Real-time modelling of dangerous wind speed gusts and thermal comfort conditions in campus of Moscow State University (Moscow, Russian Federation)

Pavel Konstantinov\textsuperscript{1,2}, Anastasia Perkhurova\textsuperscript{1}, Elizaveta Nikolaeva\textsuperscript{1}, Sergey Bukin\textsuperscript{2}, and Mikhail Varentsov\textsuperscript{2,3,4}

\textsuperscript{1}Lomonosov Moscow State University, Faculty of Geography, Meteorology and climatology, Moscow, Russian Federation (kostadini@mail.ru)
\textsuperscript{2}RUDN University, Laboratory of smart technologies for sustainable development of urban environment under global changes, Moscow, Russian Federation
\textsuperscript{3}Lomonosov Moscow State University, Research Computing Center Moscow, Russian Federation
\textsuperscript{4}A.M. Obukhov Institute of Atmospheric Physics RAS, Moscow, Russian Federation

Wind speed modeling on microscale can be important not only for local authorities but also for citizens. Due to the heterogeneity of urban development in the Moscow region, wind gusts geography and thermal comfort conditions at different points in the same territory will differ noticeably with the same meteorological parameters. Thus, it is necessary to study such parameters at the microscale. Therefore, within the framework of this study, in order to inform the public about the negative impact of the weather, and further to minimize the consequences on the human body, an attempt was made to develop an operational system for predicting dangerous conditions of wind gusts and thermal comfort.

In order to collect climate statistics, climate data were calculated for comfort conditions for the MSU campus using the RayMan model. Wind gusts modeling was performed using ENVI-MET model. Therefore, it is possible to analyze the changes in biometric conditions and wind speed in recent years and track trends in various locations.

Since the input parameters for the RayMan diagnostic model, which processes only text documents, serve as predictive data for the Canadian GEM global meteorological parameters in grib2 format, a program for converting files using Command.exe and Fortran-90 language allowed us to create an online module for predicting biometric indices (UTCI, PET and mPET).

For the convenience of perception of information, the results of calculations are visualized on the basis of Yandex maps.

Research was supported by the grant program of Russian Foundation of Basic Research (project no. 19-35-70009 mol_a_mos). The work of Pavel Konstantinov, Elizaveta Nikolaeva and Sergey Bukin was supported by Russian Science Foundation (project no. 19-77-30012)