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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "A 30-m scale modeling of extreme gusts during Hurricane Irma (2017) landfall on very small mountainous islands in the Lesser Antilles" *by* Raphaël Cécé et al.

Anonymous Referee #2

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In the manuscript, numerical simulations were conducted with the WRF-LES framework by focusing on strong wind gusts in Saint Barthélemy and Saint Martin islands during the landfall of category 5 Hurricane Irma (2017) on simulated by with the 30-m scale. Terrain gust speed-up factors greater than one were identified for the two islands. They suggested that the 30-m grid spacing is necessary to simulate intense 400-m tornado-scale vortices and the associated peak gusts. Overall, it is very interesting research and I believe that the results can improve our understanding of the extreme wind gust associated with tornado-scale vortices in the tropical cyclone inner core. Specific comments: 1. Experimental design: A typical grid ratio in WRF is 3:1, or any odd integer ratio for computational efficiency and accuracy (Skamarock et al.

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2008). The nesting ratios of the third, fourth, fifth domains in this study are not exactly, but close to 3. Some words are needed for specific consideration. 2. More detailed description is needed about the experiments. For example, When are the inner domains added in the three experiments? When are the topography and land-use removed in the NOIS and NOTP experiments? How many vertical layers are used in these experiments below 1-km altitude? 3. How many tornado-scale vortices (TSVs) are found in the NOIS90-NBA and NOIS30-NBA experiments? Since the previous studies (Wu et al. 2018, 2019) mentioned that TSVs are prevalent inside the TC eyewall. Has the structure of the simulated TSV been carefully examined? It seems that the scale is much smaller than those in Wu et al. (2019). 4. Why are the upstream surface winds over the sea in the REAL030 experiment generally higher than those in the NOIS030 experiment in Fig. 8a? 5. Physical explanation is strongly suggested to understand the enhancing effect of topography. 6. Why are some characteristics of discontinuities in the maximum instantaneous gusts in Fig. 9a (shading)?

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