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# Sensitivities of Mediterranean high impact weather. A systematic climatology

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One of the multiple approaches currently explored to mitigate the effects of hydrometeorological hazardous events aims at improving the weather numerical forecasts. This is basically achieved by refining the assimilation and forecast models, and by improving the quantity and quality of observations. Under an ever increasing societal demand for cost cuts and more precise forecasts, targeted observations have recently received great attention within the operational weather community. For the sake of efficiency, decisions regarding where to deploy new observations on demand or how to optimize the permanent component of observational networks should take into account the sensitivities of high impact weather (HIW). The MEDEX project (http://medex.inm.uib.es) is aimed at improving the forecasts of HIW in the Mediterranean and, in particular, proposes the creation of a climatology of sensitivities of HIW. The construction of a comprehensive climatology of sensitivities is hampered by the lack of an exhaustive collection of Mediterranean HIW events. Within MEDEX, a catalog of notable episodes has been collected since 1995. Various approaches have been explored to characterize and classify this episodes before the computation of the sensitivities.

In this study we present the results of a systematic climatology based on the close link between Mediterranean HIW and intense cyclones. Although a portion of Mediterranean HIW episodes in the *MEDEX database of selected cases* are not linked to significantly intense cyclones, the intense cyclones proxy is relevant during late autumn and winter. We perform an objective cluster analysis of intense cyclones from the ECMWF ERA40 reanalysis using the k-means method and compute the sensitivities for each of the resulting classes. For each cluster, a representative sensitivity field is computed using the MM5 Adjoint Modeling system. We explore various aspects

of the resulting set of sensitivity fields such as the temporal evolution, the intensity, or the most sensitive fields. Preliminary results show that although the sensitive areas for Mediterranean HIW are not particularly confined, it is remarkable how areas poorly sampled by the regular observing networks, such as North Africa and the eastern North-Atlantic, are highlighted in the prototype sensitivity maps.