Alongshore Synchronization of Rip Current Hotspots and Beach Access at Pensacola Beach, Florida and Galveston, Texas

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Submersions and near-submersions at Pensacola Beach, Florida and Galveston, Texas represent major but preventable health problem that the local health districts consider to be of significant personal and societal cost. On both islands, submersions and near-submersions are primarily attributed to some combination of heavy surf and rip currents. While rip currents are generally considered to be ephemeral features along most sandy coasts, there is evidence for hotspots of heavy surf and rip current development along both sections of coast. Wave and current modeling data are presented to suggest that heavy surf and rip current development at these hotspots are not just the result of storm waves as predicted by standard rip current indices, but are also associated with a relatively wide range of wind and wave forcing (including sea breezes) that interact with bathymetry to create alongshore convergences (and divergences) of wave height. As a consequence, beach rescues at both locations tend to be clustered in areas with relatively heavy surf and a greater propensity for rip development during both storm (red and black flag) and non-storm (green and yellow flag) conditions. The clustering of submersions and near-submersions is reinforced by the presence of primary beach access points at many of the hotspots. It is argued that the rip current hazard on both beaches is a result of a spatial and temporal synchronization of geology, environmental forcing (winds and waves), and the personal and group behavior (including population, location, time in water, etc.) of those using the beach.