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Environment for Two Dust Storms at Beijing in 2002 and 2004

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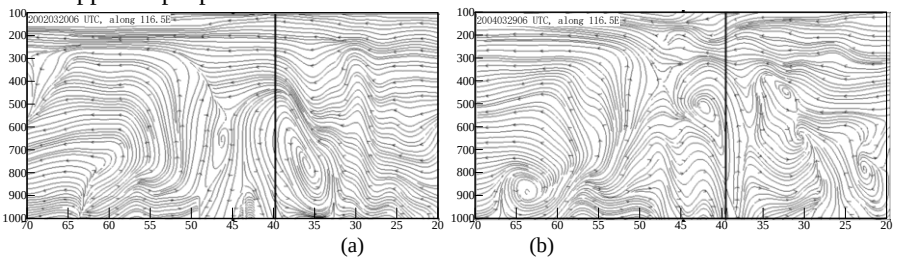
Two dust storms which were induced by the Mongolia cyclone occurred at Beijing on 20 March 2002 and 29 March 2004. To reveal the environmental conditions of these two dust storms, based on the NCEP final analysis data and GMS5, GEOS9 satellite images, the sea level pressure, the potential vorticity, vertical motion, back air trajectories, total column ozone, and satellite water vapor images were analyzed and compared for 06UTC 20 March 2002 and 29 March 2004.

1. The sea level pressure and the surface winds show that there exists one Mongolia cyclone centered approximately at 120E, 50N, and Beijing was in the low pressure trough. The northwest winds of Beijing were both about 8 m/s on 20 March 2002 and 29 March 2004.
2. The vertical motion distribution (see Fig. 1) and back air trajectories show that there is descending motion in the lower troposphere above Beijing. The back air trajectories also reveal that the dust source is from the desert in the Northwestern China.
3. The cross sections along 116.5E longitude which crosses Beijing show that there exists one jet streak above Beijing. At the north side of Beijing, the potential vorticity (PV) more than 1 PVU reaches the middle troposphere (about 500 hPa). However, above Beijing there exists high vertical gradient of PV, and this show that the tropopause was broken above Beijing.
4. The total column ozone distribution and the dark area in the satellite water vapor images illustrate that the cold and dry stratospheric air subsided to the upper troposphere over the Northwestern China.



(a) (b)

Figure.1 Cross sections of vertical motion along 116.5E longitude for 06 UTC 20 March 2002(a) and 29 March 2004(b)