4.19 METHODS AND STATISTICAL TOOLING FOR DETERMINING RAINFALL EVENTS IN RADAR DATASETS

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With the large number of heavy precipitation events in recent years, the demand for data and tools to post-process and analyse precipitation data has increased steadily. Therefore, the accuracy and high-resolution availability of weather radar data makes it an ideal source for detailed analyses of extreme precipitation events and the subsequent influence on the water system.

The reconstruction of flood events and the evaluation of a water system for flood resilience, are typically performed using hydro-dynamic or hydrologic models. These models can be fed with detailed precipitation information. However, as the radar data sets continually grow, it can be very difficult to extract the relevant data for further use in models and for further analysis.

An online system has been developed in which the user can search for precipitation events with defined characteristic qualities. The system holds a database of 13 years of radar data (5 minute time step, 1 km2 resolution, 19 000 km2 area). The data have been corrected and composited from three radars of the German Weather Service DWD in a conjoint project of 10 water boards in North-Rhine-Westphalia using SCOUT software. Accessible through the HydroNET online platform (www.hydronet.com), a user can choose periods, areas, duration (time intervals) and thresholds of precipitation amount depending on the related questions. The system will then determine the unique rainfall events which match these criteria.

To determine unique events, the system evaluates each grid cell which exceeds a given amount of rainfall of a specified duration. If a neighbouring grid cell also exceeds this threshold within a given time-frame, the cells are assumed to have a joined rainfall event. This process is repeated automatically until no further exceedances are found in the data set. The result is a list with all precipitation events per predefined duration which match the specified search criteria.

The application allows the preparation of time series for hydrological simulation, the shift of an event to another location and preparation of data for simulation, the statistical analysis of extreme events and their spatial extent and variation, as well as a comparison to extreme value statistics of rain gauge station series. This could subsequently be done using external time series management systems. The user can browse through the list of all events, each event can be viewed geographically, the maximum pixel or all pixels of the search area can be downloaded as time-series or grid data for further usage e.g. in GIS. Additionally to downloading the grids, the user can re-locate a given event to another place. The latter can be useful to

investigate What-If scenarios regarding how a water system reacts to a known event from another location.

By that, the system helps to find and analyse relevant storm events and get a better knowledge of the impacts on the hydrological cycle.