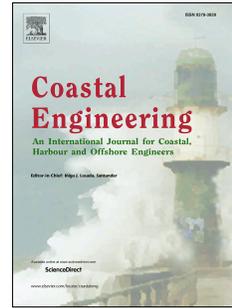


# Accepted Manuscript

Identification of storm events and contiguous coastal sections for deterministic modeling of extreme coastal flood events in response to climate change

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PII: S0378-3839(17)30532-X

DOI: [10.1016/j.coastaleng.2018.08.003](https://doi.org/10.1016/j.coastaleng.2018.08.003)

Reference: CENG 3406

To appear in: *Coastal Engineering*

Received Date: 3 October 2017

Revised Date: 2 July 2018

Accepted Date: 2 August 2018

Please cite this article as: Erikson, L.H., Espejo, A., Barnard, P.L., Serafin, K.A., Hegermiller, C.A., O'Neill, A., Ruggiero, P., Limber, P.W., Mendez, F.J., Identification of storm events and contiguous coastal sections for deterministic modeling of extreme coastal flood events in response to climate change, *Coastal Engineering* (2018), doi: 10.1016/j.coastaleng.2018.08.003.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

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18 **Abstract**

19 Deterministic dynamical modeling of future climate conditions and associated hazards, such as  
20 flooding, can be computationally-expensive if century-long time-series of waves, sea level  
21 variations, and overland flow patterns are simulated. To alleviate some of the computational  
22 costs, local impacts of individual coastal storms can be explored by first identifying particular  
23 events or scenarios of interest and dynamically modeling those events in detail. In this study, an  
24 efficient approach to selecting storm events for subsequent deterministic detailed modeling of  
25 coastal flooding is presented. The approach identifies locally relevant scenarios derived from  
26 regional datasets spanning long time-periods and covering large geographic areas. This is done  
27 by identifying storm events from global climate models using a robust, yet computationally  
28 simple approach for calculating total water level proxies at the shore, assuming a linear  
29 superposition of the important processes contributing to the overall total water level. Clustering of  
30 the total water level time-series is used to define coherent coastal cells where similar return  
31 period water level extrema occur in response to region-wide storms. Results show that the more  
32 severe but rare coastal flood events (e.g., the 100-year (yr) event) typically occur from the same  
33 storm across the region, but that a number of different storms are responsible for the less severe  
34 but more frequent local extreme water levels (e.g., the 1-yr event). This new 'storm selection'  
35 approach is applied to the Southern California Bight, a region of varying shoreline orientations  
36 that is subject to wave refraction across complex bathymetry, and shadowing, focusing,

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