

## Use of Satellite Altimetry and Moderate Resolution Imaging Technology of Flood Extent to Support Seasonal Outlooks of Nuisance Flood Risk along United States Coastlines and Managed Areas

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**Abstract :** U.S. coastal areas and ecosystems are facing multiple sea level rise threats and effects: heavy rain events, cyclones, and changing wind and weather patterns all influence coastal flooding, sedimentation, and erosion along critical barrier islands and can strongly impact habitat resiliency and water quality in protected habitats. These impacts are increasing over time and have accelerated the need for new tracking techniques, models and tools of flood risk to support enhanced preparedness for coastal management and mitigation. To address this issue, NOAA National Ocean Service (NOS) evaluated new metrics from satellite altimetry AVISO/Copernicus and MODIS IR flood extents to isolate nodes atmospheric variability indicative of elevated sea level and nuisance flood events. Using de-trended time series of cross-shelf sea surface heights (SSH), we identified specific Self Organizing Maps (SOM) nodes and transitions having a strongest regional association with oceanic spatial patterns (e.g., heightened downwelling favorable wind-stress and enhanced southward coastal transport) indicative of elevated coastal sea levels. Results show the impacts of the inverted barometer effect as well as the effects of surface wind forcing; Ekman-induced transport along broad expanses of the U.S. eastern coastline. Higher sea levels and corresponding localized flooding are associated with either pattern indicative of enhanced on-shore flow, deepening cyclones, or local-scale winds, generally coupled with an increased local to regional precipitation. These findings will support an integration of satellite products and will inform seasonal outlook model development supported through NOAA's Climate Program Office and NOS office of Center for Operational Oceanographic Products and Services (CO-OPS). Overall results will prioritize ecological areas and coastal lab facilities at risk based on numbers of nuisance flood projected and inform coastal management of flood risk around low lying areas subjected to bank erosion.

**Keywords :** AVISO satellite altimetry SSHA, MODIS IR flood map, nuisance flood, remote sensing of flood

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