# Retrieval of ice surface temperature and thin ice area using thermal infrared bands of Himawari-8/AHI

*Masahiro Hori[1], Teruo Aoki[2], Tomonori Tanikawa[3], Masashi Niwano[3]

1. Earth Observation Reseacrh Center, Japan Aerospace Exploration Agency, 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 simultaneously using a semi-empirical emissivity model which can simulate the dependence of spectral emissivity on the surface snow/ice type 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 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 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). From the retrieved emissivity image, the area of thin sea ice such as nilas were easily determined. In addition, from the comparison with the case using a fixed emissivity for all snow and ice type, possible error in the IST retrieval with the fixed emissivity could be estimated to be up to a few Kelvin, which is due to the low emissivity of thin sea ice and the large viewing zenith angle of AHI around 60 degrees when observing the area of Okhotsk Sea. The same approach can also be applied to the data of polar orbit satellite such as the coming Japanese satellite mission “Global Change Observation Mission-Climate” (GCOM-C) to be launched in 2017.

Keywords: Ice surface temperature, Ice type, Emissivity, Remote Sensing, AHI, SGLI

 