

Dust layer captured by an inversion layer over the Gobi Desert on 29–30 April 2015

*Kei Kawai¹, Yuta Nishio², Kenji Kai^{1,3}, Jun Noda⁴, Erdenebadrakh Munkhjargal^{1,5}, Masato Shinoda¹, Nobuo Sugimoto⁶, Atsushi Shimizu⁶, Enkhbaatar Davaanyam^{5,7}, Dashdondog Batdorj⁸

1. Nagoya University, 2. Japan Meteorological Agency, 3. Ibaraki University, 4. Rakuno Gakuen University, 5. Information and Research Institute of Meteorology, Hydrology and Environment, Mongolia, 6. National Institute for Environmental Studies, 7. University of Tsukuba, 8. National Agency for Meteorology and Environmental Monitoring, Mongolia

Asian dust originates in arid and semi-arid regions of East Asia, such as the Gobi Desert and the Taklimakan Desert. If the dust emitted from the ground surface reaches the free troposphere, it can be transported toward the Pacific Ocean over a long range by the westerlies. Therefore, the vertical distribution of dust over the source region is a key factor of the long-range transport of dust. In the Gobi Desert, a ceilometer (compact lidar) observation has been conducted at Dalanzadgad, Mongolia, since the end of April 2013. The ceilometer observed a developed dust storm over the ground and a dust layer at a height of 1.2–1.8 km on 29–30 April 2015. According to SYNOP reports, this dust storm had already developed in the upwind region before arriving at Dalanzadgad. This feature was consistent with the sudden increase of the ceilometer observation values. Then, the dust was lifted to a height of 1.2–1.8 km, and the dust layer was observed at almost the same height for 12 hours by the ceilometer. During this dust event, radiosonde observation at Dalanzadgad showed an inversion layer at a height of 1.2–1.5 km over cold air. These results suggest that the dust layer was captured by the inversion layer, which prevented the dust from reaching the free troposphere and restrained the long-range transport of the dust by the westerlies. This study was supported by Research Fellowships of Japan Society for the Promotion of Science (JSPS) for Young Scientists and by Grants-in-Aid for Scientific Research from the JSPS (16H02703, 17H01616, and 18J12795).

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