Statistical gap-filling of Land Surface Temperature timeseries over Romania

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The archives of geostationary land surface temperature (LST) data product provide high temporal resolution information valuable for various applications, such as investigations on surface urban heat island, heat and cold waves, or monitoring extreme events. The main constraint of satellite infrared land surface temperature product is their inability to provide data under cloud-covered conditions. In this work we tested several existing statistical approaches for filling gaps in the SEVIRI land surface temperature imagery time-series.

Three categories of gap-filling approaches used for modelling missing data have been compared: spatial, temporal and spatio-temporal. The input datasets were the land surface temperature data over Romania, based on MSG-SEVIRI measurements, which is an is an operational product of the Land Surface Analysis – Satellite Application Facility (LSA-SAF). The product was obtained from the land LSA-SAF archive centre (https://landsaf.ipma.pt/products/disseminationMethod.jsp) for 2 year-period (between 2017 to 2018).

To evaluate the gap-filling approaches, we created artificial gaps in the original LST data, estimated data for these areas and compared the computed values to the raw original LST values. The common accuracy indicators for prediction models (i.e. mean error, mean absolute error, root mean squared error, correlation coefficients, index of agreement, etc) were computed between estimated and original LST values. The final outcome of this research is a fully gap-free time series of the surface temperature over Romania from SEVIRI LST product, obtained with the help of the gap-filling approach which performed best.