

The Simultaneous Retrieval of Land Surface Temperature and Emissivity from Satellite Observation

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Abstract

The land surface temperature (LST) and land surface emissivity (LSE) affect the satellite observed radiances or brightness temperature a lot. Therefore, accurate LST and LSE could benefit the retrieval of atmospheric sounding and certain application on LST like urban heat island effect. In this study, we try to use multi-spectral observation of MODIS for developing a retrieval algorithm of LST and LSE simultaneously. The brightness temperatures at MODIS infrared channels are calculated from Pressure-Layer Fast Algorithm for Atmospheric Transmittance (PFAAST) radiative transfer model at several combination of LSTs and LSEs. By selecting two sets of channels to conduct an optimal retrieval of both LST and LSE at the same time. The preliminary results show a good LST and LSE agreement with MODIS science team products, however, our algorithm reveals a quick and straightforward algorithm for a near real-time retrieval process, which will benefit routine operation in the future.

Keyword: Brightness temperature, Land surface temperature, Land surface emissivity