Forecasting extreme precipitation in Calabria: different predictors for different lead-times

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Abstract

Extreme precipitation events pose a great threat to the society with devastating consequences like floods and landslides. Improved forecasting of this hazard can therefore support the mitigation of the associated negative impacts. Here we propose new forecasting products that improve the predictions of extreme precipitation events at different timescales. Our study focuses on forecasting of extreme rainfall in Calabria, southern Italy, a region with a complex and abruptly varying topography that poses additional challenges in the formation, and the forecasting, of precipitation. We use outputs of a gridded observational dataset (E-OBS), the ERA5 reanalysis, and the ECMWF reforecasts and show that different forecasting horizons require different forecasting products. More specifically, for short to medium-range lead times, bias-correcting the precipitation forecasts provides the most informative outputs for the end users. For extended-range forecasts though, it is beneficial to use the large-scale weather variability in combination with moisture forecasts to infer reliable information about extreme precipitation. We present the benefits of the methods based on long-term statistical analysis using a range of indicators, as the brier skill score, and the reliability diagram.