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Winter 2018 major sudden stratospheric warming impact on midlatitude mesosphere by microwave radiometer measurements

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The impact of a major sudden stratospheric warming (SSW) during the winter 2017/18 on mid-latitude mesosphere is investigated by performing microwave radiometer measurements of carbon monoxide and zonal wind over Kharkiv, Ukraine (50.0°N, 36.3°E). The SSW took place in the Arctic stratosphere in mid-February 2018 and produced the zonal wind reversal in stratosphere-mesosphere, splitting of the stratospheric polar vortex into two small parts under planetary wave-2 activity and intrusion of the warm air into the polar cap area. The reverse in the mesosphere westerly wind from about 7 m/s to easterly wind about 6 m/s has been registered at the latitude 50°N over Kharkiv site using microwave radiometer by retrieving CO molecule profiles in the Earth's mesosphere. The microwave observation at mid-latitudes during the SSW allowed investigating the CO and zonal wind behaviour at 75–85 km altitudes in the mesosphere. The SSW impact on the surface temperature anomaly due to the lower stratosphere warming and troposphere cooling has been observed at 50°N site. The data from the ERA Interim and NSEP/NCAR reanalyses as well as MLS/Aura have been used for analysis and discussion. The microwave radiometry data are suitable to improve atmosphere models and better describe the mesosphere processes at altitudes, which are sparse available in continuous measurements.

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