Hydrologic Modeling Debuts in North America

In most of the western United States, water scarcity is a way of life. In Idaho, for example, 2001 has been a year of low snow packs, hot weather and only slight precipitation, resulting in 25 of its 44 counties declaring drought emergencies by mid-year.

Responsibility for Idaho’s water management rests with the Idaho Department of Water Resources (IDWR), the lead agency for natural resources GIS. But water scarcity and management issues don’t stop at state lines. The Bear River System, a major Idaho water resource, covers 7,465 square miles in Idaho, Utah and Wyoming, and contains approximately 470,000 acres of crop and pasture land. IDWR represents Idaho in the three-state Bear River Commission,

West Africa Provides Proving Ground for ERDAS IMAGINE’s GPS-Direct Link

Investigating hydrological cycle changes and related consequences for West Africa inhabitants is no easy task in such rugged terrain. But ERDAS IMAGINE’s direct-link GPS tool is making the job easier.

IMPETUS, an interdisciplinary integrated management project, was created to establish a management plan for sustainable freshwater use. The project is a cooperative effort of the universities of Cologne and Bonn, the German Aerospace Centre, and local scientists in Benin and Morocco. In river catchments north and south of the Sahara (Morocco’s Drâa River and Benin’s upper Ouémé), IMPETUS has conducted detailed studies of the hydrological cycle and interactions between hydrological conditions and vegetation cover, as well as human response to changing environments. The results of the research are expected to support development of a regional freshwater management plan.

(continued on page 7)
EarthWatch, ERDAS Partner

EarthWatch Inc., Longmont, Colorado, and ERDAS Inc. formed a strategic software partnership that ultimately will allow customers to visualize, manipulate, analyze, measure and integrate QuickBird imagery into various 2D and 3D environments. The partnership licenses EarthWatch’s QuickBird sensor model to ERDAS for incorporation into its geographic imaging software products. The companies will provide solutions to traditional, vector-based GIS users.

“With the integration of QuickBird imagery, customers will be able to easily manipulate its panchromatic and multispectral imagery in ERDAS’ 2D and 3D environments,” says Lawrie E. Jordan III, ERDAS president.

The partnership will allow customers to leverage the benefits of incorporating high-resolution imagery into existing and new systems/processes, according to Kenyon Waugh, EarthWatch marketing alliances and community development manager.

QuickBird 2, which will offer 61-centimeter panchromatic and 2.5-meter multispectral imagery, is scheduled to launch in October 2001.

IMAGINE OrthoBASE Incorporates IKONOS Orthorectification Capabilities

With the help of Thornton, Colorado-based Space Imaging’s new Geo Ortho Kit, ERDAS Inc. will incorporate IKONOS imagery orthorectification capabilities into IMAGINE OrthoBASE.

Geo Ortho Kit consists of a high-resolution Geo image derived from IKONOS and an Image Geometry Model (IGM) digital file. IGM is a mathematical way of expressing the complex sensor geometry of the IKONOS camera, which is necessary to correct the imagery for terrain distortions. By incorporating IGM and a Geo image into commercial imagery software products, users can create accurate orthoimages with their own digital elevation models (DEMs) and ground control points (GCPs). Because IGM provides complete, accurate sensor geometry, final orthorectified image metric accuracy is limited only by DEM and GCP accuracy.

“We created Geo Ortho Kit to allow photogrammetric users to get even more value out of our popular georeferenced product and create high-quality orthorectified products,” says Brian Soliday, Space Imaging’s Sales and Marketing Global Solutions executive vice president. “By partnering with the leading software companies, we are giving them and their customers a superior decision-making tool that enables them to merge their state-of-the-art products with the exceptional quality of IKONOS imagery.”

“With the Geo Ortho Kit, our customers will now have the added ability to create exceptionally ortho-accurate imagery, using digital elevation models and ground control points derived with our easy-to-use product,” says ERDAS President Lawrie E. Jordan III.

The Geo Ortho Kit is available as a part of the Geo product suite in 1-meter black-and-white, 1-meter color and 4-meter multispectral.
Web Celebration Contest Winners Announced

Ruth Spell of California was the grand prize winner in the ERDAS Web Launch Celebration Contest. Spell won an HP Pavilion XL756 and 17-inch monitor and ERDAS MapSheets Express. Second-place winner, Christopher Kennedy of Virginia, won a Compaq iPAQ H3635 Pocket PC.

Spell, Kennedy and others who registered at ERDAS Central [www.erdas.com] were automatically qualified in the contest. Announcement of the winners in July continued the celebration of the Web site's redesign, which features a clean layout and clear navigation route for users to learn more about ERDAS, its software and services, and geographic imaging. But more than simply changing the site's graphic look and feel, the site features a Web architecture that accommodates future capabilities, including interactivity with customers and access to enhanced resources.

The site's Solutions section provides users with answers to their software questions and access to ERDAS' extensive services. By individualizing your job or industry, you can learn the solution ERDAS recommends for you. Other notable features include:

- TutorOnline, designed to provide customer training through the Web, provides free courses on topics related to ERDAS software products, geographic imaging theory and practice. TutorOnline also complements ERDAS Education Center classes.
- The ERDAS Services Center provides ERDAS training course schedules, course availability, syllabuses, training facility and accommodation details, and customized training program information.
- Product walk-throughs provide customers more information about ERDAS products on their own time and at their own pace. ERDAS Central provides walk-throughs of many ERDAS products, with online demos featuring product feel, key features and capabilities.
- ERDAS.com's user registration offers targeted, premium content to registered users when they log on. Registered ERDAS software users also can exchange information with fellow ERDAS clients, access a community of support and services, and learn more about ERDAS products, services and events.

Site development is ongoing.

ERDAS Translates Manuals into Spanish

ERDAS Inc. teamed up with the Universidad Distrital, Bogotá, Colombia, to translate key ERDAS manuals into Spanish to increase usability for ERDAS’ Spanish-speaking customers. The first set of books was translated in August. In addition, the university will use ERDAS software in the classroom to increase knowledge about geographic imaging.

“ERDAS recognizes that the remote sensing market in Spanish-speaking countries is growing rapidly,” says Bruce Q. Rado, ERDAS vice president.

The manuals also will help some Spanish-speaking customers learn to use ERDAS software faster. “One of ERDAS’ key selling factors is that our products are easy to use,” says Rado. “If removing language barriers makes the product more accessible and even easier to use, then we are happy to make the translated manuals available to our customers.”

The first books translated into Spanish are the ERDAS Field Guide, Fifth Edition, which covers theoretical information about remote sensing, and the ERDAS IMAGINE V8.4 Tour Guides manual, which provides step-by-step software use instructions. The university is also translating ERDAS IMAGINE Tour Guides for ERDAS IMAGINE V8.5. Long-term, ERDAS plans to translate all of its manuals into Spanish.

The ERDAS Field Guide is currently available in Arabic. ERDAS is amenable to translating its guidebooks in other languages as needs arise.
The new Spectral Analysis tools, available later this year with IMAGINE Professional 8.5, will provide task-oriented wizard-based tools to simplify and automate preprocessing and analysis of hyperspectral imagery.

Unlike panchromatic or multispectral imagery, hyperspectral data are derived from sensors that record the electromagnetic spectrum in hundreds of narrow, contiguous spectral bands. This continuous sampling of the spectral return from each pixel opens up a branch of scientific research—imaging spectroscopy—that analyzes information in each pixel’s spectrum.

The figure below shows the additional information inherent in the airborne visible/infrared imaging spectrometer (AVIRIS) sensor’s 224 narrow, contiguous bands, rather than Landsat’s seven-wide noncontiguous bands.

An AVIRIS pixel’s spectral profile shows “dips” resulting from molecular spectral absorption and particle scattering. Different molecular structures and materials absorb or scatter electromagnetic radiation at different wavelengths, creating patterns that identify a particular material’s presence. Thus, surface and atmospheric constituents are detectable/identifiable, constituent material concentrations are measurable, and spatial material distribution is mapped easily. Further, a particular material’s spectral profile may be identified even if it’s present in very small quantities.

Many companies, particularly in mineral exploration, regularly use hyperspectral imagery and often own their own airborne hyperspectral sensors. With the advent of commercially available hyperspectral satellite imagery, the market for analyzing such imagery is expected to expand. ERDAS Inc.’s new Spectral Analysis tools will help customers quickly and easily exploit information inherent in these new data sources.

Spectral Analysis software is built around two families of algorithms, preprocessing and analytical metrics. Preprocessing algorithms are corrections or modifications to the input data to prepare it for analysis. Analytical metrics are algorithms that process data to produce output images. Depending on objective and expertise, users can access all functionality via two routes: intuitive wizard-based task workflows or a fully functional interactive workstation.

The software’s overriding concept is ease of use, easy-to-follow workflow and intelligent data-derived defaults. Work within the Spectral Analysis module is stored in a project file that allows users to define a complete process workflow before any calculations are done. It also provides a record of decisions and processes that produced a particular output result, allow analysts to stop work on a project and return at a later time without work loss, and allows different image analyses to be run without repeating preprocessing steps.

Spectral analysis workflows are tailored to specific analysis end products or goals. Five objectives, or tasks, are predefined:

- **Anomaly Detection** searches an input image and identifies pixels with a spectral signature that deviates markedly from most other pixel spectra in the image.
- **Target Detection** searches an input image for specific material suspected to be present in very low concentration. Analysts select the material of interest from a spectral library or scene-derived signature. Pixels are ranked based on the likelihood that they contain the material.
- **Material Mapping** searches an input image for specific material(s) based on an input spectrum for the material(s) of interest. This process is similar to Target Detection, but the algorithm assumes that the material in question occurs in higher concentrations than when using Target Detection.
- **Material Identification** attempts to identify a pixel’s material by comparing it with a list of candidate spectra. Conceptually, this task is the opposite of Target Detection or Material Mapping. In this case, users point to a pixel (or group of pixels) in an image and the Material Identification process ranks the candidate spectra by how closely they match the selected pixel’s spectra.
- **Pixel Unmixing** devolves or separates a pixel into major subcomponents based on a list of candidate end-member spectra. The output is a data layer for each input candidate material where the digital number represents the estimated percentage of that material for the pixel.

Each task generally requires preprocessing functions before it can be performed. Wizards guide users through preprocessing steps and help to determine if those steps are needed. For example, if a particular hyperspectral image doesn’t contain metadata that specifies the wavelength of
the energy measured in each band, the Sensor Definition page will display in the wizard and ask the user to specify the band-to-wavelength mapping. Other preprocessing steps, such as bad band identification, atmospheric adjustment, data compression through Minimum Noise Fraction calculation, etc., also are provided.

The figures below show use of the Bad Bands tool, selected from within the preprocessing wizard, to identify bands within an image that consist largely of noise (or are otherwise bad) and mark them for exclusion from any further processing where they might adversely affect results.

While the wizards are designed to help beginning remote sensing users extract useful information from hyperspectral imagery, the workstation option provides more advanced controls. Key workstation features include:

• Access to all available functionality through the Task wizards and preprocessing steps.
• Simple drag-and-drop manipulation of spectra between libraries, images and tools, such as the spectral profile.
• Embedded tools to manage screen real estate efficiently.
• Automatic display of results for further evaluation and processing.
• RGB color display controlled through selectors on the spectral plot.

The hyperspectral image (top right) was processed in workstation mode. Embedded tools shown include two spectral library windows; three image display frames, including an overview and magnifier; and two Spectral Profile frames. Other tools and analysis functions are available through the toolbar.

Users can take their analysis even further with IMAGINE Expert Classifier. For example, users can combine results of several Material Mapping attempts or incorporate ancillary data to interpret the data. Other imagery, vector layers, cloud masks, etc., must be evaluated with multiple outputs from the Task flows to reach accurate conclusions. The IMAGINE Expert Classifier supports these steps in a repeatable, accurate manner.

The Spectral Analysis tools will be available to Software Subscription Service (SSS) subscribers for downloading from the SSS section of the ERDAS Web site. As new tasks and options are developed, they will be posted online for SSS customers.

Get the Most Out of ERDAS IMAGINE

ERDAS IMAGINE software enhancements are available online to ERDAS Software Subscription Service (SSS) subscribers via a secure SSS Web site.

Increased functionality and capabilities direct to your desktop!
Stereo Analyst 1.2 Released

Stereo Analyst 1.2 is now shipping. Designed as a stand-alone product that easily integrates with ERDAS IMAGINE and ESRI GIS products, Stereo Analyst 1.2 is a powerful, affordable Windows-based solution for 3D feature collection, interpretation, measurement and visualization of stereo imagery. New capabilities include:

- Added sensor support for SPOT, IRS-1C and IKONOS imagery, allowing users to interpret, collect, edit and visualize 3D GIS data.
- Ability to operate within the ERDAS IMAGINE 8.5 environment.
- Interactive 3D stereo viewing and image interpretation.
- Accurate creation of digital stereo models (DSMs) from external photogrammetric data.
- Highly accurate measurement of 3D distances, angles, area, perimeter and coordinates.
- Semiautomated quality assurance and control tools to validate accuracy of existing GIS layers and DSMs.
- Automatic image texture extraction for 3D models.
- Highly accurate 3D GIS feature collection.
- Continuous zoom and roaming capabilities.
- GIS layer update and feature editing.
- GIS feature data customization.
- GIS spatial and nonspatial data attribution.

Stereo Analyst transforms a 2D GIS into real-world dimensions with map-accurate 3D information. Users can update a GIS by superimposing existing 2D vector layers on a DSM and edit/reshape those layers to accurate, real-world positions.

During GIS data collection, spatial and nonspatial attributes associated with a GIS layer can be edited, and the attribute tables can be displayed with the DSM. Automated attribution techniques simultaneously populate the GIS during 3D data collection. Stereo Analyst directly outputs ESRI 3D Shapefiles for immediate use in ERDAS IMAGINE and ESRI GIS products.

Stereo Analyst is useful in various GIS applications, including telecommunications, forestry, state and local government planning, and geology.

High-resolution stereo imagery processed with Stereo Analyst 1.2. Data courtesy of Photo Science Inc.

Product Status at a Glance

ERDAS Inc. has released several products this year. Following is a list of the products and their respective release dates by quarter.

**January—March 2001**
- IMAGINE Developers’ Toolkit 8.4
- ATCOR2 for ERDAS IMAGINE 8.4
- Stereo Analyst 1.1

**July—September 2001**
- ERDAS IMAGINE 8.5 (IMAGINE Essentials, IMAGINE Advantage, IMAGINE Professional)
- IMAGINE Vector 8.5
- IMAGINE VirtualGIS 8.5
- IMAGINE Radar Interpreter 8.5
- IMAGINE StereoSAR DEM 8.5
- IMAGINE OrthoRadar 8.5
- IMAGINE IFSAR DEM 8.5
- IMAGINE OrthoBASE 8.5
- Stereo Analyst 1.2
- IMAGINE OrthoBASE 8.5.1
- IMAGINE OrthoBASE Pro 8.5.1
- IKONOS Sensor Model Support

**October—December 2001**
- IMAGINE NITF 2.1, V8.5
- Spectral Analysis Tools (IMAGINE Professional 8.5 enhancement)
- ATCOR3 for ERDAS IMAGINE 8.5
- IMAGINE Developers’ Toolkit 8.5
- IMAGINE Subpixel Classifier 8.5
In the IMPETUS framework, assessing vegetation cover changes during the last 30 years is an important task performed by the Remote Sensing Research Group of the Geographic Institutes, University of Bonn, Germany. Actual vegetation cover and land-use were derived from recent Landsat Enhanced Thematic Mapper (ETM) 7 scenes. Extended field campaigns for ground truthing were conducted in Benin and Morocco, a time-intensive task before ERDAS IMAGINE’s direct link GPS tool was available.

Installation of the GPS tool on a laptop, in this case a Toshiba Satellite Pro 4200, went smoothly. Upon installation, a new button appeared in the ERDAS IMAGINE Viewer. After connecting a Garmin III+GPS unit with the computer (Figure 1), an operator started the GPS link control menu (Figure 2). The easy-to-use GPS link menu is self explanatory. The GPS link connects the GPS-gathered position data simultaneously with any georeferenced remote sensing scene (projection, datum and spheroid) displayed in ERDAS IMAGINE. The actual position is marked on the image scene on the computer, allowing operators to compare the real vegetation with its occurrence on the image, which helps operators assess land-use and land-cover patterns quickly.

An important advantage of the direct link GPS tool is that an arrow indicates the direction in which the vehicle (or the person holding the computer) moves (Figure 3). This can help a scientist evaluate in advance what kind of vegetation will occur on subsequent trips. The size and appearance of the position marker can be changed depending on operator requirements. For example, in detailed studies, the marker can be the size of one Landsat pixel. For an overview, it can be much larger.

The GPS tool is excellent for orientation in terrain that doesn’t have proper roads or signboards (Figure 4). During dust storms in the Moroccan desert, visibility was poor, but operators used the on-screen imagery to find the track and avoid getting stuck in dune fields. In Benin, operators were able to approach unfamiliar dense wet forests.

The ERDAS IMAGINE GPS link also allowed operators to store position data in eligible time intervals (e.g., 10 seconds, 30 seconds or one minute), allowing driven tracks to be definitively marked and easily reproduced. Later, the tracks can be converted in vector files (e.g., Shapefile format) and used as overlays in remote sensing scenes or other GIS applications, such as ArcView GIS.

For the Benin and Morocco project, operators used the ERDAS IMAGINE GPS link with the IMAGINE Vector module, an ideal combination for assessing vegetation in the river catchments. As soon as a definite vegetation unit could be determined in the field, its position on the remote sensing image was marked with the IMAGINE Vector module. Simultaneously, an image of the vegetation was taken with a digital camera and affiliated in the IMAGINE Vector module database. The result is a sound database collection of ground control points now being used for supervised classification.

Using the GPS link with ERDAS IMAGINE also saves operators time by allowing them to collect two to three times as many GPS points than with more traditional methods. This is useful in creating final land-use maps for Benin and parts of Morocco, which will be presented to the public in early 2002 following classification verification. Local authorities, foresters and other environmental protection interests will use the maps for land management and planning. Because the maps will be at a 30-meter resolution, they also may be used as ground truth for vegetation maps and as input for climate modeling.

With the ERDAS IMAGINE direct link GPS tool, no further GPS points or ground truth information processing is necessary. The information is processed on the fly and is in ready-to-use formatted data, which avoids mistakes associated with processing the data back in the office. The tool provides an efficient, effective way to work in field campaigns and offers fascinating possibilities for future work.

For more information, contact Hans-Peter Thamm, H.-P., Remote Sensing Research Group, University of Bonn, Germany [E-mail: thamm@srg.uni-bonn.de].

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Figure 2. The GPS tool control window.

Figure 3. ERDAS IMAGINE GPS link with a Landsat 7 ETM scene (channel combination 4,3,2). The center of the arrow indicates the vehicle’s position and the vertex indicates movement direction.

Figure 4. ERDAS IMAGINE GPS-Direct Link is helpful for orientation in unknown terrain. Here, locals are asked about the location of suitable roads.
Cooperative Project Puts GIS Software in Montana Schools

Professional geographic imaging software is now available to every Montana public school K-12 student and teacher—thanks to a joint venture among ERDAS Inc.; ESRI Inc., Redlands, California; and NASA's Earth Observing System (EOS) Education Project at the University of Montana.

The project, GIS-4-Montana Education Initiative, is the first of its kind in the United States. Headed by the EOS Education Project, the initiative has the potential to reach about 155,000 students statewide in 2001. Montana GIS professionals also volunteer to support the effort, and ERDAS is donating the ArcView Image Analysis extension to the project.

To enhance the project, EOS obtained professional development support from Montana's GIS professional community and donated its statewide ESRI ArcView GIS license to Montana's public school system. As a core objective, EOS amassed satellite imagery from various sources, including NASA and Thornton, Colorado-based Space Imaging (IKONOS imagery). In addition, LAND INFO International, Englewood, Colorado, in collaboration with EarthWatch Inc., Longmont, Colorado, supplied a Landsat 7 ETM + 15-meter, pan-sharpened color mosaic of Montana. This massive image (8.2 Gb) was compressed and encoded by EOS with Seattle, Washington-based LizardTech Inc.'s MrSID software. The image will be delivered to every school on a single CD-ROM as a 280 Mb file.

To promote NASA's Earth system science education efforts, the EOS Education Project wanted to eliminate barriers to GIS integration in the classroom. "One of these barriers has been the acquisition of powerful software that empowers teachers and students to study ecosystem components across various scales," says Alex Philp, EOS Education Project assistant director. "Moreover, EOS wanted to create a national model for large-scale GIS integration as a means for enhancing geographical education."

"With ArcView on their school computers, students and teachers can analyze information from global to local scales," says Charlie Fitzpatrick, ESRI K-12 Education Solutions manager. "Adding ERDAS' ArcView Image Analysis extension means they can integrate the explosion of image data to the vast collections of geographic data that exist as points, lines and areas."

Other states are examining and emulating the GIS-4-Montana cooperative effort. EOS is committed to a long-term GIS education program as a mechanism for workforce development.

For more information about NASA's EOS Education Project at the University of Montana, contact Jeff Crews [phone: +1 406-243-2644] or visit www.eoscenter.com.
1. Is FLEXlm used to secure ERDAS IMAGINE 8.5 software?

Yes. ERDAS is using the industry-standard FLEXlm software to provide licensing for ERDAS IMAGINE 8.5. This provides customers with more flexible, robust licensing options.

2. What benefits do I gain from using FLEXlm over erdmaster?

FLEXlm manufacturer Globetrotter spent years working out the details of software licensing. This solution provides many capabilities not available with erdmaster software, such as the ability to obtain node locked or floating licenses.

- Node locked licenses provide a simple installation environment in which user setup is limited to supplying the license file, eliminating the requirement for dongles (hardware keys), though they may still be used when needed.

- FLEXlm provides redundant license servers to improve reliability of available floating licenses on a network. This works best for large organizations with many users that want guaranteed availability. Because three machines are designated as license servers, if any one of the machines fails or is taken off the network, it won't affect license availability.

- FLEXlm tools also allow more extensive license administration. For example, an administrator may now see which users are consuming floating licenses on the administrator's network. In addition, the administrator can control access to the licenses.

3. How do I take advantage of FLEXlm?

If you’re using a node locked license, you need to supply only the license file. Node locked license management is built directly into ERDAS software.

However, if you’re using a floating license, you must set up a license server, even if you intend to use only a single ERDAS IMAGINE license on that particular computer. The license server may also be set up as a computer on the same network that’s providing licenses for others. This should be a computer that’s always available (i.e., not a laptop or desktop system that’s frequently turned off). The license server software and license files are installed on this system. The license server may be set to start automatically so that it’s always available to other network systems. Each network system that runs ERDAS IMAGINE may be configured to consult this server for licensing information.

4. I currently have Software Subscription Service (SSS) and one or more ERDAS IMAGINE licenses. What type of license will I receive with ERDAS IMAGINE 8.5?

Licenses prior to ERDAS IMAGINE 8.5 were equivalent to floating licenses (even if you used only a single ERDAS IMAGINE license on a single machine). Consequently, ERDAS will provide floating licenses for ERDAS IMAGINE 8.5, and you’ll need to install and configure the ERDAS license server software to use your floating licenses.

5. Which types of licenses may I purchase?

Initially, only floating licenses are being offered.

6. Can I get a node locked license instead of a floating license?

Yes. If you don’t want floating licenses, contact the ERDAS license administrator and request node locked licenses. Note that the free option of changing to a node locked license isn’t available to HEAK customers and other types of site license installations.

7. Is “license file” the new phrase for key codes?

Yes. The phrase has been altered in keeping with current terminology used by FLEXlm users and for consistency within ERDAS documentation.

8. If I already use a dongle to secure ERDAS IMAGINE 8.4, must I continue using it?

The choice is yours. If you want to continue to use the dongle to provide the unique system identifier (System ID), then you may. The benefit is that you can move the dongle from machine to machine with hardware upgrades to quickly move the license around. Simply leave the dongle on the computer when you install ERDAS IMAGINE so that the reported system ID is based on that specific dongle.

Alternatively, simply remove the dongle when installing the software and have the System ID generated from computer-specific identifiers.
9 If I decide not to use my dongle, do I have to return it to ERDAS?
No. You may want to keep the dongle if you want to use ERDAS IMAGINE 8.4 (or a previous version) instead of ERDAS IMAGINE 8.5.

10 If I decide not to use a dongle to secure ERDAS IMAGINE 8.5, may I continue to use ERDAS IMAGINE 8.4 (or a prior version)?
If you end an ERDAS IMAGINE 8.5 session and return to ERDAS IMAGINE 8.4, you will need to reinstall your dongle. (Remember to switch off your computer before installing or removing a dongle.) When you finish your ERDAS IMAGINE 8.4 session, you’ll need to remove the dongle before you can run ERDAS IMAGINE 8.5.

11 May I combine and manage license files from different applications using one FLEXlm server?
Yes. Please refer to the FLEXlm End User Guide (enduser.pdf is on the ERDAS IMAGINE 8.5 Data and Documentation CD-ROM and in the IMAGINE_HOME/help/hardcopy directory) for more information on setting up custom FLEXlm configurations.

12 How can I quickly start running ERDAS IMAGINE 8.5?
If you plan to use a floating license server, first decide which machine will provide the licenses. However, if you’re already running erdmaster, you could use the same machine as your FLEXlm server.

13 How do I get license files for ERDAS IMAGINE 8.5?
SSS customers need to submit a license file request form to have license files issued. A license authorization code (LAC) is included with the SSS shipment for your reference and is required on the request form. If you can’t locate your LAC, please check with your receiving department before contacting ERDAS.
If you’re buying a new ERDAS IMAGINE 8.5 kit, you’ll automatically receive an LAC. Send your LAC to ERDAS and we will generate a license file for you. You can immediately obtain the form in the printed documentation on the ERDAS IMAGINE CD-ROM and on the Support section of ERDAS’ Web site.
Please refer to the ERDAS IMAGINE Configuration Guide supplied with your software (in print or PDF format) for instructions on how to install the license files.

14 Do ERDAS IMAGINE 8.5 licenses have to be installed on the same computer that has ERDAS IMAGINE 8.4 software?
No. You may choose different computers on which to install ERDAS IMAGINE 8.5 licenses. This is a one-off occurrence to help you transition from ERDAS IMAGINE 8.4 to ERDAS IMAGINE 8.5. Subsequent versions of ERDAS IMAGINE will have to be installed on the same computers (unless the customer enters into a CPU change agreement).
Please note that your license agreement doesn’t entitle you to simultaneously use both ERDAS IMAGINE 8.5 and ERDAS IMAGINE 8.4 (or prior) software. You are licensed to use only the total number of concurrent sessions that you purchased. Please review your license agreement before running ERDAS IMAGINE 8.5 with prior versions.

15 Will my ERDAS IMAGINE 8.5 system ID be the same as my old “sysid”? 
In most cases, no. You shouldn’t try to request license files with your old ERDAS IMAGINE 8.4 System ID. Instead, use the System ID reported to you during ERDAS IMAGINE 8.5 installation or displayed by the ERDAS IMAGINE 8.5 Properties utility.

16 Can I still request CPU changes?
A CPU change (or re-hosting) is available to customers who want to move their license (or individual modules) from one machine to another. For U.S. customers, this is accomplished by contacting the ERDAS license administrator. Customers outside the United States must contact their local distributors.
Please note that the CPU change policy is slightly different with ERDAS IMAGINE 8.5. Current SSS customers are entitled to one free CPU change session per year. In that one session, as many licenses may be moved as desired. All such transfers must be requested and arranged with the license administrator at one time. Further CPU change sessions within that year are charged at a standard rate.

17 Does ERDAS IMAGINE 8.5 have a Demonstration Mode that allows me to use the software immediately?
Yes. ERDAS IMAGINE 8.5 has a Demonstration Mode that lets the software run for up to 30 days without specifying a license server or license file on Windows platforms. This is the full version of the software with all functionality enabled (including add-on modules distributed on the CD-ROM). This mode is for customers who want to evaluate ERDAS IMAGINE software without having to contact ERDAS for a license file. It also may be used to get your software running quickly after installation.
Only administrators may use Demonstration Mode. If the Demonstration Mode doesn’t start (not all computers are
capable of running in this mode) or you're unable to use the administrator login to run the Demonstration Mode, contact your local sales representative to organize a temporary evaluation of the software.

Each time you start ERDAS IMAGINE in Demonstration Mode, you'll be asked if you want to continue using the Demonstration Mode (until your 30 days run out, specify a license file or a license server to provide normal licensing). When you receive your license file and configure ERDAS IMAGINE, you'll no longer be asked in which mode you want to operate.

There's no similar function on UNIX platforms, so you'll have to acquire license files before running ERDAS IMAGINE 8.5 on UNIX systems.

18 Who should I contact if I need help getting my license files?
In the United States, call 1-877-GO-ERDAS (877-463-7327). Outside the United States, contact your local distributor.

19 Which operating platforms are supported by ERDAS IMAGINE 8.5?
Windows NT 4.0 (Service Pack 6 or higher), Windows 2000 (Service Pack 1 or higher), Sun Solaris 7.0, Sun Solaris 8.0, SGI IRIX 6.5.7, and IBM AIX 4.3.3.
1 Snap Inquire Box to Raster Cells

ERDAS IMAGINE processes the exact geographical window requested by the user. For example, when performing a subset operation with the Inquire Box, the edge of the Inquire Box frequently lies within the extent of a pixel. Consequently, the resulting image (because it has to start at the edge of the Inquire Box) has pixels that appear to be offset from those of the original image.

Because of this, ERDAS IMAGINE 8.5 introduces a new preference, Snap Inquire Box to Raster Cells. This option, which is enabled by default, causes the Inquire Box to always snap to the pixel edges of the image with which it’s being displayed, aligning the pixels in the output images with the pixels in the source image. The Snap to Grid sizes the Inquire Box to whole pixels.

This preference is called Snap Inquire Box to Raster Cells and can be found in the Viewer category. The Box Color button now allows users to control Inquire Box color directly from the interface.

2 Calculate statistics for Visible Portion of Viewer Images

When stats are computed for a specified image in the ERDAS IMAGINE Viewer, the entire image is always used, allowing users to compute statistics for the image’s displayed area, without having to create an area of interest (AOI) over the image.

This new feature is accessible from the icon on the Raster Tool palette or the raster menu to force the calculation of statistics based on the displayed region of the image.

These statistics are available for use by the other contrast tools to modify the lookup tables used for this image.
Adding a Vector Polygon When Boundaries Are Shared

Polygon Shapefiles can include overlapping polygons, which make digitizing two polygons that share a boundary difficult without tracing the common line. The Append tool lets users digitize an arc that intersects one or more existing polygons at its start and end, resulting in a new polygon with a shared edge that duplicates the edges of the intersected polygon(s). This option works only on polygon Shapefiles.

You must enable Vector Editing before using this tool.

Next, activate the Vector Tools. The image below provides a good example of a situation for using the Append tool.

Use the Append icon to digitize an arc that intersects two or more existing polygons.

The result is a new polygon that shares and duplicates the pre-existing polygons’ edges.

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Hydrologic Modeling from page 1

This image, taken from the ArcIMS site on IDWR’s server, shows seasonal ET predicted by SEBAL and IMAGINE for a portion of southeast Idaho. Circular center-pivot footprints are visible.

Agriculture, Water Resource Planning Aid Developing Countries

Water scarcity and land-use/hydrological data shortages are common in developing countries, often stirring conflict and dispute. Distribution of available irrigation water compounds the problem. An irrigation system may have adequate flow to cover an area but may distribute the water poorly. Satellite imagery provides objective information about water locations, water consumption and land-use activities. As a result, imagery plays a crucial role in mitigating disputes, supporting water management efforts and improving crop yields around the world.

Improving agricultural and water resource planning in developing countries is the International Water Management Institute’s (IWMI) goal. The organization’s success with remote sensing reduces dependency on inaccessible government agency databases, thanks to the work of Dr. Wim Bastiaanssen, long-time researcher of water and food issues and scientific director of WaterWatch in The Netherlands. Bastiaanssen developed an innovative imagery-based modeling process to help developing countries obtain quick overviews of their water situation. Satellite imagery can be retrieved faster and provides more accurate data.

“It’s predicted that by the year 2025, one-third of the world’s population will suffer from water shortages,” says Bastiaanssen. “This will be felt most acutely in a band of land stretching from Morocco to China. Countries in this band don’t have accurate information to describe their water situations.” Satellite imagery is proving to be a reliable source of this much-needed information.

In analyzing groundwater loss from aquifers, Bastiaanssen recognized that thermal infrared information captured in satellite imagery could help measure soil moisture and groundwater lost to evaporation. There’s almost no other means to quantify these latent processes over vast areas.

When land surface is cool, water loss due to vegetation intake, or evapotranspiration (ET), is high, when all other parameters are equal. Knowing vegetation type and surface temperature helps planners predict a specific crop’s ET, supporting crop-by-crop and field-by-field irrigation decisions without the need for laborious, time-consuming field inspections. Thermal infrared data potential for land and water management has never been exploited fully, according to Bastiaanssen. “The techniques have been kept on university shelves for too long, while many river basins are acutely confronted with water management problems.”

Bastiaanssen’s hydrologic modeling process was developed with ERDAS IMAGINE’s Model Maker tool. The Surface Energy Balance Algorithm for Land (SEBAL) calculates ET...
evapotranspiration (ET), water loss due to evaporation through vegetation intake.

ET is the second most significant component of the hydrologic cycle, behind precipitation. IDWR was already computing ET, but the method was cumbersome and expensive. IDWR wanted an efficient, inexpensive procedure to accurately predict ET and improve water resource management programs.

“ET is a good measurement of irrigation effectiveness and total water consumption,” says Dr. Richard Allen, professor of Water Resources Engineering at UI. “Predicting ET [with] imagery eliminates a lot of field checking and other time-intensive tasks . . . .”

Dr. Allen and graduate student Masahiro Tasumi applied SEBAL with the assistance of IDWR personnel and Dr. Wim Bastiaanssen, professor at ITC in The Netherlands, WaterWatch scientific director and IDWR project consultant.

Bastiaanssen first applied SEBAL in Egypt in 1986 and later enhanced the process with ERDAS IMAGINE’s Model Maker through a series of models that generate net radiation and subtract heat flow into the soil and air to determine missing energy in the energy balance (i.e., that absorbed by liquid water converted into vapor). Based on this principle, SEBAL allows planners to look at a region hectare-by-hectare or crop-by-crop a few hours after a satellite overpass.

“The connection with vector information in ERDAS is easy,” says Bastiaanssen. Maps generated from satellite weather and crop data provide a picture of photosynthesis in all crops. This SEBAL-derived information provides an accurate view of harvest potential, a powerful tool for addressing poverty and planning food security.

“We saw from the images that the rice yields in Sri Lanka would be favorable,” says Bastiaanssen. “Despite this outcome, the government has used limited resources to purchase rice on the world market, which would not have been necessary.”

The Department of Meteorology in Colombo receives daily National Oceanic and Atmospheric Administration (NOAA) images. After processing the images, NOAA informs other departments about a country’s water and food status. IWMI is promoting this inexpensive solution to other developing countries.

Every region has unique geographical data and political issues with which to contend. Modifying SEBAL models, developing new ones and adapting the process to various applications are quick and easy with Model Maker’s flexibility. “There is no need to hire a programmer for making the frequent changes to the software,” says Bastiaanssen.

Since its first application in Egypt in 1986, SEBAL has been used in about 40 applications in 25 countries, including India, Sri Lanka, China, Pakistan and The Netherlands. Currently, SEBAL is being used in New Mexico and Idaho (see “Hydrologic Modeling Debuts in North America,” page 1).

A key issue for the future is the “productivity of water” concept, or determining the kilograms of crop yield per volume of water evaporated. Although optimizing scarce resources should be undertaken, targets on water productivity (or “crop per drop”) must be defined. ERDAS software helps diagnose water conditions of the past and identify targets for future investigation.

For more information, contact Dr. Wim Bastiaanssen [phone: +31 (0) 317-423401, E-mail: w.bastiaanssen@waterwatch.nl] or visit www.cgiar.org/iwmi.
The Idaho project is SEBAL’s first application in North America and one of nine “Infomart” projects across the country awarded through Raytheon’s Earth Observing System Data and Information System (EOSDIS) Synergy Program. The NASA-sponsored program helps find diverse uses for EOSDIS data and technologies. Infomart’s goal is to make remotely sensed data accessible from large online repositories.

**Learning Software, Running Models**

During the 1980s, five weather stations were installed along Bear River, complementing 11 installed by the National Weather Service. The stations collected solar radiation, air temperature, wind speed, precipitation and humidity data. In addition, three river locations were equipped with drainage-type lysimeters, which directly measured ET weekly. Analysis of the data indicated that 1985 had high measurements of solar radiation, indicating the likelihood of collecting cloudless Landsat 5 imagery, which contains thermal infrared information.

Using a surface energy balance, SEBAL estimates ET. Landsat Thematic Mapper (TM) bands 1-5 and 7 provide energy balance data for shortwave radiation. Visible and near-infrared bands also provide normalized difference vegetation index (NDVI) information, which SEBAL uses to describe and predict aerodynamic and energy balance parameters related to land surface conditions. TM band 6 provides energy balance data for long wave radiation. The thermal band information also is used as a restriction factor for predicting ET.

With only one week of ERDAS training from Bill Kramber, IDWR’s senior remote sensing analyst, and one week of SEBAL training from Bastiaanssen, Tasumi could create visual models similar to spreadsheet equations. During the first half of the project, Tasumi, Allen and Bastiaanssen analyzed various sample points with spreadsheets, made and implemented decisions, ran models, verified spatial results, and developed final models.

**Better Information**

Using SEBAL and satellite imagery, the project team was able to demonstrate, refine for application and validate within time/budget constraints a geographic imaging methodology that directly computes accumulated ET fluxes. The ET data provided IDWR a highly effective regional water resource management tool and a better understanding of how much water is available to recharge groundwater systems.

“Now we can compute ET on a 30-meter cell basis vs. our traditional methods, which had been limited to a county basis,” says Anthony Morse, IDWR’s GIS manager. “And, we can easily aggregate up. The net result is that we have a higher-quality dataset that is much more flexible to use.” For the first time, IDWR can produce uniform, objective datasets that diverse groups can use, according to Morse, who expects the data to be used in ways not yet anticipated.
Allen believes SEBAL use will expand throughout the western United States and objectively address river impacts, irrigation levels and usage issues—irrigation vs. hydroelectricity, groundwater recharge and recreation. “The use of imagery and SEBAL are very important developments in modeling water activity for large areas.”

Success of the Bear River Project (Phase I), which was completed in December 2000, earned IDWR additional funding from Raytheon and the state legislature for Phase II, which was launched in January 2001 and targets the Eastern Snake River Plain Aquifer. Phase II is using Landsat 7, advanced very high-resolution radiometer (AVHRR) and moderate-resolution imaging spectrometer (MODIS), NASA’s Earth Observing System program satellite imagery.

Phase II continues IDWR’s SEBAL evaluation and adaptation, with three primary goals:

- To help IDWR estimate aquifer withdrawal, SEBAL-derived ET is being compared with IDWR data on the amount of water pumped from irrigation wells.
- SEBAL-derived ET is being compared with lysimeter-derived ET measurements gathered at the UI Kimberly Research Station to quantitatively measure SEBAL’s ability to estimate agricultural ET on the Snake River Plain.
- Using Landsat 7 and Landsat 5 images, IDWR will evaluate SEBAL methodology to generate ET components for the Eastern Snake River Plain groundwater model. EarthSat Corp., Rockville, Maryland, will manage the orthocorrection work.

“This is already a bad year for drought in the state, and the Eastern Snake Plain Aquifer has approximately 2 million acres of irrigated agricultural land,” says Kramber. “By using AVHRR and MODIS data along with the Landsat 5 and 7 imagery, Phase II will give us additional ET data to help in the modeling process.”

Phase I maps are available now on the Internet ([www.idwr.state.id.us/gisdata](http://www.idwr.state.id.us/gisdata)) with ArcIMS from ESRI Inc., Redlands, California, and Phase II maps will be available in the future. In addition, IDWR will create 3D perspective views with IMAGINE VirtualGIS to enhance realistic landscape and data viewing.

For more information, contact Anthony Morse at the Idaho Department of Water Resources [phone: +1 208-327-7997, E-mail: tmorse@dwr.state.id.us] or Dr. Richard Allen [phone: +1 208-423-6601, E-mail: rallen@kimberly.uidaho.edu] or visit [www.state.id.us/gisdata](http://www.state.id.us/gisdata).
The Prairie Plains Resource Institute (PPRI), located in Aurora, Nebraska, is a small conservation organization in Central Nebraska dedicated to preserving and protecting Nebraska’s ecosystems. To improve its geospatial analysis and graphic communication capabilities, PPRI is integrating ERDAS IMAGINE software into its prairie restoration, conservation, education and community development projects across the state.

PPRI was founded in 1980 to maintain and restore Nebraska ecosystems for education, research, stewardship and community development. During its first decade, the fledgling institute focused on developing and refining methods of high-diversity prairie restoration. Initial restoration sites were small and localized, but they set the stage for larger projects and provided recreational and educational opportunities to local residents.

In the early 1990s, PPRI began restoring larger tracts to high-diversity prairie along the central Platte River and in the Rainwater Basin region in south-central Nebraska. The success of these restoration activities began to attract funding from various sources, including the U.S. Fish and Wildlife Service, Environmental Protection Agency, Rainwater Basin Joint Venture, Nebraska Chapter of The Nature Conservancy, Nebraska Game and Parks Commission, and Nebraska Environmental Trust (NET). In 2000, PPRI was awarded a three-year NET grant to initiate the Prairie Restoration Cooperative (PRC), a multipartner conservation effort to implement high-diversity prairie restoration across the state. In its inaugural year, PRC successfully exported its restoration practices from the central Platte River valley to the entire eastern half of Nebraska, an area about the size of West Virginia.

Throughout the 1990s, the institute’s reputation grew as did the size and scope of its projects. During this time, PPRI acquired several nature preserves, totaling more than 6,000 acres. With growth came the realization that a GIS was needed to coordinate daily restoration and land management tasks. To meet this need, a low-end GIS software package was purchased in 1998 to help create documentation and planning maps. Typical GIS projects consisted of second-generation digital orthoquads used as base maps with vector coverages and associated annotations. This rudimentary GIS served the immediate needs of PPRI. But as the organization’s mission evolved, the idea of a landscape-scale conservation project along the central Platte River corridor was taking shape.
This new project, the Platte River Corridor Initiative (PRCI), is a proactive attempt to guide and coordinate resource use within the central Platte River basin between the cities of Grand Island and Columbus. It’s an effort to balance economic development, environmental protection and cultural stability, and retain that which makes this part of the river unique (e.g., native prairies and woodlands, open river channels, scenic vistas, archeological and historical landmarks, etc.). The central Platte River basin encompasses approximately 678,000 acres and is home to thousands of farms, businesses and municipalities. Given the disparity in desires and goals among area inhabitants, it’s difficult to discuss river-related resource management without graphic representations. Thus, PPRI staff recognized the need to analyze spatial information over large areas to create informative, easy-to-interpret and visually appealing graphics. ERDAS IMAGINE provided the solution.

PPRI staff members will use the software to perform landscape-scale analyses with satellite imagery and digital elevation models and develop presentation graphics to support PRCI. These products will illustrate range-land quality, recreational and restoration potential, and help the institute model water use, population growth and land-use practices.

According to Mike Bullerman, PPRI’s restoration ecologist and GIS/RS analyst, “ERDAS IMAGINE will be an essential tool in all facets of PPRI operations, especially solutions to resource use and long-term sustainability in the central Platte River basin.”

For more information about PPRI and its various projects, please visit the organization’s Web site [www.prairieplains.org].
EVENTS

2001

Oct. 3-5  IGIC’s Fifth Biennial GIS Conference, Iowa City, Iowa, USA  [www.gis.state.ia.us]

Oct. 10-12  Minnesota GIS/US Constorium—11th Annual Conference and Workshop, Duluth, Minnesota, USA  [www.mngislis.org]


Oct. 23-25  Seventh Annual ERDAS and ESRI Russian Users Conference, Golitsyno, Moscow  [www.dataplus.ru]

Nov. 1-2  Japanese ESRI and ERDAS User Conference, Tokyo, Japan  [www.pasco.co.jp]

Nov. 1-2  Virginia GIS 2001, Roanoke, Virginia, USA  [www.rvarc.org/vagis]


Nov. 5-7  ERIM—Third International Conference on Geospatial Information in Agriculture and Forestry, Denver, Colorado, USA  [www.erim-int.com/CONF/aghtml]


Nov. 6-8  TechNet Asia Pacific 2001, Honolulu, Hawaii, USA  [www.afcse.org/asiapacific2001/default.asp]

Nov. 14  GIS Day 2001 (Geography Awareness), Atlanta, Georgia, USA  [www.erdas.com]

Nov. 26-29  I/ITSEC 2001, Orlando, Florida, USA  [www.itsec.org]

Nov. 28-30  Latin America User Conference, Quito, Ecuador  [www.prosis.com/novedad/ecuador_frm.html]

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