Geophysical Research Abstracts
Vol. 21, EGU2019-16048, 2019
EGU General Assembly 2019

How will convective storms change in the future? A COSMO-CLM modeling study for Central Europe

Christopher Purr, Erwan Brisson, and Bodo Ahrens
Goethe Universität Frankfurt, Frankfurt, Germany

Convection permitting climate models (CPMs) agree on an increase in short-term heavy precipitation in the future. However, it is still unclear to what extent CPMs can model the space-time dynamics of convective precipitation events and how these events might change in the future. To tackle this issue, we apply a tracking algorithm to precipitation data with 5-min temporal resolution from a regional climate model (COSMO-CLM) simulation. The model is run at a grid size of 0.025° for an evaluation period (1981-2015) driven by ERA-Interim reanalysis data, as well as a present-day (1976-2005) and a future (2071-2100) period driven by the EC-Earth global model. We evaluate the model by applying the same tracking algorithm to a newly developed, rain-gauge adjusted radar dataset that covers the area of Germany in the period 2001-2016. This approach allows to evaluate the statistics of heavy rain cell characteristics like maximum precipitation intensity, area and life time of convective cells. We show that the model is capable of reproducing the number of convective cells as well as the diurnal cycle of convection. The life time of convective cells as well as their area are well represented. The mean intensity and maximum intensity of large, long-living cells is systematically underestimated. Under the assumption of the RCP8.5 scenario there is an increase in heavy precipitation events at the end of the century compared to present day conditions. While the number of all precipitating convective cells remains constant, there is a shift in the mean and maximum intensity from weak cells to strong cells. As a consequence, the number of heavily precipitating cells increases (+174% for cells with a mean intensity larger than 25 mm/h). The area of convective cells also increases while the frequency distribution of cell life time does not change.