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Evaluation of OMPS Limb Profiler retrievals by studying ozone distribution inside the 2015 Antarctic ozone hole

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The 2015 Antarctic ozone hole was the 4th largest on record with the area of 25.6 million km^2. The 2015 ozone hole started to develop about 2-weeks later than usual. Despite this late start the hole reached a maximum area of 28.2 million km^2 on 2 October and remained at record large values for much of October and November. The persistent large area and low ozone values were caused by the unusually weak stratospheric dynamical conditions.

We examine ozone profile retrievals from the Ozone Mapper and Profiler Suite (OMPS) Limb Profiler (LP) to study ozone distribution inside the 2015 hole. The OMPS LP was launched in October 2011 onboard the Suomi NPP satellite. The LP reconstructs ozone profiles with a high vertical resolution ($\sim$1.8-2 km) and dense spatial sampling ($\sim 1^\circ$ latitude and 14 orbits per day). A follow-up LP will be launched onboard of the Joint Polar Satellite System 2 (JPSS-2) satellite in 2022 to ensure continuation of high vertically resolved ozone measurements.

We look at LP ozone retrievals obtained from several different retrieval algorithms: the OMPS version 2 and version 2.5 algorithms from NASA Goddard Space Flight Center (GSFC), and USask (University of Saskatchewan) 1D and 2D algorithms. All ozone retrieval algorithms were applied to the same set of measured gridded Level 1 LP radiances. This analysis allows us to test the different LP retrieval algorithms under a large range of geophysical conditions characterized by sharp vertical and horizontal ozone gradients. The retrieved ozone profiles from these algorithms are compared with ozonesonde and the Aura Microwave Limb Sounder (MLS) observations. We will describe specific features of the vertical ozone distribution inside the 2015 Antarctic vortex, contrast them with the previous 3 years of LP operation, and illustrate the effects of Calbuco volcanic aerosol on ozone retrievals in the lower Antarctic stratosphere.

Finally, we will summarize what we have learned from inter-instrument and inter-algorithm comparisons and describe our approach to fix some of the issues in the updated version 2.5. We will also outline plans for further algorithm refinements and show first results from our new simultaneous temperature and ozone retrievals in the upper stratosphere and lower mesosphere.