

EARTH OBSERVATION SYMPOSIUM (B1)
Earth Observation Data Management Systems (4)

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DOWNSCALING FOR INFRARED RESOLUTION ENHANCEMENT

Abstract

Downscaling is the scaling process of converting from low to a higher spatial resolution. In the event of temperature estimation, downscaling refers to the process of determining the sub pixel temperature values within the pixels composing a low-resolution thermal image.

A study and implementation of an automatized data processing chain has been developed to enhance the resolution of data coming from current infrared sensors (mainly MODIS and Landsat), with the aim of obtaining better estimations of already available remote sensing applications. The current trend in sensor development is to obtain higher resolution in the infrared domain by means of larger and more expensive instruments, but while this is achieved, it is valuable to develop new methods capable of performing the mentioned downscaling and hence, simulate higher resolution infrared data.

The processing chain starts with several usual corrections (radiometric, atmospheric and geometric) and filtering (land/sea and cloud mask) fully automated. From this point, the downscaling process relies on the linear correlation between predictors and surface temperature (ST). Many biophysical parameters are well correlated to the ST spatial distribution, and most of them can be observed in finer resolution than satellite thermal image, being therefore suitable as downscaling predictors.

As a case study, the application of this processing chain to the environmental issue of Urban Heat Islands (UHI) is analyzed. The city planners are now addressing the UHI issue with special attention, and Earth Observations satellites offer a vast suite of information that shall help the urban planning offices to better manage the development of their cities, providing a healthier environment for citizens and also decreasing energy consumption costs with an intelligent urban planning. Being able to provide sub-pixel information in UHI presents itself as major asset in urban planning because of the socio-economic impact of these phenomena.