

# **Information-computational system “Atmospheric radiation”. New section for modified radiation code.**

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# Web portal ATMOS



Atmosphere and Environment

Козодоев Алексей Викторович |  | 

Aerosol

Radiation

Spectroscopy

Chemistry

Climate

About Portal

Middleware

Documentation

Rus | Eng



## ATMOS: a scientific WWW portal for the atmospheric environment

The bilingual (Russian and English) scientific WWW-site **ATMOS** is designed as an integrated set of distributed but coordinated topical web sites, combining classical multi-media information with research databases, models and analytical tools for on-line use, and visualisation. Each site consists of data, models and visualisation functions. The data block provides either the user or a model with characteristics of physical processes in the atmosphere, of the atmosphere itself and of the underlying land surface. It contains relevant experimental and observation data. Data can be either of a generic nature, or refer to the selected case study sites covered in detail. The model block contains numerical models for the basic topical areas covered. The representation system relies on Internet technologies for easy access to the information resources, scientific graphics and tabular representation, dialog systems (menus), geo-information systems and service programs. The latter include topical glossaries, textbooks, on-line lectures, help facilities, and links to external Internet resources.

**Complete functionality of the ATMOS portal** is provided only for **authorized users**. For registration or authorization you have to click on the pictogram . User can get additional information in .

The basic thematic sites integrated into the proposed ATMOS site are:

- **Atmospheric Chemistry, Spectroscopy** and **Aerosols** with a structured presentation of measurements of aerosol optical characteristics, chemical properties and microphysics, and atmospheric chemistry process description. Also it should provide researchers with the basic spectroscopy information on molecular atmospheric species and the opportunity to calculate the radiation propagation in non-homogeneous atmospheres;
- **Atmospheric Radiation** to be used for calculations of radiation fluxes in the atmosphere and study of aerosols, clouds and the minor gas constituent's effect on the radiation regime;
- **Dynamics of Atmosphere** dealing with climatically and environmentally oriented models of different levels starting from 3-D GCM to statistical models of the Atmosphere.

# Atmospheric Radiation

The screenshot shows the 'Atmospheric radiation' website. At the top, there is a header with the site name and a user profile for 'Козодоев Алексей Викторович'. Below this is a navigation bar with tabs: 'Measurements', 'MODIS', 'INM Model', 'IAO radiative model', 'Frolkis Model', 'Frolkis Model v.2', 'Results', and 'Info'. A language selector shows 'Rus | Eng' and a 't1 » test' button. On the left is a vertical menu with links: 'Portal', 'Aerosol', 'Radiation', 'Spectroscopy', 'Chemistry', 'Climate', 'About Portal', 'Middleware', and 'Documentation'. The main content area is titled 'Atmospheric Radiation' and contains text about the site's purpose for calculating radiation fluxes and studying aerosols. It also mentions that full functionality is for authorized users and provides a registration link. At the bottom, a footer displays grant numbers: 'INTAS grant 00-189, RFBR grant №04-07-90123, 07-07-00269'.

Atmospheric radiation

Козодоев Алексей Викторович

Measurements MODIS INM Model IAO radiative model Frolkis Model Frolkis Model v.2 Results Info

Rus | Eng t1 » test

Portal  
Aerosol  
Radiation  
Spectroscopy  
Chemistry  
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**Atmospheric Radiation**

**Atmospheric Radiation** site is used for calculations of radiation fluxes in the atmosphere and study of aerosols, clouds and the minor gas constituent's effect on the radiation regime

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INTAS grant 00-189, RFBR grant №04-07-90123, 07-07-00269

- Photometers' measurements data
- Statistical characteristics of cloud and aerosol are obtained from the observation of MODIS
- Radiation block of climatic model of the Institute of Computational Mathematics RAS
- Radiative model of the Institute of Atmospheric Optics
- The radiative convective model (Frolkis' model)

# The Radiative Convective Model

The Radiative Convective Model of the climate system is a zonally and annually average steady state model. The atmosphere is divided into layers in vertical, top of the atmosphere is assumed to be at the level of 0.3 mbar. The vertical distribution of the atmospheric temperature is determined by the radiative–convective equilibrium; whenever the vertical temperature profile is calculated to have a supercritical lapse rate, it is replaced by a critical one. The replacement of the temperature lapse rate leads to a change in the heat content of the troposphere, which is restored in accordance with the energy conservation law: in the climate system, at top of the atmosphere, the globally and annually average fluxes of incoming and outgoing radiative energy are equal.

# The Radiative Convective Model

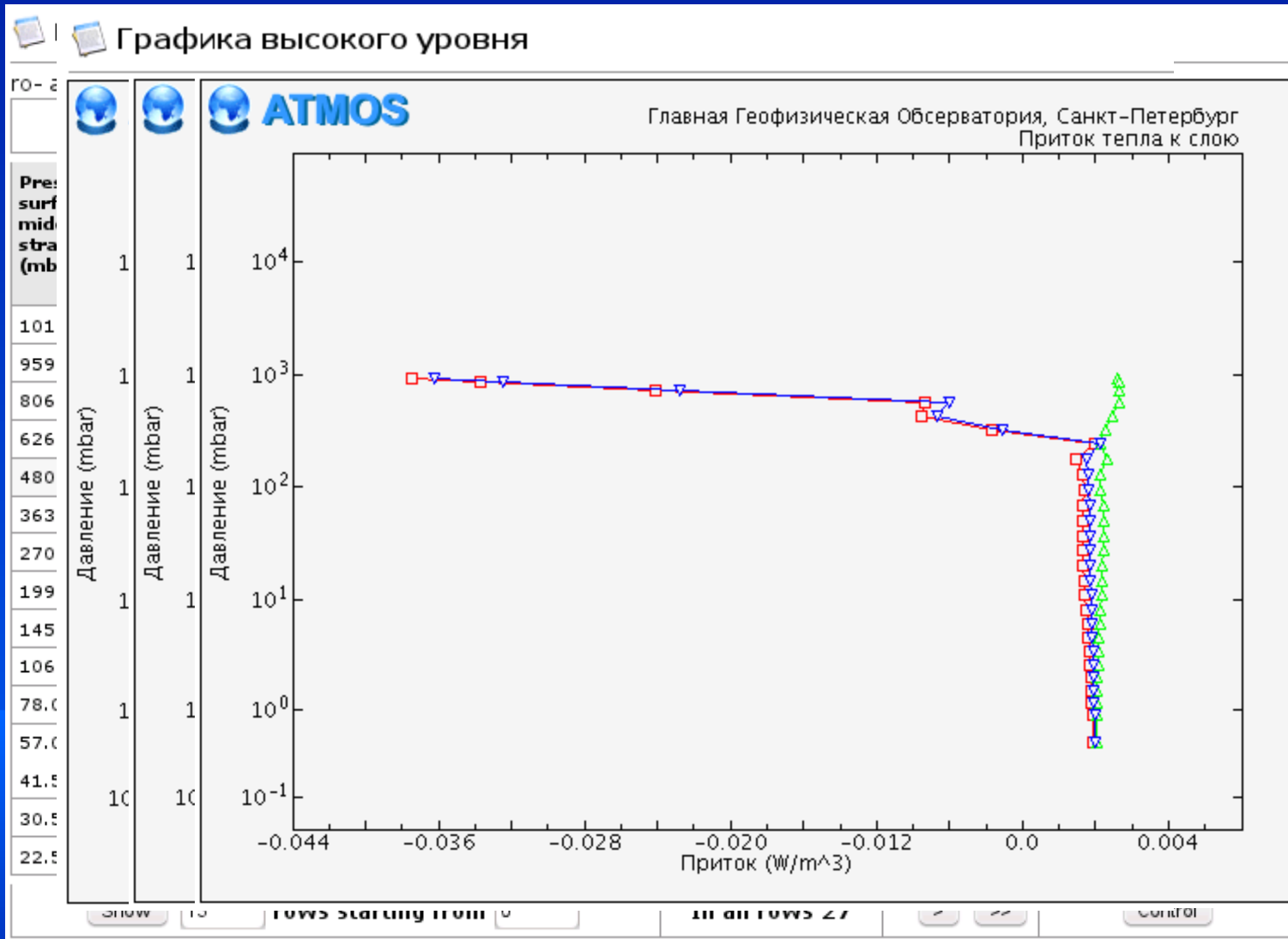
- Frolkis V.A., Rozanov E.V., Radiation Code for Climate and General Circulation Models // In : IRS'92 Current problems in Atmospheric Radiation. / Ed. S.Keevallik. A.DEEPAAK Publishing., Hampton, VA 23666, U.S.A., 1993, C. 176-179.
- Киселев А.А., Фролькис В.А., Эволюция термического режима атмосферы в условиях прогнозируемого антропогенного загрязнения // Известия РАН. Серия Физика атмосферы и океана, 1994, Т. 30, № 4, С. 582-587.
- Розанов Е.В., Фролькис В.А., Оценка влияния температурной зависимости функции пропускания в ИК диапазоне на чувствительность климатических моделей // Известия РАН. Серия Физика атмосферы и океана, 1993, Т. 29, № 4, С. 509-514.
- Фролькис В.А., Киселев А.А., Кароль И.Л., Диагностика антропогенных изменений климата моделированием радиационно-фотохимических процессов в атмосфере // Известия РАН. Серия Физика атмосферы и океана, 1999, Т. 35, № 4, С. 444-456

# New section for modified radiation code

Aerosol Parameters Assignment

| #<br>layer | #<br>layer | Optical depth of<br>aerosol layer |     |            | Aerosol single scattering<br>albedo |            | Aerosol<br>asymmetric factor |            |
|------------|------------|-----------------------------------|-----|------------|-------------------------------------|------------|------------------------------|------------|
|            |            | IR                                | NIR | UV+Visible | NIR                                 | UV+Visible | NIR                          | UV+Visible |
| 1          | 1          | 0.01                              | 0   | 0          | 0.998                               | 0.998      | 0.51                         | 0.51       |
| 2          | 2          | 0.01                              | 1   | 1          | 0.998                               | 0.998      | 0.51                         | 0.51       |
| 3          | 3          | 0.01                              | 0   | 0          | 0.998                               | 0.998      | 0.51                         | 0.51       |
| 4          | 4          | 0.01                              | 1   | 1          | 0.998                               | 0.998      | 0.51                         | 0.51       |
| 5          | 5          | 0.01                              | 1   | 1          | 0.998                               | 0.998      | 0.51                         | 0.51       |
| 6          | 6          | 0                                 | 0   | 0          | 0                                   | 0          | 0.51                         | 0.51       |
| 7          | 7          | 0                                 | 0   | 0          | 0                                   | 0          | 0.51                         | 0.51       |
| 8          | 8          | 0                                 | 0   | 0          | 0                                   | 0          | 0.51                         | 0.51       |
| 9          | 9          | 0                                 | 0   | 0          | 0                                   | 0          | 0.51                         | 0.51       |
| 10         | 10         | 0                                 | 0   | 0          | 0                                   | 0          | 0.51                         | 0.51       |
|            | 11         | 0                                 | 0   | 0          | 0                                   | 0          | 0.51                         | 0.51       |
|            | 12         | 0                                 | 0   | 0          | 0                                   | 0          | 0.51                         | 0.51       |
|            | 13         | 0                                 | 0   | 0          | 0                                   | 0          | 0.51                         | 0.51       |
|            | 14         | 0                                 | 0   | 0          | 0                                   | 0          | 0.51                         | 0.51       |
|            | 15         | 0                                 | 0   | 0          | 0                                   | 0          | 0.51                         | 0.51       |

# New section for modified radiation code



# New section for modified radiation code

## Initial Conditions

| General initial conditions                                  |
|-------------------------------------------------------------|
| Number of layers in the atmosphere                          |
| Earth surface albedo                                        |
| Take into account the radiative-active gases                |
| Take into account the cloudiness                            |
| Take into account the aerosol                               |
| Take into account Sun (Specification of averaging interval) |
| Latitude (°)                                                |
| Initial date                                                |
| Final date                                                  |

## Initial Conditions

| General initial conditions                                                                |                                                                                                                                                                                                                           |  |
|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Number of layers in the atmosphere (= < 45)                                               | 26                                                                                                                                                                                                                        |  |
| Earth surface albedo                                                                      | 0.17                                                                                                                                                                                                                      |  |
| Take into account the radiative-active gases                                              | <input checked="" type="checkbox"/>                                                                                                                                                                                       |  |
| Take into account the cloudiness                                                          | <input checked="" type="checkbox"/>                                                                                                                                                                                       |  |
| Take into account the aerosol                                                             | <input checked="" type="checkbox"/>                                                                                                                                                                                       |  |
| Take into account Sun (Specification of averaging interval)                               | <input checked="" type="checkbox"/>                                                                                                                                                                                       |  |
| Latitude (°)                                                                              | 60                                                                                                                                                                                                                        |  |
| Initial date                                                                              | Day Month<br>20 10                                                                                                                                                                                                        |  |
| Final date                                                                                | Day Month<br>25 10                                                                                                                                                                                                        |  |
| Calculation variant                                                                       | <input checked="" type="radio"/> Only radioactive fluxes and affluxes are calculated<br><input type="radio"/> Only radiance balance point is calculated<br><input type="radio"/> Only radiation temperature is calculated |  |
| Moisture preservation mode                                                                | <input type="radio"/> Absolute humidity is preserved<br><input checked="" type="radio"/> Relative humidity is preserved                                                                                                   |  |
| Vertical critical temperature gradient at the calculation of the convective accommodation | <input type="radio"/> Adiabatic humidity gradient<br><input type="radio"/> Standard gradient (6.5 degrees/km)<br><input type="radio"/> Adiabatic dry gradient<br><input checked="" type="radio"/> User defined gradient   |  |
| gradient value                                                                            | -6                                                                                                                                                                                                                        |  |
| Define surface temperature (otherwise calculated)                                         | <input type="checkbox"/>                                                                                                                                                                                                  |  |
| Surface temperature (K°)                                                                  |                                                                                                                                                                                                                           |  |
| Absolute precision of temperature calculation                                             | 0.01                                                                                                                                                                                                                      |  |

Thank you  
for your attention !

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