

(1) **MMAD&IT** - Mesoscale Model of Atmospheric Dynamics and Impurity Transport

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(3) **Available modes for the model runs:** Research

(4) **Components & processes:** Atmosphere & Physical, Chemical

(5) Brief model description

MMAD&IT model consists of two main blocks: a non-hydrostatic model of atmospheric dynamics and an impurity transport model. The models are applicable for regions with complex terrain. The latter is taken into account using the ideas of the fictitious domain method. In the dynamic model, the complete equations for three components of the velocity vector, the heat and moisture transfer equations, and the continuity equation are solved. The following models and parametrizations are used to close the model of atmospheric dynamics: the k-e model of turbulent diffusion; parametrization of the surface layer with calculation of the underlying surfacetemperature; parametrization of phase transitions for the components of moisture (vapor, cloudy and rain waters). The impurity transport model is based on the convection-diffusion-reaction equation. With the help of the MMAD&IT model, the meso-regional problems for the Siberian regions are mainly solved (the Lake Baikal region, the Eastern Trans-Baikalia, etc.). There are some versions of the model to address urban environmental issues.

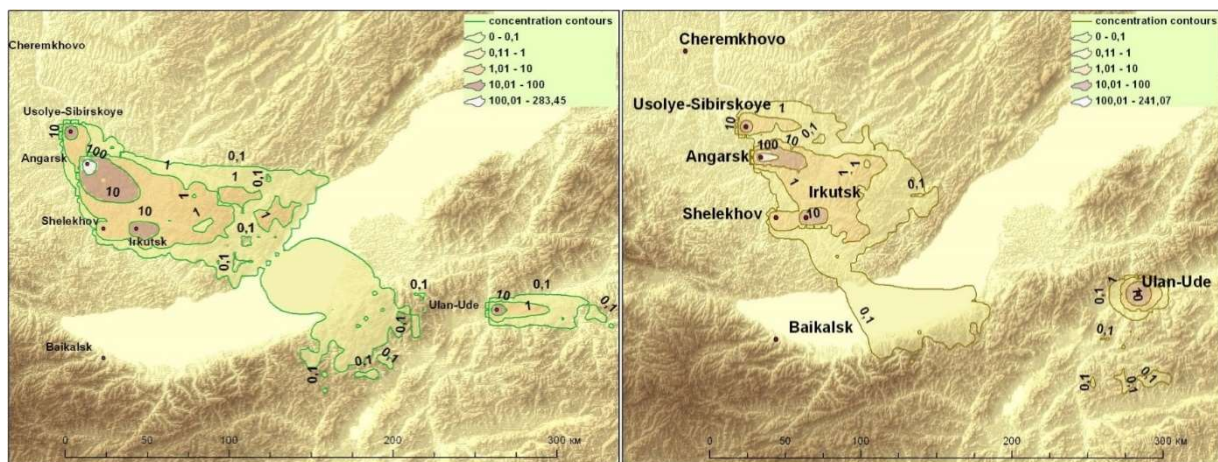


Fig. 1: Isolines of the total passive pollutant concentration (conventional units) at 100 m above the surface at 8 a.m. (left), and at 2 p.m. (right) of the local time. North-western background flow.

References:

Pyanova E.A., V.V. Penenko and L. M. Faleychik (2014): Simulation of atmospheric dynamics and air quality in the Baikal region, Proc. SPIE 9292, 20th International Symposium on Atmospheric and Ocean Optics: Atmospheric Physics, 929247; <http://dx.doi.org/10.1117/12.2074998>.