Geophysical Research Abstracts
Vol. 19, EGU2017-6130, 2017
EGU General Assembly 2017

The characteristics of the real-time land surface emissivity of the ATMS data for numerical weather prediction model

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An accurate estimation of land surface emissivity in the microwave region is essential to expand the utilization of microwave satellite observations to the data assimilation process of numerical weather prediction (NWP) scheme. Several attempts have been made to derive real-time emissivities for this purpose. Here, we try to characterize the real-time land surface emissivity derived from the Advanced Technology Microwave Sounder (ATMS) data with auxiliary information obtained from the radiative simulation; RTTOV-11.2 with the Unified Model of the Korea Meteorological Administration's operational NWP model. Comparison of the real-time emissivities with a climatological emissivity atlas, TELSEM (A Tool to Estimate Land Surface Emissivities at Microwave frequencies), shows a significant improvement in the first guess departure; the reduced bias with the increased number of observations that pass the quality control along with the decreased diurnal variation of the first guess departure. Further, the uncertainty of the real-time emissivities has been estimated over the desert and dense forest areas where the physical variables related to the emissivity are relatively stable. With the 15 days of data at the selected target area, the estimated uncertainty varies about 0.5–5% (1.5–15 K) over both regions. The suspected error sources are the errors inherent in auxiliary data (e.g. surface temperature or temperature and humidity profiles) or the imperfect cloud screening which will be further analyzed.