Sea-ice detection using Himawari-8/AHI data

Donghyun Jin, Kyeong-sang Lee, Minji Seo, Eunkyung Lee, and Kyung-soo Han

Division of Earth Environmental System Science (Major of Spatial Information Engineering), Pukyong National University, Korea, Republic Of

The sea-ice is produced by freezing the seawater regardless of its shape, which is an important element in the earth's climate system and is distributed as snow-covered ice and pure ice that is not covered with snow. In addition, it is mainly distributed in high latitudes and polar regions, and there are limitations on observing sea-ice directly by human due to seasonal variation. Since 1960s, there has been a lot of research on sea-ice detection through remote sensing using various types of satellites. In particular, geostationary satellites are capable of continuous observation of sea-ice. Sea-ice detection using satellites is mainly done by using satellite channel reflectance and Ice Surface Temperature (IST) technique. However, the snow covered area is more volatile than the snow covered area, and the IST has discontinuity of IST calculation coefficient depending on the atmospheric water vapor and brightness temperature. There is a potential for false positives and undetected when using these two techniques. In this study, Dynamic Wavelength Warping (DWW) technique which compares the variation pattern of the reflectance according to the wavelength in the snow covered area using the AHI channel data in the Himawari-8 satellite, which is a geostationary satellite, Detected sea ice through a simple and efficient dynamic thresholding technique with no IST computation. In order to evaluate the accuracy of the sea ice data produced by this technique, we performed quantitative evaluation using National Oceanic and Atmospheric Administration (NOAA)'s Visible Infrared Imager Radiometer Sensor (VIIRS) Sea-ice characterization data. The accuracy of detection was 88.93% for POD and 1.77% for False Alarm Ratio (FAR). For the qualitative evaluation, RGB images were used. The evaluation results showed that the sea-ice data of the VIIRS Sea-ice data were misdiagnosed as sea-ice in the area where clouds and ice-free water were mixed. However, we did not detect it.