Lakes: The Mirrors of the Earth
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MONITORING AND RETRIEVING HISTORICAL DAILY SURFACE TEMPERATURE OF SUB-ALPINE LAKES FROM SPACE

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Thermal infra-red remote sensing methods provide great opportunity to study spatial and temporal temperature variations over land and water masses. In this study, we used MODIS (Moderate Resolution Imaging Spectroradiometer) Land Surface Temperature (LST) data by reconstructing them using a multi regression technique (FEM-CRI PGIS, http://Array, at 250 m resolution) and daily Lake Surface Water Temperature dataset (Arc-Lake 1995-2009, http://Array) at 0.05º spatial resolution retrieved using optimal estimation and probabilistic cloud screening from A(A)TSR (Advanced Along-Track Scanning Radiometer) aboard the Envisat satellite. The ability of remotely sensed datasets to capture the thermal variations over time was validated against historical monthly ground observation data collected in the largest Italian lakes – Como, Iseo, Garda, Maggiore and Trasimeno. The preliminary analysis over lake Garda was able to reconstruct the seasons on an annual scale while giving us a graphical view of intra-annual variations in the trends with residuals. The correlation between time series of satellite data LST (x, y, t) and the field measurements f (x, y, t) were found to be in acceptable range, with a correlation coefficient of 0.94. The time series methods STL – Seasonal Time series decomposition based on Loess method and BFAST – Breaks for Additive Season and Trend, were implemented and compared in their ability to derive changes in trends and seasonality with respect to the monthly field data. The time series trend analysis showed similar pattern from both the datasets reinstating the importance of remotely sensed data in climate change related studies.