A versatile RADAR display for nowcasting of precipitation and severe weather

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Monitoring precipitation is one of the key issues in nowcasting at the Royal Netherlands Meteorological Institute (KNMI). A dedicated presentation system has been developed to display real time precipitation and derived products like echo top height, sort of precipitation, short time forecast and wind shear. External sources as lightning and station observations are added. The system is equipped with alert and warning functions in case of severe weather.

KNMI operates two C-band Doppler weather radars that observe three-dimensional distribution of the reflectivity from precipitation every 5 minutes. Several operational products with a grid of 256 by 256 pixels are produced with a resolution of 2.5 km^2.

The RADAR display is based on a thin client animation engine that communicates to a server side client that captures, prepares and archives data. This architecture entails a web based system that can be tailored for different users inside (intranet) and outside (extranet) KNMI with respect to data access and permitted features. For example, in case of extreme server load during severe weather, irrelevant options like detailed roadmaps can be remotely disabled to conserve network bandwidth.

On the server side data is accumulated and stored in HDF5 Data Format in a platform independent and self-contained way. Storage of actual data builds up an online archive for several days, directly accessible to users. After conversion to bitmap and XML format, data is sent to the client by an HTTP internet protocol. On the user side a Java Web Start application is equipped with advanced animation functionality and mouse-over features. The animation engine stacks multiple layers of data and maps, each of which can be turned on and off independently. The stack of layers allows maps and data layers to be updated anytime. Maps can be static or can be imported from a GIS map-

ping server. Warnings pop up when severe weather conditions are nowcasted. These include lightning alerts, summer hail warning and warnings for exceeding thresholds of accumulative precipitation in areas of interest set by the user.

The forecast of precipitation (0-2 h) is obtained by extrapolation and interpolation using clustering techniques, feature tracking and pattern recognition. Wind fields are incorporated from high resolution NWP. Short time forecast is a highly demanded feature of our clients to extrapolate the actual conditions and recognize extreme weather phenomena.