

USER GUIDE

MeteoGamma

Software application for satellite data processing concerning hydrometeorological and environmental monitoring

Version 1.07

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1 Overview

MeteoGamma application (**MeteoGamma**) is designed for processing satellite digital data of HRPT radiometer AVHRR from NOAA and METOP series operational satellites concerning hydrometeorological and environmental monitoring. MeteoGamma application runs on WINDOWS Operating System. The operator needs to be trained in the scope of higher school synoptic meteorology course and be a confident user of WINDOWS based PC. MeteoGamma Version 1.07 is designed for processing images taken in summer (snowless) season. Correct operation of all listed functions of MeteoGamma application requires preliminary adaptation of a software product to a certain geographic region.

MeteoGamma application consists of the following components:

- main program module;
- library modules;
- help system modules;
- service and utility files;
- ini-files.

1.1 Functions

MeteoGamma application features the following functions:

- viewing of images;
- calibration of source data;
- geolocation;
- insertion of grid and points;
- coastline drawing;
- region boundaries drawing;
- fragments cut-out;
- transfer of fragments into map projection;
- saving fragments to disk;
- type classification of underlying surfaces;
- calculation of underlying surface thematic properties and representation of numeric values in the form of raster images;
- save images into graphic format files;
- sending to printer;
- animated playback of processing results.

1.2. Hardware Requirements

Operation of the software bundle requires a computer with 1GB of RAM and a monitor from 17" in size. Processor frequency shall be at least 2GHz. Operating system - WINDOWS XP.

1.3. Source Data

The following data are used as source data when running MeteoGamma application: HRPT format of AVHRR radiometer, which are received by ScanEx RDC stations from NOAA and METOP series satellites, and L1F format derived by Space Research Institute of the Russian Academy of Sciences, NORAD telegram files containing orbital data of NOAA and METOP series satellites.

Thematic processing is applied to fragments of images, and the requirement is to keep the size of a fragment within the range of about 1000x1000 km in order to avoid climatic deltas of the areas being processed in particular in latitudinal direction;

It is not recommended to:

- perform processing for fragments of images if a fragment center is more than 500 pixels away from the scan center due to significant distortions, which take place at an image edges and impact restoration of underlying surface properties.
- perform processing for fragments, which contain ranges of interference in a received image.

1.4. Results of Thematic Processing

Work results of MeteoGamma application – hydrometeorological characteristics of clouds and other parameters could be viewed in digital form in the **log** and in the form of a raster image.

The following basic information is viewable in the form of a raster image:

- **types of clouds and underlying surface;**
- **liquid water path;**
- **temperature of cloud top;**
- **cloud depth;**
- **cloud top height;**

including additional information:

- **vegetation index;**
- **water temperature;**
- **water albedo.**

2 User Interface

Notes.

- WINDOWS standard commands are not described.
- identical commands, described before, repeatedly are not described.

2.1 First Menu

Program first main menu is located in the top of main window after start application and includes the following sub-menus:

File menu contains the following commands:

Open...	Open a source file or a fragment file.
Fragment File	Set fragment or source file options mode.
Page Setup	Open standard Windows dialog box to perform page setup for printing
Files 1, 2, 3, 4	Open files, which were worked on during previous sessions
Exit	Close all open files and exits MeteoGamma application.

View menu contains the following commands:

Toolbar	Display or hide the toolbar
Status Bar	Display or hide the status bar

Actions menu contains the following commands:

Start Animation	Start the process of animation on prewritten script
Stop Animation	Stop the animation process.
Continue Animation	Continue the animation process.

Options menu contains the following commands:

Geographic Objects	Set options of geographic objects drawing on an image
Palette – Load	Load palette from file
Palette – Save	Save palette to file
Palette – Edit	Edit palette
Animation Setup	Set animation options
Auto Open Images Setup	Set options for automatic image open
Auto Cut Setup	Set geographic coordinates of the center and size of a fragment to be cut out
Paths	View, set and change paths to various data types


Help menu contains one command:

About MeteoGamma that displays reference information on the current version of MeteoGamma application.

2.1.1 File menu

Open

The command is used for opening a file with source information or a fragment file. Up to 16 files of various types can be opened. Opening the Open File dialog box sets the path to

fragment files or source files depending on whether the **Fragment File** menu item is checked (the button  is pressed on the toolbar) or not respectively.

To switch from one open image to another the **Windows** menu can be used.


Shortcut is provided by button  on the toolbar and hotkey **Ctrl+O**.

Fragment File

This option defines what type of information the operator intends to work with – with source information (if the option is not checked) or with fragments (if the option is checked).

The option value is changed by the operator to the opposite by any mouse click on this menu item or by any pressing the button on the toolbar. The value of this option is also changed automatically if the operator switches between open images of different types (source file – fragment file).

By default the option is checked and its status is saved upon exiting the application.

Shortcut is provided by the button  on the toolbar.

2.1.2 View menu

This menu contains 2 options: Toolbar and Status Bar.

Toolbar

This option is used to display or to hide the toolbar, which contains buttons used for the most frequent functions of MeteoGamma application. Check this option appears on left clicking on the option and indicates that the toolbar is displayed on the screen. A repeated click on the option removes the check and simultaneously hides the toolbar.

Status Bar

This option is used to display or hide the status bar, which contains description of a command selected on a menu or a button on the toolbar.

A check against this option appears on left clicking on the option and indicates that the status bar is displayed on the screen. A repeated click on the option removes the check and simultaneously hides the status bar.

The status bar displays essential information for the operator therefore it is not recommended to hide it.

2.1.3 Actions menu

This menu contains **Animation**'s commands only.

Start Animation

This command is used for starting animation process per a prewritten and preselected script.

The process of starting animation begins with closing all previously opened files and represents quite a long procedure. The procedure opens all required files then opens all required images and arranges them appropriately.

The operator cannot interfere into this process and perform any actions using the mouse or the keyboard. Any actions could lead to aborting the start-up process, which will have to be started all over again taking a lot of time in case of many files and images.

Script writing can include up to 16 files and several types of images to run. But keep in mind that this is only possible if PC resources permit. During the first run it could turn out that the resources are scarce. In this case the script needs to be corrected by limiting the number of files and types of images.

After starting the animation could be stopped and continued.

Stop Animation

This command is used for stopping the started up animation process. This can also be accomplished by the hotkeys **Pause** or **Space**.

Note. Repeated pressing of these keys will continue the animation process.

When the animation process is stopped the operator has the opportunity to change such parameters as intervals between slides and intervals between cycles. In this case when continued the show will run with newly set intervals.

Continue Animation

This command is used to continue the stopped animation process. This can also be accomplished by the hotkeys **Pause** or **Space**.

Note. Repeated pressing of these keys will stop the animation process.

Unless show cycling was selected, when all image types are shown the process ends and cannot be continued by the **Continue Animation** command. This will require restarting the process.

2.1.4 Options menu

Geographic Objects

To change options for geographic objects use **Options – Geographic Objects**. This opens the dialog box where the operator can set options for drawing objects on the image, such as type of drawing setup, drawing options for coordinates grid, names of points, coastline, region boundaries. The operator can set list of points names and its coordinates, list of names vector files (MapInfo Format – **MIF**); set **Severe Weather Events (SWEEvents)** signs attributes, select current **SWEEvents** sign. See details in **5.5 Service**.

Palette

The palette operating commands are located in the sub-menu:

Command	Action
Palette - Load	Load new palette
Palette - Save	Save modified palette
Palette - Edit	Open Edit Palette dialog.

See details in **5.4 Service**.

Animation Setup

Set and save in script file animation options (see details in **5.7 Service**).

Auto Open Images Setup

Sets options for automatic image opening during thematic processing.

During thematic processing the check against **Actions – Auto Open Images** will automatically open windows with certain image types preset by the operator.

At the end of thematic processing selected types of images will also open and if indicated so by the operator they will automatically be saved as graphic format files.

See details in **5.2 Service**.

Auto Cut Setup

This command opens the dialog box. Here the operator can set fragment vertical and horizontal size, geographic coordinates of the fragment and save options. See details in **5.1 Service**.

Paths

Paths to data could be viewed or changed in the dialog box **Paths to Source Data (RAW-format)** or **Paths to Fragment Data (DUF2 format)** depending on the file type worked by the operator.





This dialog box displays paths to source data, results, calibration and other service data: path for saving as graph file format, file names and paths with geographic objects data, with headers and footers, default palette.

Note. To display or hide the toolbar on the screen select the option **View - Toolbar** on the SB menu provided no windows of any type are open.

First Toolbar



The following buttons are available on the toolbar:

-  - set source file or fragment  options mode;
-  - open source file or fragment file;
-  - close all open files and exit MeteoGamma application.

Status Bar

The status bar displays essential information for the operator.

2.2. Source Menu.

Program source main menu is located in the top of main window and includes the following sub-menus:

File menu contains the following commands:

Open...	Open a source file or a fragment file.
Close	Close the active image file
Rename	Rename the active image file.
Move	Move the active image file.
Delete	Delete the active image file from disk.
Information	Show the active image properties
Fragment File	Set path to a source file or a fragment file.
Page Setup	Adjust page settings for printing
Print Preview...	View the active image on the screen prior to sending to printer
Print...	Print the image from the active window
Save As...	Save the image from the active window to graph format file.
Header / Footer	Enter text in the active image header and footer
Titles	Select or deselect headers and footers
1, 2, 3, 4 Files	Open recently worked files
Exit	Close all open files and exit MeteoGamma application.

View menu contains the following commands for the active window image:

Grid and Points	Show or hide coordinates grid and names of points.
Coastline	Show or hide coastline.
Vector Layers	Show or hide vector layers.
Zoom	Zoom in, zoom out or set initial scale of the active image.

Actions menu contains the following commands:

Cut Out Fragment	Select or deselect the mode of cutting a fragment out from a source file
Contrast	Contrast the active window image.
Load Vector Layer	Manual load graphics objects from file
Animation - Start	Run animation per written script
Animation - Stop	Stop animation
Animation - Continue	Continue animation
Auto Cut Out Fragment	Automatically cut out a fragment.

Options menu contains the following commands:

Geographic Objects	Set options for drawing geographic objects on image
Automatic Grid and Points	The options provides for inserting the coordinates grid and points upon opening an image
Source Image Load	Set options for loading a source image
RGB Image Load	Set options for RGB image generation
Fragment Save	Set options for contents of the fragment to be saved
Animation Setup	Set animation options
Auto Open Images Setup	Set options for automatic image opening in thematic processing
Auto Cut Setup	Set geographic coordinates of the center and size of the image to be cut out
Paths	View, set or change paths to various data types

Windows menu provides for the following commands which could be used to arrange multiple open windows on the screen or close all windows:

Cascade	Arrange windows with overlapping
Tile	Arrange windows without overlapping
Close All Windows	Close all windows.
Windows 1, 2,...	Switch to selected window

Help menu

About MeteoGamma	Display the version number of this application.
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2.2.1 File Menu

The **File** menu provides the opportunity to perform various operations with files: open, close, move, delete, export, print as well as adjust page setup for printing, enter information for titles, exit MeteoGamma application.

Rename

This command opens the standard file saving dialog box showing the path to the active source file on disk and default file name comprised of the year, month, month's date, hours and minutes of the reception start. If the user confirms the file will be renamed. The active image will be closed.

Move

This command opens the standard file saving dialog box with the path to the processing results on disk and default file name comprised of the year, month, month's date, hours and minutes of

the reception start. If the user confirms the file will be renamed and moved. The active image will be closed.

Delete

This command serves for deleting an active source file from disk.

Hotkey **Ctrl+D**.

Information

This command opens dialog box **Image Information**, that lists source data properties: data format, receiving station coordinates, satellite name and number, number of orbit, date and time of comm. pass start (Greenwich time – GMT), image file size in pixels, channels involved in the file, orbital direction and reference scale of the loaded image.

Viewing is initiated by the button  located on the toolbar.

Save As...

Active window information can be saved in graphic file format. Hotkey **Ctrl+E**.

Additionally you can set a header and a footer for an image.

Note. Export of an image is always done to the same scale as the image in the active window. It is exported the way it looks on the screen: with drawn geographic objects and in case of fragment files – including Severe Weather Events signs if any were drawn.

Header / Footer

Images sent to printer or saved as graphic format files can be assigned to carry additional information – header and footer. Information to be displayed is entered by the operator separately for each image type and saved the same way as the other options of MeteoGamma application. See details in **5.3 Service**.

Titles

This option defines whether header and footer should be printed and saved as graphic format files for the active image (if selected) or not (if deselected).

The option is selected by default. If the operator switches this option off this will affect the current file. In other words if another file is opened it will have the default value. Therefore at the end of the session the current setting is not saved.

2.2.2 View menu


The **View** menu allows controlling the process of drawing various geographic objects on the image and zooming images.

Grid and Points

By checking **View – Grid and Points** or the coordinates grid and points are inserted on the active image. If the command is unchecked – they are removed.

Initial setting of this option for each file performs calculation of the image geolocation if that wasn't done previously. When this completed that the status bar shows geographic coordinates of the mouse pointer placed on the image.

Drawing format (font color, type, what is to be drawn) could be defined by settings individually for each image type.

Button on the toolbar .


Hotkey **Ctrl+G**.

Coastline

By checking **View – Coastline** the coastline is drawn on the active image. If this option is deselected the coastline is removed.

Initial setting of this option for each file performs calculation of the image geolocation if that wasn't done previously. When this completed that the status bar shows geographic coordinates of the mouse pointer placed on the image.

Coastline color, its drawing on the image could be defined individually for each image type.

Button on the toolbar .

Hotkey **Ctrl+Alt+L**.

Vector Layers

By checking **View – Vector Layers** graphics objects from preset list of MapInfo Format files (MIF-files) are drawn on the active window image. If this option is deselected – they are removed. This files contains region boundaries usually.



Initial setting of this option for each file performs calculation of the image geolocation if that wasn't done previously. When this completed that the status bar shows geographic coordinates of the mouse pointer placed on the image.

Boundaries drawing option could be defined by setting individually for each MIF-file.

Hotkey **Ctrl+Alt +B**.

Zoom

Zooming commands **Zoom -In | Zoom - Out | Zoom - Source** allow zooming in or out active window image. At each zooming command initiation the image scale will change by one if it is larger than the source one and change two times if it's smaller than the source one. The number of zoom-out increments from the file format is limited to 16 by the application. Zoom-in limitation allows using command **Zoom - In** 15 times. However the zoom-in capability can be reduced depending on the version of the operating system and available PC resources.

Zoom - In | Zoom - Out commands are duplicated by **Ctrl++, Ctrl+-** hotkeys;  and  buttons on the toolbar.

Zoom - Source command sets reference scale, which is the scale that was selected at the file loading.

Note. In case of a fragment file the reference scale is always 1.


2.2.3 Actions menu

The **Actions** menu enables operations with animation, image contrasting and automatic fragment cutting out.

Cut Out Fragment

This option allows selecting or deselecting the mode of fragment cutting out from a source file (if this option is checked or unchecked respectively).

Note. Unlike the automatic cutout mode this command does not initiate cutting. The application is just switched to the mode, which allows selecting a cutout area.

Button on the toolbar .

Contrast

The command **Contrast** is designed for changing contrast of images for visual analysis. It's available only for black-and-white active images with source data.

Button on the toolbar .

Hotkey **Ctrl+K**.

Load Vector Layer

Manual load graphics objects from MapInfo format file and draw its.

Auto Cut Out Fragment

Automatically cut out a fragment from source file.

Hotkey **Ctrl+F**

2.2.4 Options menu

The **Options** menu may be used for presetting various groups of options: geographic objects; loading of source data and RGB image; cutting and saving a fragment; animation, automatic opening of images, paths to data.

Automatic Grid and Points

By checking **Automatic Grid and Points** the coordinates grid and points are shown on an image upon its opening. This command duplicates similar setting in the options for geographic objects to make it easier for the operator to change it when required. But this makes sense only if several image types are opened for a fragment file since by default when a new file is opened this menu option is reset in accordance with the settings in the dialog box.

Source Image Load

Dialog box **Source Image Load Options** is accessed by this command.

The operator can select the following options for source image being loaded in the dialog box:

- number of the image to be loaded (number from 1 through 11)
- scale of the image to be loaded (number from 1 through 16)

as well as the option **Show this Dialog**.

When selecting a channel number a tip is displayed to the right from the box explaining the number in the box. Here the operator can select one of the five satellite channels as well as different combinations of several channels; pseudo-color image in the form of a simple channel combination (RGB image), where the operator can voluntarily set channels to be combined; and pseudo-color composite image which has color constituents fixed to channel combinations. RGB constituents are selected by the command for setting options of RGB image loading.

If each time a source file is normally viewed with the same options and no resetting is required prior to each loading it is recommended to deselect option **Show this Dialog**. Introduced changes need to be saved by pressing the button **Save**.

RGB Image Load

RGB image load options are listed in the dialog box **RGB Load Options**.

Here the operator can set channel numbers corresponding to each of constituting colors – red, green and blue as well as the option **Show this Dialog**.

Introduced changes need to be saved by pressing the button **Save**.

Fragment Save

Fragment save options are listed in the dialog box **Fragment Save Options**.

Here the operator can set numbers of the channels to be saved as well as HIRS information saving attribute and the option **Show dialog before each reflect**.

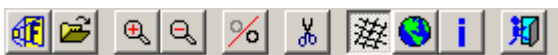
To save the operator the trouble of unnecessary mouse clicks in the process of saving it is not recommended to check this option.

If thematic processing is required after cutting each fragment it is advisable to check the option **Load After Save**.













If the process is such that first all required fragments are cut and saved to be thematic processed later then it doesn't make sense to check this option.

Introduced changes need to be saved by pressing the button **Save**.

Toolbar



The buttons on the toolbar can be used to:

-  – set paths to source files  or to fragments .
-  – open file
-  – zoom in active image
-  – zoom out active image
-  – contrast image
-  – select or deselect fragment cut-out mode
-  – show or hide coordinates grid
-  – show or hide coastline
-  – show properties of active image
-  – close all open files and exit MeteoGamma application.

Source Status Bar

Placing the mouse pointer on an interface element the status bar displays description of the selected menu command or toolbar button.

Placing the mouse pointer over an active image window the status bar displays information containing the following:

- type or legend related to the displayed information and in case of a composite image – numbers of channels, which generate its color constituents;
- cursor pixel position in the file across (Y) lines and in (X) line geographic coordinates of a point on the image (after geolocation is complete).

2.3 Thematic Interface

Opening or going to a fragment file displays the following menu:

File menu contains the following commands:

Open...	Open a file.
Close	Close the active image file
Fragment File	Set path to a source file or a fragment file.
Page Setup...	Adjust page settings for printing
Print Preview...	View the active image on the screen prior to sending to printer
Print...	Print the image from the active window
Save As...	Save the image from the active window to graph format file.
Header / Footer	Enter text in the active image header and footer
Titles	Select or deselect headers and footers
1, 2, 3, 4 Files	Open recently worked files
Exit	Close all open files and exit MeteoGamma application.

View menu contains the following commands for the active window image:

Source Data – Channels 1,2,3,4,5	Show information from channel 1, 2, 3, 4, 5
Source Data – Difference of Channels 1-2, 3-4, 3-5, 4-5	Show difference of channels 1 and 2, 3 and 4, 3 and 5, 4 and 5
Source Data –RGB Image	Show RGB image

Source Data – Thermal Composition	Show thermal composition image – RGB with constituents (5-4), (4-3), (4)
Results – Clusters	Show raster image with cluster analysis results
Results – Cloud Types	Show raster image of cloud types
Results – Liquid water path	Show raster image of liquid water path
Results – Cloud Top Temperature	Show raster image of cloud top temperature
Results – Cloud Depth	Show raster image of cloud depth
Results – Cloud Top Height	Show raster image of cloud top height
Results – Vegetation Index	Show raster image of vegetation index
Results – Water Temperature	Show raster image of water temperature
Results – Water Albedo	Show raster image of water albedo
Grid and Points	Show or hide coordinates grid and names of points.
Coastline	Show or hide coastline.
Vector Layers	Show or hide vector layers.
Zoom – In, Zoom – Out, Zoom – Source	Zoom in, zoom out or set initial scale of the active image.

Actions menu contains the following commands:

Start Processing	Start over thematic processing
Identification	Repeat the identification procedures of surface types
Transform to UPS Projection	Transform into projection
Geolocation Correction	Select/deselect the mode of geolocation correction
Cancel Correction	Cancel geolocation correction and roll back
Contrast	Contrast the active window image.
Cut Out Fragment	Select or deselect the mode of cutting a fragment out from a fragment file
Save for Viewer	Save selected results to an archive
Animation - Start	Run animation per written script
Animation - Stop	Stop animation.
Animation - Continue	Continue animation.

Options menu contains the following commands:

Geographic Objects	Set options for drawing geographic objects on an image
Projection	Set options for transformation into projection
Filter	Set filter value
Palette – Load	Load palette from file
Palette – Save	Save palette to file
Palette – Edit	Edit palette
Automatic Grid and Points	The options provides for inserting the coordinates grid and points upon opening an image
Auto Open Images	Set options for automatic image opening in thematic processing
Save Results	Save or dismiss results of thematic processing
Additional Results Calculation	Select additional results to be calculated
Load RGB Image	Set options for RGB image generation
Viewer Save Options	Set options for contents of the fragment to be saved
Animation Setup	Set animation options
Auto Open Images Setup	Set options for automatic image opening in thematic processing
Paths	View, set or change paths to various data types

Windows menu provides for the following commands which could be used to arrange multiple open windows on the screen or close all windows:

Cascade	Arrange windows with overlapping
Tile	Arrange windows without overlapping
Close All Windows	Close all windows.
Windows 1, 2,...	Switch to selected window


Help menu

About MeteoGamma Display the version number of this application.

2.3.1 View menu

View menu allows selecting various image types, drawing geographic objects on images and zooming images.

Shortcuts for commands **Source Data – Channels 1,4 | Difference of Channels 1-2** - buttons on toolbar:  ,  ,  .

Source Data – RGB Image command. An RGB image is pseudocolor image in which three color constituents are represented by information of three channels or their combination. Information is displayed to scale set by the operator for loading the source image (when working with source files) or to scale equal 1 (when working with fragments). If the scale is other than one the image header displays how many meters are in one pixel of the image data. Button on toolbar -  .

Channel correspondence to each color is defined while setting up **Load RGB Image**.

Source Data –Thermal Composition command. Thermal composition is pseudocolor image, in which the following information is used as color constituents:

- red color - difference of channels 5 and 4;
- green color – difference of channels 4 and 3;
- blue color – channel 4 data.

Button on toolbar -  .

Shortcuts for **Results - ...** commands are:



- for **Clusters**



- for **Cloud Types**



- for **Liquid water path**



- for **Cloud Top Height**



- for **Cloud Top Temperature**



- for **Water Albedo**



- for **Water Temperature**

2.3.2. Actions menu

Start Processing

This command initiates the thematic processing from the beginning.

Identification

This command initiates the process of types identification according to options selected by the operator in the dialog box.

It is used if the operator is not satisfied with results of the previous identification session.

Transform to UPS Projection

The command **Transform to UPS Projection** initiates the transformation process according to preset options (see **Projection Options**).

This closes all images except the log window.

The Geolocation Correction

The command **Geolocation Correction** enables or disables the geolocation correction mode. The mode is accessible only after coastline is drawn on the image.

Cancel Correction

The command **Cancel Correction** cancels completed correction of geolocation. The mode is accessible only after coastline is drawn on the image.

Save for Viewer

The command **Save for Viewer** saves results of thematic processing for viewer in a special format according to preset options, which define data set for saving and type of saving.

The command is accessible only after thematic processing is complete.

2.3.3 Options Menu

Projection

This opens the dialog box **Transformation in cartographic projection**.

To transform to projection the following options are used:

Ellipsoid - the shape of the Earth

Scale Factor –UPS projection option.

Data Scale - scale of the generated image

Attention! It is not recommended to change the above options to avoid projection distortion.

The **Central Meridian** group is used for setting central meridian of the projection. Selection of the option **Standard** requires setting average longitude value in degrees of the region to be processed and in case of selecting the option **Calculation for Fragment** this value is calculated automatically for each fragment being processed and is not accessible for manual changes.

The option **Transform in UPS projection before open data file** provides transformation into UPS projection and does not require operator to perform additional actions.

The option **Load dialog before transformation in cartographic projection** controls dialog for transforming into UPS projection,

The command **Cancel transformation** is used when work is required on non-transformed images.

Note. When processing and running animation the primary options for obtaining similar images shall not vary. While setting options for transformation into projection follow the rules below:

- options **Ellipsoid**, **Scale-factor**, **Data scale** shall be left unchanged;
- option **Central meridian**: select **Standard**, and set numeric value to be equal to average longitude of cut-out fragments;
- option **Transform in UPS projection before open data file** should be checked for file processing and unchecked for animation to expedite the process of composing animation;
- option **Load dialog before transformation in cartographic projection** shall be deselected.

The same rules are applicable for setting the auto open images mode.

Introduced changes need to be saved by pressing the button **Save**.

Process Options

Access to clustering options is provided via **Process Options**. This opens the dialog box **Process Options**.

By changing option values under the tab **Plot Histogram** the user can control the clustering process. In doing that the user sets initial breakdown of data of radiometer channels 1 and 4 to plot a two-dimensional histogram. This histogram is used as the basis for cluster analysis.

Option values:

Minimal value - minimal calibrated histogram value for channel 1 in %, for channel 4 – in degrees C.

Maximal value - maximal calibrated histogram value for channel 1 in %, for channel 4 – in degrees C..

Number of intervals – a number of breakdown intervals for plotting a histogram for each channel.

Breakdown interval - interval ranges in initial (not calibrated) values of radio brightness.

When changing these options it is recommended:

- not to change options in **Plot Histogram**, if the operator is satisfied with the results of the cluster analysis;
- values to the right from the options **Breakdown interval** correspond to approximately 3% albedo in the 1st channel (30) and 3 degrees C in the 4th channel (45). These values are optimal for running cloud classification in middle latitudes. We recommend returning to them in case of unsatisfactory option setting in **Plot Histogram**, which will be apparent for the operator when receiving clustering results;
- minimal allowed value for the option **Number of intervals** - 2 in both channels.
- minimal allowed values for the option **Breakdown interval** - 10 in channel 1 and 07 in channel 4 .
- maximal limits are entered automatically for each image in accordance with minimal allowed values.

Introduced changes need to be saved by pressing the button **Save**.

Filter Options

Filter options are modified in the dialog box **Filter** accessed via **Options – Filter**. Filter options are used to set minimum filter and maximum filter. Changes to any values are not allowed unless agreed with the designers.

Auto Open Images

During thematic processing and on its completion the operator has to perform many repeated actions. This where **Auto Open Images** feature could convenient which allows automatic execution of the following actions:

- transform an image into a stereographic projection;
- open required images upon completion of the type definition stage (usually these are **Channel 4** and **Clusters**);
- open required window with results on completion of the processing cycle;
- create files in graph format file for open result windows.


Please refer to **Auto Open Image Options** for details.

To enable auto open images mode set option **Options – Auto Open Images**.

Note. If you need to obtain results in BMP format with overlaid geographic objects you need to set the option of overlaying these objects on image opening.

Save Results

To have the ability to view results of the thematic processing in future without switching to processing, you need to save these results to disk.

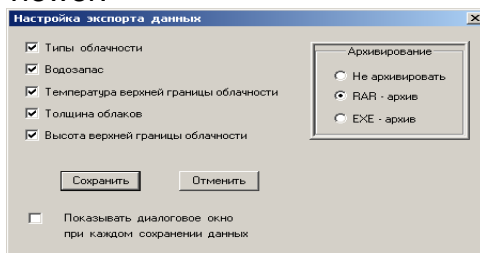
To save processing results make sure the option **Save Results** is checked or the button  is pressed on the toolbar at the time of the fragment file close. In this case on closure of the fragment file or MeteoGamma application proper the files with the processing results will not be erased from disk and will be available for viewing during subsequent application sessions. By default the results are not saved. Please note that saving all the results of one fragment processing produces 17 files and their total size approximately equals the size of this fragment file. A catalog for storing processing results can be defined in the dialog box **Options – Paths – Processing Results**.

Additional Results Calculation

Selection of additional thematic results to be calculated shall start off with the menu item **Options – Additional Results Calculation**. This gives the operator access to the dialog box **Additional Results**, where he can select such types of information for calculations as **Vegetation Index**, **Water Temperature**, **Water Albedo**.

Viewer Save Options

Projection options setting is accomplished via **Option – Viewer Save Options**. This opens the dialog box **Data Export Setup**. It is used to prepare information to save for viewer.



The operator can select types of processing results transferred for viewer. Additionally the group **Archiving** can be used for selection of data saving options.

Introduced changes need to be saved by pressing the button **Save**.









Auto Open Images Setup




















Changing options for auto open images mode is done via **Options – Auto Open Images Options**. This opens the dialog box where you go to group **Images** and then click the tab **Global** and set the option **Auto Open Selected**. If the operator wants to use the mode of auto open image this option needs to be checked.

See details in **5.2. Service**.

Thematic Toolbar



-  – Set paths to fragments  or source files 
-  – Open a file.
-  – Start over file thematic processing.
-  – Open image of channel 1.
-  – Open image of channel 4.
-  – Open image of channels 1 and 2 difference.

-  – Open thermal composition image.
-  – Open RGB image.
-  – Zoom in the active image.
-  – Zoom out the active image.
-  – Contrast the active image.
-  – Draw coordinates grid and points on the active image.
-  – Draw coastline on the active image.
-  – Open cluster image.
-  – Open cloud type image.
-  – Open liquid water path image.
-  – Open cloud top height image.
-  – Open cloud top temperature image.
-  – Open water albedo image.
-  – Open water temperature image.
-  – Save  or dismiss  results of thematic processing.
-  – Set Severe Weather Events signs drawing and displaying mode.
-  – End session, exit MeteoGamma application.

Thematic Status Bar

Information displayed in the status bar when the mouse cursor is placed over an active image depends on the type of this image.

General structure of information:

Type – Information – Geographic Coordinates

type – name or identification of an image type;

geographic coordinates – geographic latitude and longitude of the point under the mouse cursor, for which all information is displayed. Coordinates are not displayed if the image geolocation was not performed;

information – information on the image properties, which is different between various types of images.

Image types could be combined in several groups each having similar structure in the **information** field.

1. Source data: channels and channel differences.
2. Pseudocolor images.
3. **Clusters** and **Cloud Types**.
4. Other types of thematic results.

Source Data Status Bar

The source data status bar: channels and channel differences contain the following data in the **information** field:

- pixel position located under the cursor, in the file by (Y) lines and in (X) line;
- data value in this point (V).

Further the following information is displayed:

- For channels 1, 2, 3a – albedo value and in brackets – brightness temperature value defined using channel 4 data;

- For channels 3b, 4, 5 – brightness temperature value and in brackets – albedo value defined using channel 1 data;
- For differences of channels 1, 2, 3a – значение разности отсчетов радиометра в этих каналах (альбедо);
- For differences of channels 3b, 4, 5 – radiometer readings in these channels (temperature).

Pseudocolor Image Status Bar

Pseudocolor image status bar: **RGB**, **Composite Image**, **Thermal Composition** have identical constituents in the **information** field.

Instead of the name the **type** field for composite image and thermal composition displays numbers of channels that generate their color constituents:

- for a composite image - [(3-4)/(3+4)], [(1-2)/(1+2)], [1];
- for a thermal composition – [4], [4-3], [5-4].

The **information** field for pseudocolor images displays the following data:

- pixel position located under the cursor, in the file by (Y) lines and in (X) line;
- data value for each constituent in this point (V).

Clusters and Cloud Types Status Bar

The status bar of the **Clusters** and **Cloud Types** images contains the following data in the **information** field:

- for **Clusters** – number of the cluster (V);
- for **Cloud Types** – symbolic identifier of a cloud type or underlying surface (in accordance with the legend).

Results Status Bar

The **information** field of the status bar for **Liquid Water Path**, **Cloud Top Temperature**, **Cloud Depth**, **Cloud Top Height**, **Vegetation Index**, **Water Temperature**, **Water Albedo** contains numeric value corresponding to calculated characteristic in the point under the cursor.

3. SOURCE DATA

Source menu and toolbar is shown by opening source (RAW-format) file.

Operator must make the next types of works:

- viewing of source information;
- fragment preparation for thematic processing.

3.1. Options Setup

To speed up and simplify operator's activities during his work sessions in MeteoGamma application it makes sense to preset required options.

Options, which could be pressed before opening files of any type are listed below:

- options of automatic fragment cut-out;
- options of automatic image opening;
- options of geographic objects;
- animation options;
- palette options;
- paths to data.

During work process that is when source files are open settable options are:

- auto fragment cut out options;
- source data load options;
- RGB image load options;
- fragment save options;
- headers and footers.

3.1.1. Source Data Load Options Setup

Source file load options are selected in the dialog box **Source Data Load Options**, which is accessed by **Options - Source Data Load**.

The operator can select the following options for source image being loaded in the dialog box:

- number of the image to be loaded (number from 1 through 11)
- scale of the image to be loaded (number from 1 through 16)

as well as the option **Show dialog before each reflect**.

When selecting a channel number a tip is displayed to the right from the box explaining the number in the box. Here the operator can select one of the five satellite channels as well as different combinations of several channels; pseudo-color image in the form of a simple channel combination (RGB image), where the operator can voluntarily set channels to be combined; and pseudo-color composite image which has color constituents fixed to channel combinations. RGB constituents are selected by the command for setting options of RGB image loading.

If each time a source file is normally viewed with the same options and no resetting is required prior to each loading it is recommended to deselect option **Show dialog before each reflect**.

3.1.2. RGB Image Load Options Setup

RGB image load options are listed in the dialog box **RGB Load Options**, which is accessed via **Options - Load RGB Image**.

Here the operator can set channel numbers corresponding to each of constituting colors – red, green and blue as well as the option **Show dialog before each reflect**.

3.1.3. Saving Fragment File Option Setup

Fragment save options are listed in the dialog box **Fragment Save Options** (show dialog), which is accessed via **Options - Save Fragment**.


Here the operator can set numbers of the channels to be saved as well as HIRS information saving attribute and the option **Show dialog before each reflect**.


To save the operator the trouble of unnecessary mouse clicks in the process of saving it is not recommended to check this option.

If thematic processing is required after cutting each fragment it is advisable to check the option **Load After Save**.

If the process is such that first all required fragments are cut and saved to be thematic processed later then it doesn't make sense to check this option.

3.2. Source Data Loading

Loading of a source file is standard for Windows environment: via **File – Open...**, by **Ctrl+O** hotkey or by pressing button .

Make sure that the option **File – Fragment File** is deselected, that is the button  shall be released. In this case all options of the application will be set up for work with source information.



The operator can select the following source information viewing options:

- type of image (number of viewed channel or a combination of channels);
- Initial scale of displaying.

The following image types are available for viewing:


- Channel 1;
- Channel 2;
- Channel 3;
- Channel 4;
- Channel 5;
- Difference between channels 1 and 2;
- Difference between channels 3 and 4 (1);
- Difference between channels 3 and 5;
- Difference between channels 4 and 5;
- RGB Image;
- Composition Image;
- Thermal Composition.

The operator can draw additional information on an image:

- coordinates grid and names of points (button  on toolbar);
- coastline (button  on toolbar);
- vector layers (region boundaries);
- Severe Weather Events signs.

Note. It is not recommended to open one file several times in a row without closing the previously opened one, otherwise problems may be encountered in case of file deletion.

3.3. Source Data Viewing Mode

To be able to run the program in the image view mode the fragment cut mode shall be deactivated (option **Setup – Fragment Cut** in the menu needs to be unchecked), consequently in case of working with the source file the button  shall be in the released state.

In the view mode left click on an image ties mouse to this point; If the image doesn't fully fit in the window further mouse movements with the button depressed will make the image move along with the mouse.

3.3.1 Zooming

Zooming commands **View – Zoom In | Zoom Out | Source** allow zooming in or out active window image. At each zooming command initiation the image scale will change by one if it is

larger than the source one and change two times if it's smaller than the source one. The number of zoom-out increments from the file format is limited to 16 by the application. Zoom-in limitation allows using command **Zoom In** 15 times. However the zoom-in capability can be reduced depending on the version of the operating system and available PC resources.

Zoom In | Zoom Out commands are duplicated by **Ctrl++**, **Ctrl+-** hotkeys and buttons (show button) and (show button) on the toolbar.

The **Source** command sets reference scale, which is the scale that was selected at the file loading.

3.3.2 Geolocation

Calculation of an image geolocation is performed in the process of opening and loading of the data file. Information required for the calculation is taken from the open file and in case of its absence in the file the operator is prompted to provide information to search for the required NORAD telegram file containing orbital data of NOAA and METOP series satellites.

Upon completion of geolocation mouse cursor placed over the image displays its current coordinates in the status bar.

Geolocation may turn out to be calculated inaccurately. This could be related to errors in the satellite trajectory model, inaccurate or outdated orbital data (when using old telegrams with data).

This situation can be rectified using specially provided manual **geolocation correction**. To achieve that you need to draw coastline of the geographic object such as the one of a sea, a lake or a river and verify its position on the screen reference visible coastline of the object in question. This means that in case of overcast and in absence of visible coastline geolocation correction is not possible.

Calculation and correction of geolocation is done for the entire file and in case of a fragment it automatically applies to all windows open for this file.

3.4. Selection of Cut Out Area and Saving of Fragment


Thematic processing of data requires cutting out one or several fragments of smaller size from the source file. There are two options for cutting out fragments: manual and automatic.

In case of automatic cut-out the operator sets options for a fragment to be cut out: geographic coordinates of the center and a size. This type of cut-out is used if the operator works with the same area all the time. Cut-out process is very simply via **Actions - Auto Cut Out Fragment** or pressing **Ctrl+F** hotkey.

In case of manual cut-out the operator uses the mouse to select an area to be cut out. This option is used if the operator continuously needs to cut out different areas of random size.

The process of manual cutting out a fragment from the source file after loading begins with setting the cut-out mode (by default the file is in the image viewing mode).

To achieve that you need to go **Actions – Cut Out Fragment**, and in case of source files – use button  on the toolbar.

Checking against this command (or depressed state of the button ) indicates that SB is in the fragment cut-out mode.

Note. It is not recommended to take any other actions. If the operator dismisses the idea of cutting out a fragment, he needs to exit the cut-out mode by unchecking the command or releasing the button. In case of terminating cut-out operations SB exits the cut-out mode automatically.

After setting the cut-out mode you can proceed with the next step – **Selection of Cut-out Area**.

Selection of a cut-out area on the source file image is done using the mouse. The operator shall left click on one of the corners of the fragment intended to be cut out and with the mouse button depressed move the mouse towards the second corner of the fragment and then release the button. The selected area will be shown by red line.

After selecting an area the operator has two options:

- dismiss the selected area and select another one;
- save selected area information as fragment file.

In the first case you need to left click outside the outlined rectangle and select another area.

In the second case you need to left click inside the outlined rectangle. This will initiate the procedure for saving selected area as fragment file with selected options.

After saving the fragment SB transitions from the cut-out mode to the view mode.

Attention! The cut-out mode is set for each image individually therefore it is not recommended to switch to other windows until the cut-out process is complete.

4.THEMATIC PROCESSING

Thematic menu and toolbar is shown by opening fragment (DUF2-format) file.

Operator must make the next types of works:

- viewing of source information;
- fragment preparation for thematic processing.

Thematic processing is the main function of MeteoGamma application. This version of MeteoGamma application calculated the followings of cloud hydrometeorological parameters: therefore calculated are just estimated cloud characteristics of:

- cloud types;
- cloud top height;
- liquid water path;
- depth;
- cloud top temperature.

In accordance with the operator's query the following values are calculated for land and water surfaces clear of clouds:



- vegetation index;
- water surface temperature;
- water surface albedo (HRPT channel 1) for mapping optical heterogeneity of water surface.

Calculation results are shown as color raster images of all above listed characteristics. Average values for precipitation producing cloud types for the entire image are summarized in the table **Result characteristics of cloud types** in the log window.

4.1. Fragment Data Loading

A fragment file can be loaded by two ways:

- manually;
- automatically.

In case of manual loading file opening is done using standard Windows procedure: via **File – Open...** or by pressing the button . At the same option **File – Work with Fragment** shall be checked and the button  shall be depressed. This will configure all application options for working with fragments.

Automatic loading takes place after cutting out a fragment from a file with source data if option **Load after Save** is selected in **Fragment Save Options** dialog box in case of manual cut-out or in **Fragment Size and Coordinates** dialog box in case of automatic cut-out.

In automatic fragment loading two types of windows open: log window and the same type of window (with the same channel number or with the same combination of channels) as the one of the open source file.

In manual loading only log file gets open.

Unlike the source file where the operator can select initial scale of the image being loaded, a fragment image is always initially loaded in 1:1 scale.

There is the active file name and name of log file in a title bar. Standard information is in the first lines of log file:

- 1 line – name and number of satellite, revolution number;
- 2 line – Greenwich time (GMT) of beginning and end of image session;
- 3 line – of the receiving station and height above a sea level (m);
- 4 line – image size (pixels number × lines number), channels number;
- 5 line – position of center of image in relation to the centre of scan (pixels);
- 6 line – ascending or descending satellite orbit;

Below in a log window there is a report on the done calculation procedures and tables hatch with the mean values of the expected parameters.






Source information is viewed via **File – Information**. This opens dialog box **Image Properties**, that lists source data: data format, receiving station coordinates, satellite name and number, number of orbit, date and time of beginning pass (Greenwich time – GMT), image file size in pixels, channels involved in the file, orbital direction and reference scale of the loaded image.

4.2. Fragment Data Viewing

The following image types are available for viewing:

- Channel 1;
- Channel 2;
- Channel 3;
- Channel 4;
- Channel 5;
- Difference between channels 1 and 2;
- Difference between channels 3 and 4 (1);
- Difference between channels 3 and 5;
- Difference between channels 4 and 5;
- RGB Image;
- Composition Image;
- Thermal Composition.

Their opening is accomplished by the operator going **View – Source Data - ...**, where ... - the above window types.

Opening of the most frequently used window types can be accomplished using control panel buttons for channels 1, 4, difference between channels 1 – 2, thermal composition and RGB image      respectively.

4.3. Geolocation

Calculation of an image geolocation is performed in the process of opening and loading of the data file. Information required for the calculation is taken from the open file and in case of its absence in the file the operator is prompted to provide information to search for the required NORAD telegram file containing orbital data of NOAA and METOP series satellites.


Upon completion of geolocation mouse cursor placed over the image displays its current coordinates in the status bar.

Geolocation may turn out to be calculated inaccurately. This could be related to errors in the satellite trajectory model, inaccurate or outdated orbital data (when using old telegrams with data).

This situation can be rectified using specially provided manual **geolocation correction**. To achieve that you need to draw coastline of the geographic object such as the one of a sea, a lake or a river and verify its position on the screen reference visible coastline of the object in question. This means that in case of overcast and in absence of visible coastline geolocation correction is not possible.

Calculation and correction of geolocation is done for the entire file and in case of a fragment it automatically applies to all windows open for this file.

4.3.1. Coastline Drawing

Manual drawing of the coastline is achieved via **View – Coastline**, by using the **Ctrl+Alt+L** hotkey or by pressing the button  on the toolbar. Details see in **5.5.1 Service**.

можно производить эту операцию на увеличенном изображении.

может отказаться от нее нажатием клавиши **Esc**.

4.3.2 Correction of Geolocation

To correct geolocation you need to overlay coastlines of geographic objects with actual objects visible on the image. To achieve that you need to complete the following:

1. Draw **coastline** on the image.

2. Enable geolocation correction mode
3. Highlight area for overlaying
4. Overlay geographic object on the image with highlighted area.
5. Disable geolocation correction mode

Steps 3 and 4 need to be repeated **at least 3 times**, each time selecting the area to be highlighted in **different parts of the image**.

To facilitate the process of overlaying geographic object with drawn highlighted area this operation can be performed on a zoomed in image.

Geolocation correction mode setup is done by selecting the option in the menu **Actions – Geolocation Correction** or by pressing **Ctrl+B** on the keyboard with the selected image being active (difference of channels 1 and 2 works better)

Highlight Area for Overlaying is identical to highlighting area for a fragment cutout; left click on the image and drag the mouse with the button depressed in diagonal direction to draw a highlighting rectangle with boundaries. Upon completion of highlighting the required area release the mouse button. The coastline drawn on the image disappears. It remains only in the highlighted area, besides it becomes “tied” to the mouse.

Overlaying can be achieved using the mouse or the numeric pad.

Since the highlighted area is tied to the mouse, **mouse-assisted overlaying** requires moving the highlighted area carefully until entire overlaying with the visible coastline is achieved and then left clicking to end the overlaying mode.

Attention! After the overlaying mode is turned off the initially drawn coastline appears in the image. Results of the geolocation correction will become visible only after the correction is complete, i.e. after exiting the geolocation correction mode.

Overlaying with the use of the numeric pad is achieved using **up arrow, down arrow, right arrow and left arrow** keys to move by 1 pixel in the respective direction or using **Home, PgUp, End, PgDn** keys to move diagonally left-up, right-up, left-down, right-down respectively. If using the keyboard termination of the overlaying mode is achieved by pressing the **Insert** key.

Attention! Transition from the mouse-assisted overlaying to key-assisted overlaying is possible while the reverse transition is not, i.e. when working with the keyboard the mode shall be terminated by pressing the **Insert** key.

If the operator is not satisfied with the highlighted area or results of the overlaying process he can dismiss them by pressing the **Esc** key.

Work in the geolocation correction mode is ended by **deselecting the option** in the menu **Actions - Geolocation Correction** or by pressing **Ctrl+B** on the keyboard.

As a result the coastline with made corrections will appear on the image.

4.4 Calibration

Calibration of source data is accomplished using the standard procedure recommended by NOAA. The procedure generates an array of albedo and temperatures corresponding to possible readings of the radiometer (0 – 1023) in each spectral channel. The calibration procedure is mandatory for thematic data processing therefore it is run automatically at the file loading.

Completion of calibration is confirmed by albedo or radiant temperature values in the current point, which appear in the status bar of the active window. In viewing data of visible range the status bar shows albedo of the current point for the loaded channel and radiant temperature determined using data of channel 4. In viewing data of thermal ranges the status bar shows radiant temperature of the current point for the loaded channel and albedo determined using data of channel 1. Displaying these values facilitates visual analysis of cloudiness.

4.5. Surface Types Classification

Thematic processing consists of several stages. Some stages are fully automatic and some stages are run in interactive mode.

1) Type classification of underlying surfaces is a two-step process:

- building and analysis of multidimensional histograms on the basis of the cluster analysis procedure. This version of MeteoGamma application uses two-dimensional histogram built on the basis of the most informative data for cloudiness provided by channels 1 and 4.
- type definition of underlying surfaces.

The first step takes place in automatic mode via **Actions – Start of Processing** or by pressing the button (show button) on the toolbar. Initial breakout of the histogram can be set by **Clustering Options**. Clustering result is displayed in the form of color image (see **View – Results – Clusters** or the button (show button)).

The second step of the classification process starts off when the dialog panel **Select Way** (show dialog) is displayed. This is the most important step.

It is performed in interactive mode and requires the operator to have knowledge and skills on defining cloud types. Dialog with the operator is carried out using dialog panels. The operator is assisted with a table with averaged for each cluster albedo (Albedo), temperature (Tempr), cloud top height (C.T. Height) values, share of each cluster on the image (FRTCL), difference of radiant temperatures in channels 4 and 5 (T4-T5), located in the processing log. By dialog exchange the operator can view and operate any images.

Completion of this step results in creating a classified color image of types of clouds, land and water surface (show image **Cloud Types**).

2) Calculation of hydrometeorological parameters of cloudiness is performed in automatic mode. Completion of calculations is indicated by listing **Result characteristics of cloud types** in the table processing log and by back lighting of icons with calculated parameters on the toolbar.

4.5.1. Clustering Options

Clustering options are listed in the dialog box (show dialog), which can be accessed via **Options - Process Options**.

An experienced user of MeteoGamma application is provided with the opportunity to manipulate the clustering process. The classification of underlying surfaces is based on the cluster analysis procedure of two-dimensional frequency histogram. The histogram is plotted using data of the 1st (visible band) and 4th (infrared band) channels.

Initial breakdown is set separately for each channel. The tab **Plot Histogram** provides for experimental tip: set value intervals corresponding to approximately 3% albedo in the 1st channel (30) and 3°C in the 4th channel (45). The operator is provided with the opportunity to change values of intervals proper and their quantity if he is not satisfied with the clustering result. For repeated clustering it makes more sense to change interval quantity to go by the following rules:

1. If part of cloud cover is detected to be within the near-ground cluster you need to increase the number of intervals in both bands. Don't take too long for that if you deal with cirrus clouds.
2. If near-ground surface is shown in too much detail (by a big number of clusters) you need to decrease the number of intervals in the visible band.
3. If part of water surface is detected as a cloud cluster you need to increase the number of intervals in the visible band decreasing the number of intervals in the infrared band.
4. If sun glints appearing on a water object surface (normally in the morning) share one cluster with cloud cover you need to try to isolate the sun glints in one cluster by increasing up to the limit the number of intervals in both bands; if you cannot achieve this isolation then the calculation results on the clusters containing the sun glints are rejected.

Note. Upon completion of a processing session MeteoGamma application saves the latest entered processing options and uses them by default. It is recommended to set values in **Breakdown Interval** position provided by the tip upon completion of clustering activities.

4.5.2. Defining Cloud Types

Upon completion of the clustering procedure the **Clusters** image is formed (the corresponding icon is backlit) and **Select Way** dialog appears. This is the beginning of the identification stage in a continuous processing session. To return to the identification stage from the following stages and upon completion of processing you can also go **Actions – Identification**.

Open **Clusters** image. Clusters represent compact areas with similar characteristics in the visible and infrared regions of spectrum. Near the cluster image there is a tip suggesting certain surface type (types) identifier for each cluster.

Identifiers are defined automatically by analysis of albedo, temperature and cloud top height values average across a cluster. Analysis involves climatic characteristics of various types of clouds. Identification of cumuliform cloud cover takes place after image texture qualities analysis in the 4th channel: calculated values of average linear dimensions of each cluster elements are compared with average linear dimension taken from cloudy atmosphere data bank. For each cluster the most likely types of surfaces being analyzed are given in the tip separated by commas.

The following identifiers are used for clouds:

Sc/st	- stratocumulus and stratus;
Cu	- cumulus (vertically developed clouds);
Cu hum	- cumulus humilis (vertically developed clouds);
Cb	- cumulonimbus;
Ns	- nimbostratus;
As	- altostratus;
Ac	- altocumulus;
Ci	- cirrus, cirrocumulus and cirrostratus;
Mist	- mist.

Near-ground surfaces can be denoted as:

Sur	- combined ground and water surfaces;
Sg	- smog, smoke plumes, large fire seats, thermal pollution of cities and water objects.

Clusters related to ground or water surface per the maximum possible threshold values are automatically initialized by water or ground surface on the value delta signature in the 1st and the 2nd radiometer channels.

To move from clusters to types of clouds and types of ground and water surfaces you need to either agree to suggested tips (automatic selection) or manually enter identifiers of types of underlying surfaces.

In the process of analyzing the **Clusters** image the operator shall decide if he is satisfied with the results of clustering and suggested identification of underlying surface types. Next to the cluster image in the legend there is a tip suggesting certain identifier of surface type (types) for each cluster (see list of identifiers and their meanings in **Defining Cloud Types**). Types of analyzed surfaces selected for each cluster are given in the tip and separated by commas, the first in line being the most likely.

Before selecting way of processing via the dialog panel **Select Way**, the operator **must** **analyze clustering results** focusing on:

- accurate near-ground surfaces and clouds isolation (if in doubt clustering shall be repeated with new histogram options, to accomplish that select **Repeat** clustering in the dialog panel);

- right selection of highly important precipitation producing types of clouds Sc, Cu, Cb, Ns; **Automatic** confirms suggested tips for type setting per the first identifier positioned before the first comma and transfers control to the calculation module.

Manual provides the operator with the opportunity to set one of the surface types for each cluster or introduce required corrections in the classification suggested by the tip. Therefore

each selected type of clouds is assigned with a microphysical model to be used in calculations that will follow.

Thus, **Automatic** could be checked only if you completely agree with the tips suggested in the legend.

Manual type set provides the operator with the opportunity to set one of the surface types for each cluster or introduce required corrections in the classification suggested by the tip. This all is accomplished using the dialog panel.

First of all ground and water surfaces included in the cloud class are redefined. Mark such clusters as **Sur** and finish selection. Cloud type assignment then follows on the basis on the newly created **Clusters** image. In manual type selection of surface types the type **Sg** can be assigned to all clusters, which present problems, for instance, sun glints on water surface, since the type **Sg** is not subject to further thematic processing.

This processing stage produces classified color image of types of clouds, ground and water surfaces (the image **Cloud types**).

4.6. Calculation of Cloud Characteristics

Calculation of hydrometeorological characteristics takes place in automatic mode upon completion of the stage of underlying surface type classification. Completion of calculations is indicated by appearance of the table **Result characteristics of cloud types** and backlighting of the icons with the calculated characteristics on the toolbar. This version of MeteoGamma application uses simplified models for calculation of cloud hydrometeorological characteristics therefore calculated parameters are just estimated cloud characteristics of:

- cloud top height;
- liquid water path;
- depth;
- cloud top temperature.

Characteristics of cloud top height, liquid water path, cloud depth are calculated for precipitation producing cloud types Sc, Cu, Cb, Ns. Cloud top temperature is calculated for all cloud types except cirrus.

Calculation results are shown as color raster images of all above listed characteristics. Average values for precipitation producing cloud types for the entire image are summarized in the table **Result characteristics of cloud types** in the log window.

4.7. Calculation of Ground and Water Surface Characteristics

If the operator selects the option to calculate additional values for cloudless ground and water surfaces when calculation of hydrometeorological cloud characteristics is complete the following characteristics will be calculated automatically:


- vegetation index (NDVI – normalized difference of the 1st and 2nd HRPT channels);
- water surface temperature (per NLSST and MCSST algorithm using data of the 4th and 5th HRPT channels);
- water surface albedo (1st HRPT channel) for mapping optical heterogeneities of water surface.

Results of these calculations are shown in the form of additional (to main MeteoGamma application themes) color raster images. In case of using variable scale spacing the contrasting procedure could be applied to these images (see **Contrasting**) to achieve additional visual effects.

Note. In the standard supplied package variable spacing scale is used for water albedo only.

4.8 Saving Processing Results

To have the ability to view results of the thematic processing in future without switching to processing, you need to save these results to disk.

To save processing results make sure the option in the menu **Options – Save Results** is checked or the button  is depressed on the toolbar at the time of the fragment file closure.

In this case on closure of the fragment file or MeteoGamma application proper the files with the processing results will not be erased from disk and will be available for viewing during subsequent application sessions.

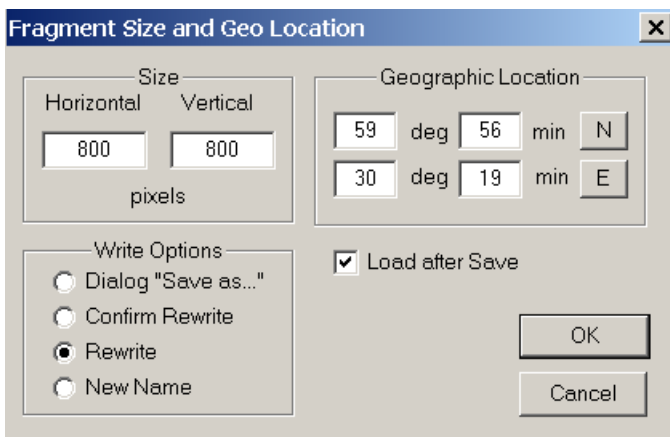
By default the results are not saved. Please note that saving all the results of one fragment processing produces 17 files and their total size approximately equals the size of this fragment file. A catalog for storing processing results can be defined in the dialog box **Options – Paths – Result Data**.

5. SERVICE

Service functions: automatic fragment cut out, automatic images open, print, save images as graph format files, animation, palette edit.

5.1. Automatic Fragment Cut Out

Setting of fragment auto cut-out options is accomplished via menu **Options – Auto Cut Out Options**. This opens the dialog box **Fragment Size and Geo Location**.



Here the operator can set fragment vertical and horizontal dimensions to minimum 200 and to maximum 1000 (the limitations are imposed by thematic processing capabilities), as well as geographic coordinates of the fragment to be cut out.

To load or not to load the fragment after saving is based on checked Load after save option.

Separate channels and HIRS selection is not available as information is saved as a whole.

In **Write Options** group the operator can select available options for writing fragment file to disk:

- **Always display file saving dialog.**
- **Ask to confirm overwriting.**
- **Overwrite the existing file without asking.**
- **Generate new name.**

In all cases except the last one the file is saved by the name of the source file with added suffix **_f1**. In the last case if the file name has **_f1** suffix the number 1 will be replaced with currently non-existent number (2, 3, etc).

It is recommended to select the option **Overwrite the existing file without asking**, in order not to generate identical files with different names. However the operator can select any option.

Save made changes by pressing the button **Save**.

Cutting is accomplished after opening the source file by pressing the keys **Ctrl+F**.

5.2. Automatic Open Images

During thematic processing and on its completion the operator has to perform many repeated actions. This where **Auto Open Images** feature could be convenient which allows automatic execution of the following actions:

- transform an image into a stereographic projection;

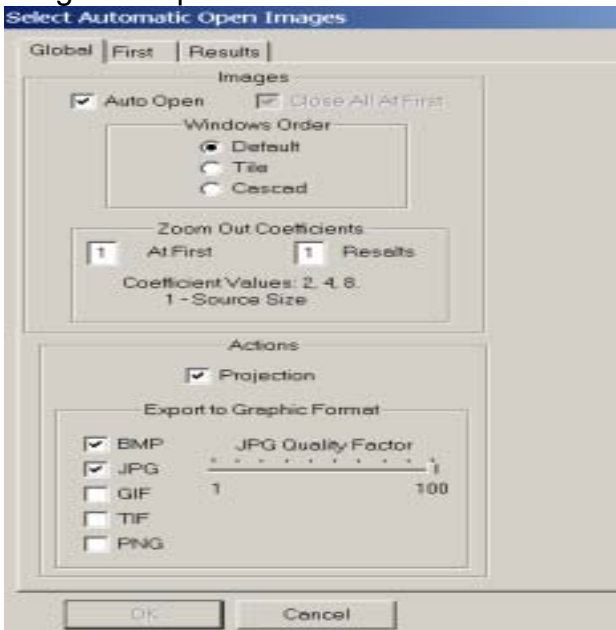
- open required images upon completion of the type definition stage (usually these are **Channel 4** and **Clusters**);
- open required window with results on completion of the processing cycle;
- create files in BMP format for open result windows.

To enable auto open images mode set option **Options – Auto Open Images**.

Note. If you need to obtain results in BMP format with overlaid geographic objects you need to set the option of overlaying these objects on image opening.

Auto Open Images Global Options

Changing options for auto open images mode is done via **Options – Auto Open Images Setup**. This opens the dialog box **Select Automatic Open Images** where you click the tab **Global** and set the option **Auto Open**. If the operator wants to use the mode of auto open image this option needs to be checked.



Note. Enabling and disabling of this mode can be accomplished promptly without changing options via **Options – Auto Open Images**. However actions to this command will be executed only if the option **Auto Open Selected** is checked.

Opened images are provided with automatic execution of options such as transformation into a projection (option **Projection**) in accordance with the set transformation options.

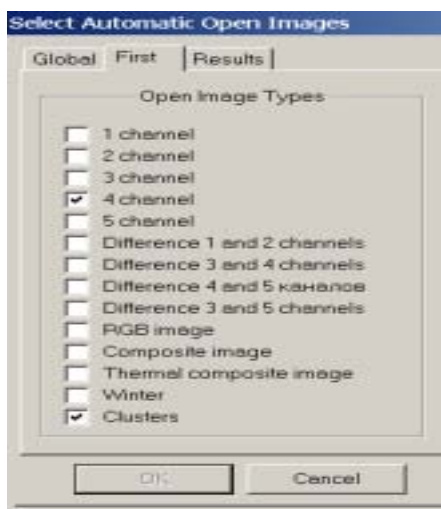
Note. The option **Load dialog before transformation in cartographic projection** in the projection options shall be disabled. Similarly the option **Transform in UPS projection before open data file** shall be deselected.

In addition types of images selected under the tab **Results** can automatically be saved as graphic format file and written to disk if the option **BMP, JPG, GIF ...** in group **Export to Graphic Format** is checked. For JPG format it is possible set **JPG Quality Factor**.

To enable auto open image you need to set the option via **Options – Auto Open Images**.

Actions Before Processing

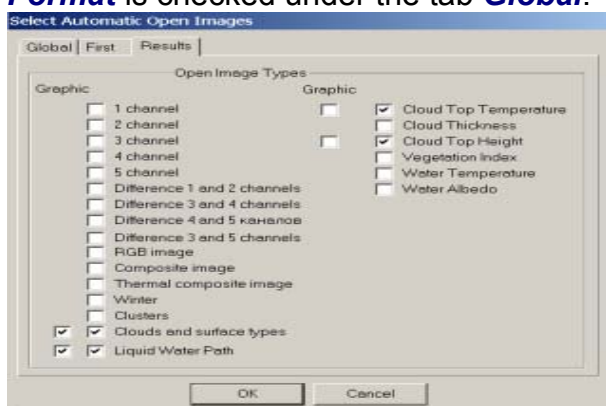
The tab **First** of the dialog box **Select Automatic Open Images** contains the group **Open Image Types** where the operator can check those types of images, which should automatically open before thematic processing that is after clustering. Normally these are **Channel 4** and **Clusters**.



Note. If the operator wants to see an open image with inserted geographic objects he needs to select insertion of these objects upon image opening using the options for geographic objects.

Actions After Processing

The tab **Results** of the dialog box **Select Automatic Open Images** contains the group **Open Image Types** where the operator can check those types of images which should automatically open after thematic processing. Additional capability will become available for selected image types to select **Graphic** image formation and saving to file. This capability becomes available only if the one of options **BMP, JPG...** in group **Export to Graphic Format** is checked under the tab **Global**.



Note. If the operator wants to see an open image and graphic format image with inserted geographic objects he needs to select insertion of these objects in the options for geographic objects, i.e. check the option **Automatic Draw**.

Introduced changes need to be saved at the end of editing options under all tabs by pressing the key **Save**.

5.3. Export Results

Active window image information can be sent to printer via **File – Print** or can be saved in graphics format to disk files via **File – Save As...**

Note. Export of an image is always done to the same scale as the image in the active window. It is exported the way it looks on the screen: with drawn geographic objects and in case of fragment files – including Severe Weather Events signs if any were drawn.

Headers and footers

Images sent to printer or saved as graph format can be assigned to carry additional information – header and footer. The flag for displaying or not displaying this information is set via **File – Titles**. Information to be displayed is entered by the operator separately for each image type and saved the same way as the other options of MeteoGamma application.

Contents of headers and footers are set using the dialog box Set header and footer, which is opened via **File – Header / Footer**. Here you can also apply required font settings including color.

When entering headers and footers you can use the following abbreviations, which will be replaced with values, and the three keys affecting horizontal text alignment:

Abbreviation	replaced with
/tc	name of image type
/sd	image date
/st	image Greenwich time (GMT)
/s	name and number of satellite
/f	file name
/dt	current date and time
/d	current date
/t	current time

Key	effect to text
/l	align left on page
/r	align right on page
/c	center on page

Note. Header and footer are set for each type of image separately and saved to file if Titles dialog had option **Save by Default** selected. Otherwise they survive only until the window with this image is closed.

5.4 Palette

The palette utilized by MeteoGamma application consists of several palettes each of which is related to certain type of thematic images.

For most of the images (the exceptions are **Clusters** and **Cloud Types**) the palette comprises two sections: the main scale with color distribution of the basic parameter value range and the scale of underlying surfaces.

The default palette file (**Colors.pal**) could be viewed or located on disk using the dialog via **Options – Paths – Default Palette File**.

All thematic processing windows are displayed using the currently set palette. The palette is loaded by the application automatically once at the time the first image utilizing the palette is opened or by the operator going to **Options – Palette – Palette Load** (any time).

The palette operating commands are located in the menu group **Options – Palette**.

Command	Action
Load Palette	New palette is loaded
Save Palette	Edited palette is saved
Edit Palette	Opens dialog for editing palettes

5.4.1 Load and Save Palette

A palette is loaded via **Options – Palette – Load Palette**. This opens the standard file opening dialog showing standard palette name. When opening this or another file the palette is loaded and set up in the application. The new palette becomes current and editable.

Attention! Each loading makes the newly loaded palette current overwriting the previous one with all changes made to it. Therefore you need to exercise caution when loading a palette if the previous palette was edited without saving to disk.

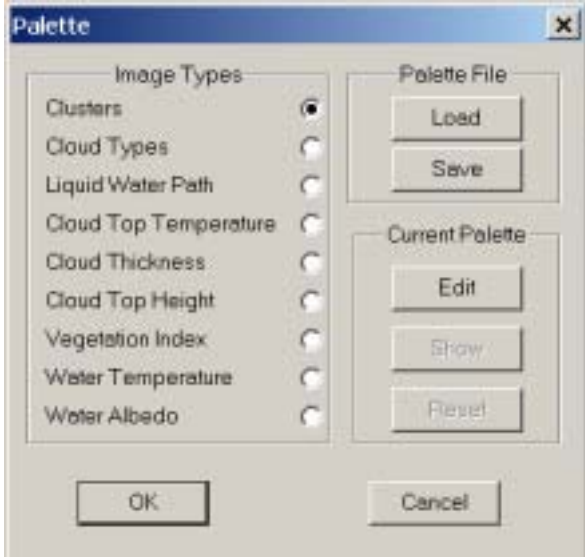
A palette is saved via the menu **Options – Palette – Save Palette**. This opens the standard file saving dialog showing the default palette path and the name **nMyColors.pal**. The current palette is saved including all changes introduced and saved during editing sessions.

5.4.2 Edit Palette

Palette editing is accomplished during one or several editing sessions.

An editing session is the operator's actions from the time of opening the **Palette Edit** dialog until its closing. Any part of a palette is edited separately.

Switching to editing mode is accomplished by the operator going to **Options – Palette – Palette Edit**. This opens the dialog box **Palette** on the screen.



This dialog could be used to do the following:

1. Select a palette to be edited (buttons in group **Image Types**).
2. Change colors in a palette (button **Edit** in group **Current Palette**).
3. View results of the editing (button **Show** in group **Current Palette**).
4. Save editing results to a file on disk (button **Save** in group **Palette File**).
5. Cancel the results of all the editing sessions and return to the initial palette (button **Reset** in group **Current Palette**).
6. Save the editing results and exit the dialog (button **OK**).
7. Exit the dialog without saving (button **Cancel**).

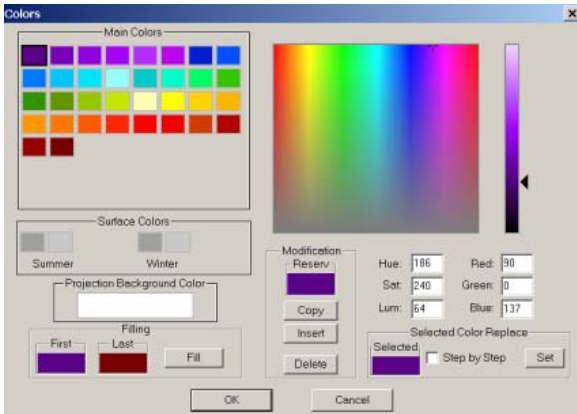
The process of editing is consecutive completion of steps 1, 2, 3 required number of times for various palettes and step 6 or 7 at the end.

Step 4 is not compulsory. An edited palette can be saved at any time after exiting the editing box.

Recommendation. Prior to editing open the image whose palette will be edited to be able to view introduced changes without exiting the editing dialog.

Replacing Colors in Palette

Replacing of colors in a palette is achieved in the dialog box **Colors**, opened by pressing the button **Edit** in dialog box **Palette**.



The left hand part of **Colors** dialog box contains the main constituent colors of the palette – **Main Colors**, **Surface Colors**, and additionally **Projection Background Color** shown in boxes.

Here you can left click to select color to be changed. It will be highlighted by a black box. This color will automatically be moved to the group **Selected Color Replace** as **Selected**.

The selected color could be replaced using standard Windows procedure (by selecting in the spectrum to the right or entering numeric value of its constituents).

Using the button **Set** the new color can be moved from the group **Selected Color Replace** to its place in the palette. If several colors need to be replaced consecutively in the palette the operator could save clicking every time on a new palette color. This is set by the option **Step by Step**. In this case color selection in the palette will automatically shift to another.

Selected color could be placed on stand by through left clicking on the field **Reserve** of the icon group **Modification**. From there it could be copied to the palette (the button **Copy**), inserted before the selected one (the button **Insert**). When inserted all colors are shifted to the right. By pressing the button **Delete** the selected color is deleted and all colors are shifted to the left.

The group **Filling** is designed for automatic filling in of the indicated palette color range with intermediate colors. On opening the dialog box **Colors** the first palette color is **First** and the last one is **Last**. Both first and last ordinal numbers could be changed by selecting any color in the palette (by a mouse click), and then clicking on **First** or **Last**. Pressing the button **Fill** will fill in the range between the first and the last numbers with intermediate colors between the first color and the end color.

Upon changing colors they need to be saved by exiting the dialog box via the button **OK**. This brings you back to the dialog box **Palette**.

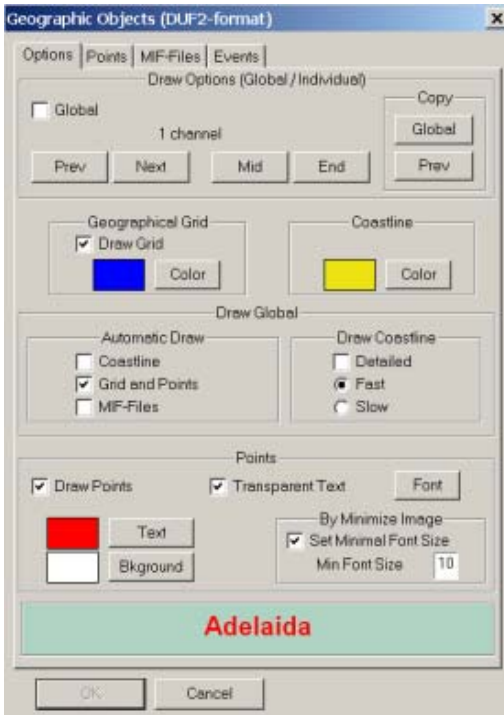
5.5 Geographic Objects Draw Options

To change options for geographic objects use **Options – Geographic Objects**. This opens the dialog box where the operator can set options for drawing objects on the image, such as type of drawing setup, drawing options for coordinates grid, names of points, coastline, region boundaries. The operator can set list of points names and its coordinates, list of names vector files (MapInfo Format – **MIF**); set **Severe Weather Events (SWEvents)** signs attributes, select current **SWEvents** sign.

Drawing options are set separately for source files and fragment files, which is reflected in the dialog box title: **Geographic Objects (RAW format)** or **Geographic Objects (DUF2 format)**. If there are open images on the screen a dialog is displayed which corresponds to the type of the open image and if there are no open images on the screen – the one corresponding to depressed or released buttons.

5.5.1 Geographic Objects Global Options

The **Geographic Objects** dialog box, which contains the tab **Options** where the operator can set options for drawing objects on the image, such as type of drawing setup, drawing options for coordinates grid, names of points, coastline, region boundaries.



The button **Global** in the **Draw Options (Global / Individual)** group of the dialog box allows setting global drawing options individual options for each type of image. Individual options in different combinations could be set for the following types of objects:

- for coordinates grid – the tag for drawing on an image and color (the buttons **Draw Grid** and **Color** in the group **Geographical Grid**);
- for coastline – color (the button **Color** in the group **Coastline**);
- for names of points – the tag for drawing on an image, text and background color, its transparency and font properties (the buttons **Draw Points**, **Color**, **Background**, **Transparent Text**, **Font** in the group **Points**). Additionally you can limit font decreasing in scaling mode (the button **Set Minimal Font Size** and setting minimum font size in the group **By Minimize Image**).

Global for all image types are such options as drawing coastline, coordinates grid and points, as well as automatic drawing of pre-selected graphic objects from files on image opening (the buttons **Coastline**, **Grid and Points**, **Graphic Objects** in the group **Automatic Draw**).

Coastline type is also global for all types of images (the buttons **Detailed**, **Fast**, **Slow** in the group **Draw Coastline**). Selection of a detailed coastline means drawing such objects as small rivers. In this case the drawing process can take a long time therefore it is not recommended to select this option if that is not really required, especially in case of low computer performance. Selection between fast and slow options is selection between fine and coarse coastline. If general view of the coastline is required it makes sense to use fast option and if correction of geolocation is required slow and detailed options are preferred.

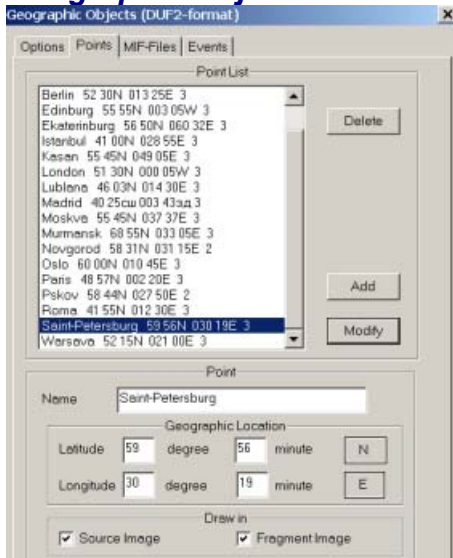
To simplify individual setup the operator is provided with the opportunity not to set each type of images separately but copy the options for the previous type or global options. All the above buttons are located in the group **Draw Options (Global / Individual)** and they become visible in selecting individual setup. There are four buttons to change from one type of image to another. The name of the selected type is displayed above the buttons. They could be changed by consecutively going forward and backward (the buttons **Previous** and **Next**) and by jumping to the middle or the end of the image types list (the buttons **Mid** and **End**). For each selected image type all options could be manually set or copied as already existing – options of the previous image type or global options (the buttons **Previous** and **Global** in the group **Copy**).

Note. In case of jumping via the buttons **Mid** and **End** the previous setting will be for the type

preceding the middle or for the type being the second from the end and not the one from which the jumping was made.

5.5.2 List of Points

Changing of the list of points drawn on an image is done via the tab **Points** of the dialog box **Geographic Objects**.



Using buttons in the group **Point List** you can add a new point (the button **Add**), delete a selected point (the button **Delete**), edit options of a selected point (the button **Modify**).

Pressing of the button **Modify** in the bottom part of the tab displays the group **Point**, where a new name and geographic coordinates of a point could be entered.

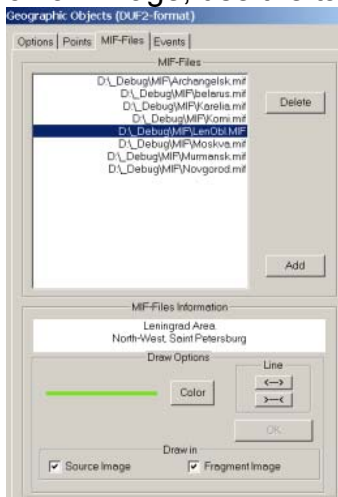
The list of points is global for both source files and fragment files. The operator has the opportunity to use the group **Draw on** and for each point name check the type of files where it will be drawn on (the buttons **Source Image** and **Fragment Image**). Unchecking both buttons allows excluding the point from drawing on an image without deleting it from the list.

All introduced changes to a certain point's options should be saved by pressing the button **Save**, or cancelled by pressing the button **Cancel**. Further operations will be blocked unless any of these two buttons is pressed.

The function of adding a new point (the button **Add**) differs from the function of changing (the button **Modify**) to the extent that in case of adding no fields are filled in of the group **Point**.

5.5.3 List of Vector Objects Files

To change the list of optional vector objects from files (in particular region boundaries), drawn on an image, use the tab **MIF-Files** of the dialog box **Geographic Objects**.



Using buttons in the group **MIF-Files** you can add a new graphic file created by MapInfo application in MIF format with region boundaries or other graphic data (the button **Add**) or

delete a selected file (the button **Delete**).

For each selected MIF-file accompanied by the associated MID-file the group **MIF-file Information** displays information on the file contents.

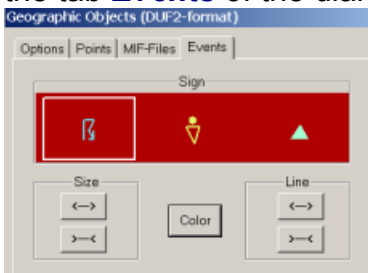
List of files with graphic information is global for both source files and fragment files. The operator is provided with the opportunity to use the group **Draw Options**, subgroup **Draw in** to select the type of image, which it will be drawn on (the buttons **Source Image** and **Fragment Image**). Unchecking both buttons allows preventing the file from drawing on an image without deleting it from the list.

Also the operator can go to the group **Draw Options** to change for each file the color and thickness of the drawn line using the buttons **Color** and two buttons in the subgroup **Line: <->** and **>---<**.

Note! All changes made in the group **Draw Options** the operator shall save by pressing the button **OK** in this group before selecting another file for editing otherwise all changes will be lost. In case of exiting via the button **Exit** all changes will be cancelled except such changes of MIF-Files drawing options as line color and thickness. Saving of these options is accomplished individually for each MIF-File in the process of its editing and they are changed only through new editing process.

5.5.4 Severe Weather Events Signs

To change the view of Severe Weather Events (SWEvents) signs inserted in an image use the tab **Events** of the dialog box **Geographic Objects**.




Here the operator may select the current symbol by left clicking on its image. Presently symbols of three hazardous events are used: storm, rainfall, hail.

The following options can be modified for a selected symbol: color (the button **Color**), size (the buttons from the subgroup **Size: <->** and **>---<**), line thickness (the buttons from the subgroup **Line: <->** and **>---<**),


Introduced changes need to be saved at the end of editing options under all tabs by pressing the key **Save**.

5.6 Set Severe Weather Events Signs on Image

To set Severe Weather Events sign on image operator must press the  button on toolbar. Then by a mouse left clicking on active window image SWEvents sign appears on this point. A repeated left click on this point removes **this** SWEvents sign. Right click on this point removes **any** SWEvents sign.

To change SWEvents sign operator can use **Options – Geographic Objects – Events** or right click on legende field of thematic window. To close **Events** dialog box on legende field it needs repeated right click on this dialog box.

After all settings press the  button on toolbar once again.

Note. For draw SWEvents signs on an image operator must at first press the  button on toolbat and then open an image.

Check this option appears on left clicking on the option and indicates that the toolbar is displayed on the screen. A repeated click on the option removes the check and simultaneously hides the toolbar.

5.7 Animation

MeteoGamma application provides opportunity to view homotypic results from different files in dynamic mode per prewritten script. Currently animation is available only for processed fragment files (hrp-files of DUF2 format), as well as for processing results saved by exporting data (gdf-files).

To produce fragments identical in position and size source file cutting should be done using automatic cut-out feature.

Prior to including fragment files in an animation script you need to complete full file processing if there is a need to view processing results since animation shows only what has been completed.

To obtain required view of an image in the process of animation the operator needs to check all the options (coordinates grid, points, coastline) if he wants to see them on that image, besides the option for their insertion on window opening shall be checked.

During processing and animation primary options for obtaining similar images shall not differ.

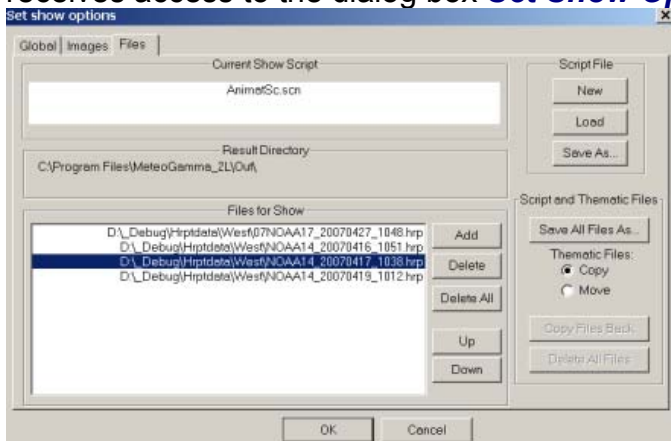
When script writing is complete animation can be started by **Actions – Animation – Start Animation**. After that all windows open in MeteoGamma application will close and animation will be played back.

Animation can be stopped by **Actions – Animation – Stop Animation** or by pressing hotkeys **Pause** or **Space**.

When stopped animation playback could be continued by **Actions – Animation – Continue Animation** or by pressing the same hotkeys **Pause** or **Space**.

Animation Script

Writing of animation script shall start off by **Options – Animation Setup**. The operator receives access to the dialog box **Set Show Options**.



Having opened the tab **Files**, press the button **New** in the icon group **Script File**. The field **Current Show Script** will show the name of the script by default **AnimatSc.scn**. This clears the list of animation files and assigns the default name to the script, i.e. the link to the previous script is lost to prevent its overwriting. At the same time all previously set options in the tabs **Global** and **Images** are saved.

After that it is recommended to first save this unfilled script by pressing the button **Save as** in the group of buttons **Script File** under a new name and then start filling it in. Later on an empty or filled-in script file could be loaded by pressing the button **Load** in the group of buttons **Script File**.

Filling in a new empty script file is done per the following procedure. First you need to fill in the list of files involved in the animation and select image types for showing on tab **Images**, and then set show options on tab **Global**.

Attention! Please note that opening the dialog box **Set Show Options** always displays the latest used script and all introduced changes will affect it. So if the operator wants to save

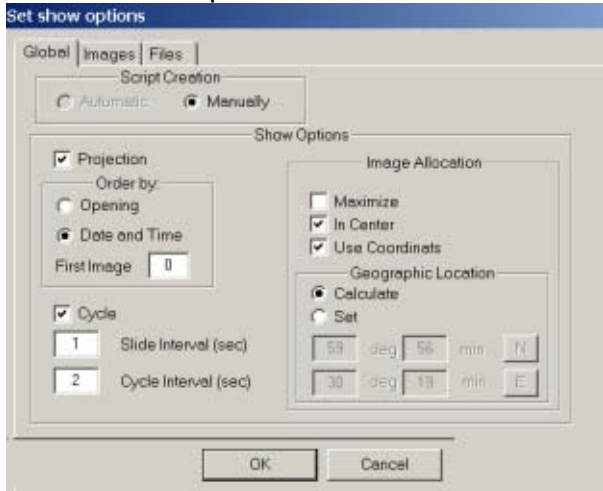
several scripts and not modify one script all the time he shall always start off with pressing the button **New** and saving it under a new name.

Group *Script and Thematic Files* is intended only for the advanced users!

Introduced changes need to be saved at the end of editing options under all tabs by pressing the key **OK**.

Show Options

Global show options are set under the tab **Global** of the dialog box **Set Show Options**.



Script creation is presently done only in manual mode therefore the operator can not modify this option. He can only change show options using the group under the same name.

Here he can set such options as cycling show (or single run show) using the selector button **Cycle**, and setting intervals between displaying different images (**Slide interval (sec)**) and cycles (**Cycle interval (sec)**). Interval values can be selected in the range from 0.5 to tens of seconds.

The group **Order by** can be used to select animation by particular date and time of pass or in according to the order of putting the file names in the list for a show (the buttons **Date and Time** and **Opening**).

Additionally you can select the first file to show from the list of selected images (**First Image**). Numbering starts with 1, if number of selected images is exceeded this option will be ignored.

The group **Image Allocation** has default options set for quality image displaying:

- **Projection** – checked;
- **Maximize** – unchecked;
- **In Center** – checked;
- **Use Coordinates** – checked.

The subgroup **Geographic Location** has the button **Calculate** selected.

Introduced changes need to be saved at the end of editing options under all tabs by pressing the key **OK**.

Image Type Selection

Selection of image types for a show is done under the tab **Images** of the dialog box **Set Show Options**.

Here you simply need to check those image types, which should be used in the animation.

Note. It is not advisable to select a large number of image types simultaneously. It is recommended to limit their number to two since computer performance could be affected.

Set of Files for Animation

After opening the tab **Files** of the dialog box **Set Show Options** you can proceed with editing the file list.

For this purpose the button group **List of Files for Animation** contains the buttons **Add**,

Delete, **Delete All**, assigned with corresponding functions for the list. The buttons **Up** and **Down** allow moving file names in the list changing their order, which could be used for setting a non-typical order of a show. Total not more than 16 files can be selected for a show, which is limited by specifications of MeteoGamma application. Files can be selected from different directories.

It is recommended that the buttons from the group *Script and Thematic Files* should be used by advanced users only, who understand the process of file processing run by MeteoGamma application.

File Composition for a Show

Advanced users are provided with the opportunity to use file composition mode for an animation show in certain catalogs. These actions could be completed with the use of buttons presented under the tab **Files** of the dialog box **Set Show Options**.

Attention! Be extremely careful while operating buttons of this group knowing exactly the functions these buttons are assigned with as unlike other actions in writing a script these could lead to physical moving of various files and even their irreversible deletion. At the same time they allow putting together all files required for viewing results obtained on a certain day and removing them automatically from the heap of worked files dispensing the operator from the necessity of manually cleaning work directories.

In event of composition all fragment files, thematic results and accompanying service data could be placed in separate catalogs named after associated scripts. All the files could be copied to separate catalogs (the button **Copy** in the subgroup **Thematic Files** is selected), and also they could be moved there (the button **Move** in the subgroup **Thematic Files** is selected), cleaning the source catalogs from unneeded files. Pressing the button **Save as** in the group **Script and Thematic Files** will create a catalog next to the script file with the same name as that of the latter, where copying or moving all necessary files will take place.

Taking these actions makes sense only if a script is entirely tested and checked.

If a new processed file is to be added its results will be located not in the catalog common for the script but where the application places it when processing (see the menu **Options - Paths – Result Data**).

Therefore the results will be located in different catalogs which will not allow correct animation. The fact that a script affected by such actions becomes incorrect is confirmed by showing two catalogs instead of one in the field **Result Directory**. A correct script can have only one results catalog.

The simplest way to avoid such cases is before adding a new file return all files by pressing the button **Copy Files Back**. After that add a new file and use again the button **Save All Files As...** in the group **Script and Thematic Files** as the old script file. All files including the newly added will be written again to that separate catalog.

Attention! The most dangerous button **Delete All Files** in the group **Script and Thematic Files**. If pressed not only the script file is deleted but also is the created catalog will all files including fragment files copied or moved to it.

Appendix

Appendix 1

Location of Data on Disk

After the installation work directories are located by default within MeteoGamma application directory. Since files with satellite data are quite large in size the recommendation for advanced users will be to move all work directories to a separate disk. Please see below recommended distribution of data between directories (names are chosen arbitrarily).

1. Source files received from the station are located on disk in **Source** directory.
2. Fragments cut out from these files are saved to disk in **Fragments** directory.
3. Make **Fragments** directory the source directory for opening files.
4. Make **Results** directory the directory for writing results of thematic processing.
5. Graph format files are better to be placed in **Pictures** directory.

All paths to data can be set by:

- responding to SB prompts when they appear;
- using path show/setting dialog **Options – Paths**;

Appendix 2

Operator Actions

MeteoGamma application provides for the following types of work:

- viewing of source information;
- fragment preparation for thematic processing;
- thematic processing;
- viewing of obtained results;
- sending results to printer or exporting them into BMP format.

To complete the entire information processing cycle the operator shall do the following after starting MeteoGamma application:

1. Load file with source information.
2. View image, cut a fragment out from it and save it to file.
3. Load fragment, and view it.
4. Perform thematic processing.
5. View processing results.
6. If required send results to **Print** or **Export them into Graph File Format**.
7. **Save Results** of processing.
8. Close processed files.

Repeat steps 1 – 8 for required number of files and end operations by exiting MeteoGamma application.

To make work easier the operator can preset various options of files processing.