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B 会場 ：9/24　PM2 （15:45-18:15）
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Aura/MLS 衛星データによる日食時の中高層大気微量分子応答の統計解析

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Statistical Analysis of the Earth's Atmospheric Molecular Constituents Response during a Solar Eclipse Using Aura/MLS Data

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A solar eclipse is a familiar natural phenomenon characterized by a short-term obscuration of solar radiation. It can provide a unique perspective of a natural experiment on the short-term variations of the middle and upper atmosphere during a short-term change in solar radiance. However, limited research or survey has been conducted on this short-term variability. For example, Imai et al. (2015) used JEM/SMILES data to assess the impact of the January 15, 2010, annular solar eclipse on the mesospheric ozone. However, there are few examples of observations on the variation of atmospheric molecular constituents in the stratosphere and mesosphere during solar eclipses. This study examined the relationship between eclipse obscuration rate and ozone variability for all eclipses from 2004 to 2023 using Aura/MLS data. We used the vertical ozone distribution data (version 4.2) with AURA/MLS, and the obscuration rate at the time of the eclipse was calculated for each observation point. Ozone variability was determined as the difference from the ozone data from orbits before and after the eclipse. In the case of the total eclipse on December 14, 2020, we found that ozone concentrations increased at altitudes of 58 km to 67 km during the eclipse. This is generally consistent with the results of Imai et al. (2015). Imai et al. (2015) also noted that the relationship between solar radiation variability and ozone variability is due to differences in the mechanism of OH production at different altitudes. However, our statistical analysis shows that the rate of ozone variability when the obscuration rate is significant is lower than the relationship noted by Imai et al. (2015), which suggests that when the occultation rate is significant in an eclipse, ozone loss due to OH may continue for a relatively long time and suppress ozone increase.