Aerosol Distribution over the Qinghai-Xizang Plateau and Its Relationship with O_3

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Using the HALOE data (from October 1991 to November 2005), the distributions and variations of aerosol concentration, volume density, surface area density over the Qinghai-Xizang Plateau (27°N～40°N，75°E～105°E) have been analyzed, and their relationships with ozone have discussed, then the aerosol distribution and the relationship between aerosol and ozone over the Qinghai-Xizang Plateau are compared with those over the eastern part of China (107°E～122°E，27°N～40°N) and over the North Pacific (170°E～170°W，27°N～40°N). The following conclusions are made:

1.The influence of Pinatubo volcanic eruption on aerosol volume density, area density over the Plateau appeared significantly in 1991 to 1995; however the effect on aerosol concentration was not as clear as the volume density and area density (***Fig.1***).

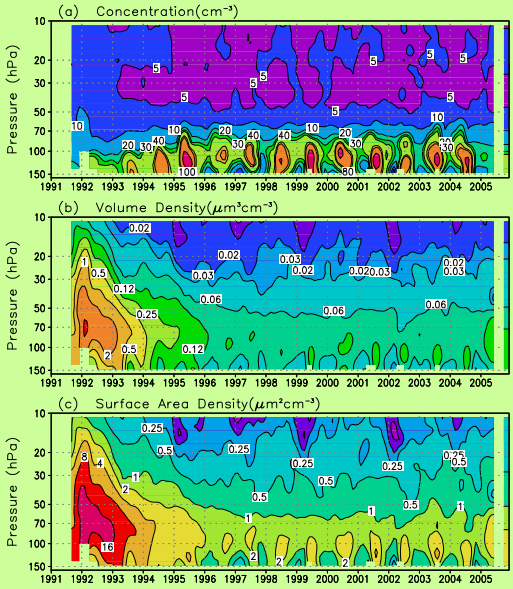

Fig.1 Time-height cross sections of aerosol distribution over Qinghai-Xizang Plateau（the data were 3 months moving averaged）

2.There is a higher value of aerosol concentration near the tropopause over the Plateau which locates beneath the tropopause (~120 hPa) in summer and above the tropopause (~100 hPa) in winter (***Fig.2***).

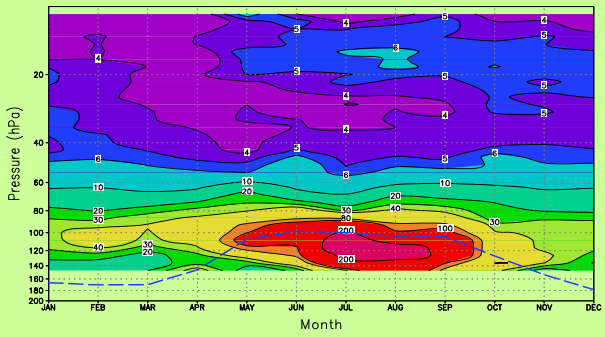

Fig.2 Seasonal variation of aerosol concentration over Qinghai-Xizang Plateau, averaged from 1996 to 2005 (in 1/cm³). The dashed line indicates the tropopause.

3.The main differences in aerosol densities over Qinghai-Xizang Plateau, the eastern part of China and North Pacific occur below 60 hPa. The differences are the most notable in summer: aerosol concentration at 120 hPa over the Plateau is 1.8 times as large as that over the Plain, and 5.5 times as large as that over the Ocean (***Fig.3***).

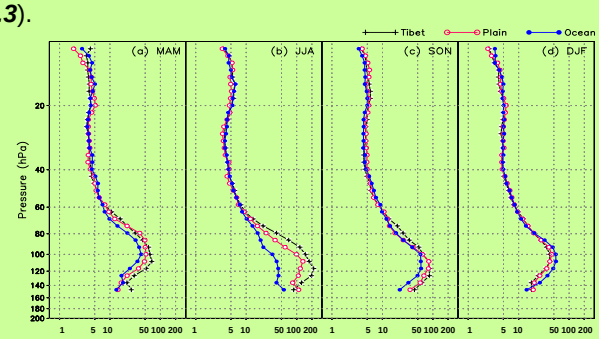

Fig.3 Vertical Profiles of aerosol concentration over Qinghai-Xizang Plateau, the plain and the ocean which are in the same latitude zone (in 1/cm³).

4.Near the tropopause and in the low stratosphere, the aerosol concentration and ozone mixing ratio have a good negative correlation over the Plateau, but they have a significant positive correlation above 20 hPa. Compared the relationship between aerosol and ozone over the three regions, the results indicate: Near the tropopause and in the low stratosphere, the negative correlation of aerosol concentration and ozone mixing ratio is obvious over the Plateau and over the Plain, but their correlation over the Ocean is not clear. Aerosol concentration and ozone mixing ratio appear a good positive correlation above 20 hPa over the three regions (***Fig.4***).

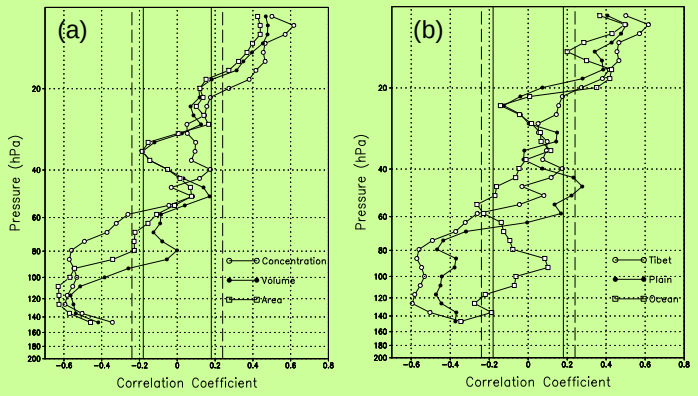

Fig.4 Correlation coefficients between aerosol and ozone mixing ratio. (a) Correlation coefficients of ozone mixing ratio with aerosol concentration, volume density and area density, respectively, over Qinghai-Xizang Plateau; (b) Correlation coefficients of ozone mixing ratio with aerosol concentration over Plateau, Plain and Ocean, respectively.