Reply to Kennedy et al.: Katrina storm records in tide gauges

We appreciate the opportunity to discuss our definition of events of Katrina magnitude. Kennedy et al. (1) argue that our definition of Katrina magnitude events (2) is too low because we do not use any tide gauge data in the immediate proximity of New Orleans and the region of absolute maximal surge height.

We note that hurricane best track records (3) for Katrina magnitude events show a ~20-y return period, similar to our estimate (2), which supports our definition of the Katrina benchmark. We therefore strongly dispute that our benchmark is too low and that it corresponds to merely moderate events.

In our definition (2) of the benchmark, we do not use absolute surge heights or high water marks, which depend on local geometry, tides, waves, and the exact path of the hurricane. We designed preprocessing steps that minimize these complicating factors and thus greatly increase the hurricane surge footprint. First, we normalize surge records to reduce the amplifying effects of local coastal geometry. New Orleans is in a region that effectively funnels the surge into a confined space, which leads to greater surges in general. Second, we use day-to-day differences of daily averages that remove waves and tides and that extract the slower large-scale ocean swells associated with the hurricane surge. These two processing steps render our admittedly small sample of tide gauges much more representative of the entire coast line as illustrated in Fig. 1. If Kennedy et al. (1) are correct that our measure of storm surge for Katrina magnitude events is too low, then we can examine the implications of choosing a more extreme benchmark. One of our results is that the most extreme surges are also the most sensitive to warming, in agreement with many other hurricane studies (4). Thus, we would have projected an even greater relative frequency increase if a more extreme benchmark for Katrinas had been chosen [as argued by Kennedy et al. (1)].

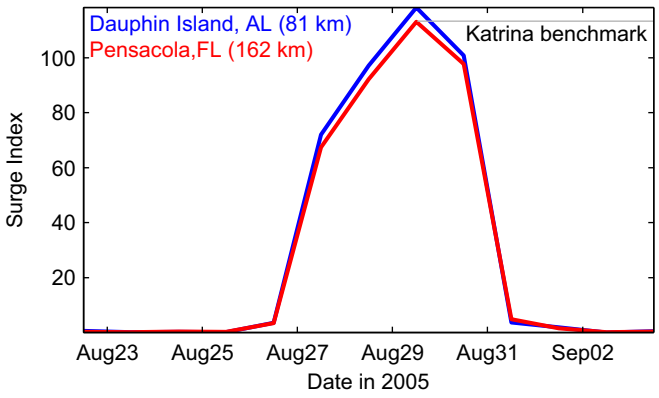

Fig. 1. The Hurricane Katrina surge records from Pensacola and Dauphin Island tide gauges appear very similar when processed as in ref. 2. This is despite Pensacola being twice as far as Dauphin Island (see legend) from the peak high water mark from Katrina recorded at Biloxi, MS (5). This shows that the methodology used to produce the surge index does not underestimate relative storm size.

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The authors declare no conflict of interest.

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