Estimation of atmospheric ammonia distribution from GOSAT-TIR

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Atmospheric ammonia has the various sources such as food production, wastes, and biomass-burning and their emissions are increasing rapidly with human activities. It is reported that it has the large impacts for the environments, for instance, the formation of particulate matter or CCN, and the eutrophications. However, the accurate estimation of its behavior is difficult because their life-time in the atmosphere is not so long. Space-borne hyper-spectral TIR sounders enable to monitor them globally. Clarisse et al. (2009) had reported the global concentration distribution using the brightness temperature difference at the ammonia absorption band. The similar studies are also reported using the other sounders, TES, AIRS, and CrIS. Although they had captured the seasonal variations of the concentrations, the smaller time-scale events can be hardly detected because of their revisit cycle of 16 days. In addition, it also reported that there are some differences between the results from the satellites and the numerical simulations based on the inventories (Shephard et al., 2011). GOSAT which has the shorter revisit cycle of 3 days has the potential to reveal short time-scale events. The retrieval algorithm was developed based on non-linear Maximum a Posteriori (MAP) method (Rogers, 2000) and the scaling factor to the U. S. standard ammonia profile is estimated as the parameter. The large error causes, temperature and water vapor profiles are pre-estimated from GOSAT-TIR data. The preliminary results show the high concentrations in the northern India and the eastern China consistently with the previous researches and the global distribution will be presented.

Keywords: satellite remote sensing, thermal infrared radiation, atmospheric minor constituents