

PLANETARY- AND SYNOPTIC-SCALE VARIATIONS OF OZONE
AND THEIR RELATIONSHIP TO THE DYNAMICAL FIELD
(ABSTRACT)

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Longitudinal inhomogeneity of total ozone distribution is investigated in association with dynamical variations in the troposphere and the stratosphere. First, in order to see the spatial correlation between the total ozone and dynamical fields we do a statistical analysis using 10 years of the Total Ozone Mapping Spectrometer (TOMS) total ozone data and the Stratospheric Sounding Unit (SSU) geopotential height and temperature data. Correlation coefficients between longitudinal anomalies of total ozone and lower stratospheric temperature are positive and significantly large in mid- and high latitudes, though the seasonality is much stronger for the planetary scale (wavenumbers 1 and 2) variations than for the synoptic scale (wavenumbers 4 to 6). Next, by using the Stratospheric Aerosol and Gas Experiment (SAGE) ozone profile data, we do case studies to investigate where the main contribution to the wave structure in the total ozone field comes from. It is found in mid- and high latitudes that the synoptic disturbances in total ozone are mainly due to the variation of ozone around the bottom of the stratosphere and that the planetary scale disturbances are due to that over the lower stratosphere. During the spring in the southern hemisphere, however, there are some exceptional situations in which chemical reactions in the polar vortex decrease ozone in a thin layer of the lower stratosphere.

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