



Probabilistic Flood Forecast Within A Time Horizon

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Recent developments in Predictive Uncertainty (PU) assessment allowed probabilistic forecasts to be part of flood warning systems in terms of the probability of occurrence of a future event. Nonetheless, flood managers are urged to answer questions such as: “what is the probability of occurrence of a flood within the next 12/24 hours?” and “when is flooding expected to occur?”, which are not resolved by the present flood forecasting systems. Until recently probabilistic forecasts were developed to provide the probability of threshold exceedance at a specific lead time, not “within” that specific lead time. From a probabilistic point of view, these forecasts provide important information about the probability of exceedance of a maximum river stage within the forecast lead time. This work aims at presenting and discussing the results of recent developments of the Model Conditional Processor (MCP) within the frame of a Multi-Temporal forecast. This approach has been implemented in order to evaluate a discrete time function representing the variation of cumulative probability of exceeding a river stage during the forecast lead time and the distribution of the time occurrence of the flood peak. The resulting processor is also able to estimate the Multi-Temporal probabilistic information starting from one or more model forecasts. After describing the required modifications to the original MCP version in order to perform the Multi-Temporal probabilistic forecasts, this work shows the results obtained on the Po River in Italy. The Civil Protection of Emilia-Romagna Region provided the forecasts of the operational flood forecasting system model, with a time horizon up to 36 hours in advance. These historical data and the relevant forecasts, available for a period of 9 years, were used to develop the Multi-Temporal probabilistic forecasts and to assess their performances.