Geological Society of Africa

Newsletter

Mark your calendar

28th Colloquium of African Geology

10-18 October 2020 - Morocco

Volume 9 - Issue 2
(June, 2019)

'Sea monster' found in Antarctica

PUBLISHED June 7, 2019
National Geographic

Full story inside the issue

Edited by
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Editor of the GSAf Newsletter

In The Issue

Geological Society of Africa – Newsletter
Volume 9 – Issue 2
June 2019

http://gsafr.org
http://www.geologicalsocietyofafrica.org/

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GSAF MATTERS

22nd June is the Day of the Mozambican Geologist

Prof. Lopo Vasconcelos (Dept. Geology, Mondlane University) letter to the GSAf council that:

Dear Council

Two years ago, when we in Mozambique wanted to celebrate a Geologist Day, I made a search in the Internet to look for an International Geologist Day. I didn't find any. I searched in Portuguese, English, French and Spanish.

The search in French didn't show any "Jour du Géologue" (Geologist day). The search in English refer to the Day of Geologist in former USSR and in the countries that resulted from it. The search in Portuguese revealed dates for Portugal and Brazil and still Spain – Geolodía (Geoloday)! The search in Spanish still gave information on Argentina.

Therefore:

a) In the former USSR and in the current countries that resulted from the break-up of the USSR, Geologist's Day is on the 1st Sunday of April, when the end of winter is considered and the preparation for the next summer fieldwork begins!

b) In Brazil, it is celebrated on May 30, coinciding with the date of presentation of the draft law that regulates the profession of geologist, on May 30, 1962.

c) In Spain it is celebrated in the second weekend of May (I did not find the reason).

d) In Portugal, with the influence of Brazil, was also celebrated on May 30, but to give an Iberian dimension, from 2015 it began to celebrate on the Friday previous to the second weekend of May.

e) In Argentina, it is celebrated on April 9, when a general assembly of geologists met and decided to establish the day of the geologist (in 1945).

As we didn't find nothing, AGMM in Mozambique decided to celebrate the Day of the Mozambican Geologists, on the date of creation of AGMM – 22nd June.

Congratulation for the Mozambican Geologists for their approaching Geologist's Day

GSAf MATTERS: AN IMPORTANT OFFER FROM THE GEOCHEMICAL SOCIETY

I: Introductory Student Memberships

https://www.geochemsoc.org/programs/ism

What is it?

To encourage broader international participation, the Geochemical Society offers free memberships to students from under-represented countries. This student membership has all the Benefits of Membership including a print subscription to *Elements* magazine and online access to the entire *Elements* magazine archive.

Do I qualify?

To qualify, a candidate must meet the following criteria:

- Candidate must be a first-time member of the Geochemical Society.
- Candidate must be currently enrolled in a geochemistry related Masters or Doctorate program at a qualified institution in a **qualified country**. Applications will **not** be considered from students in Australia, Canada, China, European Union members and candidates, Japan, New Zealand, Republic of Korea, Taiwan, or the United States. (Together, these countries constitute 95% of the membership of the Geochemical Society.) Students from all other countries are eligible to apply.

How do I apply?

Applications may be submitted via email to the GS business office at gsoffice@geochemsoc.org. Please include this information for each student:

- Student Name and contact information, including email address
- Institution and Department
- Student's Primary Field of Research
- Student's Planned Graduation Year
- Advisor Name (Advisors may be contacted to verify student status)
- Advisor Email Address

Membership for Scientists from Countries with Low-income Economies

https://www.geochemsoc.org/news/2018/10/03/membership-scientists-countries-low-income-economies

In order to make membership more affordable for scientists in every county, the GS Board of Directors recently approved a new dues structure for professional members. A reduced professional rate of $15 is now available to scientists from countries classified by the World Bank as having low-income or lower-middle-income economies. If dues are paid before Dec. 31, then the rate is only $10. This new rate is available to both new and continuing members.

Initiative from Jean Louis Bodinier (UM6P) via Y. DRIOUCH (GSAf)

GSAf MATTERS: Funding opportunity to attend IGC36th in New Delhi, India, in March 2020

Establishment of the 35th International Geological Congress (35th IGC) Legacy Fund and offer of financial support to attend the 36th IGC

Background to the 35IGC Legacy Fund

Following a directive from the IUGS concerning all International Geological Congress events, one of the goals of the Local Organizing Committee (LOC) of the 35th International Geological Congress (35th IGC) held in Cape Town in August 2016, was to establish a Legacy Fund with surplus funds generated by the 35th IGC. The purpose of the Fund is to support student attendance of appropriate international and national congresses, as well as various legacy and research projects being undertaken by the southern African earth science community. With the surplus funds from the 35th IGC now audited and available, the 35IGC Legacy Fund has been formally established.

Funding policy

Following preliminary discussions on the establishment of the 35IGC Legacy Fund, the proposed mandate for the Fund is to provide financial assistance for *inter alia*,

- Student attendance of local and international earth science congresses and particularly IGCs;
- Geoheritage projects mooted or developed as a consequence of 35th IGC;
- Publication of guidebooks, textbooks or other material that will assist in the communication and education of society with regard to earth science matters;
- Geotourism initiatives preferably in partnership with government and local tourism agencies, and
- Selected research, development and innovation projects in the earth science disciplines.

Application for financial support from the 35IGC Legacy Fund to attend the 36th IGC

One of the main mandates of the Legacy Fund is the support of young southern African earth science students wishing to attend future International Geological Congresses to present the results of their research. With the planning of the 36th IGC in India well advanced the 35IGC Legacy Fund would like to provide financial support for deserving students to attend the event.

This notice therefore serves as an official invitation to full-time, post graduate students in the earth sciences, **registered at South African universities,** to apply to the 35IGC Legacy Fund for financial assistance to attend the 36th IGC in India in 2020. To apply for financial assistance, the following conditions will apply:

- Applicants must be registered full-time for a post graduate degree in earth sciences at a South African university in 2019 and at the time of the 36th IGC. Proof of University registration will be required;
- Applicants must be under the age of 35 at the time of application;
- A letter of support from the university supervisor is required;
- Financial support will cover the cost of a return air ticket to India, the conference registration fee and reasonable accommodation cost for the duration of the congress;
- Proof of submission and acceptance of a presentation or poster by the Organising Committee of the 36th IGC must be provided;
- The research results presented in the abstract should focus on aspects of African geology;
- Financial support from 36th IGC or other sources to cover travel, registration costs and accommodation is not acceptable and will result in the cancellation of the application to the 35IGC Legacy Fund. Sources of financial support to cover 36th IGC costs must be declared, and the costs covered by such funding should be stated in the application.
- In the case of a multi-author abstract the applicant must be the presenter of the paper (oral or poster) at 36th IGC.

As only limited funds are available, compliance with the above conditions does not guarantee acceptance of the application. All provisionally successful applications will be reviewed and evaluated by the Management Committee/Board of the Legacy Fund and their decision is final.
Applications must be made on the prescribed form available as an attachment to this notice and submitted to Ms Ndivhuwo Mukosi at 35IGCLegacy@geoscience.org.za before 31 May 2019 (deadline extended to end of June).

The following supporting documents must be submitted with each application:

- Copy of the abstract submitted to the Organising Committee of the 36th IGC. Attach proof of acceptance by Organising Committee if already available.
- Budget indicating allocation of funds requested for airfare, congress registration and accommodation.
- Supervisor support letter also stating proof of university registration, age and whether registration will continue through to 2020.
- Short CV (100 words max.)

All successful applicants will be required to provide proof of being in possession of a valid passport and visa to attend the 36th IGC in India.

N.B deadline for submissions of abstract to 36th IGC is 31 August 2019.
Other important key dates of 36th IGC are available at http://36igc.org/

Application can be found at:

http://gsafr.org/wp-content/uploads/2019/06/35IGCLegacyFundFinAppl36thIGCUpdated.pdf

GSAf MATTERS: a report on 3MA meeting

3MA-11 International Colloquium. Geology Department of CHOUAIB DOUKKALI University. El Jadida. Morocco. In Partnership with GSAf

The eleventh session of Magmatism, Metamorphism and Associated Mineralizations took place at El Jadida University on 23-24 April 2019.

More than one hundred geoscientists participated to this event. Seventy oral and poster communications have been organize in 6 sessions. Four plenary conferences were given. They are:

Magmatism-Mineralization relationships in the Anti-Atlas belt
Prof. Dominique GASQUET
Savoie Mont Blanc University (France)

The geology of Morocco : review of the major discoveries in the last decade
Prof. Omar SADDIQI
Casablanca University (Morocco)

A review of the volcanology, petrology, geochemistry and geochronology of the Central Atlantic Magmatic Province (CAMP) of Morocco
Prof. Nasrrddine YOUBI
Marrakech University (Morocco)

On the other hand, on behalf of the Geological Society of Africa (GSAf), Partner and Sponsor of 3MA-11, the VP for North Africa, Prof. Youssef DRIOUCH, gave his talk during the opening ceremony. He presented the structure and activities of the GSAf during the last years and introduced officially the organisation of the 28th Colloquium of African Geology (CAG28), which will be held at Fez University (Morocco) from 10 to 18 October 2020.

The 3MA-11 ended after a "round table" discussing different aspects of this important meeting. The main decisions and recommendations of the minutes can be summarized as follows:

- ✓ The assembly thanked very much **Prof. Abdellatif JOUHARI** and his organizing committee team for their appreciated efforts that make this edition successful;
- ✓ The next **3MA-13** will be held at **Casablanca University** (Aïn Chok Faculty of Sciences) on 2021;
- ✓ This henceforth-important meeting deserves to be more supported by national and international academic and private organisations. It also necessitates a communication and advertising campaign in order to make it more visible at continental and international scales;
- ✓ The assembly recommended strongly creating a **steering committee** in order to applicate these recommendations and to manage with successive LOCs the different organisational aspects

GSAf MATTERS: Homage of Prof. El Hassan Sayouty

The Geological Society of Africa and the scientific community lost another great scientist "Prof. El Hassan Sayouty" due to the crush of the Ethiopian Airlines Boeing 737 Max (10 of March 2019).

Prof. Youssef Driouch and Prof Aberra Mogessie wrote two separated homages of Prof. El Hassan

Prof. Youssef Driouch wrote:

Professeur El Hassan Sayouty a perdu la vie suite au crash de l'Avion d'Ethiopian Airlines qui le conduisait d'Addis Abeba à Nairobi pour participer, en tant que président du « Social and Environmental Leadership Task Force » du groupe de travail AMREC lié aux activités des groupes UNFC-AMREC. Cette réunion devait se tenir au cours de la 4ème session de la commission des nations unis sur l'environnement (UNEA) prévue du 11 au 15 mars 2019.

Ce groupe de travail inclut aussi des experts géologues dont des membres du conseil de la société géologique d'Afrique (GSAf) dont il était plus qu'un collaborateur, mais un ami. Décrit comme un homme exceptionnel doté du sens de l'écoute et du partage, il était très soucieux du développement humain en Afrique.

Ci-dessous quelques extraits de ce qu'en ont dit, spontanément, des membres du conseil de la GSAf dans des e-mails partagés en interne suite à cette triste nouvelle :

L'actuel président de la GSAf, Prof. Gbenga Okunlola, a écrit :

"I lost a good friend and academic, Prof Sayouty, Moroccan and nuclear physicist but working closely with us on the expert group of the AMREC /PARC project that GSAf is also very much involved in. He was extremely enthusiastic about the CAG 28 in Morocco. We were together in Dakar, Senegal in November 2018 at one of the working group meetings. In fact, he encouraged me to book and stay in the hotel we both stayed in and we were next door neighbours, seeing each other and interacting closely everyday throughout the duration of the meeting that dovetailed into the OAGS meeting. It is to me a personal loss and a loss to the geoscience and the entire science community in Africa."

L'ex président de la GSAf, Prof. Aberra Mogessie.

"I am very sad about the death of Prof. El Hassan Sayouty from Morocco, who was a very nice and friendly colleague who I worked with in the AMREC Group."

Par ailleurs Mr Saddiqi Omar, géologue et Doyen de la faculté des Sciences Ain Chock de l'Université de Casablanca, a rendu un émouvant hommage au Prof. Sayoury en disant notamment(extrait de http://article19.ma/accueil/archives/109193):

Hommage de la Société Géologique d'Afrique au Professeur El Hassan Sayouty de l'université Hassan II de Casablanca. Maroc

« Le défunt « a toujours été une fierté pour la Faculté des sciences parce qu'il était connu au plan mondial dans le domaine de la physique nucléaire. Il travaillait beaucoup avec l'Agence internationale de l'énergie atomique (AIEA). Il participait souvent à des réunions internationales. Il honorait ainsi les enseignants et l'université marocaine dans ce domaine ». « Prof. Sayouty a perdu la vie alors qu'il était en mission et représentait l'Université et le royaume du Maroc à une importante réunion, la 4ème session de la commission de l'ONU sur l'environnement prévue à Nairobi au Kenya du 11 au 15 mars. »

Charlotte Griffiths, Chief of Section, Sustainable Energy Division. United Nations Economic Commission for Europe, a écrit à propos du Dr Sayouti:

« Professor Sayouty was going to Nairobi to participate in the Fourth United Nations Environmental Assembly (UNEA). He was one of the organizers and speakers at the session on "Mining and the environment: The African framework to address impacts through innovative solutions". This session, organized jointly by the African Union and UNECE, showcases the development of UNFC-AMREC as a comprehensive system for social and environmentally sound resource management in Africa. An exceptional man with a contemporary vision of human development that overflowed with passion and philosophy, Professor Sayouty will be sorely missed. We offer our sincere condolences to his family, friends and colleagues. »

Please leave your memories and photos of Professor Sayouty here: www.weremember.com/hassan-sayouty/4w2h/memories .

Toute la communauté universitaire marocaine est endeuillée par cette disparition. La communauté des Géologues avec laquelle Prof. Sayouty, travaillait sur des thématiques liées à l'énergie et à l'environnement, tient aussi à rendre hommage à ce grand homme de la science et de la société.

Nous nous associons à ses collègues et amis pour présenter nos sincères condoléances à sa famille, à ses collègues du département de physique, de la faculté des sciences Ain Chock et de toute l'Université de Casablanca.

Que son âme repose en paix.

Nos pensées vont aussi à plusieurs universitaires de différents pays (Nigeria, Togo, Éthiopie, Kenya,…) qui ont perdu la vie dans cet accident.

Ci-dessous un extrait du parcours du Professeur El Hassan Sayouti

- Né le 11 Novembre 1956 à Tafraout. Maroc ;
- Après un baccalauréat obtenu à Casablanca, il suivi des études de physique puis de physique atomique et nucléaire à l'université Claude-Bernard de Lyon (France) où il a obtenu son doctorat de 3ème cycle en 1984 ;
- Doctorat d'État en 1990 à l'Université de Casablanca où il était enseignant chercheur depuis 1985 après avoir travaillé dans l'office national de l'Électricité en tant qu'Ingénieur ;
- Il a occupé plusieurs fonctions au sein de sa faculté dont principalement :
  - Responsables de plusieurs projets de recherche internationaux,
  - Directeur de laboratoire
  - Chef du département de physique ;
- Coordinateur du réseau « Analyse nucléaire et environnement »
- Il a aussi été expert auprès de :
  - la Commission Nationale d'Accréditation et d'Evaluation (CNAE)
  - L'agence internationale de l'énergie atomique
  - Des commissions d'experts des Nations Unis.

- Il a aussi été le directeur de recherches, durant plus de trente ans de loyaux services à l'enseignement et à la recherche, d'un nombre considérable d'étudiants de Master et de Doctorat.

Ses étudiants comme ses collègues en sont, à jamais, orphelins.

Pour la GSAf

Y. DRIOUCH, Vice President. Northern Africa

Julian Hilton and Tunde Arisekola gave a memorial speech in memory of Prof. El Hassan Sayouty.

The speech given on the occasion of the opening ceremony of the Annual Meeting of the Expert Group on Resource Management of the United Nations Economic Commission for Europe and in the presence of Olga Algayerova (Executive Secretary)

Julian Hilton and Tunde Arisekola wrote:

It is a deeply sad, but very great honour for us to stand before you today to speak of our fallen brother, friend and colleague, Professor El Hassan Sayouty, who tragically died in the Ethiopian Airlines plane disaster of March 10th.

Born in Morocco a Soussi, January 6, 1956, origins of which he was very proud, Hassan Sayouty rose to become a much respected and much-loved Professor of Nuclear Physics at the University Hassan II, Casablanca, a great

teacher and a major figure on the Moroccan national stage in science and energy policy, one whose influence was felt across the African region and the wider world.

Education, integrity and stewardship of the God-given resources of our earth for him were three faces of the same life-long commitment to preserving and enhancing our planet for the equal benefit of all its peoples and for the benefit of all the other life forms with which we share our increasingly crowded world.

Over the ten years we knew him and in which we were proud to be counted among his friends, Hassan found within himself a uniquely graceful equilibrium of wit and admonition, passion and ease, soul and intellect, and all these coalesced into a chuckling laugh so infectious that we all laughed with him, relaxing in each other's company to reflect and learn with him.

We cannot imagine how his wonderful wife Wafa and his daughter Soufia can bear the pain of his untimely death. We have lost a dear friend and colleague; they have lost a beloved husband, a father and so much more.

Our profoundest condolences go to them and their families.

In our grief at his loss if we consider that Hassan was courageous enough to give his life for the same cause that brings us all here today to Geneva, and if we live up to that sacrifice he made, carry on his work and complete it as he would have wished, his death will have left a legacy of which he would be proud and pleased.

And all the while the precious gifts he gave us while alive, his inspirational talent for teaching, his kindness, his deep love for his family, his students and colleagues, for his country and for his beloved Africa endure in all our hearts as long as we draw breath.

Hassan, our brother, we salute you.

May you rest in peace.

Julian Hilton, Tunde Arisekola

Palais des Nations, Geneva

May 1, 2019

GSAf MATTERS: 2018 report of the International Union of Geological Sciences

As affiliated organization with the IUGS, the GSAf has received the 2018 report from the International Union of Geological Sciences. The report includes chapters on: the union aims, structure, financial situation of 2018 and other information.

If you interest to read more about the report, please send us a request.

GSAf MATTERS: Invitation to the IGC36

Prof. Hassan Helmy (former Vice President for Northern Africa) invites colleagues and scholars to submit their abstracts to session 28.5 "Solubility of Metals in Melt/Fluid Systems".

The session is convened by Anna Vymazalová, Hassan Helmy

Session short summary:

This symposium welcomes contributions that enhance our understanding of metal solubility, speciation, and transport in geologically-relevant fluids (aqueous or non-aqueous) and melts (silicate, sulfide, carbonate) in ore-forming environments.

Submission is from: https://www.36igc.org/abstract-submission

LETTERS TO THE EDITOR

The GSAf newsletter receives letters from members or non-members of the society which highlight important issues or scientific ideas. The letters should be short and to the point. The letters will be registered on the GSAf's website and subjected to a discussion among the society. Approved letters will be posted in the following newsletter.

Use tamerabualam@yahoo.com to send your letters.

The current registered letter is: "One More Geological Clue Still Pending; "The Obsidian of the Land of Punt" by Mahmoud A. Emam.

To follow the discussion around this letter, please follow the following link: http://gsafr.org/letter1/

WELCOME TO FEZ, MOROCCO (CAG28)

The GSAf will release a special newsletter issue early July to inform our African and international scholars more about the CAG28. The first meeting announcement/program and the website will be announced very shortly "Prof. Youssef Driouch has reported".

Fossil 'sea monster' found in Antarctica was the heaviest of its kind

By Joshua Rapp Learn (National Geographic)

The 15-ton Elasmosaur adds to evidence that a vibrant marine ecosystem existed just before the dinosaur mass extinction.

It took decades of struggling with the weather on a small, desolate island off the Antarctic Peninsula. But now, scientists have finally unearthed the heaviest known Elasmosaur, an ancient aquatic reptile that swam the seas of the Cretaceous period alongside the dinosaurs. The animal would have weighed as much as 15 tons, and it is now one of the most complete ancient reptile fossils ever discovered in Antarctica.

Elasmosaurs make up a family of the Plesiosaurs, which represent some of the largest sea creatures of the Cretaceous. Plesiosaurs generally look a little like large manatees with giraffe necks and snake-like heads, though they have four flippers rather than a manatee's three.

Plesiosaurs 101

While dinosaurs roamed the Earth, marine reptiles in the order Plesiosauria swam in our planet's prehistoric oceans.

The team thinks the newly described heavyweight belongs to the genus Aristonectes, a group whose species have been seen as outliers to other

Elasmosaurs, since they differed so much from fossilized specimens discovered in the U.S. This genus, found in the Southern Hemisphere, is characterized by shorter necks and larger skulls.

"For years it was a mystery ... we didn't know if they were Elasmosaurs or not," says José O'Gorman, a paleontologist with the National Scientific and Technical Research Council of Argentina (CONICET) who is based at the Museum of La Plata near Buenos Aires. "They were some kind of weird Plesiosaurs that nobody knew."

Researchers needed a more complete specimen, and as it happened, William Zinsmeister of Purdue University had discovered a potential candidate on Seymour Island—just south of the northern tip of the Antarctic Peninsula—during a 1989 expedition. At the time, though, he didn't have the resources to excavate the fossil find, but he informed researchers in Argentina about the discovery.

Glacial excavations

The Argentina Antarctic Institute got involved and started excavating the fossil as part of its annual summer research expeditions, but the giant reptile was uncovered at a glacial pace due to weather and logistics.

O'Gorman, who was five years old when the fossil was discovered, went on the first of these trips starting in 2012. Work could only happen for a few weeks in January and early February, and some years the dig didn't happen at all because of conditions and limited resources. On active days, the team had to wait for the sun to defrost the soil before they could excavate, and every piece wrested from the dirt would then need to be shipped by helicopter to the Argentine Marambio Base a few miles away.

"The weather is one of the problems. The weather controls all. Maybe one day you can work, and the next day you cannot because you have a snowstorm," O'Gorman says.

"It takes a little more effort and logistics in the first place, and not just everyone stumbles into those fossils," agrees Anne Schulp, vertebrate paleontologist at Utrecht University in the Netherlands and the Naturalis Biodiversity Center who was not involved in the research.

A colossus among giants

The excavation finally finished in 2017, yielding a substantial portion of the animal's skeleton, which O'Gorman and his colleagues describe in their recent paper in Cretaceous Research.

"We don't have a skull, but we have a lot of pieces of the specimen," O'Gorman says.

They estimate that the as-yet-unnamed Elasmosaur weighed between 11.8 tons and 14.8 tons, with a head-to-tail length of nearly 40 feet. While some previously known Aristonectes have weighed about 11 tons or so, most other Elasmosaurs only come in at around five tons.

"That guy is big!" Schulp says from looking at photos of the bones.

He thinks the work is well done, and he's happy that the team hasn't jumped to hasty conclusions—O'Gorman even hesitates to say whether the species is definitely from the Aristonectes genus, since further evidence may put the species in a new genus entirely.

Last call of the Cretaceous

Schulp has worked on some Plesiosaurs from the Netherlands, but he says the aquatic reptiles are very different in the Southern Hemisphere. The new specimen is also very interesting because it dates so close to the end of the Cretaceous—just 30,000 years before the mass extinction event that wiped out the non-avian dinosaurs about 66 million years ago.

A lot of marine life would have needed to thrive there to satisfy the appetite of such a large creature, so the fact that these animals continued to exist so late in the Cretaceous adds to the evidence that the aquatic world, at least, was doing just fine right up until the sudden mass extinction.

"Even in Antarctica, there were lots of happy Elasmosaurs," Schulp says. The different morphology of this species also shows that specialization was still happening at this late point in the existence of Plesiosaurs. "It's definitely an indication that toward the end of the Cretaceous, [Plesiosaurs] managed to expand their feeding repertoire," Schulp says.

While the animal's exact diet can't be known without fossilized stomach contents or other evidence, O'Gorman says that it likely fed on crustaceans and small fish, based on the small size of its teeth. And work on the bones unearthed over the past few decades has just begun; now that they are housed at a museum, O'Gorman says there is a lot of other research that can be done on this ancient specimen.

Schulp adds that the work moves our knowledge of Plesiosaurs forward, and he is excited to see Argentine paleontologists go back out there and find more fossils.

"The Southern Hemisphere—at least the Pesiosaurs—could definitely use some attention," he says.

This story originally appeared on: https://www.nationalgeographic.com/science/2019/06/fossil-sea-monster-found-antarctica-heaviest-of-its-kind-elasmosaurs/?fbclid=IwAR10C3U3aoE3aek3ZT7CfvQbmvxxeByNoMFxe4PoT76WOBuyftvOaPKRZdc

OPINION

New report shows alarming weather changes in South Africa

Source: businesstech.co.za (11 May 2019)

South Africa is already experiencing significant effects of climate change, particularly as a result of increased temperatures and water variability.

This is according to a National Climate Change Adaptation Strategy published by the Department of Environmental Affairs earlier this week.

"The observed rate of warming has been 2°C per century or even higher – more than twice the global rate of temperature increase for the western parts and the northeast," the department said.

"There is evidence that extreme weather events in South Africa are increasing, with heat wave conditions found to be more likely, dry spell durations lengthening slightly, and rainfall intensity increasing.

"Climate zones across the country are already shifting, ecosystems and landscapes are being degraded, veld fires are becoming more frequent, and overused natural terrestrial and marine systems are under stress."

Much hotter

As part of its report, the Department of Environmental Affairs provided a summary of projected future changes in temperature and rainfall in South Africa.

The changes are based on 'high mitigation' and 'low mitigation' scenarios, with the projections changing drastically based on how quickly and drastically authorities are able to stem the effects of climate change.

In a low mitigation scenario the temperatures are set to increase 'drastically', the department said.

Before the end of the current century (to 2099) it expects temperature increases greater than 4°C across South Africa, with increases greater than 6°C possible in the western, central and northern interior.

The department said that it also expects an increase in the number of heat-wave days and very hot days where these above temperatures will be common or even exceeded.

In a high mitigation scenario, the department said that an increase in temperatures in the interior could be constrained to between 2.5 to 4°C.

Rainfall

The department said that there is more uncertainty around rainfall projections than in temperature projections.

Under a low mitigation scenario, South Africa is set to experience drier conditions overall. In addition, the department said that it expects to see an increase in 'extreme rainfall events' in the interior of the country.

However the projections for a high mitigation scenario differ, it said.

"A large number of projections predict generally wetter conditions over the central and eastern interior," it said. "Other projections predict generally drier conditions."

Impact on South Africans

In addition to the general changes in temperature and rainfall, the report outlined the vulnerability of key socio-economic sectors in South Africa to climate change.

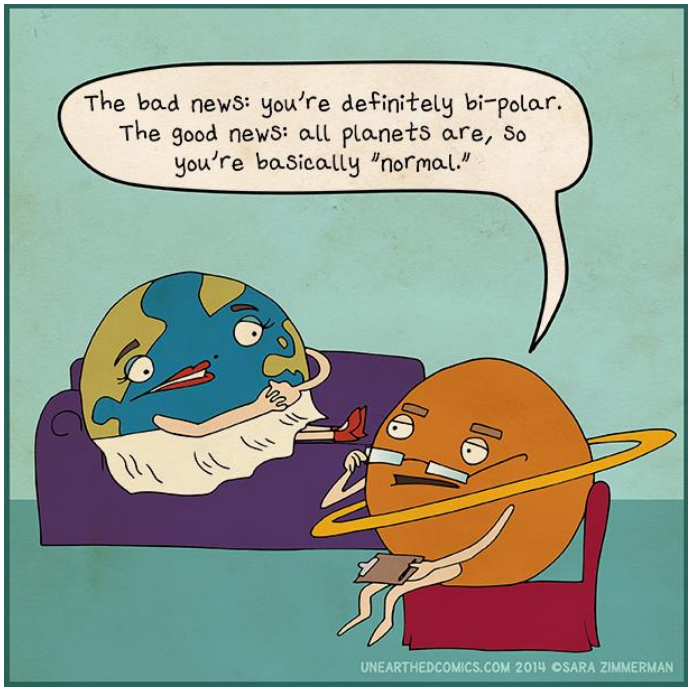
Some of the biggest concerns include:

- An increase in 'direct wave impacts' and coastal flooding/inundation;
- Flooding of low-lying areas and erosion;
- Quadruple burden of disease;
- Poor housing, infrastructure and service delivery;
- High water demand – highly problematic as current water usage already exceeds reliable yield;
- Deteriorating water quality in river systems, water storage reservoirs and groundwater.

This story originally appeared on: https://businesstech.co.za/news/lifestyle/315344/new-report-shows-alarming-weather-changes-in-south-africa/

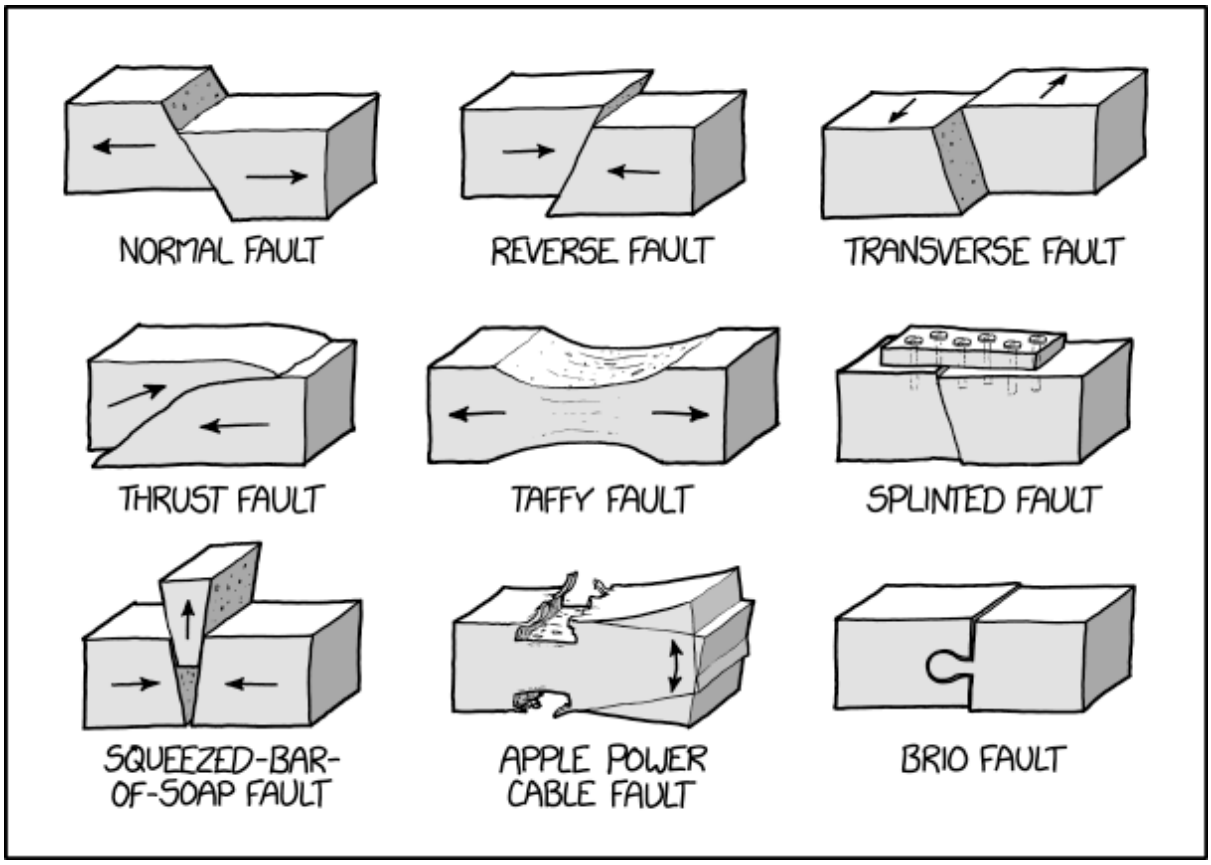
GEOLOGY COMIC

This story originally appeared on: https://ucmp.berkeley.edu/fosrec/index.html



This story originally appeared on: https://unearthedcomics.com/comics/diagnosis/

GEOLOGICAL EXPRESSIONS



This story originally appeared on: https://xkcd.com/1874/

NEWS

About Africa

90 000 gold and platinum jobs at risk as Eskom hikes loom

Published on miningweekly.com (25th March 2019)

The Minerals Council South Africa is ringing alarm bells over the threat posed to employment and production in the gold and platinum sectors as a result of recently approved electricity tariff increases, including the 13.8% hike to be implemented from April 1.

In addition, the council is warning that the hikes will accelerate the State-owned utility's own downward spiral as mines and smelters, which currently consume 30% of Eskom's yearly production, respond by closing unprofitable operations.

The body's revised estimates point to 90 000 gold and platinum jobs being at risk as a result of the increases, approved by the National Energy Regulator of South Africa (NERSA) on March 7. The figure represents a modest improvement on the 150 000 job losses forecast ahead of the regulator's fourth multiyear price determination (MYPD4) decision.

Some 464 000 people were employed across the mining industry in 2017 and the council estimated earlier this year that about 18 300 of the 53 500 jobs shed in the industry since 2006, when South Africa's

power crisis emerged, could be directly attributed to electricity tariff increases.

Nevertheless, the outlook for the gold-mining sector remained especially dire, with the council indicating that only two mines were likely to remain viable at the end of the three-year period. Previously, only one mine, with a yearly output of 20 t, was expected to remain viable. In 2018, the industry is likely to have produced about 132 t of gold.

NERSA has granted Eskom increases of 9.4% for 2019/20, 8.1% for 2020/2021 and 5.2% for 2021/22, following an adjudication of the MYPD4, in which Eskom requested hikes of 17.1%, 15.4% and 15.5% respectively. The State-owned utility would increase tariffs on April 1 by 13.8%, however, given that the regulator had already approved a further 4.41% hike, in line with an earlier adjudication of three regulatory clearing account applications.

Minerals Council South Africa CEO Roger Baxter said on Monday that the "front-loaded" nature of the hikes would hurt all miners as well as smelting operations.

Deep-level gold and platinum miners would be particularly hard hit, however, given that many mines were already unprofitable or marginal, as well as the fact that electricity made up about 25% and 17% respectively of a gold and platinum mine's cash production costs.

Chief economist Henk Langenhoven said total industry production costs would rise by 29% over the three-year period, which was 12% lower than would have been the case should NERSA not have disallowed R102-billion of revenue sought by Eskom in the MYPD4.

Nevertheless, the outcome was "inconsequential" for the gold sector, potentially only saving about 8 000 jobs. For platinum, the impact was larger, potentially saving 22 800 jobs.

The hikes would further erode the competitiveness of the South African mining industry relative to global peers, which were enjoying lower tariffs and were also less affected by supply interruptions.

At R1.06/kWh from April 1, Eskom's Megaflex industrial tariff was higher than average industrial tariffs of about R1/kWh in the US and well above those of around 66c/kWh available in Quebec, Canada.

"Our electricity prices in South Africa have gone up by 538% over the last ten years, which has obviously had a huge impact particularly on our deep-level gold and platinum mines," Baxter noted.

South Africa had also experienced a sustained period of rotational power cuts in mid-March, with Stage 4 load-shedding, equating to cuts of 4 000 MW, declared by Eskom on several days. During those periods, mines were required to reduce their load by 20%.

ESKOM'S MINE-LINKED REVENUE TO FALL

Although Eskom immediately noted that R102-billion in revenue had been disallowed by NERSA for the MYPD4 period, Langenhoven cautioned that the approved hikes were likely to supress demand further and accentuate Eskom's so-called death spiral.

He said that, while Eskom expected mining-related revenue to rise to R50-billion by the end of the MYDP4 period, the modelling done by the Minerals Council South Africa showed that its revenue could fall to about R30-billion as a result of operational closures.

"If the mining industry's usage declines as tariffs make certain operations and activities unprofitable, Eskom will not achieve its targeted sales volumes," Langenhoven explained.

"Inevitably, the increases awarded to Eskom will only serve to accelerate the power utility's downward spiral that will come as a result of inflated tariff increases and the declining electricity usage by a critical consumer."

Baxter indicated that the industry had noted the offer of special pricing agreements for companies experiencing distress as a result of the hikes, but was unaware whether any platinum or gold miners had applied to Eskom and NERSA for relief.

He also expressed frustration at the regulatory logjam preventing up to 2 000 MW of small-scale embedded generation projects from being implemented and indicated that the issue was receiving the priority attention of organised business.

Various mining companies have announced that they are studying various self-generation options, but remain concerned about the lack of regulations to facilitate projects of larger than 1 MW and for wheeling power from such projects.

This story originally appeared on: https://www.miningweekly.com/article/90-000-gold-and-platinum-jobs-at-risk-as-eskom-hikes-loom-2019-03-25-1

News: About Africa

Strange Canary Yellow Glass in Egyptian Desert Shown to Be Result of Meteorite Impact

By Peter Dockrill; sciencealert.com (16 March 2019)

A strange kind of yellow, exotic glass found across some of the world's desert regions has finally had its mysterious origins identified – almost 30 million years after it formed on Earth.

Libyan Desert glass is a naturally occurring kind of glass that's found in the eastern stretches of the Sahara Desert, in eastern Libya and western Egypt. Its rare yellow colour has seen it used decoratively going back to the age of Tutankhamun, but desert glass has been around a lot longer than that.

The formation of this strange glass has been dated as far back as some 29 million years ago, but it's never been entirely clear what forces brought the material into existence on Earth, although two major hypotheses have dominated the conversation.

"It has been a topic of ongoing debate as to whether the glass formed during meteorite impact, or during an airburst, which happens when asteroids called Near Earth Objects explode and deposit energy in the Earth's atmosphere," says geologist and planetary scientist Aaron Cavosie from Curtin University in Australia.

According to Cavosie, previous modelling suggested that Libyan Desert glass could have been formed in airburst events much like the dramatic Chelyabinsk explosion that occurred over Russia in 2013.

But new research gives us the first "unequivocal substantiation" that this might not be the case after all.

In a new study, Cavosie examined small grains of the mineral zircon embedded in samples of the Libyan Desert glass. The analysis turned up trace evidence of another mineral called reidite, which forms in high pressure, but only during meteorite impacts (as it's found solely in impact craters), not from airbursts.

"Both meteorite impacts and airbursts can cause melting, however, only meteorite impacts create shock waves that form high-pressure minerals," says Cavosie.

"So finding evidence of former reidite confirms it was created as the result of a meteorite impact."

According to the researchers, the reidite identification doesn't just help us close the book on how this ancient desert glass came into being.

It also lets us clarify, with reference to the geological record, just how often destructive shockwave-producing run-ins with NEOs occur on Earth – since there are no confirmed airburst-related glass deposits that were formed within the last 5 million years.

Because we now know only much rarer and major meteorite impact events can produce Libyan Desert glass, hopefully it will be another incredible age before this yellow material gets a chance to be fused together on Earth again, as beguiling as it is.

"Meteorite impacts are catastrophic events, but they are not common," says Cavosie.

"Airbursts happen more frequently, but we now know not to expect a Libyan Desert glass-forming event in the near future, which is cause for some comfort."

This story originally appeared on: https://www.sciencealert.com/exotic-glass-in-egypt-was-created-by-a-meteorite-impact-millions-of-years-ago?fbclid=IwAR38_PU_JBfnx8LgJyvdaXMGj09UN6MEJ-Sd4kLzdU_i6Vsq1_i8TN7Jq2I

News: About Africa

Second-Biggest Diamond in History Found

By Lucara Diamond Corp; geologyin.com

The 1,758-carat diamond found in Botswana. Source: Lucara Diamond Corp

A giant 1,758-carat diamond, the second-biggest ever discovered, has been found in Botswana. But unlike its rivals, it won't fetch a record-breaking price.

Lucara Diamond Corp. said it unearthed the stone -- roughly the size of a tennis ball -- at its Karowe project in Botswana, a mine renowned for its huge gems including the previous holder of the No. 2 position. Still, the company said the diamond is a near gem of variable quality, meaning it won't yield incredibly valuable polished diamonds on par with earlier finds.

Lucara's Karowe mine is becoming famous for giant stones. In 2015, Lucara found the 1,109-carat Lesedi La Rona, which at the time was the second-largest ever and eventually sold for $53 million. The mine has also yielded a 813-carat stone that fetched a record $63 million. Those two gems were both much more valuable Type-IIa stones.

Still, the latest find shows that Karowe's plant can process and detect huge gems without breaking them, a consistent headache when trying to separate brittle stones from hundreds of tons of waste rock.

"Karowe has now produced two diamonds greater than 1,000 carats in just four years, affirming the coarse nature of the resource and the likelihood of recovering additional, large, high quality diamonds in the future," Eira Thomas, Lucara's chief executive officer, said in a statement.

This story originally appeared on: http://www.geologyin.com/2019/04/second-biggest-diamond-in-history-found.html

News: About Africa

Minerals Council appeals some Mining Charter 3 provisions, DMR responds

Published on miningweekly.com (27th March 2019)

The Minerals Council South Africa has filed an application for the judicial review and setting aside of certain clauses of Mining Charter 3, which was published in September.

The decision follows after the council's board engaged in ongoing attempts to reach a compromise with Mineral Resources Minister Gwede Mantashe on certain provisions that are "problematic for the industry" and could be "detrimental to its sustainability".

The Minerals Council has delayed bringing the application forth, in the hopes that those discussions would be successful but, given the peremptory 180-day time bar imposed by the Promotion of Administrative Justice Act, the council was obliged to launch the review proceedings on March 26, despite the fact that the discussions are ongoing and may yet bear fruit.

CEO Roger Baxter noted that the council remained fully committed to the transformation of the mining sector in South Africa, with the aim of achieving job creation, economic growth and competitiveness and social upliftment.

"A transformed, growing and competitive mining sector would be a catalyst for South Africa's development and critical for the realisation of the ambitions of the National Development Plan.

"However, these goals will only be realised through a minerals policy framework that conforms to the rule of law and principles of legality and by administration action which is lawful, reasonable and procedurally fair and consistent in all respects, with provisions of the country's legislation."

Baxter added that the rule of law, regulatory uncertainty and the fair and even-handed administration of laws are of the utmost importance in sustaining the industry and the economy as a whole.

The council believes most aspects of the charter represent a reasonable and workable framework, but said the fact that the charter does not fully recognise the continuing consequences of previous empowerment transactions, particularly in respect of mining right renewals and the transfers of these rights, remains untenable.

"Not only does this provision have a severely dampening effect on the attractiveness of mining in investors' eyes, but it also breaches the declaratory order on the matter issued by the North Gauteng High Court in April 2018.

"The Minister has been kept fully apprised of the Minerals Council's intentions. We continue to seek a solution to the current impasse that respects the outcome of the High Court judgment on continuing consequences and provides a level playing field for companies in this regard," said Baxter.

GOVERNMENT RESPONSE

The Department of Mineral Resources (DMR) has noted the application for judicial review and said it was "unfortunate" that the council had taken this route, stating that the parties could have reached an amicable solution in the ongoing dialogues.

"The current Mining Charter represents broad consensus and acceptance by stakeholders who were involved in its development and formulation. As such, it is a broadly agreed to, workable framework for transformation in the industry.

"Leading to its gazetting, and thereafter, there have been and continues to be constant dialogue between the Ministry and various stakeholders. Delaying the implementation of the charter will impact negatively on the positive climate characterising mining and economic investment at present. Such delays will also halt the realisation of the much-needed benefits for the workers and the mining communities," the department stated.

The DMR intends to oppose the application by the council and will file its responding papers in due course.

COMMENTARY

Herbert Smith Freehills partner Peter Leon told Mining Weekly Online that the Minerals Council made a sensible and necessary move. "Procedurally, because of the six-month time limit for bringing judicial review applications which expired earlier this week. Secondly, substantively, as the charter currently drafted does not extend the protection of historical black economic empowerment transactions to the renewal of transfer of rights.

"This is obviously prejudicial to mining companies whose rights expire in the short term or who are planning to sell their rights. It is clear that the Minerals Council's attempt to engage the DMR on these issues over the last six months have come to naught."

This story originally appeared on: https://www.miningweekly.com/article/minerals-council-appeals-some-mining-charter-3-provisions-2019-03-27

News: About Africa

Dramatic housing transformation in sub-Saharan Africa revealed for first time

Improved housing estimated to have doubled between 2000 and 2015 but nearly 50 percent of the urban population still living in slum conditions

By London School of Hygiene & Tropical Medicine; Science Daily (27th March 2019)

Summary:

Housing with improved water and sanitation, sufficient living area and durable construction has doubled in sub-Saharan Africa between 2000 and 2015, according to new research.

Using state-of-the-art mapping, the study, led by the London School of Hygiene & Tropical Medicine, Imperial College London and Malaria Atlas Project, University of Oxford, is the first accurate estimate of urban and rural housing quality in sub-Saharan Africa. While highlighting the positive transformation in the region, the prevalence of improved housing doubling from 11% in 2000 to 23% in 2015, the study also estimates that 53 million urban Africans (in the countries analysed) still lived in slum conditions in 2015.

Adequate housing is integral to many associated health outcomes including mental health, respiratory disease, diarrheal disease, and vector borne diseases, such as malaria. Addressing the housing needs of a growing population is therefore key to sustainable urban development and the health and wellbeing of millions of Africans.

The researchers say these new data will be vital to guide interventions to achieve the United Nations Sustainable Development Goal (SDG) 11 which aims for universal access to adequate, safe and affordable housing and to upgrade slums by 2030.

Lead author Dr Lucy Tusting, from the London School of Hygiene & Tropical Medicine who conducted the work while at the Malaria Atlas Project, University of Oxford, said: "Adequate housing is a human right. The housing need is particularly urgent in Africa where the population is predicted to more than double by 2050. Remarkable development is occurring across the continent but until now this trend this had not been measured on a large scale.

"These results are a crucial step to reaching sustainable development goals as quickly as possible, and show that African housing is transforming, with huge potential to improve human health and wellbeing."

To produce these new estimates, the researchers combined data from 661,945 households from 31 countries into a model using an innovative technique that allowed the prevalence of different house types to be mapped across the African continent.

Housing was categorised using the United Nations description, where houses with improved water and sanitation, sufficient living area and durable construction were considered to be improved. Housing lacking any one of these features was considered to be unimproved.

The prevalence of improved housing was highest in countries including Botswana, Gabon and Zimbabwe, and lower in countries such as South Sudan.

The researchers also found that the housing transition may be linked to economic development. Improved housing was 80% more likely among more educated households and twice as likely in the wealthiest households, compared to the least educated and poorest families.

Senior author Dr Samir Bhatt from the MRC Centre for Global Infectious Disease Analysis at Imperial College London said: "These findings highlight that poor sanitation remains commonplace across much of sub-Saharan Africa, which may be holding back progress to improve living conditions. Our study demonstrates that people are widely investing in their homes, but there is also an urgent need for governments to help improve water and sanitation infrastructure."

Dr Fredros Okumu, Director of Science at Ifakara Health Institute in Tanzania, and a co-author of the paper said: "The changes that we have observed are incredibly significant, especially since households mostly paid for these improvements with their own incomes and no external financing.

"From a public health perspective, this trend presents a massive opportunity for African governments to accelerate ongoing efforts against vector-borne diseases such as malaria, and to secure such gains for the long-term."

The authors acknowledge limitations of their study including the difficulty of using a single definition to

capture the full range of housing conditions across sub-Saharan Africa. The study also relied on national surveys which may not be directly comparable due to variation in their methods and data collection procedures, and which represent a limited sample of African households.

Dr Tusting was supported by a fellowship from the UK Medical Research Council to conduct this work.

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This story originally appeared on: https://www.sciencedaily.com/releases/2019/03/190327142008.htm

News: About Africa

New light into the recent evolution of the African rift valley

Field research on the border between Ethiopia and Kenya provides new insights into the break-up of continents

By GFZ GeoForschungsZentrum Potsdam, Helmholtz Centre; Geology Page (22 March 2019)

Explosive volcanic crater (maar) with small lake at the bottom close to Dilo. Credit: Giacomo Corti, National Research Council Italy

Continental rift valleys are huge fractures on the surface of our planet that progressively break continental plates with the eventual development of new oceans. The African rift valley between Ethiopia and Kenya is a classical example of this geodynamic process. There, volcanism, earthquakes, and fracturing of the Earth's surface result from the enormous forces that tear the eastern portion of the African continent apart. This system of linear valleys extending for thousands of kilometers is believed to result from the growth and propagation of isolated rift segments that evolve into a continuous zone of deformation. However, although instrumental in driving climate and biosphere of that region which in turn may have influenced habitats and the pattern of migration of human species in East Africa, and possibly even conditioned hominin evolution, this process is poorly documented and understood.

In a study published in Nature Communications and funded by the National Geographic Society, an international group of scientists from universities and research institutions from Ethiopia, France, Germany, Italy, New Zealand and the United Kingdom, of which Sascha Brune from the GFZ German Research Centre for Geosciences was a part, has shed new light into the recent evolution of the African rift valley. Its focus was on the spatial and temporal sequence of the propagation, interaction and linking of the Ethiopian rift section with the Kenyan part of the rift fracture. By conducting fieldwork in a remote area at the border between Ethiopia and Kenya, and integrating the results of that field campaign with laboratory analysis of volcanic rocks, analysis of the seismicity, morphology and numerical modelling, the authors have been able to reconstruct the geological history of an almost unknown sector of the African rift valley: the Ririba rift in South Ethiopia. The scientists showed that the Ririba trench formed about 3.7 million years ago as the southernmost advance of the Ethiopian rift segment.

Sascha Brune says: “In my research group at the GFZ we were able to substantiate the geological observations with numerical experiments. To this end, we brought together regional structures, deformation laws and basic physical equations to modelling in a supercomputer. In this way, we were able to show how the focusing of the rift valley contributed to a direct connection between the Kenyan and Ethiopian Rift.”

In contrast with previous theories of rifting in the region, the new data indicate that the southward growth was short-lived and aborted around 2.5 million years ago. At this time, deformation migrated westward into the Lake Turkana region, where the Ethiopian and Kenyan sectors of the rift valley are now directly connected. A later phase of volcanism, expressed by numerous lava flows and impressive explosive volcanic craters (maars), have since affected the Ririba area; however, this volcanic activity was unrelated to tectonic activity, opening new questions on how volcanism and faulting interact during rifting.

Overall, the results of this work provide new insights into the break-up of continents: “In the East African rift, we can observe processes that are important far beyond the region,” says Sascha Brune. “The same dynamics that determine the rift development in East Africa led to the opening of the Atlantic and Indian Oceans many millions of years ago and thus had a decisive influence on the face of the Earth.”

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This story originally appeared on: http://www.geologypage.com/2019/03/new-light-into-the-recent-evolution-of-the-african-rift-valley.html#ixzz5qLlgt4wU

News: About the World

Magnetic north is shifting fast. What'll happen to the northern lights?

By Nathan Case, Lancaster University; earthsky.org (22 May, 2019)

As magnetic north shifts increasingly away from the geologic north pole – towards Siberia – studies suggest the northern lights could move with it.

Northern lights over Lake Lappajärvi in Finland. Image via Santeri Viinamäki.

Like most planets in our solar system, the Earth has its own magnetic field. Thanks to its largely molten iron core, our planet is in fact a bit like a bar magnet. It has a north and south magnetic pole, separate from the geographic poles, with a field connecting the two. This field protects our planet from radiation and is responsible for creating the northern and southern lights – spectacular events that are only visible near the magnetic poles.

However, with reports that the magnetic north pole has started moving swiftly at 50km (31 miles) per year – and may soon be over Siberia – it has long been unclear whether the northern lights will move too. Now a new study, published in Geophysical Research Letters, has come up with an answer.

Our planetary magnetic field has many advantages. For over 2,000 years, travellers have been able to use it to navigate across the globe. Some animals even seem to be able to find their way thanks to the magnetic field. But, more importantly than that, our geomagnetic field helps protect all life on Earth.

Earth's magnetic field extends hundreds of thousands of kilometers out from the center of our planet – stretching right out into interplanetary space, forming what scientists call a "magnetosphere". This magnetosphere helps to deflect solar radiation and cosmic rays, preventing the destruction of our atmosphere. This protective magnetic bubble isn't perfect though, and some solar matter and energy can transfer into our magnetosphere. As it is then funneled into the poles by the field, it results in the spectacular displays of the northern lights.

A wandering pole

Since Earth's magnetic field is created by its moving, molten iron core, its poles aren't stationary and they

wander independently of one another. In fact, since its first formal discovery in 1831, the north magnetic pole has travelled over 1,240 miles (2,000 km) from the Boothia Peninsula in the far north of Canada to high in the Arctic Sea. This wandering has generally been quite slow, around 9km (6 mi) a year, allowing scientists to easily keep track of its position. But since the turn of the century, this speed has increased to 30 miles (50 km) a year. The south magnetic pole is also moving, though at a much slower rate (6-9 miles, or 10-15 km a year).

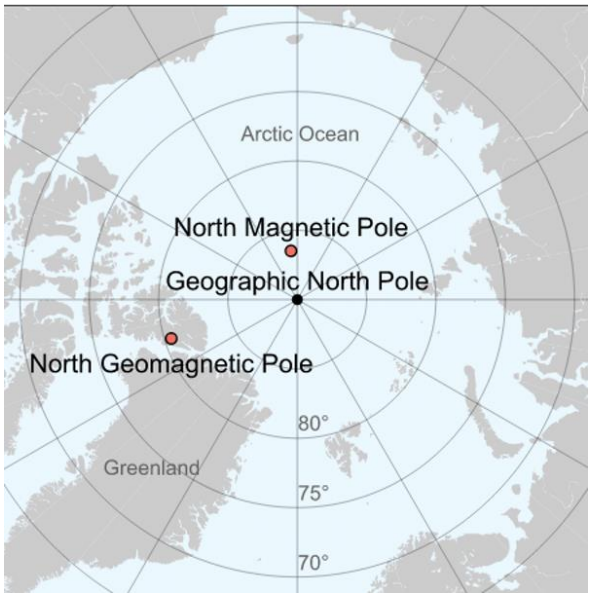
This rapid wandering of the north magnetic pole has caused some problems for scientists and navigators alike. Computer models of where the north magnetic pole might be in the future have become seriously outdated, making accurate compass-based navigation difficult. Although GPS does work, it can sometimes be unreliable in the polar regions. In fact, the pole is moving so quickly that scientists responsible for mapping the Earth's magnetic field were recently forced to update their model much earlier than expected.

Will the aurora move?

The aurora generally form in an oval about the magnetic poles, and so if those poles move, it stands to reason that the aurora might too. With predictions suggesting that the north pole will soon be approaching northern Siberia, what effect might that have on the aurora?

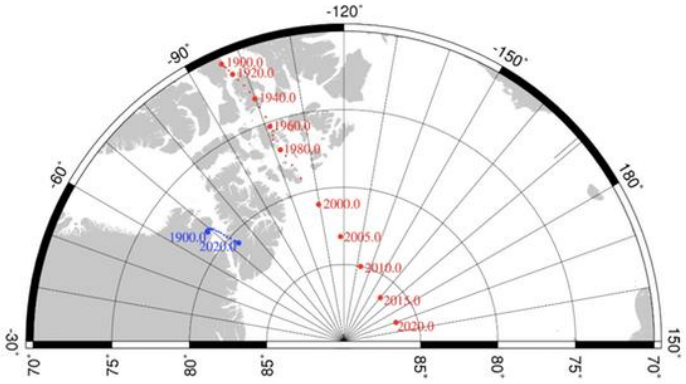
The northern lights are currently mostly visible from northern Europe, Canada and the northern U.S. If, however, they shifted north, across the geographic pole, following the north magnetic pole, then that could well change. Instead, the northern lights would become more visible from Siberia and northern Russia and less visible from the much more densely populated U.S./Canadian border.

Fortunately, for those aurora hunters in the northern hemisphere, it seems as though this might not actually be the case. A recent study made a computer model of the aurora and the Earth's magnetic poles based on data dating back to 1965. It showed that rather than following the magnetic poles, the aurora follows the "geomagnetic poles" instead. There's only a small difference between these two types of poles – but it's an important one.



Magnetic versus geomagnetic poles. Image via Wikipedia.

The magnetic poles are the points on the Earth's surface where a compass needle points downwards or upwards, vertically. They aren't necessarily connected and drawing a line between these points, through the Earth, would not necessarily cross its center. Therefore, to make better models over time, scientists assume that the Earth is like a bar magnet at its center, creating poles that are exactly opposite each other – "antipodal". This means that if we drew a line between these points, the line would cross directly through the Earth's center. At the points where that line crosses the Earth's surface, we have the geomagnetic poles.



Positions of the north magnetic pole (red) and the geomagnetic pole (blue) between 1900 and 2020. Image via British Geological Survey.

The geomagnetic poles are a kind of reliable, averaged out version of the magnetic poles, which move erratically all the time. Because of that, it turns out they aren't moving anywhere near as fast as the magnetic north pole is. And since the aurora seems to follow the more averaged version of the magnetic field, it means that the northern lights aren't moving that fast either. It seems as though the aurora are staying where they are – at least for now.

We already know that the magnetic pole moves. Both poles have wandered ever since the Earth existed. In fact, the poles even flip over, with north becoming south and south becoming north. These magnetic reversals have occurred throughout history, every 450,000 years or so on average. The last reversal occurred 780,000 years ago meaning we could be due for a reversal soon.

So rest assured that a wandering pole, even a fast one, shouldn't cause too many problems – except for those scientists whose job it is to model it.

This story originally appeared on: https://earthsky.org/earth/magnetic-north-pole-shift-northern-lights?utm_source=EarthSky+News&utm_campaign=c390066fe3-EMAIL_CAMPAIGN_2018_02_02_COPY_01&utm_medium=email&utm_term=0_c643945d79-c390066fe3-393647361

News: About the World

Arctic warming contributes to drought

University of Wyoming; Science Daily (27 March 2019)

Summary

According to new research, changes similar to those after the ice age 10,000 years ago could be in store today because a warming Arctic weakens the temperature difference between the tropics and the poles. This, in turn, results in less precipitation, weaker cyclones and weaker mid-latitude westerly wind flow -- a recipe for prolonged drought.

According to new research led by a University of Wyoming scientist, similar changes could be in store today because a warming Arctic weakens the temperature difference between the tropics and the poles. This, in turn, results in less precipitation, weaker cyclones and weaker mid-latitude westerly wind flow -- a recipe for prolonged drought.

The temperature difference between the tropics and the poles drives a lot of weather. When those opposite temperatures are wider, the result is more precipitation, stronger cyclones and more robust wind flow. However, due to the Arctic ice melting and warming up the poles, those disparate temperatures are becoming closer.

"Our analysis shows that, when the Arctic is warmer, the jet stream and other wind patterns tend to be weaker," says Bryan Shuman, a UW professor in the Department of Geology and Geophysics. "The temperature difference in the Arctic and the tropics is less steep. The change brings less precipitation to the mid-latitudes."

Shuman is a co-author of a new study that is highlighted in a paper, titled "Mid-Latitude Net Precipitation Decreased With Arctic Warming During the Holocene," published today (March 27) online in Nature, an international weekly science journal. The print version of the article will be published April 4.

Researchers from Northern Arizona University; Universite Catholique de Louvain in Louvain-In-Neuve, Belgium; the Florence Bascom Geoscience Center in Reston, Va.; and Cornell University also contributed to the paper.

"The Nature paper takes a global approach and relates the history of severe dry periods of temperature changes. Importantly, when temperatures have changed in similar ways to today (warming of the Arctic), the mid-latitudes -- particularly places like Wyoming and other parts of central North America -- dried out," Shuman explains. "Climate models anticipate similar changes in the future."

Currently, the northern high latitudes are warming at rates that are double the global average. This will decrease the equator-to-pole temperature gradient to values comparable with the early to middle Holocene Period, according to the paper.

Shuman says his research contribution, using geological evidence, was helping to estimate how dry conditions have been in the past 10,000 years. His research included three water bodies in Wyoming: Lake of the Woods, located above Dubois; Little Windy Hill Pond in the Snowy Range; and Rainbow Lake in the Beartooth Mountains.

"Lakes are these natural recorders of wet and dry conditions," Shuman says. "When lakes rise or lower, it leaves geological evidence behind."

The researchers' Holocene temperature analysis included 236 records from 219 sites. During the past 10,000 years, many of the lakes studied were lower earlier in history than today, Shuman says.

"Wyoming had several thousand years where a number of lakes dried up, and sand dunes were active where they now have vegetation," Shuman says. "Expanding to the East Coast, it is a wet landscape today. But 10,000 years ago, the East Coast was nearly as dry as the Great Plains."

The research group looked at the evolution of the tropic-to-pole temperature difference from three time periods: 100 years ago, 2,000 years ago and 10,000 years ago. For the last 100 years, many atmospheric records facilitated the analysis but, for the past 2,000 years or 10,000 years, there were fewer records available. Tree rings can help to expand studies to measure temperatures over the past 2,000 years, but lake deposits, cave deposits and glacier ice were studied to record prior temperatures and precipitation.

"This information creates a test for climate models," Shuman says. "If you want to use a computer to make a forecast of the future, then it's useful to test that computer's ability to make a forecast for some other time period. The geological evidence provides an excellent test."

The research was funded by the Science Foundation Arizona Bisgrove Scholar Award, the National Science Foundation and the state of Arizona's Technology and Research Initiative Fund administered by the Arizona Board of Regents.

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This story originally appeared on: https://www.sciencedaily.com/releases/2019/03/190327161247.htm

News: About the World

Largest Delta Plain in Earth's History Discovered in Arctic

If this Triassic period delta existed today, its footprint would equal about 1% of all land on Earth.

By Kimberly M. S. Cartier; EOS Earth & Space Science News (1 April 2019)

An ancient channel, part of the largest known delta in Earth's history, extends from the shore of Svalbard, Norway, into the Barents Sea. Credit: Tore Grane Klausen.

A river delta plain nearly 2 million square kilometers in size once dominated the northern shores of ancient Pangaea, according to a recent study. The Triassic Boreal Ocean delta plain, whose deposits are currently

located in the Barents Sea, is around 230 million years old and is the largest delta plain, modern or past, known to exist.

"We always knew it was large. There was little doubt about that," Tore Klausen, lead researcher on the discovery, told Eos. When Klausen and his team began connecting their observations to those from collaborators, "then we started to realize just how large it was." Klausen is a senior explorationist at Petrolia NOCO AS in Bergen, Norway.

Learning from the Past

Deltas can support large-scale agriculture and have sustained some of the largest ancient civilizations. The Nile delta in Egypt, the Yangtze delta in China, and the Ganges-Brahmaputra delta in India and Bangladesh are a few examples. Many countries today continue to rely on lush and sediment-rich deltas to support agriculture.

"You can use ancient deltas to understand how modern river systems should be behaving."

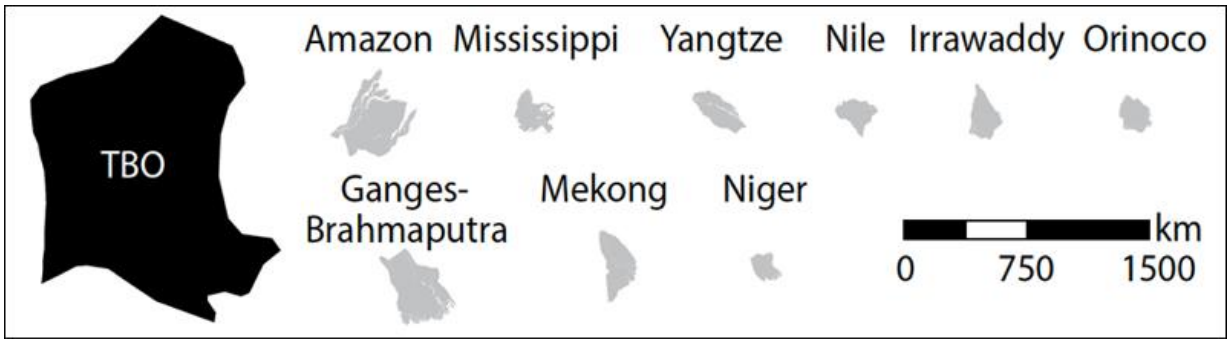
But this same propensity for humans to congregate around deltas makes it more difficult for scientists to study how they naturally grow and change.

"Modern river deltas are very controlled and regulated, and this hampers the natural evolution of these delta plains," said coauthor Björn Nyberg, a sedimentologist at the University of Bergen in Norway. "Over 90% of the world's population lives within 10 kilometers of a river source."

But "you can use ancient deltas to understand how modern river systems should be behaving," he said.

A Delta the Size of Alaska

How does one team map out a delta more than a thousand kilometers across? "We used seismic reflectors, which is essentially like sonar, to look at the different rock layers in the subsurface," Nyberg explained. The delta's channels and meanders left behind ribbon-like deposits of sediment with a distinctive seismic signature in the rock record.



The footprint of the Triassic Boreal Ocean (TBO) river delta compared to the footprints of some of the largest modern deltas. Distance is measured in kilometers (km). Credit: Klausen et al., 2019, https://doi.org/10.1130/G45507.1, Figure 4A, CC-BY 4.0

The team combined the seismic data with measurements from boreholes as well as from where the delta deposits lie exposed in rocky outcrops in Svalbard, Norway. Ages from zircons sampled across the region ensured that the deposits were the same age despite being separated by a great distance.

The delta "is essentially 10 times bigger than the modern Amazon delta or the Ganges in India. It absolutely out scales any other example that we know of."

All told, the Triassic Boreal Ocean delta plain spanned at least 1.65 million square kilometers in northern Pangaea. That's about 1% of the total land area of Earth right now.

"It's basically the size of Alaska," Nyberg said. "That is essentially 10 times bigger than the modern Amazon delta or the Ganges in India. It absolutely out scales any other example that we know of."

Incomplete Puzzle

The team measured past seafloor depths—paleobathymetry—and found that the delta emptied into a very large basin only about 400 meters deep. Most modern deltas exist near the edges of continental shelves that quickly drop to thousands of meters deep, which cuts off delta growth.

A large supply of sediment, monsoon-like rainfalls, and steady sea levels all contributed to the delta's growth, the researchers said, but the shallow basin was the key to its gargantuan size. The shallow gradient let the delta plain grow uninterrupted for more than a million years.

And the delta plain might have been even larger than Klausen's team could measure. "We don't see the end of the delta plain," Klausen said. "There are time-equivalent deposits in eastern Greenland and Canada,

for instance, which are possibly linked to the delta plain."

"There are likely pieces of the puzzle that still need to be added this story," he added.

The team published this discovery in Geology on 22 March.

"The Triassic delta plain system built across this shelf region is truly vast," Elizabeth Miller, a structural geologist at Stanford University in Stanford, Calif., told Eos. This study's detailed seismic reflection data "allow unprecedented documentation of large-scale depositional systems from Paleozoic to modern times," according to Miller, who was not involved with this research.

Exciting and Familiar

Beyond its size, one aspect of the Triassic Boreal Ocean delta plain that excited the scientists was its timing.

"Right before this, we were coming out of the Permian extinction, the mass extinction which wiped out the majority of life on Earth," Nyberg said. "Then right after, in the Triassic, you get this perfect set of conditions that's creating this vast delta plain on the northern coast of Pangea, and it's one of the only areas that's very hospitable to life after this mass extinction."

"The channels split and evolve and are dancing around on the delta plain much like we see today."

"One of the things that we're really excited to look at in the future is what role this massive delta had in evolution and the resurgence of both terrestrial and marine life," he said.

Despite this ancient delta plain's oversized footprint, many aspects of it are familiar.

"As you move down the delta plain and start affecting it with tides and standing water, the channels split and evolve and are dancing around on the delta plain much like we see today," Klausen said. "There is much we can take from the modern to understand the ancient."

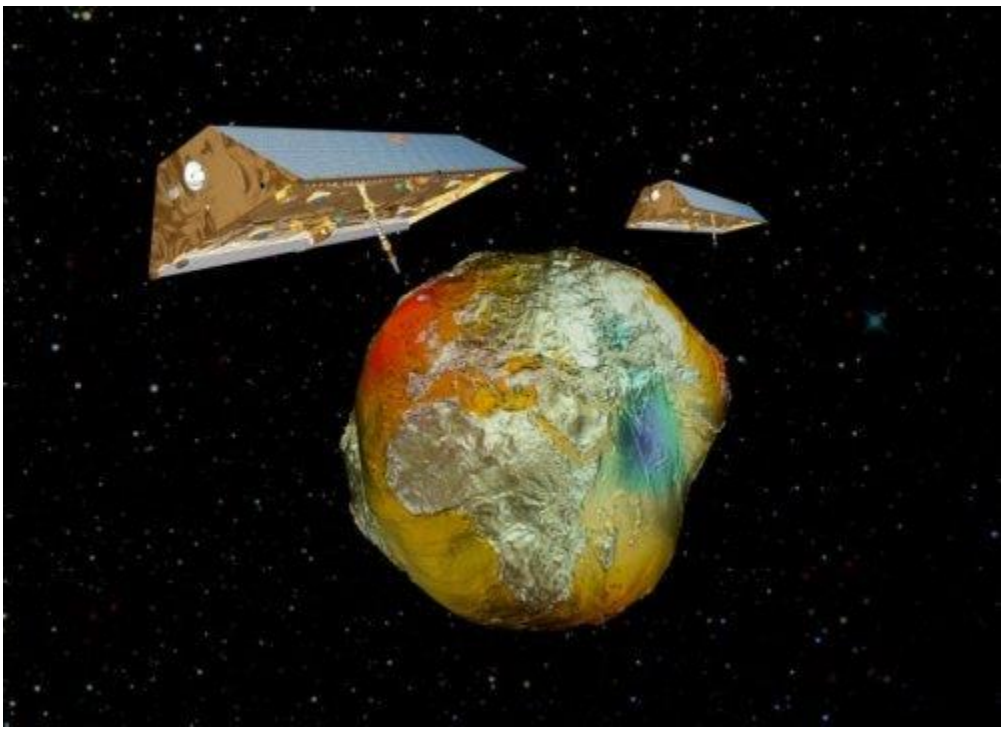
"Apart from the actual size," he said, "they are not too different."

This story originally appeared on: Cartier, K. M. S. (2019), Largest delta plain in Earth's history discovered in Arctic, Eos, 100, https://doi.org/10.1029/2019EO119681. Published on 01 April 2019

News: About the World

What Earth's gravity reveals about climate change

By GFZ GeoForschungsZentrum Potsdam, Helmholtz Centre; Sciences Daily (16 April 2019)



The satellite twins GRACE with the Earth's gravitational field. Credit: AIRBUS/GFZ.

Summary:

On March 17, 2002, the satellite duo GRACE was launched to map the Earth's gravity field more precisely than ever before. The measurements make it possible to monitor the terrestrial water cycle, the mass balance of ice sheets and glaciers or changes in sea levels. This helps to better understand important trends in the global climate system.

On March 17, 2002, the German-US satellite duo GRACE (Gravity Recovery and Climate Experiment) were launched to map the global gravitational field with unprecedented precision. After all, the mission lasted a good 15 years -- more than three times as long as expected. When the two satellites burnt up in the Earth's atmosphere at the end of 2017 and beginning of 2018, respectively, they had recorded the Earth's gravitational field and its changes over time in more than 160 months.

This so-called time-resolved satellite gravimetry makes it possible, among other things, to monitor the terrestrial water cycle, the mass balance of ice sheets and glaciers or sea-level change, and thus to better understand the mechanisms of the global climate system, to assess important climatic trends more precisely and to predict possible consequences.

A review in the journal Nature Climate Change, in which Frank Flechtner, Christoph Reigber, Christoph Dahle and Henryk Dobslaw from the Helmholtz Centre Potsdam German Research Centre for Geosciences GFZ and Ingo Sasgen from the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI) participated, now presents highlights in the field of climate research based on GRACE observations.

Ice sheets and glaciers

GRACE produced the first direct measurement of ice-mass loss from ice sheets and glaciers ever. Previously, it had only been possible to estimate the masses and their changes using indirect methods. Within the first two years of the mission it was already possible to observe clear signals of ice-mass loss in Greenland and Antarctica. The measured data showed that that 60 percent of the total mass-loss is due to enhanced melt production in response to Arctic warming trends, while 40 percent is due to an increase of ice flow into the ocean. According to GRACE data, between April 2002 and June 2017 Greenland lost

about 260 billion tons of ice per year, Antarctica about 140 billion tons. In addition to long-term trends, the gravity field data also provide evidence of the direct effects of global climate phenomena such as "El Niño" on ice sheets and glaciers worldwide.

Terrestrial water storage

Among the most impactful contributions of the GRACE mission has been the unveiling of Earth's changing freshwater landscape, which has profound implications for water, food and human security. Global estimates of GRACE trends suggest increasing water storage in high and low latitudes, with decreased storage in mid-latitudes. Though the GRACE record is relatively short, this observation of large-scale changes in the global hydrological cycle has been an important early confirmation of the changes predicted by climate models through the twenty-first century.

GRACE data also help to analyse and assess the sea level more accurately, as the storage of freshwater on land is linked to the sea level by various mechanisms. Analyses of GRACE data have enabled the first-ever estimates of groundwater storage changes from space. They confirm excessive rates of groundwater depletion from individual aquifers around the world. The data on terrestrial water storage have also contributed to the validation and calibration of various climate models.

Sea-level change and ocean dynamics

Within this century, sea-level rise could accelerate to 10 millimetres per year -- a rate unprecedented during the past 5000 years and a profound and direct consequence of a warming climate. High-precision sea-level measurements have been available since the early 1990s but they only show the absolute sea-level change. In the 25 years between 1993 and 2017, the sea-level rose by an average of 3.1 millimetres per year. To find out how thermal expansion, melting ice and the continental influx of water each affect sea-level, it is necessary to study the water's mass distribution. GRACE has shown that 2.5 millimetres of the average annual sea-level rise of 3.8 millimetres between 2005 and 2017 is caused by the inflow of water or other mass and 1.1 millimetres by the thermal expansion of water. Resolving this composition is important for sea-level projections. GRACE data provide a constraint on ocean mass change and thus indirectly on the Earth's energy imbalance, which is a fundamental global metric of climate change. GRACE has shown that most of the warming released by the rise in temperature occurs in the upper 2000 metres of the oceans, which are the most important energy sinks of climate change. GRACE also contributes to a better understanding of the dynamics and impact of ocean currents, in particular for the Arctic Ocean.

Climate service applications

The gravity field data of the GRACE satellites help to improve the United States Drought Monitor. This helps US authorities to react to droughts in a timely and sensible manner. With EGSIEM (European Gravity Service for Improved Emergency Management), the European Union has promoted a service designed to identify regional flood risks as early as possible. Between April and June 2017, test runs with historical flood data took place, showing that the wetness indicators for large river basins determined by GRACE can improve forecasts, for example for the Mississippi or the Danube. Current results also show that GRACE data can be used to more accurately predict the risk of seasonal wildfires.

The GFZ operated the GRACE mission together with the German Aerospace Center (DLR) and on the US side with the NASA Jet Propulsion Laboratory (JPL). In May 2018, the follow-up mission GRACE Follow-on (GRACE-FO) was launched. The first monthly gravity field maps should be available to international users by the end of July this year. Unexpected difficulties delayed the submission of the products. "The reason was the failure of a control unit on the second GRACE-FO satellite," explains Frank Flechtner of GFZ. "This made it necessary to switch to the replacement unit installed for such scenarios. But now, with GRACE-FO, a more than two decades long recording of the mass changes in the system Earth is within reach." (ph)

Background: The weight of water

The greater the mass of an object, the greater its gravitational attraction. For example, the Alps exert a higher gravitational pull than the North German lowlands. When satellites orbit the Earth and fly over a massive region, they accelerate minimally when approaching it and slow down as they fly away.

A tiny part of the gravitation emanating from the Earth is based on water on or near the surface in oceans, rivers, lakes, glaciers and underground. This water reacts to seasons, storms, droughts or other weather effects. GRACE took advantage of the mass displacement of water by recording its effect on the satellite duo that orbited our planet 220 kilometres in a row. Microwaves were used to measure their distance. This distance changed over time due to the mass shift on Earth. From the data, the researchers then calculated monthly maps of the regional changes in the Earth's gravitational pull and the causal changes in the masses on the surface.

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This story originally appeared on: https://www.sciencedaily.com/releases/2019/04/190416132155.htm

News: About the World

66-million-year-old deathbed linked to dinosaur-killing meteor

University of California – Berkeley; Geology Page (30 March 2019)

The beginning of the end started with violent shaking that raised giant waves in the waters of an inland sea in what is now North Dakota.

Then, tiny glass beads began to fall like birdshot from the heavens. The rain of glass was so heavy it may have set fire to much of the vegetation on land. In the water, fish struggled to breathe as the beads clogged their gills.

The heaving sea turned into a 30-foot wall of water when it reached the mouth of a river, tossing hundreds, if not thousands, of fresh-water fish — sturgeon and paddlefish — onto a sand bar and temporarily reversing the flow of the river. Stranded by the receding water, the fish were pelted by glass beads up to 5 millimeters in diameter, some burying themselves inches deep in the mud. The torrent of rocks, like fine sand, and small glass beads continued for another 10 to 20 minutes before a second large wave inundated the shore and covered the fish with gravel, sand and fine sediment, sealing them from the world for 66 million years.

This unique, fossilized graveyard — fish stacked one atop another and mixed in with burned tree trunks, conifer branches, dead mammals, mosasaur bones, insects, the partial carcass of a Triceratops, marine microorganisms called dinoflagellates and snail-like marine cephalopods called ammonites — was unearthed by paleontologist Robert DePalma over the past six years in the Hell Creek Formation, not far from Bowman, North Dakota. The evidence confirms a suspicion that nagged at DePalma in his first digging season during the summer of 2013 — that this was a killing field laid down soon after the asteroid impact that eventually led to the extinction of all ground-dwelling dinosaurs. The impact at the end of the Cretaceous Period, the so-called K-T boundary, exterminated 75 percent of life on Earth.

“This is the first mass death assemblage of large organisms anyone has found associated with the K-T boundary,” said DePalma, curator of paleontology at the Palm Beach Museum of Natural History in Florida and a doctoral student at the University of Kansas. “At no other K-T boundary section on Earth can you find such a collection consisting of a large number of species representing different ages of organisms and different stages of life, all of which died at the same time, on the same day.”

In a paper to appear next week in the journal Proceedings of the National Academy of Sciences, he and his American and European colleagues, including two University of California, Berkeley, geologists, describe the site, dubbed Tanis, and the evidence connecting it with the asteroid or comet strike off Mexico’s Yucatan Peninsula 66 million years ago. That impact created a huge crater, called Chicxulub, in the ocean floor and sent vaporized rock and cubic miles of asteroid dust into the atmosphere. The cloud eventually enveloped Earth, setting the stage for Earth’s last mass extinction.

“It’s like a museum of the end of the Cretaceous in a layer a meter-and-a-half thick,” said Mark Richards, a UC Berkeley professor emeritus of earth and planetary science who is now provost and professor of earth and space sciences at the University of Washington.

Richards and Walter Alvarez, a UC Berkeley Professor of the Graduate School who 40 years ago first hypothesized that a comet or asteroid impact caused the mass extinction, were called in by DePalma and Dutch scientist Jan Smit to consult on the rain of glass beads and the tsunami-like waves that buried and preserved the fish. The beads, called tektites, formed in the atmosphere from rock melted by the impact.

Tsunami vs. seiche

Richards and Alvarez determined that the fish could not have been stranded and then buried by a typical tsunami, a single wave that would have reached this previously unknown arm of the Western Interior

Seaway no less than 10 to 12 hours after the impact 3,000 kilometers away, if it didn't peter out before then. Their reasoning: The tektites would have rained down within 45 minutes to an hour of the impact, unable to create mudholes if the seabed had not already been exposed.

Instead, they argue, seismic waves likely arrived within 10 minutes of the impact from what would have been the equivalent of a magnitude 10 or 11 earthquake, creating a seiche (pronounced saysh), a standing wave, in the inland sea that is similar to water sloshing in a bathtub during an earthquake. Though large earthquakes often generate seiches in enclosed bodies of water, they're seldom noticed, Richards said. The 2011 Tohoku quake in Japan, a magnitude 9.0, created six-foot-high seiches 30 minutes later in a Norwegian fjord 8,000 kilometers away.

"The seismic waves start arising within nine to 10 minutes of the impact, so they had a chance to get the water sloshing before all the spherules (small spheres) had fallen out of the sky," Richards said. "These spherules coming in cratered the surface, making funnels — you can see the deformed layers in what used to be soft mud — and then rubble covered the spherules. No one has seen these funnels before."

The tektites would have come in on a ballistic trajectory from space, reaching terminal velocities of between 100 and 200 miles per hour, according to Alvarez, who estimated their travel time decades ago.

"You can imagine standing there being pelted by these glass spherules. They could have killed you," Richards said. Many believe that the rain of debris was so intense that the energy ignited wildfires over the entire American continent, if not around the world.

"Tsunamis from the Chicxulub impact are certainly well-documented, but no one knew how far something like that would go into an inland sea," DePalma said. "When Mark came aboard, he discovered a remarkable artifact — that the incoming seismic waves from the impact site would have arrived at just about the same time as the atmospheric travel time of the ejecta. That was our big breakthrough."

At least two huge seiches inundated the land, perhaps 20 minutes apart, leaving six feet of deposits covering the fossils. Overlaying this is a layer of clay rich in iridium, a metal rare on Earth, but common in asteroids and comets. This layer is known as the K-T, or K-Pg boundary, marking the end of the Cretaceous Period and the beginning of the Tertiary Period, or Paleogene.

Iridium

In 1979, Alvarez and his father, Nobelist Luis Alvarez of UC Berkeley, were the first to recognize the significance of iridium that is found in 66 million-year-old rock layers around the world. They proposed that a comet or asteroid impact was responsible for both the iridium at the K-T boundary and the mass extinction.

The impact would have melted the bedrock under the seafloor and pulverized the asteroid, sending dust and melted rock into the stratosphere, where winds would have carried them around the planet and blotted out the sun for months, if not years. Debris would have rained down from the sky: not only tektites, but also rock debris from the continental crust, including shocked quartz, whose crystal structure was deformed by the impact.

The iridium-rich dust from the pulverized meteor would have been the last to fall out of the atmosphere after the impact, capping off the Cretaceous.

"When we proposed the impact hypothesis to explain the great extinction, it was based just on finding an anomalous concentration of iridium — the fingerprint of an asteroid or comet," said Alvarez. "Since then, the evidence has gradually built up. But it never crossed my mind that we would find a deathbed like this."

Key confirmation of the meteor hypothesis was the discovery of a buried impact crater, Chicxulub, in the Caribbean and off the coast of the Yucatan in Mexico, that was dated to exactly the age of the extinction. Shocked quartz and glass spherules were also found in K-Pg layers worldwide. The new discovery at Tanis is the first time the debris produced in the impact was found along with animals killed in the immediate aftermath of the impact.

"And now we have this magnificent and completely unexpected site that Robert DePalma is excavating in North Dakota, which is so rich in detailed information about what happened as a result of the impact," Alvarez said. "For me, it is very exciting and gratifying!"

Tektites

Jan Smit, a retired professor of sedimentary geology from Vrije Universiteit in Amsterdam in The Netherlands who is considered the world expert on tektites from the impact, joined DePalma to analyze and date the tektites from the Tanis site. Many were found in near perfect condition embedded in amber, which at the time was pliable pine pitch.

"I went to the site in 2015 and, in front of my eyes, he (DePalma) uncovered a charred log or tree trunk about four meters long which was covered in amber, which acted as sort of an aerogel and caught the tektites when they were coming down," Smit said. "It was a major discovery, because the resin, the amber, covered the tektites completely, and they are the most unaltered tektites I have seen so far, not 1 percent of alteration. We dated them, and they came out to be exactly from the K-T boundary."

The tektites in the fishes' gills are also a first.

"Paddlefish swim through the water with their mouths open, gaping, and in this net, they catch tiny particles, food particles, in their gill rakers, and then they swallow, like a whale shark or a baleen whale," Smit said. "They also caught tektites. That by itself is an amazing fact. That means that the first direct victims of the impact are these accumulations of fishes."

Smit also noted that the buried body of a Triceratops and a duck-billed hadrosaur proves beyond a doubt that dinosaurs were still alive at the time of the impact.

"We have an amazing array of discoveries which will prove in the future to be even more valuable," Smit said. "We have fantastic deposits that need to be studied from all different viewpoints. And I think we can unravel the sequence of incoming ejecta from the Chicxulub impact in great detail, which we would never have been able to do with all the other deposits around the Gulf of Mexico."

"So far, we have gone 40 years before something like this turned up that may very well be unique," Smit said. "So, we have to be very careful with that place, how we dig it up and learn from it. This is a great gift at the end of my career. Walter sees it as the same."

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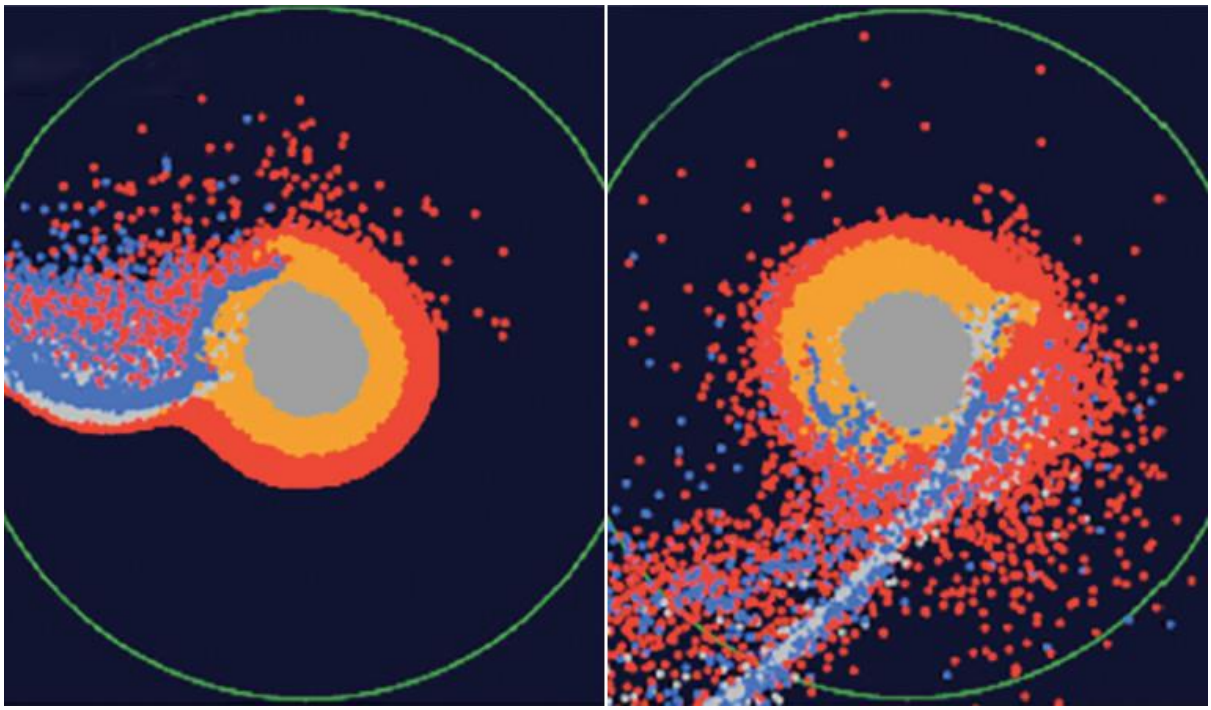
This story originally appeared on: http://www.geologypage.com/2019/03/66-million-year-old-deathbed-linked-to-dinosaur-killing-meteor.html

News: About Space/Astronomy

Was moon created from proto-Earth magma?

By Eleanor Imster; Space (9 May 2019)

A new study suggests that our moon formed from a splash of magma when a large object crashed into a proto-Earth covered in a fiery ocean.



Snapshots of numerical modeling of the moon's formation by a giant impact. The central part of the image is a proto-Earth; red points indicate materials from the ocean of magma in a proto-Earth; blue points indicate the impactor materials. Image via Yale.

For more than a century, scientists have struggled to explain how the Earth's moon formed. The most widely-accepted explanation is that the moon formed from the debris left over after a Mars-sized object, known as Theia, slammed into the early Earth and ejected enough debris to form the moon.

The problem is that when this idea was tested, computer simulations indicated that the moon would be made primarily from the same stuff as the impacting object. Yet the opposite is true. We know from analyzing rocks brought back from Apollo missions that the moon consists mainly of material from Earth.

A new study published April 29, 2019, in Nature Geoscience by a team of scientists from Japan and the U.S. has offered an explanation for the discrepancy.

The key, according to Yale geophysicist Shun-ichiro Karato, who is a study co-author, is that the early, proto-Earth — about 50 million years after the formation of the sun — was covered by a sea of hot magma, while the impacting object was likely made of solid material. The impact splashed magma out into space, and that material formed the moon.

Karato and his collaborators set out to test a new model, based on the collision of a proto-Earth covered with an ocean of magma and a solid impacting object.

The model showed that after the collision, the magma is heated much more than solids from the impacting object. The magma then expands in volume and goes into orbit to form the moon, the researchers say. This explains why there is much more Earth material in the moon's makeup. Previous models did not account for the different degree of heating between the proto-Earth silicate and the impactor.

Karato said in a statement:

In our model, about 80 percent of the moon is made of proto-Earth materials. In most of the previous models, about 80 percent of the moon is made of the impactor. This is a big difference.

Karato said the new model confirms previous theories about how the moon formed, without the need to propose unconventional collision conditions — something theorists have had to do until now.

Bottom line: The moon formed from a splash of magma when a large object crashed into a proto-Earth covered in a fiery ocean, according to a new study.

This story originally appeared on: https://www.nature.com/articles/s41561-019-0354-2

News: About Space/Astronomy

Scientists Detect 'Mini-Tremors' On Mars

By Diane Samson Tech Times (19 March 2019)

Using a highly sensitive seismometer, NASA's InSight has detected for the first time minute tremors that rock the surface of Mars.

The lander, which arrived on the Red Planet in November, discovered the microseisms in February. Scientists believe that the continuous rumbling is caused by low-frequency pressure waves from atmospheric winds that blow on the surface.

The findings were presented at the annual Lunar and Planetary Science Conference.

Microseisms Detected In Mars

Earth has similar microseisms, faint seismic signals that are ubiquitous and continuous, caused by wind-driven surface waves. While Mars has neither seas nor oceans, a similar "humming" was heard from the Red Planet.

InSight, which is short for Seismic Investigations, Geodesy, and Heat Transport, discovered the microseisms of Mars while trying to detect "marsquakes," the vibrations that occur underground. According to scientists, the quakes that occur in Mars are fundamentally different from the ones experienced on Earth.

On Earth, quakes happen because of plate tectonics or when the plates that make up the surface of the planet move over the mantle. However, Mars does not have the same broken outer shell. Instead, scientists believe that marsquakes happen because of different

phenomena, such as the pressure of magma pushing upward to the surface or meteorite impacts.

NASA is hoping that marsquakes would help paint a picture of what Earth looked like during its early years.

InSight so far has not detected any marsquakes, but Philippe Lognnonné, the planetary seismologist behind the effort, said that finding the microseism is a major discovery. On Earth, scientists have started to see microseisms as more than just a nuisance, but something from which they can learn about features of the subsurface. Lognnonné explained that the microseisms can be as valuable to scientists studying Mars.

Scientists Waiting For the First Marsquake

Scientists are gearing for their first marsquake. The hypersensitive seismometer has been placed on the surface of Mars and the detection of microseisms in the Red Planet is proof that it is working. The team is expecting to detect about one marsquake a month.

NASA's InSight is the first Martian lander to conduct a thorough checkup of the insides of the Red Planet. It is equipped to study the vital signs of Earth's neighbor, including the pulse (seismology), temperature (heat flow), and reflexes (precision tracking).

This story originally appeared on: https://www.techtimes.com/articles/239886/20190319/scientists-detect-mini-tremors-on-mars.htm?fbclid=IwAR0uhv5p9o0KK-tMsRNyUcPPolHRmNoEBGaZkQ-T-PJMSa9BRkVWAflf83g

News: About Space/Astronomy

'Active system' of flowing water may be hidden underneath Mars surface, scientists say

Andrew Griffin; Independent (28 March 2019)

There may be a vast and active system of water running underneath the surface of Mars, scientists have said.

Groundwater on Mars may run much deeper than previously thought, with streams flowing invisibly under the surface, a new study has found.

The discovery may help fundamentally change our understanding of the red planet, as well as informing our search for life.

Last year, scientists working with the Italian Space Agency found the presence of a dee-water lake on Mars, under its south pole. The new study suggests that groundwater could still be flowing in active system, and that it could lead to streams flowing on the surface in parts of the planet near the equator.

The researchers found the groundwater probably exists in areas much broader than the plus and that the system could run as deep as 750 meters.

The researchers made the discovery after analysing the characteristics of the Mars Recurrent Slope Linea, which are like dried, short streams of water that appear on the walls of some of the planet's craters.

Previously, researchers thought those features were the result of flowing water across the surface or just underneath it. But now the researchers believe they are actually coming up from a deep pressurised source from where water is pushed up.

"We propose an alternative hypothesis that they originate from a deep pressurised groundwater source which comes to surface moving upward along ground cracks," said Essam Heggy, one of the co-authors on the new paper.

Researchers came to the conclusion after seeing similar mechanisms at work on Earth.

"The experience we gained from our research in desert hydrology was the cornerstone in reaching this conclusion. We have seen the same mechanisms in the North African Sahara and in the Arabian Peninsula, and it helped us explore the same mechanism on Mars," said Abotalib Z. Abotalib, the paper's first author.

Some of Mars craters have fractures in, and the scientists say those allow water springs to rise up to its surface, pushed up by the pressure deep below. Those springs then leak out onto the surface, which leads to the clear features that can be seen in images of the walls of those creators.

That would explain why the water features seem to fluctuate according to Mars' seasons, the researchers say as part of the new study published in Nature Geosciences.

Scientists should consider those exposed parts where the water springs out as primary candidates when looking to explore Mars and understand how habitable it could be, the researchers say. Water of this kind is

likely to key to the question of whether Mars could support life – either future human exploration, or basic life that could have lived there in the past or even survive now.

New probing methods would allow scientists to explore those fractures and understand any potential water system that is lurking beneath the surface, the scientists write in the study.

As well as shedding light on the possibility of living on the planet, the new findings are convincing evidence that Mars has important similarities to our own Earth.

"Groundwater is strong evidence for the past similarity between Mars and Earth – it suggests they have a similar evolution, to some extent," said Heggy.

That could help shed light on our own planet and its evolution, as much as the red planet itself.

"Understanding how groundwater has formed on Mars, where it is today and how it is moving helps us constrain ambiguities on the evolution of climatic conditions on Mars for the last three billion years and how these conditions formed this groundwater system," said Heggy in a statement.

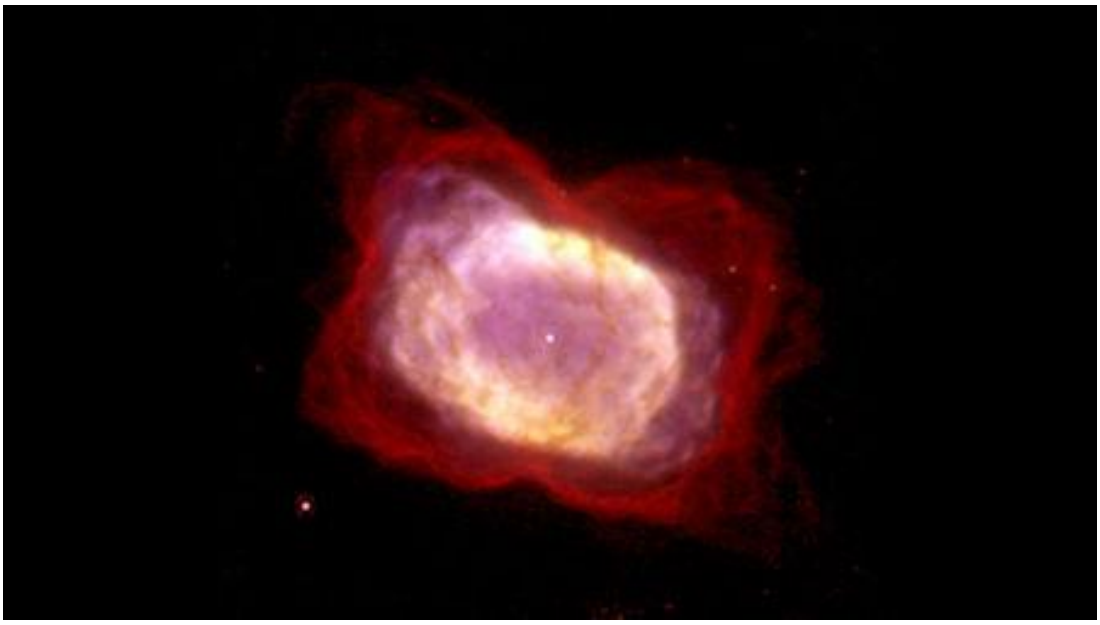
"It helps us to understand the similarities to our own planet and if we are going through the same climate evolution and the same path that Mars is going. Understanding Mars' evolution is crucial for understanding our own Earth's long-term evolution and groundwater is a key element in this process."

This story originally appeared on: https://www.independent.co.uk/life-style/gadgets-and-tech/news/mars-water-life-alien-proof-flowing-system-active-latest-research-a8844111.html?fbclid=IwAR2amlSw7KKz5x92MJWCkDLdlqcNHnzy8ySXZy0p6bdNTeAMboKkuKFIZs0

News: About Space/Astronomy

Astronomers have spotted the universe's first molecule

Daniel Clery; In science, doi:10.1126/science.aax7353



The universe's very first molecule, thought to be created after the big bang, has been detected in space for the first time. Helium hydride (HeH), a combination of helium and hydrogen, was spotted some 3000 light-years from Earth by an instrument aboard the airborne Stratospheric Observatory for Infrared Astronomy (SOFIA), a telescope built into a converted 747 jet that flies above the opaque parts of Earth's atmosphere.

HeH has long been thought to mark the "dawn of chemistry," as the remnants of the big bang cooled to about 4000 K and ions began to team up with electrons to form neutral atoms. Researchers believe that in that primordial gas, neutral helium reacted with hydrogen ions to form the first chemical bond joining the very first molecule.

In 1925, chemists synthesized HeH in the lab. In the 1970s, theorists predicted that the molecule may exist

today, most likely formed anew in planetary nebulae, clouds of gas ejected by dying sunlike stars. But decades of observations failed to find any, casting doubts on the theory.

To find the elusive molecule, astrochemists search for characteristic frequencies of light it emits, particularly a spectral line in the far infrared typically blocked by Earth's atmosphere. But a far-infrared spectrometer aboard SOFIA allowed them to find that signature for the first time, in a planetary nebula called NGC 7027 (pictured above), the researchers report today in Nature. The result shows this unlikely molecule—involving typically unreactive helium—can be created in space. With this cornerstone confirmed, it appears that the evolution of the following 13 billion years of chemistry stands on firmer ground.

This story originally appeared on: doi:10.1126/science.aax7353

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Volume 153,
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Volume 153,
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Imene Dridi, Moncef Gueddari,
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Hemayat Jamali, Forough Sadat Zohouri, Seyed Mohsen Tabatabaei Manesh,
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Pages 120-135,
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Volume 154,
Pages 49-58,
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Christopher Fuanya, Anthony Temidayo Bolarinwa, Boniface Kankeu, Rose Fouateu Yongue, Ralain Bryan Ngatcha, Tangko Emmanuel Tangko,
Morphological and chemical assessment of alluvial gold grains from Ako'ozam and Njabilobe, southwestern Cameroon,
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Pages 111-119,
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Sylvin S.T. Tedonkenfack, Jules Tamen, David G. Nkouathio, Asobo N.E. Asaah, Merlin Gountié-Dedzoedzo, Festus T. Aka,
Petrography and geochemistry of mantle xenoliths from Ibal-Oku region (North-West region, Cameroon): Preliminary evidence of mantle heterogeneities,
Volume 154,
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Earth-Science Reviews

Droughts in East Africa: Causes, impacts and resilience
Earth-Science Reviews, Volume 193, June 2019, Pages 146-161
Gebremedhin Gebremeskel Haile, Qiuhong Tang, Siao Sun, Zhongwei Huang, Xingcai Liu

A geodynamic model for the Paleoproterozoic (ca. 2.27–1.96 Ga) Birimian Orogen of the southern West African Craton – Insights into an evolving accretionary-collisional orogenic system
Earth-Science Reviews, Volume 192, May 2019, Pages 138-193
Mikael Grenholm, Mark Jessell, Nicolas Thébaud

The global tectonic context of the ca. 2.27-1.96 Ga Birimian Orogen – Insights from comparative studies, with implications for supercontinent cycles
Earth-Science Reviews, Volume 193, June 2019, Pages 260-298
Mikael Grenholm

Evolution of an Archaean intracratonic basin: A review of the Transvaal Supergroup lithostratigraphy in Botswana
Earth-Science Reviews, Volume 191, April 2019, Pages 273-290
Fulvio Franchi, Read Brown Mthanganyika Mapeo

From a bipartite Gondwanan shelf to an arcuate Variscan belt: The early Paleozoic evolution of northern Peri-Gondwana
Earth-Science Reviews, Volume 192, May 2019, Pages 491-512
Tobias Stephan, Uwe Kroner, Rolf L. Romer, Delia Rösel

Detrital zircon provenance of Permo-Carboniferous glacial diamictites across Gondwana
Earth-Science Reviews, Volume 192, May 2019, Pages 285-316
John P. Craddock, Richard W. Ojakangas, David H. Malone, Alexandros Konstantinou, George Gehrels

Sediment-hosted geothermal systems: Review and first global mapping
Earth-Science Reviews, Volume 192, May 2019, Pages 529-544
M. Procesi, G. Ciotoli, A. Mazzini, G. Etiope

Environmental impact of mineralised black shales
Earth-Science Reviews, Volume 192, May 2019, Pages 65-90
Annika Parviainen, Kirsti Loukola-Ruskeeniemi

New starting point for the Indian Ocean: Second phase of breakup for Gondwana
Earth-Science Reviews, Volume 191, April 2019, Pages 26-56
J. O. Thompson, M. Moulin, D. Aslanian, P. de Clarens, F. Guillocheau

Holocene climate, dynamic landscapes and environmentally driven changes in human living conditions in Beijing
Earth-Science Reviews, Volume 191, April 2019, Pages 57-65
Gan Xie, Yi-Feng Yao, Jin-Feng Li, Jian Yang, Yu-Fei Wang

Mantle and sub-lithosphere mantle gravity maps from the LITHO1.0 global lithospheric model
Earth-Science Reviews, Volume 194, July 2019, Pages 38-56
Robert Tenzer, Wenjin Chen

Triassic to Middle Jurassic geodynamic evolution of southwestern Gondwana: From a large flat-slab to mantle plume suction in a rollback subduction setting
Earth-Science Reviews, Volume 194, July 2019, Pages 125-159
C. Navarrete, G. Gianni, A. Encinas, M. Márquez, A. Folguera

An evaluation of Australia as a major source of dust
Earth-Science Reviews, Volume 194, July 2019, Pages 536-567
Patrick De Deckker

The end-Ordovician mass extinction: A single-pulse event?
Earth-Science Reviews, Volume 192, May 2019, Pages 15-33
Guangxu Wang, Renbin Zhan, Ian G. Percival

Petrographic classification of sand and sandstone
Earth-Science Reviews, Volume 192, May 2019, Pages 545-563
Eduardo Garzanti

Formation and evolution of Gobi Desert in central and eastern Asia
Earth-Science Reviews, Volume 194, July 2019, Pages 251-263
Huayu Lu, Xianyan Wang, Xiaoyong Wang, Xi Chang, Zhiyong Han

Multi-decadal variations in delta shorelines and their relationship to river sediment supply: An assessment and review
Earth-Science Reviews, Volume 193, June 2019, Pages 199-219
Manon Besset, Edward J. Anthony, Frédéric Bouchette

Phytoliths as proxies of the past
Earth-Science Reviews, Volume 194, July 2019, Pages 234-250
Irfan Rashid, Showkat H. Mir, Débora Zurro, Reyaz A. Dar, Zafar A. Reshi

Sedimentary basin analysis of the Neo-Tethys and its hydrocarbon systems in the Southern Zagros fold-thrust belt and foreland basin
Earth-Science Reviews, Volume 191, April 2019, Pages 1-11
Masoumeh Kordi

Intraplate magmatism at a convergent plate boundary: The case of the Cenozoic northern Adria magmatism
Earth-Science Reviews, Volume 192, May 2019, Pages 355-378
Valentina Brombin, Costanza Bonadiman, Fred Jourdan, Guido Roghi, Andrea Marzoli

Graphitic material in fault zones: Implications for fault strength and carbon cycle
Earth-Science Reviews, Volume 194, July 2019, Pages 109-124
Shuyun Cao, Franz Neubauer

A new approach to understanding diamond surface features based on a review of experimental and natural diamond studies
Earth-Science Reviews, Volume 193, June 2019, Pages 45-65
Yana Fedortchouk

Nitrous oxide from streams and rivers: A review of primary biogeochemical pathways and environmental variables
Earth-Science Reviews, Volume 191, April 2019, Pages 224-262
Annika M. Quick, W. Jeffery Reeder, Tiffany B. Farrell, Daniele Tonina, Shawn G. Benner

Facilitating sustainable geo-resources exploitation: A review of environmental and geological risks of fluid injection into hydrocarbon reservoirs
Earth-Science Reviews, Volume 194, July 2019, Pages 455-471
Mariska Schimmel, Wen Liu, Ernst Worrell

Palaeogeographical evolution of the Egadi Islands (western Sicily, Italy). Implications for late Pleistocene and early Holocene sea crossings by humans and other mammals in the western Mediterranean
Earth-Science Reviews, Volume 194, July 2019, Pages 160-181
V. Lo Presti, F. Antonioli, M. R. Palombo, V. Agnesi, S. Tusa

Late Quaternary glacial phases in the Iberian Peninsula
Earth-Science Reviews, Volume 192, May 2019, Pages 564-600
M. Oliva, D. Palacios, J. M. Fernández-Fernández, L. Rodríguez-Rodríguez, P. D. Hughes

Empirical constraints on magnitude-distance relationships for seismically-induced submarine tsunamigenic landslides
Earth-Science Reviews, Volume 191, April 2019, Pages 66-92
Amos Salamon, Pio Di Manna

Predation in the marine fossil record: Studies, data, recognition, environmental factors, and behavior
Earth-Science Reviews, Volume 194, July 2019, Pages 472-520
Adiël A. Klompmaker, Patricia H. Kelley, Devapriya Chattopadhyay, Jeff C. Clements, Michal Kowalewski

Establishing tephrostratigraphic frameworks to aid the study of abrupt climatic and glacial transitions: a case study of the Last Glacial-Interglacial Transition in the British Isles (c. 16-8 ka BP)
Earth-Science Reviews, Volume 192, May 2019, Pages 34-64
Rhys G. O. Timms, Ian P. Matthews, J. John. Lowe, Adrian P. Palmer, Simon P. E. Blockley

Deep learning and its application in geochemical mapping
Earth-Science Reviews, Volume 192, May 2019, Pages 1-14
Renguang Zuo, Yihui Xiong, Jian Wang, Emmanuel John M. Carranza

Precambrian Research

Episodic collisional orogenesis and lower crust exhumation during the Palaeoproterozoic Eburnean Orogeny: Evidence from the Sefwi Greenstone Belt, West African Craton
Precambrian Research, Volume 325, June 2019, Pages 88-110
H. B. McFarlane, L. Ailleres, P. Betts, J. Ganne, S. Block

Geochemistry and petrogenesis of Archean mafic rocks from the Amsaga area, West African craton, Mauritania
Precambrian Research, Volume 324, May 2019, Pages 208-219
Ashlea N. Wainwright, Fatima El Atrassi, Vinciane Debaille, Nadine Mattielli

Provenance and tectonic implications of the 3.28–3.23 Ga Fig Tree Group, central Barberton greenstone belt, South Africa
Precambrian Research, Volume 325, June 2019, Pages 1-19
Nadja Drabon, Aleksandra Galić, Paul R. D. Mason, Donald R. Lowe

Contrasting isotopic sources (Sm-Nd) of Late Ediacaran series in the Iberian Massif: Implications for the Central Iberian-Ossa Morena boundary
Precambrian Research, Volume 324, May 2019, Pages 194-207
Esther Rojo-Pérez, Ricardo Arenas, José M. Fuenlabrada, Sonia Sánchez Martínez, Rubén Díez Fernández

Poly-phase metamorphism of garnet-bearing mafic granulite from the Larsemann Hills, East Antarctica: P-T path, U-Pb ages and tectonic implications
Precambrian Research, Volume 326, 15 June 2019, Pages 385-398
Laixi Tong, Zhao Liu, Zheng-Xiang Li, Xiaohan Liu, Xin Zhou

Revisiting the Precambrian evolution of the Southwestern Tarim terrane: Implications for its role in Precambrian supercontinents
Precambrian Research, Volume 324, May 2019, Pages 18-31
Chuan-Lin Zhang, Xian-Tao Ye, R. E. Ernst, Yan Zhong, Xiao-Ping Long

The Neoproterozoic Upper Ruvubu alkaline plutonic complex (Burundi) revisited: Large-scale syntectonic emplacement, magmatic differentiation and late-stage circulations of fluids
Precambrian Research, Volume 325, June 2019, Pages 150-171
Sophie Decrée, Daniel Demaiffe, Luc Tack, Gérard Nimpagaritse, Vinciane Debaille

Detrital zircon U–Pb–Hf systematics of Ediacaran metasediments from the French Massif Central: Consequences for the crustal evolution of the north Gondwana margin
Precambrian Research, Volume 324, May 2019, Pages 269-284
Simon Couzinié, Oscar Laurent, Cyril Chelle-Michou, Pierre Bouilhol, Jean-François Moyen

Geochemistry of banded iron formations and their host rocks from the Central Eastern Desert of Egypt: A working genetic model and tectonic implications
Precambrian Research, Volume 325, June 2019, Pages 192-216
A. K. El-Shazly, K. I. Khalil, H. A. Helba

Norite from the Mahalapye granitoid complex, northern edge of Kaapvaal Craton: Implications for the extent of the Paleoproterozoic Bushveld LIP
Precambrian Research, Volume 324, May 2019, Pages 146-154
H. M. Rajesh

The 3.5 Ga São Tomé layered mafic-ultramafic intrusion, NE Brazil: Insights into a Paleoarchean Fe-Ti-V oxide mineralization and its reworking during West Gondwana assembly
Precambrian Research, Volume 326, 15 June 2019, Pages 462-478
Felipe Velásquez Ruiz, Maria Emilia Schutesky Della Giustina, Claudinei Gouveia de Oliveira, Elton Luiz Dantas, Maria Helena Bezerra Hollanda

Early Paleoproterozoic magmatism in the Yangtze Block: Evidence from zircon U-Pb ages, Sr-Nd-Hf isotopes and geochemistry of ca. 2.3 Ga and 2.1 Ga granitic rocks in the Phan Si Pan Complex, north Vietnam
Precambrian Research, Volume 324, May 2019, Pages 253-268
Tianyu Zhao, Peter A. Cawood, Jian-Wei Zi, Kai Wang, Dung My Tran

Neoarchean A-type granitoids from Carajás province (Brazil): New insights from geochemistry, geochronology and microstructural analysis
Precambrian Research, Volume 324, May 2019, Pages 86-108
Bhrenno Marangoanha, Davis Carvalho de Oliveira, Vinícius Eduardo Silva de Oliveira, Marco Antonio Galarza, Cláudio Nery Lamarão

Rifting events in the southern sector of the Paramirim Aulacogen, NE Brazil: New geochronological data and correlations for the São Francisco – Congo paleocontinent
Precambrian Research, Volume 326, 15 June 2019, Pages 417-446
Caroline Novais Bitencourt, Simone Cerqueira Pereira Cruz, Vanderlucia dos Anjos Cruz, Antônio Carlos Pedrosa-Soares, Johildo Salomão Figueiredo Barbosa

Emplacement origins of coarsely-crystalline mafic rocks hosted in greenstone belts: Examples from the 2.7 Ga Yilgarn Craton, Western Australia
Precambrian Research, Volume 324, May 2019, Pages 236-252
Patrick C. Hayman, Ray A. F. Cas, Richard J. Squire, Ian A. Campbell, David Doutch

Kinematics, strain pattern and geochronology of the Salem-Attur shear zone: Tectonic implications for the multiple sheared Salem-Namakkal blocks of the Southern Granulite terrane, India
Precambrian Research, Volume 324, May 2019, Pages 32-61
B. M. Behera, B. D. Waele, V. Thirukumaran, K. Sundaralingam, T. K. Biswal

Preface to the special issue of Precambrian geological events and metallogeny, in honour of Academician Mingguo Zhai
Precambrian Research, Volume 326, 15 June 2019, Pages 1-5
Yusheng Wan, Chunjing Wei, Changqing Yin

U-Pb geochronology and coupled Hf-Nd-Sr isotopic-chemical constraints of the Cassiterita Orthogneiss (2.47–2.41-Ga) in the Mineiro belt, São Francisco craton: Geodynamic fingerprints beyond the Archean-Paleoproterozoic Transition
Precambrian Research, Volume 326, 15 June 2019, Pages 399-416
N. Barbosa, W. Teixeira, C. A. Ávila, P. M. Montecinos, F. F. Vasconcelos

Mesoproterozoic rift setting of SW Hainan: Evidence from the gneissic granites and metasedimentary rocks
Precambrian Research, Volume 325, June 2019, Pages 69-87

Limin Zhang, Yuzhi Zhang, Xiang Cui, Peter A Cawood, Aimei Zhang

The Lomagundi-Jatuli carbon isotopic event recorded in the marble of the Tandilia System basement, Río de la Plata Craton, Argentina
Precambrian Research, Volume 326, 15 June 2019, Pages 447-461
M. F. Lajoinie, M. E. Lanfranchini, C. Recio, A. N. Sial, R. O. Etcheverry

Evolution of the North West Arm and the Central Sector of Mashava Igneous Complex in south central Zimbabwe from an investigation of its silicate minerals compositions
Precambrian Research, Volume 324, May 2019, Pages 109-125
Jeff B. Chaumba

Neoarchean granitoid gneisses in Eastern Hebei, North China Craton: Revisited
Precambrian Research, Volume 324, May 2019, Pages 62-85
Zhuang Li, Chunjing Wei, Shiwei Zhang, Chuan Yang, Zhanzhan Duan

Magmatic record of Neoarchean arc-polarity reversal from the Dengfeng segment of the Central Orogenic Belt, North China Craton
Precambrian Research, Volume 326, 15 June 2019, Pages 105-123
Hao Deng, Timothy Kusky, Ali Polat, Bingyuan Lan, Songjie Wang

Continental outbuilding along the margin of an Archean cratonic nucleus in the North China Craton
Precambrian Research, Volume 326, 15 June 2019, Pages 35-57
Qiong-Yan Yang, M. Santosh, S. W. Kim

Revisiting the Lushan-Taihua Complex: New perspectives on the Late Mesoarchean-Early Neoarchean crustal evolution of the southern North China Craton
Precambrian Research, Volume 325, June 2019, Pages 132-149
Xue Wang, Xiao-Long Huang, Fan Yang

2. 45 Ga break-up of the Archaean continent in Northern Fennoscandia: Rifting dynamics and the role of inherited structures within the Archaean basement
Precambrian Research, Volume 324, May 2019, Pages 303-323
Pietari Skyttä, Simo Piippo, Armelle Kloppenburg, Giacomo Corti

The metamorphic evolution of Salma-type eclogite in Russia: Constraints from zircon/titanite dating and phase equilibria modeling
Precambrian Research, Volume 326, 15 June 2019, Pages 363-384
Huanglu Yu, Lifei Zhang, Lijuan Zhang, Chunjing Wei, Yunfei Qi

Petrogenesis of the Neoarchean diorite-granite association in the Wangwushan area, southern North China Craton: Implications for continental crust evolution
Precambrian Research, Volume 326, 15 June 2019, Pages 84-104
Yanyan Zhou, Taiping Zhao, Qianying Sun, Mingguo Zhai, Axel Hofmann

Very distant Sudbury impact dykes revealed by drilling the Temagami geophysical anomaly
Precambrian Research, Volume 324, May 2019, Pages 220-235
Alexander Kawohl, Hartwig E. Frimmel, Andrejs Bite, Wesley Whymark, Vinciane Debaille

Ore Geology Reviews

Fluid inclusion and stable isotope (O, H, C) constraints on the genesis of the Pedra Branca gold deposit, Troia Massif, Borborema Province, NE Brazil: An example of hypozonal orogenic gold mineralization
Ore Geology Reviews, Volume 107, April 2019, Pages 476-500
Felipe Grandjean da Costa, Evandro Luiz Klein, Chris Harris, Sherissa Roopnarain

Mineralizing fluids of the supergene-enriched Mashitu South Cu-Co deposit, Katanga Copperbelt, DRC
Ore Geology Reviews, Volume 109, June 2019, Pages 201-228
Marta Sośnicka, Gruffudd M. Gigler, Judith A. Kinnaird, Wojciech J. Przybyłowicz, Birgit Plessen

Titanium, zirconium resources and production: A state of the art literature review
Ore Geology Reviews, Volume 107, April 2019, Pages 629-646
Cameron Perks, Gavin Mudd

Beaches and bedrock: How geological framework controls coastal morphology and the relative grade of a Southern Namibian diamond placer deposit
Ore Geology Reviews, Volume 107, April 2019, Pages 853-862
L. H. Kirkpatrick, J. Jacob, A. N. Green

Secondary gold mineralization in the Amani Placer Gold Deposit, Tanzania
Ore Geology Reviews, Volume 107, April 2019, Pages 87-107
Stephan C. Dunn, Bjorn P. von der Heyden, Abraham Rozendaal, Rikard Taljaard

Geology of the Gouap iron deposit, Congo craton, southern Cameroon: Implications for iron ore exploration
Ore Geology Reviews, Volume 107, April 2019, Pages 1097-1128
Landry Soh Tamehe, Wei Chongtao, Sylvestre Ganno, Shaamu Jeremia Simon, Naing Htun Lin

Fluid inclusions, S isotopes, and Pb isotopes characteristics of the Kuh-e-Surmeh carbonate-hosted Zn–Pb deposit in the Zagros Fold Belt, southwest Iran: Implications for the source of metals and sulfur and MVT genetic model
Ore Geology Reviews, Volume 109, June 2019, Pages 615-629
Samaneh Fazli, Batoul Taghipour, Farid Moore, David R. Lentz

From Mantle to Motzfeldt: A genetic model for syenite-hosted Ta,Nb-mineralisation
Ore Geology Reviews, Volume 107, April 2019, Pages 402-416
Adrian A. Finch, Jamie A McCreath, Callum D. J. Reekie, William Hutchison, Siri L. Simonsen

Episodic porphyry Cu (-Mo-Au) formation and associated magmatic evolution in Turkish Tethyan collage
Ore Geology Reviews, Volume 107, April 2019, Pages 119-154
İlkay Kuşcu, Richard M. Tosdal, Gonca Gençalioğlu-Kuşcu

Epithermal systems of the Torud–Chah Shirin district, northern Iran: Ore-fluid evolution and geodynamic setting
Ore Geology Reviews, Volume 109, June 2019, Pages 253-275
Ebrahim TaleFazel, Behzad Mehrabi, Majid GhasemiSiani

In-situ analyses of organic matter maturation heterogeneity of uranium-bearing carbonaceous debris within sandstones: A case study from the Ordos Basin in China
Ore Geology Reviews, Volume 109, June 2019, Pages 117-129
Fan Zhang, Yangquan Jiao, Liqun Wu, Hui Rong, Zhicheng Zhang

Porphyry and epithermal deposits in Greece: An overview, new discoveries, and mineralogical constraints on their genesis
Ore Geology Reviews, Volume 107, April 2019, Pages 654-691
P. Voudouris, C. Mavrogonatos, P. G. Spry, T. Baker, M. Melfou

Sulfide melt inclusions associated with magmatic Ni-Cu-platinum-group element (PGE) mineralization in the Caribou Lake Gabbro, Blatchford Lake intrusive suite, Northwest Territories, Canada
Ore Geology Reviews, Volume 107, April 2019, Pages 513-531
Kevin Neyedley, Jacob J. Hanley, Hendrik Falck, Robert J. Bodnar, Ryan Sharpe

Major and trace elements and sulfur isotopes in two stages of sphalerite from the world-class Angouran Zn–Pb deposit, Iran: Implications for mineralization conditions and type
Ore Geology Reviews, Volume 109, June 2019, Pages 184-200
Liangliang Zhuang, Yucai Song, Yingchao Liu, Mahmoud Fard, Zengqian Hou

Discrete mineralization events at the Hongtuling Au-(Mo) vein deposit in the Xiaoqinling district, southern North China Craton: Evidence from monazite U-Pb and molybdenite Re-Os dating
Ore Geology Reviews, Volume 109, June 2019, Pages 413-425
Shao-Rui Zhao, Jian-Wei Li, David Lentz, Shi-Jian Bi, Ke-Fei Tang

Re-assessing the European lithium resource potential – A review of hard-rock resources and metallogeny

Ore Geology Reviews, Volume 109, June 2019, Pages 494-519
B. Gourcerol, E. Gloaguen, J. Melleton, J. Tuduri, Xavier Galiegue

Occurrence and geochemistry of bastnäsite in carbonatite-related REE deposits, Mianning–Dechang REE belt, Sichuan Province, SW China
Ore Geology Reviews, Volume 107, April 2019, Pages 266-282
Dongxu Guo, Yan Liu

Regional variations in fluid formation and metal sources in MVT mineralization in the Pennine Orefield, UK: Implications from rare earth element and yttrium distribution, Sr-Nd isotopes and fluid inclusion compositions of hydrothermal vein fluorites
Ore Geology Reviews, Volume 107, April 2019, Pages 960-972
Dennis Kraemer, Sebastian Viehmann, David Banks, Anjani D. Sumoondur, Michael Bau

The Fazenda Nova gold deposit, Goiás Magmatic Arc: Late neoproterozoic intrusion-related auriferous mineralization controlled by intracontinental strike-slip faulting
Ore Geology Reviews, Volume 107, April 2019, Pages 546-572
Gustavo Campos Marques, Claudinei Gouveia de Oliveira, Eugênio Espada, Elton Luis Dantas

Calcrete uranium deposits in the Southern High Plains, USA
Ore Geology Reviews, Volume 109, June 2019, Pages 50-78
S. M. Hall, B. S. Van Gosen, J. B. Paces, R. A. Zielinski, G. N. Breit

Geochemistry and genesis of magmatic Ni-Cu-(PGE) and PGE-(Cu)-(Ni) deposits in China
Ore Geology Reviews, Volume 107, April 2019, Pages 863-887
Yiguan Lu, C. Michael Lesher, Jun Deng

Point and imaging spectroscopy investigations on the Pedra Branca orogenic gold deposit, Troia Massif, Northeast Brazil: Implications for mineral exploration in amphibolite metamorphic-grade terrains
Ore Geology Reviews, Volume 107, April 2019, Pages 283-309
João Luís Carneiro Naleto, Mônica Mazzini Perrotta, Felipe Grandjean da Costa, Carlos Roberto de Souza Filho

Mechanisms of element precipitation in carbonatite-related rare-earth element deposits: Evidence from fluid inclusions in the Maoniuping deposit, Sichuan Province, southwestern China
Ore Geology Reviews, Volume 107, April 2019, Pages 218-238
Xu Zheng, Yan Liu

Origin of a Miocene alkaline–carbonatite complex in the Dunkeldik area of Pamir, Tajikistan: Petrology, geochemistry, LA–ICP–MS zircon U–Pb dating, and Hf isotope analysis
Ore Geology Reviews, Volume 107, April 2019, Pages 820-836
Jun Hong, Wenhua Ji, Xiaoyong Yang, Tahseenullah Khan, Huishan Zhang

A review of intermediate sulfidation epithermal deposits and subclassification
Ore Geology Reviews, Volume 107, April 2019, Pages 434-456
Le Wang, Ke-Zhang Qin, Guo-Xue Song, Guang-Ming Li

Origin of granodiorite hosted Neoarchaean orogenic gold ore deposits: Stable isotopic and geochemical constraints with example from the Dharwar craton, southern India
Ore Geology Reviews, Volume 107, April 2019, Pages 754-779
M. Kesarwani, S. Sarangi, R. Srinivasan, B. G. George, V. N. Vasudev

Deposit geology, geochronology and geochemistry of the Gongpengzi skarn Cu-Zn-W polymetallic deposit, NE China
Ore Geology Reviews, Volume 109, June 2019, Pages 465-481
Yongsheng Li, Xiaofei Yu, Kuifeng Mi, Emmanuel John M. Carranza, Sheng He

Fractal modeling and fry analysis of the relationship between structures and Cu mineralization in Saveh region, Central Iran
Ore Geology Reviews, Volume 107, April 2019, Pages 172-185
Mirko Ahmadfaraj, Mirsaleh Mirmohammadi, Peyman Afzal, Amir Bijan Yasrebi, Emanuel John Carranza

Earth and Planetary Science Letters

Emergence and evolution of the South Atlantic Anomaly revealed by the new paleomagnetic reconstruction SHAWQ2k

Earth and Planetary Science Letters, Volume 512, 15 April 2019, Pages 17-26
S. A. Campuzano, M. Gómez-Paccard, F. J. Pavón-Carrasco, M. L. Osete

Biomarkers reveal abrupt switches in hydroclimate during the last glacial in southern California
Earth and Planetary Science Letters, Volume 515, 1 June 2019, Pages 164-172
Sarah J. Feakins, Mong Sin Wu, Camilo Ponton, Jessica E. Tierney

Dominant influence of the humidity in the moisture source region on the 17O-excess in precipitation on a subtropical island
Earth and Planetary Science Letters, Volume 513, 1 May 2019, Pages 20-28
Yuina Uechi, Ryu Uemura

(In)coherent multiproxy signals in marine sediments: Implications for high-resolution paleoclimate reconstruction
Earth and Planetary Science Letters, Volume 515, 1 June 2019, Pages 38-46
Blanca Ausín, Clayton Magill, Negar Haghipour, Álvaro Fernández, Timothy I. Eglinton

Shelf exposure influence on Indo-Pacific Warm Pool climate for the last 450,000 years
Earth and Planetary Science Letters, Volume 516, 15 June 2019, Pages 66-76
Grace Windler, Jessica E. Tierney, Pedro N. DiNezio, Kelly Gibson, Robert Thunell

Early flank uplift along the Suez Rift: Implications for the role of mantle plumes and the onset of the Dead Sea Transform
Earth and Planetary Science Letters, Volume 516, 15 June 2019, Pages 56-65
Navot Morag, Itai Haviv, Moshe Eyal, Barry P. Kohn, Shimon Feinstein

Divergent Mediterranean seawater circulation during Holocene sapropel formation – Reconstructed using Nd isotopes in fish debris and foraminifera
Earth and Planetary Science Letters, Volume 511, 1 April 2019, Pages 141-153
Jiawang Wu, Katharina Pahnke, Philipp Böning, Li Wu, Gert J. de Lange

Grain-size-dependent remanence anisotropy and its implications for paleodirections and paleointensities – Proposing a new approach to anisotropy corrections
Earth and Planetary Science Letters, Volume 512, 15 April 2019, Pages 111-123
Andrea R. Biedermann, Dario Bilardello, Mike Jackson, Lisa Tauxe, Joshua M. Feinberg

A shorter Archean day-length biases interpretations of the early Earth's climate
Earth and Planetary Science Letters, Volume 514, 15 May 2019, Pages 28-36
Christopher Spalding, Woodward W. Fischer

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Earth and Planetary Science Letters, Volume 512, 15 April 2019, Pages 124-133
Gelvam A. Hartmann, Wilbor Poletti, Ricardo I. F. Trindade, Lucio M. Ferreira, Pedro L. M. Sanches

Topographic evolution of the western United States since the early Miocene
Earth and Planetary Science Letters, Volume 514, 15 May 2019, Pages 1-12
Quan Zhou, Lijun Liu

Paired organic matter and pyrite δ34S records reveal mechanisms of carbon, sulfur, and iron cycle disruption during Ocean Anoxic Event 2
Earth and Planetary Science Letters, Volume 512, 15 April 2019, Pages 27-38
Morgan Reed Raven, David A. Fike, Alexander S. Bradley, Maya L. Gomes, Samuel A. Webb

The frequency-size scaling of non-volcanic tremors beneath the San Andreas Fault at Parkfield: Possible implications for seismic energy release
Earth and Planetary Science Letters, Volume 516, 15 June 2019, Pages 77-107
Nadine Staudenmaier, Thessa Tormann, Benjamin Edwards, Arnaud Mignan, Stefan Wiemer

EVENTS

2019 Annual National Conference of the Ghana Institution of Geoscientists

"*Geoscience, Environmental Stewardship and Society*"

(GHIGCON–2019)

University of Mines and Technology (UMaT), Tarkwa, Ghana

13–16 August 2019

Announcement and Second Call for Papers

We are pleased to announce that the Ghana Institution of Geoscientists (GhIG), in collaboration with the University of Mines and Technology (UMaT) and other stakeholders, is organising its 2019 Annual Natural Conference (GHIGCON-2019) at the UMaT from 13 to 16 August 2019 under the theme **"Geoscience, Environmental Stewardship and Society."** The Conference programme will consist of a plenary session, scientific/technical sessions and General Meeting of the Ghana Institution of Geoscientists. It will be preceded by fieldwork.

We, therefore, extend an invitation to you to participate in the GHIGCON-2019 and submit abstracts for the scientific/technical sessions.

IMPORTANT INFORMATION

First Call for Abstracts/Contributions	31 March 2019
Second Call for Abstracts/Contributions	10 May 2019
Abstract Submission Deadline	30 June 2019
Notification of Acceptance/Rejection of Abstract	15 July 2019
Early Bird Registration Deadline	20 July 2019
Submission of Abstracts should be done via	ghigcon@gmail.com
Presenters have the opportunity to publish their contributions in a selected journal (*optional*)	
Students attendees will have the opportunity to contest for the Best Student Oral Presentation and Best Student Poster Presentation	

Background

The Annual National Conference of the Ghana Institution of Geoscientists (GhIG) has been institutionalized to bring together members of the geoscience fraternity of Ghana every year to exchange and share their experiences and research results on various aspects of Geoscience with emphasis on Ghana. The GhIG Annual National Conference (GHIGCON) provides an excellent platform for experts, professionals, academicians, researchers and students to share knowledge,

explore innovative ideas, update their ideas/concepts and improve on their professional skills in the field of geoscience. Additionally, GHIGCON provides networking opportunities, including joint research activities and collaborations between industry and academia.

Conference Objectives and General Description

The theme of the GHIGCON-2019 is **"Geoscience, Environmental Stewardship and Society,"** which extensively covers all aspects on scientific and technical advances in the field of geosciences.

Geoscience has developed into a practical and important science at the interface between nature and society. It plays a key role in national and global sustainable development agenda as it provides the requisite knowledge, experience and ingenuity to meet society's demands for natural resources, environmental quality and resilience to geohazards.

Human beings have a greater responsibility, as stewards of our surroundings, to ensure that our activities do not harm the environmental and impact negatively on society, but are done in the context of sustainability. We are expected to use nature wisely to deliver quality life to mankind but not to abuse it to the detriment of posterity. Our interaction with the environment, trying to meet the needs of today's population should be done in a more responsible manner so as not to rob future generations of their abilities to meet their own needs. Therefore, in our quest to tap natural resources for the prosperity and sustainable development of our nations and the world at large, the activities must be done in the true sense of stewardship.

The Conference aims at creating a highly interactive scientific and technical platform for effective sharing of research experiences and other works among industry players, researchers/scientists and students from the academia and research institutions, workers of government agencies, policy-makers and users of scientific information. It will serve as a unique forum for experts and professionals from all parts of Ghana engaged in different fields of Geoscience to appraise the local/national societal challenges related to mining and sustainability of natural resources (including artisanal and small-scale mining), stabilizing wetlands and shielding natural areas from resources harvesting, replantation of forests, natural disasters (flooding and earth tremors/earthquakes), health and environmental stewardship, and discuss the important role of geoscience in informing solutions.

It will facilitate an intellectual discourse between the science and user community to advance the foundational capability to tackle societal challenges by leveraging geoscience. For example, how do we strike a balance between the needs of a growing commercial society and development without destroying the environment? The Conference will also explore the possibility of fostering multidisciplinary/interdisciplinary engagements and science diplomacy to solve our national problems. It is anticipated that collaborative efforts will yield positive results and advance science to the benefit of humanity.

It is expected that at the end of the Conference, geoscience students, educators, researchers and professionals as well as policymakers will have been enlighten on the various aspects of geoscience of Ghana and motivated to promote and facilitate responsible Earth stewardship for the good of the society and national and/or global development.

Sub-themes, Topics and Format

The Ghana Institution of Geoscientists invites the submission of abstracts for oral and poster presentations that address themes and topics of the forthcoming its 2019 Annual National Conference (GHIGCON–2019). Contributed papers will be accepted on the following subthemes:

1. Mining, Policy and the Environment
2. Geoheritage and Geotourism
3. Geohazards and Disaster Management
4. Geoscience Education
5. Geology of Ghana
6. Rocks and Mineral Resources
7. Hydrogeology and Hydrology
8. Environmental Geosciences
9. Medical Geology
10. Engineering Geology/Geological Engineering
11. Petroleum Geoscience
12. Other/General Contributions

Conference Fees

Category	Fees (in Ghana Cedis)
Members in good standing	200
Student Members	100
Non-Members	300

Students presenting papers may apply to the Conference Committee for sponsorship.

Contributed Papers, Participation and Registration

Authors must submit the abstracts of their contributed papers before the abstract deadline of **30 June 2019** in order for their abstracts to be considered. All abstracts are to be submitted under a technical category. There is a limit of I page including key words. The abstract should include the concise definition of the scientific topic, goals of the study, methodology, findings and discussion, implications and significance of the study. With the exception of invited papers or contributions, authors, must present original work.

No fee is required for abstract submittals. Please submit all abstracts, whether oral and/or poster electronically via email account ghigcon@gmail.com, following the instructions provided (Annexes I and II). Please indicate your presentation preference (oral or poster) at the time of submission. The decision by the Organising Committee in placing your paper in either an oral or a poster session is final. Accepted papers will be published in the Book of Abstracts. Authors will be informed about the acceptance or rejection of their abstract by **15 July 2019.**

All authors who have been listed on abstracts must consent to being named as part of the abstract at the time of submission, and share responsibility for submitted abstracts. In order to qualify to make either an oral or poster presentation, the presenter must be listed as an author of the abstract at the time of submission or publication. The Conference organisers wish to remind you that at least one author from each submission accepted for the GHIGCON-2019 technical programme is expected to

register for and attend the conference at their own expense. Please use the form provided in Annex III to register for the conference.

Working Language

The working language of the Conference will be English. All communications and contributed papers must be sent to the GhIG Conference Secretariat in English.

Exhibition

Opportunity will be given to companies/organisations/institutions to exhibit their products or showcase their activities, etc. during the Conference. To participate as an exhibitor, please contact the organisers well ahead of time for the GHIGCON–2019, since there is a limited amount of space for that purpose.

Important Deadlines

First Call for Abstracts/Contributions	-	31 March 2019
Second Call for Abstracts/Contributions	-	30 April 2019
Abstract Submission Deadline	-	30 June 2019
Notification of Acceptance/Rejection of Abstract	-	15 July 2019
Early Bird Registration Deadline	-	20 July 2019
Conference Dates	-	13 – 16 August 2019

Contacts of Conference Secretariat

Conference Organising Committee

Dr. Daniel Boamah
Email: boamahkwaku@yahoo.com;
Tel: 0244260746

Prof. Daniel Asiedu
Email: dasiedu61@gmail.com;
Tel: 0243716895

Local Organising Committee

Dr. Issaka Yakubu

Email: yissaka@umat.edu.gh

Tel.: 0242957741/0502102794

Accommodation

Information on accommodation, including a list of hotels/guesthouses, their contact details and room rates would be provided in the third announcement. Conference participants would be requested to contact the hotels/guesthouses directly for accommodation.

XIX International Multidisciplinary Scientific GeoConference SGEM 2019
28 June - 7 July, 2019

https://www.sgem.org/

50th Anniversary Conference of the Geological Society of Namibia in September 2019.
The celebratory conference will be held in Windhoek/Namibia from 01 Sept thru 04 Sept 2019, with a total of seven pre- or post-conference excursions with multi-faceted topics and destinations.
More information: geolsocnam50@gmail.com; geolsocnamibia@gmail.com

Regional Conference on Geomorphology, Athens, 19-21 September 2019.

https://rcg2019.com/

2nd Euro-Mediterranean Conference for Environmental Integration (EMCEI)
10 – 13 October 2019, Sousse, Tunisia
www.emcei.net

4th IGCP638 Conference to be held in Algiers (Algeria, Oct. 28th – Nov. 2nd, 2019):
"Paleoproterozoic Birimian Geology for Sustainable Development".
https://igcp638.univ-rennes1.fr/

2nd Springer Conference of the Arabian Journal of Geosciences
25 – 28 November 2019 in Sousse, Tunisia
www.cajg.org

Geological Society of America Annual Meeting
22 - 25 September, 2019, Phoenix, Arizona
https://community.geosociety.org/gsa2019/home

List of international conferences, symposia, congresses on Earth Sciences between 2019-2024

A contribution From Natalya Nikitina, IAGETH

2019

3 - 6 June 2019
81st EAGE Annual Conference and Exhibition
London, United Kingdom
Website: https://events.eage.org/en/2019/eage-annual-2019

4 - 7 June 2019
I Congreso Internacional de las Ciencias Exactas y Naturales
San José, Costa Rica
Website: http://www.eventos.academicos.una.ac.cr/index.php/cicen/ICICEN/

10 - 13 June 2019
7th International Conference on Debris-Flow Hazards Mitigation
Golden, Colorado, USA
Website: https://dfhm7.csmspace.com/

11 - 14 June 2019

EGC 2019 - European Geothermal Congress
The Hague, Netherlands
Website: http://europeangeothermalcongress.eu/

17 - 20 June 2019
7ICEGE - International Conference on Earthquake Geotechnical Engineering
Rome, Italy
Website: http://www.7icege.com/

18 - 19 June 2019
International Meeting on Paleoclimate: Change and Adaptation
Coimbra, Portugal
Website: https://paleoclimate2019.wixsite.com/paleoclimate2019

23 - 26 June 2019
ICONHIC 2019 - 2nd International Conference on Natural Hazards & Infrastructure
Chania, Greece
Website: https://iconhic.com/2019/

23–27 June 2019
11th North American Paleontological Convention
Riverside, USA
Website: https://napc2019.ucr.edu/

2 - 5 July 2019
STRATI 2019 - 3rd International Congress on Stratigraphy
Milano, Italy
Website: http://www.strati2019.it/

3–5 July 2019
7th International Conference on Coupled THMC Processes: GeoProc2019 - Earthquake and Faulting Mechanics
Utrecht, The Netherlands
Deadline: Abstracts 1 December 2018
Website: http://geoproc2019.sites.uu.nl/

8–11 July 2019
Space Climate 7 **Symposium**
Canton Orford, Québec, Canada
Website: http://craq-astro.ca/spaceclimate7/

21 - 27 July 2019
8th International Symposium on Gully Erosion
Townsville, Australia
Express interest https://www.research.net/r/FWCM3G2

25 - 31 July 2019
INQUA 2019
Dublin, Ireland
Website: http://www.inqua2019.org/

28 July – 2 August 2019
AOGS 16th Annual Meeting
Singapore, Singapore
Website: http://www.asiaoceania.org/aogs2019/public.asp?page=home.htm

12 - 13 August 2019
Earth & Geo Science 2019 - 2nd International Conference on Earth Science & Geo Science
"Insight into Innovations in Earth System Sciences and Climate Change Challenges"
Prague, Czech Republic
Website: https://www.scientificfederation.com/earth-science-2019/

12 – 15 August 2019
MEDGEO 2019: the 8th International Conference on Medical Geology
Guiyang, China
Website: www.medgeo2019.com

18 - 23 August 2019
Goldschmidt2019 - International Conference on Geochemistry and Related Subjects
Barcellona, Spain
Website: https://goldschmidt.info/2019/

27 - 30 August 2019
15th Biennial Meeting of the Society for Geology Applied to Mineral Deposits
Glasgow, Scotland
Website: https://www.sga2019glasgow.com/

2 - 12 September 2019
INHIGEO Annual Conference
44th Symposium of the International Commission on the History of Geological Sciences
Varese and Como, Italy
Website: https://inhigeo2019.jimdofree.com/

4–5 September 2019
ICSD 2019: 7th International Conference on Sustainable Development
Rome, Italy
Deadline: Abstracts 10 June 2019
Website: http://www.rsc.org/events/detail/33849/icsd-2019-7th-international-conference-on-sustainable-development
9 - 13 September 2019
5th International YES Congress
Berlin, Germany
Website: https://yesdeutschland.weebly.com/
https://eurogeologists.eu/call-for-sessions-for-5th-international-yes-congress/

13 - 18 September 2019
ISRM 14th - International Congress of Rock Mechanics
Iguassu Falls, Brazil
Website: http://www.isrm2019.com/

22 - 25 September 2019
Geological Society of America Annual Meeting
Phoenix, Arizona, USA
https://www.clocate.com/conference/Geological-Society-of-America-Annual-Meeting-and-Exposition-GSA-2019/74866/

24–26 September 2019
8th International Symposium on Andean Geodynamics
Quito, Ecuador
Deadline: Abstracts 1 March 2019
https://www.igepn.edu.ec/8isag

26-30 September 2019
XVII Congress of the International Society for Mine Surveying - ISMS 2019
Irkutsk National Research Technical University (INRTU), City of Irkutsk, Russia
https://ism2019.com/news/the-follow-up-meeting-about-organizing-the-congress-has-taken-place-in-irkutsk-national-research-technical-university-1/
Coordinator of the forum - Alina Kshanovskaya
Tel: +7 (964) 215-60-96
Email: president@ism-minesurveying.org
Work Email: kshanovskayaav@gmail.com

8-10 October 2018
15th Russian Mining and Exploration Forum
MINEX Russia Mining and Exploration Forum is regarded as one of the most successful business-driven mining events in Russia. The Forum is held annually and consistently attracts top executives and managers from leading Russian and international companies. The Forum addresses the ongoing developments and prospects for exploration, mining and processing of minerals and metals in Russia and across the countries of the Eurasian Economic Community. The Forum actively promotes investment and stimulates exchange of best practices and technologies in mining and mineral exploration
Moscow, Russia
https://www.showsbee.com/fairs/MINEX-Russia.html
E-mail: russia@minexforum.com

21 - 25 October 2019
International Congress: "Geoethics & Groundwater Management: Theory and Practice for a Sustainable Development"
Porto (Portugal)
Website: https://geoeth-gwm2019.wixsite.com/porto

4–8 November 2019
4th COSPAR Symposium: Small Satellites for Sustainable Science and Development
Herzliya, Israel
Deadline: Abstracts 15 April 2019
Website: http://www.cospar2019.org/

11-12 November 2019
6th International Conference on Geology, Geophysics and Environmental Science
Theme: Global View of Geological features and Environment for futuristic advancements
Helsinki, Finland
https://geology.conferenceseries.com/

14–15 November 2019
Dorothy Hill Women in Earth Sciences Symposium
Brisbane, Australia
https://sees.uq.edu.au/event/8493/dorothy-hill-women-earth-sciences-symposium

9 - 13 December 2019
AGU Fall Meeting
San Francisco, California, USA

2020

2 – 8 March 2020
36th International Geological Congress
Delhi, India
Website: http://www.36igc.org
e-mail: igc.delhi2020@nic.org

27 April - 1 May 2020
World Geothermal Congress 2020
Reykjavik, Iceland
Website: https://www.wgc2020.com/

3 - 8 May 2020
European Geosciences Union (EGU) General Assembly 2020
Vienna, Austria
Website: https://www.egu2020.eu/

12 - 24 May 2020
Geological Society of Nevada 2020 Symposium
Sparks, Nevada
Website: http://www.gsnv.org/2020-symposium/

16 - 18 June 2020
16th ICAAR - International Conference on Alkali Aggregate Reaction in Concrete
Lisbon, Portugal
Website: http://icaar2020.lnec.pt/

4–10 July 2020
ESOF: EuroScience Open Forum 2020
"Freedom for Science, Science for Freedom"
Trieste, Italy
Website: https://www.esof.eu/en/trieste-2020.html
15–23 August 2020
43rd COSPAR Scientific Assembly
Sydney, Australia
Deadline: Abstracts 15 February 2020
Website: https://www.cospar-assembly.org/

2021

25–30 April 2021
EGU General Assembly 2021
Vienna, Austria
Website: https://www.egu.eu/meetings/calendar/

2022

3–8 April 2022
EGU General Assembly 2022
Vienna, Austria
Website: https://www.egu.eu/meetings/calendar/

2023

23–28 April 2023
EGU General Assembly 2023
Vienna, Austria
Website: https://www.egu.eu/meetings/calendar/

2024

14–19 April 2024
EGU General Assembly 2024
Vienna, Austria
Website: https://www.egu.eu/meetings/calendar/

OPPORTUNITIES

The Following opportunities collected for you from several sources, so duplications of the same position may be occurred.

Bern-Fribourg Master in Earth Sciences	Bern/Fribourg, Switzerland	Apply Now
Natural Resources Management Project Manager - Africa	Munich, Germany	30/06/2019
Project Manager (m/f/d) for institutional strengthening of the Biodiversity Sector in the Association of Southeast Asian Nations (ASEAN)	Los Banos, CA, USA	10/06/2019
Ph.D. Position in Geochemistry and Hydrogeochemical modelling (F/M)	Strasbourg, France	08/07/2019
12 Early Stage Researchers (PhD student positions) within the MSCA ITN MARSoluT (Managed Aquifer Recharge Solutions Training Network) at various locations in Europe and Israel	Europe, Israel	15/06/2019
Two Postdoc or PhD positions in Biogeochemistry	Bayreuth, Germany	30/06/2019
Technical Information Manager	UK	21/06/2019
Surface/Subsurface Hydrological Modeller	Keyworth, UK	28/06/2019
Environmental Chemist	Keyworth, UK	05/07/2019
Senior Research Officer – Hydromorphology and Fisheries	Citywest, Dublin, Ireland	07/06/2019
Senior Research Officer - Quantitative Fisheries Science	Citywest, Dublin, Ireland	07/06/2019
Full Professorship in Geochemistry	Freiburg, Germany	03/07/2019

2 PhD positions at NORCE Climate in the cross-disciplinary field of molecular ecology and paleoceanography	Bergen, Norway	11/06/2019
Senior Communications Officer - Copernicus Services	Reading, UK	16/06/2019
Deputy Director of Forecasts	Reading, UK	17/06/2019
Master of Hydrogeology	Perth, WA, Australia	Apply Now
Ph.D. Position in Urban Biocides Transformation and Transfer (M/F)	Strasbourg, France	30/06/2019
Research Engineer - technical system for separation and analysis of greenhouse gases	Stockholm, Sweden	03/06/2019
Project Manager & Bid Manager EO	Leuven, Belgium	17/06/2019
Senior EIA Consultant	Manchester, UK	15/06/2019
2 PhD Positions (m/f/d) in the field of Economic Impacts of Climate Change	Potsdam, Germany	01/07/2019
PhD opportunity in Paleolimnology - Lake carbon sequestration	Thonon-les-Bains, France	02/06/2019
Postdoctoral Position - Remote Sensing of Vegetation	Toronto, ON, Canada	10/06/2019
Editor/Senior Editor (Books) Earth Sciences, Geography and Environment	Dordrecht, Netherlands	07/06/2019
Project assistant in microwave remote sensing of vegetation (m/f)	Vienna, Austria	10/06/2019

MSc Climate Change and Development MSc Sustainable Development	London, UK	Apply Now
Associate Editor (f/m/d): Earth Sciences, Geography & Environment	Heidelberg, Germany	06/06/2019
Research Scientist - Atmospheric & Emissions Chemistry	Newcastle NSW, Australia	24/06/2019
Assistant Professor or Lecturer - Geography and Environmental Studies	Regina, SK, Canada	04/06/2019
Tenure-track Professorship (W1) for Geology	Karlsruhe, Germany	19/07/2019
Professorship of Mineralogy and Petrology	Cambridge, UK	30/07/2019
Professorship of Geophysics	Cambridge, UK	30/07/2019
Assistant (Tenure-Track) or Associate (Tenured) Professor in Solid Earth Geophysics	Austin, TX, USA	30/06/2019
Instructional Faculty Position - Geology	Buffalo, NY, USA	30/06/2019
Full Professorship in Geochemistry	Freiburg, Germany	03/07/2019
Lecturer in Rock and Tunnel Engineering	Leeds, UK	09/06/2019
Lecturer - Geoenvironment and Geometallurgy	Hobart, Tasmania	30/05/2019
Lecturer in Geology	Hobart, Tasmania	06/06/2019
Assistant Professor (tenure track) in Paleoclimate Sedimentology	Lausanne, Switzerland	24/08/2019

Editor/Senior Editor (Books) Earth Sciences, Geography and Environment	Dordrecht, Netherlands	07/06/2019
Associate Editor (f/m/d): Earth Sciences, Geography & Environment	Heidelberg, Germany	06/06/2019
Assistant Professor or Lecturer - Geography and Environmental Studies	Regina, SK, Canada	04/06/2019
Senior Lecturer in Tectonic/Geodynamics - Full Time Fixed Term (2 years)	London, UK	15/06/2019
Lecturer in Earth Sciences	London, UK	15/06/2019
Lecturer - Geochemistry	Townsville, Australia	30/05/2019
Lecturer - Economic Geology	Townsville, Australia	30/05/2019
Senior Lecturer/Associate Professor/Professor in Solid-Earth Geophysics	Kigali, Rwanda	15/06/2019
University of Aberdeen BP MSc Scholarships	Aberdeen, UK	21/07/2019
Senior Hydrogeologist	Townsville, Australia	08/06/2019
PhD proposal: Development of advanced microseismic monitoring and machine learning tools for enhanced geothermal systems (EGS)	Nancy, France	30/06/2019
Geotechnical Engineer	Nancy, France	07/07/2019
Scientist of Hydrogeology or Geoscience	Hannover, Germany	27/06/2019

Two Postdoc or PhD positions in Biogeochemistry	Bayreuth, Germany	Apply Now
Postdoctoral Researcher in Aqueous Geochemistry/Hydrothermal Systems	Minneapolis, MN, USA	30/06/2019
Postdoctoral position: Coupled thermo-hydro-mechanical (THM) modeling of structurally-controlled deposits at basement - basin interface: application to unconformity-related U deposits	Vandeuvre-les-Nancy, France	01/07/2019
Ph.D. Position in Geochemistry and Hydrogeochemical modelling (F/M)	Strasbourg, France	08/07/2019
PhD Position in Geomagnetism	Potsdam, Germany	30/06/2019
Moorings Technician	Christchurch, New Zealand	23/06/2019
MSc and PGDip - Petroleum Geoscience	London, UK	Apply Now
12 Early Stage Researchers (PhD student positions) within the MSCA ITN MARSoluT (Managed Aquifer Recharge Solutions Training Network) at various locations in Europe and Israel	Europe, Israel	15/06/2019
Master of Science in Petrophysics	Kingsville, TX, USA	30/07/2019
Two Postdoc or PhD positions in Biogeochemistry	Bayreuth, Germany	30/06/2019
Post-Doctoral Researcher - Ocean Floor Modeling Framework	Bremen, Germany	16/06/2019
Post-Doctoral Researcher - Ocean Floor as RECORDER	Bremen, Germany	16/06/2019

2 PhD and 1 MSc project opportunities in Igneous Petrology and Economic Geology	Chicoutimi, Canada	15/07/2019
Senior Project Manager	Bristol, UK	29/06/2019
Education Manager (m/f/ d) EIT RawMaterials Innovation Hub North	Lulea, Sweden	28/06/2019
Senior Advisor / Expert (m/f/d) in mining and mineral processing	Berlin, Germany	12/07/2019
Surface/Subsurface Hydrological Modeller	Keyworth, UK	28/06/2019
Environmental Chemist	Keyworth, UK	05/07/2019
Support Geoscientist	London, UK	28/06/2019
Postdoctoral position in Modeling Hydrogeological Processes in Fractured Rocks	Uppsala, Sweden	05/08/2019
Research position in Applied Geophysics and Geology	Uppsala, Sweden	01/07/2019
MSc in Petroleum Geoscience	London, UK	Apply Now
Research Associate/PhD candidate (f/m/d) in Earth Sciences	Karlsruhe, Germany	23/06/2019
PhD and Postdoctoral positions in geochemistry	Reykjavik, Iceland	01/07/2019
Scientific Drilling Data Manager (m/f/x)	Potsdam, Germany	21/06/2019
MSc in Petroleum Geoscience	Adelaide, Australia	Until Filled

Master of Hydrogeology	Perth, WA, Australia	Apply Now
Research Assistant	Hannover, Germany	11/06/2019
Research Assistant - ReCharBo project	Hannover, Germany	11/06/2019
Project Manager & Bid Manager EO	Leuven, Belgium	17/06/2019
PhD-Student Position in Paleolimnology/Limnogeology	Köln, Germany	17/06/2019
Computer Vision Software Engineer	Berlin, Germany	15/06/2019
Satellite Image Quality Engineer	Berlin, Germany	15/06/2019
MSc in Applied Computational Science and Engineering	London, UK	Apply Now
PhD and Postdoctoral positions in seismology	Dublin, Ireland	Until Filled
Postdoctoral Fellow in Geochemistry and Spectral Imaging - The Red Sea and Mars	Kensington WA, Australia	19/06/2019
PhD opportunity in Paleolimnology - Lake carbon sequestration	Thonon-les-Bains, France	02/06/2019
BSc. Oil, Gas and Energy Management MSc. Oil and Gas Management MSc. Petroleum and Environmental Technology MSc. Oil and Gas Engineering	Coventry , UK	Apply Now
Research Assistant	Berlin, Germany	03/06/2019
Groundwater Modeler	Vancouver, Canada	08/06/2019

PhD. thesis: Automatic recognition of tectono-saliferous structures from geophysical imagery and geological data	Orleans, France	07/06/2019
Editor/Senior Editor (Books) Earth Sciences, Geography and Environment	Dordrecht, Netherlands	07/06/2019
Associate Editor (f/m/d): Earth Sciences, Geography & Environment	Heidelberg, Germany	06/06/2019
Researcher geochemistry	Trondheim, Norway	02/06/2019
3 Positions (2PhD + 1 Postdoc): Mathematical Potential Field Methods for Geomagnetism and Geothermal Characterization	Freiberg, Germany	06/06/2019
Petroleum Geoscience (MSc) Pollution and Environmental Control [MSc]	Manchester, UK	Apply Now
Bern-Fribourg Master in Earth Sciences	Bern/Fribourg, Switzerland	Apply Now
Leiter (m/w/d) der Komponente Kamerun im Global - vorhaben Nachhaltigkeit und Wertschöpfungs-steigerung in der Baumwoll wirtschaft	Garoua, Cameroon	07/07/2019
Natural Resources Management Project Manager - Africa	Munich, Germany	30/06/2019
Project Manager (m/f/d) for institutional strengthening of the Biodiversity Sector in the Association of Southeast Asian Nations (ASEAN)	Los Banos, CA, USA	10/06/2019

12 Early Stage Researchers (PhD student positions) within the MSCA ITN MARSoluT (Managed Aquifer Recharge Solutions Training Network) at various locations in Europe and Israel	Europe, Israel	15/06/2019
PhD with the focus on soil fertility and nutrient management in cotton and cover cropping systems	Clemson, SC, USA	21/06/2019
Leiter (m/w/d) des Länderpakets Mali	Bamako, Mali	05/06/2019
Research Assistant	Hannover, Germany	11/06/2019
Project Manager & Bid Manager EO	Leuven, Belgium	17/06/2019
Research Assistant - ReCharBo project	Hannover, Germany	11/06/2019
Postdoctoral Position - Remote Sensing of Vegetation	Toronto, ON, Canada	10/06/2019
Business manager, Earth observation applications	Wallingford, UK	21/06/2019
Postdoctoral Investigator (m/f/d) in the area of Submesoscale Dynamics and Ocean Color	Geesthacht, Germany	02/07/2019
Grant-Funded Researcher (A) in Physical Sciences	Adelaide, Australia	16/06/2019
VN 19/24 Remote Sensing Scientist - 3MI Polarimetry	Darmstadt, Germany	01/07/2019
12 Early Stage Researchers (PhD student positions) within the MSCA ITN MARSoluT (Managed Aquifer Recharge Solutions Training Network) at various locations in Europe and Israel	Europe, Israel	15/06/2019

Postdoc Geoinformatics for Disaster Damage and Recovery Assessment	Enschede, The Netherlands	29/06/2019
Sales Professional - Imagery and Related Products and Services	Harwell, UK	28/06/2019
Scientific Drilling Data Manager (m/f/x)	Potsdam, Germany	21/06/2019
Remote Sensing and ENVI Specialist	Dubai, UAE	28/06/2019
Associate Research Scholar Position in Machine Learning	Princeton, NJ, USA	22/06/2019
Scientist to work on cloud and precipitation retrievals from the EarthCARE satellite	Reading, UK	13/06/2019
Scientific employee (PhD student): Determination of ozone profiles from combined UV and IR spectral data of the satellite instruments S5P / TROPOMI and NPP / CrIS	Bremen, Germany	06/06/2019
Research Assistant	Hannover, Germany	11/06/2019
Project Manager & Bid Manager EO	Leuven, Belgium	17/06/2019
Research Assistant - ReCharBo project	Hannover, Germany	11/06/2019
Computer Vision Software Engineer	Berlin, Germany	15/06/2019
Satellite Image Quality Engineer	Berlin, Germany	15/06/2019
Postdoctoral Fellow in Geochemistry and Spectral Imaging - The Red Sea and Mars	Kensington WA, Australia	19/06/2019
Research Assistant	Berlin, Germany	03/06/2019

Postdoctoral Position - Remote Sensing of Vegetation	Toronto, ON, Canada	10/06/2019
Program Manager - Science and Data Lead	Bangkok, Thailand	09/06/2019
PhD. thesis: Automatic recognition of tectono-saliferous structures from geophysical imagery and geological data	Orleans, France	07/06/2019
Project assistant in microwave remote sensing of vegetation (m/f)	Vienna, Austria	10/06/2019
Researcher geochemistry	Trondheim, Norway	02/06/2019

CONTACT THE COUNCIL

The Geological Society of Africa's Council is appreciated your opinion and inputs. All of your suggestions and comments will be taken into considerations. Just drop us an email:

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GSAf's Newsletter Editor/Information Officer: Dr. Tamer Abu-Alam (Norway/Egypt); the University of Tromsø - The Arctic University of Norway. (tamerabualam@yahoo.com)

Geological Society of Africa
Newsletter

Volume 9 - Issue 2
(June, 2019)

Edited by
Tamer Abu-Alam
Editor of the GSAf Newsletter

Cover Image
An illustration shows an Elasmosaur swimming through rough waters. A fossil from Antarctica is now the heaviest known animal in this group of prehistoric marine reptiles.

Photograph by Stocktrek Images, Inc. / Alamy
https://www.nationalgeographic.com/science/2019/06/fossil-sea-monster-found-antarctica-heaviest-of-its-kind-elasmosaurs/?fbclid=IwAR10C3U3aoE3aek3ZT7CfvQbmvxxeByNoMFxe4PoT76WOBuyftvOaPKRZdc

Figures, illustrations and text appear in the issue were edited to meet the format of the newsletter. For original articles and illustrations, please visit the links below the articles.