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The effect of space weather, proxy parameters of solar activity, and stratospheric phenomena on the concentration of cosmogenic radionuclide ^{7}Be (in the Czech Republic)

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Cosmogenic radionuclides concentrations are predominantly determined by the solar activity and space weather around the Earth, forming an important source of cosmic-origin background radiation in the terrestrial environment. The highest values of such radiation are observed during the solar minima because the penetrability of the Earth's magnetosphere is greatest at that time. Beryllium ^{7}Be binds to aerosols and is transported within a few years to the Earth's surface. Its concentrations are higher during the spring and summer months when the stratospheric ^{7}Be penetrates the troposphere as a result of the exchange of air masses between the troposphere and stratosphere. We compare periods of strong solar and geomagnetic storms with periods of very low solar activity in the longitudinal view during the years 1986 – 2020.

For a better understanding of the process dynamics, in our work we investigate the coupling of concentrations of the cosmogenic radionuclide ^{7}Be (time series of activity concentration of ^{7}Be in aerosols) to space weather parameters around the Earth (Kp planetary index, disturbance storm time Dst, proton density, proton flux), proxy parameters of the solar activity (intensity of solar radio flux, relative sunspot number), stratospheric dynamics parameters (temperature, zonal component of wind, O_3), and aggregates of strong atmospheric frontal transition. The beryllium radionuclide ^{7}Be concentration was evaluated by the corresponding activity in aerosols on a weekly basis at the National Radiation Protection Institute Monitoring Section in Prague.

We also perform the case study of cosmogenic radionuclide ^{7}Be concentrations during the period of strong solar and geomagnetic storm in November 2021 with the ERA5 reanalysis data, and Aeolus satellite lidar wind measurements.