Statistical analysis of (extreme) precipitation events in Germany from an 18-year climatological radar data set

*Katharina Lengfeld¹, Ewelina Walawender¹, Tanja Winterrath¹, Andreas Becker¹

1. German Weather Service

Extreme precipitation events are expected to occur more frequently in a warming climate. Understanding their structure and predicting the exact time and location of precipitation events still remains a challenge because of the high temporal and spatial variability of rainfall. Precipitation records from rain gauges exist for more than 100 years, but they represent a very limited area and, thus, only give information on the temporal variation. In order to capture spatial variability in rainfall, comprehensive observations from weather radar networks are crucial. Therefore, measurements from single radars or nationwide networks have become a common tool to investigate precipitation and its variability in the last decades. Although they lack long time series, they give valuable information on the spatial structure of rain events.

The German Weather Service (DWD) provides a nationwide climatological radar data set from 2001 to 2018. A reprocessing procedure has been applied to reflectivity measurements in order to obtain precipitation estimates as homogeneous as possible. The final product is a precipitation data set on a 1 km x 1 km grid with temporal resolution of 1 hour. From the radar-based precipitation climatology we identify spatio-temporal rainfall events with an object-oriented analysis. All spatially and temporally independent precipitation events between 2001 and 2018 for 11 different durations from 1 to 72 hours have been detected and statistically analysed. We will present the procedure for computing the radar climatology as well as for identifying independent events. Additionally we will give an overview of the statistics including intensity, return period, location and size of the events and present regional differences in the statistic parameters within the 18 years.

Keywords: extreme precipitation, radar climatology, rainfall events