Infrared continental surface emissivity spectra retrieved from IASI observations

E. Péquignot, A. Chédin, N. A. Scott

Infrared Atmospheric Sounding Interferometer (IASI) is a key element of the payload onboard METOP series of European meteorological polar-orbit satellites. The first METOP satellite was successfully launched on 19th of October 2006. In this paper, IASI observations over land are interpreted in terms of surface emissivity spectra at a resolution of 0.05 µm and skin temperature. For each IASI observation, an estimation of the atmospheric temperature and water vapor profiles is first obtained through a proximity recognition within the Thermodynamic Initial Guess Retrieval (TIGR) climatological library of about 2300 representative clear sky atmospheric situations. With this a priori information, all terms of the radiative transfer equation are calculated by using the 4A line-by-line radiative transfer model. Then, surface temperature is evaluated by using a single IASI channel (channel 699 at 12.203 µm) chosen for its almost constant emissivity with respect to soil type. Emissivity is then calculated for a set of 97 atmospheric windows (transmittance greater than 0.5) distributed over the IASI spectrum. The overall infrared emissivity spectrum at 0.05 µm resolution is finally derived from a combination of high spectral resolution laboratory measurements of various materials carefully selected within the MODIS/UCSB and ASTER/JPL emissivity libraries.
Proceedings of the
Sixteenth International
TOVS Study Conference

Angra dos Reis, Brazil
7-13 May 2008

Sharing ideas, plans and techniques to study the earth’s weather and climate using space-based observations