

# Reconstructing the Eta and Iota Events for San Andrés and Providencia: A Focus on Urban and Coastal Flooding

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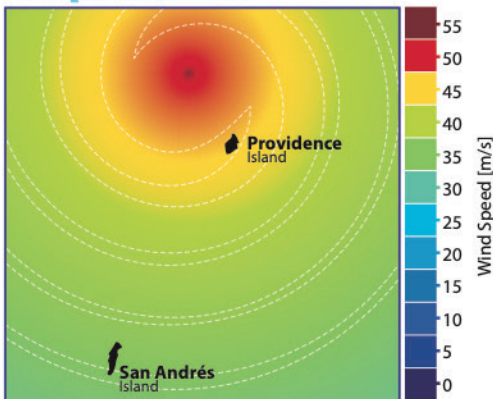
## Abstract

Hurricanes Eta and Iota were the most intense events during the 2020 Atlantic hurricane season, and their passage caused serious infrastructure affectations and even human losses in the Archipelago of San Andrés, Providencia and Santa Catalina due to the extreme winds, storm surge flooding and rainfall flooding. Numerical modeling and field measurements were used to reconstruct the effects of these events on the archipelago. The simulations were conducted with WAVEWATCHIII, SWAN, XBeach, Storm Water Management Model (SWMM), and a parametric model for hurricane winds. A differentiated contribution of each hazard on physical infrastructure, coastal ecosystems and population is represented through: winds up to 50 m/s, significant wave heights (Hs) between 1m and 6m in intermediate waters (around 10m deep) associated with flood levels in the order of 2m on the coast, and flood distances varying between 12m and 904m. A spatial distribution of Hs and the contribution of wave run-up and storm surge in some areas of the archipelago showed the importance of mangrove and coral reef ecosystems to mitigate the intensity of Eta and Iota on the coast. This study encourages science-based decision-making and provides information for policymakers to consolidate risk assessments in vulnerable zones like the archipelago.

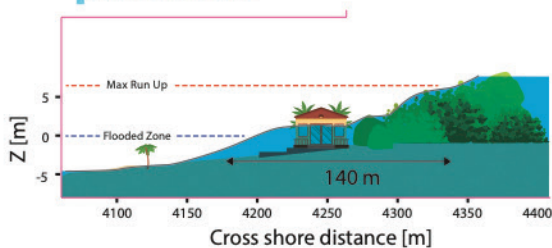
*Keywords: Tropical cyclones. Storm surge. Urban flooding. Coastal flooding. Archipelago of San Andrés, Providencia and Santa Catalina.*

## ATMOSPHERE-OCEAN-LAND INTERACTIONS DURING A HURRICANE

### MAXIMUM WIND SPEED (I) of up to 55 m/s



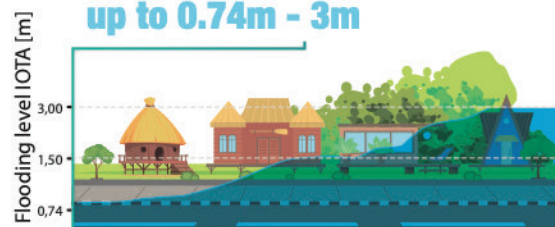
### MAXIMUM COASTAL FLOODING (II) max. height 6m 100m - 500m penetration



### COASTAL FLOODING



### MAXIMUM URBAN FLOODING (III) up to 0.74m - 3m



### URBAN FLOODING

