



NEWSLETTER-Nr. 4 of 2015 – Annum 5

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EDITORIAL

The first three weeks of this month (April 2015) have been marked by a number of deadly and shocking events spread through the four regions of Africa (south, east, west and north). And the fact that the victims were mostly children, students, and women makes it even more painful.

At the beginning of April, a cruel attack was carried out by the terrorist movement Al-Shabab against the Garissa Campus of the Moi University, Kenya, with 147 deaths and 95 injured, the majority of the victims being students.

This event, as well as others below, have shocked the African Geoscientific community. The Geological Society of Africa (GSAf), as the continental representation of this community wants to express its indignation at this barbaric act which claimed lives of many young people with promising lives ahead and much to give to their country and families.

We wish that our Kenyan friends may recover quickly from this carnage, and face the future with hope.

We are also shocked by the xenophobic violence in South Africa, against African and Asian citizens that work and built their lives in that country, many of them having built a family with local people. The uncontrolled violence is something that we, African geoscientists, cannot understand and or accept.

We are in mourning for those who lost their lives in this senseless violence!

We also denounce the violence of Boko Haram in Nigeria, Cameroon, Tchad and Niger who, in the name of Allah, profanes the image of Islam, considered religion of Peace. We are in mourning for all the people killed by this terrorist group.

And we are also in solidarity with all the survivors of these violent attacks to the dignity of a Human Being.

In the last years, the World has been witnessing the exodus of thousands of Africans from their home continent, seeking for better living conditions in the West, particularly in Europe, in tiny little boats, overcrowded, with no security, nor health and dignity conditions, resulting in hundreds if not thousands of deaths. This exodus is, amongst others, a result of insecurity, unemployment, prosecution from political turmoil and the lack of liberty in their countries of origin.

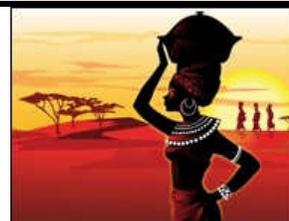
All these tragedies are a result of bad policies and the lack of respect for human life.

Being a scientific institution, struggling for the well-being of humankind in general, and geoscientists in particular, GSAf condemns all acts against innocent people, and challenges all African Governments to define policies that encourage young people to have a free space to work hard and live in their own countries, contributing to the development efforts in place and avoiding extortion of hard earned money they get to pay someone to help them make a terrible journey to an unknown destiny which, as we have seen and heard, ends in thousands of deaths in the high sea.

May peace prevail in our Continent!

The GSAf Council

(image in <http://answersafrica.com/african-last-names.html>)



LET US MAKE AFRICA A BETTER PLACE AND THE BEST PLACE TO LIVE!!!!

GSAf Matters

Report on “The Africa Data Revolution High Level Meeting at the African Union Commission Headquarters, Addis Ababa, Ethiopia , March 27-29, 2015”

by **Asfawossen Asrat**

(GSAf, Vice President for the Eastern African Region and Treasurer)

Final Version adopted by the High Level Conference on Data Revolution – A side event of the 8th AU-ECA Conference of Ministers

- ✓ **Data Community:** A data community refers to a group of people who share a social, economic or professional interest across the entire data value chain – spanning production, management, dissemination, archiving and use.
- ✓ **African Data Revolution:** A profound shift in the way that data is harnessed to impact on development decision-making, with a particular emphasis on building a culture of usage. The process of embracing a wide range of data communities and diverse range of data sources, tools, and innovative technologies, to provide disaggregated data for decision-making, service delivery and citizen engagement; and information for Africa to own its narrative.
- ✓ **Data Ecosystem:** Multiple data communities, all types of data (old and new), institutions, laws and policy frameworks, and innovative technologies and tools, interacting to achieve the data revolution.

Why an African data revolution?

At their 23rd Ordinary Session of the African Union held in Malabo, Equatorial Guinea in June 2014, African Heads of State requested ECA, AUC, AfDB and UNDP to organize a High Level Conference to discuss the data revolution in Africa and its implications for African Union's Agenda 2063 and the post-2015 development agenda. The High Level Conference on Data Revolution was held in Addis Ababa, Ethiopia from 27 to 29 March 2015,

culminating in this Africa Data Consensus.

A sustained data revolution is needed to drive social, economic and structural transformation in every African country. Such a revolution will also make it easier to track our countries' progress towards meeting national and globally agreed sustainable development goals, with a view to leave no one behind.

The building blocks for an African data revolution are already in place. National Statistical Offices have long been the backbone of data production and management, producing official statistics and supporting data activities to create accurate and timely data for decision-making.

However, today's development challenges and prospects call for a broad data ecosystem that spans the entire value chain driven by national priorities and underpinned by the Fundamental Principles of Official Statistics. This ecosystem must be inclusive of all forms of data – including official and other data – and involve all stakeholders.

Vision

A partnership of all data communities that upholds the principles of official statistics as well as openness across the data value chain, which creates a vibrant data ecosystem providing timely, user-driven and disaggregated data for public good and inclusive development

Challenges

Building this new African data ecosystem will involve addressing a number of challenges, including:

- Uneven coverage, lack of disaggregated data and data stored in sector-specific silos.
- Supply driven data subject to conditional financing and influences at odds with national priorities
- Lack of accessible usable information that is open to all communities
- A mismatch between available data and actual problems
- A lack of harmonisation of data collected by different sources in different formats
- Weak demand and capacity in the use of data at both national and local level
- A lack of timely, accurate, comparable and relevant data.
- Weak data governance and accountability
- Concerns over privacy, data protection and intellectual property
- Insufficient funding and dependence on external resources
- Lack of common standards allowing comparison of data across sectors and countries
- The lack of data on key issues such as governance, peace and security. environmental sustainability, gender and human rights

Principles

- Political will is pivotal to the implementation of the African data revolution. Countries must own the prioritisation, financing and leadership of this revolution.
- Data must be disaggregated to the lowest levels of administration by gender, age, income, disability, and other categories.
- People must be counted to make them count. Civil registration should be accessible and provided at no cost.
- Official data belong to the people and should be open to all. They should be open by default.
- The data community should embrace the Fundamental Principles of Official Statistics as a starting point.
- There is a need for governance and coordination of the data ecosystem.
- African governments should acknowledge open data provided by credentialed data communities as acceptable sources of country statistical information.
- Technology, new forms of data and other innovations should be actively embraced.
- Data communities should promote a demand-driven data user culture spanning the entire ecosystem.
- Privacy and intellectual property rights should be respected.
- Data should be translated into information that is simple, understandable and relevant.
- Information must be timely, accurate, relevant and accessible.
- Data must be driven by needs rather than for its own sake.
- The data revolution in all its facets should be gender-sensitive.

Key Actions

- Create an inclusive data ecosystem involving government, private sector, academia, civil society, local communities and development partners that tackles the informational aspects of development decision-making in a coordinated way. Governments must play a pro-active role in engaging this community and other stakeholders should prioritise partnership with government.
- As a critical first step to strengthening the data ecosystem, review the capacity needs, legal and financial frameworks, participating institutions, data assets and gaps at national, sub-national and community level to recognize the roles of the various stakeholders and create a workable roadmap with clear milestones.
- Governments should take the lead in ensuring that the recurrent costs of production and dissemination of all required data is financed from sustainable domestic resources.
- Existing National Strategies for the Development of Statistics should be revised to become more inclusive of all data communities.
- Governments should identify a body authorised to provide credentials to data communities providing open data, based on established criteria for quality, reliability, timeliness and relevance to statistical information needs.
- The development of Civil Registration systems that produce credible vital statistics must be a cornerstone of the data revolution. Likewise population, economic, labour, health, education, land and agricultural management information systems should be supported to ensure timely and accurate data to drive decision-making at national and sub-national level.
- Public-private partnerships should be adopted, fostered and strengthened as a strategy for knowledge transfer and to promote sustainable collaborations
- All international norms and standards relating to official statistics should, where applicable, be extended to all data so as to improve their validity and credibility.
- Innovative, integrated methodologies and technologies, including geospatial referencing, should be promoted to improve data collection, analysis and usage.
- Integrate gender statistics and gender specific indicators in monitoring and evaluation.
- The Pan Africanist Institutions (AfDB, AUC and ECA) should take the lead in the realisation of the Data Consensus, in partnership with other development partners.

EU-AU Joint Session on Infrastructure for the Minerals Sector

Organized by the African Union Commission & the European Commission
within the Joint Africa-EU Strategy
Brussels, 19-20 March 2015

Report by Aberra Mogessie (GSAf President)

Thanks to the invitation of the African Union (AU) and the European Union (EU), the Geological Society of Africa (GSAf) was represented at this meeting by its President (Aberra Mogessie). There were a number of participants who made presentations and participated in the deliberations in the following seven sessions :

Session 1: Stocktaking of the Joint Africa-EU Strategy

Session 2: Existing support programs for infrastructure development – lessons learnt and focus areas

Session 3: Barriers to investment in the raw materials sector

Session 4: Investment policy success stories – policy case studies

Session 5: Mapping the infrastructure needs of the raw materials sector

Session 6: Innovative approaches to infrastructure funding

Session 7: Raw materials-related infrastructure funding through economic diversification and related initiatives

Closing speeches: Stocktaking for the Joint Africa-EU Strategy way forward on infrastructure development in raw materials

I made a presentation on “*The mineral resources potential of Africa and the need for infrastructure*” in Session 5 which dealt with “*Mapping the infrastructure needs of the raw materials sector*”

Here is the Draft Concept Note of the meeting which summarizes the essence of the deliberations:

“The African Mineral Resources sector provides high potential and opportunity of generating growth and jobs in the mining industry and as an input for industrial production and manufacturing and thus contributing to the continents’ social and economic structural transformation as envisioned by Agenda 2063. It provides that opportunity for accelerating industrialization as defined by the Accelerated Industrial

Development of Africa (AIDA) and the African Mining Vision (AMV). On the other hand, the EU Raw Materials Initiative aimed to address the challenges the EU industry faces with ensuring sustainable supply of raw materials foresees in its international cooperation pillar supporting Africa in developing its raw materials potential apart from fostering own EU supply and promoting recycling and resource efficiency.

The aim of this Joint Session is to discuss the infrastructure needs of the minerals sector in Africa and identify ways in which those can find support in the broader context of existing and planned infrastructure projects and networks, including transport, ICT, water and energy as well as all other types of infrastructure necessary for the sector to play its transformative role. The Joint Session should look into existing support programs for infrastructure and industrial development in Africa such as PIDA as well as the on-going Resource Corridors across Africa and for Accelerating Industrial Development of Africa AIDA. The Joint Session will also be a first attempt to map the needs of the different African countries in terms of infrastructure for the minerals sector and look into innovative approaches to stimulate investment in the sector. It will also explore the barriers to investment in infrastructure and look at infrastructure financing strategies of the mining industry and financial institutions active in the sector”.

There were a minimum of five presenters in each session dealing with the topics indicated in the concept note above. The presentations were well prepared and informative. At the end of each session we had question and answer sessions which led to open discussions.

During this meeting I took the opportunity to discuss with officials of the AU, EU and the European Federation of Geologists (EFG) in strengthening the Geological Society of Africa(GSAf). I want to remind our readers that I have reported previously on the engagement of the GSAf in the African Minerals and Geoscience Initiative (AMGI) project of the World Bank and the AU, the PanAfGeo project of the EuroGeosurveys (EU)-and the Organization of African Geological Surveys (OAGS); the African Network of Earth Science Institutions (ANESI) project in cooperation with UNESCO. These projects, I feel will bear fruits and make the GSAf a strong partner for all engaged in the mineral and energy resources sector in Africa.

Memorandum of Agreement between the Geological Society of Africa (GSAf) and The European Federation of Geologists (EFG)

By **Aberra Mogessie** (GSAf president)

The European Federation of Geologists (EFG), based in Belgium, with its office located in Rue Jenner 13, (c/o Belgium Geological Survey), 1000 Brussels, hereby represented by its President, VitorCorreia, hereinafter referred to as “EFG”

And

The Geological Society of Africa (GSAf) based in the School of Earth Sciences, College of Natural and Computational Sciences, Addis Ababa University, Faculty of Science, P.O.Box 1176 Addis Ababa, Ethiopia, hereby represented by its President, Aberra Mogessie, hereinafter referred to as “GSAf”

Both collectively referred below as “the Parties” have signed a memorandum of understanding on March 31, 2013.

The EFG is a federation of professional geoscience societies and associations from Europe whose main objectives are to: represent the geological profession in Europe; safeguard and promote the interests of the geological profession in Europe (and elsewhere in the World); promote best technical, scientific and ethical practice in the application of geology generally; and promote responsible use of the Earth’s resources and sustainable use of land. It currently has 23 National Association members.

EFG achieves its objectives through: award of the professional title European Geologist (EurGeol); participation in EU projects relevant to its objectives (particularly in areas of dissemination of results and in representing the point of view of professional geoscientists as users of such research); the activities of a range of Panels of Experts in providing briefing papers on professional geoscience issues for the European Commission and other public bodies; the bi-annual publication of the European Geologist Magazine; support to its member associations; and participation in the international professional geoscience community (especially through the IUGS Task Group on Global Geoscience Professionalism).

The GSAf is an organization aiming to: promote the understanding of Earth sciences and improve standards of earth science’s education and research in Africa;

provide a forum for discussion and dissemination of information across national boundaries between scientists, associations and institutions engaged in African Geology and earth resources; promote the development and sustainable management of the continent's resources, advance its socio-economic development; and improving natural hazards assessment and disaster mitigation. It publishes the Journal of African Earth Sciences (AJES by Elsevier publishers) and has a monthly electronic newsletter that is published in its website and also distributed among its readers. It supports African National Geological Societies in organizing workshops and conferences. The bi-annual Colloquium of African Geology (CAG) is its flagship where most geologists working and doing research in Africa get together to present their scientific results and exchange ideas. It cooperates with the African Union Commission and the European Union Commission among others to implement the Africa Mining Vision in the raw materials sector. The GSAf is an associated member of the IUGS.

Given the similar objectives and common benefits of its members, EFG and GSAf agree to promote activities to fostering cooperation in scientific research and promote scientific opportunities between members of both organizations.

EFG and GSAf will promote the following activities:

- a) Exchange of information on key programs and initiatives;
- b) Expansion of membership of both organizations through possible joint programs;
- c) Exchange of information and possible joint activities concerning international cooperation, educational opportunities, student programs and professional services;
- d) Exchange of information and possible co-organization of scientific conferences.

The 9th edition of 3MA (Magmatism, Metamorphism and Associated Mineralizations) international Colloquium held in Taroudant-Agadir. Morocco. 2-5 May 2015.

In Partnership with GSAf

By Youssef Didrouch,
GSAf Counselor for North Africa

Coordinators: Moha IKKENNE and Mustapha SOUHASSOU

Other partners: MANAGEM GROUP, OCP Group, GARROT CHAILLAC –MAROC and CRIMIDESA –MAROC

111 participants from 10 countries: Morocco, Algeria, Tunisia, France, UK, Japan, USA, Canada, Senegal, Mali.

This 9th edition honored Pr. Christian Maignac and Pr. Pierre Barbey from Nancy University, France.

5 conferences were animated:

1 - L'or orogénique à la lumière des gisements d'or varisques

Marignac, Ch. - Université de Lorraine, UMR Géoressources et Ecole des Mines de Nancy

2 - Nature of the ophiolitic chromitite

Arai S. - Department of Earth Sciences, Kanazawa University, JAPAN

3 - Large igneous provinces: their role in metallogeny, oil/gas resource generation and aquifer formation

Ernst, R.E. - Dept. of Earth Sciences, Carleton University, Ottawa, Ontario, Canada

Jowitt, S.M. - School of Earth, Atmosphere and Environment, Monash University, Melbourne, Australia;

4 - Mineral Evolution, Mineral Ecology and the Search for Earth's "Missing" Minerals

Hazen, R. - Carnegie Institution of Washington and George Mason University

5 - Les chutes de météorites au Maroc : retrospective

Chennaoui Aoudjehane, H. - **Error! Bookmark not defined.** Laboratoire GAIA, Université Hassan II Casablanca, Faculté des Sciences Ain Chock. Morocco

The field trip have been organized in the Anti-Atlas belt with visits to Bou Azzer (Co) and Imiter (A g-Hg) Ore deposits

The closing ceremony honored the victims of terrorist attack in Garissa University. Kenya.

The 10th edition will be held in Meknes. Spring 2017.



Group Photo



Organizing Committee

Geological field excursion to South Africa (April 6-20, 2015)

Aberra Mogessie

(GSAf President)

There is a tradition to take our students from the University of Graz, Institute of Earth Sciences for geological field excursions to different countries and continents outside Austria. The same is the case with the earth Sciences department of the Mining University of Leoben. Both Universities are found within the region of Styria, Austria located about 70kms from each other. In order to organize such an excursion one needs local colleagues who help in the local organization and having good contacts with the mining companies and government Agencies in the localities we planned to visit. Our colleague Prof. Christoph Gauert from the University of Free State was very helpful. Having prepared for almost one year, we left Austria on 6 April 2015 with Ethiopian Airlines flying from Vienna to Addis Ababa stopping for a transit and from Addis Ababa to Johannesburg arriving on 7th April 2015 around 13hrs local time. Our 47 sit bus was waiting for us at the Oliver Tambo Johannesburg International Airport and we made our way for a final rest in Pretoria. During the following days until our flight back to Austria on 19th April from Johannesburg to Addis Ababa-Vienna arriving on the 20th April early morning, we had a chance to visit one of the most spectacular mineral resources areas in the world and did not know about the disturbances that were happening in the areas of Durban and Johannesburg until we returned back home. The areas we visited were:

1) The Vergenoeg Fluorite mine, 2) Karoo coal Middleburg; and in the Bushveld Complex: 3) Eastern Chrome, Dwars River UG1, 4) Merensky Reef Maandagshoek, Modikwa Mine openpit, the Upper Group Chromitites (UG3, UG2); 5) Cameron section Lower Zone –Critical Zone transition. We then left the Eastern Bushveld and visited different localities and mining areas in the Western Limb of the Bushveld Complex: 6)The Kumba Iron Ore Thabazimbi Fe Mine (Banded Iron Formation); 7)Pilanesberg game reserve with the Alkaline Ring Complex, 8)Big hole Kimberley (with kimberlite pipes and xenoliths), 9) A visit to The University of Free State Department of Geology where Prof. Marion Tredoux made an interesting presentation on the controversial models of the formation of the Vredefort Crater and finally 10) The worlds' largest and oldest meteorite crater-Vredefort impact structure, impact melt.

I was accompanied by Prof. Christoph Hauzenberger, University of Graz; Profs. Frank Melcher, Walter Prochaska and Heinz Mali from the Mining University of Leoben in addition to 35 Geology students ranging from undergraduate to PhD classes. It was an excellent excursion. The success depended on the character and discipline of the staff and students and the detailed preparation that has been made in Austria and South Africa. I have to acknowledge again our friend and colleague Prof. Christoph Gauert for his hard work and enthusiasm during our excursion where he accompanied us, apart from the time he has invested in making sure that we have a possibility to visit the mines in the excursion areas. We also thank all colleagues of the University of Free State who took time to show us their Department and share their knowledge about the excursion areas and the mine managers and geologists for their support in facilitating the visits to their mining areas. Last but not least I would like to thank Dr. Bisrat Yibas, Dr. Fhatuwani Ramagwede, and Ms Mashudu Matshivha of the Council of Geosciences of South Africa (CGS) who provided us with the necessary geological maps of the respective localities which helped us a lot. Our driver Donald has really contributed to the positive outcome of the excursion. The Universities of Graz and Mining University of Leoben are gratefully acknowledged for the financial and administrative support. We should also not forget the South African Lodges where we were well taken care of. South Africa is a beautiful resources rich country with an intact infrastructure. I wish all South Africans and foreigners who have made South Africa their home to work together and make a heaven out of this beautiful country.



University of Graz and Mining University of Leoben, Austria Staff and students field excursion in South Africa. Location is the Upper Group Chromitite locality (UG1) a world heritage site, Dwars River, Bushveld Complex.



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THE EARTH DAY – 22ND APRIL

Earth Day is an annual event, celebrated on April 22, on which day events worldwide are held to demonstrate support for environmental protection. It was first celebrated in 1970, and is now coordinated globally by the Earth Day Network (http://en.wikipedia.org/wiki/Earth_Day_Network), and celebrated in more than 192 countries each year.

In 1969 at a UNESCO Conference in San Francisco, peace activist John McConnell proposed a day to honor the Earth and the concept of peace, to first be celebrated on March 21, 1970, the first day of spring in the northern hemisphere. This day of nature's equipoise was later sanctioned in a Proclamation written by McConnell and signed by Secretary General U Thant at the United Nations. A month later a separate Earth Day was founded by United States Senator Gaylord Nelson as an environmental teach-in first held on April 22, 1970. Nelson was later awarded the Presidential Medal of Freedom Award in recognition of his work. While this April 22 Earth Day was focused on the United States, an organization launched by Denis Hayes, who was the original national coordinator in 1970, took it international in 1990 and organized events in 141 nations. Numerous communities celebrate **Earth Week**, an entire week of activities focused on environmental issues.

Text extracted from http://en.wikipedia.org/wiki/Earth_Day.



Earth Day Flag created by John McConnell

NEWS

About Africa

Mining infrastructure in Africa

18 Mar 2015

Mining infrastructure is an important driver for development in mineral-rich countries.

Sub-Saharan Africa has the biggest untapped mineral and natural resources in the world, due to a lack of infrastructure. Mines, more than most industries, depend on infrastructure to operate and to transport their products to other countries.

Tapping into the rich mineral resources of the region will generate royalties and taxes, as well as local employment opportunities needed for broad-based economic development in the region, but infrastructure is required before this can be done.

While mining operations in developed countries are supported by infrastructure created by governments, the infrastructure deficit in sub-Saharan Africa cannot be handled alone by governments that already face many financial challenges.

According to the World Bank's Africa Infrastructure Country Diagnostic, sub-Saharan Africa faces an annual infrastructure funding gap of \$31 billion. This gap can be filled by mining where operations can be leveraged to build long-term assets, such as infrastructure, to support sustainable and inclusive growth.

Foreign agendas

Economic development in the region has been driven largely by mining in countries, such as South Africa, Zimbabwe and Nigeria; however, where mining resources were primarily exploited for foreign agendas, countries faced huge

challenges when foreign entities withdrew. The resulting lack of capacity resulted in infrastructure failures in governments, regions and societies.

"Mining is a catalyst for business where the value chain starts at mining, with value-add driving the rest of the economy through beneficiation to manufacturing and on to industry," said Frans Pienaar, Chairman of Inyatsi Construction, a company involved in building infrastructure in the region.

"From our experience we have found that it is better to view mining infrastructure from a regional, rather than a country, point of view, because cooperation between regions improves profitability as well as the ability to compete internationally in the world markets. Obviously, different countries have different needs and priorities, but it is important to align as far as possible to regional players to exploit cooperation and learning experiences."

The involvement of mines in Africa will generate sustainable development when the infrastructure constructed for the operational purposes of the mines will also be available for employees and their families, as well as communities around the operation during and after the mining process.

Infrastructure plays an important role in the social and economic development of communities. Regions without sufficient access to effective infrastructure are characterised by high levels of poverty. The development of mining infrastructure that can contribute to economic growth in sub-Saharan Africa can be the catalyst for encourage economic growth, which, in turn, will fulfil a major role in alleviating poverty.

At <http://www.bizcommunity.com/Article/196/355/125822.html>

New discovery helps solve mystery source of African lava

2015.04.02

Floods of molten lava may sound like the stuff of apocalyptic theorists, but history is littered with evidence of such past events where vast lava outpourings originating deep in Earth accompany the breakup of continents.

New research at Michigan State University shows that the source of some of these epic outpourings, however, may not be as deep as once thought. The results, published in the journal *Geology*, show that some of these lavas originated near the surface rather than deep within the mantle.

When geoscientists want to learn more about massive lava flows -- the kind that accompany continental rifting and continent break up -- they conduct

field studies of the African tectonic plate. Here, the Great Rift Valley of East Africa provides a snapshot of how a continent can be torn apart.

Armed with new technology, scientists can better translate the story that is stored in the rift's fossilized lava flows. What they learn is applicable to continental breakup around the globe, said Tyrone Rooney, MSU geologist.

"For decades, there's been a big debate as to where the lavas from this massive outpouring came from," he said. "Did they emit from deep within Earth? Or was there some contribution from shallower sources? Our paper shows that some lavas came from within the African tectonic plate itself."

To clarify, many nonscientists think of big eruptions in terms of Mount St. Helens or Vesuvius. These were mere drops in a bucket compared to what Rooney and his colleagues are studying. The ancient African outpouring is estimated to have poured out 350,000 cubic kilometers of lava about 30 million years ago. That's comparable to twice the amount of water in all the world's lakes, Rooney explained.

While much of this lava is probably derived from deep sources, Rooney's team found that some parts of the tectonic plate also have melted to form an unusual group of lavas in Ethiopia. The researchers showed that the rocks, artifacts from the ancient outpouring, had chemical signatures of materials found in the lithosphere and were distinctly different from most of the other rocks in Ethiopia.

Rooney and his team were able to confirm their findings because, in part, of having access to tools that their predecessors merely imagined. The new approaches are allowing them to challenge long-standing theories in their field.

For example, mass spectrometers are employed to reveal the rocks' chemical signatures. By identifying the lavas' elemental characteristics, the scientists can

trace their origin to the surface or from deep in the mantle. Using lasers, scientists can transform rock into a fine mist and measure its composition.

In a surprise finding, the team's lab experiments revealed that the Ethiopian samples matched rocks collected from other distant regions. The lavas in Arabia, Jordan, Egypt and Sudan are similar, which means that some of the ingredients that supply the massive outpourings, or basalt floods, have a shallow source that is tapped as the continents split apart. Indeed the seeds of the lithosphere's own destruction maybe contained within it, Rooney said.

"We're interested in this because these massive outpourings happen around the same time continents break apart, create new oceans and affect the planet and the environment on a global scale," he said. "So knowing the source of the lava gives us insights into a process that we still know little about."

Rooney's research laid the groundwork for a National Science Foundation grant that will allow him to continue to unlock the secrets of tectonic forces and continental rifting.

The above story is based on materials provided by Michigan State University.

At <http://www.geologyin.com/2015/02/new-discovery-helps-solve-mystery.html>

World's oldest stone tools discovered in Kenya



NIGEL PAVITT/CORBIS.
The shores of Lake Turkana, where many fossils of human ancestors have been found, are also the home of what may be the oldest known tools.

By Michael Balter. 14 April 2015.

SAN FRANCISCO, CALIFORNIA—Researchers at a meeting here say they have found the oldest tools made by human ancestors—stone flakes dated to 3.3 million years ago. That's 700,000 years older than the oldest-known tools to date, suggesting that our ancestors were crafting tools several hundred thousand years before our genus *Homo* arrived on the scene. If correct, the new evidence could confirm disputed claims for very early tool use, and it suggests that ancient australopithecines like the famed "Lucy" may have fashioned stone tools, too.

Until now, the earliest known stone tools had been found at the site of Gona in Ethiopia and were dated to 2.6 million years ago. These belonged to a tool technology known as the Oldowan, so called because the first examples were found more than 80 years ago at Olduvai Gorge in Tanzania by famous paleoanthropologists Louis and Mary Leakey. Then, in 2010, researchers working at the site of Dikika in Ethiopia—where an australopithecine child was also discovered—reported cut marks on animal bones dated to 3.4 million years ago; they argued that tool-using human ancestors made the linear marks. The claim was immediately controversial, however, and some

argued that what seemed to be cut marks might have been the result of trampling by humans or other animals. Without the discovery of actual tools, the argument seemed likely to continue without resolution.

Now, those missing tools may have been found. In a talk at the annual meeting of the Paleoanthropology Society here, archaeologist Sonia Harmand of Stony Brook University in New York described the discovery of numerous tools at the site of Lomekwi 3, just west of Lake Turkana in Kenya, about 1000 kilometers from Olduvai Gorge. In 2011, Harmand's team was seeking the site where a controversial human relative called *Kenyanthropus platyops* had been discovered in 1998. They took a wrong turn and stumbled upon another part of the area, called Lomekwi, near where *Kenyanthropus* had been found. The researchers spotted what Harmand called unmistakable stone tools on the surface of the sandy landscape and immediately launched a small excavation.

More tools were discovered under the ground, including so-called cores from which human ancestors struck off sharp flakes; the team was even able to fit one of the flakes back to its original core, showing that a hominin had crafted and then discarded both core and flake in this spot. The researchers returned for more digging the following year and have now uncovered nearly 20 well-preserved flakes, cores, and anvils apparently used to hold the cores as the flakes were struck off, all sealed in sediments that provided a secure context for dating. An additional 130 pieces have also been found on the surface, according to the talk.

More at http://news.sciencemag.org/africa/2015/04/world-s-oldest-stone-tools-discovered-kenya?utm_source=facebook&utm_medium=social&utm_campaign=facebook

A Vertical City in the Sahara?

Apr 21, 2015, By Glenn Mcdonald

In what is surely the most resolutely optimistic architectural proposal of the year so far, French firm OXO Architectes has put forth a plan to build a city in the Sahara desert. A vertical city. That looks like a rock.

The City Sand Tower is technically described as a mixed-use tower, but in its scope and ambition might be more accurately termed a space-age arcology. Rising to a height of more than 1,400 feet, the tower would have a total floorspace of 192 acres and include residential housing, business offices, hotels, shops, restaurants, sports and recreation facilities and a museum.

The tower's exterior design, meanwhile, would incorporate angled facades with shading materials and sensors calibrated to make the most of the desert sun, collecting solar energy while cooling the interior.

As you can see from the image, the design is also intended to make the tower appear part of the desert environment — an enormous, impossible rock jutting out of the sand.

Inside the perimeter structure, architects plan a central inner tower that doubles as a vertical farm, with vegetation protected from the desert climate. At the top of the structure, a meteorological research station and observatory would keep an eye on the sky.

To power the gigantic structure, the builders plan to run a 700-mile extension cord to a wall outlet in this one guy's apartment in Cairo. We kid: Builders intend a self-sustaining system using solar panels and geothermal energy. Rainwater would be recycled

more or less endlessly, converted into steam for generators and used to irrigate the vertical farm.

If it all seems a bit ambitious, keep in mind that these kinds of proposals tend to be more conceptual than anything else. They're like thought experiments in high-density living and improbable real estate. Still, it can't hurt to dream, right?

via Gizmag

At http://news.discovery.com/tech/alternative-power-sources/a-vertical-city-in-the-sahara-150421.htm?utm_source=facebook.com&utm_medium=social&utm_campaign=DNewsSocial



Gaz de schiste en Algérie: pour Hacina Zegzeg, «les dégâts sont déjà là»

Invité Afrique. 06/04/2015. Par Leïla Beratto

En Algérie, un comité national contre l'exploitation du gaz de schiste a été créé. Il regroupe des experts et des militants de plusieurs régions du pays, mais il est basé à In Salah, ville de 50 000 habitants à plus de 1 000 kilomètres de la capitale. C'est là qu'est situé le premier puits de gaz de schiste algérien. Et c'est là que les habitants manifestent contre l'exploitation de ce gaz depuis le 31 décembre dernier. Hacina Zegzeg est la représentante des opposants au gaz de schiste de In Salah. Elle est au micro de Leïla Beratto.

RFI : Les manifestations contre le gaz de schiste dans la ville d'In Salah durent maintenant depuis trois mois, que demandent les manifestants?

Hacina Zegzeg : La première demande, c'est l'arrêt immédiat des forages. La deuxième demande, c'est le nettoyage du site et la troisième demande, c'est le moratoire.

L'exploitation a commencé au mois de décembre, vous dites demander l'arrêt des forages et le nettoyage du site, est-ce que vous avez des craintes de conséquences écologiques?

La catastrophe écologique a déjà eu lieu. Il y a des bourbiers qui sont remplis de produits chimiques, ils ont créé des puits poubelles, on a trouvé des animaux morts, on a des chameaux qui ont bu de l'eau et qui sont morts, un vol de cigognes noires qui est passé au-dessus des forages et qu'on a trouvé morts aussi. Oui, on craint bien sûr. Tous les produits chimiques sont exposés à l'air libre et l'eau mélangée avec les produits chimiques, qui est en fait stockée dans les bourbiers, tout ce qui ne passe pas dans la nappe, qu'on utilise pour les besoins quotidiens, ça s'évapore dans l'air. C'est vraiment à proximité, c'est à 35 km. Le gaz de schiste, on n'est pas contre. On n'est pas contre son exploration, on est contre l'utilisation des fracturations hydrochimiques. Ils utilisent 750 produits chimiques, on n'a pas le droit de voir la liste parce qu'on nous a dit que c'était un secret professionnel. 70% de l'eau qui est injectée, est récupérée, 30%, ils ne savent pas où elle va, ils n'ont jamais utilisé aucun fluide de traçabilité pour savoir où va cette eau. Nos experts nous ont expliqué, nos experts localement, nous ont expliqué que les 30% de cette eau, qui n'est pas récupérée, est mélangée à l'eau potable.

Et ça, ça aurait des conséquences sur la population directement?

Complètement, puisqu'à In Salah, on a une nappe fossile qui ne se renouvelle pas et cette nappe va jusqu'en Mauritanie et jusqu'en Libye. Elle part pas, elle ne rejoint pas la mer, elle ne bouge pas, elle est fossile, donc les produits restent là-bas. Et puis c'est clair, quant on est un chameau, un chameau pèse de 600 à 800

kg, quant il boit de l'eau, il meurt. On n'a pas d'habitants qui font 600 kg, en trois heures les chameaux sont morts. On a fait les autopsies et on a envoyé les échantillons, l'eau actuellement, qui est à proximité des forages, est mortelle. Ils ont déjà fracturé plusieurs fois, ils veulent fracturer le deuxième puits et c'est ce qu'on veut empêcher. On a dit de ne plus faire de fracturation. Ils sont en train de nous dire que ce sont des puits d'expérimentation. Pour expérimenter, il faut un minimum de 50 puits, ils ne vont pas s'arrêter là.

Alors vous avez demandé un moratoire au président de la République, mais dans un message, le président a déclaré que le gaz de schiste était une nécessité et qu'il fallait que les habitants fassent preuves de raison. Comment, après cette réponse, allez-vous poursuivre votre mobilisation?

On ne nous a pas donné de réponse sur le moratoire mais on n'a pas eu de refus, on ne nous a pas répondu. Pour ne pas bloquer le dialogue, on a créé ce collectif national, il va prendre le relais, et on va redemander encore une fois une réponse à un autre moratoire. La mobilisation ne s'arrêtera pas, ça fait trois mois que l'on est dehors, on n'a pas de réponse, on continue.

Il y a eu une journée de violence, il y a eu des manifestants et des policiers qui ont été blessés, en trois mois, il y a aussi une fatigue des habitants. Dans quel état d'esprit sont aujourd'hui les opposants au gaz de schiste de la ville d'In Salah?

En fait, c'est vrai, il y a eu une journée de violence mais c'est quelque chose que l'on regrette énormément, parce que nous, on n'est pas violents et on avait décidé que ce serait une contestation pacifique et intelligente. Maintenant, on a eu affaire à des personnes qui ont insulté les citoyens qui étaient montés à la base de Halliburton pour voir si les produits chimiques étaient encore là-bas. Les gendarmes ont le devoir de protéger la société et puis ça a dérapé. Maintenant tout va bien et puis on continue pacifiquement. Bien sûr, comme tous les mouvements, parfois ça s'essouffle.

Qu'est-ce qui explique, selon vous, que la ville d'In Salah accorde autant d'importance au développement durable, aux énergies renouvelables et soit aussi consciencieuse de l'eau et du respect de l'eau?

Parce que traditionnellement, parce que culturellement, l'eau est un élément très important dans la vie du Sahara. Et puis on utilise l'eau avec parcimonie, on ne peut pas admettre que l'on utilise de l'eau pour faire des fracturations. C'est une quantité énorme, en dépit du fait qu'elle sera polluée, c'est une nappe fossile, si elle est asséchée, elle est asséchée, c'est fini.

Site: <http://m.rfi.fr/emission/20150406-hacina-zegzeg-representante-opposants-gaz-de-schiste-algerie/>

Current status of Lakes Nyos and Monoun within the framework of the SATREPS-NyMo project

By Wilson Y Fantong¹ and Greg Tanyileke¹
¹ IRGM, Yaounde, Box 4110 Yaounde

What is the SATREPS-NyMo project: In 2008, Japan launched the "SATREPS" (Science and Technology Research Partnership for Sustainable Development) program for joint research cooperation between Japan and developing countries aimed at resolving some global issues pertaining to the environment, energy, natural disaster prevention and infectious disease control. On the 19th of November 2010, Japan and Cameroon signed a Technical Cooperation Agreement related to the project title "Magmatic Fluid Supply into Lakes Nyos and Monoun and Mitigation of Natural Disasters through Capacity Building in Cameroon", under the scheme: Natural Disaster Prevention. The main purpose is to provide Cameroonian scientists with the required knowhow and tools to enable them independently undertake research on issues related to the Lakes Nyos and Monoun-type disasters and to utilize the results for disaster mitigation. The project, which commenced in March, 2011 and shall end in March, 2016, is a counterpart activity between Japan (JICA and JST) and Cameroon with IRGM as the host institute.

Major achievements of the project: For human capacity building, a total of nine Cameroonian researchers, amongst which 4 PhDs, have so far been trained in Japanese universities on how to generate data and interpret them for managing and mitigating Lakes Nyos and Monoun-type disasters.

For infrastructural reinforcement, the project can boast of cutting-edge and user friendly analytical equipment such as; Multi beam sonar, an autobuoy, an atomic adsorption spectrometer (AAS), PICARRO Cavity Ringdown Water Isotope Analyser, ¹³Carbon analyzer, and ion chromatography. The function of each piece of equipment can be downloaded from the SATREPS-NyMo website.

Although the Laboratory awaits accreditation, good inter-laboratory results have enabled publication of data generated therefrom to be published (Hydrological Sciences Journal). The administrative machinery of the IRGM laboratory is not sparing any effort to transform the laboratory to a center of excellence in the sub-region of Central Africa.

For scientific results, the multidisciplinary team of researchers from IRGM-Cameroon and various Universities in Japan has so far produced the following salient findings: The eruptive history of Lakes Nyos and Barombi-Mbo maars, mechanism of limnic eruption model at Lakes Nyos and Monoun, conceptual model of groundwater flow at Lake Nyos catchment, low temperature water-rock interaction at lake Nyos, gas geochemistry in and around Lakes along the Cameroon Volcanic Line, hydrobiology of Lakes Nyos and Monoun, and petrochemistry of volcanic rocks in the Oku volcanic chain that hosts Lake Nyos. Degassing of lakes Nyos and Monoun which started in 2001 and 2003 respectively is virtually finished at Monoun and 85% completed at Nyos. These equipment will ensure the continuous monitoring of degassing of these lakes as well as the Lake Nyos Dam reinforcement works.

Action plan for the year 2015-2016: Before the project ends next March, the team will produce a risk management manual and a hazard map of Lakes Nyos and Monoun environs, prepare and organize the 9th international workshop on Crater Lakes (CVL-9) with GSAF as one of the sponsors, write a final report project, establish a road map for final project evaluation by JICA, propose post SATREPS-NyMo project activities to ensure continuity of monitoring of Lakes along the Cameroon Volcanic Line, and improve upon the functioning of the laboratory.

The Center of Expertise and Geological Survey is a scientific non-governmental organization. CEGS is a regional survey office with its main objective to study the geological environments in order to inform the population on the challenges bound to them.

It is in the scope of celebrating the international day of the Earth Sciences in Africa and Middle East commemorated every March 19-20-21 that CEGS with its partners organized a conference under the theme: "**Water and its role in the development and stability of the Democratic Republic of Congo**".

This activity consisted to a thinking conference on the strategies to make the consumption in safe water accessible to all.

1. Global objective

To inform the participants on the potentiality in water of the DR Congo and the role of earth sciences in the resolution of the problem of deficiency in water in Africa.

2. Specific objectives

The specific objectives were:

- To show the assets in water that our planet have and the importance of earth sciences,
- To make know wealth in water of the RDC,
- To bring up the geologist's role facing water
- To think on the enhancement of the water resources of this vast country,
- To motivate the environmental and biodiversity protection,
- To increase the mind of research in geosciences

The activity have been organized from 12h30 to 15h30, three under-themes have been developed:

a. Role, place and the future of the earth sciences in the Great Lakes region

By Prof Robert WAZI NANDEFO professor at Department of Geology in university of ROUEN (France) and university of GOMA (DR Congo),

Prof Robert WAZI, started his speech with defining *geology* and talking about its different disciplines. He mentioned the multiple stakes bound to water policy in the world specifying the potentiality in water of DR Congo. The Professor didn't forget to talk especially about the role and place of geologists in the problematic of water in Great Lakes Region. The hydro-geologist in Great Lakes region has a very crucial place he strongly said. The discovery of water grounds, the good management of this resource depends inevitably to hydro-geologists. So they must be associated in different level in water management in this region.

Geologist must also develop by the way and appropriate ethic according to the place they have in water aspect.

b. The potentialities in water of the DR Congo facing to water accessibility and desertification in Africa challenges

By Prof Pigeon KAMBALE MAHUKA Coordinator of the survey office of the North Kivu provincial parliament,

In his speech he started with showing that the peace constitutes the fundamental element nevertheless water can be the disruptive element of peace. Prof Pigeon KAMBALE MAHUKA in his intervention spoke mainly

about the international relations between state around water and the international law according to it, he reminded the strategic position of DR Congo in the world in the thematic of water. He underlined that the Congolese state must respect the five principles of the international right: the principles of non-prejudicial use of the national territory, principle of diligence and vigilance, principle of cooperation, principle of *polluting - payer* and principle of precaution.

For each of these principles, Prof Pigeon illustrated each by an example of case having existed between States. He concluded his intervention saying that the States must maintain the pacific relations knowing that water can constitute a conflict.

c. Water and its role in the development and stability of the Democratic Republic of Congo.

By Mr. Etienne NYAMI, responsible of the production and quality service in the national water office REGIDESO.

The speaker started his speech with thanking the promoters of the activity. He defined water insisting how water is indispensable to life, then he specified the place of water in the development of the DR Congo. A lot of human being sectors in the life depends on. About the role of water in the stability of the DR Congo, Mr. Etienne let to the participants to debate but he reminded that DR Congo is surrounded by 9 countries, which among some have very recurrent needs in water. While speaking about the Third world War due to water as some pessimists speak, the speaker Mr. Etienne minimized this approach developing more optimism.

At the end the activity the following recommendations were taken:

To the REGIDESO

- To increase effort in water provision to the whole city of Goma,
- To analyze permanently the quality of water for a safe consumption by the population,
- To think on the new sources of water catchment for the peripheries of Goma,
- To recruit geologists in its services

To the national, regional and international organizations

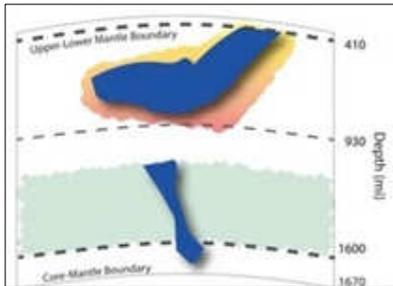
- To continual support the water sector and the intervening parties according to multiple challenges,
- To act in synergy so that to reach more impact and success,
- To the international NGO, to finance local initiatives of development,
- To recruit geologists in their relative projects of water.

To CEGS

- to continue in the future to organize such activities,
- to work in partnership with other national and international organizations acting in the same domain of intervention,
- To make more sensitizations to the population in relation to the challenges of geological and environmental stakes,
- To make the intensification and the diversification of actions for the development of this sector.



A stiff new layer in Earth's mantle



A simplified image of a slab from one of Earth's tectonic plates sinking through the upper mantle above, through the boundary between the upper and lower mantle 410 miles deep, then stalling and pooling at a depth of 930 miles, where University of Utah experiments suggest the existence of an extremely stiff or viscous layer in Earth. Such a layer may explain why tectonic plate slabs seem to pool at 930 miles under Indonesia and South America's Pacific coast. Below the highly viscous zone, slabs can continue to sink to the core-mantle boundary. Credit: Lowell Miyagi, University of Utah

plate slabs seem to pool at 930 miles under Indonesia and South America's Pacific coast. Below the highly viscous zone, slabs can continue to sink to the core-mantle boundary. Credit: Lowell Miyagi, University of Utah

March 23, 2015; University of Utah

By crushing minerals between diamonds, a University of Utah study suggests the existence of an unknown layer inside Earth: part of the lower mantle where the rock gets three times stiffer. The discovery may explain a mystery: why slabs of Earth's sinking tectonic plates sometimes stall and thicken 930 miles underground.

The findings -- published today in the journal *Nature Geoscience* -- also may explain some deep earthquakes, hint that Earth's interior is hotter than believed, and suggest why partly molten rock or magmas feeding midocean-ridge volcanoes such as Iceland's differ chemically from magmas supplying island volcanoes like Hawaii's.

"The Earth has many layers, like an onion," says Lowell Miyagi, an assistant professor of geology and geophysics at the University of Utah. "Most layers are defined by the minerals that are present. Essentially, we have discovered a new layer in the Earth. This layer isn't defined by the minerals present, but by the strength of these minerals."

Earth's main layers are the thin crust 4 to 50 miles deep (thinner under oceans, thicker under continents), a mantle extending 1,800 miles deep and the iron core. But there are subdivisions. The crust and some of the upper mantle form 60- to 90-mile-thick tectonic or lithospheric plates that are like the top side of conveyor belts carrying continents and seafloors.

Oceanic plates collide head-on with continental plates offshore from Chile, Peru, Mexico, the Pacific Northwest, Alaska, Kamchatka, Japan and Indonesia. In those places, the leading edge of the oceanic plate bends into a slab that dives or "subducts" under the continent, triggering earthquakes and volcanism as the slabs descend into the mantle, which is like the bottom part of the conveyor belt. The subduction process is slow, with a slab averaging roughly 300 million years to descend, Miyagi estimates.

Miyagi and fellow mineral physicist Hauke Marquardt, of Germany's University of Bayreuth, identified the likely presence of a superviscous layer in the lower mantle by squeezing the mineral ferropericlasite between gem-quality diamond anvils in presses. They squeezed it to pressures like those in Earth's lower mantle. Bridgmanite and ferropericlasite are the dominant minerals in the lower mantle.

The researchers found that ferropericlasite's strength starts to increase at pressures equivalent to those 410 miles deep -- the upper-lower mantle boundary -- and the strength increases threefold by the time it peaks at pressure equal to a 930-mile depth.

And when they simulated how ferropericlasite behaves mixed with bridgmanite deep underground in the upper part of the lower mantle, they calculated that the viscosity or stiffness of the mantle rock at a depth of 930 miles is some 300 times greater than at the 410-mile-deep upper-lower mantle boundary.

"The result was exciting," Miyagi says. "This viscosity increase is likely to cause subducting slabs to get stuck -- at least temporarily -- at about 930 miles underground. In fact, previous seismic images show that many slabs appear to 'pool' around 930 miles, including under Indonesia and South America's Pacific coast. This observation has puzzled seismologists for quite some time, but in the last year, there is new consensus from seismologists that most slabs pool."

How stiff or viscous is the viscous layer of the lower mantle? On the pascal-second scale, the viscosity of water is 0.001, peanut butter is 200 and the stiff mantle layer is 1,000 billion billion (or 10 to the 21st power), Miyagi says.

More at http://www.sciencedaily.com/releases/2015/03/150323130849.htm?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+sciencedaily%2Fearth_climate+%28Earth+%26+Climate+News+--+ScienceDaily%29

Doubling of coastal erosion by mid-century in Hawai'i



Chronic erosion dominates the sandy beaches of Hawai'i, causing beach loss as it damages homes, infrastructure, and critical habitat. Researchers have long understood that global sea level rise will affect the rate of coastal erosion. However, new research indicates that coastal erosion of Hawai'i's beaches may double by mid-century.

2015.03.24. Chronic erosion

dominates the sandy beaches of Hawai'i, causing beach loss as it damages homes, infrastructure and critical habitat. Researchers have long understood that global sea level rise will affect the rate of coastal erosion.

For the study "Doubling of coastal erosion under rising sea level by mid-century in Hawai'i," published this week in *Natural Hazards*, the research team developed a simple model to assess future erosion hazards under higher sea levels -- taking into account historical changes of Hawai'i shorelines and the projected acceleration of sea level rise reported from the Intergovernmental Panel on Climate Change (IPCC). The results indicate that coastal erosion of Hawai'i's beaches may double by mid-century.

"Business as Usual" leads to double erosion

Like the majority of Hawai'i's sandy beaches, most shorelines at the 10 study sites on Kaua'i, O'ahu and Maui are currently retreating. If these beaches were to follow current trends, an average 20 to 40 feet of shoreline recession would be expected by 2050 and 2100, respectively.

"When we modeled future shoreline change with the increased rates of sea level rise (SLR) projected under the IPCC's "business as usual" scenario, we found that increased SLR causes an average 16-20 feet of additional shoreline retreat by 2050, and an average of nearly 60 feet of additional retreat by 2100," said Tiffany Anderson, lead author and post-doctoral researcher at the UH Mānoa School of Ocean and Earth Science and Technology.

"This means that the average amount of shoreline recession roughly doubles by 2050 with increased SLR, compared to historical extrapolation alone. By 2100, it is nearly 2.5 times the historical extrapolation. Further, our results indicate that approximately 92 percent and 96 percent of the shorelines will be retreating by 2050 and 2100, respectively, except at Kailua, O'ahu which is projected to begin retreating by mid-century."

More at <http://www.geogyn.com/2015/03/doubling-of-coastal-erosion-by-mid.html>

Japan opts for massive, costly sea wall to fend off tsunamis

2015.03.22. By Elaine Kurtenbach

Four years after a towering tsunami ravaged much of Japan's northeastern coast, efforts to fend off future disasters are focusing on a nearly 400-kilometer (250-mile) chain of cement sea walls, at places nearly five stories high.

Opponents of the 820 billion yen (\$6.8 billion) plan argue that the massive concrete barriers will damage marine ecology and scenery, hinder vital fisheries and actually do little to protect residents who are mostly supposed to relocate to higher ground. Those in favor say the sea walls are a necessary evil, and one that will provide some jobs, at least for a time.

In the northern fishing port of Osabe, Kazutoshi Musashi chafes at the 12.5-meter (41-foot)-high concrete barrier blocking his view of the sea.

"The reality is that it looks like the wall of a jail," said Musashi, 46, who lived on the seaside before the tsunami struck Osabe and has moved inland since.

Pouring concrete for public works is a staple strategy for the ruling Liberal Democratic Party and its backers in big business and construction, and local officials tend to go along with such plans.

The paradox of such projects, experts say, is that while they may reduce some damage, they can foster complacency. That can be a grave risk along coastlines vulnerable to tsunamis, storm surges and other natural disasters.

At least some of the 18,500 people who died or went missing in the 2011 disasters failed to heed warnings to escape in time.

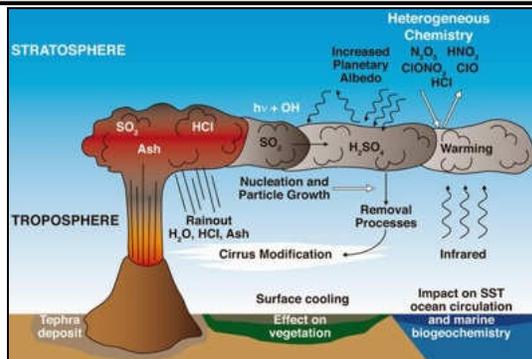
Tsuneaki Iguchi is mayor of Iwanuma, a town just south of the region's biggest city, Sendai, when the tsunami triggered by a magnitude-9 earthquake just off the coast inundated half of its area.

A 7.2-meter (24-foot)-high sea wall built years earlier to help stave off erosion of Iwanuma's beaches slowed the wall of water, as did stands of tall, thin pine trees planted along the coast. But the tsunami still swept up to 5 kilometers (3 miles) inland. Passengers and staff watched from the upper floors and roof of the airport as the waves carried off cars, buildings and aircraft, smashing most homes in densely populated suburbs not far from the beach.

The city repaired the broken sea walls but doesn't plan to make them any taller. Instead, Iguchi was one of the first local officials to back a plan championed by former Prime Minister Morihiro Hosokawa to plant mixed forests along the coasts on tall mounds of soil or rubble, to help create a living "green wall" that would persist long after the concrete of the bigger, man-made structures has crumbled.

At <http://phys.org/news/2015-03-japan-opts-massive-costly-sea.html>

Volcanic eruptions found to durably impact climate through alterations to Ocean circulation



Particles emitted during major volcanic eruptions cool the atmosphere due to a 'parasol' effect that reflects sunlight. The direct impact of these particles in the atmosphere is fairly short, lasting two to three years. However, they alter for more than 20 years the North Atlantic Ocean circulation, which connects surface and deep currents and influences the climate in Europe. This is the conclusion of a study by researchers from the CNRS, IRD, CEA and Météo-France* who combined, for the first time, climate simulations, recent oceanographic data, and information from natural climate records. Their findings** are published in *Nature Communications* on March 30th.

2015.03.30.

The Atlantic Ocean is home to variations in surface temperatures that last for several decades, affecting Europe's climate. This slow variability is caused by changes in the ocean circulation, which connects surface to deep currents and transports heat from the tropics to the Norway and Greenland seas. However, the reason for this variability is still poorly understood.

In order to elucidate its mechanisms, the researchers first used information from the natural climate record covering the last millennium. By studying the chemical composition of water from ice cores in Greenland, they were able to estimate past temperature changes. The data highlights the close connection between the surface temperature of the Atlantic Ocean and air temperatures over Greenland, showing that climate variability in the region is a periodic phenomenon some of whose cycles, or oscillations, last around twenty years.

By using numerical simulations from more than twenty different climate models, the researchers also showed that major volcanic eruptions, like that of Mount Agung, Indonesia, in 1963, or Pinatubo in the Philippines in 1991, could significantly alter ocean circulation in the North Atlantic. This is because the large quantities of particles emitted by these eruptions into the upper atmosphere reflect

part of the solar radiation, rather like a parasol, causing the climate at Earth's surface to cool. The cooling, which only lasts two or three years, then triggers a rearrangement of ocean circulation in the North Atlantic Ocean. Around fifteen years after the beginning of the eruption, the circulation speeds up. It then slows down after twenty-five years, before accelerating again thirty-five years after the phenomenon. Volcanic eruptions thus appear to act on the ocean circulation in the North Atlantic rather like a pacemaker, causing variability over a twenty-year period.

The scientists confirmed these results by comparing them with observations of ocean salinity, a key factor for the sinking of water and therefore for ocean circulation. In numerical simulations and modern oceanographic data they detected similar variations in the early 1970s and 1990s connected to the eruption of the Agung volcano. Using data from Greenland ice cores and observations carried out on bivalve molluscs collected to the north of Iceland and dating back more than 500 years, as well as a simulation of the climate over the last thousand years, the researchers systematically identified acceleration of ocean circulation fifteen years after five volcanic eruptions that took place several hundred years ago.

Lastly, the researchers revealed the interference produced by the latest three main eruptions, Agung in 1963, El Chichón in Mexico in 1982, and Pinatubo in 1991, explaining for the first time the recent variability of currents in the North Atlantic ocean. They conclude that a major eruption in the near future could have an impact on the currents in the North Atlantic Ocean -- and hence on our ability to predict the variability of the climate in Europe -- over several decades. They now hope to consolidate these findings by collecting data from additional sources, especially in paleoclimatology.

* From the Laboratoire Environnements et Paléo-environnements Océaniques et Continentaux (CNRS/Université de Bordeaux), Centre National de Recherches Météorologiques -- Groupe d'Etude de l'Atmosphère Météorologique (CNRS/Météo France), and Laboratoire d'Océanographie et du Climat: Expérimentations et Approches Numériques (CNRS/UPMC/MNHN/IRD) and Laboratoire des Sciences du Climat et de l'Environnement (CNRS/CEA/UVSQ), both part of the Institut Pierre Simon Laplace.

**The project was funded by the Agence Nationale de la Recherche via the 'Groenland Vert' project in the 'Changements Environnementaux Planétaires et Société' program (2011-2015).

The above story is based on materials provided by CNRS.

At <http://www.zeolqvin.com/2015/03/volcanic-eruptions-found-to-durably.html>

An ocean of plastic: Magnitude of plastic waste going into the ocean calculated



Ocean currents have been carrying floating debris into all five of the world's major oceanic gyres for decades. The rotating currents of these so-called "garbage patches" create vortexes of trash, much of it plastic. However, exactly how much plastic is making its way into the world's oceans and from where it originates has been a mystery -- until

now.

2015.03.31

A new study published today in the journal *Science*, quantifies the input of plastic waste from land into the ocean and offers a roadmap for developing ocean-scale solutions to the problem of plastic marine pollution. The research was conducted by a scientific working group at UC Santa Barbara's National Center for Ecological Analysis and Synthesis (NCEAS) with support from the Washington, D.C.-based Ocean Conservancy. To conduct the research, lead author Jenna Jambeck, an environmental engineer at the University of Georgia, coordinated contributions from experts in oceanography, waste management and plastics materials science.

The study found that more than 4.8 million metric tons of plastic waste enters the oceans from land each year, and that figure may be as high as 12.7 million metric tons. That's one to three orders of magnitude greater than the reported mass of plastic floating in the oceans. A metric ton is equivalent to 1,000 kilograms or 2,205 pounds.

"Using the average density of uncompacted plastic waste, 8 million metric tons -- the midpoint of our estimate -- would cover an area 34 times the size of Manhattan ankle-deep in plastic waste," said co-author Roland Geyer, an associate professor at UCSB's Bren School of Environmental Science & Management. "Eight million metric tons is a vast amount of material by any measure. It is how much plastic was produced worldwide in 1961."

Previous studies have documented the impact of plastic debris on more than 660 marine species -- from the smallest of zooplankton to the largest whales, including fish destined for the seafood market -- but none have quantified the worldwide amount entering the ocean from land. "This is the first time people have connected the dots in a quantifiable way," said Jambeck.

Plastic pollution 2-2-2

According to the study, countries with coastal borders -- 192 in all -- discharge plastic into the world's oceans with the largest quantities estimated to come from a relatively small number of middle-income, rapidly developing countries. In fact, the investigators found that the top 20 countries accounted for 83 percent of the mismanaged plastic waste available to enter the ocean. They went on to say that reducing the amount of this waste by 50 percent would result in a nearly 40 percent decline in inputs of plastic to the ocean.

"Large-scale removal of plastic marine debris is not going to be cost-effective and quite likely simply unfeasible," said Geyer. "This means that we need to prevent plastic from entering the oceans in the first place through better waste management, more reuse and recycling, better product design and material substitution."

Knowing how much plastic is going into the ocean is just one part of the puzzle. Millions of metric tons reach the oceans, yet researchers are finding between 6,350 and 245,000 metric tons floating on the surface -- a mere fraction of the total. This discrepancy is the subject of ongoing research.

"Right now, we're mainly measuring plastic that floats," said study co-author Kara Lavender Law, a research professor at the Massachusetts-based Sea Education Association. "There is a lot of plastic sitting on the bottom of the ocean and on beaches worldwide."

The NCEAS working group forecasts that the cumulative impact to the oceans could be as high as 155 million metric tons by 2025. However, the planet will not reach global "peak waste" before 2100, according to World Bank calculations. "We're being overwhelmed by our waste," Jambeck said.

"The numbers are staggering, but as the group points out, the problem is not insurmountable," said NCEAS Director Frank Davis, who is also a professor at UCSB's Bren School. "The researchers suggest achievable solutions that could reverse the alarming trend in plastics being dumped into our oceans."

Among them, according to the study, are waste reduction and "downstream" waste management strategies such as expanded recovery systems and extended producer responsibility. According to the researchers, while infrastructure is being built in developing nations, "industrialized countries can take immediate action by reducing waste and curbing the growth of single-use plastic."

The above story is based on materials provided by University of California - Santa Barbara. The original article was written by Julie Cohen.

At <http://www.earthjournal.com/2015/02/an-ocean-of-plastic-magnitude-of.html>

Giant sea lizards in the age of dinosaurs: A new beginning for baby mosasaurs



Researchers have discovered a new birth story for mosasaurs. Credit: Illustration by Julius T. Csotonyi

April 10, 2015, Yale University

They weren't in the delivery room, but researchers at Yale University and the University of Toronto have discovered a new birth story for a gigantic marine lizard that once

roamed the oceans.

Thanks to recently identified specimens at the Yale Peabody Museum of Natural History, paleontologists now believe that mighty mosasaurs -- which could grow to 50 feet long -- gave birth to their young in the open ocean, not on or near shore.

The findings answer long-held questions about the initial environment of an iconic predator that lived during the time of the dinosaurs. Mosasaurs populated most waters of the Earth before their extinction 65 million years ago.

"Mosasaurs are among the best-studied groups of Mesozoic vertebrate animals, but evidence regarding how they were born and what baby

mosasaur ecology was like has historically been elusive," said Daniel Field, lead author of a study published online April 10 in the journal *Palaentology*. Field is a doctoral candidate in the lab of Jacques Gauthier in Yale's Department of Geology and Geophysics.

In their study, Field and his colleagues describe the youngest mosasaur specimens ever found. Field had come across the fossils in the Yale Peabody Museum's extensive collections. "These specimens were collected over 100 years ago," Field said. "They had previously been thought to belong to ancient marine birds."

Field and Aaron LeBlanc, a doctoral candidate at the University of Toronto at Mississauga, concluded that the specimens showed a variety of jaw and teeth features that are only found in mosasaurs. Also, the fossils were found in deposits in the open ocean.

"Really, the only bird-like feature of the specimens is their small size," LeBlanc said. "Contrary to classic theories, these findings suggest that mosasaurs did not lay eggs on beaches and that newborn mosasaurs likely did not live in sheltered nearshore nurseries."

At

http://www.sciencedaily.com/releases/2015/04/150410165316.htm?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+sciencedaily%2Fearth_climate+%28Earth+%26+Climate+News+---+ScienceDaily%29

Fragment of continental crust found under south east Iceland

April 13, 2015; University of Liverpool

An international team, including researchers at the University of Liverpool, have shown that south east Iceland is underlain by continental crust.

The team found that the accepted theory, that Iceland consists only of very thick oceanic crust, is incorrect. Maps of crustal thickness produced from satellite gravity data, together with geochemical, plate tectonic reconstruction and mantle plume track analysis (an upwelling of abnormally hot rock), were used to show that south east Iceland is underlain by continental crust which extends offshore to the east.

Professor Nick Kusznir, from the University's School of Environmental Sciences, who produced the satellite data, said: "The established theory is that geological features such as Iceland, known as oceanic plateaux, are generated by the interaction of ocean-ridge sea-floor spreading with a hot mantle upwelling.

"Our results suggest that there is another critical ingredient which is the presence of fragments of continental crust. This discovery has important implications for how mantle plumes interact with plate tectonics."

Satellite mapping

Crustal thickness mapping shows thick crust under south east Iceland of up to 30 km, which is more 'typical' of continental crust in comparison to much thinner crust in the surrounding ocean basins and under the rest of Iceland.

The thick crust of south east Iceland extends eastwards offshore and is interpreted as being a sliver of continental crust originally part of, but now separated from, the Jan Mayan micro-continent to the north from which it has

rifted during the formation of the north east Atlantic in the last 55 million years.

Professor Kusznir added: "Global crustal thickness mapping, using gravity inversion, suggests that tectonic features, such as Iceland, formed by the interaction of mantle plumes, sea-floor spreading and micro-continent fragments, are quite common.

"Other examples include Mauritius in the Indian Ocean; the Rio Grande High in the south Atlantic; and the Canary Islands in the Central Atlantic.

"Not only is this discovery important for the science of geo-dynamics, our findings also has important implications for natural resources in these regions. Continental crust has a very different composition and history to oceanic crust and is much richer in natural resources."

Oil and gas exploration

Crustal thickness mapping using the satellite gravity inversion methodology was developed by Professor Kusznir and has been used for locating the transition between continental and oceanic crust and micro-continent for the United Nations Convention on the Law of the Sea (UNCLOS) territorial claims and is used extensively by the hydrocarbon industry in deep water oil and gas exploration.

Story Source: The above story is based on materials provided by University of Liverpool. Note: Materials may be edited for content and length.

At

http://www.sciencedaily.com/releases/2015/04/150413110628.htm?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+sciencedaily%2Fearth_climate+%28Earth+%26+Climate+News+--+ScienceDaily%29

Meteorites key to the story of Earth's layers

April 13, 2015; Australian National University

A new analysis of the chemical make-up of meteorites has helped scientists work out when the Earth formed its layers.

The research by an international team of scientists confirmed the Earth's first crust had formed around 4.5 billion years ago.

The team measured the amount of the rare elements hafnium and lutetium in the mineral zircon in a meteorite that originated early in the solar system.

"Meteorites that contain zircons are rare. We had been looking for an old meteorite with large zircons, about 50 microns long, that contained enough hafnium for precise analysis," said Dr Yuri Amelin, from The Australian National University (ANU) Research School of Earth Sciences.

"By chance we found one for sale from a dealer. It was just what we wanted. We believe it originated from the asteroid Vesta, following a large impact that sent rock fragments on a course to Earth."

The heat and pressure in the Earth's interior mixes the chemical composition of its layers over billions of years, as denser rocks sink and less dense minerals rise towards the surface, a process known as differentiation.

Determining how and when the layers formed relies on knowing the composition of the original material that formed into the Earth, before differentiation, said Dr Amelin.

"Meteorites are remnants of the original pool of material that formed all the planets," he said.

"But they have not had planetary-scale forces changing their composition throughout their five billion years orbiting the sun."

The team accurately measured the ratio of the isotopes hafnium-176 and hafnium-177 in the meteorite, to give a starting point for the Earth's composition.

The team were then able to compare the results with the oldest rocks on Earth, and found that the chemical composition had already been altered, proving that a crust had already formed on the surface of the Earth around 4.5 billion years ago.

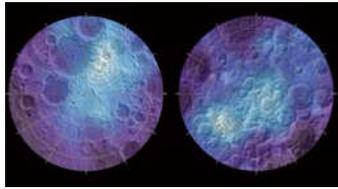
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http://www.sciencedaily.com/releases/2015/04/150413161541.htm?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+sciencedaily%2Fearth_climate+%28Earth+%26+Climate+News+--+ScienceDaily%29

OtherStories

- **Sewage could be a source of valuable metals and critical elements.** March 23, 2015 .American Chemical Society. http://www.sciencedaily.com/releases/2015/03/150323075239.htm?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+sciencedaily%2Fearth_climate+%28Earth+%26+Climate+News+--+ScienceDaily%29
- **X-raying the past "New evidence: ammonites were probably able to swim"**. 2015.04.08. <http://www.geologypage.com/2015/04/x-raying-past-new-evidence-ammonites.html#ixzz3Wolqgm1o>
- **Is the Shale Boom Reversing Progress in Curbing Ozone Pollution?** By Gunnar W. Schade and Geoffrey S. Roest; <https://eos.org/opinions/is-the-shale-boom-reversing-progress-in-curbing-ozone-pollution>

Lopsided ice on the moon points to past shift in poles



An off-axis abundance of water at the moon's north pole (left) is matched symmetrically at the south pole (right).

Richard Miller/University Of Alabama, Huntsville.

By Eric Hand. 19.03.2015

THE WOODLANDS, TEXAS—What little ice remains on Mercury and Mars is mostly confined to the

planets' poles, as one would expect, because the sun shines the least in those regions. Not so on the moon. Much of the moon's ice, which lurks beneath the surface, is found in an area 5.5° away from the north pole and in a matching region 5.5° from the south pole, scientists announced here this week at the Lunar and Planetary Science Conference. The data suggest that in the past, the moon's axis of rotation—and hence its poles—shifted.

"It turns out these enhanced concentrations are exactly opposite each other—they're antipodal," says Matthew Siegler, a planetary scientist at the Planetary Science Institute who is based in Dallas, Texas. "The easiest explanation is: There used to be poles there." Siegler and his colleagues have suggested a cause for the "polar wander": a 3.5-billion-year-old hot spot beneath the moon's surface. If the story holds up, it means the moon's water is nearly as ancient as the orb itself.

The researchers relied on data from NASA's Lunar Prospector mission, which orbited the moon from 1998 to 1999. One of the spacecraft's instruments measured neutrons emitted from the surface. Slower, less energetic ones indicate the amount of hydrogen lurking within a meter of the surface, and on the moon, hydrogen is a proxy for water. Although scientists had noticed before that the water was not centered at the current poles, no one had noticed this precise off-axis, antipodal relationship. "Everyone is basically kicking themselves and saying, 'Why didn't I notice this?'" Siegler says.

He and his colleagues assumed that when the ice was deposited, it was

centered on the poles. But what kind of event could have moved the poles by 5.5°? Known asteroid impacts were too small or in the wrong location to do the job. Instead, the team hypothesizes that a 3.5-billion-year-old hot spot could have nudged the poles to their present-day position. Pouring out enormous amounts of lava, that hot spot created Oceanus Procellarum, the vast dark spot on the near side of the moon. The Procellarum region is known to have high concentrations of radioactive elements that would have been hot in ancient times. The research team theorizes that this heat would have created a less dense lens in the moon's mantle that would have caused the axis to wobble into today's position.

If that idea is correct, then it implies that the moon's water is mostly ancient—contrary to scientists who have argued that water was delivered more recently by asteroid impacts or even produced by a hail of protons known as the solar wind. "That ice might be primordial from the beginning of the moon," Siegler says.

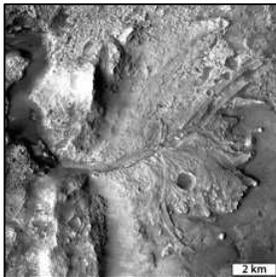
"It's a terrific idea," says Oded Aharonson, a planetary scientist at the Weizmann Institute of Science in Rehovot, Israel. But Aharonson isn't sure the idea could have persisted for so long. At other times in its ancient past, the moon's poles are thought to have wandered far enough to bring polar regions near the sun-drenched equator. Moreover, ice could be destroyed by large asteroid impacts. For the ice to survive, the 5.5° tilting event would need to occur after those cataclysms, he says. "It's really critical not to do this [tilting] too early in lunar history," he says.

But the research team says there are ways for the ice to persist through the ages. Some of the water may be locked up as hydrated minerals in rocks. And some of it may be protected by an insulating layer of regolith, says Richard Miller, a planetary scientist at the University of Alabama, Huntsville, and a collaborator on the research. "If it gets buried and moves to depth, some fraction can survive for a long period of time."

Posted in Space. At http://news.sciencemag.org/space/2015/03/lopsided-ice-moon-points-past-shift-poles?utm_source=facebook&utm_medium=social&utm_campaign=facebook

Ancient Martian lake system records two water-related events

Water record from a paleolake. A delta-like fan at the western edge of Jezero Crater marks an area where flowing water would have entered the lake-filled crater and deposited clay minerals transported from the surrounding watershed. Image: NASA/MSSS



March 25, 2015

Current and former graduate students at Brown University combined images from NASA's CTX instrument with mineralogical data from NASA's CRISM orbiting spectrometer to create a geologic history of flowing water on the surface of Mars nearly 4 billion years ago.

PROVIDENCE, R.I.[Brown University] —

Researchers from Brown University have completed a new analysis of an ancient Martian lake system in Jezero Crater, near the planet's equator. The study finds that the onslaught of water that filled the crater was one of at least two separate periods of water activity in the region surrounding Jezero.

"We can say that this one really well-exposed location makes a strong case for at least two periods of water-related activity in Mars' history," said Tim Goudge, a graduate student at Brown who led the work. "That tells us something really interesting about how early Mars operated."

The study is in press in the *Journal of Geophysical Research: Planets*.

The ancient lake at Jezero crater was first identified in 2005 by Caleb Fassett, a former Brown graduate student now a professor at Mount Holyoke College. Fassett identified two channels on the northern and western sides of the crater that appear to have supplied it with water. That water eventually overtopped the crater wall on the southern side and flowed out through a third large channel. It's not clear how long the system was active, but seems to have dried out around 3.5 to 3.8 billion years ago.

Each of the crater's inlet channels has a delta-like deposit where sediment carried by water was deposited in the lake. In 2008, Bethany Ehlmann, another former Brown graduate student now a professor at Caltech, showed that those fan deposits are full of clay minerals — a clear sign of alteration by water. The question of how exactly those minerals formed, however, remained open. Did the minerals form in place in the lake, or did they form elsewhere and get transported into the lake?

That's the question Goudge and his colleagues wanted to answer.

To do that, Goudge gathered high-resolution orbital images from NASA's CTX instrument, and combined them with data from the Compact Reconnaissance Imaging Spectrometer for Mars (CRISM) aboard NASA's Mars Reconnaissance Orbiter. Using those two sources, Goudge put together a detailed geological and mineralogical map of the entire Jezero Crater paleolake system.

The map showed that each of the fan deposits has its own distinct mineral signature that matches the signature of the watershed from which it was sourced. "That's a good indication that the minerals formed in the watershed and were then transported into the lake," Goudge said.

The minerals' formation and their transportation seem to have been separated by a fair amount of time. Mapping of the watershed showed a younger layer of rock that sits on top of the hydrated minerals. The crater's inlet channels cut through that layer of younger rock. That means the water that carved the channels must have flowed well after the mineral layer had formed.

"What it implies is that there were actually two periods of water-related activity," Goudge said. "The earlier episode formed the alteration minerals in the watershed, then some time later you had the surface water activity that transported the minerals into the lake. At this site, those two events appear not to have been genetically related."

More at <https://news.brown.edu/articles/2015/03/jezero>

Dust-covered ice glaciers found on Mars



An evenly-layered rock on the planet Mars, photographed by the Mast Camera (Mastcam) on NASA's Curiosity Mars Rover is shown in the NASA handout provided December 9, 2014. Credit: Reuters / NASA / JPL-Caltech / MSSS / Handout via Reuters

2015.04.12. Mars has thousands of glaciers buried beneath its dusty surface, enough frozen water to blanket the planet

with a 3.6-foot (1.1-meter) thick layer of ice, scientists said on Wednesday.

The glaciers are found in two bands in the mid-southern and mid-northern latitudes. Radar data, collected by Mars-orbiting satellites, combined with computer models of ice flows show the planet has about 5.3 trillion cubic feet (150 billion cubic meters) of water locked in the ice, according to a study published in this week's issue of the journal *Geophysical Research Letters*.

"The ice at the mid-latitudes is therefore an important part of Mars' water reservoir," Nanna Bjornholt Karlsson, a researcher at the University of

Copenhagen's Niels Bohr Institute, said in a statement.

Scientists have been trying to figure out how Mars transformed from a warm, wet and presumably Earth-like planet early in its history into the cold, dry desert that exists today.

Billions of years ago, Mars, which lacks a protective, global magnetic field, lost much of its atmosphere. Several initiatives are under way to determine how much of the planet's water was stripped away and how much remains locked in ice in underground reservoirs.

"The atmospheric pressure on Mars is so low that water ice simply evaporates and becomes water vapor," the institute said in a news release. Scientists suspect that the glaciers remained intact because they are protected under a thick layer of dust. In addition to evidence of river beds, streams and hydrated minerals, scientists studying telltale molecules in the Martian atmosphere last month concluded that the planet probably had an ocean more than a mile deep covering almost half of its northern hemisphere. Mars has lost about 87 percent of that water, scientists said.

Currently, the planet's largest known water reservoir is in the polar caps.

Note: The above story is based on materials provided by Reuters. The original article was Reporting by Irene Klotz; Editing by Jonathan Oatis.

More at <http://www.geologypage.com/2015/04/dust-covered-ice-glaciers-found-on-mars.htm#ixzz3X5myNuJU>

Dawn's Ceres Color Map Reveals Surface Diversity



This map-projected view of Ceres was created from images taken by NASA's Dawn spacecraft during its initial approach to the dwarf planet, prior to being captured into orbit in March 2015. Image Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA.

April 13, 2015

A new color map of dwarf planet Ceres, which NASA's Dawn spacecraft has been orbiting since March, reveals the diversity of the surface of this planetary body. Differences in morphology and color across the surface suggest Ceres was once an active body, Dawn researchers said today at the 2015 General Assembly of the European Geosciences Union in Vienna.

"This dwarf planet was not just an inert rock throughout its history. It was active, with processes that resulted in different materials in different regions. We are beginning to capture that diversity in our color images," said Chris Russell, principal investigator for the Dawn mission, based at the University of California, Los Angeles.

The Dawn mission made history on March 6 as the first spacecraft to reach a dwarf planet, and the first spacecraft to orbit two extraterrestrial targets. Previously, Dawn studied giant asteroid Vesta from 2011 to 2012, uncovering numerous insights about its geology and history. While Vesta is a dry body, Ceres is believed to be 25 percent water ice by mass. By comparing Vesta and Ceres, scientists hope to gain a better understanding of the formation of the solar system.

Ceres' surface is heavily cratered, as expected, but appears to have fewer large craters than scientists anticipated. It also has a pair of very bright neighboring spots in its northern hemisphere. More detail will emerge after the spacecraft begins its first intensive science phase on April 23, from a distance of 8,400 miles (13,500 kilometers) from the surface, said Martin Hoffmann, investigator on the Dawn framing camera team, based at the Max Planck Institute for Solar System Research, Göttingen, Germany.

The visible and infrared mapping spectrometer (VIR), an imaging spectrometer that examines Ceres in visible and infrared light, has been examining the relative temperatures of features on Ceres' surface. Preliminary examination suggests that different bright regions on Ceres' surface behave differently, said Federico Tosi, investigator from the VIR



These images, from Dawn's visible and infrared mapping spectrometer (VIR), highlight two regions on Ceres containing bright spots. The top images show a region scientists have labeled "1" and the bottom images show the region labeled "5." Region 5 contains the brightest spots on Ceres. Image Credit: NASA/JPL-Caltech/UCLA/ASI/INAF.

instrument team at the Institute for Space Astrophysics and Planetology, and the Italian National Institute for Astrophysics, Rome.

Based on observations from NASA's Hubble Space Telescope, planetary scientists have identified 10 bright regions on Ceres' surface. One pair of bright spots, by far the brightest visible marks on Ceres, appears to be located in a region that is similar in temperature to its surroundings. But a different bright feature corresponds to a region that is cooler than the rest of Ceres' surface.

The origins of Ceres' bright spots, which have captivated the attention of scientists and the public alike, remain unknown. It appears the brightest pair is located in a crater 57 miles (92 kilometers) wide. As Dawn gets closer to the surface of Ceres, better-resolution images will become available.

"The bright spots continue to fascinate the science team, but we will have to wait until we get closer and are able to resolve them before we can determine their source," Russell said. Both Vesta and Ceres are located in the main asteroid belt between Mars and Jupiter. The Dawn spacecraft will continue studying Ceres through June 2016.

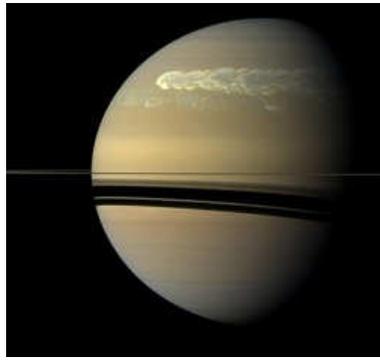
Dawn's mission is managed by NASA's Jet Propulsion Laboratory, Pasadena, California, for NASA's Science Mission Directorate in Washington. Dawn is a project of the directorate's Discovery Program, managed by NASA's Marshall Space Flight Center in Huntsville, Alabama. UCLA is responsible for overall Dawn mission science. Orbital ATK Inc., in Dulles, Virginia, designed and built the spacecraft. The German Aerospace Center, Max Planck Institute for Solar System Research, Italian Space Agency and Italian National Astrophysical Institute are international partners on the mission team. For a complete list of mission participants, visit:

<http://dawn.jpl.nasa.gov/mission/>

For more information about Dawn, visit: <http://dawn.jpl.nasa.gov>

At <http://www.jpl.nasa.gov/news/news.php?feature=4548>

Explaining the great 2011 Saturn storm



Saturn storm encircles planet in February 2011. Image via Cassini spacecraft.

Apr 14, 2015

A storm on Saturn began in late 2010. Six months later, it wrapped entirely around the planet. Later, it subsided. Two planetary scientists explain.

Caltech has released news of a study explaining the amazing storm that raged on the planet Saturn for much of 2011. You might be

familiar with the idea that Jupiter's Great Red Spot is a giant hurricane, which, by the way, has swirled on that planet for hundreds of earthly years. The 2011 storm on Saturn was much like Jupiter's Red Spot; such storms are sometimes referred to as White Spots on Saturn. Saturn's storms aren't as enduring as the Red Spot, but, unlike the Red Spot on Jupiter, the 2011 storm encircled the entire globe of Saturn. Two Caltech planetary scientists have now suggested the cause for Saturn's periodic storms, and they've explained why the storms on Jupiter and Saturn manifest differently. The journal *Nature Geoscience* published their study yesterday (April 13, 2015).

Andrew Ingersoll and Cheng Li used numerical modeling to simulate the formation of Saturn's storms and found that they may be caused by the

weight of the water molecules in the planet's atmosphere. Because these water molecules are heavy compared to the hydrogen and helium that comprise most of Saturn's atmosphere, they make the upper atmosphere lighter when they rain out. For that reason, they suppress convection, the movement of the atmosphere that happens when colder, denser material sinks under the influence of gravity.

Over time, say Ingersoll and Li, these conditions lead to a cooling of Saturn's upper atmosphere. As the upper atmosphere cools, convection begins again, causing warm moist air to rise rapidly and trigger a thunderstorm. Ingersoll commented:

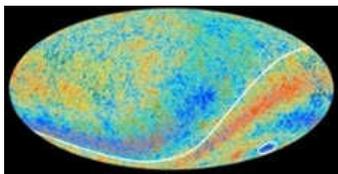
And, indeed, these storms on Saturn have been seen to occur about every 20 to 30 years. Six such storms have been observed on Saturn over the past 140 years, alternating between the equator and midlatitudes. The most recent storm emerged in December 2010 and encircled the planet within six months. The storms usually occur when Saturn's northern hemisphere is most tilted toward the sun.

Ingersoll and Li also propose that the absence of planet-encircling storms on Jupiter could be explained if Jupiter's atmosphere contains less water vapor than Saturn's atmosphere.

Bottom line: Caltech has released news of a study explaining the amazing storm that raged on the planet Saturn for much of 2011. They say the storm may have begun with a rain of heavier water molecules through the light hydrogen and helium that makes up most of Saturn's atmosphere. A rain of this kind on Saturn may set up a series of conditions that ultimately leads to the formation of Saturn storms about every 20-30 years.

At http://earthsky.org/space/explaining-the-great-saturn-storm-of-2011?utm_source=EarthSky+News&utm_campaign=db10e1bfdd-EarthSky+News&utm_medium=email&utm_term=0_c643945179-db10e1bfdd-393647361

Astronomers discover largest known structure in the universe is ... a big hole



An earlier image from the Planck telescope shows the Cold Spot, circled. Photograph: ESA and the Planck Collaboration

Hannah Devlin, science correspondent; 21 April 2015

Astronomers have discovered what they say is the largest

known structure in the universe: an incredibly big hole.

The "supervoid", as it is known, is a spherical blob 1.8 billion light years across that is distinguished by its unusual emptiness.

István Szapudi, who led the work at the University of Hawaii at Manoa, described the object as possibly "the largest individual structure ever identified by humanity".

Its existence only emerged thanks to a targeted astronomical survey, which confirmed that around 10,000 galaxies were "missing" from the part of the sky it sits in.

Szapudi's team was intentionally searching for the void because they believed that it could explain previous observations showing that part of the sky is unusually cool.

The so-called Cold Spot was discovered 10 years ago and has proved a sticking point for the best current models for how the universe evolved following the Big Bang. Cosmological theory allows for a bit of patchiness in the background temperature, due to warmer and cooler spots of various sizes emerging in the infant universe, but areas as large and cold as the Cold Spot are unexpected.

Prof Carlos Frenk, a cosmologist at the University of Durham, said: "The Cold Spot raised a lot of eyebrows. The real question was what was causing it and whether it was a challenge to orthodoxy."

The latest study suggests that the Cold Spot can be partly explained by a gigantic region of emptiness at its centre, which drains energy from light travelling through it.

The supervoid is not an actual vacuum, as its name suggests, but has about 20% less stuff in it than our part of the universe – or any typical region. "Supervoids are not entirely empty, they're under-dense," said András Kovács, a co-author at the Eötvös Loránd University in Budapest.

The structure may sound unremarkable – hardly a standalone object even – but scientists say it is unprecedented given how evenly distributed the universe normally is at this spatial scale. "This is the greatest supervoid ever discovered," Kovács said. "In combination of size and emptiness, our supervoid is still a very rare event. We can only expect a few supervoids this big in the observable universe."

Previously, astronomers observing in the direction of the Cold Spot had established that there was no distant void in that part of the sky, but until now the nearer sky had not been surveyed.

The latest study used the Hawaii's Pan-STARRS1 (PS1) telescope located on Haleakala, Maui, and Nasa's Wide Field Survey Explorer (WISE) satellite to count the number of galaxies in a patch of sky around 3 billion light years away – relatively close in the cosmic scheme of things.

More at <http://www.theguardian.com/science/2015/apr/20/astronomers-discover-largest-known-structure-in-the-universe-is-a-big-hole>



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[http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1936-704X](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1936-704X)
- **Journal of Geophysical Research: Atmospheres:**
[http://agupubs.onlinelibrary.wiley.com/agu/journal/10.1002/\(ISSN\)2169-8996/](http://agupubs.onlinelibrary.wiley.com/agu/journal/10.1002/(ISSN)2169-8996/)
- **Journal of Geophysical Research: Biogeosciences:**
[http://agupubs.onlinelibrary.wiley.com/agu/journal/10.1002/\(ISSN\)2169-8961/](http://agupubs.onlinelibrary.wiley.com/agu/journal/10.1002/(ISSN)2169-8961/)
- **Journal of Geophysical Research: Earth Surface:**
[http://agupubs.onlinelibrary.wiley.com/agu/journal/10.1002/\(ISSN\)2169-9011/](http://agupubs.onlinelibrary.wiley.com/agu/journal/10.1002/(ISSN)2169-9011/)
- **Journal of Geophysical Research: Oceans:**
[http://agupubs.onlinelibrary.wiley.com/agu/journal/10.1002/\(ISSN\)2169-9291/](http://agupubs.onlinelibrary.wiley.com/agu/journal/10.1002/(ISSN)2169-9291/)
- **Journal of Geophysical Research: Planets:**
[http://agupubs.onlinelibrary.wiley.com/agu/journal/10.1002/\(ISSN\)2169-9100/](http://agupubs.onlinelibrary.wiley.com/agu/journal/10.1002/(ISSN)2169-9100/)
- **Journal of Geophysical Research: Solid Earth:**
[http://agupubs.onlinelibrary.wiley.com/agu/journal/10.1002/\(ISSN\)2169-9356/](http://agupubs.onlinelibrary.wiley.com/agu/journal/10.1002/(ISSN)2169-9356/)
- **Journal of Metamorphic Geology:**
[http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1525-1314](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1525-1314)
- **Journal of Petroleum Geology:**
[http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1747-5457](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1747-5457)
- **Journal of Quaternary Science:**
[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1099-1417](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1099-1417)
- **Journal of Sustainable Development in Africa:** <http://www.jsd-africa.com/>
- **Journal of Synchrotron Radiation:**
[http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1600-5775](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1600-5775)
- **Lakes & Reservoirs: Research & Management:**
[http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1440-1770](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1440-1770)
- **Land Degradation & Development:**
[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1099-145X](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1099-145X)
- **Lethaia:** [http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1502-3931](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1502-3931)
- **Limnology and Oceanography Bulletin:**
[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1539-6088](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1539-6088)
- **Limnology and Oceanography e-Lectures:**
[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)2164-0254](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)2164-0254)
- **Limnology and Oceanography: Fluids and Environments:**
[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)2157-3689](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)2157-3689)
- **Limnology and Oceanography:**
[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1939-5590](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1939-5590)
- **Limnology and Oceanography: Methods:**
[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1541-5856](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1541-5856)
- **Marine Ecology:** [http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1439-0485](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1439-0485)
- **Meteoritics & Planetary Science:**
[http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1945-5100](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1945-5100)
- **Meteorological Applications:**
[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1469-8080](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1469-8080)
- **Natural Gas & Electricity:**
[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1545-7907](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1545-7907)
- **Natural Resources Forum:**
[http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1477-8947](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1477-8947)
- **Oil and Energy Trends:** [http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1744-7992](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1744-7992)
- **OPEC Energy Review:** [http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1753-0237](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1753-0237)
- **PAGES – Past Global Changes – Magazine:** <http://www.pages-igbp.org/>
- **Paleoceanography:**
[http://agupubs.onlinelibrary.wiley.com/agu/journal/10.1002/\(ISSN\)1944-9186/](http://agupubs.onlinelibrary.wiley.com/agu/journal/10.1002/(ISSN)1944-9186/)
- **Paleontology:** [http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1475-4983](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1475-4983)
- **Papers in Palaeontology:**
[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)2056-2802](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)2056-2802)
- **Polar Research:** [http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1751-8369](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1751-8369)
- **River Research and Applications:**
[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1535-1467](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1535-1467)
- **Sedimentology:** [http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1365-3091](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1365-3091)
- **Seismological Research Letters:** <http://www.seismosoc.org/publications/srl/srl-toc.php>
- **Soil Use and Management:**
[http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1475-2743](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1475-2743)
- **Tectonics:** [http://agupubs.onlinelibrary.wiley.com/agu/journal/10.1002/\(ISSN\)1944-9194/](http://agupubs.onlinelibrary.wiley.com/agu/journal/10.1002/(ISSN)1944-9194/)
- **Terra Nova:** [http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1365-3121](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1365-3121)
- **The Depositional Record:**
[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)2055-4877](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)2055-4877)
- **The Geographical Journal:**
[http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1475-4959](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1475-4959)
- **The Photogrammetric Record:**
[http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1477-9730](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1477-9730)
- **Transactions in GIS:** [http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1467-9671](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1467-9671)
- **Water and Environment Journal:**
[http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1747-6593](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1747-6593)
- **Water Resources Research:**
[http://agupubs.onlinelibrary.wiley.com/agu/journal/10.1002/\(ISSN\)1944-7973/](http://agupubs.onlinelibrary.wiley.com/agu/journal/10.1002/(ISSN)1944-7973/)
- **Weather:** [http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1477-8696](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1477-8696)
- **Wetlands Ecology and Management:** <http://link.springer.com/journal/11273>
- **Wiley Interdisciplinary Reviews: Climate Change:**
[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1757-7799](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1757-7799)
- **Wiley Interdisciplinary Reviews: Water:**
[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)2049-1948](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)2049-1948)
- **Zeitschrift für anorganische und allgemeine Chemie:**
[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1521-3749](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1521-3749)

EVENTS

The events not announced in former Bulletins are highlighted with dates in **yellow**

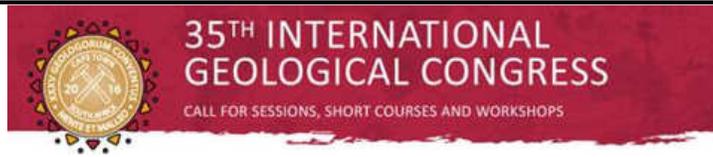
In Africa and about Africa

Next Month (May 2015):

- 2015.05.01-02 The International Symposium for the 60th Anniversary of the pressuremeter "ISP7. Hammamet, Tunisia. <http://www.cramsg2015.org/isp7-pressio2015/?lang=en>
- 2015.05.12-13 Mining, Environment and Society Conference "Beyond sustainability – Building resilience", Johannesburg, South Africa, http://www.saimm.co.za/saimm-events/upcoming-events?page=shop.product_details&category_id=2&flypage=flypage_events.tpl&product_id=89
- 2015.05.18-25 URSI Mid-Atlantic Meeting 2015. Gran Canaria, Spain. Contact: peter.vandaele@intec.ugent.be
- 2015.05.20-21 UMEC: 2nd Uganda Mining, Energy and Oil & Gas Conference and Exhibition, Kampala, Uganda, <http://www.umec-uganda.com/>
- 2015.05.21-22 Waste To Wealth – Transforming a Seemingly Useless Commodity Into a Valuable Asset, Nairobi, Kenya, [http://www.marcusevans-conferences-africa.com/marcusevans-conferences-event-details.asp?EventID=21790&SectorID=42&utm_source=Green+Cities+Newsletter&utm_campaign=66cce5b93c-Green+Conference1_20_2015&utm_medium=email&utm_term=0_11c6f09bfe-66cce5b93c-238286629&ct=\(Green+Conference1_20_2015\)&mc_cid=66cce5b93c&mc_eid=f30b0f83c#;VMDVl0eUd8F](http://www.marcusevans-conferences-africa.com/marcusevans-conferences-event-details.asp?EventID=21790&SectorID=42&utm_source=Green+Cities+Newsletter&utm_campaign=66cce5b93c-Green+Conference1_20_2015&utm_medium=email&utm_term=0_11c6f09bfe-66cce5b93c-238286629&ct=(Green+Conference1_20_2015)&mc_cid=66cce5b93c&mc_eid=f30b0f83c#;VMDVl0eUd8F)
- 2015.05.27-29 CIMEC: 2nd Cameroon International Mining Conference & Exhibition, Yaoundé, Cameroon, <http://cimecameroon.com/>
- 2015.06.03-04 Junior Indaba, Johannesburg, South Africa, <http://www.juniorindaba.com/>
- 2015.06.06-08 Copper Cobalt Africa In association with the 8th Southern African Base Metals Conference, Victoria Falls Livingstone, Zambia, http://www.saimm.co.za/saimm-events/upcoming-events?page=shop.product_details&category_id=2&flypage=flypage_events.tpl&product_id=81
- 2015.06.18-19 ZIMEC: 5th Zambia International Mining and Energy Conference & Exhibition, Lusaka, Zambia, <http://www.zimeczambia.com/>
- 2015.07.13-14 Production Of Clean Steel School, Johannesburg, South Africa, http://www.saimm.co.za/saimm-events/upcoming-events?page=shop.product_details&category_id=2&flypage=flypage_events.tpl&product_id=90
- 2015.07.15-17 Virtual Reality in Mining Conference 2015, Pretoria, South Africa, http://www.saimm.co.za/saimm-events/upcoming-events?page=shop.product_details&category_id=2&flypage=flypage_events.tpl&product_id=92
- 2015.07.27-28 6th Annual Mozambique Coal Conference, Maputo, Mozambique, <http://www.informa-resources.com/mining-conference/mozambique-coal-conference>
- 2015.08.05&07-08 Min Proc 2015 Southern African Mineral Beneficiation and Metallurgy Conference, Cape Town, South Africa, <http://www.minproc-wcape.org.za/>
- 2015.08.11-14 7th Heavy Minerals Conference "Expanding the horizon", Sun City, South Africa, http://www.saimm.co.za/saimm-events/upcoming-events?page=shop.product_details&category_id=2&flypage=flypage_events.tpl&product_id=85
- 2015.08.19-20 The Danie Krige Geostatistical Conference – Geostatistical Geovalue, Johannesburg, South Africa, http://www.saimm.co.za/saimm-events/upcoming-events?page=shop.product_details&category_id=2&flypage=flypage_events.tpl&product_id=91
- 2015.08.26-27 Mine SAFE 2015, Johannesburg, South Africa, http://www.saimm.co.za/saimm-events/upcoming-events?page=shop.product_details&category_id=2&flypage=flypage_events.tpl&product_id=100
- 2015.08.27-29 Oil and Gas Tanzania – The gateway to the East African Oil and Gas industry, Dar es Salaam, Tanzania. Contact: Jason Dexter, response@expogroup.net
- 2015.09.06-09 14th Biennial Geophysical Conference, Drakensberg, South Africa, <http://www.saga2015.co.za/>
- 2015.09.15-17 Microstructure and Texture of Metal Alloys Conference 2015, Gauteng, South Africa, http://www.saimm.co.za/saimm-events/upcoming-events?page=shop.product_details&category_id=2&flypage=flypage_events.tpl&product_id=95
- 2015.09.21-23 14th Groundwater Division of the Geological Society of South Africa Conference, Muldersdrift, Ekuden, South Africa, <http://gwd.org.za/events/14th-biennial-groundwater-conference-theory-action-gwd-0>
- 2015.09.23-24 EIMC: Ethiopia International Mining Conference, Addis Ababa, Ethiopia, <http://miningethiopia.com/>
- 2015.09.28–2015.10.02 World Gold Conference 2015, Misty Hills, Gauteng, South Africa. http://www.saimm.co.za/saimm-events/upcoming-events?page=shop.product_details&category_id=2&flypage=flypage_events.tpl&product_id=88
- 2015.10.05-09 International Conference on the Rise of Animal Life: Cambrian and Ordovician biodiversification events", Marrakesh, Morocco, <http://www.fstg-marrakech.ac.ma/rali2015/>
- 2015.10.06-08 ECOMOF: ECOWAS Mining & Petroleum Forum, Accra, Ghana, <http://www.ecomof.com/>
- 2015.10.12-14 International Symposium On Slope Stability In Open Pit Mining And Civil Engineering – Slope Stability 2015, Cape Town, South Africa, http://www.saimm.co.za/saimm-events/upcoming-events?page=shop.product_details&category_id=2&flypage=flypage_events.tpl&product_id=87
- 2015.10.14-15 2014 Joburg Indaba. South Africa, <http://www.joburgindaba.com/>
- 2015.10.26-30 1st International Conference on the Hydrology of African Large River Basins, Hammamet, Tunisia. Contact: hammamet_lrb_2015@yahoo.fr
- 2015.10.27-28 OIL & GAS SUMMIT'15: Fueling the Future – Angolan New Challenges, Luanda, Angola, <https://oilgasacademy.files.wordpress.com/2014/11/ogslnld.jpg>
- 2015.10.28-30 Nuclear Materials Development Network Conference, Port Elizabeth, South Africa, http://www.saimm.co.za/saimm-events/upcoming-events?page=shop.product_details&category_id=2&flypage=flypage_events.tpl&product_id=84
- 2015.11.08-13 23rd International Symposium on Mine Planning & Equipment Selection - MPES2015 – Smart Innovation in Mining. Johannesburg, South Africa, http://www.saimm.co.za/saimm-events/upcoming-events?page=shop.product_details&category_id=2&flypage=flypage_events.tpl&product_id=83
- 2015.11.11-13 Esri South Africa User Conference (AUC), Cape Town, South Africa. http://www.esri.com/events/auc?utm_source=esri&utm_medium=email&utm_term=73903&utm_content=article&utm_campaign=2015_auc
- 2015.11.11&13 23rd International Symposium on Mine Planning & Equipment Selection - MPES2015, Smart Innovation in Mining, Johannesburg, South Africa. http://www.saimm.co.za/saimm-events/upcoming-events?page=shop.product_details&category_id=2&flypage=flypage_events.tpl&product_id=83
- 2015.11.16-18 4th Regional South Africa YWP Conference and 1st African YWP Conference, Pretoria, South Africa, <http://www.ywp-za.org/>
- 2015.11.17-19 JMP Mali 2015 - 6th International Mali Mining and Petroleum Conference & Exhibition, Bamako, Mali, <http://jmpmali.com/>
- 2015.11.23-25 Hydro 2015 – Developing Sustainable Hydrography in Africa. Cape Town, South Africa. <http://www.hydro2015.org/>
- 2016.11.24-26 8th International Conference on the Geology of Africa 2015, Assiut, Egypt. Contacts: Hasoliman1940@gmail.com; Myosef943@yahoo.com
- 2016.04.13-14 Mine to Market Conference 2016, Emperors Palace, South Africa, http://www.saimm.co.za/saimm-events/upcoming-events?page=shop.product_details&category_id=2&flypage=flypage_events.tpl&product_id=98
- 2016.05.01 Southern African Rock Engineering Symposium, Cape Town, South Africa. <http://www.isrm.net/conferencias/detalhes.php?id=3267&show=conf>
- 2016.08.16-19 10th Heavy Minerals Conference, "Expanding the horizon", Sun City, South Africa, http://www.saimm.co.za/saimm-events/upcoming-events?page=shop.product_details&category_id=2&flypage=flypage_events.tpl&product_id=85
- 2016.08.27-2016.09.04 35th International Geological Congress (35 IGC), Cape Town, South Africa. <http://www.35igc.org/>

2016.08.27

2016.09.04



2nd Circular: <http://www.35igc.org/Content/Downloads/35th IGC Announcement SecondCircular.pdf>



Rest of the World

Next Month (May 2015):

- 2015.04.26- Triennial Earth-Sun Summit (TESS), Indianapolis, Indiana, USA. <http://aas.org/meetings/tess2015>
2015.05.01
- 2015.04.29- ISRM 13th International Congress on Rock Mechanics, Montreal, Canada. <http://www.isrm.net/conferencias/detalhes.php?id=3024&show=conf>
2015.05.06
- 2015.05.03-07 Geological Association of Canada – Mineralogical Association of Canada Annual Meeting in conjunction with AGU, Montreal, Quebec, Canada. <http://ja.agu.org/2015/>
- 2015.05.04-06 European Biomass Association (AEBIOM) Bioenergy Conference, Brussels, Belgium. <http://www.aebiom.org/conference/>
- 2015.05.04-07 2015 World of Coal Ash Conference (WOCA), Nashville, Ten., USA. <http://www.worldofcoalah.org/>
- 2015.05.04-08 VI Cuban Earth Science Convention and Geoeexp. Havana, Cuba. <http://www.cubacienciasdelatierra.com/>
- 2015.05.05-07 ESA's Planetary GIS Workshop, Madrid, Spain. <http://www.rssd.esa.int/index.php?project=PSA&page=gisws>
- 2015.05.06-07 Applied Biostratigraphy FORCE seminar, Stavanger, Norway. <http://www.force.org/Seminars/Applied-biostratigraphy/>
- 2015.05.06-08 SAFE 2015 - 6th International Conference on Safety and Security Engineering, Opatija, Croatia. http://www.wessex.ac.uk/15-conferences/safe-2015.html?utm_source=wit&utm_medium=email&utm_campaign=safe15rem4&uid=225297
- 2015.05.08-10 9th International Young Geomorphologists Workshop, Heimbach-Hergarten, Aachen, Germany. <http://blogs.equ.eu/divisions/gm/2015/02/10/9th-international-young-geomorphologists-workshop/>
- 2015.05.10-13 International Society for Rock Mechanics (ISRM) 13th International Congress on Rock Mechanics: Innovations in Applied and Theoretical Rock Mechanics, Montreal, Canada. <http://www.isrm2015.com/>
- 2015.05.11-12 5th International Symposium on Precious Metals (Precious Metals '15), Falmouth, UK. <http://www.min-eng.com/preciousmetals15/>
- 2015.05.11-14 Geoinformatics 2015 – XIVth International Conference - Geoinformatics: Theoretical and Applied Aspects, Kiev, Ukraine. <http://www.eage.org/event/index.php?eventid=1345&Opendivs=s3>
- 2015.05.11-15 IAUS314: Young Stars & Planets Near the Sun, Atlanta, Georgia, USA. Contact: jhk@cis.rit.edu
- 2015.05.11-15 36th International Symposium on Remote Sensing of Environment, Berlin, Germany. <http://www.isrse36.org/>
- 2015.05.14-15 9th International Industrial Minerals Symposium, Izmir, Turkey. <http://indmin.org/en/>
- 2015.05.14-15 3^a Conferência sobre Morfodinâmica Estuarina e Costeira – MEC 2015 (3rd Conference on Estuarine and Coastal Morphodynamics), Faro, Portugal. <http://mec2015.lnec.pt/>
- 2015.05.14-16 IFCRASC'15 – Italian Association of Forensic Engineering - 3rd Congress on Forensic Engineering and 6th Congress on Collapses, Reliability and Retrofit Structures. Rome, Italy. <http://iugs.org/uploads/IF%20CRASC15.pdf>
- 2015.05.18-19 "Tethys-Atlantic Interaction Along the European-Iberian-African Plate Boundaries", Lisbon, Portugal. <https://europeevents.aapq.org/ehome/lisbon2015/Home/?&>
- 2015.05.18-20 7th International Workshop on Information Fusion and Geographic Information Systems, Grenoble, France. <http://if-gis.com/>
- 2015.05.18-22 7th ESSC – European Society for Soil Conservation – International Congress on "AGROecological assessment and Functional-environmental Optimization of Soils and TERrestrial Ecosystems", Moscow, Russia. <http://www.essc-congress2015.ru/index.php/en/>
- 2015.05.19-20 GSA North-Central Section Meeting, Madison, Wisconsin, USA. <http://geosociety.org/Sections/nc/2015mtg/>
- 2015.05.19-22 4th International Planetary Dunes Workshop. Boise, Idaho, USA. <http://www.hou.usra.edu/meetings/dunes2015/>
- 2015.05.20-22 Disaster Management 2015 - 4th International Conference on Disaster Management and Human Health: Reducing Risk, Improving Outcomes, Istanbul, Turkey. <http://www.wessex.ac.uk/15-conferences/disaster-management-2015.html>
- 2015.05.20-22 Made in Steel, Milan, Italy. <http://www.madeinsteel.it/?lang=en>
- 2015.05.21-22 Joint Workshop, Indoor-Outdoor Seamless Modelling, Mapping and Navigation, Tokyo, Japan. Contact: fuse@civil.t.u-tokyo.ac.jp
- 2015.05.21-23 Rocky Mountain Section Meeting, Casper, Wyoming, USA. <http://geosociety.org/Sections/rm/2015mtg/>
- 2015.05.23-30 ALTA 2015 - 20th Anniversary Event, Perth, Western Australia. <http://www.altamet.com.au/conferences/alta-2015/>
- 2015.05.24-29 The 17th IBFRA Conference – Towards a New Era of Forest Science in Boreal Region, Rovaniemi, Finland. <http://www.ibfra2015.org>
- 2015.05.25-27 Baku 2015-Increasing the Knowledge about Oil and Gas Reservoir, Baku, Azerbaijan. <http://www.eage.org/index.php?evp=4430>
- 2015.05.25-27 4th Climate Change Technology Conference 2015. Montreal, Quebec, Canada. <http://www.cctc2015.ca/>
- 2015.05.25-29 International conference on groundwater vulnerability, Ustron, Poland. <http://khqi.wnoz.us.edu.pl/vulnerability.html>
- 2015.05.26-27 The 3rd International Geological Conference "Atyrau Geo-2015" on CASPIAN SEA REGION: problems of structure and oil-and-gas occurrence of deep-seated complexes and pools and the genetic nature of hydrocarbons. Atyrau City, Kazakhstan. <http://www.ongk.kz>
- 2015.05.26-28 United Nations/Germany International Conference on Earth Observation – Global solutions for the challenges of sustainable development in societies at risk, Bonn, Germany. <http://www.un-spider.org/post2015>
- 2015.05.26-29 XVI Simposio Argentino de Paleobotánica y Palinología, Ciudad de La Plata, Argentina. <http://www.xvisapp.fcnym.unlp.edu.ar>
- 2015.05.26-29 International Symposium "Environmental safety and construction in karst areas", Perm, Russia. <http://karst.psu.ru/index>
- 2015.05.27-28 GeoBusiness, London, United Kingdom. <http://www.geobusinessshow.com/>
- 2015.05.27-29 10th Jubilee Workshop on Digital Approaches to Cartographic Heritage. Corfu, Greece. http://xeee.web.auth.gr/ICA-Heritage/Corfu_2015.htm
- 2015.05.28-30 5th International 100% Renewable Energy Conference, Istanbul, Turkey. <http://irenc2013.com/qiris.php>
- 2015.05.31- AAPG 2015 Annual Convention & Exhibition. Denver, Colorado, USA. <http://ace.aapg.org/2015>
2015.06.03
- 2015.05.31- Society of Wetland Scientists (SWS) Annual Meeting, Changing Climate. Changing Wetlands. Providence, Rhode Islands, USA. <http://www.swsannualmeeting.org/>
2015.06.04
- 2015.06.01-03 Air Pollution 2015, 23rd International Conference on Modelling, Monitoring and Management of Air Pollution, Valencia, Spain. <http://www.wessex.ac.uk/air2015?e=1-225297>

2015.06.01-04 Inaugural workshop on digital soil morphometrics. Madison, Wisconsin, USA. <http://digitalsoilmorphometrics.org/>

2015.06.01-04 77th EAGE Conference & Exhibition 2015, Madrid, Spain. <http://www.eage.org/index.php?evp=4021>

2015.06.02-04 Land Quality and Landscape Processes Conference and Workshop. Keszthely, Hungary. <http://lq2015.georgikon.hu/>

2015.06.03-05 ECOSUD 2015 - 10th International Conference on Ecosystems and Sustainable Development, València, Spain. <http://www.wessex.ac.uk/15-conferences/ecosud-2015.html>

2015.06.07-09 21st CoalTrans Asia, Beijing, China PR, http://www.coaltrans.com/asia/details.html?WT.tsrc=Email&WT.mc_id=C14K0320E015&LS=C14K0320E015

2015.06.07-10 13th International Symposium on Estuarine Biogeochemistry (IEBS 2015), Bordeaux, France. <http://iebs2015.sciencesconf.org/>

2015.06.07-12 ISPRSTCV, Workshop at CVPR2015, *Looking from above: when Earth observation meets vision (Earth Vision)*, Boston, USA. <http://www.pamitc.org/cvpr15/index.php>

2015.06.07-12 IPS Annual Meetings – Colloquium on the Peatland Experience, Tullamore, Ireland, <http://www.peatsociety.org/tullamore2015>

2015.06.07-12 AMAM 2015, the International Conference on Applied Mineralogy & Advanced Materials, Taranto, Italy, <http://www.amam2015.org/>

2015.06.08-13 XII International Congress of Hydraulic Engineering and VIII International Seminar on the Integral Use of Water, La Habana, Cuba. Contact: eventos@unaicc.co.cu or hidráulica2015@unaicc.co.cu

2015.06.09-10 International Workshop on Supporting Future Earth with Geo-information, Beijing, China. http://ngcc.sbsm.gov.cn/article/isprs_cn/

2015.06.10-12 ISFOG 2015 - 3rd International Symposium on Frontiers in Offshore Geotechnics (ISFOG), Oslo, Norway. <http://www.ngi.no/en/Selected-topics/ISFOG-2015---Oslo/>

2015.06.11-12 Workshop Mining in a Crowded Country. Newcastle, United Kingdom. <http://eurogeologists.eu/conferences/>

2015.06.14-16 3rd International Conference on the Flat Dilatometer DMT'15, Rome, Italy. <https://www.dmt15.com>

2015.06.14-16 The 8th Bologna's Convention on Crystal Forms, Bologna, Italy. <http://www.polycrystalline.it/content/9/Events.html>

2015.06.14-19 12th International Conference on Mercury as a Global Pollutant. Jeju, Korea. <http://mercury2015.com>

2015.06.15-19 The Astrobiology Science Conference 2015 (AbSciCon 2015), Chicago, Ill., USA <http://www.hou.usra.edu/meetings/abscicon2015/>

2015.06.16-20 The 34th EARSeL Symposium 2014 remote sensing – new opportunities for science and practice, Warsaw, Poland. <http://www.earsel.org/symposia/2014-symposium-Warsaw/index.php>

2015.06.17-19 River Basin Management 2015 - 8th International Conference on River Basin Management, A Coruña, Spain, http://www.wessex.ac.uk/15-conferences/river-basin-management-2015.html?utm_source=wit&utm_medium=email&utm_campaign=rbm15rem3&uid=225297

2015.06.17-19 35th EARSeL Symposium and Workshop on Temporal Analysis. Stockholm, Sweden, <http://www.earsel.org/symposia/2015-symposium-Stockholm/index.php>

2015.06.18-19 Advances in Web-based Education Services, Potsdam, Germany. <http://www.igg.tu-berlin.de/ISPRS>

2015.06.20-26 International Conference on Groundwater in Karst, Birmingham, United Kingdom. <http://www.birmingham.ac.uk/generic/kgatb/index.aspx>

2015.06.22-25 Videometrics, Rangemaging, and Applications, within SPIE Optical Metrology 2015, Munich, Germany. <http://spie.org/EOM/conferencedetails/videometrics-range-imaging-and-applications>

2015.06.22–2015.07.02 26th IUGG General Assembly. Earth and Environmental Science for Future Generations. Prague, Czech Republic. <http://www.iugg2015prague.com/>

2015.06.29–2015.07.01 ERES 2015 - 10th International Conference on Earthquake Resistant Engineering Structures, Opatija, Croatia, <http://www.wessex.ac.uk/eres2015?e=2-225297>

2015.06.29–2015.07.03 6th European Conference for Aeronautics and Space Sciences, Krakow, Poland, <http://www.eucass2015.eu/>

2015.06.22–2015.07.05 IAVCEI General Assembly, Prague, Czech Republic, <http://www.iugg2015prague.com/>

2015.07.01-03 4th ISPRS International Workshop on *Web Mapping and Geoprocessing Services*, Sardinia, Italy. Contact: vaccag@unica.it

2015.07.01-03 SHMII7 - 7th International conference on structural earth monitoring of intelligent infrastructure, Turin, Italy. <http://www.shmii2015.org>

2015.07.01-03 Ravage of the Planet IV - 4th International Conference on Management of Natural Resources, Sustainable Development and Ecological Hazards, Opatija, Croatia http://www.wessex.ac.uk/15-conferences/ravage-of-the-planet-iv.html?utm_source=wit&utm_medium=email&utm_campaign=rav15rem2&uid=225297

2015.07.02-04 IAG/AIG Regional Conference 2015 on Gradualism vs catastrophism in landscape evolution, Barnaul, Russia, <http://iaq2015.rurs.net/>

2015.07.05-10 Euroclay Edinburgh 2015, Edinburgh, Scotland, United Kingdom, <http://www.euroclay2015.org/>

2015.07.05-10 ISMOM 2015 (Interactions of Soil Minerals with Organic Components and Microorganisms), Commission 2.5 IUSS. Montreal, Canada. <http://ismom2015.conference.mcgill.ca/index0f50.html>

2015.07.06-10 9th International Convention on Environment and Development, Havana, Cuba <http://www.cubambiente.com/>

2015.07.07-10 International Scientific Conference, *Our Common Future Under Climate Change*, Paris, France. <http://www.commonfuture-paris2015.org/>

2015.07.07-10 GI_Forum 2015 – Geospatial Minds for Society, Salzburg, Austria. <http://www.gi-forum.org/>

2015.07.13-15 ISPRSICWGI/II Workshop on Spatiotemporal Computing, Fairfax, Virginia, USA. Contact: msun@gmu.edu

2015.07.13-17 ISAESXII-12th International Symposium on Antarctic Earth Sciences, Goa, India. <http://isaes2015.ncaor.gov.in>

2015.07.14-17 FOSS4G Europe Conference, *Free and Open Source For Geospatial*, Como, Italy. Contact: maria.brovelli@polimi.it

2015.07.15-17 Water and Society 2015 - 3rd International Conference on Water and Society. A Coruña, Spain. <http://www.wessex.ac.uk/watersoc2015?e=2-225297>

2015.07.18-21 Esri Education GIS Conference, San Diego, Ca., USA, http://www.esri.com/events/educ?utm_source=esri&utm_medium=email&utm_term=66502&utm_content=banner&utm_campaign=ed_gis_conference_2015

2015.07.19-23 STRATI 2015 - 2nd International Congress on Stratigraphy, Graz, Austria. <http://www.stratigraphy.org/index.php/ics-news-and-meetings/96-strati-2015-2nd-international-congress-on-stratigraphy-to-be-held-in-graz-austria-19-23-july-2015>

2015.07.19-25 Planetary Systems: A Synergistic View", Quy Nhon, Vietnam <http://rencontresduvietnam.org/conferences/2015/planetary-systems/>

2015.07.26-31 Chapman Conference on The Width of the Tropics: Climate Variations and Their Impacts, Santa Fe, New Mexico, USA. <http://chapman.agu.org/tropics/>

2015.27-31 78th Annual Meeting of the Meteoritical Society, in Berkeley, California, USA. <http://metsoc2015.ssl.berkeley.edu/>

2015.07.27–2015.08.02 XIX INQUA Congress, Nagoya, Japan. <http://inqu2015.jp/>

2015.07.26–2015.08.01 Facing challenges and seeking solutions to promote human health, Aveiro, Portugal, <http://medgeo15.web.ua.pt>

2015.08.03-07 IAUS315 From interstellar clouds to star-forming galaxies: Universal processes? IAUS316 Formation, Evolution and Survival of Massive Star Clusters. Honolulu, USA. Contact: pascale.jablonka@epfl.ch

2015.08.07-15 18th International Congress on the Carboniferous and Permian, Kazan, Russia. <http://www.iccp2015.ksu.ru>

2015.08.08-14 Geoanalysis 2015. Leoben, Austria. <http://geoanalysis.info/>

2015.08.10-12 12th International Congress for Applied Mineralogy (ICAM), Istanbul, Turkey, <http://icam2015.org/>

2015.08.11-15 18th International Congress on the Carboniferous and Permian, Kazan, Russia, <http://www.iccp2015.kpfu.ru/>

2015.08.16-21 Goldschmidt Conference 2015, Prague, Czech Republic. <http://goldschmidt.info/2015/>

2015.08.17-20 CANQUA (Canadian Quaternary Association) 2015 Meeting, St. John's, NL, Canada. <http://www.canqua.com/meetings>

2015.08.17-22 International Geographical Union (IGU) Regional Conference, Moscow, Russia. <http://www.igu2015.ru/>

2015.08.23-27 SER2015 World Conference on Ecological Restoration – Towards Resilient Ecosystems: Restoring the Urban, the Rural and the Wild, Manchester, United Kingdom <http://www.ser2015.org>

2015.08.23-28 European Crystallographic Meeting – ECM29, Rovinj, Croatia. <http://ecm29.ecanews.org/>

2015.08.23-28 27th International Cartographic Conference. Rio de Janeiro, Brazil. <http://www.icc2015.org/>

2015.08.24-26 11th International Symposium on Rock Fragmentation by Blasting, Sydney, Australia. <http://fragblast11.org/>

2015.08.24-29 International Symposium on Contemporary Ice-Sheet Dynamics, Cambridge, UK, <http://www.scar.org/events/51-events/31-contemporary-ice-sheet-dynamics>

2015.08.30–2015.09.02 UAV-g 2015 – Unmanned Aerial Vehicles in Geomatics, Toronto, Canada. <http://www.uav-g-2015.ca/>

2015.08.30–2015.09.02 5th EUGEO Congress on the Geography of Europe "Convergences and Divergences of Geography in Europe", Budapest, Hungary. http://iugs.org/uploads/eugeo2015_1st_circular.pdf

2015.08.31–2015.09.03 29th Congress of the Polish Soil Science Society "Soil Resources and Sustainable Development". Wroclaw, Poland. http://www.org.up.wroc.pl/igorsr/PTG29/index_a.html

2015.08.31–2015.09.05 CIPA-XXVth CIPA Heritage Documentation Symposium, Taipei, Taiwan. <http://www.cipa2015.org/>

2015.09.01-03 Sustainable City 2015 - 10th International Conference on Urban Regeneration and Sustainability, Medellin, Colombia. http://www.wessex.ac.uk/15-conferences/sustainable-city-2015.html?utm_source=wit&utm_medium=email&utm_campaign=city15rem3&uid=225297

2015.09.02-04 Energy and Sustainability 2015 - 6th International Conference on Energy and Sustainability. Medellin, Colombia. http://www.wessex.ac.uk/15-conferences/energy-and-sustainability-2015.html?utm_source=wit&utm_medium=email&utm_campaign=esus15rem1&uid=225297

2015.09.02-05 Mires of Northern Europe: Biodiversity, Dynamics, Management, Republic of Karelia, Petrozavodsk, Russia, mire2015@krc.karelia.ru

2015.09.05-07 Baltic Peat Forum, Tallinn, Estonia, <http://www.turbaliit.ee>

2015.09.05-11 67th Annual Meeting of the ICCP (International Committee for Coal & Organic Petrology), Potsdam, Germany, <http://www.iccop.org/first-circular-for-the-67th-iccp-meeting-and-call-for-abstracts/>

2015.09.06-08 China Shale Gas 2015 – an ISRM Specialized Conference, Wuhan, China. <http://www.isrm.net/conferencias/detalhes.php?id=3290&show=conf>

2015.09.06-10 21st European Meeting of Environmental and Engineering Geophysics Near Surface Geoscience 2015, Turin, Italy. <http://www.eage.org/event/index.php?eventid=1119&Opendivs=s3>

2015.09.06-10 1st Conference on Proximal Sensing Supporting Precision Agriculture Near Surface Geoscience 2015, Turin, Italy. <http://www.eage.org/event/index.php?eventid=1279&Opendivs=s3>

2015.09.06-10 1st European Airborne Electromagnetics Conference Near Surface Geoscience 2015, Turin, Italy. <http://www.eage.org/event/index.php?eventid=1325&Opendivs=s3>

2015.09.07-10 Metamaterials 2015 – 9th International Congress on Advanced Electromagnetic Materials in Microwaves and Optics. Oxford, UK. <http://congress2015.metamorphose-vi.org/>

2015.09.07-10 Geomodel 2015 - 17th science and applied research conference on oil and gas geological exploration and development, Gelendzhik, Russia. <http://www.eage.org/event/index.php?eventid=1334&Opendivs=s3>

2015.09.07-11 Petroleum Geostatistics 2015, Biarritz, France. <http://www.eage.org/event/index.php?eventid=1155&Opendivs=s3>

2015.09.08-12 The VIII International Symposium of ProGEO, Reykjavik, Iceland. http://www.progeo.se/iceland2015_1circ.pdf

2015.09.09-11 The 5th European Conference on Crystal Growth ECCG5, Bologna, Italy. <http://www.eccg5.eu/>

2015.09.13-15 42nd IAH International Congress, AQUA 2015, Rome, Italy, <http://www.iah2015.org/>

2015.09.13-16 AAPG 2015 International Conference & Exhibition. Melbourne, Australia. <http://ice.aapg.org/2015>

2015.09.13-17 XVECSMGE 2015 "Geotechnical Investigation for Infrastructure and Development", 16th European Conference on Soil Mechanics and Geotechnical Engineering, Edinburgh, United Kingdom. <http://xvi-ecsmge-2015.org.uk/>

2015.09.13-18 42nd IAH International Congress, Rome, Italy. <http://www.iah2015.org/>

2015.09.17-18 CIMP2015 (Micropaleontology), Bergen, Norway, <http://www.tmsoc.org/cimp-meeting-2015/>

2015.09.17-19 III Simposio del Mioceno-Pleistoceno del Centro y Norte de Argentina, Corrientes, Argentina, <http://alpaleobotanicapalinologia.blogspot.com/p/evntos.html>

2015.09.20-24 4th International Conference on Fault and Top Seals. Artor Science? Almeria, Spain. <http://www.eage.org/event/index.php?eventid=1154&Opendivs=s3>

2015.09.20-23 Canadian Geotechnical Society Annual Meeting, GeoQuebec, Quebec, Canada. <http://www.geoquebec2015.ca/>

2015.09.20-24 5th International Symposium on Soil Organic Matter 2015, Göttingen, Germany, <http://www.som2015.org/>

2015.09.20-25 8th Hutton Symposium on Granites and Related Rocks. Florianopolis, Brazil. <http://www.hutton8.com.br/>

2015.09.20-26 32nd TSOP (The Society of Organic Petrology) Annual Meeting Yogyakarta, Indonesia. <http://tsop2015.ugm.ac.id/geo/>

2015.09.21-23 Symposium on the Iberian Atlantic Margin (MIA2015), Malaga, Spain, <http://www.ma.ieo.es/MIA15/ingles.html>

2015.09.21-24 LuWQ2015 – International Conference on LANDUSE and WATER QUALITY: Agricultural Production and the Environment, Vienna, Austria. <http://web.natur.cuni.cz/luwq2015/>

2015.09.22-26 GEOINV2015 – Congress on Geoheritage Inventories, Toulouse, France. <http://iugs.org/uploads/Flyer%20Geo%20inv%202015-1.pdf>

2015.09.23-26 Geological Heritage Inventories: Achievements, Toulouse, France. <http://iugs.org/uploads/GHI%20Conference%202015.pdf>

2015.09.24-25 Workshop on Volcanic Rocks and Soils – an ISRM Specialised Conference, Isle of Ischia, Italy. <http://www.wvrs-ischia2015.it/>

2015.09.26-27 10th Anniversary Asian Regional Conference of IAEG, Kyoto, Japan. <http://2015ars.com/>

2015.09.28 ISPRS Geospatial Week 2015, La Grande Motte, France. <http://www.isprs-geospatialweek2015.org/>

2015.09.29–2015.10.02 Chapman Conference on Magnetospheric Dynamics, Fairbanks, Alaska, USA. <http://chapman.aqu.org/magnetospheric/>

2015.10.01-06 German Congress for Geography, Berlin, Germany, <http://www.dkq2015.hu-berlin.de/>

2015.10.05-08 32nd Annual International Pittsburgh Coal Conference, Pittsburgh, PA, USA, <http://www.pccpitt.org/>

2015.10.05-08 8th Congress of the Balkan Geophysical Society, Chania, Greece, <http://www.eage.org/event/index.php?eventid=1313&Opendivs=s3>

2015.10.07-10 EUROCK 2015 – ISRM European Regional Symposium - 64th Geomechanics Colloquium, Salzburg, Austria. <http://www.eurock2015.com/en/>

2015.10.10-17 International Conference on Geoethics in the framework of the Mining Příbram Symposium 2015, Prague and Příbram, Czech Republic. Contact: lidmila.nemcova@quick.cz; marcinikova@diamo.cz; dolezalova@diamo.cz

2015.10.12-13 APGCE 2015 Energising Asia Through Geoscience Ideas and Solutions, Kuala Lumpur, Malaysia, <http://www.eage.org/event/index.php?eventid=1312&Opendivs=s3>

2015.10.12-16 The 6th International Wildfire Conference, Gangwon, SouthKorea <http://en.wildfire2015.kr/>

2015.10.13-15 The 3rd Sustainable Earth Sciences Conference & Exhibition: Use of the Sub-surface to Serve the Energy Transition, Celle, Germany, <http://www.eage.org/event/index.php?eventid=1259&Opendivs=s3>

2015.10.16-21 15th Water Rock Interaction, Evora, Portugal. <http://www.wri15portugal.org/>

2015.10.18-24 XIV Congreso Nacional de Paleontología México, Coahuila, Mexico, Contacto: congresomuzquiz@gmail.com

2015.10.27-29 Golden Jubilee International Geotechnical Conference, New Delhi, India. <http://www.egmindia2015.org/>

2015.11.01-02 Bridging Two Continents. 2nd joint scientific meeting of GSA and GSC, Baltimore, Maryland, USA. <http://www.geosociety.org/meetings/15china/>

2015.11.01-04 GSA 2015, Baltimore, USA. <http://www.globaleventslist.elsevier.com/events/2015/11/the-geological-society-of-america-gsa-2015-annual-meeting/>

2015.11.02-04 6ICEGE - 6th International Conference on Earthquake Geotechnical Engineering, Christchurch, New Zealand. <http://www.6icege.com/>

2015.11.03-05 10th Fennoscandian Exploration and Mining, Levi, Finland. <http://10times.com/fem-levi>

2015.11.05-08 The Association of Canadian Universities for Northern Studies, 11th Student Conference, Calgary, Canada. <http://arctic.ucalgary.ca/acuns-2015-student-conference>

2015.11.09-13 15th Asian Regional Conference on Soil Mechanics and Geotechnical Engineering – New Innovations and Sustainability, Kyushu, Japan. <http://jgskiyushu.jp/xoops/uploads/15ARC/>

2015.11.15-18 VIII PanAmerican Conference on Soil Mechanics and Geotechnical Engineering, Buenos Aires, Argentina. <http://conferenciasba2015.com.ar/website/viii-south-american-congress-on-rocks-mechanics/welcome/>

2015.11.25-27 ISPRS WGIV/4 and FIG Commission 2, International Workshop on *Strengthening Education for Land Professionals and Opportunities for SDI Development*, Kathmandu, Nepal. Contact: paudyal@usq.edu.au

2015.11.25-27 3rd Coastal and Maritime Mediterranean Conference, Ferrara, Italy. http://www.paralia.fr/ferrara_2015_880.htm

2015.11.26-28 Geo-Environment and Construction European Conference, Tirana, Albania. <http://www.issmge.org/en/conferences-and-events/conferences-issmge/eventdetail/566/-/geo-environment-and-construction-european-conference>

2015.12.05-08 AsCA 2015 Science City, Kolkata, India. <http://www.asca2015.org/>

2015.12.14-16 2015 Canberra Conference on Earth System Governance: "Democracy and Resilience in the Anthropocene", Canberra, Australia. <http://www.earthsystemgovernance.org/news/2015-01-12-canberra-conference-earth-system-governance-call-papers>

2016.02.21-26 AGU 2016 Ocean Sciences Meeting, New Orleans, Louisiana, USA. <http://meetings.agu.org/meetings/os16/>

2016.05.10-12 7th In-Situ Rock Stress Symposium 2016, Tampere, Finland. <http://www.isrm.net/conferencias/detalhes.php?id=3297&show=conf>

2016.05.10-13 4th International Climate Change Adaptation Conference, Rotterdam, The Netherlands. <http://www.adaptationfutures2016.org/>

2016.05.25-27 GEOSAFE: 1st International Symposium on Reducing Risks in Site Investigation, Modelling and Construction for Rock Engineering, Xian, China. <http://www.isrm.net/conferencias/detalhes.php?id=3289&show=conf>

2016.05.25-28 NGM 2016, The Nordic Geotechnical Meeting, Reykjavik, Iceland. <http://www.ngm2016.com>

2016.06.01-03 Geological Association of Canada – Mineralogical Association of Canada Annual Meeting, From the Margin of Laurentia, to the Margin of Beringia, to the Margin of Society Whitehorse, Yukon, Canada. <http://whitehorse2016.ca/>

2016.06.07-09 Waste Management 2016 - 8th International Conference on Waste Management and the Environment, València, Spain. http://www.wessex.ac.uk/16-conferences/waste-management-2016.html?utm_source=wit&utm_medium=email&utm_campaign=wm16cfp&uid=225297

2016.06.08-10 3rd International Conference on Environmental and Economic Impact on Sustainable Development, València, Spain. http://www.wessex.ac.uk/16-conferences/environmental-impact-2016.html?utm_source=wit&utm_medium=email&utm_campaign=eid16cfp&uid=225297

2016.06.19-22 AAPG 2016 Annual Convention & Exhibition, Calgary, Alberta, Canada. <http://www.aapg.org/events/conferences/ace/announcement/articleid/5662/aapg-2016-annual-convention-exhibition>

2016.06.26-27 International Conference on Intelligent Earth Observing and Applications, Guilin, China. <http://www.glut.edu.cn/Git/Index.asp>

2016.06.26-2016.07.01 Goldschmidt Conference 2015, Yokohama, Japan. <http://goldschmidt.info/2016/>

2016.07.25-27 GeoChina 2016, Shandong, China. <http://geochina2016.geoconf.org/>

2016.08.01-06 16th International Summer School on Crystal Growth - ISSCG-16, Otsu, Shiga, Japan. <http://www.iccge18.jp/isscg16/>

2016.08.07-08 18th International Conference on Crystal Growth and Epitaxy ICCGE-18, Nagoya, Japan. <http://www.iccge18.jp/>

2016.08.15-19 15th International Peat Congress - "Peatland in Harmony-Agriculture, Industry, Nature", Kuching, Malaysia. <http://www.ipc2016.com>

2016.08.29-31 EUROCK2016 – The 2016 ISRM International Symposium-Rock Mechanics & Rock Engineering, Urgüp-Neveşehir, Turkey. <http://eurock2016.org/>

2016.09.04-07 3rd ICTG International Conference on Transportation Geotechnics, Guimaraes, Portugal. <http://www.webforum.com/ct3>

2016.09.15-17 13th Baltic States Geotechnical Conference, Vilnius, Lithuania. <http://www.13bsqc.lt>

2016.10.01 ARMS9 - 9th Asian Rock Mechanics Symposium, Bali, Indonesia. <http://www.isrm.net/conferencias/detalhes.php?id=3268&show=conf>

2016.10.16-18 Recent Advances in Rock Engineering - RARE2016, Bangalore, India. <http://www.isrm.net/conferencias/detalhes.php?id=3312&show=conf>

2016.10.16-21 15 Water Rock Interaction, Évora, Portugal. <http://wri15portugal.org/>

2017.04.14-17 24th International Mining Congress and Exhibition of Turkey (IMCET2015), Antalya, Turkey. <http://imcet.org.tr/defaulten.asp>

2017.07.02-07 28th International Cartographic Conference, Washington, D.C., USA. <http://www.icc2017.org/>

2017.07.17-21 XVI ICC International Clay Conference, Granada, Spain. <http://www.16icc.org/>

PROFESSIONAL COURSES/WORKSHOPS/SCHOLARSHIPS

Executive Training Program on Extractive Industries and Sustainable Development

Date: **June 08-19, 2015** at Columbia University

- a) The 2015 Executive Training Brochure here: http://ccsi.columbia.edu/files/2013/07/EISD2015_Brochure_draft-20-Aug-20141.pdf
- b) Application here: https://docs.google.com/spreadsheets/viewform?usp=drive_web&formkey=dHBzUjVeb3FMRWZDVXh2M0w0OEVKU3c6MA#gid=0

MINERAL REGULATORY COMPLIANCE

The Professional Development Project of the Faculty of Law UCT, and Mineral Law in Africa in conjunction with The Mining Solution, are pleased to offer a course in Mineral Regulatory Compliance.

On **20-24 July 2015**.

Contact: Andrea Blaauw / Company name: UCT Professional Development Project
Telephone number: +27216505413 / Email address: andrea.blaauw@uct.ac.za