Hirose, H., S. Shige, M. K. Yamamoto, and A. Higuchi, 2019: High temporal rainfall estimations from Himawari-8 multiband observations using the random-forest machine-learning method. *J. Meteor. Soc. Japan*, **97**, 689-710.
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Plain Language Summary: The Himawari-8 Rainfall estimation Algorithm (HRA) was developed by using the Random Forest (RF) machine-learning method. Training data is obtained from an Infrared (IR) radiometer of a third-generation geostationary meteorological satellite (GEO), Himawari-8, and Ku-band precipitation radar on board the Global Precipitation Measurement (GPM) core observatory. HRA could estimate heavy rainfall from warm-type precipitating clouds in Kanto-Tohoku heavy rainfall events although the Global Satellite Mapping of Precipitation (GSMaP_NRT) could not estimate such heavy rainfall when microwave satellites were unavailable.
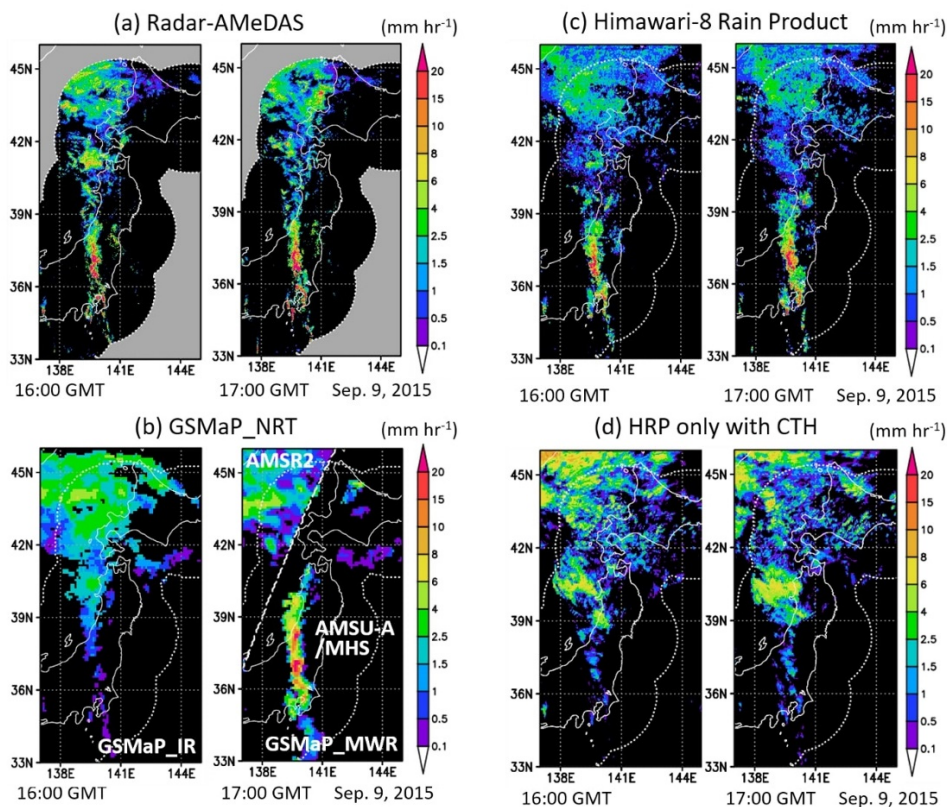
Figure 1. Estimated rainfall results for the Kanto–Tohoku heavy rainfall event from (a) radar–AMeDAS and (b) GSMaP_NRT. The result at 16:00 GMT was complemented by GEO IR and that at 17:00 GMT was observed by microwave satellites. The dashed line indicates boundary of the two different microwave satellites. (c) HRA. (d) HRA estimated without the SW and WV information. The dashed circular frame lines show the effective range of the ground-based radar.

- We introduce a novel rainfall-estimating algorithm only from GEO IR observations, called HRA.
- A statistical analysis showed that the warm-type heavy rain seen in the Asian monsoon region occurred frequently when there were small BT differences between the 6.9-μm and 7.3-μm of water vapor bands (ΔT6.9–7.3), which is first to be analyzed by GEO after the launch of Himawari-8.