Geophysical Research Abstracts
Vol. 13, EGU2011-1682-1, 2011
EGU General Assembly 2011

Experiment of Rain Retrieval over Land Using Surface Emissivity Map Derived from TRMM TMI and JRA25 (II)

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Rain estimation over land is necessary for monitoring disasters like flood and management of fresh water. But the precision and accuracy of the estimate are less than that over the ocean. So, the rain estimation over land is needed to be improved. GPM (Global Precipitation Measurement) mission will bring us 3-hourly microwave radiometer's data over the globe. Therefore, reliable rainfall retrieval becomes to be more important. Rain estimation over land is mainly based on scattering signal of high frequency, because strong land microwave radiation hides rain signal and it is difficult to obtain exactly land surface properties due to the large variations. Therefore, we are developing a data-set of global land surface emissivity calculated from Tropical Rainfall Measuring Mission (TRMM) Microwave Imager (TMI) brightness temperature (TB) and atmospheric profile data of Japanese 25-year Reanalysis Project (JRA-25) for the region identified as no-rain by TRMM PR, assuming zero cloud liquid water beyond 0-C level. For the evaluation, a comparison between radiative transfer simulation and TMI-observed TB has been done, and some characteristics of global monthly emissivity maps, for example, dependency of emissivity on each TMI frequency or each local time or seasonal/annual variation are checked. Moreover, these data are classified based on JRA25 land type or soil-wetness and compared. Next, by interpolating this instantaneous data-set with Gaussian function weighting, we derive emissivity over neighboring rainy region and assess the interpolated emissivity by running radiative transfer model using PR rain profile and comparing with TMI-observed TB. Possibility of rain retrieval is checked by comparing between the difference of TBs with and without PR rain profile and PR rain rate. Preliminary rain retrieval from the emissivities for some frequencies and TBs is evaluated based on PR rain profile and TMI rain rate. Moreover, another method is tested to estimate surface temperature from two emissivities, based on their statistical relation for each land type. We will show the results for vertical and horizontal emissivities of each frequency. The resultant temperatures change gradually depending on frequencies. Then, emissivity using this temperature is compared with original one.