

Influence of Stratospheric Intrusions on the Lower Free Tropospheric Ozone at Lulin Atmospheric Background Station

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Stratospheric intrusions (SI) often bring ozone (O_3) rich air with low humidity from the stratosphere rapidly into the troposphere. Cutoff lows, tropopause folds, frontal passages and surface high-pressure systems are mainly counted for the occurrence of SI. In this study, we present 5 years of O_3 data measured at Lulin Atmospheric Background Station (LABS; 23.47°N, 120.87°E, 2862m a.s.l.) located in the subtropical East Asia from April 2006 to March 2011. The mean O_3 mixing ratio was 32.8 ± 15.2 ppb, whereas the O_3 was enhanced ~ 11.5 ppb on average during the 64 detected SI events over the 5 years. Distinct seasonal variation of O_3 was observed with a springtime maximum and a summertime minimum, which was predominately shaped by the long-range transport of biomass burning air masses from Southeast Asia and oceanic influences from the Pacific, respectively. Diurnal cycles were also observed at the LABS, with a maximum around midnight and a minimum during noontime. The impacts and characteristics of SI events during the measurement period were investigated. Selected SI events were also discussed in associated with Modern Era Retrospective Analysis-2 (MERRA-2) assimilated data provided by NASA/Goddard Space Flight Center in this study.

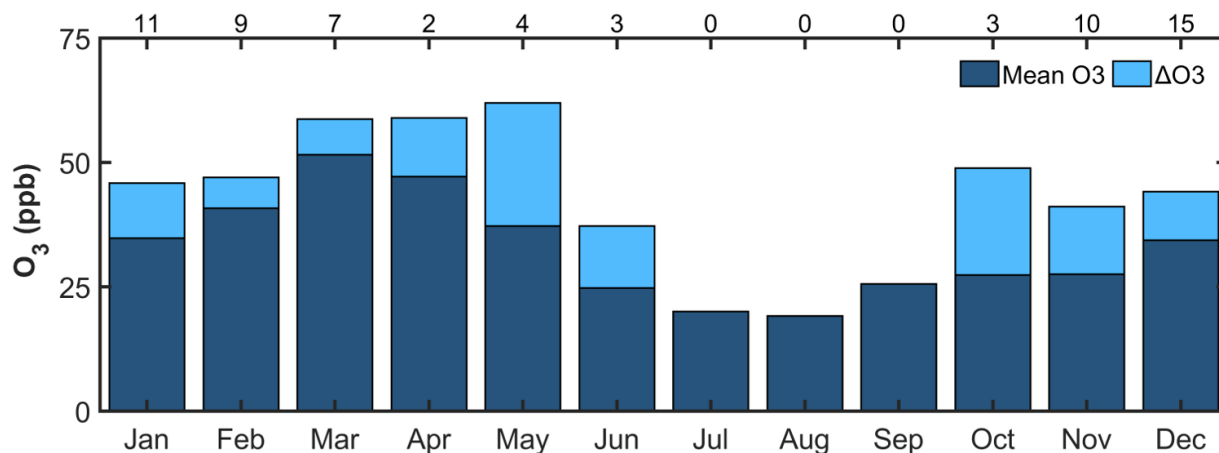


Figure 1. Seasonal variation of O_3 and enhanced levels by SI at Mt. Lulin from April 2006 to March 2011. Numbers of detected events in each month are listed on the top of the figure.