CORRELATION BETWEEN OZONE AND POTENTIAL TEMPERATURE AND ITS DEPENDENCE ON SEASON AND LATITUDE

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The seasonal and latitudinal variations of the correlation between the small-scale structures of ozone mixing ratio and potential temperature are investigated using ozonesonde data. Ozone distribution in the lower stratosphere is disturbed mainly by atmospheric motions since the chemical lifetime of ozone in this region is on the order of several months. Recently the backward trajectory method with the aid of meteorological assimilation data has successfully explained that the distinct structures of ozone profiles are mainly caused by horizontal advections associated with planetary waves. Ozone structures with vertical scales less than 1km are less focused, due to the limit of the vertical resolutions of assimilation data, although they appear more frequently in the vertical profiles of routine ozone observations.

The present study investigates the role of vertical and horizontal advections in creating small-scale structures of ozone profiles with statistical methods. We extract small-scale (less than 2km) structures of ozone, temperature, and wind velocity from the ozonesonde data distributed by the World Ozone and Ultraviolet Radiation Data Centre. The contributions of vertical and horizontal advections are inferred from the statistical analysis of the correlation between ozone mixing ratio and potential temperature. The candidates for the dynamical processes that cause those advections are also discussed.