Geophysical Research Abstracts
Vol. 21, EGU2019-3747, 2019
EGU General Assembly 2019

Retrieving temperature and specularity of sea-ice surface from remotely sensed thermal infrared brightness temperatures

Masahiro Hori (1), Teruo Aoki (2,3), Tomonori Tanikawa (3), Masashi Niwano (3), and Rigen Shimada (1)

(1) Japan Aerospace Exploration Agency, Tsukuba, Japan (hori.masahiro@jaxa.jp), (2) Graduate School of Natural Science and Technology, Okayama University, (3) Meteorological Research Institute

Ice surface temperature (IST) has been an important observation target from space not only for calculating radiation budget but also for estimating the production of thin ice thickness in the cryosphere. In particular, the latter is important for assessing the amount of dense water with high salinity produced under newly formed thin ice. In this study we developed an algorithm for estimating IST and emissivity in the thermal infrared atmospheric window simultaneously using a semi-empirical emissivity model which simulates the dependence of spectral emissivity on the surface snow/ice type (specularity) and exitance angle. In this analysis we neglected the effect of water vapor absorption in the atmosphere and applied the algorithm to the data of two optical sensors. One is AHI sensor onboard the Japanese geostationary satellite Himawari-8. Channel 13 (center wavelength: 10.4 μm) and 15 (12.4 μm) were used for the retrieval. The other is SGLI onboard Global Change Observation Mission for Climate (GCOM-C) launched on December 23, 2017. Channel TI01 (10.8 μm) and TI02 (12.0 μm) were used. The results show that emissivity as well as IST seemed to be successfully retrieved over the Okhotsk ice areas (but not validated with in-situ data), although the center wavelengths of sensor's spectral channels sensitively affects the noise level in the retrieved emissivity (i.e. specularity of the surface). From the retrieved specularity image, the area of thin sea ice such as nilas were easily determined.