



EGUsphere, referee comment RC1
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Comment on egusphere-2022-347

Anonymous Referee #1

Referee comment on "Importance of non-stationary analysis for assessing extreme sea levels under sea level rise" by Damiano Baldan et al., EGU Sphere,
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The manuscript compares the return levels obtained from four different extreme value analyses accounting for non-stationarity in the Punta Della Salute tide gauge, Venice. The extreme value distributions include: (i) generalized extreme value (GEV) applied to a block maxima sampling (BM); (ii) generalized Pareto distribution (GPD) and (iii) a point process (PP) method, both applied to peak over a threshold (POT); and (iv) a joint probability method (JPM). In addition, the authors tested the implications of using three different detrending techniques, including (i) removing the annual mean sea level from the time series (MSL); (ii) removing the last 19 years' mean sea level (MSL_L); and (iii) not detrending the data before fitting the distributions.

I find the topic important for coastal flood risk assessment as traditional designs have been based on analyses using direct methods that ignore the non-stationarities, which can lead to an underestimation of the risk, as found in previous studies. In addition, having a comprehensive analysis of the different non-stationary extreme value methodologies would help on the way to obtaining a more standardized analysis, facilitating the comparison of the results between the studies. Thus, the results of the manuscript are relevant for the scientific community and coastal risk stakeholders after improving the work in some aspects, mainly related to

- the level of comprehensiveness of the analysis: it will be interesting for the scientific community to include one of the most utilized indirect methods: the revised joint probability method. In doing so, the authors will also reduce the existing overlapping with previous studies,
- the level of applicability to other study areas by including more tide gauge records in the analysis, and
- the level of replicability (some information relevant for reproducibility is missed).

Please also note the supplement to this comment:

<https://egusphere.copernicus.org/preprints/2022/egusphere-2022-347/egusphere-2022-347-RC1-supplement.pdf>