

Веб-ГИС инструменты для анализа больших архивов пространственно- привязанных метеорологических и климатических данных

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Д.ф.-м.н

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Научно-практическая школа-семинар для молодых ученых и специалистов в области
гидрометеорологии

31 октября – 2 ноября 2012 года
г. Новосибирск

План:

Введение: Науки об окружающей среде и ИВТ

- Предметная область: климатология
- Данные
- ИВС для наук об окружающей среде
- Интегрированное региональное исследование окружающей среды Сибири (ИРИС/SIRS)

Веб-ГИС система CLIMATE

Результаты

- Веб-ГИС платформа для мониторинга и прогноза региональных климатических и экологических изменений и поддержки непрерывного образования «Климат»
- Заключение: к распределенной вычислительно-информационной среде (environment)

Науки об окружающей среде и ИВТ

Широкое использование математического моделирования в качестве вычислительного аппарата.

Интенсивное накопление временных рядов данных наблюдений и моделирования

Особая роль информационных и вычислительных технологий!

Организация всей доступной информации об окружающей среде в информационные и информационно-вычислительные системы.

Вычислительные и информационные технологии являются инструментом выполнения научных исследований и образуют их инфраструктуру

Исследования мультидисциплинарны и выполняются большим числом коллективов.

Работа с огромными массивами иерархизированных по временным и пространственным масштабам данных: получение, обмен, обработка и представление накапливаемых данных, превращение наборов данных в информационные ресурсы (данные и их метаданные) и знание.

Необходима информационно-вычислительная инфраструктура, позволяющая исследователям получать и обрабатывать огромные массивы данных и получать знания.

Earth and Space Sciences Informatics

EGU-ESSI Position Paper (2008)

Stefano Nativi, Mohan Ramamurthy, Bernd Ritschel and *EGU Scientific Committee*

An Advanced Multidisciplinary Infrastructures for Earth System Science Community

Earth scientists are engaged in integrating knowledge stemming from different disciplines about the constituents parts of the complex Earth system with the objective of understanding its properties as a whole.

Such system analysis is a challenge for scientists as well as for information technology. In fact, the scope and complexity of Earth system investigations demand the formation of distributed, multidisciplinary collaborative teams. This requires the integration of different discipline information systems, characterized by: heterogeneous and distributed data and metadata models, different semantics and expertise, diverse protocols and interfaces.

Advanced informatics infrastructures must be conceived in order to support the formation and operation of an Earth System Science Community, based on multidisciplinary knowledge integration. These systems will provide scientists, researchers and decision makers with a persistent set of independent services and information that scientists can integrate into a range of more complex analyses. Hence, there exists the need to shift from a “traditional” data centric approach to a more effective and advanced service-based solutions for Earth System Science information.

Earth & Space Sciences Informatics research area

The Earth & Space Sciences Community needs informatics artifacts for the Earth System modeling and for the modeling of the instruments used to observe the Earth System.

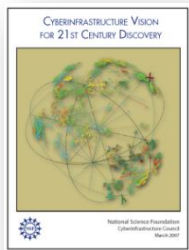
The Community makes use of the Information Science for modeling the Earth System data (either observed or generated) and for the description of the acquisition/generation systems/instruments.

Besides, the Community needs the Service Science to model the behavior of the instruments used for the acquisition/generation and for the information management.

Important tasks concern the right (effective) granularity and structure levels for datasets and the interaction level (i.e. interfaces) for systems.

Data, information and knowledge (Richard Kenway)

- virtual data ...from the grid
 - from a database somewhere
 - computed on request
 - measured on request
- automated knowledge ...from computer science
 - **data**: un-interpreted bits and bytes
 - **information**: data equipped with meaning
 - **knowledge**: information applied to solve a problem



C. Jacobs Cyberinfrastructure Vision for 21st Century Discovery (EGU GA 09)



NSF's Cyberinfrastructure Vision for 21st Century Discovery

- The Next Five Years: Creating a High Performance Computing Environment for Petascale Science and Engineering
- The Next Five Years: Towards a National Digital Data Framework
- The Next Five Years: Establishing a Flexible, Open Cyberinfrastructure Framework for Virtual Organizations
- The Next Five Years: Learning About and With Cyberinfrastructure

Development

FP7 -- e-infrastructure activities in FP7 (2007-2008)

- Developing high-capacity and high-performance communication (**GEANT**) and **grid empowered infrastructures**, reinforcing world class **distributed supercomputing facilities**, data storage and advanced visualization facilities.
- Deploying a **scientific data infrastructure** resulting from the coordination, at pan-European level, of data storage, archiving, access, management and curation activities.
- Fostering the **adoption of e-Infrastructures by user communities**, enhancing their global relevance and increasing the level of trust and confidence from their users.
- **Supporting the construction of critical new facilities** based on the European Strategy Forum on Research Infrastructures (ESFRI) roadmap for new research infrastructures of pan-European interest.

Российский путь к распределенной среде гео-пространственных данных и вычислительных приложений

Первый шаг:

ПРОЕКТ

Стратегия создания академической инфраструктуры
пространственных данных

*А.В.Кошкарёв (ИГ РАН), В.М.Ряховский (ГГМ),
В.А.Серебряков (ВЦ РАН)*

Архитектура и реализация портала «ГеоМЕТА»

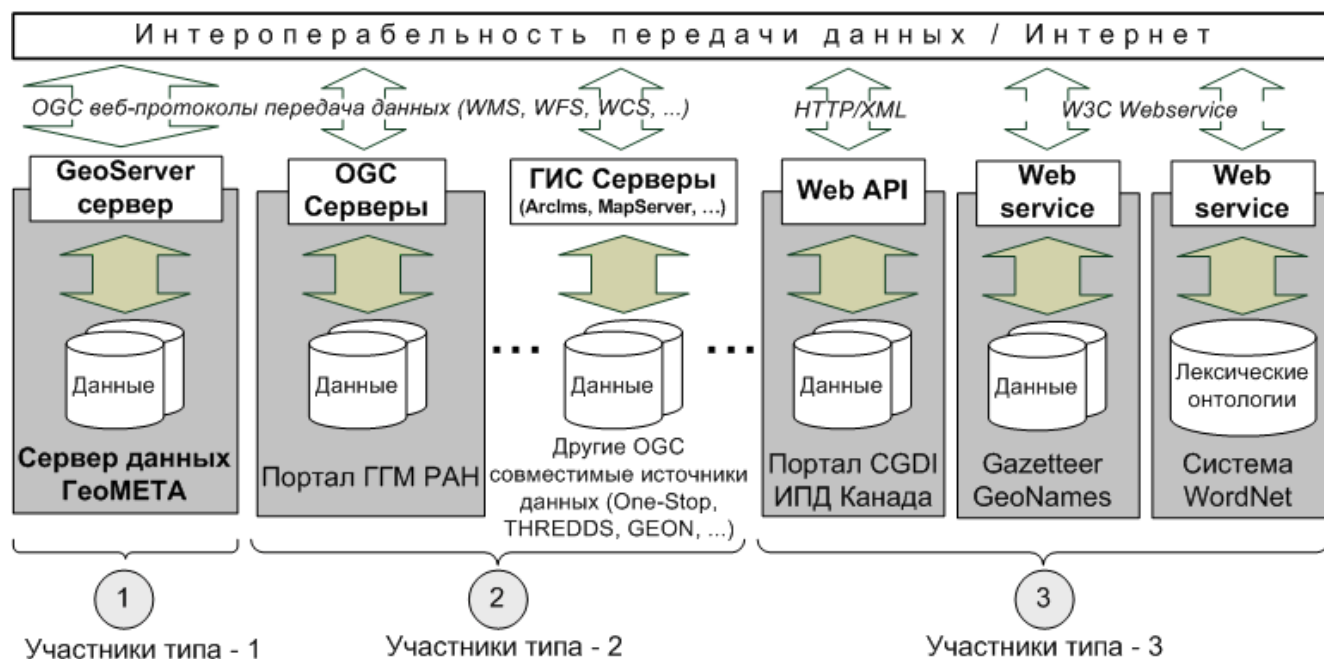
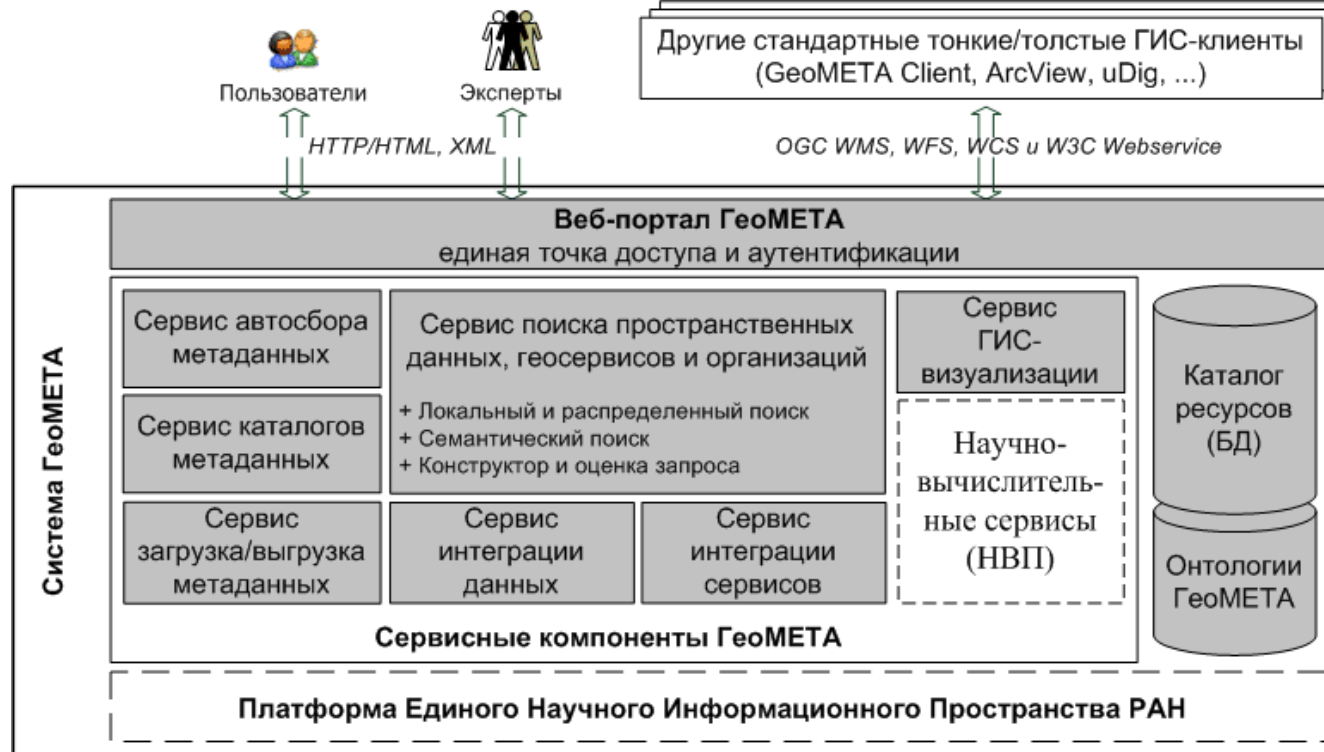
Портал «ГеоМЕТА» (<http://www.geometa.ru/>) - платформа для создания распределенной среды интеграции неоднородных источников геоинформационных данных и сервисов, которая позволит :

легко находить специализированные данные и приложения;
производить вычислительные эксперименты;
визуализировать результаты деятельности.

ГИС-часть системы:

каталогизация, сбор, поиск геопространственных метаданных;
предоставление доступа к распределенным
геопространственным данным по стандартизованным
протоколам;
визуализация карт, редактирование элементов.

Интерфейс системы представлен Web-порталом

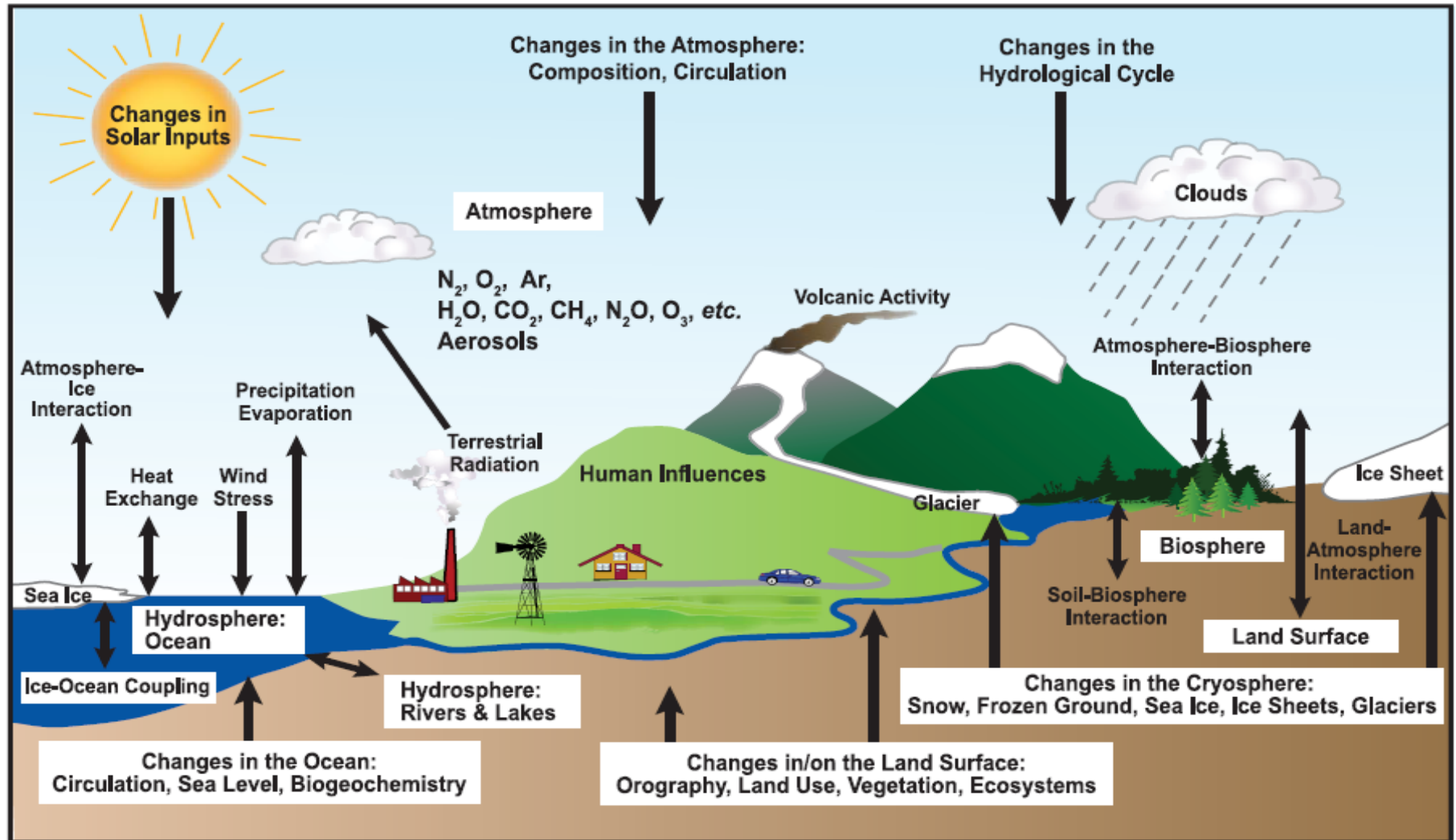


Симпозиум «Информационная инфраструктура пространственных данных», С.-Петербург, 10-12 октября 2012 г., СПбГУ ИТМО, СПбГУ. Председатели Симпозиума: проф. В.А. Серебряков, проф. Е.Б. Кудашев.

Основная цель - координация усилий научных коллективов и научных сотрудников в области создания распределенной академической инфраструктуры пространственных данных:

- разработка программных и организационных средств по созданию такой инфраструктуры;
- разработка конкретных приложений, обеспечивающих представление пространственных данных в такой инфраструктуре;
- использование и внедрение международных стандартов на пространственные данные.

Предметная область Климатология



Физика климатической системы (МГЭИК, 2007)



(МГЭИК, 2007)

Рис. 1.1. Схематическая структура, представляющая антропогенные движущие силы, последствия и реакции на изменение климата,

Данные

- Наблюдения (станционные метеорологические, спутниковые,...)
- Моделирование (метеорологическое, включая Реанализы, и климатическое)
- Центры данных (поиск и доступ, визуализация)



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Обновления

▶ 27.06.2011
Справочные издания: (июнь)

▶ 23.06.2011
Каталоги МЦД за июнь:
(Метеорология)

▶ 24.03.2010
Представлены 173 и 175 выпуски
"Трудов ВНИИГМИ-МЦД"

Москва, 28 июня

+27.0 °C облачно
Ветер: **В; 2 м/с**

Давление: **мм.рт.ст.** Влажность: **53.3%**
Особые явления:

По данным [diware](#) на 08:00(GMT). Местное время: +3ч

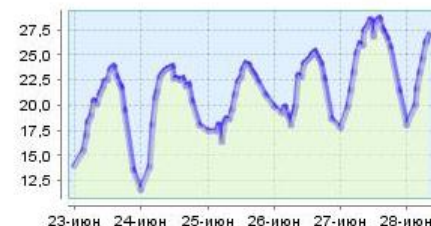
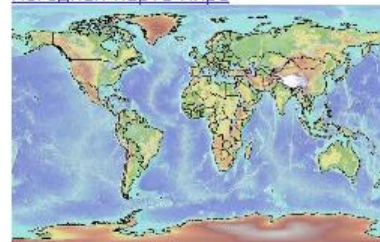
[Города России](#)

[Города мира](#)

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[Погодная карта РФ](#)

[Погодная карта мира](#)



Дата	Температура, °C		Давление, мм. рт. ст.	
28.06	18.0	27.0	746.2	746.8
27.06	17.7	28.6	743.1	745.5
26.06	18.1	25.4	740.8	742.9
25.06	16.4	24.1	741.5	743.0
24.06	11.6	23.8	743.1	745.2
	мин.	макс.		

[Погода на территории Российской Федерации в 2010 году.](#)

Новости:

1. **Сильную жару ждут синоптики в столичном регионе во вторник после обеда**
[Москва, 28 июня. INTERFAX.RU - Столичные синоптики предупреждают, что К...](#)
2. **Метеостанции установлены в нефтепорте "Козьмино" в Приморье**
[ВЛАДИВОСТОК, 28 июн - РИА Новости. Метеостанции установлены в приморском...](#)
3. **В Хабаровском крае под 40 градусов жары**
[ИА "Метеонести" / Понедельник, 27 июня В Хабаровском крае установилась...](#)
4. **В Москву приходит жара**
[ИА "Метеонести" / Понедельник, 27 июня Москвичам на текущей неделе...](#)
5. **Тропический циклон принесет в Приморье сильные дожди**
[ВЛАДИВОСТОК, 27 июн - РИА Новости. Тропический циклон Meari в ближайшие...](#)

Заседания Ученого совета ГУ "ВНИИГМИ-МЦД"

[23 марта в ГУ «ВНИИГМИ-МЦД» состоялось торжественное заседание Ученого Совета, посвященное Всемирному метеорологическому дню и Дню гидрометеорологов России](#)

[Единый государственный фонд данных о состоянии окружающей природной среды, ее загрязнении \(ЕГФД\)](#)

Участники деятельности ЕГФД
Правовые и методические документы ЕГФД
Аналитическая информация по ЕГФД
Совещания, конференции, семинары
Получение сведений о составе и размещении информации ЕГФД
Учет информационных ресурсов ЕГФД

Совещания

- Оперативно-производственное совещание
«Состояние формирования ИНТЕРНЕТ-ресурсов...



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Гидрометеорологические данные

[Оперативные данные](#)

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[Специализированные массивы](#)

[Каталог данных](#)

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Оперативные данные — Система CliWare

Мониторинг сбора данных оперативных наблюдений: синоптические, судовые, аэрологические, морские метеорологические, глубоководные, климатические наблюдения.

Данные судовых метеорологических наблюдений

Данные по Мировому океану полученные по Глобальной сети телесвязи, ежеквартально поставляемые в глобальные центры сбора (ГЦС в Германии и Англии) в рамках схемы морских климатических сборников (СМКС).

Специализированные массивы данных для климатических исследований

Массивы данных суточной температуры воздуха и количества осадков на 223 метеорологических станциях на территории бывшего СССР. Массив данных среднемесячной температуры воздуха на 476 станциях России.

Каталог Единого государственного фонда данных о состоянии окружающей природной среды, ее загрязнении

Каталог верхнего уровня семейства каталогов о состоянии окружающей природной среды, ее загрязнении предназначенный для информирования широкого круга пользователей о составе информационных ресурсов ЕГФД.

Режимно-справочные банки данных по гидрометеорологии

Сведения об исторических гидрометеорологических данных хранящихся в Российском государственном фонде данных о состоянии природной среды.

Каталог гидрологических постов

✉ webmaster@meteo.ru

[In English](#)

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«ВНИИГМИ— МЦД» ●

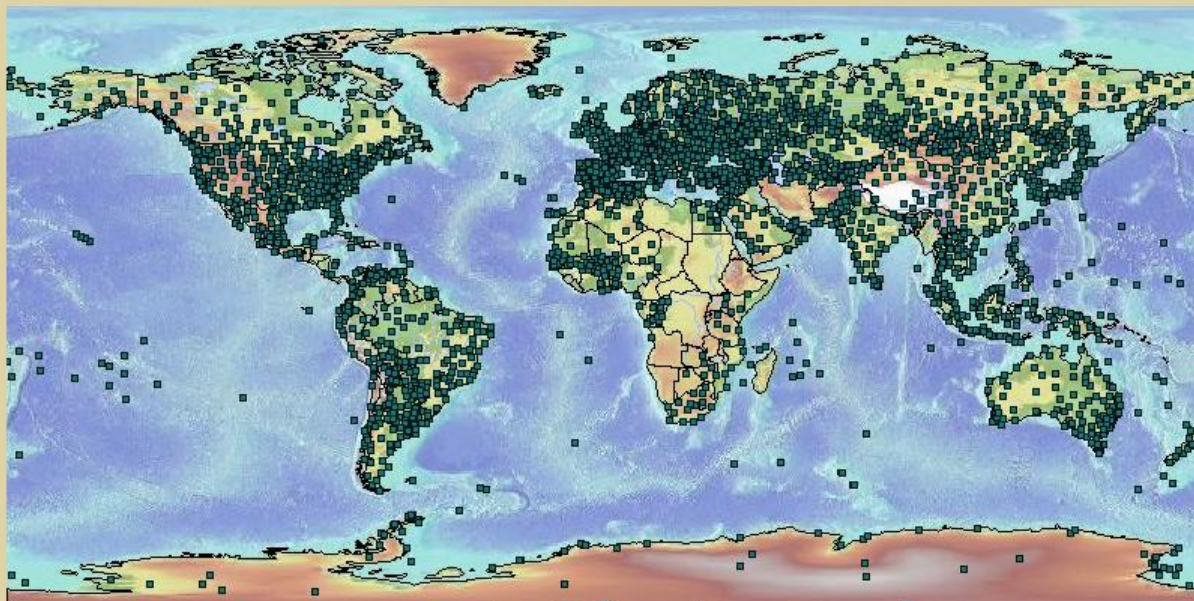
| объявление [снять квартиру без посредников](#). | Наша [мебель](#) впишется в любое офисное помещение - приходите!



CliWare

Сообщения КЛИМАТ

Количество сообщений CLIMAT:2958



2011 ▾ Май ▾

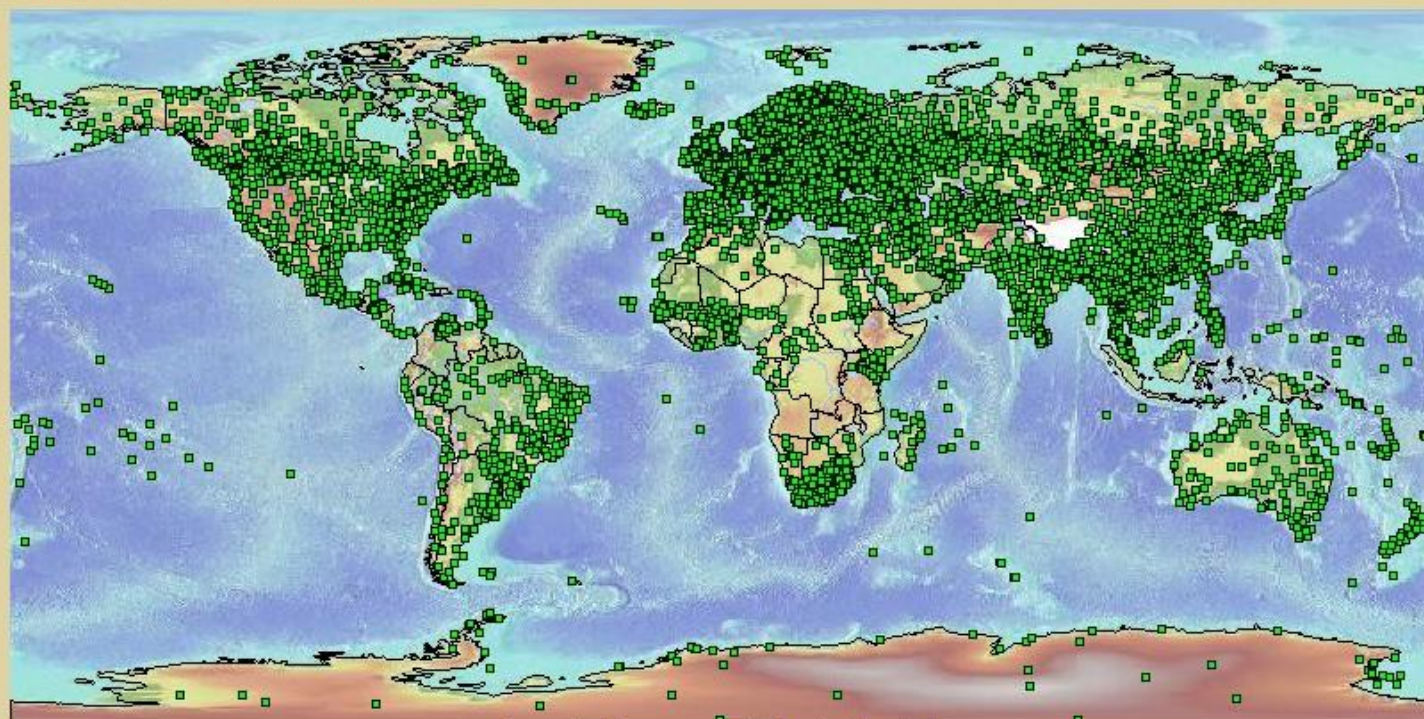
Обновить

☐ Автоматическое обновление (1 мин.)

CliWare

Синоптические данные

Количество синоптических сообщений: 6060



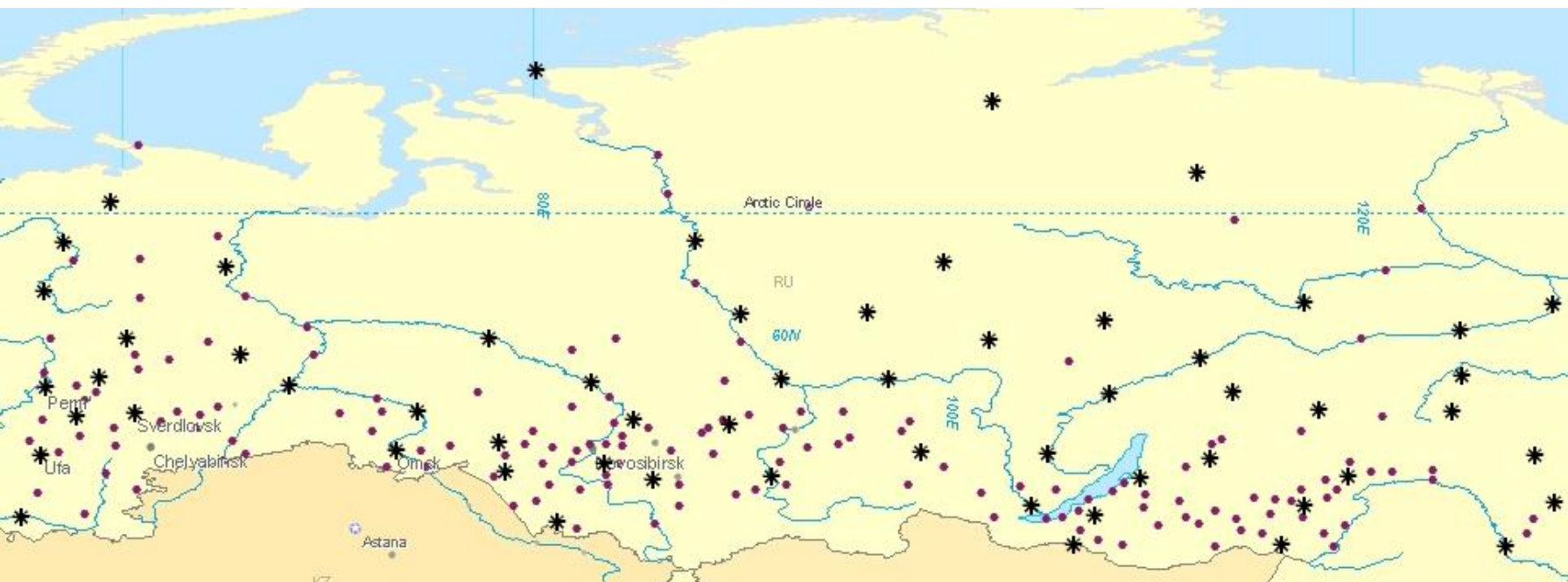
2011 ▾ Июнь ▾ 28 ▾ 00 ▾

Обновить

☐ Автоматическое обновление (5 мин.)



Наземная метеорологическая реперная сеть России, включающая 454 пункта наблюдений (черные и красные кружки), из них 135 пунктов участвуют в международном обмене в рамках программы ГСНК (красные кружки).



Сеть 212 валидных синоптических станций (из 348!) на территории Сибири. Звездочкой помечены «приоритетные» станции, содержащие полные ряды измерений приземной температуры воздуха за временной интервал 1951 – 2000 годы (Т.М. Шульгина)



NOAA Satellite and Information Service
National Environmental Satellite, Data, and Information Service (NESDIS)



National Climatic
Data Center
U.S. Department of Commerce



DOC > NOAA > NESDIS > NCDC

Enter Search Term(s):

Search NCDC

Introduction

Data Access:

Climate Normals

Climate of the World

Data Search

International Climate-
Related Datasets

World Weather
Records

Climatic
Research
Support

International
Best Tracks
Archive for
Climate
Stewardship
(IBTrACS)

International
Polar Year (IPY)

METAR

Data Exchange

Relevant Links

Contact

Introduction

The World Data Center (WDC) for Meteorology, Asheville is one component of a global network of discipline subcenters that facilitate international exchange of scientific data. Originally established during the **International Geophysical Year (IGY)** of 1957, the **World Data Center System** now functions under the guidance of the **International Council of Scientific Unions (ICSU)**.

The WDC for Meteorology, Asheville is maintained by the **U.S. Department of Commerce (DOC)**, **National Oceanic and Atmospheric Administration (NOAA)** and is colocated and operated by the **National Climatic Data Center (NCDC)** in Asheville, NC, USA.

In accordance with the principles set forth by ICSU, WDC for Meteorology, Asheville acquires, catalogues, and archives data and makes them available to requesters in the international scientific community. Data are exchanged with counterparts, **WDC for Meteorology, Obninsk** and **WDC for Meteorology, Beijing** as necessary to improve access. **All data and special data sets contributed to the WDC are available to scientific investigators without restriction.**

News:

- For 10th Series WWR 2001-2010 country submission information please contact Russel Vose (Russell.Vose@noaa.gov)
- The NOAA/NCDC Climate Analysis Branch is pleased to announce the release of the **Global Historical Climatology Network - Monthly (GHCNM) version 3.0 (beta)**. The public is encouraged to provide feedback during this beta phase to help improve and enhance the dataset. More information can be found at:
 - <http://www.ncdc.noaa.gov/gHCNM>
 - <ftp://ftp.ncdc.noaa.gov/pub/data/gHCNMv3/>

To direct questions, comments, or feedback, specific to the GHCNM please e-mail NCDC.GHCNM@noaa.gov

- **World Weather Record (WWR) clearinghouse page** (<http://www.ncdc.noaa.gov/oa/wdc/index.php?name=worldweatherrecords>). Users can find information, and references as well as access and download WWR data either unformatted or in table format. Data available are from 1755 to 2000.

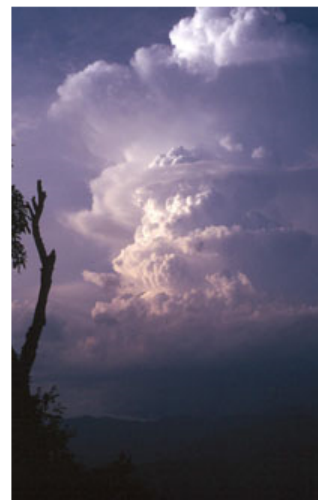


Photo courtesy Grant Goodge/NCDC



NOAA Satellite and Information Service
National Environmental Satellite, Data, and Information Service (NESDIS)

**National Climatic
Data Center**
U.S. Department of Commerce



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World's Largest Archive of Climate Data

National Climatic Data Center

Protecting the Past, Revealing the Future



Land Based



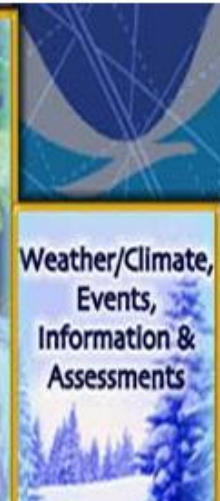
Upper Air



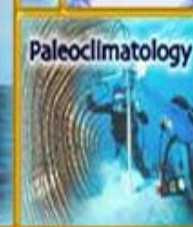
Marine



Satellite



Weather/Climate,
Events,
Information &
Assessments



Paleoclimatology

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<http://www.ncdc.noaa.gov/oa/ncdc.html>

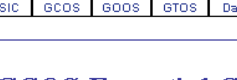
Downloaded Thursday, 16-Jun-2011 03:28:46 EDT

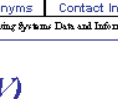
Last Updated Friday, 10-Jun-2011 09:01:41 EDT

Please see the [NCDC Contact Page](#) if you have questions or comments.

http://gosc.org/ios/MATRICES/ECV/ecv-matrix.htm

★ ☆ IPCC data





Home About GOSIC GCOS GOOS GTOS Data Registry Search Publications Acronyms Contact Info

Facilitating Access to Global Observing Systems Data and Information

GCOS Essential Climate Variables (ECV) Data & Information Access Matrix

The ECV Data Access Matrix provides easy access to data download, metadata and information for each of the ECVs. Data access has been divided into 2 categories: 1) *In-situ* and Non-Satellite and 2) Satellite. The selection of the data sets are based on information from Scientific Steering committees and scientific expert advisory groups and the supporting documentation they provide and publish such as the recent WMO/IOC release: 'Implementation Plan for the Global Observing Systems for Climate in Support of the UNFCCC (August Update)' ([GCOS-138/GOOS-184/GTOS-76](#))

The Essential Climate Variables (ECV) are required to support the work of the United Nations Framework Convention on Climate Change ([UNFCCC](#)) and the Intergovernmental Panel on Climate Change ([IPCC](#)). All ECV are technically and economically feasible for systematic observation. It is these variables for which international exchange is required for both current and historical observations. It is emphasized that the ordering within the table is simply for convenience and is not an indicator of relative priority. Currently, there are 60 ECVs. [More about the ECV Matrix](#)

Please note that this matrix is in development. If you would like to contribute data sets please contact gosc@noaa.gov

[\[ECV Matrix Main Page\]](#) [\[About the ECV Matrix\]](#) [\[Main Reference Documents\]](#) [\[Contact Information\]](#) [\[Updated June 15, 2011\]](#)

ATMOSPHERIC (over Land, Sea & Ice)	OCEANIC	TERRESTRIAL (2)
Surface (4)	Surface (6)	River Discharge (ECV T1)
Pressure	Carbon Dioxide Partial Pressure	Water Use (ECV T2)
Air Temperature***	Current	Ground Water (ECV T3)
Precipitation	Ocean Acidity *	Lakes (ECV T4) *
Surface Radiation Budget	Ocean Color (for Biological Activity)	Snow Cover (ECV T5)***
Water Vapor	Phytoplankton *	Glacier and Ice Caps (ECV T6)***
Wind Speed and Direction	Sea Ice	Permafrost (ECV T7)
Upper-Air (5)	Sea Level***	Albedo (ECV T8) *
Cloud Properties	Sea State	Land Cover (including Vegetation Type) (ECV T9)
Earth Radiation Budget (including Solar Irradiance) *f***	Sea Surface Salinity (SSS)	Fraction of Absorbed Photosynthetically Active Radiation (FAPAR) (ECV T10)
Temperature	Sea Surface Temperature (SST)	Leaf Area Index (LAI) (ECV T11)
Water Vapor	Sub-Surface	Above Ground Biomass (ECV T12) *
Wind Speed and Direction	Carbon	Fire Disturbance (ECV T13)
Composition	Current	Soil Moisture *
Aerosols Properties	Nutrients	Soil Carbon *
Carbon Dioxide***	Ocean Acidity *	Ice Sheets *
Methane and other Long-Lived Green House Gases (f)***	Oxygen *	
Ozone	Salinity	
Precursors (supporting the Aerosols and Ozone ECVs) (3) *	Temperature	
	Tracers	
	Global Ocean Heat Content **f***	

* Added or modified per 'Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC - August 2010, GCOS-138 (GOOS-184, GTOS-76, WMO-TD-Info. 1523) (page 19) ([pdf](#))

** Not an official GCOS ECV

ATMOSPHERIC (over Land, Sea & Ice)	OCEANIC	TERRESTRIAL [2]
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Wind Speed and Direction	Sea Ice	Permafrost (ECV T7)
Upper-Air [5]	Sea Level***	Albedo (ECV T8) *
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	Tracers	
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* Added or modified per 'Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC - August 2010, GCOS-138 (GOS-184, GTOS-76, WMO-TD/No. 1523)' (page 19) (pdf)

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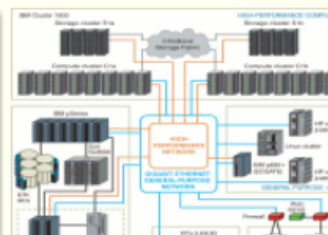
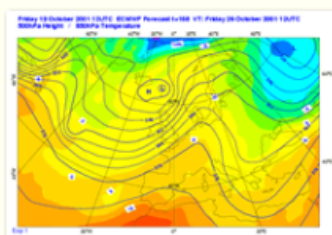
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Find out about our EPS

Our Ensemble Prediction System provides 51 possible weather forecasts.





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ERA-Interim is the latest ECMWF global atmospheric reanalysis of the period 1989 to present. ERA-Interim products can be retrieved from MARS (class=ei, expver=1) or downloaded from the [ECMWF Data Server](#). Please see the [ERA-Interim archive document](#) for a full description of the available products. When using the data server, please refer to our list of [frequently asked questions](#).

An open-access [journal article](#) describing the ERA-Interim reanalysis is now available from the Quarterly Journal of the Royal Meteorological Society.

ERA-Interim products on MARS and the data server are normally updated once per month, allowing a two-month delay for quality assurance and for correcting technical problems with the production, if any. Product updates will be announced here as soon as they occur.

Product availability as of 7 June 2011:

ERA-Interim data are now available for dates from 1 January 1989 to 31 March 2011.

For technical questions related to the modeling and data assimilation system used to produce ERA-Interim, please consult the [IFS Cy31r1 documentation](#). We are aware of several known [quality issues with ERA-Interim data](#).

NEW: Climate monitoring products



Time series of global 2m-temperature anomalies, and many other [climate indicators](#) produced from ERA-Interim and ERA-40 monthly data. Plots are updated monthly. The most recent two months of ERA-Interim data shown are provisional and therefore subject to change.

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Monthly mean time series

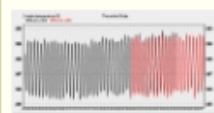
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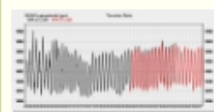
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Single-level analysed parameters



Global and regional monthly mean time series of single-level analysed parameters

Pressure-level analysed parameters



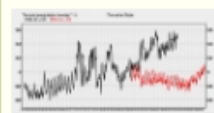
Global and regional monthly mean time series of pressure-level analysed parameters

Circulation indices



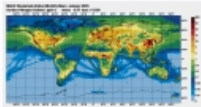
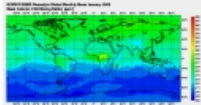
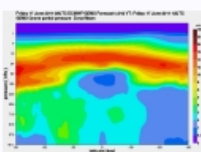
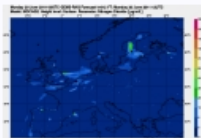
Monthly mean time series of various circulation indices

Single-level accumulated forecast parameters



Global and regional monthly mean time series of single-level accumulated forecast parameters

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 MACC Reanalysis	chemical and aerosol species, meteorological parameters	1.1.2003 - 31.12.2006	global	
GEMS datasets				
 GEMS Reanalysis	chemical and aerosol species, meteorological parameters	1.1.2003 - 30.4.2009	global	
 GEMS Near-real-time Analysis/Forecast Suite	chemical and aerosol species	5.7.2008 - 29.9.2009	global	
 GEMS Regional Air Quality Forecasts	chemical and aerosol species	last 8 days	Europe	

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- [MISR Plume Data](#) - data added for Dornier Sumatra 2001-2009
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- New MISR Level 3 Data Products: [Cloud Fraction by Altitude \(CFbA\)](#) and [Cloud Motion Vector \(CMV\)](#)
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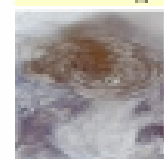
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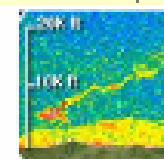
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Jun 3, 2011
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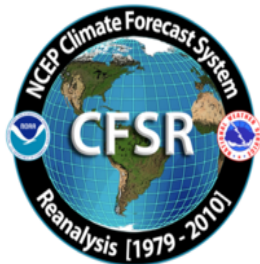
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NCEP CLIMATE FORECAST SYSTEM REANALYSIS (CFSR)



The National Centers for Environmental Prediction (NCEP) Climate Forecast System Reanalysis (CFSR) was completed over the 31-year period of 1979 to 2009 in January 2010. The CFSR was designed and executed as a global, high resolution, coupled atmosphere-ocean-land surface-sea ice system to provide the best estimate of the state of these coupled domains over this period. The current CFSR will be extended as an operational, real time product into the future.

The CFSR relative to most, if not all, previous reanalyses include (1) coupling of atmosphere and ocean during the generation of the 6 hour guess field, (2) an interactive sea-ice model, and (3) assimilation of satellite radiances by the Grid-point Statistical Interpolation scheme over the entire period. The CFSR global atmosphere resolution is ~38 km (T382) with 64 levels extending from the surface to 0.26 hPa. The global ocean is 0.25° at the equator, extending to a global 0.5° beyond the tropics, with 40 levels to a depth of 4737m. The global land surface model has 4 soil levels and the global sea ice model has 3 levels. The CFSR atmospheric model contains observed variations in carbon dioxide (CO₂) over the 1979-2009

period, together with changes in aerosols and other trace gases and solar variations. With these variable parameters, the analyzed state will include estimates of changes in the Earth system climate due to these factors.

All available conventional and satellite observations were included in the CFSR. Satellite observations were used in radiance form and were bias corrected with "spin up" runs at full resolution, taking into account variable CO₂ concentrations. This procedure enabled smooth transitions of the climate record due to evolutionary changes in the satellite observing system.

CFSR atmospheric, oceanic and land surface output products are available at an hourly time resolution and 0.5° horizontal resolution. This reanalysis will serve many purposes, including providing the basis for most of NCEP Climate Prediction Center's operational climate products by defining the mean states of the atmosphere, ocean, land surface and sea ice over the next 30-year climate normal (1981-2010); provide initial conditions for historical forecasts required to calibrate operational NCEP climate forecasts (from week 2 to 9 months); and provide estimates and diagnoses of the earth's climate state, over the satellite data period, for community climate research.

Preliminary analysis of the CFSR output indicates a product far superior in most respects to the reanalysis of the mid-1990s. The previous NCEP reanalyses have been one of the most used NCEP products in history; there is every reason to believe the CFSR will supersede these older products both in scope and quality, because it is higher in time and space resolution, covers the atmosphere, ocean, sea ice and land, and was executed in a coupled mode with a more modern assimilation system and forecast model.

For additional information about the CFSR, please visit: <http://cfs.ncep.noaa.gov/cfsr>.

Component datasets in the CISL RDA:

- ds093.0: NCEP Climate Forecast System Reanalysis (CFSR) 6-hourly Products, January 1979 to March 2011
- ds093.1: NCEP Climate Forecast System Reanalysis (CFSR) Selected Hourly Time-Series Products, January 1979 to March 2011
- ds093.2: NCEP Climate Forecast System Reanalysis (CFSR) Monthly Products, January 1979 to March 2011

ds093.0 HOME PAGE
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NCEP Climate Forecast System Reanalysis (CFSR) 6-hourly Products, January 1979 to March 2011

The National Centers for Environmental Prediction (NCEP) Climate Forecast System Reanalysis (CFSR) was initially completed over the 31-year period from 1979 to 2009 and has been extended to March 2011. CFSR was initialized 4 times per day (00Z, 06Z, 12Z, and 18Z), and the 6-hourly atmospheric, oceanic and land surface analyzed products are available at 0.3, 0.5, 1.0, and 2.5 degree horizontal resolutions, along with forecast hours 1 through 6 and 9. For more information about CFSR, please see <http://dss.ucar.edu/pub/cfsr.html>. For data to extend CFSR beyond March 2011, please see the Climate Forecast System Version 2 (CFSV2) datasets.

NCEP has run CFSR for Jan-Mar 2011 but has not yet made the data available. We are hoping to obtain the data by summer 2011.

PERIODS: 1979-01-01 00:00 +0000 to 2011-01-01 03:00 +0000

VARIABLES:

Air Temperature	Albedo	Atmospheric Heating	Atmospheric Stability
Cloud Amount/Frequency	Cloud Liquid Water/Ice	Dew Point Temperature	Evaporation
Geopotential Height	Gravity Wave	Heat Flux	Humidity
Hydrostatic Pressure	Ice Depth/Thickness	Ice Extent	Land Cover
Longwave Radiation	Maximum/Minimum Temperature	Ocean Currents	Planetary Boundary Layer Height
Potential Temperature	Precipitable Water	Precipitation Amount	Precipitation Rate
Runoff	Salinity	Sea Ice Motion	Sea Surface Height
Sea Surface Temperature	Shortwave Radiation	Skin Temperature	Snow Cover
Snow Depth	Snow Water Equivalent	Soil Classification	Soil Moisture/Water Content
Soil Temperature	Streamfunctions	Sublimation	Surface Air Temperature
Surface Roughness	Temperature Tendency	Upper Level Winds	Vegetation Cover
Vegetation Species	Velocity Potential	Vertical Wind Motion	Vorticity
Wind Shear			

[GRIB2 parameter table](#)

LEVELS: See the [detailed metadata](#) for level information

TYPES: Grid

COVERAGE: Longitude Range: Westernmost=180W Easternmost=180E
Latitude Range: Southernmost=90S Northernmost=90N



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Data Sources

Filed under — group @ 27 November 2008

This page is a catalogue that will be kept up to date pointing to selected sources of code and data related to climate science. Please keep us informed of any things we might have missed, or any updates to the links that are needed.

- [Climate data \(raw\)](#)
- [Climate data \(processed\)](#)
- [Paleo-data](#)
- [Paleo Reconstructions \(including code\)](#)
- [Large-scale model \(Reanalysis\) output](#)
- [Large-scale model \(GCM\) output](#)
- [Model codes \(GCMs\)](#)
- [Model codes \(other\)](#)
- [Data Visualization and Analysis](#)
- [Master Repositories of climate and other Earth Science data](#)

Climate data (raw)

- [GHEN v2](#) (Global Historical Climate Network: weather station records from around the world, temperature and precipitation)
- [USHCN US: Historical Climate Network \(v1 and v2\)](#)
- [World Monthly Surface Station Climatology](#) [USAR](#)
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WorldClim - Global Climate Data

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WorldClim

WorldClim is a set of global climate layers (climate grids) with a spatial resolution of a square kilometer. They can be used for mapping and spatial modeling in a GIS or other computer programs. If you are not familiar with such programs, you can try [DIVA-GIS](#).

The database is documented in this article: Hijmans, R.J., S.E. Cameron, J.L. Parra, P.G. Jones and A. Jarvis, 2005. Very high resolution interpolated climate surfaces for global land areas. *International Journal of Climatology* 25: 1465-1478.

The WorldClim database is under continuous development, please provide us with feedback if you find any problems. The current version is Version 1.4 (release 3). It is only marginally different from version 1.3.

→ [Download data](#) ←

Information about the [methods](#) used to generate the climate layers, and the [units and formats](#) of the data.

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This dataset is freely available for academic and other non-commercial use. Redistribution, or commercial use is not allowed without prior permission.

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Location: DDC Home

Welcome to the Data Distribution Centre (DDC) of the [Intergovernmental Panel on Climate Change \(IPCC\)](#). The DDC provides climate, socio-economic and environmental data, both from the past and also in scenarios projected into the future. Technical guidelines on the selection and use of different types of data and scenarios in research and assessment are also provided.

The DDC is designed primarily for climate change researchers, but materials contained on the site may also be of interest to educators, governmental and non-governmental organisations, and the general public.

The DDC web site has the following areas (all accessible from the menu in the left hand column of most pages):

- [About the DDC](#): who we are and what we do,
- [Climate observations](#), as global mean time series and gridded fields,
- Climate model projections and simulations: [Monthly means](#) and [climatologies](#) (decadal and 30-year means),
- [Socio-economic data](#),
- [Environmental data and Scenarios](#),
- [Guidelines and other supporting material](#).

The identification, selection, and application of baseline and scenario data are crucial steps in the assessments of the potential impacts of future climate change. The need to provide a consistent collection of data covering a great diversity of different scenario elements can pose substantial challenges to researchers. The IPCC DDC seeks to provide access to such a collection of data and scenarios and to offer guidance on their application.

The DDC is overseen by the IPCC [Task Group on Data and Scenario Support for Impact and Climate Analysis \(TGICA\)](#) and jointly managed by the [British Atmospheric Data Centre \(BADC\)](#) in the United Kingdom, the [CSU World Data Center Climate \(WDCC\)](#) in Germany, and the [Center for International Earth Science Information Network \(CIESIN\)](#) at Columbia University, New York, USA. The data are provided by co-operating modelling and analysis centres.

Feedback from users is welcome and can be made by completing the [feedback form](#).

Latest News

[TGICA members](#) for the 5th Assessment Round appointed. (08/06/2010)

User survey results [available](#). (20/07/2009)

Data in spreadsheet format now available: [observed](#) and [projected](#) climatologies. (15/04/2009)

Location: DDC Home

☐ A (Excellent) ☐ B ☐ C ☐ D ☐ E (Very poor)

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Page last modified: 16 May 2011



Data Distribution Centre

ipcc
INTERGOVERNMENTAL PANEL ON climate change



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IPCC web sites

Climate Observations

Location: [Climate Observations](#)

Data available from the DDC

- [Data used in the AR4 assessment report](#): four datasets were used in the report to evaluate trends over the past century. These are available either as global and hemispheric aggregates or as low resolution (5 degrees by 5 degrees) spatial fields.
- [High resolution climatology](#): a high resolution data set prepared by the Climatic Research Unit (CRU). This dataset is not, however, considered to have the same reliability for studies of long term trends as the low resolution CRU dataset which was included in the AR4 assessment (see above). This dataset is available in NetCDF and GeoTIFF (GIS compatible) format.
- [Previous version of CRU data](#): these data have been superseded by the new versions above, but are preserved in the archive.

Links to other Public-Domain Observed Climate Datasets:

A list of external climatological datasets is also included in the DDC. The list is not comprehensive, and is continually being updated. Moreover, its inclusion implies no judgement about the validity or reliability of the data, nor does it imply that these datasets have been "approved" by the IPCC. Users should make their own evaluation based on the available documentation and provenance of each dataset.

- [Global Historic Climatology Network \(GHCN\)](#)
- [International Research Institute for Climate Prediction/Lamont-Doherty Earth Observation at University of Columbia](#)
- [NCEP Re-analysis Data](#)
- [British Atmospheric Data Centre \(BADC\)](#)
- [Global Precipitation Climatology Centre \(GPCC\)](#)
- [National Centre for Atmospheric Research \(NCAR\) Data Support System](#)
- [Climatic Research Unit \(CRU\) data](#)
- [World Data Center - A. Meteorology](#)
- [Climate Diagnostics Centre at NOAA](#)
- [Comprehensive Ocean-Atmosphere Data Set \(COADS\) at NOAA](#)

Related Links

[AR4 observational data](#)
[CRU high resolution climatologies](#)
[Earlier CRU Climatologies](#)
[Data Visualisation](#)
[File formats](#)
Publications
[IPCC Reports](#)

Page last modified: 16 May 2011



Location: [Climate Observations](#)



INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE The IPCC Data Distribution Centre



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Climate models

Socio-economic data

Environmental data
and Scenarios

Supporting material

Publications

IPCC TAR

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IPCC

WG1

WG2

WG3

TGICA

GCM Experiment Data Archive

Location: [DDC Home](#) > [GCM Experiment Data](#)

Welcome to the GCM Data Archive section of the Data Distribution Centre (DDC) of the Intergovernmental Panel on Climate Change (IPCC). This page is the main entry point for users who want to retrieve either *monthly mean data* available at DDC or information on the models used.

About DDC GCM data archive

The DDC uses the CERA database which is run by the Model and Data group at the MPIfM. A detailed information on the CERA database is available on the Web. You can look [here](#) to get more information.

The data is stored on a tape archive which is associated with the (local) database CERA. A data request will initiate a retrieval mechanism that will take some time to transfer the data from tape to disk, therefore users may have to wait before the requested data is transferred.

Due to a change in the data transfer system we currently provide data only in GRIB format (a machine independent, self-descriptive binary format). If you need data in GZIP (compressed ASCII) format you'll have to convert the GRIB data locally.

Information on both formats and the internal data structure is given [here](#).

You can select between:

- [Results from GCM-Runs for the Fourth Assessment Report \(AR4\) based on the IPCC-SRES scenarios*](#)
- [Results from GCM-Runs for the Third Assessment Report \(TAR\) based on the IPCC-SRES scenarios](#)
- [Results from GCM-Runs based on the IPCC-IS92a \(or similar\) emission scenarios](#)
- [Results from GCM-Runs user in the First Assessment Report \(FAR\) \(subset\)](#)

*You can get some IPCC AR4 Data of DVD's [here](#)

GCM data validation

One of the criteria commonly used in selecting a GCM to be used in constructing regional climate scenarios for impact assessment is the performance of the GCM in simulating the present-day climate in the region. This is evaluated by comparing the model outputs with observed climate in the target region, and also over larger scales, to determine the ability of the model to simulate large scale circulation patterns. Examples of graphical comparisons between GCM outputs and observed climate for the 1961-1990 period for subcontinental world regions can be found [here](#).

Variables requested for the Fifth IPCC-Assesemt Report

The Task Group on Data and Scenario Support for Impact and Climate Analysis ([TGICA](#)) on its 14th meeting (26.2 - 28.2 2008 in St. Augustin/ Trinidad and Tobago) has approved a list of (proposed) required variables for the next climate model experiments (Fifth IPCC-Assessment Report). A summary can be found [here](#).

Search the DDC:

go

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Additional Information

[Definition of terms](#)
[What is a GCM?](#)
[Constructing change
fields](#)
[Stochastic weather
generators](#)



APEC Climate Center

Climate Information Services

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News & Events

General

- ▶ [Seminar] Introduction to the NCEP Climate Forecast System Version 2
- ▶ [Project] APCC supports NCHMF project
- ▶ Experimental 6-month MME outlook for MAM-JJA 2011
- ▶ Experimental 6-month MME outlook for DJF 2010-MAM 2011

Press Release

- ▶ APEC Climate Center Revamps Website to Better Serve its User Community - 31/03/2010 (doc)
- ▶ APEC Climate Center hosts an international workshop on climate information and prediction of electricity demand - 03/03/2010 (doc)
- ▶ Celebration of New APCC Building Provides Fresh Momentum to Climate Change Lead Center for Asia-Pacific - 17/11/2009 (pdf)

Opportunities

- ▶ (Local hiring) Recruitment in Research scientist, Computer system and Administration
- ▶ Research scientists in climate prediction/climate change/climate adaptation

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Forecast

▶ Latest Monthly

- ▶ Past Monthly
- ▶ Past Seasonal

Verification

- ▶ Hindcast
- ▶ Past Forecast

State of our climate

- ▶ Highlight
- ▶ Tropical Indo-Pacific Monitoring
- ▶ Global Extreme Drought / Flood Monitoring

Documentation

- ▶ Experimental 6Month lead coupled MME Outlook
 - ▶ Enso Prediction
 - ▶ Latest Seasonal
 - ▶ Past Seasonal

- ▶ Invitation to join semi-operational coupled 1 to 6 month lead prediction

▶ CLIK

▶ TRACE

2011 JJA

The APEC CLIMATE CENTER

Climate Outlook for June - August 2011

BUSAN, 25 May 2011 - Synthesis of the latest model forecasts for June-to-August (JJA) 2011 at the APEC Climate Center (APCC), located at Busan, Korea, indicates warmer than normal conditions over Northeast Asia, while colder than normal signals are expected in South and Southeast Asia. Drier than normal conditions over the East Asian coast and most of Indochina, with wetter than normal signals in southern Mexico, Florida key region, Caribbean Sea and northern South America, are expected.

Current Climate Conditions

La Niña condition continued to weaken across the equatorial Pacific. The tropical Pacific Ocean warmed further and the magnitude of Niño 3 index, which has been negative, began to decrease and approached neutral values. In like manner, the magnitude of southern oscillation index (SOI), which has remained highly positive, also began to decrease, reflecting a transition from La Niña condition to neutral.

It has been warm and dry over Siberia, Central Asia, southern North America, and Arctic region for the period from March through the first half of April 2011. Below-average temperature was found over the part of South, Northeast and Southeast Asia, Australia, and northern North America. The Philippines and the southern Polynesian Islands saw wetter than normal conditions. Suppressed rainfall was found over parts of China, Mongolia, and southern South America. Severe drought persisted in southeastern China.

Forecast



APEC Climate Center

Climate Information Services



About us

Organization

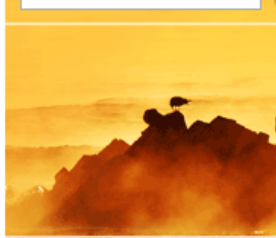
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APCC - APEC Climate Center > About us > Mission and Functions

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- ▶ **Mission and Functions**
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- ▶ APCC Visiting Scientist Program
- ▶ Location

Mission and Functions



The mission of APCC is to enhance the socio-economic well-being of member economies by utilizing up to date scientific knowledge and applying innovative climate prediction techniques through:

- **Developing** a value-added reliable real-time climate prediction system, through a state-of-the-art multi-model climate prediction system utilizing model predictions from member economies;
- **Acting** as a center for climate data and related information with open access to member economies;
- **Helping** build the capacity of member economies in producing and using reliable climate predictions;
- **Developing** improved methods of utilizing socio-economic innovation to mitigate and adapt to climate fluctuations and change and guide member economies towards optimum utilization of APCC climate prediction information; and
- **Coordinating** research toward the development of an APEC integrated climate-environment-socio-economic system model (ultimate and longer-term scope).

News & Events

General

- ▶ [Seminar] Introduction to the NCEP Climate Forecast System Version 2
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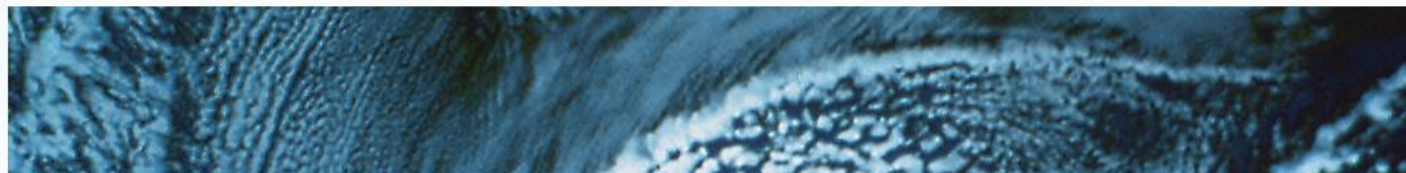


MME Forecast

Model Predictions

The Forecast

TYPE: Anomaly MONTH: JJA
REGION: Russia(25E-180E, 40N-80N)



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OVERVIEW



Startpage > Research > Data Center

Data Center

The CliSAP-Integrated Climate Data Center (ICDC) has the following main objectives:

- To establish a climate data base for in situ and satellite data, making them available to the general public in an easy to access format accompanied by meta and error information (Web portal, data server, etc).
- To participate in international and national climate in situ and satellite data reanalysis efforts. These are currently organized by the World Climate Research Programme, the European Organisation for the Exploitation of Meteorological Satellites and the German Weather Service.

 [to the ICDC](#)

Research

- > [Project Topics](#)
- > [Data Center](#)
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- > [Infrastructure](#)
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News

Dates

08.06.2011:
Media's Interest in Climate
Change: Reactions Similar in the
EU and USA

03.06.2011:
Economics is About Making
Choices: An Interview with Prof.
Dr. Michael Funke

01.06.2011:
KlimaCampus' expertise for the
Federal Foreign Office

Integrated Climate Data Center

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[> ICDC Data Center](#)

Breaking News:

14.06.2011 08:38

2nd ICDC User-Workshop

Invitation to attend the 2nd ICDC User Workshop!
The workshop will take place on June 27, 2011,
1...

[\[more\]](#)

10.06.2011 12:01

Update: MODIS Albedo data

The MODIS Albedo data set has been updated and
new parameters were added.

[\[more\]](#)

Keywords

albedo **antarctic** arctic atmosphere

bathymograph climate **data**

global historical hydrographic **ice**

land modis news **observations**

ocean reanalysis **sea** ship

snow

surface temperature thickness

weather xbt

ICDC Data Center

The CliSAP-Integrated Climate Data Center (ICDC) allows easy access to climate relevant data from in-situ measurements and satellite remote sensing. These data are important to determine the status and the changes in the climate system. Additionally some relevant re-analysis data are included, which are modeled on the basis of observational data.

[> Data section](#)

Aims

ICDC collects and provides data and information from CliSAP and partner institutions. It is also an aim to make unpublished data available that are quality assured. Meta data and error information are added to the data; quality of existing data is optimized by re-processing of raw data with improved algorithms and error analysis. ICDC provides advice and assistance in selection, usage and interpretation of data sets. It also arranges workshops on climate data themes.

[> Overview of aims](#)

Projects

ICDC is working in own projects at other data products that are of interest for researchers. These include, for example, the [> Easy INIT \(Earth System Initialization for Decadal Prediction\)](#), validation and [> correction of XBT](#) and [> MBT data sets](#) or the production of a quality-controlled global CTD record.

[> Projects](#)

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Integrated Climate Data Center

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Atmosphere

- DWD Climate data
- Wind speed over water (QuikSCAT)
- Global precipitation (GPCP)
- Global precipitation over Land (GPCC)
- Ocean-atmosphere parameters and fluxes (HOAPS)
- Weather observations from Hamburg Weather Mast

Land

- EUMETSAT Land Surface Albedo
- MODIS Land Surface Albedo
- MODIS Land Surface Temperature

Ice and Snow

- Snow Cover
- Antarctic polynyas
- Sea-Ice concentration for Arctic & Antarctic (OSI-SAF)
- Sea-Ice concentration for Arctic & Antarctic (ASI)
- Sea-Ice drift vectors for Arctic & Antarctic (NSIDC)
- Sea-Ice thickness from ship observations (Antarctic)
- Sea-Ice thickness from ICESat data (Arctic)
- Sea-Ice type from ship observations (Antarctic)
- Snow depth on sea ice from ship observations (Antarctic)
- Snow depth / water equivalent (SWE)

Ocean

- Ocean tides obtained by data assimilative HAMTIDE model
- AVISO Sea Surface Heights (SSH)
- Sea surface temperature (AVHRR)
- Sea surface temperature (Reynolds-SST)
- Sea surface temperature (AMSR-E)
- Chlorophyll-a concentration via GlobColour
- Mechanical bathythermograph (MBT)
- Expendable bathythermograph (XBT)
- Global Hydrographic Climatology WOCE
- CTD profiles from IfM Collaborative Research Centre Cruises
- Historical hydrographic data from BSH



home

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news

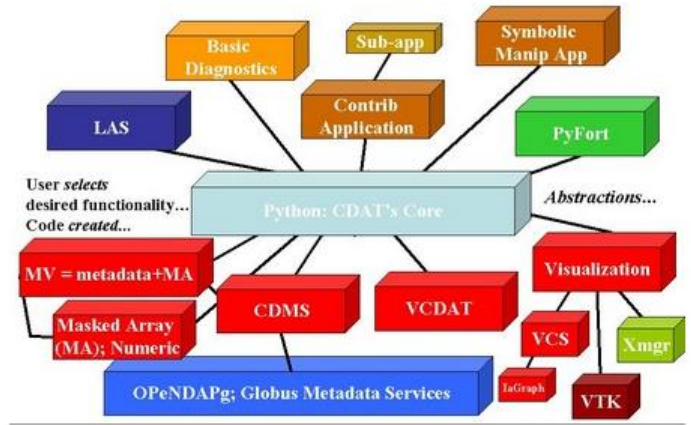
CDAT Newsletter, June 2007

Climate Data Analysis Tools

by halliday1 — last modified 2009-03-26 13:26

CDAT makes use of an open-source, object-oriented, easy-to-learn scripting language (Python) to link together separate software subsystems and packages to form an integrated environment for data analysis. Outside collaborators work independently and contribute on an equal basis with PCMDI.

CDAT's Modularity



CDAT's major subsystems are:

- [cdms](#) - Climate Data Management System (*file I/O, variables, types, metadata, grids*)
- [cdutil](#) - Climate Data Specific Utilities (*spatial and temporal averages, custom seasons, climatologies*)
- [genutil](#) - General Utilities (*statistical and other convenience functions*)
- [numpy](#) - Numerical Python (*large-array numerical operations*)
- [vcs](#) - Visualization and Control System (*manages graphical window: picture template, graphical methods, data*)

VCDAT is the graphical user interface for CDAT and helps users become familiar with CDAT by translating every button press and keystroke into Python scripts.

Информационные системы

PORTAL



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Welcome to the Earth Knowledge Portal!

We invite you to join our worldwide community of people working hard to make the best decisions we can to help businesses and communities prosper AND take care of our precious and amazing planet.

Map Data Layers telling us about ocean changes & weather patterns.

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Success



Interactive WISSDOM Portal for Climate Change Research

Dr. Don Wuebbles from the *University of Illinois at Urbana-Champaign*, shares the 2007 Nobel Peace Prize with his colleagues on the United Nations International Panel for Climate Change (IPCC). In January 2011, he launched a new "Center for Transformative Climate Solutions (CTCS).

CTCS is a multidisciplinary research initiative aimed at facilitating collaboration between natural scientists, engineers, social scientists, and humanists to address the urgent need for multidisciplinary integration of climate

change impact analysis and policy and economic solutions at the local and regional, national and international scale.

Dr. Wuebbles came to Earth Knowledge seeking an internet-based collaboration strategy for building the CTCS that would facilitate international climate change research and provide online tools to assist decision-makers in understanding and mitigating the effects of climate change.

In partnership with *Earth Knowledge*, CTCS is creating a robust, interactive online "Virtual Center" to distribute data and research findings, gather information from stakeholders, and foster dialog among all engaged parties. The effort uses WISSDOM Technology that is being integrated into a comprehensive online modular platform combining programming environments, information and multimedia content management tools, geospatial analysis software, and visualization packages that enable ease-of-use by scientists and societal decision-makers. The advanced interactive web system, as well as online tools for decision support and risk management, is being developed in coordination with the entire **CTCS** team.

The CTCS Portal is now under construction and can be found at:
<http://www.earthknowledgeintegration.com/CTCS/>

™ Portal
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×

Welcome to the new **Center for Transformative Climate Solutions (CTCS)** led by Don Wuebbles who shares the Nobel Peace Prize for his work on the International Panel for Climate Change (IPCC).

CTCS is a multidisciplinary research initiative aimed at facilitating collaboration between natural scientists, engineers, social scientists, and humanists to address the urgent need for multidisciplinary integration of climate change impact analysis and policy & economic solutions at the local and regional, national and international scale.

This Center is based out of the University of Illinois at Urbana-Champaign, with its "virtual center" connecting researchers and decision makers worldwide.

The Center for Transformative Climate Solutions (CTCS)

- **Multidisciplinary research initiative: Natural Scientists, Engineers, Social Scientists, and Humanists Working together**
- **End-to-End Using Comprehensive integrated analyses and data structure**
- **To address the complex environmental, social and policy challenges of climate change**
- **For policymakers and stakeholders tasked with developing robust government and industry responses to climate change**
- **For Transformative Climate Solutions At the local, regional, national and global levels**



NASA Goddard Space Flight Center

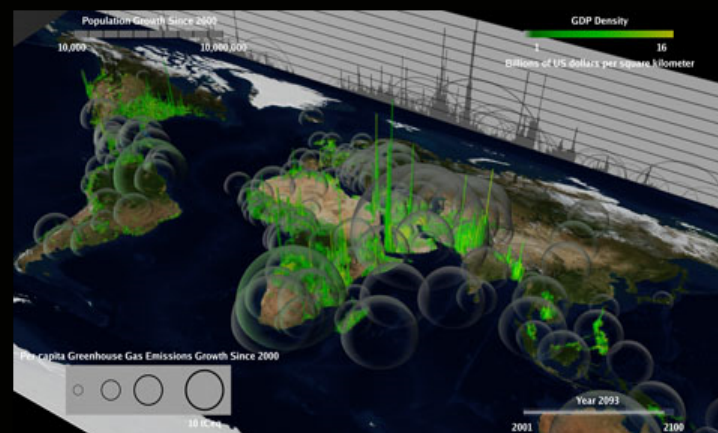


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Our Approach

[Mission](#) [Objectives](#) [The Challenges](#) [Our Approach](#) [Leadership](#) [Advisory Committee](#) [Stakeholders](#)

- Bring broad national and international visibility to leading-edge research beyond what can be achieved by the work of individual investigators.
- Open doors for research opportunities beyond the usual government-based research programs, including enhanced connections with foundations, industry, and other organizations and coordination with universities and national laboratories.
- Provide a high-profile institutional structure for interaction with governments and other research institutions both in and outside the United States.
- Provide a focus for education on the environment and sustainability at all levels. Undergraduate and graduate students will benefit greatly from the research experience, hands-on model development and application, and international exposure.
- Provide benefit to the State of Illinois in practical terms through the availability of its services to local and state policymakers, and also economically in the exportation of its capabilities and technological innovations.
- Provide a strong focus for interactions with the National Center for Supercomputing Applications (NCSA) and other national and international computer centers whose computational data mining, analysis, and visualization capabilities will be indispensable to the Center's work.
- Be a home for sabbatical and visitor programs to bring outstanding researchers to the university.
- Be a conduit for research and collaborative grant support opportunities by providing expert services in proposal development and project oversight, while offering an agreement with the **University of Illinois** for Indirect Cost Return to help maintain its administrative and program development capabilities.



CTCS

Data Layers

Map Data, Videos, Images
& Google Earth Tours

- (1) Click +/- to expand & collapse
- (2) Check box & click layer name to zoom to layer
- (3) For more information, click ⓘ

Base Data

Google Base Data

CTCS Network

CTCS Members

Data Layers

☐ Countries Participating in UN
Climate Change Treaties ⓘ

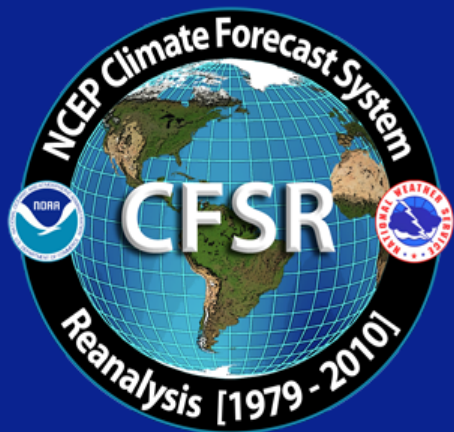
☐ Secure Tenure ⓘ

☐ Human Development Index
(HDI) ⓘ

☐ Emissions of CO2 per GDP
(PPP) [2006] ⓘ



The Climate Forecast System Reanalysis [1979 - 2010]

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CFS Home
NOAA/ National Weather Service
National Centers for Environmental Prediction

Environmental Modeling Center
5200 Auth Road
Camp Springs, Maryland 20746
cfs@noaa.gov

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Last modified on: 04/13/2011 01:08:20

CFS Reanalysis Atlas

Legend

Input

- Sea Ice Sea Ice Analysis
- Snow Land Surface Snow Analysis
- SST Sea Surface Temp
- Precip Precipitation
- Satellite Satellite Data Statistics
- Performance Performance Statistics
- Obs_Dist Observation Distribution

Validation

- Plots Fits to Obs Plots
- Scores Validation Scores
- Strat Stratospheric Plots
- Trop Tropospheric Plots
- Sfc Surface Variables Plots
- Ocn Ocean Variables Plots

Please address any questions to the person named on each plot.
All email addresses are of the format
Firstname.Lastname@noaa.gov

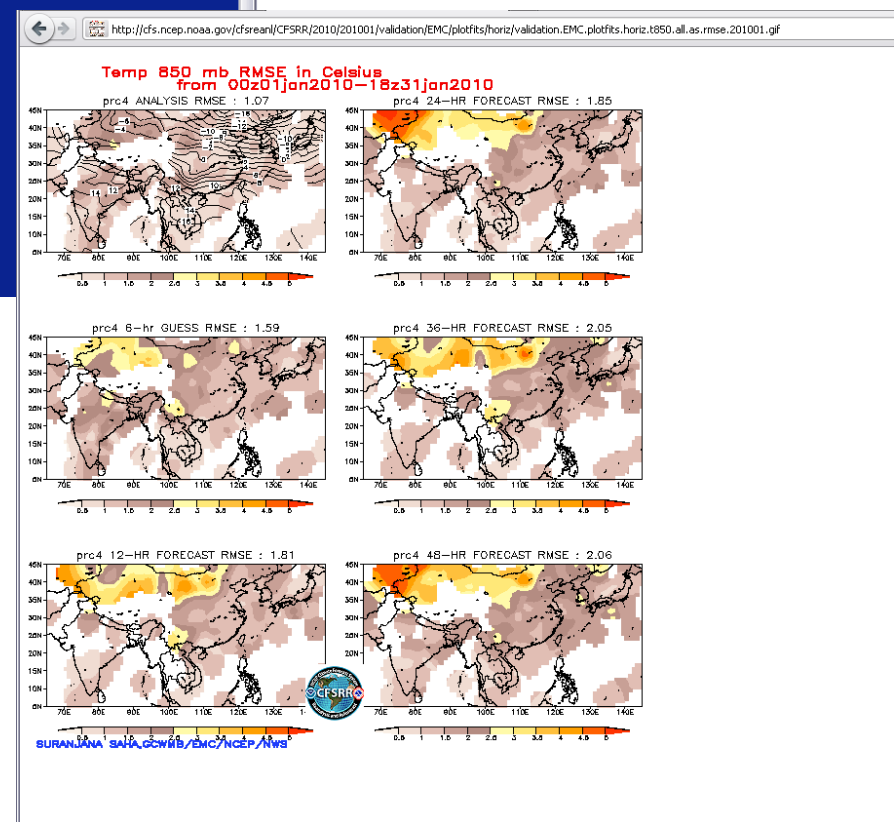
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Новый подход: ИВС

- Сбор надежных данных на высокопроизводительной системе
- Организация и подготовка данных
- Реализация алгоритмов для быстрого доступа и поиска данных
- Реализация проверенных алгоритмов обработки данных
- Обеспечение унифицированного высокоскоростного доступа через Интернет с удобным интерфейсом пользователя

Giovanni

You are here: [GES DISC Home](#) » Giovanni

GIOVANNI

Giovanni is a Web-based application developed by the GES DISC that provides a simple and intuitive way to visualize, analyze, and access vast amounts of Earth science remote sensing data without having to download the data.

Giovanni is comprised of a number of interfaces, called instances, each tailored to meet the needs of different Earth science research communities. To access a Giovanni instance, click on one of the four categories below.

- **Atmospheric Instances:** A-Train along CloudSat Track; Aerosol Optical Thickness Measurement and Model Comparison *Daily* and *Monthly*; Aqua/AIRS Global *Daily* and *Monthly*; Aura High Resolution Dynamics Limb Sounder (HIRDLS); Aura Microwave Limb Sounder (MLS); Aura OMI *Level 3* and *Level 2G*; MISR *Daily* and *Monthly*; Clouds and the Earth's Radiant Energy System (CERES FM4); Modern Era Retrospective-Analysis for Research and Applications (MERRA) *3D Monthly* and *2D Monthly*; MODIS Terra and Aqua *Daily* and *Monthly*; Earth Probe and Nimbus-7 TOMS; Tropospheric Emission Spectrometer (TES); Upper Atmosphere Research Satellite (UARS) Halogen Occultation Experiment (HALOE).
- **Environmental Instances:** Agriculture; Air Quality; Monsoon Asia Integrated Regional Study (MAIRS) *Monthly* and *8-Day*; Northern Eurasia Earth Science Partnership Initiative (NEESPI) *Daily* and *Monthly*.
- **Ocean Instances:** Ocean Color Radiometry (SeaWiFS, MODIS, and derived and model products); Ocean Model *Daily* and *Monthly*.
- **Hydrology Instances:** Modern Era Retrospective-Analysis for Research and Applications (MERRA) *3D Monthly*, *2D Monthly*, *Monthly Analysis*, and *Chemical Forcing*; MODIS Terra and Aqua *Daily* and *Monthly*; Northern Eurasia Earth Science Partnership Initiative (NEESPI) *Daily* and *Monthly*; TRMM Online Visualization and Analysis System (TOVAS); Global Land Data Assimilation System (GLDAS) *Monthly*.

If you already know which instance to choose, please select it from the table below.

A-Train	Aerosol Daily	Aerosol Monthly	Agriculture	Air Quality
Aqua/AIRS Daily	Aqua/AIRS Monthly	Aura HIRDLS	Aura MLS	Aura OMI L3
Aura OMI L2G	CERES (FM4)	GLDAS Monthly	MAIRS Monthly	MAIRS 8-Day
MERRA MONTH 2D	MERRA MONTH 3D	MERRA MONTH ANA	MERRA MONTH CHM	MERRA HOUR 2D
MERRA HOUR 3D	MISR Daily	MISR Monthly	MODIS Daily	MODIS Monthly
NEESPI Daily	NEESPI Monthly	Ocean Color Radiometry	Ocean Model Daily	Ocean Model Monthly
TOMS	TRMM/TOVAS	TES	UARS HALOE	

MORE! [Introductory chapter of our online user's manual for beginning Giovanni users](#)

Latest News



Jun 16, 2011 - [GES DISC scientists attend recent scientific meetings and workshops](#)

Meetings examine data from NASA instruments and applications around the world

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Giovanni (Goddard Interactive Online Visualization ANd aNalysis Infrastructure)



Goddard Earth Sciences
Data and Information Services Center

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+ ATMOS COMPOSITION

+ HYDROLOGY

+ A-TRAIN

+ AIRS

+ MODELING

+ MAIRS

+ MEASURES

+ PRECIPITATION

Giovanni

» OVERVIEW

- + What is Giovanni?
- + Who Uses Giovanni?
- + [Giovanni Parameters](#)
- + Giovanni Plot Types
- + How to Use Giovanni
- + How to Acknowledge Giovanni
- + Acknowledgements

Additional Features

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You are here: [GES DISC Home](#) » [Giovanni](#) » Giovanni Parameters

GIOVANNI PARAMETERS

The Giovanni parameters presented on these pages are organized according to the science keywords used in the [Global Change Master Directory](#) (GCMD). Each link below takes you to a table describing the relevant parameters.

[Atmosphere -> Aerosols](#)

[Atmosphere -> Altitude](#)

[Atmosphere -> Atmospheric Chemistry](#)

[Atmosphere -> Atmospheric Pressure](#)

[Atmosphere -> Atmospheric Radiation](#)

[Atmosphere -> Atmospheric Temperature](#)

[Atmosphere -> Atmospheric Water Vapor](#)

[Atmosphere -> Clouds](#)

[Atmosphere -> Precipitation](#)

[Oceans -> Marine Biology](#)

[Oceans -> Ocean Chemistry](#)

[Oceans -> Ocean Optics](#)

[Oceans -> Ocean Pressure](#)

[Oceans -> Ocean Temperature](#)

To see the [parameters organized by instance](#), refer to Chapter 2 of the Giovanni User's Manual.



NASA Official: Steve Kempler
Website Curator: M Hegde

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Last updated: Sep 09, 2009 02:29 PM ET

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[Atmos Composition](#) [Hydrology](#) [A-Train](#) [AIRS](#) [Modeling](#) [MAIRS](#) [MEaSURES](#) [Precipitation](#)

Personal tools

You are here: [GES DISC Home](#) » [Giovanni](#) » [Additional Features](#) » [Users Manual](#) » Giovanni-3 Online Users Manual: 5. Services and Operations

Giovanni-3 Online Users Manual: 5. Services and Operations

[< Previous](#) [Next >](#) [TOC](#)

In the nomenclature of Giovanni, a service provides a data visualization or analytical result requested by the user. Giovanni operations are steps in the data processing sequence which are performed to produce the service output.

5.1 Giovanni Analytical Services and Operations

- [Animation](#)
- [Lat-Lon Area Plot, Time-averaged](#)
- [Lat-Lon Plot, Difference Map](#)
- [Latitude-Time Hovmöller Plot](#)
- [Longitude-Time Hovmöller Plot](#)
- [Correlation Plot](#)
- [Comparison Plot](#)
- [Cross-Map Plot \(Latitude-Pressure\)](#)
- [Cross-Map Plot \(Longitude-Pressure\)](#)
- [Cross-Map Plot \(Time-Pressure\)](#)
- [Scatter Plot](#)
- [Scatter Plot, Time-averaged](#)
- [Curtain Plot](#)
- [Time Series, Area-averaged](#)
- [Time Series Difference](#)
- [Time Series, Area Statistics](#)
- [Vertical Profile](#)
- [Zonal Mean](#)
- [Histogram](#)
- [Histogram, Area-Averaged](#)

+ ATMOS COMPOSITION

+ HYDROLOGY

+ A-TRAIN

+ AIRS

+ MODELING

+ MAIRS

+ MEASURES

+ PRECIPITATION

Hydrology

+ OVERVIEW

+ DATA HOLDINGS

+ DOCUMENTATION

Additional Features

+ News

+ Science Focus

+ Related Data Sets

+ Links

+ FAQ

You are here: [GES DISC Home](#) » Hydrology

HDISC: HYDROLOGY DATA AND INFORMATION SERVICES CENTER

**IMPORTANT MESSAGE** May 23, 2011 GLDAS Version 2 (GLDAS-2) data have been released

The GLDAS-2 1.0x1.0 degree 3-hourly and monthly NOAA model data (GLDAS_NOAH10_3H_E1.002 and GLDAS_NOAH10_M_E1.002), with temporal coverage from January 1948 to December 2008, are accessible via Hydrology Data Holdings page at <http://disc.sci.gsfc.nasa.gov/hydrology/data-holdings>. The GLDAS-2 data from other models will also become available soon. GLDAS-2 README Document is available at <http://disc.sci.gsfc.nasa.gov/hydrology/documentation>.

Supporting the Hydrological Sciences Branch (HSB)

The Hydrology DISC supports data products generated by GSFC's Hydrological Sciences Branch. Data products from the North America Land Data Assimilation System (NLDAS) and the Global Land Data Assimilation System (GLDAS) can be accessed through anonymous ftp, the [Mirador](#) search and access tool or the [GrADS Data Server \(GDS\)](#). NLDAS and GLDAS systems integrate data from multiple space-based Earth observing systems using advanced land surface modeling and assimilation techniques. These products support weather and climate forecast experiments, water resources applications, and water and energy cycle research.

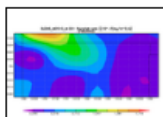
The data are provisional and subject to change as model improvements are implemented and new input data sets become available.

Other atmospheric moisture and precipitation products are available from the [AIRS](#) and [Precipitation](#) Data and Information Services Centers.

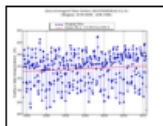
Latest News

Jun 16, 2011 - [GES DISC scientists attend recent scientific meetings and workshops](#)

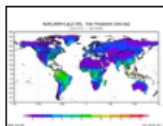
Meetings examine data from NASA instruments and applications around the world

[+ Read More...](#)May 31, 2011 - [GES DISC scientist discusses climate change with teachers in New Mexico](#)

Workshops will preview how GES DISC provides access to satellite and model data relevant to climate change

[+ Read More...](#)May 31, 2011 - [May 2011 issue of The Giovanni News now available online](#)

Articles on tropical convection, ocean color, hydrology data, floods, climate change education, coffee, and music

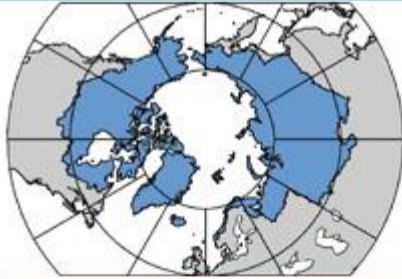
[+ Read More...](#)May 27, 2011 - [GLDAS Version 2 \(GLDAS-2\) data have been released](#)

Global Land Data Assimilation System Version 2 provides decades of hydrological data

[+ Read More...](#)

RIMS Rapid Integrated Mapping System

Гидрология метеорология: данные, модели, анализ



ArcticRIMS

A Regional, Integrated Hydrological
Monitoring System for the
Pan -Arctic Land Mass

<http://rims.unh.edu/>

Home

Background

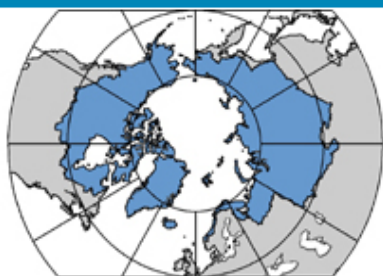
Tour

Data

Institutions

Site Map





ArcticRIMS

A Regional, Integrated Hydrological
Monitoring System for the
Pan -Arctic Land Mass

Home

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Site Map

ArcticRIMS Data Server

Data Access

[Data Explorer](#) (analysis)

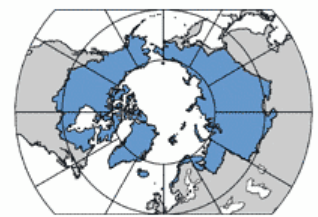
[Core Data](#) (data access)

[ArcticRIMS Station Lists](#) (river discharge)

[Pan-Arctic](#) | [R-ArcticNet](#) | [WALE](#) | [Global Hydrology Group](#) | [UNH Complex Systems](#)

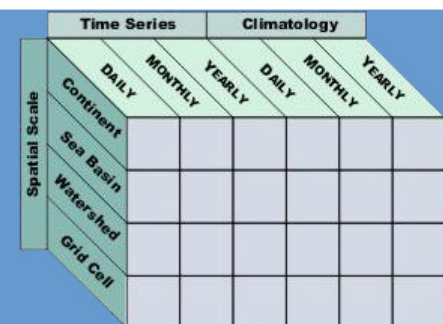
Arctic RIMS Data Download Page

ArcticRIMS



Static Data	☐	SWE	☐
NCEP-UNH	☐	Temperature	☐
Precipitation	☐	Atmosphere	☐
Runoff	☐	Subsurface	☐
Snowcover	☐		

Core RIMS Data



Choose Data Cube Spatial Domain ☒ HYDRO ☐ ADMIN

[Data Explorer](#)

Core Data

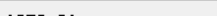
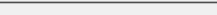
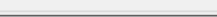
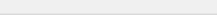
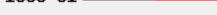
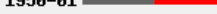
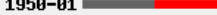
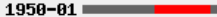
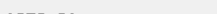
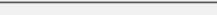
[Citations](#)

Monthly Gridded Data

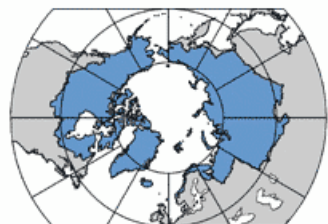
Data Set Name (download)	Download All	Temporal Basis	Timeline	README File
Precipitation (Univ. Delaware)	all files.tgz	1930 - 2004	1930-01 2010-12	README.txt
P-E (Serreze)	all files.tgz	1960 - 2008	1950-01 2010-12	README.txt
Precipitation (UDeI-NEW)	all files.tgz	1900 - 2008	1900-01 2010-12	README.txt
Vapor Pressure (CRU)	all files.tgz	1980 - 2000	1950-01 2010-12	README.txt
Temperature (Univ. Delaware)	all files.tgz	1930 - 2004	1930-01 2010-12	README.txt
Temperature (UDeI-NEW)	all files.tgz	1900 - 2008	1900-01 2010-12	README.txt

Daily Gridded Data

Data Set Name (download)	Download All	Temporal Basis	Timeline	README File
Temperature (NCEP-UNH)	all files.tgz	Jan 1948 - Dec 2009	1948-01 2010-12	README.txt
Temperature (Maximum-NCEP-UNH)	all files.tgz	Jan 1948 - Dec 2009	1948-01 2010-12	README.txt

http://rims.unh.edu/data/data.cgi					
Radiation (Short-Wave-NCEP-OLD)	all files.tgz	Jan 1980 - Oct 2002	1950-01  2010-12	README.txt	
Vapor Pressure (NCEP-OLD)	all files.tgz	Jan 1980 - Dec 2002	1950-01  2010-12	README.txt	
Wind Direction (NCEP-OLD)	all files.tgz	Jan 1980 - Dec 2002	1950-01  2010-12	README.txt	
Wind Speed (NCEP-OLD)	all files.tgz	Jan 1980 - Dec 2002	1950-01  2010-12	README.txt	
Runoff (PWB-M-Prelim)	all files.tgz	Jan 1980 - Dec 2001	1950-01  2010-12	README.txt	
Snowcover (MODIS)	all files.tgz	Jan 2001 - Nov 2006	1950-01  2010-12	README.txt	
SWE (SSM/T)	all files.tgz	Aug 1987 - Sep 2003	1950-01  2010-12	README.txt	
Temperature (Topographically Adjusted)	all files.tgz	Jan 1960 - Nov 2006	1950-01  2010-12	README.txt	
Temperature (NCEP)	all files.tgz	Jan 1980 - Mar 2006	1950-01  2010-12	README.txt	
Temperature (Maximum-NCEP)	all files.tgz	Jan 1980 - Mar 2006	1950-01  2010-12	README.txt	
Temperature (Minimum-NCEP)	all files.tgz	Jan 1980 - Mar 2006	1950-01  2010-12	README.txt	
Temperature (NCEP-OLD)	all files.tgz	Jan 1980 - Dec 2002	1950-01  2010-12	README.txt	
Temperature (Maximum-NCEP-OLD)	all files.tgz	Jan 1980 - Dec 2002	1950-01  2010-12	README.txt	
Temperature (Minimum-NCEP-OLD)	all files.tgz	Jan 1980 - Dec 2002	1950-01  2010-12	README.txt	
Temperature (ERA-40)	all files.tgz	Jan 1979 - Aug 2002	1950-01  2010-12	README.txt	
Active Layer (Oelke)	all files.tgz	Jan 1980 - Dec 2001	1950-01  2010-12	README.txt	
Active Layer (Etringer)	all files.tgz	Jan 1979 - Dec 2001	1950-01  2010-12	README.txt	
Freeze Thaw (Zhang)	all files.tgz	Aug 1987 - Jun 2001	1950-01  2010-12	README.txt	
Static Gridded Data					
Elevation (mean, minimum, and maximum)		Soil (texture, type, and phase)			
Vegetation		Ground Ice			
Permafrost		Root Depth			
Wetlands					
Old Arctic RIMS Data					

ArcticRIMS



Static Data - Elevation ☒ SWE ☐

NCEP-UNH ☐ Temperature ☐

Precipitation ☐ Atmosphere ☐

Runoff ☐ Subsurface ☐

Snowcover ☐ ☐ Core RIMS Data

Spatial Scale	Time Series			Climatology		
	DAILY	MONTHLY	YEARLY	DAILY	MONTHLY	YEARLY
Continent						
Sea Basin						
Watershed						

For spatial navigation click map below or choose ☐ RIMS ☐ WALE

☐ HYDRO ☐ ADMIN

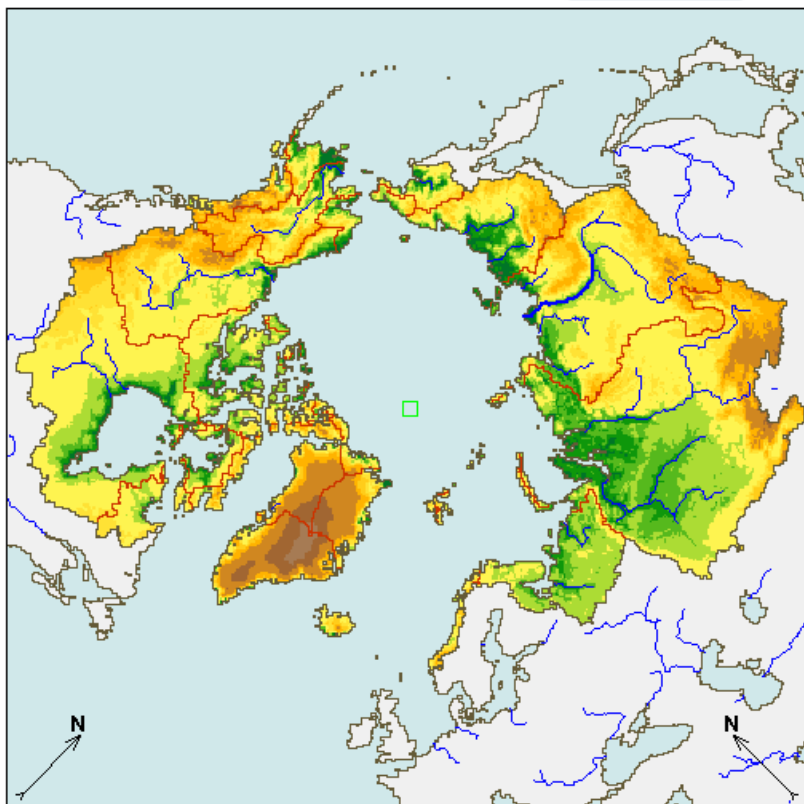
[Data Page](#)

Elevation for Pan Arctic

[Citations](#)

Show ☐ Towns ☐ Operational Sites ☐ Re-Analysis Sites

☒ Elevation- Mean ☐ Minimum ☐ Maximum



Basin Name	Pan Arctic
Receiving Ocean	Pan Arctic
Mouse over	
Longitude	
Latitude	
Sea Basin	
Basin	
Elevation- Mean, m ☐	Data not Loaded
Minimum, m ☐	Data not Loaded
Maximum, m ☐	Data not Loaded

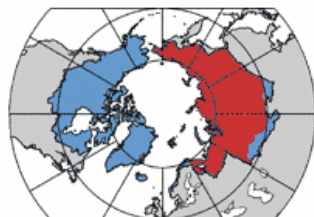
Data for Selected Grid Cell		
RIMS ID	Not Available	
Longitude	270.0	
Latitude	90.0	
Sea Basin	Ocean or Lakes	
Basin	Ocean or Lakes	
Elevation- Mean, m	NA	
Minimum, m	NA	
Maximum, m	NA	



Switch to Horizontal View

Data Explorer

ArcticRIMS



Static Data ☐ SWE ☐

Temperature ☐ Temperature ☒

Precipitation ☐ Atmosphere ☐

Runoff ☐ Subsurface ☐

Snowcover ☐ ☐ Core RIMS Data

			Time Series			Climatology		
			DAILY	MONTHLY	YEARLY	DAILY	MONTHLY	YEARLY
Political Units	National							
	Sub-National							
	Admin.							

For spatial navigation click map below or choose ☐ RIMS ☐ WALE

☐ HYDRO ☒ ADMIN

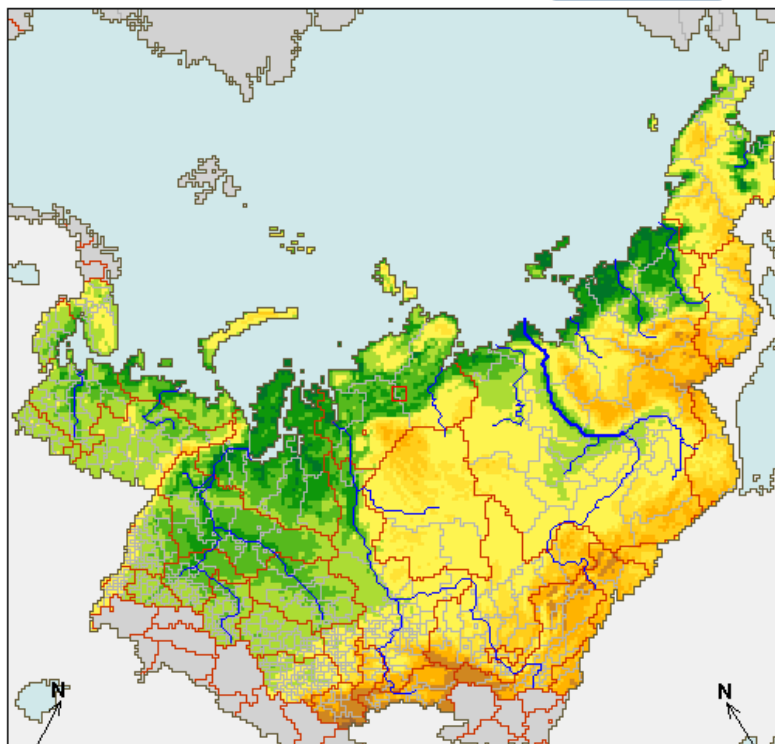
[Data Page](#)

Elevation for Russia

[Citations](#)

Show ☐ Towns ☐ Operational Sites ☐ Re-Analysis Sites

☒ Elevation- Mean ☐ Minimum ☐ Maximum



Basin Name	Russia		
Mouse over			
Longitude			
Latitude			
Sub Nation			
Administrative Division			
Elevation- Mean, m ☐		Data not Loaded	
Minimum, m ☐		Data not Loaded	
Maximum, m ☐		Data not Loaded	

Data for Selected Grid Cell		
RIMS ID	22084	
Longitude	95.8	
Latitude	72.0	
Sea Basin	Kara Sea	
Basin	Pyasina	
Elevation- Mean, m	61	
Minimum, m	29	
Maximum, m	110	

Интегрированное региональное исследование окружающей среды Сибири (ИРИС/SIRS)

В 2003 г. Партнерство наук о системе Земля (Earth System Science Partnership, ESSP,) объявило о развертывании Программы международных интегрированных региональных исследований (ИРИ) в районах экстремального проявления таких изменений глобального климата, последствия которых могут изменить функционирование всей климатической системы.

Организация интегрированных региональных исследований в наиболее важных регионах планеты предполагает ряд требований на такие исследования:

разработку концепции региона как целостной единицы в контексте Земной системы;

качественное и количественное понимание глобально-региональных связей и последствий изменений в этих связях.

Основные «сибирские» угрозы изменения характера глобальных процессов :

- Сдвиг границ вечной мерзлоты (угрозы инфраструктуре и новые источники углерода);**
- Сдвиг границ экосистем: пустыня-степь-лес (изменения регионального баланса углерода и социо-экономические последствия); и**
- Изменения режима температур, осадков и всей гидрологии (включая влияние на вероятность лесных и торфяных пожаров).**

Интегрированное региональное исследование Сибири (Siberia Integrated Regional Study, SIRS, <http://sirs.scert.ru/>)

Сибирь:
Резкие климатические изменения,
Роль в углеродном цикле (леса, болота, торф)
Вечная мерзлота,
Регионально-глобальные связи и наличие инфраструктуры СО РАН.
2003 – начало целенаправленной активности!



Program

Climate

News

Rus | Eng

Few years ago IGBP suggested to develop in selected regions integrated regional studies of environment, which would represent a complex approach to reconstruct the Earth System dynamics from its components. It considered as a complementary effort to the thematic project approach employed so far in the international global change programs. Nowadays Integrated Regional Study (IRS) approach is developed by the Earth System Science Partnership (<http://www.essp.org/>), joining four major Programs on global change research. IGBP initiative aimed at development of IRS in the most important regions of the planet puts a set of prerequisites for such studies:

- The concept should be developed in the context of the Earth System as a whole;
- Scientific findings should support sustainable development of the region;
- Qualitative and quantitative understanding of global-regional interconnections and the consequences of changes in these interconnections should be achieved.

The regional (region here is a large geographical area, which functions as a biophysical, biogeochemical and socio-economical entity) aspect of science for sustainability and of international global change research is becoming ever more important nowadays. Modern technologies in land use, industrial and economical development lead to rapid changes both at regional social-economical system and the Earth System. Consequences of these changes are very important on a regional and global scale. Regional approach to the study is also important with respect to the point of view of Earth sciences. Regional compounds of the Earth System may manifest significantly different Earth System dynamics and changes in regional biophysical, biogeochemical and anthropogenic components may produce considerably different consequences for the Earth System at the global scale. Regions are "open systems" and the interconnection between regional and global processes plays a key role. Some regions may function as choke or switch points (in both biophysical and socio-economic senses) and small changes in regional systems may lead to profound changes in the ways in which the Earth System operates.

In each region IRS should be developed, lead and performed by regional scientists. It should reflect individual characteristics, and be integrated with other regional studies and international programs. The SIRS approach is based on the following principles:

News

30.03.2010 | RNC IGBP open meeteng

Open Meeting of Russian National Committee for IGBP: Development of Siberia Integrated Regional Study will take place on 10 July in Tomsk during ENVIROMIS 2010 Conference.

18.12.2009 | Workshop on Siberia Integrated Regional Study 2009

Workshop on Siberia Integrated Regional Study (SIRS) took place in the framework of International Conference on Computational Information Technologies for Environmental Sciences: "CITES-2009", July 5–15, 2009, Krasnoyarsk, Russia. Workshop materials are available at the event site.

Siberia Integrated Regional Study: multidisciplinary investigations of the dynamic relationship between the Siberian environment and global climate change

Author E P Gordov¹ and E A Vaganov²

Affiliations ¹ Siberian Center for Environmental Research and Training and Institute of Monitoring of Climatic and Ecological Systems SB RAS, 10/3, Akademicheskii Ave, 634055 Tomsk, Russia
² Siberian Federal University and Sukhachev Institute of Forest SB RAS, 79, Svobodny Ave, 660041 Krasnoyarsk, Russia

E-mail gordov@scert.ru rector@sfu.ru

Journal [Environmental Research Letters](#)  Create an alert  RSS this journal

Issue [Volume 5, Number 1](#)

Citation E P Gordov and E A Vaganov 2010 *Environ. Res. Lett.* **5** 015007
doi: [10.1088/1748-9326/5/1/015007](https://doi.org/10.1088/1748-9326/5/1/015007)

<http://iopscience.iop.org/1748-9326/5/1/015007/>

[Article](#) [References](#)

EDITORIAL

Part of [Focus on Climatic and Environmental Change in Northern Eurasia](#)

 Tag this article  Full text PDF (105 KB)

This is an editorial overview of the Siberia Integrated Regional Study (SIRS), which is a large-scale investigation of ongoing and future environmental change in Siberia and its relationship to global processes, approaches, existing challenges and future direction.

Introduction

The SIRS is a mega-project within the Northern Eurasia Earth Science Partnership Initiative (NEESPI), which coordinates international scientific and information activities in Northern Eurasia that follow the Earth

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Информационно-вычислительная инфраструктура SIRS

Цель: поддержка мультидисциплинарных и распределенных групп исследователей выполняющих совместные проекты по изучению Сибири инструментом для обмена данными, моделями и знанием, а также оптимизация использования информационно-вычислительных ресурсов и приложений.

Ключевые элементы:

Научные веб-порталы (ИВС) для комплексного анализа наборов пространственно-привязанных геофизических данных с целью мониторинга и прогнозирования климатических и экосистемных изменений (метеорологические наблюдения, результаты моделирования и реанализа, данные дистанционного зондирования), обеспечивающие интерактивный доступ к данным, моделям и инструментарию:

- **ATMOS** (<http://atmos.iao.ru/> и <http://atmos.scert.ru/>)
- **RISKS** (<http://climate.risks.scert.ru/>)
- **ENVIROMIS** (<http://enviromis.scert.ru/en/>)
- **CLIMATE**

Информация

Rus | Eng

Портал ATMOS

Аэрозоль

Радиация

Спектроскопия

Химия

Климат

О проектах

ГПО

Глобальная и региональные модели атмосферы

Полная функциональность портала обеспечивается только для зарегистрированных пользователей. Регистрация и авторизация проводится в разделе, помеченном иконкой . Справку о каждой текущей странице можно найти в .

Одной из наиболее важных проблем, стоящих перед наукой в XXI столетии, является проблема предсказания климатических изменений, вызываемых человеческой деятельностью. В качестве антропогенных воздействий на климатическую систему можно рассматривать сжигание ископаемого топлива, приводящее к изменению концентрации углекислого газа в атмосфере; изменение концентрации малых газовых примесей, контролирующей концентрацию озона в атмосфере; вырубку лесов, приводящую к изменению альбедо и процессу опустынивания; освоение нефтяных и газовых месторождений в районах вечной мерзлоты, сопровождаемое нарушением растительного покрова, и многие другие воздействия. Эти проблемы, имеющие особое значение для дальнейшего развития экономики России, тесно связаны с необходимостью создания национальной системы экспертной оценки неблагоприятных для страны последствий глобальных изменений климата.

Климатические модели дают возможность на основе численных экспериментов попытаться воспроизвести современный климат и исследовать чувствительность "модельного" климата по отношению к малым изменениям параметров, характеризующих внешние воздействия, изучить основные климатообразующие процессы, оценить опасные региональные последствия глобальных изменений и многое другое. Фундаментальным является вопрос, что и с какой точностью должна воспроизводить климатическая модель, чтобы ее чувствительность к малым возмущениям внешних воздействий была бы близка к чувствительности реальной климатической системы. Глобальные климатические модели, включающие в себя описание большого числа разнообразных физических процессов и их взаимодействий, переживают в настоящее время период бурного развития, определяемого в конечном итоге интенсивным развитием вычислительной техники. Эти модели оправдали себя, например, при воспроизведении наблюдаемых в XX веке изменений гидрологического баланса водосбора Волги, уровня Каспия и стока северных рек, распространения вечной мерзлоты. Климатические модели составляют также основу технологий четырехмерного усвоения многообразной информации о состоянии компонент климатической системы, в первую очередь, атмосферы и океана.

Вычислительно - информационная система (ВИС) **Климат** предназначена, с одной стороны, для демонстрации возможностей математического моделирования для решения отдельных климатических задач, а с другой стороны - на основе интернет-технологий и средств визуализации осуществлять взаимодействие с "потребителями" информации о результатах решения таких задач. При этом, вычислительная компонента системы представляет собой глобальную модель общей циркуляции атмосферы, разрабатываемую в Институте вычислительной математики РАН и реализованную на высокопроизводительных вычислительных системах параллельной архитектуры. Информационная компонента ВИС связана с последующим преобразованием результатов расчетов в информацию, необходимую конкретным пользователям (специалистам по проблемам окружающей среды; людям, занятым управлением в конкретных областях хозяйственной деятельности; студентам, аспирантам и преподавателям и т.д.).

Портал RISKS



Project	Siberia	Air quality	Climate	Distributed resources	Intranet
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[Rus](#) | [Eng](#)  

The bilingual (Russian and English) Enviro-RISKS web-portal is aimed at dissemination of the FP6 CA "Man-induced Environmental Risks: Monitoring, Management and Remediation of Man-made Changes in Siberia" (Enviro-RISKS) results as well as relevant projects results and approaches. It is also an information resource on general environment issues adjusted also for usage in education process and giving an access to environmental information and basics on environmental monitoring and management to regional administrators, researchers, students and general public thus giving rise the environmental concern in NIS management bodies and general public;

The portal operation will be supported by a distributed information system with main server in Tomsk and nodes Krasnoyarsk, Moscow, Khanty-Mansiisk and Almaty thus providing easy access to structured information resources on Siberia environment, its management under anthropogenic environmental risks and methods of its remediation. Among the information resources there are also gathered and systemized environmental information resources obtained in process of environmental studies in Siberia and results of relevant expert groups studies. The portal is also aimed at exchange and dissemination of good practices examples of practically important results obtained in course of projects implementation, especially those obtained in area of remediation.

Additionally it is used as an instrument for exchange and dissemination of information between the project partners.

Portal functionality

Access to:

Gathered and analyzed detailed information on all coordinated Projects;

Gathered and systemized results and finding obtained including relevant observation data and information resources;

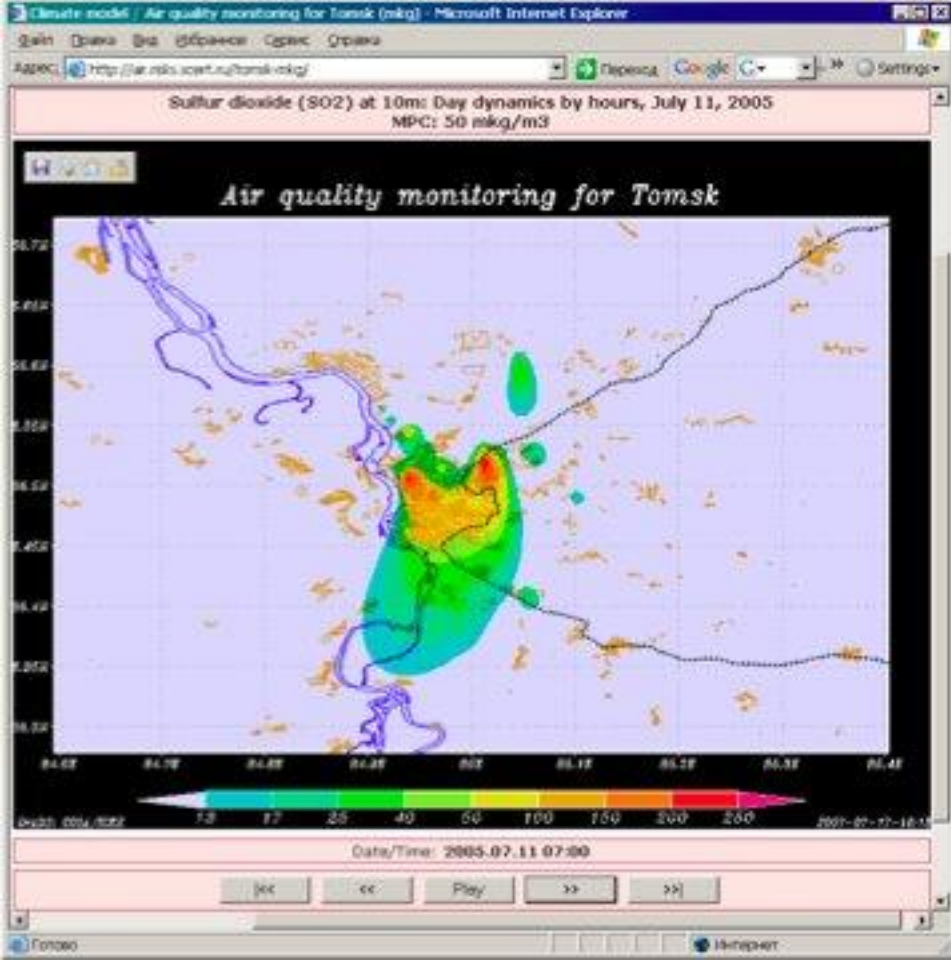
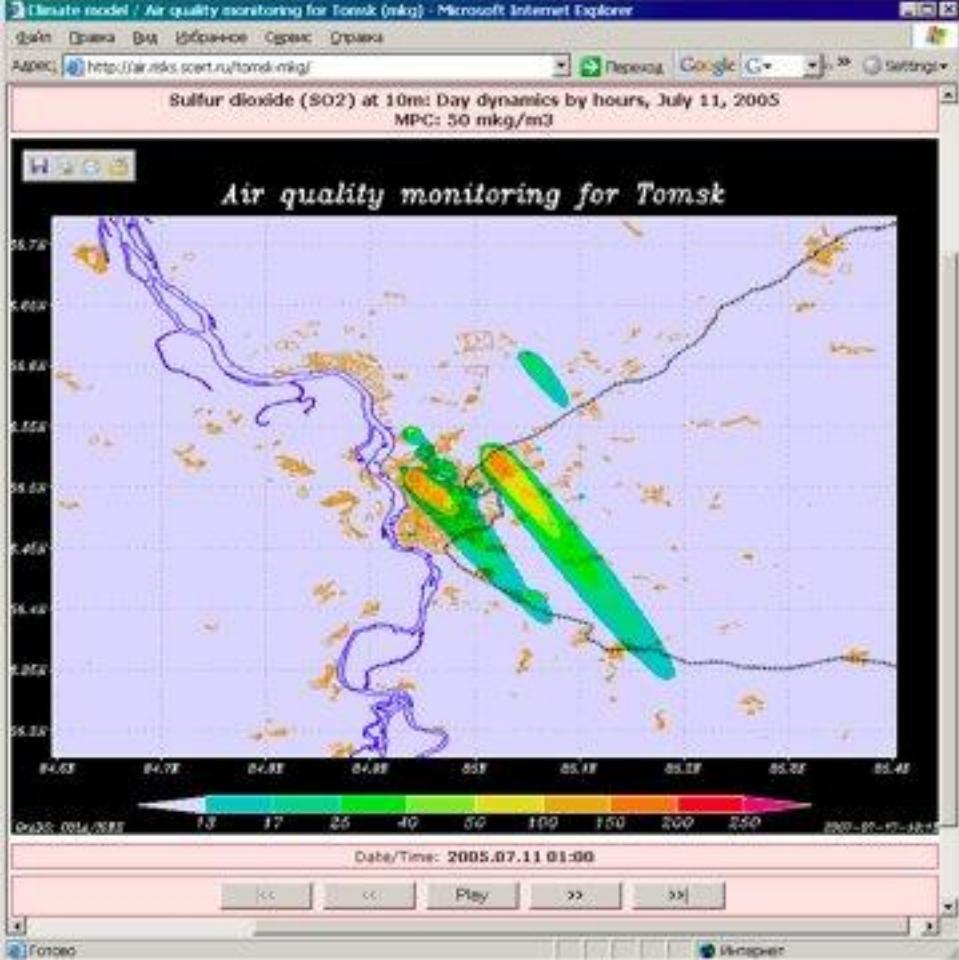
Distributed Database, which will give an access to data on characteristics of Siberian environment to the Project Partners and an access to relevant metadata to all interested professional community.

The basic thematic sites integrated into the Enviro-RISKS web-portal are:

Air Quality Assessment and Management will compile basic aspects of air pollution and environmental impact assessment and include interactive tutorials. Specific case study examples will be drawn from Lake Baikal and the West Siberian Lowlands.

ENVIRO-RISKS (INCO-CT-2005-013427)

<http://risks.scert.ru/>



Веб система для оценки загрязнений воздуха в Томске на основе математического моделирования (перенос и атмосферная фотохимия)

Визуализация результатов вычислений (проект Enviro-RISKS)

Система для обработки и визуализации климатических и метеорологических данных

<http://climate.risks.scert.ru/reanalysis/>

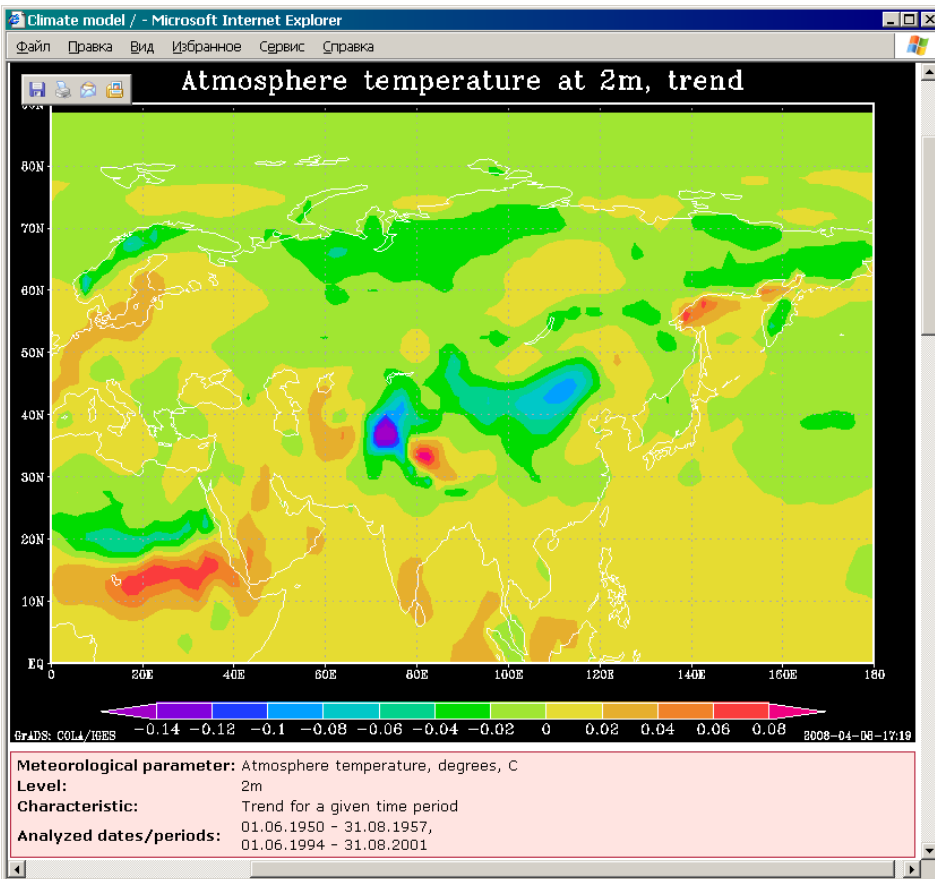
Веб-система состоит из трех частей: графического интерфейса пользователя, набора программ, написанных на языке сценариев системы GrADS или IDL, и структурированных метеорологических данных.

Графический интерфейс разработан на базе ядра веб-портала ATMOS с использованием языков HTML, PHP и Java, и представляет собой динамическую форму для ввода параметров расчета и визуализации. Программы представляют собой независимые модули, подключаемые с помощью PHP и выполняемые системой GrADS/IDL, которая по окончании расчетов производит графический вывод результатов в файл. Этот файл отображается на веб-странице.

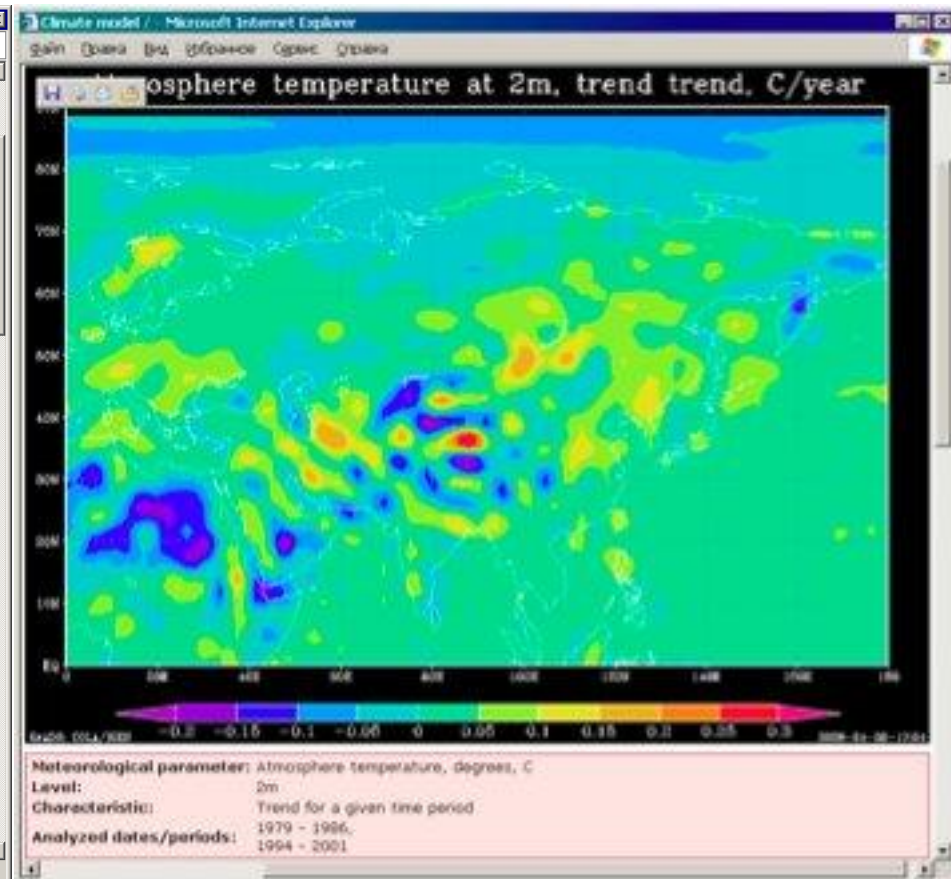
Зарегистрированный пользователь может свободно получить результаты графического отображения, как данных, так и результатов их обработки, но **не имеет непосредственного доступа к данным и не может скачать их.**

Система работает с данными Реанализов NCEP/NCAR, NCEP/DOE AMIP II, ERA-40 и JRA-25.

Тренды летних температур



NCEP/NCAR,
1950-1957/1994-2001



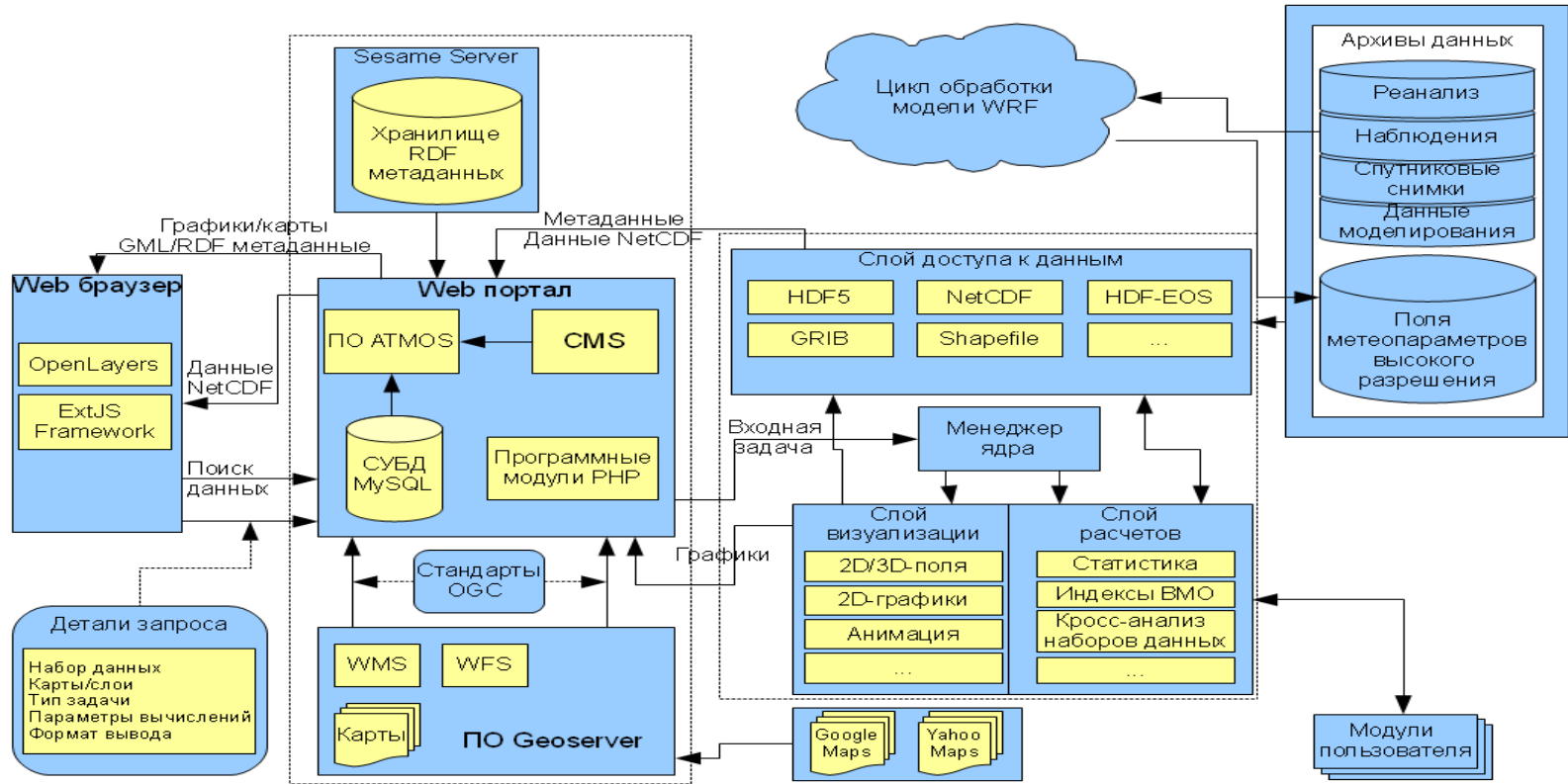
NCEP/DOE AMIP II,
1979-1986/1994-2001

Веб-ГИС система CLIMATE:

- Унифицированный набор архивов геофизических данных (NetCDF/HDF5)
- Расширяемое модульное вычислительное ядро с поддержкой модулей пользователя
- Обработка данных и представление результатов в графическом виде совместно с файлами данных и метаданных (OGC, ISO 19115)
- Интернет доступ, графический веб-интерфейс пользователя с ГИС-функциональностью
- Метаданные: поиск и выборка, технологии Semantic Web
- Информационная поддержка интегрированных научных исследований в области наук о Земле
- Достоверность выполняемого анализа несмотря на разный уровень исследователей

ИВВГС КЛИМАТ

Общая архитектура



Структурированные архивы геофизических данных + метаданные
Вычислительное модульное ядро, реализованное на IDL
Веб портал, реализующий логику разрабатываемых веб-приложений, обеспечивает API для работы с ядром и картографическими веб-сервисами
JavaScript-библиотека классов для реализации графического интерфейса

Наборы геофизических данных

- Хранилище наборов данных
 - Реанализы (ERA-40, JRA-25, NCEP/NCAR, NOAA-CIRES, ERA Interim, APHRODITE)
 - Данные метеостанций РФ
 - ДДЗ Landsat 4-7, GLS, MODIS
 - Объем данных 6 Тб, доступно 17 Тб
 - Базовый набор геопривязанных карт, включая карты растительного покрова, природных экосистем, индекса NDVI
- Данные реанализов приведены к форматам NetCDF/HDF5
- Для выбранных регионов восстанавливаются поля метеорологических величин с высоким пространственным разрешением (WRF)

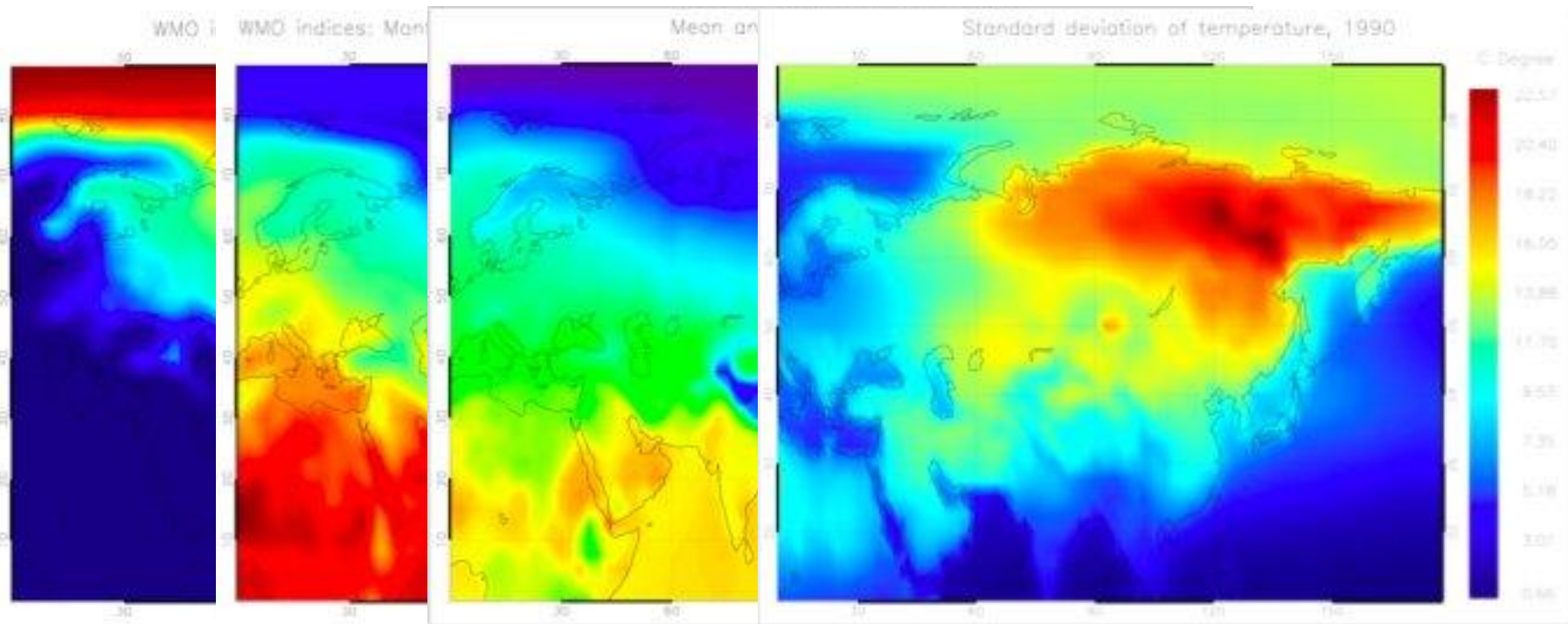


Функциональность

Веб-портал:

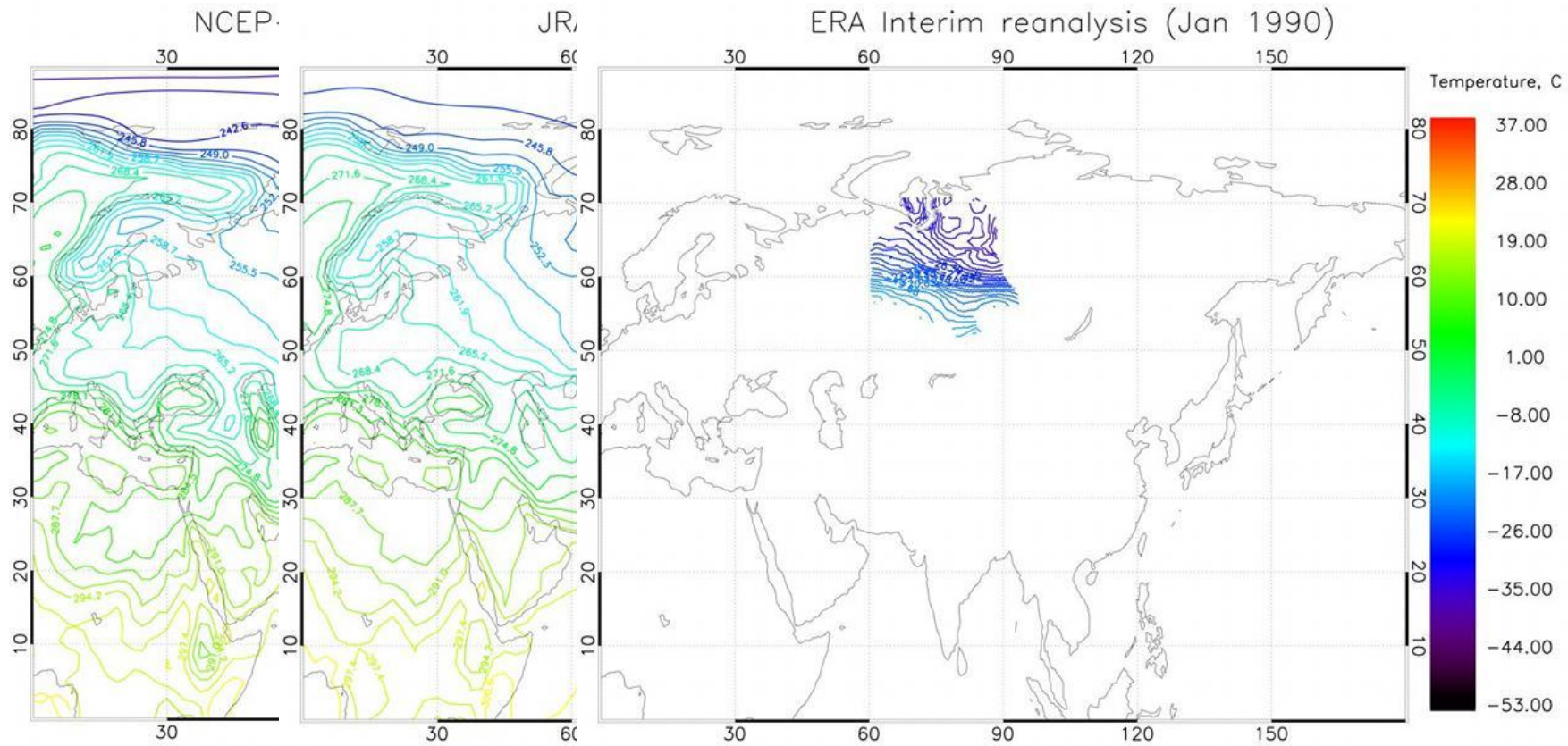
- Унифицированный программный интерфейс для разработки веб-приложений
- Обеспечение Веб-ГИС функциональности за счет интеграции с картографическими веб-сервисами (WMS, WFS) на базе ПО Geoserver (<http://geoserver.org/>)
- Масштабирование графических результатов вычислений
- Выбор географического диапазона, использование слоев
- Предоставление информации, связанной с географическим объектом
- Предоставления картографических легенд по WMS-запросу
- Функциональность для работы с RDF-метаданными, описывающими архивы данных, включая элементы семантического поиска по ключевым словам
- Библиотека для разработки графического интерфейса пользователя:
GeoExt (ExtJS Framework + OpenLayers)

Примеры вычислений и представления результатов



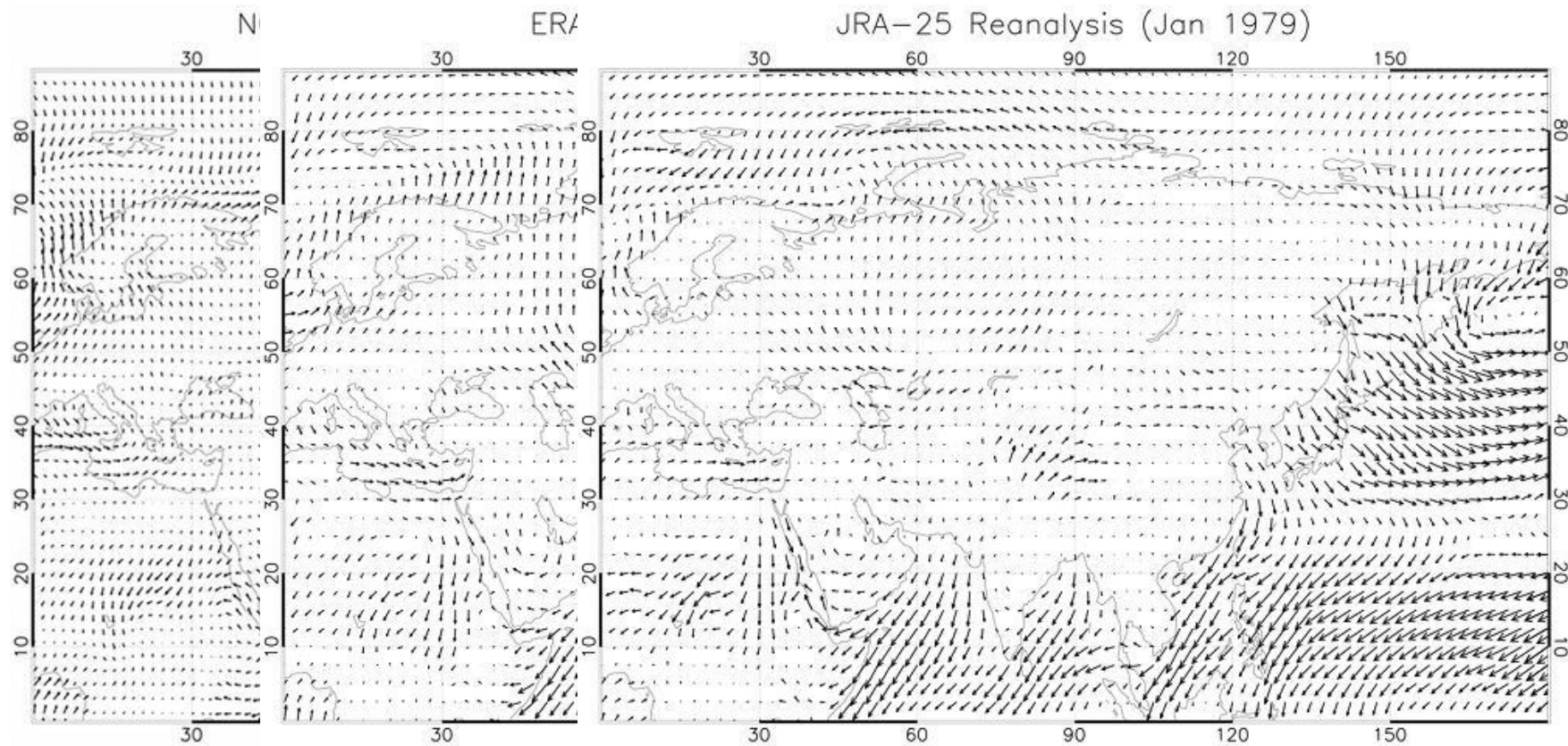
Индексы изменения климата: «Число дней с заморозками»,
«Месячный минимум дневной максимальной температуры», 1920г,
NOAA-CIRES Twentieth Century Global Reanalysis V.1
Среднегодовая температура воздуха,
стандартное отклонение температуры воздуха, 1990г, ECMWF ERA-40

Примеры вычислений и представления результатов



Температура воздуха у поверхности, среднее за январь

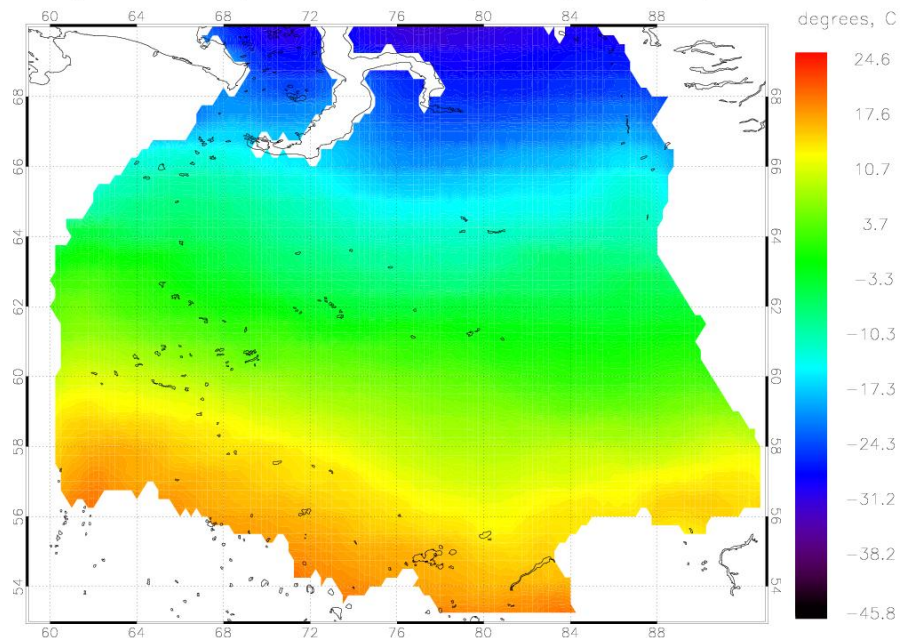
Примеры вычислений и представления результатов



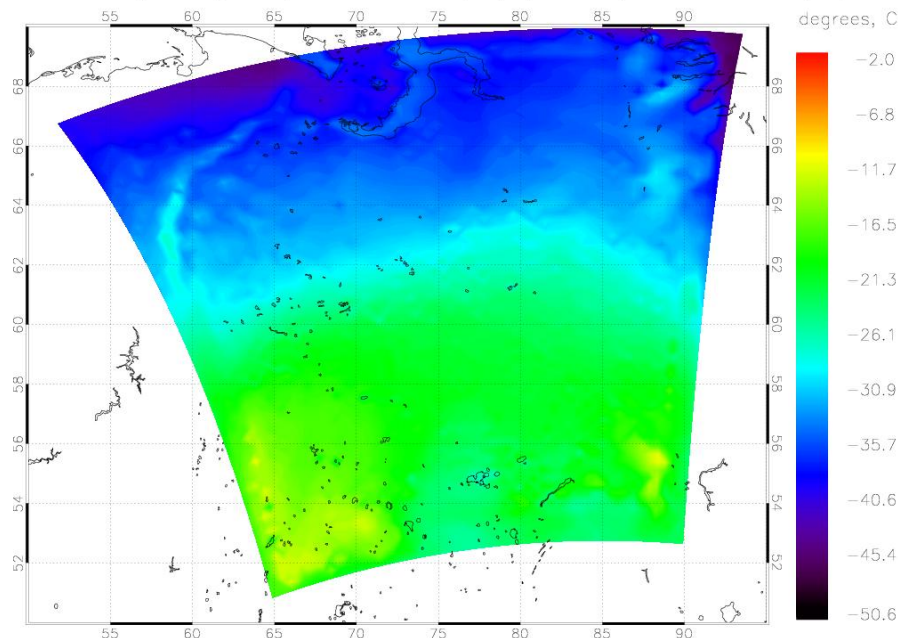
Скорость ветра, январь

Примеры вычислений и представления результатов

Average annual temperature at surface, 1990 (ERA Interim, Western Siberia)

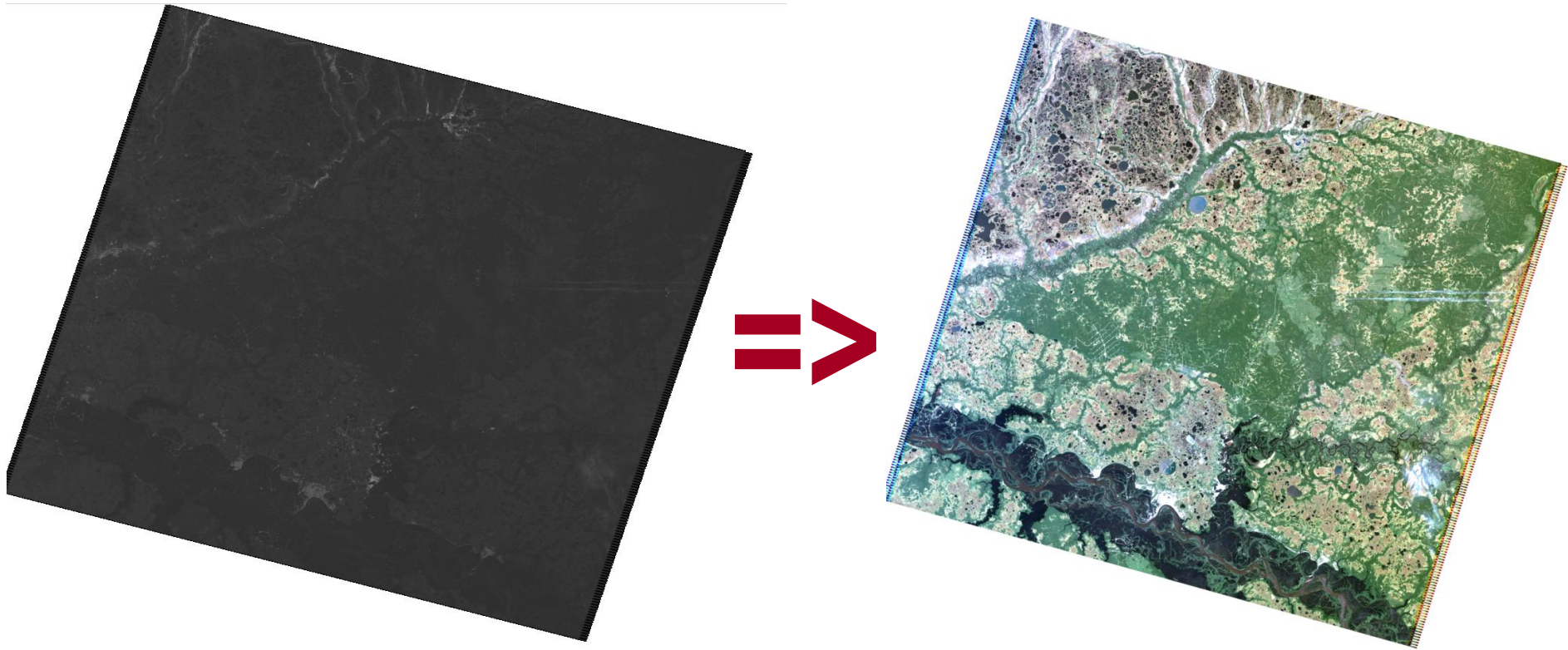


Average daily temperature at 2m, 2/2/1999 (WRF model output)



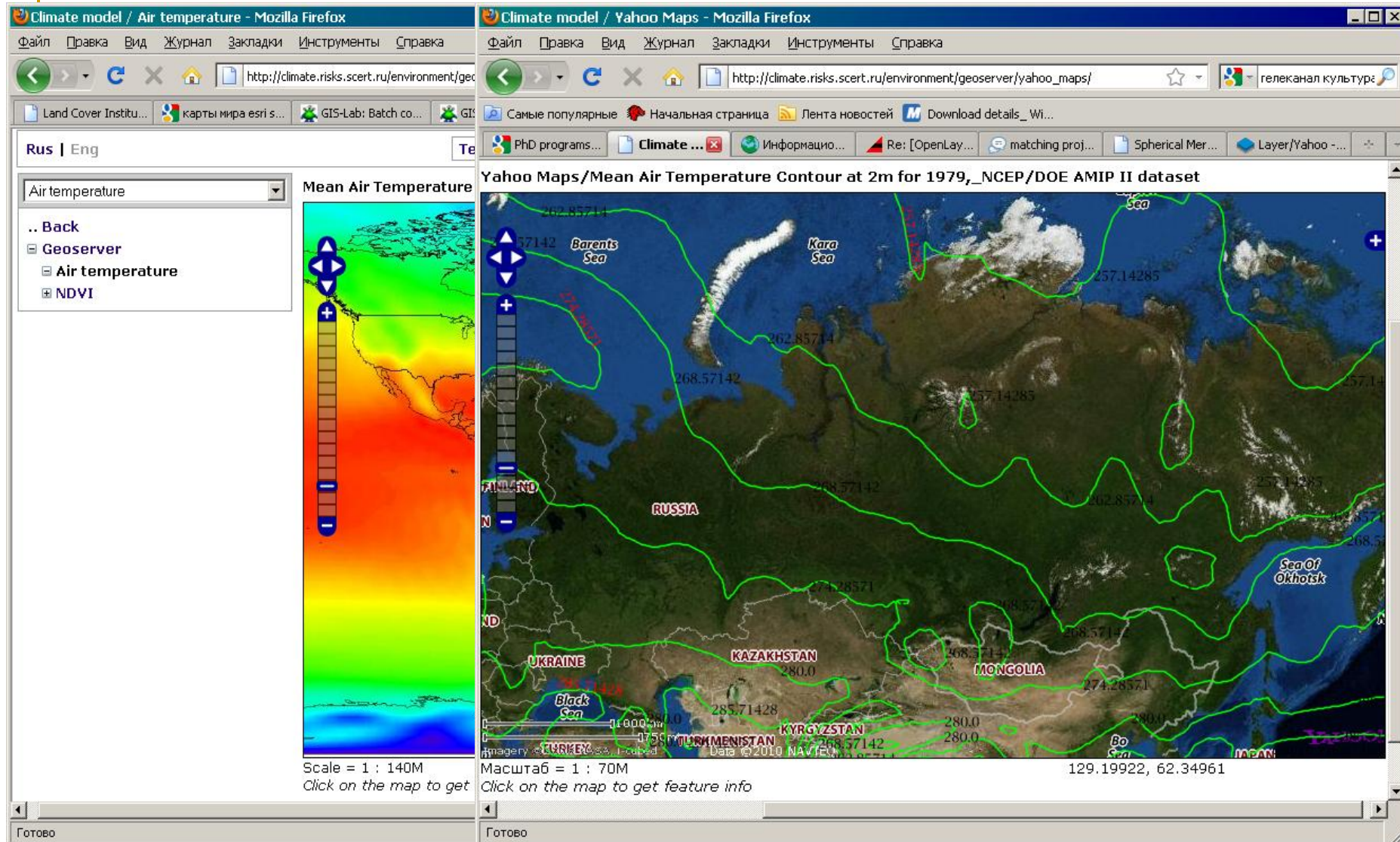
Среднегодовая температура воздуха у поверхности, 1990г., ECMWF ERA-Interim
Среднесуточная температура на 2 м, 2 фев. 1999 г., Модель WRF

Обработка спутниковых данных Landsat

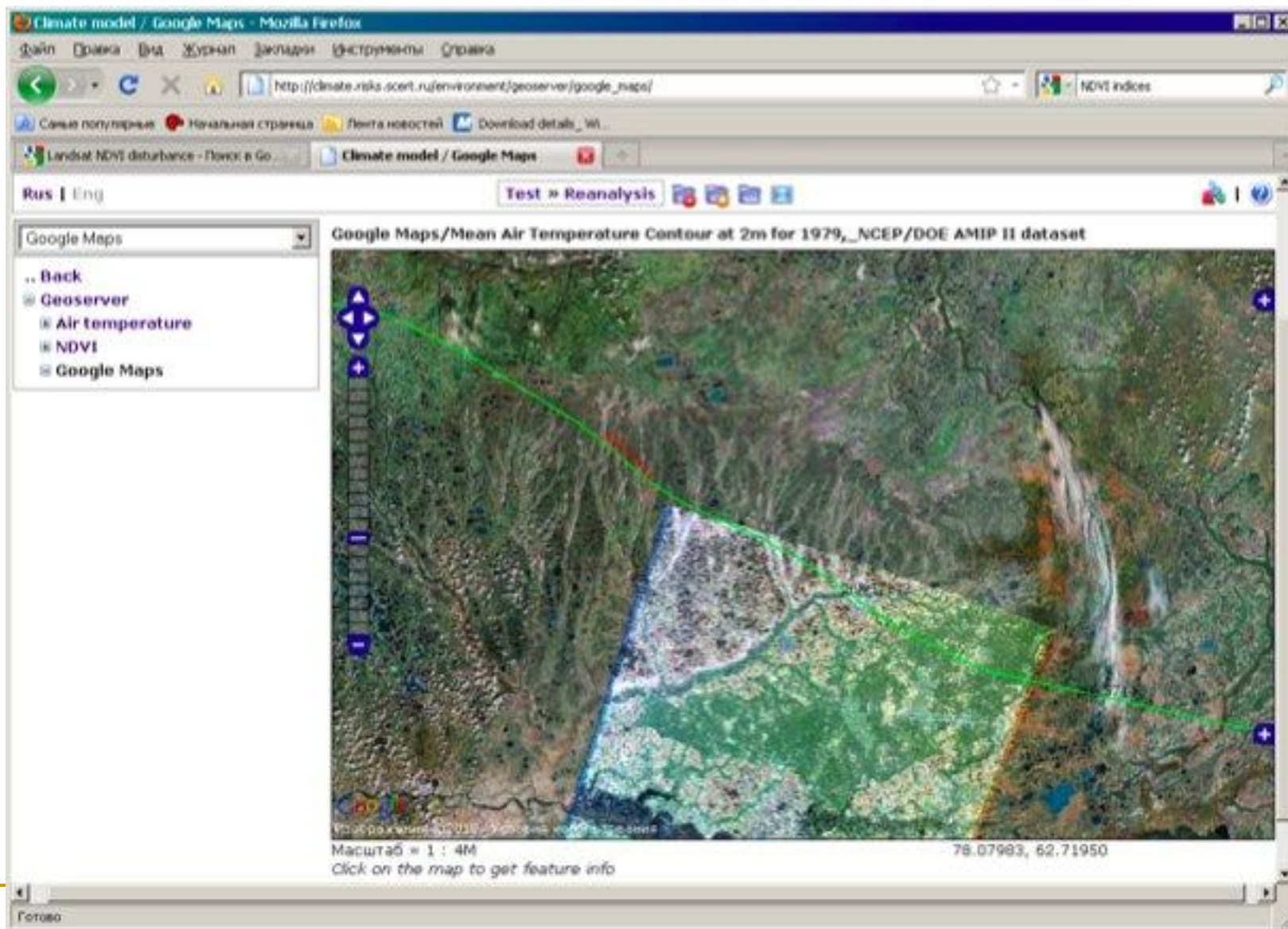


1. Изображение RGB (Рис.)
2. NDVI, EVI
3. ...

Визуализация средней температуры на высоте 2м, 1979

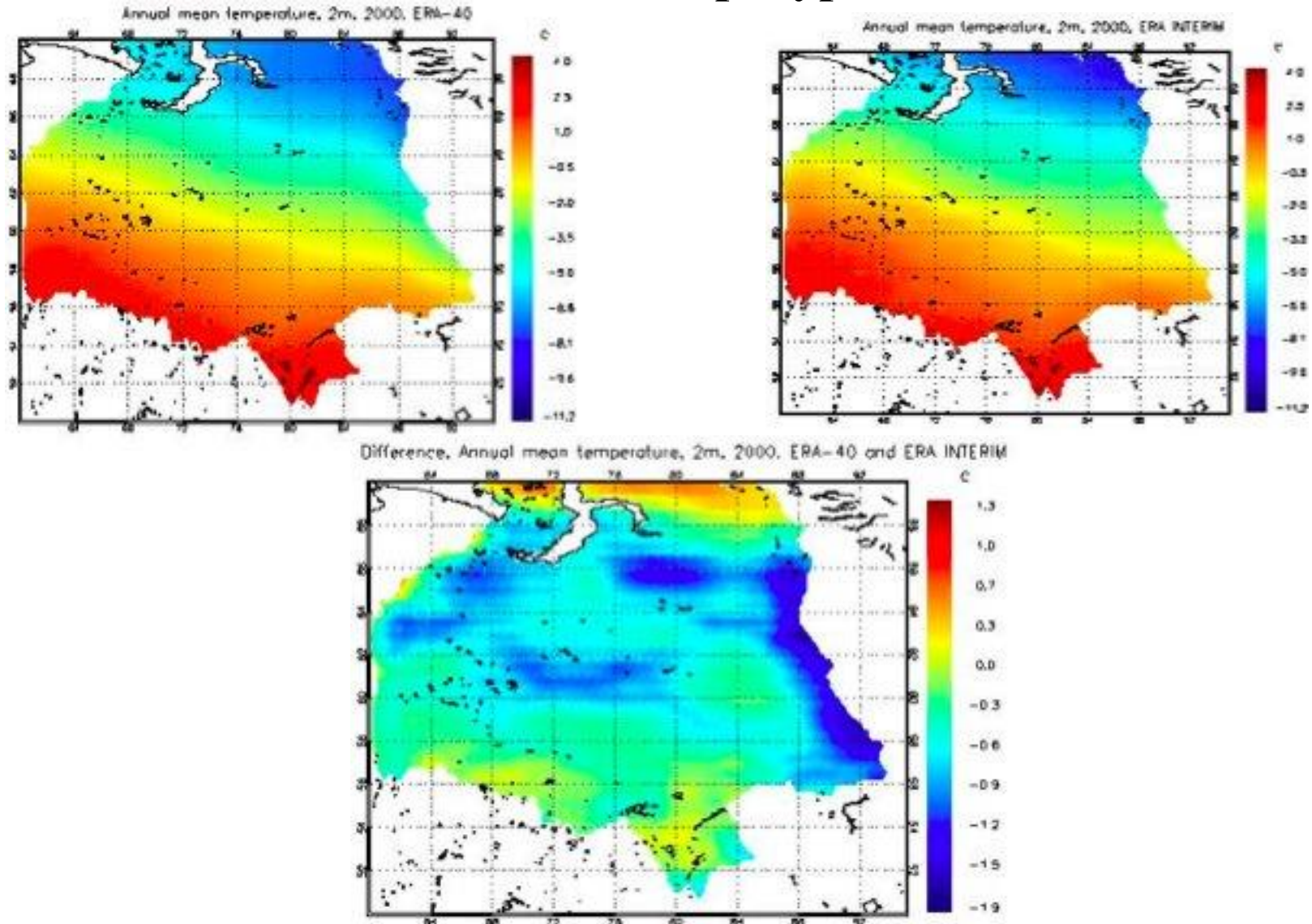


Использование слоев Google Maps и спутниковых снимков Landsat



Новые Реанализы: новые возможности (разрешение)/ новые проблемы (объем)

Сравнение среднегодовой температуры в ERA-40 и Interim



ДИРЕКЦИЯ



Проект Минобрнауки РФ Веб-ГИС платформа для мониторинга и прогноза региональных климатических и экологических изменений и поддержки непрерывного образования «Климат»

*Е.П. Гордов, В.Н. Крупчатников, В.Н. Лыкосов,
Ю.В. Мартынова, И.Г. Окладников,
А.Г. Титов, Т.М. Шульгина*

Томский государственный университет

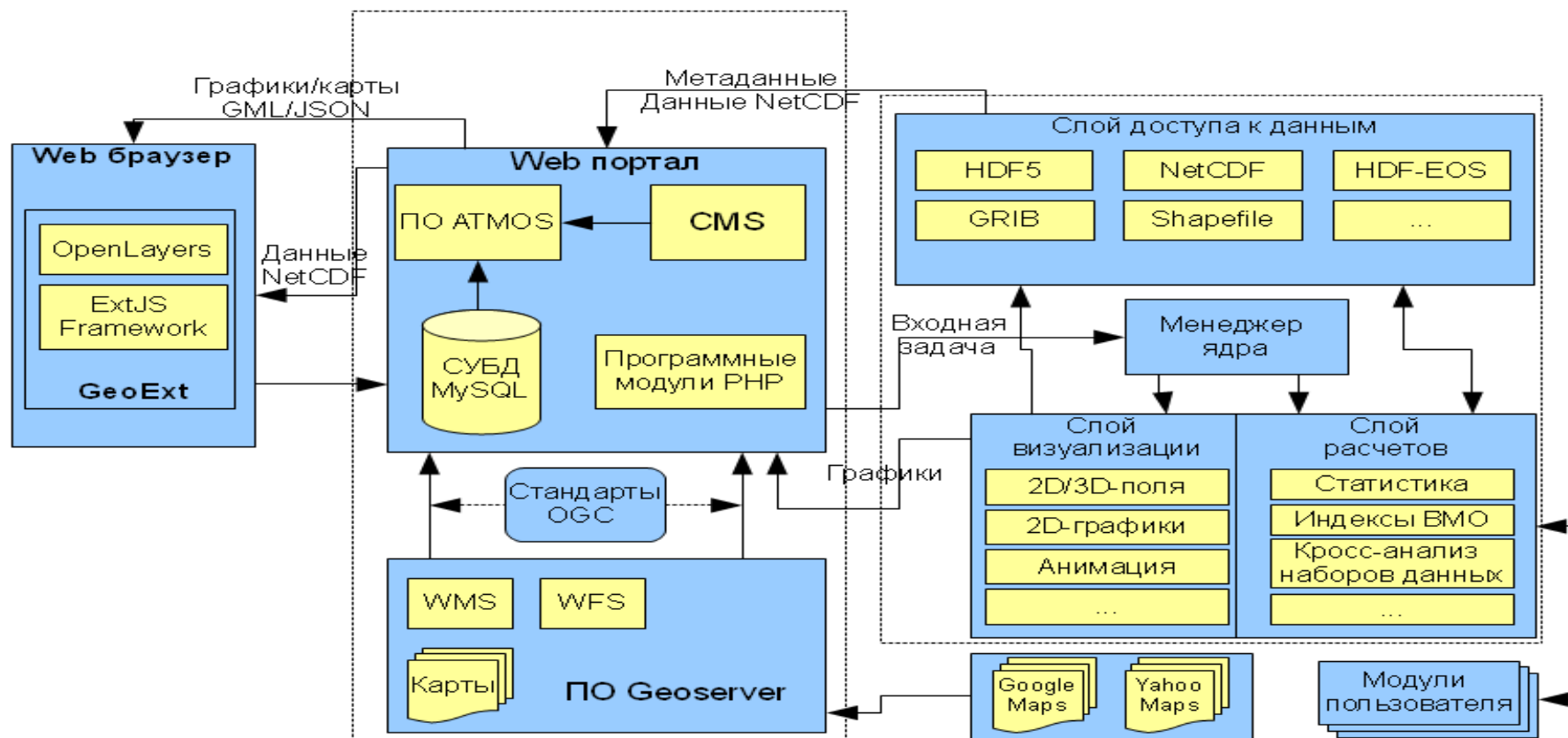
ИМКЭС СО РАН, ТФ ИВТ СО РАН, СибНИГМИ,
СЦ КЛИО, ИВМиМГ СО РАН, ИВМ РАН, НИВЦ МГУ



ОСНОВАН В 1878 ГОДУ

- Информационно-вычислительная инфраструктура основанная на ГИС-технологиях
 - Требования к вычислительным ресурсам
 - Доступ к огромным распределенным архивам пространственно-привязанных данных
- Комбинированное использование веб- и ГИС-технологий
 - Концентрация вычислительных ресурсов (кластер)
 - Организация хранилища наборов геофизических данных
 - Современные программные решения позволяют реализовать необходимую функциональность в рамках Интернет-портала
- Множество задач, возникающих в области климато-экологического мониторинга
 - Специализированное ПО (инструментарий) для быстрой разработки тематических Веб-ГИС приложений

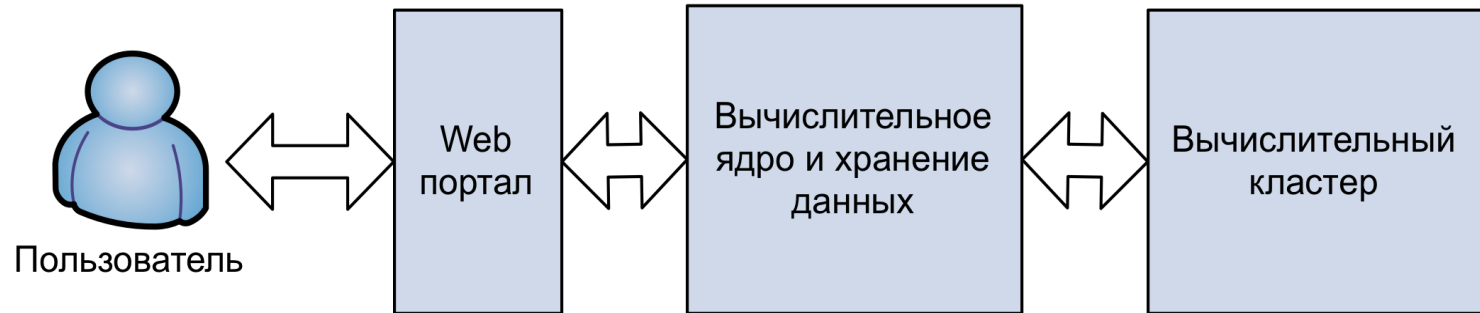
- Специализированный программный инструмент для быстрой разработки тематических Веб-ГИС приложений
 - Модульное вычислительное ядро, GDL
 - Веб-портал включающий набор управляющих PHP-контроллеров
 - JavaScript-библиотека для создания типовых элементов графического интерфейса Веб-ГИС приложений на базе технологии AJAX



■ Программно-аппаратная платформа «Климат»

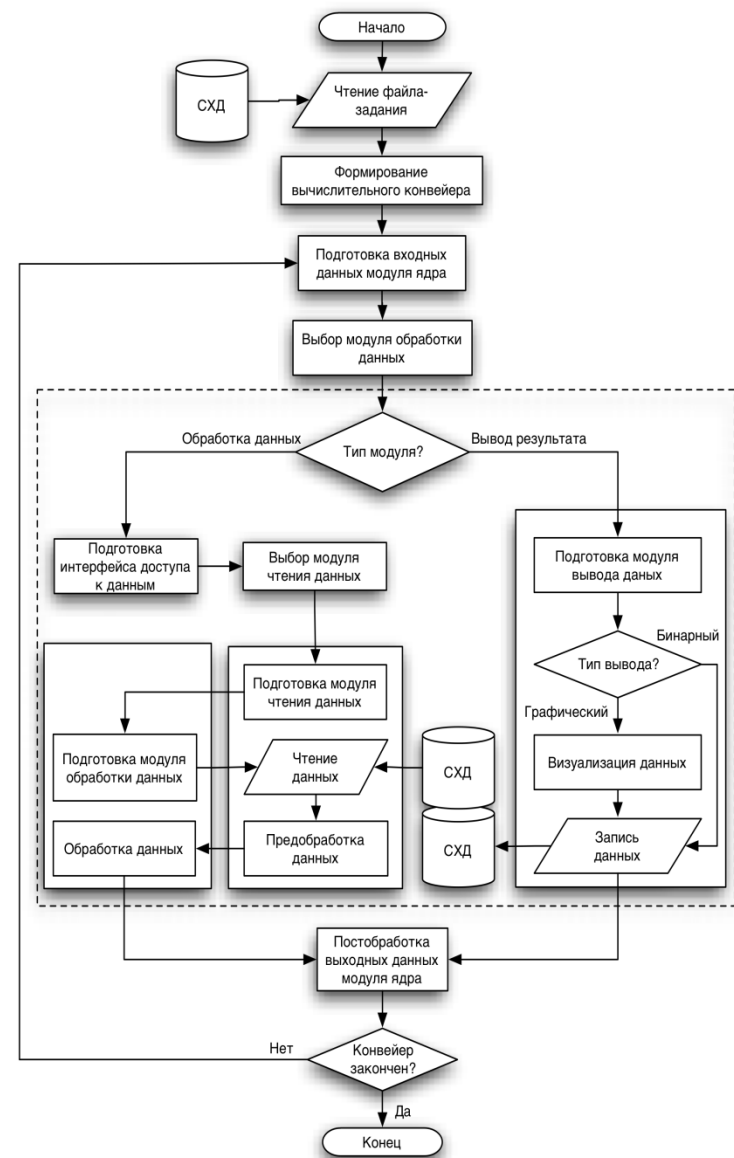
- Создана на базе программного инструментария

- Имеет трехуровневую структуру

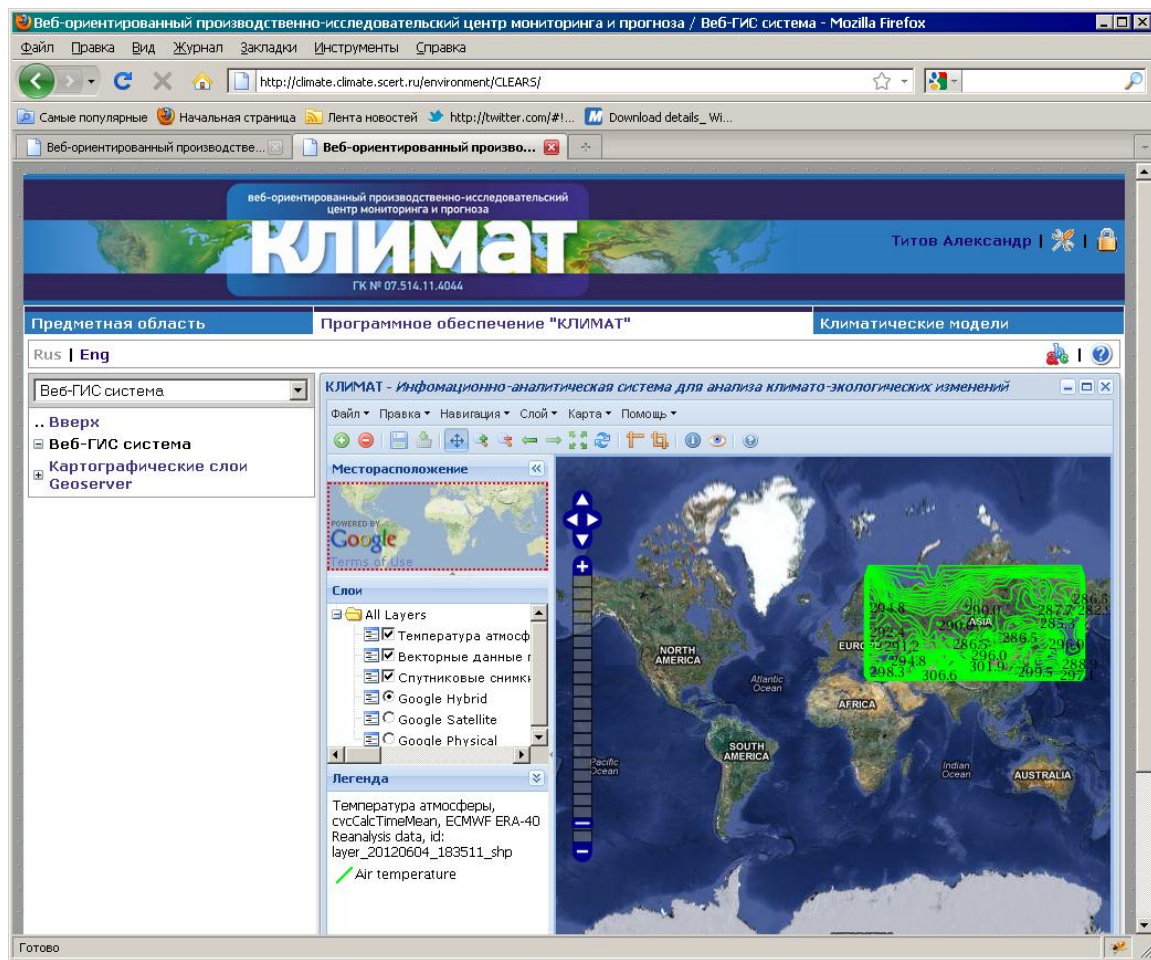


- Наборы пространственно-привязанных геофизических данных (численное моделирование/реанализы, натурные наблюдения, ДЗЗ)
- Модульное вычислительное ядро на стороне сервера, управляющее набором прикладных вычислительных модулей.
- Веб-портал (логика веб-приложений, связь с картографическими веб-сервисами, модулями ядра, хранилищем данных и моделями)
- Графический интерфейс пользователя на стороне веб-клиента, обеспечивающий ГИС-функциональность.
- Климатические модели «WRF» и «Planet Simulator»
- Информационная среда взаимодействия распределенных групп специалистов (форумы, wiki, блоги, ПО для совместной разработки)

- ITTVIS IDL, GNU Data Language, Python
- Управляется веб-ГИС порталом
- Обеспечивает управление конвейером обработки, поиск и выборку данных из архива, визуализацию результатов
- Модульная компоновка
- Обработка данных в форматах netCDF, GRIB, ESRI Shapefile
- Вывод результатов обработки в виде закрашенных и контурных карт, графиков и диаграмм и файлов в форматах netCDF, geoTIFF, ESRI Shapefile
- Модули для расчета: минимальные/максимальные значения, диапазон, дисперсия, стандартное отклонение, индексы изменения климата, принятые ВМО, обработка снимков Landsat...



- Авторизация
- Интеграция с БД
- Система управления контентом
- Локализация
- Использование стандартов OGC
- Технологии: PHP, JavaScript, DHTML



Обеспечивает Веб-ГИС функциональность

окно отображения карты с информационной панелью (масштабная линейка, координаты, используемые легенды..)

список слоев карты, с возможностью добавления/удаления, включения/выключения, просмотра свойств

панель навигации

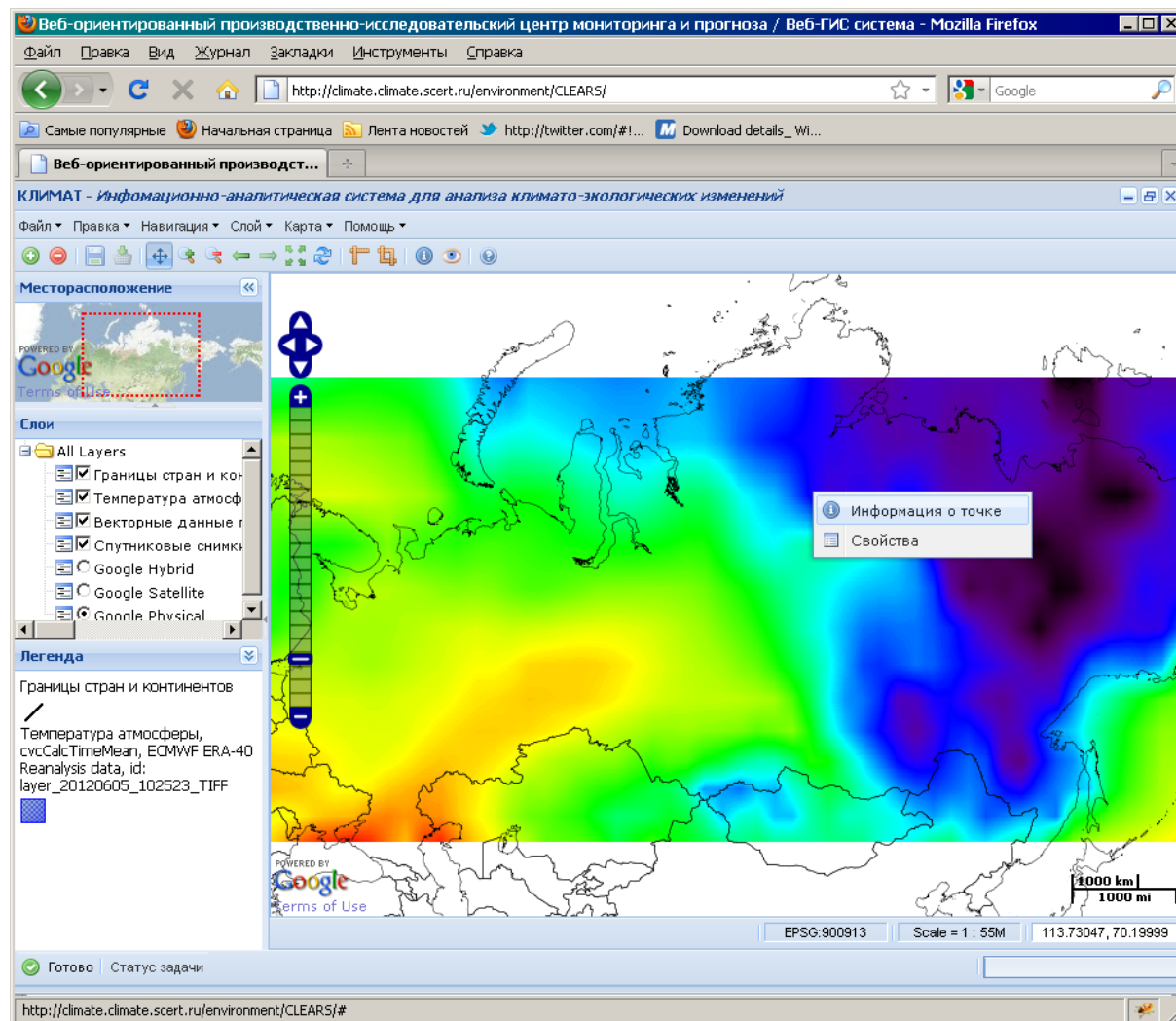
общее/контекстное меню и панель инструментов

окно вывода результата запроса пользователя

диалоговые окна;

аналитические таблицы и графики

ПО: ExtJS, OpenLayers, GeoExt

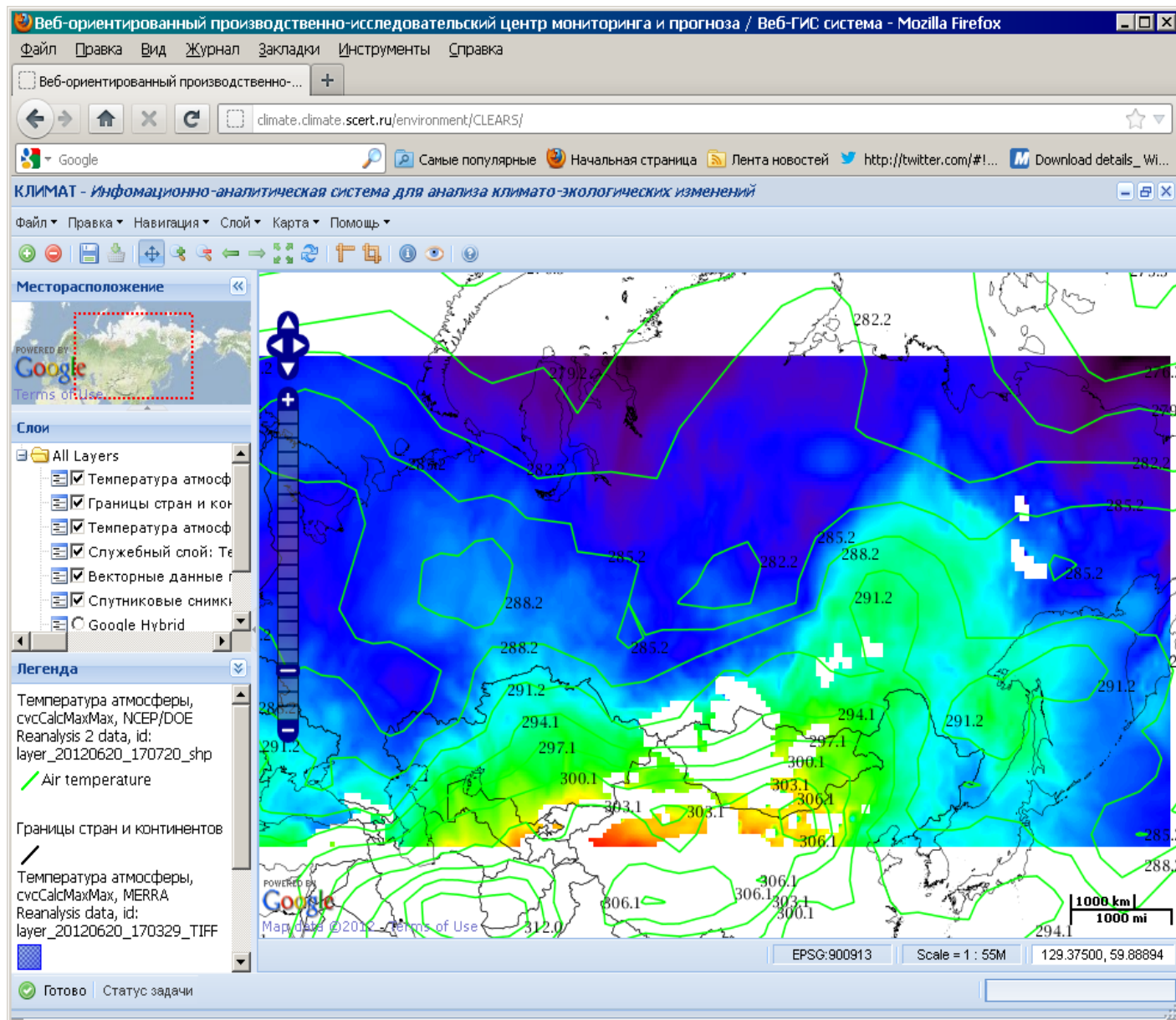


Архивы метеорологических данных

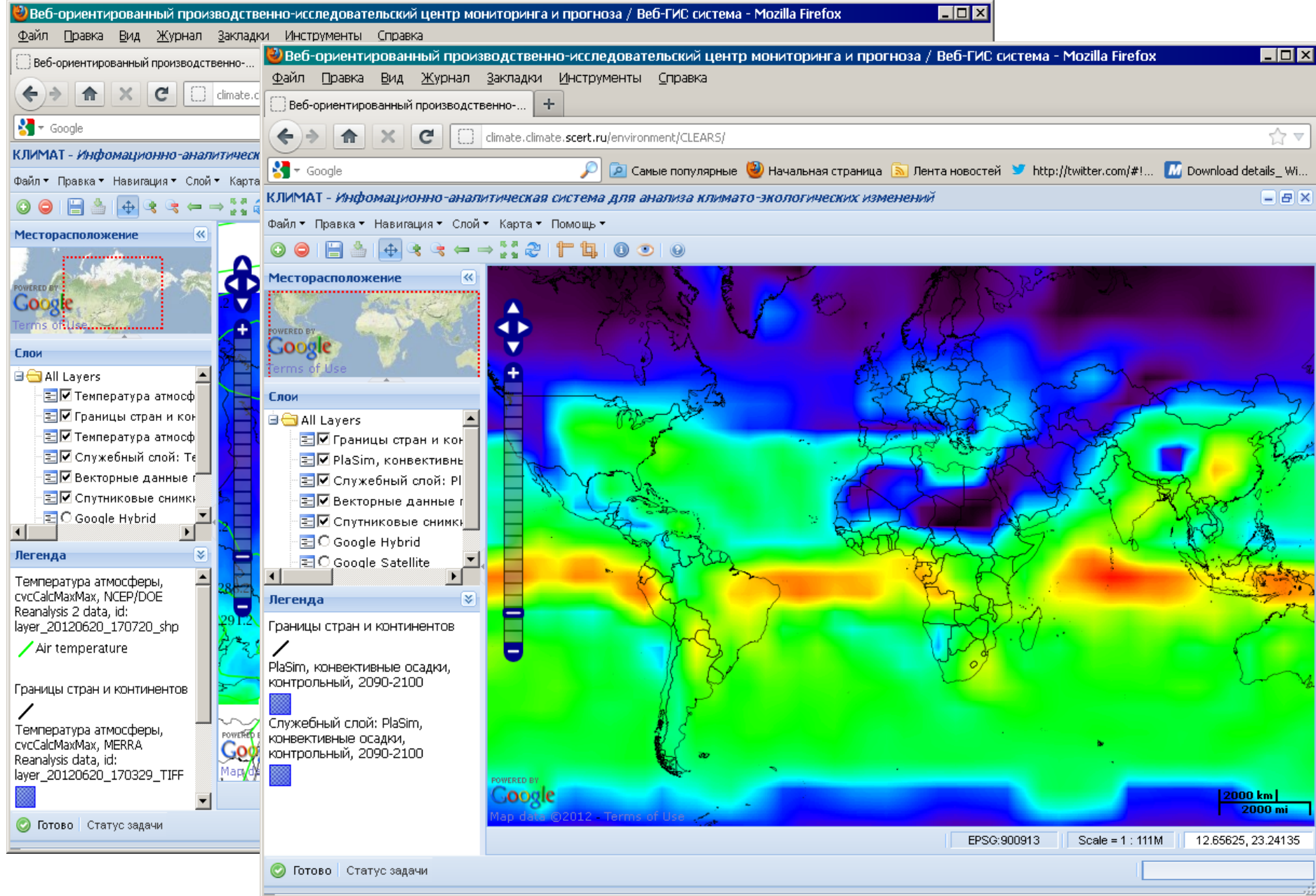
Название набора данных	Организация	Временной период	Разрешение данных
NCEP/NCAR Reanalysis	NCEP/NCAR	1951 – 2001	2.5 2.5 17 в. ур. давления
NCEP/DOE AMIP II Reanalysis	NCEP/DOE	1979 – 2003	2.5 2.5 17 в. ур. давления
ERA-40 Reanalysis	ECMWF	1957 – 2004	2.5 2.5 23 в. ур. давления
JRA-25 Reanalysis	JMA/CRIEPI	1979 – 2009	2.5 2.5 ; 23 в. ур. давления
NOAA-CIRES 20th Century Global Reanalysis	NOAA/OAR/ESRL PSD	1908 – 1958	2.0 2.0 ; 24 в. ур. давления
APHRODITE Reanalysis	RIHN-MRI/JMA	1951 - 2007	0.25 0.25 ; поверхность
Merra Reanalysis	ECMWF	1979 - 2000	0.67 0.5 ; 42 ур. давл.
GPCC Reanalysis	GPCC	1901 - 2009	0.5 0.5 ;
INM CM4 dataset	INM RAS	1950 - 2005	2.0 1.5 ; 8 ур.
PlaSim dataset	IMCES SB RAS	2000 - 2100	2.5 2.5
9092c Synoptic Network	RIHMI-WDC/ NOAA CNDC	~ 1900 – 2000	83 метеостанций Сибири

№	Тип обработки, которую предоставляет соответствующий модуль
1	Вычисление среднего значения метеовеличины по времени
2	Вычисление среднеквадратического отклонения метеовеличины
3	Вычисление коэффициента асимметрии
4	Вычисление коэффициента эксцесса
5	Вычисление абсолютного максимума метеовеличины
6	Вычисление абсолютного минимума метеовеличины
7	Вычисление размаха значений метеовеличины
8	Определение числа морозных дней
9	Определения числа теплых дней
10	Определения числа дней с заморозками
11	Определение числа тропических ночей
12	Определение продолжительности вегетационного периода
13	Вычисление суммы эффективных температур
14	Расчет индекса интенсивности осадков
15	Расчет числа дней с осадками выше заданных границ
16	Определения максимальной продолжительности периода без осадков
17	Определение максимальной продолжительности периода с осадками
18	Расчет гидротермического коэффициента Селянинова
19	Расчет значений линейного тренда
20	Расчет значений коэффициента корреляции

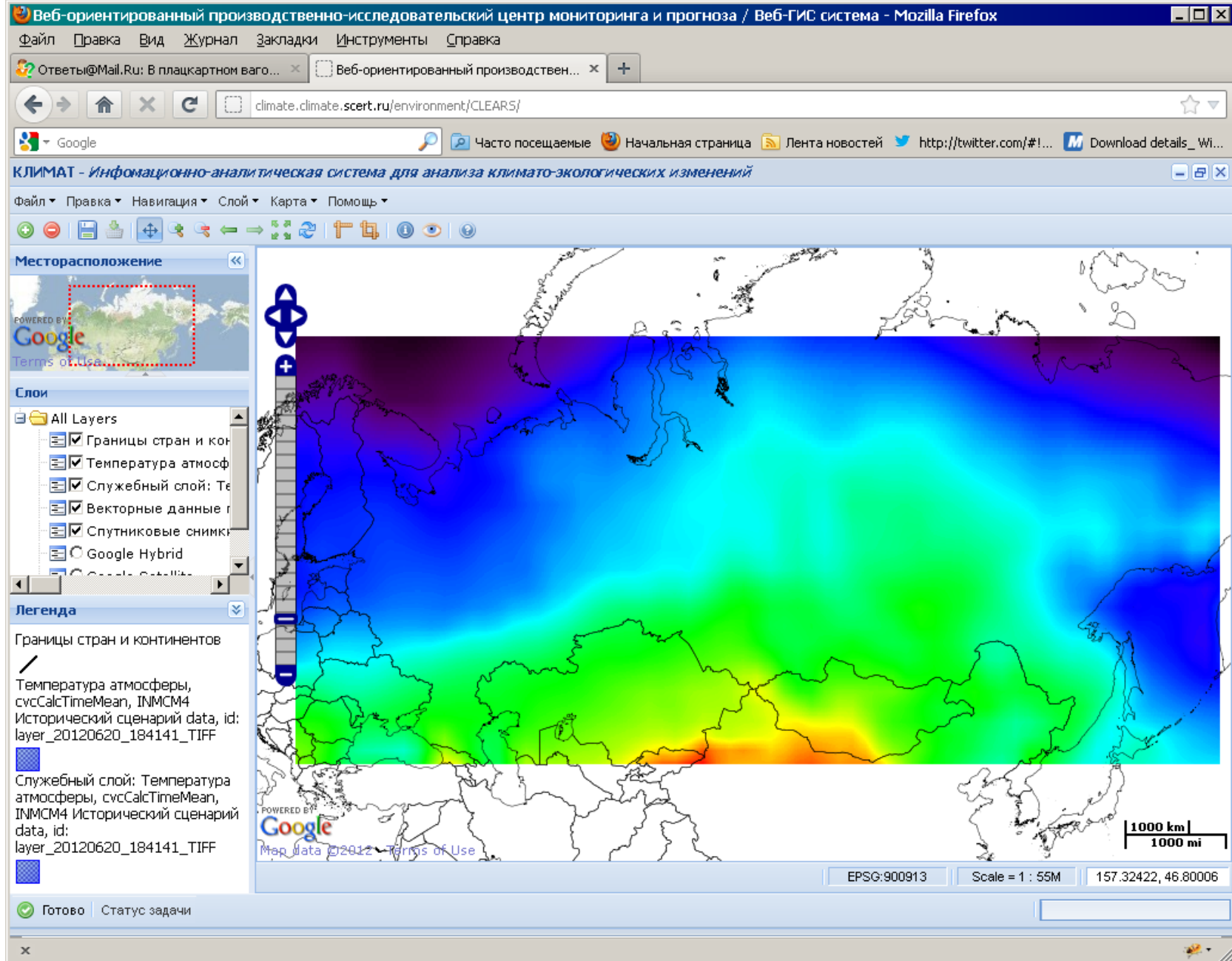




**Данные Merra, максимальная температура, 850mb, июнь 1990, растр
NCEP2, контур**



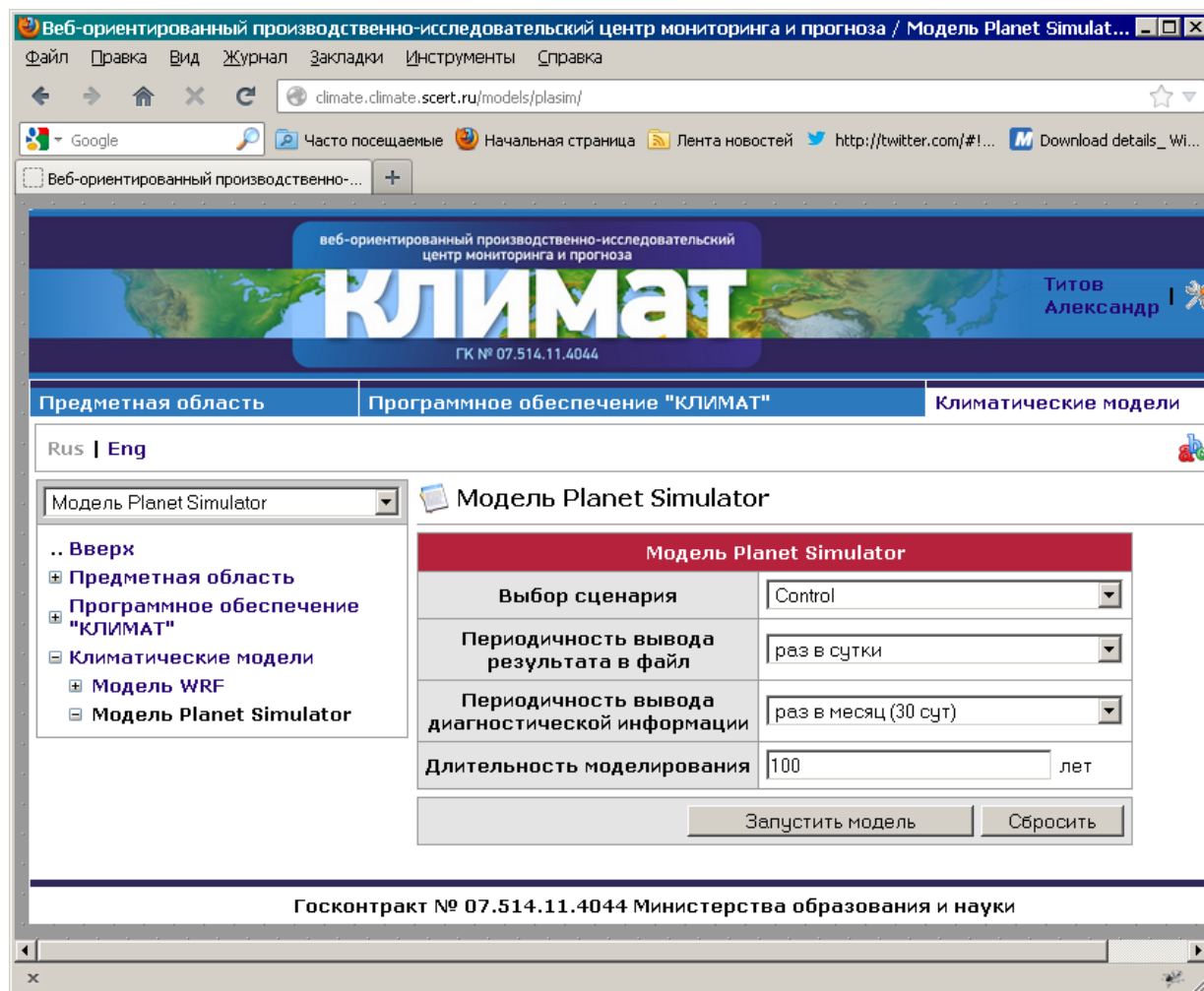
Данные PlaSim, конвективные осадки, 2090 - 2100, растр



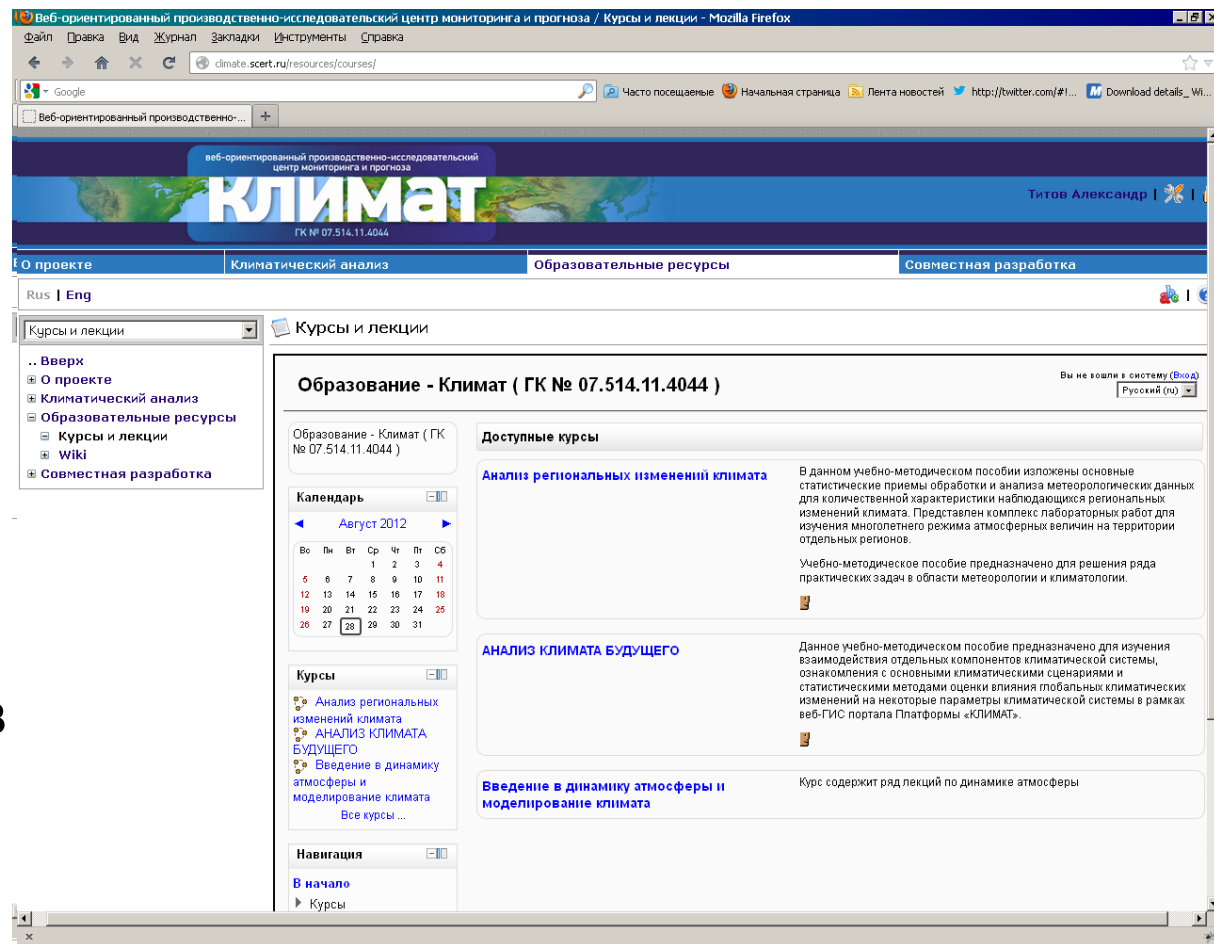
Данные ИВМ РАН, температура, июнь 2000, растр

■ Выполнение вычислений для выбранного набора значений концентрации углекислого газа для периода с 2000 по 2100 годы

■ Сохранение результатов в распределенном архиве



- Wordpress
- Wiki
- Subversion
- Moodle
- Создание блогов и групп пользователей
- Форумы
- Публикация ресурсов
- Совместная разработка
- Образовательные курсы



- Экспериментальный образец программно-аппаратной платформы «Климат» обеспечивает информационно-вычислительную поддержку исследований изменений регионального климата, объединяя современные концепции Web 2.0 и возможности доступа к климатическим моделям, большим наборам геофизических данных, средствам визуализации, совместной разработки приложений распределенными научными коллективами, а также организации обучения студентов и аспирантов.
- При этом обеспечивается доступ для конечного пользователя ко всем функциям платформы через веб-портал с использованием возможностей стандартного браузера, реализуя, в частности, возможность обработки пространственно-привязанных геофизических данных и визуализацию результатов расчетов с помощью Веб-ГИС технологий.



Спасибо за внимание!