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Development of globally applicable algorithm to estimate land surface temperature using satellite-borne microwave radiometer data

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In order to understand the climate system of the Earth, it is essential to globally estimate a land surface temperature (LST) by remote-sensing satellite. Some algorithms to estimate LST using infrared (IR) radiometers have already been developed. However, LST estimated by these algorithms has a large uncertainty under some weather conditions since it is difficult to discriminate an IR radiation from the ground from that from clouds.
In contrast, a microwave radiometer is less subject to weather conditions though its resolution is coarse. Therefore, if appropriate data processing is applied to compensate for this coarse resolution, microwave radiometers might become more suitable for estimating LST than IR radiometers. Based on this concept, we first developed a data processing method to extract local and faint changes from data of the satellite-borne microwave radiometer AMSR-E and are aimed to develop the globally applicable algorithm to estimate LST. This algorithm being developed at present calculates microwave radiation from the ground from brightness temperatures of vertically and horizontally polarized signals at 18.7 GHz and 23.8 GHz observed by AMSR-E with atmosphere temperature and water vapor profiles simultaneously observed by AIRS and AMSU. LST is then estimated from these calculated microwave radiation from the ground. We present the development and verification process of this algorithm.