Geophysical Research Abstracts
Vol. 21, EGU2019-11335, 2019
EGU General Assembly 2019

How well can we describe the atmospheric water cycle components in the Atacama desert over the last 100 years?

Christoph Böhm, Mark Reyers, Jan Schween, Ulrich Löhnert, and Susanne Crewell
Universität zu Köln, Institut für Geophysik und Meteorologie, Mathematisch-Naturwissenschaftliche Fakultät, Germany

Within the German Science Foundation funded Collaborative Research Center "Earth – Evolution at the dry limit" our overarching goal is to understand the moisture supply to the Atacama desert and its variability which is driven by synoptic and large scale patterns. Characterizing the moisture supply to the Atacama desert in the context of the recent climate is essential in order to establish thresholds for growth and development of the local biota and for surface alternations. Due to the scarcity of in-situ measurements especially over longer time periods, studies on a climatological scale are limited to satellite remote sensing and model data. Here, we extract the integrated water vapor, the divergent water vapor flux, precipitation, cloud heights and cloud cover from model data (ERA-20C), which only assimilates surface observations (pressure and wind), over the course of the 20th century. To assess the quality of these data, comparisons with satellite derived products for recent years and decades are carried out (e.g. water vapor from HOAPS data, cloud heights derived from MISR, and precipitation derived from TRMM). In this extremely dry location situated at the subsiding branch of the Hadley circulation, only very few synoptic features disturb the prevailing dry conditions. These are namely cut-off lows and atmospheric rivers. They are expected to cause an enhanced moisture supply to the Atacama desert. Exploiting the benefits of having an exceptionally long time series of meteorological data, i.e. ERA-20C, we investigate the frequency of occurrence of such features and whether this frequency has changed over the past century. Furthermore, we investigate the moisture supply in relation to El Nino/Southern Oscillation (ENSO) conditions.