Toward Beach Water Quality Modelling in Dorado PR: Preliminary Hydrodynamic Simulations

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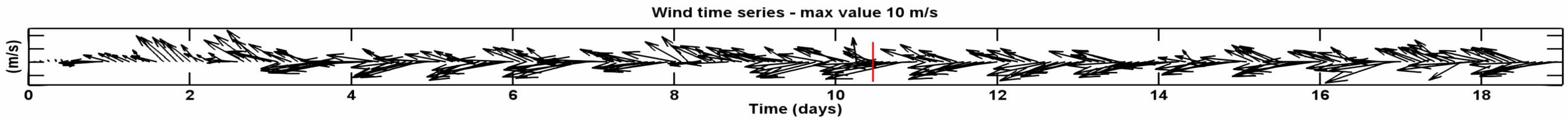
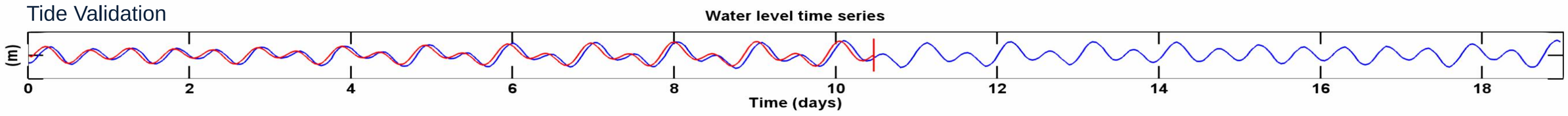
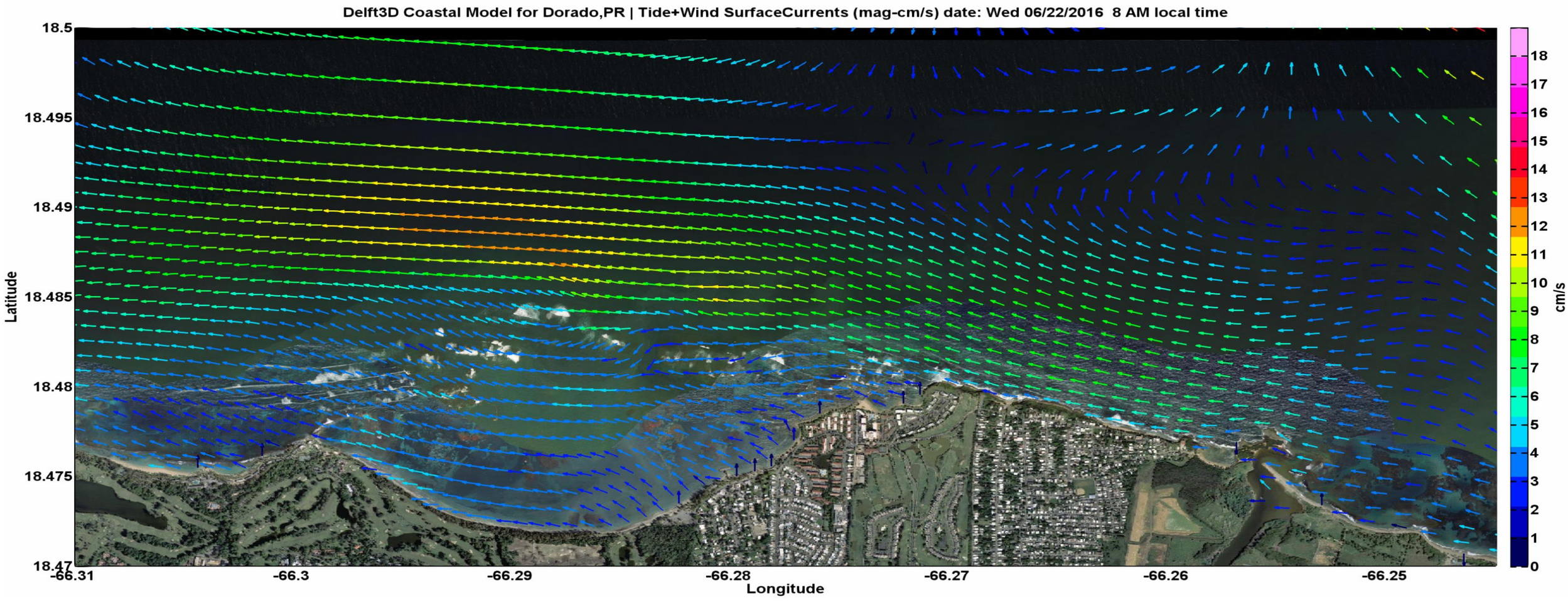
Delft3D Hydrodynamic Coastal Model



Tide Validation

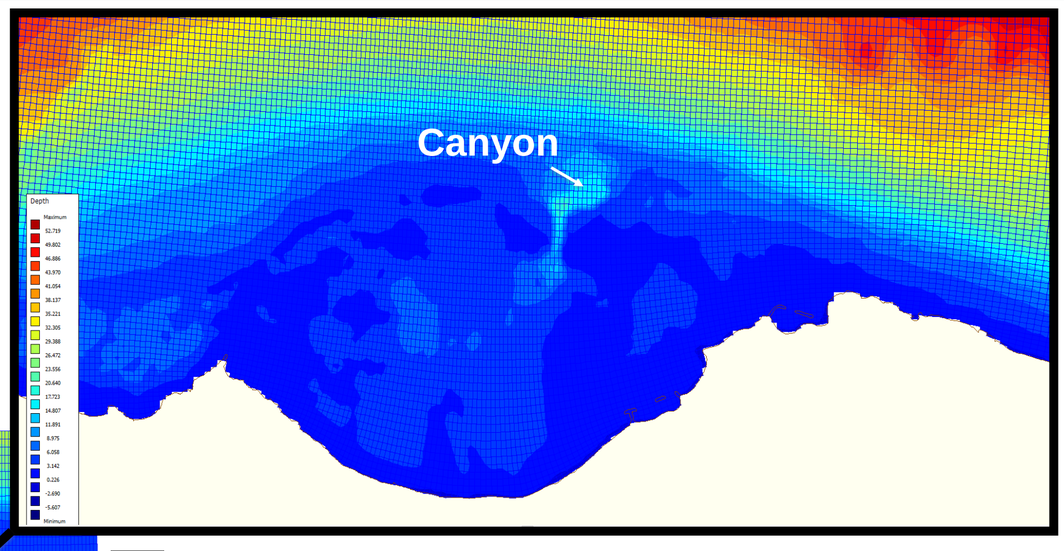


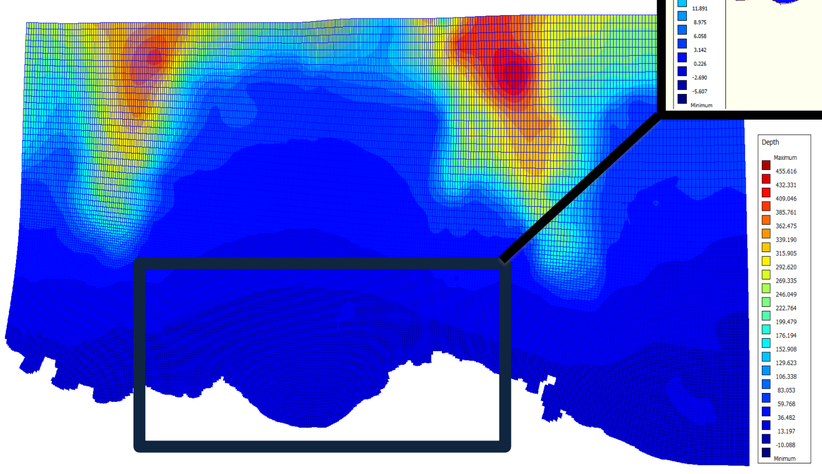


Delft3D numerical modelling tool has been configured and implemented in Dorado Public Beach, Puerto Rico. Using geographic information such as Digital Elevation Models (bathymetry) and ocean driving forces such as tides, winds and waves, it is possible to generate a circulation model for hindcast and forecast applications.

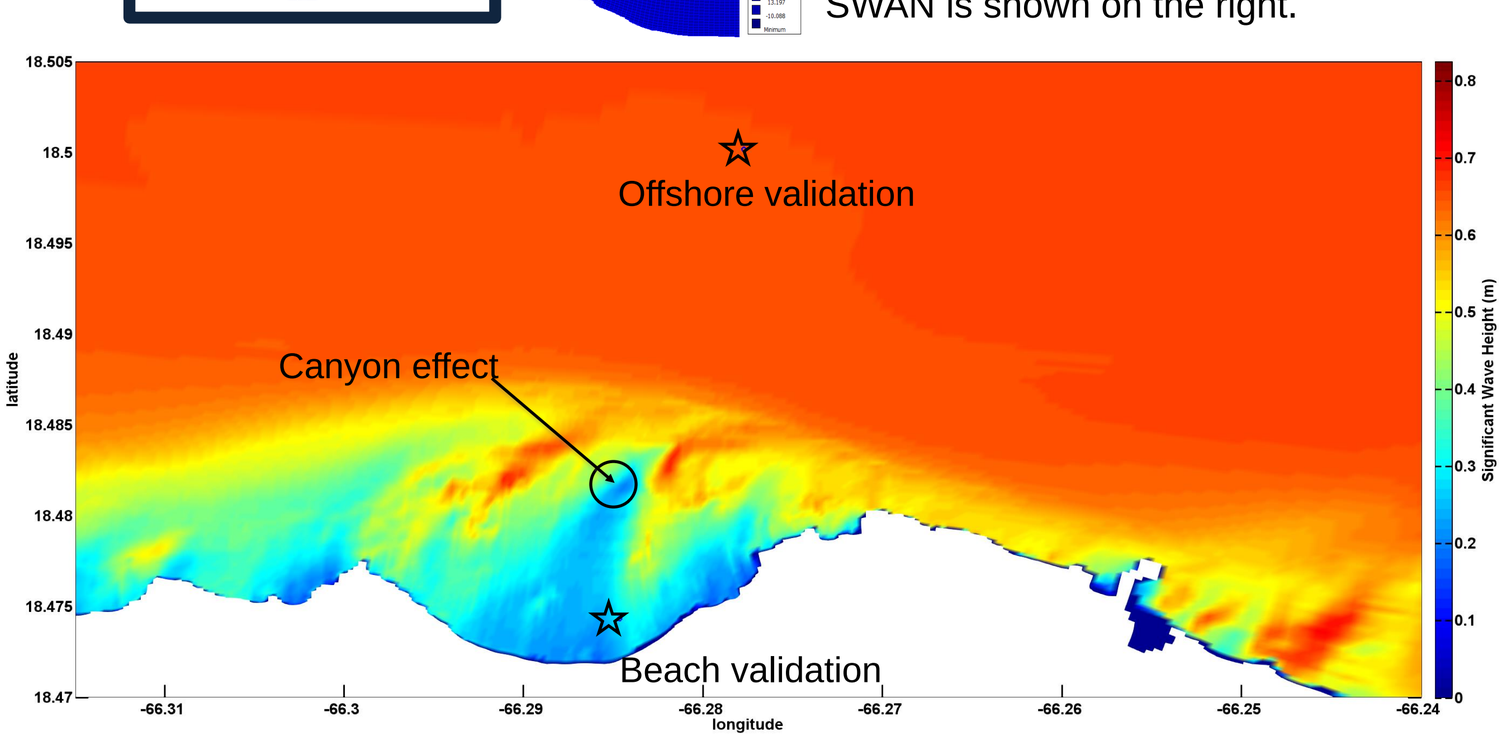
Model Setup & Development

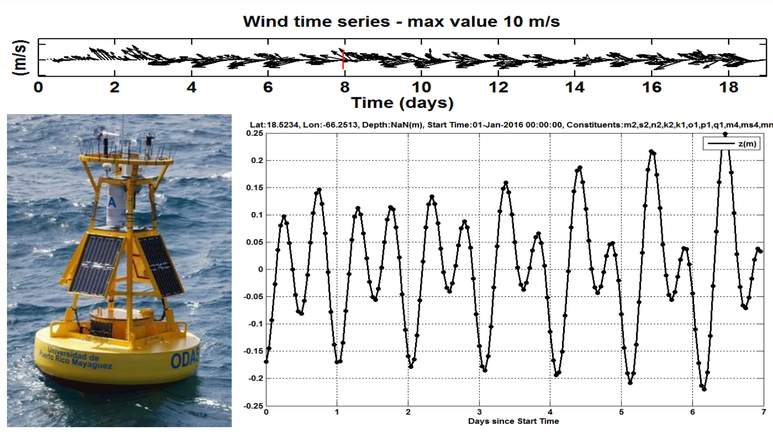
A curvilinear structured grid with varying resolution is designed to represent our spatial domain. Discrete attributes such as depth and bottom roughness are assigned to each grid cell as part of the model setup. Grid varying spatial resolution is required to represent an accurate coastal profile.



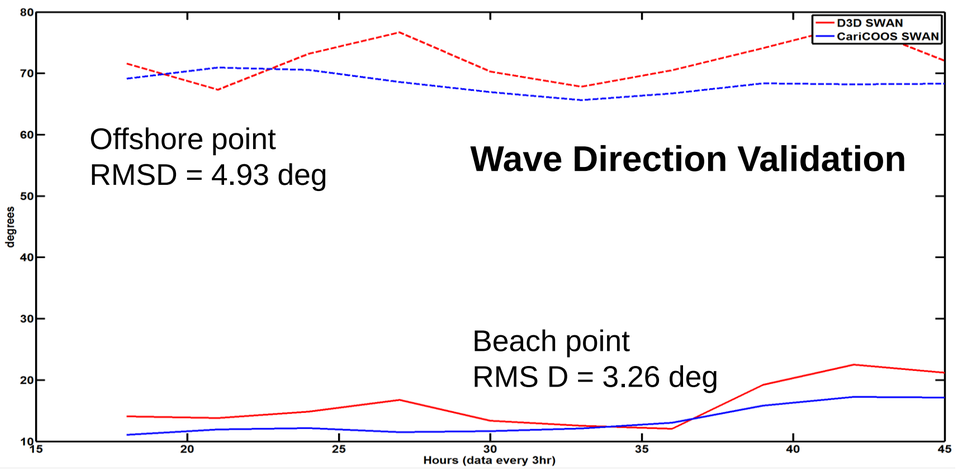


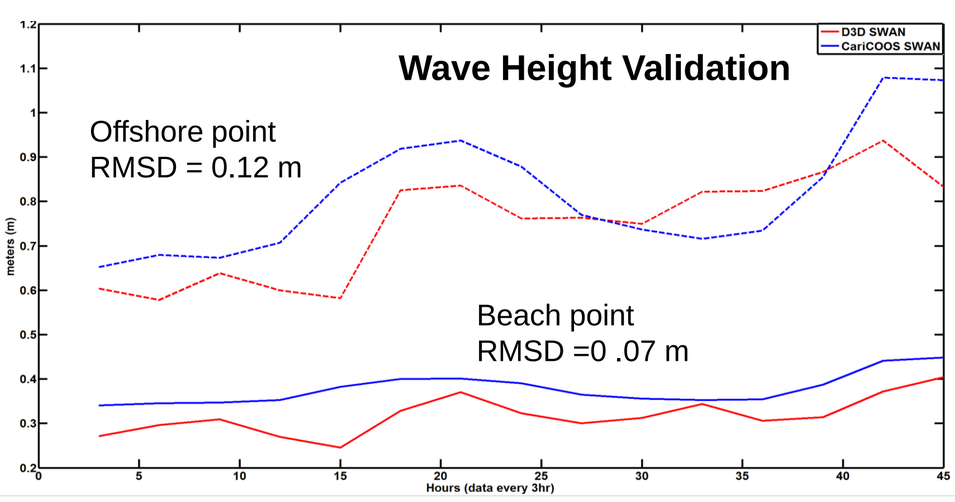
Wave dynamics are the dominant forcing along the complex nearshore region of Dorado, PR. The spatial distribution of wave heights, as resolved by D3D, is shown below; validation with operational CariCOOS SWAN is shown on the right.





Wind and wave information is taken from CariCOOS San Juan Buoy, while tides are obtained from OSU's Tidal Model Driver.





Future Work & Acknowledgements

Water quality simulations for different mete-ocean conditions will be developed after an accurate hydrodynamic model is completed and validated. This project is primarily supported by the Puerto Rico Sea Grant College Program, to which we extend our most sincere appreciations for the opportunity and support. CARICOOS has also provided in-kind support to this effort. We also appreciate valuable input from M. Canals and J. González López.