

DeeCCA

Change in Deep Convective Clouds Activity over Europe as a response to the Climate Change

One of the consequences of global warming, also affecting Europe, is a change in atmospheric circulation in mid-latitudes. As storm track changes, Europe features more weather extremes, including severe storms. The strongest of them are bring the intense rainfall, large hail, wind gusts, and even tornadoes. Climate change scenarios suggest that in the nearest future those phenomena will be even more frequent.

The main aim of this project is to determine whether the recent climate change resulted in the increased of deep convection clouds frequency over Europe (as expected from models). Deep convection clouds are clouds associated with the occurrence of severe storms, and satellite analysis of their properties gives an insight into the intensity of extreme weather.

Research will investigate 40-year of climate data collected from the geostationary orbit by the Meteosat First Generation and Meteosat Second Generation satellites (namely Meteosat Visible Infra-Red Imager and Spinning Enhanced Visible Infra-Red Imager instruments). In addition, the last 20 years will be characterized by the observations acquired with (Moderate-resolution Imaging Spectro-radiometer) and AIRS (Atmospheric Infra-Red Sounder) instruments operating onboard the Terra (MODIS) and Aqua (MODIS, AIRS) polar-orbiting satellites.

Analysis will include the determination of trends in the frequency of deep convection clouds, as well as trends in the properties of these clouds. Of special interest will the cloud top temperature and the presence of the so-called overshooting tops – parts of deep convection clouds that penetrate through the tropopause into the stratosphere.

Result of the project will be a deep convective cloud climatology and trend maps showing in which regions of Europe the frequency of deep convection clouds has increased, how much, and whether those trends are statistically significant (can one trust them?). That kind of information will help validate the climate change scenarios in the severe weather domain, and also provide support for developing more accurate strategies of climate change adaptation/ mitigation.