Daily Change of the Earth Surface Temperature by Himawari-8/AHI

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1. Introduction
The Japan Meteorological Agency(JMA) successfully launched Himawari-8 in October 2014 and start its operation in July 2015. JMA is operating Himawari-8 at around 140 degrees east covering the East Asia and Western Pacific regions. A new sensor system called the Advanced Himawari Imager (AHI) is scanning five areas: Full Disk(images of the whole Earth as seen from the satellite), the Japan Area, the Target Area and two Landmark Areas. In each 10-minute period, the AHI is able to scan not only the Full Disk once but also the Japan Area four times. Additionaly the number of bands has increased from 5 (VIS 1, IR 4) to 16 (VIS 3, NIR 3 and IR 10). Therefore AHI is observing the Earth surface temperature of Japan area at every 2.5 minutes continuously.
The purpose of this study is to analyse daily change of the Earth surface temperature observed by Himawari-8/AHI continuously. Land cover information is obtained from AHI visible and near infrared data observed at the same time. It was investigated that daily changes of the Earth surface temperature in artificial land cover (cities), natural land cover (forests and bare fields) and water area are different each other. It is known that the thermal environment of the urban is influenced by the landcover.
2. Data and Methods
AHI data observed in December 4th 0900 to 1500(JST), 2015 were used in this study. Band 14 is used for the analysis because the spectral range is similar to the one of Landsat/TM thermal band. Band 1 to 4, visible and near infrared bads, are used for land cover classification. Using dayly change of the brightness temperature by AHI band 14, curvilinear regression was caried out in each land cover points.
3. Results and Discussion
The following facts are found out.
* Standard errors at a city and a forest were small by a polynomial of the fourth degree.
* A standard error at a water area was small by a polynomial of the second degree.
* They are similar results at a farmland and a bare field by plynomials of the second to the fourth degree.
It could be confirmed that the daily change can be regressed by the second to the fource demensional polynomials. The results of this study should be useful for countermeasurement of urban heat island phenomenan.

Keywords: Meteorological Satellite, Earth Observation, Earth Surface Temperature, Curvilinear Regression