



Air Temperature Derivation at Different European Ecosystems from Space by combining the TvX approach with a range of EO datasets

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Being able to accurately estimate parameters such as Air Temperature (T_a) across a variety of spatially explicit local, regional, and global scales is of great importance, due to its relevance to key physical processes of the Earth system and its requirement by scientists, resource managers and policy makers in a range of applications at different disciplines.

Earth Observation (EO) technology has allowed contemporary derivations of reasonably accurate T_a estimates from space at different spatial and temporal resolutions. A range of methods have been proposed for this purpose, exploiting spectral information acquired at different parts of the electromagnetic radiation spectrum. One of the most widely used approaches is based on the temperature – vegetation index (TvX) method.

The present study aimed at evaluating the ability of the TvX method in deriving estimates of T_a at a range of ecosystem conditions in Europe using EO data acquired from sensors operating at different spatial resolutions. In particular, the TvX method is implemented for selected sites / days in Europe using satellite imagery acquired from Landsat (60 m), MODIS (1 km) and SEVIRI (3 km) radiometers. Satellite-derived T_a predictions are compared against concurrent ground measurements derived from the CarboEurope ground observational network. Selected sites are characterised by varying topographical and biome characteristics, further allowing the development of a comprehensive evaluation on how topography and land fragmentation can effect T_a retrievals.

Conducted statistical evaluation allowed a subjective evaluation to be provided of the use of the TvX method in deriving T_a using the EO datasets examined herein. Effects of spatial resolution on the retrievals of T_a from EO datasets using the Ts/VI approach are discussed. The study results provide a potentially important contribution towards the development of a potential downscaling scheme of T_a , at least for the selected test sites examined. This is of potential wider importance given the scope of our knowledge at present with regarding an EO-based related global product.

Key words: Air Temperature (T_a), temperature – vegetation index (TvX), Landsat, MODIS, SEVIRI, spatial scale, Earth Observations (EO).