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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Extreme waves analysis based on atmospheric patterns classification: an application along the Italian coast" *by* Francesco De Leo et al.

Anonymous Referee #2

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The study described in the manuscript "Extreme waves analysis based on atmospheric patterns classification: an application along the The Italian coast" proposes a revision of previously developed works focused on exploiting Weather Patterns (WP) classification methodologies for defining homogeneous dataset to be further employed in Extreme Value Analysis (EVA). First of all I would like to acknowledge the effort made by the authors, together with a clear, concise and well-structured presentation of their work. The manuscript addresses scientific issues within the scope of NHESS, such as the extreme value analysis, together with the development of interesting concepts and tools. Nonetheless the approach sounds too simplistic throughout the entire presentation. Although at large scale the general atmospheric circulation pattern can

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Discussion paper

be described via the proposed technique, the main concern is how the application of such a methodology can be suitable to address extreme waves analysis. In fact, not all the extreme events can be associated to a clear weather pattern considering that the effectiveness of a cyclone to produce an intense marine storm in a basin like the Mediterranean Sea, and along the Italian coast in particular, crucially depends on its position, whose effects are strongly dependent on the interactions with the local orography. Despite not being an expert in the field of WP recognition, I must point out that the proposed methodology for the classification of extreme events in the Mediterranean Sea may not be the proper approach to capture the characteristic wave climate, because of the, possibly high, local scale of the physical processes involved, especially when refering to extreme events, that prevents from identifying the necessary details. For instance, the strong effects caused by the storm that hit the Gulf of Genoa on October 2018 could have been hardly captured by this methodology, though possibly classified as one of the most severe events over that area. Moreover the assumption of making the peak classification depending only on the corresponding wind fields seems to totally underestimate the contribution of other relevant components in determining the characteristic wave climate. In addition, within the Data and Methods section, the spatial resolution of the hindcast employed as reference for the study is not mentioned. The same for the wind input derived from the NCEP Cimate Forecast System Reanalysis. Although the references have been cited, this information would be relevant also to appreciate the overall quality and confidence limits of the anaysis that have been performed. For these reasons, I do not suggest that the paper is published in the present form, suggesting to reconsider the overall approach and make a thorough revsision of the applied methodology, together with the definition of the related confidence limits.

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