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Typhoon-driven wave deposits on island rock coasts in the Gulf of Thailand

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Palaeogeomorphological knowledge can be usefully applied to understand better the risks that marine flood hazards pose to low-lying coastlines. Examination of reef-derived coarse carbonate clastic deposits on tropical coastlines in particular, i.e. boulders and megaclasts [1], has been shown to provide valuable information on the magnitude and frequency of high-energy wave events driven by typhoons and/or tsunamis, especially if age-dating of clast coral fabric is able establish the approximate timing of such events over the recent geological past.

This work presents results of investigations on the islands of Ko Larn, Ko Sichang and Ko Samui in the Gulf of Thailand (GoT) [2,3]. Over 200 boulders of carbonate lithology were mapped, measured and sampled from various coastal settings, including beaches, wave-cut rock platforms, Holocene emerged reefs (Fig. 1), and up to almost 5 m above sea level on talus-mantled cliffs and slopes. Adjacent coral reefs are the presumed geological source. Using available hydrodynamic transport equations, powerful onshore flow velocities over 5 ms^{-1} can be estimated (Fig. 2), generated by breaking waves during initial boulder emplacement according to rolling, sliding or lifting modes of transport. In the absence of tsunamigenic mechanisms in the region, these clastic deposits are believed to represent evidence of prehistorical typhoons that managed to penetrate the northern GoT over the past two millennia, even though few storms with similar trajectories have been observed in modern times.

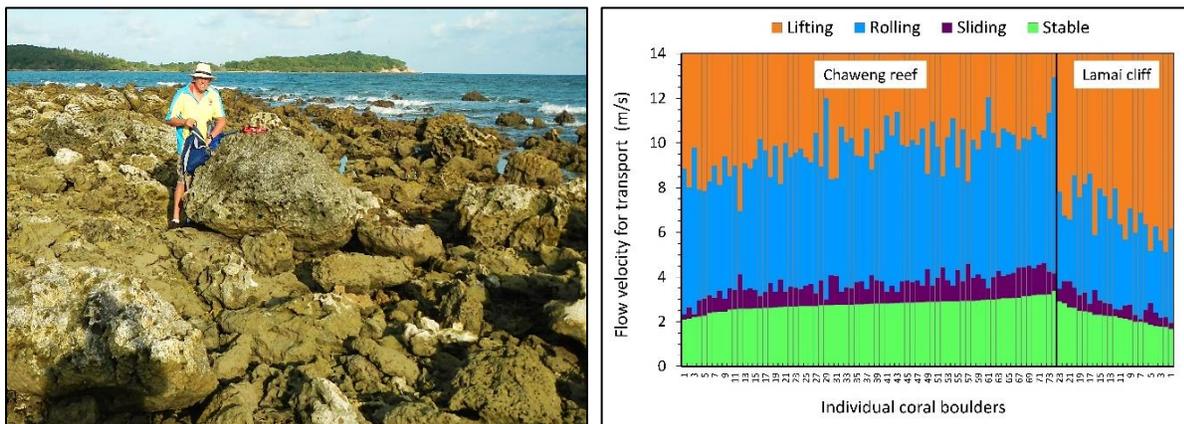


Figure 1: Carbonate boulder field strewn across the 100-m wide Holocene emerged reef platform at Chaweng, Ko Samui, Thailand.

Figure 2: Histogram of flow velocities that are able to initiate boulder transport. The minimum flow velocities required to move individual boulders by an assumed transport mode are the values at the base of each colour band. Lifting is assumed for boulders at the Lamai cliff site in eastern Ko Samui.

Example.....

References:

- [1] Terry JP and Goff J (2014) *J Sediment Res* 84:192-197
- [2] Terry JP et al. (2015) *Estuar Coast Shelf S*, 165:261-269
- [3] Terry JP et al. (2016) *Earth Surf Processes*, doi:10.1002/esp.3873

Example.....
