



A framework for global diurnally-resolved observations of Land Surface Temperature

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Abstract

Land surface temperature (LST) is the radiative skin temperature of the land, and is one of the key parameters in the physics of land-surface processes on regional and global scales. Being a key boundary condition in land surface models, which determine the surface to atmosphere fluxes of heat, water and carbon; thus influencing cloud cover, precipitation and atmospheric chemistry predictions within Global models, the requirement for global diurnal observations of LST is well founded. Earth Observation satellites offer an opportunity to obtain global coverage of LST, with the appropriate exploitation of data from multiple instruments providing a capacity to resolve the diurnal cycle on a global scale.

Here we present a framework for the production of global, diurnally resolved, data sets for LST which is a key request from users of LST data. We will show how the sampling of both geostationary and low earth orbit data sets could conceptually be employed to build combined, multi-sensor, pole-to-pole data sets. Although global averages already exist for individual instruments and merging of geostationary based LST is already being addressed operationally (Freitas, et al., 2013), there are still a number of important challenges to overcome. In this presentation, we will consider three of the issues still open in LST remote sensing: 1) the consistency amongst retrievals; 2) the clear-sky bias and its quantification; and 3) merging methods and the propagation of uncertainties. For example, the combined use of both geostationary earth orbit (GEO) and low earth orbit (LEO) data, and both infra-red and microwave data are relatively unexplored but are necessary to make the most progress. Hence this study will suggest what is state-of-the-art and how considerable advances can be made, accounting also for recent improvements in techniques and data quality.

The GlobTemperature initiative under the Data User Element of ESA's 4th Earth Observation Envelope Programme (2013-2017), which aims to support the wider uptake of global-scale satellite LST by the research and operational user communities, will be a particularly important element in the development and subsequent provision of global diurnal LST.

References

Freitas, S.C., Trigo, I.F., Macedo, J., Barroso, C., Silva, R., & Perdigao, R., 2013, Land surface temperature from multiple geostationary satellites, *International Journal of Remote Sensing*, 34, 3051-3068.