

The three-dimensional Brewer-Dobson circulation feedback on the climate change

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The 3D Brewer Dobson Circulation in the middle atmosphere is characterized by a downwelling in the area of the polar low anomaly and upwelling in the area of the Aleutian high anomaly. The changes in the strength of downward and upward branches of Brewer Dobson circulation is examined by analyzing the zonally asymmetric features of the residual winds using CMIP5 MPI RCP4.5 between 2006-2100 and ECMWF ERA INTERIM data between 1979-2014. The variability in the stratospheric chemical composition or the stratospheric quasi-biennial oscillation (QBO) is capable of altering the strength of the vertical residual winds. On the other hand strengthening and increased longevity of the wintertime Polar vortex which is associated by the downward branch of the Brewer Dobson circulation effects the Arctic Oscillation. In this study it is shown that the variations in the zonally asymmetric vertical residual winds are influenced by the QBO and also play an important role in the evolution of the climate through changes in the AO patterns.