



## **Performance evaluation of Landsat 8 TIRS and the NOAA/METOP AVHRR sensors for lake surface water temperature retrieval**

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Lake surface water temperature (LSWT) is an important driver of lake ecosystems and it has been identified as an indicator of climate change. In-situ data for European lake water temperatures are very heterogeneous in terms of spatio-temporal coverage and retrieval methods.

Satellite derived long term LSWT time series, as derived for example from the AVHRR sensor (since early 80ies), can serve as a baseline when merging different data sets. Another important advantage of satellite based temperature measurement is the representation of spatial temperature distribution within a waterbody.

Focusing on spatial temperature distribution, the coarse resolutions of older sensors (1.1km for AVHRR sensor) is a limiting factor. Thus, during this study, the performance of LSWT retrieval from the TIRS sensor on the Landsat 8 platform was evaluated. The TIRS sensor has a resolution of 100m which allows to see small spatial temperature gradients, and it also offers the possibility to retrieve LSWT from smaller lakes where it was not possible with the AVHRR sensor.

The temperature retrieval method used for both sensors was an optimized split window approach with lake specific and sensor specific coefficients. To validate and to evaluate the performance of the retrievals, the LSWT derived from Landsat 8 TIRS and from AVHRR were compared to each other, and also to different in-situ measurements. The accuracy of the temperature retrieval with the Landsat 8 sensor is shown to be generally better than with the AVHRR sensor. This is due to the higher resolution of the TIRS sensor, leading to lower contamination rate for individual pixels.