



A classification of Mediterranean intense cyclones oriented to ensemble sensitivities

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The Mediterranean region is frequently affected by intense cyclones that produce hazardous weather such as strong windstorms and heavy rains. Improving the forecast of these events is currently a key scientific challenge. Sensitivity analysis techniques highlight atmospheric features that have relevant effects on certain forecast aspects and that information is used by decision makers when planning and designing efficient routine observing networks and targeted observation strategies. Previous studies of ensemble sensitivities of Mediterranean intense cyclones show that the evolution of these high-impact systems 24h prior to their maturity stage depends largely on structures located over Western Europe, Northern African lands and parts of east North-Atlantic. However, these results are questionable due to the limited homogeneity of some cyclone classes, which severely hampers the application of the statistical sensitivity analysis technique. As a natural follow-up, a new classification of Mediterranean intense cyclones, with special emphasis on intra-class homogeneity, is needed.

In this study, we design an improved classification method oriented towards the application of ensemble sensitivities. The homogeneity and size of each cyclone class is optimized to improve the reliability of the derived sensitivities and also avoid spurious distant correlations in the field. Statistical sensitivity fields for each Mediterranean intense cyclone class will be shown and the limitations of the technique, as well as new approaches to explore in the future will be discussed.