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Introduction of confidence flags to the Himawari-8 precipitation estimation algorithm

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The Himawari-8 precipitation estimation algorithm (HPA) can estimate precipitation from IR multi-band observations of geostationary meteorological satellites (GEOs) by using the Random Forest machine learning method (Hirose et al., 2019). Case studies near Japan show that the HPA has high accuracy in estimating linear precipitation zones and three water vapor bands contribute to the estimation accuracy. By limiting the learning sample to the summer area of Japan, overestimation of heavy rain area was reduced.

However, in cases where optically thick upper-level clouds covered large areas, overestimation of heavy rain area was often occurred. This is because the effectiveness of the IR multiband is significantly reduced for optically thick upper clouds. Therefore, in this study, a confidence flag was introduced to isolate overestimation of heavy rain areas. The Random Forest method classifies strong or weak rainfall in a probabilistic manner. When the probability of classifying a rainfall as heavy rain was close to 50%, it was judged to have a low confidence level. The case analysis showed that the confidence flag was able to detect a significant portion of the heavy rain area overestimated by the HPA.