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Towards an integrated index on hydrometeorological risk in coastal Mediterranean Regions

Maria-Carmen Llasat^{1,2}, Tomeu Rigo³, Montserrat Llasat-Botija^{1,2}, Maria Cortès^{1,2}, Joan Gilabert^{1,2}, Anna del Moral^{1,2}, Isabel Caballero^{1,2}, Esther Oliver⁴, and José A. Jiménez⁵

¹University of Barcelona, Faculty of Physics, Department of Applied Physics, Barcelona, Spain (carmell@meteo.ub.edu)

²Water Research Institute (IdRA), University of Barcelona, 08028 Barcelona, Spain

³Servei Meteorològic de Catalunya, 08029 Barcelona, Spain

⁴Facultat d'Economia i Empresa, University of Barcelona, 08028 Barcelona, Spain

⁵Laboratori d'Enginyeria Marítima, Universitat Politècnica de Catalunya, BarcelonaTech, 08034 Barcelona, Spain

The Mediterranean region is a hot spot for climate and environmental changes (Cramer et al., 2018). Climate change rates currently observed and expected in future scenarios in this region, exceed the global trends for most variables. Particularly, the average annual mean temperature has risen by 1.4°C since the pre-industrial times and it is expected that it could increase more than 1°C before the end of the century. The Mediterranean coastal zone comprises 75 coastal watersheds and 224 coastal administrative regions, with a total of 46,000 km of coastline. This coastal zone concentrates about the 50 % of the population of the Mediterranean region while also attracts millions of tourists, supports a large network of infrastructures and, also, supports a large set of coastal and marine ecosystems delivering valuable services.

Regional climatic and geographical characteristics determine the area to be frequently affected by multiple hydrometeorological hazards such as thunderstorms, floods, windstorms and marine storms. These hazards together with the existence of high values at exposure determine the Mediterranean coastal fringe to be highly vulnerable and subjected to a high risk to the impact of extreme events, which will likely be worsened due to climate change (IPCC, 2018). Due to this, long-term planning of these coastal areas requires a proper assessment of their vulnerability and risk. Usually, this has been done by considering these hazards in an independent manner, although it is clear that a more holistic and integrated approach considering their interdependencies and feedbacks is needed.

Within this context, this work proposes an integrated risk index to classify the Mediterranean coastal municipalities in terms of their susceptibility to be affected by multiple hydrometeorological hazards, which will be later integrated with a similar index for marine hazards. The index will be tested for a representative Mediterranean coastal area highly affected by hydrometeorological and marine hazards, the Catalonia and Valencia coastal zone (NE Spanish Mediterranean). The indicators represent different system characteristics determining the expected risk: a) climatic, b) geomorphological and c) impact and perception components. The

selected climatic indicators used have been: return period of precipitation, number of lightning strikes and maximum wind speed. Geomorphological indicators include average slope of the catchment area and surface within the municipality. Socioeconomic indicators have been estimated from the economical compensations paid by the Consorcio de Compensación de Seguros (the National insurance company), number of flood events that have affected each municipality estimated from their impact, and population awareness and social impact measured through analysing response in social media (tweets) to the impact of these hazards. Finally, as a matter of validation, the impact of the last flood events affecting this region is compared with the spatial distribution of the developed index.

This work has been developed in the framework of the M-CostAdapt project (FEDER/MCIU-AEI/CTM2017-83655-C2-2-R) where the adaptability to Climate Change and natural risks of the Mediterranean coast is analysed by jointly considering natural maritime and terrestrial (hydrometeorological) hazards.