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Two new ECMWF products for precipitation type

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One of the greatest difficulties facing forecasters during the cool season is the correct determination of precipitation type, especially with temperatures close to freezing point. Freezing rain is particularly hazardous due to possible ice-loading effects in power wires, roads or vegetation with catastrophic consequences in the economy and human health. The use of ensembles (compared with deterministic forecast) in precipitation type forecasting can help to reduce, and also quantify, the numerous sources of uncertainty intrinsic to this forecasting problem.

The Integrated Forecast System (IFS) ensemble forecasts (ENS) from ECMWF provide the instantaneous precipitation type (ptype) output variable that describes 6 types of precipitation at the surface: rain, freezing rain, snow, wet snow, sleet or ice pellets. As part of ECMWF's contribution to the ANYWHERE (EnhANcing emergencY management and response to extreme WeatHER and climate Events) project two new products have been developed based on ENS forecasts of precipitation type combined with the instantaneous precipitation rate variable. These are the most probable precipitation type, shown in map format, and the instantaneous probabilities of different types, shown for a given site. The first of these shows which type is most probable whenever the probability of some precipitation is >50%. The second product depicts the temporal evolution of probabilities for a specific location in bar chart format, classified also according to three categories of instantaneous precipitation rate. A new methodology to classify dry from precipitating has been applied using a minimum value of precipitation rate for each ptype in order to try to enforce a zero frequency bias for all types (within the 4-month verification training period we used).

Observations of present weather from manual SYNOPs in Europe for 4-months in the 2016-2017 winter period were used to develop the verification. This verification shows that the IFS is highly skilful in forecasting rain and snow, but only moderately skilful for freezing rain and sleet, while the ability to predict the occurrence of ice pellets is negligible. The verification also highlighted that there were only small changes with lead time in the frequency of occurrence of the different precipitation types.