Geomatica® 9 Software Solutions

What's New?

May 25, 2003

PCI Geomatics

Committed to GEO-intelligence Solutions®

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➢ **The New Geomatica 9**

Introducing the new Geomatica 9, the most complete all-in-one geospatial software solution for Remote Sensing, Photogrammetry, GIS, and Cartography. No other geomatics software solution has the built-in capabilities to support your needs and increase your productivity like Geomatica 9, and no other geomatics software solution makes it seem so easy.

➢ **The Geomatica 9 Difference**

Each release of Geomatica builds upon three decades of strong commitment to continuously elevate both functionality and design in PCI Geomatics software solutions. Our dedication to bringing *Simple Solutions for a Complex World* has led us to the best designed, most capable, and most dynamic geomatics software solution available today.

Geomatica 9 breaks down the conventional divisions in traditional remote sensing, GIS, photogrammetry, and cartography. All of these are offered in a single integrated environment, meaning fewer errors, less wasted time, and greater productivity.

Full Integration, Maximum Productivity!

➢ **New Advantages with Geomatica 9**

With previous software achievements to build upon and surpass, Geomatica 9 introduces new advancements within an empowering geospatial production environment. Take advantage of new features and functionality in Geomatica 9 for working with hyperspectral data, high-resolution imagery, new spatial analysis operations, improved atmospheric correction, enhanced cartography tools, new sensor support, the latest data formats and superior pan sharpening. Geomatica 9 represents our best performing software, offering complete capabilities through an efficiently integrated work environment that provides the latest in remote sensing, photogrammetry, spatial analysis, and cartographic processing technology.
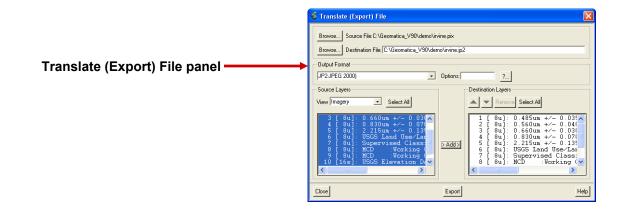
General Improvements

➢ **Generic Database (GDB) Technology**

Geomatica 9 utilizes GDB technology to directly read and write raster, vector, and other information from and extensive list of supported file formats. This gives Geomatica 9 the advantage of quick and direct access to data, and eliminates the need to replicate files since conversion is no longer necessary.

New formats include:

- ESRI GeoDatabase
- ESRI Binary Grid
- JPEG 2000

Translate (Export) File panel ⟶
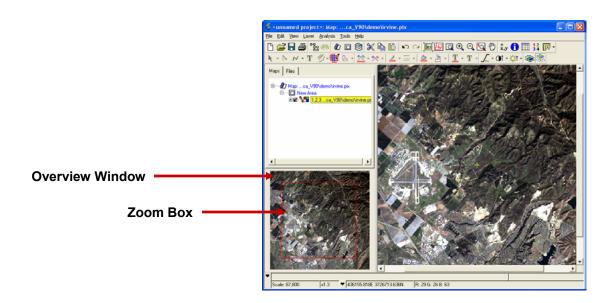
➢ **Overview Window**

When you have a very large image file open in Focus, or when your image is zoomed in, you can pan around the image in the Focus view area. There are two ways to pan around images. You can click the Pan tool in the Focus toolbar or you can use the bounding outline in the Focus Overview Window.
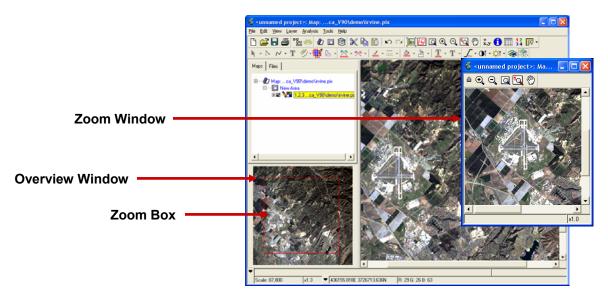
When you open data in Focus, the Overview Window shows a smaller version of the image in the Focus view area. The Overview window has a bounding outline (Zoom Box) that you can use to control the view in the view area. You can click the bounding outline to pan around the image in the Focus view area and you can resize the bounding outline to zoom the image in the Focus view area.

Overview Window

Zoom Box

➢ Zoom Window

The Zoom Window lets you see a linked copy of your image data in a separate viewer. You can zoom the images independently, using one image to locate features and the other to zoom them for a closer look. You open the Zoom Window from the Focus View menu. When you click the Lock command, you can move the cursor in the Focus view area without changing the image in the Zoom Window.

Zoom Window

Overview Window

Zoom Box

➢ Setting Focus Options and Preferences

Several options are available for you to customize how Focus handles certain features and how it uses your system resources. You open the Options dialog box from the Tools menu. The Options dialog box is divided into two panes. On the right side of the panel is a list of options. When you click an option the left side of the panel changes to give you access to the preferences for that option. The Options panel lets you customize these features:

Option / Preference	Available Controls
General Interface	Cursor and menu preferences
Warnings	Interface warning preferences
Layers	Zoom and raster preferences
Default Representation	Default data type representations
Vector Editing	Vector editing tolerances
Memory Cache	Undo, tiling, total, and vector caching
Overview Window	Rasters, vectors, and colors
Zoom Window	X and Y sizes, tools, and status bars
Layer Manager	Visible column options
Open GL Settings	3D Cube preferences
Selection	Adjust preferences for points, lines, polygons, text, and rasters
Digitizing Tablet	Tablet setup
GPS Receiver	Receiver setup
Measurement Tools	Units and report preferences

Focus Options panel →

➢ **Save As**

Better *Save As* capabilities.

Features include:

- Scale your data to different data types
- Save your image data with the current Focus enhancements
- Save your data to a GDB format other than the original data

Vector Save As panel →

RGB Save As panel →

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➢ **Improved Layer Management Tools**
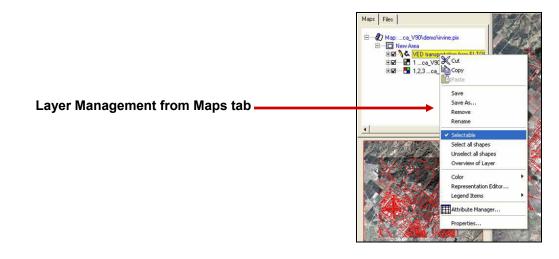
You can work directly with all items in the Focus work area under both the Maps and Files tabs to rename and remove data with the shortcut menus. These basic operations can be done when working with either project files or PIX files.

From the improved shortcut menus, Focus provides properties panels for all layer types. The Focus Properties panels have layer specific settings so you can adjust the properties for any layer when you need to.

Layer properties panels have tabs along the top of the panel that begin with general properties, such as the layers name, and priority. The remaining tabs differ depending on the layer type you have chosen. When you click a properties panel tab, you open attribute controls that are specific to your layer.

You can view and modify the properties for these layer types:

- RGB Image
- Grayscale
- Pseudo-color
- Bitmap
- Vector
- Topological Vector

Layer Management from Maps tab ➝

➢ **Cut/Copy/Paste Layers**

Cut, copy, and paste shapes between layers.

➢ **Layer Manager**

The Layer Manager manages your layer properties in a convenient table format. It shows the current properties of each object in the map, and the hierarchical structure, including maps, areas, and layers. For surrounds, the Layer Manager only displays the surround elements. This tool is useful when you are trying to manage a large combination of data layers, raster and vector, when making a map. Using the Layer Manager, you are able to control your vector layer hierarchy to ensure that one project layer does not cover another.

Focus Layer Manager

➢ Changing Layer Properties

In the Layer Manager table, object names are listed in rows. Object properties are listed in the table columns. Like the Focus Maps and Files trees, icons are shown beside each object in the Name column. Properties in the Layer Manager show the state of your layers in the current project. They can be changed according to the editable items for the specific layers you are using.

Changes in the Layer Manager are shown in the Focus Maps tree automatically when you click OK or Apply. A layer must be open, and the map must be active to make changes. The check box indicates active layers and maps. The following lists the Layer Manager table columns and explains the property cells you use to show, edit, open, and activate properties for layers.

Name: You can edit this column and change the names of your layers.

Layer Visible: Checked cells are visible layers. When the check is removed, the layer will not be visible in Focus.

Legend Items Visible: Checked cells are Legend items that will be visible. Very similar to Layer Visible column, but only applies to layers in your legend.

Read Only: Checked layers are read-only. When a layer is read-only, a red x will appear beside the layer under the Maps Tab.

Layer Priority: Cell numbers show the layer priority. A layer that is assigned a higher priority will be displayed on top of a layer with a lower priority.

Zoom Scale Active: Checked layers can be assigned zoom scale values.

Min Zoom Scale: Minimum zoom scale value. As map scales go, this parameter, X, is considered to be 1: X.

Max Zoom Scale: Maximum scale zoom value. As map scales go, this parameter, X, is considered to be1: X.

Selectable: Objects are selectable

Transparency Active: Checked cells can be assigned a transparency value. When this is checked, the values in Transparency Value columns will become active and the results will be shown in Focus.
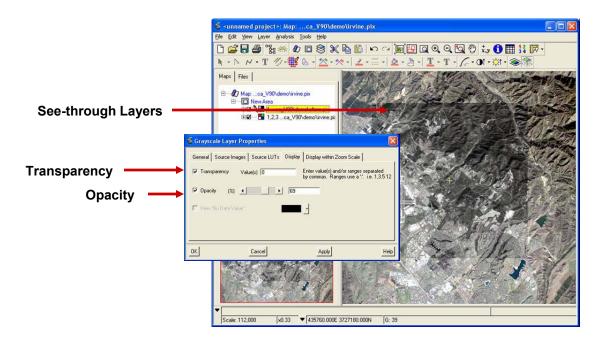
Transparency Value: The pixel value entered here will become transparent, allowing you to see imagery under it. To properly assign transparent values to a three channel, RGB image, use the following format:R10G20B100In this example, pixel value 10 will become transparent for the red band, 20 for the green band and 100 for the blue band. For grey scale images, you would only specify a singe value. For example:10The pixel value of 10 would become transparent in your grey scale image.

Opacity Active: When this is checked, the values in the Opacity% column become active and the results will be shown in Focus.

Opacity%: Sets the opacity level. For example:100 - No opacity. Entire image is shown, cannot see anything under it.50 - Half transparency. You can see 50% of the image and 50% of what is under it.0 - Image is not shown

View No Data Value: Shows Null values.

No Data Color: Set the color you want your No Data pixels to be viewed as.

Clipping/Subsetting

Clipping and subsetting data are effective methods when working with large data sets. In research and testing situations, you may want to create subsets of a large data set. Before creating a subset or a clip you should consider your output format. Your subset file is based on the file type of the source by default. You can change the output format of a subset to any GDB compatible data type. For some file types you may want to add or remove information. The Focus Clipping/Subsetting process lets you choose the file data type for a clip or subset with a GDB Options Editor.
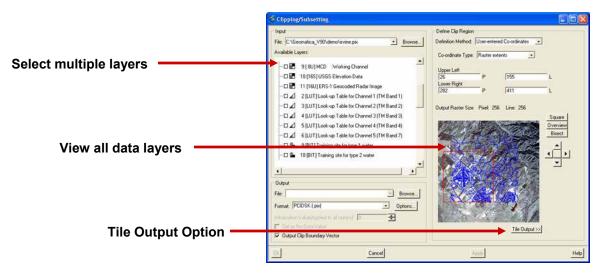
When you use the Clipping/Subsetting feature you begin by specifying the bounds of your clip or subset and then run the process from the Clip File panel. There are two methods available for clipping and subsetting. You can create file subsets by entering coordinates for your subset or you can use a visual clipping method using the bounding outline in the Clip File panel preview

window. The preview window can also be used for tiling or batch clipping on all GDB compatible data types.

New features include:

- Visual Clipping – specify which layer to define as the clip area.
- Multiple Layer Selection – specify multiple layers for clipping and subsetting.
- Visual Tiling – generate multiple tiled files based on a specified number of tiles.
- Improved Preview Window – views all data layers, not just raster.

Select multiple layers

View all data layers

Tile Output Option

➢ **Improved Attribute Manager**

The Focus Attribute Manager produces a table showing all of the pixel values for raster attributes. You can select vectors, search for segments, and locate records. You can also edit vector attribute records and fields.

New features include:

- Improved Export Capabilities – export to a number of spreadsheet and database formats.
- New Area Neighbors – determine adjacent polygons to selected polygons of interest.
- Enhanced Usability – improved architecture and access to the Main menu.

Attribute Manager

➢ **Area Neighbors**

Area Neighbors is a reporting tool for Whole Polygon layers, Topological Polygon layers, and Thematic Rasters. It generates an unconnected table containing attributes so you can analyze the relationship between the shapes.

Depending on which Neighbor Operation you select, the Area Neighbors table can include by default:
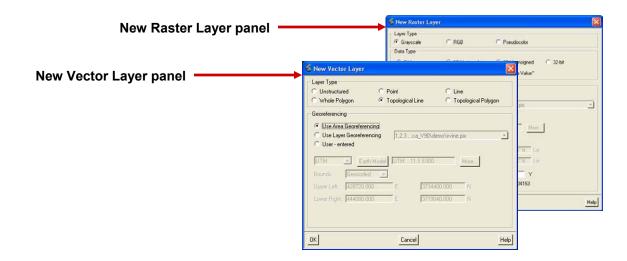
- Shape ID – the number of the record in the Area Neighbors table.
- Input ID – the ID of the Input Area, which is the Shape ID of the shape from the layers Attribute Manager.
- Adj. ID – the Shape ID of the shape that borders on the Input area.
- Sur. ID – the Shape ID of the shape that is surrounded by the Input area.
- SurBy ID – the Shape ID of the shape that surrounds the Input area.
- Level – determines the relationship between shapes that surround and are surrounded by other shapes, as the number of concentric shapes increases, so does the Level.
- SharedPerim – the measurement of the perimeter in common between two shapes.
- %Perim – the percentage of the Input Area's perimeter covered by the other shape.

Area Neighbors panel ➡️

➢ **Improved New Layer Functionality**

It is now easier than ever to create new layers from the Maps tree. Simply right-click on an area you want to add your new layer and select a layer type (raster, vector, or bitmap). You can now add new raster layers (8-bit, 16-bit signed, 16-bit unsigned, or 32-bit) from the Maps tree. Improvements have been made to provide better georeferencing options for new layers and better layer differentiation for new vector types including unstructured data, points, lines, whole polygons, topological lines, and topological polygons.

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New Raster Layer panel →

New Vector Layer panel →

GIS Improvements

➢ **Input/Editing Tools**

Improvements have been made to make Input/Editing tools more layer-type aware (line, point, and polygon)

➢ **Topological Vector Support**

Geomatica 9 includes improved topological vector support including Topological Lines and Topological Polygons. Topology is a graphic representation of the surface features of an area. Topology involves not only building a relationship between the shape and the attributes, but also a relationship between the shapes themselves.

➢ **Topological Lines**

A Topological Line contains two layers: Arcs and Nodes. An Arc is a line that can contain several vertices, but only two Nodes. A Node is the start point or the end point of the Arc depending on the direction of the Arc. When an Arc intersects or meets another Arc, the intersect point becomes a Node. The Node splits the Arc into separate Arcs.

You create and edit the lines on the Arc layer. The Node layer is generated automatically when you add a Topological Line layer, but you cannot edit the Node layer.

➢ **Topological Polygons**

A Topological Polygon contains three layers: Areas, Arcs, and Nodes. An Area is a polygon formed by one or more Arcs.
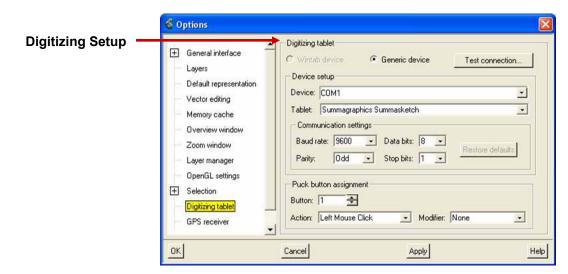
When a Topological Polygon overlaps another, the intersecting points become Nodes. And the Arcs are split, which results in a new Topological Polygon in the overlap. Therefore, two Topological Polygons become three.

The Arc layer includes attributes that identify which Areas (polygons) lie on either side of each Arc. The Area layer includes attributes that identify which Arcs form each Area. These attributes describe the relationship between the shapes.

➢ **Digitizing Tablet Support**

New Tablet connection options and tools for digitizing new data and editing existing data using a Digitizing Tablet.

Digitizing Setup ⟶

➢ **Vector Editing Tolerances**

These controls are used when you are creating and editing vectors. The Vector Editing dialog box sets the units and tolerances for Search, Snap, and Weed Vertices tolerances in either pixels, meters, or feet. The tolerances are measured in pixels by default. While Digitizing the option is also set from this dialog box for the Snap operation.

➢ **Vector Cleaning**

Improved VECCLEAN algorithm. This module is used to correct common digitizing errors on line work. Vector cleaning is also the first step to produce cleaned topologically correct data. VECCLEAN can perform the following clean-up procedures:

- Weed redundant vertices
- Correct over/under shoots
- Merge lines together
- Break lines at intersections
- Remove pseudo nodes

VECCLEAN automatically:

- Removes exact duplicate lines
- Removes lines of zero length

VECCLEAN Module Control Panel ⟶

➤ Vector Editing Toolbar

Improved Vector Editing toolbar. The Vector Editing toolbar provides a variety of tools for modifying vectors with enhanced capabilities for topological vector editing.

Vector Editing Tools Toolbar ⟶

➤ Conversion Tools

Geomatica 9 includes a number of conversion tools that will convert data between different layer types. They include:

Conversion Tool	Description
BIT2LINE	Convert a Bitmap layer to a Line layer
BIT2POLY	Convert a Bitmap layer to a Polygon layer
CRCENTROID	Create a Centroids for Vector layer
CRTHMR	Create a Thematic Raster layer
LINE2PNT	Convert a Line layer to a Point layer
LINE2POLY	Convert a Line layer to a Polygon layer
LINE2RAS	Convert a Line layer to a Raster layer
LINE2TLINE	Convert a Line layer to a Topological Line layer
POLY2BIT	Convert a Polygon layer to a Bitmap layer
POLY2LINE	Convert a Polygon layer to a Line layer
POLY2PNT	Convert a Polygon layer to a Point layer
POLY2RAS	Convert a Polygon layer to a Raster layer
RAS2BIT	Convert a Raster layer to a Bitmap layer
RAS2LINE	Convert a Raster layer to a Line layer
RAS2PNT	Convert a Raster layer to a Point layer
RAS2POLY	Convert a Raster layer to a Polygon layer

Conversion Tool	Description
RAS2THMR	Convert a Raster layer to a Thematic Raster layer
THMR2RAS	Convert a Thematic Raster layer to a Raster layer
TLINE2LINE	Convert a Topological Line layer to a Line layer
TPOLY2POLY	Convert a Topological Polygon layer to a Polygon layer

➢ **Other Vector Editing Improvements**

Other vector editing improvements include:

- Improved z-coordinate handling

➢ **Spatial Query Tools**

Better Selection/Spatial Query tools.

Find features that are…

- Fully within
- Partially within
- Within a distance
- Fully within a distance
- Crossing selected features

Spatial Query Tools ⟶

➢ **Selecting Fully Contained Shapes**

The Fully Within tool selects all other shapes that fall completely within the shape that you selected. Any shape that touch or overlap a shape other than the one you selected will not be included.

➢ **Selecting Partially Contained Shapes**

The Partially Within tool selects the shapes that have at least one vertex in common with the shape that you selected, including overlapping and neighboring shapes.

➢ **Selecting Shapes Within a Specified Distance**

The Within Distance tool selects the shapes that fall within the specified distance of the shape that you select. If you do not select a shape, the distance is calculated from the location of the cursor.

➢ **Selecting Shapes Fully Within a Distance**

The Fully Within Distance tool selects only the shapes that fall completely within the specified distance of the shape that you select. If you do not select a shape, the distance is calculated from the location of the cursor.

➢ **Selecting Intersecting Shapes**

The Crosses tool selects all shapes that intersect the shape that you select. It selects all the shapes that have at least one vertex in common with the shape that you selected.

➢ **Querying Using an Expression**

If you want to perform a more elaborate query, you can create an expression that will select all of the corresponding records. An expression can be a statement where two attributes are connected by a relational operator to produce a result, or it can be two or more statements joined by an AND or OR operator.

For example, if you have an attribute called Length that describes the length of rivers on the layer, you can query "Length > 10". The result is all the records that contain a value greater than 10 in the Length field are selected in the Attribute Manager.
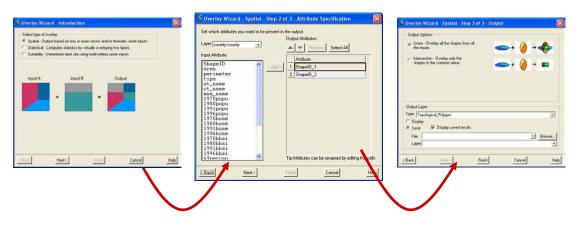
➢ **Enhanced Measure Tools**

The Measure Tools are used to obtain length, area and perimeter measurements of a user specified area of an image. These tools provide a variety of option for how an area is be measured and how the measurement units reported.

➢ **Overlay Analysis Tools**

Geomatica 9 includes a new Overlay Wizard that will obtain new information from two or more input layers. Three Overlay options are available:

- Spatial Overlay – one output based on many vector and/or thematic raster inputs.
- Statistical Overlay – compute statistics by overlaying two layers.
- Suitability Overlay – create one raster layer showing the suitability of many input raster layers.

Interactive 2 or 3 step process!

➢ **Dissolve Tool**

The Dissolve Tool has been enhanced for Geomatica 9 to include support for Thematic Rasters. Dissolve combines shapes that contain the same value for the selected attribute or RST style. The resulting output is a layer that contains the newly combined shapes with each shape represe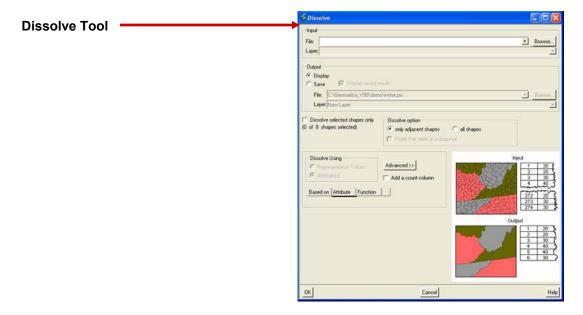nted as a record in the layer's Attribute Manager. You can use Dissolve to combine Whole Polygons, Topological Polygons, and Thematic Rasters. Dissolve can also remove Nodes where two Topological Lines meet, but do not intersect (pseudo-Nodes).

Dissolve Tool ────────────▶

➢ **Proximity Analysis**

The programs in this group are all used for carrying-out proximity analysis, using point and raster data.

Programs	Description
AREAOFINF	Create an Area of Influence Thematic Raster
AREAPROB	Create an Area Probability Raster
DENSITY	Create a Density Raster from Points
POTMAPSTAT	Create a Raster representing Statistics for Points
POTMAPSUR	Create a Raster surface from Points
THMRMER	Merge Thematic Raster classes
THSNPOLY	Create a Thiessen Polygon layer

➢ **Create an Area of Influence Thematic Raster**

The areas of influence gravity modeling function converts a point layer to a raster representative of the influence or attractiveness of each point in the layer.

The underlying premise of a gravity model is that the attractiveness of a point is inversely proportional to distance and is directly related to the perceived attractiveness of the point itself. The point data must contain a weight (attribute) representing the attractiveness of each point. A weight is a numeric value assigned to each point as an indication of its importance or its intended contribution to the final output. The user also specifies a distance decay factor used to calculate

the diminishment of attractiveness with increasing distance. The greater the distance from the point, the less attractive the point becomes.

Using this information, this function defines a catchment area around each point. A catchment area is an area surrounding a point within which any location is more attracted to that point than to any other point. These results in a one-to-one relationship: one area to one point. The higher the density of points, the smaller the catchment area. Conversely data with a low density of points creates large catchment areas.

This function differs from Thiessen polygon in that a weight and distance decay factor is used to define the catchment areas.

➢ Create an Area Probability Raster

Gravity Probability modeling converts a point data layer to a raster representative of an index of attractiveness asserted by a user specified point. This type of modeling is particularity useful for analyzing trade areas and forecasting sales retail and service institutions with the point representing the store or a shopping mall.

The underlying premise of a gravity model is that the attractiveness of a point is inversely proportional to distance and is directly related to the perceived attractiveness of the point itself. The point data must include weight values representing the attractiveness of each point. A weight is a numeric value assigned to each point as an indication of its importance or its intended contribution to the final output. The user also specifies a distance decay factor used to calculate the diminishment of attractiveness with the increasing distance. The greater the distance to the point, the less attractive the point becomes.

Using this information, this function generates areas indicating the probability of any location within that area being attracted to the specified point. The output values are expressed as a percentage with 0 indicating no attractiveness and 100 indicating maximum attractiveness.

The probability function is based on Reilly's improvements on the Huff model.

➢ Create a Density Raster from Points

This module converts a point layer to a raster representative of either the density per square unit of the points or the density of an attribute, referred to as a Z-value, of the points.

The density function generates a surface by applying a sampling radius to each point in the data layer. No output values are calculated for areas lying outside of any sampling radius.

The value for each pixel in the output raster is calculated based on the value of each point whose sampling radius overlaps the centre of that pixel. The user can specify the size of the sampling radius.

➢ Create a Raster Representing Statistics for Points

The POTMAPSTAT (potential mapping statistics) function converts a point layer to a surface representative of a statistical model of a selected attribute, referred to as a Z-value, of the points. The statistical models available are the sum, sum of squared deviations, variance, standard deviation, coefficient of variance, and standard error of mean. An averaging technique is used and therefore this function does not create any new values greater than the maximum value of

the input data nor less than the minimum value of the input data. This function considers the input point data to be a sample data set as defined by the study of statistics.

This technique was called Potential Mapping Statistics in SPANS.

➢ Create a Raster Surface from Points

This module converts a point layer to a raster representative of a selected attribute, referred to as a Z-value of the points. The surface derivative models are the weighted average of Z-values, slope, aspect, X - and Y - derivatives, angle of incidence and sum. This function uses an averaging technique and does not create any new values greater than the maximum of the input data nor less than the minimum value of the input Z-value.

This technique was called Potential Mapping Surface in SPANS.

➢ Merge Thematic Raster Classes

This module creates a new thematic raster based on merging pixel values by attributes.

➢ Create a Thiessen Polygon Layer

A Thiessen polygons or Voronoi diagram defines a polygon about a point such that all locations within the polygon are closer to that point than to any other point.

This module takes a point layer and generates a whole polygon vector layer. One polygon is generated for each input point. The attributes for the polygon layer will include area, perimeter and the attributes from the original layer either copied to the new layer or joined from the original layer. If joined, an attribute called "SourceID" will be added as the joined field. The extents of the generated layer are determined from either the input point layer (+ 10%) or from an optional georeferencing port (Geo Port). A Geo Port is a port used to define the georeferencing from the FILE.

Raster Thiessen polygons can be generated in PACE using GRDPIN though the user has to enter a parameter of 1 for "Number of sample Points".

This function can be used to model zones of influence.

➢ Spatial Analysis Utilities

These programs are all utility functions for spatial analysis. They include programs for cleaning vector data, as well as some analysis functionality.

Program	Description
CNTGTHMR	Combine contiguous Thematic Raster classes
CRNEAT	Create Neatline
EDMATCH	Edgematching
GRATGRID	Generate a graticule grid
SMBOYLE	Boyle smoothing on Vector layer
SMCAIKEN	Chaiken smoothing on Vector layer
SMMCMASTER	McMaster smoothing on Vector layer
VECCLEAN	Clean a Vector layer
VECTHIN	Thin a Vector layer (Douglas-Peuker)

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➤ **Area Cross-tabulation**

This function generates an area cross tabulation report containing correlation coefficients (Chi square coefficients) which gauges the extent of correlation between two raster layers.

➤ **Generate Centroids**

CRCENTROID is a vector/thematic raster operation which generates a point location (X and Y coordinate) for each shape in the input layer.

In the case of a vector layer, the module can optionally create only centroids for polygons or for each shape in the layer. If a point is generated for every shape and the shape is a point, the resultant centroid will be the same as the point. If a point is generated for every shape and the shape is a line, the resultant centroid will be a point on the center of the line (not necessarily on a vertex of the shape). The coordinates generated will be of the same projection as the input polygon layer. The point layer will only have one attribute which is the shape id of the shape from which the point was generated. The attributes of the source shape will be "joined" or "copied" to its corresponding point in the point layer.

For thematic rasters, a point is generated for each attribute record. The centroid will be contained in biggest contiguous area.

This module can be used to create a point layer for labeling

➤ **GPS Tool**

The GPS option includes the inputs for setting up a GPS receiver so that you can use it with Geomatica Focus. You can use the GPS Tool to provide two services within the Focus environment. Firstly, you can use it to update the position of the cursor within a Focus Area. Secondly, you can use it as a data input device for a new vector layer.

GPS Receiver Setup →

Remote Sensing Improvements

➤ **Atmospheric Correction**

Atmospheric Correction has been added to the Geomatica Focus environment as an interactive process that can be repeated, until a satisfactory result is achieved. In Focus, Atmospheric Correction is carried out in a similar way to multi-spectral classification. You use a Meta-layer in the Focus work area to track all the layers for the process. You can use several different input layers including haze and cloud masks, raw data layers, elevation data, and associated information. Output data includes corrected layers and visibility layers. You can also use several kinds of value-added layers such as vegetation and leaf area indexes.

Atmospheric Correction in Focus includes:

- Spectra Viewing, using set parameters.
- Constant Atmospheric Correction
- Spatially Varying Correction
- Automatic Haze/Cloud Mask Generation
- Manual Haze/Cloud Mask Generation/Editing
- Visibility Index Editing
- Value-added Product generation

In Focus, you configure atmospheric corrections using the Atmospheric Correction Configuration panel.You use the same panel for both ATCOR2 and ATCOR3.

Atmospheric Correction Configuration Panel ⟶

➤ **ATCOR2**

Calculates atmospheric correction for flat areas applying constant or varying atmosphere.

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➢ **ATCOR2_T (Thermal)**

Calculates a surface temperature map for flat areas given a thermal sensor.

➢ **ATCOR3**

Calculates a ground reflectance image using elevation data.

➢ **ATCOR3_T (Thermal)**

Create a surface temperature map given a thermal sensor band and elevation data.

➢ **Pan Sharpening**

PANSHARP fuses high resolution B&W (panchromatic) imagery with colour (multi-spectral) imagery creating a high resolution colour image. This technique is often referred to as pan-sharpening. This program was designed to work with 8 bit, 16 bit, or 32 bit real data. Panchromatic data can be fused with multi-spectral imagery acquired simultaneously by the same sensor, or images from different sensors can be used. However, the best results will be achieved when the imagery is collected simultaneously and the resolutions of the panchromatic and multi-spectral data are closely matched. The spectral characteristics of the original data will be preserved in the resulting high resolution colour imagery. This means that analysis such as classification can be done on the pan-sharpened imagery with the added benefit of higher spatial resolution.

➢ **Thematic Rasters**

Improved Thematic Raster support. A Thematic Raster layer can have a set of values, representing a crop type, or a forest type corresponding to the ground truth for a scene or image. Raster layers can also contain values for continuous fields of data relating to temperature, proximity to fire stations, or probability of erosion. You can assign Raster layer values manually, automatically, or from the metadata associated with the raster layer.

➢ **Advanced Hyperspectral Analysis**

Data collected from airborne and satellite-borne imaging spectrometers (hyperspectral images) represent many narrow and practically contiguous wavelength intervals, or bands, typically throughout the visible, near infrared, and mid-infrared wavelength intervals. For example, the Airborne Visible/Infra-Red Imaging Spectrometers (AVIRIS) has 224 practically contiguous bands each of which are less than 10nm wide.
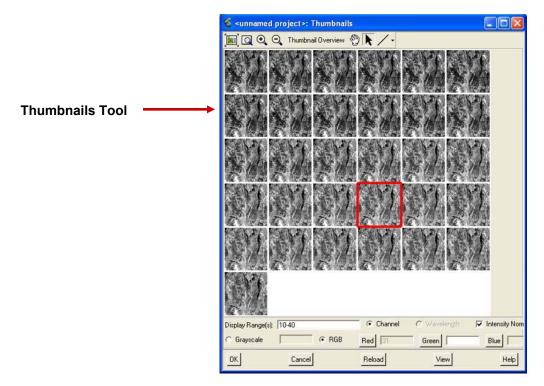
Geomatica 9 comes with several new tools and operations that are particularly valuable for visualizing your hyperspectral image data.

Geomatica 9
Software Solutions

New features:

- New image metadata support
- Geometric correction
- Noise removal
- Simple atmospheric correction
- Endmember selection
- Spectral Angle Mapper image classification
- Spectral unmixing
- Scatter and Spectra plotting
- Spectral mixing
- Visualization operations
- Support for spectra libraries
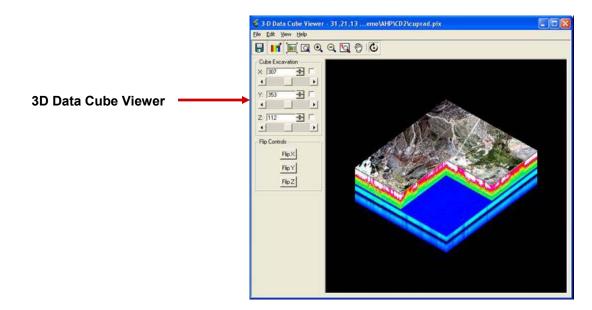- Vector quantization image compression

➢ Thumbnails Tool

The Thumbnails tool lets you display hyperspectral bands simultaneously. Although the individual band images in the display are highly sub-sampled *thumbnails,* they can reveal exceptionally *noisy* bands, where rapid sensor response changes occur, allowing you to quickly select triplets of uncorrelated bands and create informative RGB displays in the Focus view area. Finding noisy band in hyperspectral data is much more difficult when displaying bands one at a time in an image.

Thumbnails Tool ⟶

➢ 3D Data Cube

The 3D Data Cube tool also provides a way of visualizing a hyperspectral image as a whole, but without the severe sub-sampling of a Thumbnails display. The image bands are not all visible at once in the 3D Data Cube Viewer, but the excavation feature allows between-band differences to be examined more conveniently than they are with a conventional band-at-a-time display.

Geomatica 9
Software Solutions

3D Data Cube Viewer

➢ **Band Cycling Tool**

The Band Cycling Visualization Tool provides yet another way of conveniently displaying information from multiple image bands. This tool can be used to clearly display how the appearance of particular parts of an image change, over specific wavelength intervals. Rapid change in appearance over particular wavelength regions may be diagnostic of certain material types.
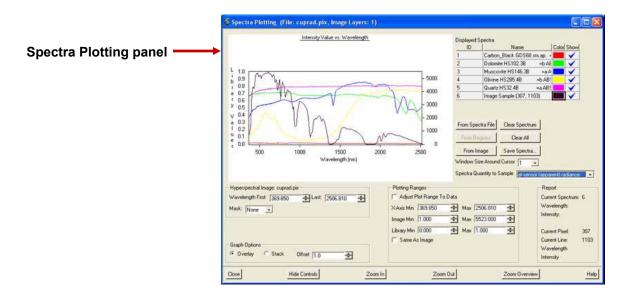
➢ **Spectra Plotting Tool**

The image value versus wavelength curve (*the image spectrum*) for individual pixel neighbourhoods in the currently displayed image can be extracted quickly from the image and displayed with the Spectra Plotting Tool. This tool also allows selected image spectra to be saved as records in a file. Spectra stored as records in one or more files may also be displayed with the Spectra Plotting Tool. Such file-stored spectra may come from a variety of sources. For example, they may be reflectance spectra (i.e., reflectance versus wavelength curves) for representative material samples that have been measured in a laboratory or in the field with non-imaging spectrometers, or they may be saved image spectra. Image spectra for the currently displayed image may be displayed together with file-stored spectra.

These capabilities of the Spectra Plotting Tool have many uses in hyperspectral image analysis. For example:

- Image spectra may indicate wavelength intervals in which the sensor probably did not measure accurately (e.g., through the presence of unexpected spikes or noise in the plots.).
- Spectra for an image that has been radiometrically corrected (e.g., for the removal of atmospheric absorption features) may be displayed with saved spectra for the same locations in the uncorrected image in order to visually assess the quality of the correction.
- Spectra for a reflectance image (derived from an original sensed image with an atmospheric correction procedure) may be compared to laboratory-measured reflectance spectra for known materials in order to help identify the material type corresponding to selected locations in the image.

Spectra Plotting panel →

➢ Spectra Extraction Tool

The Spectra Extraction Tool allows you to manually delineate particular regions in an image, and then invoke the Spectra Plotting Tool to plot and save mean image spectra for those regions, or invoke the Scatter plot Tool to display two-dimensional image value scatter plots for those regions. The Spectra Extraction Tool essentially extends the applicability of the Spectra Plotting Tool to arbitrary image regions (used on its own, the Spectra Plotting Tool can only display and save image spectra for small square neighbourhoods of specific image locations).

➢ Hyperspectral (Vector Quantization) Image Compressor

This program is an important part of the Advanced Hyperspectral package, because hyperspectral datasets in an operational environment may be very large (e.g., long flightlines of over 50 bands of 16 bits-per-pixel data). A major advantage of vector quantization is that the codebook/indexmap pair may be processed by Advanced Hyperspectral programs without first reconstructing an explicit image from the pair.

The compression is lossy, and so it some cases it may best be used to support initial trial processing (e.g., for determining the best parameter values for programs), with final processing done on the original, uncompressed dataset.

The Hyperspectral Image Compressor is an add-on to the Advanced Hyperspectral package.

This Vector Quantization program was incorporated into PCI Geomatica under a license agreement between the Canadian Space Agency and PCI Geomatics.
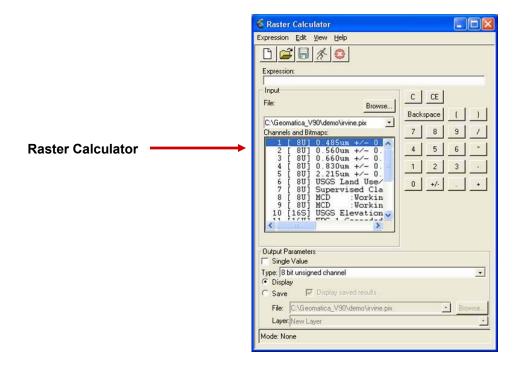
➢ Raster Calculator

You can work with raster data in the spectral domain using the Raster Calculator tool. The Raster Calculator also provides indices such as the NDVI Leaf Area Index. You can use it on any file with raster channels and it can support multiple files and raster attributes. You can output a number or a 2D image. A file must be open before the Raster Calculator is available in either the Tools menu or the shortcut menu. You do not need a file open in the Maps Tree, a new map and area are added when you select layers from the Thumbnails viewer. When you close the Raster

Calculator, any layers added to the Focus window remain and the main Focus window is active again.

The Raster Calculator panel has a Basic and an Advanced view. The advanced view gives you more category and function options that you can use while allowing you to choose from several attributes used in the calculation.
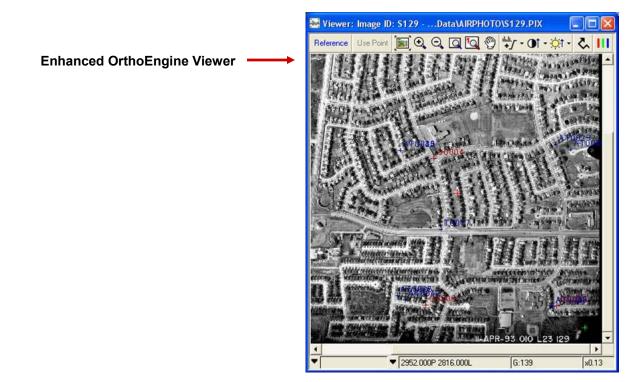
Raster Calculator ⟶

OrthoEngine Improvements

➢ **Enhanced Focus Style Viewer**

Geomatica 9 OrthoEngine inlcudes an enhanced Focus style viewer.

Features include:

- Zoom to overview
- Panning
- Ehancement Tools
- Vector overlay
- Interactive mapping of image channels
- Display of coordinates, pixel values, and the zoom factor

Enhanced OrthoEngine Viewer →

> ## Collecting Tie Points Automatically

The Automatic Tie Point collection has been improved to collect more points, more efficiently. Used only in rigorous models such as Aerial Photography and Satellite orbital math models, tie points identify how the images in your project relate to each other. Since tie points are simply matching points in two or more images, OrthoEngine can automate the tie point collection by using image correlation techqniques.

> ## Satellite Model Bundle Adjustment

Now work with blocks of satellite data using less GCPs!

In the Satellite Orbital math model, the position and orientation of the satellite is described by a combination of several variables of the viewing geometry reflecting the effects due to the platform position, velocity, sensor orientation, integration time, and field of view.

The bundle adjustment uses ground control points (GCPs) and tie points combined with the knowledge of the rigorous geometry of the sensor to calculate the *best fit* for all images in the project simultaneously.

> ## Automated DEM Extraction Tools

Utilize new Batch Epipolar Generation with Batch DEM Extraction for complete end-to-end processing in a single-step!
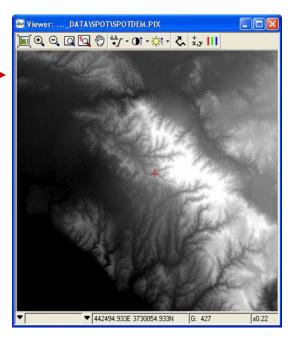
Normally, the process of generating a digital elevation model (DEM) consists of several steps:

- Convert the raw images into epipolar pairs. Epipolar images are stereo pairs that are reprojected so that the left and right images have a common orientation, and matching features between the images appear along a common x axis.

- Extract DEMs from the overlap between the epipolar pairs. The resulting DEMs are called epipolar DEMs. They are not georeferenced at this stage.

- Geocode the epipolar DEMs and stitch them together to form one DEM.

DEM displayed in the enhanced OrthoEngine Viewer

➢ Multiple File Selection

Selecting multiple images to orthorectify or geometrically correct streamlines the process!

➢ Color Balancing

Improved color balancing reduces the need to refine results!

Radiometric differences between images can cause a patchwork effect in a mosaic. Color balancing evens out the color contrasts from one image to another to reduce the visibility of the seams and produce a visually appealing mosaic.

➢ Sensor Support

The OrthoEngine Add-on Modules provide support for the latest sensors!

New sensors include:

- ASAR
- EROS
- Hyperion
- MERIS
- MODIS
- SPOT 5

OrthoEngine Project Information panel ————→

Cartography Improvements

➢ **Neatline**

Advanced Neatline options. You can automatically update the position and size of the neatline when the application area is moved, rescaled, or resized. You can also regenerate the neatline, or leave it as is. The Neatline – Advanced dialog box provides the control options.

➢ **Grid**

The Grid element is a map reference system used to locate point coordinates on your map. You can adjust the location, style, headings, labels, and other features of a grid element.

New features include:

- Custom grid layouts
- Display intersection points alone – without grid lines
- Map objects (text, symbols, etc…) can be snapped to the layout grid

Layout Grid Setup panel ————→

> ## Symbol Editor

Symbols can be simple arrows or more complex diagrams.You can draw and customize north arrows with the Symbol Editor, and then save the symbol file. You can then assign the new symbol to a Quick Style to use again in other projects.

Symbol Editor panel ➝

> ## Representation Style Table

The Representation Style Table (RST) is the way in which the graphical display of vectors is described, and stored. A vector layer optionally contains an RST, which, if it exists can be assumed to describe how shapes in that layer should be drawn.

An RST consists of zero or more representations. Each included representation is indicated by its representation code, or RepCode. This is the integer value used to look up the representation in the RST, typically based on the RepCode attribute of the shapes in the layer.

The representation consists of a series of zero or more parts. Each part describes a drawing method used when drawing a shape. Normally there is only one part.

Each part has the following information:

Priority: The priority is used to indicate how different vector drawing components should be layered. The higher priority values are drawn over those with lower priorities. This applies between different parts within a given representation, but also applies between different shapes drawn within a given layer, and in some applications is evaluated between all vector layers in a given view.

Graphical Primitive: The drawing primitive to be used for this part. Supported primitives include:

- Simple-Line
- Dash-Line
- Spaced-Symbol
- Simple-Point
- Point-Symbol
- Vector-Text

- Solid-Polygon
- Patterned-Fill
- Transparent-Polygon

➢ **Representation Editor**

The main goal of the Representation Editor is to combine the RST Editor and the Thematic Display (commonly referred to as the GTD Editor) panels. The Representation Editor will be the starting point for creating, assigning, managing and manipulating indirect representation for vector data. Direct Representation is not changing for Geomatica 9. The Representation Editor succeeds at combining the two Indirect and Default.

Representation Editor panel ⟶

➢ **Label Tool**

Label Points, Lines, and Areas with associated attribuites.

Specify the…

- Attribute
- Label name
- Horizontal postion and offset
- Verticle position and offset
- Alignment
- Font
- Size
- Color

Label Tool ⟶

For more information visit…

www.pcigeomatics.com

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