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Temperature extremes assessment using the Land Surface Analysis Climate Data Record of Land Surface Temperature

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The availability of new Climate Data Records (CDR) based on more than a decade of observations from the Spinning Enhanced Visible and Infrared Imager (SEVIRI) Meteosat Second Generation (MSG) has been motivating a number of studies of trends and extreme values of satellite retrievable variables. The Land Surface Analysis Satellite Application Facility (LSA-SAF) is currently developing such a CDR for Land Surface Temperature (LST), taking advantage of the high quality and temporal stability of the SEVIRI instruments onboard the different MSG platforms. The CDR comprehends the period from 2004-2012 and from that date to the present (produced operationally). The temporal resolution of 15min and the spatial resolution is 3km at the sub-satellite point (nearly 5 km over Europe). The LST is retrieved with the Generalized Split-Windows approach, which uses the brightness temperatures from the thermal infrared channels (the 10.8μm and 12.0μm) and surface spectral emissivity, also provided by LSA-SAF using the Vegetation Cover Method. The LST algorithm coefficients are calibrated in classes of total column water vapour and viewing angle, using radiative transfer simulations of a wide range of surface and atmospheric conditions.

In this work we explore this dataset in terms of trends, variability and extreme values. The use of this dataset has some advantages in terms of spatial and temporal resolution, but is limited to clear sky pixels. Here we analyse the interannual variability and trends of this dataset, comparing the outcome with similar statistics performed over re-analysis data (ERA-Interim) for overlapping period. Then, a series of standard diagnostics of extreme values and large scale variability such as heat waves and cold spells are calculated. Particular emphasis is given to the occurrence of these situations over Europe, although other regions within the SEVIRI disk (e.g., Horn of Africa, Sahel) are also analyzed. Case studies will be presented and characterized in terms of intensity, duration and spatial extension.