Geophysical Research Abstracts
Vol. 20, EGU2018-17392, 2018
EGU General Assembly 2018

Atmospheric parameters characterizing extreme rainfall events in the south-central Andes

Maryam RamezaniZiarani (1,2), Bodo Bookhagen (1), Torsten Schmidt (2), Jens Wickert (2,3)

(1) University of Potsdam, Potsdam, Germany (ramezani@uni-potsdam.de), (2) GFZ German Research Centre for Geosciences, Potsdam, Germany(ramezani@gfz-potsdam.de), (3) Technische Universität Berlin, Berlin, Germany

The prediction of extreme rainfall in the south-central Andes of NW Argentina is challenging, because of the following reasons: (1) complex, steep terrain with elevations ranging from ∼800m in the foreland to >5000m at mountain peaks characterized by high relief; (2) the region lies at the climatic transition zone between the tropical and subtropical atmospheric circulation regimes, where deep-convective storms play a crucial role; (3) the region is affected by mountain waves triggered by convection; (4) wind direction controls the moisture influx in this region. In this study, we aim to identify the dominant atmospheric conditions and climatic variables, such as convective available potential energy (CAPE) and dew point temperature (Td) leading to extreme rainfall events. We rely on ERA-Interim reanalysis data, version 2.0 of the ECMWF (European Centre for Medium-Range Weather Forecasts) and TRMM (Tropical Rainfall Measuring Mission) data. In our work, we define extreme events as events above the 90th percentile and we process data from 1998 to 2013. We identify a correlation between the 90th percentile rainfall and a combination of dew point temperature and CAPE by a multivariable regression analysis in three characteristic regions. These regions are: The high-elevation Puna Plateau (the southern Central Andean Plateau), an intermediate area characterized by high relief, and the low-elevation foreland area. The correlation results show a statistically significant relationship (p-value<0.001) between the dew point temperature and CAPE and 90th percentile rainfall over all three areas. The understanding of atmospheric processes leading to extreme rainfall events will help to predict conditions leading to flooding and other natural disasters.