

Best Member Selection: Combining Thunderstorm Tracking and Ensemble Prediction for Timely Flood Warning

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From an operational forecasters perspective, it is sometimes quite difficult to judge whether the forecast precipitation will lead to floods or not. Ensemble models can help to better estimate probabilities, but still the question of confidence in the individual forecasts arises. How can forecasters on duty in the warning services trust the forecasts, how can they judge if one or which of the available forecasts is correct? Issuing warnings whenever heavy precipitation amounts are forecast over the catchments would certainly result in a high number of false alarms with the effect, that such warnings would not be taken seriously.

One way out of this dilemma is to observe and check in real time which forecast is closest to the real situation. A possible approach how to do this is “Best Member Selection” which is shortly summarized as follows.

Best Member Selection takes advantage of the fact that often severe precipitation events are accompanied by severe convection and therefore show clear signals in satellite imagery. Inspecting past occurrences of flooding, e.g. the ones of Genoa on 4 November 2011 and 9 October 2014, one can find that thunderstorms are embedded in the streamers of moist air which transport large amounts of water into the precipitating area, thus enhancing heavy precipitation locally leading to flash floods. These thunderstorms can be detected by the DLR thundertorm tracking and nowcasting system Cb-TRAM which is using satellite data from Meteosat. Besides using real satellite data from observation, Cb-TRAM can also be run with synthetic satellite data constructed from output of forecast models, as e.g. from the AROME model of Météo-France. Best Member Selection now aims at comparing forecast (synthetic) thunderstorm cells to their real counterparts and thus deciding which member out of the ensemble is the closest to reality. This is then the one which can be trusted best by forecasters.

The presentation discusses the best member selection for the Genoa flooding of 9 October 2014 and suggests an online application in real time. Such a system should have the potential to detect the danger for flooding early enough to issue timely warnings.