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The INtegrateD RMI Alert system (INDRA)

G. Smet, J. Van den Bergh, M. Reyniers, D. Poelman, D. Degrauwe, A. Deckmyn, R. Hamdi, P. Termonia, and L. Delobbe

Royal Meteorological Institute of Belgium, Brussels, Belgium (geert.smet@meteo.be)

We describe the INtegrateD RMI Alert system (INDRA). This system is under development at the Royal Meteorological Institute of Belgium (RMI), to improve our capability to issue alerts and warnings to the public for extreme events, in particular heavy precipitation, flooding and thunderstorms. The relevance of this was confirmed in 2011 by the famous Pukkelpop thunderstorm, where the RMI carried out its task according the current meteorological state of the art, but which also pointed out potential for developing new applications to further improve the warnings for such cases.

The main aim of INDRA is to integrate and provide a common platform for RMI products that involve warnings for extreme precipitation (rain and snow), high waters and thunderstorms. This includes visualization of various forecasts, and their continuous verification and validation. Different systems will contribute towards the early warning system. For now these are the ECMWF Ensemble Prediction System (EPS) and Grand Limited Area Model Ensemble Prediction System (GLAMEPS), the INCA-BE nowcasting system, SAFIR lightning detection, and the RMI hydrological ensemble prediction system.

The INDRA system uses probabilistic forecasts and predetermined thresholds to issue alerts for extreme quantities of rain and snow, at different lead times. Hydrological forecasts, giving early warnings for high waters, are also included on the platform. These are aimed specifically at the regional authorities responsible for water management.

We illustrate the current version of the INDRA system using hindcasts for the Pukkelpop thunderstorm of 2011.