



## The web system for operative description of air quality in the city

A.A. Barth (1), A.V. Starchenko (1), A.Z. Fazliev (1,2)

(1) Tomsk State University, Department of Numerical Mathematics and Computer Modelling, Russian Federation (starch@math.tsu.ru), (2) Institute of Atmospheric Optics SB RAS, Tomsk, Russian Federation (faz@iao.ru)

Development and implementation of information-computational system (ICS) is described. The system is oriented on the collective usage of the calculation's facilities in order to determine the air quality on the basis of photochemical model. The ICS has been implemented on the basis of the middleware of ATMOS web-portal [1, 2].

The data and calculation layer of this ICS includes:

- *Mathematical model of pollution transport based on transport differential equations.* The model describes propagation, scattering and chemical transformation of the pollutants in the atmosphere [3]. The model may use averaged data value for city or forecast results obtained with help of the Chaser model.[4]
- *Atmospheric boundary layer model (ABLM)* [3] is used for operative numerical prediction of the meteorological parameters. These are such parameters as speed and direction of the wind, humidity and temperature of the air, which are necessary for the transport impurity model to operate. The model may use data assimilation of meteorological measurements data (including land based observations and the results of remote sensing of vertical structure of the atmosphere) or the weather forecast results obtained with help of the Semi-Lagrange model [5].
- *Applications for manipulation of data:*
  - An application for downloading parameters of atmospheric surface layer and remote sensing of vertical structure of the atmosphere from the web sites (<http://meteo.infospace.ru> and <http://weather.uwyo.edu>);
  - An application for uploading these data into the ICS database;
  - An application for transformation of the uploaded data into the internal data format of the system.

At present this ICS is a part of “Climate” web site located in ATMOS portal [5]. The database is based on the data schemes providing the calculation in ICS workflow. The applications manipulated with the data are working in automatic regime.

The workflow oriented on computation of physical parameters contains:

- The application for the calculation of geostrophic wind components on the base of Eckman equations;
- The applications for solution of the equations derived from ABL and transport of impurity models.
- The application for representation of calculation results in tabular and graphical forms.

“Cyberia” cluster [6] located in Tomsk State University is used for computation of the impurity transport equations.

References:

1. Gordov E.P., V. N. Lykosov, and A. Z. Fazliev, Web portal on environmental sciences “ATMOS”// Advances in Geoscience, 2006, v. 8, p. 33-38.

2. ATMOS web-portal  
<http://atmos.iao.ru/middleware/>
3. Belikov D.A., Starchenko A.V. Numerical investigation of secondary air pollutions formation near industrial center // Computational technologies. 2005. V. 10. Special issue. Proceedings of the International Conference and the School of Young Scientists "Computational and informational technologies for environmental sciences" (CITES 2005). Tomsk, 13-23 March 2005. Part 2. P. 99-105
4. Sudo, K., Takahashi M., Kurokawa J., Akimoto H. CHASER: A global chemical model of the troposphere. Model description, J. Geophys. Res., 2002, Vol.107(D17), P. 4339.
5. Tolstykh M.A., Fadeev R.Y. Semi-Lagrangian variable-resolution weather prediction model and its further development // Computational technologies. 2006. V. 11. Special issue. P. 176-184
6. ATMOS web-portal  
<http://climate.atmos.math.tsu.ru/>
7. Tomsk state university, Interregional computational center  
<http://skif.tsu.ru>