GISSA-KZN

Geo - Information Society of South Africa

From the editor

Hi! I am Craig Gers, the GISSA-KZN Public Relations / Communications Officer for 2005, and it is about time that our paid-up members receive a benefit for their membership. I hope to be sending you an update every 4 to 6 weeks, so watch this space!

So what do you get for your R100 GISSA Subscription?

- Free Position Magazine
- Discounted fees at future GISSA workshops
- The opportunity to network with professionals in the geoscience and remote sensing fields
- Possible status recognition from being associated with a professional body (pending the outcome of a submission made to the Premier of KZN)

Recent Workshops

On Friday 5 August, GISCOE hosted a presentation on Quickbird and Ikonos satellite products at the Balmoral Conference Centre, Durban. Satellite Applications Centre and GISCOE are both providers of Quickbird and Ikonos imagery, which in certain applications is more cost effective than digital orthophotography. A comparison of these two sensors is provided on Page 2.

GISSA News

It is with sadness that the GISSA-KZN Chairperson, Clinton Papenfus, tendered his resignation to the committee owing to personal reasons. We wish him well and hope to co-opt his valuable expertise in the future.

The GISSA-KZN committee members are:

Name	GISSA Title
Neil Hartley	Vice-Chairman
Rajan Munien	Secretariat
Claudia Ringewaldt	Special Interests Group
Craig Gers	Public Relations
Chris Byren	Treasurer
Vishanth Singh	By-Laws
Brent Steyn	
Sandy Dove	
Dave Purdon	
Sam M. Dagane	

Upcoming GIS/Remote Sensing Events

Event	Place	Date
Africa GIS Conference	CSIR ICC, Tshwane (Pretoria)	31 Oct to 4 Nov 2005
The Geospatial Information & Technology Association (GITA) 29th Annual Conference	Tampa, FL USA	Apr 23-26, 2006
International Geo-science and Remote Sensing Symposium (IGARSS) **2009**. If you are into remote sensing, start planning today to attend this conference. I attended it in 2003 and it is an **absolute must!**	Cape Town	Late May 2009 (subject to change)
GISSA-KZN Remote Sensing Workshop (2-3 days)	The date,time and venue are to be announced. Watch this space!	

Click here to join GISSA !

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Quick comparison table of the Ikanos and Quickbird multispectral sensors

<table>
<tr><th></th><th>Quickbird</th><th>Ikonos</th></tr>
<tr><td>Spectral Resolution (micrometers)</td><td>Blue (0.450 – 0.520)
Green (0.520 – 0.600)
Red (0.630 – 0.690)
NIR (0.760 – 0.900)</td><td>Blue (0.445 – 0.516)
Green (0.506 – 0.595)
Red (0.632 – 0.698)
NIR (0.757 – 0.853)</td></tr>
<tr><td>Spatial resolution at nadir</td><td>61 cm panchromatic,
2.44 m multispectral</td><td>82 cm panchromatic,
3.2 m multispectral</td></tr>
<tr><td>Revisit Time</td><td>1 - 14 days depending on latitude and swath angle.
1 - 3.5 days at 30° off-nadir.</td><td>Approximately 3 days at 1 m resolution.</td></tr>
<tr><td>Image swath at nadir</td><td>16.5 km</td><td>11.3 km</td></tr>
<tr><td>Digital Elevation Model Generation</td><td>Not ideal for DEM creation</td><td>Better suited to DEM creation</td></tr>
<tr><td>Min Collection Area</td><td>1 scene or 64 km^2, 25 km^2 for archive data, 100 km^2 for Rush Tasking</td><td>100 km^2 for new collections and 49 km^2 for archive</td></tr>
<tr><td>Products</td><td><table><tr><th>Name</th><th>CE90</th><th>RMS</th><th>US NMAS</th></tr><tr><td>Geo</td><td>15 m@</td><td>NA</td><td>NA</td></tr><tr><td>Reference</td><td>25 m</td><td>11.8 m</td><td>1:50,000</td></tr><tr><td>Pro</td><td>10 m</td><td>4.8 m</td><td>1:12,000</td></tr><tr><td>Precision</td><td>4 m</td><td>1.9 m</td><td>1:4,800</td></tr><tr><td>Precision-Plus</td><td>2 m</td><td>0.9 m</td><td>1:2,400</td></tr></table></td><td>• Basic Imagery
• Standard and Ortho-ready Standard Imagery
• Orthorectified Imagery</td></tr>
<tr><td>Cost for Archive (U$)</td><td>• **Reference Imagery 18U$/km^2
• **Precision Plus 22U$/km^2</td><td>• -Basic Imagery 13.20U$/km^2
• -Orthorectified Imagery 15.40U$/km^2</td></tr>
<tr><td>Cost Standard Tasking (U$)</td><td>• +Reference Imagery 22U$/km^2
• +Precision Plus 27U$/km^2</td><td>• -Basic Imagery 22.00U$/km^2
• -Orthorectified Imagery 22U$/km^2</td></tr>
</table>

@Not including effects of terrain. Within each IKONOS-derived product, location error is defined by a circular error at 90% confidence (CE90), which means that locations of objects are represented on the image within the stated accuracy 90% of the time. This CE90 accuracy level can be related to Root Mean Square Error (RMSE) as well as the U.S. National Map Accuracy Standards (NMAS).

** Please note that 25 square kilometers is the minimum area supplied for archive Quickbird imagery.
+ Please note that 64 square kilometers are the minimum area supplied for tasked Quickbird imagery
- Please note that Ikonos is supplied at a minimum area of 64 square km for archive and tasking.

News arcicles

GISCafe Special Report from ESRI UC 2005: Get a Different Viewpoint with Image Server, By Susan Smith

July 28, 2005 - Image Server was announced at the Plenary Session on Monday, and yet its powerful functionality was only touched upon at that time. Image Server serves up imagery and processes imagery in a server environment on request from the client. It can link the acquisition of images through the server very quickly and serve it up in real time. With Image Server you can add additional services to the server dynamically. Image Server has access to raw files and can display imagery from different viewpoints.

Key functionality of ESRI's Image Server includes

- Fast access to large image datasets
- On-the-fly server-based image processing
- Production of multiple imagery products from a single source
- Multiplatform GIS/CAD/Web client access
- Direct access to multiple file formats and compression
- Fully scalable enterprise client/server architecture
- Data security and access logging
- Independence from third-party software or DBMS
- Expandability through extensions and SDK

Key attributes to the Image Server include:

- Rapid access to data without preprocessing
- No DBMS load
- Very fast access to large quantities of images
- On-the-fly server side processing can access from a small device, as well as workstations with a thin client
- Derive multiple products from single source with different process attached to the data
- Dynamic update of image services

Director of product development, David Maguire, said that the interface will change between this version and what you'll get on the CD.

A demonstration given by Peter Becker, clearly showed the power of this product as it was running on the desktop with 2 gigabytes of RAM. The example in this case used Landsat imagery, a dataset freely available from 8,000 Landsat scenes, with tiff files with 8 1/2 Terabytes of managed overview. If anything changes underneath it, the overview will change.

Image Server lets you zoom and pan around the dataset. The server is very busy: it's back looking through an index and extracting pixels from various scenes, it's doing coordinate transformation, it's being fed a mosaic and then displaying on the screen. As you zoom in it's actually adding pan sharpening to the process. Most bands are 50 meter, now we have a pan sharpened image. You can change band combinations, compute them, for example, to a false color infrared. The server goes back and done computations. NDVI is essentially just algebra being applied to the bands.

"Anywhere I pan and zoom I can get the NDVI computed. If I had to preprocess this for the whole world, I'd be hitting 80 Tb of data, and it would take a long time to process. With satellites you get new ways of processing. You don't always have a full data set all the time, and you don't want to have to wait until you have one to serve it out to your users," explained Peter Becker.

"We can handle SRTM data, we talk about imagery, not just standard pixels, or colors. They can actually be terrain modeled. 40,000 tiles - the server on-the-fly identifies what areas I need."

Another dataset: scanned maps 1:500,000 Russian maps of the world. What is actually stored on the server are the scanned maps that came in as tiff files put on the server. Someone has measured the tick marks and georeferenced them. "From those parameters, every time I zoom it clips the images, coordinates them, mosaicking the images together and displaying them on the screen. If I change the tick marks the image will dynamically update."

It is a known fact that any time you do anything with image processing, you lose information. Every time you subsample an image, you lose. With Image Server, the image goes to the server, passes pixels through the system, subsampling is passed through with minimal if no degradation.

Another example: A service is showing Quickbird imagery. You can see the image quality, down to the struts on sides of the wings on a plane in the Dubai airport. Stored here are 16 bit basic images of unprocessed data. The process chain is as follows: take radiometric enhancement, then orthorectification, the terrain model is SRTM, then pan sharpening (to color band and pan band and merging this together), then the result is a 60 centimeter color image generated from a raw image.

“I can take pan bands raw pan imagery, can change it to get 4:1 false color, if I want to do a vegetation analysis, the quality of pixels is amazing. I’m doing an NDVI, combining that with water detection algorithms. I can add algorithms without adding data volume,” explained Becker.

“You can change properties of imagery, for example, I can use two services -- one with JPEG 15 and one without. I can add an additional process to the process change--I’m compressing it after I’ve done the processing. I can pan and zoom around my dataset even on a low band connection and find what I’m looking for.” On PDAs, where you don’t have the bandwidth and image quality you would like, this is important.

Becker said that you can also get metadata. You can change properties, can change super sampling, and get better information about the service you’re displaying as well as the meta information about each of the various images. You can see in XML the bands that have been used, the radiometry that has been used, and these have been transmitted by the server application. Meta information can be controlled by the administrator. “You might be dealing with secret information and not want to share it,” he pointed out.

In a digital aerial photography example, the photography had been done by a digital ortho camera, with images that are processed on-the-fly by the server. The digital camera data has been loaded onto the server, and has also orthorectification parameters, going into the database. “We have an existing terrain model. We have on-the-fly orthophotos generated by the system. That imagery is available very quickly and get the product right away,” said Becker. “The accuracy may not be what you want right away but for many applications that is important, rather than waiting months for a product.” What is the importance of imagery for GIS applications?

- Natural background - for many GIS apps
- Analytical dataset - statistics (E.g. NDVI)
- terrain models used often for background for doing data sets, where does vector data come from? Someone has to extract it
- Source of most vector map data - extraction (vector mapping) you can get imagery quickly and cheaper than vector data.
- Do we trust vector data? Imagery is used to give trust - yes it is used to verify
- Verification of vector data

Imagery sources-
- Satellites (Landsat, Quickbird, modis spot)
- Digital cameras
- Scanned aerial photographs
- Orthoimagery (DOQQ)
- Terrain models
- Scanned existing maps
- Scanned cadastre
- Scanned as-built drawings
- Archives of airphotos

Becker warned that you don’t want to necessarily want to store some of the scanned data in a georeferenced state.

Imagery
- Volumes growing exponentially (30%/year)
- Increasingly inexpensive
- Plenty available
- Only fraction is accessed
- Problem is accessibility

There are three differentiators of imagery:
- Volume - magnitudes larger than vector data sets
- Value - devalues quickly with time, increases again with time - steep drop in value of imagery
- goes down quickly as new imagery is taken, reduce time it takes between gathering of imagery and use of it.
- Fixed - primary data does not change, output from processing changes-it’s a snapshot of the world in one instant of time.

In a traditional imagery process flow you have the following processes:
- Acquire
- Determine parameters
- Process
- Distribute

- Interface/use

Image Server offers a paradigm shift in the way we can think about image processing:

- Merge processing & distribution stages of imagery
- nearly no preprocessing
- quick to create
- low latency maximizes value
- read multiple products from safe source
- dynamic product. Update as required
- reduced disk requirements You don't need to put data in any particular format and you can handle 1bit to 32bit channels.

Other Important Features

Image Server has direct access to native file formats
- Geotiff, JPEG, LZW, PackBits, flat, scanline, tiled
  BIL, BIP, BSQ
  JPG2000, MrSID, ECW
  SDE Raster
  Oracle Georaster
SDK to add additional formats

Compression:

- Store and process uncompressed or compressed imagery
- Compress for transmission recommend not compressing data (raw data)
- diskspace is cheap
- higher quality
- create more products

The input process

- Can applied to each individual image
- can be different for each image
- process parameters
- in process definition (XML)
- fields in the database
- sample input processes
- extract bands and band algebra
- sub and super sample
  - nearest neighbor
  - bicubic
  - cubic convolution
  - weighted matrix
- Transparency

For enhancing and sharpening, you can put the image through look up tables of brightness and contrast, can look into highlights of features, get details out of shadowy areas of a photo. To sharpen you can use a convolution filter on raw pixels.

Coordconvert-
- Service has default projection
- Client can specify output projection

PanSharp
- Fuse high resolution pan with lower resolution color
- Very fast
- Very accurate

Mosaic/merge
- Fusing of multiple input images
- Important to be able to control how images are put together
- Can see same viewpoint from different views

Most people have been given a mosaicked product, so you don't see various views that are not included. Building occlusion is a problem in imagery and generally to over come this, people do a true ortho which is extremely expensive. With Image Server you can see areas that you can't see normally see in mosaicked or orthorectified images.

You can create a service called My World, where you're able to create a very high resolution terrain model of the whole world, which is important for different types of terrain analysis. You can then use low resolution data where you don't have good data, and then higher where you have a higher level of interest.

Besides the processes already in Image Server you can
- Add your own process
- Specialized processing
- Proprietary algorithms
- Stamping
- Interface to hierarchical data storage
- Interface to payment gateway.

Client controlled parameters can control coordinate system, subsampling, compression for transmission, LockImage, and mosaic method.

Scalability:
- Load balancing between multiple servers Can have same service on multiple servers and

servers will perform load balancing between them

- Recommend hard disks stored with the server
- Cascade servers - meaning, have servers requests service from another service, while the end users see it as the world

Managed derived images
The Server creates overviews of images as you don't want the server displaying all the images it has. These overviews create 1% to 30% additional space so the display is very fast. With tiles the server can monitor every single request made, and there is a log to see who is requesting what data. 90% of requests are made in 5% of the area. Along corridors of new development, towns, and other areas you have random requests.

You can define areas that are high priority and the server will preprocess those areas and store them by tiles. If someone zooms into that area, it's already processed. This way you can reduce the amount of load on the system.

Data security
Image Server is a client server architecture, and the client has no access to system. There is no need to convert data, as you can implement on whatever you have at the moment. Works on legacy applications, and you can still work from the same imagery, and can use any imagery for other uses.

Image Server Publisher is another product, designed for allowing organizations to have a server, copy the server and provide it to another client. This way you can deliver data to different people or can use it in server farms

Image Server and ArcSDE are complementary.

What's the difference between ArcSDE and Image Server?

ArcSDE uses database management system to store need DBMS, and database administrator. For security, a DBMS is a good choice, as you can store all vector, raster, etc. in one location, Complete products image processing takes place on client, and integration with vectors is on a common server.

With Image Server, data is stored in files, you don't have to preprocess, you have high latency, processing takes place on a server, you can work on thin clients, with integration with vectors on a separate server and source. The long term goal is to combine the two so you can work on the server or client side.

The Image Server products include:
- Image Server
- Server
  Server Manager
- Service Manager
- Clients

Support for the following GIS vendors' clients and standards:

- ArcGIS, ArcEngine and server plugins
- ERDAS Imagine
- Intergraph GeoMedia
- MapInfo Pro
- AutoCAD and MicroStation
- Open standards such as WMS and HTML viewers

Image Server will be on its own release cycle and the price is not finalized yet.

No spam please!

Please feel free to e-mail me any news that may be of interest to our GISSA-KZN members.