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## Toward a dedicated warning system of severe storms in Italy: the PRETEMP project

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A dedicated warning system can significantly reduce economic and human losses during severe storm events. While in the USA a well-tested warning system exists since many years, a corresponding institutional warning system has not been established so far in Europe. ESTOFEX has been the first attempt of a severe weather forecasting system at a European-scale, very appreciated by the meteorological community, but on a voluntary basis.

PRETEMP is an initiative carried on by a group of students and young meteorologists who aim to replicate the ESTOFEX initiative at a national scale: it has been publishing a severe weather outlook specific for Italy every day since 2015. Italy is a country with very complex orography mostly surrounded by the sea. Therefore, a national dedicated warning system may allow to capture local mesoscale features, important for severe storm development, better than an outlook on a continental scale. Like ESTOFEX, PRETEMP is a volunteer group, but it has informal collaboration with local weather agencies: hopefully, in the near future it can be an example for an institutional warning system. The PRETEMP forecast is based on four levels of severity, ranging from level 0 (generic thunderstorms) to level 3 (extremely severe storms).

Furthermore, PRETEMP has been collecting severe storm reports from Italy since 2018, exploiting the Storm Report Database created by Meteonetwork, an Italian amateur association. These reports, collected by many volunteers and local meteorological associations, ensure a capillary network of storm spotters: it represents an effective example of citizen science applied to severe weather. They have been automatically submitted to the ESWD (European Severe Weather Database) since 2019 representing the main source of storm reports from Italy. In addition, in case of tornado events, PRETEMP contribute to the path damage reconstruction and tornado classification, in collaboration with ESSL.

More recently PRETEMP is testing some forecast verification techniques to increase the reliability of the forecast product and to assess and improve the forecaster performance. Initially the forecast verification was qualitative, based on a simple overlay of storm report locations on the outlook map. PRETEMP is now moving toward a more quantitative approach, testing both dichotomous (to create performance diagrams) and probabilistic approaches (using the Brier Skill Score index), to find the most suitable method to assess the outlooks.

