OBSERVATION OF WAVE RUNUP SEASONALITY ON A REEF-LINED BEACH IN THE CARIBBEAN

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Small Caribbean Islands are highly vulnerable to coastal flooding. On the one hand, because the limited space and topographical constraints have oriented human development near to coastal areas but on the other hand, because the Caribbean region is exposed to strong hydrodynamic events materialized by winter strong swells and hurricanes. The strength of the latter is predicted to rise in the near future (Knuson et al., 2019) and in association with other effects of climate change like sea level rise, the frequency of flooding events is expected to rise in the next decades (Vitousek et al., 2017) as well as their impact on human assets. The wave runup is the maximum onshore elevation reached by waves. When extreme, this process may induce overtopping and upperbeach destabilization leading to erosion and backshore flooding.

Longterm monitoring of runup and its implications on reef-lined shore are scarce, therefore this study propose a .. days monitoring of daily maximum runup on a Caribbean beach located in Guadeloupe Island (France). The beach is bounded by a narrow chaotic fringing reef mainly composed by an assembly of dead colonies of *Acropora Palmata* with an algae cover, though the bottom subtract remain very complex. The site is exposed to strong Atlantic swells during the winter season (from December to March) and episodically during the cyclonic season (from July to November).

The runup monitoring was performed with a low-cost Solarcam® video monitoring system. The devices takes a 8 MP resolution picture every 10 minutes which is automatically followed to a ftp server. After a georectification process performed using GPS ground control points (see Holland et al., 1997) images were used to extract daily maximum runup on a profile.

The chronic obtained was compared to waves and sea level data in order to evaluate their respective impact on runup. An important mitigation by sea level annual cyclicity has been identified resulting in a nonlinear impact of offshore waves. The role of the reef in the process is discussed.

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References

Holland, K.T.; Holman, R.A.; Lippmann, T.C.1997. Practical use of video imagery in nearshore oceanographic field studies'. *IEEE J. Ocean Eng*., 22, 81–92.

Knutson, T., Camargo, S. J., Chan, J. C. L., Emanuel, K., Ho, C., Kossin, J., Mohapatra, M., Satoh, M., Sugi, M., Walsh, K., & Wu, L. 2019. Tropical Cyclones and Climate Change Assessment: Part I: Detection and Attribution, *Bulletin of the American Meteorological Society*, *100*(10), 1987-2007.

Vitousek, S.K., Barnard, P.L., Fletcher, C.H., Frazer, N., Erikson, L.H., Storlazzi, C.D., 2017. Exponential increase in coastal flooding frequency due to sea-level rise. Nat. Sci. Rep. 7, 1399. https://doi.org/10.1038/s41598-017-01362-7.