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On the sensitivity of stratospheric circulation on helio-geophysical parameters

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The long-term behaviour of global circulation structures and their connections to some helio-geophysical influence, especially solar and geomagnetic activity, has been studied for SOLICE Project recently. To represent an objective characteristics of circulation patterns the spectral structure of both stratospheric and tropospheric fields is analysed in terms of spherical harmonics coefficients of expansions for potential vorticity, NCEP/NCAR database of reanalyses is used for period 1948-2002 with monthly data. Temporal analysis of significant spherical harmonics is introduced as well as the comparison of their changes with respect to the changes of different sets of solar, geomagnetic and global circulation indices. A strong sensitivity of four trough shape of polar vortex presented by wave number 4-4 on solar activity found previously is analysed and similar behavior is seeked in model results. The natural variability connected to the extraterrestrial influence is studied as well as interannual variability with the emphasis to the QBO and ENSO. The systematic review of the appropriate correlations and linear regression analysis are presented and decadal variability and long-term trends are pointed out for some of wave numbers. Long-term changes in the variability of the circulation patterns are analysed by means of wavelet analysis as well.