EMS Annual Meeting Abstracts
Vol. 15, EMS2018-862, 2018

Heatwaves and Cold Spells in the SATSTACE Daily Global Temperature Data Set

Stefan Bronnimann, Yuri Brugnara, and the Students at Oeschger Centre for Climate Change Research and Institute of Geography

Oeschger Centre for Climate Change Research and Institute of Geography, University of Bern

The European EUSTACE project (EU Surface Temperature for All Corners of Earth) will provide global daily air temperature fields since 1850 over all surfaces of the Earth in high spatial resolution from blending satellite skin temperatures and in-situ surface air temperature observations using novel statistical techniques. Day-to-day variations in surface air temperature affect society in many ways, especially in extreme warm and cold periods, but also the annual variations are important. However, daily surface air temperature measurements are not available everywhere. Satellite data can be used to estimate temperatures at locations where no ground (or in situ) observations are available. To achieve this, relationships between traditional (land and marine) surface air temperature measurements and satellite measurements are determined (i.e. land surface temperature, ice surface temperature, sea surface temperature and lake surface water temperature). For this purpose it is important that the in situ records are homogenized. The daily surface air temperature estimates are provided with consistent uncertainty estimates. These relationships can be derived either empirically, or with the help of physical understanding. A big challenge in the estimation of air temperatures from satellite skin temperatures is the representation of extremes.

Earlier in 2018 the surface air temperature estimates for the days where satellite images were available have become available (data set called SATSTACE). Intercomparison of this data set with other data sets may show the value of the various data sets over the others.

In this poster, a preliminary version of the satellite-based temperature data set SATSTACE is analysed for heatwaves and cold spells occurring on different continents during the last decade (the decade with satellite data). The events analysed include the heat wave in Pakistan in June 2015, the heat wave in Argentina in 2013 and the relatively warm period in the Arctic in 2016. The cold spells analysed include the cold wave in the British Isles in 2010 and the cold wave over China in January 2016. For all cases, the minimum or maximum daily surface air temperature estimates from EUSTACE were compared with ERA5 reanalysis data for minimum and maximum air temperatures (mapped to 0.25°, based on hourly data) and they are compared with in-situ station air temperature data. Results of the analyses of these events will be shown on the poster. It is clear that in some cases there may be considerable differences between the data sets used. Characteristics and caveats of all the three data sets for these specific events are discussed.