

# **Aircraft observations of high SO<sub>2</sub> and NO<sub>x</sub> instances in the lower troposphere over the west of Seoul metropolitan area for 1997—2011**

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Aircraft enable the direct measurement of chemical components in the free troposphere (FT). This study employed airborne measurements to examine the occurrences of high concentrations of SO<sub>2</sub> and NO<sub>x</sub> in the FT over the coastal region west of the Seoul metropolitan area in South Korea. The data from a long-term (1997–2011) airborne measurement campaign were used to determine the meteorological conditions conducive to carrying these pollutants into the Seoul area. The back trajectory analyses of 21 instances of high-level pollutants in the FT showed ascending patterns from the major pollutant sources (industrial complexes in eastern China) in 9 instances and passing patterns in 12 instances. In the ascending instances (9), the developing low-pressure systems over the source regions were conducive to the uplifting of air pollutants from the surface into the FT. In the passing instances (12), an anomalous low-pressure system near the surface prevented the descent of airflows into the planetary boundary layer and the upper-level anticyclonic systems contributed to keeping the ascending airflows in the FT. This study proposes the basic mechanisms for prediction of the air quality in the Seoul area, considering that air pollutants in the FT often entrain into the boundary layer to increase the local concentrations.

Key words: aircraft measurement, free troposphere, SO<sub>2</sub>, NO<sub>x</sub>