



Statistical analysis of precipitation forecast ensemble obtained by an analogue-based approach

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A new approach based on a search for similar past situations (analogues), defined in terms of several meteorological variables over Western Europe and East Atlantic, is developed to determine an ensemble of hourly quantitative precipitation forecasts (QPFs). These different future precipitation scenarios represent a probabilistic approach to QPFs that allows an evaluation of their uncertainty. The analogues of geopotential height at 500 and 850 hPa, specific humidity at 700 hPa, vertical velocity at 700 hPa and several combinations of them are extracted from an archive collecting ECMWF analyses at 12 UTC for the period 1990-2000. According to two similarity criteria (S1 score and euclidean distance) a certain subset of such analogues is singled out and the corresponding precipitation measurements, recorded for the next 72 hours by 45 raingauges spread over the Reno river basin in Northern Italy, are extracted. A statistical analysis is performed over the entire length of the archive for the fall season (4 September-29 November) of each year searching for the relative analogues on the remaining years, thus permitting to establish which meteorological field provides a better estimation of precipitation, the relevance of the two similarity criteria and the optimal size of analogous ensemble. Moreover, results obtained through this approach are then compared with those of a deterministic Limited Area Model and an alternative scheme, where ECMWF analyses and model forecasts at +24, +48 and +72 hours are considered to determine analogues.