Geophysical Research Abstracts
Vol. 20, EGU2018-14761, 2018
EGU General Assembly 2018

Future Changes in Moisture Transport towards the Alps

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High amounts of integrated vapor transport (IVT) in the atmosphere directed perpendicular to orography often leads to heavy precipitation in the Alps and other mountainous areas around the world. Such high IVT reaching the Alps either from the south or the north were identified as important precursors for major floods in Switzerland. Thus, the future evolution of high IVT is of particular interest for adaptation planning. It is important to know how the moisture transport will evolve in future in terms of intensity but also flux direction. Therefore, we analyze IVT projections for the RCP8.5 scenario by models from the Coupled Model Intercomparison Project Phase 5 (CMIP5). To check the accuracy of the models and the effect of the model grid resolution, present day IVT from the CMIP5 models is compared to the ERA-Interim reanalysis data (period 1979-2015). First results (for GFDL-ESM2G model) indicate that the model tends to overestimate IVT compared to the reanalysis data. This overestimation seems to be mainly caused by the very smooth model orography. Then several statistical moments of the IVT distribution as well as frequency, direction and seasonality of high IVT are considered for the comparison of future and historical periods. Preliminary results show that the model projects an intensification of IVT directed towards the Alps. The difference between future and historical periods is significant and becomes larger for more extreme the IVT percentiles and the more distant future. However, changes in IVT directed perpendicular to the Alps are smaller than the changes of all IVT events independent of direction. To analyze changes of extreme IVT we fitted Generalized Extreme Value (GEV) distributions to yearly block maxima and compared the distributions and their corresponding parameters for future and historical periods. Fitting GEVs to yearly block maxima per pixel indicates a shift in the distribution of extreme IVT from historical period to the far future period (2080 - 2100). Finally,we decompose the dynamical and the thermodynamical contribution to the detected changes in IVT and its extremes.