

Fast and cheap forecasting system for Mediterranean cyclones

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The Mediterranean region is a very active cyclone area, and is often affected by these atmospheric phenomena, which bring strong winds and heavy rain. Despite the efforts of the scientific community to improve numerical cyclone prediction, the systems developed are costly.

"Sensitivity studies are a low-cost and efficient way of establishing the best kinds of observation strategies", Lorena Garcies, lead author of the study and a researcher in the Meteorology Group at the University of the Balearic Islands (UIB), tells SINC.

The study, which has been published in the latest issue of *Tellus Series A-Dynamic Meteorology and [Oceanography](#)*, shows that analyses of atmospheric sensitivity are useful for designing "efficient" observation networks based in Europe, and strategies that can be adapted to "especially dangerous" events.

"Areas with low levels of in situ measurements, such as northern Africa, the [Mediterranean Sea](#) and the north east Atlantic, are important areas in the prediction of intense, short-range Mediterranean cyclones", says Víctor Homar, another of the study's authors and a researcher at the UIB.

Measuring the 'sensitivities' of the atmosphere

Garcies and Homar have developed a methodology that builds up a

climatology based on atmospheric sensitivities "without any dependence on numerical prediction models". The researchers applied statistical calculations of this sensitivity to the climatology of intense Mediterranean cyclones and obtained more precise estimates of the sensitivity of the real atmosphere.

With this method, the scientists are able to improve the prediction of cyclones' development and impact between 48 and 24 hours before they fully form. Temperature and wind speed are also important factors in predicting this high-impact phenomenon.

"The results for intense Mediterranean cyclones show dynamic, spatial and temporal coherence between the sensitivity fields, and are consistent with similar results obtained by using much more expensive sensitivity techniques", Garcies and Homar point out.

The researchers are inviting the network of European Meteorological Institutes (EUMETNET) to use this new system to help improve observation systems over the regions of western [Europe](#), northern Africa and the Atlantic Ocean, and "to bring about a systematic improvement in the forecasting of high-impact events in the Mediterranean".

Forecasting is improved by increasing the observations within data assimilation systems, but Garcies believes that "building up in situ observations to the same levels over all areas is an unachievable goal, because it is incompatible with growing public demand for improved forecasts with maximum efficiency but at the lowest cost".

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