EGU21-14852, updated on 26 Jul 2021
https://doi.org/10.5194/egusphere-egu21-14852
EGU General Assembly 2021

Ensemble strategies for Flash Flood Forecasting: the 29 October 2018 event in the Eastern Italian Alps

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On 27-29 October 2018, heavy precipitation over the Eastern Italian Alps (the so-called “Vaia Storm”) led to an extreme flood, causing several casualties and extensive damages to buildings and infrastructures. The event, which occurred at the end of a climatic anomaly of prolonged drought, developed into two phases: a first phase (October 27-28) and a short, but more intense second phase on the 29th. The event was characterized by extreme accumulated precipitation, and several flash floods in the second phase. A previous work focused on the implementation of two NWP models (MOLOCH and WRF) at convection permitting resolution and showed a general good predictability of the precipitation event, associated with a well-defined large-scale forcing. This work aims at providing an outline of the hydrological predictability, focusing on different river systems in the area (the Upper Adige, the Piave and the Bacchiglione-Astico river systems), with different characteristics in terms of drainage areas, elevations and positions within the region hit by the event. For this, the hydro-meteorological forecasting chain includes the two mesoscale models (MOLOCH and WRF), driven by two global analysis systems (GFS-NCEP and IFS-ECMWF), and a grid-based spatially distributed hydrologic model termed GRIS (Grid-based runoff simulation model). We examine different ensemble strategies for the initialization of the hydro-meteorological chain and focus on the assessment of hydrological predictability, paying specific attention to basins with high regulation capacity thanks to the presence of hydropower storage.