

Irreversible vertical mixing of ozone caused by inertio-gravity wave breaking in the lower stratosphere

Katsuyuki Noguchi[1]; Takeshi Imamura[2]; Koh-ichiro Oyama[3]

[1] JAXA/ISAS; [2] Institute of Space and Astronautical Science; [3] ISAS

The irreversible vertical mixing of ozone due to the breaking of an inertio-gravity wave was investigated based on a case study with the aid of meteorological data obtained by ozonesondes. The conditions of shear instability and convective instability were examined in order to investigate the contribution of such instabilities to the irreversible vertical transport and mixing. The altitude regions where the condition of instabilities was satisfied had locally flat vertical distributions of ozone mixing ratio and potential temperature. A hodograph analysis showed that such unstable regions could be related to the gravity wave field, suggesting that the gravity wave observed simultaneously caused instabilities and the vertical mixing of potential temperature and ozone. Statistical studies showed that the vertical mixing under the condition of shear instability occurs frequently in the lower stratosphere.