Evaluation of Remotely Sensed Lake Water Surface Temperature over Finnish Lakes

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Heat exchange between lakes and the overlying atmosphere influence local and regional weather and climate. This exchange strongly depends on Lake Water Surface Temperatures (LWST). Obtaining spatially detailed in situ LWST measurements, especially for large and deep lakes, is challenging such that satellite remote sensing observations are of particular interest. They can provide surface temperature data at high spatial and temporal resolutions. Satellite data products provide the opportunity to collect continuous data over very large geographic areas, including remote high-latitude regions. In this study, 1-km satellite-derived LWST products from the MODerate resolution Imaging Spectroradiometer (MODIS) aboard NASA's Earth Observing System Terra and Aqua satellite platforms, and the Advanced Along Track Scanning Radiometer (AATSR) aboard the ESA ENVISAT are evaluated against in situ LSWT measurements. Daytime and nighttime satellite data as well as calculated daily mean values are compared with in situ data provided by Finnish Environment Institute (SYKE) over 27 Finnish lakes during the open water period.

Preliminary results show a good agreement between daily averaged MODIS satellite observations and in situ measurements ($0.878 \leq$ relative index of agreement ≤ 0.962, -0.38 oC $\leq$ mean bias error ≤ -2.33 oC, and 1.70 oC $\leq$ root mean square error ≤ 3.01 oC). This strong level of agreement indicates that satellite-derived LWST observations are a promising data source for improving the representation of lakes in climate and weather forecasting models.