

Multi-decadal validation of the TIMELINE AVHRR Land Surface Temperature product with MODIS and in situ LST

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The study assesses the accuracy and consistency of the TIMELINE AVHRR LST product. In the TIMELINE project (www.timeline.dlr.de), one aim is to retrieve accurate and consistent LST for the entire operating period of AVHRR sensors over Europe using the approach created by Frey et al. (2017) based on the Qin et al. (2001) and Becker & Li (1990) algorithms. The validation approach comprises the following steps:

- a) an inter-comparison between AVHRR LST and in-situ LST obtained at 10 stations located in Europe (Evora, Donana), North America (7 surface radiation network (SURFRAD) stations) and Southern Africa (Heimat);
- b) a comparison of the AVHRR LST product to concurrent MODIS (Moderate Resolution Imaging Spectroradiometer) LST (MOD11_L2 product). The comparisons were conducted on a daily basis for the complete MODIS time series (2000-present) over Europe and for the period of 2010-2013 over North America and Southern Africa;
- c) an assessment of the consistency of the complete AVHRR LST time series (1982-present) between the different NOAA missions at selected European sites.

The results indicate a satisfactory consistency of the TIMELINE product, as no offsets across-sensors could be detected. Visible trends are generally in line with climate records from other data sets. On average, an absolute deviation of the AVHRR LST by 1.8 K from in situ LST and 1.5 K from the MODIS product was observed. The deviations show diurnal and annual patterns as well as differences for individual land cover types.