



Investigation of the relationship between the snow cover and surface ozone concentration

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The physicochemical properties of ozone that determine the possible negative consequences for the environment under conditions of its high concentration, lead to the need for the mechanisms of its formation in the atmosphere to be investigated in details. In recent years, many researchers have become more interested in studying the role of meteorological variables and phenomena in the photochemical production of ozone in the troposphere. Snow cover is among them with which spring ozone maximum is associated.

In the present work, the dynamics of ozone concentration during the period of stable snow cover in the Tomsk region (West Siberia) is analyzed and factors determining it have been estimated. For this purpose, we used data on the surface ozone concentration (SOC) and air temperature measured at the TOR-station of IAO SB RAS. The data on snow cover depth were provided by Tomsk meteorological station. The period under analysis covers 1990-2017 that is comprised of 26 annual cycles.

Analysis allowed four types of seasonal ozone cycles to be distinguished in the presence of snow cover. The first of them is characterized by the growth of O₃ concentration that ends with a spring maximum. It is observed in 53.9% of cases. For the second one (19.2% of cases), it is typical a slow rise in the ozone concentration and its sharp increase after snow cover melting. The third one (15.4% of cases) is distinguished by insignificant changes of SOC when the snow cover is present and a rapid concentration rise after snow disappearance. And finally, the fourth type (11.5%) when no spring maximum in surface ozone was observed. Thus, the spring maximum in SOC is observed at the end of the snow cover period in 88.5% of cases. Differences in seasonal cycles observed during individual years can be explained by the temperature dependence of the photochemical production of ozone in the atmosphere.

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