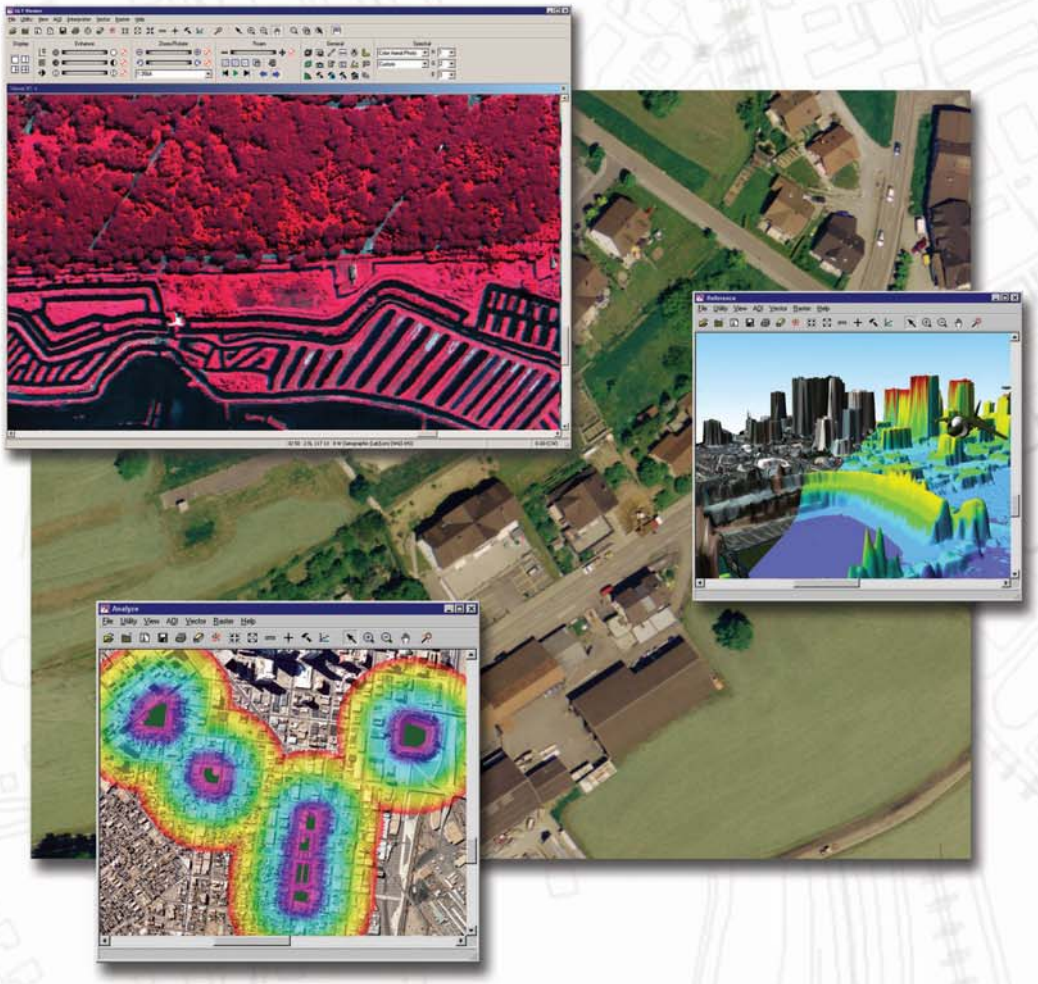
What's New in ERDAS IMAGINE® V8.7



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POWERING GEOSPATIAL IMAGING™

Leica Geosystems

What's New in ERDAS IMAGINE® V8.7

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Overview

ERDAS IMAGINE®, the geographic imaging software favored by remote sensing professionals, only gets better with each new release. ERDAS IMAGINE V8.7 adds advanced image handling tools through the IMAGINE Geospatial Light Table™ interface, superior mosaicking functions, more import and export utilities, as well as advanced 3D visualization and scene creation capabilities.

Key New Features Summary

- Fuzzy Recode for deconflicting land cover classification
- Improved Mosaic Tool workflow and tools
- Faster, smoother multi-threaded GLT viewer
- Dozens of new raster DLLs, importers and exporters for seamless data access
- Support for extremely large, multi-resolution terrain databases in IMAGINE VirtualGIS®
- New Stereo Analyst® tools for constructing realistic 3D city models
- JPEG2000 support, including GeoJP2
- Expanded list of projections, spheroids and datums, including new datum transformations

New in IMAGINE Professional®

Fuzzy Recode

ERDAS IMAGINE 8.6 introduced the Grouping Tool. This tool improved the efficiency of assigning land use categories to the results of Unsupervised image classification (or other image segmentation processes), including helping to identify conflict between category assignments.

However, it was not always possible for the operator to manually deconflict all selections. For example, a particular class number might have had two or more land use categories assigned to it.

A further issue with using the Grouping Tool was that there was no easy way to consolidate the land use category assignments into a single "class_name" attribute field (especially if there were still conflicts present).

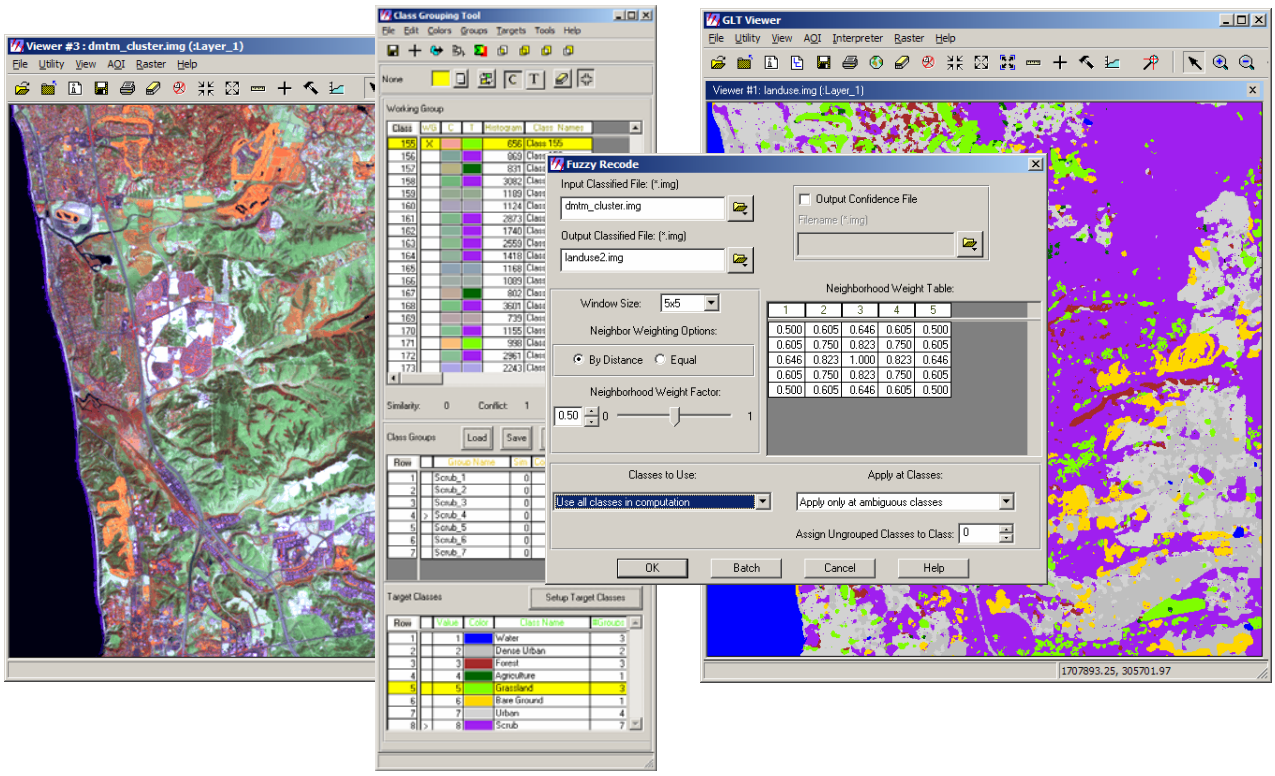
The new Fuzzy Recode* tool can be used to process the results of the Grouping Tool. This can be used for two main tasks:

- To save a "Grouped" image to a new image where the final class allocations are assigned as DN values and class names.

- To deconflict any remaining ambiguity in class assignment. This process is based

on a weighted focal operation. The Grouping Tool will help users identify classes in conflict with each other (more than a single Target Class has been picked for a particular class DN value in the original image). The user can then assign confidences for each assignment – if the user can't decide whether a certain DN should be Cultivated Land or Grassland, but is more confident of it being Grassland, confidence values could be set on those Groups of 0.6 and 0.8, respectively.

When Fuzzy Recode is applied to this image, the focal operation used considers not just local relative confidence at each pixel, but also adjacency effects by applying a distance-weighted confidence from the surrounding classes to determine the Target class. For example, if the conflicted pixels described above existed surrounded by Mixed Forest, the higher-confidence Grassland might win, but if the surrounding pixels consisted of a high proportion of Cultivated Land, the weighting might favor a Cultivated Land assignment.



New in IMAGINE Advantage®

Mosaic Tool

In its ongoing efforts to automate and improve the image mosaicking process, Leica Geosystems again enhanced the features of the IMAGINE Mosaic Tool.

Simpler Interface

The utilities for loading image frames and blocks into the Mosaic Tool, as well as the output options and various other dialogs have been streamlined to improve the mosaicking workflow. For example, to add images to the list of files to be mosaicked, the Mosaic Tool now simply uses the standard File Chooser dialog with its standard multiple file selection capabilities (using Regular Expressions).

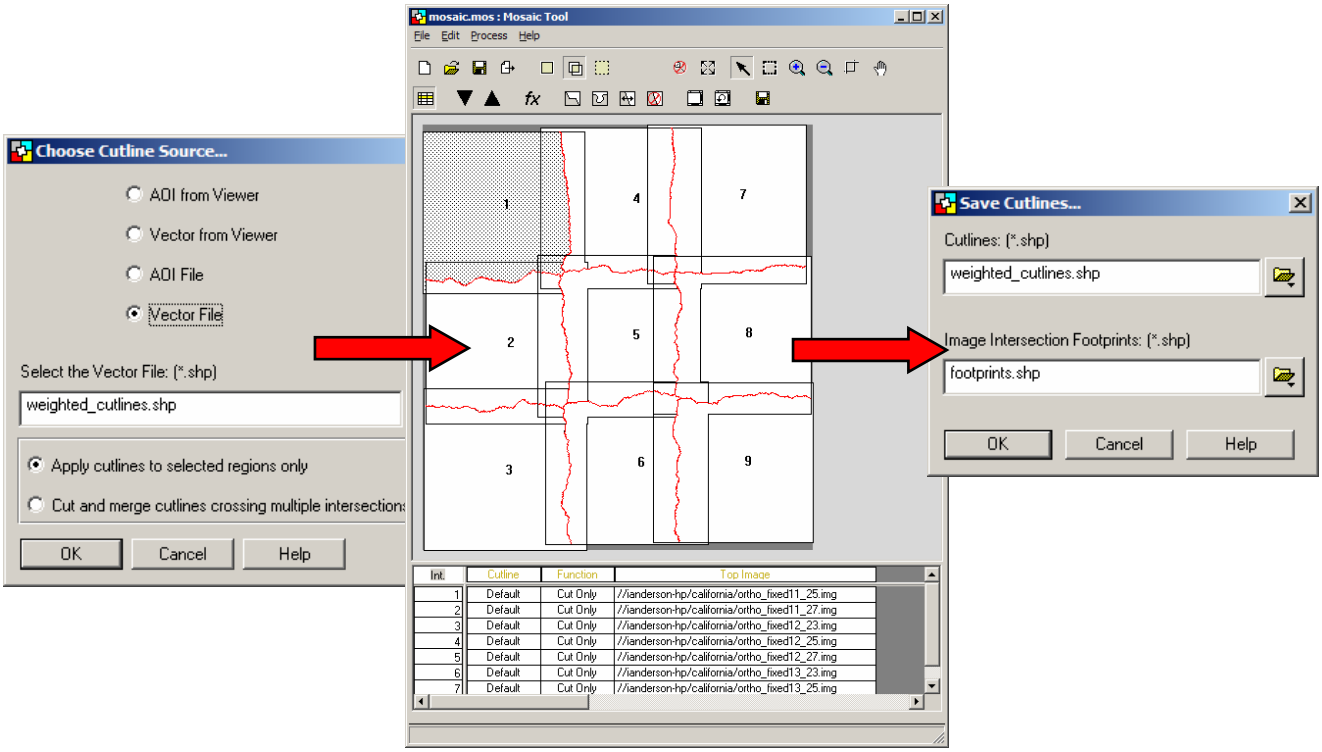
Direct Use of Blockfiles

A Blockfile produced by IMAGINE OrthoBASE® or Leica Photogrammetry Suite (LPS) can be directly opened into the Mosaic Tool to provide the list of images to be orthorectified and mosaicked.*

Cutline Saving and Loading

Cutlines, or seamlines, can be loaded into the Mosaic Tool from external sources such as a GIS vector layer, as well as saved to Shapefile format.

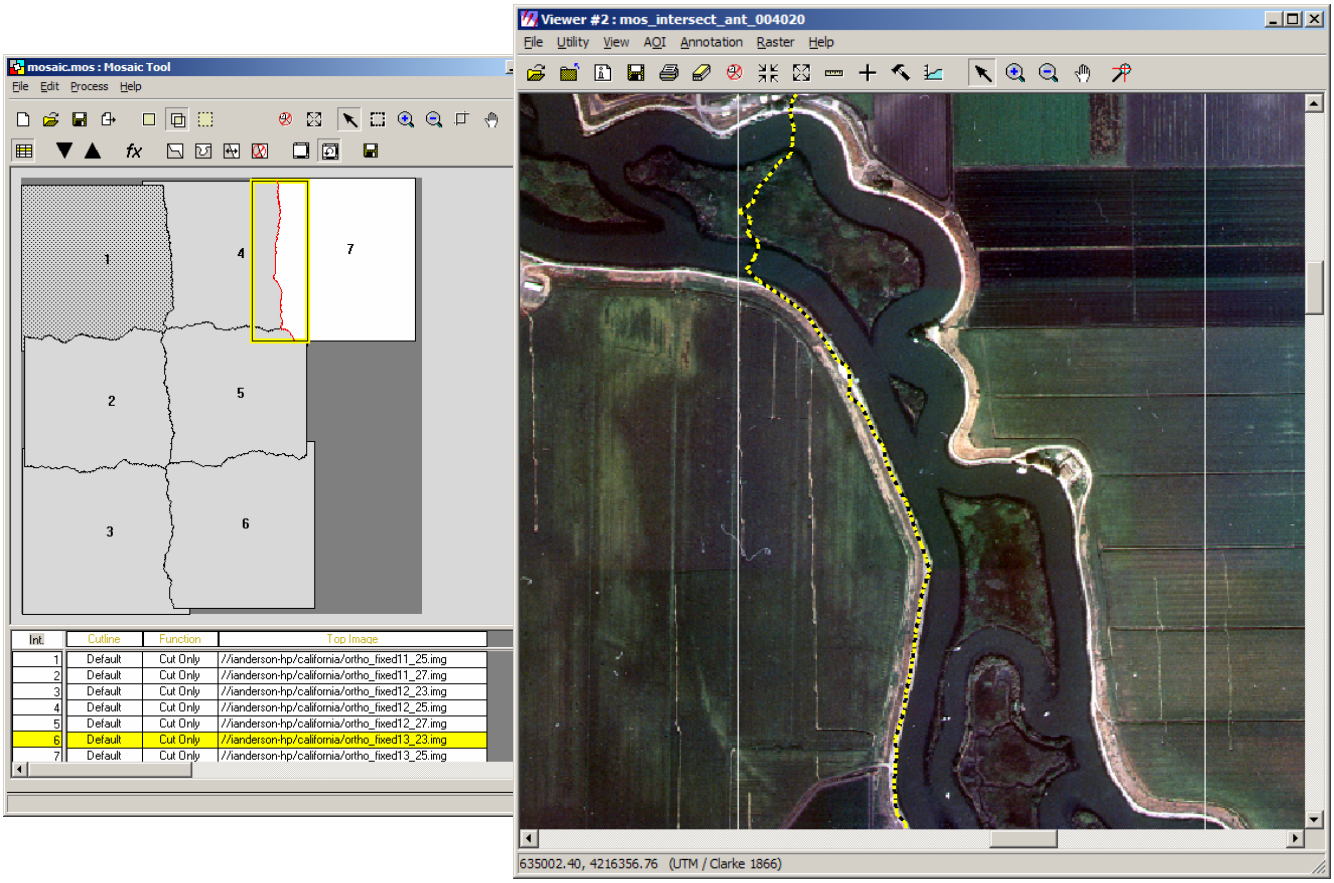
This brings additional flexibility to the user because cutlines that are automatically generated by the Mosaic Tool can easily be saved to a format that can be edited with the full suite of vector editing tools, and then rapidly reloaded to the Mosaic Tool. Similarly, lines generated outside of the Mosaic Tool (or even outside of ERDAS IMAGINE) can be imported and used to define the cutlines in areas of overlapping imagery.



Automated Cutline Generation

The Mosaic Tool now offers two techniques for automatically generating the cutline between overlapping images. Cutlines are used to either butt-join or to feather between two or more images along the line. In either instance, it is important to select a line which avoids cutting through marked changes in contrast. For example, the line should follow the edges of water bodies and buildings, not cut through them. Instead, it should attempt to follow such edges of contrast so that any remaining tonal differences between image frames are hidden from the user by the natural change in contrast.

The new Weighted Cutline algorithm attempts to automatically create such cutlines. The algorithm trends along the natural nadir, or center line, of the overlap, but is weighted by contrast differences to draw cutlines that follow natural breaks in contrast.



Seam Smoothing / Blurring

Users can apply seam smoothing / blurring along the cutline path to hide micro mismatches due to elevation errors, buildings, trees, sun angle and so forth.

Find Like Areas

The option to use Exclude Areas was introduced in previous versions of the Mosaic Tool to exclude sun glint and other effects in the imagery from affecting the mosaic processes. However, setting up these areas was time-consuming, especially if large blocks of imagery were involved.

ERDAS IMAGINE 8.7 introduces the Find Like Areas tool to the Exclude Areas dialog. Users can quickly identify a type of pixel, such as an area of sun glint on water, in one image and have the Find Like Areas algorithm automatically identify similar areas throughout the rest of the image, as well as the other images in the mosaic list, saving a large amount of manual processing.

Fast Dodging

An alternate or even complementary technique to color balancing individual image frames is now available.

Fast Dodging uses a statistically-based moving window algorithm to remove tonal imbalances across individual input image frames. Removing these imbalances will produce a more seamless mosaic that does not suffer from the usual “checkerboard” effect seen in air photo mosaics.

New Output Options

Much greater control is offered over the type of outputs created from the Mosaic Tool.

The output tiles can now be defined using an ASCII list of coordinates, which can also include a rotation angle. This enables users with linear projects such as road or pipeline surveying, to set up tiles that are oriented to the direction of the feature being mapped, but which minimize the disk space used by rotating the data into the minimum required rectangular area.

A Clip Boundary can also be defined for those who wish to limit the processed data to the confines of a project area. This could be a county boundary, coastline or similar. The file tile will be output, but pixels falling outside the Clip will be null data.

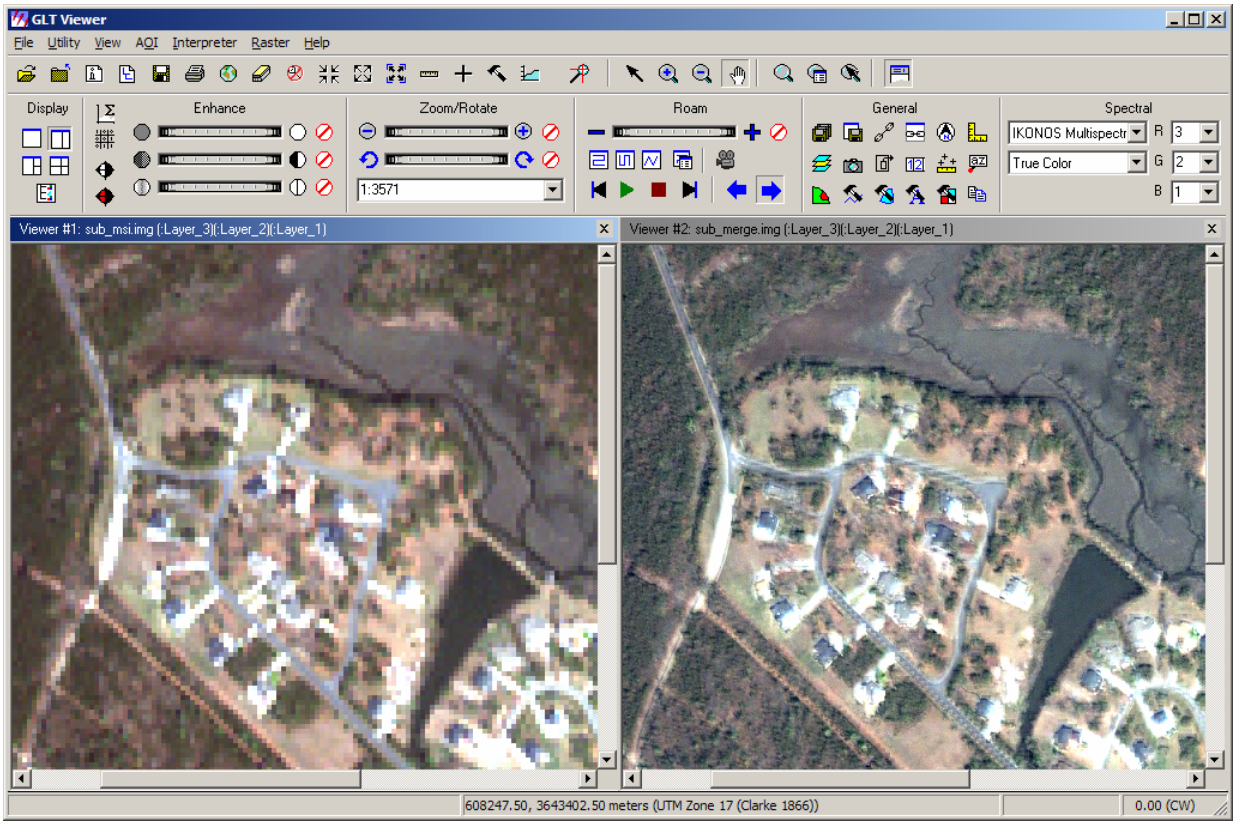
Wavelet Resolution Merge

For a long time, IMAGINE Advantage has offered several techniques for resolution merging (also referred to as Pan Sharpening), or merging a higher-resolution panchromatic image with lower-resolution multispectral imagery to form high-resolution multispectral imagery.

However, most of the existing techniques suffer from altering the radiometry of the merged image so that it differs from the original multispectral data.

The Wavelet Resolution Merge technique introduced with ERDAS IMAGINE 8.7 uses a technique which maintains the radiometry of the original input data and produces merged imagery where the colors look very similar to the original multispectral data.

Results can vary depending on how similar the Pan band is to the multispectral bands with which it is being merged. However, very good results can be obtained when merging accurately co-registered (both at the spatial and radiometric levels) imagery such as IKONOS, QuickBird and Landsat ETM+.



The figure above shows a 4m IKONOS multispectral scene on the left (using a True Color band combination of 3,2,1) and the merged product produced using the Wavelet Resolution Merge technique on the right. Note the strong similarity in color between the two images and the much higher resolution on the right produced by merging in the 1m IKONOS panchromatic image.

NOTE: This is the first release of the Wavelet Resolution Merge technique and it will continue to be refined and developed using different wavelet coefficients in future releases.

New in IMAGINE Essentials®

IMAGINE Geospatial Light Table™

Building on more than 20 years of writing geographic imaging solutions, ERDAS IMAGINE evolved the Electronic Light Table (ELT) to the next generation by introducing the geospatial paradigm with the IMAGINE Geospatial Light Table™* (IMAGINE GLT™).

The need to rapidly exploit the information inherent in today's high quality imagery sources affects the efficient use of an analyst's time and expense. The IMAGINE GLT provides a self-contained data viewing environment, capable of displaying multiple, linked geospatial views within a GUI that immediately presents all the commonly used exploitation tools to the user, eliminating the need to drill down through multiple menu choices. This environment is a recommended alternative to the classic IMAGINE Viewer.

With the V8.7 release, many new features have been added to the IMAGINE GLT to enhance and expand the efficiency of image exploitation.

Fluid Roam

DirectX is used more extensively in ERDAS IMAGINE 8.7 to provide smoother image roaming with extremely large sets of imagery loaded into a view.

All users should see an improvement in the quality of roaming between version 8.6 and 8.7, however the greatest benefit is seen on higher-end PCs with dual CPUs. The IMAGINE GLT makes use of two threads for image display, one for rendering and one for reading data from disk.

For the best results it is recommended that the system be configured with dual CPUs (with Preferences set accordingly), a graphics card with 64MB or more graphics memory and hardware blits support and 1GB of system memory. DirectX 8.1 or later should be installed.

Fluid Zoom and Rotate

The same improvements made to roaming also mean that extra system resources can be allocated to visually improve zooming and rotating of data.

When interactively zooming out of a data set, the view will no longer merely reduce the size of the current backing store, surrounded by a black collar until the mouse is released. Instead, the surrounding imagery automatically renders into the view as the user backs out on the zoom scale.

Similarly, when the contents of the view are interactively rotated, the IMAGINE GLT no longer shows a rectangular patch of imagery being rotated. Instead, it fills the entire view with rotating data.

Freeze the DRA

The IMAGINE GLT user interface features a new toggle button which freezes the contrast and brightness tables applied by the Dynamic Range Adjustment (DRA) tool at the moment the icon is pressed. This lets the user preserve desirable contrast table settings encountered while roaming.

When the DRA is frozen, the bulk of the DRA calculations are bypassed, making roaming in this mode just as smooth and fast as when the DRA is turned off.

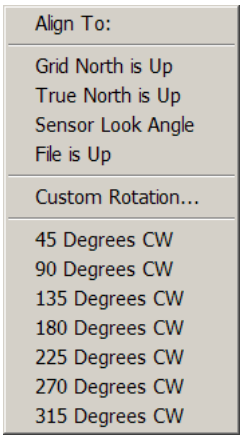
Below is a summary depicting how this new button interacts with the viewer:

- If the DRA is off, pressing the Sticky DRA button has no effect. It does not stay depressed.
- If the DRA is on and the Sticky DRA is off, pressing the Sticky DRA button on freezes the current brightness and contrast settings. These same settings are used no matter where the viewer is roamed or scrolled.
- If the DRA is on and the Sticky DRA is on, pressing the Sticky DRA button off causes the DRA to work as it did in V8.6. The DRA attempts to adjust brightness and contrast in real-time whenever the view is changed.
- If the DRA is on and the Sticky DRA is on, pressing the DRA button off terminates the DRA and deselects both the DRA and Sticky DRA buttons.

Common Image Rotation Angles

The Align To field of the Status Bar has been extended to include several pre-defined rotation angles to complement the preset geographic rotations.

These new angles act cumulatively, so if the user first selects 45 degrees, then selects 45 degrees again, the data rotates through a total of 90 degrees. The image rotates about the center of the view.



Jump Roam

A new item is now available to drive the main (exploitation) view from the overview (or any of the other three views). Click the right mouse button over a feature of interest in the overview window. Choose the "Drive Main View" entry in the menu. The main (exploitation) window will now be centered on the feature selected.

Users can use this feature to re-center the main view. Within the main view, click the right mouse button over a feature of interest and select "Drive Main View". The main view now centers over the feature chosen.

Auto Roam by Points, Rectangle or Ellipse

This feature allows roaming in a manner identical to specifying a polyline as a user-defined path in previous versions of ERDAS IMAGINE.

Instead of a polyline, the user specifies a sequence of points, a rectangle or an ellipse using the AOI tools. Features must be selected, just as a polyline would be selected.

In the case of a number of selected points, the user-defined path is a sequence of line segments traversing the points in the order they were created. In the case of a selected ellipse or rectangle, the auto-roam will be constrained within the boundary of the selected polygon.

Note that only one ellipse or rectangle can be selected (and must be at 0 rotation), whereas multiple points must be selected.

Pause / Resume Auto Roam

The roaming PLAY/PAUSE button has been replaced by PLAY/PAUSE and STOP buttons. When PAUSE is pressed, the current view location, zoom and rotation are recorded so that a user can change zoom levels or manually roam to investigate a feature and they return to the place they left off the auto roam. Pressing PLAY resumes roaming with the location, zoom and rotation restored to the same values as when PAUSE was pressed.

Pressing STOP at any time does not record the viewing characteristics. Consequently, resuming roaming (pressing PLAY) does not change the view location, zoom or rotation if the user roamed away from the stopping location.

Freehand Polyline Annotation

This new annotation tool works in a similar fashion to the existing polyline tool, but instead of clicking to add vertices, the user clicks and drags the mouse. Vertices are added automatically. The polyline tracks where the mouse has been moved by the user.

The polyline stops tracking when the user releases the mouse button or when the edge of the current view window is reached.

Use Top Image for Default Zoom / Rotate

This is a preference-based feature. Previously, when the user clicked the default roam or zoom buttons in the IMAGINE GLT, the viewer would return to the default scale and rotation of the initial image placed in the viewer. In other words, the initial image determined the default scale and rotation for the view window.

However, it is usually the uppermost image of the display stack which is being analyzed. Therefore a viewer preference has been added that, when set, drives the view window to the default scale and rotation of the top raster in the view window. Users can raise the image they are looking at to the top, click the default scale button, and the image will be displayed at its default scale.

Note this also alters the behavior of the Scale pull-down when using pixel-based scaling, such as 100 percent or one-to-one pixel display, since the scaling is now set by the top image rather than the bottom one.

This behavior is controlled by a preference that defaults to this new style of operation. If the older behavior is desired, the “Viewer | Use top raster for default zoom?” preference should be set to off.

Automatic Statistics Generation

When an image without statistics, a GeoTIFF image, for example, is opened into the Viewer, users are prompted to calculate statistics. The dialog also enables users to set the default behavior of this feature for all future images.

While extra time is required for the initial calculation, the advantage to calculating a full set of statistics rather than simply approximating statistics is that the full set of statistics is saved and available for all future uses of the image.

Pixel to Pixel Scaling Menu and Display

When the Viewer | Display Scale as Pixel Ratios preference is on, the scale is displayed in the IMAGINE GLT scale field as a pixel ratio rather than as a map scale. Thus, when displaying an IKONOS scene at default zoom, the scale field would normally show a map scale similar to 1:14,000, but if this preference is enabled it would show 1:1 (one screen pixel is used to represent one image pixel).

The default scale is displayed as 1:1; zooming in by two is displayed as 2:1; zooming out by two from default is displayed as 1:2; zooming out by two again gets displayed as 1:4, and so on. These values are always rounded to the nearest integer.

Using this new feature allows you to guarantee that the view is directly using an appropriate pyramid level, if present, minimizing any processing the view may have to perform in resampling.

When this preference is set, the scale drop down menu on the IMAGINE GLT shows a preset list of pixel ratios from which you may choose.

Lock Annotation Orientation

This feature is activated by the viewer preference Lock Annotation Orientation. When this preference is set, text, symbol and geopoint annotations will not rotate when the imagery in the viewer is rotated.

Consequently, the annotation can always be easily read in the viewer no matter how the viewer has been rotated, assuming the annotation was right side-up when it was locked.

Treeview Arrange Layers

This dialog is provided as an alternative to the traditional Arrange Layers dialog. It provides all the capabilities of the traditional Arrange Layers but also provides some new capabilities:

- Changes made in the Treeview Arrange Layers dialog are applied immediately rather than having to click the Apply button before they take effect.

- A preference can be used to embed the dialog within the IMAGINE GLT interface rather than having it float across your desktop. This helps prevent the Arrange Layers dialog from being obscured by other dialogs. By default, the preference is set to embed the dialog.

- As an aid to identifying a particular image from a group of images displayed into a single viewer frame the Treeview Arrange Layers dialog highlights the image currently under the cursor. For example, if a 3 x 3 array of nine air photo ortho-images is currently displayed in a view, the mouse cursor can be moved over one of the images and that image's corresponding name will be highlighted in the treeview. This helps the user to select the correct image for manipulation, such as changing its band combination.

- Double-clicking the cursor over a particular image that has been highlighted in the Treeview Arrange Layers stack in the Main View will bring that image to the top of the stack. This is useful for quickly identifying a particular image for further analysis since raising it to the top of the stack enables other tools to be applied, such as brightness / contrast thumbwheels or for the image to be dragged and dropped into another View on its own.

Speed Setting for Mouse-Controlled Auto Panning

When using the Hand tool to pan around an image, there is an option to click to get a four-way arrow that can be used to automatically pan around the image. The speed of the pan is proportional to the distance moved.

ERDAS IMAGINE 8.7 introduces a new preference to control the maximum panning speed, which prevents the image from moving too quickly and thereby maintaining a smoother roam.

The default is zero, resulting in no speed limit. Setting the value to 10 corresponds to a maximum roaming rate of 10*75 = 750 pixels/second if the frame rate is 75 Hz and refresh is synchronized with vertical blanking. Note that this setting does not affect other roaming modes such as auto-roam.

Show Roam Rate

For customers wishing to benchmark different graphics cards, a preference is now provided to display the roam rate in the Viewers Status Bar. If this setting is on, the roam rate (in pixels/second) is displayed in the lower left corner of the status bar. If this setting is off, the status bar behaves as it did in previous versions of ERDAS IMAGINE.

Up is Up

Today's modern batch of Earth-observing satellites is fully capable of being pointed away from their direction of travel and nadir viewing lines. This makes it possible for the satellite operators to gather imagery of a particular location on a more frequent basis than the normal satellite revisit times would allow since the location can be imaged from a different orbital path by pointing the satellite in the required direction.

This off-nadir pointing capability highlights an issue which has long been seen in photogrammetric data – features on the ground will "lean" away from the sensor in the direction it is "looking" (the ground itself suffers from this effect, necessitating the use of ortho-correction to remove the terrain displacement). This effect can be seen at the edges of air photos – buildings at the edges all lean away from the perspective center of the image.

To an analyst trying to process imagery, this effect can be disconcerting and confusing. For example, a satellite image may have all the buildings leaning toward the bottom right corner of the image. To the human brain, this is not the expected effect. For tall buildings it is relatively easy to interpret the image, but in lower buildings the more subtle lean may be confusing.

To assist with the more intuitive interpretation of imagery, the GLT now incorporates a new option in the Align To pop-up menu. This option is called Sensor Look Angle, also sometimes referred to as Up is Up. For images that have a 3D ground-to-image math model embedded into their headers, such as an ortho-calibrated image, selecting this option will automatically rotate the image so that the direction the sensor was looking for this particular location is up the screen—and so buildings lean up the screen. This more closely resembles the perspective that you expect to see and is much easier to interpret.

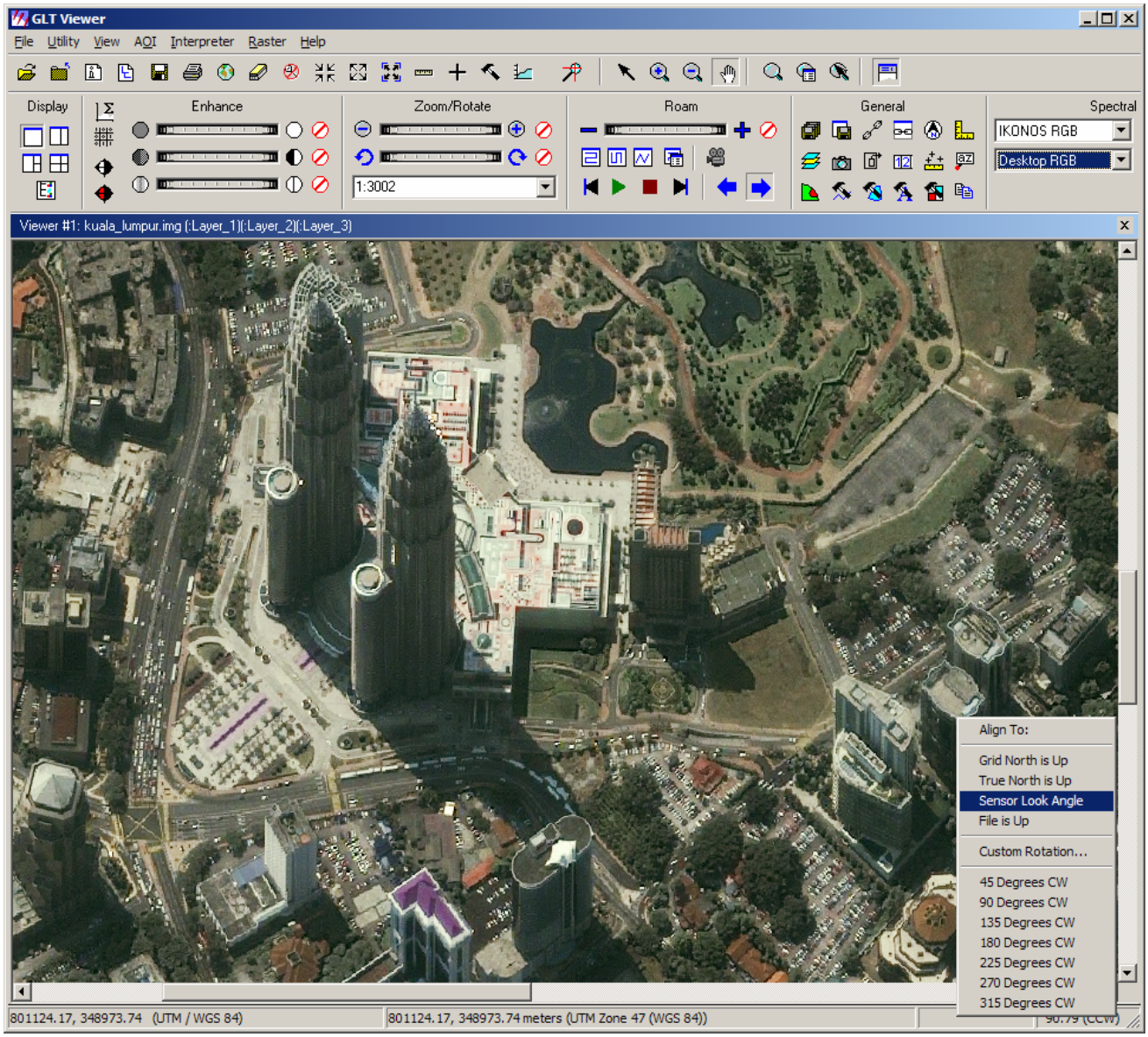


Image of Kuala Lumpur, Malaysia, courtesy Space Imaging, showing the use of the Align To Sensor Look Angle option to automatically rotate the buildings so that they “lean” up the screen for easier interpretation.

Default Format Filter

A new preference is provided in the User Interface & Session category which allows you to change the default file format filter in the File Chooser dialog. Until now, this has always defaulted to the ERDAS IMAGINE *.img file format.

Data Exchange

ERDAS IMAGINE 8.7 provides several new file format converters, including Importer dialogs for formats previously available only as direct-read raster DLLs. This makes importing raster files easier and more intuitive.

New Raster DLLs

- JPEG2000 (including GeoJP2) raster DLL & Encoder
- HDF Scientific
- MrSID Generation 3 (GeoExpress) *
- SPOT-5 DIMAP
- PCI .pix
- VITEC
- Surfer (Binary, ASCII, Surfer7)
- ENVISAT
- SOCET SET .sup *
- SOCET SET GRID *
- ADS40 .ads *
- EROS A1 (Imagesat)

New Importers

- All Raster DLLs have a corresponding Importer dialog
- IRS-1C/D Euromap Superstructure importer
- IRS-P4 OCM Superstructure importer
- IMAPP format MODIS importer
- SPOT-5 DIMAP Direct Read importer also extracts GCPs

New Exporters

- JPEG2000 (including GeoJP2) Encoder
- ArcSDE Raster Exporter

Improved TIFF

The TIFF raster DLL has been updated and improved to provide several new capabilities, including:

- Read / write images up to the TIFF specification limit of 4GB
- Read embedded TIFF pyramids
- Read hardware-compressed JPEG TIFFs

New in IMAGINE VirtualGIS®

VirtualDEMs

One of the key factors influencing the frame rates achieved in a 3D visualization scene is the number of triangles that must be rendered to represent geometric features (such as the ground surface or a building model). The lower the number of triangles that must be rendered by the graphics engine, the smoother and more responsive the fly-through.

In IMAGINE VirtualGIS, the terrain surface is one of the main sources of triangles to be rendered. In single resolution mode, each pixel in the DEM is turned into two triangles of geometry to be rendered. Thus if you have a DEM of 1000 x 1000 pixels, 2 million triangles will be rendered, if displaying at 100 percent Level of Detail.

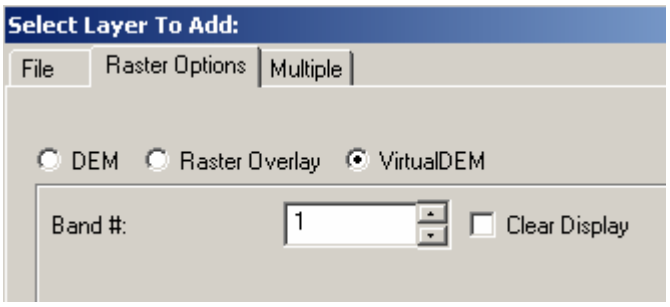
Approaches used in previous releases to keep the number of triangles low were to generate a Virtual World or to calculate a TIN Mesh.

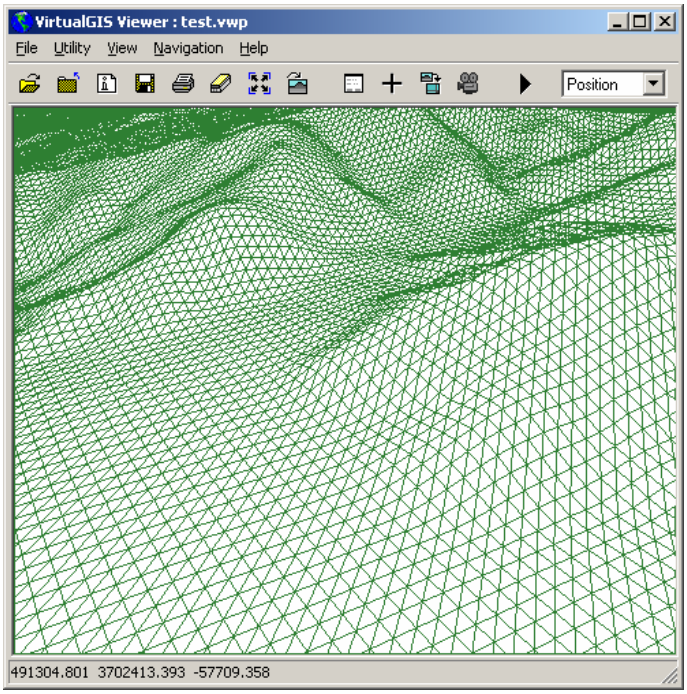
The major drawback of both these methods was the time and disk space required to generate the pre-optimized version of the terrain. This also meant keeping a new version of the terrain on disk that was used only for 3D visualization.

IMAGINE VirtualGIS 8.7 introduces a new default method for opening a standard raster terrain database (DEM) called VirtualDEM. This mode of opening a DEM retains the original formatting of the terrain (such as an IMAGINE .img file), doing away with the disk- and time-consuming requirement to pre-process the terrain data. Instead, standard pyramid layers are utilized to provide differing levels of terrain detail.

Using the VirtualDEM methodology means that a coarse resolution pyramid level can be used to render terrain triangles in the distance, while progressively more detailed pyramid levels up to the full resolution image itself can be used at closer distances—all without needing to pre-process the data in any special way.

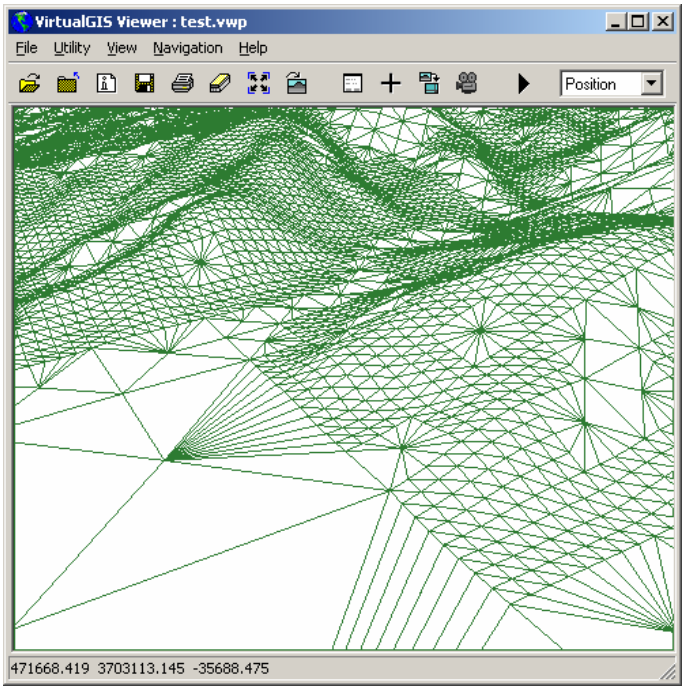
This means that the number of triangles that need to be rendered in the scene can be minimized, increasing the performance and smoothness of the 3D visualization.





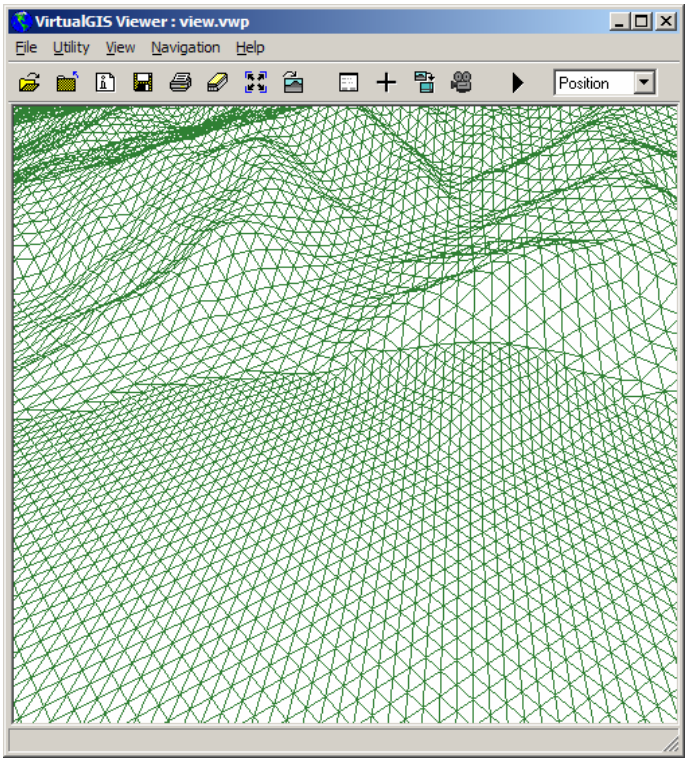
The screen shot to the left represents the traditional "Static" mode of displaying a raster DEM surface – the image file has been opened into IMAGINE VirtualGIS using the "DEM" option and a single level of detail is set for the entire extent of the image.

A large number of triangles has to be rendered, even in the distance and in flat areas where that level of detail cannot be seen. This reduces the frame rates and smoothness of 3D scene visualization unless you select a coarser Level Of Detail for the entire extent of the data.



The screen shot to the left represents the method introduced with IMAGINE VirtualGIS 8.6 for pre-calculating a TIN Mesh. This enables a smaller number of triangles to be used to render areas of relatively flat or gently sloping terrain, while retaining a high level of detail in areas of higher frequency terrain displacement.

This method cuts down the number of triangles required to render the scene compared with the terrain shown above, but requires up-front processing time to compute a TIN Mesh and means you may need to keep two representations of the terrain available on your disk – the original raster DEM and the TIN Mesh.



The screen shot to the left represents the new VirtualDEM mode of displaying a raster DEM surface. The image file was opened into IMAGINE VirtualGIS using the "VirtualDEM" option.

This mode automatically selects a coarser resolution pyramid level for the data in the distance and finer resolution for areas closer to the observer. Notice the curving "event horizon" in the center of this scene where a higher resolution of data is automatically being stitched in as the observer flies over the terrain.

A level of detail slider can be used to change the relative distance from the observer at which the extra detail starts to be loaded.

This method reduces the number of triangles that needs to be rendered into the visible scene at any one time, which increases the 3D scene frame rate, and does not require any special pre-processing of the standard raster dataset.

To simplify the use of VirtualDEMs, there are no new options specifiable at the File Open dialog. If the user wants to modify any settings of the VirtualDEMs, they can do so through the global preferences (see section below on preferences).

Terrain Resolution Hot-Spots

Another benefit of using the VirtualDEM model of terrain rendering is that datasets of differing resolution can be stitched together on-the-fly. For example, you may have a DEM of the whole United States at a 1km DEM spacing. This could be opened into IMAGINE VirtualGIS 8.7 as a VirtualDEM. You may also have certain local areas at a higher resolution, such as National Elevation Dataset (NED) 1 degree tiles at 30m resolution, for local study areas. Adding these higher-resolution hot-spots is as simple as clicking File Open, selecting the additional DEMs as VirtualDEMs and clicking OK. IMAGINE VirtualGIS stitches these higher-resolution areas into the base DEM on-the-fly.

Terrain Database Export

IMAGINE VirtualGIS 8.7 provides two new exporters (for Multigen OpenFlight and the Raw Triangle formats) and an improved VRML exporter.

What is exported:

	VRML	OpenFlight	RAW
Sun Position	•	•	
Saved Positions	•		
Raster Layers	•	•	[1]•
[2]Extruded Vectors/Annotations	•	•	•
[3]Draped Vectors/Annotations	•	•	
Models	•	•	•
Intervisibility	•	•	•

1. Only the geometry is exported to raw format.
2. Texture is not included in the export.
3. Only when using a TIN with Virtual Rasters or a VirtualDEM do users get draped files as they themselves are drawn onto the raster.

Vector Point Extruding

This new feature adds a capability similar to the existing ability to extrude polygon vector sources. However, the new capability is for point vector sources and uses an attribute field to determine the height to which a line is drawn vertically from the points x, y and ground location.

MGRS Support

As with the standard 2D viewers, the IMAGINE VirtualGIS Inquire Cursor can now display Military Grid Reference System (MGRS) coordinates, as well as position the Inquire Cursor at an MGRS coordinate typed into the coordinate field.

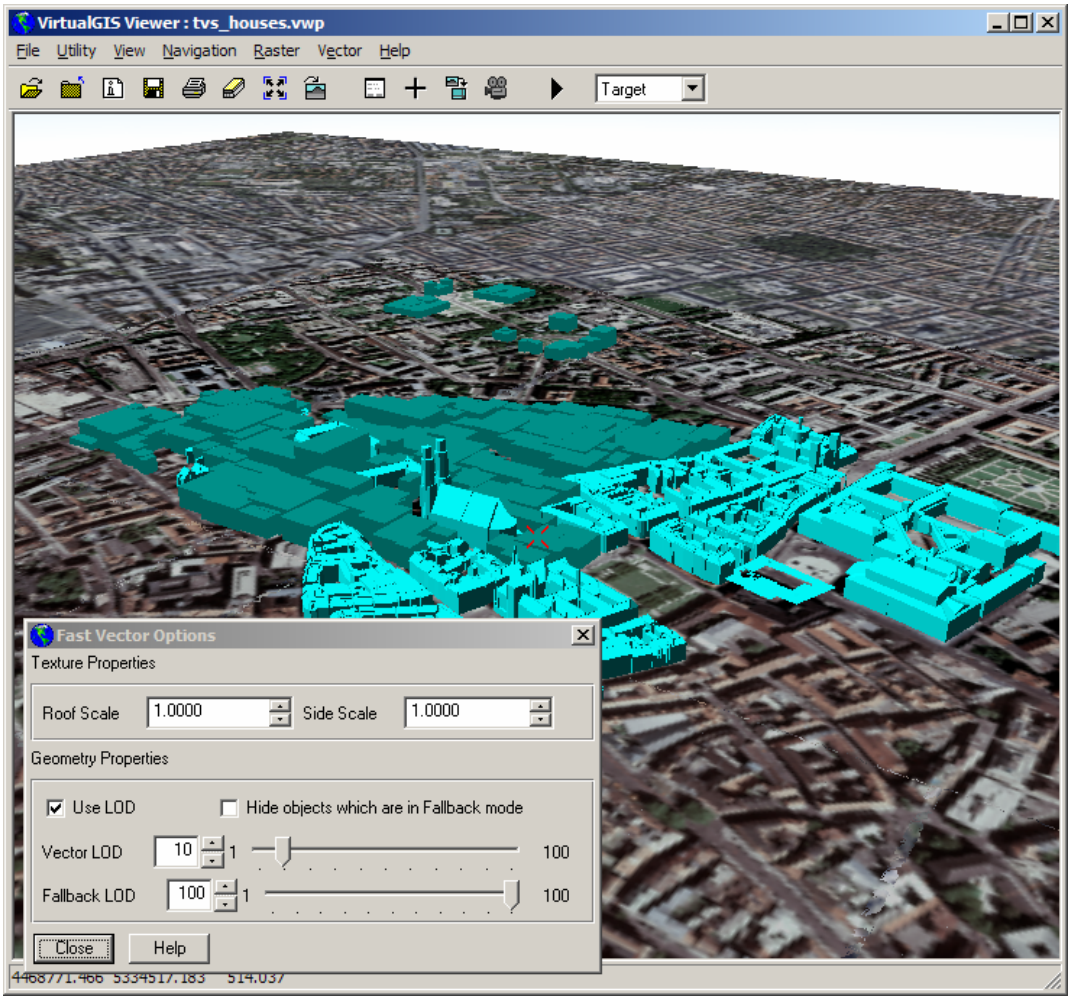
Vector Fast Loading and Level of Detail (LOD) Support

It is not only the terrain DEM which requires triangle rendering resources to create a 3D virtual scene. If there are extruded 2D or true 3D vector layers displayed in the scene, they will also require geometry triangles for them to be rendered. The more complex and numerous the features, the more resources will generally be consumed.

A new option has been added to IMAGINE VirtualGIS 8.7 which enables vector feature sources to be rapidly loaded into memory and a level of detail (LOD), similar to that used for VirtualDEMs, applied so that features in the distance are first (and optionally) rendered as a simple bounding box and then removed from the scene entirely.

A slider bar controls the distance from the observer at which these transitions take place.

This allows objects in the distance, where it might be difficult to see the detail, to be rendered as much simpler objects or removed from the scene entirely. This reduces the number of triangles and improves the speed and efficiency of scene manipulation.

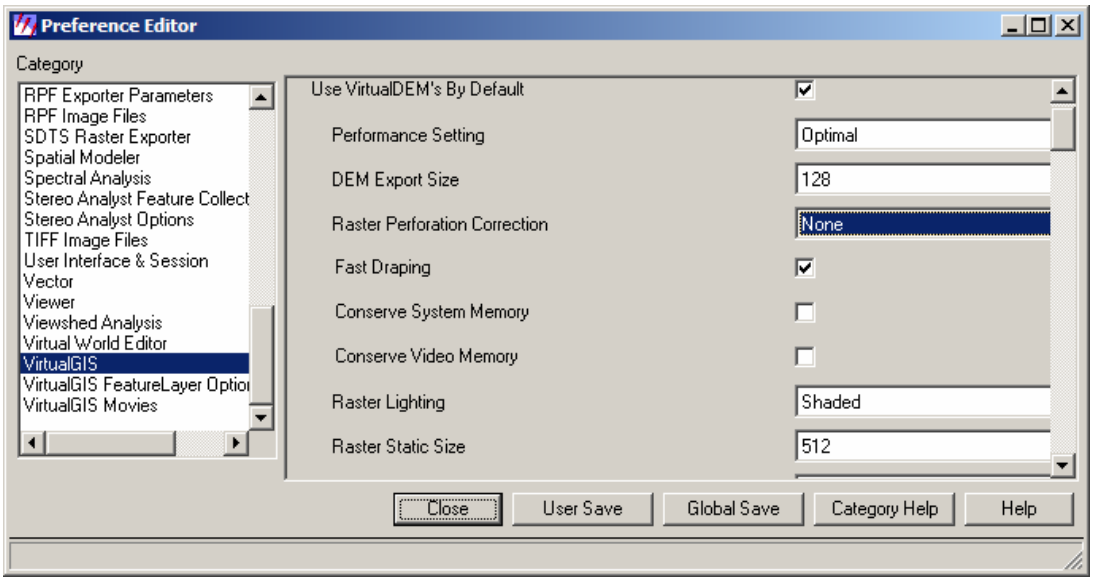


No vector features loaded in the far distance

Vectors in the mid-distance are rendered as bounding boxes

Vectors closer to the observer are rendered in full detail

New IMAGINE VirtualGIS Preferences



Use VirtualDEMs by Default This option toggles the default viewing mode for DEMs between VirtualDEMs and regular, static DEMs.

Performance Setting This option controls how much detail to apply to the base mesh. The less detail you apply (Best Speed), the faster your viewing, but at the cost of quality. The more detail you apply (Best Quality), the better looking your DEM is, but at the cost of speed.

DEM Export Size When using the exporters from the export menu, this option controls what size to use when exporting the VirtualDEM. Since VirtualDEMs can be of enormous sizes at times, you must ensure that the exported geometry is usable. To do this, resample the DEM down to the given resample size and then export. For example, if you have a 10,000 x 5,000 VirtualDEM, use 128 for the export size. The exported geometry size will be 128 x 64.

Raster Perforation Correction Use this option to fix perforations caused by raster tiling. The default is off because it uses video-card resources to seal the cracks.

When the image pixel resolution is considerably higher than the DEM, you may start to see cracks where the image is subdivided across the DEM. This is a clipping accuracy issue when the raster is clipped to the DEM. To compensate for this, the raster crack correction preference has been added. It will patch all the cracks at the cost of consuming more polygons/lines. Depending on the system, lines or polygons may be the faster method to use.

Fast Draping This option takes advantage of hardware accelerated raster draping. The downfall is that while running, there is no hardware mipmapping. When rendering movies, this option must be turned off to use mipmapping (if turned on through other preference.)

Conserve System Memory This option allows you to try and conserve system memory at the cost of performance and accuracy of the DEM.

Conserve Video Memory This option allows you to try and conserve video memory at the cost of visual quality loss for the rasters.

Raster Lighting

- **Full Lighting** – Uses lighting on each point.
- **Shaded** – Instead of lighting each point in the DEM, the rasters are shaded completely according to the position of the sun.
- **None** – This option disables raster lighting, but still has everything else lit (extruded annotations/vectors, models, and so forth).

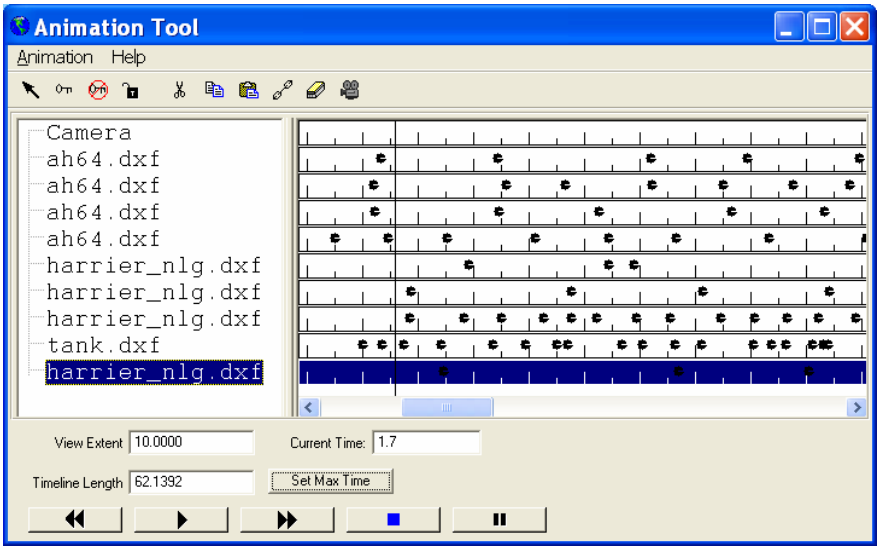
Raster Static Size If you try to load a raster without processing it, this option designates the maximum size at which the raster will be loaded. If the raster is larger, it is down-sampled to be proportionate to this resolution.

DEM Boundary Value This preference determines the height value used for the edges or boundary of a DEM when it is rendered. This is the height above which the actual data values of the DEM are extruded. Previously, the minimum data value was used and in some cases this could have the effect of creating “cliffs” at the edge of the rendered DEM geometry.

Animation Tool

One of the key features introduced for IMAGINE VirtualGIS 8.6 was the ability to automatically move elements in the 3D scene in real time. This enabled you to simulate a wide range of scenarios, including aircraft flight paths, ground vehicle routes, shipping lanes and so forth.

Various improvements have been made to the Animation Tool in IMAGINE VirtualGIS 8.7



Improved Speed Control

You can now set individual speeds for each keyframe in a timeline.

Once you set speeds, the Time field of the Timeline Editor will not be editable because the time at each keyframe must be calculated based on the speed.

However, there is now greater flexibility over the animation of a particular object since you can vary its speed throughout the animation maintaining a constant speed throughout the entire range of the timeline. For example, an object could start from a standstill (speed of 0 on the first keyframe), accelerate to an average speed through the majority of its animation then decelerate to a halt at the end.

Right-Click Context Menus

The right click context menu is designed to give the user the ability to cut, copy and paste keyframes by right-clicking on the selected keyframes.

You can also use the Timeline Editor features by right-clicking on a timeline. This allows you to quickly turn on and off the graphical display of a timeline in the IMAGINE VirtualGIS Viewer.

Draggable Current Time Marker

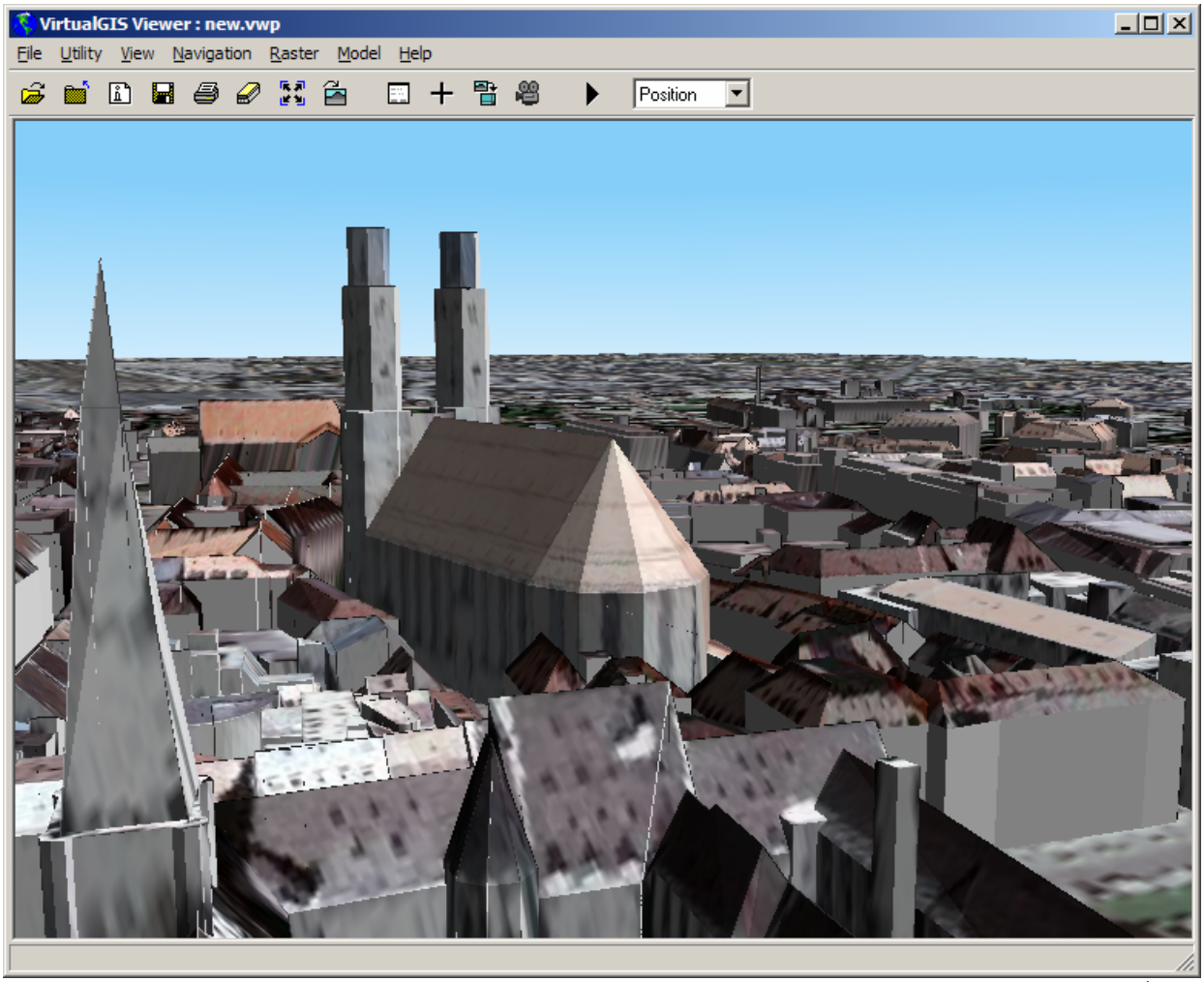
You can now left-click on the Current Time marker line in the Animation Tool and drag it left or right. Time, as well as the positions of models within the scene, update in real time. This gives the user a real-time interactive way of updating time and seeing the effect on the animated features, as opposed to pressing the play button or entering time manually in the "Current Time" textbox.

Collapsible Animation Tool

To help save screen space, the Animation Tool can now be "collapsed" into a much simpler version that consists of only the tools for playing an animation.

Texture Vector Symbology

The new ERDAS Stereo Analyst® Texel Mapper tool (see description later in this document) enables the automatic (and manual) creation of Texture Vector Symbology files (*.tvs) which can be used by IMAGINE VirtualGIS to render a 3D vector feature layer with textures on the sides and roofs, greatly enhancing the visual appearance of a 3D scene.



The screen shot above shows a textured 3D view of Munich, Germany using IMAGINE VirtualGIS.◊

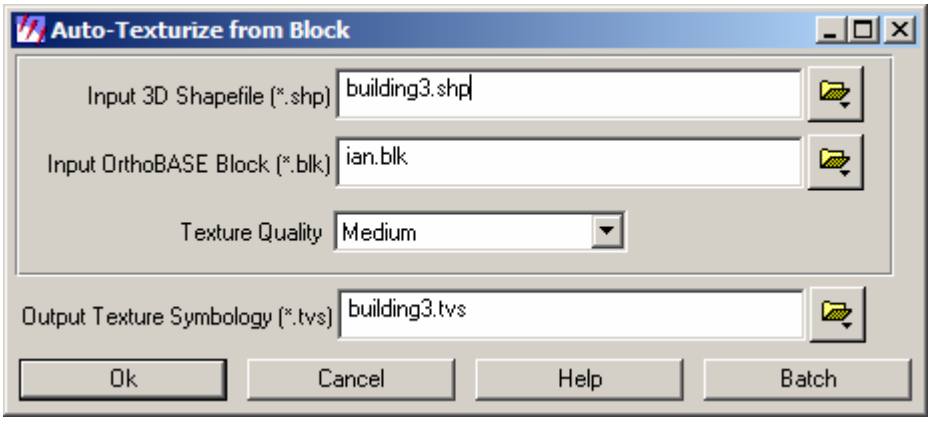
New in ERDAS Stereo Analyst® V1.4

ERDAS Stereo Analyst* V1.4 features two new tools to help create fully texture-mapped 3D vector features with textures being drawn from a block file of stereo overlapping imagery and also from user-supplied external pictures such as photographs and generic tiled textures.

Auto-Texturize from Block

Having used ERDAS Stereo Analyst to capture 3D features from a Block File of triangulated imagery, the user can automatically extract the best texture from the block for every face in the 3D Shapefile.

The textures are stored in a new file called a Texture Vector Symbology file (*.tvs) which is similar to the *.evs file used to store attribute-base symbology for 2D display of vectors in a standard viewer.



The tool works by moving sequentially through all the 3D faces in the 3D shapefile–the block is searched for all frames which intersect the location of each face. From this set of image frames it calculates which frame has viewing geometry that gives it the most nadir view of the face. For example, with a vertical, east-facing wall, it would select the image frame that has the most oblique (off-nadir to the ground) westerly viewing geometry for that location. The relevant portion of imagery would be chipped out of the original frame and added to the *.tvs file as a texture.

The user has control over the quality (size) of textures extracted for each face so that performance can be fine-tuned.

See the Texture Vector Symbology section above for a screen shot of the results of using this tool on a block of air photos and a 3D Shapefile database captured using ERDAS Stereo Analyst.

Texel Mapper

The Texel Mapper is a new tool for managing, editing and applying texture elements, or texels, to 3D models. Functions range from altering the source frame image used in creating *.tvs symbology from a block file, through applying generic tiled textures to surfaces, to extracting new textures from scanned photographs of buildings and other 3D features.

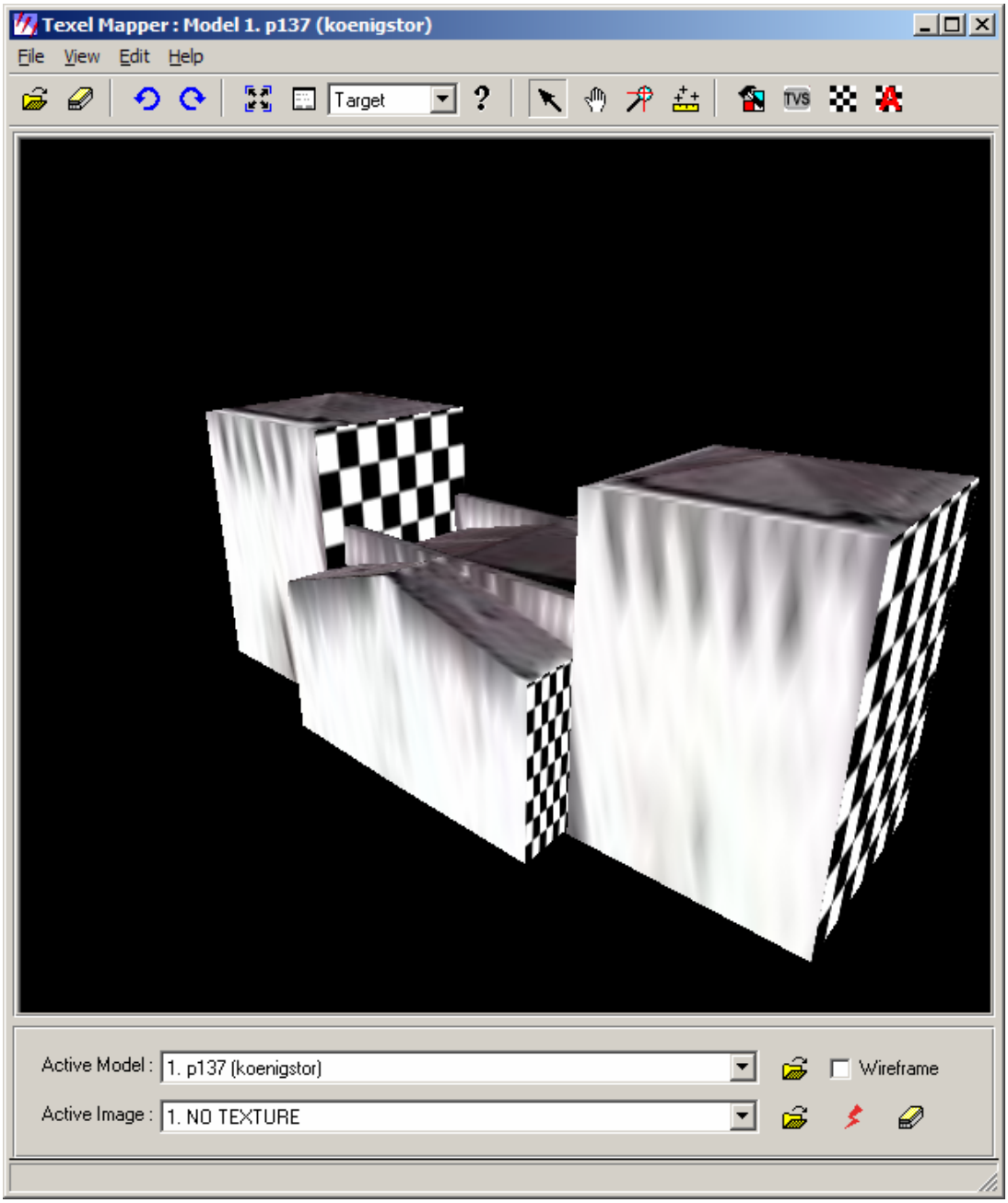
This tool enables you to rapidly create realistic 3D scenes, such as a 3D City Model.

Texel Mapper provides a simple user interface for loading both the 3D models to be edited

and the sources of textures that are going to be utilized

Key Features of Texel Mapper:

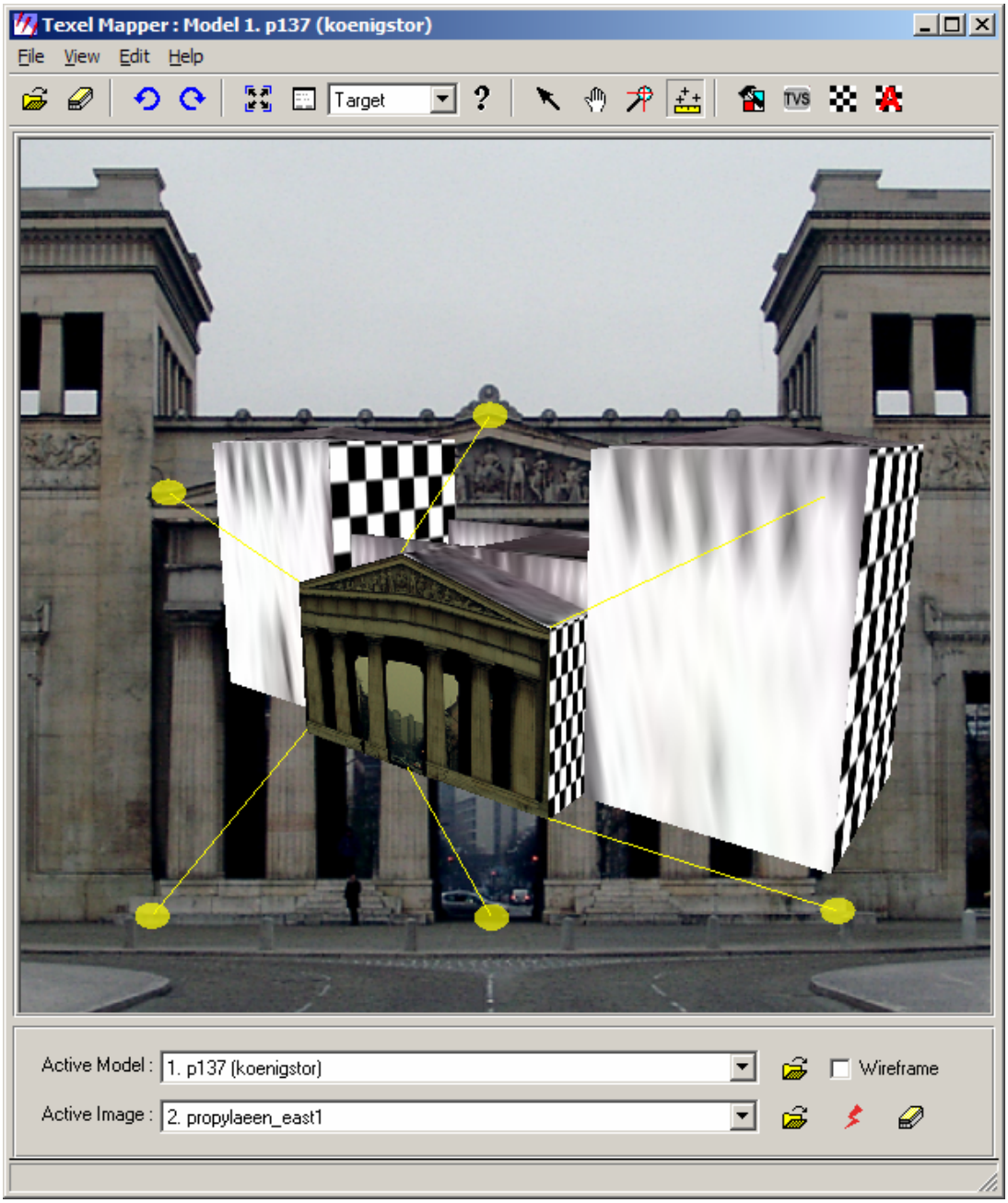
- Load various 3D model formats, including 3D Shapefile
- Identify alternate source image frames for TVS-based textures
- Use generic textures to tile across faces
- Use photographs of the real-world feature and extract textures for the 3D model
- Graphically map model coordinates to image locations to extract textures
- Texture Editing Tools to remove artifacts such as power lines and lamp posts
- Delete unnecessary model faces (prevents model “flashing”)
- Save edited models out to a variety of formats ready for use in 3D modeling applications such as IMAGINE VirtualGIS, Multigen OpenFlight or ArcScene



The Texel Mapper screen shot above shows the user interface with a basic 3D model loaded. This 3D model was constructed using ERDAS Stereo Analyst and the initial textures were created from the stereo pairs of aerial photography.

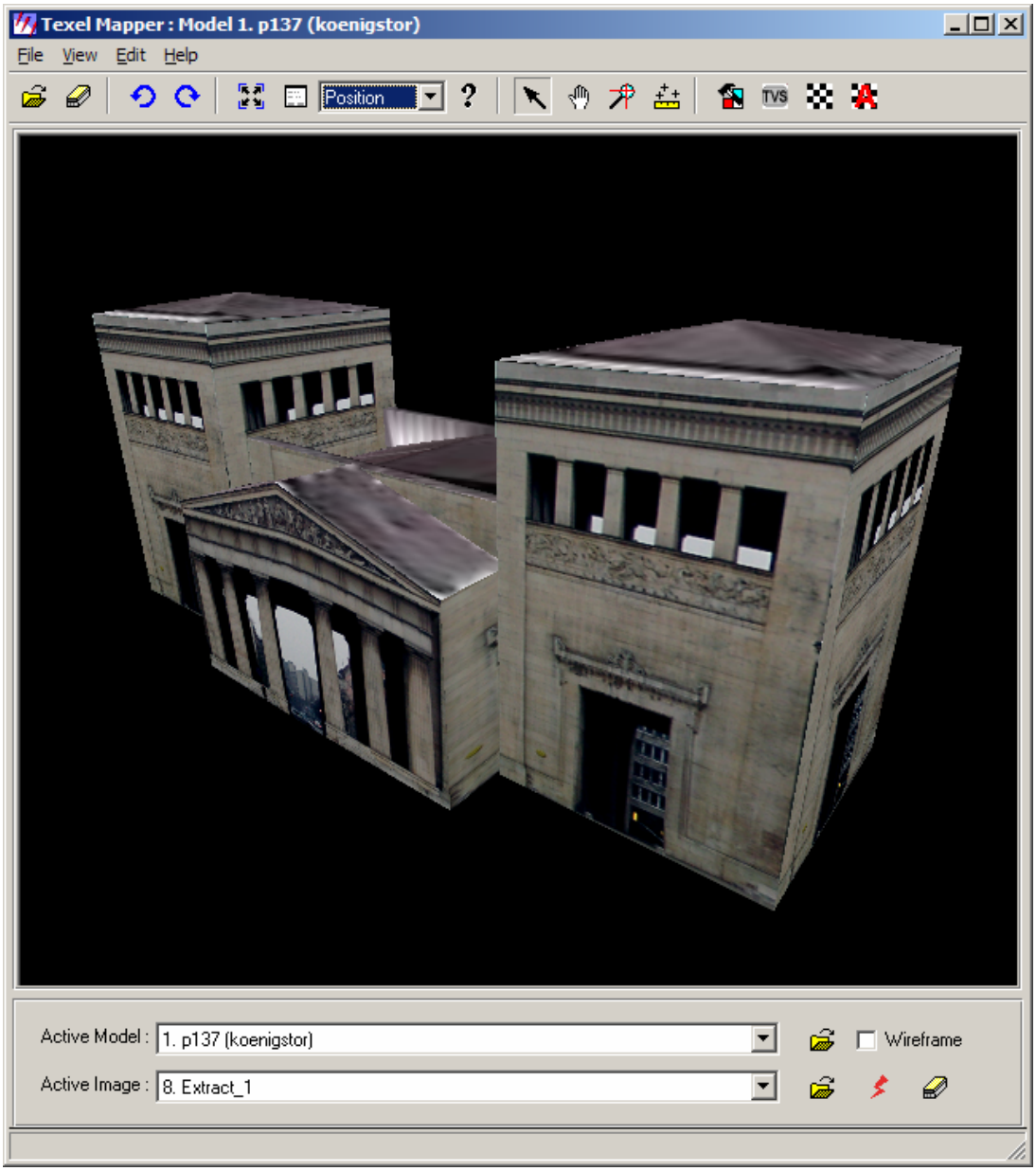
Issues the Texel Mapper will help resolve:

- The sides of the building appear “smeared” because of the highly oblique angle through which an air photo will be looking at walls.
- Some of the walls (the “checkerboard” ones) have no texture at all because none of the air photo frames contained those walls (they were occluded by building lean in all available frames).
- Low-resolution textures because of the flying height and resolution of the original air photos.



In the screen shot above, a new texture source has been loaded into the background of the Texel Mapper. This is a scanned photograph from a hand-held camera. Such images can be displayed in any image format supported by ERDAS IMAGINE.

The Affine mapping tool is shown being used to map part of the photograph onto selected faces of the 3D building model.



The screen shot above shows the final fully texture-mapped model ready to be saved and used as part of a 3D city model.

Platform Support

ERDAS IMAGINE 8.7 is shipped on all platforms simultaneously, including:

- Windows 2000 (Service Pack 2)
- Windows XP Professional
- Sun Solaris 8
- Sun Solaris 9

CD-ROM Distribution

ERDAS IMAGINE 8.7 is distributed as a seven CD-ROM set consisting of the following volumes:

- ERDAS IMAGINE for Windows
- ERDAS IMAGINE Example Data
- ERDAS IMAGINE for UNIX
- IMAGINE Geodatabase Support CD
- Leica Photogrammetry Suite (LPS)
- LPS Example Data CD #1
- LPS Example Data CD #2

Supported Modules

The initial ERDAS IMAGINE 8.7 release provides upgraded installation for the following modules:

- IMAGINE Essentials
- IMAGINE Advantage
- IMAGINE Professional
- IMAGINE Vector™
- IMAGINE VirtualGIS
- IMAGINE Radar Interpreter
- IMAGINE StereoSAR DEM™
- IMAGINE OrthoRadar™
- IMAGINE IFSAR DEM™
- IMAGINE LZW
- IMAGINE MrSID Desktop Encoder*
- IMAGINE MrSID Workstation Encoder*
- IMAGINE NITF 2.0™
- IMAGINE NITF 2.1™
- IMAGIZER® Data Prep
- IMAGIZER Viewer
- LPS Core*
- LPS Automatic Terrain Extractor*
- LPS Terrain Editor*
- LPS ImageEqualizer*
- ERDAS Stereo Analyst*

Additional modules are scheduled for future releases.

*Features marked with an asterisk (*) are not available on the Sun Solaris UNIX platform at this time. All new features are available on the Windows platform unless otherwise stated.

◊Data for the screen capture on page 23 was provided by: Baureferat Muenchen - Hauptabteilung Gartenbau (City building authority - department for horticulture). Data capturing by: Mrs. Gerlinde Gruber and Mrs. Marion Strobel, Fachhochschule Munich (University of Munich). Texture mapping and presentation by: GEOSYSTEMS GmbH.

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