FLOOD PREDICTION IN AN URBANIZED EMBAYMENT: ADVANCING THE PREDICTIVE SKILL OF URBAN FLOOD MODELS THROUGH THE INTEGRATION OF TIDE, SURGE, WAVE AND FLOOD CONTROL PROCESSES.

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Newport Beach, California is a highly developed, densely populated lowland along the Southern California coast. Currently, episodic flooding occurs from coincident high tide and waves events, and the frequency and intensity of flooding is expected to increase with projected future sea levels. Adaptation to elevated sea levels will require advanced flood modeling tools that are sensitive to the dominant factors affecting flooding including extreme high tides, waves and flood control infrastructure.

Considerable effort has focused on the mapping of sea level rise for urbanized embayments, however these models rely often upon pl anar surface methods implemented in Geographical Information Software which do not represent critical dynamical processes such as embayment amplification and overtopping flows needed to map unsteady flooding effects in coastal lowlands protected by dunes, levees and seawalls. Here, a recently developed two dimensional Godunov based non-linear shallow water model parameterized with fine-scale flooding thresholds and embedded with empirical wall and dune overtopping models is presented. We apply the integrated tide, wave, surge and flood control infrastructure model in Newport Beach, California where we benefit from extensive local data and examine the sensitivities and uncertainties associated with these important dynamic processes.