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CHAIRMAN'S MESSAGE

ACTING CHAIRMAN'S MESSAGE

With Dan Taranik leaving us this summer, to take up a new post with AngloAmerican in Chile, I've stepped in to cover for him until we elect a new Chairman at the AGM.

Dan will be greatly missed by the GRSG Committee and we wish him every success with his Andes exploration.

I'm finding that Dan is a very hard act to follow: he did a great job of increasing the profile of the GRSG both at home and abroad in such a short time as Chairman. Under his very able and enthusiastic leadership the GRSG went through an important phase of realignment with its parent societies (the Geological Society of London, GSL, and the Remote Sensing & Photogrammetric Society, RSPSoc), developed stronger international links with a wide range of remote sensing organisations, began an email discussion group, and ran a 3-day conference and workshop session on ASTER that attracted a host of international participants.

This year's AGM conference is designed to catch various new sensor applications and innovative data processing techniques that were left off the menu at last year's ASTER-fest. We already have an interesting set of presentations lined-up for you: from hydrocarbon exploration to landslide hazard mapping, with the possibility of some extra-terrestrial remote sensing too – geology, though not as we know it..... Further details of the 2003 AGM conference, 'Geology Unveiled', are given in this Newsletter.

AGM2003 is a relatively low-key event after the ASTER epic, but plans are afoot for some more innovative and exciting GRSG events over the next few years. At next year's annual symposium of the European Association of Remote Sensing Laboratories (EARSeL), in Dubrovnik, there will be a joint EARSeL-GRSG session on '*Earth Observation and Geohazards*'. Preliminary discussions with the Chairmen of the Engineering Group of the GSL and the British Geomorphological Research Group have also highlighted a strong mutual interest in a joint UK-based conference on remote sensing and mapping hazardous terrain (- perhaps part of our Yuletide AGM in 2004 ?). Looking further ahead, a joint GRSG-EARSeL conference and field course, based in the mineral-rich but hazardous terrain of SE Spain, is also being considered for the autumn of 2005.

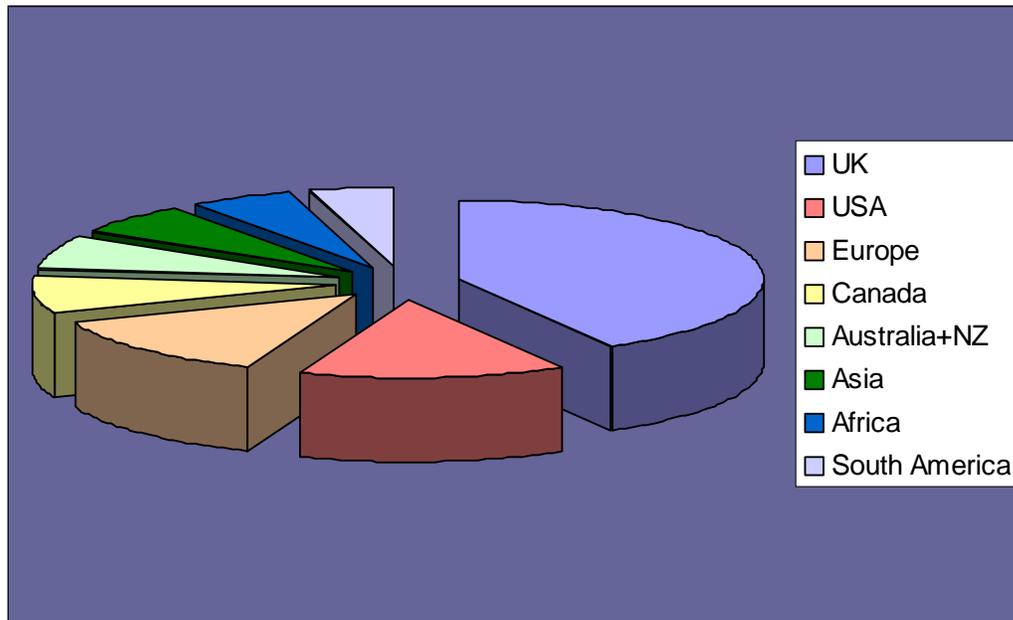
Finally, a reminder that your GRSG Committee meetings are open to all of you. They are usually fairly lively and interesting gatherings, with any mind-numbing bureaucracy reduced to minimal levels. Many thanks to Todd Rubin for getting us a meeting room (with biscuits) at Sasol-Chevron's London HQ. We've recently decided to hold the committee meetings quarterly, on the last Thursday of the relevant month. Those of you in the exploration and mining sector will probably realise that this coincides with the IMM's long-standing 'Sun-downer' evenings at the Captain's Cabin in Piccadilly, giving you the opportunity to attend both events. We're always keen to see new GRSG Committee members, so if you feel that you have things to contribute, please come along to a meeting – more details are given in the Newsletter.

Richard Teeuw

GROUP & MEMBERS NEWS

GRSG Membership

The pie chart below shows the proportions of GRSG membership throughout the world. The largest membership base is situated in the UK not surprising, as this is where the society is based. It is pleasing that the USA and the rest of Europe have joint second largest membership and shows how well advertised the GRSG is in North America and the rest of Europe. South America has the smallest membership at present but it is hoped that now Dan Taranik, former chairman of the GRSG and organiser of the ASTER unveiled AGM in 2002, is based in Chile that this membership base will grow!



Dates for Upcoming Committee Meetings

Please find below, the dates for the upcoming Committee meetings to be held in London. Should you wish to attend one of these, please contact a committee member.

30 Oct 2003
18 Dec AGM at GSL
25 March 2004
24 June 2004
30 Sept 2004
AGM in mid-Dec 2004.

NEW SENSORS & DATA

SMART-1 (adapted from www.esa.int)

SMART-1 is the first of ESA's "Small Missions for Advanced Research in Technology". SMART-1 will travel to the Moon using a new technology, solar electric propulsion. Solar-electric propulsion does not burn fuel as chemical rockets do; instead the technique converts sunlight into electricity via solar panels and uses it to electrically charge heavy gas atoms, which accelerate away from the spacecraft at high speed thus driving the spacecraft forwards.

As well as testing new technology, SMART-1 will make the first comprehensive inventory of key chemical elements in the lunar surface. It will also investigate the theory that the Moon was formed following the violent collision of a smaller planet with Earth, four and a half thousand million years ago.

SMART-1 will be looking at the darker parts of the Moon's South Pole for the first time. It will be mapping the so-called Peak of Eternal Light, an eerie mountaintop that is permanently bathed in sunlight, while all around are dark craters never touched by the Sun. These craters are believed to harbour water-ice in the lunar soil. SMART-1 will also help scientists to confirm if ice is present at the lunar poles, where the temperature never rises above -170°C . Any water on the lunar surface would be very helpful in the creation of permanent bases on the Moon.

SMART-1 is due for launch on the 27/28 September 2003 from Kourou, French Guiana on the Ariane 5 launcher.

Orbview-3

Orbview-3 was successfully launched on 26th June 2003 onboard a Pegasus® rocket from Vandenberg Air Force Base, California. After tests have been completed Orbview-3 will provide 1m panchromatic imagery and 4m multispectral imagery with a swath width of 8km and is able to revisit each location on the Earth in less than three days with an ability to turn from side-to-side up to 45 degrees. For more information on orbimage-3 please visit www.orbimage.com.

Landsat ETM (adapted from <http://landsat7.usgs.gov>)

Landsat ETM has had a rocky time over the last few months. An instrument anomaly associated with the Scan Line Corrector (SLC) was discovered in late May and resulted in Landsat ETM imagery post 31st May 2003 being unavailable for order. Throughout June the team investigating the anomaly worked tirelessly to correct the problem. The non-functioning SLC was causing individual scans to alternately overlap then leave large gaps at the edge of the image, thus losing approximately 30% of the total scene area. Data is still being collected and archived by the USGS and the anomaly investigation team are attempting to produce algorithms to allow processing of the data. In early September authorisation was given from DOI/USGS to attempt recovery of the SLC. On 7th September the recovery was attempted but unfortunately it was unsuccessful and the team concluded that the failure of the SLC is probably permanent. Data will continue to be collected and the processing systems updated in line with the anomaly. The schedule, as set out on the USGS web page, states that the availability of the SLC-off products will be November 2003. Let us all hope that the problem can be resolved. For more information on the status of Landsat ETM please use the contact form on the Landsat web page: <http://Landsat7.usgs.gov/contact.php>.

The End of Galileo

(adapted from http://www.nasa.gov/vision/universe/solarsystem/galileo_final.html)

On Sunday 21st September the 14 year life of the Galileo spacecraft came to an end when it passed into Jupiter's shadow and disintegrated in the planet's dense atmosphere.

Having travelled approximately 4.6 billion kilometers (about 2.8 billion miles), the spacecraft endured more than four times the cumulative dose of harmful jovian radiation it was designed to withstand. During a flyby of the moon Amalthea in November 2002, flashes of light were seen by the star scanner that indicated the presence of rocky debris circling Jupiter. Galileo has a history of exciting discoveries including images of the asteroid Gaspra in October 1991, and then another asteroid Ida less than a year later when the first moon of an asteroid was discovered. In 1994 the spacecraft made the only direct observation of a comet impacting a planet, comet Shoemaker-Levy 9's, collision with Jupiter.

Galileo extensively investigated the geologic diversity of Jupiter's four largest moons: Ganymede, Callisto, Io and Europa. Galileo found that Io's extensive volcanic activity is 100 times greater than that found on Earth. The moon Europa, Galileo unveiled, could be hiding a salty ocean up to 100 kilometers (62 miles) deep underneath its frozen surface containing about twice as much water as all the Earth's oceans. Data also showed Ganymede and Callisto may have a liquid-saltwater layer. The biggest discovery surrounding Ganymede was the presence of a magnetic field. No other moon of any planet is known to have one.

Airborne Reflective Emissive Spectrometer (ARES) Expressions of Interest

This new imaging spectrometer, built by Integrated Spectronics of Australia and operated by DLR of Germany, goes into service in 2004 and was featured in the previous edition of this Newsletter. To recap: ARES has 160 channels, 30 in the VNIR, 96 in the SWIR and 32 in the TIR wavelengths. It looks to be an ideal sensor for geological remote sensing: a huge improvement on the Airborne Thematic Mapper and a useful "half-way house" between field spectrometry data and ASTER data.

The GRSG can provide a useful forum for discussing possible applications of ARES. I have been discussing options with Andreas Mueller at DLR and Peter Purcell at the UK Airborne Remote Sensing Facility (ARSF). High on the list of options is an ARES campaign in the UK (and possibly SE Spain, or even Iceland) for the spring or early summer of 2005, with outline proposals submitted in Dec 2004. If you any views on this, and particularly if you have a potential project that could effectively utilise ARES data - no matter whether it is academic or commercial - could you please email me with a brief summary: I will then liase with DLR and ARSF to see if an ARES campaign can be organised.

Richard Teeuw
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Malcolm Whitworth - Data Source

As mentioned in the last newsletter Malcolm has an excellent website for data sources. This has now been updated and can be found at:

<http://web.port.ac.uk/departments/sees/staff/whitworth/dataguide/>

NOAA-N Prime Spacecraft

While being repositioned from vertical to horizontal, it slipped. Great pictures at

<http://www.spaceref.com/news/viewwsr.html?pid=10299>

Turkish Scientific Earth Observation Satellite- BILSAT

The first Turkish Scientific Earth Observation satellite - BILSAT- was successfully launched on 27th of September 2003. It was built at Surrey University - UK with the cooperation of Turkish scientists from the TUBITAK-BILTEN Research Institute.

It was carried to it's orbit by a Russian COSMOS 3M rocket. The same rocket, carried satellites from Nigeria, UK, Korea and Russia. BILSAT will be a part of disaster monitoring system with other satellites of a similar type from Indian, Nigerian and the UK.

General properties of BILSAT:

Weight:	129kg
Orbit:	sun-synchronous
Altitude:	686km
Life:	5-15 years
Sensors:	VNIR 4 bands and 27.3m GSD swath: 55km Pan: 12.6 GSD, swath: 25 km

One low resolution (120km) 8 bands sensor (COBAN) and One Real-time Image processing and compressing system (patent pending) developed by BILTEN scientists.

For further information please contact

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NEW PRODUCTS

ERDAS IMAGINE V8.7 from Leica Geosystems

Atlanta, Georgia, USA— Leica Geosystems is pleased to announce that ERDAS IMAGINE V8.7, the industry's premier geographic imaging suite, will be released worldwide Fall 2003. The latest version of ERDAS IMAGINE will feature JPEG2000 support (including GeoJP2), further improvements to its mosaic tool and a faster, smoother multi-threaded IMAGINE Geospatial Light Table (GLT) viewer. Set to be simultaneously released with the Leica Photogrammetry Suite, ERDAS IMAGINE 8.7 will be fully compatible with Leica Geosystems' new process-driven photogrammetric software suite.

ERDAS IMAGINE 8.7 will support the JPEG2000 and GeoJP2 data formats developed by Mapping Science, Inc. It will add both the capacity to display and create JPEG2000 images. The ability to quickly and easily read geospatially-registered image data in the JPEG2000 format is currently available for ERDAS IMAGINE 8.6 customers.

Leica Geosystems has also further improved ERDAS IMAGINE's mosaic tool. These improvements will include providing users the ability to import/export cut lines, image smoothing along cut lines, color balance imagery using ImageEqualizer's Dodging algorithm and support for rotated output sheets.

Information obtained from the Leica website at
<http://www.gis.leica-geosystems.com/news/prarticles.asp?id=246>

RSI Releases ENVI 4.0 Software

ENVI 4.0 release adds New QuickBird and IKONOS Orthorectification, Color Balancing, Image Sharpening, and Powerful Decision Tree Tools

Boulder, Colorado, September 30, 2003 - Research Systems, Inc. (RSI), a wholly owned subsidiary of Eastman Kodak Company, announced that it has released ENVI 4.0. This software upgrade offers major new enhancements over previous versions of ENVI, including new image orthorectification tools, a decision tree classification tool, mosaic color balancing, pan-sharpening algorithms and other features.

"This new release of ENVI offers many advantages to image analysts using data from a variety of popular platforms. In particular, our users will find ENVI 4.0's enhanced support for QuickBird and IKONOS high-resolution satellite data a very valuable contribution," said Richard Cooke, president and COO of RSI. "This new feature allows ENVI customers to process both QuickBird and IKONOS data using the standard ENVI software without the need to purchase an extra cost module," he added.

Among the new features available in ENVI 4.0:

The ability to orthorectify QuickBird and IKONOS satellite images using rational polynomial coefficient (RPC) models provided by the data vendors.

A binary decision tree classification tool allows image analysts to integrate decision logic created in other applications as well as interactively modify decision rules while viewing both the decision tree and the resulting classified image.

The ability to automatically color balance images in a mosaic helps minimize the appearance of seams between images in mosaics. ENVI 4.0 also allows color images to appear in the mosaic preview display, enabling users to achieve a more realistic preview of mosaics.

A new atmospheric correction tool for thermal imagery, such as ASTER, MASTER, SEBASS and others, better prepares the imagery for ENVI's accurate ground emissivity and temperature calculations.

Two new pan-sharpening algorithms create sharpened spectral images that more accurately preserve the spectral information from the original images in many cases.

Information obtained from the RSI website at
<http://www.rsi.com>

ADAM Systems Debuts GeoProcessor Engine For Geospatial Imagery Digital Asset Management Applications

The ADAM Systems Group of Advanced Software Resources, Inc. (ASR), a Silicon Valley based Digital Asset Management solutions provider, today unveiled its GeoProcessor™, a standalone Solaris-based application for satellite and aerial imagery data processing.

The ADAM Systems GeoProcessor retrieves metadata and source imagery from customer-specified source files, manages the data ingest process and generates imagery products. The unique software solution handles a variety of data types, including imagery from Landsat, SPOT, RADARSAT and IKONOS satellites as well as TIFF, GeoTIFF and JPEG formats, among others. GeoProcessor customers benefit from a focused solution to handle data ingest and cataloging that can be integrated into an overall imagery management system.

Information obtained from the ADAM Systems website at
<http://www.adamsystems.com/press/index.html>

ClimatePrediction.net

The climateprediction.net project began in 1999, when Myles Allen wrote a commentary article in Nature called Do-it-yourself climate prediction.

By 2000, David Stainforth (Oxford University), the Met Office, the Rutherford Appleton Laboratory and the University of Reading had become actively involved. In 2002, thanks to funding from the Natural Environment Research Council (NERC) and The Department of Trade and Industry (DTI), the project grew considerably, and allowed us to entrain expertise from the Open University, KMi and the Oxford University Computing Laboratory (ComLab).

Initially called Casino-21 (a reference both to Monte Carlo simulations and 21st century climate), the project was renamed climateprediction.com in 2001. In 2002 the project name was refined to climateprediction.net to make it plain that we are not a commercial enterprise.

In 2003 the project team has grown even more, bringing in more computing and climate science expertise. We began alpha testing at the end of 2002, and beta testing in spring 2003. The full public launch happened on 12th September 2003, with overwhelming public interest - 25,000 users worldwide registered on the first weekend!

Information obtained from
<http://www.climateprediction.net>

BAE SYSTEMS - SOCKET SET

BAE SYSTEMS is pleased to announce that as of June 19, 2003, they began distributing and supporting their SOCET SET product on a worldwide basis through a new integrated, worldwide distribution network. This distribution network replaces the distribution channel previously supported by Leica Geosystems.

This change in distribution, and their continued investment in SOCET SET, supports their objective of ensuring that it continues to be the world's premier digital photogrammetric tool.

They made the decision to move the product distribution from Leica Geosystems for three primary reasons; to provide dedicated and improved customer support and training worldwide, to provide a direct means for users to influence the future direction of the product, and to allow rapid access to new software releases.

Their new distribution network consists of offices in North America, Europe, and Asia. These offices, assisted by a select group of worldwide distributors, bring BAE SYSTEMS expert sales and support to your doorstep.

Information obtained from
<http://socetset.com/news/news.html>

PCI's Software Development Kit (SDK)

After one year of development effort, PCI Geomatics® is pleased to announce the release of its latest PCI Software Development Kit (SDK). The new kit supports Geomatica® 9, PCI Geomatics' most recent geospatial software solution. The new PCI Geomatics Software Development Kit also includes improvements to PACE program tool libraries, additions to format support through the GeoGateway, and enhancements to Visual Basic and Java programming capabilities.

The PCI Geomatics Software Development Kit, with a collection of over 150 subroutines, provides new and experienced users with the flexibility to customize their Geomatica 9 software environment and better communicate with geospatial databases. Users can establish new and specialized workflows to suit their primary needs, make modifications to the Geomatica 9 software interface, and connect to supported peripherals, as required. One key advantage is that the PACE Toolkit allows users to integrate their own algorithms directly into the Geomatica 9 software environment. Once created with the SDK, these customized programs can be shared with - and used by - any licensed Geomatica user.

Information obtained from
http://www.pcigeomatics.com/pressnews/2003_sdk.html

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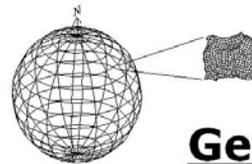
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SPOTLIGHT ON JORDAN

The usual business trip abroad is predictably the same. I get up very early, whilst the rest of the residents in Reading are still asleep. In earlier times I would have said hello to the milkman on his rounds - but they are a dying breed. Half a sleep, I drive to the airport, go to the same long term car park and make my way to the bus stop for the shuttle bus to the terminal. At this point I have to make a mental note of where my car is parked, as I do not want to go through the nightmare of locating the vehicle in the dark amongst the hundreds already there, invariably in the middle of the night on my return.

After checking in and passing through security and passport control, I sit in the cafe for what seems like hours before I have to board. I must know every inch of that cafe by now. I have exhausted the shops and know every item on sale and on display, so the diversion of window shopping has lost its' appeal. Hence the time spent sipping a coffee or a beer depending on the time of day.

A quick call to the office and the family just before boarding is always the last task - just in case I don't make it back - a bit morbid I know. The next predicament is should I start talking to the person next to me? Not likely, I am tired and have a meeting as soon as I land - so a few winks are more to my liking.

I think I am starting to ramble, so to the point. On many of these trips all I get to see, is the inside of an airport terminal, a plane cabin, a taxi, the clients' office, maybe a hotel room and then back to the airport for the return flight. The point being is that I do not get to see much of the places that I visit physically but only have access to the data. So when I was given the images of Jordan and Amman and actually visited the places and saw how the images related to the environment, I was amazed. I hadn't realised how high the terrain was above sea level and how hilly the area was.

So for those who have not been to Jordan, here are some facts and images of the country.

Area

89,342 sq km

Population

5,039,000 (2000)

Capital

Amman. Population: 1,864,500 (1999).

Geography

Jordan shares borders with Israel, Syria, Iraq and Saudi Arabia. The Dead Sea is to the northwest and the Red Sea to the southwest. A high plateau extends 324km (201 miles) from Syria to Ras en Naqab in the south with the capital of Amman at a height of 800m (2625ft). Northwest of the capital, are undulating hills, some forested, others cultivated. The Dead Sea depression, 400m (1300ft) below sea level in the west, is the lowest point on earth. The River Jordan connects the Dead Sea with Lake Tiberias (Israel). To the west of Jordan is the Palestinian National Authority Region. The east of the country is mainly desert. Jordan has a tiny stretch of Red Sea coast, centred on Aqaba.

Climate

Hot and dry summers with cool evenings. The Jordan Valley below sea level is warm during winter and extremely hot in summer. Rain falls between November and March, while colder weather conditions occur in December/January.

A sprawling city spread over 19 hills, or jebels. Amman is the modern, as well as the ancient capital of the Hashemite kingdom of Jordan. Known as Rabbath-Ammon during prehistoric periods and later as Philadelphia, the ancient city that was once part of the Decapolis league, now boasts a population of around 1.5 million.

Often referred to as the white city due to its low size canvas of stone houses, Amman offers a variety of historical sites and modern facilities that is complemented by wonderfully gracious and welcoming people.

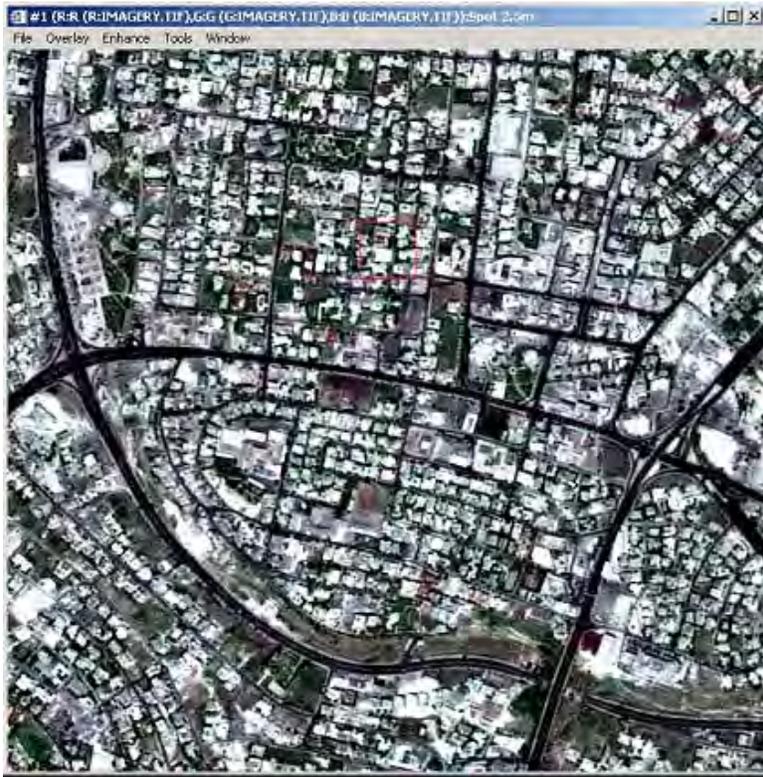
Below are some Landsat, Ikonos and Spot Data of the area.

Naz Khaleque



30m Landsat 7





2.5m Spot Image of Amman



0.61m IKONOS Image of Amman

MEETING PROGRAMME

GRSG AGM - 18 December 2003

Following last years' popular ASTER Unveiled conference, this year's meeting aims to present an overview of geological applications involving new sensors and innovative approaches to data processing. The AGM will be held at Burlington House, Piccadilly, London, UK on Thursday 18th December.

ESA Fringe 2003

ESA is organising its third International Workshop on ERS SAR Interferometry and its first Workshop on ASAR interferometry from ERS and ENVISAT missions, which will be held at ESA ESRIN Frascati Italy.

The Workshop is open to Scientists and students working in the field of SAR interferometry and to representatives from National, European and National Space agencies.

For further information please visit the ESA Website at <http://earth.esa.int/fringe03>

EARSeL - 24th Annual Symposium

NEW STRATEGIES FOR EUROPEAN REMOTE SENSING
Dubrovnik, Croatia, from 25-27 May 2004

The European Association of Remote Sensing Laboratories (EARSeL) is pleased to announce its 24th annual symposium. This will be followed by a specialist workshop on "Remote Sensing of Land Use and Land Cover" on 28/29 May 2004.

The deadline for abstracts is 1st November 2003 to be sent to the EARSeL Secretariat.

Details may be found on the website: www.earsel.geosat.hr

Earth from Space – the Most Effective Solutions

The first international conference "Earth from Space – the Most Effective Solutions" 26-28 November, Holiday Hotel "Vatutinki" in the vicinity of Moscow

If it is important for you to know how satellite images can be used to determine:

- how many illegal oil wells that are being used;
- the extent and severity of damage after flooding;
- how agricultural lands are being used;
- the real condition of large dams;
- the activity of illegal fishing vessels;
- illegal logging and its extent;
- the location and duration of oil pipeline leaks;
- the real damage and consequences of wild fires;
- how many unapproved sand quarries and gold fields that are being developed,
- how many tankers are docked at oil terminals and where they go;
- the real ice conditions for sea navigation and oil and gas fields;
- the status of protected nature areas,

and, at last, how well today's maps reflect recent changes on the ground, we invite you to participate in the First international conference "Earth from Space – the Most Effective Solutions"!

The conference is devoted to practical solutions to these problems in a practical context. This requires a systems approach - all available satellite information and GIS technology must be effectively integrated and used. A wide circle of experts is therefore invited, representing different scientific fields as well as governmental organizations and environmental NGOs.

This will make it possible to have a truly meaningful and constructive discussion.

The prospects of the increasingly popular small Earth observation satellites will be discussed in a series of presentations on the topic "RS micro-satellites – myth or reality?"

Real-time acquisition and processing of RS data from the satellites Meteor-3M, EOS, IRS-1C/1D, RADARSAT-1 will be demonstrated on a mobile ground station, developed by R&D Center ScanEx.

Conference proceedings, including all presentations, will be published.

<http://www.scanex.ru/confer.htm>

XXth ISPRS Congress

GEO-IMAGERY BRIDGING CONTINENTS has been chosen as the theme of the XXth ISPRS Congress to express the fact that the acquisition, processing and use of "GEO-IMAGERY" will play an important role in our future professional activities. New technological developments, particularly in computers have significantly influenced the theory and practice of photogrammetry, remote sensing and SIS. In fact, geospatial information technologies are widely applied in such diverse activities as property conveyancing, infrastructure design and facilities management, environmental assessment, and land use planning, while geo-imagery processing is used at close range for engineering and documentation purposes. Geospatial analysis not only makes possible answering old scientific questions more efficiently, it also enables us to address a whole new series of questions over a range of spatial, spectral and temporal scales. This not only provides an improved understanding of how the Earth works as a system, it also provides a new paradigm for the management of natural resources and the environment. Therefore understanding geo-imagery provides key core elements in micro or macro scale applications. Another important aspect of geo-imagery is its ability to bring numerous individuals to "common understanding" in terms of the information on which they base their analysis and decisions.

The importance of geo-imagery to the community and the ISPRS efforts toward improving its processing and application will be stressed at the XXth Congress. All Congress officials and participants are invited to contribute to this effort. By combining "GEO-IMAGERY" with the words "BRIDGING CONTINENTS" the Congress Organising Committee wishes to point out the characteristics of the chosen Congress location, namely the city of Istanbul. The Congress Organising Committee wishes the XXth Congress participants in Istanbul to benefit from the "fascinating blend of EAST and WEST, PAST and PRESENT, MODERN and EXOTIC" in their future planning activities.

Information taken from the following website:

<http://www.isprs2004-istanbul.com/>

IGARSS 2004

Science for Society
Exploring and Managing a Changing Planet
Anchorage Alaska
Egan Convention Center
September 20-24, 2004

The conference theme "Science for Society: Exploring and Managing a Changing Planet" reflects the maturation of remote sensing and the power of this technology to provide societal benefit through a better understanding of the natural forces and processes that sculpt our planet and through provision of critical information to decision support systems that enable sound policy and management choices.

2004 International Conference on Cooperation and Innovation in the Geo-Industry

Feb 04-07, 2004 International Conference on Cooperation and Innovation in the Geo-Industry, Hyatt Hotel, Orlando, FL , by the Geo-Institute and ADSC: The International Association of Foundation Drilling. (Ted Ledgard, P.O. Box 550399, Dallas, TX 75355, Phone: 214-343-2091 EMail: adsc@adsc-iafd.com Web: www.geo-support2004.com)
Abstracts are due August 15, 2002

The 32nd International Geological Congress

The 32nd International Geological Congress (32IGC) will be held from August 20 to 28, 2004 in Florence, Italy

The Congress is being organized in co-operation with, and under the sponsorship of the International Union of Geological Sciences (IUGS), and the various member countries of the Mediterranean Consortium. It has been designed to set up a forum for a broad debate of the most significant advances in the geological sciences, as well as to promote discussion of the

Congress theme:

From the Mediterranean Area Toward a Global Geological Renaissance Geology, Natural Hazards, and Cultural Heritage

MEETING REPORTS

IAMG 2001, Portsmouth, UK

Richard Teeuw

The International Association for Mathematical Geology held their annual conference at the University of Portsmouth over 7-12 September. The dozen or so conference symposia ranged from predictive modelling and risk analysis of geohazards (glacial, geotechnical, landslide, seismic and volcanic), through to geostatistical estimation and modelling in the petroleum and mining sectors – plus a session on remote sensing and GIS, convened by GRSG's Richard Teeuw.

A keynote address on trends in geological remote sensing was given by Stuart Marsh of the British Geological Survey: this wide-ranging presentation highlighted a shift from 'traditional' uses of remote sensing in the production of geological maps, towards applications in the geohazards and environmental geology sector. This has been driven by national and international political agendas, but has been made much more feasible by new sensors, such as ASTER, and new applications, such as radar interferometry. Examples were given of ERS SAR applications from the Integrated Global Observing Strategy for Geohazards, co-chaired by the BGS, ESA and UNESCO. On another international project, the EU-funded MINEO programme, HyMAP airborne hyperspectral data, plus thermal imaging, have been used to map and monitor mine waste, in addition to mineral exploration applications.

The use of GIS – plus a bit of remote sensing - in exploration for Pb-Zn deposits in humid tropical environments was the basis of two presentations, from Vietnam and Brazil. Doan Ngdoc San *et al.*, used Landsat TM for structural, lithological and geomorphological mapping, as well as base maps, for an assessment of 257 mines spread over a 20,000 km² region of northern Vietnam: the selection of exploration targets was based on specially developed data-mining software (GIS_RIGMR and GeoExpert_RIGMR). Spectral mapping based on ASTER and Landsat TM was just one of thirteen evidence themes used by Washington Franca-Rocha *et al.* to model the distribution of Proterozoic Pb-Zn deposits in Brazil: favourable areas were located using Fuzzy Logic, Weights of Evidence and Logistic Regression techniques.

Other geological remote sensing presentations included: Arash Barjasteh's use of Landsat ETM to map drainage patterns and basement lineaments in SW Iran; the use of airborne remote sensing in Russia for geohazard mapping and pollution monitoring along pipelines (Olga Trapeznikova *et al.*); and the use of airborne SAR for the real-time monitoring of fractures in the crater of Miyakejima volcano, Japan, during an eruption (R. Kouda *et al.*).

Another keynote paper on a remote sensing theme was given by Dave Rothery of the Open University, on identifying, characterising and quantifying volcanic eruptions from space. NASA's MODIS (Moderate Resolution Imaging Spectrometer: 36 channels with pixels of 250m to 1000m) has been particularly useful in this sector, allowing the establishment of an automated global thermal alert system, aimed at detecting volcanic activity. The basis of this system is the MODVOLC algorithm, which uses the Normalised Thermal Index: $(4 \mu\text{m radiance} - 12 \mu\text{m radiance}) / (4 \mu\text{m radiance} + 12 \mu\text{m radiance})$. The MODVOLC results are proving to be very useful in identifying new fissure systems and quantifying active lava flows.

IEEE International Geoscience and Remote Sensing Symposium

21-25 July Toulouse, France.

Alex Davis (a.m.davis@imperial.ac.uk)

I attend and presented at the IGARSS conference in Toulouse, July, 2003. The conference is one of the largest international remote sensing symposiums with over 3000 delegates. With multiple parallel sessions ranging from Radar Polarimetry to Military Applications, I

concentrated on advances in high spatial resolution digital elevation models (DEM) generation from satellite platforms.

Defining the earth's landscape using DEMs is an increasing academic and industrial tool with projects now demanding "value added" DEM analysis and 3D (actually 2.5-2.9D) visualisation. My interest is in the research application of DEMs to geohazards and tectonic geomorphology. I was interested to learn more about current and future high spatial resolution image sensors dedicated to DEM generation from space platforms. I will summarise a session on the SPOT 5 satellite capability of generating DEMs. I will then introduce the Japanese Advanced Land Observing Satellite (ALOS) which is due for launch next year.

SPOT5 DEM Generation

As mentioned in the last GRSG newsletter, the SPOT5 satellite, the fifth in the SPOT family of satellites, was launched on May 4th 2002. There are two optical sensor systems that are capable of generating DEMs. The High Resolution Geometry (HRG) sensor consists of two identical optical cameras with a 60km swath. In panchromatic mode the spatial resolution is 2.5m (supermode) and 5.0m (standard), and in multi-spectral mode the resolution is 10m. There is also a dedicated along-track stereo camera arrangement called High Resolution Stereo (HRS). The two cameras are configured in a 20° aft and forward stereo geometry arrangement with a 120km swath and samples the earth terrain every 5m.

At the conference the SPOT5 satellite talks were divided into two half-day sessions. The first session focussed on the results of calibration tests and the operational state of the satellite after a year in space. The second session showed application examples using the SPOT5 imagery. With the demand for high accuracy DEM generation from space platform, tests have been carried out on the variety of stereo geometries possible from the SPOT5 satellite. The paper presented by Nonin showed the performance of DEM extraction using the HRG and HRS instruments based on a Los Angeles urban test area. The reference DEM and orthoimage used for assessing the SPOT5 DEMs were generated using stereo 0.8 m airborne digitally scanned images. DEMs generated using the SPOT5 data were compared with this reference DEM. Experiments were carried out with and without control points.

DEM Generation Using HRG.

Comparison with the reference DEM involved the geometric correction of the HRG image stereo models using 81 control points with a xyz RMS of 2.41, 2.11 and 2.38. Several different spatial resolution stereo images (2.5m and 5m in panchromatic, and 10m using band 2 in multi-spectral mode) and stereo geometry (base / height ratio) combinations can be used to generate DEMs using the across track HRG images. As with earlier SPOT satellites, there is a time lag in acquiring the across track stereo pairs. Stereo pairs were generated with a time range from 2 to 142 days (Nonin, 2003). Comparison results with the reference DEM show that the Z RMS for standard and supermode DEMs range from 2.6m to 3.66m with a time lag from 2 to 17 days. For the 10m B2 imagery the Z RMS ranges from 4.8 to 4.8m. The results show that the increase in time lag between image acquisitions decreased DEM quality.

DEM generation using HRS

The main advantage in the along track stereo HRS images is that there is a nominal time lag in image stereo image acquisition. However, the 90 second interval in image acquisition results in a bias that must be corrected. The results show a Z RMS of 4.33m.

In summary, the test comparison (Nonin, 2003) shows that SPOT5 imagery can generate high accuracy DEMs. The XYZ absolute accuracy with no control points is dependent on the satellite self-registration which has a horizontal RMS of 50m for HRG and 30m for HRS. The Z RMS ranged from 0 to 40m which can be significantly improved with one control point. The results (shown above) of ground control points used to geometrically correct the SPOT5 stereo models and compared to the reference DEM indicate relatively high accuracies. The time lag in image acquisition of the HRG cross track stereo acquisition affects the accuracy. Finally, visual inspection of the different SPOT5 DEMs shows that urban details such as houses and roads are more detectable in the supermode DEM. For more information on the

SPOT5 satellite, visit the URL below. For more information on first year results and the DEM accuracy test refer to the IEEE references below.

ALOS DEM Generation

The Advanced Land Observing Satellite (ALOS) is scheduled for launch next summer by the Japanese space agency NASDA from the Tanegashima space centre. The ALOS satellite is based on the earlier JERS-1 and ADEOS missions. The payload consists of an L-band Synthetic Aperture Radar (PALSAR) and two optical instruments (PRISM and AVNIR-2).

The Panchromatic Remote – sensing Instrument for Stereo Mapping (PRISM) is dedicated to generating high resolution DEMs of the earth's surface. Figure 1a shows the three camera arrangement of PRISM each with a spatial resolution of 2.5m. Figure 1b shows the stereo geometry with a swath width of 35 km. In comparison, it is similar to merging the optical arrangement from the ASTER and SPOT5 sensor instrument configuration. The forward and backward tilts of the telescopes are inclined at 23.8°. This geometry combined with the nadir telescope gives a base to height ratio of 1.

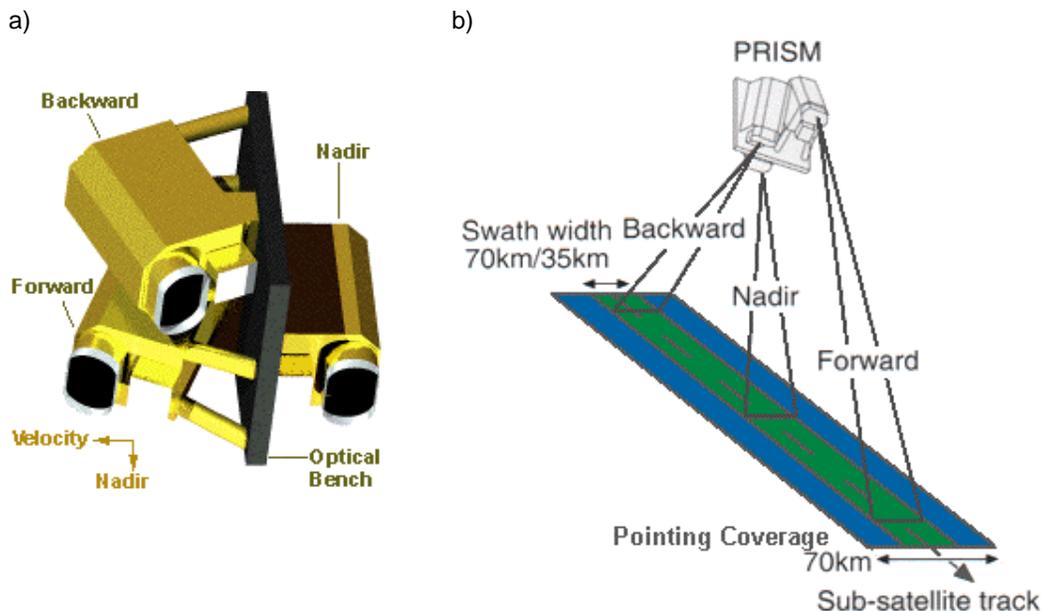


Figure 1(a) shows the PRISM telescope arrangement and 1(b) shows the image geometry of the nadir, backward and forward telescope arrangement. (Diagrams courtesy of the ALOS website.)

In the ALOS session a talk by Junichi Takaku summarised the process and methodology of generating DEMs using PRISM. A triplet image algorithm is being developed to automatically generate PRISM DEMs. An airborne Three Line Scanner (TLS) has been used to simulate PRISM images of two test sites to evaluate the triplet image algorithm. The results of the simulation indicate that triplet image matching and window size are important in high resolution DEM accuracy. The relative DEM height accuracy of the simulated PRISM DEMs is 2.3m RMS error (Takaku, 2003). For more information on the ALOS satellite and the PRISM instrument visit the URLs below.

Summary

The IGARSS conference contained many updates on new sensor payloads currently in orbit and showed the diversity of passive and active sensors that are in development or due for launch in the near future. One noticeable absence from the conference was a session on ASTER. There were a few ASTER related talks and posters but these were mainly linked to

specific application sessions. However, the next IGARSS conference scheduled in Anchorage Alaska, September 2004 has a planned dedicated ASTER session.

The interest in ASTER DEM generation has lead to an increasing demand for improved spatial resolution and absolute geometric accuracy DEMs for geological and earth science related applications. The remote sensing tools for geohazard and tectonic geomorphology applications rely mainly on DEMs for landscape morphology. Many tectonically active areas of the world are in inaccessible regions so high relatively accurate DEMs are essential when comparing terrain features. The SPOT5 and the future PRISM instrument on ALOS is and will be providing the aerial photograph type resolutions that are essential for identifying and mapping minor to medium scale terrain features such as fault scarps and river terraces.

Website URLs

IEEE & IGARSS

<http://www.ieee.com/portal/index.jsp>

<http://ewh.ieee.org/soc/grss/>

SPOT5

http://www.spotimage.fr/spot5/spot5_eng.html

ALOS

<http://www.eorc.nasda.go.jp/ALOS/>

<http://www.eorc.nasda.go.jp/ALOS/about/prism.htm>

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Nonin, P., and S. Piccard, **"Performance Analysis of DEM Automatic Extraction from SPOT5 Sensors"**, Vol I: p309 – 311.

Suzuki, S., **"Level 1 Data Processing Algorithm for ALOS PRISM and AVNIR-2"**,vol III: p1842 – 1844.

Takaku, J., N. Futamura, A. Goto, T. Iijima, T. Tadono, M. Matsuoka, M. Shimada and R. Shibasaki **"High Resolution DEM Generation from ALOS PRISM Data - Triplet Image Algorithm Evaluation"** vol III: p1858 – 1860.

STUDENT STIPEND'S

The following paper is being considered for the first GRSG Student Stipend. It has been submitted by Margaret Andrews.

Locating dateable minerals in laterites using remote sensing: an example from Eritrea, NE Africa.

M.E. Andrews Deller

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Dating laterites is difficult. The problem lies in finding dateable minerals formed in these palaeosols during lateritisation. Such minerals are rare, randomly distributed and impossible to distinguish in hand specimen from surrounding lateritic minerals. Unlike igneous rocks, which contain several common minerals formed at the time of crystallisation that are suitable for radiometric dating, palaeosols are dominated by secondary minerals with no unstable isotopes.

New analytical techniques using TM, ASTER, ALI and Hyperion data from NASA's experimental EO-1 mission, enable geologists to pinpoint locations of dateable minerals in laterites over entire countries by focusing on characteristic mineral spectra which uniquely identify appropriate minerals. This revolutionises the dating of laterites, which have been dated crudely in places, by the age of the rocks on which they develop and that of rocks that overlie them.

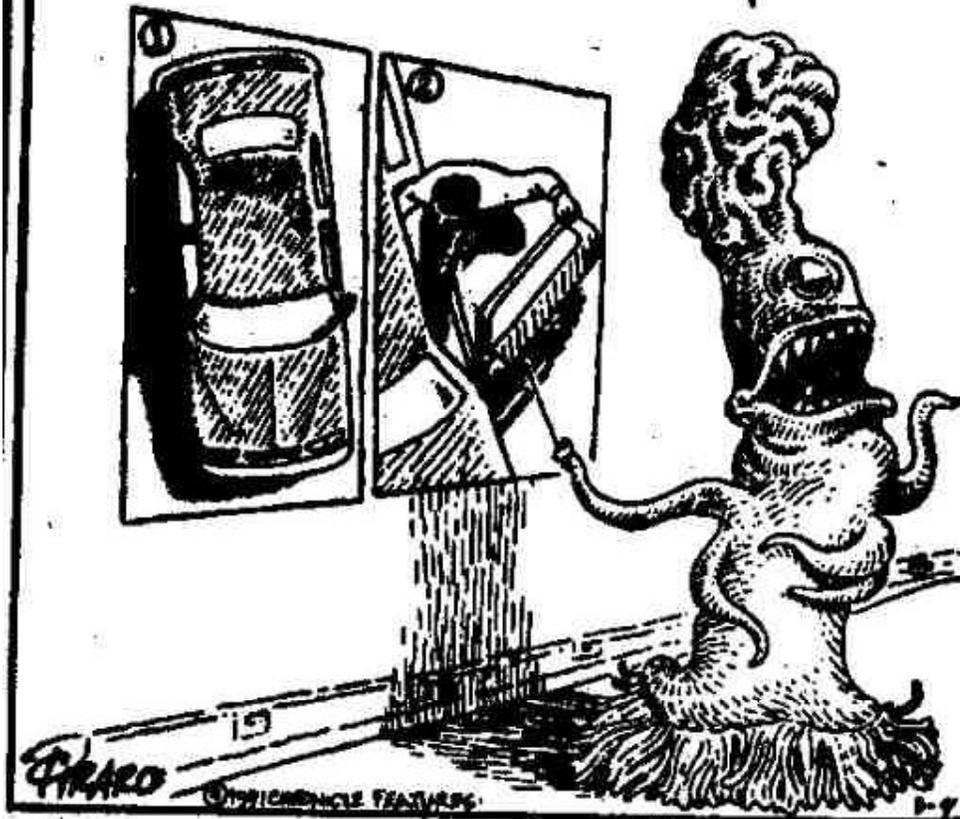
Dating of K-bearing minerals in the lateritic profile, consistently proves that the minimum age for lateritisation in Eritrea is mid-Eocene (40 to 43 Ma), not mid-Oligocene. As a result, long-accepted notions on the evolution of the Ethiopian Igneous Province are thrown into question and time constraints are placed on supergene enrichment of gold and base-metal mineralisation in the area.

The results, backed by ground truth, prove that screening for dateable minerals in laterites using remote sensing, enables systematic regional dating of them and makes field work more efficient.

BIZARRO

By DAN PIRARO

OUR FIRST RECONNAISSANCE MISSION TO THE BLUE PLANET INDICATES THAT THE RECTANGULAR CREATURES IN PHOTO #1 ARE THE DOMINANT LIFE FORMS, AND FEED PRIMARILY ON THE CREATURES IN PHOTO #2.



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