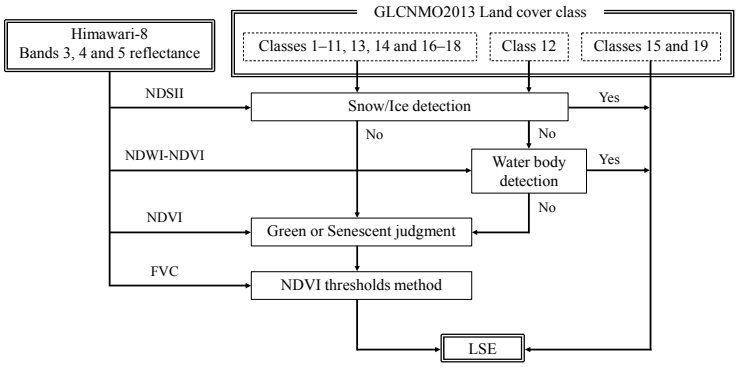
Yamamoto, Y., and H. Ishikawa, 2018: Thermal land surface emissivity for retrieving land surface temperature from Himawari-8. *J. Meteor. Soc. Japan*, **96B**, 43-58.
https://doi.org/10.2151/jmsj.2018-004




↑ Figure 1. Flowchart of the procedure for the land surface emissivity (LSE) estimation method.

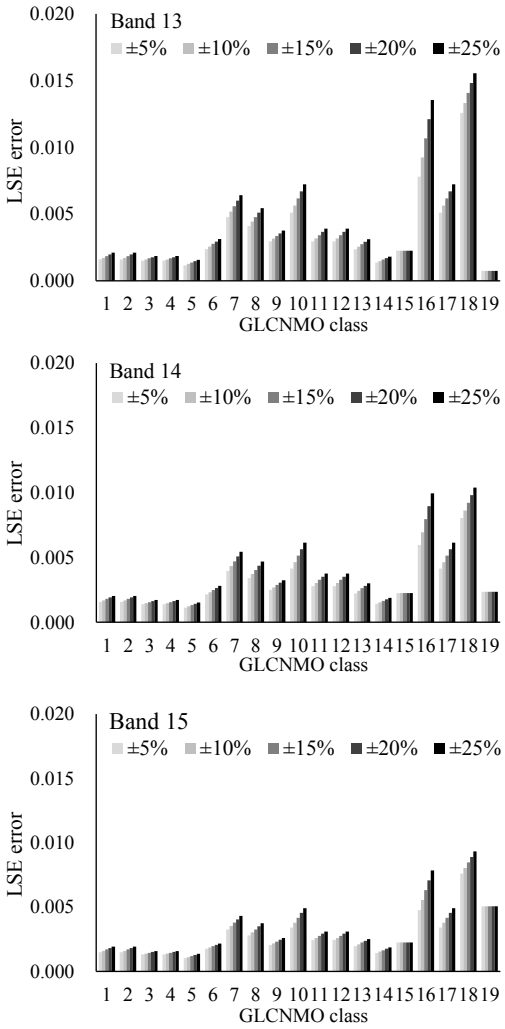



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Figure 2. The LSE error for each GLCNMO class (Kobayashi et al., 2017) and TIR band in the green state. The errors were calculated from sensitivity analysis that considers the uncertainties of vegetation/ground emissivity and geometrical shapes. Classes 1–14 are forest types. Classes 16 and 17 are bare areas. Class 15, 18 and 19 are wetland, urban and snow/ice, respectively. The estimation error of fractional vegetation cover is assumed to vary between 5% and 25%.

- The land surface emissivity (LSE) maps for AHI (Advanced Himawari Imager) bands, Band 13, 14 and 15 were developed, which is used in the land surface temperature retrieval.
- The LSE is estimated by a semi-empirical method, which is a combination of the classification-based method and a normalized difference vegetation index (NDVI) thresholds method (Figure 1).
- The new method basically follows the work of Peres and DaCamara (2005), and some advanced considerations are added. These considerations are the phenology of vegetation, flooding of paddy fields, snow/ice coverage, and internal reflections (cavity effect) in urban areas (Figure 1).
- The average cavity effect on LSE in urban canopies is approximately 0.01, but it reaches 0.02 in built-up areas.
- The sensitivity analysis shows that the LSE errors for the three bands are less than 0.02. The LSE

estimation is especially stable at the vegetation area, where the error is less than 0.01 (Figure 2).