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# Forecasting river levels during flash floods using Data Based Mechanistic models, online data assimilation and meteorological forecasts

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The parsimonious time series models used within the Data-Based Mechanistic (DBM) modelling framework are readily transferred into a State-Space form allowing the implementation of data assimilation using the Kalman filter. Multiple case studies have demonstrated the effectiveness of this framework in providing probabilistic forecasts for many hydrological situations, such as flood events on large rivers. To forecast flash floods (with a useful lead time) the DBM model representing the hydrological response must be coupled to meteorological forecasts. Two case studies are presented to highlight how this can be achieved. In the first; the Verzasca catchment (Switzerland); demonstrates the coupling of a DBM model to ensemble QPF forecasts available at a similar temporal resolution to the model. Hydrological data is assimilated to provide a representation of the forecast uncertainty. The second case study; Gardon d'Anduze basin (France) ; demonstrates how a DBM model can be formulated to make use of NWP forecasts (COSMO-LEPS) whose temporal resolution is course compared to the time scale of the flooding. In this case both meteorological and hydrological data is assimilated to improve the forecasts.