Geophysical Research Abstracts
Vol. 15, EGU2013-7692, 2013
EGU General Assembly 2013

Circulation type classifications as a tool to assess variability of precipitation extremes in Southern Germany and Austria

Markus Homann (1), Jucundus Jacobeit (1), Christoph Beck (1), Andreas Philipp (1), Michael Hofstätter (2), Barbara Chimani (2), and Manfred Ganekind (2)

(1) University of Augsburg, Institute of Geography, Germany (markus.homann@geo.uni-augsburg.de), (2) Central Institute for Meteorology and Geodynamics, Vienna, Austria (michael.hofstaetter@zamg.ac.at)

Excessive large-scale precipitation events cause an increasing risk of severe floodings. For example in 2002 and 2005 Vb cyclones led to extreme flooding events in Central Europe. The aspect of ongoing climate change makes a valid assessment of the regional flooding potential in dependence of different circulation types and cyclone track types even more important.

The present study refers to Southern Germany and Austria for which a gridded daily precipitation set with 6km horizontal resolution is available for the 1951-2007 period. S-mode principal component analysis (PCA) is applied to determine regions with similar precipitation variability. Extreme precipitation events are defined by the 95th percentiles of daily precipitation during the standard seasons (DJF, MAM, JJA, SON). Large-scale circulation types are derived by different statistical methods using the COST733 classification software and different re-analysis data. To assess the performance of particular circulation type classifications with respect to regional precipitation extremes, the Brier-Skill-Score (BSS) has been applied.

For Southern Germany and Austria the regionalization of precipitation variability results in seasonally varying numbers and spatial extents of 'rainfall regions'. Concerning relationships between large-scale dynamics and regional impacts, the general conclusion is that in more sub-continental regions, the dependency between circulation types and precipitation extremes is less pronounced than in sub-oceanic regions. This fact is much clearer in winter than in summer. Further results show that in these two areas different classification methods (threshold-based and optimizing ones) lead to most valid results.

After further improving the performance of circulation type classifications, future extreme precipitation events under enhanced greenhouse warming conditions will be estimated by using output from CMIP5 Global Climate Models for the synoptic downscaling from large-scale circulation types to regional rainfall extremes.

Investigations are performed in context of the WETRAX project (WEather Patterns, Cyclone TRAcks and related precipitation EXtremes), funded by the Austrian Lebensministerium and the Bavarian Landesamt für Umwelt.