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Impact of transport of sulfur dioxide from the Asian continent on air quality over Korea in May 2005

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Sulfur dioxide (SO_2) is an important trace species in the atmosphere, both under background conditions and in polluted areas. The SO_2 emitted is chemically converted to sulfuric acids in the atmosphere both in the gaseous and aqueous phases. When these acids precipitate, damage is caused to ecosystems, particularly where soils are lacking sufficient alkalinity to buffer these acids, and buildings. Related formation of sulfuric acid (sulfate) aerosols can cause human respiratory morbidity and mortality. Stratospheric sulfate aerosols have a cooling effect on the Earth's surface. These sulfate particles reflect energy coming from the sun, thereby decreasing the amount of sunlight reaching and heating the Earth's surface. The East Asian countries have been affected by atmospheric gaseous pollutants (in particular SO_2) transported from the Asian continent as well as Asian dust storms containing a toxic mixture of heavy metals and carcinogens accumulated as the clouds pass over China's industrial areas. To investigate the impact of anthropogenic trace gases (e.g. SO_2) from the Asian continent on air quality over Korea, the following scientific questions were addressed in this paper: (1) the extent of long-range transport of anthropogenic trace gases (e.g. SO_2) from the Asian continent and (2) the impact of these atmospheric trace gases on local air quality over Korea. Basically, scattered sun-light spectra obtained by the satellite-born instrument, SCIAMACHY launched on board of ENVISAT in March 2002, as well as synoptic meteorological conditions and air-mass backward trajectory methods were utilized to retrieve SO_2 and to trace its transport from the Asian continent to East Asian countries. Ground-based measurements using a MAX-DOAS system and

in-situ gas analyzers have been utilized to investigate the impact of the anthropogenic trace gases transported from the Asian continent in May 2005 over Korea.