



Validations of nadir and limb viewing satellite ozone vertical profiles using ozonesonde measurements at Jangbogo station in Antarctica

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Analysis of ozone profile is an essential task for quantifying stratospheric ozone depletion. For decades, satellites have provided valuable measurements of the composition of the atmosphere to follow the ozone chemistry. The nadir-viewing instruments, the Ozone Monitoring Instrument (OMI) based on ultraviolet channels and Atmospheric Infrared Sounder (AIRS) based on infrared channels, have been conducting the long-term monitoring longer than a decade. The broad coverage achieved by these nadir-viewing instruments, however, there has a coarser vertical resolution. The limb-viewing instruments, the Microwave Limb Sounder (MLS) based on microwave channels and Ozone Mapping Profiler Suite (OMPS) based on visible channels, provide a higher vertical resolution but have limited spatial coverage and a coarse horizontal resolution. Some studies have shown that the quality of satellite data has been validated so far, but still not enough for the Antarctic area. Since 2015, Korea Polar Research Institute (Longitude: 164° 12'E, Latitude: 74° 37'S) have launched ~ 25 ECC ozonesondes every year, mostly during the austral spring (September to November) to see the vertical pattern of ozone hole period.

In this study, we evaluate ozone profile retrievals from OMI, AIRS, MLS, and OMPS using ozonesonde measurements at Jangbogo station. We found the different large patterns of ozone, temperature, and potential vorticity between spring 2015, and 2016 to 2017 below 30 km. Substantial ozone depletion was detected in 2015 due to the colder temperature and strong potential vorticity condition. Also, all of the instruments were found to be in good agreement with ozonesonde data. They showed a tendency to overestimate at troposphere because, towards higher latitudes, the troposphere has a smaller retrieval signal than stratosphere at the satellite.