

Interactive comment on “Probabilistic hurricane-induced storm surge hazard assessment in Guadeloupe, Lesser Antilles” by Y. Krien et al.

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The database do not rely on historical events, as explained in section 3.1, but on very large synthetic datasets of thousands of hurricanes passing nearby Guadeloupe. These synthetic storms were provided by applying the statistical-deterministic models of Emanuel et al. (2006) to the observed climate in the North Atlantic Ocean between 1980 and 2011. In all, it is not four, but hundreds of strong events (category 4 or 5) that were simulated to estimate the 100- and 1000-year return levels.

The 1000-year return levels are not extrapolated but empirically inferred from this large

C530

database that represents tens of thousands of years of synthetic cyclonic activity, taking into account the natural variability in hurricane frequency, size intensity and track that were observed during the last decades. All the details about the numerical-statistical atmospheric model have been presented in previous papers (eg. Emanuel et al. 2006).

We are not aware of any paper investigating the ability of hurricane to produce large surges as a function of size and strength in the French Lesser Antilles. Hence, the events selection was achieved using a trial and error method. The 100km radius criteria was first selected since we did not find any record of hurricane inducing large surges beyond this distance in the French West Indies. Then we simulated all the hurricanes in the database in decreasing order of strength, until the intensity was found to be too low to change the results. Finally, as mentionned in section 3.2, we checked that strong events passing at a distance of 100km from Pointe-A-Pitre were not able to produce surges larger than the computed 100-year levels, except if they display sizes considerably larger than what has been observed in the past. Although we admit that exceptionnaly strong and large hurricanes farther than 100km might theoretically occur and produce surges larger than the estimated 100-year level, we expect this kind of event to be much too rare to change our results significantly (as stated in section 3.2)

Emanuel, K., Ravela, S., Vivant, E., Risi, C.(2006). A statistical deterministic approach to hurricane risk assessment. Bull. Am. Meteorol. Soc., 87, 299-314

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C531