Nowcasting of precipitation at the Danish Meteorological Institute

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Heavy precipitation events can cause major disruptions and damage to society, and in recent years several extreme rain events have occurred in Denmark. Latest on July 2, 2011, where rain intensities up to 3.1 mm/min were observed over the capital of Copenhagen and flash flooding caused considerably economic and material losses. The benefits of an improved prediction of such events are many: more precise weather warnings from the national weather services, higher preparedness and faster response, and better handling of the flood water, to name a few. Observations by weather radar can play a central role in improving the short-range forecasting (nowcasting) of precipitation. The Danish Meteorological Institute (DMI) is working towards improved nowcasting of precipitation along multiple lines. First and foremost, considerable progress has been made to improve data quality including the identification and removal of non-hydrometeors, especially ground clutter and electronic signals from external sources, which often infest the precipitation fields. Secondly, development of a radar-based nowcaster for lead times of up to 2 hours. The method is based on the computation of the optical flow field from radar image pairs and subsequent extrapolation of radar reflectivity. Furthermore, and as a side-product, the flow field is used in an image morphing technique to interpolate radar observations between timesteps. This potentially improves QPE as well as QPF applications. Finally, assimilation of radar data into numerical weather prediction models is carried out at the DMI using a rapid-update cycle which provides nowcasts up to 6 hour's lead time. This contribution presents some of DMI's recent nowcasting efforts and results and shows examples of their qualitative and quantitative performance.