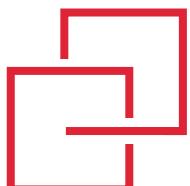


the link



Your Link to Leica Geosystems Geospatial Imaging

Ushering in the 3D Business-Decision Model – The Future Is Here



3D visualization of Cape Town, Africa

With the convergence of high-performance versatile and customized data, organizations can use leading visualization technologies to share ideas and collaborate in decision-making. This collaboration lets users look inside data to understand complex issues with greater clarity and share their findings with greater confidence and ease.

For the geospatial industry, the drive for performance, data sharing and collaboration is also stimulating. It lets us provide tools that help organizations work better today and invest in their future.

Sharing Data for Greater Yield

The demand for more accurate, timely imagery has driven many organizations to question how the data can be shared and managed to maximize its value.

Public and private entities are increasingly employing geospatial data in decision-making. Municipal governments rely on an accurate assessment of land use for revenue projections; farmers rely on accurate image analysis to project crop yield, and power utilities rely on land use data to decide where to place new power or gas lines; public works departments rely on maps for accurately locating infrastructure for road construction.

However, businesses are learning to employ this information for decision-making, and many are recognizing the value of 3D visualization of geospatial data.

For example, image databases record buildings, roads, rivers, trees, schools, mountains and other features located on the

earth's surface; images also record relationships and processes as they occur in the real world. Using a series of images of the same area taken over time allows us to more accurately model and analyze the relationships and processes that occur on the earth's surface.

"The demand for more accurate, timely imagery has driven many organizations to question how the data can be shared and managed to maximize its value."

Enterprise-enabled software allows users to employ imagery across applications, so they can work from a single canvas to make educated, coordinated business decisions. With the advent of geospatially aware databases, enterprise GIS applications are becoming more readily adopted. These products facilitate access, retrieval, and dissemination of raster and vector data from a central server.

As some users migrate from heavy desktop applications to image processing capabilities with a centralized server, solution providers are adapting to enable those customers to take full advantage of our expertise in image exploitation coupled with the latest in database and server technology.

continued on page 2

Make the Most of Your Imagery

By Bob Morris, President,
Leica Geosystems Geospatial Imaging

Welcome to **the link**, the bi-annual newsletter from Leica Geosystems Geospatial Imaging. This is the first issue in 2006 and features information regarding our exciting product releases, case studies, product information and more.

As in 2005, we have started the year off at a fast pace with exciting new product announcements, including launching the latest version of ERDAS IMAGINE® 9.0, the leading software package used by the geospatial imaging community, Leica Virtual Explorer, which sets the standard in 3D visualization and exploration and Leica Photogrammetry Suite 9.0, a seamlessly integrated collection of photogrammetric software tools. ERDAS IMAGINE offers enhanced enterprise capabilities, with support for relational databases such as Oracle Spatial 10g and ESRI ArcSDE. Plus, it introduces new add-on modules that provide powerful image processing functionality: IMAGINE AutoSync™, Leica MosaicPro, IMAGINE Enterprise Loader™ and IMAGINE Enterprise Editor™.

Now more than ever, Leica Geosystems customers are turning to imaging tools that offer 3D representation and improved accuracy. For instance, a ski resort is attracting more skiers by displaying a 3D image of a downhill run and cross country trail. Cities are attracting more tourists by showcasing their attractions, accommodations and local hotspots in 3D so visitors know what they can do during a stay. And forestry services are getting a better understanding of how many acres of land were damaged in a recent storm from hundreds of integrated images. Find more examples of how organizations are using 3D imagery to better understand their spatial data inside this issue.

We hope you find this issue of **the link** helpful and informative. If you have any questions, comments, or if you would like to share your story, please contact us. You may share your comments and suggestions using the e-mail address, info@gi.leica-geosystems.com. It has been created to provide you with a direct link to us.

Feature articles include:

- Leica Virtual Explorer takes online travel research to new levels
- Automated georeferencing for fast, accurate results
- IMAGINE Easytrace™ delivers efficient assisted feature extraction
- and more...

Ushering in the 3D Business-Decision Model – The Future Is Here

continued from page 1

Online Access, Communication

The availability of geospatial information online is both driving demand and meeting the need for access to it.

Average users and savvy GIS professionals alike are fascinated with online mapping and satellite imagery products and have begun to seek out this information for various reasons. Mashups, such as add-ons that allow for spatially noting band tour stops, news item locations, or anything else, have been created to meet the real-world needs of map consumers. Users are looking to have customizable applications via which they can share their geospatial information.

With more imagery, coupled with better management and dissemination of that imagery, the last frontier is 3D viewing and collaboration capabilities. The global marketplace creates communication and efficiency challenges; sharing imagery over the Internet in real-time is essential to ensuring that all parties can participate in critical decision making, whether for time-critical military decisions or remote real estate decisions.

Current commercial visualization software can provide 3D imagery, but the ability to share information in real-time brings true value to decisions.

Web served 3D city models have piqued the interest of a market beyond the traditional geospatial user, primarily centered on finding a neighborhood or the closest coffee shop to the office. Transparent to those seeking such information are the terabytes of data that were transformed into the requested data product.

Before You Decide

Three-dimensional geospatial information can be delivered effectively via the Internet. However, there are many considerations when evaluating Web-based 3D technology. Beyond the sale price, a buyer must determine if the software will deliver long-term business value to the organization.

Following are some key features to require:

1 Ease of Use

The ease and efficiency of implementing a Web-based mapping service is crucial to success in any business workflow. If the software is difficult to use by all but the most experienced GIS professional, the organization will likely be unable to update its GIS in a timely manner.

2 Preprocessing Requirement

Raster imagery was conventionally thought to be too large to stream over the Internet in its raw format. As a result, other Internet mapping software products require the raster and Digital Elevation Model (DEM) imagery to be optimized for Web-distribution by applying a series of image compression tiling and indexing algorithms. However, a product that can efficiently stream raster and DEM imagery in its raw format eliminates the length of time spent preprocessing data and allows imagery to maintain its original radiometric properties. This means the accuracy of subsequent operations such

as image classification (e.g., looking for water and soil wet spots, vegetation density, urban sprawl, etc.) will not be compromised.

3 DEM Requirements

Users will often have access to only satellite or aerial imagery for the area of interest, without its elevation information. Many solutions require a DEM over which the imagery must be draped to build a 3D scene. If your application requires elevation to facilitate decision-making and spatial communication, seek a product that can ingest raster imagery, treating it like a flat 3D plane onto which 3D feature layers can be overlaid.

4 Thorough Data Ingestion

Web-serving of geospatial data should not change the existing data workflow of an organization. Select a product that minimizes data migration by ingesting a comprehensive variety of aerial and satellite imagery, GIS data and 3D models in their native formats. This will cut down the number of steps required to build and host 3D Web-streamed scenes and will enhance data management practices and allow procedures to remain intact.

5 Fast Turnaround

Often geospatial information is time-sensitive, and it must be available on demand. A Web-ready 3D visualization solution should deliver ease of use and flexibility, combined with freedom from the requirement to preprocess or translate data; it would be possible to build, serve and explore a 3D scene over the Internet in a matter of minutes.

6 Flexible Server Rendering

Server rendering controls how the server interprets each raster in each scene. This may be as independent images that can be individually customized, or as one large mosaic that cannot be modified. Most 3D visualization packages deliver the latter to maximize streaming performance, at the expense of many features. However, a few let the user determine how the server operates so streaming performance can be fully customized.

7 Collaboration

Collaboration has many meanings in the GIS world. Some vendors claim that their software performs collaboration because files with simple overlays and features can be sent to other users and opened over a served scene. While this allows geospatial opinions to be shared, it does not allow true, real-time 3D terrain investigation in a team environment. The ideal tool empowers users across the world to host any number of simultaneous public or private collaboration sessions to:

- Share additional 3D feature layers, such as GIS layers and 3D models, with other users



3D visualization of Calgary street level

- Collaboratively edit, analyze and markup scenes
- Chat to other session participants
- View the camera locations of other session participants, symbolized with 3D models
- Auto-navigate through the scene by attaching to other users in the session

8 Comprehensive Animation Tools

Advanced animation tools should allow complex, precise animations to be created quickly, dramatically increasing the realism of the resulting virtual worlds. For example, a keyframe timeline editing tool allows any object or layer property to be accurately animated over time. You can flood a valley over time; control the appearance of all raster and feature layers over time; or make cities come to life by using the flight line animation tool to animate the flow of cars, boats, tanks or any other 3D model.

9 Advanced GIS Analysis Tools

An Internet mapping solution would not be complete without GIS analysis tools. Users must be able to query all attributes of feature information with a variety of tools. These could allow individual query of each feature of interest with a mouse, or batch attribute queries of varied complexity.

10 3D Model Support

To ensure accuracy, a 3D city model (including buildings, trees, signs and any other feature with geospatial coordinates) can be easily loaded into the solution using the model's true geometric coordinates. This saves the time required to digitize and estimate their location and orientation.

11 Raster Editing

Raster editing is essential to many 3D workflows, and users should look for an array of raster editing tools to cut, crop or blend raster imagery out of a 3D scene.

Working in the New World

Rich, attractive and highly informative 3D scenes can be quickly assembled to meet the growing, time-sensitive geospatial intelligence needs of any organization. A virtual scene has many showcasing features that can be leveraged to convey information.

With a Web-based application, scenes can be created and shared to allow users to gain familiarity with areas by locating landmarks, amenities, utilities and transportation options. Distances can be measured, and paths can be created with fly-throughs to provide a virtual tour animated with 3D models such as cars, trains, planes and even people.

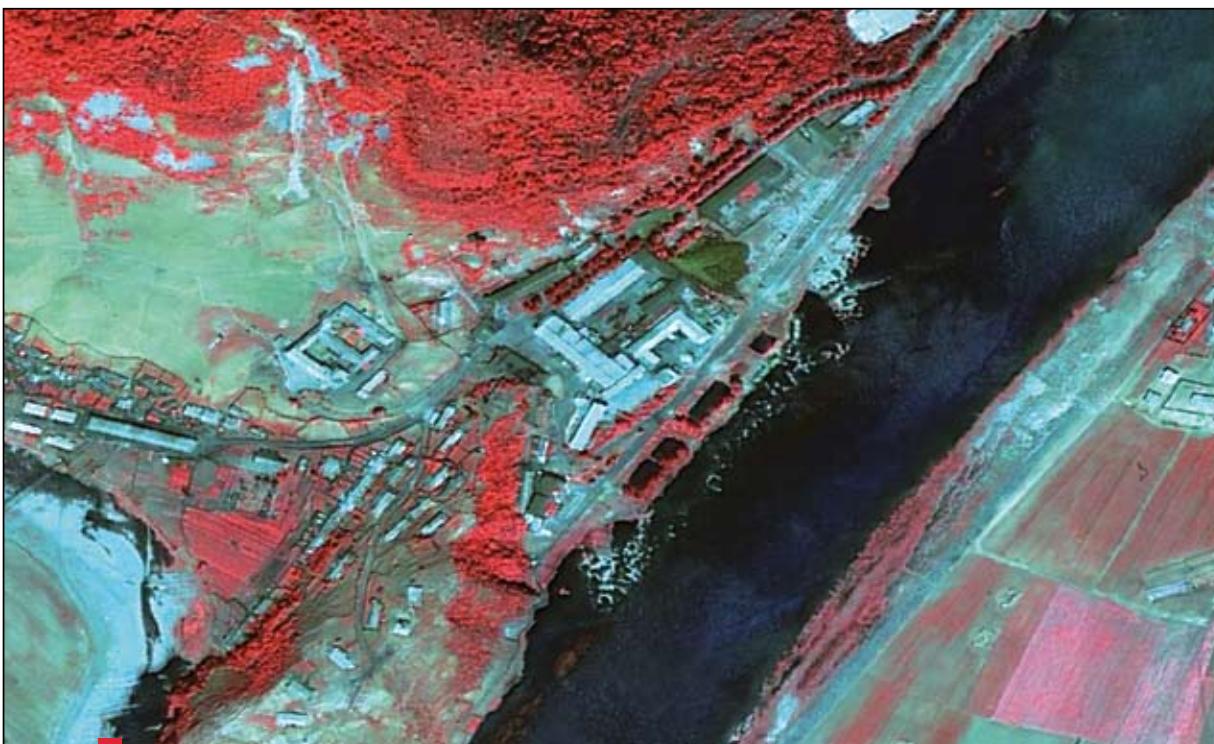
By selecting the most appropriate solution, users are empowered to efficiently employ, manage and disseminate their imagery. As a result, global stakeholders can participate in critical decision making, leveraging real-time geospatial intelligence.

When your organization is ready to visualize the future, and improve your real-time decision-making, be sure you have the right tools at hand. That future can be yours today. ■



A rich 3D scene of Calgary, Canada

Automated Georeferencing for Rapid Data Production



Results of applying the new High Pass Filter resolution merge technique to merge a QuickBird multispectral scene with the corresponding pan scene (co-registered using the new IMAGINE AutoSync module) and produce a 0.61m color image. This new technique retains the spectral (color) information, while maximizing the spatial content, much more effectively than previous algorithms permitted.

Imagery needs to be geometrically corrected to a map coordinate system to be useful. Many processes in the GIS world, such as mosaicking, resolution merge and change detection and even simple layer stacking require closely aligned images, but aligning images has not always been a simple process for inexperienced users and has been time consuming for users of all levels. The geometric correction must be highly accurate, because misalignment of features at the same location could render the results useless.

Hazards of Manual Point Measurement

The current process of manual point measurement can be prohibitively labor-intensive for large projects, and it does not enforce subpixel level correlation between images due to the limitation of human visual interpretation. Block triangulation, although tying imagery together photogrammetrically, does not enforce any correlation to already-existing image layers.

Automation is the Solution

An automated solution would enable significant reduction – or even elimination – of manual point collection. With an automated point measurement algorithm to generate thousands of tie points to produce a mathematical model tying images together, users would benefit from the fast, accurate results.

Input and Reference Images: Key to Accurate Results

The quality of input data plays a crucial role in determining the accuracy of the output.

Some of the main factors that can affect the performance of an automated point measurement algorithm include the following:

- **Time of Capture Differences:** Time of capture, especially the season, could greatly alter the radiometric characteristics of the images. For example, a winter scene may not match well with a summer scene containing more vegetation.

- **Spatial Resolution:** This is another factor that affects point measurement results, because it creates a difference in the details of the two images. There will be a point where the algorithm will fail to produce acceptable automatic results.

- **Elevation Variation:** Variation in the elevation could also cause a difference between the input and reference images. This is because the reference most likely will be an orthorectified image and therefore vertical displacement is minimal compared to the input. As a result, features that should be in the same location could be far apart when the input and reference images are attempted to be matched.

- **Sensor:** The sensor used in capturing the image (Landsat, IKONOS, SPOT, etc.) affects the resolution and radiometric characteristics of the images. It also determines the mathematical models that can be used in the rectification.

- **Digital Elevation Model (DEM):** The availability of a high resolution DEM can drastically impact the quality of rectification results, especially for mountainous areas. A DEM provides additional model-solving information in determining

the location of features in the output. This could greatly reduce the negative impact of vertical displacement when matching input and reference images.

Generating the Best Results

Artifacts arising as byproducts of poor image registration and processing can ruin processes requiring tightly aligned images. The final output from a project such as this is the cumulative result of the workflow the users select, the data quality, automatic point measurement engine usage (parameter settings) and the model selected. To ensure the best results, users should make careful and judicious decisions on these factors, starting with the data preparation.

"A tool for fast image rectification offers a tremendous saving of manual labor."

Because the point measurement process is incredibly time consuming, and minor errors can produce inaccurate results, many users are seeking a tool for fast automatic point measurement. By automating point measurement, users can be more productive and keep project cost and hours to a minimum.

For example, IMAGINE AutoSync from Leica Geosystems Geospatial Imaging gives users the capability to take two or more images of potentially dissimilar type, such as data with different resolutions or from different sensors, and generate geometric models which tie the images together with high accuracy. This method can be used to improve the registration between already georeferenced data sets, or it can be used to correlate new raw imagery into an existing georeferenced image base to quickly georeference the raw imagery.

Thousands of tie points are generated between the images automatically, which allows the output images to align more closely with the initial reference image. The Direct Linear Transform (DLT) model allows for the specification of a DEM. The DEM, together with an accurate orthorectified reference image, will allow for the rapid orthorectification of aerial photography resulting in the new data tightly aligning to the existing database. The same ability to specify a DEM is available for the rigorous orbital pushbroom (ROP) and RPC models as well.

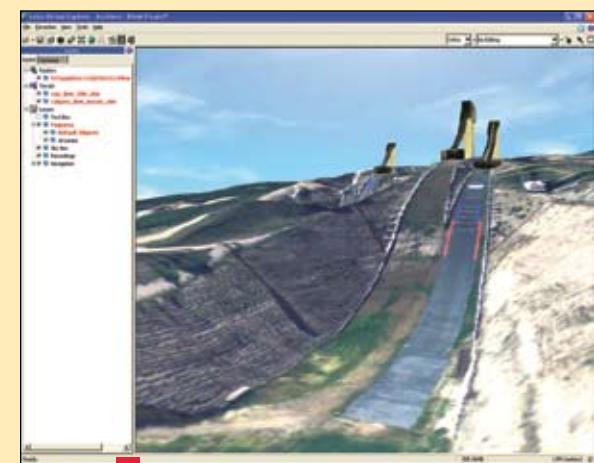
When properly used, a tool for fast image rectification, such as IMAGINE AutoSync, offers a tremendous saving of manual labor. This is achieved via streamlined workflow, a user-friendly workstation environment, a state-of-the-art automatic point matching engine and a wide selection of intelligent modeling methods. The time saved by using an automated georeferencing program makes the process highly efficient and yields a better return on the user's investment. ■

Leica Virtual Explorer is a valuable tourism resource for vacation planning

Online travel research has grown incredibly as more and more people worldwide rely on the Internet when making plans for everything from checking out different locales and attractions to booking tickets and accommodations. Through its dramatic visualization capabilities, Leica Virtual Explorer takes online travel research to new levels.

When using Leica Virtual Explorer, not only are the attributes, beauty and fun of a destination simply shown to the potential clients, but they have the ability to explore and investigate future destinations in a more graphic and hands-on way than ever before.

For example, ski resorts can use Leica Virtual Explorer to show skiers their downhill runs and cross-country trails – even how to ski to the doorstep of their hotel or condo. Cities and towns can use Leica Virtual Explorer to showcase local attractions, accommodations and hotspots in 3D in order to maximize a travel researcher's understanding of what certain places have to offer. The possibilities for use in the tourism and travel industry are varied and numerous.



Ski jumps viewed remotely over the web with Leica Virtual Explorer

The first order of business for locations welcoming tourists is attracting tourists. A Leica Virtual Explorer scene has many showcasing features that can be leveraged to heavily influence a vacationer's travel arrangements. A three-dimensional backdrop displaying the beauty or desirability of a destination can be shown with text boxes and logo layers displaying snapshots or movies highlighting local attractions and upcoming events. Labels and 2D pointers can be used to post pictures and call attention to local areas of interest. The Favorite Places feature can be used to set specific location bookmarks and complex, detailed 3D models of popular landmarks can be placed on the site.

"A Leica Virtual Explorer scene has many showcasing features that can be leveraged to heavily influence a vacationer's travel arrangements."

Digital realities are created using Leica Virtual Explorer by placing animated 3D models of trains, cars, planes and people in the scene or creating fly-throughs to take potential visitors on virtual tours of the destination. Event Scripting to trigger movies and text-to-speech sentences add special effects to the created scene. Links to scene objects, schedules, show times and other information highlight the convenience of using Leica Virtual Explorer. The ability to measure distances, demarcate directions and potential paths and mark up terrain makes Leica Virtual Explorer an invaluable tool when planning a trip. ■

Leica Photogrammetry Suite 9.0 Delivers Productivity & Accuracy

New version offers significant enhancements; introduces Leica MosaicPro

Leica Photogrammetry Suite (LPS) 9.0 provides a more efficient means of editing seams for sizable projects that may involve a large number of images. This release also introduces Leica MosaicPro and makes available several innovative features, benefits and fixes. Updated versions of PRO600 9.0 and ORIMA DP for LPS 9.0 are also included with this release.

New features and enhancements in LPS 9.0 include:

- Improved auto-correlation during manual point measurement in the Stereo Point Measurement tool
- Seed DTM support in the Automatic Terrain Extraction module
- The ability to edit terrain extraction properties for all image pairs in the Automatic Terrain Extraction module
- CARTOSAT RPC model support
- Graphical view for tie point patterns in LPS Core
- APM success rate report
- The ability to create empty terrain datasets in LPS Core

"LPS 9.0 was designed to provide enhanced capabilities for effectively managing large-scale projects," said Richard McKay, Vice President of Sales, Leica Geosystems Geospatial Imaging. "With Leica MosaicPro, we are responding to our customers' needs for powerful mosaicking tools that remain easy to use."

Ultimately, these additions and improvements offer increased versatility, and users will benefit from more efficient digital photogrammetric workflows."

Leica MosaicPro

This new mosaicking module features improved seam editing capabilities, enhanced functionality and improved radiometric adjustment abilities. With seam editing, image previewing and a streamlined user interface, Leica MosaicPro increases efficiency through a smooth process and improved functionality, which ultimately reduces project time.

"LPS 9.0 was designed to provide enhanced capabilities for effectively managing large-scale projects."

Features and benefits of Leica MosaicPro:

- Easy use of polygonal seams to visualize the output mosaic
- New embedded viewer for rendering images and performing seam editing in a streamlined process
- Preview option that applies all settings for a selected preview area within the embedded viewer
- Streamlined user interface featuring all tools within a single toolbar
- New "Global Balancing" algorithm for optimal radiometric adjustment results
- New image selection and graphical display capabilities
- New "visible" column added to the cell array
- Optimized default settings

Features and benefits of PRO600 9.0

Enhancements to PRO600 include semi-automatic grid terrain dataset measurement in PRODTM; various snap-to-ground image correlation modes in the PROLPS driver; and ability to quickly hide and show stereo overlay graphics in the LPS ViewPlex.

Features and benefits of ORIMA DP for LPS 9.0

The updated version of ORIMA offers improved stability, and it includes the option to edit sigma a priori of control points, new options for image activation and point selection, and allows more efficient point measurement. ■

IMAGINE Easytrace Delivers Assisted Feature Extraction to ERDAS IMAGINE Users

Continuing its commitment to streamlining geospatial workflows, Leica Geosystems Geospatial Imaging introduced IMAGINE Easytrace.

IMAGINE Easytrace delivers efficient assisted feature extraction, driving efficiency throughout the vector feature capture process by minimizing the number of mouse clicks that a user must perform. When capturing vector information from a digital source, such as satellite imagery or aerial photography, traditional "heads-up" digitizing requires the user to place vertices frequently along a road or land cover boundary. The IMAGINE Easytrace add-on to IMAGINE Essentials® expedites this process by employing interactively placed seed points and then applying an adaptive line fitting algorithm to accurately trace the feature between the seed locations, reducing the time needed to capture irregular linear and polygonal features.

"We understand the substantial time requirement in digitizing features from digital imagery, so IMAGINE Easytrace was developed to speed the workflow and drive productivity for ERDAS IMAGINE users," commented Richard McKay, Vice President of Sales, Leica Geosystems Geospatial Imaging.

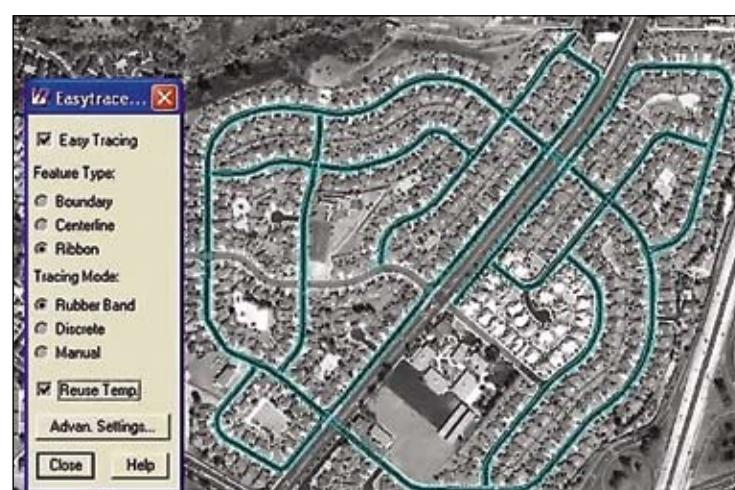
"By cutting hours – even days, for large projects – from the feature extraction process, our customers can keep overhead low and quickly move on to new tasks." ■



The IMAGINE Easytrace module makes it quick and easy to capture linear features such as road and river centerlines.

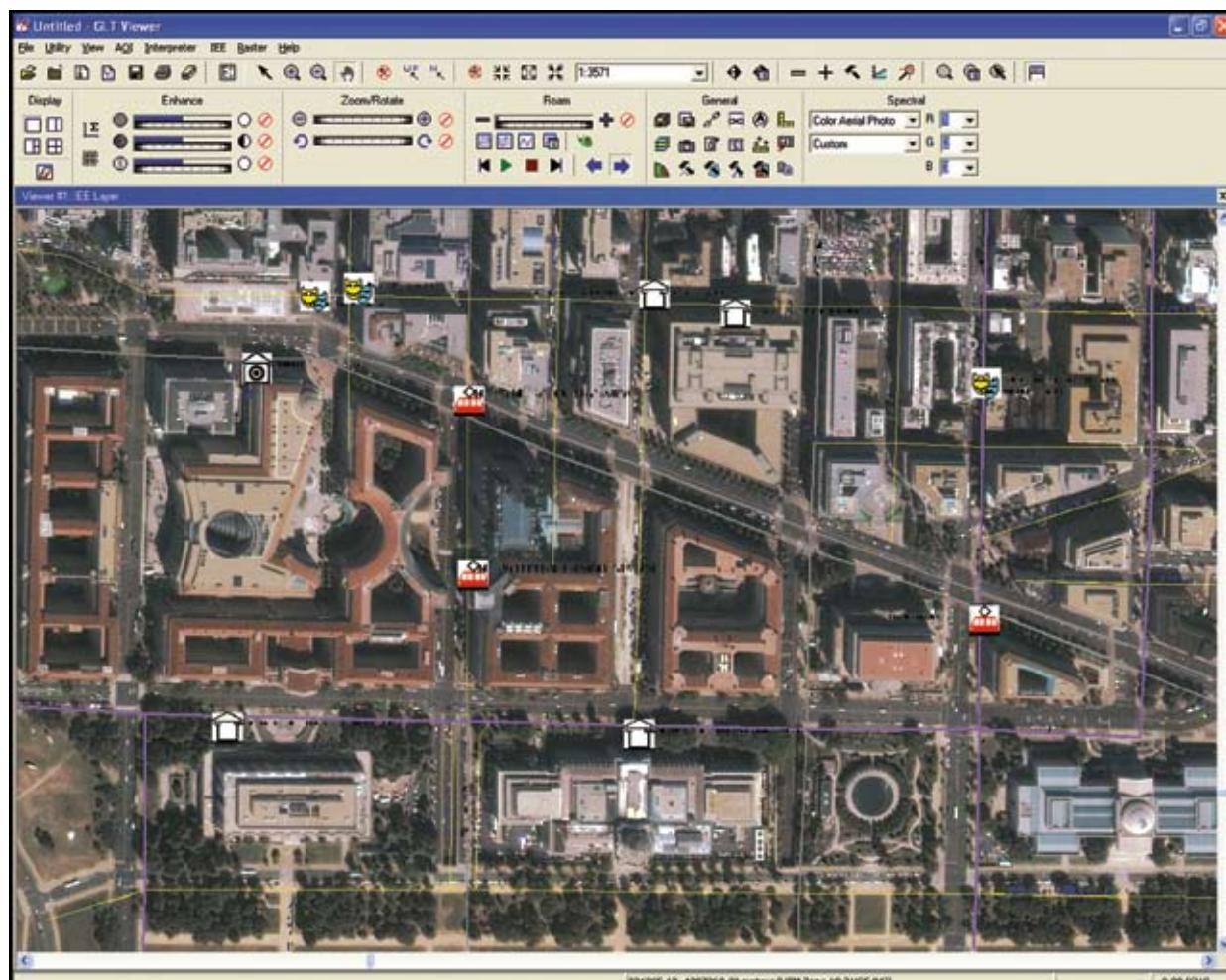


The power of IMAGINE Easytrace also enables the creation of ribbon features (both edges simultaneously) and the tracing of polygon boundaries.



IMAGINE Easytrace is easy to learn since it is embedded within the standard ERDAS IMAGINE editing tools. When performing heads-up digitizing and GIS layers the efficiency gains provide a rapid return on investment.

ERDAS IMAGINE 9.0 Advanced Enterprise Capabilities Facilitate Decision Making and Streamline Workflow



The enterprise capabilities of ERDAS IMAGINE 9.0 enable multi-user topological editing of centralized feature databases in either a connected or web-enabled environment. IKONOS imagery courtesy of GeoEye; NAVTEQ sample data in Oracle 10g format for the City of Washington DC is copyright to NAVTEQ North America.

ERDAS IMAGINE 9.0 offers enhanced geospatial image processing for an enterprise environment, leveraging the capabilities of spatially-aware databases. Additionally, ERDAS IMAGINE 9.0 introduces IMAGINE AutoSync, which enables rapid georeferencing of images using automatically-generated tie points from an existing reference image.

"The enhanced capabilities in ERDAS IMAGINE 9.0 will allow users to more easily employ our intuitive image processing tools in the enterprise environment, providing organizations with the ability to collaboratively work with their spatial data. As a result, users will obtain spatial intelligence, leading to better decision making," commented Bob Morris, President of Leica Geosystems Geospatial Imaging.

Empowering Enterprises with Geospatial Intelligence
ERDAS IMAGINE 9.0 allows organizations to maximize their investments in imagery

and feature geospatial information by increasing accessibility to spatial data, and by enabling image exploitation by both local and remote end users via an Internet connection. Key components facilitate the ability to load, read and edit both raster and vector data within the enterprise environment.

IMAGINE AutoSync

IMAGINE AutoSync offers the ability to tightly align images for change detection, mosaicking and resolution merge. With IMAGINE AutoSync, artifacts from poor image registration are no longer a byproduct of processing.

IMAGINE AutoSync takes two or more images of potentially dissimilar type (different sensors or different resolutions), and automatically generates thousands of tie points between the images to produce a geometric model that ties the images together accurately. This can be used to improve the registration between two already georeferenced data sets so that change detection or resolution merge can be applied, or it can be used to correlate new raw imagery to an existing

georeferenced image base in order to quickly georeference the new imagery.

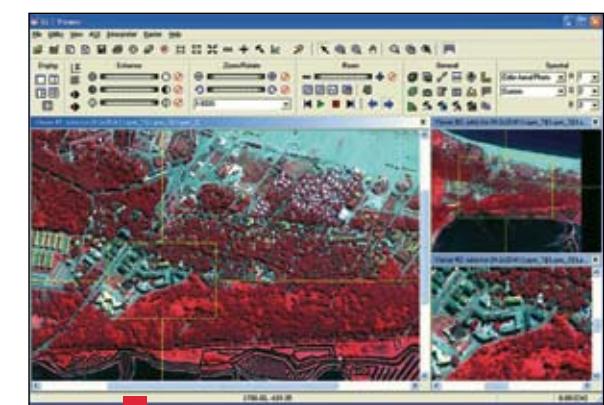
A second workflow, Edge Matching lets a localized model be applied to the overlap region of image pairs. Using a process similar to the first, tie points are generated in the region of overlap to pull misaligned features into alignment.

IMAGINE AutoSync also offers project-based workflows. Project files hold information on location of all input and reference images, stored Automatic Point Measurement (APM) and output settings and all control points generated by APM or manually measured.

"Our intuitive image processing provides organizations with the ability to collaboratively work with their spatial data. As a result, users will obtain spatial intelligence, leading to better decision making."

Additional benefits in ERDAS IMAGINE 9.0 include:

- Better image quality when zooming out, produced by improved pyramid layer algorithms
- Improved user control over the projection system used in the Viewer
- Enhanced control for trading spectral quality for spatial detail (or vice versa) through additional Pan Sharpening techniques
- Ability to edit Brightness/Contrast for Areas of Interest for 16-bit imagery, such as IKONOS and QuickBird ■



The advanced image processing capabilities of IMAGINE Professional combined with the image enhancing tools in the IMAGINE GLT allow you to enhance multispectral imagery and improve the quality of the data you collect.

Executing Forestry Applications with ERDAS IMAGINE and Leica Photogrammetry Suite

Kingwood Forestry Services is a leading forestry consulting firm

providing forestry and natural resources management services, from seedling to harvest, to forest landowners across the southern United States. The organization has offices and field operations headquarters in Monticello and Arkadelphia, Arkansas, and in Texarkana, Texas, with a sphere of operations that stretches from the Carolinas west to Oklahoma. The company's forestry professionals have extensive experience in all areas of the forest industry including custom forest management plans, land sales and acquisition, timber and land appraisal, custom high resolution digital aerial imaging and spatial information systems.

The market for aerial photography products for the forest and closely associated industries has changed over the past few years. End users are requiring higher resolution imagery and more precise positionally accurate products. Managers of spatial

data want to continuously improve the accuracy of their GIS systems keeping them as current as possible.

"...We have never run across a problem in processing our digital imagery that the Leica Geosystems technical support teams could not help us solve...."

Orthorectified imagery, of both large and small projects, is the most common client request for Kingwood's aerial photography and spatial information products. Kingwood orthorectifies thousands of digital images each year collected with its' two digital camera systems. Processing the imagery in compliance with photogrammetric standards and doing so rapidly is where

ERDAS IMAGINE and Leica Photogrammetry Suite (LPS) come into the picture. Examples of projects which Kingwood has recently flown include nearly one million acres damaged by hurricanes Katrina and Rita in southern Mississippi, Louisiana and eastern Texas as well as nearly 500,000 acres of potential habitat for the recently re-discovered and endangered Ivory-Bill Woodpecker which lives in the Big Woods area of eastern Arkansas.

Glen Dabney of Kingwood Forestry says, "Simplicity of use, logical work flow, and power are the strong points of LPS. We work with very large mosaic files all day every day."

LPS has the power to handle the imagery. Several other software packages that have the capability to process our digital imagery repeatedly crash when tasked with large imagery projects. We know that LPS is going to be able to handle the

continued on page 8

Leica Ortho Accelerator

Leica Geosystems Geospatial Imaging will soon be releasing Leica Ortho Accelerator. This new product offering will streamline digital orthophoto production with an enterprise-enabled geospatial process management system.

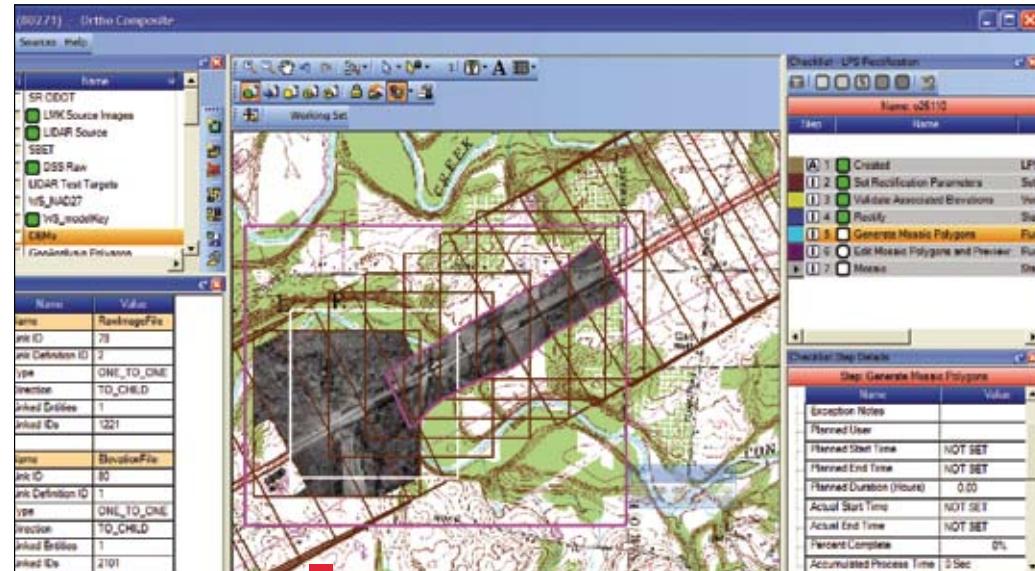
Under a strategic development agreement with Leica Geosystems, GeoCue Corporation (NIIRS10) of Huntsville, AL, has integrated various Leica Geosystems production photogrammetry tools into GeoCue, its geospatial production management system. The result of the collaboration is a series of Leica proprietary CuePacs that will comprise the Leica Ortho Accelerator product.

Leica Ortho Accelerator Features and Benefits:

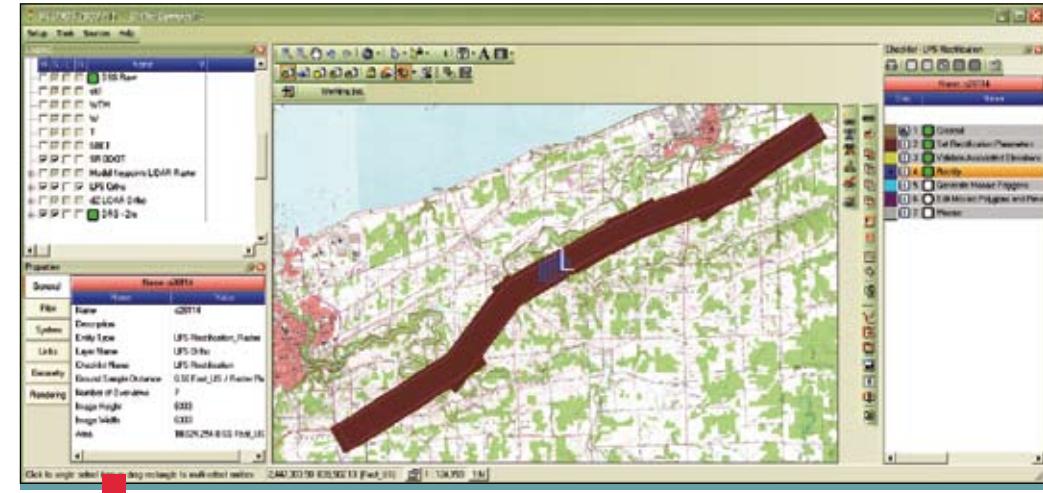
- Orthorectification can be executed as a distributed process, enabling users to significantly increase throughput.
- Start-to-finish project, data, and user management can be performed in a multi-user environment.
- A graphical, checklist based production system guides users through the production process, eliminating production errors, increasing throughput, and simultaneously allowing for effective personnel cross-training because of the easy-to-use design.
- Production history tracking, eliminating the need to maintain separate progress reporting systems.
- Seamless integration with other GeoCue CuePacs. When coupled with the widely deployed LIDAR 1 CuePac, users can implement a smooth workflow from the beginning LIDAR processing stages all the way through digital ortho production.
- Orientation data can be ingested from multiple sources including Leica Photogrammetry Suite, ImageStation, SOCET SET, and MATCH-AT.
- Multiple output definition options are available for final image products.
- Mosaicking is performed with an integrated version of Leica MosaicPro, a highly effective tool for mosaicking large quantities of input images. With Leica MosaicPro, users can:
 - Visualize the output mosaic with ease using polygonal seams and rendering input imagery in an embedded viewer.

- Radiometrically adjust imagery with a new "Global Balancing" method.
- Choose an area to preview results. All mosaicking parameters (radiometric adjustments, GSD, feathering, and smoothing) are applied to the preview area.

Leica Ortho Accelerator takes advantage of recent advances in computer processing as well as new digital photogrammetry techniques to enable smooth, high-volume production workflows in an enterprise environment. ■



Entity Linking: making associations between terrain and image data.
Image Data Courtesy of Ohio Department of Transportation



Real time production status

Leica MosaicPro

The latest version of Leica Photogrammetry Suite, LPS 9.0, has several important innovative new features and benefits. Since our customer surveys indicated a need for improving the cutline editing portion of the Mosaic Tool, as well as a more refined radiometric adjustment process, we have introduced a revamped mosaicking module, called Leica MosaicPro. While previous updates (Mosaic Direct, Mosaic Wizard) to the mosaic tool changed the "presentation" of mosaicking options, the new module offers significant changes in functionality.

Leica MosaicPro is aimed at high-volume production customers that need an efficient means of editing seams for large projects that may involve large quantities of images. It is installed with the 9.0 versions of LPS Core, IMAGINE Advantage®, and IMAGINE Professional®.

Leica MosaicPro Features and Benefits:

- Visualize the output mosaic with ease using polygonal seams. Polygonal seams replaced cutlines previously used in the classic mosaic tool.

- Seam editing can now be performed in the new embedded viewer which replaced the static canvas display. Eliminates the need to launch an external viewer for cutline editing.
- Display input images within the embedded viewer. This allows users to see exactly what image portions will be used in the output mosaic.
- A preview option is available for visualizing seam feathering, smoothing, radiometric adjustments, and output GSD changes for a user-defined area.
- Streamlined editing process. Images can be selected and turned on and off within the embedded viewer. All editing can be performed with the use of a single easy-to-use tool.
- New "Global Balancing" algorithm. Added for achieving optimal radiometric adjustment results.
- In the embedded viewer, images are clipped to seam polygons, if available. Image portions are immediately updated when a seam edit is performed, resulting in a "what you see is what you get" editing process.

- New tools have been added for image selection and manipulation. A new "visible" column added to the cell array, allowing the user to interactively control which images are loaded in the viewer. When working on a large project, this process saves time by loading only the necessary images.
- Redesigned user interface. All tools are now available within a single toolbar, instead of having "input", "intersection", and "output" modes.
- Image footprints. Displayed in the embedded viewer and can easily be turned off and on.
- Updated options. User preferences and optimized default settings.

These features significantly streamline the Mosaic tool and help reduce the amount of time required to complete a project. The batch functionality of the existing Mosaic tool is also available with Leica MosaicPro. The existing Mosaic tool will also continue to be available. ■

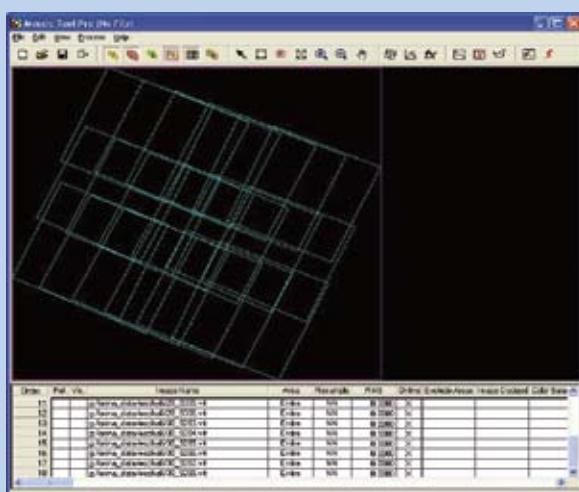
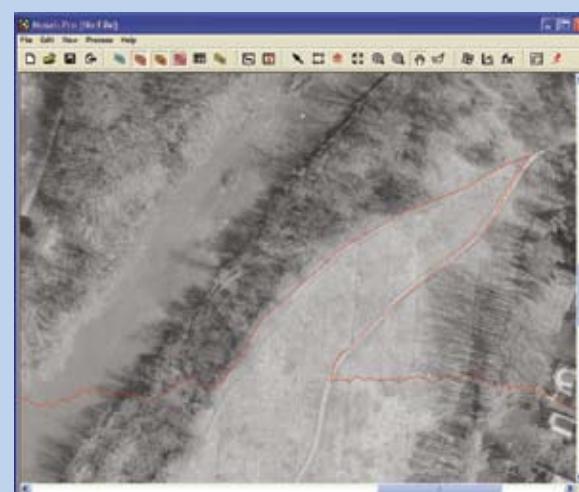
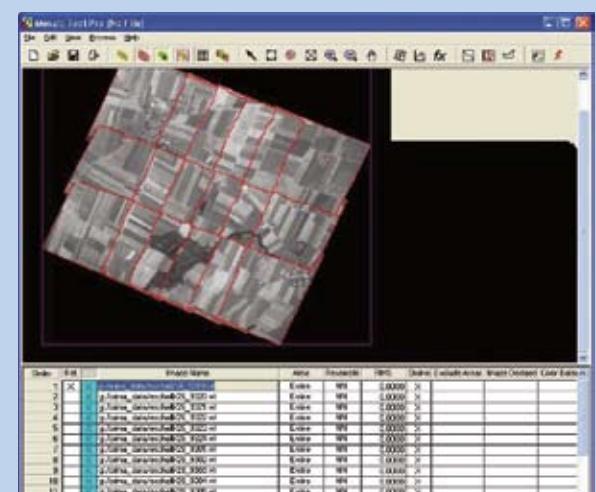


Image footprints displayed in MosaicPro -
Displayed in the embedded viewer and can
easily be turned off and on.

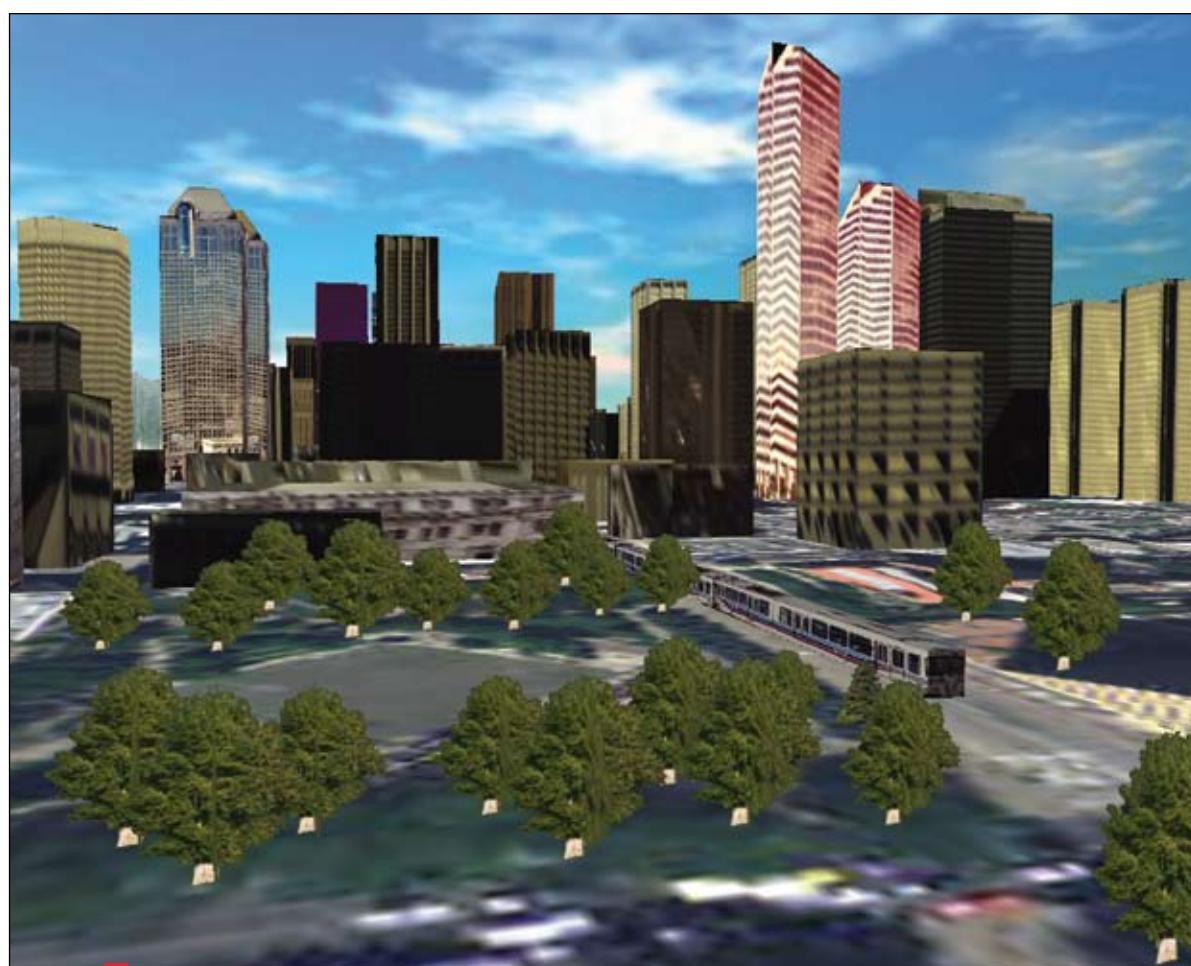


Seam editing can now be performed in the new
embedded viewer which replaced the static
canvas display - Eliminates the need to launch
an external viewer for cutline editing.



In the embedded viewer, images are clipped to
seam polygons, if available - Image portions
are immediately updated when a seam edit is
performed, resulting in a "what you see is what
you get" editing process.

Leica Virtual Explorer sets the standard for 3D visualization and collaboration



Leica Virtual Explorer 3D representation of Calgary

Leica Geosystems Geospatial Imaging developed Leica Virtual Explorer to facilitate collaborative decision making through 3D visualization and sharing of geospatial information. Leica Virtual Explorer seamlessly integrates terabytes of spatial data into an interactive "digital earth" that can be distributed to thousands of users worldwide.

Leica Virtual Explorer empowers stakeholders to demonstrate 3D spatial relationships, driving awareness of project logistics while increasing efficiency and effectiveness. While independently or collaboratively exploring these environments, users may employ a broad array of geospatial query, analysis, annotation, 3D modeling and animation, overlay and raster editing tools. With Leica Virtual Explorer, organizations in an array of markets can build on the Leica Geosystems' 3D architecture, leveraging and streamlining the use of their GIS data to increase spatial communication and geospatial understanding.

"In the ever expanding global marketplace, it is critical that geospatial information can be easily accessed and collaboratively explored when organizations need to make planning decisions," said Bob Morris, President of Leica Geosystems Geospatial Imaging. "Leica Virtual Explorer provides a complete solution for exploitation of 3D GIS data in the worldwide arena - expanding the reach of their digital geospatial workflows."

Leica Virtual Explorer Client

Leica Virtual Explorer Client is the common, user-friendly interface used to access high resolution Leica Virtual Explorer scenes. The flexibility of Leica Virtual Explorer Client makes it a solution for a wide variety of commercial and professional uses including:

- Customization of your personal viewing environment by independently toggling raster layers, vector layers, terrain layers and any other feature layer on and off
- Smoothly exploring the 3D scene controlling speed, altitude and viewing angle with mouse and keyboard controls that use five different navigation modes
- Denoting planned paths and areas of interest by using the Overlay Tools to mark up lines and polygons along with complex paths using the freehand pencil
- Recording flight paths and play predefined animations
- Using the geocoding feature to quickly find locations around the globe by searching street addresses and area codes
- Ability to join any Leica Virtual Explorer scene

"Leica Virtual Explorer provides a complete solution for exploitation of 3D GIS data in the worldwide arena..."

Leica Virtual Explorer Architect

A highly efficient design allowing massive amounts of spatial information to be compiled into an interactive and realistic planetary viewing environment is the hallmark of Leica Virtual Explorer Architect. It contains all the tools necessary to rapidly assemble and smoothly explore comprehensive 3D terrain visualizations. Leica Virtual Explorer Architect gives users the ability to assemble a rich, photo-realistic 3D backdrop of a digital world with unlimited aerial and satellite images, geographic terrain layers and GIS vector data in addition to smoothly exploring 3D scenes controlling speed, altitude and viewing angles. Users can employ Logo Layers, Text Boxes and 2D Pointers to customize the appearance of the 3D view. Leica Virtual Explorer Architect can be used as a stand alone 3D analysis tool, or as an authoring tool for the creation of scenes for global Web-distribution using Leica Virtual Explorer Server.

Leica Virtual Explorer Pro Client

Leica Virtual Explorer Pro Client is the gateway to the Leica Virtual Explorer digital world. It allows geospatial users to further sculpt 3D scenes into their own

personal virtual perception. Beyond simply exploring scenes, users can independently modify their visualization experience within Leica Virtual Explorer scenes. This includes the local addition of satellite images, geographic terrain layers, GIS vector data and 3D georeferenced models. Leica Virtual Explorer Pro Client users can then remotely navigate and fully analyze spatial relationships of the 3D scene using a comprehensive analysis toolbox. Leica Virtual Explorer Pro Client allows for the play and creation of movies of predefined flight paths and animations. Users can record an index of favorite locations for quick feature access and use the Geocoding feature to quickly find locations around the globe by searching street addresses and area codes.

Leica Virtual Explorer DVD

For conversion of 3D scenes into an effortless, file-distributable format, Leica Virtual Explorer DVD gives users the ability to use Leica Virtual Explorer Architect to create scenes and distribute them via CD, DVD or using any other file-based media. The freely distributable Leica Virtual Explorer Client can be embedded into the 3D scene so others can access unsurpassed terrain navigation and analysis without purchasing additional software. Leica Virtual Explorer DVD scenes include all the real-time 3D terrain exploitation resources available in Leica Virtual Explorer Client plus all features defined by the Leica Virtual Explorer Architect such as animations, events and attribution.

Leica Virtual Explorer Server

Designed to stream mass quantities of 3D data to a large web audience quickly and efficiently, Leica Virtual Explorer Server

allows users to independently and concurrently perform geographical exploration and analysis. Users can stream 3D terrain environments over private networks or the Internet due to Leica Virtual Explorer Server's optimization of terabytes of geospatial data for efficient streaming to any bandwidth connection. This technology provides an extremely scalable distribution solution and lets Leica Virtual Explorer Server serve as the power plant for Leica Virtual Explorer Collaboration.

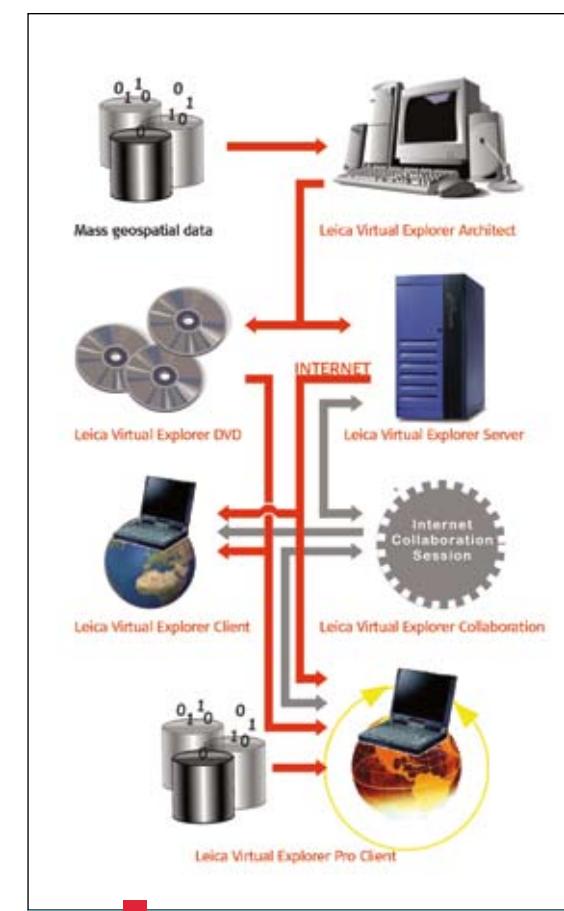
Leica Virtual Explorer Collaboration

Leica Virtual Explorer Collaboration allows people worldwide to simultaneously join collaboration sessions so they can collectively navigate, edit and mark up Leica Virtual Explorer scenes. Used in conjunction with Leica Virtual Explorer Server, comprehensive spatial communication is delivered through online chat and by attaching to other users in real-time. For those needing to present information to colleagues in remote offices, Leica Virtual Explorer Collaboration allows the presenter to lead participants around the scenes, pointing out features of interest and answering questions through the chat dialog before letting participants explore the scene on their own.

"The response to Leica Virtual Explorer has been very positive," noted Richard McKay, Vice President of Sales for Leica Geosystems Geospatial Imaging. "Organizations in any industry can easily visualize and share their data with Leica Virtual Explorer, and we've just made it even easier."

Key new features in Leica Virtual Explorer 3.1 include:

- Import of models using existing coverage
- Tile texture and 3D roofs for more realistic vector presentation
- Texture attributes may be specified when creating vectors
- Unicode support, allowing users to customize the default graphical user interface and scene content in their native language
- ActiveX control enables Leica Virtual Explorer to be easily embedded into third-party applications
- Available API toolkit, so that developers can create applications, tools or customized interface for Leica Virtual Explorer
- Support for leading geospatial databases to enable users to directly access enterprise data
- Enhanced navigation, including updated Spherical Navigation mode and roaming mode north arrow
- Server geocoding to provide thin clients geocoding services when connected to Leica Virtual Explorer Server
- Percentage based lookup tables, allowing greater control over the visual output of the scene ■



Executing Forestry Applications with ERDAS IMAGINE and Leica Photogrammetry Suite

continued from page 5

large data sets and we know that we are not going to have to run a process numerous times and in small blocks to get a job done."

After Kingwood Forestry specialists acquire high resolution imagery with one of the firms digital sensors, the processed imagery is imported into LPS to create a block file the first step in image orthorectification with LPS. The interior orientation for the digital camera system is then retrieved from the camera calibration report and the exterior orientation is extracted from the navigation data collected by the Inertial Navigation Systems (INS) for the particular mission. Either USGS or custom digital elevation models are then applied to the project and the images are orthorectified.

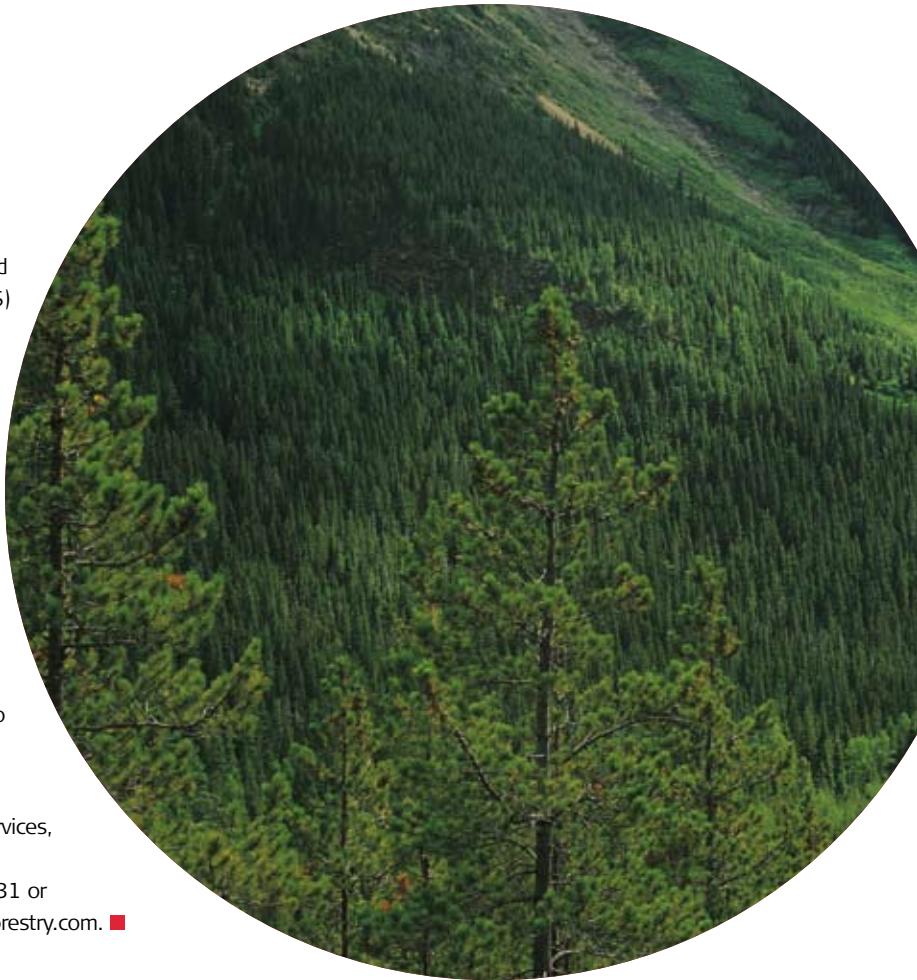
Often, multiple exposures are required to cover a project.

Kingwood Forestry recently flew a 141,000 acre project in central Mississippi of a forested area that was heavily damaged by

hurricane Katrina. The project required stereo coverage at an image resolution of one square foot per pixel in color infrared creating 1,243 individual images. Kingwood orthorectified the imagery and then used the LPS mosaic tool to create a seamless dodged and color balanced mosaic of the project area. Next, they used the subset function embedded in the mosaic tool to create Digital Ortho Quarter Quads

(DOQQ) with the exact same coordinates and coverage as the U.S. Geological Survey (USGS) DOQQs. Dabney says, "Leica Geosystems has continually worked to improve the LPS package. We have never run across a problem in processing our digital imagery that the Leica Geosystems technical support teams could not help us solve. We consider Leica Geosystems to be part of our production team. Clients want high resolution, high positional accuracy, and fast turn around time. By combining LPS and our digital sensors, we can deliver the products our clients need in a speedy time frame and in a price range which allows us to remain competitive."

For more information about Kingwood Forestry or its services, call 1 870 367 8567, toll free: 1 800 308 3831 or visit www.kingwoodforestry.com. ■



Join us!

Join us at **ESRI User's Conference** in San Diego, August 7-11, 2006. Visit our booth #601 and meet with one of our experts for interactive demonstrations of the following product offerings:

- Leica Photogrammetry Suite
- ERDAS IMAGINE
- ESRI Extensions for ArcGIS
- Leica Virtual Explorer
- IMAGINE Autosync

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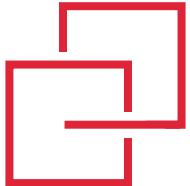
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