kumar Yadav, and Paromita Chakraborty
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Abstract: The coastal wave dynamics of Agatti island situated on a coral atoll in Lakshadweep, India, having a notable topographic feature of steeper eastern shore over the western shore, is analysed in this study. A multinested model setup is generated using the global third-generation models WAM (Wave Modeling) and SWAN (Simulating Waves Nearshore). A high resolution unstructured grid is generated for the domain containing the island using SMS (Surface-Water Modeling System) interpolated with merged GEBCO (General Bathymetric Chart of the Oceans) and SRTM (Shuttle Radar Topography Mission) bathymetry. The SWAN model is integrated with a fine resolution of one minute by one minute during the tropical storm 01A (05–10 June 2004) which passed near the island. Model simulated significant wave height data when validated against satellite observations exhibited high accuracy. SWH (significant wave height) is observed to be greater for the west coast than that over the east coast of the island due to steeper eastern shore and there is widespread wave energy dissipation along the southwest direction of wave propagation during normal conditions. The one-dimensional energy density spectra generated during the storm period exhibit multimodality with structured and unstructured grids.