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平流层气溶胶的准两年周期特征分析

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The analysis of Quasi-Biennial Oscillation characteristics of Stratospheric Aerosol

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摘要

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摘要 本文采用HALOE和SAGE II资料,分析了平流层气溶胶的准两年周期变化(简称QBO)特征及其与臭氧QBO的关系,结果表明:(1)北半球中高纬上空平流层气溶胶存在明显的QBO特征,其QBO信号自上向下传播,振荡幅度在平流层中下层可以达到20%;而在赤道和南半球上空的平流层气溶胶的QBO特征相对于北半球则不明显;(2)在北半球平流层中下层,气溶胶的QBO与臭氧QBO存在明显的相关关系:在低纬与高纬地区上空,两者呈很好的正相关关系,而在中纬度上空30 hPa高度附近两者则存在明显的负相关;(3)当赤道纬向风为东风位相时,北半球30~10 hPa高度处,气溶胶面积密度为正距平,距平百分率可达20%,西风位相时则反之;东西风位相时气溶胶面积密度的变化与剩余环流对气溶胶的输送是密切相关的。

关键词: 平流层气溶胶 准两年周期振荡 HALOE SAGE II

Abstract: Through the HALOE and SAGE II data, the Quasi-Biennial Oscillation characteristics of Stratospheric Aerosol have been analyzed. The relationship of aerosol QBO and ozone QBO has also been studied. The results indicate: (1) Stratospheric Aerosol QBO characteristics are obvious in high and middle latitude of northern hemisphere. Here the QBO signal propagates downward from 10 hPa to 50 hPa, and the oscillating amplitude can reach 20% in middle and lower stratosphere. However, in southern hemisphere or equator the Stratospheric Aerosol QBO characteristics are less apparent. (2) There is a strong correlation between the aerosol QBO and ozone QBO in the middle and low stratosphere of northern hemisphere. The correlation is apparently positive over the low and high latitude while it turns to be negative at 30 hPa over the middle latitude. (3) The aerosol surface density is positive anomaly in 30~10 hPa of northern hemisphere during easterly phase of tropical zonal wind and the anomaly percentage can reach 20%. It changes to negative anomaly during westerly phase. The variation of aerosol surface density is closely related to the transportation of aerosol by residual circulation.

Keywords: Stratospheric Aerosol Quasi-Biennial Oscillation HALOE SAGE II

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