Digital Photogrammetric System

PHOTOMOD

Version 8.0

USER MANUAL

General system's parameters (Windows x64)

RACURS

Table of Contents

1. The "Settings" window

The system provides possibilities to setup system's parameters to perform different steps of project processing. The **Settings** window is used for this.

To open the window choose **Service › Settings** or click the 🖼 button of the main toolbar.

> All changes take effect after clicking OK, unless stated otherwise (see Section 19).

2. Settings of windows and marker display

2.1. Settings of windows display

The **Windows** tab is used to specify display parameters of 2D-windows.
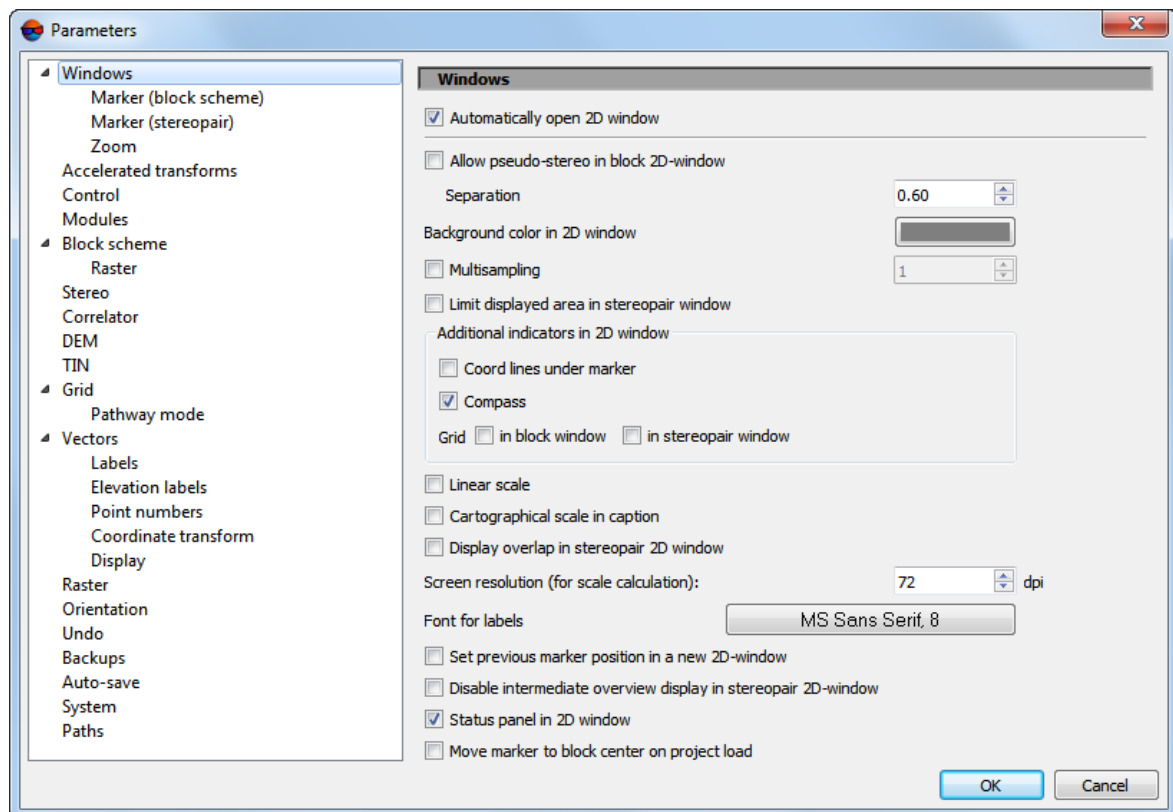

Fig. 1. Settings of 2D-windows

Images block is opened by default in 2D-window when the system starts. If it is necessary to display only the main menu and toolbar (without 2D-window) when the system starts, which were opened in previous session, set the **Automatically open 2D-window** checkbox off.

The system allows to work in pseudo-stereo mode in the block scheme window.

Pseudo-stereo – is a stereo mode, where orthogonal projection is used for left eye, and for right eye – parallel projection with some angle to normal line.

In order to turn on the pseudo-stereo mode perform the following actions:

1. Set the **Allow pseudo-stereo in block 2D-window** checkbox.

2. [optional] To define an angle of projection to normal line, specify the **Separation** coefficient.

> A **Separation** coefficient is equal to survey height/basis ratio. The more precisely **Separa-tion** is set, the more accurate Z measurements made in this mode will be.

3. Click OK. To apply changes, close 2D-window and open it again by selecting the menu item **Windows › 2D-window (block)**.

4. Buttons used to turn on and setup stereomode are added in 2D-window toolbar. The buttons are the same as buttons in stereopair 2D-window.

In order to specify background color of 2D-windows, click in **Background color in 2D-window** area and select desirable color from standard color box.

> Re-open 2D-windows to apply changes.

The **Multisampling** checkbox setting allows you to improve the quality of visualization of objects in the 2D window by using the additional computing power of the video adapter. Increasing the default value in the appropriate input field improves the detail and quality of the display of objects in the 2D window, with a possible decrease in system perform-ance.

> **Multisampling** is recommended to be used on workstations equipped with a powerful video adapter (12 GB and higher), in situations that require the highest possible quality of data display when demonstrating project materials on the workstation screen.

> Clear the **Multisampling** checkbox when performing *PHOTOMOD* operations that require sig-nificant system resources.

The **Limit displayed area in stereopair window** checkbox allows to display in 2D-window just those parts of layers, which fall into rectangle bounding the stereopair (in project coordinate system).

The **Additional indicators in 2D-window** section is used to turn on/off the following parameters:

• **Coord lines under marker** – allows to add to the marker *guides* in the form of red and green dash lines which are co-directed with the active (main or additional) co-ordinate axes. The red line is aligned with the X-axis, and the green one is aligned

with the Y-axis. The guides enable us to assess mutual alignment of the objects on images.

> The system also allows us to rotate marker cross-hair according to the axes of the additional (user) coordinate system.

- **Compass** – allows to display in left lower corner of 2D-window axes orientation of project coordinate system in a marker position;

- **Grid** – allows to display coordinate grid **in block window** and/or **in stereopair window**. In 2D-window a grid is displayed approximately in a marker position height;

- **Linear scale** – allows to display a scale bar (in marker coordinates) and GSD in left lower corner of 2D-window;

> In this case, the scale is a aspect ratio of objects on using monitor to real dimension.

> Compass, linear scale and grid are displayed in the *Marker* layer. In order to hide them (along with marker), turn off the layer visibility.

- **Display overlap in stereopair 2D-window** – allows to display images overlap area in stereopair 2D-window (it is calculated using block scheme).

Also the following display parameters are set here:

- in the **Screen resolutions** field is set *dpi* value for linear scale calculation;

- the **Font for labels** field allows to specify a style of standard labels displaying in 2D-window. To do this click the button and choose font, size and style of labels from standard Windows set;

- the **Set previous marker position in a new 2D-window** checkbox allows to save marker position on image in each new 2D-window relatively to previous window;

- the **Disable intermediate overview display in stereopair 2D-window** checkbox allows to speed up a transition between stereopairs;

> ⚠ If this option is enabled there may be some worsening of image visual quality.

- the **Status panel in 2D-window** checkbox allows to display a status panel in lower part of 2D-window;

- the **Move marker to block center on project load** checkbox is used to place a marker during project loading to 3D center (including average height) of block. The

center is calculated if adjustment is available and if the center is located within the bounds of current block layout.

2.2. Marker settings

The system provides possibilities to choose a marker display style (type, size and color) for block scheme and for stereopair.

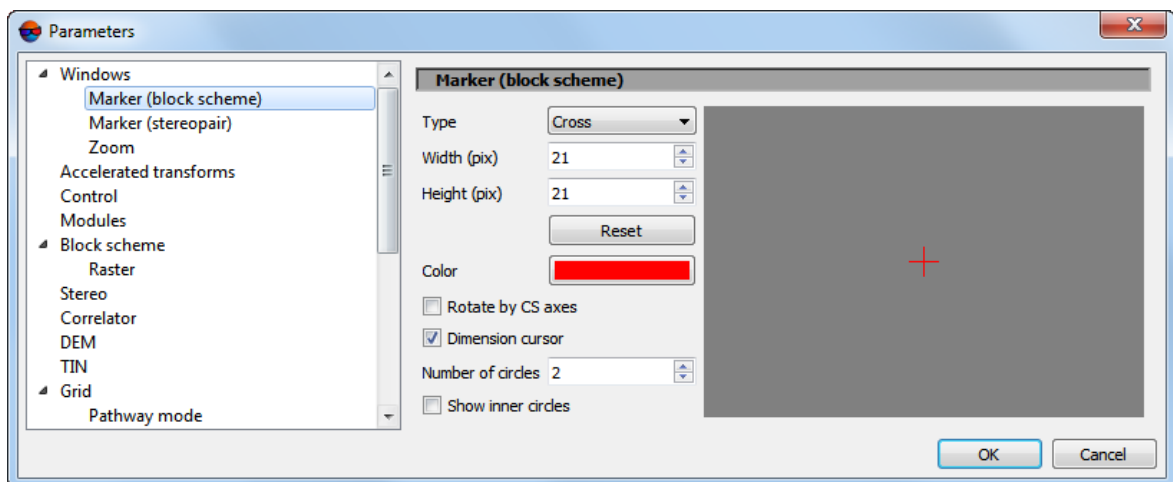The **Windows | Marker (block scheme)** and **Windows | Marker (stereopair)** tabs are used to do this.

Fig. 2. Marker settings

The **Type** list allows to choose marker shape. The following shapes are acailable:

• **Cross**;

• **T**-shaped marker;

• **Aim**;

• **Rectangle**;

• **Bold cross**;

• **Diagonal cross**.

Marker's width and height are set up in the **Width (pix)** and **Height (pix)** fields accordingly. They should be specified in pixels. To go back to default marker size use the **Reset** button.

To adjust marker color double click the **Color** field and choose a color from a standard color palette.

To rotate marker cross-hair according to the axes of the additional (user) coordinate system, set the **Rotate by CS axes** checkbox.

⚠️ This function is available only for a standard **Cross**-type marker.

To asses the dimensions of various objects using a cursor, set the **Dimension cursor** checkbox and set the **Number of circles**. A step of dimension grid depends on scaling in the 2D-window. To **show inner circles** with finer grid (inside the first circle from the cursor), set the appropriate checkbox.

2.3. Zoom settings

The system provides possibilities of image zoom in 2D-window using hotkeys, and also various ways of scale presets.

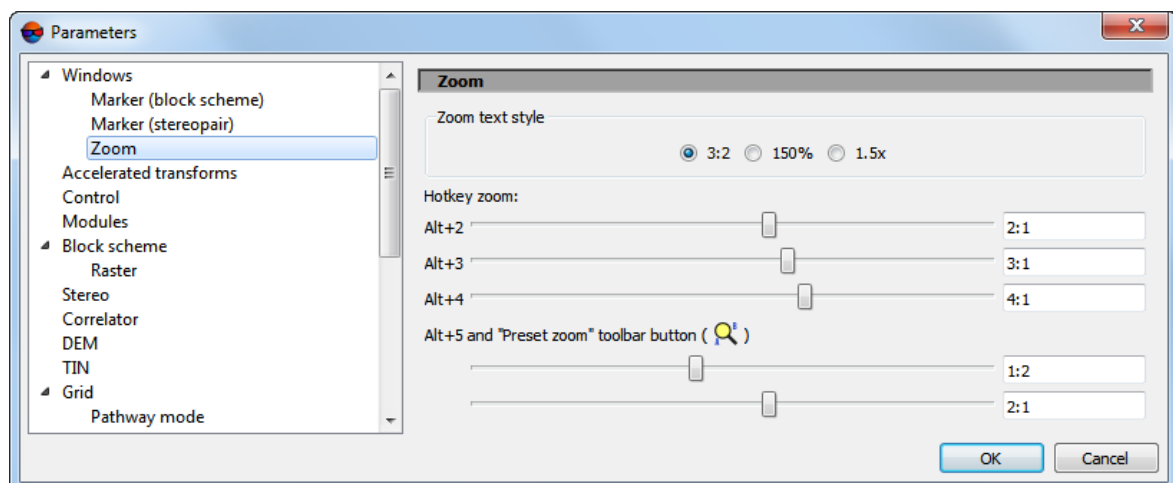Use the **Windows | Zoom** tab to setup zoom parameters.

Fig. 3. Zoom settings

The **Zoom text style** section allows to specify one of zoom displaying style:

• **3:2** – is used to display zoom in the ratio "display on a source image : display on a screen";

• **150%** – is used to display zoom in percentage;

• **1.5x** – is used to display zoom in the ratio "screen image to source image".

The system allows to use hotkeys to change zoom. Use sliders to setup zoom which will be applied using the **Alt+2**, **Alt+3**, **Alt+4** shortcuts.

The **Alt+5** shortcut and the 🔍 button on the toolbox of 2D-window allow to setup 2 versions of preset zoom.

3. Performance parameters

To setup the system performance parameters use the **Accelerated transforms** tab.
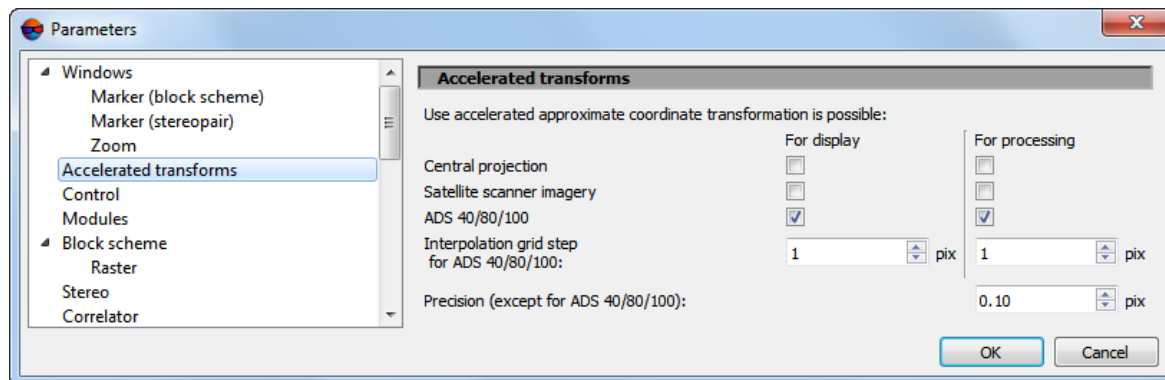

Fig. 4. System performance parameters (for ADS project)

The system allows to perform accelerated approximate calculation of coordinates in order to speed up visualization of images and/or calculations.

To use accelerated calculation set one or multiple checkboxes in columns, that define for what the calculation is used: **For display** and/or for **For processing**, depending on type of a project:

• **Central projection**;

• **Satellite scanner imagery**;

• **ADS 40/80/100**.

☞ Accelerated calculation of coordinates is turned on by default in the system for work with **ADS 40/80/100** projects.

The **Precision** field is used to setup precision of accelerated calculation of coordinates in pixels.

☞ Precision of accelerated calculation of coordinates in pixels is not used for **ADS 40/80/100** projects.

The **Grid interpolation step** field is displayed only when working with **ADS 40/80/100** projects. It is recommended to decrease value for projects with low camera stabilization, but the stereopair opens slower and amount of using memory increases.

4. Control parameters

In order to setup parameters of marker control and parameters of stereomode use the **Control** tab.
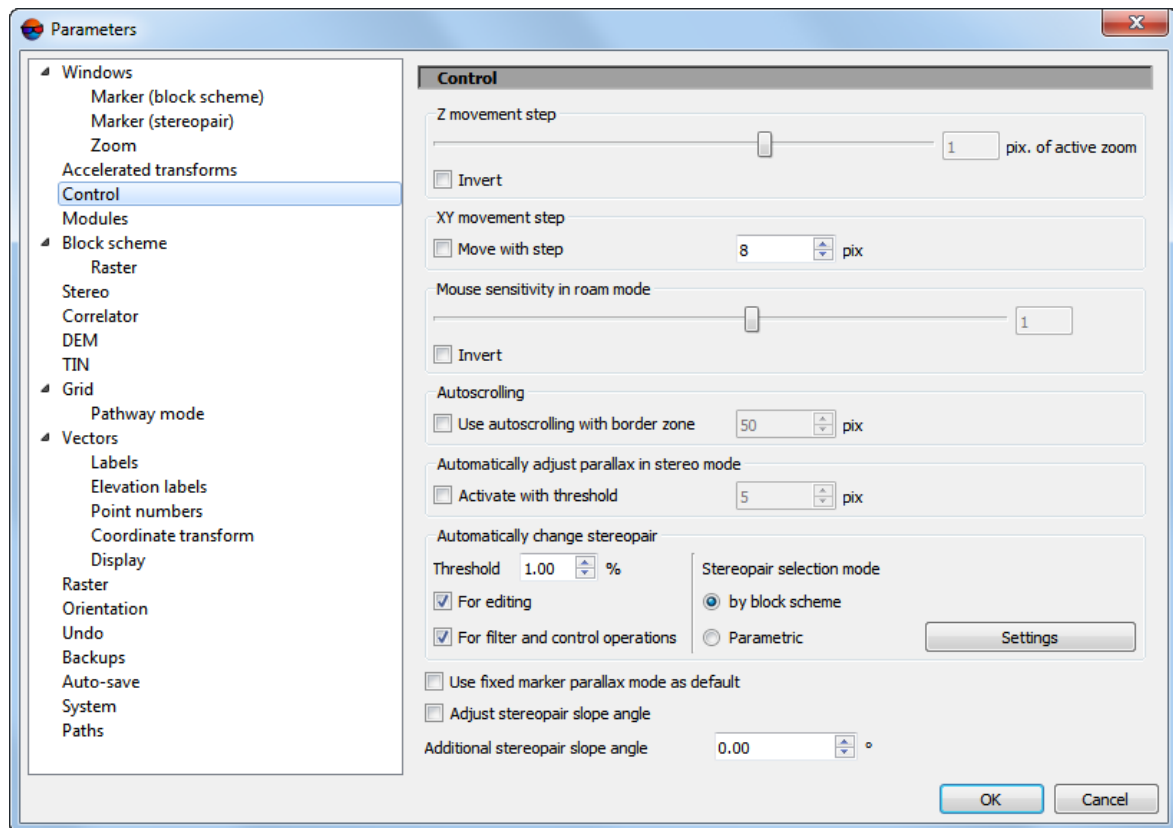
Fig. 5. Control parameters

The **Z movement step** slider allows to specify a step of marker movement by Z axis in pixels in current scale. In order to increase a step of marker movement, shift the slider to the right, to decrease the step – shift it to the left.

> The **Invert** checkbox allows to change zoom direction (in/out) using the mouse wheel.

The **XY movement step** slider allows to tune work in the roam mode, defines a step of images moving in 2D-windows of block or stereopair during mouse move.

The **Mouse sensitivity in roam mode** slider allows to tune work in the roam mode, defines a speed of images moving in 2D-windows of block or stereopair during mouse move. In order to speed up the movement, shift the slider to the right, to slow down – shift it to the left.

> The **Invert** checkbox allows to change moving by images or by stereopairs direction (left/right).

A *border zone* is a distance from boundary of overlap area in percent of image size. When this distance is reached the automatic scroll of images begins, if in the **Auto-scrolling** section the **Use autoscrolling with border zone** checkbox is set on. Size of border zone in pixels is set in appropriate field.

In order to specify a threshold of marker movement by Z, which value will be used to start automatic adjustment of parallax in stereomode, set the **Activate, with threshold** checkbox in the **Automatically adjust parallax in stereomode** section and specify a value of the threshold in pixels in appropriate field. This allows to pass from oblique stereopair to stereopair, for which projection plane (chosen coordinate system) coincides with stereopair plane.

> In this mode rotation angle around stereopair base line is automatically adjusted during stereopair opening, so that epipolar plane is parallel to Z-plane. It is recommended to turn on this mode when working with oblique stereopairs, for example, acquired by A3 camera (VisionMap) providing that images of the block were acquired from constant altitude.

> The option has an effect on projects of central projection only.

The **Automatically change stereopair** section allows to setup automatic changeover to next stereopair when the border zone is reached. To do this perform the following actions:

1. In the **Threshold** field specify size of the threshold zone – a distance from boundary of overlap area in percent of image size.

2. [optional] For automatic changeover to next stereopair when the threshold is reached during creation/editing of vector objects set the **For editing**.

3. [optional] For automatic change over to next stereopair when the threshold is reached **For filter and control operations** of vectors, contour lines, TIN, and DEM.

    > Automatic stereopair changeover when creating points in pathway mode is setup using corresponding tab.

4. Define the **Stereopair selection mode**:

    *   **by block scheme** – to select next stereopair in a block scheme;

    *   **parametric** – to select a stereopair using specified parameters.

        > Use the **Settings** button to specify parameters of customized search for stereopair. See details of parametric search in "Vectorization" User Manual.

        > Is it is impossible to search for the best stereopair using parametric method, a stereopair from current and next images of the block will be opened.

By default in the system is used the free marker mode. The **Use fixed marker parallax as default** checkbox allows to change the default marker mode.

The **Adjust stereopair slope angle** checkbox allows to to change a slope angle of stereopair during vectorization automatically. In the **Additional stereopair slope angle**

field specify correction to omega angles of left and right images during creation of stereopair model in 2D-window of stereopair when processing central projection images.

5. Setup of modules start

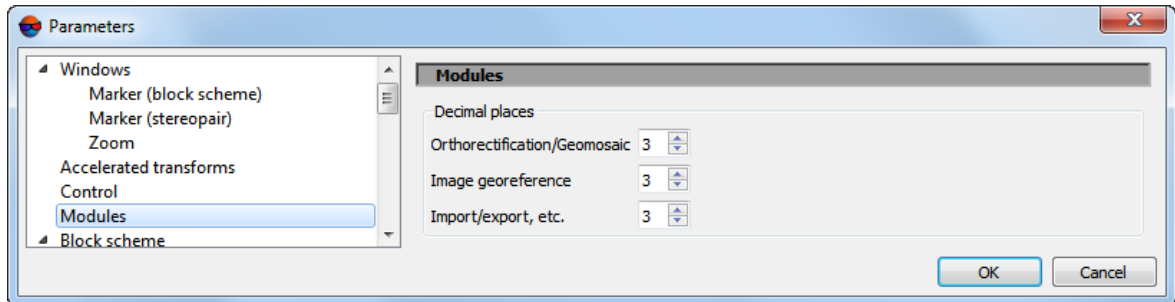To setup parameters of system modules interaction use the **Modules** tab.

Fig. 6. Setup of modules interaction

The **Decimal places** section allows to define number of decimal places in coordinates values in the following cases:

• during orthorectification or when working in the *GeoMosaic* module;

• when saving images georeference;

• during import/export and other operations.

> The value specified in the **Import/export etc.** field is used to define number of decimal places for vector objects attributes labels.

> The value specified in the **Import/export etc.** field is used to define number of decimal places for vector objects coordinates labels.

Use the appropriate fields to specify decimal places.

> The system supports from 1 to 18 decimal places.

6. Block scheme settings

6.1. Settings of block scheme display

The **Block scheme** tab is used to setup parameters of block scheme display.

The **View** section allows to setup the following parameters of block scheme display:

- **Trim image edges, %** – allows to cut (hide) images edges (the option is used to cut black fields on images taken by analogue camera, for instance;

- **"Opaque" image frames** – allows to display only visible parts of frames according to order of images and strips in block (set by default);

  > Frame of selected images is fully displayed.

- **Highlight fill selected images** – allows to set semi-transparent fill for selected images;

- **Highlight fill selected strips** – allows to set semi-transparent fill for all images in a strip when any image of the strip is selected.

- **Rotate block scheme window content (this setting is local for the current project)** – allows to rotate image for value, set in the **Rotation angle** field in degrees.

  > If the block scheme rotates for 180º, specular reflection occurs on both axes.

  > The parameter is used only for loaded project.

The **Make interstrip stereopairs** section allows to specify the **Minimum images overlap for forming interstrip stereopairs** . It is recommended to set this value not less than 20%, and for big projects with «good» overlap set the value not less than 40-50%.

The **Form stereopairs** parameter allows to choose, which stereopairs with defined overlap will be formed – **all** or those which have maximal overlap. When forming stereopairs **with maximum overlap** could be created insufficient number of stereopairs.

> It is recommended to refresh When forming block using **all** stereopairs it is recommended to refresh created block layout (see "Measurements" User Manual).

> The parameter is used only for loaded project.

The **Control** section allows to setup the following parameters used to work with block scheme:

- **Refresh automatically, if number of images in project less or equal to** – allows to specify maximal number of images, at which a block scheme is refreshed automatically (for example, after editing of tie points or after block adjustment);

- **Delete empty strips when deleting images** – is used to delete empty strips, which were created after moving of images on block scheme to new or existing strips (set by default).
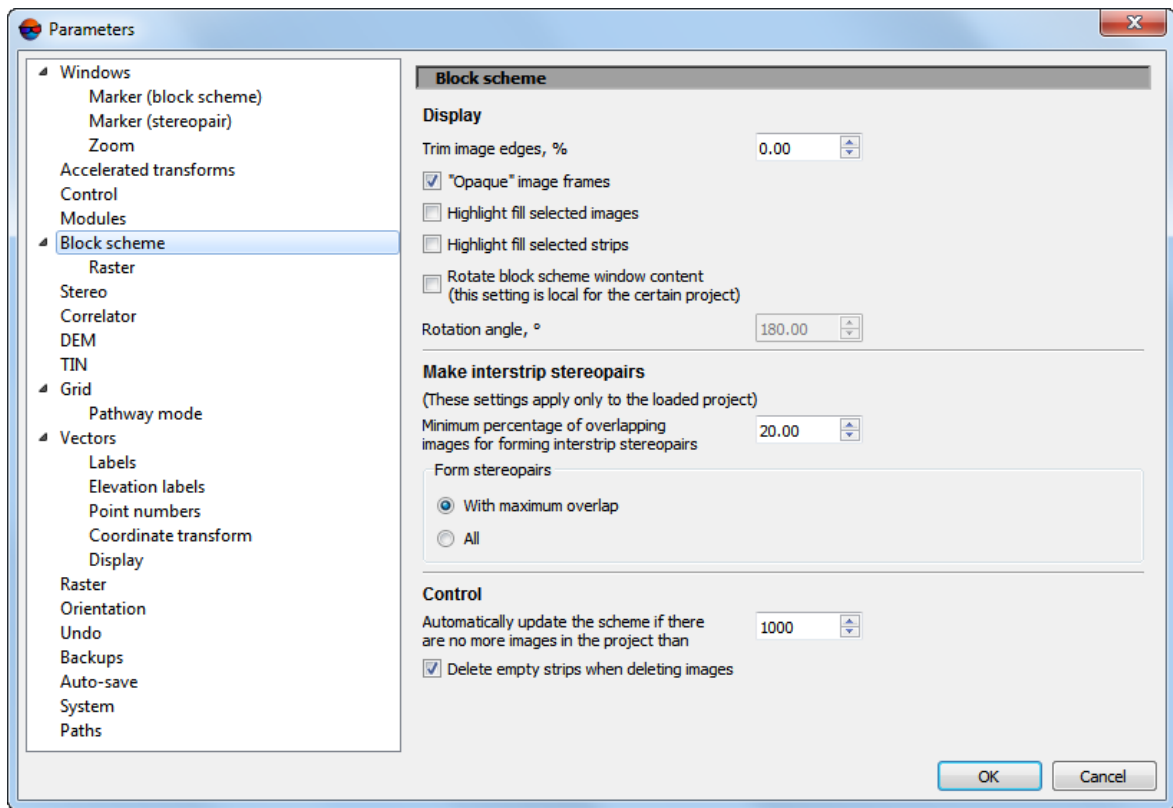
Fig. 7. Settings of block scheme display

6.2. Parameters of images load and display

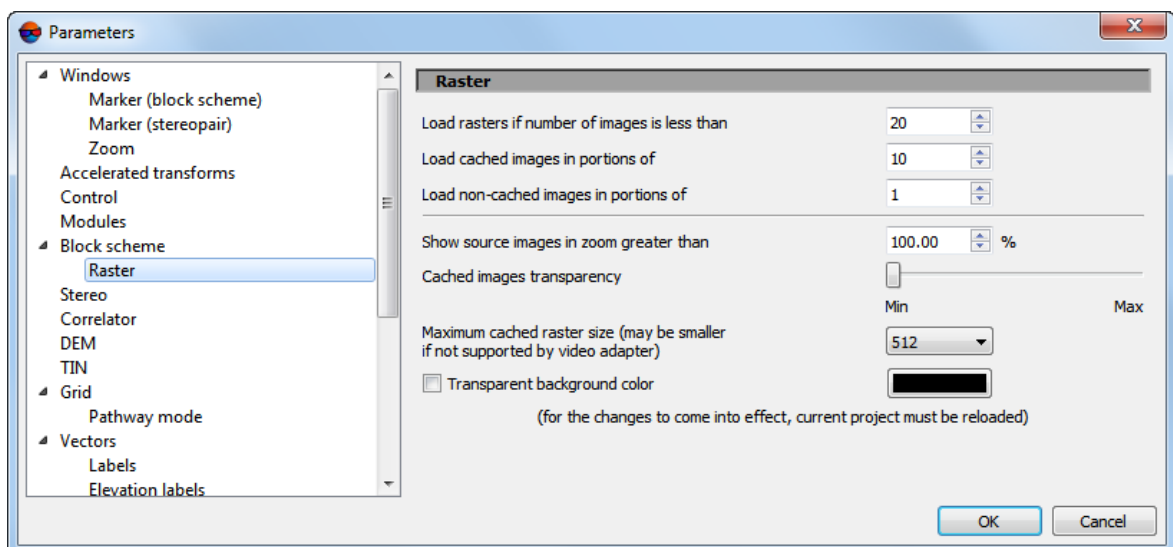The **Block scheme | Raster** tab is used to setup images display.

Fig. 8. Parameters of images load and display

The system allows to setup the following parameters:

- **Load rasters if number of images is less than** – allows to not display images (just their frames), if their number in project block is less than specified;

    In order to display all images regardless of their number choose the **Block › Show images** menu item, however this slows down work with images block.

- **Load cached images in portions of** – allows to set number of cached images during their loading;

- **Load non-cached images in portions of** – allows to set number of non-cached images during their loading;

- **Show true images in zoom greater than** – allows to specify a threshold zoom, if this threshold is exceeded, initial images will be displayed in 2D-window;

- **Cached images transparency** – allows to setup a transparency level for cached images display;

- **Maximum cached image size** – allows to specify size in pixels for cached image in a block scheme;

    The less the size of the cache, the more quickly the image will be redrawn; the bigger the size, the higher the shown image quality.

    Some graphics cards automatically setup the cache size less than maximal.

- **Transparent background** – allows to set color of transparency of images background. To set color click the [...] button and choose necessary color from standard color palette.

    ⚠ All changes performed on this tab take effect only after project reload.

7. Stereo settings

The **Stereo** tab is used to select stereo measurement mode. The system allows to work in **Anaglyph** or **Page-flipping** stereomodes.
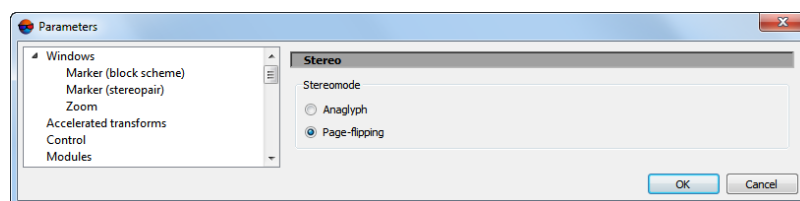

Fig. 9. Stereo settings

8. Correlator settings

For automatic positioning marker on terrain relief in stereo mode the system uses correlation algorithm (see the "Stereopair 2D-window" chapter in "General information" User Manual and the "Marker modes" chapter in "Vectorization" User Manual).
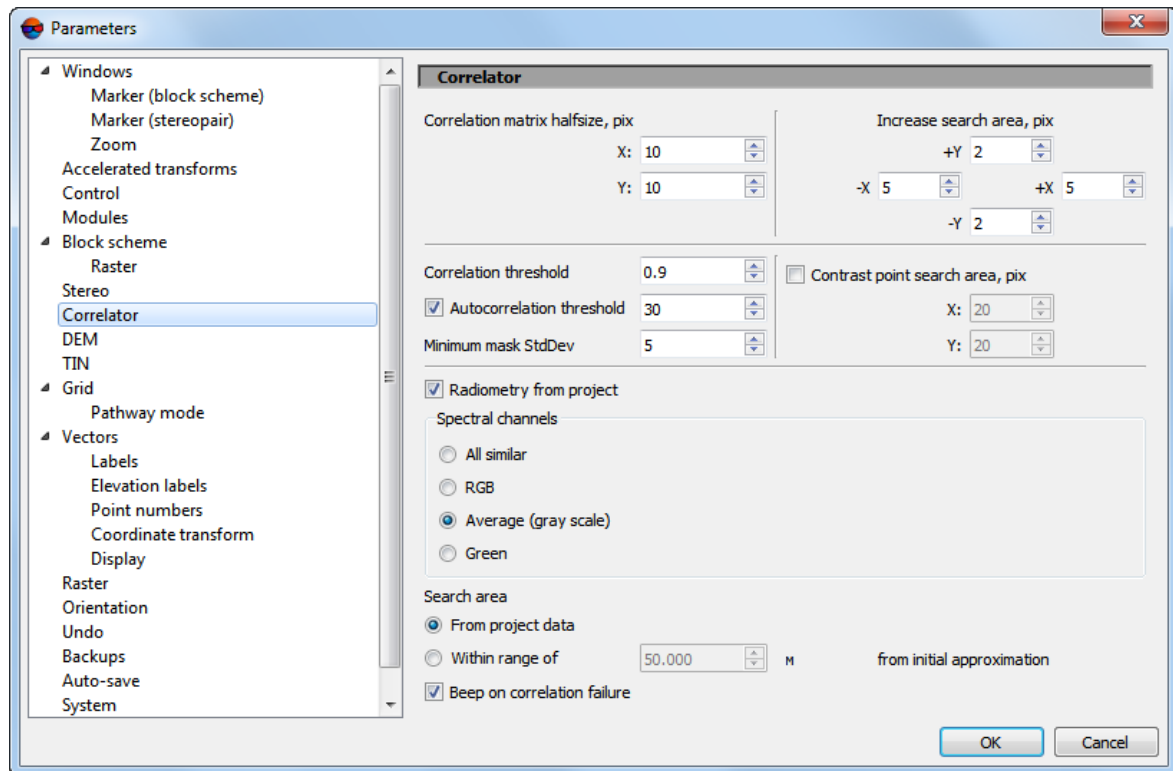

Fig. 10. Correlator settings

The **Correlator** tab allows to setup the following correlator parameters:

- **Correlation matrix halfsize** – allows to specify half size of matrix used to search for matching points in pixels (default value is 10x10);

> ⚠️ In most cases it is not recommended to increase a size of correlation matrix because it results in slowing down of images processing.

- **Increase search area**:

  ○ **± X** – allows to extend search area by X-parallax (in pixels);

  > ☞ It is recommended to increase this value if during relative orientation points are not embrace the whole range of heights (if they are not located on highest and lowest relief features).

  ○ **± Y** – allows to extend search area for matching point by Y-parallax (in pixels).

> Usually values of Y-parallax not exceed one pixel, that is why increasing of this parameter leads to decreasing of processing performance without improving processing results.

- **Correlation threshold** – allows to specify minimal permissible value of correlation coefficient; points with less value of correlation coefficient will be filtered.

> Decreasing of correlation threshold leads to increasing of number of points found, but raises probability of errors. Default value is 0.9.

- **Autocorrelation threshold** – allows to specify maximal permissible value of autocorrelation coefficient; points with bigger value of correlation coefficient will be filtered;

  ○ [optional] Clear the appropriate checkbox in order not to use the **autocorrelation threshold** while filtering points.

  > The autocorrelation coefficient allows to assess the point uniqueness in the region, which is determined by the **Correlation matrix halfsize**.

  > It is recommended to set the threshold between 15 and 30.

- **Minimum mask StdDev** – allows to specify minimal RMS of brightness using correlation mask (absolutely monotonous surface has RMS that equals 0);

  > There is no direct dependence between RMS value and correlation quality, however too low values indicate that mask mainly consist of "noise". In most cases it is enough to leave default value (5). If the image contains only monotonous surfaces, decrease minimal RMS of mask up to 1. If there are different surfaces or if monotonous surfaces contain too many erroneous points, specify minimal RMS of mask more than 5.

- **Contrast point search area** – set this checkbox to allow search for a point with maximal contrast in specified area (in pixels) prior to correlation.

  > It is recommended to increase this value for images with well-defined contours of objects, and to decrease it for low-contrast (fuzzy) areas, where there is high probability of correlator errors.

- **Radiometry from project**– correlator use information about radiometric correction, obtained from project; set off the checkbox to use source images;

- **Spectral channels** – allows to choose image spectral channels, using in project processing:

  ○ **All similar** – channels, which are similar for all images in the project;

  ○ **RGB** – red, green and blue channels;

Generally, it is selected for tie point calculation on the color images, passed radiometric correction operation.

○ **Average (grayscale)**;

○ **Green** – it is recommended to use for low quality images acquired by compact digital camera.

• **Search area** – allows to define search area of matching point on the adjacent image:

○ **From project data** – search within maximal and minimal heights, calculated for each project stereopair;

○ **Within range of (n) meters from initial approximation** – search for a surface within specified value from marker position.

The **Beep on correlation failure** checkbox allows to give a sound signal when the correlator didn't work.

9. Settings of DEM display

The **DEM** tab is used to setup parameters of digital elevation model (DEM) display.
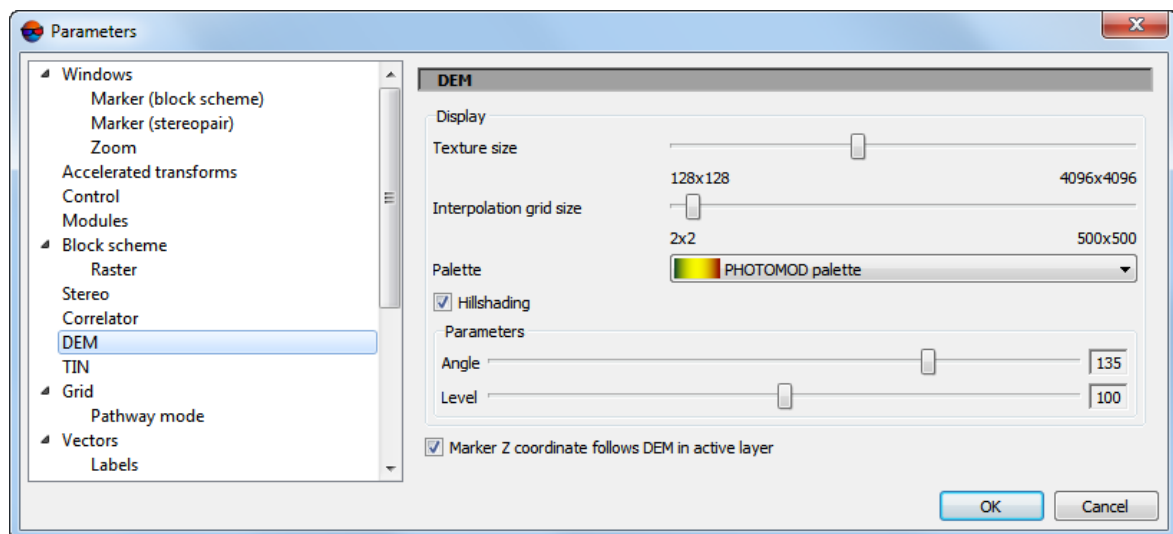

Fig. 11. Settings of DEM display

In the **Display** section use sliders to setup the following parameters:

• **Texture size** – allows to specify texture size, which is used to make surface image more realistic (to let it look like terrain relief). When the slider is shifted to the right the image is more detailed, however DEM loading slows down significantly;

- **Interpolation grid size** – allows to specify a size of regular grid, which is used to "draw on" texture (to comply a relief in non-orthogonal projection), it influences on DEM display in stereo window.

- **Palette** – allows to choose the palette for DEM coloring:

  ○ **PHOTOMOD palette**;

  ○ **rainbow palette**;

  ○ **terrain palette**;

  ○ **topography palette**.

- In the system the **Hillshading** checkbox is set by default to let your DEM be more realistic. It is necessary to set off the checkbox to increase performance.

  In the **Hillshading** section use sliders to setup the following parameters:

  ○ **Angle** – allows to setup lighting parameters ("sun angle", for example, 90 degrees - at the nadir; 135 degrees - Northwest lighting);

  ○ **Level** – allows to specify the level of micro-relief detail (the more the slider is moved to the right, the more detailed the micro-relief).

- The **Marker Z coordinate follows DEM in active layer** checkbox is set in the system by default, the result is that marker is placed on DEM surface, i.e. marker's Z-coordinate is equated with DEM's Z-coordinate in specified point of DEM's active layer.

> Changes apply for next loaded DEM. To apply changes for active DEM, reload it to the project.

> To get quick access to DEM view settings right-click the name of layer containing DEM in the **Manager**. The context menu is opened. Select the **Properties** item in the context menu. The **DEM Parameters** window opens.

10. Settings of TIN display

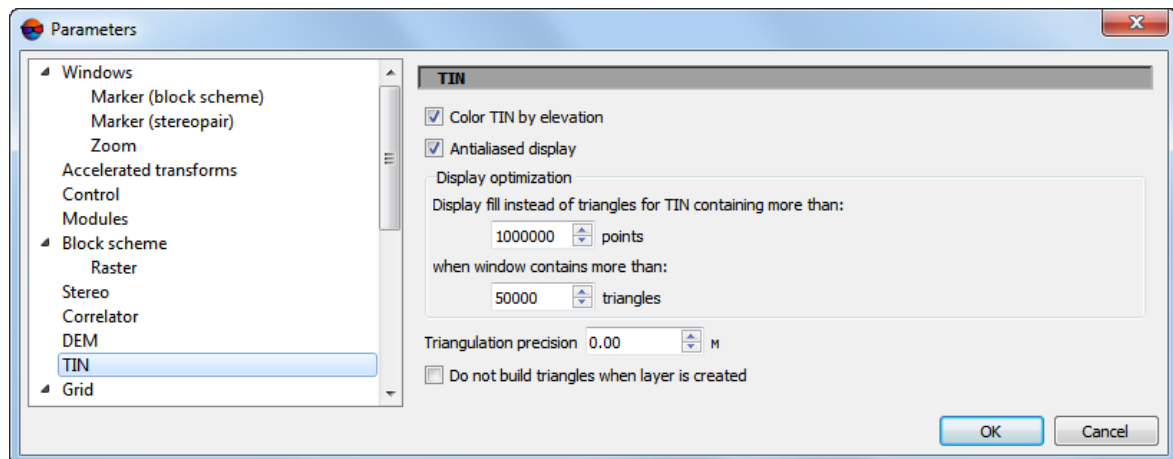The **TIN** tab is used to setup parameters of TIN display.

Fig. 12. Settings of TIN display

The **Color TIN by elevation** checkbox allows to display ЕШТ as grid of triangles colored by height. If the checkbox is set off all TIN triangles are displayed by the same color, defined in the **Manager** panel for TIN layer.

The **Display optimization** section contains the following parameters used to improve performance and to display a TIN as solid fill:

* **Display fill instead of triangles for TIN containing more than** specified number of triangles;

* Display solid fill for TIN **when window contains more than** specified number of triangles.

The **Antialiased display** checkbox is used to smooth TIN and quasi-contours for improving visual perception.

> When TIN is displayed as solid fill quasi-contours are not displayed.

The **Triangulation precision** parameter is intended for filtering of errors of TIN creation using vector objects, which contain closely-spaced nodes. A value in the **Triangulation precision** field is used to specify minimal distance between points, at which the points are considered as different nodes, not the same one.

To save computer memory when editing large datasets set the **Do not build triangles when layer is created**.

11. Settings of grid display

The **Grid** tab is used to setup display parameters of regular grid of nodes.

Use the **Display as solid fill when window contains more than ... nodes** field to specify maximal number of nodes, when the number is exceeded the grid will be displayed in 2D-window as a solid fill.
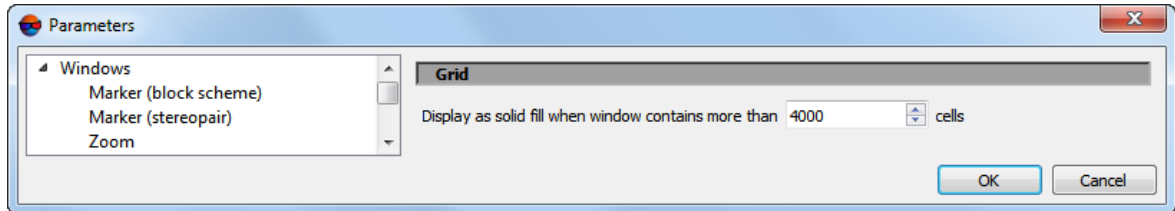

Fig. 13. Settings of grid display

12. Settings of pathway mode

The system allows to create vector objects in pathway mode. Use the **Pathway mode** tab to setup parameters of this mode.
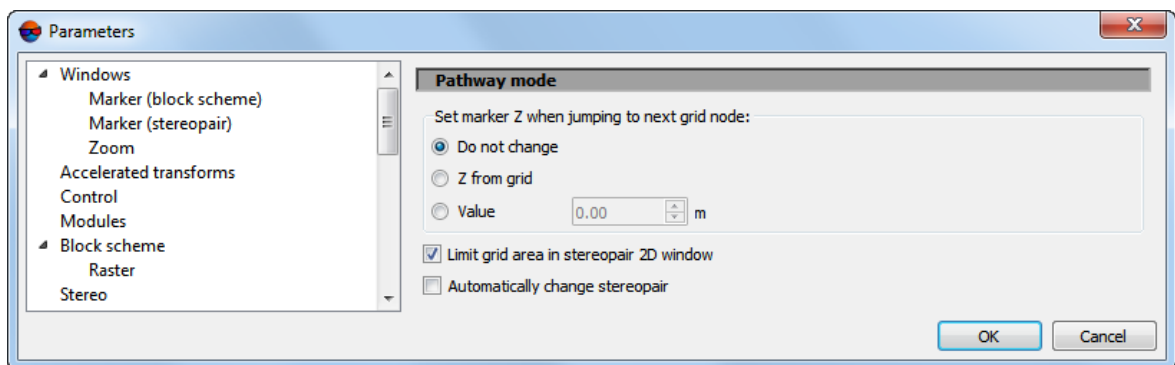

Fig. 14. Settings of pathway mode

Choose one of the ways of specifying marker position by Z when pass to next grid node:

• **Do not change** – marker position by Z is not change, i.e. Z-coordinate of marker in previous grid node is used;

• **Z from grid** – marker position by Z is set equal to Z level of grid, defined in the **Grid properties** window;

• **Value** – marker position by Z is set equal to the value specified in this field (in meters).

The **Limit grid area in stereopair 2D-window** checkbox is set in the system by default, that allows to setup passing grid nodes in pathway mode only in borders of stereopair regardless of grid size.

⚠️ It is not recommended to set the **Automatically change stereopair** checkbox while the **Limit grid area in stereopair 2D-window** checkbox is set, since it leads to work with incorrect data.

In order to pass nodes of "global" grid with automatic stereopair change set the **Limit grid area in stereopair 2D-window** checkbox off and set the **Automatically change stereopair** checkbox on. Besides, the **Threshold** parameter also has influence on automatic stereopair change. The parameter specifies a distance from stereopair border in percent of the whole stereopair size, and when this distance is reached during passing nodes in pathway mode the stereopair is changed to the next one in 2D-window. The **Control** tab is used to setup the **Threshold** parameter (see Section 4).

13. Settings of work with vector objects

13.1. Settings of vector objects display

The **Vectors** tab is used to setup parameters of vector objects display in 2D-window.
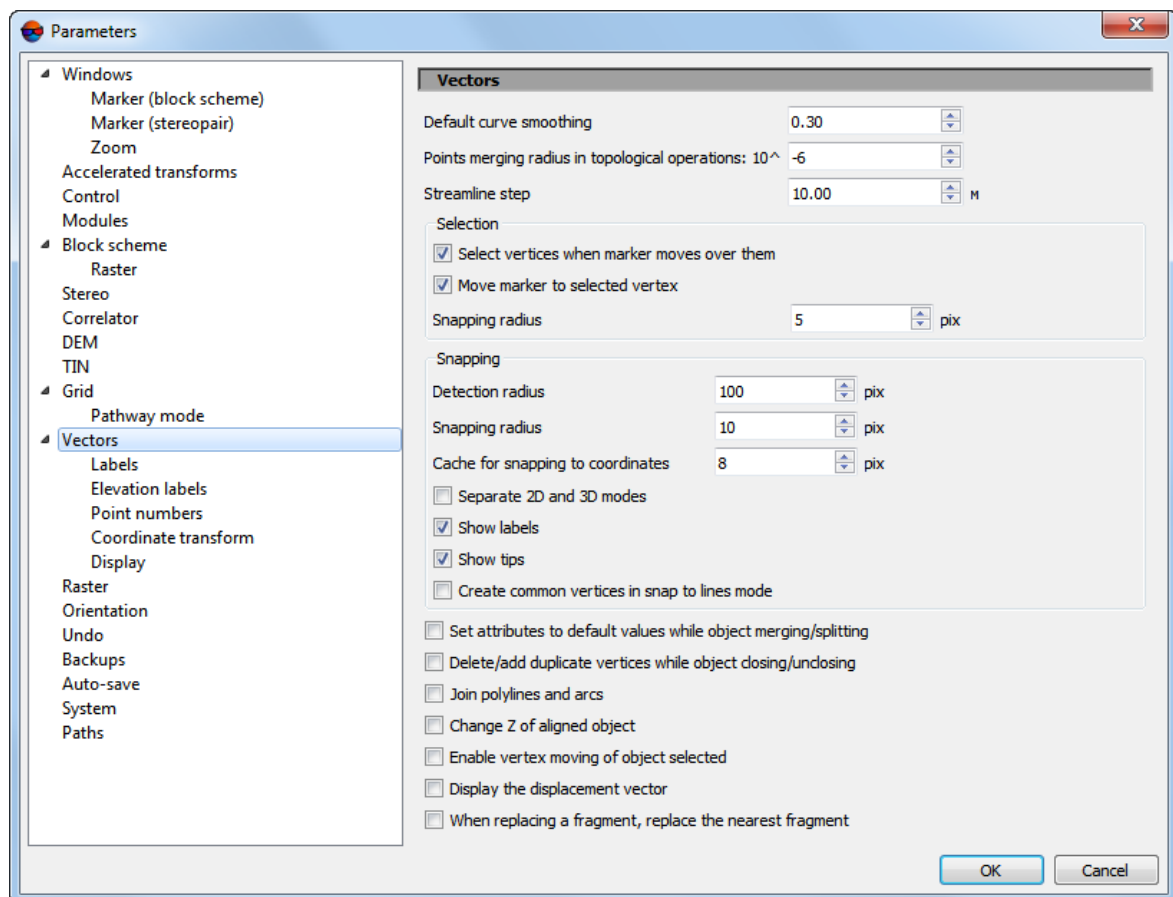

Fig. 15. Settings of vector objects display

The following settings are available:

• **Default curve smoothing** – the lower the smoothing coefficient, the more accurately the curve is created in relation to initial broken line; the coefficient should be set in range from 0 to 1;

- **Points joint swath for topological operations** – allows to specify a distance between vertices, and if vertices are closer to each other than this distance they are considered as one common vertex and are edited simultaneously ;

- **Streamline step** – allows to setup minimal distance in meters during vertices creation in streamline mode.

The **Selection** section is used to setup the following parameters of vector objects selection:

- **Select vertices when marker moves over them** – is used to select a vertex, located in marker area on a distance specified in the **Swath** field. For automatic marker move to selected vertex use the **Move marker to selected vertex** checkbox;

    When the vertex is selected the status line displays X, Y, Z coordinates of the vertex and real marker position;

    The checkboxes are duplicated by **Edit › Select vertices when marker moves over them** and **Edit › Move marker to selected vertex** menu items.

- **Swath** – if the distance (in pixels) from marker to vertex is less than specified the vertex will be captured during manual selection.

The **Snapping** section is used to setup the following parameters of *snapping* (marker movement mode, when it "sticks" to the different elements of the vector objects on the screen):

- **Detection radius** – if marker is placed from the object element at the distance of less than **Detect radius**, this element is highlighted by grey colour with no snapping (moving marker);

    The **Detect radius** should exceed the **Snap radius**.

    An element of the object is highlighted in gray, if the default **Show tips** checkbox is not cleared.

- **Snapping radius** – if marker is placed from the object element at the distance of less than **Snap radius**, a marker snapped to this element. A label of snapping mode used appears near it;

    A snapping label appears if the default **Show labels** checkbox is not cleared.

    Detect radius and **Snap radius** are specified in pixels.

- **Cache for snapping to coordinates** – determines the number of selected vertices of the existing objects for snapping to the coordinates stored in the system memory.

- **Separate 2D and 3D modes** – allows to create unique combinations of active snapping options (to points, midpoints, lines, coordinates, as well as perpendicular mode) separately for 2D and 3D snapping modes.

The **Split polygons/polylines** section is used to setup the following parameters of polygons/polylines splitting:

- **Delete cutting polyline** after the splitting is performed;

- **Split only polygons** when the both types of objects are intersected by the "cutting" polyline.

The **Create common vertices on snap-to-line mode** checkbox allows to add vertices in snapping mode both on marker and source line height.

> In the 3D-snapping mode vertices are also becomes topological connected.

The **Set attributes to default value while objects merging/splitting** checkbox is used to replace values of objects attributes which are involved in merging or splitting. The values will be replaced by the following:

- `text` – blank string,

- `float` – 0.0,

- `integer` – 0.

> If an object has obligatory attribute with the same name, its value is used as default value.

The **Delete/add duplicate vertices while objects closing/unclosing** checkbox allows to check vertices for duplicates in first or end points. As a result:

- when closing polylines the system checks for duplicates of the first and last vertices, the last vertex is deleted if necessary;

- when closing polygons the first vertex will be added to the end of polyline.

The **Join polylines and arcs** checkbox is used to turn on the mode of **arc**-type CAD-object joining with the created polyline, as its fragment.

The **Change Z of aligned object** checkbox allows to connect vector objects in the alignment mode both on the plane and heightwise.

The **Enable vertex moving on object selected** checkbox allows to move individual vertices of a vector object, even if the entire object was selected before the *vertices editing mode* was enabled.

> This function can be useful, for example, when working with *cutlines* in the *GeoMosaic* module.

When moving an object, to **display a displacement vector** as a dashed line between the first and final marker positions, set the appropriate checkbox.

13.2. Settings of labels display

To setup display of labels of point objects or vertices of linear and area objects the **Vectors | Labels** tab is used.
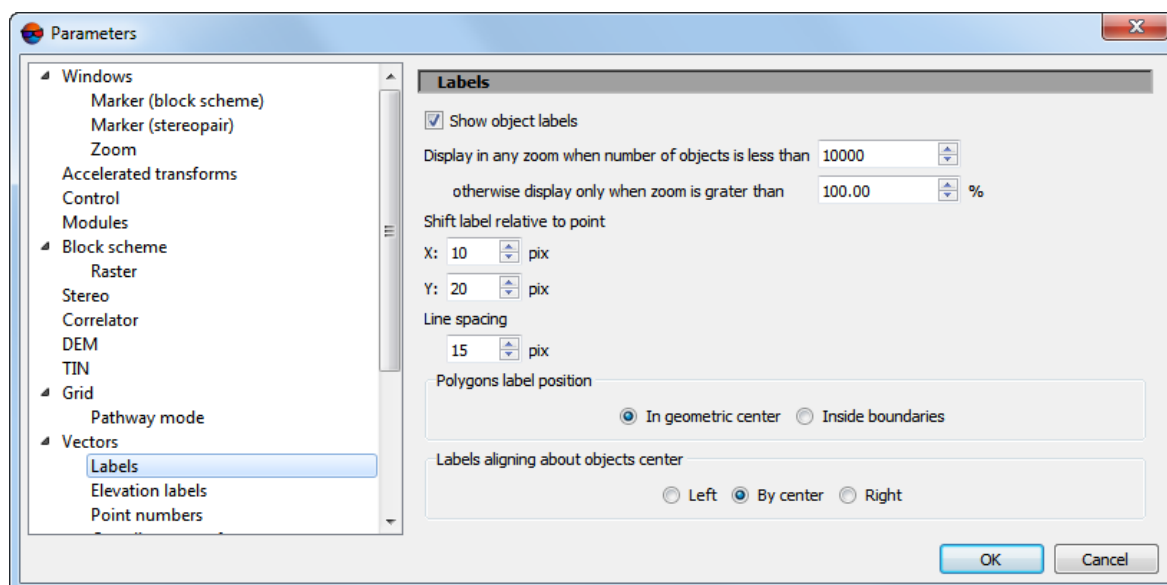
Fig. 16. Settings of labels display

The **Show object labels** checkbox is set in the system by default.

There are the following parameters of labels display:

• **Display in any zoom when number of objects is less than** specified objects number;

• **otherwise display only when zoom is greater than** specified zoom value in percent.

The **Shift label relative to point** fields are used to specify a value of elevation label **X** and **Y** shift in relation to object center.

Use the **Line spacing** field to specify spacing between lines in pixels.

☞　　　If 0 value is input to the shift fields, the label will be placed on top of the point object itself.

The **Polygons labels position** section is used to choose labels placement - **In geometrical center** or **Inside boundaries** of polygons.

The **Labels aligning** section is used to setup labels placement with alignment by **Left**, **Center** or **Right**.

13.3. Settings of elevation labels display

In order to setup display parameters of elevation labels of vector objects use the **Vectors | Elevation labels** tab.
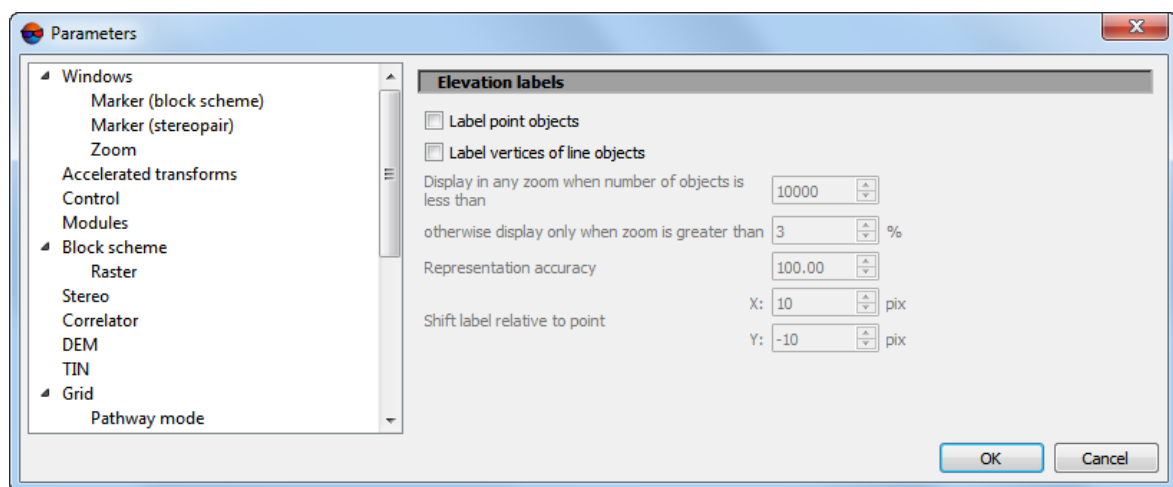
Fig. 17. Settings of elevation labels display

In order to display elevations of vertices of point vector objects, set the **Label point objects**.

In order to display elevations of vertices of linear vector objects (polylines or polygons), set the **Label vertices of line objects**.

The system provides the following parameters of elevations display:

• **Display in any zoom when number of objects is less than** specified number of objects;

• **otherwise display only when zoom is greater than** specified value of zoom in percent.

The **Representation accuracy** field allows to set number of decimal places for elevation labels.

The **Shift label relative to point** fields are used to specify a value of label shift in relation to object center by **X** and **Y** axes in pixels.

> If 0 value is input to the shift fields, the label will be placed on top of the point object itself.

13.4. Settings of point numbers display

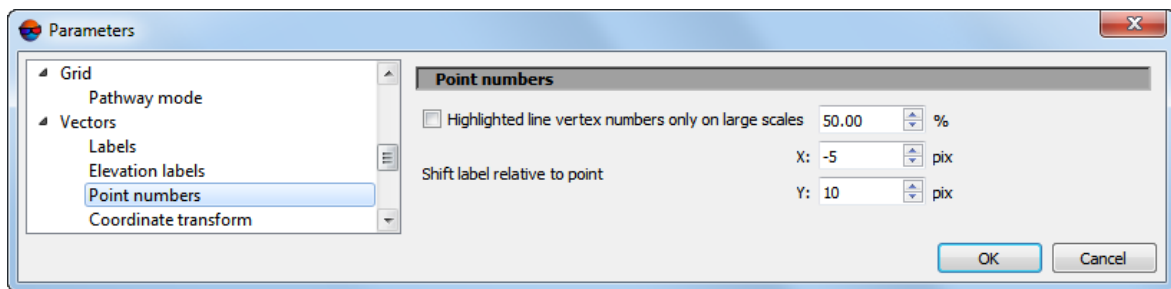To setup display of vertices numbers of vector objects use the **Vectors | Point numbers** tab.

Fig. 18. Settings of display of vertices of selected vector object

Set the **Number of points of selected line** checkbox on to display numbers of vertices of selected vector object (polyline or polygon).

Use the **only in zoom larger than** field to specify value of zoom (in percent), and when the zoom exceeds the specified one numbers of polylines vertices or point objects will be displayed.

The **Shift label relative to point** fields are used to specify a value of number shift in relation to object center by **X** and **Y** axes in pixels.

> If 0 value is input to the shift fields, the number will be placed on top of the point object itself.
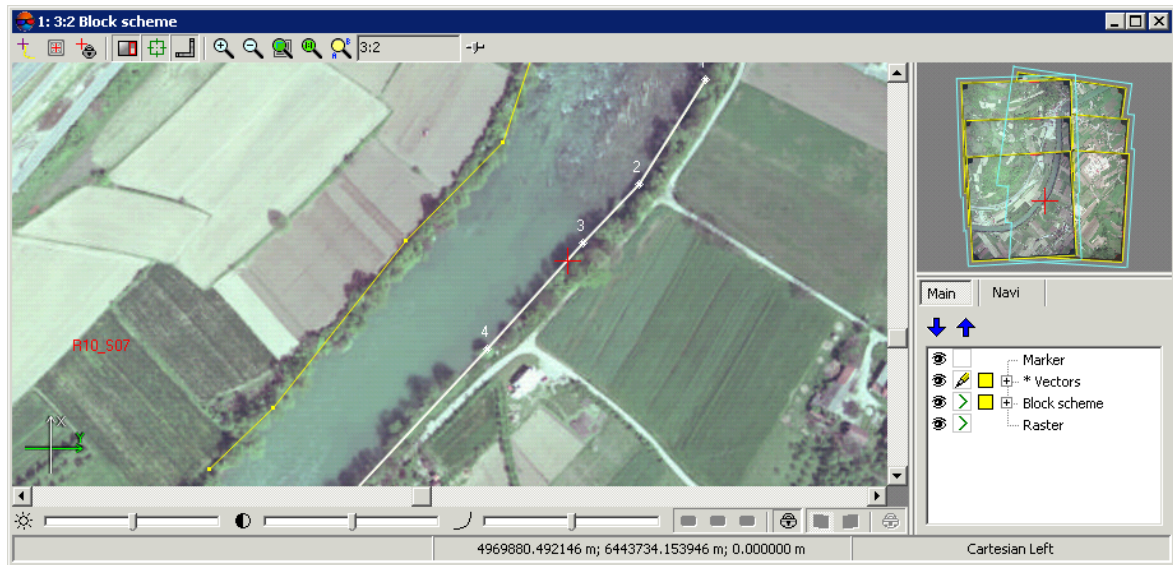
Fig. 19. Display numbers of vector objects vertices in 2D-window

13.5. Coordinates transformation

The system provides opportunity of object coordinates transformation form one coordinate system to another. The **Vectors | Coordinates transform** tab is used to choose transformation method.
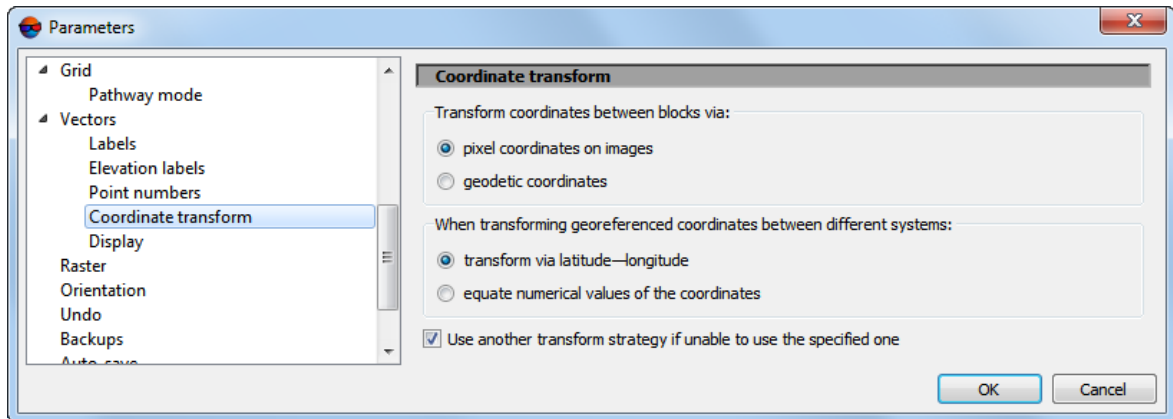

Fig. 20. Settings of coordinates transformation method

The system allows to **Transform coordinates between blocks via** the following ways:

• using **pixel coordinates on images** – is set by default

> This transformation may return incorrect results when using incorrect source data, for example, blocks of different images or incorrect transformation results of source images.

- using **geodetic coordinates** – it is recommended to use if 3D coordinates are associated in blocks and one of conditions is performed :

  ○ not all project images have overlap;

  ○ during import data from the different types of projects.

⚠ Selected parameters also have an influence on recalculation between adjustment results of the same block, so it is recommended to use transformation via **pixel coordinates**.

Choose the way of recalculation for geodetic coordinates transform between different systems:

- **transform via latitude-longitude**;

⚠ It is impossible to use this method, if at least one of the blocks is adjusted in free model or in Cartesian or local coordinate system. During transformation between two adjustments of the same block, points on images may shift by a value of adjustments difference.

- **equate numerical values of the coordinates** – used to equate X,Y-coordinates in two blocks. The option is used for Cartesian and local coordinate systems, and for any other cases, except for blocks adjusted in free model.

In order to **Use another transform strategy if unable to use the specified one** the appropriate checkbox is set in the system by default. This allows the system to use optimal way of coordinates transformation. Selected parameters define preferable method. Set the checkbox off to use only selected way of coordinates transformation.

⚠ Method of coordinates transformation should be selected for all points of vector file. The system analyses only possibility in principle to transform by selected method.

13.6. Display settings for vector objects in anaglyphic mode

The system allows you to separately set the colors of vector objects displayed in the 2D stereopair window (in anaglyphic mode).

🎓 In most cases, white is the best possible color for vector objects that are created in anaglyphic stereovectorization mode (by default).

The choice of other colors, e.g., dark hues, may be feasible in the case of processing images containing many areas with light hues.

As for both cases described above, it is strongly recommended to avoid red and blue hues, as well as those close to them.
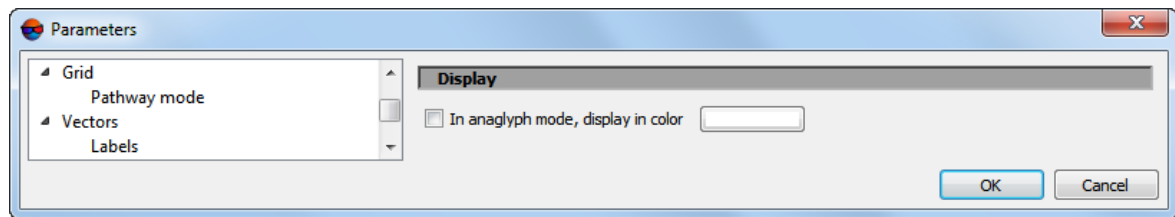
Fig. 21. Display settings for vector objects in anaglyphic mode

All changes performed on this tab take effect only after system reload.

14. Settings of images and DEM load

In order to setup of images pyramid creation during loading of georeferenced images and DEMs use the **Raster** tab.

By default pyramids create automatically during images loading. Set the **Create overview pyramids when loading georeferenced images and DEMs** checkbox off to turn off automatic pyramids creation.

Created pyramid improves a speed of images refresh.

To skip rasters check for radiometric correction (out of *ImageWizard*), set the **Ignore missing radiometric correction data when checking rasters**.
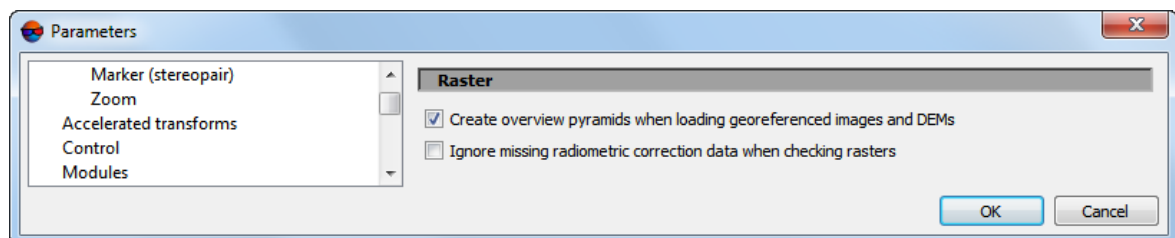

Fig. 22. Settings of images load

15. Settings of orientation

The **Orientation** tab allows to setup images selection for operation of automatic points measurement.

In the system by default all block images are selected automatically for points measurement. Set the **Select all images for automatic tie point measurement** checkbox off to use for measurement only images selected on block scheme in 2D-window.
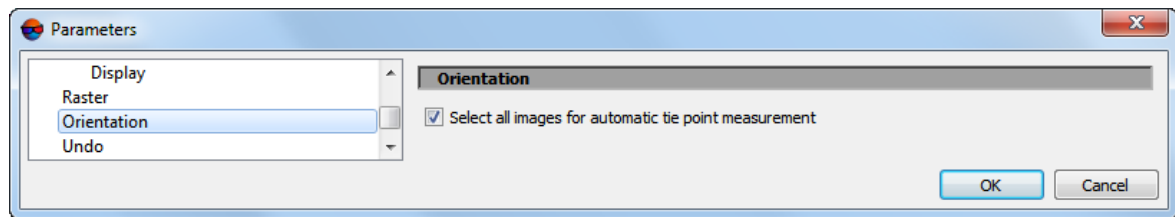
Fig. 23. Settings of orientation

16. Settings of undo parameters

The system allows to undo operations with vector objects, and also to redo recently undone operations. The **Allow undo** and **Allow redo** checkboxes are set on the **Undo** tab by default. When working with a fair amount of vector objects using of undo mode slows down editing operations. In this case set off the checkboxes to speed up the processing.

Use the **Maximum undo steps** field to specify number of operations to be saved and available for roll back. Number of operations by default is 100.

> It is impossible to undo if too many operations are run automatically. In this case, the appropriate warning appears, and the list of executed operations is not maintained.

> List of undo operations is maintained for each layer separately.

> It is possible to undo some operations with DEMs (see The "DEM editing" toolbar in the "DTM Generation" User Manual).
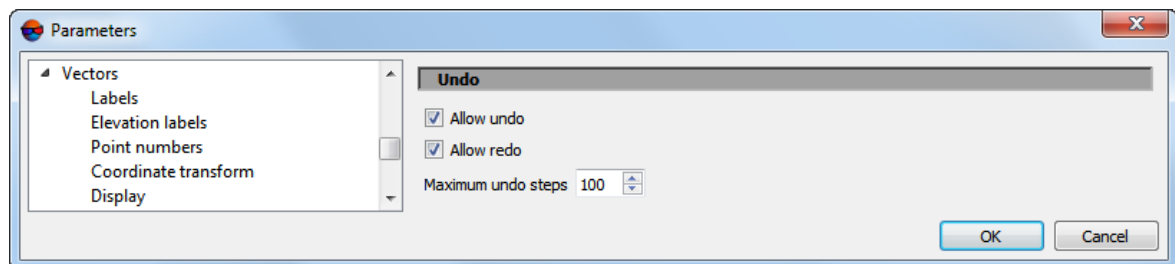

Fig. 24. Settings of undo parameters

17. Settings of backups number

The system allows to create backups of project resources. The **Backups** tab allows to specify **Number of stored backup copies (per resource)** for the following types of data:

• **for main project resources**;

• **for vector data / point clouds** (including point clouds stored in *Windows* filesystem).

If the specified number of backups is exceeded, older backups will be deleted. Backups of project data are stored in the *backup* folder of a project. Backups of system settings are stored in the *ProjOption\backup* folder of a project.

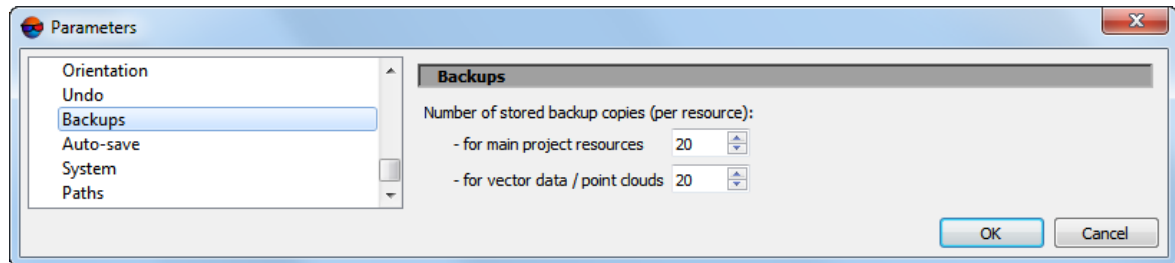> ☞   If these options values are set to zero, backups will be not created.

Fig. 25. Settings of number of project data backups

18. Settings of auto-save

The system allows to save vector data automatically. Use the **Auto-save** tab to setup the parameters.
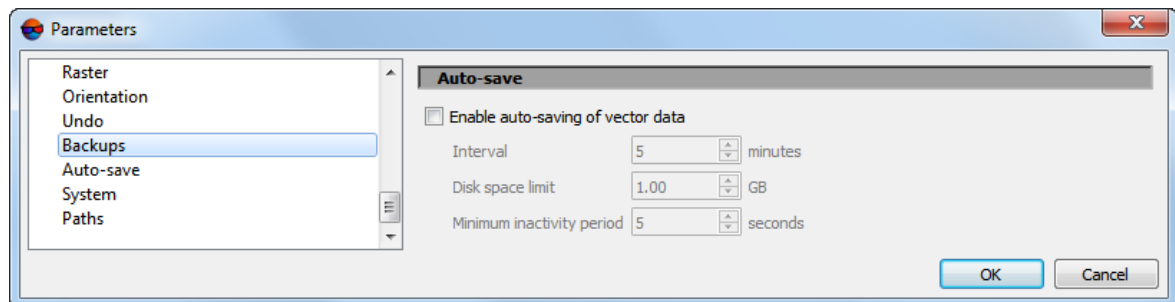

Fig. 26. Settings of auto-save

To use auto-save operation set the corresponding checkbox and setup the following parameters of auto-save:

- **Interval** – is used to specify time interval in minutes, to perform auto-save procedure (in case of user inactivity);

- **Disk space limit** – is used to specify disk space in gigabytes, reserved for vector files storing;

- **Minimum inactivity period** – is used to specify minimal inactivity time, after which auto-save operation will start.

> ☞   As *inactivity* is understood to be an absence of the following events: mouse actions, performing of any operations, windows opening.

In case of overlimit of specified disk space, older files will be deleted automatically at the system start or during auto-save operation.

Vector data is saved in the *PHOTOMOD6.VAR\AutoSave* folder. A name of resource with save date is used as a name of vector file during auto-save. Auto-save becomes possible only after editing of opened vector layers (changed layers are marked by asterisk symbol in the Layer manager).

In order to load automatically saved files choose **Vectors › Restore**. Choose an auto-saved file in the *AutoSave* folder to load it into project.

Choose necessary file and click the **Open** button to load auto-saved file to a project.

19. System settings

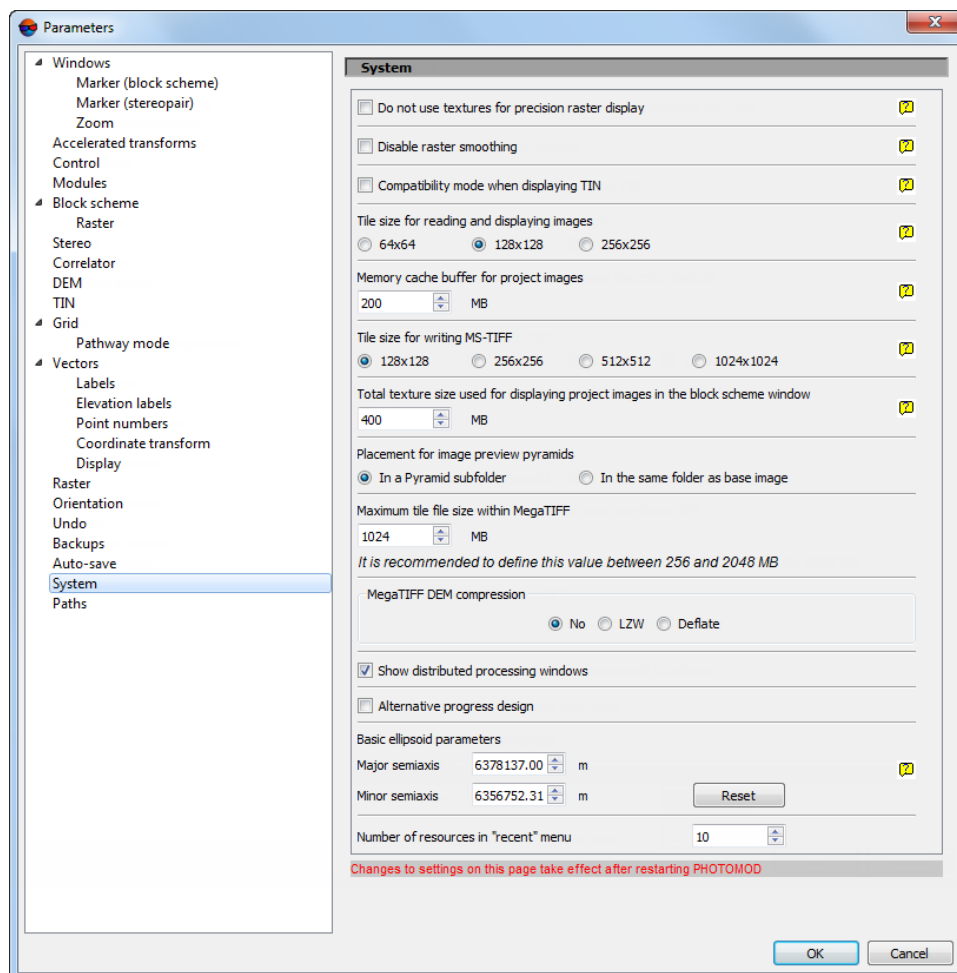The **System** tab is used to setup system parameters.

Fig. 27. System settings

⚠️ All changes performed on this tab take effect only after system reload.

The **System** allows to setup the following parameters:

- **Do not use textures for precision raster display** – allows to speed up images visualization when working with old graphic cards (the checkbox is set by default);

  ☞ When using this parameter positioning with subpixel accuracy is not available (in fixed marker mode, for instance).

- **Disable raster smoothing** – allows to turn off images smoothing during visualization;

  ☞ This parameter influences on accuracy of operations, which use correlator.

- **Compatibility mode for TIN display** – allows to correct TIN display when artifact appears;

- **Tile size for reading and displaying images** – allows to speed up images visualization in 2D-window; the system supports the following tile sizes: **64x64**, **128x128**, **256x256**;

- **Memory cache buffer for project images** – allows to provide system performance during work with vector data: it is recommended to increase buffer size when working with not big data volumes or to decrease it when working with vector data of big volume;

- **Tile size for writing MS-TIFF** – allows to specify tile size of files created in GeoTIFF, MS-TIFF and BigTIF formats; the system supports the following tile sizes: **128x128**, **256x256**, **512x512**, **1024x1024**;

- **Total texture size used for displaying project images in the block system window** – is used to specify total memory space, allocated for images pyramids in block scheme;

  ☞ In case of errors of memory allocation after loading of images pyramids, input a value less than specified by default.

- **Placement of image overview pyramids** – is used to specify path for images pyramids: **In a Pyramid subfolder** or **In the same folder as base image**;

- **Maximum tile file size within MegaTIFF** – is used to limit file size included to MegaTIFF files set. Upper limit of file size – 8 192 MB; file size by default – 1 024 MB.

⚠️ This parameter works for all applications, however it is not recommended to change maximal file size, when several applications run.

- **MegaTIFF DEM compression** – служит для ограничения размера файла матрицы высот.

  ○ **None** – no compression;

  ○ **Deflate** – a lossless data compression algorithm;

  ○ **LZW** (Lempel-Ziv-Welch) – a lossless data compression algorithm.

  ⚠️ Some tools of filtering and DEM quick editing using a selection tool may not be available for DEMs compressed in this way.

It is also possible to make settings of progress windows display on the **System** tab:

- **Show distributed processing windows** – allows to display progress windows during distributed data processing;

- **Alternative progress design** – allows to display "cuckoo-clock" in progress window.

The system also provides opportunity to process data of celestial bodies different from the Earth. For correct work with such projects, specify the **Basic ellipsoid parameters** in meters in the **Major semiaxis** and **Minor semiaxis** fields. Use the **Reset** button to roll back to initial values, calculated for the Earth.

The **Number of resources in "recent" menu** input field allows to set maximum number of available recent loaded layers in the **Recent** submenu of **Grid**, **Points**, **TIN**, **DEM**, **Contours**, and **Vectors** menus.

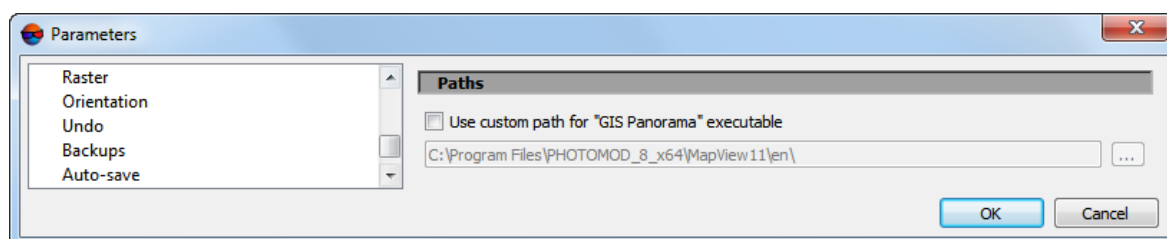# 20. Paths settings

The **Paths** tab is used to setup paths.

Fig. 28. Paths settings

The **Paths** allows to setup the following parameters:

• Set an appropriate checkbox to **use custom path for "GIS Panorama" executable file**. Click the ⟨...⟩ button to set this path.

> This software is not included with the *PHOTOMOD* but can be installed separately.