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Energetic Particle Precipitation reflected in the Global Secondary Ozone Distribution

Jia Jia^{1,2}, Lisa E. Murberg^{1,3}, Tiril Løvset¹, Yvan J. Orsolini^{1,3}, Patrick J. Espy^{1,2}, Jude Salinas^{4,5}, Jae N. Lee^{4,5}, Dong Wu⁴, and Jiarong Zhang⁶

¹Norwegian University of Science and Technology, NV-NTNU, Department of Physics, Trondheim, Norway (jia.jia@ntnu.no)

²Birkeland Centre for Space Science (BCSS), Norway

³NILU - Norwegian Institute for Air Research, Kjeller, Norway

⁴NASA Goddard Space Flight Center, Greenbelt, Maryland, USA

⁵University of Maryland, Baltimore County, Maryland, USA

⁶Coastal Carolina University, Conway, South Carolina, USA

The secondary ozone layer is a global peak in ozone abundance in the upper mesosphere-lower thermosphere (UMLT) around 90-95 km. The effect of energetic particle precipitation (EPP) from geomagnetic processes on this UMLT ozone has not been well studied. In this research we investigated how the secondary ozone response to EPP from the Microwave Limb Sounder (MLS) and the Sounding of the Atmosphere using Broadband Emission Radiometry (SABER) instrument on the Aura and TIMED satellites, respectively. In addition, the Whole Atmosphere Community Climate Model with thermosphere and ionosphere extension and specified dynamics (SD-WACCM-X) was used to characterize the residual circulation during EPP events. By comparing ozone and circulation changes under High- and low-Ap conditions, we report regions of secondary ozone enhancement or deficit across low, mid and high latitudes as a result of circulation and transport changes induced by EPP.