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Comparison of aerosols among surface measurements, CALIOP data, and the SPRINTARS model(I): Sources of dust at Phimai

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For atmospheric aerosols measured at Phimai, Thailand, comparison of chemical and optical properties was performed between the surface measurements and the SPRINTARS model in the previous report at Japan Geoscience Union Meeting 2010. According to the analysis by the field study, dust particles were transported from East China and Indochina, in the early- and the late-dry season, respectively. In contrast, the dust concentration in wet season was usually low compared with that in the dry season, while high concentration of dust was measured, comparable to that in the dry season due to transport of the edge of dust storms in East Asia. The purpose of this study is to clarify if the high dust particles were caused by the local sources or by long range transport. The case study on the episode of high dust concentration during 17-20 June 2008 was made, by comparing the surface data with CALIOP data (<http://www-calipso.larc.nasa.gov/data/BROWSE/production/V3-01/>), NIES RIDAR data(<http://www-lidar.nies.go.jp/Phimai/archives/>), and the result of the SPRINTARS model(<http://sprintars.riam.kyushu-u.ac.jp/archivej.html>). The CALIOP data showed that high dusts were measured during 14-20 June 2008, from Saudi Arabia to Somalia, from Pakistan to Arabian Sea, from Bangladesh to the Bay of Bengal, and the maximum vertical height of the dust layer reached up to 7 km. According to the RIDAR data, high dust aerosols were observed up to the height of 2-3km during 15-17 June 2008 (missing data from 18 June). Furthermore, the backward trajectory analysis by NOAA HYSPLIT MODEL (<http://www.arl.noaa.gov/ready/hysplit4.html>) showed that the air masses arrived at Phimai on 17-20 June 2008, was transported in the lower troposphere from over the Bay of Bengal a few days after, and in the layer of 2-4km height from the east coast of north Africa one week after. On the other hand, the SPRINTARS model, a high dust layer existed up to the height of 2-3km at least for a week from 14 June 2008, spreading horizontally from the eastern part of North Africa to the Bay of Bengal through west Asia, India, and the edge of which reached Indochina. All these data strongly suggest that the high dust particles at Phimai in the wet season could be caused by the long range transport of dust generated in the desert areas of west Asia, in addition to the local dust.

Keywords: atmospheric aerosol, dust, CALIOP, LIDAR, long range transport, SPRINTARS model