Climatic fluctuations of the terrestrial atmosphere in Central Siberia: long-term monitoring at ZOTTO observatory

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In this study we present the analysis of climatic data for the prevailing ecosystem types in the footprint area of the Zotino Tall Tower Observatory (ZOTTO; www.zottoproject.org), a research platform for large-scale climatic observations that is operational in Central Siberia (60°48'N, 89° 21'E) since 2006. The data of the high-frequency trace gas measurements at the tall tower are used in atmospheric inversion studies to infer the distribution of carbon sinks and sources over central part of Northern Eurasia. Thus knowledge of climatic fluctuations of the terrestrial atmosphere linked with time series of trace gases and aerosols measured at the tall tower are vital for our understanding how they are affect each other.
Systems to measure environmental variables were installed at the tall tower and local ecosystems (pine forest, peat bog). Climatic data for the period 2009 - 2015 yrs used in this study were collected during continuous high-frequency WMO sertified measurements of the main meteorological parameters: air temperature and air humidity (Combined temperature and humidity probe KPK1-6-ME-H38, MELA Sensortechnik GmbH, Germany), precipitation (Precipitation transmitter 5.4032.35.009, Adolf Thies GmbH, Germany), air pressure (Air pressure sensor 61202V/61302V, R.M.Young, USA), wind speed and direction (Ultrasonic-anemometer 3D 1210-R3 / R3-50, Gill Instruments Ltd. UK; 3D heated METEK USA-1, METEK GmbH, Germany), solar radiation (Combined net radiometer CNR1, Kipp & Zonen B.V., Netherlands), soil temperature (Soil temperature sensor 902830-Jumo, Jumo GmbH, Germany) and soil moisture (Soil moisture probe ML-2x, Delta-T Devices, UK). In this study method of climatic and microclimatic observations was used.
Results reflect atmospheric conditions and processes, and demonstrate direct and inverse feedbacks between mesoclimatic conditions in study area and the processes in global earth's climate system. We found out that western wind drift is a prevailing for study area and continental polar air could be a reason of a strong radiation cooling effect in wintertime. Climatic parameters reflect the typical continental conditions of the region. Wind rose demonstrated mainly southeast wind directions that can be attributed to impact of the Asian anticyclone. However during the period of measurements the cyclonic activity in the region was unstable and could contribute to the climate conditions both on regional and continental levels. Due to the relatively high homogeneity of the landscape in study area the derrived results are representative for the tall tower footprint area (1000 km^2) and can catch even larger territory of Central Siberia.
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