Variations of the meteorological and atmospheric-electrical values during the passage of mesoscale convective systems (complexes)

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Climate change leads to a change in the frequency of cumulonimbus clouds and related dangerous weather events. Its most dangerous manifestations are mesoscale convective systems (MCS), and in particular their variety - mesoscale convective complexes (MCC). The consequences of the passage of the MCS (MCC) in the south of Western Siberia have not been studied enough, therefore, studies in the surface layer of the atmosphere of meteorological phenomena associated with the passage of the MCS (MCC) are very relevant. The paper presents the results of studies of the influence of the passage of the MCC, accompanied by intense rainfall, on the main meteorological quantities in the surface layer of the atmosphere.

The dynamics of changes in the main meteorological parameters is considered on the example of the passage of the MCC on June 10-11, 2018. From June 10 to 11, a cloud system of a cyclone developed on the polar front, separating temperate and tropical air masses, passed over the south of Western Siberia. The cloud system of the cold front and the cyclone occlusion front was represented mainly by a series of MCC lining up along the surface front line. The largest of these MCC on the night of June 10-11 passed directly over the city of Tomsk.

As a result of the study.

- It has been established that variations of meteorological parameters in the surface layer (air temperature T, pressure P, wind speed v, etc.) differ significantly from variations in the potential gradient gradϕ, which is closely related to the distribution of electric charges in the MCC, namely: a) the beginning of variations gradϕ, caused by the MCC, at least $\sim 3/4$ hours ahead of the reaction of the meteorological parameters of the surface layer of the atmosphere to the passage of the MCC; b) the time delay dt of the beginning of variations gradϕ between the measuring points "Universitet"and "IMCES"(distance $\sim$ 7.5 km in latitude) is $\sim$ 15 min and decreases almost to zero after the start of variations in the main meteorological parameters; c) for T, P and v. the delay dt was no more than 3 minutes; d) at the initial stage of the passage of the MCC, positive lightning discharges predominate, and then negative ones.

- Revealed: wind speeds in the surface layer and at the level of 300 mbar (near the tropopause) are practically directed towards each other (according to the ERA5 reanalysis).

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