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German Near-Real Time Ensemble Hydroclimate Forecasting System

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Helmholtz Centres are developing a research infrastructure in Germany to investigate the interactions of short-term events and long-term trends across Earth compartments under the Modular Observation Solutions for Earth System initiative (MOSES- <https://www.ufz.de/moses/>). A near-real time hydroclimate forecasting system at sub-seasonal to seasonal time range (HS2S) is developed for MOSES to provide tailored information for early warning of extreme events.

Here, we introduce two components of the HS2S which benefits from operational forecasts provided by the European Center for Medium-range Weather Forecast (ECMWF). The first component is weekly averaged forecasts of two atmospheric variables (total precipitation and maximum air temperature) which are bias corrected using a trend-preserving approach. The second component is German hydrological forecasting system. We use the mesoscale Hydrological Model (mHM- <https://www.ufz.de/mhm>) for generating hydrological initial conditions and ensemble forecasting. The same approach by German Drought Monitor (www.ufz.de/duerremonitor) is applied to interpolate near-real time in-situ observations from the German Meteorological Service (DWD) into 1-km grids. Then 51 real-time atmospheric daily ensemble forecasts from ECMWF ensemble extended product are bias corrected to generate of soil moisture and streamflow forecasts up to 30-day in advance. By post-processing mHM ensemble forecasts, an overview of drought conditions for the next 30-days horizon is disseminated online over Germany (<https://www.ufz.de/moses/index.php?en=47304>). Hydroclimate forecast are updated operationally twice a week to support MOSES event-driven campaigns for flood, drought and heat waves and to understand the predictability and skill of near-real time hydroclimate forecasts in Central Europe based on the state-of-the-art models and tools.