



VEGA-GEOGLAM

web-based analysis of agriculture monitoring



SIGMA

Stimulating Innovation for
Global Monitoring of Agriculture



GEOGLAM

Global Agricultural Monitoring

VEGA-GEOGLAM service

User guide

Moscow – 2015

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List of acronyms

R&D - Research and Development

EO – Earth observation

HR – High resolution

MR - Moderate resolution

TC - Temporal composite images

NDVI - Normalized Difference Vegetation Index

SWVI – Short Wave Vegetation Index

NDSI - Normalized Difference Snow Index

SMAP - sequential maximum a posteriori estimation

Maxlik - maximum likelihood estimation

NCEP - National Center for Atmospheric Research

NOAA-AVHRR National Oceanic and Atmospheric Administration - Advanced Very High Resolution Radiometer

1. Introduction

The VEGA-GEOGLAM web-based analysis system is developed by the Russian Academy of Sciences Space Research Institute in framework of the EC FP7 SIGMA project.

The VEGA-GEOGLAM is aimed at providing tools for analysis of the Earth observation data, results of their processing and other related information with particular focus at SIGMA-JECAM test sites for agricultural monitoring focused R&D activities. The VEGA-GEOGLAM is implemented using the concept of geospatial information web-service gathering satellite and other geographic information from different sources and providing access to users worldwide.

The VEGA-GEOGLAM provides access to near-real-time updated MODIS and Landsat data archives, DEIMOS data and other geospatial information collected over SIGMA-JECAM test-sites. The service performs automated pre-processing of MODIS and Landsat satellite data with daily update.

The VEGA-GEOGLAM is focused at facilitating agricultural lands and crops state analysis using vegetation indices time-series based on its seasonal and multi-annual dynamics at user-specified polygons (objects).

This tool is hence mainly positioned towards the partners of the SIGMA project. However the VEGA-GEOGLAM service offers also access to this pre-processed data for a wider community.

2. Users registration

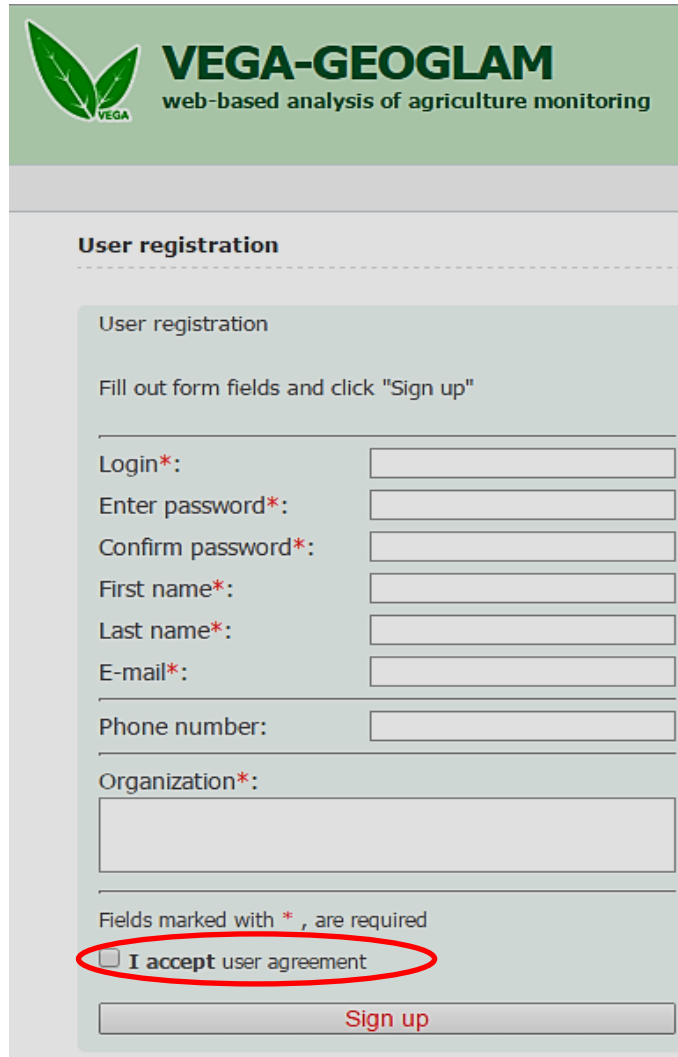
Accessing the VEGA-GEOGLAM a user has to agree to be bound by the terms of the User Agreement. A user has to fill a registration form and also read and accept the provisions of the User Agreement by clicking "I accept". Accepting the Agreement a user assumes the obligation:

- to provide his/her name, the organization and email address;
- to enter a login name and password;
- not to provide access to his/her account to other persons.

A user also agrees that VEGA-GEOGLAM will use his/her e-mail address for notifications.

Using the VEGA-GEOGLAM you agree to the terms of data collection, storage, use and transfer. The VEGA-GEOGLAM team respects the intellectual property rights of other persons. Therefore, we require that information did not violate the intellectual property rights and other rights of the third parties. When you enter any data to the VEGA-GEOGLAM other users can view, copy and use it in their work. You also have the ability to work with data entered by other users. If

you want to send us messages, you can do it through the website by e-mail:
vega_tech@smis.iki.rssi.ru



The image shows a web-based user registration form for VEGA-GEOGLAM. At the top, there is a green header with a logo of two leaves and the text "VEGA-GEOGLAM web-based analysis of agriculture monitoring". Below the header, the section is titled "User registration". Inside this section, there is a sub-header "User registration" and a instruction "Fill out form fields and click 'Sign up'". The form contains several input fields: "Login*", "Enter password*", "Confirm password*", "First name*", "Last name*", "E-mail*", "Phone number:", and "Organization*". Below these fields, there is a note "Fields marked with *, are required". At the bottom of the form, there is a checkbox labeled "I accept user agreement" which is circled in red, and a "Sign up" button.

VEGA-GEOGLAM
web-based analysis of agriculture monitoring

User registration

User registration

Fill out form fields and click "Sign up"

Login*:

Enter password*:

Confirm password*:

First name*:

Last name*:

E-mail*:

Phone number:

Organization*:

Fields marked with *, are required

☐ I accept user agreement

Sign up

The Agreement is signed for the period of the project EC FP7 SIGMA implementation, but may be terminated by the request. In case of termination, you lose the right to access and use of the VEGA GEOGLAM. The rights of other users to utilize data you entered before the termination are remaining in force.

3. The VEGA-GEOGLAM starting page

The screenshot shows the VEGA-GEOGLAM web interface. The browser address bar displays `vega.geoglam.ru`, which is circled in red. An arrow points from a text box labeled "The starting page address" to this address. The page header includes the VEGA-GEOGLAM logo and the text "web-based analysis of agriculture monitoring". Navigation links for Home, Data, Products, Tools, Download, and Contacts are present. Below these, a registration/login section is highlighted with a red circle, containing fields for "Username: demo" and "Password: ***", with an "Enter" button. An arrow points from a text box labeled "Login user name and password" to this section. On the left, a "Map interface" section contains a "SIGMA-JECAM test sites:" dropdown menu, which is also circled in red. An arrow points from a text box labeled "The SIGMA-JECAM test sites navigation tool to open map interface directly at the selected area of interest" to this dropdown. The dropdown menu lists various test sites: Antsirabe (Madagascar), Antonio Areco (Argentina), Belgium (France), Koumbia (Burkina Faso), West Shewa (Ethiopia), Kyiv (Ukraine), Para (Brazil), Sao Paulo (Brazil), Heilongjiang (China), Taishan (China), Shangdong (China), Stavropol (Russia), Rungwe (Tanzania), Fresno (USA), and Albacete (Spain). The main content area features a "Welcome to VEGA-GEOGLAM!" section with text about the system's development by the Russian Academy of Sciences Space Research Institute and its purpose for providing tools for Earth observation data analysis. It also mentions access to high-resolution data (Landsat, DEIMOS) and MODIS data. A "News" section on the right lists recent updates, including external testing by IKI and VITO, a new 30 m spatial resolution arable lands map for the JECAM test site in Stavropol Kray (Russia), and the implementation plan meeting hosted by RADI in Beijing.

← → ↻ vega.geoglam.ru The starting page address

VEGA-GEOGLAM
web-based analysis of agriculture monitoring

SIGMA **GEOGLAM**
Global Agricultural Monitoring

Home | Data | Products | Tools | Download | Contacts

Registration : Username: demo Password: *** Enter

Map interface

SIGMA-JECAM test sites:

Select the test-site

- Select the test-site
- Antsirabe (Madagascar)
- Antonio Areco (Argentina)
- Belgium (France)
- Koumbia (Burkina Faso)
- West Shewa (Ethiopia)
- Kyiv (Ukraine)
- Para (Brazil)
- Sao Paulo (Brazil)
- Heilongjiang (China)
- Taishan (China)
- Shangdong (China)
- Stavropol (Russia)
- Rungwe (Tanzania)
- Fresno (USA)
- Albacete (Spain)

Welcome to VEGA-GEOGLAM!

The VEGA-GEOGLAM web-based analysis system is developed by [Russian Academy of Sciences Space Research Institute](#) in framework of EC FP7 [SIGMA](#) project.

The VEGA-GEOGLAM is aimed at providing tools for analysis of the Earth observation data, results of their processing and other related information with particular focus at SIGMA-JECAM test sites for agricultural monitoring focused R&D activities. The VEGA-GEOGLAM is implemented using the concept of geospatial information web-service gathering satellite and other geographic information from different sources and providing access to users worldwide.

The VEGA-GEOGLAM is providing access to high-resolution (e.g. Landsat, DEIMOS) data over the [JECAM](#) sites, as well as to MODIS data along with various derived products. The VEGA-GEOGLAM provides access to near-real-time updated MODIS and Landsat data archives, DEIMOS data and other geospatial information collected over SIGMA-JECAM test-sites. The service performs automated pre-processing of MODIS and Landsat satellite data with daily update.

The VEGA-GEOGLAM is focused at facilitating agricultural lands and crops state analysis using vegetation indices time-series based on its seasonal and multi-annual dynamics at every single point or user-specified polygons (objects).

This tool is hence mainly positioned towards the partners of the SIGMA project. However the VEGA-GEOGLAM tool offers also access to this pre-processed data for a wider community. In particular the VEGA-GEOGLAM is used for analysis of satellite data for global monitoring of agricultural production and yield forecast in the framework of the [GEOGLAM Crop Monitor](#).

News

12/03/2015
IKI and VITO launched external testing of the VEGA-GEOGLAM service. The SIGMA-JECAM test sites responsible are invited to conduct the testing that is planned to be held during the two months until mid-May.

20/01/2015
A new **30 m** spatial resolution arable lands map for the JECAM test site in **Stavropol Kray (Russia)** has been developed based on the Landsat-8 data for year 2014. The developed arable lands map is incorporated into the VEGA-GEOGLAM service and available for users.

31/10/2014
[GEOGLAM](#) implementation plan meeting hosted by [RADI](#) took place in Beijing (China) October 20-22, 2014. Dr. Sergey Bartalev has represented Russian Academy of Sciences' Space Research Institute (IKI).

SIGMA annual progress meeting was held in Beijing, China October 22-25, 2014. The meeting aimed to review the results achieved by an international consortium during the first year of SIGMA project implementation. The meeting was hosted by the Institute of Remote Sensing and Digital Earth, [Chinese Academy of Sciences](#). Dr. Sergey Bartalev from Russian Academy of Sciences' Space Research Institute (IKI) presented the

The SIGMA-JECAM test sites navigation tool to open map interface directly at the selected area of interest

Login user name and password

4. The Earth observation and other data

The data to be provided through the VEGA-GEOGLAM facilities are summarized in the tables below:

EO sensor	Data	Time period covered and updating mode
MODIS	MOD09 standard product	2000 – ongoing, automatic daily download from NASA Land Processes Distributed Active Archive Center (LP DAAC) https://lpdaac.usgs.gov/about/citing_lp_daac_and_data
Landsat	Level 1T standard product	2008 – ongoing, a day of data became available, automatic download from U.S. Geological Survey (USGS) http://earthexplorer.usgs.gov/
DEIMOS	L1T orthorectified product	2010 - ongoing, download from DEIMOS as soon as data available

The MODIS and Landsat data are continuously updated over the SIGMA-JECAM test sites and entire Northern Eurasia region. The VEGA-GEOGLAM is potentially open to include other EO data, which can be provided by the SIGMA project partners and under their requests.

Data	Time period covered and updating frequency
Meteorological data (National Center for Atmospheric Research (NCEP) http://rda.ucar.edu/datasets/ds094.0/	2000 – ongoing, 4 times per day update
Field data provided by project partners for the SIGMA-JECAM test-sites	Follows data providing
National and sub-national information on agricultural statistics provided by project partners	Follows data providing

5. The EO data derived products

The data derived products, which are foreseeing to be provided through the VEGA-GEOGLAM facilities, are summarized in the tables below:

EO data product	Time period covered and updating frequency
MODIS NDVI cloud-free composites	2000 – ongoing, weekly
MODIS multi-channel image cloud-free composites ¹	2000 – ongoing, monthly
Landsat image cloud-free composites	2008 – ongoing, yearly for vegetation season
DEIMOS data derived NDVI images ²	2010 – ongoing

EO data derived thematic product	Time period covered and updating frequency
MODIS data derived arable lands, winter crops and fallow lands masks ³	2000 – ongoing, annually
MODIS NDVI seasonal anomalies for agricultural lands and crops ⁴	2000 – ongoing, weekly

The VEGA-GEOGLAM will include global and regional EO data derived products, which are foreseeing to be developed within the SIGMA project, as well as the SIGMA-JECAM test-sites available thematic maps, which can be provided by the SIGMA project partners and under their requests.

¹ Available for test sites in Russia, Ukraine and China.

² In progress.

³ Limited to the Russian Federation with possible extension to other regions if suitable.

⁴ Aggregated at the level of administrative districts, limited to the Russian Federation with possible extension to other regions if suitable.

6. The main elements of the map interface

Data **Toolbar** **Map window**

Tabs

Data filter

Data list

Products list

☒ High resolution data

Date from **2015-01-01** to **2015-04-07** ☐ - only this date

Filter

Data list

Scenes 1-10, all ~ 17

<input type="radio"/>	2015-03-16 07:41:22	ETM+ (Landsat 7)*	IKI RAS
<input type="radio"/>	2015-03-16 07:40:58	ETM+ (Landsat 7)*	IKI RAS
<input checked="" type="radio"/>	2015-02-27 07:49:33	OLI-TIRS (Landsat 8)*	IKI RAS
<input type="radio"/>	2015-02-24 08:05:56	ETM+ (Landsat 7)*	IKI RAS
<input type="radio"/>	2015-02-24 08:05:32	ETM+ (Landsat 7)*	IKI RAS
<input type="radio"/>	2015-02-18 07:54:34	OLI-TIRS (Landsat 8)*	IKI RAS
<input type="radio"/>	2015-02-05 07:35:18	ETM+ (Landsat 7)*	IKI RAS
<input type="radio"/>	2015-02-02 07:55:54	OLI-TIRS (Landsat 8)*	IKI RAS
<input type="radio"/>	2015-01-25 07:54:09	ETM+ (Landsat 7)*	IKI RAS
<input type="radio"/>	2015-01-24 08:01:41	OLI-TIRS (Landsat 8)*	IKI RAS

Prev page To the basket
Next page Unselect

Products ☐ Product autonormalization

Basic colour composite (all satellites)

Area coverage:

- ☒ Do not display
- ☐ Scenes' boundaries
- ☐ Images

Stavropol

RUSSIA

Cherkessk

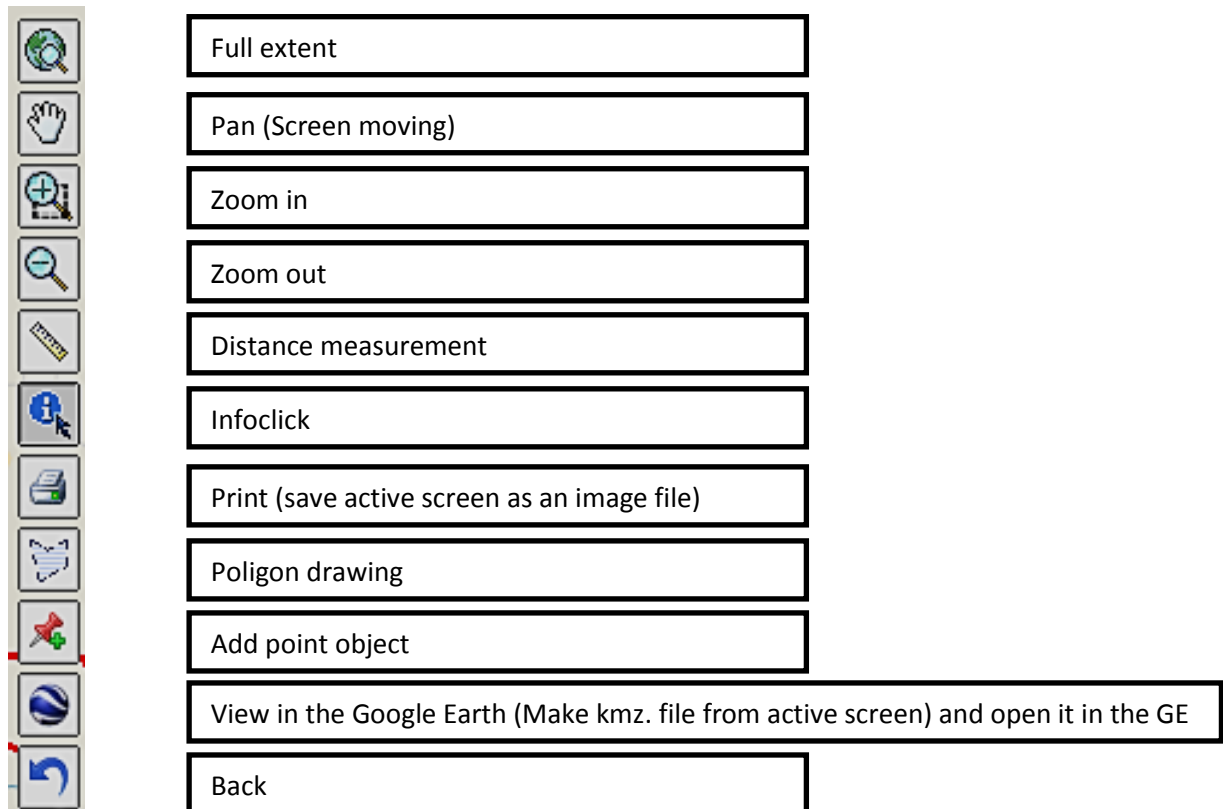
Naltchik

GEORGIA

Vladikavkaz

VEGA

7. Toolbar description



8. Group of the Tabs - Satellite data - This part of the VEGA-GEOGLAM interface provide access to integrated archive of satellite images acquired by different instruments. A user can work with data online or download data to user's desktop computer. Interface provides access to data of the following satellite instruments: NOAA-AVHRR, MODIS-Terra/Aqua, Meteor-M1, Kanopus, Landsat, Deimos and some others. Satellite data are available for the period from 1984 up to now.

Group of the Tabs - Satellite data consists of three parts: **High resolution (HR)**, **Moderate resolution (MR)**, **Temporal composite images (TC)**.



8.1 High resolution data include images from following satellite systems:

- Landsat 4, 5, 7, 8
- Kanopus-B
- METEOR-M1-KMSS
- Kanopus-PSS, Kanopus-MSS (Roskosmos)
- Deimos

Note: Using the **HR data tab** we recommend to switch off **MR data** and **TC** tabs.

The screenshot shows a software interface for satellite data selection. Red circles and arrows highlight specific features, which are detailed in the following callouts:

- Tab – Satellite data**: Points to the satellite icon in the top toolbar.
- SubTab – High resolution data**: Points to the high-resolution data icon in the top toolbar.
- Date Selection**: Points to the date range selection fields (from 2015-01-01 to 2015-03-23).
- Data filter – satellite instrument selection**: Points to the 'Filter' button and the 'Filter' dialog box, which lists various satellite instruments like OLI-TIRS, ETM+, TM, KMSS, MSS, PSS, Hyperion, and Deimos.
- Data list box – all available data for selected period**: Points to the list of satellite scenes, with one entry (2015-02-27 07:49:33 OLI-TIRS (Landsat 8)* IKI RAS) circled in red.
- Selected image pointer**: Points to the red circle around the selected scene in the data list.
- Button To the basket**: Points to the 'To the basket' button in the data list controls.
- Autonormalization checkbox**: Points to the 'Product autonormalization' checkbox.
- Droplist of the available products**: Points to the dropdown menu showing various product types, with 'Colour composite TM3-TM4-TM5' selected.
- Mode of the image displaying**: Points to the 'Area coverage' section, which includes options like 'Do not display', 'Scenes' boundaries', and 'Images'.

8.2 Moderate resolution data archive of images acquired by the NOAA-AVHRR, MODIS-Terra/Aqua, MSU-MR and NPP satellite instruments are accessible via this tab.

Note: Using **the MR data tab** we recommend to switch off **HR data** and **TC** tabs.

The screenshot shows the 'Moderate resolution data' interface. Annotations include:

- Tab – Satellite data**: Points to the satellite icon in the top toolbar.
- SubTab – Moderate resolution**: Points to the 'Moderate resolution data' subtab.
- Date Selection**: Points to the date input field showing '2015-04-09'.
- Use AOI (polygon) to select images**: Points to the 'Use polygon' checkbox.
- Select satellite TERRA or AQUA**: Points to the 'Satellite' section with 'TERRA' and 'AQUA' checkboxes.
- Button To the basket**: Points to the 'To the basket' button at the bottom right.
- Data list box – all available data for the selected period**: Points to the 'Data list' section.
- Selected image pointer**: Points to the first entry in the data list: '2015-04-09 22:30:00 AQUA (LANCE)'.
- Button To the basket**: Points to the 'To the basket' button at the bottom right.
- Available data products**: Points to the 'Products for selected image' dropdown menu, which is expanded to show a list of products including 'Channel 3.7 mkm (20 MODIS channel)'.

Data list

Found seances: 10

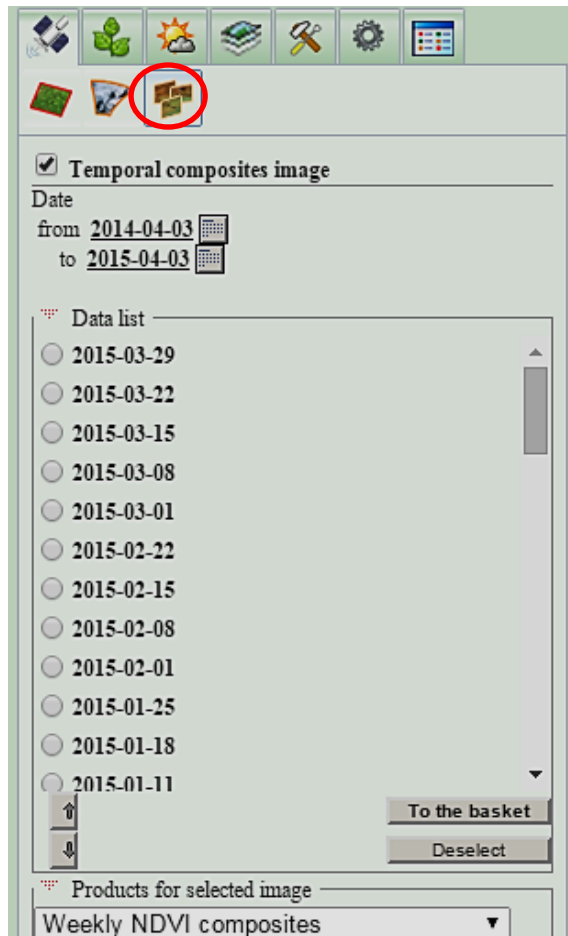
Selected	Date	Satellite	Center
<input checked="" type="radio"/>	2015-04-09 22:30:00	AQUA	(LANCE)
<input type="radio"/>	2015-04-09 22:25:00	AQUA	(LANCE)
<input type="radio"/>	2015-04-09 19:55:00	TERRA	(LANCE)
<input type="radio"/>	2015-04-09 18:15:00	TERRA	(LANCE)
<input type="radio"/>	2015-04-09 10:30:00	AQUA	(LANCE)
<input type="radio"/>	2015-04-09 08:55:00	AQUA	(LANCE)
<input type="radio"/>	2015-04-09 08:50:00	TERRA	(LANCE)
<input type="radio"/>	2015-04-09 08:50:00	AQUA	(LANCE)
<input type="radio"/>	2015-04-09 08:45:00	TERRA	(LANCE)
<input type="radio"/>	2015-04-09 07:10:00	TERRA	(LANCE)

Products for selected image

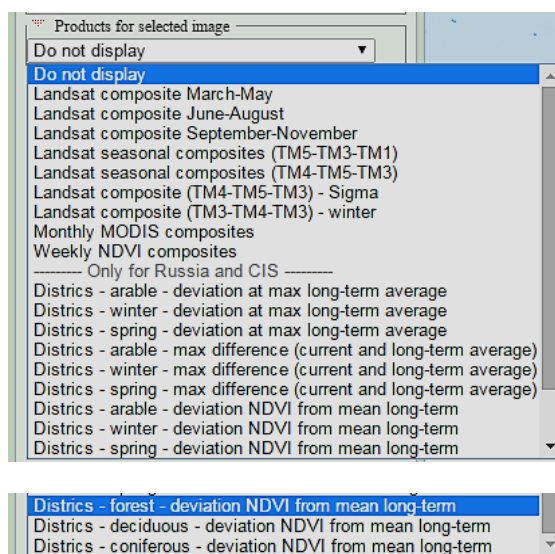
- Channel 3.7 mkm (20 MODIS channel)
- Do not display
- Image boundaries
- Surface
- Snow and clouds
- Snow and ice
- NDVI
- Infrared image (channel 11 mkm MODIS)
- Albedo 3.7 mkm channel (20 MODIS channel)
- Channel 0.65 mkm (1 MODIS channel)
- Channel 0.86 mkm (2 MODIS channel)
- Channel 0.47 mkm (3 MODIS channel)
- Channel 1.24 mkm (5 MODIS channel)
- Channel 2.13 mkm (7 MODIS channel)
- Channel 3.7 mkm (20 MODIS channel)**
- Channel 12 mkm (32 MODIS channel)

8.3 Temporal composite images - enhancement multi-temporal (seasonal) cloud free composite images. The map interface provides access to Landsat and MODIS data derived composite images along with MODIS derived NDVI composite images.

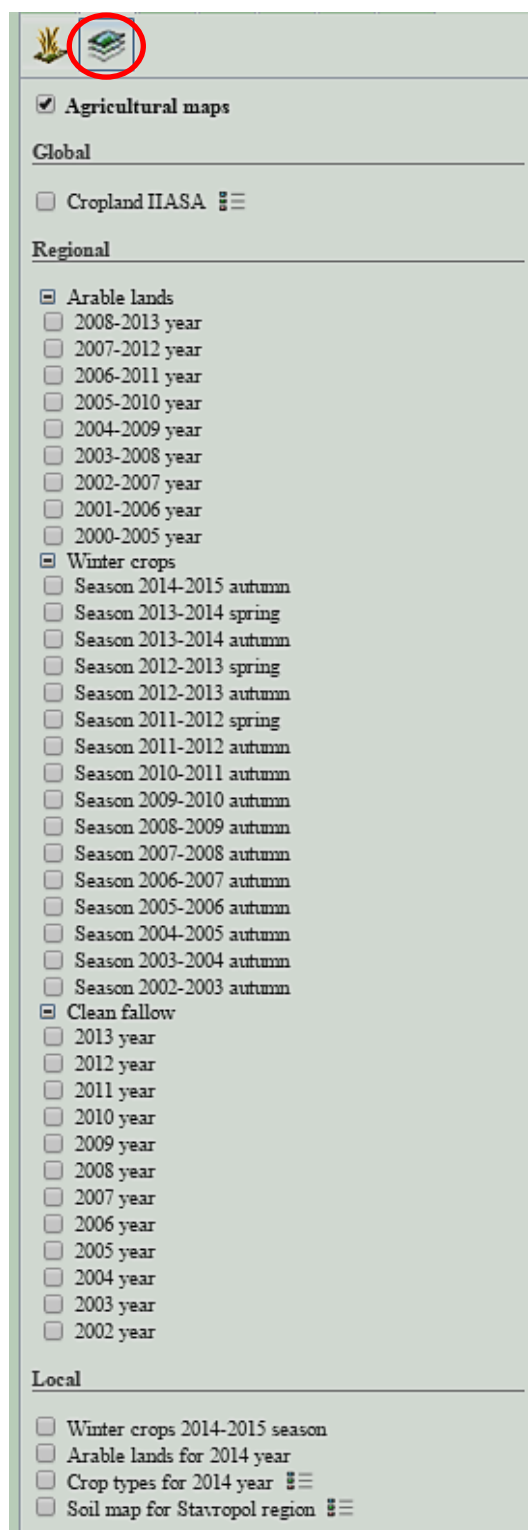
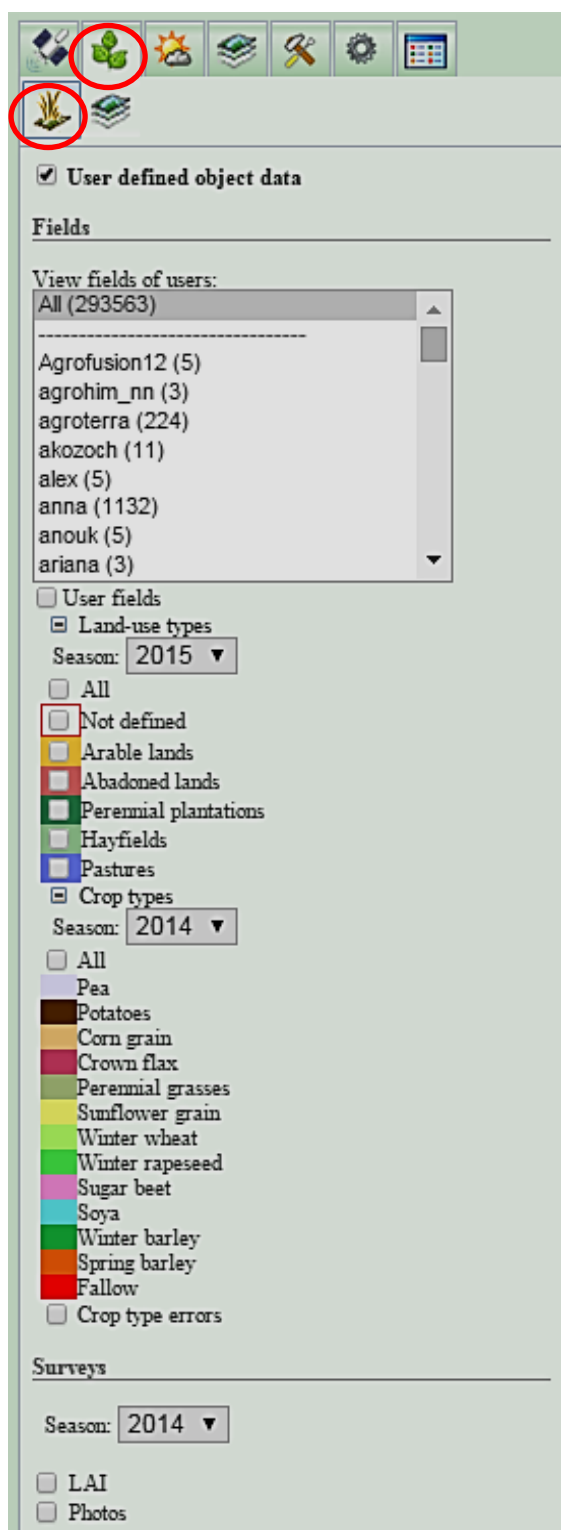
Note: Using **TC data products tab** we recommend to switch off **HR** and **MR data** tabs.



The list of available composite images



9. Group of the Tabs - Agricultural data provides access to the data on agriculture lands and crops. The subTab **User defined object data** allows visualising objects boundaries (polygons) and corresponding land-use and crop types maps based on objects' related attributes. The land-use maps legend consist of 6 classes, such as arable lands, abandoned lands, perennial plantations, hayfields and pasture. This object creation and editing procedure described in the **Polygon drawing** section of this User Guide (section 16, page 24). The subTab **Agriculture maps** provides access to the set of annually updated maps, such as: arable lands, winter crops, clean fallow.



10. Meteo data Tab provides access to actual and historical weather data, such as air temperature, wind speed, atmospheric pressure, cloud cover, soil humidity and temperature (at different deep levels) and some others.

The screenshot shows the 'Meteo data' tab in a software interface. The interface includes a toolbar at the top with various icons. The 'Meteo data' section is active, showing options for date and time selection, geographical area selection, and various meteorological data parameters. Red circles highlight specific elements: the weather icon in the toolbar, the date and time selection fields, the 'Global data' radio button, the 'Wind' checkbox, and the 'Isolines' dropdown menu. Arrows point from these elements to labels on the right. A list of available data parameters is shown at the bottom, with 'Soil humidity (10 cm below ground)' and 'Snow cover, %' highlighted in blue.

Meteo data Tab

Date/Time selection

Geographical Area Of

Wind speed and direction

Isolines of different meteo characteristics to be mapped

Do not display
Temperature, °C
Maximum temperature, °C
Minimum temperature, °C
Relative humidity, %
Pressure, mbar
Total cloud cover, %
Accumulated precipitation, kg/m²
Downward longwave radiation, W/m²
Upward longwave radiation, W/m²
Downward shortwave radiation, W/m²
Upward shortwave radiation, W/m²
Soil humidity (10 cm below ground)
Soil humidity (40 cm below ground)
Soil humidity (100 cm below ground)
Soil humidity (200 cm below ground)
Soil temperature (10 cm below ground)
Soil temperature (40 cm below ground)
Soil temperature (100 cm below ground)
Soil temperature (200 cm below ground)
Snow cover, %
Snow depth, m
Hydrothermal coefficient (per decade)
Hydrothermal coefficient (monthly)
Multiyear average daily maximum temperature, °C
Multiyear average daily minimum temperature, °C
Multiyear average daily average temperature, °C
Multiyear average precipitation, kg/m²
Multiyear average relative humidity, %
RHM: Hydrothermal coefficient (monthly)
RHM: Soil moisture in 0-20 cm (per decade), mm
RHM: Soil moisture in 0-100 cm (per decade), mm

11. Group of the Tabs - Basic maps – consists of two subtabs: **Base maps** and **Land cover maps**.

11.1 Base maps it is a very basic cartographic vector layers to be mapped using the interface along with the Sigma-JECAM test-sites limits.

11.2 Land cover maps – annually (from year 2000) updated MODIS derived maps with the legend of 21 land cover classes



12. Group of the Tabs - Data Analysis - this interface part provides various tools with focus on following functions: (1) Image color enhancement, (2) Image Classification and (3) Image Algebra (mathematical operations with images). The rest tools in the tab serve as auxiliary ones. The **Data Analysis** Tab functions meanings are illustrated below.



Tab – Data Analysis



Basket - making images available for further analysis and processing



Image color enhancement – visual image improvement based on multi-channel (multi-spectral or multi-temporal or multi-sensor) colour RGB compositing and histograms transforming



Point objects collection of the signatures for classification. Access to spectral or temporal profiles at the points



Classifications - thematic classification of raster images



Image algebra - mathematical operations with images



Bands selection should be done before any classification

12.1 Basket. This tool allows making images available for further analysis and processing. This tab requires describing in linkages with Group of the Tabs - **Satellite data**. Any type of the images from the **Satellite data Tabs** (High Resolution, Moderate Resolution or Temporal Composite images) could be made available for analysis and processing by their selection and use **To the basket** button. The data selected appear in the tab **Basket**, described below.

The screenshot shows the 'Satellite Data Tab' interface. Annotations with arrows point to various elements:

- Satellite Data Tab**: Points to the top toolbar area.
- High resolution data - Moderate resolution data – Temporal Composite images SubTabs**: Points to the sub-tab icons below the toolbar.
- Date Selection**: Points to the 'Date from' and 'to' fields.
- Data filter – satellite system selection**: Points to the 'Filter' button and the 'Filter' dialog box.
- Data list box – all available data for the selected period**: Points to the list of satellite scenes.
- Selected image pointer**: Points to a specific scene in the data list.
- To the basket Button**: Points to the 'To the basket' button.
- Autonormalization checkbox**: Points to the 'Product autonormalization' checkbox.
- Droplist of the available products**: Points to the 'Products' dropdown menu.
- Mode of the images displaying**: Points to the 'Area coverage' radio buttons.

Filter dialog box details:

- Devices (satellites)**:
 - ☒ OLI-TIRS,OLI (Landsat 8)
 - ☒ ETM+ (Landsat 7)
 - ☐ TM (Landsat 4,5)
 - ☐ KMSS-101,102 (Meteor-M 1,2)
 - ☐ KMSS-50 (Meteor-M1,2)
 - ☒ MSS (Canopus-V, BKA)
 - ☒ PSS (Canopus-V, BKA)
 - ☐ Hyperion (EO-1)
 - ☐ Deimos
 - ☐ Other devices (satellites)
- ☐ Data centers
- ☐ Only corrected data
- ☐ Only in the specified polygon
- ☒ Cloud max 10 %

Products dropdown menu details:

- Colour composite TM3-TM4-TM5
- Do not display
- Scenes' boundaries
- Basic colour composite (all satellites)
- Enhanced image
- Colour composite TM3-TM4-TM5** (selected)
- Panchromatic image
- Clouds (Landsat)
- NDVI
- Ice situation (Landsat)
- Smoke (Landsat)

Basket – in this tab user could have available data that have been selected before (either individual images or temporal composites)

The screenshot shows the 'Basket' sub-tab in a software interface. At the top, a toolbar contains various icons, with a shopping cart icon circled in red. Below the toolbar, the 'Basket' section is titled 'Selected data:' and contains a list of two items: 'Landsat seasonal composites (TM4-TM5-TM3) 2013-09-30 00:00:00' and '2015-02-18 07:54:34 LANDSAT 8 (USGS) Image'. Each item has a checkbox and a close button (X). Below the list, there are buttons for 'Animation' and 'List mode', with 'List mode' selected. A 'Sort by date' checkbox is also present. A group of buttons is highlighted with a red box: 'Select all', 'Unselect all', 'Show entire list', 'Show selected list', 'Save data list to the file', 'Load data list from the file', 'Clear the basket', and 'Order data'. Below this, the 'Comparison Tools' section is circled in red, featuring a 'Swipe' control with a play button and a 'Transparency' slider. A 'Reset to source state' button is at the bottom.

Basket SubTab
Data available for the analysis and processing
Data removing button

Automatic images animation
List mode
Images selection
Show list of images in the interface
Save/Load selected data to/from the list (txt. file)
Order data for downloading
Clear basket – removing all data from basket

Comparison Tools – swipe and transparency
Reset all settings in the comparison tools

12.2 Image color enhancement - a set of tools that allows following options:

- RGB colour compositing of multi-spectral, multi-temporal or multi-sensor satellite images;
- Transformation of image histograms to facilitate visual interpretation

Data Analysis Tab

Image color enhancement SubTab

Switch Tab

Mode selection (RGB or Monochrome)

Band selection (*inside* Image color enhancement tab). It is possible to choose the same or different images in the bands R, G, B. After selection it is necessary to push **Apply combination** button.

Range of values for the 16-bit data in each channel. Option appear only for unsigned integer 16-bit data

Brightness / contrast scales

Image histogram scales

Image histogram stretching

1) By area of the histogram (80%,90%,95%,98%,100%)

2) By RMS error (1σ , 1.5σ , 2σ , 2.5σ , 3σ)

3) Equalization - Histogram equalization is a technique for adjusting image intensities to enhance contrast.

12.3 Point objects. This option provides possibility for signature collection to perform supervised classification. It is possible to use option **create by map** or make it manually by adding new groups of points.

It allows to the user to mark objects and to add comments. Points could be grouped together to groups (classes).

The tab is divided into the following areas: options to collect points and tool to work with the current set of points.

The screenshot shows the 'Point objects' SubTab interface. It includes a toolbar with a location pin icon, a 'Point objects' checkbox, 'Parameters of tab' section with 'Labels' and 'Info on map' checkboxes, an 'Additional' section with 'Export to file', 'Graphics for all groups', and 'Create from map by' dropdown. Below is a list of groups with columns for name, count, and icons for temporal/spectral profiles, visibility, and removal. An 'Add new group' button is at the bottom.

Point objects SubTab

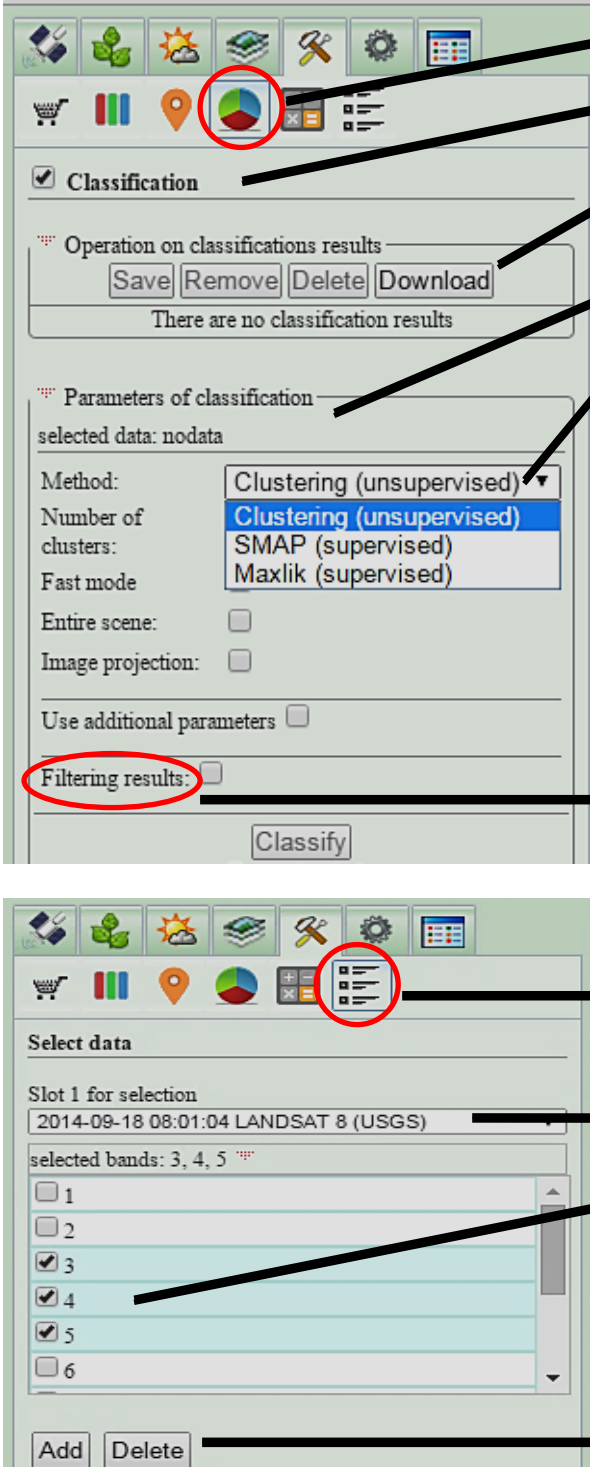
- Labels – show points labels (numeric)
- Info on map – switching info about labels (of the points) on the map
- Export list of points to the csv. file
- Graphics for all groups – classes' temporal or spectral profiles
- Create by map – collect point from land cover map
- Save/Clean/Delete/Download – list of points on server. Name of current kit - number of kit
- Group (class) and number of objects in a group (class)
- Temporal and spectral profiles for the points in the group (class)
- Group visibility
- Group removing
- Adding new group (class)

Add new group tool

- Name of the group (class)
- Description (comments)
- Color selection
- Adding and Cancel buttons

12.4 Classification and Bands Selection Tabs - thematic interpretation of the multi-band raster images. The classification methods available in the interface are based on the open source GRASS modules. There are three different methods of the classification in the web-interface:

- 1) Clustering (unsupervised)
- 2) SMAP (supervised)
- 3) Maxlik (supervised)



Classification SubTab

Switch tab – Classification

Save/Clear/ Delete/Download results of the previous classification on the server

Parameters of the classification drop list

Methods of the classification

Fast mode - Classification of quicklook image

Filtering results methods. Filtering window shape (square by default) and size (3-21 pix) selection.

Filtering results: ☒

Methods: mode

Window size: average

Circular window: median

mode

minimum

maximum

range

stddev

sum

variance

diversity

interspersions

• Select bands for selection" (or t

• Unsupervised bands

Bands selection Tab – this step should be done before any type of classification

Image selection drop list

Bands selection check box

Add/Delete new image slot buttons

Parameters of classification

selected data: nodata

Method: Clustering (unsupervised) ▼

Number of clusters: 5 ▼

Fast mode ☐

Entire scene: ☐

Image projection: ☐

Use additional parameters ☐

Filtering results: ☐

Classify

Clustering - unsupervised classification

Preprocessing – Generates spectral signatures for land cover types in an image using a clustering algorithm
(i.cluster - method description
<http://grass.osgeo.org/grass64/manuals/i.cluster.html>)

Classification – Classifies the cell spectral reflectances in imagery data. Classification is based on the spectral signature information generated by either *i.cluster*,
(i.maxlik - method description
<http://grass.osgeo.org/grass64/manuals/i.maxlik.html>)

Parameters of classification

selected data: nodata

Method: SMAP (supervised) ▼

Fast mode ☐

Entire scene: ☐

Image projection: ☐

Use additional parameters ☐

Filtering results: ☐

Classify

SMAP Performs contextual (image segmentation) image classification using sequential maximum a posteriori (SMAP) estimation.

Preprocessing - (using training maps) - Generate statistics for *i.smap* from raster map layer.
(i.gensigset - method description
<http://grass.osgeo.org/grass64/manuals/i.gensigset.html>)

Classification - Performs contextual (image segmentation) image classification using sequential maximum a posteriori (SMAP) estimation.
(i.smap - method description
<http://grass.osgeo.org/grass64/manuals/i.smap.html>)

Parameters of classification

selected data: nodata

Method: Maxlik (supervised) ▼

Fast mode ☐

Entire scene: ☐

Image projection: ☐

Use additional parameters ☐

Filtering results: ☐

To classify the entire screen

Classify

Maxlik – (SMAP flag m) Performs contextual (image segmentation) image classification using sequential maximum a posteriori (SMAP) estimation.

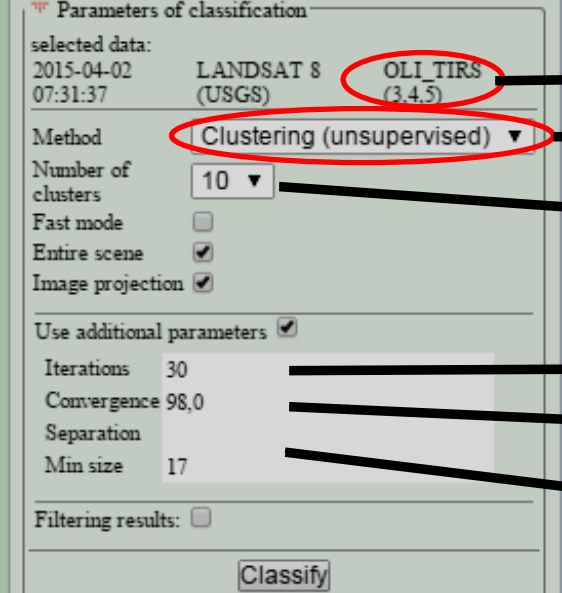
Preprocessing - (using training maps) - Generate statistics for *i.smap* from raster map layer.
(i.gensigset - method description
<http://grass.osgeo.org/grass64/manuals/i.gensigset.html>)

Classification - Performs contextual (image segmentation) image classification using sequential maximum a posteriori (SMAP) estimation.
(i.smap - method description
<http://grass.osgeo.org/grass64/manuals/i.smap.html>)

Flag m - Use maximum likelihood estimation (instead of smap)

12.4.1 Unsupervised classification

Grass module [i.cluster](#) - Generates spectral signatures for land cover types in an image using a clustering algorithm <http://grass.osgeo.org/grass64/manuals/i.cluster.html>

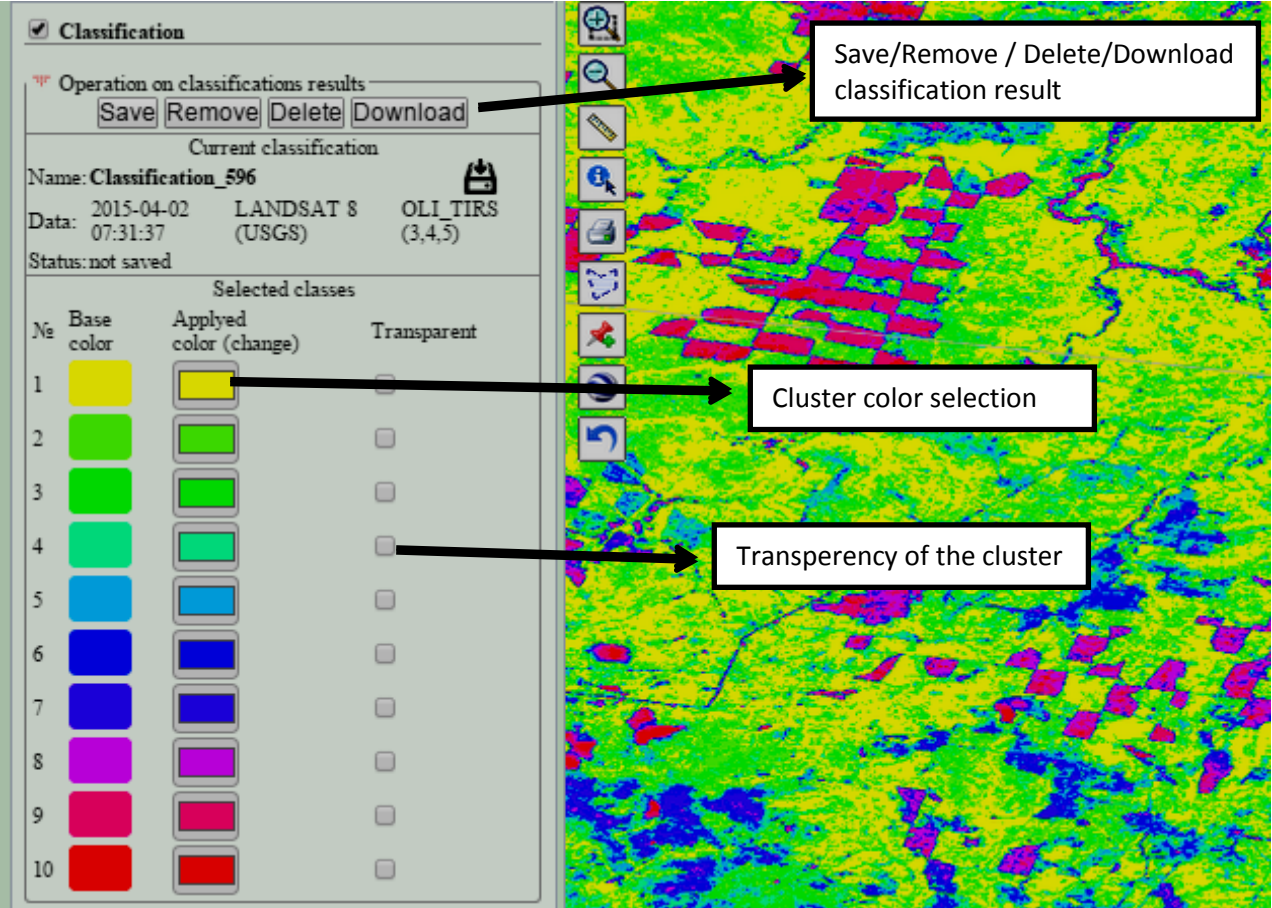


The dialog box 'Parameters of classification' contains the following settings:

- selected data: 2015-04-02 07:31:37 LANDSAT 8 (USGS) OLI_TIRS (3,4,5)
- Method: Clustering (unsupervised)
- Number of clusters: 10
- Fast mode: ☐
- Entire scene: ☒
- Image projection: ☒
- Use additional parameters: ☒
- Iterations: 30
- Convergence: 98,0
- Separation: 0
- Min size: 17
- Filtering results: ☐
- Classify button

Annotations with arrows point to the following elements:

- Selected bands of image (points to OLI_TIRS (3,4,5))
- Classification method (points to Clustering (unsupervised))
- Number of clusters (max. 20) (points to 10)
- Number of iterations (points to 30)
- Convergence (0-100%) (by default - 98.0) (points to 98,0)
- Cluster separation (by default - 0) (points to 0)
- Minimum number of pixels in a class (points to 17)



The 'Classification' dialog box shows the following information:

- Operation on classifications results: Save Remove Delete Download
- Current classification: Name: Classification_596
- Data: 2015-04-02 07:31:37 LANDSAT 8 (USGS) OLI_TIRS (3,4,5)
- Status: not saved
- Selected classes table:

Nº	Base color	Applied color (change)	Transparent
1	Yellow	Yellow	<input type="checkbox"/>
2	Light Green	Light Green	<input type="checkbox"/>
3	Green	Green	<input type="checkbox"/>
4	Light Blue	Light Blue	<input type="checkbox"/>
5	Blue	Blue	<input type="checkbox"/>
6	Dark Blue	Dark Blue	<input type="checkbox"/>
7	Dark Blue	Dark Blue	<input type="checkbox"/>
8	Magenta	Magenta	<input type="checkbox"/>
9	Pink	Pink	<input type="checkbox"/>
10	Red	Red	<input type="checkbox"/>

Annotations with arrows point to the following elements:

- Save/Remove / Delete/Download classification result (points to the buttons)
- Cluster color selection (points to the 'Applied color (change)' column)
- Transparency of the cluster (points to the 'Transparent' column)

The map on the right shows the classified land cover with various colors and patterns.

12.4.2 Supervised SMAP and Maxlik classifications

An image supervised classification methods requires collection of points (signatures) (see 12.3 Points collection). Then users have to select one of the supervised methods SMAP or Maxlik. The tools for both supervised classification methods are similar. The SMAP method tools are discribed below.

No	Base color	Applied color (change)	Transparent
1			<input type="checkbox"/>
2			<input type="checkbox"/>
3			<input type="checkbox"/>
4			<input type="checkbox"/>
5			<input type="checkbox"/>
6			<input type="checkbox"/>
7			<input type="checkbox"/>
8			<input type="checkbox"/>

Parameters of classification

selected data:
2015-04-02 07:31:37 LANDSAT 8 (USGS) OLI_TIRS (3,4,5)

Method: SMAP (supervised) ▼

Fast mode: ☐

Entire scene: ☒

Image projection: ☒

Use additional parameters: ☒

Maxsig: 50

Blocksize: 1024

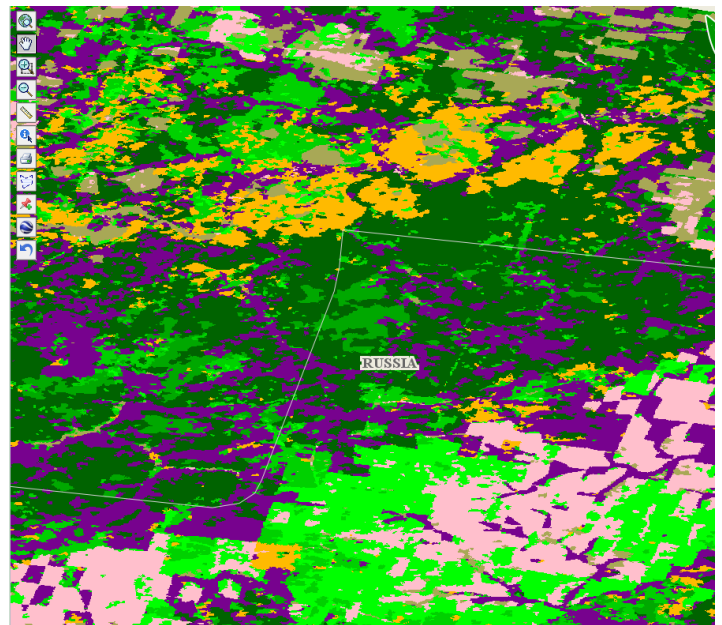
Filtering results: ☐

Classify

Selected bands (bands has to be selected in the special Tab)

Class color selection

Class transparency



Max number of signatures for the class

Block size to be processed

12.5 Image Algebra - this function allows mathematical operations with images or image bands. For example, this tool allows calculating spectral vegetation indexes (NDVI, SWVI, NDSI and etc) or performing other calculations between images' bands.

The screenshot shows the 'Image Algebra' tool interface. The top toolbar contains icons for various functions, with the 'Image Algebra' icon (a calculator) circled in red. Below the toolbar, the 'Images algebra' section is checked. The 'Work with results of calculations' section includes buttons for 'Save', 'Remove', 'Delete', and 'Download', which are also circled in red. The 'Current calculation' section shows a calculation named 'Calculations_462' with a status of 'saved'. The 'Parameters of calculation' section shows selected data for 'A.1' and 'A.2' as 'LANDSAT 8 OLI_TIRS (4)' and 'LANDSAT 8 OLI_TIRS (5)' respectively. The 'Calculation formula' section shows the formula 'float(A.2-A.1)/(A.1+A.2)' and a 'Create task' button. The 'Data type' is set to 'Automatically'.

Image Algebra SubTab

Bands selection Tab – this step should be done before any type of classification. See page 21.

Save/Clear/Delete/Download results of the calculation

Saving calculations results as GeoTIFF

Name of the calculation for the downloading from the server

Saving status check

A.1 – symbol of the band 4 (Landsat 8)

A.2 – symbol of the band 5 (Landsat 8)

All scene or part of it in the frame of screen

Data or interface projection

Data type – for ex.: Byte, Int 16, Float 32 etc.

A.1 – symbol of the band 4 (Landsat 8)

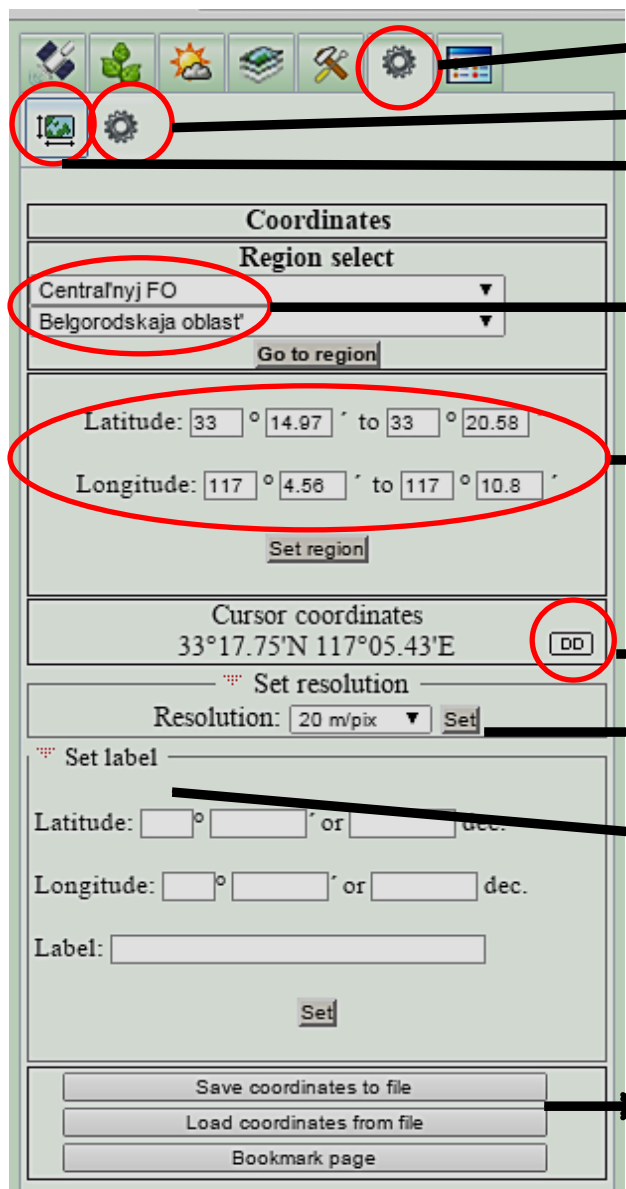
A.2 – symbol of the band 5 (Landsat 8)

To calculate NDVI you have to write formula $\text{float}(A.2-A.1)/(A.1+A.2)$ and push **Create task** button

13. Group of the Tabs - Geographical Navigation and Reprojection

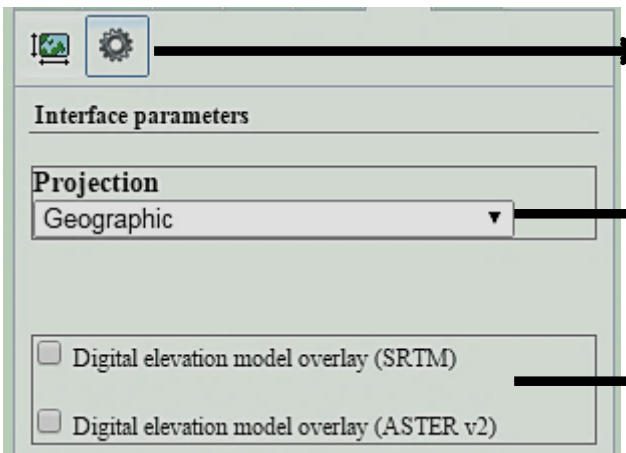
By the default the interface works in the Geographic projection (Lat/Long) on the spheroid WGS

84. There is possibility to reproject interface to the Mercator.



The screenshot shows the 'Geographical Navigation and Reprojection' tab in a software interface. It features several sub-tabs and input fields. Annotations with arrows point to specific elements:

- Geographical Navigation and Reprojection Tab**: Points to the gear icon in the top toolbar.
- Interface parameters (projection) subTab**: Points to the map icon in the top toolbar.
- Coordinates subTab**: Points to the gear icon in the top toolbar.
- Region selection – Move directly to selected region (for Russia only)**: Points to the 'Region select' dropdown menu showing 'Centralnyj FO' and 'Belgorodskaja oblast'.
- Coordinates (lat/long) – possibility to move directly to indicated geographical window**: Points to the latitude and longitude input fields.
- Cursor coordinates (degrees minutes seconds or decimal degrees changes by pushing button)**: Points to the 'DD' button next to the cursor coordinates.
- Resolution settings 20 or 500 m/pix**: Points to the 'Resolution' dropdown menu.
- Labeling of the coordinate – input coordinates and labels it on map**: Points to the 'Set label' section with latitude, longitude, and label input fields.
- Saving coordinates to ASCII file and loading from ASCII file**: Points to the 'Save coordinates to file' and 'Load coordinates from file' buttons.



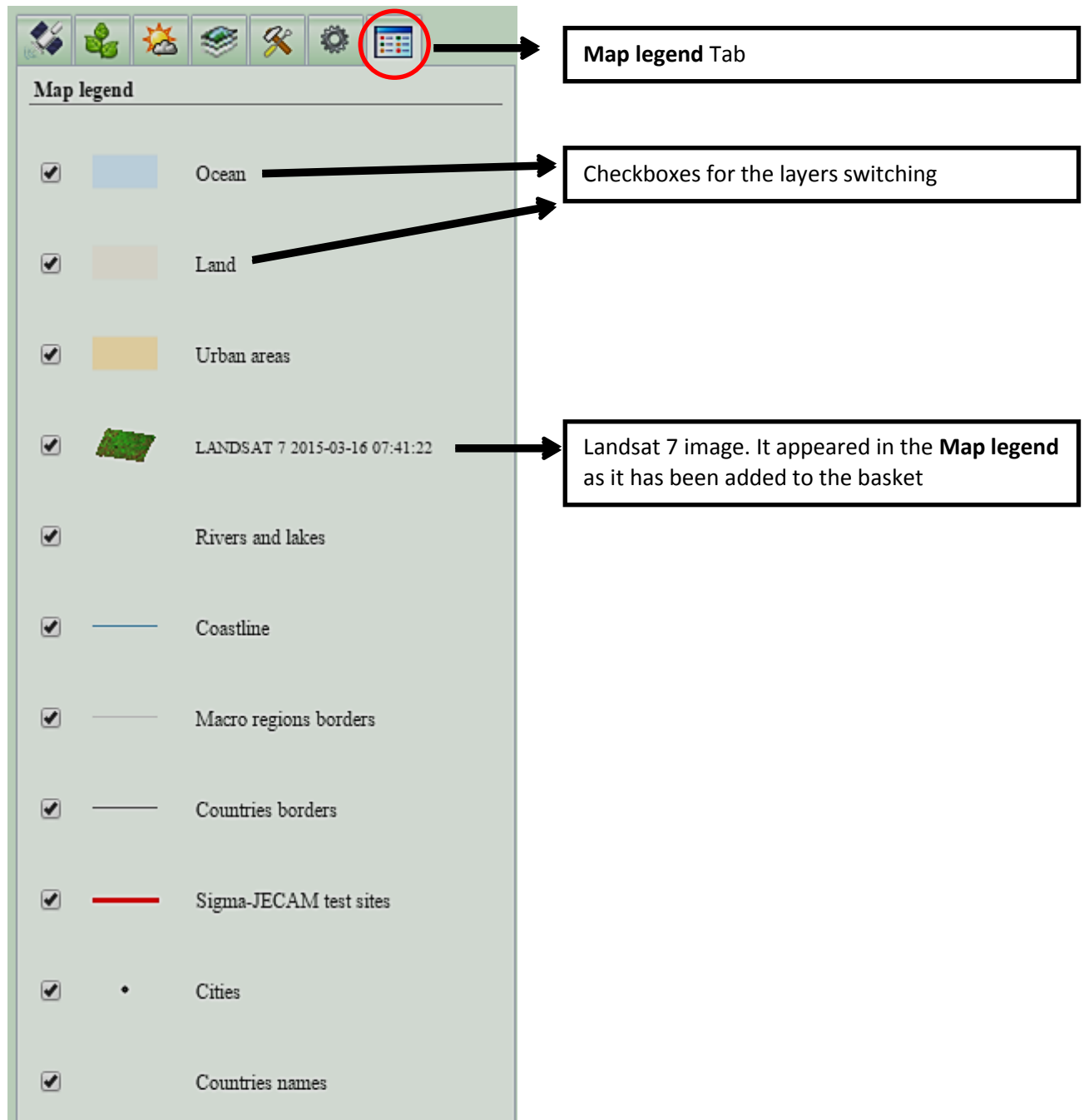
The screenshot shows the 'Interface parameters (projection) subTab'. Annotations with arrows point to specific elements:

- Interface parameters (projection) subTab**: Points to the gear icon in the top toolbar.
- Setting map projection – Geographic or Mercator**: Points to the 'Projection' dropdown menu.
- Digital elevation model overlaying SRTM or ASTER**: Points to the checkboxes for 'Digital elevation model overlay (SRTM)' and 'Digital elevation model overlay (ASTER v2)'.

14. Map legend tab aimed to switch (on\off) any considered layer.

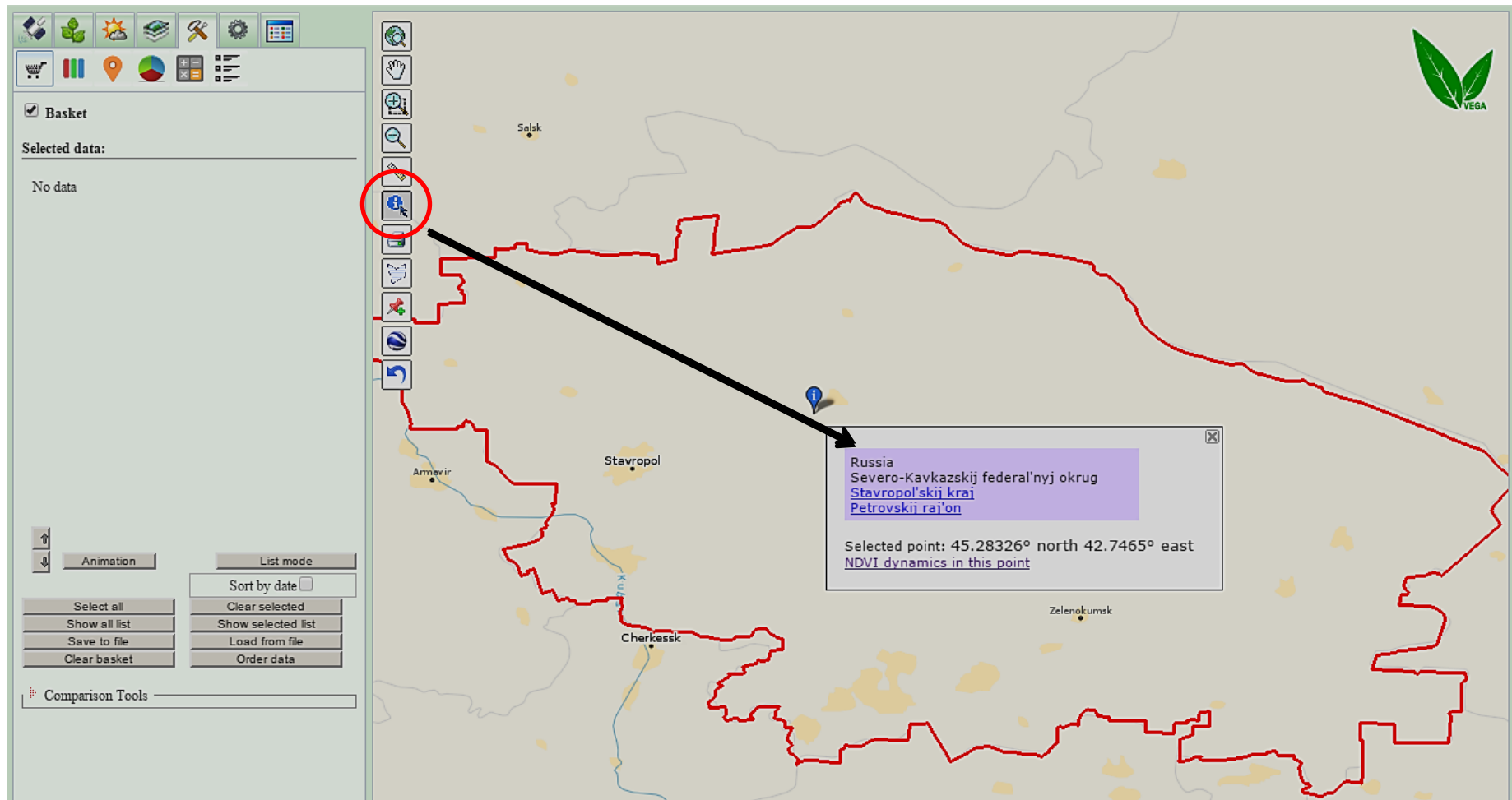
Note: if you add an image (or any kind of data) to the basket it will appear in this tab as well.

Note: using **High resolution data** we recommend switching off **Moderate resolution data** and **Temporal composite images** tabs



15. NDVI dynamics in the user defined objects

Infoclick button allows visualising NDVI dynamics in the user defined objects using MODIS time-series data. At the charts below you can find an example of NDVI profile for the five different years. User could visualise also NDVI mean temporal profile for the region and different types of vegetation. There is also information about soil and air temperature, air and soil humidity, pressure, snow depth and some others.





Username: **ssbartalev** Exit

Chart

Legend

Available objects

☒ Stavropol'skij kraj – Petrovskij raj'on
(42.7465° north, 45.28326° east)

Parameter

Soil temperature (in layer 10-40cm), °C
Soil temperature (in layer 40-100cm), °C
Soil temperature (in layer 100-200cm), °C
Soil humidity (in layer 0-10cm), %
Soil humidity (in layer 10-40cm), %
Soil humidity (in layer 40-100cm), %
Soil humidity (in layer 100-200cm), %
Snow depth, m
Snow cover, %
Hydrothermal coefficient (decade)
NDVI (TIFF)

Year

2015
2014
2013
2012
2011
2010

Interannual parameter, average for the district

NDVI – arable lands
NDVI – winter crops
NDVI – spring crops
NDVI – forest
NDVI – forestpine
NDVI – forestleaf

Show full size

Print chart - Save picture for the printing

Save chart to the
picture (png) or to
the (csv) file

Hide /Show
Point description

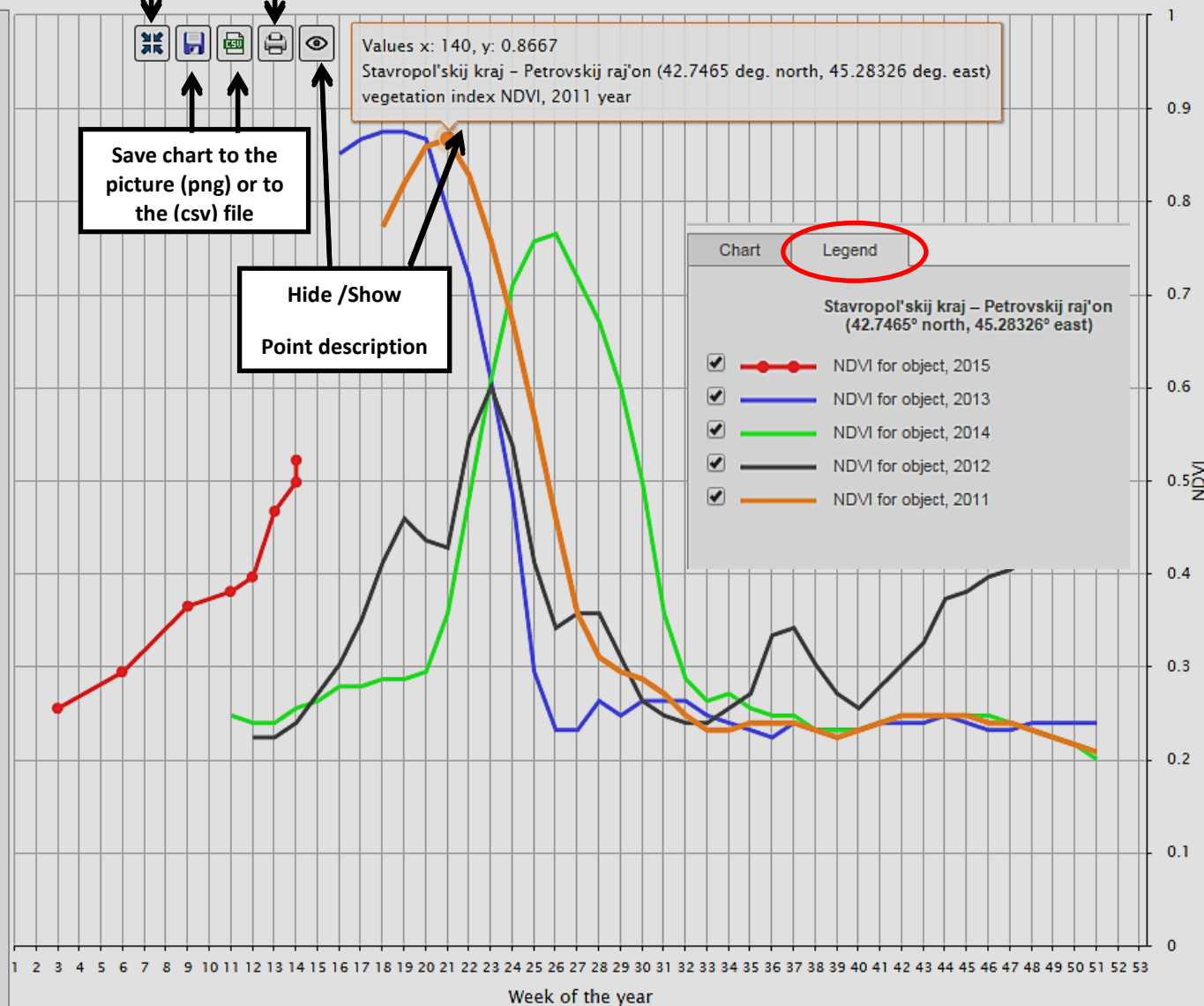
Values x: 140, y: 0.8667
Stavropol'skij kraj – Petrovskij raj'on (42.7465 deg. north, 45.28326 deg. east)
vegetation index NDVI, 2011 year

Chart

Legend

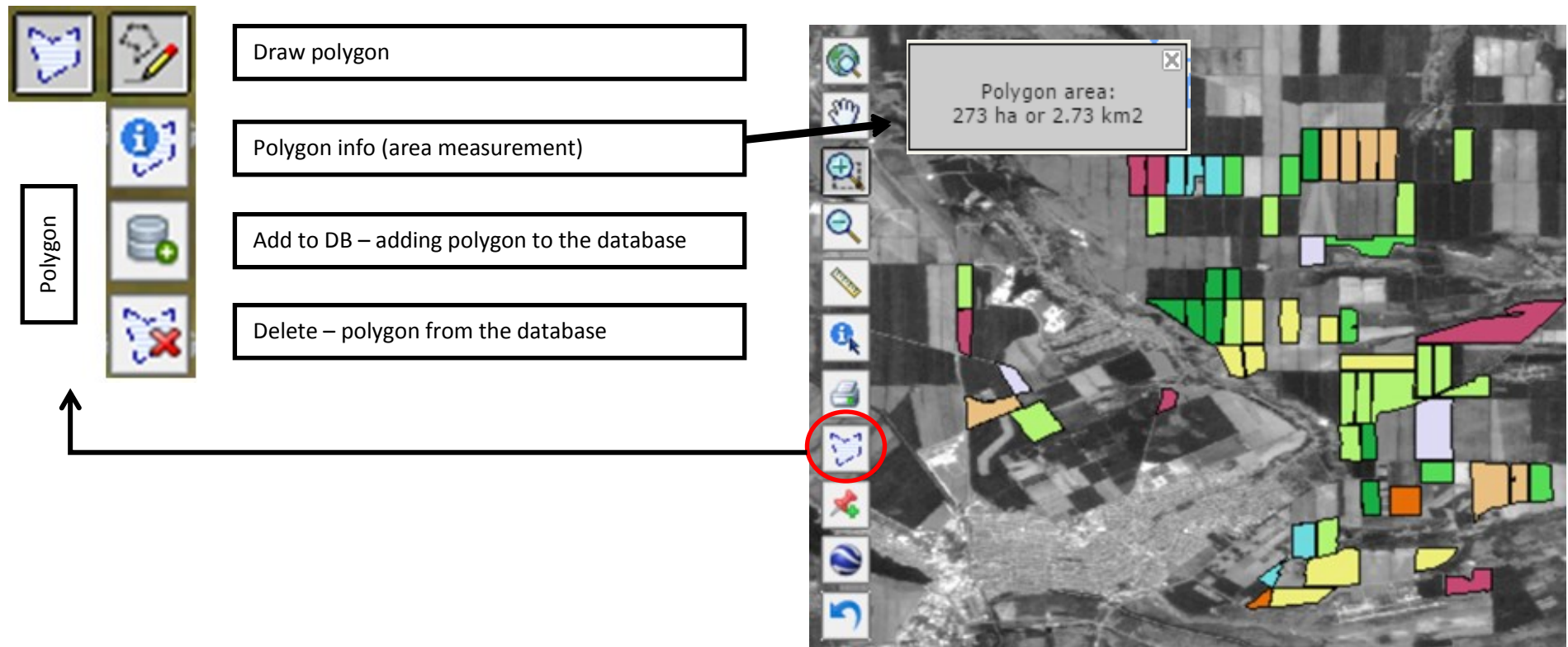
Stavropol'skij kraj – Petrovskij raj'on
(42.7465° north, 45.28326° east)

- ☒ NDVI for object, 2015
- ☒ NDVI for object, 2013
- ☒ NDVI for object, 2014
- ☒ NDVI for object, 2012
- ☒ NDVI for object, 2011

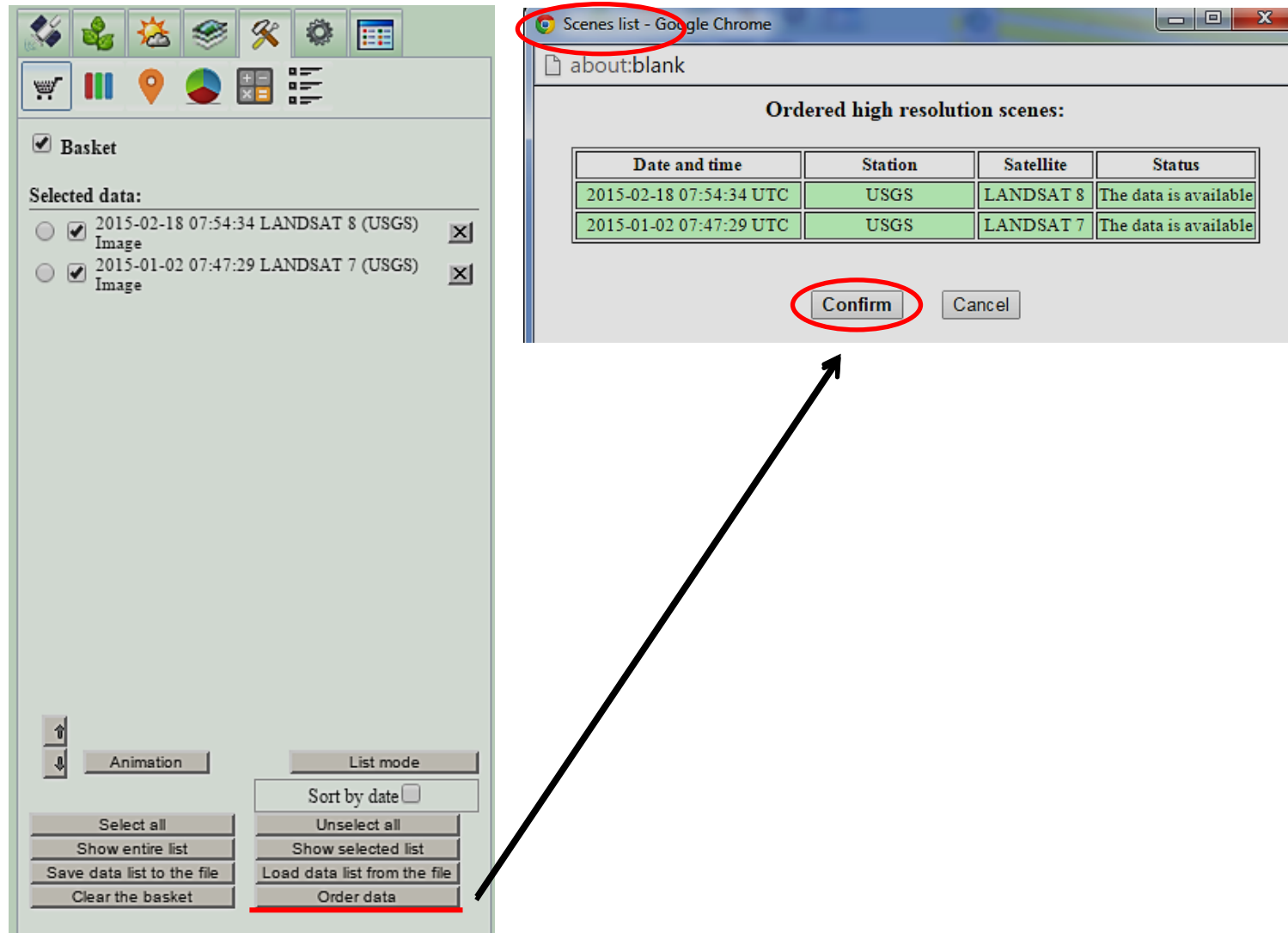


16. Polygons drawing that tool allows drawing polygons (objects) in the map interface. There are two options in this tool: 1) it is allows area measurement, 2) user can use polygons as AOI (Area of interest). Below you can find examples of polygons drawing on agriculture fields.

Notice: to finish polygon drawing you should locked first and the last vertexes with one click. Otherwise system will generate erroneous polygon.



17. Data ordering and downloading User could order images that have been loaded to the **Basket**. To make it necessary to open **Basket** in the tab **Data analysis** and push the button Order data. Than Scenes list will appear and user have to confirm the order. In about 10 minutes user is expecting to receive an e-mail with an ftp links for data downloading. The data stored in a zip files, which includes metadata and GeoTIFF image files. Links are available for users during next ten days.



18. Bug report

In case of any technical issues, please inform the system administrator using the bug report form. Comments and suggestions are also welcome.

The screenshot displays the VEGA-GEOGLAM web-based analysis of agriculture monitoring interface. The top header includes the VEGA-GEOGLAM logo, navigation links (Home, Data, Products, Tools, Download, Contacts), and logos for SIGMA and GEOGLAM. A sidebar on the left contains links for 'Map interface', 'SIGMA-JECAM test sites', and 'Bug report' (circled in red). The main content area shows a 'Welcome to VEGA-GEOGLAM!' message and a 'Bug report' form. The form includes fields for 'Your first name and last name', 'Organization:', 'E-mail address for feedback:', 'Bug page URL link:', and a large 'Bug description:' text area. At the bottom of the form, there are buttons for 'Add URL link', 'Choose file', 'Upload file', and a 'Send' button (circled in red).

VEGA-GEOGLAM
web-based analysis of agriculture monitoring

SIGMA
Integrating Information for
Global Monitoring of Agriculture

GEOGLAM
Global Agricultural Monitoring

Home | Data | Products | Tools | Download | Contacts

Username: nni Exit

[Map interface](#)

SIGMA-JECAM test sites:

Select the test-site ▼

[Bug report](#)

Welcome to VEGA-GEOGLAM!

The VEGA-GEOGLAM web-based analysis system is developed by [Russian Academy of Sciences Space Research Institute](#) in framework of EC FP7 [SIGMA](#) project.

News

20/01/2015
A new **30 m** spatial resolution arable lands map for the JECAM test site in **Stavropol Krai (Russia)** has been

VEGA-GEOGLAM
web-based analysis of agriculture monitoring

SIGMA
Integrating Information for
Global Monitoring of Agriculture

GEOGLAM
Global Agricultural Monitoring

Home | Data | Products | Tools | Download | Contacts

Username: nni Exit

Bug report

Your first name and last name	<input type="text"/>
Organization:	<input type="text"/>
E-mail address for feedback:	<input type="text"/>
Bug page URL link:	<input type="text"/>
Bug description:	
<div></div>	
<input type="button" value="Add URL link"/>	
<input type="button" value="Choose file"/> <input type="button" value="Upload file"/>	
<input type="button" value="Send"/>	