Development of web-system for processing and visualization of meteorological and climatic data

Gordov E.P., Okladnikov I.G., Shulgina T.M., Titov A.G.

Institute of Monitoring of Climatic and Ecological Systems SB RAS

Siberian Center for Environmental Research and Training

CITES-2009, Krasnoyarsk, July 5-15, 2009
Introduction

Evolution of science:
- new approaches
- new numerical schemes
- new instruments
- multidisciplinary investigations

Lots of people involved
Tons of data collected

CITES-2009, Krasnoyarsk, July 5-15, 2009
Introduction

- Problem 1: different formats of data
- Problem 2: special knowledge for using data
- Problem 3: coordinated access to data
- Problem 4: unification of results achieved
Introduction

- Collect, organize and store data on a high-performance server
- Develop computational modules for data processing
- Provide Internet access and unified GUI

Solution:
Web-based information-computational system
Web-based information-computational system

- User interface based on web-portal ATMOS
- Technologies: HTML, PHP, Java, GrADS, IDL
- Basic mathematical and statistical processing, visualization
- Data archives:
  NCEP/NCAR Reanalysis, NCEP/DOE Reanalysis AMIP II,
  ECMWF ERA-40,
  JMA/CRIEPI JRA-25
- [http://climate.risks.scert.ru](http://climate.risks.scert.ru)

CITES-2009, Krasnoyarsk, July 5-15, 2009
Variables:

- atmosphere and soil temperature;
- atmosphere and soil humidity;
- precipitation, precipitation rate;
- water equivalent of accumulated snow depth;
- atmosphere pressure;
- geopotential height
Web-based information-computational system

Data processing:

- maximum, minimum, average, standard deviation, variance calculation for a day, week, month, season, year;
- count of days with given temperature or precipitation values range;
- moving mean of time series;
- correlation coefficient for a random pair of variables;
- time trends;
- dataset comparison;
- first/last warm/cold period of the year;
- climate change indices approved by WMO
Web-based information-computational system
Web-based information-computational system

### Climate Model / Atmosphere Temperature - Mozilla Firefox

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Average for day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Given range, degrees</td>
<td>0 - 18</td>
</tr>
<tr>
<td>Area average mode</td>
<td>Average for all grid points</td>
</tr>
<tr>
<td>Region</td>
<td>Eurasia</td>
</tr>
<tr>
<td>Longitudinal range</td>
<td>0 - 180</td>
</tr>
<tr>
<td>Latitudinal range</td>
<td>0 - 90</td>
</tr>
<tr>
<td>Altitude level / Time grid</td>
<td>2m, 12h</td>
</tr>
<tr>
<td>Averaging window width</td>
<td>Week</td>
</tr>
</tbody>
</table>

#### Choose the day and years range

<table>
<thead>
<tr>
<th>Date range</th>
<th>1950, January 01</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001, January 01</td>
<td></td>
</tr>
</tbody>
</table>

#### Graphical Output Type

- Shaded Contour Plot

#### Output picture size

- 800 x 600
- 600

#### Animation frame rate, ms

- 300
Web-based information-computational system

CITES-2009, Krasnoyarsk, July 5-15, 2009
Web-based information-computational system
Web-based information-computational system
Web-based information-computational system
Web-based information-computational system

CITES-2009, Krasnoyarsk, July 5-15, 2009
Web-based information-computational system
Conclusion

What's next?

• new features

• new data:
  - in-situ measurements
  - remote sensing
  - numerical models

CITES-2009, Krasnoyarsk, July 5-15, 2009
Thank you for your attention!