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Edited by

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After many months of planning and rising excitement, the 1st Short Course on African Metallogeny was held from 12th to 18th March 2012 in Ouagadougou, Burkina Faso. Having been the first event of this kind and of what is planned to become an annual series of courses, it was naturally an experiment with initially uncertain outcome. With hindsight it can safely be said that it was a huge success and a major milestone in the extra-university training of mine and exploration geologists in Africa.

The principle idea behind the Short Course followed the model of the highly successful UNESCO-SEG-SGA Latin American Metallogeny Courses that have been run annually in different locations in South America for the past three decades. The African continent is well endowed with mineral resources and yet much of Africa’s mineral riches remain to be discovered. Mining has played a pivotal role in the economy of many African countries with contributions to foreign exchange earnings exceeding 50% in many instances. There is no doubt that the exploitation of mineral deposits could form a substantial, if not the strongest, platform on which to base the future uplifting of the African economy. At the same time Africa is moving more and more into the focus of the global mining industry, especially gold miners. This became particularly evident at the recent PDAC Meeting in Toronto where discussions revolved around the growing number of junior companies producing gold in Africa and growing space of acquisitions in countries like Burkina Faso or Ivory Coast.

The discovery of new deposits as well as the economic and sustainable exploitation of known deposits requires skills that are not as readily available in many areas of Africa as they might be in other parts of the world. Thus, not surprisingly, the wish to organize some kind of training courses for young African geoscientists in the specific field of metallogeny, i.e. practical aspects of the genesis of ore deposits that can be applied in the formulation of future exploration strategies, has been voiced repeatedly by numerous companies and organizations, foremost the Geological Society of Africa (GSAf), SGA and SEG. As an aftermath of the IGCP’s 40th anniversary celebrations, an Earth Science Education Initiative in Africa was launched and, as the concept of running professional short courses for African geoscientists fits perfectly into this initiative, it was no surprise that UNESCO and the IUGS swiftly welcomed the plan of Short Courses on African Metallogeny. Under the leadership of SGA, the course was organized with help from the Institut de recherche pour le développement (IRD) in Toulouse, financial contributions from SEG and IUGS and sponsorship (in kind) from UNESCO and the GSAf.

The decision to run this first short course on African metallogeny in Burkina Faso, a country that is known to many foreigners as “Burkina what?”, was guided by a currently extraordinary interest by many exploration companies in the West African Craton as exemplified by WAXI, the West African Exploration Initiative, and a keen interest by local geologist to host the course there. Burkina Faso is one of the poorest countries in the world where the hopes for a better future are fuelled by the expectation to discover new ore deposits. Just in the past five years five gold mines opened in the country and the national gold production rose from close to zero in 2006 (based merely on artisanal mining) to 33 t in 2011 when gold overtook cotton as the country’s most important export product. Several projects stand a good chance of becoming mines in the foreseeable future. Apart from gold there are also promising prospects in manganese and several other commodities. The largely covered bedrock geology is dominated by Palaeoproterozoic granite-greenstone belts (Birimian) adjacent to an Archaean craton further west.

Taking into consideration the regional geological setting and current exploration interests, the course was chosen as theme for the course.

The course was hosted by Teng Tuuma Geoservices (TTG), a young company in Ouagadougou that provides exploration services as well as a brand new training centre. In fact, this course was the very first event staged by TTG in their new building, which became finished literally on the day before the opening of the course. The managing director of TTG, Dr Morou Francois Ouedraogo, deserves much of the credit for the success of the course. Together with his staff he organized all the logistics on site, supported the delegates from their first steps into the country at the airport all the way through to taking care of food and drinks during the course and providing a well equipped, comfortable lecture theatre. Without his engagement and the tremendous work done by his wife and all the TTG staff this short course would not have been possible.

The course attracted considerable interest from the Burkina Faso government. Thus the opening ceremony on Monday, 12th March, was attended by Mr. Name, representative of the Minister of Mines of Burkina Faso, who expressed his gratitude to the organizers for the initiative to train young geoscientists in Burkina Faso, and by Mr Koa, Executive Secretary of the Chamber of Mines of Burkina Faso. On the next day, Mr Salif Kaboré, Burkina Faso’s Minister of Mines, Carriers and Energy himself, honoured our meeting with his presence and expressed his thanks for this initiative but also his hope for a continuation of the training of West African geoscientists in the years to come.

The theoretical part of the course covered a wide range of lectures. Following an introduction to the regional geology, specific topics that were addressed in greater detail included hydrothermal ore-forming processes, structural control on mineralization, orogenic gold deposits in general and geochemical exploration tools for such deposits in particular, IOCG deposits in Archaean rocks, Palaeoproterozoic granite-hosted gold deposits (with examples from Brazil), Archaean palaeoplacer deposits, rare metal deposits in pegmatites, genesis of iron formation and their significance in the reconstruction of palaeoenvironmental conditions, and iron ore as well as manganese ore deposits. These contributions were presented by Pasi Ellu from the Geological Survey of Finland, Roberto (alias “Aleluia”) Xavier from the University of Campinas, Brazil, Lenka Baratoux and Marieke van Lichtervelde, both from the Institut de recherche pour le développement (IRD) in Toulouse, France, Nic Beukes from the University of Johannesburg, South Africa, and Hartwig Frimmel from respectively the University of Wuerzburg (Germany) and the University of Cape Town (South Africa). Towards the end of the week, Peter Williams from Curtin University and partner in TTG provided insights into geophysical exploration methods, with many real-life examples, and Morou Francois Ouedraogo explained numerous examples of exploration successes in Burkina Faso. Finally, the course was concluded by an outlook on future availability of geosources by Hartwig Frimmel.
The five-day short course was followed by a two-day field trip to several exploration projects in the area near Gaoua in the southwestern part of Burkina Faso near the border to the Ivory Coast. This field visit was led by Morou François Ouédraogo and Athanase Nara, chief geologist of Volta Resources. The participants were able to examine the style of mineralization (mainly Cu and Au) in field outcrops, trenches and drill core, and gained a good insight into the principle controls of Cu and Au mineralization in that greenstone-dominated area, reaching the conclusion that an early porphyry Cu-type of mineralization was followed and overprinted by syn-Birimian orogenic gold mineralization along a major north-south trending shear zone. The field trip was generously supported by Volta Resources who sponsored a final dinner that was also attended by Mr Jean Baptiste Kambou, the mayor of Gaoua, and Mr Bernard Y. Sawadogo, the chief commissioner of the Southwest Region. Special thanks go to our host there, the country manager of Volta Resources, Mr Raphael Goama Zoungrana, for his great hospitality.

For logistic reasons the number of participants was initially set to not more than 50 for the theoretical part of the short course and not more than 20 for the post-workshop field trip. The demand for this course was, however, so overwhelming that, although several (late) applicants had to be turned down, a total of 61 delegates ended up for the short course, most of whom came along for the field trip as well. Altogether 14 different exploration companies were present. The country origin of the participants reflected perfectly the overall African (with focus on West African) flavour of the course, with delegates not only from Burkina Faso but also from as far afield as Australia, Botswana, Cameroon, Congo, France, Ghana, Guinea, India, Ivory Coast, Liberia, Niger, Nigeria, South Africa, and Sweden.

The entire short course was presented in English. A dominance of delegates from francophone countries led to initial concerns that language could be a stumbling block. Our French-speaking colleagues very quickly proved, however, that their language skills had been underestimated and that they could follow the English-speaking presenters perfectly well, in spite of having to deal with a variety of dialects and styles of pronunciation.

A principal goal of this and hopefully all following Short Courses on African Metallogeny has been and will remain the provision of a platform for further training of young geologists who have difficulties in obtaining such training in the fields of ore deposit research and exploration due to financial constraints or the lack of capacity at their home institutions. This will be possible only for as long as sufficient funding for sponsoring students and professionals from economically disadvantaged backgrounds can be generated. Although professional societies, such as SGA and SEG, and organizations, such as UNESCO or the IUGS, can help to some extent, the onus of providing the required funds will continue to rest with the mining and exploration industry. To achieve a win-win situation for all parties, delegates from industry are expected to cross-subsidize with their course fees those delegates who do not have access to sufficient funds. Although this 1st Short Course on African Metallogeny saw a healthy mix of delegates from industry, academia and government institutions, the proportion of delegates from the exploration industry was higher than expected. This made it possible to accumulate some money that will form the beginning of an educational fund to be used to support a greater number of students (and some professionals from economically disadvantaged backgrounds) in future courses. Thus the 1st Short Course on African Metallogeny was not only a great success for those who participated but also for those who plan to conduct, or participate in, similar courses on the African continent in the years to come.

Finally, it cannot be emphasized enough that the success of such a Short Course lies not only in the hands of an organizing society, such as SGA, but hinges completely on the cooperation, efficiency and willingness of a local partner. The whole team of TTG has set a high standard, for which we all owe them greatly. Now other groups in Africa are invited to take up the challenge to host one of the next Short Courses on African Metallogeny. Applications to stage such an event are called for and anyone interested is invited to submit a proposal to the SGA Executive Secretary Dr Jan Pašava (jan.pasava@geology.cz).

Thanks to our local sponsors in Burkina Faso, Teng Tuuma Geoservices and Volta Resources!
2. The IUGS COGE Geoscience Education Roadmap for Africa (GEO-ERA)

By Jesús Martínez-Frias
Chair, IUGS COGE
Goodwill Ambassador of GSAf to Spain

The IUGS Commission on Geoscience Education, Training and Technology Transfer (COGE) was established in 2004 to examine and develop programs to assist developed and developing countries to maintain, expand or introduce better Earth science education, outreach and technology transfer within their country. Despite the numerous science education activities focused on Africa, there is no yet a real “Geoscience Education Roadmap” for the whole continent, which takes into account not only that “Africa is one” (GSAf Chair, Prof. Aberra Mogessie dixit), but also the diversity of its regions and the idiosyncrasy and specific needs of each African country. Thus, following the IUGS recommendation concerning Africa as a potential location for the development of COGE activities, the need of launching a new, mid-long term (2012-2016) project, named GEO-ERA (GEScience Education Roadmap for Africa) was proposed and advanced by the COGE Chair during the IUGS meeting in February 2011 in Paris[1]. The real origin of this project was, in great part, the result of the fruitful discussion and brainstorming held in Paris with Prof. Aberra Mogessie, during the IUGS EC meeting, about what was the best way to move forward, learning and taking full advantage of other previous geoscience education initiatives (e.g. Earth Science Education Initiative in Africa)[2].

Basically, GEO-ERA attempts to provide the entire African continent with a mid-long term plan to advance the target of geoscience education, training and technology transfer. In addition to the previous description, two extremely significant aspects regarding the Roadmap are the following:

- GEO-ERA will be developed by Africans by which the participation Geological Society of Africa (GSAf) as one of the partnerships is crucial.
- GEO-ERA will increase the currently still scarce visibility of the contributions linking “Geoscience Education” and “Africa” through the publication of thematic contributions in prestigious journals (i.e. Science, Nature, Journal of African Earth Sciences, Episodes).

In order to accomplish the IUGS recommendations regarding partnership with other institutions and organizations, specific contacts for the joint coordination of GEO-ERA were established with GSAf, the UNESCO Earth Science Education Initiative in Africa, AGID, CIFEG, NSF-Earth Science Literacy Initiative and UNCGEO. All their responses were positive (although UNESCO is particularly interested on cooperation regarding primary and secondary education). Further collaborations regarding the Roadmap are going on (but in a more preliminary stage), with NASA Astrobiology Institute Education and Public Outreach, Xsci-ESERC and Cosmos Education and, above all, AGN and AAWG (Gender dimension and Geoparks). A second step presenting GEO-ERA was given in the context of the excellent First International Conference on African and Arabian Geoparks “Geo-education in Africa - UNESCO & COGE initiatives - " El Jadida (Morocco)[3], as Geoparks are privilege places where field geoscience educational activities can be pursued (and are proposed to be made) in the context of this project. The GEO-ERA was unanimously approved by all members of the IUGS COGE and also was evaluated positively by the IUGS Ad-Hoc Review Committee after its meeting held in Madrid in September/2011.

The development of GEO-ERA, as a specific part of the COGE Annual plan for 2012 and also for the five-years Action Plan of the Commission, was recently approved by the IUGS during the 63th EC Meeting held in San Sebastian, Basque Country (Spain). The first activity in the context of GEO-ERA will increase the currently still scarce visibility of the contributions linking “Geoscience Education” and “Africa” through the publication of thematic contributions in prestigious journals (i.e. Science, Nature, Journal of African Earth Sciences, Episodes).

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On behalf of the IUGS-COGE, I call the collaboration and participation of all interested African institutions, organizations, societies and associations to take part in the development and construction of the Geoscience Education Roadmap for Africa (GEO-ERA), through contacting our Commission and the GSAf.

References

3. **GIRAF Geoscience Information in Africa**

**GIRAF roadmap**

- **2006:** Preparatory workshop at the 21st Colloquium on African Geology (CAG 21), Maputo, Mozambique
- **Mar. 2009:** Kick off Workshop in Windhoek, Geological Survey of Namibia
- **Jan. 2011:** OneGeology – AEGOS – GIRAF Session at the CAG 23, Johannesburg, South Africa
- **Dec. 2011:** 2nd GIRAF Workshop in Dar es Salaam, hosted by the Southern and Eastern African Mineral Center (SEAMIC), Tanzania
- **Aug. 2012:** Geoscience Information in Africa Session (GIRAF), 34th International Geological Congress (34th IGC), Brisbane, Australia
- **Jan. 2013:** GIRAF Session, CAG 24, Addis Ababa, Ethiopia
- **Autumn 2013:** 3rd GIRAF Workshop at the Centennial celebrations of the Geological Survey of Ghana, Accra
- **Aug. 2016:** Geoscience Information in Africa Symposium (GIRAF), 35th IGC, Cape Town, South Africa

**Associated Organisations**

- Southern and Eastern African Mineral Centre (SEAMIC)
- African Association of Women Geologists (AAWG)
- Commission of the Geological Map of the World (CGMW)
- Young Earth Scientists Network (YES)
- Geological Society of Africa (GSAf)
- OneGeology (OneG)

**GIRAF**

Geoscience Information in Africa

**Linked with:**

![AEGOS](image)

**Steering Committee**

- **Sadrack Felix Toteu**
  UNESCO Nairobi (chair)
- **John Ayei Duodu**
  Director of the Geological Survey of Ghana (vice-chair)
- **Musfin Wubeshet Gebremichael**
  SEAMIC, Tanzania
- **Masresha Gebreslassie**
  Director of the Geological Survey of Ethiopia
- **Cecilia Mukosi**
  Council for Geoscience (South Africa), YES Network
- **Gabi Schneider**
  Director of the Geological Survey of Namibia
- **Abera Mogesie**
  President of the Geological Society of Africa
- **Kristina Asch**
  BGR, CGI chair, GIRAF coordinator

**Contact**

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![CGI](image)
GIRAF is a network of Geoscience Information in Africa under the auspices of the Commission for the Management and Application of Geoscience Information (CGI) of the IUGS and the UNESCO.

It encompasses members of geological survey organisations, research institutes, universities, and private companies.

Mission
To ensure that knowledge-based geoscience information contributes to improve the environmental & economic prosperity of people in Africa.

Aims
Build a pan-African geoscience information knowledge network of geological surveys, universities, research institutes and companies.

Exchange and share geoscience information and good practice.

Bring together relevant African authorities, national experts and stakeholders in geoscience information.

Make Africa a more active part of the international geoscience information community.

Encourage the contribution to and creation of cross-border and global geoscience information standards

Stimulate and support cross-border geoscience information projects and initiatives in Africa.

In particular support those institutions who have demonstrated a considerable lack of resources and capacities.

Participating countries and partners
- Angola
- Botswana
- Burkina Faso
- Cameroon
- Central African Republic
- Egypt and Kuwait
- Ethiopia
- France
- Gambia
- Germany
- Ghana
- Kenya
- Lesotho
- Malawi
- Morocco
- Mozambique
- Namibia
- Netherlands

Geoscience information challenges in Africa
- Many isolated geoscience information projects within Africa
- Only rarely existing: African geoscience information standards
- Vast amounts of inaccessible data and research results
- Education and training: Find and retain skilled people
- Fragmentation of institutional responsibilities
- Government and administration often unaware of the importance of geoinformation
- Lack of technical infrastructure, internet access and equipment

Status: 3/2012
4. GSAf sponsors the 6th Conference of AAWG in April 2012

The Geologic al Society of Africa (GSAf) is sponsored the 6th Conference of the African Association of Women in Geosciences (AAWG) held in Yaoundé, Cameroun, 23-27 April.

The Society was represented in this forum by Prof. Greg Tanyileke, from Cameroun, and our Vice-President for Central Africa.

5. Mozambique launched the 1st Congress of Geology of Mozambique

AGMM (Geological Mining Association of Mozambique, affiliated to the Geological Society of Africa), together with the National Museum of Geology and the Department of Geology of Eduardo Mondlane University will organize in 21-23 November this year the 1st Geological Congress of Mozambique – CoGeo01-Moç2012.

The Geological Society of Africa is sponsoring this geological event in Mozambique.

The launching ceremony took place on the 10th April through a Press Conference at the Maputo VIP Hotel, in the presence of the media representatives – radio, TV, newspapers.

6. GSAf and the Facebook

GSAf is very impressed with the ‘movement’ around its FB page. The graphic shows the visits and the outreach!

7. MEMBERSHIP

**NEW MEMBERS**

Dennis Maobe  
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The GSAf welcomes these new Members and those who renewed their Membership.
8. YES AFRICA MEETING MINUTES

YES Africa Meeting Minutes.
Thursday April 12th 2012 at 3PM Central African Time.

Attendance:
Ddamba, Ivy – Uganda
Malozo, Mponda – Tanzania
Ndiphwvu, Cecilia Mukosi – South Africa
Nyagonde, Stephen – Tanzania
Mdala, Hassan – Malawi
Tefogoum, Ghislain Zangmo – Cameroon

Meeting Discussion:

1. New YES Network Africa Initiative: Business Opportunities in the Earth Sciences in Africa
Earth scientists in Africa have recently recognized the important role of the earth sciences in Africa’s economic development. Africa’s earth sciences would greatly benefit from a proliferation of business and investment attracted by our natural resources. The opportunities in the earth sciences are wide and it is up to us, Africa’s earth scientists to make them known worldwide, through the YES Network and beyond.

This initiative seeks to IDENTIFY the investment opportunities and economic impact of natural resources in Africa. The main reason for this initiative is to raise awareness in Africa’s earth science and investment communities, about the bridge that can be built within them, with the common goal of growth in Africa.

Said opportunities and impacts will be identified by YES Network members and emailed to yesnetworkuganda@gmail.com and posted on our collective blog at: http://yesnetworkbussinessafrica.wordpress.com. Blog entries will be shared the international earth science community through each YES Network Africa chapter portal.

2. Voting Results on Regional Responsibility

Voting is now closed on the Regional Responsibility. From the results, the following is the responsibility as distributed per region:

- North Africa (Algeria, Egypt, Libya, Morocco, Sudan, Tunisia).
- Researching the economical impact of natural resources current and planned in Africa.
- Examples for what this region may do is:
  - Create a natural resource portal in Africa
  - Publish reports about natural resources in Africa
  - Have an YES Africa economic impact awareness day

- East Africa (Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, Tanzania, Uganda).
- Natural hazards. The chapters in the region should collaborate to determine the best way forward for natural hazard mitigation in Africa.
- Examples for what this region may do is:
  - Create a geo-hazards portal in Africa
  - Publish reports about Geo hazards in Africa as well as risk assessment of those Geo hazards
  - Have a YES Africa geo hazard awareness day

- West Africa (Benin, Burkina Faso, Cape Verde, Cote d’Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mauritania, Mali, Niger, Nigeria, Senegal, Sierra Leone, Togo).
- Researching mining and Para mining potential. The chapters in the region should collaborate to determine mining potential in Africa.
- Examples for what this region may do is:
  - Create a mining portal in Africa
  - Publish reports about mining in Africa
  - Have a YES Africa mining awareness day

- South Africa (Botswana, Lesotho, Namibia, South Africa, Swaziland, Zambia, Zimbabwe) and Central Africa (Angola, Cameroon, Central African Republic, Chad, Democratic Republic of Congo, Congo Brazzaville, Equitorial Guinea, Gabon, Sao Tome & Principe).
- Geo Education – Literature initiatives detailing the importance of particular fields of geo science in Africa. The chapters in the region should collaborate to write reports under the umbrella of the importance of particular fields of geo education in Africa. For example: “The importance of Hydrology education in Africa”.
News of/on Africa

9. DRC, Burundi to follow Rwanda minerals transparency – International Crisis Group

By: Martin Creamer, 28th March 2012. JOHANNESBURG (miningweekly.com) – Burundi and the Democratic Republic of Congo (DRC) were expected to begin certifying the origin of minerals in the next few months as was already being done by Rwanda, International Crisis Group Central African project director Thierry Vircoulon said on Wednesday.

The Rwandan authorities last year introduced a tagging and certification-of-origin scheme, which is reducing the scourge of conflict minerals. The objective of the certification initiative created by the International Conference on the Great Lakes Region was to create a “clean and transparent” supply chain from mines that operate in legally insecure areas wrecked by militia groups and army commanders with an illicit grip on minerals trade.

Vircoulon said that Burundi and the DRC were expected to follow Rwanda’s lead from April/May.

“If the governments of DRC, Burundi and others show willingness to address governance issues, the international community will certainly be ready to provide support.

Many governance issues have to be addressed to make the initiatives effective and the question on the table is how far the national authorities are prepared to go when it comes to reforming the administration of minerals trade,” Vircoulon told Mining Weekly Online.

Despite the successful demilitarisation of a significant number of combatants across the DRC, the government and its international partners continue to experience problems with disarmament, demobilisation and reintegration in North and South Kivu.

“It’s a matter of telling governments very bluntly that they either create a clean supply chain from the Kivus or find themselves partly out of business,” Vircoulon said.

While the US’s Dodd-Frank legislation compels America’s Securities and Exchange Commission (SEC) to impose disclosure and, in some instances, auditing requirements on publicly traded companies that use conflict minerals to manufacture their products, the SEC has still to publish the related regulations.

“It’s high time that the SEC does so because it’s leaving many companies in the dark,” he added.

The International Tin Research Institute has assisted with the implementation of the Rwanda process and electronics companies that are heavily exposed to conflict minerals have set up a conflict-free programme at smelter level.

The Organisation for Economic Cooperation and Development has designed the global guidelines for conflict free gold and the World Gold Council is due to issue its due diligence regulations to combat gold that enables, fuels or finances armed conflict.

Vircoulon reported that there was also discussion at World Bank level to support the formalisation of informal artisanal miners, of which there were more than two-million in the DRC alone.

South African-born Tincq CEO Brian Menell told Mining Weekly Online last year that while tagging and certification were tedious and expensive, their enforcement was having the desired affect in Rwanda.


Next meeting: Thursday April 19- 2012 at 3PM Central African Time.

2012 YES Network Elections

The YES Network is seeking applicants for 2012-2014 leadership roles. This is an exciting opportunity to be involved in the YES Network.

EXECUTIVE positions:
President (1)
Team Leaders (5)
Lead on 2015 YES Congress (1)
Secretary (1)

Visit www.networkyes.org for more information

Next meeting: Thursday April 19- 2012 at 3PM Central African Time.

Visit www.networkyes.org for more information

Examples for what this region may do is:
Create a geo-education portal in Africa
Publish reports about geo-education in Africa
Have a YES Africa geo-education awareness day

More details on the regional responsibility will be sent out to individual national representatives and the YES Africa members in the specific region.

we young people cannot wait until we are established professionals before we start engaging with others, nor can the other group of people delay in learning what we already understand about the environment therefore we need to start now

Find us on www.networkyes.org
10. “LUCY” SAW “ARDI”-LIKE KINS: New partial foot from Lucy’s times did not belong to a member of her species

Addis Ababa, ETHIOPIA: An international team of Ethiopian and American scientists conducting paleontological field research in the Woranso-Mille area of the Afar region of Ethiopia has announced the discovery of a 3.4 million-year-old partial foot that did not belong to a member of Lucy’s species, *Australopithecus afarensis*. The new specimen, a partial foot, was found in an area locally known as Burtele, located in the Mille District of Zone 1 of the Afar Regional State. The discovery and results from the initial analysis of this specimen will be published in the March 29, 2012 issue of the international scientific journal *Nature*. The lead author and Woranso-Mille project team leader Dr. Yohannes Haile-Selassie, Curator and Head of Physical Anthropology at the Cleveland Museum of Natural History, said “the Burtele partial foot clearly shows that at 3.4 million years ago, Lucy’s species was not the only hominin species roaming around what is now the Afar region of Ethiopia. Her kins had seen close relatives who were more adept at climbing trees like ‘Ardi’.” Lucy’s species lived from 2.9 million years ago to 3.8 million years ago.

Scientists have long argued that there was only one pre-human species between 3 and 4 million years ago. The new partial foot (BRT-VP-2/73) is the first incontrovertible evidence for the presence of at least two pre-human species (with different modes of locomotion) contemporaneously living in eastern Africa around 3.4 million years ago. While the first digit (big toe) of the foot in Lucy’s species, *Australopithecus afarensis*, was lined up with the other four digits for human-like bipedal walking, the Burtele foot had an opposable big toe like the earlier *Armidipes ramidus* and was probably a facultative biped when on the ground. Co-author Dr. Bruce Latimer of Case Western Reserve University said that it is now clear that the adaptation to terrestrial bipedality was not a single, isolated event. Rather, one group (Lucy’s species) totally relinquished the arboreal habitat and became functionally committed, long distance ground walkers while another group, represented by the Burtele foot, maintained a climbing foot and stayed, at least part-time in the trees. In hindsight, says Dr. Latimer, it is apparent which group succeeded.

The new partial foot has not been assigned to a species yet although it is similar in some of its morphology to the 4.4 million-year-old *Armidipes ramidus*. Dr. Haile-Selassie says that the lack of cranial and dental elements associated with the Burtele foot, and its much younger age, precludes its assignment to *Armidipes ramidus*.

**Discovery of the Burtele Partial Foot:**

The first piece (proximal half of a fourth metatarsal) was discovered on February 15, 2009, by Stephanie Mellilo (project member and former graduate student at Stanford University) eroding out of an unconsolidated sandstone horizon. The remaining half of this element was found on the surface about ten centimeters from the first piece. Further surface scraping and excavation resulted in the recovery of a total of eight elements of a right foot from one individual. These are a complete first metatarsal, a complete second metatarsal, the head of a third metatarsal, a complete fourth metatarsal, three proximal phalanges (rays 1, 2, and 4), and one intermediate phalanx (ray 2). The lack of the same element from the same side, placements of the recovery of each element, and preservation of the recovered specimens indicate that they are from a single foot.

**Location of the Discovery:**

The Burtele foot (BRT-VP-2/73) was found in the Woranso-Mille Paleontological Project study area located in the central Afar region of Ethiopia about 325 miles (520 kilometers) northeast of the capital Addis Ababa and 30 miles (50 kilometers) north of Hadar (“Lucy’s” site). Burtele is the local name for the area where the partial foot was found and it is located in the Mille district, Zone 1 of the Afar Regional State, 27 kilometers east of Mille town on the road to Chifra. This area is inhabited by the Afar people who are semi-nomadic.

**Geology and Age Determination:**

The Burtele locality, where the partial foot was found, is part of a rift basin in the Afar and has an interesting stratigraphy composed of several rock types. The Burtele partial foot was found eroding out from silty clay below sandstone, approximately 27 meters stratigraphically above a thin tuff, dated to 3.469 ± 0.008 Myr ago by the 40Ar/39Ar (“Argon-Argon”) method. The dating was conducted at the Berkeley Geochronology Center, Berkeley, California, by project member and co-author Dr. Alan Deino.

An approximate age for the partial foot was estimated using regional sediment accumulation rates in the older Woranso-Mille and younger Hadar areas yielding an age of 3.22 and 3.38 million years ago, respectively. These contrasting ages result from the lower estimated rate of deposition for the Woranso-Mille deposits and higher rate of deposition for the Hadar sediments. The combined rate of deposition from the two areas yields an age between 3.2 and 3.4 million years ago for the Burtele partial foot, more likely closer to the older age. Dr. Mulugeta Alene, geologist at the Addis Ababa University, project member and co-author of the paper said that the sedimentation at Burtele appears to show a transition from a claystone at the base to largely paleosol and cross-bedded sandstone at the top. This can be related to a deposition in a lake-like basin, perennial water body, and deltaic system, respectively, and the deposition of such variable lithology within short period of time is not uncommon particularly in a rift environment.

**Significance of the Discovery:**

1. The Burtele partial foot (BRT-VP-2/73) is the first incontrovertible fossil evidence to show the presence of more than one adaptively separated pre-human species between 3 and 4 million years ago: Scientists have long argued that there was only one pre-human species at any given time between 3 and 4 million years ago. When the 3.5 million-year-old Kenyanthropus platyops was named from Kenya in 2001, it was suggested by the discoverers that it indicated the presence of more than one species during the late Pliocene. However, some researchers doubted the validity of the species due to the distorted nature of the specimen assigned to the new species. The Burtele foot belongs to a species that does not match the contemporaneous *Australopithecus afarensis* in its morphology and inferred locomotor adaptations.

2. The Burtele partial foot (BRT-VP-2/73) shows the persistence of *Armidipes ramidus*-like locomotor adaptation into the late Pliocene: At 4.4 million years ago, *Armidipes ramidus*, with its divergent great toe, surprised the scientific community by showing that all human ancestors after the split from the common ancestor they shared with chimpanzees did not have modern humanlike foot morphology. However, at 3.7 million years ago, Lucy’s species, *Australopithecus afarensis*, had developed humanlike foot morphology as seen from the fossil foot elements of the species from Hadar, Ethiopia, and footprints from Laetoli, Tanzania. The presence of a species with *Armidipes ramidus*-like locomotor adaptation at 3.4 Million years ago indicates that locomotor adaptations during the earlier parts of human evolution were more diverse and such diversity persisted longer than previously thought.

3. The Burtele partial foot (BRT-VP-2/73) generates new information on the foot morphology and metatarsal ratios of the earliest human ancestors: The forefoot (metatarsals and phalanges) of early human ancestors is poorly preserved in the fossil record due to its fragility, predator activity, and various agents in the fossilization process. As a result, metatarsal length ratios are poorly understood for early human ancestors. BRT-VP-2/73 is the first fossil specimen to preserve metatarsals of both the second and fourth digits. Monkeys and Mioene apes have a fourth metatarsal longer than the second metatarsal. The Burtele foot is similar to monkeys and some Mioene apes in this ratio. In humans, the second metatarsal is longer than the fourth. This ratio is unknown in *Armidipes* and *Australopithecus* and hence its significance cannot be accurately assessed although a fourth metatarsal longer than the second is more likely to be the primitive condition for the human lineage.

**The Woranso-Mille Project:**

The Woranso-Mille Paleontological project conducts field and laboratory work in Ethiopia every year. This multidisciplinary project, initiated in 2004, is led by Dr. Yohannes Haile-Selassie of the Cleveland Museum of Natural History and Dr. Bruce Latimer of Case Western Reserve University, Cleveland.
Ohio. Participants of the project include scientists from Ethiopia, the United States of America, France, Spain, and Sweden. These scientists specialize in various subdisciplines of geology and paleontology. Graduate and undergraduate students from Ethiopia and the United States of America also participate in the field and laboratory activities of the project.

Support:
The Authority for Research and Conservation of Cultural Heritage (ARCCH) annually issues fieldwork research permit to the Woranso-Mille project. The National Museum of Ethiopia and the Directorate of Collections, Curation, and Laboratory Services of ARCCH provided laboratory research facility and fossil storage space.

Field and laboratory work conducted by the Woranso-Mille project through the years were supported by grants from the National Science Foundation (Physical Anthropology program; BCS-0234320, BCS-0321893, BCS-0542037 and BCS-1124705), The Leakey Foundation, and The National Geographic Society. The first few years of field and laboratory research were also partially supported by the Wenner-Gren Foundation. MA also received support from the Fulbright Program of the Bureau of Educational and Cultural Affairs of the US Department of State.

(info contained in an email from Girma Woldeyitnas, 2102.03.28)

11. Geologists Correct a ‘Rift’ in Africa

ScienceDaily (Mar. 26, 2012) - The huge changes in Earth’s crust that influenced human evolution are being redefined, according to research published March 26 in Nature Geoscience.

The Great Rift Valley of East Africa -- the birthplace of the human species -- may have taken much longer to develop than previously believed.

"We now believe that the western portion of the rift formed about 25 million years ago, and is approximately as old as the eastern part, instead of much younger as other studies have maintained," said Michael Gottfried, Michigan State University associate professor of geological sciences. "The significance is that the Rift Valley is the setting for the most crucial steps in primate and ultimately human evolution, and our study has major implications for the environmental and landscape changes that form the backdrop for that evolutionary story."

Gottfried worked with an international team led by Eric Roberts at Australia’s James Cook University who added that the findings have important implications for understanding climate change models, animal evolution and the development of Africa’s unique landscape.

The Rukwa Rift (a segment of the western branch) is an example of a divergent plate boundary, where Earth’s tectonic forces are pulling plates apart and creating new continental crust. The East African Rift system is composed of two main segments: the eastern branch that passes through Ethiopia and Kenya, and a western branch that forms a giant arc from Uganda to Malawi, interconnecting the famous rift lakes of eastern Africa.

Traditionally, the eastern branch is considered much older, having developed 15 to 25 million years earlier than the western branch.

This study provides new evidence that the two rift segments developed at about the same time, nearly doubling the initiation age of the western branch and the timing of uplift in this region of East Africa.

"A key piece of evidence in this study is the discovery of approximately 25 million-year-old lake and river deposits in the Rukwa Rift that preserve abundant volcanic ash and vertebrate fossils," Roberts said.

These deposits include one of the earliest anthropoid primates yet found in the rift, added Nancy Stevens of Ohio University.

The findings imply that around 25 to 30 million years ago, the broad uplift of East Africa occurred and re-arranged the flow of large rivers such as the Congo and the Nile to create the distinct landscapes and climates that mark Africa today.

At http://www.sciencedaily.com/releases/2012/03/120326160913.htm?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+science daily%2FEarth+climate%23ScienceDaily%3A+Earth%26Climate+News%29

12. Fossil Raindrop Impressions Imply Greenhouse Gases Loaded Early Atmosphere

ScienceDaily (Mar. 28, 2012) - In ancient Earth history, the sun burned as much as 30 percent dimmer than it does now. Theoretically that should have encased the planet in ice, but there is geologic evidence for rivers and ocean sediments between 2 billion and 4 billion years ago.

Scientists have speculated that temperatures warm enough to maintain liquid water were the result of a much thicker atmosphere, high concentrations of greenhouse gases or a combination of the two.

Now University of Washington researchers, using evidence from fossilized raindrop impressions from 2.7 billion years ago to deduce atmospheric pressure at the time, have demonstrated that an abundance of greenhouse gases most likely caused the warm temperatures.

Their work, which has implications for the search for life on other planets, is published March 28 in Nature.

"Because the sun was so much fainter back then, if the atmosphere was the same as it is today the Earth should have been frozen," said lead author Sanjoy Som, a postdoctoral researcher at NASA's Ames Research Center, Mountain View, Calif., who conducted the research as part of his UW doctoral work in Earth and space sciences.

He and his coauthors -- David Catling and Roger Buick of UW Earth and space sciences; Jeltje Hammeijer, a UW graduate student in civil engineering -- set out to determine how the ancient atmosphere differed from that of today.

Knowing the atmospheric pressure of a given period can help scientists understand in better detail the overall nature of the atmosphere at that time. For example, substantially higher pressure would be needed for a phenomenon called "pressure broadening," which allows existing greenhouse gases to absorb more radiation and warm the planet. That has been speculated as a reason for the warmer conditions on ancient Earth.

But precise measurements of atmospheric pressure date only from the invention of the barometer in 1644. The new work allowed the scientists to determine limits of ancient air pressure by comparing raindrop impressions from today with the fossilized impressions from a time when there were no plants or animals on Earth but the planet was teeming with microbes.

More at http://www.sciencedaily.com/releases/2012/03/120328135928.htm?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+science daily%2FEarth+climate%23ScienceDaily%3A+Earth%26Climate+News%29
13. Wits answers urgent call for Africa-based mining research

By: Martin Creamer, 28th March 2012. JOHANNESBURG (miningweekly.com) – The University of the Witwatersrand had commenced with a strategy of establishing a large-scale world-class institute for mining, minerals and exploration research, its vice-chancellor and principal Professor Loyiso Nongxa said on Wednesday night.

Speaking at a function to mark the 90th anniversary of the university's founding in 1922, Nongxa said South Africa would be hearing more about the institute in the months ahead.

"This is just a whetting of your appetite," he remarked, shortly after unveiling the magnificent Unknown Miner bronze sculpture by Herman Wald.

The vice-chancellor did so in the presence of many dignitaries, including Chamber of Mines of South Africa CEO Bheki Sibiya and National Planning Commissioner, Bobby Godsell, the former CEO of AngloGold Ashanti, who was the keynote speaker.

Godsell said, however, that he did not think that the Unknown Miner sculpture was adequate recognition of the cost in blood and human lives of South African miners and more appropriate would be a structure like the Vietnam War Memorial, which honoured by name each of the more than 50 000 American troops who died in Vietnam.

"I would not like the Chamber of Mines to think that today is a complete recognition of the human cost of the mining industry’s contribution to South Africa," he said.

Wits School of Mining Engineering head Professor Fred Cawood explained to Mining Weekly Online that the aim of the new mining research institute would be to fill the current gap by advancing patents to prototype developments.

"It will enable us to give meaning to the 'D' in 'R&D'. What we are good at is the ‘R’ part and one of the fundamental objectives will be to ensure that we also become good at the ‘D’ part," Cawood said.

Earlier Godsell had recalled that South Africa was once a centre of thought leadership in the gold- and diamond-mining industries.

"South Africa is the country that pioneered the deepest level, narrowest vein and hardest rock mining in human history. It was also at the forefront of a succession of metallurgical revolutions and a thought leader in geology," Godsell added.

Wits University continued to be the largest mining engineering department in the English-speaking world and Wits together with the University of Pretoria enrolled more first-year mining engineering students than Australia, New Zealand, Canada and the US.

Nongxa revealed to Mining Weekly Online that Wits' proposed new mining research institute, which had still to be formally named, was a response to the serious decline in mining-related research in South Africa, which had resulted in South African mining companies having to go abroad to resolve local problems.

The university had identified the most pertinent and strongest of its research areas and had commenced with a strategy to build them aggressively into a limited number of large-scale world-class research institutes, five of which would be outside of mining.

He added that there were several important factors that pointed to the urgent need for a substantively increased and improved Africa-based mining research effort.

While much of the mining research that was carried out on other continents had application to African conditions, it could seldom be successfully applied without taking account of the particular mining environment in South Africa and the rest of Africa.

There was an urgent need in African countries for the development of increasing numbers of university-trained postgraduates able to participate at the highest levels within the mining sector.

There was also an unprecedented need for advanced research within the mining industry and, in turn, support for that research.

The mining industry the world over was being reshaped by the now indisputable pressure on companies to adhere to sustainability requirements – people, planet and profits, the triple bottom line.

What Wits was planning was an Africa-based institute of research and postgraduate training in multiple disciplines that would address the need "with a sensitivity to and an understanding of African conditions".

Cawood described Professor Nielen van der Merwe of the Wits School of Mining Engineering as a leading protagonist of Wits' upcoming mining research institute, which was expected to be formally launched on July 10.

Godsell pointed out that Wits' roots were firmly embedded in mining, having developed from the South African School of Mines in Kimberley in 1896 and then being established formally as the University of the Witwatersrand in 1922.

Unknown Miner

In the late 1950s, Harry Oppenheimer commissioned Wald to create two memorial works to celebrate the life and achievement of his father, Sir Ernest Oppenheimer, one in Kimberley and the other in Johannesburg.

The prototype of the miner was originally submitted in plaster to form a group of three miners holding up a sieve. Oppenheimer decided to use five smaller figures and the prototype was modified slightly and reduced in size.

The five figures form the Diamond Diggers Fountain installed in Kimberley in 1959, comprising a group of five miners holding up a sieve.

The Unknown Miner artwork is a casting of one of the five miners and stands at the east entrance of the newly renovated Chamber of Mines building that partially houses Wits Faculty of Engineering and the Built Environment, headed by Professor Beatrys Lacquet.

The outstretched arms and muscular ripping of the body provide a reminder of the important contribution of the mining industry.

It has been donated to Wits by Louis Wald, the son of the sculptor.

The second work by Wald, called Stampede – a group of 18 impala forming an arch over a fountain – was donated to the City of Johannesburg and now stands in Main street, which serves as the base for several mining houses.

The roll of honour in a brochure handed out to mark the 90th anniversary of the university bears the names of mining luminaries that include the Glencore-Xstrata merger high-flier Ivan Glasenberg, African Rainbow Minerals executive chairperson Patrice Motsepe and Northam Platinum chairperson Lazarus Zim.

Edited by: Creamer Media Reporter. At http://www.miningweekly.com/article/wits-2012-03-28

ScienceDaily (Mar. 30, 2012) — Two new studies into the “plumbing systems” that lie under volcanoes could bring scientists closer to predicting large eruptions.

International teams of researchers, led by the University of Leeds, studied the location and behaviour of magma chambers on Earth’s mid-ocean ridge system — a vast chain of volcanoes along which Earth forms new crust.

They worked in Afar (Ethiopia) and Iceland — the only places where mid-ocean ridges appear above sea level. Volcanic ridges (or “spreading centres”) occur when tectonic plates “rift” or pull apart. Magma (hot molten rock) injects itself into weaknesses in the brittle upper crust, erupting as lava and forming new crust upon cooling.

Magma chambers work like plumbing systems, channelling pressurised magma through networks of underground “pipes.”

The studies, published in Nature Geoscience, reveal new information about where magma is stored and how it moves through the geological plumbing network. Finding out where magma chambers lie and how they behave can help identify early warning signs of impending eruptions.

Scientists used images taken by the European Space Agency satellite Envisat to measure how the ground moved before, during and after eruptions.

Using this data, they built and tested computer models to find out how rifting occurs.

Data in one study showed magma chambers that fed an eruption in November 2008 in the Afar rift of Northern Ethiopia were only about 1 km below the ground. The standard model had predicted a depth of more than 3 km.

It is highly unusual for magma chambers to lie in shallow depths on slow spreading centres such as the Afar rift, where tectonic plates pull apart at about the same speed as human fingernails grow.

Dr Carolina Pagli from the University of Leeds’ School of Earth and Environment, who led the study, says: "It was a complete surprise to see that a magma chamber could exist so close to the Earth’s surface in an area where the tectonic plates move apart so slowly. The results have changed the way we think about volcanoes."

Dr Pagli also noticed that the ground started “uplifting” (elevating) four months before the eruption, due to new magma increasing pressure in one of the underground chambers. Understanding these precursory signals is fundamental to predicting eruptions.

A wider study of eruptions in Afar and Iceland, two vastly different environments, found remarkable similarities. Many events occurred within a short space of time. Researchers identified multiple magma chambers positioned horizontally and vertically, allowing magma to shoot in several directions.

Moving magma triggered earthquakes, and separate magma chambers fed single eruptions.

The 2008 eruption is part of an unusual period of recent volcanic unrest in Ethiopia, and is enabling scientists to learn more about volcanoes at spreading centres. Most spreading centres are under 2 km of water at the bottom of the ocean, making detailed observations extremely challenging.

The new knowledge derived from Ethiopian volcanoes will help scientists understand volcanoes in Iceland, where eruptions can have a bigger impact on the UK.

Dr Tim Wright from the School of Earth and Environment, who leads the international Afar Rift Consortium, said: "The dramatic events we have been witnessing in Afar in the past six years are transforming our understanding of how the crust grows when tectonic plates pull apart. Our work in one of the hottest place on Earth is having a direct impact on our understanding of eruptions from the frozen volcanoes of Iceland."

At http://www.sciencedaily.com/releases/2012/03/120330111023.htm?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+science
daily%2Fearth_climate+%28ScienceDaily%29+%28Earth+%26+Climate+News%29

15. Ghanaian journalists call for more science coverage

Maxwell Awumah, 11 April 2012. [ACCRA] Many journalists in Ghana want to see a significant increase in science reporting over the next decade, but say that significant obstacles are preventing this from happening, according to a new survey.

The survey results were published in the Journal of Science Communication last month (16 March), and are based on responses to a questionnaire from more than 150 Ghanaian journalists.

Eighty percent of the respondents said there was a need for greater public literacy about science, and that increasing the amount of science coverage would lead to better science outcomes for the country, according to the lead author, Bernard Appiah.

Despite the growth of interest in science journalism in recent decades, Appiah said many journalists in Ghana struggled to get access to researchers, and in particular to obtain contact information for scientists they wished to interview.

Appiah - director of the Centre for Science and Health Communication (CShC), a non-profit Ghanaian organisation that promotes public engagement with science - said this reflected a broader problem in Ghana, where both scientists and journalists have little access to formal science communication training.

"There is no such course as ‘science journalism’ in Ghana – or in most African countries – and this should change if science journalism in Africa is to occupy its appropriate niche," he said. There was also little formal training available to enable researchers or journalists to communicate about science with each other, or with the public, he said.

Appiah said many journalists surveyed also reported high levels of "mistrust between scientists and journalists". This was reflected in a reluctance of scientists – especially those working in the public sector – to be interviewed. Appiah said the CShC is working to improve the situation by setting up online expert databases – including contact details – to help journalists reach researchers they want to speak to.

A pilot database of health professionals has been established for journalists who have been trained in health reporting, and in the long term, Appiah said there were plans to expand the database to other disciplines. Although Wellcome Trust funding for the project is due to expire later this year, he said the Centre is investigating other potential income streams to continue operating and expanding.

Bright Blewu, secretary-general of the Ghana Journalists’ Association (GJA), said science reporting in Ghana was inadequate because many newsrooms had not specialised science reporters, and many scientific achievements received little or no publicity.

George Essegbey, director of the Science and Technology Policy Research Institute at Ghana’s Centre for Scientific and Industrial Research, said a collaboration between the Research Scientists Association, the GJA and the Ghana Academy of Arts and Sciences (GAAS) could provide additional impetus to increase science coverage.

Link to full article: http://jcom.sissa.it/archive/11/01/Jcom1101%282012%29C01/Jcom1101%282012%29C04/Jcom1101%282012%29C04.pdf
16. Poor Spring Rain Projected in Africa
ScienceDaily (Apr. 12, 2012) — Spring rains in the eastern Horn of Africa are projected to begin late this year and be substantially lower than normal. From March-May, the rains are expected to total only 60 to 85 percent of the average rainfall in this region. This is a significant deterioration compared to earlier forecasts.

Lower rain amounts would have significant impacts on crop production, rangeland regeneration for livestock, and replenishment of water resources. This would put greater stress on the region, particularly Somalia which is still recovering from a famine declared last year, as well as Kenya and Ethiopia which also experienced a severe food crisis. An increase in food insecurity and in the size of the food insecure population is likely.

The State Department released a statement on this forecast and their intent to provide additional funding to aid refugees and drought-affected communities.

Famine Early Warning Systems Network
The rainfall projections were completed by the Famine Early Warning Systems Network (FEWS NET), which helps target more than $1.5 billion of assistance to more than 40 countries each year. FEWS NET monitors high risk areas of the developing world with the most food insecurity, identifying critical situations in which food aid will be needed.

FEWS NET is sponsored and led by the U.S. Agency for International Development (USAID) Office of Food for Peace. Implementing partners include the U.S. Geological Survey (USGS), Chemonics International, Inc., National Aeronautics and Space Administration (NASA), National Oceanographic and Atmospheric Administration (NOAA), and the U.S. Department of Agriculture (USDA).


17. Forum hears proposals for African science foundation
ESTHER NAKKAZI; 3 April 2012; [NAIROBI] Scientists at an all-Africa meeting on science, technology and innovation underway in Kenya have put forward a range of proposals to improve science funding for the continent — including the creation of a science foundation or fund modelled on the likes of US National Science Foundation.

Delegates at the first Africa Forum on Science, Technology and Innovation for Youth Employment, Human Capital Development and Inclusive Growth (1–3 April) heard that that a continental foundation would enable bold, innovative ideas to be developed and scaled up more easily.

Alfred J. Watkins, the executive chairman of the Global Innovation Summit, said any African Foundation "could probably benefit a great deal from the lessons of experience generating by [the] 'Rising Stars' model," which is funded by the Canadian government as part of the Grand Challenges Canada programme.

Rising Stars provides grants worth 100,000 Canadian dollars to innovators from low- and medium-income countries, for research into persistent health challenges in the developing world.

It also includes an "angels' club", which sources funding and mentors for researchers, and a procurement process, through which the private sector purchases innovations for large-scale dissemination or manufacture.

"We did this because there is so much talent in opportunities in these countries, so many innovations that can offer solutions to make an impact," Peter Singer, chief executive officer of Grand Challenges Canada, told SciDev.Net.

"It would be the ideal model to build upon. We are at the conference to create partnerships and to try and scale up through the private sector." Watkins said an African fund could organise a competition whereby "virtual multi-disciplinary teams of African scientists from more than one African country" could vie for research grants.

He acknowledged there would be challenges in measuring the impact of research across the continent in terms of the number jobs or entrepreneurs established, or the number of scientific articles and patents produced.

He suggested that funding could be provided by such institutions as the Africa Development Bank.

An official from the African Development Bank who declined to be named told SciDev.Net that the bank is not yet ready to fund an African continental foundation yet, noting that the proposal needed further discussion and the selection of a viable model by the region’s scientific community.

Other scientists at the forum suggested a regional rather than continental structure for a foundation, to reduce costs and linguistic challenges. Some also suggested it should be chaired or hosted on a rotating basis.

But some researchers warned against any haste moves to establish a foundation.

"I think we need to take stock of what we have before we think of a foundation," said Alfred van Kent, director of National Research, Science, Technology and Innovation in Namibia. "What have we done right, what is not working, where are the gaps? Maybe it is a matter of tweaking the alignment and everything falls in place."

Separately, concern was expressed on the second day of the conference that today's ministerial meeting might not generate sufficient concrete outcomes.

"In the last decade there have been at least five Ministerial conferences on ST&I with lofty resolutions. It is my sincere hope that this meeting will not suffer the same fate as its predecessors," said Dzingai Mutumbuka, chairman of the Association for the Development of Education in Africa.

"The takeaway here is that it is time that we, Africans, moved away from lofty conference resolutions to implementation, implementation, implementation," he said.


18. Canary Islands: The Base of the Teide Was Formed in Just 40,000 Years

ScienceDaily (Apr. 13, 2012) — A European research team, led by a Spanish scientist, shows for the first time how the Teide-Pico Viejo stratovolcano on the Canary Islands was formed and how long it took.

Until now there had been several hypotheses about how the depression in the Las Cañadas Caldera was formed, in which the Teide (3,718 metres) and Pico Viejo (3,135 metres) volcanoes rose on the island of Tenerife. A new study confirms that the caldera was formed as a result of a tectonic movement, and most of the load valley filling, which is the base of the stratovolcano, was produced in a period of 40,000 years.

"On a geological scale, this is a very short period of time," Vicente Soler, a researcher at the Volcanological Station of the Canary Islands and coordinator of the study that was published in Geomorphology, said. This new dating was possible because scientists have had underground access to the first lava emitted since the movement for the first time.

The team of scientists collected over a hundred samples to find out when the movement occurred, i.e., 180,000 years ago. According to the results, the
The 'hole' in which the Teide arose

The movement caused a 'gap', which is the large depression in the caldera. In the same area of the Canary Island "the Teide volcano grew as a geological response" the researcher stated.

During recent decades, the geological cause of this depression has sparked scientific controversy. Until now there were two plausible hypothesis of the origin of these depressions, both for the Cañadas del Teide and for the Güimar and Orotava valleys.

The first hypothesis attributes its formation to a sinking after an eruption that emptied the magma chamber, creating the gap in the caldera. After several investigations, the second hypothesis, that a landslide from the north of the island towards the sea was confirmed as the cause of the depression. The area is now surrounded by vertical walls (except for the upper part) which would be the "scar caused by the big movement," Soler confirmed.

As time passed, the big dip was filled and formed the Teide, which became the highest peak in Spain as a result of "nature's fanciful whim," an eruption "that occurred in the 14th century" the geophysicist forecast.

More at http://www.sciencedaily.com/releases/2012/04/120413101117.htm

19. South Africa and Australasia may have to 'share' SKA

David Dickson, 10 April 2012. Speculation is growing that South Africa and Australia may be asked to join forces in building and operating the Square Kilometre Array – the world's most powerful radio telescope – following a decision last week to delay an announcement on where it will ultimately be based.

Scientists hope the telescope will help answer fundamental questions about the universe, including its origin and evolution, and whether it contains life beyond our planet.

Both countries had previously been asked to submit separate bids for the telescope, which is likely to cost at least $US2 billion, and whose 3,000 receptors have been designed to make the telescope 50 times more sensitive to radio waves than any existing facility.

The SKA Organisation – the international consortium responsible for the project – had been due to announce which bid had been successful last week, but at the end of a two-day meeting in the Netherlands, it issued a statement on 4 April saying that its members had recognised that it was "desirable to maintain an inclusive approach".

The statement added that the members considered it to be "important to maximise the value from the investments made by both candidate host regions". As a result, a small scientific working group has been set up "to explore possible implementation options that would achieve this".

Officials from the organisation have declined to elaborate further or to provide any further details on what these options might be, citing the need to keep the negotiations confidential.

One possibility that has been raised is that receptors built in South Africa, Australia and New Zealand – which is a partner to the Australian bid – might be programmed to operate jointly.

However other commentators question whether the two sets of receptors can look at the same part of the sky simultaneously, given that Australia and South Africa are on opposite sides of the Southern hemisphere.

Unconfirmed reports in the Australian media have suggested that a panel of scientific experts had given their preference to the South Africa bid, which would involve building receiving stations in at least eight other African nations.

South Africa's Science Ministry has strongly rejected suggestions that this option represented a "sympathy decision". Officials insist the country has the capacity to host the facility, and supporters of the South African bid have also emphasised the potential role of the SKA project to boost the image of science and technology in Africa.

In an interview with SciDev.Net last year, the director of the South African bid, Bernie Fanaroff, described the importance of the SKA project for its potential to create "a significant legacy of skills and be a continuing attraction for young people in Africa to enter careers in science and technology".

However the South African Ministry of Science and Technology has been quoted as describing accusations that such arguments had been used to sway the site adjudication process as "a not very subtle attempt to undermine [its] scientific and technical rigour".

A final decision on the choice of the site is now due to be announced next month.


20. Other stories!!!


NEWS OF/ON THE REST OF THE WORLD

21. West Antarctic Ice Shelves Tearing Apart at the Seams

ScienceDaily (Mar. 27, 2012) — A new study examining nearly 40 years of satellite imagery has revealed that the floating ice shelves of a critical portion of West Antarctica are steadily losing their grip on adjacent bay walls, potentially amplifying an already accelerating loss of ice to the sea.

The most extensive record yet of the evolution of the floating ice shelves in the eastern Amundsen Sea Embayment in West Antarctica shows that their margins, where they grip onto rocky bay walls or slower ice masses, are fracturing and retreating inland. As that grip continues to loosen, these already-thinning ice shelves will be even less able to hold back grounded ice upstream, according to glaciologists at The University of Texas at Austin's Institute for Geophysics (UTIG).

Reporting in the Journal of Glaciology, the UTIG team found that the extent of ice shelves in the Amundsen Sea Embayment changed substantially between the beginning of the Landsat satellite record in 1972 and late 2011. These changes were especially rapid during the past decade. The affected ice shelves include the floating extensions of the rapidly thinning Thwaites and Pine Island Glaciers.

"Typically, the leading edge of an ice shelf moves forward steadily over time, retreating episodically when an iceberg calves off, but that is not what happened along the shear margins," says Joseph MacGregor, research scientist associate and lead author of the study. "An iceberg is said to calve when it breaks off and floats out to sea."

"Anyone can examine this region in Google Earth and see a snapshot of the same satellite data we used, but only through examination of the whole satellite record is it possible to distinguish long-term change from cyclical calving," says MacGregor.

The shear margins that bound these ice shelves laterally are now heavily rifted, resembling a cracked mirror in satellite imagery until the detached icebergs finally drift out to the open sea. The calving front then retreats along these disintegrating margins. The pattern of marginal rifting and retreat is hypothesized to be a symptom, rather than a trigger, of the recent glacier acceleration in this region, but this pattern could generate additional acceleration.

"As a glacier goes afloat, becoming an ice shelf, its flow is resisted partly by the margins, which are the bay walls or the seaways where two glaciers merge," explains Ginny Catania, assistant professor at UTIG and co-author of the study. "An accelerating glacier can tear away from its margins, creating rifts that negate the margins' resistance to ice flow and causing additional acceleration."

The UTIG team found that the largest relative glacier accelerations occurred within and upstream of the increasingly rifted margins.

The observed style of slow-but-steady disintegration along ice-shelf margins has been neglected in most computer models of this critical region of West Antarctica, partly because it involves fracture, but also because no comprehensive record of this pattern existed. The authors conclude that several rifts present in the ice shelves suggest that they are poised to shrink further

At http://www.sciencedaily.com/releases/2012/03/120327134356.htm?utm_source=feederburner&utm_medium=email&utm_campaign=Feed%3A+science_daily%2Fearth_climate+%28ScienceDaily%3A+Earth+%26+Climate+News%29

22. Iran starts $1-bn project to bring water to desert

by Staff Writers, Tehran (AFP) April 16, 2012. Iran on Monday officially launched a $1-billion first phase of an ambitious project to pump water from the Caspian Sea to a city in its vast and expanding central desert, state media reported.

The initial phase will see a desalination plant and pipes built over the next two years to supply water to the desert city of Semnan, population 200,000, according to officials.

"The desert is growing... therefore we need to control its growth," said President Mahmoud Ahmadinejad.

President Mahmoud Ahmadinejad said in a speech in the northern city of Sari, near the Caspian shore.

The first phase would see water for drinking, irrigation and industrial use taken from the Caspian, treated to rid it of salt, and pumped to Semnan, 150 kilometres (90 miles) away to the south.

The first desalination plant to be built would have a capacity of 200 million cubic metres per year, or 548 million litres a day, according to Energy Minister Majid Namjou.

Khatam al-Anbiya group, the industrial arm of Iran's powerful military Revolutionary Guards which has interests in key economic sectors, is handling work on the project.

Later, two other phases are planned that would pump more water into desert areas from the Caspian Sea and from the Gulf, the media said.

Iran has operated several other desalination plants for decades for other regions.

Such seawater treatment facilities are also in use in other wealthy and arid Middle East countries, including the United Arab Emirates, Saudi Arabia and Israel, to augment scarce water supplies.

http://www.terradaily.com/reports/Iran_starts_1bn_project_to_brin_water_to_desert_999.html

23. New Evidence That Comets Deposited Building Blocks of Life On Primordial Earth

ScienceDaily (Mar. 27, 2012) — New research reported in San Diego on March 27 at the 243rd National Meeting & Exposition of the American Chemical Society (ACS) provides further support for the idea that comets bombarding Earth billions of years ago carried and deposited the key ingredients for life to spring up on the planet.

Jennifer G. Blank, Ph.D., who led the research team, described experiments that recreated with powerful laboratory "guns" and computer models the conditions that existed inside comets when these celestial objects hit Earth's atmosphere at almost 25,000 miles per hour and crashed down upon the surface. The research is part of a broader scientific effort to understand how amino acids and other ingredients for the first living things appeared on a planet that billions of years ago was barren and desolate. Amino acids make up proteins, which are the workhorses of all forms of life, ranging from microbes to people.

"Our research shows that the building blocks of life could, indeed, have remained intact despite the tremendous shock wave and other violent conditions in a comet impact," Blank said. "Comets really would have been the ideal packages for delivering ingredients for the chemical evolution thought to have resulted in life. We like the comet delivery scenario because it includes all of the ingredients for life -- amino acids, water and energy."


Newsletter of the Geological Society of Africa (GSAF) — Nr. 04; April 2012 — Annum 2.
Comets are chunks of frozen gases, water, ice, dust and rock that astronomers have termed "dirty snowballs." These snowballs, however, may be 10 miles or more in diameter. Comets orbit the sun in a belt located far beyond the most distant planets in the solar system. Periodically, comets break loose and hurtle inward, where they may become visible in the sky.

Billions of years ago, however, swarms of comets and asteroids bombarded Earth with the remnants still visible as craters on the moon. Scientific evidence suggests that life on Earth began at the end of a period 3.8 billion years ago called the "late heavy bombardment" that involved both comets and asteroids. Before that, Earth was too hot for living things to survive. The earliest known fossils with evidence of life date from 3.5 billion years ago. So how could life originate so quickly when there was little evidence of water or the amino-acid building blocks for making proteins?

Blank and colleagues at the Bay Area Environmental Research Institute NASA/Ames Research Center, Moffett Field, Calif., set out to check whether amino acids could remain intact after a comet's descent through Earth's atmosphere. Previous analyses of comet dust samples returned to Earth by a NASA spacecraft eliminated any doubt that amino acids do occur in comets.

In one set of experiments, they used gas guns to simulate the enormous temperatures and powerful shock waves that amino acids in comets would experience on entering Earth's atmosphere. The gas guns, devices that weigh thousands of pounds, hit objects with high-pressure blasts of gas moving at supersonic speeds. They shot the gas at capsules filled with amino acids, water and other materials.

The amino acids did not break down due to the heat and shock of the simulated crash. Indeed, they began forming the so-called "peptide bonds" that link amino acids together into proteins. The pressure from the impact of the crash apparently offset the intense heat and also supplied the energy needed to create the peptides, she explained. In other experiments, Blank's team used sophisticated computer models to simulate conditions as comets collided with Earth.

Blank suggested that there may well have been multiple deliveries of seedlings of life through the years from comets, asteroids and meteorites.

At http://www.sciencedaily.com/releases/2012/03/120326160919.htm?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+science-daily%2FEarth+climate+%28ScienceDaily%3A+Earth+%26+Climate+News%29

24. Scientists Find Slow Subsidence of Earth's Crust Beneath the Mississippi Delta
ScienceDaily (Apr. 2, 2012) — Earth's crust beneath the Mississippi Delta sinks at a much slower rate than what had been assumed.

That's one of the results geoscientists report April 2 in a paper published in the journal Earth and Planetary Science Letters.

The researchers arrived at their conclusions by comparing detailed sea-level reconstructions from different portions of coastal Louisiana.

"The findings demonstrate the value of research on different facets of Earth system dynamics over long time periods," says Thomas Baerwald, geography and spatial sciences program director at the National Science Foundation (NSF). NSF's Directorates for Geosciences and for Social, Behavioral & Economic Sciences funded the research.

"The results provide valuable new insights about the factors that affect shorelines and other locations in the Gulf Coast area now and into the future," says Baerwald.

Our study shows that the basement underneath key portions of the Mississippi Delta, including the New Orleans area, has subsided less than one inch per century faster over the past 7,000 years than the more stable area of southwest Louisiana," says paper co-author Torbjörn Törnqvist of Tulane University.

The difference is much lower than previously believed.

"Other studies have assumed that a large portion of the Earth's crust underneath the Mississippi Delta subsided at least 30 times faster due to the weight of rapidly accumulating sediments in the delta," says Törnqvist.

The paper, co-authored by Tulane scientists Shi-Yong Yu and Ping Hu, reveals some good news for residents of the New Orleans area.

Large structures such as coastal defense systems could be relatively stable, provided they are anchored in the basement at a depth of 60-80 feet below the land surface.

Shallower, water-rich deposits subside much more rapidly.

However, the study also provides more sobering news.

"These subsidence rates are small compared to the rate of present-day sea-level rise from the Florida panhandle to east Texas," says Törnqvist.

"The rate of sea-level rise in the 20th century in this region has been five times higher compared to the pre-industrial millennium as a result of human-induced climate change," Törnqvist says.

Sea level has risen more than eight inches during the past century.

"Looking forward 100 years, our main concern is the continued acceleration of sea-level rise due to global warming, which may amount to as much as three to five feet," says Törnqvist.

"We can now show that sea-level rise has already been a larger factor in the loss of coastal wetlands than was previously believed."

At http://www.sciencedaily.com/releases/2012/03/120326160919.htm?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+science-daily%2FEarth+climate+%28ScienceDaily%3A+Earth+%26+Climate+News%29

25. Expedition to Undersea Mountain Yields New Information About Sub-Seafloor Structure
ScienceDaily (Mar. 26, 2012) - Scientists recently concluded an expedition aboard the research vessel JOIDES Resolution to learn more about Atlantis Massif, an undersea mountain, or seamount, that formed in a very different way than the majority of the seafloor in the oceans.

Unlike volcanic seamounts, which are made of the basalt that's typical of most of the seafloor, Atlantis Massif includes rock types that are usually only found much deeper in the ocean crust, such as gabbro and peridotite.

The expedition, known as Integrated Ocean Drilling Program (IODP) Expedition 340T, marks the first time the geophysical properties of gabbroic rocks have been successfully measured directly in place, rather than via remote techniques such as seismic surveying.

With these measurements in hand, scientists can now infer how these hard-to-reach rocks will "look" on future seismic surveys, making it easier to map geophysical structures beneath the seafloor.

"This is exciting because it means that we may be able to use seismic survey data to infer the pattern of seawater circulation within the deeper crust," says Donna Blackman of the Scripps Institution of Oceanography in La Jolla, Calif., co-chief scientist for Expedition 340T.

"This would be a key step for quantifying rates and volumes of chemical, possibly biological, exchange between the oceans and the crust."

More at http://www.sciencedaily.com/releases/2012/03/120326160919.htm?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+science-daily%2FEarth+climate+%28ScienceDaily%3A+Earth+%26+Climate+News%29
26. Scientists Refine Earth’s Clock: Some Events in Planet's History Happened More Recently Than Previously Thought

ScienceDaily (Mar. 29, 2012) - New research has revealed that some events in Earth’s history happened more recently than previously thought. Scientists from the British Geological Survey and the Massachusetts Institute of Technology, publishing recently in the journal Science, have refined the data used to determine how much time has passed since a mineral or rock was formed. They report uranium isotopic composition of minerals, used to date major geological events, which are more accurate than previously published. The major effect of this is to reduce previous age determinations by up to 700,000 years.

Minerals naturally capture uranium when they form, which in turn undergoes a chain of radioactive decays to other elements, ending with lead. This new research has shown that, by more accurately measuring the relative amount of the uranium isotopes 238U and 235U, we now have a better understanding of how much time has passed since a mineral or rock has formed.

A major effect of this work will be to decrease all previous uranium-lead (U-Pb) age determinations, by up to 700,000 years for samples that are about 4.5 billion years old -- the age of Earth. In particular, the new 238U/235U ratio will allow geologists to place more accurate limits on the exact timing of a broad range of geological processes, from the initial formation of our planet, continents and economic mineral deposits, to past evolutionary events and climate change. Left: Uranium is purified from dissolved minerals. Right: 238U/235U is measured with a mass spectrometer.

Blair Schoene, a geologist from Princeton University said "This new determination will not only improve the accuracy of each U-Pb age but ultimately our understanding of events in Earth history."

For over 35 years, a 238U/235U ratio of 137.88 has been used to calculate U-Pb dates, from the oldest rocks that formed four billion years ago, to much younger rocks that are hundreds of thousands of years old. When scientists recently evaluated the measurements used to arrive at the 137.88 value, they came to a dead end: the value could not be traced back to standard units such as the kilogram.

This new study shows that many naturally occurring uranium-rich minerals, such as zircon, actually have a lower 238U/235U value with an average of 137.818 ±0.045 (the uncertainty assigned to this value relates to the variation observed between different samples).

Agreement between these results, other rocks, and meteorites indicate the new average 238U/235U value and uncertainty may also be representative of Earth's 'bulk' uranium isotopic composition.

At http://www.sciencedaily.com/releases/2012/03/120329141918.htm?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+science
daily%2FEarth_climate+&%28ScienceDaily%3A+Earth+%26+Climate+News%29

27. Satellite observes rapid ice shelf disintegration in Antarctic

April 5, 2012. One of the satellite’s first observations following its launch on 1 March 2002 was of break-up of a main section of the Larsen B ice shelf in Antarctica – when 3200 sq km of ice disintegrated within a few days due to mechanical instabilities of the ice masses triggered by climate warming.

Now, with ten years of observations using its Advanced Synthetic Aperture Radar (ASAR), Envisat has mapped an additional loss in Larsen B’s area of 1790 sq km over the past decade.

The Larsen Ice Shelf is a series of three shelves – A (the smallest), B and C (the largest) – that extend from north to south along the eastern side of the Antarctic Peninsula.

Larsen A disintegrated in January 1995. Larsen C so far has been stable in area, but satellite observations have shown thinning and an increasing duration of melt events in summer.

"Ice shelves are sensitive to atmospheric warming and to changes in ocean currents and temperatures," said Prof. Helmut Rott from the University of Innsbruck.

"The northern Antarctic Peninsula has been subject to atmospheric warming of about 2.5°C over the last 50 years – a much stronger warming trend than on global average, causing retreat and disintegration of ice shelves."

Larsen B decreased in area from 11512 sq km in early January 1995 to 6664 sq km in February 2002 due to several calving events. The disintegration in March 2002 left behind only 3463 sq km. Today, Envisat shows that only 1670 sq km remain.

Envisat has already doubled its planned lifetime, but is scheduled to continue observations of Earth’s ice caps, land, oceans and atmosphere for at least another two years.

This ensures the continuity of crucial Earth-observation data until the next generation of satellites – the Sentinels – begin operations in 2013.

"Long-term systematic observations are of particular importance for understanding and modelling cryospheric processes in order to advance the predictive capabilities on the response of snow and ice to climate change," said Prof. Rott.

"Climate models are predicting drastic warming for high latitudes. The Envisat observations of the Larsen Ice Shelf confirm the vulnerability of ice shelves to climatic warming and demonstrate the importance of ice shelves for the stability of glaciers upstream. "These observations are very relevant for estimating the future behaviour of the much larger ice masses of West Antarctica if warming spreads further south."

Radars on Earth observation satellites, such as Envisat’s ASAR, are particularly useful for monitoring polar regions because they can acquire images through clouds and darkness. The Sentinel missions – being developed as part of Europe’s Global Monitoring for Environment and Security (GMES) programme – will continue the legacy of radar observations.

Provided by European Space Agency. At http://phys.org/news/2012-04-satellite-rapid-ice-shelf-disintegration.html

28. New Mechanism of Past Global Warming? Thawing Permafrost 50 Million Years Ago Led to Global Warming Events

ScienceDaily (Apr. 4, 2012) - In a new study reported in Nature, climate scientist Rob DeConto of the University of Massachusetts Amherst and colleagues elsewhere propose a simple new mechanism to explain the source of carbon that fed a series of extreme warming events about 55 million years ago, the Paleocene-Eocene Thermal Maximum (PETM), and a sequence of similar, smaller warming events afterward.

"The standard hypothesis has been that the source of carbon was in the ocean, in the form of frozen methane gas in ocean-floor sediments," DeConto says. "We are instead ascribing the carbon source to the continents, in polar latitudes where permafrost can store massive amounts of carbon that can be released as CO2 when the permafrost thaws."

The new view is supported by calculations estimating interactions of variables such as greenhouse gas levels, changes in Earth’s tilt and orbit, ancient distributions of vegetation, and carbon stored in rocks and in frozen soil.
While the amounts of carbon involved in the ancient soil-thaw scenarios was likely much greater than today, implications of the study appear dire for the long-term future as polar permafrost carbon deposits have begun to thaw due to burning fossil-fuels, DeConto adds. "Similar dynamics are at play today. Global warming is degrading permafrost in the north polar regions, thawing frozen organic matter, which will decay to release CO₂ and methane into the atmosphere. This will only exacerbate future warming in a positive feedback loop."

He and colleagues at Yale, the University of Colorado, Penn State, the University of Urbino, Italy, and the University of Sheffield, U.K., designed an accurate model—elusive up to now—to satisfactorily account for the source, magnitude and timing of carbon release at the PETM and subsequent very warm periods, which now appear to have been triggered by changes i Earth's orbit.

Earth's atmospheric temperature is a result of energy input from the sun minus what escapes back to space. Carbon dioxide in the atmosphere absorbs and traps heat that would otherwise return to space. The PETM was accompanied by a massive carbon input to the atmosphere, with ocean acidification, and was characterized by a global temperature rise of about 5 degrees C in a few thousand years, the researchers point out. Until now, it has been difficult to account for the massive amounts of carbon required to cause such dramatic global warming events.

More at http://www.sciencedaily.com/releases/2012/04/120404133801.htm?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+sciedaily%2FEarth_climate+%28ScienceDaily%3A+Earth+%26+Climate+News%29

29. Greenland May Be Slip-Sliding Away Due to Surface Lake Melting

ScienceDaily (Apr. 16, 2012) - Like snow sliding off a roof on a sunny day, the Greenland Ice Sheet may be sliding faster into the ocean due to massive releases of meltwater from surface lakes, according to a new study by the University of Colorado Boulder-based Cooperative Institute for Research in Environmental Sciences.

Such lake drainages may affect sea-level rise, with implications for coastal communities, according to the researchers. "This is the first evidence that Greenland's 'supraglacial' lakes have responded to recent increases in surface meltwater production by draining more frequently, as opposed to growing in size," says CIRES research associate William Colgan, who co-led the new study with CU-Boulder computer science doctoral student Yu-Li Liang.

During summer, meltwater pools into lakes on the ice sheet's surface. When the water pressure gets high enough, the ice fractures beneath the lake, forming a vertical drainpipe, and "a huge burst of water quickly pulses through to the bed of the ice sheet," Colgan said.

The study was being published online April 16 by the journal Remote Sensing of the Environment.

The researchers used satellite images along with innovative feature-recognition software to monitor nearly 1,000 lakes on a Connecticut-sized portion of the ice sheet over a 10-year period. They discovered that as the climate warms, such catastrophic lake drainages are increasing in frequency. Catastrophic lake drainages were 3.5 times more likely to occur during the warmest years than the coldest years.

During a typical catastrophic lake drainage, about 1 million cubic meters of meltwater — which is equivalent to the volume of about 4,000 Olympic swimming pools — funnels to the ice sheet's underside within a day or two. Once the ice bed surface into a Slip 'N Slide, lubricating the ice sheet's glide into the ocean. This would accelerate the sea-level rise associated with climate change.

Alternatively, however, the lake drainages may carve out sub-glacial "sewers" to efficiently route water to the ocean. "This would drain the ice sheet's water, making less water available for ice-sheet sliding," Colgan said. That would slow the ice sheet's migration into the ocean and decelerate sea-level rise.

"Lake drainages are a wild card in terms of whether they enhance or decrease the ice sheet's slide," Colgan said. Finding out which scenario is correct is a pressing question for climate models and for communities preparing for sea-level change, he said.

For the study, the researchers developed new feature-recognition software capable of identifying supraglacial lakes in satellite images and determining their size and when they appear and disappear. "Previously, much of this had to be double-checked manually," Colgan said. "Now we feed the images into the code, and the program can recognize whether a feature is a lake or not, with high confidence and no manual intervention."

Automating the process was vital since the study looked at more than 9,000 images. The researchers verified the program's accuracy by manually looking at about 30 percent of the images over 30 percent of the study area. They found that the algorithm — a step-by-step procedure for calculations — correctly detected and tracked 99 percent of supraglacial lakes.

The program could be useful in future studies to determine how lake drainages affect sea-level rise, according to the researchers. CIRES co-authors on the study are Stefan Reeh, Waleed Abild Abdal, Juiliene Stroeve and Nicolas Bayou.

The study was funded by the Arctic Sciences Program of the National Science Foundation.

http://www.sciencedaily.com/releases/2012/04/120416135056.htm?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+sciencedaily%2FEarth_climate+%28ScienceDaily%3A+Earth+%26+Climate+News%29

30. Glass sponge as a living climate archive

April 5, 2012 (PhysOrg.com) -- Climate scientists have discovered a new archive of historical sea temperatures. With the help of the skeleton of a sponge that belongs to the Monorhaphis chuni species and that lived in the East China Sea for 11,000 years, an international team around scientists from the Max Planck Institute for Chemistry were now able to show that the deep ocean temperature changed several times over the past millennia. As isotopic and elemental analyses showed, the sea water temperature in the vicinity of the sponge increased at least once from less than two degrees Celsius to six to ten degrees Celsius. These temperature changes were not previously known and are due to eruptions of seamounts.

The deep sea is full of unknown creatures, but it is new to find one with which one can trace back thousand years of climate changes. Researchers at the Max Planck Institute for Chemistry in Mainz have now determined the age of a more than two meters long and one centimetre thick glass sponge to be about 11,000 years. It is among the longest living animal species existing today. From this animal's skeleton the researchers can also read how its environment and the climate changed during its life.

The team that included researchers from the Max Planck Institute for Chemistry in Mainz alongside researchers from China, and Switzerland, determined the age of the sponge needle, with the Latin name Monorhaphis chuni, based on the isotopic and elemental composition of its skeleton. It consists of silicon dioxide and is reminiscent of a glass fibre rod, made up of hundreds of fine lamellae which have grown annually like the rings of a tree from the inside outwards. The skeleton of the sponge was already found in 1986 at a depth of approximately 1,100 metres in the East China Sea. Here, these bizarre animals, which attach with one end to the seabed, continue to live today.

31. Initial Stages by Which Giant Gypsum Crystals Form

ScienceDaily (Apr. 5, 2012) — Gypsum is a naturally occurring mineral which is often used in industrial processes and which in nature, if left alone for thousands of years, can grow into huge translucent, towering and eerie, crystals more than 10 metres tall. These are famed for their beauty in places such as the Cave of Crystals in Mexico. Nevertheless, the formation of gypsum has until now been largely unexplored.

A study by researchers from the School of Earth and Environment at the University of Leeds and the Laboratorio de Estudios Cristalográficos CSIC-University of Granada found that gypsum starts off as tiny crystals of a mineral called bassanite. Most of us know this as Plaster of Paris as we use it in building, art-work, casts and fireproofing. Currently bassanite plaster is manufactured at a rate of 100 million tons per year by dehydrating quarried gypsum at 150 deg C. Builders, artists and medical specialists buy the bassanite powder and add water to create a malleable material that hardens once dried again.

By experimenting with supersaturated gypsum solutions, the researchers were able to produce bassanite at room temperature. This than transforms to gypsum.

Professor Liane G Benning from the University of Leeds said: "This process has never been documented before. In nature gypsum grows as these fantastic large crystals, yet we show that in the lab gypsum actually grows through the assembly of many, tiny bassanite crystals. These link together like a string of pearls before they crystallize to gypsum. We studied hundreds of high-resolution images and caught the tiny bassanite crystals in the act of assembling into gypsum" Their findings are published April 6 in the journal Science.

The lead author, Alexander van Driessche from the Laboratorio de Estudios Cristalográficos in Grenada said: "Our study shows a new, low cost and low temperature way of making bassanite, although so far we have only managed to keep it stable for up to one hour. * This finding may also be applicable for reducing the clogging of pipes and filters through the precipitation of gypsum during water desalination or oil production. It can cost millions of pounds to remove gypsum from a pipe -- a serious economic problem specifically for countries supplying much needed drinking water.

Prof. Juan Manuel Garcia Ruiz, the director of the Laboratorio de Estudios Cristalográficos in Granada said: "The study reveals how a natural mineral forming process can have important economic consequences for our daily lives. It also tells us how nature can make such beautiful and enormous crystals as seen in the caves at Naica or even the gypsum and bassanite, recently documented on Mars."

Finally, Prof. Benning said: "If we manage to produce and stabilize bassanite crystals at room temperature through a clean, green method for long periods, we don’t just learn something about a natural process but, compared to what is industry standard currently, our research could also lead to a massive cost and energy saving for the production of plaster.

At http://www.sciencedaily.com/releases/2012/04/120411120356.htm?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+science_daily%2FEarth+climate+%28ScienceDaily%3A+Earth+%26+Climate+News%29

32. Oldest-Ever Reptile Embryos Unearthed

ScienceDaily (Apr. 11, 2012) — Dating back 280 million years or so, the oldest known fossil reptile embryos have been unearthed in Uruguay and Brazil. They belong to the ancient aquatic reptiles, mesosaurs. The study of these exceptionally well-preserved fossils suggests that mesosaurs were either viviparous[1] (pushing back this mode of reproduction by 60 million years) or that they laid eggs in advanced stages of development.

These finds, published in the journal Historical Biology, were revealed by an international team including Michel Laurin, CNRS senior researcher at the Centre de Recherche sur la Paleobiodiversité et les Paléoenvironnements (CNRS/Museum national d’histoire naturelle/UPMC).

Although the oldest known adult amniote[2] fossils date back some 315 million years, very few collections of fossil eggs and embryos are available to paleontologists. The discovery by an international team including Michel Laurin, from the Centre de Recherche sur la Paleobiodiversité et les Paléoenvironnements (CNRS/Museum national d’histoire naturelle/UPMC), of fossilized embryos of mesosaurs, ancient aquatic reptiles that lived ca. 280 million years ago, sheds light on these animals’ reproductive mechanism.

In Brazil, the team uncovered a fossil specimen in gestation, which revealed that mesosaur embryos were retained in the uterus during most of their development. These reptiles, therefore, were probably viviparous[3].

In addition, the same researchers unearthed 26 adult mesosaur specimens in Uruguay, all of which were associated with embryos or very young individuals, dating from the same period as the Brazilian fossil. Although these more or less disarticulated specimens are difficult to interpret, most of them are probably embryos in the uterus, thus backing up the hypothesis that mesosaurs were viviparous. The largest of these fossils may be young animals that were looked after by at least one of the parents, pointing to the existence of parental care. However, one isolated mesosaur egg (see photograph below) was also found at the Uruguayan site. This find casts doubt on the hypothesis of viviparity (which, in theory, excludes the laying of eggs). It suggests that the Uruguay mesosaurs laid eggs at an advanced stage of development, which then hatched shortly afterwards (several minutes to days later).

This research therefore reveals the oldest known fossil amniote embryos from the Paleozoic (543 to 250 million years BP) and the first examples of embryo retention (and perhaps viviparity), pushing back this reproductive mechanism by some 60 million years. But do the reproductive characteristics of mesosaurs highlighted in this study reflect their aquatic way of life (since viviparity is frequent in aquatic reptiles), or was it rather a fairly widespread condition among early reptiles?

Notes:
(1) Animals that keep their embryos inside their bodies and give birth to their offspring.
(2) Amniotes are vertebrates whose embryo is surrounded by a membrane called the amniotic membrane: they include mammals and reptiles.

At http://www.sciencedaily.com/releases/2012/04/120411120356.htm
33. Copper Chains: Earth’s Deep-Seated Hold On Copper Revealed

ScienceDaily (Apr. 5, 2012) - Earth is clingy when it comes to copper. A new Rice University study recently published in the journal Science finds that nature conspires at scales both large and small -- from the realms of tectonic plates down to molecular bonds -- to keep most of Earth’s copper buried dozens of miles below ground.

"Everything throughout history shows us that Earth does not want to give up its copper to the continental crust," said Rice geochemist Cin-Ty Lee, the lead author of the study. "Both the building blocks for continents and the continental crust itself, dating back as much as 3 billion years, are highly depleted in copper."

Finding copper is more than an academic exercise. With global demand for electronics growing rapidly, some studies have estimated the world’s demand for copper could exceed supply in as little as six years. The new study could help, because it suggests where undiscovered caches of copper might lie.

But the copper clues were just a happy accident. "We didn’t go into this looking for copper," Lee said. "We were originally interested in how continents form and more specifically in the oxidation state of volcanoes."

Earth scientists have long debated whether an oxygen-rich atmosphere might be required for continent formation. The idea stems from the fact that Earth may not have had many continents for at least the first billion years of its existence and that Earth’s continents may have begun forming around the time that oxygen became a significant component of the atmosphere.

In their search for answers, Lee and colleagues set out to examine Earth’s arc magmas -- the molten building blocks for continents. Arc magmas get their start deep in the planet in areas called subduction zones, where one of Earth’s tectonic plates slides beneath another. When plates subduct, two things happen. First, they bring oxidized crust and sediments from Earth’s surface into the mantle. Second, the subducting plate drives a return flow of hot mantle upwards from Earth’s deep interior. During this return flow, the hot mantle not only melts itself but may also cause melting of the recycled sediments. Arc magmas are thought to form under these conditions, so if oxygen were required for continental crust formation, it would mostly likely come from these recycled segments.

"If oxidized materials are necessary for generating such slabs, we should see evidence of it all the way from where the arc magmas form to the point where the new continent-building material is released from arc volcanoes," Lee said.

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34. Eggs of enigmatic dinosaur discovered

April 10, 2012. (Phys.org) -- An Argentine-Swedish research team has reported a 70 million years old pocket of fossilized bones and unique eggs of an enigmatic birdlike dinosaur in Patagonia.

"What makes the discovery unique are the two eggs preserved near articulated bones of its hindlimb. This is the first time the eggs are found in a close proximity to skeletal remains of an alvarezsaurid dinosaur," says Dr. Martin Kundrát, dinosaur expert from the group of Professor Per Erik Ahlberg at Uppsala University.

The first Argentine-Swedish Dinosaur expedition and collaboration, Fernando Novas, F. Agnolin and J. Powell from Museo Argentino de Ciencias Naturales and Martin Kundrát was performed in December 2010.

The dinosaur represents the latest survivor of its kind from Gondwana, the southern landmass in the Mesozoic Era. The creature belongs to one of the most mysterious groups of dinosaurs, the Alvarezsauridae, and it is one of the largest members, 2.6 m, of the family. It was first discovered by Dr. J. Powell, but has now been described and named Bonapartenykus ultimus in honor of Dr. José Bonaparte who 1991 discovered the first alvarezsaurid in Patagonia.

"This shows that basal alvarezsaurids persisted in South America until Late Cretaceous times," says Martin Kundrát.

The two eggs found together with the bones during the expedition might have been the oviducts of the Bonapartenykus female when the animal perished. On the other hand numerous eggshell fragments later found show considerable calcite resorption of the inner eggshell layer, which suggest that at least some of the eggs were incubated and contained embryos at an advanced stage of their development.

Martin Kundrát analyzed the eggshells and found that it did not belong to any known category of the eggshell microstructure-based taxonomy. Hence, a new egg-family, the Arraigadoolithidae, was designated and named after the owner of the site where the specimen was discovered, Mr. Alberto Arraigada. Kundrát also made another discovery:

"During inspection of the shell samples using the electron scanning microscopy I observed unusual fossilized objects inside of the pneumatic canal of the eggshells. It turned out to be the first evidence of fungal contamination of dinosaur eggs," he says.

About Alvarezsaurid theropods: These were small (0.5-2.5 m) bipedal feathered dinosaurs known from Asia, North and South America. They had a bird-like skull, tiny teeth-carrying jaws, typical robust but considerably abbreviated forearms, and one of their manual digits that developed massive phalanges including enormous claw.


ScienceDaily (Apr. 11, 2012) -- Environmental policy has historically been driven by a demand-side mindset -- attempting to limit consumption of precious fossil fuels through pollution permits, taxation, and multi-national climate change treaties. However, new research from the Kellogg School of Management at Northwestern University suggests that actually buying coal, oil and other dirty fossil fuel deposits still in the ground could be a far better way to fight climate change.

The new study, "Buy Coal! A Case for Supply-Side Environmental Policy," suggests that the single best policy for a multi-national climate coalition is to...
purchase the extraction rights of dirty fossil fuels in non-participating countries (also called "third countries"), and then conserve rather than exploit the deposits. According to the study's author, Bard Harstad, this would be a radical departure from the traditional view that focuses on reducing the demand for fuel.

"One of the biggest challenges for multi-national climate agreements is the role of non-participating countries. If a climate coalition reduces demand for fossil fuel, the world price of oil goes down and non-participating countries find it profitable to consume and pollute more. Similarly, if the coalition seeks to reduce the supply or extraction of fossil fuels, the world price increases and these countries find it optimal to supply more," said Harstad, associate professor of managerial economics & decision sciences and Max McGraw Chair in Management & Environment at the Kellogg School of Management.

"Thus, both on the demand-side and the supply-side the result is carbon leakage, which is an increase in pollution abroad relative to the emission-reduction at home. To limit carbon leakage, the coalition may set up tariffs or other border measures, but this will distort trade."

"In my analysis, I show that by letting coalition countries buy extraction rights in third countries -- and preserve rather than exploit the fuel deposits -- climate coalitions can circumvent the traditional problems of a demand-side policy," he said.

Harstad explained further that the most intuitive benefit from this policy is that emission is reduced if one buys and conserves deposits. Furthermore, the coalition finds it cheapest to buy the marginal deposits (ie, deposits that are not very profitable to exploit, but still quite polluting when consumed). After selling its marginal deposits, a non-participating country’s level of supply will be less sensitive to changes in the world fuel price. Consequently, there is no longer carbon leakage on the supply-side, and the coalition can limit its own supply without fearing that the non-participants will increase theirs.

"This does the trick," Harstad noted. After purchasing marginal extraction rights, the coalition implements its ideal policy simply by reducing its supply, not its demand. Fossil fuel prices are then equalized across countries. Also, the resulting fossil fuel price seems high enough to motivate even non-participating countries to invest effectively in new technologies, such as renewable energy sources. For these reasons, the policy is socially optimal in the analysis, even if some countries do not participate.

Most importantly, Harstad said, "The analysis shows that progress on international climate policy is best achieved by simply utilizing the existing market for extraction rights."

Multi-national companies are already trading extraction rights. "Climate coalitions should, as well," he concluded.

At http://www.sciencedaily.com/releases/2012/04/120411161628.htm?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+scien
daily%2FEarth+climate%28ScienceDaily%29%3AEarth%26%238211%3B+Climate%26News%29

36. Volcanic Plumbing Provides Clues On Eruptions and Earthquakes

ScienceDaily (Apr. 12, 2012) — Two new studies into the "plumbing systems" that lie under volcanoes could bring scientists closer to understanding plate ruptures and predicting eruptions — both of which are important steps for protecting the public from earthquake and volcanic hazards.

International teams of researchers, including two scientists from the University of Rochester, have been studying the location and behaviour of magma chambers on Earth’s mid-ocean ridge system -- a vast chain of volcanoes along which Earth forms new crust.

They worked in the tropical region of Afar, Ethiopia and the subarctic country of Iceland -- the only places where mid-ocean ridges appear above sea level. Volcanic ridges (or "spreading centers") occur when tectonic plates "rift" or pull apart. This happens when magma (hot molten rock) injects itself into weaknesses in the brittle upper crust, erupting as lava and forming new crust upon cooling.

"These conclusions would not have been possible without the multi-disciplinary expertise of the researchers taking part in these studies," said Cynthia Ebinger, professor of geophysics at the University of Rochester.

The studies, published in Nature Geoscience, reveal new information about where magma is stored and how it moves through the geological plumbing network.

Magma chambers work like plumbing systems, channelling pressurized magma through networks of underground "pipes." Finding out where magma chambers lie and how they behave could help identify early warning signs of impending eruptions, according to the researchers.

By analyzing images taken by the European Space Agency satellite Envisat, scientists were able to measure how the ground moved before, during, and after eruptions. Also, Ebinger and Manahih Belachew, also from the University of Rochester, operated an array of seismographs that provided the depth and detailed time control to gauge the fracturing of the earth and the flow of magma from multiple eruptions in Afar. Using these data, the international team built and tested computer models to find out how rifting occurs.

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37. Southern sea levels rise drastically

April 12, 2012 (Phys.org) -- Sea levels have risen about 20cm in the South West Pacific since the late 19th century, a new scientific study shows.

Sea levels in Tasmania remained relatively stable for much of the past 6000 years but around 1880 they started rising drastically, said Dr Patrick Moss from the School of Geography, Planning and Environmental Management at The University of Queensland.

Between 1900 and 1950, relative sea level rose at an average rate of 4.2 mm per year.

"Overall the rate of 20th century sea level rise reconstructed from our data is 1.5 mm per year,” said Dr Moss, who co-wrote a report on the study with scientists from Plymouth University (UK), the Victoria University of Wellington (NZ), Queens University Belfast (UK), the University of Tasmania and University of Southampton (UK).

The highest rates of sea level rise occurred in the 1910s (.3 - .8 mm per year) with a second peak in the 1990s.

"The rise in 1910 probably reflects the end of the little ice age, when temperatures were about one to two degrees cooler in the northern hemisphere than today," Dr Moss said.

"The 1990s peak is most likely indicative of human-induced climate change."

The study used sediment cores from Tasmania's salt marshes to reconstruct a record of past sea levels.

"The surface of the marshes builds up over time in response to tidal inundation, providing an accurate record for sea level change," Dr Moss said.
38. Ratio rethink will adjust rock clocks


The uranium content of rocks is more variable than was thought, say geologists. The finding should lead to more accurate dating of geological events.

Ignorance of the variation has created small errors in our chronology of the world. Correcting this oversight should put geological dating on a solid scientific footing for the first time.

Many minerals, such as zircon, contain minute quantities of two forms of uranium, with atomic weights of 235 and 238. Each decays at a constant rate into lead atoms with weights of 207 and 206, respectively. By comparing the amount of uranium in a sample with the amount of lead, geologists can work out when the rock formed.

Uranium–lead dating of zircon crystals has been used to measure the age of everything from volcanic rocks to meteorites. The technique, however, has always been based on the assumption that the ratio of $^{238}\text{U}$ to $^{206}\text{Pb}$ was a constant 137.88 to 1 in all rocks.

"This is something we assumed was the same number everywhere on the planet," says Daniel Condon, head of chronology research at the British Geological Survey in Keyworth. But when Condon and his colleagues measured the actual ratio in 58 samples of different minerals from around the world, they found that it varied from 137.743:1 to 138.490:1.

Writing in Science today, the team suggests that the geological community should adopt a new average figure: \(137.818 \pm 0.045\).

Using the slightly smaller ratio would mean that the ages of many rocks would be reduced by around 800,000 years, says Condon, although in many cases the changes are within the accepted range of uncertainty.

But that uncertainty range is itself going to grow, because the ratio in conventional use does not have uncertainty factored into it, as the new one does.

Three of the team's samples had uranium–lead ratios bigger than 138.0:1. The most extreme outliers could shift dates by 10 million years if they were factored into the revised ratio. But Condon says that all zircon from rocks typically used to date most of geological time falls within the range used to create the new ratio.

"The Earth is still the same age," he assures Nature.

The work "definitely helps the accuracy of terrestrial dating", says Greg Brennecka, an isolate geochemist at Arizona State University in Tempe. "Just the realization that these things do vary is important," he adds.

The conventional ratio of 137.88:1 was derived from a consensus opinion among geologists, rather than a hard measurement. The latest work will mean that geochronology is based on "real physical quantities that can be precisely measured, defined and internationally agreed upon", says Condon.

James Mattinson, a geochronologist at the University of California, Santa Barbara, says that the data in the latest paper "beautifully refine accuracy and error analysis for dating".

"People active in the field will find it very useful in conjunction with the recent efforts to refine the decay constant of $^{235}\text{U}$ relative to the decay constant of $^{238}\text{U}$ — it will lead to greater rigour in accuracy, precision and error assessment in [uranium–lead] geochronology," he adds.

http://www.nature.com/news/ratio-rethink-will-adjust-rock-clocks-1.10358

39. Space environmentalist warns we need to better prepare for solar storms

April 19, 2012 by Bob Yirka. In the business of everyday life, it's easy to overlook things that could cause a serious disruption to how life is lived; floods happen, hurricanes, volcanoes and tsunamis like the one that devastated Japan last year. And now it seems, there is one more potential disaster we should add to the list: geomagnetic storms caused by coronal mass ejections from the sun. Mike Hapgood head of the space environment group with RAL Space, part of the UK Science and Technology Facilities Council, has written a commentary published in the journal Nature, suggesting that it's time we quit burying our heads in the sand regarding the devastating impact a serious solar storm could have on modern populations.

The problem he points out, is that we've become so dependent on electricity and electronic communications, that a big solar storm could cause power grids the world over to go down, and for
GPS to become non-functional for an unknown amount of time, causing havoc across a wide spectrum of systems such as those used by the military, the Internet, financial institutions and of course aviation. And what’s more, he says, it doesn’t necessarily have to be that way because there are many things that could be done to prevent such a nasty outcome. He suggests, for example, that power grids could be upgraded to better withstand such an onslaught. He cites how upgrades were made to many grids the world over after a solar storm in 1989 knocked out power to a large section of Quebec.

Unfortunately, that storm was rather puny compared to other storms that have hit Earth. One in 1921 was bigger, and another in 1859 was so powerful that it caused telegraph machines to set fire to cable offices. A storm today of that magnitude could cause power outages lasting in some places for months. Upgrading transformers even more, he says, could prevent such an outcome.

But then the question is, how far do you go? Since no one really knows how bad solar storms can get, no one really knows how much protection to build into systems. Because of that, Happgood says we need to do our homework. There are records, he points out, of prior events and what occurred as a result, but they are all mostly hand written and stored in unknown locations. We need to find those, digitize them and make them available to researchers.

We need to get better at forecasting too, he adds. Currently we get from ten minutes to about an hour’s notice for solar storms, very little time to take preventive action. Better satellites could be built and put into space that could open that window a little wider, perhaps giving grid operators or those that run satellites enough time to take evasive action that could save such facilities from damage.

In summation, he writes, we as a world community need to take the possibility of a serious solar storm more seriously and then start doing things to minimize the damage that could result. Failure to do so could lead to widespread chaos and unknown circumstances thereafter.

More information: Astrophysics: Prepare for the coming space weather storm, Nature 484, 311–313 (19 April 2012) http://dx.doi.org/10.1038/484311a

40. NOAA releases new views of Earth’s ocean floor

April 17, 2012. NOAA has made sea floor maps and other data on the world’s coasts, continental shelves and deep sea floor and coasts available for easy viewing online. Anyone with Internet access can now explore undersea features and obtain detailed depictions of the sea floor and coasts, including deep canyons, ripples, landslides and likely fish habitat.

The new online data viewer compiles sea floor data from the near shore to the deep blue, including the latest high-resolution bathymetric (sea bottom) data collected by NOAA’s Office of Coast Survey primarily to support nautical charting.

‘NOAA’s ocean bottom data are critical to so many mission requirements, including coastal safety and resiliency, navigation, healthy oceans and more. They are also just plain beautiful,’ said Susan McLean, chief of NOAA’s Marine Geology and Geophysics Division in Boulder, Colo. McLean’s division is part of NOAA’s National Geophysical Data Center, responsible for compiling, archiving and distributing Earth system data, including Earth observations from space, marine geology information and international natural hazard data and imagery. NGDC’s sea floor data have long been free and open to the public in original science formatting, but that often required the use of specialized software to convert the data into maps and other products. “For serious scientists, the new viewer allows an important preview capability that will help speed data access and analysis. But its real power is exposing a new audience to NOAA data,” said LCDR Dan Price, bathymetric program manager at NGDC. “I showed the new viewer to my neighbors and they were blown away by the detail and features revealed.”

The new interface makes exploration easy and intuitive, using a “color-shaded relief” technique to depict bathymetric data and derived maps and models. For example, a user can zoom into Delgada Canyon, one of a series of deep canyons off the northern California coast between Fort Bragg and Eureka. The sea floor descends steeply from shallow dark blues and purples.

“These are critical data for modeling coastal flooding, from tsunami to hurricane storm surge,” said Kelly Carignan, a digital elevation modeler at NGDC.

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42. Titanium Paternity Test Fingers Earth as Moon’s Sole Parent

ScienceDaily (Mar. 29, 2012) — A new chemical analysis of lunar material collected by Apollo astronauts in the 1970s conflicts with the widely held theory that a giant collision between Earth and a Mars-sized object gave birth to the moon 4.5 billion years ago.

In the giant-collision scenario, computer simulations suggest that the moon had two parents: Earth and a hypothetical planetary body that scientists call “Theia.” But a comparative analysis of titanium from the moon, Earth and meteorites, published by Junjun Zhang, graduate student in geophysical sciences at the University of Chicago, and co-author of the study, which appears in the March 25 edition of Nature Geoscience.

“What we found is that the child does not look any different compared to the Earth,” Dauphas said. “It’s a child with only one parent, as far as we can tell.”

The research team based their analysis on titanium isotopes — forms of titanium that contain only slight subatomic variations. The researchers selected titanium for their study because the element is highly refractory. This means that titanium tends to remain in a solid or molten state rather than becoming a gas when exposed to tremendous heat. The resistance of titanium isotopes to vaporization makes it less likely that they would become incorporated by objects in the newly forming solar system. The researchers examined the concentrations of titanium isotopes in samples of lunar material collected by Apollo missions.

If two objects had given rise to the moon, “Just like in humans, the moon would have inherited some of the material from Earth and some of the material from the impactor, approximately half and half,” said Nicolas Dauphas, associate professor in geophysical sciences at UChicago, and co-author of the study, which appears in the March 25 edition of Nature Geoscience.

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43. New look at HD 10180 shows it might have nine planets

April 9, 2012 by Bob Yirka. Astronomer Mikko Tuomi of the University of Hertfordshire, has found after looking at data regarding the solar system surrounding the star HD 10180, that it likely has nine planets making it the most highly populated solar system known to man (ours has just eight after the demotion of Pluto). He details his findings in a paper pre-published on arXiv (and set for publication in Astronomy and Astrophysics) describing how after studying slight wobbles by the star as it’s tugged by planetary gravitation, he found what he believes is confirmation of a seventh planet, and evidence for two more.

HD 10180 is about 130 light years away from us, in the Hydrus constellation and was first noted by astronomers in 2010. At the time it was thought the solar system consisted of just five planets, though there was speculation that it might have as many as seven. Since that time, other work has shown that there are likely six planets, five of which are believed to have a mass close to that of Neptune. The other appears closer in mass to Saturn. Researchers come to these conclusions by studying the way a star appears to wobble (a Doppler shift) as it responds to the gravitational pull of planets originally noted had periods ranging from 5 to 2000 days.

Tuomi didn’t make any new observations, instead he went back and looked at the original data using different kinds of statistical analysis techniques. In so doing, he found evidence for three more planets, all much smaller than the original six. These new planets, which he estimates to be 1.3, 1.9, and 5.1 times the size of Earth, have much shorter periods (1.2, 10 and 68 days) than the other planets indicating that they are very close to their star, closer even than Mercury is to our sun, which would mean they are far too hot to support water retention or life, at least as we know it.


44. A spiral galaxy in Hydra

April 9, 2012. This image from the NASA/ESA Hubble Space Telescope shows NGC 4980, a spiral galaxy in the southern constellation of Hydra. The shape of NGC 4980 appears slightly deformed, something which is often a sign of recent tidal interactions with another galaxy. In this galaxy’s case, however, this appears not to be the case as there are no other galaxies in its immediate vicinity.

The image was produced as part of a research program into the nature of galactic bulges, the bright, dense, elliptical centers of galaxies. Classical bulges are relatively disordered, with stars orbiting the galactic center in all directions. In contrast, in galaxies with so-called pseudobulges, or disc-type bulges, the movement of the spiral arms is preserved right to the center of the galaxy.

Although the spiral structure is relatively subtle in this image, scientists have shown that NGC 4980 has a disc-type bulge, and its rotating spiral structure extends to the very center of the galaxy.

A galaxies’ bright arms are the location of new star formation in spiral galaxies, and NGC 4980 is no exception. The galaxy’s arms are traced out by blue pockets of extremely hot newborn stars are visible across much of its disc. This sets it apart from the reddish galaxies visible in the background, which are distant elliptical galaxies made up of much older, and hence redder, stars. This image is composed of exposures taken in visible and infrared light by Hubble’s Advanced Camera for Surveys. The image is approximately 3.3 by 1.5 arcminutes in size.


45. The pit-chains of Mars - a possible place for life?

April 6, 2012. The latest images released from ESA’s Mars Express reveal a series of ‘pit-chains’ on the flanks of one of the largest volcanoes in the Solar System. Depending on their origin, they might be tempting targets in the search for microbial life on the Red Planet.

The images, taken on 22 June 2011, cover Tractus Catena in the Arcadia quadrangle, part of the vast Tharsis region on Mars. This region boasts a number of huge volcanoes, including the three collectively known as Tharsis Montes. To their north sits Alba Mons, also known as Alba Patera, one of the largest volcanoes in the Solar System by area and volume.

Tractus Catena sits on its southeastern flank of Alba Mons and the pit-chains in that region are a series of circular depressions that formed along fracture points in the martian crust.

Pit-chains can have a volcanic origin. Lava streaming from a volcano solidifies on the surface, leaving a molten tube of lava running below.

Once volcanic activity ceases, the tube empties, leaving behind a subterranean cavity. Over time, parts of the roof over the cavity may collapse, leaving circular depressions on the surface. On Earth, recent examples can be seen on the flanks of Kilauea volcano in Hawaii, while on the Moon, Hadley Rille, visited by Apollo 15 in 1971, is believed to have formed in the same way billions of years ago.

Pit-chains can also be caused by strains in the Martian crust, which translates into a series of parallel elongated depressions known as grabens, in which pits can also form. But the most dramatic scenario involves groundwater. On Earth, there are clear examples of similar structures in ‘Koast’ regions – after the German name for a region extending from Slovenia to Italy, where this phenomenon was first studied.

Some of Earth’s most famous examples are the network of ‘canyons’ on the Yucatan peninsula of Mexico. These deep natural pits form when the surface limestone rocks collapse, exposing the groundwater underneath.

This origin is the most interesting in the context of the search for microbial life on Mars. If there are any cave-like structures associated with the pits, microorganisms could have survived, protected from the harsh surface environment.

Mars landers have measured surface radiation around 250 times higher than that found on the Earth, and more than double that experienced by astronauts on board the International Space Station. Any caves associated with the pit-chains may in future provide a possible refuge for astronauts from the harsh surface radiation. However they formed, these pit-chains show again just how similar many of the geological processes on Mars are to those on the Earth, and provide interesting targets for future missions.

46. Gravity changes along the Moon

April 8, 2012. Using detailed topographic information from NASA's Lunar Reconnaissance Orbiter mission, Curtin’s Western Australian School of Mines (WASM) spatial scientists, Dr. Christian Hirt and Professor Will Featherstone, were able to reveal the fine structure of the Moon’s gravity field in brand new detail.

Dr. Hirt, who calculated the new gravity maps, said that the findings showed existing gravity models neglected approximately 50 per cent of the lunar gravity signal.

“The Moon’s gravitational pull is about one-sixth of the Earth’s. Our new lunar gravity map now shows, for the first time, how the pull of gravity changes from location to location over the rugged surface of the Moon,” Dr Hirt said.

“This reveals features of the lunar gravity field, including poackmark signatures, showing gravity accelerations are higher at the bottom of impact craters than the elevated crater rim, and revealing the strength and variation of gravity acceleration over the entire surface of the Moon.”

Dr. Hirt said the research to improve gravity field maps for the Moon came from an approach that was successfully tested on Earth and could also be used for other solid planetary bodies.

Dr. Hirt and Professor Featherstone’s research findings were recently published in the prestigious journal Earth and Planetary Science Letters (Issue 1, May 2012, Vol. 329-330, pages 22-30).


47. H3+: The molecule that made the Universe

April 12, 2012. (Phys.org) -- In a study that pushed quantum mechanical theory and research capabilities to the limit, University of Arizona researchers have found a way to see the molecule that likely made the universe - or at least the hot and fiery bits of it.

Lurking in the vast, chilly regions between stars, the unassuming molecule known as a triatomic hydrogen ion, or H3+, may hold secrets of the formation of the first stars after the Big Bang.

At the University of Arizona, then doctoral candidate Michele Pavanello spent months doing painstaking calculations to find a way to spot H3+ and unveil its pivotal role in astronomy and spectroscopy, supervised by Ludwik Adamowicz, a professor in the UA’s department of chemistry and biochemistry. The groundbreaking results have been published in a recent edition of Physical Review Letters.

"Most of the universe consists of hydrogen in various forms," said Adamowicz, "but the H3+ ion is the most prevalent molecular ion in interstellar space. It’s also one of the most important molecules in existence."

Believed to be critical to the formation of stars in the early days of the universe, H3+ also is the precursor to many types of chemical reactions, said Adamowicz, including those leading to compounds such as water or carbon, which are essential for life.

Early stars would have become hotter and hotter until they exploded before they ever formed, according to Pavanello, unless there was a way to release some of that pent-up energy.

"There wouldn’t be any star formation if there weren’t molecules that slowly cool down the forming star by emitting light," said Pavanello. Not many molecules can do that, he added, partly because very few molecules existed in the early days of the universe.

"Astronomers think that the only molecule that could cool down a forming star in that particular time is H3+.*"


48. Study on extrasolar planet orbits suggests that Solar System structure is the norm

April 12, 2012. The EXOEarths team (Centro de Astrofísica da Universidade do Porto - CAUP), in collaboration with Geneva University, did a joint analysis of data from the HARPS spectrograph and the Kepler satellite. This analysis revealed that the orbits of other planetary systems are aligned, like in a disk, just like in our own Solar System.

Recently, the HARPS spectrograph and the Kepler satellite made a census of the planetary population around stars like our own, revealing a bounty of planetary systems. A follow-up study lead by members of the EXOEarths team (Centro de Astrofísica da Universidade do Porto - CAUP), in collaboration with Geneva University, did a joint analysis of the data which showed that the planetary orbits in a system are strongly aligned, like in a disk, just as we have in our own solar system.

The two most effective methods for detecting extrasolar planets are the radial-velocity method and the transit method. The radial-velocity method detects planets through the reflex motion induced by the planet on the star’s velocity on the radial direction (hence the name). This velocity variation is detected through the Doppler effect, the same that leads to a pitch change in the sound of an traveling ambulance. On the other hand, a planetary transit is akin to a mini-eclipse. As a planet travels around the star, its orbit can locate it in front of the star, and the light we collect from the star is reduced because the planet blocks part of it (even though we cannot image the planet).

There is a significant difference when these two methods are applied to planetary system. A planet can be detected in radial velocity even when the orbit’s plane direction is tilted relative to the line of sight, and the same is true for a system of planets. However, for a planet to transit, the plane of its orbit has to be almost perfectly aligned with our lign-of-sight, and the same is true for a system of two (or more planets) to transit. This means that if several planets in a system transit they form necessarily a very small angle between them.

We simulated planetary systems with frequencies as reported by HARPS survey (that detects basically all the systems, independently of their inclination angle), and attributed to them different relative inclinations. The frequency of transiting systems was calculated and compared with the values reported by Kepler. We showed that a match can be obtained for double-transiting systems only if they are very strongly aligned with a common plane (the system’s plane). This alignment has to be close to 1 degree, and only reaches 5 degrees on very extreme cases (extreme on the sense of the
assumption on how a planetary mass translates to a radius).

These results show consistently that the planets' orbits are predominantly aligned, reinforcing the idea that planets form on a disk and suggesting for the first time that violent encounters between planets are not frequent. This provides a very important clue about the formation and evolution of exoplanets, a domain in which several open questions remain. Even though the solar system's organization is more often the exception than the rule, this study shows that the high degree of alignment of our system might well be the norm.

Pedro Figueira (CAUP), the article's first author stated: “These results show us that the way our Solar System formed must be common. Its structure is the same as the other planetary systems we studied, with all planets orbiting roughly in the same plain.”


49. Infant galaxy offers tantalizing peek at early Universe

Ron Cowen. 13 April 2012. Discovery hints at an unexpected cohort of baby star systems.

Astronomers are claiming a new benchmark in the quest to see the Universe’s first galaxies. By taking advantage of a rare cosmic zoom lens — in which the gravity of a large mass magnifies light from objects in the distant background — a team of US and European researchers has spotted a galaxy so remote its light was emitted just 490 million years after the Big Bang, when the Universe was a mere 3.6% of its current age.

Astronomers had previously found evidence for a handful of galaxies about as young and remote, but the newly discovered object is noteworthy because of the confidence that underlies the measurement of its redshift, a surrogate for distance. Based on Images taken in several colours, or wavelength bands, using both the Hubble and Spitzer Space Telescopes, the measurement is “one of the most accurate estimates ever obtained” for a candidate galaxy from the early Universe, the team asserts in a paper posted online on 12 April.

And because the faint galaxy appears 15 times brighter than it otherwise would, thanks to the lensing effect of a massive galaxy cluster that lies between it and Earth, researchers say the object is luminous enough to be examined in detail by Hubble’s planned successor, the James Webb Space Telescope (JWST), now scheduled for launch in 2018. The team used a Hubble survey called CLASH (Cluster Lensing and Supernova Survey with Hubble) to find the lensing cluster, MACS1149.

The boost in brightness also enabled the team, which includes Wei Zheng of Johns Hopkins University and Marc Postman of the Space Telescope Science Institute, both in Baltimore, Maryland, to estimate several key properties of the apparently youthful galaxy. The team calculates that the body is less than 200 million years old, with the mass of its constituent stars weighing in at only 1% that of the Milky Way.

The authors declined to comment on the find while the paper is under review but several researchers who have read the online report say they are excited. “These data are as good as they get before the JWST,” says galaxy hunter Roger Windhorst of Arizona State University in Tempe, who is not a member of the study team.

Because of the nature of cosmic expansion, light emitted by distant galaxies is shifted to longer, or redder wavelengths, than the light emitted by nearby bodies. Zheng and his colleagues estimate that the galaxy they found, dubbed MACS1149-JD1, has a redshift of 9.6, putting it on a par with other bodies that are candidates for being extremely remote.

“I wouldn’t declare this to be a sure thing, but it looks like a good candidate,” says Mark Dickinson of the National Optical Astronomy Observatories in Tucson, Arizona. “I like the fact that this object is bright enough that one can hope to make confirming observations now, with existing facilities, before JWST.”

The interpretation of the galaxy as a body from the early Universe depends on the galaxy appearing extremely faint in Spitzer Space Telescope observations at an infrared wavelength of 3.6 micrometres, Dickinson notes. In fact, Spitzer doesn’t detect the galaxy at all at this wavelength. It would be more convincing, says Dickinson, if the telescope stared for a longer time and recorded a faint image at 3.6 micrometres. A senior NASA review panel has now extended the Spitzer mission, and it is likely that observers will take longer exposures of the galaxy with the orbiting telescope, he says. In addition, astronomers using ground-based telescopes will hunt for telltale emissions from hydrogen atoms in the galaxy that could be used to directly measure redshift, rather than estimate it, he adds.

Richard Ellis of the California Institute of Technology in Pasadena says he is most excited about a possibility that’s not mentioned in the online paper. He notes that the observations — even though they are of only one galaxy — come from such a narrow field of view that they suggest the early Universe may hold a larger number of baby galaxies than researchers have previously estimated. That in turn could indicate that the ionizing radiation from such galaxies played an even more important role in breaking apart hydrogen atoms, allowing light to stream freely into space for the first time.

Nature - doi:10.1038/nature.2012.10450


50. Astronomers identify 12-billion-year-old white dwarf stars

April 11, 2012. A University of Oklahoma assistant professor and colleagues have identified two white dwarf stars considered the oldest and closest known to man. Astronomers identified these 11- to 12-billion-year-old white dwarf stars only 100 light years away from Earth. These stars are the closest known examples of the oldest stars in the Universe forming soon after the Big Bang, according to the OU researcher.

Mukremin Kilic, assistant professor of physics and astronomy in the OU College of Arts and Sciences and lead author on a recently published paper, announced the discovery. Kilic says, “A white dwarf is like a hot stove; once the stove is off, it cools slowly over time. By measuring how cool the stove is, we can tell how long it has been off. The two stars we identified have been cooling for billions of years.”

Kilic explains that white dwarf stars are the burned out cores of stars similar to the Sun. In about 5 billion years, the Sun also will burn out and turn into a white dwarf star. It will lose its outer layers and die as it rises and turns into an incredibly dense star the size of Earth.

Known as WD 0346+246 and SDSS J110217.48+411315.4 (J1102), these stars are located in the constellations Taurus and Ursa Major, respectively. Kilic and colleagues obtained infrared images using NASA’s Spitzer Space Telescope to measure the temperature of the stars. And, over a three-year period, they measured J1102’s distance by tracking its motion using the MDM Observatory’s 2.4m telescope near Tucson, Arizona.
"Most stars stay almost perfectly fixed in the sky, but J1102 is moving at a speed of 600,000 miles per hour and is a little more than 100 light years from Earth," remarks co-author John Thorstensen of Dartmouth College. "We found its distance by measuring a tiny wiggle in its path caused by the Earth's motion—it's the size of a dime viewed from 80 miles away."

"Based on the optical and infrared observations of these stars and our analysis, these stars are about 3700 and 3800 degrees on the surface," said co-author Piotr Kowalski of Helmholtz Centre Potsdam in Germany. Kowalski modeled the atmospheric parameters of these stars. Based on these temperature measurements, Kilic and his colleagues were able to estimate the ages of the stars.

"It is like a crime scene investigation," added Kilic. "We measure the temperature of the dead body—in our case a dead star, then determine the time of the crime. These two white dwarf stars have been dead and cooling off almost for the entire history of the Universe."

Kilic was the lead author on the paper accepted for publication in the Monthly Notices of the Royal Astronomical Society. Kilic's co-authors include John Thorstensen, Dartmouth College; Piotr Kowalski, Helmholtz Centre Potsdam, Germany; and Jeff Andrews, Columbia University.

More information: For more information about Kilic and his research, visit his website at http://www.nhn.ou.edu/~kilic/.


51. Discovery of the Musket Ball Cluster

April 12, 2012. Using a combination of powerful observatories in space and on the ground, astronomers have observed a violent collision between two galaxy clusters in which so-called normal matter has been wrenched apart from dark matter through a violent collision between two galaxy clusters.

The newly discovered galaxy cluster is called DLSCL J0916.2+2951. It is similar to the Bullet Cluster, the first system in which the separation of dark and normal matter was observed, but with some important differences. The newly discovered system has been nicknamed the "Musket Ball Cluster" because the cluster collision is older and slower than the Bullet Cluster.

Finding another system that is further along in its evolution than the Bullet Cluster gives scientists valuable insight into a different phase of how galaxy clusters - the largest known objects held together by gravity - grow and change after major collisions. Researchers used observations from NASA's Chandra X-ray Observatory and Hubble Space Telescope as well as the Keck, Subaru and Kitt Peak Mayall telescopes to show that hot, X-ray bright gas in the Musket Ball Cluster has been clearly separated from dark matter and galaxies.

In this composite image, the hot gas observed with Chandra is colored red, and the galaxies in the optical image from Hubble appear as mostly white and yellow. The location of the majority of the matter in the cluster (dominated by dark matter) is colored blue. When the red and the blue regions overlap, the result is purple as seen in the image. The matter distribution is determined by using data from Subaru, Hubble and the Mayall telescope that reveal the effects of gravitational lensing, an effect predicted by Einstein where large masses can distort the light from distant objects.

In addition to the Bullet Cluster, five other similar examples of merging clusters with separation between normal and dark matter and varying levels of complexity, have previously been found. In these six systems, the collision is estimated to have occurred between 170 million and 250 million years earlier. http://phys.org/news/2012-04-discovery-musket-ball-cluster.html

52. Venus found to have aurora type magnetotails

April 6, 2012 by Bob Yirka. Researchers studying the planet Venus have found that despite a lack of a magnetic field, the planet has magnetotails, which on Earth are part of the process known as the Northern and Southern Lights. This, as the team describes in their paper published in Science, is due to the solar wind interacting with the planet's ionosphere.

On Earth and other planets that do have a magnetic field, solar wind is deflected by the magnetism that surrounds the planet into the magnetosphere causing magnetic lines of force to break and reconnect, resulting in the show of lights in the night sky called an aurora. This process known as magnetic reconnection also causes the creation of magnetotails, or elongated stretches of the magnetosphere on the lee side of planets. This new research shows that Venus too has such magnetotails, though the process of their creation is different.

In analyzing data obtained from Venus Express, the probe sent by the European Space Agency, the researchers found that on Venus, the solar wind reacts with the ions in its ionosphere and in one instance resulted in what they describe as a magnetic plasma bubble stretching for some 2100 miles and lasting for just over a minute and a half. This they say is also an example of magnetic reconnection, albeit, one of a different kind.

For years, researchers have puzzled over mysterious flashes of light coming from Venus, and some have even speculated that they might be caused by magnetic reconnection, but until now lacked evidence. This new research adds strong credence to that theory and may also explain how some comet tails manage to disengage from their heads.

As for whether the light generated by such instances of magnetic reconnection on Venus can truly be called an aurora, that remains up for debate. On Earth the Northern and Southern lights, also known as aurora borealis and aurora australis are named after the Roman goddess of dawn and thus are not tied to any specific scientific phenomenon, so it wouldn't seem to be a stretch to use the same term for a similar effect discovered on another planet.

More information: Magnetic Reconnection in the Near Venusian Magnetotail, Science http://dx.doi.org/10.1126/science.1217013

53. Asteroid craters could provide clue to life on Mars

Scientists at the University of Edinburgh said organisms had been discovered thriving deep underneath a site in the US where an asteroid crashed 35 million years ago. They believe such craters provide refuge for microbes. The findings suggest that crater sites on other planets may be "hiding life".

Samples from below ground showed that microbes are unevenly spread throughout the rock, suggesting that the environment is continuing to settle 35 million years after impact.

*Our findings suggest that the subsurface of craters on Mars might be a promising place to search for evidence of life.*

http://www.bbc.co.uk/news/uk-scotland-17705984

54. Tiny particles key to understanding early solar system

April 16, 2012. New research from The Australian National University has answered a decades-old cosmic conundrum on how 'chondrules' – tiny particles found within meteorites – could have formed in extreme heat, especially when the meteorite structure surrounding them remained cold.

Chondrules are spherical particles of molten material found in meteorites but their origins have long been a mystery. No longer than about 1mm in diameter, they melted at temperatures of more than 1000 degrees Celsius, while the cooler materials surrounding them only experienced temperatures of a few hundred degrees Celsius.

ANU researchers Dr. Raquel Salmeron from the Research School of Astronomy and Astrophysics, and Dr Trevor Ireland from the Research School of Earth Sciences, have proposed a new theory as to how chondrules formed in the early solar system.

"Most of the solar system is cold, so it's been unclear for decades what caused the chondrules to experience such extreme heat. We believe that chondrules formed in jets of material ejected from flattened disks, called 'protostellar disks', which encircle young stars," Dr. Salmeron said.

"These disks are somewhat like the rings around the planet Saturn. The modern planets are the remnants of material of these disks clumping together. In observations of the formation of new stars, we can see jets of material accelerating out of protostellar disks."

"We show that as these jets shoot out of the disks, from about the Earth-Sun distance away, the materials brought with them are heated to the point of melting. The heavier items in them then drop back into the disks, where they cool and re-form."

Dr. Salmeron said that this theory challenged old assumptions about the formation of chondrules.

"For decades it has been assumed that jets could only form chondrules through the heating of materials in the vicinity of the Sun, followed by their transportation into protostellar disks," Dr. Salmeron said.

"We believe that our new theory explains how chondrules – among the earliest materials in the solar system – reached the temperatures required for melting, even though the early solar nebula was cold. It also explains the fairly uniform size of chondrules and provides a means for them to mix and combine with unheated material."


55. Scientists suggest evidence of recent lunar volcanism

April 16, 2012. By Jason Major. A team of researchers at India’s Physical Research Laboratory (PRL) claims it has found evidence of relatively recent volcanic activity on the Moon, using data from NASA’s Lunar Reconnaissance Orbiter and the Chandrayaan-1 spacecraft. According to the findings the central peak of Tycho crater contains features that are volcanic in origin, indicating that the Moon was geologically active during the crater’s formation 110 million years ago.

In an article by the Deccan Herald, a Bangalore-based publication, the PRL researchers claim that vents, lava channels and solidified flows of inner crustal material found within Tycho were made as recently as 100 million years ago — after the creation of the crater.

This could indicate that there was pre-existing volcanic activity within the Moon at the site of the Tycho impact, lending credence to the idea that the Moon was recently geologically active.

In addition, large boulders ranging in size from 33 meters to hundreds of yards across have been spotted on Tycho’s central peaks by LRO, including one 400-foot (120-meter) -wide specimen nestled atop the highest summit. How did such large boulders get there and what are they made of?

The researchers hint that they may also be volcanic in origin.
56. The earth is not at rest

April 18, 2012. The Earth is not at rest. It orbits the Sun, which in turn orbits the center of the Milky Way Galaxy, which in turn moves within the Local Group of Galaxies - a collection of about fifty four galaxies in our "neighborhood" (that is, within about ten million light-years of Earth). The Local Group itself is "falling" toward the Virgo Cluster of Galaxies, a set of over one thousand galaxies about fifty million light years away in the direction of the constellation of Virgo, and whose gravity pulls the Milky Way. After the cosmic microwave background radiation was detected in 1960, astronomers began searching for signs of these motions of Earth with respect to the background light. First hints came in the mid-1970s and 1980s, and signaled a serious problem: the measured motion of the Earth with respect to the cosmic background was considerably smaller than the sum of all the movements listed above. One possible solution was that our understanding of the distribution of galaxies was incorrect.

John P. Huchra, the distinguished CfA astronomer who tragically passed away eighteen months ago at the age of 61, was a pioneer in the study of the large scale structure of the universe. Together with his colleagues, he helped map the locations in space of nearly 20,000 of the nearest galaxies, revealing that the universe was not uniformly sprinkled with galaxies. Instead, the local universe appears to have a structure dominated by tremendous filaments, sheets and voids, including what became known as "the Great Wall," a thin sheet of galaxies about 600 million light-years wide, 250 million light-years high, and 30 million light-years deep - one of the largest known structures in the universe. The discovery helped resolve the mystery of the measured motion of Earth with respect to the cosmic background by finding these large structures and their gravitational influences. But even with the landmark effort, most of the galaxies in the larger neighborhood remained unstudied. Moreover, the precision of the results was considerably worse than the precision from newer cosmic background instruments, as breakthroughs like the acceleration of the universe helped confirm and fill out the larger cosmological picture.

During the ten years before his death, John had been working on another huge and significant project: studying each one of 44,599 galaxies seen in the infrared 2MASS survey to determine its distance, and so place it in an enlarged, much more complete and precise three-dimensional map of the universe near the Earth. This month that paper was published; his team of nineteen collaborators, to honor his leadership and scholarship, and his memory, made him the posthumous first author.

The paper uses new spectroscopic observations of eleven thousand galaxies, and archival spectra of the rest, to obtain a distance catalog that is 97.6% complete over 91% of the sky (to certain well-defined limits). It is an unprecedented accounting of all of the normal matter within about one billion light-years of Earth; in addition, it catalogs the morphological types of a nearly complete subsample of 20,860 galaxies. The result refines and completes the earlier work in an extremely uniform, deep, and unbiased survey of the nearby universe, and is a fitting tribute to the memory of this pioneering astronomer and admired colleague.

Provided by Harvard-Smithsonian Center for Astrophysics. At http://phys.org/news/2012-04-earth-rest.html

57. Astronomers detect coolest radio star

April 18, 2012. Astronomers using the world's largest radio telescope, at Arecibo, Puerto Rico, have discovered flaring radio emission from an ultra-cool star, not much warmer than the planet Jupiter, shattering the previous record for the lowest stellar temperature at which radio waves were detected.

The team from Penn State University's Department of Astronomy and Astrophysics and the Center for Exoplanets and Habitable Worlds has been using the giant 305-m (1000-ft) telescope to look for radio signals from a class of objects known as brown dwarfs. These are small, cold stars that bridge the gap between giant planet-like giant planets and normal, more massive, hydrogen-fusing stars. They hit the jackpot with a star named J1047+21, a brown dwarf 33.6 light years away in the constellation Leo, in a result that could boost the odds of discovering life elsewhere in the universe.

Matthew Route, a graduate student at Penn State and the lead author of the discovery paper, said, "This object is the coolest brown dwarf ever seen in the radio - it's half the temperature of the previous record holder, making it only about five times hotter than Jupiter."

The new radio-star is much smaller and colder than our Sun. With a surface temperature not much higher than that of a giant planet, and a size comparable to Jupiter's, it is scarcely visible in optical light. Yet the radio flares seen at Arecibo show it must have a strong magnetic field, implying that the same could be true of other similar stars.

Dr. Alex Wolzszczan, who is leading the project, said, "This is a really exciting result. We hope that in the future we'll be able to detect yet colder brown dwarfs, and possibly even giant planets around other stars."

The possibility that young, hot planets around other stars could be detected in the same manner - because they still maintain strong magnetic fields - has implications for the chances of finding life elsewhere in the Galaxy. Dr. Wolzszczan explained, "The Earth's field protects life on its surface from harmful particles of the solar wind. Knowing whether planetary magnetic fields are common or not throughout the Galaxy will aid our efforts to understand chances that life may exist beyond the Solar System."

The discovery of radio signals from J1047+21 dramatically broadens the window through which astronomers can study the atmospheres and interiors of these tiny stars, using the radio detection of their magnetic fields as a tool. At the temperature of this brown dwarf, its atmosphere must be made of neutral gas, which would not give off radio signals like those seen. The energy to drive the signals is likely to come from magnetic fields deep inside the star, similar to the field that protects the Earth from dangerous high-energy particles. By monitoring the radio flares from J1047+21, astronomers will be able to tell how stable the magnetic field is over time, and, from flare duration, they can infer the size of the emitter itself.

The results were published in the March 10 edition of the Letters section of the Astrophysical Journal.

More information: http://dx.doi.org/10.1088/2041-8205/747/2/L22

58. Cassini finds titan lake is like a Namibia mudflat

A recent study finds that the lake known as Ontario Lacus on Saturn’s moon Titan (left) bears striking similarity to a salt pan on Earth known as the Etosha Pan (right). Image credit: NASA/JPL-Caltech and NASA/USGS

April 20, 2012. A new study analyzing data from NASA’s Cassini spacecraft suggests that the lake, known as Ontario Lacus, behaves most similarly to what we call a salt pan on Earth.

A group led by Thomas Cornet of the Université de Nantes, France, a Cassini associate, found evidence for long-standing channels etched into the lake bed within the southern boundary of the depression. This suggests that Ontario Lacus, previously thought to be completely filled with liquid hydrocarbons, could actually be a depression that drains and refills from below, exposing liquid areas ringed by materials like saturated sand or mudflats.

"We conclude that the solid floor of Ontario Lacus is most probably exposed in those areas," said Cornet, whose paper appears in a recent issue of the journal Icarus.

These characteristics make Ontario Lacus very similar to the Etosha salt pan on Earth, which is a lake bed that fills with a shallow layer of water from groundwater levels that rise during the rainy season. This layer then evaporates and leaves sediments like tide marks showing the previous extent of the water.

"Some of the things we see happening in our own backyard are right there on Titan to study and learn from," said Bonnie Buratti, a co-author and Cassini team member based at NASA’s Jet Propulsion Laboratory in Pasadena, Calif. "On Earth, salt pans tend to form in deserts where liquids can suddenly accumulate, so it appears the same thing is happening on Titan."

While the liquid on Titan is methane, ethane and propane rather than water, the cycle appears to work in a very similar fashion to the water cycle on Earth. Beyond Earth, Titan is the only other world known to bear stable liquids on its surface. There, the full hydrocarbon cycle is based on hydrogen, carbon and nitrogen, and takes place between the atmosphere, the surface and the subsurface. Titan’s lakes are an integral part of this process.

This latest paper is part of an ongoing study of Ontario Lacus, the largest lake in Titan's south polar region. Cassini has been observing the lake with multiple instruments and employing multiple methods of analysis to see if Titan, like Earth, changes with the seasons. During the time Cassini has been exploring the Saturn system, Titan’s southern hemisphere has transitioned from summer to fall.

"These results emphasize the importance of comparative planetology in modern planetary sciences: finding familiar geological features on alien worlds like Titan allows us to test the theories explaining their formation," said Nicolas Altobelli, ESA’s Cassini-Huygens project scientist.


59. Other stories!


INTERESTING SITES

• CPCEMR - The Circumpacific Council for Energy and Mineral Resources website is at: http://www.circumpacificcouncil.org

• The Scale of the Universe. This visualization shows ocean surface currents around the world during the period from June 2005 through December 2007. http://svs.gsfc.nasa.gov/vis/a000000/a003800/a003827/

• Perpetual Ocean. This visualization shows ocean surface currents around the world during the period from June 2005 through December 2007. http://svs.gsfc.nasa.gov/vis/a000000/a003800/a003827/

BOOKS / JOURNALS / MAPS / NEWSLETTERS / ETC


• CCOP E-News - The Coordinating Committee for Geoscience Programmes in East and Southeast Asia (CCOP) produces the CCOP E-News See their website at: http://www.ccop.or.th/download/e-news/CCOP-e-news

• The European Federation of Geologists (EFG) magazine “European Geologist” can be downloaded from: http://www.eurogeologists.eu

Newsletter of the Geological Society of Africa (GSAf) – Nr. 04; April 2012 – Annum 2. 32
EuroGeoSurveys Newsletters at: http://eurogeosurveys.org/newsletters.html. To automatically receive the issues of the Newsletter, you can register online at: http://www.eurogeosurveys.org/newsletters/registration.html.


GEOETHICS -The latest copies of the "Geothics News" newsletter can be downloading from the Geoethics website at: http://terra.redins.es/Geothics_Planetary_Protection/.


IAG -The International Association of Geomorphologists (IAG/AIG) publishes its newsletter at 3 month intervals. The Newsletters can be downloaded at: http://www.geomorph.org/ijpb/newhtml.html.

IAH -The International Association of Hydrogeologists (IAH) publishes "Groundwater eNews" every 2 months. See their website at: http://www.iah.org/news_enews.asp.

ICSU -the International Council for science (ICSU) newsletter "ICSU Insight" will keep you up to date with ICSU global and regional activities, latest publications, and other news. See: http://www.icsu.org/news-centre/icsu-insight. Visit the ICSU website at: http://www.icsu.org/.

IFA - The International Fertilizer Industry Association (IFA) has produced a Fertilizer Glossary that is now available on-line in five languages: English, French, German, Spanish and Chinese. See it at: http://www.fertilizer.org/ifa/HomePage/LIBRARY/Glossary-of-fertilizer-terms

The International Geosphere-Biosphere Programme (IGBP) website is at: http://www.igbp.net and their News archive is at: http://www.igbp.net/4.d8b4c3c12bf3be638a8000369.html.

The International Medical Geology Association (IMGA). newsletter can be downloaded from their website at: http://www.imga.org/publications/publications.htm.


OneGeology - an international initiative of the geological surveys of the world with a target of creating dynamic geological map data of the world, available to everyone via the web see: http://www.onegeology.org/.

ProGEO News - the newsletter of the European Association for the Conservation of the Geological Heritage can be downloaded from: http://www.progeo.eu/

RMCNS-Bulletin of the Regional Committee on Mediterranean Neogene Stratigraphy downloadable from: http://www.geomare.na.cnr.it/


PAPERS ON AFRICA


David M. Martill, Nizar Ibrahim. \textit{Aberrant rostral teeth of the sawfish Onchopristis numidus from the Kem Kem beds (Yearly Late Cretaceous) of Morocco and a reappraisal of Onchopristis in New Zealand}, Journal of African Earth Sciences, Volume 64, (14 February 2012), Pages 71-76. \url{http://www.sciencedirect.com/science/journal/1464343X/65}


**EVENTS**

The events not announced in former Bulletins are highlighted with dates in red bold.

**Africa**

- **2012.05.10-11** Workshop "Managing Natural Hazards", Hotel Sol Puerto de la Cruz, Tenerife, Canary Islands, \url{http://eurogeologists.eu/images/content/TenerifeWorkshop%20MANAGING%20NATURAL%20HAZARDS-1.pdf}
- **2012.05.10-12** 2ème Colloque International Sur la Gestion et la Préservation des Ressources en Eau (CGIPRE 2). Meknès, Morocco. \url{http://www.oieau.org/spip.php?article1841}
- **2012.05.14-16** Advanced Seismic Data Processing & Interpretation Masterclass 2012, Dar es Salaam, Tanzania. For Course Registration: \url{wci.hku.hk/SeismicGlobal2012}
- **2012.05.23** First National YES Morocco Symposium, Rabat, Morocco. \url{http://yes-morocco.blogspot.com/}
- **2012.06.05-06** The Africa Iron Ore Conference - Cape Town June 2012. Cape Town, South Africa. \url{http://www.immevents.com/international-mining-events/africa-iron-ore-conference}
- **2012.06.05-07** Global Platinum Conference: Focus on Southern Africa. Johannesburg, South Africa. \url{http://www.immevents.com/international-mining-events/global-platinum-conference}
- **2012.06.06-07** 3rd Annual Global Mining Technology Forum 2012, Technology as a Key to the Future of Mining. Johannesburg, South Africa. \url{http://fleminggulf.com/mining/3rd-annual-global-mining-technology-forum/}
- **2012.06.11-12** Coalbed Methane (Coal to Liquids / Underground Coal Gasification). Johannesburg, South Africa. \url{http://www.immevents.com/international-mining-events/coalbedmethane}
- **2012.06.27-30** 2nd IGC/PISA Workshop, Kumasi, Ghana, \url{http://tech.groups.yahoo.com/groups/igcp606/}
2012.07.05-06 Annual Workshop of the ICP/SDA Project 594 - Environmental and Health Impacts of Mining in Africa, Windhoek, Namibia. Contacts: briyangu@um.na; btekeleem@gmail.com; geonaard@mme.gov.na; endalulita@mme.gov.na; bokehns@geology.co.za; http://www.seanac.umn.mz or http://www.seanac.org


2012.09.13-14 Copper in Namibia, Copper Exploration, Mining & Processing, Windhoek, Namibia. mail@geosocnambia.org.


2012.11.21-23 1º Congresso de Geologia de Moçambique (1º Congress of Geology of Mozambique), Maputo, Mozambique, with pre-event (18-20) and post-event (24-26) excursions. Contact: congresso@geoem.org

2013.01.08-14 The 40th Anniversary of the Geological Society of Africa (1973-2013). Theme: "40 Years of GSAf (1973-2013): Earth Sciences Solutions to African Development Challenges" will be conducted at the United Nations Economic Commission Conference Center (UNECA), Addis Ababa, Ethiopia. The Ethiopian Geosciences and Mineral Engineering Association (EGMEA) will organize this joint conference and will distribute the first circular shortly. Details will be posted on the websites at: http://www.geologicalsocietyofafrica.org/ and http://www.egmea.org/et

2013.05.04-10 FIG (Fédération Internationale des Geomètres) Working Week and General Assembly. Abuja, Nigeria. http://www.fig.ng


2014 12th Geochemical Congress of the Portuguese Speaking Countries, Mozambique


2015 67th Annual Meeting of the ICCP (International Committee for Coal & Organic Petrology), Telte, Mozambique.

2015 35th International Geological Congress (IGC), Cape town, South Africa. Contacts: Danie Barnardo (barnardo@geoescience.org.za), Juanite van Wyk (juanite@geoescience.org.za) and Martin Lekotoko (martinek@geoescience.org.za)

Rest of the World


2012.05.02 2012.05.03 AGU’s Inaugural Science Policy Conference, Washington, D.C., USA. http://sites.agu.org/spconference/

2012.05.03 Course on “Seagrass Carbonate Production: from modern to fossil environment”. Mallorca, Spain.

2012.05.05 http://www.museuendocrinologiaen.org/en/news.php/seagrass_carbonate_sediment_posidonia_course

2012.05.01-04 GeoHab (Marine Geobiological and Biological Habitat Mapping). Rosario Resort, Orcas Island, Washington State, USA. http://www.seabiodiversity.org/geohab2012


2012.05.06-10 The 8th International Symposium Agra Environ, Wageningen, the Netherlands, http://www.agraenviron.com

2012.05.06-10 The National Groundwater Association 2012 Ground Water Summit. Garden Grove, California, USA. http://www.groundwatersummit.org/


2012.05.08-09 The 3rd Euro Nickel Conference 2012, Helsinki, Finland. http://www.imevents.com/international-mining-events/euro-nickel

2012.05.11-12 GeoCAD 2012. Alba Iulia, Romania. The http://www.fig.net/events/2012/geocad2012_alba_iulia.pdf


2012.05.13-17 IAGLR’s 55th Annual Conference on Great Lakes Research. Cornwall, ON, Canada. http://iaglr.org/conference/


2012.05.15-17 2nd International Conference and Exhibition on Mapping and Spatial Information (ICMS2012) and the 19th National Geomatics Conference. Tehran, Iran. http://conf.ncc.org.ir


2012.05.20-23 10th International Symposium on Ceramic Materials and Components for Energy and Environmental Applications. Dresden, Germany. http://www.cm2e/2.de/contact.html

2012.08.01–American Crystallographic Association (ACA) Annual Meeting, Boston, MA, USA. http://www.amercrystalassoc.org
2012.08.05–Microscopy and Microanalysis 2012, Phoenix, AZ, USA. http://www.microprobe.org/events/microscopy-microanalysis-2012
2012.08.12–Annual meeting of the Meteoritical Society, Cairns, Queensland, Australia. http://www.meteoriticalsociety.org
2012.08.17–24th ACS National Meeting & Exposition, Philadelphia, PA, USA. http://www.acs.org
Please use the registration facility at the website for making preliminary registration and encourage also as many potential organizations under the auspices of the Geological Society of Africa (GSAf). The Theme of the Conference is: “40 Years of GSAf - Ethiopian Geosciences and Mineral Engineering Association (EGMEA) in cooperation with governmental and non-governmental organizations.” The Conference will be organized by the Geological Society of Africa (1973-2013) was assigned to Ethiopia. This will be conducted at the United Nations Economic and Social Commission Conference Center (UNECA) in Addis Ababa, Ethiopia from 8 to 14 January 2013. The CAG24 will be organized by the Geological Society of Africa (GSAf). Since the first colloquium in 1965, this Colloquium has been hosted by several European and African countries. The African countries that have chosen to organize this event were Swaziland, Zimbabwe, Morocco, Mozambique, Tunisia and South Africa. Based on the decision of the Geological Society of Africa (GSAf) General Assembly held on 14 January 2011 at the University of Johannesburg, South Africa (during the 23rd Colloquium), the organization of the next Colloquium of African Geology (CAG24) as well as the 14th Conference of the Geological Society of Africa and the 40th Anniversary of the Geological Society of Africa (1973-2013) was assigned to Ethiopia. This will be conducted at the United Nations Economic and Social Commission Conference Center (UNECA) in Addis Ababa, Ethiopia from 8 to 14 January 2013. The CAG24 will be organized by the Ethiopian Geosciences and Mineral Engineering Association (EGMEA) in cooperation with governmental and non-governmental organizations under the auspices of the Geological Society of Africa (GSAf). The Theme of the Conference is: “40 Years of GSAf (1973-2013): Earth Sciences Solutions to African Development Challenges”. (from the CAG24 website)

Please use the registration facility at the website for making preliminary registration and encourage also as many potential participants.
SNOWDEN PROFESSIONAL DEVELOPMENT TRAINING COURSES

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<thead>
<tr>
<th>Course</th>
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<td>Resource Estimation</td>
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<td>Belo Horizonte</td>
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<td>Manageing Risks and Realising Opportunities in the Mining Activity</td>
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<td>18-22 June</td>
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<td>10-14 Sept</td>
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<td>3-7 Dec</td>
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<tr>
<td>Mining &amp; Sampling Theory for Mine Technicians &amp; Field Assistants</td>
<td>Johannesburg, RSA</td>
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<td>Bulawayo, Zimbabwe</td>
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<td>Reporting Resources &amp; Reserves</td>
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<tr>
<td>Introduction to Geostatistics</td>
<td>Johannesburg, RSA</td>
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<td>Practical Variography</td>
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<td>Metallurgy for Non-Metallurgists</td>
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<td>Advanced Financial Modelling</td>
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<td>Technical Report Writing</td>
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<tr>
<td>Introduction to Geotechnical Engineering</td>
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<tr>
<td>CONTACT AND REGISTRATION</td>
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Please note that GSSA members will pay the same rates as SAIMM members

For information on sponsorship opportunities please contact:
Caron Lance, Southern African Institute of Mining & Metallurgy
Tel 011 834 1273/7 Fax 086 684 0453/ 011 838 5923 Email: caron@saimm.co.za

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ITP Programme Secretariat
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Phone +46 10 615 60 00 Fax +46 10 615 20 00 itp@ramboll.se www.rambollnatura.se

See prospectus at:
http://www.rambollnatura.se/services/capacity%20development%20and%20training~/media/Files/RSE/Natura/Training%20programmes/ISCD/286B_ISCD%202012.ashx
INTERESTING PHOTOS

Tundavala - Angola

LOCATION:
Latitude: 13° 14' 55" 10'E
Longitude: 15° 4' 15.90'S
GABON