

Horizontal mass flux of aerosols in Taklamakan desert area using Balloon Borne Measurements

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ABSTRACT

Balloon borne measurements were carried out during calm weather conditions in Taklamakan desert, which is considered as one of the major source areas of Asian Dust (KOSA) particles. Vertical distribution of aerosols number concentration, size distribution, mass concentration and horizontal mass flux due to westerly wind was investigated. Vertical distribution of aerosol number concentration and size

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distribution at Dunhuang (40 °00N, 94°30E) China were observed by Optical Particle Counter (OPC) on August 17, 2001 ,October 17, 2011, January 11, 2002 , April 30, 2002 . Five channels were used 0.3 μm, 0.5 μm, 0.8 μm, 1.2 μm and 3.6 μm in OPC for particle sizing measurements. Aerosol number concentration in winter season (11 January 2002) at 3-5 km was very high .Variation of free tropospheric aerosols in April 30, 2002 was noticeable. Many inversions of temperature are found, and aerosol concentration change at these inversion points. Super micron range was noticeable in size distribution of all balloon borne measurements. High values of estimated mass concentration of aerosols were frequently observed in the ground atmosphere (1–2 km), and interestingly relatively high concentrations were frequently detected above about 2 km. Wind pattern was observed, using ERA-interim data sets at 500 hPa and 850 hPa, shows that westerly winds were dominated in Taklamakan desert during balloon borne observation period. Average horizontal mass flux of background Asian dust due to westerly wind was about in the range of 1219 -58.5 μg/m³ tons/km²/day. Most of the profiles showed active transport of aerosols in the region where westerly dominated, fluxes were found to be very low on January 11, 2002, compared with the other seasons. Vertical profiles of aerosols number concentration showed that significant transport of aerosols was dominated in westerly region (4-7 km). Low horizontal mass flux of aerosols found in winter season.

Key words: Troposphere, Aerosols, Balloon Borne Measurements, Mass Flux ,
Asian Dust