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Estimation of Land Surface Temperature from 1-km AVHRR data

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In order to re-process DLRs 1km AVHRR data archive to different geophysical and descriptive parameters of the land surface and the atmosphere, a series of scientific data processors are being developed in the framework of the TIMELINE project. The archive of DLR ranges back to the 80ies. One of the data processors is SurfTemp, which processes L2 LST and emissivity datasets from AVHRR L1b data. The development of the data processor included the selection of statistical procedures suitable for time series processing, including four mono-window and six split window algorithms. For almost all of these algorithms, new constants were generated, which better account for different atmospheric and geometric acquisition situations. The selection of optimal algorithms for SurfTemp is based on a round robin approach, in which the selected mono-window and split window algorithms are tested on the basis of a large number of TOA radiance/LST pairs, which were generated using a radiative transfer model and the SeeBorV5 profile database. The original LSTs are thereby compared to the LSTs derived from the TOA radiances using the mono- and split window algorithms. The algorithm comparison includes measures of precision, as well as the sensitivity of a method to the accuracy of its input data. The results of the round robin are presented, as well as the implementation of selected algorithms into SurfTemp. Further, first cross-validation results between the AVHRR LST and MODIS LST are shown.