POSTER PRESENTATION

P-13. *Yulia Gavrilova: Possible modification of the Enviro-HIRLAM NWP model to include urbanization effects for Saint-Petersburg*

Yulia Gavrilova

Russian State Hydrometeorological University, RSHU, Malookhtinsky pr. 98, St.Petersburg, 195196, Russia
(gavrilova @ rshu.ru)

A city can strongly modify the structure of the Atmospheric Boundary Layer. The urban areas have significant influence on the meteorological processes and atmospheric flow, its turbulence regime, the microclimate, and, accordingly modify the transport, dispersion, and   deposition of atmospheric pollutants within these areas. The urban effects must be parameterized in a grid cell of about one km. Experimental studies have shown that parameterizations usually applied over smoother surfaces are not valid for urban areas. As a consequence, numerical models often experience problems in reproducing pollutant concentrations in cities at ground level (where people live). At the current moment the urban classes and urban scale parameterizations are not well represented in the Numerical Weather Prediction (NWP) models. Due to a high resolution of modern NWP models, reaching the city scale, the improvements of existing parameterizations of urban atmospheric processes and urban physiographic data classifications became needed.

Enviro-HIRLAM model includes three modules related to urbanization problem. The first, module is diagnostic analytical parameterization of the wind profile into the urban canopy layer and corrections to the surface roughness (with the incorporation of the displacement height) for urban areas and heat fluxes (additional AHF, e.g., via heat/energy production/use in the city, heat storage capacity, and albedo change) within existing physical parameterizations of the surface layer in NWP models with higher resolution and improved land-use classification. The second, the Swiss Federal Institute of Technology (EPFL) module - Building Effect Parameterization (BEP) - is based on the urban surface exchange parameterization submodel. The third, the Ecole Centrale de Nantes (ECN) module - Soil Model for Sub-Meso Scales Urbanized version (SM2-U) - is based on the detailed urban area soil and sublayer model.

The aim of this study is to evaluate effects of urbanization of numerical weather prediction (NWP) model on simulated meteorological and pollution patterns over the urbanized areas and surroundings (on example of Saint-Petersburg metropolitan area, Russia). The objectives are to modify the existing NWP land surface scheme using: 1) anthropogenic heat flux and roughness (AHF+R) module, 2) building effect parameterization (BEP) module.