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A pan-European multi-hazard early warning system: ANYWHERE MH-EWS

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Impacts of weather-related natural hazards are frequently reported. The impacts especially can be severe when these have a compound nature. Hazards can be concurrent, which means that these may happen at almost the same time (e.g. dry hazards, such as, drought, heat waves, wildfires, wildfires, primarily driven by below-normal rainfall often combined with high temperatures, or storm surges occurring at the same time as river mouth floods). Natural hazards can also be cascading, which implies, for example, that a dry hazard can be followed up by wet hazards (e.g. short-term flash floods or landslides driven by intensive rainfall that occur after a long-lasting drought). Likely, global change will even lead to more extreme compound weather-related hazards in multiple regions across the globe. Multi-hazard early warning systems are therefore required to avoid or, at least, to minimize impacts of compound weather-related natural hazards using probabilistic weather forecasts and impact algorithms. For some impacts, hydrological models are necessary as an intermediate step before impacts can be forecasted.

In this study, we present an operational, pan-European Multi-Hazard Early Warning System (MH-EWS) that is being developed within the EU's Horizon 2020 research and innovation project ANYWHERE (EnhANcing emergencY management and response to extreme WeatHER and climate Events, http://anywhere-h2020.eu/). Probabilistic weather forecasts with different lead times (sub-daily up to 7 months) are provided by the European Centre for Medium-Range Weather Forecasts (ECMWF). Additionally, several nowcast products are used (e.g. based on OPERA weather radar composites) for short-term hazards. The weather and nowcast products feed algorithms to forecast weather-related impacts, such as, flash floods, landslides, storm surges, forest fires, heat stress, air quality with lead times varying from sub-daily to 10-15 days depending on the hazard. For other impacts, the ECMWF' weather forecasts serve as input to generate probabilistic hydrological forecasts using the LISFLOOD hydrological model. The probability of drought and river floods are derived from these forecasts (5 km scale) and has a lead time up to 7 months. Impacts of single, or concurrent hazards can be presented. The ANYWHERE catalogue provides details of the MH-EWS (http://anywhere-h2020.eu/catalogue/). We will show some compound events generated within the ANYWHERE project and conclude to discuss research challenges and operational aspects.