EMS Annual Meeting Abstracts
Vol. 12, EMS2015-373, 2015
15th EMS / 12th ECAM

Generating percentile maps and bubble diagrams for extreme events using a grid data base solution

Peter Bissolli, Karsten Friedrich, Hermann Mächel, Stefan Rösner, Andrea Kreis, and Maya Körber
Deutscher Wetterdienst, Offenbach, Germany (peter.bissolli@dwd.de)

Continuous climatological monitoring of extreme temperature and precipitation events and their spatial and temporal variability is an important task of National Meteorological and Hydrological Services. To support this monitoring notably for Europe, Deutscher Wetterdienst (DWD) has developed two particular products: percentile maps and bubble diagrams.
Percentiles allow for quick and consistent localization of extreme temperature and precipitation anomalies. These maps enable detecting in which months an extreme anomaly occurs, its frequency and spatial coverage. In addition, by a comparison of various time periods and computation of trends, a spatio-temporal analysis can be carried out.
Various special characteristics of events can be displayed in bubble diagrams, such as duration (x-axis, defined by successive days, when a percentile threshold is exceeded), intensity (y-axis, defined by the most extreme value within the duration), spatial extent (size of the bubble at the point (x,y)), and their start and end dates (as annotation). This kind of display allows a comparison of various historical events within a predefined area (e.g. Europe) and a certain time period.
The data connection of these products has been realized by using a data base solution especially developed for grid data (Rasdaman Enterprise). Data of special time periods are efficiently organized as multi-dimensional arrays and therefore can be read with high performance. This solution offers a number of possibilities for further development of spatio-temporal analyses of arbitrary grid data sets. Presently, daily mean temperature data are taken from the E-OBS data set (http://www.ecad.eu) and monthly precipitation totals from the GPCC (http://gpcc.dwd.de).
Together with additional monitoring information (e.g. traditional anomaly maps or even data from single stations) these two displays enable a quick assessment of extreme events or climate anomalies concerning their properties, particularly their intensity, frequency and climate change assessment.