

Vegetation Cover Method Emissivity Dependencies on Atmosphere and Multispectral Vegetation Index

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Abstract:

This work studies the influence caused by the lack of atmospheric correction of the optical images used to calculate land surface emissivity (LSE) for common atmospheric situations and multispectral vegetation indexes. Previous works of the authors pointed out that improved thermal emissivity is calculated with the Vegetation Cover Method (VCM) by using atmospherically corrected optical images. Now, the Second Simulation of the Satellite Signal in the Solar Spectrum (6S) radiative transfer code is used to simulate the atmosphere. Atmosphere type, aerosol model and total load, illumination and observation geometries, and spectral range are taken into account when computing simulations. Moreover, the atmospheric effect impacts the vegetation index used in VCM. This effect depends on the particular multispectral vegetation index used. The described atmosphere simulation data have been applied to a set of spectral configurations from different satellite sensors (AVHRR, MODIS, ASTER, Landsat, etc.) and have also been taken into account when computing the most common multispectral vegetation indexes (NDVI, PVI, SAVI, ARVI, etc.). Finally, the simulated emissivity and temperature results are compared to real data obtained from AGRISAR, EAGLE, SEN2FLEX and SPARC2004 ESA campaigns.

Keywords: optical atmospheric correction, thermal emissivity, Vegetation Cover Method, 6S.

Presentation preference: poster

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