Geophysical Research Abstracts
Vol. 20, EGU2018-597, 2018
EGU General Assembly 2018

Recent trends in extreme weather: A model study

Joakim Kjellsson, Wonsun Park, and Mojib Latif
GEOMAR Helmholtz Zentrum für Ozeanforschung Kiel, Kiel, Germany (joakimkjellsson@gmail.com)

We investigate the frequency and intensity of extreme weather events such as heavy precipitation or heat waves in a global atmosphere model run from 1982 to 2016 with observed surface conditions. Results from the simulations allow us to study how extreme weather events have changed due to recent decadal warming. We use a suite of model experiments with varying horizontal resolutions, which also allow us to determine how horizontal resolution impacts extreme events and their trends in atmosphere models. Our main focus is on European extreme weather events, and in particular heavy precipitation events.

Our predictions of future climates largely rely on results from global climate models. However, state-of-the-art climate models in the CMIP5 archive are unable to resolve the mesoscale (10-100 km) and will thus not capture e.g. tropical storms or intense precipitation events. Studies suggest that most types of extreme weather events, e.g. heat waves, heavy precipitation, or Atlantic hurricanes, will become more intense during the 21st century due to surface warming. Furthermore, the amplified surface warming in the Arctic can slow propagation of midlatitude Rossby waves and lead to more persistent extreme weather events over Europe. It is thus imperative that we understand how extreme weather events are represented in atmosphere models and what errors arise from insufficient horizontal resolution. We therefore run simulations with the global atmosphere model OpenIFS from ECMWF from 1982 to 2016 using observed sea surface temperatures and sea ice extent. We compare extreme weather events in simulations with spectral truncation of T255, T511 or T1023, which corresponds to 80 km, 40 km and 20 km horizontal resolution respectively. The vertical resolution is fixed with 91 levels.