

## ***Interactive comment on “The concept of credible duration for the Regional Frequency Analysis including historical data: application of the FAB method to a skew storm surge database” by Roberto Frau et al.***

### **Anonymous Referee #2**

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Dear editor, the manuscript in object describes a technique to use "historical data", i.e. past records of extreme events of storm surge, together with "systematic data", i.e. systematic measurements with tidal gauges, based on the concept of "credible duration", i.e. a time horizon for which extreme events are somehow recorded. The authors use this technique together with Regional Frequency Analysis, to increase the sample size for extreme value analysis. Unfortunately, though this idea may have some interesting aspects, I believe this manuscript does not meet the minimum requirements to be considered on NHES for publication, at this stage, for different reasons. The first is that

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the authors don't really discuss any reason why their technique should work better than using a perception threshold. They explain how to estimate this credible duration, but in my opinion they don't provide persuasive explanation of why this should be considered a reasonable estimation of the time horizon. They don't explain how exactly they make use of this quantity in the extreme value analysis. Last but not least, the quality of the exposition is poor: the idea of credible duration (as far as I can understand) is rather simple, but it took me quite a long of time to grasp it from explanation given in section 2. As it took me some time to understand that "systematic skew storm surges" means "systematic measurements of water levels". Or that "historical data" means "non-systematic records of water levels" (the term "historical data" is widely used to indicate a lot of different things, including systematic measurements and model reanalyses and hindcasts). The most positive that I can suggest is that this manuscript should be completely rewritten and resubmitted.

Follows a (sub)list of comments

The title is too long, the term "historical data" is puzzling, and I would suggest of not putting the acronym FAB here

From the abstract one does not understand what's really the point in this research

Abstract, line 20, .. events data provided by single event "analysis" .. do you mean .. sparse records or estimations of extreme events in absence of systematic measurements ?

Abstract, line 23. To answer these questions a new method is introduced here (hereinafter referenced as FAB, from the name of the authors)

pag 1, line 30. "stochastic segment of sea level", what do you mean? Any sea level variable can be treated as stochastic, from tides to waves.

pag 4, line 2, "duration for systematic skew storm surges". This is really unclear. Say rather "time horizon of systematic observations/measurements of ...". In general, I

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would not speak about "duration", but rather "time horizon"

pag 4, line 23: "the lack of a trend on skew storm surge frequency means the storm frequency has not a trend" this is a tautology

pag 4-5, lines 25-3: this is also a consequence of the requirements for a stationary EVA. I believe this long explanation can be simplified and shortened.

section 2: this whole explanation is not very clear. I would start explaining the concept of "credible time horizon", and then I would define it in the simplest way possible

figures 1-4: I would summarize these figures (that are almost identical) in a unique figure, trying also to explain better why they are interesting

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