



Estimating temperature of surface components by synergistically combining optical and thermal radiative transfer models

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To estimate evapotranspiration (ET) from space the accurate retrieval of Surface Temperature and several land surface parameters (LSP) is of vital importance. This however had lead in the past to a large caveat: namely, the consistency between the different input parameters. When consistency between input parameters is not considered, this ignores the fact that that without goodness inputs no decent output can provided. When LSP- dynamics contradict each other, the output of the model cannot be representative of reality. At present however, the LSPs used in large scale ET estimations originate from different single-sensor retrieval-approaches and even from different satellite sensors.

In response, the Earth Observation Land Data Assimilation System (EOLDAS) was developed. EOLDAS uses a multi-sensor approach to couple different satellite observations/types to radiative transfer models (RTM), consistently. It is therefore capable of synergistically estimating a variety of LSPs. Considering that ET is most sensitive to the temperatures of the land surface (components), the goal of this research is to expand EOLDAS to the thermal domain. This research not only focusses on estimating LST, but also on retrieving (soil/vegetation, Sunlit/shaded) component temperatures, to facilitate dual/quad-source ET models.

To achieve this, The Soil Canopy Observations of Photosynthesis and Energy (SCOPE) model was integrated into EOLDAS. SCOPE couples key-parameters to key-processes, such as photosynthesis, ET and optical/thermal RT. In this research SCOPE was also coupled to MODTRAN RTM, in order estimate BOA component temperatures directly from TOA observations. This paper presents the main modelling steps of integrating these complex models into an operational platform. In addition it highlights the actual retrieval using different satellite observations, such as MODIS and Sentinel-3, and meteorological variables from the ERA-Interim.