



January, 2022

G E O D E

Monthly e-Newsletter Vol. II, No.01



University Department of Geology, Ranchi University, Ranchi.

Estd:1962

Patron : Prof. (Mrs.) Kamini Kumar,
Hon'ble Vice-Chancellor, R. U.

Chief-Editor : Dr. Bijay Singh, Head
Univ. Dept. of Geology, R. U..

Editorial Board:

- Dr. Bacha Ram Jha
- Dr. Chanchal Lakra
- Dr. Suresh Kumar Samad
- Mrs. Neelu Priya Tirkey
- Mr. Amit Kumar

Editorial Assistance:

- Mr. Vikram Yadav
- Ms. Sapna Xaxa
- Ms. Rosh Anshu Mala Toppo
- Ms. Nikita Bhagat
- Mrs. Alisha Priyal Minz
- Ms. Ritika Tudu

Geosciences : Challenges Ahead

Wishing you all a very HAPPY NEW YEAR 2022. It is my pleasure to present the Indian spectrum of Earth System Science scenario. Our country is bestowed with huge records of most of the geological process and events encapsulated within a single territorial entity. Surprisingly we have some of the very old rocks (3.2 billion years), lofty mountains, multitudinous glaciers, the largest foreland basin mighty rivers, a near exclusive climate system comprising of monsoons and the westerlies, lakes, lagoons, mangroves, deltas, hot and cold deserts, impact craters, volcanoes, open ocean and the closed Bay of Bengal. Our country experiences the substantive anthropological impacts due to complex socio-cultural ecology, knowledge systems and practices.

With such grandeur of the nature, culture and knowledge systems it is painful to note that the country has not achieved its leadership status in the conceptual space. This poses a greater challenge before the entire geoscientific communities. We realise that the landscapes are sculpted by extreme geological events which occur only when an appropriate ecosystem and environment gets created. There is an ardent need for the community to be empowered to work at the highest level constantly so that their contribution gets recognised. A favourable ecosystem which facilitates excellence is a necessary pre-condition. We need to guard against the creation and propagation of **bonsai** scientists/geologists by limiting their ecosystem through restrictive funding excessive administrative hurdles and accountability. A lot needs to be done in the handling and nurturing of our younger minds and institutional leadership following suggestive measures may be considered

The professional geosciences association may need to assume responsibility so that to create synergies transgression of discipline and develop new program.

The HEI's/departments need to augment facilities/courses drawn from Physics, Applied mathematics, Computer Sciences Chemistry Biology, Material Sciences besides its conventional branches including AI and ML. A radical change is required to include all contemporary fields to enable the future geoscience students. The methodology of imparting teaching should be integrative with researches in areas like Geo-morphodynamics, Geo-biology, Geo-mathematics, Ecohydrology, Geo-forensics, Geo-Pharmaceutics, Medical Geology, Molecular Palynology and Palaeontology. Develop autonomous & intelligent insitu measurements through indigenous development of instrumental techniques and products to ensure self sufficiency, self reliance and realization of scale /density of instrumentation within our resources. Modelling and simulation.

Data interpretation, comparison and calibration program.

Development of Crowd Sourcing for education and research.

Roadside Geology to ensure conservation of geoheritage sites of societal relevance

Data and sample repository and archival System

In the post Covid-19 situation and the overlying stress on economy there has to be many constraints but we need to prioritize and optimize our geoscientific efforts to deliver the results with highest degree of precision better. Now it is high time for us to **Perform** (act together) or **Perish** (face the music).

-Chief Editor's Desk

Geology gave us the immensity of time and taught us how little of it our own species has occupied. - Stephen Jay Gould (American Paleontologist)



Department Activities

- Teachers, Research scholars and Students of this department participated in the Motivational speech conducted in the Aryabhata Hall at Science Campus of Ranchi University on 1st of December 2021 at 10:00 AM.
- One Ph. D. pre-registration and three Ph. D. progress report presentation was held on 3rd December 2021 in the Seminar hall of this department in presence of Dean Faculty of Science Prof. (Dr.) Kunul Kandir from 12:00 PM onwards.
- Ms. Alisha Priyal Minz attended a 3 day **33rd Conference of the Indian Institute of Geomorphologists (IGI), an online International Conference on the Theme Geomorphology & Environmental Sustainability** from December 02-04, 2021, organized by Department of Geography, University of Allahabad, Prayagraj.
- 93 Students of M. Sc. Batch Semester II session 2020-2022 officially visited the CMPDI Museum under the guidance of Dr. Jinia Nandi on 4th of December 2021 between Hours 02:00 – 05:00 PM.
- Ph.D. Coursework Semester (Jul-Dec 2021) online Exam was held on 11th and 13th December 2021 of Paper I and Paper II respectively from 11:00 AM to 01:00 PM.
- Geode Editorial Committee meeting was held on 15th December.
- Dr. Nitish Priyadarshi attended the workshop on Artificial Intelligence (AI)/ Machine Language (ML) on 17th December 2021 at Institute of Public Health, RCH Campus, National Health Mission (NHM), Namkum, Tata road, Ranchi.
- Sem II Practical Exam was conducted in offline mode on 20th & 21st of December 2021.
- Campus selection interview held on 18th of December 2021 (rescheduled on 22nd) for Geology Students.
- Winter vacation starts from 23rd of December 2021 and department to reopen on 3rd January 2022.

Trainings/ Fieldworks

- Four-day Local Field work of M.Sc. Students session 2020-22 semester II was conducted under the guidance of Dr. B. R. Jha (Prof. incharge field work), with Dr. Suresh Kr. Samad and Mr. Amit Kumar on 5th, 6th, 8th and 9th of December 2021 in which 113 students participated.
- Date of field work & Places visited
 05-12-21 Tagore Hill & Chiraundi Pahar
 06-12-21 Joda Pahar & Bariyatu Fire Range
 08-12-21 Balsiring
 09-12-21 Hehal Pahar



Ms. Achla Kandulna presenting her Ph.D. pre-registration synopsis



Ms. Nikita Bhagat presenting her Progress Report



Ms. Sapna Xaxa presenting her Progress Report



Workshop on Artificial Intelligence (AI)/ Machine Language (ML)

DIAMOND JUBILEE YEAR 1962-2022



- The Honorable Vice Chancellor of Ranchi University Prof. (Mrs.) Kamini Kumar visited in the field (Bariyatu Hill) and spent some time with students in field on 06-12-21.

(AMD), Hyderabad on March 24-25, 2022.

Seminar/Symposia Organized/ Attended

- Ms. Alisha Priyal Minz gave a presentation on topic “Geomorphological controls of Gemstone Exploration: A case study of Emeralds of Gurabanda Area, District- East Singhbhum, Jharkhand” on 04-12-2021 in 33rd Conference of the Indian Institute of Geomorphologists (IGI), an online International Conference on the Theme Geomorphology & Environmental Sustainability from December 02-04, 2021, organized by Department of Geography, University of Allahabad, Prayagraj.



Hon'ble Vice-Chancellor Prof. Kamini Kumar in the Feild with the students

Research Publications:

- Following paper from Univ. Dept. of Geology was published in JETIR, ISSN UGC approved (Journal No: 63975) published in Volume 8 Issue 10, October 2021 and date of publication: 2021-10-31
- “A note on Auriferous Mineralization in Parasi Area, Ranchi District, Jharkhand, India” – Bijay Singh and Sapna Xaxa.
- A paper to be publish in the proceeding volume of 33rd Conference of the Indian Institute of Geomorphologists (IGI).
“Geomorphological controls of Gemstone Exploration: A case study of Emeralds of Gurabanda Area, District- East Singhbhum, Jharkhand” – Alisha Priyal Minz and Bijay Singh.



CMPDI Museum visit by M.Sc Sem II Session 2020-2022 Students

Hindi Usages:

On the occasion of Hindi Day celebrated on 14th of September every year, the September Issue of Geode will be published in Hindi.



Bariyatu Hill visit by students

Appointments

With reference of letter no. RU/ cvs/ 5080/ 2021 dated 02/12/2021, Mr. Amit Kumar (Asstt. Prof, Univ. Dept.of Geology. R.U.) has been appointed as Course Co-ordinator in Radio Kanchi under University with financial power to operate the Bank A/c of B-1 A/c of Radio Khanchi jointly with the Director by the order of the Vice-Chancellor.

Announcements

National Seminar on 75 years of Mineral Exploration and Future challenges in India (MEFCI-2022) organized by Atomic Minerals Directorate for Exploration and Research



Students in field



(AMD), Hyderabad on March 24-25, 2022.

- International Conference for Applied Meteorology and Climatology ICAPMECL to be held on 8th January 2022 at Trivandrum, India. ICAPMECL is being organized by Science Society- Japan to provide an opportunity to research scholars, delegates and students to interact and share their experience and knowledge in technology application.
- The international conference on Geological and Environmental Sustainability ICGES will be held on 15th January 2022 at Pondicherry, India. ICGES is being organized by ITAR-India to provide an opportunity to research scholars, delegates and students to interact and share their experience and knowledge in technology application.

Ph. D. Progress Report/ Registration/ Thesis Presented/Submitted/Awarded:

S.N.	Name of the Student	Supervisor	Title	Awarded/ submitted with Date
1.	Shyam Lal Singh	Dr. P. K. Verma	GEOLOGICAL ASPECTS OF SOIL GENESIS AND STUDY OF ENRICHMENT OF SOIL COMPOSITION DUE TO GENERATION OF BIOMASS THROUGH CHAKRIYA VIKAS PRANALI IN PARTS OF PALAMU AND LATEHAR DISTRICTS (JHARKHAND)	Ph. D. Thesis Awarded 10-12-2021
2.	Achla Kandulna	Dr. Bijay Singh	RARE EARTH MINERALISATION IN PEGMATITE IN BMB IN KODERMA DISTRICT	Pre- Registration Presented 03-12-2021
3.	Nikita Bhagat	Dr. P. K. Verma	A STUDY OF GEOGENIC AND ANTHROPOGENIC CAUSES OF WATER POLLUTION IN NORTH KOEL BASIN AND ITS TRIBUTARIES IN LATEHAR AND PALAMU DISTRICTS, JHARKHAND	1 st Progress Report Presented 03-12-2021
4.	Sapna Xaxa	Dr. Bijay Singh	NATURE AND GENESIS OF AURIFEROUS MINERALIZATION AT PARASI AREA (TAMAR BLOCK) DISTRICT- RANCHI, JHARKHAND, INDIA	Mid- Progress Report Presented 03-12-2021
5.	Rosh Anshu Mala Toppo	Dr. Bijay Singh	GEOLOGY OF MICA DEPOSIT IN KODERMA DISTRICT AND ADJOINIG AREAS WITH SPECIAL REFERENCE TO GEM MINERALS	Mid- Progress Report Presented 03-12-2021



Achiever's of the Department (Continued.):

(1) **Name:** Dr. Reet Kamal Tiwari

Address (mailing): Home: House no B8, Type 4,
Faculty Quarters,
IIT Ropar, Rupnagar-140001, Punjab.

Office: Dr.Reet Kamal Tiwari, Assistant Professor,
Department of Civil Engineering, Indian
Institute of Technology
Ropar, Nangal Road,
Rupnagar – 140001, Punjab, India.

Present Assignment:

Assistant Professor (Geomatics), Department of Civil
Engineering, Indian Institute of Technology Ropar.

RU Batch: 2005-2007 (M.Sc)



Recent Achievements:

1. Elected as IEEE Senior member.
2. Given Charge of Vice-Chairperson for Career
Development and Placement Cell, IIT Ropar.

Publications:

1. Tripathi, A., & Tiwari, R. K. Synergetic utilization of sentinel-1 SAR and sentinel-2 optical remote sensing data for surface soil moisture estimation for Rupnagar, Punjab, India. Geocarto International, pp. 1-22, Volume Not assigned yet, (2020).
2. Tripathi, A., & Tiwari, R. KA simplified subsurface soil salinity estimation using synergy of SENTINEL-1 SAR and SENTINEL-2 multispectral satellite data, for early stages of wheat crop growth in Rupnagar, Punjab, India. Land Degradation & Development, pp. 3905– 3919, Volume 32(14), (2021). <https://doi.org/10.1002/ldr.4009>.
3. Tripathi, A. & Tiwari, R. K. Utilization of Spaceborne C-band dual Pol Sentinel-1 SAR data for simplified Regression-based Soil Organic Carbon Estimation in Rupnagar, Punjab, India. Advances in Space Research, Page and volume not yet assigned (2021). <https://doi.org/10.1016/j.asr.2021.08.007>.
4. Singh, N., Singh, J., Gupta, A. K., Bräuning, A., Dimri, A.P., Ramanathan, A.L., Sharma, V., Tiwari, R. K., Chakraborty, J. S., Chauhan, P., Shukla, T., Singhal, M., Rawat, R., Agarwal, S.,

and Raja, P., “Climate-driven acceleration in forest evapotranspiration fueling extreme rainfall events in the Himalaya. Environmental Research Letters, pp. 084042, Volume 16(8), (2021). <https://doi.org/10.1088/1748-9326/ac14ed>. (Corresponding Author)

5. Singh, S., Tiwari, R. K., Sood, V., Gusain, H. S., & Prashar, S. (2021). Image-Fusion of Ku-band based SCATSAT-1 and MODIS data for Cloud-free Change Detection over Western Himalayas. *IEEE Transactions on Geoscience and Remote Sensing*. (Corresponding Author)

Mobile: +91-9458159323

Email: reetkamal@iitrpr.ac.in

(2) **Name:** Kanchan Mishra, (PhD, Earth Sciences)

Address (mailing): WLE-303B, Department of
Earth Sciences, Indian Institute of
Technology Kanpur, Kanpur
208016, Uttar Pradesh, India

Present Assignment: Project Scientist,
Indian Institute of Technology Kanpur
Kanpur, U.P., India

RU batch: 2007-09



Recent Achievements:

She has completed her Ph. D. in Earth Sciences, from Indian Institute of Technology Kanpur, Kanpur and is working as a Project Scientist at IIT Kanpur.

Publications (max. Five):

1. Flood risk assessment in the Kosi alluvial plains (megafan) using multi-criteria decision analysis: a hydro-geomorphic approach. Kanchan Mishra, Rajiv Sinha. *Geomorphology* 350 (2020), 106861.
2. Towards the assessment of sediment connectivity in a large Himalayan River basin. Kanchan Mishra, Rajiv Sinha, Vikrant Jain, Santosh Nepal, Kabir Uddin. *Science of The Total Environment* 661 (2019), 251-265.



3. Spatio-temporal variability in stream power distribution in the Upper Kosi River basin, Central Himalaya: controls and geomorphic implications. Rahul Kaushal, Ankita Sarkar, Kanchan Mishra, Rajiv Sinha, Santosh Nepal, Vikrant Jain. *Geomorphology* 350 (2020), 106888.
4. Basin scale hydrology and sediment dynamics of the Kosi River in the Himalayan foreland. Rajiv Sinha, Alok Gupta, Kanchan Mishra, Shivam Tripathi, Santosh Nepal, Shahriar Wahid, Somil Swarnkar. *Journal of Hydrology* 570 (2019), 156-166.
5. Channel morphodynamics and sediment budgeting of the Lower Ganga River using a hydro-geomorphological approach. Rajiv Sinha, Shobhit Singh, Kanchan Mishra, Somil Swarnkar. *Earth Surface Processes and Landforms* (In review).
Mobile number: +91-8601969402
Email: mishra.kanchan1986@gmail.com; kanchanm@iitk.ac.in

(3) **Name:** Dr. Kumar Gaurav, (PhD, IGP, France)

Address (mailing): AB-2, 119

Department of Earth and Environmental Sciences, Indian Institute of Science Education Research, Bhopal, Madhya Pradesh:462066, India

Present assignment: Assistant Professor

RU batch: 2004-06



Publications (max. Five):

1. Beg, Z., **Gaurav, K.**, Singh, A., Tandon, S.K. (2021) Assessing the palaeohydrology of the lost Saraswati River in the Punjab-Haryana plains, Northwest India from satellite data. **Palaeogeography, Palaeoclimatology, Palaeoecology**, 585.
2. Singh, A., **Gaurav, K.**, Rai, A.K., Beg, Z (2021) Machine learning to estimate surface roughness from the satellite images. **Remote Sensing**, 13 (19).
3. Rai, A.K., Beg, Z., Singh, A., **Gaurav, K.** (2021) Estimating discharge of the Ganga River from satellite altimeter data. **Journal of Hydrology**, 603.
4. **Gaurav, K.**, Métivier, F., Sreejith, A.V., Sinha, R., Kumar, A. and Tandon, S.K. (2021) Coupling

threshold theory and satellite-derived channel width to estimate the formative discharge of Himalayan foreland rivers. **Earth Surface Dynamics**, 9(1), pp.47-70.

5. Sonkar, G.K. and **Gaurav, K.** (2020) Assessing the impact of large barrages on habitat of the Ganga River dolphin. **River Research and Applications**, 36(9), pp.1916-1931.

Mobile: +91-8959768168

Email: Kgaurav@iiserb.ac.in

Website: <http://home.iiserb.ac.in/~kgaurav/>

ACTIVITIES PHOTOS(continued...)



V.C. Ma'am with Dr. B.R. Jha, Dr. Suresh Samad and Mr. Amit Kumar



Panel for Campus Selection Interview



Campus Selection Panel in dept of Geology



GLOBAL

Ammonites were jet set of the Mesozoic era, say scientists

Shelled creatures roamed oceans millions of years ago by jet propulsion, suggests innovative 3D imaging

Analysis of an extraordinary fossil discovered in a Gloucestershire gravel pit has given fresh insight into how an ancient sea creature swam through oceans and defended itself from predators millions of years ago.

Innovative imaging techniques have allowed scientists to build up a 3D picture of the inner workings of the ammonite, best known by the shell-shaped fossils found on beaches and sea cliffs.

The research has led them to conclude that the marine animal swam by jet propulsion using the hyponome – a muscular tube-like funnel through which water is expelled – as found in creatures such as squid and octopuses.



Researchers scanned an unusually well-preserved ammonite in which the soft insides were intact.

Photograph: Cherns et al.

Researchers also pinpointed muscles that they believe allowed the ammonite to retract itself deep into its shell for protection. This would have been important since ammonites are believed to have lacked defensive features such as the ink sac found in modern squid and cuttlefish.

Ammonites thrived in oceans during the Mesozoic era but became extinct at the same time as non-avian dinosaurs about 66m years ago. Scientists have learned a lot about them through the fossilised remains of their shells, but little was known about the soft body within.

In 1998, Neville Hollingworth, an avid-fossil hunter, discovered an exceptionally well-preserved ammonite in an open gravel pit in Gloucestershire in 1998. It was unusual because it contained the fossilised remnants of soft tissue.

A research team led by scientists from Cardiff

University has now used CT and neutron scanning to create a detailed 3D computer reconstruction of the creature's muscles and organs.

Publishing their findings in *Geology*, the team say their work suggests ammonites may be evolutionarily closer to coleoids – the sub-group of animals containing squid, octopuses and cuttlefish – than previously thought. Up until now, scientists used the modern cephalopod nautilus as a body-plan for reconstructing ammonite biology.

The study's lead author, Lesley Cherns of Cardiff University's school of Earth and environmental sciences, said scientists had patiently waited for new techniques to emerge rather than carrying out more destructive research.

She said: "Preservation of soft parts is exceptionally rare in ammonites. Since the discovery of the fossil over 20 years ago, we have used numerous techniques to try to decipher the soft tissues, and have resisted the option of cutting it apart and hence destroying a unique specimen to see what is inside. We preferred to wait for the development of new, non-destructive technology – as now used in this study – to understand those internal features without harm to the fossil."

Imran Rahman, a co-author and principal researcher at the Natural History Museum, added: "Ammonites are an iconic extinct group of marine animals renowned for their rich fossil record that stretches back hundreds of millions of years. Their hard shells made of calcium carbonate preserve well, however, important details of the living animal were largely still a mystery.



The iconic ammonite shell is often found on beaches and sea cliffs, but little was known about the soft creature inside. Photograph: Cherns et al.

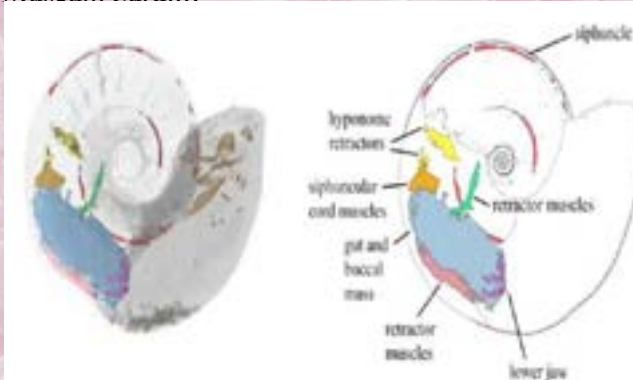
"In almost all cases, it's only the hard shell – not the soft parts – preserved in fossil ammonites. On the rare occasions where soft parts have been found, they are mostly flattened.

"The preserved musculature described in our paper represents the strongest fossil evidence yet that ammonites swam using a muscular hyponome and



could retract deep into the shell, which had previously been hypothesised on largely theoretical grounds.”

Hollingworth's specimen is housed at the National Museum Cardiff.



A 3D reconstruction of the ammonite created from X-ray and neutron scan data. Photograph: Cherns et al.

SOURCE: *theguardian.com*

Fossilized Shell Consisting of Emerald

Fossilized shells can be replaced by various types of gemstones, such as quartz and chalcedony (Spring 2014 Gem News International, p. 77), opal (A. Cody and D. Cody, *The Opal Story: A Guidebook*, Melbourne, 2008), and demantoid garnet (Winter 2013 Gem News International, pp. 257–258). In rare cases, emerald may also participate in the petrification of the shell and form pseudomorphs.

Recently, the Hong Kong laboratory received 11 fossilized shells composed primarily of emerald, measuring $13.00 \times 8.20 \times 6.16$ mm to $24.54 \times 16.72 \times 12.57$ mm and weighing 3.22 to 20.63 ct (figure 1). Most of them preserved the distinctive gastropod shell outlines, with different degrees of weathering. Under magnification, numerous small light green to green anhedral emerald crystals contained very fine fluid inclusions associated with well-formed brassy pyrite grains (figure 2), which is one of the most common mineral inclusions in Colombian emeralds (S. Saeseaw et al., “Geographic origin determination of emerald,” Winter 2019 *G&G*, pp. 614–646).

An X-ray radiograph further revealed the spiral skeleton of the shell and scattered pyrite crystals (figure 3). The polycrystalline emerald was deposited evenly throughout the specimens, indicating complete replacement.

Fossilized gastropods were reported from the Matecaña tunnel of the Gachala emerald mine in Colombia (P. Vuillet et al., “Les émeraudes de Gachalá, Colombie,” *Le Regne Mineral*, No. 46, July/August 2002, pp. 5–18).

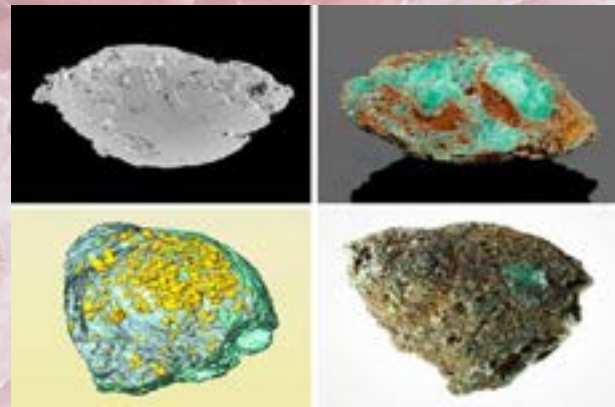
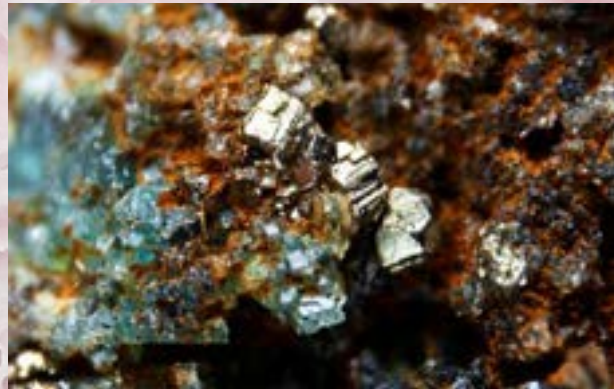


Figure. Clear shell structure and internal banding are shown in the X-ray radiograph (top left) of a fossilized shell measuring $22.06 \times 14.85 \times 10.32$ mm and weighing 14.89 ct (top right). Scattered pyrite crystals (yellow in the colored image on the bottom left) are deposited in a fossilized shell measuring $13.91 \times 11.89 \times 9.32$ mm and weighing 5.07 ct (bottom right). Top images by Johnny Leung and Cheryl Wing Wai Au; bottom images by Ching Yin Sin and Emiko Yazawa.



Well-formed pyrite, a common accessory mineral associated with Colombian emerald. Photomicrograph by Johnny Leung; field of view 14 mm.

Gachala is not a principal emerald mining district but can produce high-quality material (D. Fortaleche et al., “The Columbian emerald industry: Winds of change,” Fall 2017 *G&G*, pp. 332–358). It is located on the Lower Cretaceous fossiliferous sedimentary rocks of the Eastern Cordillera Basin (B. Horton et al., “Construction of the Eastern Cordillera of Colombia: Insights from the sedimentary record,” in J. Gómez and D. Mateus-Zabala, Eds., *The Geology of Colombia*, Chapter 3, Vol. 3, 2020, Servicio Geológico Colombiano, Publicaciones Geológicas Especiales 37, pp. 67–88), where pyrite and emerald crystallized during the circulation of hydrothermal mineralizing fluids in black shales (G. Giuliani and L. Groat, “Geology of corundum and emerald gem industry,” Winter 2019 *G&G*, pp. 464–489) and subsequently precipitated to form the fossilized shells.

SOURCE: *gia.edu*



Luminescent Sensor Identifies Valuable Rare Earth Element Terbium in Unexpected Locations

Researchers funded by the U.S. National Science Foundation have developed a luminescent sensor that can detect and measure the presence of a rare earth element called terbium. The element is used in manufacturing devices like car batteries, smart phones, energy efficient lighting and X-ray equipment.

The scientists were successful in locating the element using a protein known for the strength and selectivity of its bond to rare earth metals — an approach that could be used to extract terbium from previously prohibitive environments.

Researchers used the sensor to test samples from an acid mine waste treatment facility that had low levels of terbium and contained traces of other metals. The sensor performed as well as ICP-MS mass spectrometry, which has long been considered the industry standard.

This technological advance will aid in the creation of a domestic supply chain of terbium and other rare earth elements by locating and measuring these valuable materials in plentiful sources, the scientists said, including industrial waste and manufacturing byproducts like acid mine drainage and coal waste.



A new sensor can detect the presence of a rare earth element called terbium. Credit: Wikimedia Commons.

The techniques involved will also avoid or reduce some of the environmental concerns that arise in some rare earth element collection and detection practices. The portability, affordability and capability to operate in suboptimal environmental conditions will transform how rare earth metals are sustainably identified, sourced and managed, the researchers believe.

Reference: “Probing Lanmodulin's Lanthanide Recognition via Sensitized Luminescence Yields a Platform for Quantification of Terbium in Acid Mine Drainage” by Emily R. Featherston, Edward

J. Issertell and Joseph A. Cotruvo Jr., 25 August 2021, *Journal of the American Chemical Society*. DOI: [10.1021/jacs.1c06360](https://doi.org/10.1021/jacs.1c06360)

SOURCE:scitechdaily.com

World's biggest blue sapphire 'Queen of Asia' found in Sri Lanka

The National Gem and Jewellery Authority, the state-run institute, certified the immensely valuable gem stone and plans are underway to sell it at an international market.

The world's largest natural corundum blue sapphire, weighing around 310 kg and named the "Queen of Asia", was unveiled on Sunday. The rare gem stone had been found three months ago from a gem pit in Ratnapura, popularly known as gem city situated around 85 km away from capital Colombo, but it was only shown for the first time at the residence of the gem pit owner on Sunday.

The National Gem and Jewellery Authority, the state-run institute, certified the immensely valuable gem stone and plans are underway to sell it at an international market.

Thilak Weerasinghe, Chairman of the National Gem and Jewellery Authority, said that more tests are to be carried out on the gem stone. "There could be more clean stones inside this and there are already one or two clean stones which are could be seen from outside."



Gem expert Chamila Suranga said that the specialty of this gem is that the gem stone is comprised of aluminum oxide, titanium, iron, and nickel.

New tools to unearth rare metals

A new understanding of how volcanic processes form deposits of rare earth metals, vital to everyday modern technology, is revealed in a new study from the University of St Andrews. The research, led by a team from the School of Earth and Environmental Sciences at St Andrews and published in the journal *Geology* (Friday 3 December), provides new clues about how hot volcanic fluids concentrate rare earth



and how these metals seep out from the magma body.

These rare metals, which include elements such as niobium and tantalum, are essential for the production of alloys, batteries, magnets and superconductors, and are vital for modern technologies ranging from mobile phones and laptops to MRI machines. These metals are also essential for green technologies and, crucially, the transition to a low-carbon economy must involve finding new sources of the rare earth metals. Rare earth deposits are associated with extinct alkaline volcanoes. These volcanoes are unusual and only exposed in select regions around the world, such as south Greenland.



Igánâq, Greenland: view to the southwest from the Igánâq summit (~540m) towards Tunulliarfik and the snowy peaks of Ilímaussaqa. Credit: University of St Andrews

The team of researchers from the University of St Andrews wanted to understand why some volcanoes produce massive metals deposits, whilst others are devoid of mineralisation. By studying a metal-poor volcano in Greenland the researchers were able to show that fluids leaking from the magma body into the surrounding rocks can carry significant quantities of rare earth metals. Rather than concentrating metals, these fluids scatter them over a large area and significantly decrease the chances of forming an economically viable deposit.

Lead researcher Krzysztof Sokół from the School of Earth and Environmental Sciences said: "By measuring the chemical composition of the rocks around the chamber we showed that metals had been carried out of the magma chamber and into the surrounding rocks. This is the first time that the mass of material transported by this process was estimated. We also present a new way to visualize the distribution of metals in the surrounding rock.

"We show that during an episode of volcanic activity, the melts residing at shallow levels of the Earth's crust can form a separate hot fluid enriched in

critical metals, which subsequently leaks from the magma chamber into the surrounding rocks carrying a globally significant volume of the metals."



Morning at the Narsaarsuk beach, southern bank of Tunulliarfik. Credit: University of St Andrews

The research team estimates that the total tonnage of the critical metals transported to the surrounding rocks by this processes is about 40 megatonnes, which is comparable to the mass of rare earth metals present in some of the world's largest metal deposits. Professor Adrian Finch and Dr. Will Hutchison, also from the School of Earth and Environmental Sciences at St Andrews, added: "We show that fluids can 'leak' from magma systems that would otherwise have crystallized to form large critical metal deposits within the chamber confines. Now that we understand this process more fully, we can predict more effectively how the deposits under these types of volcanoes formed. Armed with this information, we can guide far better exploration for the next generation of green technologies."

SOURCE: phys.org

NATIONAL

GSI completes preliminary survey of scientific exploration for Paddar sapphire mines in Kishtwar

The sapphire found in Kishtwar is renowned for its clarity and transparency, and are mainly used for jewellery, with a high ornamental value.

The Geological Survey of India has completed the preliminary survey for scientific exploration of sapphire mines in Jammu and Kashmir's Kishtwar district, officials said on Friday. Sapphire found in the Paddar Valley in the district is famous world-over for its unique peacock blue colour, they said.

Located at an altitude of 4,742 metres above sea level, a 116-km stretch in the valley is estimated to have a reserve of sapphire worth Rs 2,700 crore, the officials said. Till now, extreme geographical conditions and lack of resources have hampered



commercial exploitation of this valuable stone, officials of the J&K Minerals Limited, a government company, said.

Extraction of sapphires from Paddar began in 1885 and they achieved legendary status in the jewellery world. The gems mined during this period are valued highly and usually fetch enormous prices around the world, they said. The preliminary survey for Paddar sapphire mines has been completed by the Geological Survey of India (GSI) and further options are being explored for the scientific exploration of the area, officials said.



Representational Picture Creative Commons/Wikimedia

The status of the preliminary survey was discussed by top officials at a meeting of the board of directors of the J&K Minerals Limited here, and it was chaired by Chief Secretary Arun Mehta. Mehta directed that a committee be constituted to evaluate the quantity of sapphire reserves and design a suitable mechanism for its sustainable extraction. The panel will also recommend future course of action in this regard, he said.

According to a notice issued by J&K Minerals Limited, the precious stone, which is famous for its unique peacock blue colour, is rarely found in other parts of the world.

The sapphire found in Kishtwar is renowned for its clarity and transparency, and are mainly used for jewellery, with a high ornamental value, it said.

The price of these "pure sapphires" easily crosses USD 100,000 a carat, making them the most expensive in their category, the officials said.

It was also informed in the meeting that despite the COVID-19 crisis, which had far-reaching economic and social repercussions, J&K Minerals Limited showed satisfactory performance and continued to deliver much-needed raw material to mineral-based industries in Jammu and Kashmir,

they said.

The officials said the company for the first time has ventured into minor mineral exploitation and has operationalised four minor mineral blocks in the Jammu region.

This has ensured a regular supply of construction material like sand and boulders to various projects, including the construction of AIIMS, IIM, ring roads in Jammu and Srinagar, and works on the National Highway-44, they said.

Regarding the Kalakote mines, the mining department has been asked to conduct a safety audit through the Director-General, Mines Safety, Government of India, within three months, and rationalise excess labour from these mines to other minor minerals mines, the officials said.

Mehta also reviewed the functioning of the Parlanka Gypsum mines in Ramban district and directed allotment of additional blocks to J&K Minerals Limited for boosting gypsum extraction, which currently stands at 40,000 metric tonnes a month.

The chief secretary, while appreciating the efforts of the management for making the corporation self-reliant, asked it to explore possibilities of further mineral extraction in Jammu and Kashmir. "This will help to develop the mineral-based industries in the Union Territory of Jammu and Kashmir and create more employment in the region" he added.

SOURCE: ndtv.com

Study says Gujarat seeing salinisation of coastal groundwater

The research study, published in the Science of Total Environment journal recently also points out that select points along the Gujarat's coastline is losing less groundwater to the sea compared to other coastal regions in the country.

Most parts of the 1,600-kilometre Gujarat coastline is seeing salinisation of coastal groundwater, which results in deterioration of its quality, a research study funded by the Ministry of Earth Sciences and National Centre for Earth Science Studies in Trivandrum, Kerala revealed.

The study authored by IIT-Gandhinagar researchers — Chandrasekhar Bhagat, Anant Misra, Pranab Kumar Mohapatra — along with DS Suresh Babu of National Centre for Earth Sciences in Trivandrum and Manish Kumar of the University of Petroleum and Energy Studies in Dehradun, also notes that higher micronutrient load in south Gujarat coast owing to higher contaminants, made it more vulnerable.



The research study, published in the Science of Total Environment journal recently also points out that select points along the Gujarat's coastline is losing less groundwater to the sea compared to other coastal regions in the country.

The study estimated submarine groundwater discharge (SGD) and contaminant flux reaching the coastal waters of Arabian Sea through the Gujarat coastline, by sampling seawater, porewater, and groundwater along the coastline. SGD is the flow of fresh or saline groundwater into the sea and is considered as an invisible pathway carrying contaminant load from the land or aquifer to the marine environment.

Comparing with previously published research, the new study found that Gujarat coast is losing relatively less groundwater to the sea vis-a-vis that seen in the Bay of Bengal in 2015, Western Bengal basin in 2007, South coast of India in 2021 and 2019 and Mumbai Harbour coast of Western India in 2019. In contrast, Gujarat's loss of groundwater to seawater was comparable to that reported in the South-East coast of India.

Kumar, who is with the School of Engineering of University of Petroleum and Energy Studies in Dehradun and one of the authors of the research, said, "Most of Gujarat's coastline is seeing seawater intrusion (that is saline water entering groundwater). It then becomes crucial to stop the fresh water which we are losing to seawater every year. Gujarat is one place where urgent action is needed and it must act fast with a deadline. If these losses are stopped, it will only increase the groundwater."



To estimate the contaminant load reaching the seashore, the study also analysed the porewater samples for various trace metals such as zinc, strontium, cadmium, lead, chromium and iron.

The study also raises an alarm on the contaminants entering seawater already being much higher than permissible limits and which is only due to increase with further urbanisation and industrial activities

along the coast.

As the paper notes, "The trace metal load discharging into the coast was observed to be decreasing from the South Gujarat coast to the Saurashtra coast. Therefore, the South Gujarat coast was more vulnerable to harmful algal bloom, eutrophication and biotic ligand formation in aquatic species, as loads of contaminants discharging were relatively higher. Also, the carcinogenic metals flux reaching into the marine environment poses a carcinogenic risk to fishers through dermal contact... We speculate that the accumulation of contaminants would increase in the future as urbanization and industrial activities increase along the coast."

To estimate the contaminant load reaching the seashore, the study also analysed the porewater samples for various trace metals such as zinc, strontium, cadmium, lead, chromium and iron. Concentration of zinc was reported to be highest among all the trace metals studied and most of the trace metal concentrations exceeded by many orders the permissible limits standardised by various agencies like WHO, US Environmental Protection Agency and Bureau of Indian Standards. The highest toxic metals load was observed at Udvada beach of Valsad district. High concentration of chromium found in most of the groundwater and porewater samples "depicted the high influence of anthropogenic activities across the coastal region of Gujarat," the research further notes.

SOURCE:indianexpress.com

Study Suggests That Uranium Is Found In The Groundwater Of A Karnataka Village

According to a new survey, chemical analysis of groundwater in 73 Karnataka villages hinted high and risky levels of uranium concentration in 78 percent of these areas. The maximal safety limit suggested by the World Health Organization (WHO) is 30 micrograms per litre (g/l), however India's Atomic Energy Regulatory Board has give a maximum limit of 60 micrograms per litre. The contamination was linked to natural causes rather than manmade activities, as shown in a recent study by the Divecha Centre for Climate Change at the Indian Institute of Science (IISc) and the Centre for Advanced Research in Environmental Radioactivity at Mangalore University. Researchers conducted a survey 73 villages in the state's eastern region for the investigation.



They discovered uranium concentrations of more than 30 micrograms per litre in 57 villages and more than 60 micrograms per litre in 48 villages. In one hamlet each in Tumakuru and Chitradurga districts, five in Kolar, and seven in Chikkaballapur, scientists discovered uranium concentrations exceeding 1,000 micrograms per litre. An article published in Current Science reported the observations. Uranium poisoning can cause serious health problems. Dr. Subrata Das, an internal medicine specialist and diabetologist at Sakra World Hospital, stated as an impartial expert that detrimental consequences are decided by the amount of uranium consumed. According to the researchers, neither of the borewells wherein the water was taken were within nuclear facilities or urban waste disposal routes. The elevated uranium concentration, as per the experts, is due to a fall in the groundwater level as well as Karnataka's geological makeup. According to gamma-ray spectrometric surveys, the eastern half of Karnataka has a higher quantity of potassium, uranium, and thorium than the western part, which geologists refer to as the Eastern and Western Dharwar craton, correspondingly. Due to the sheer high radon content in the Bengaluru urban and rural belts, large levels of uranium were identified in three villages in the Bengaluru Rural district. Avathi village samples exhibited significant uranium levels, ranging from 174 to 942 micrograms per litre, while Kodagurki village samples had 356 g/l uranium, according to the study, which matches observations provided by the Central Ground Water Board. A sample from the district's Gudla Muddenahalli revealed more uranium than the WHO's recommended limit (56). Meanwhile, repeated test at Gollahalli village in Bengaluru Urban revealed that uranium concentrations fluctuated from 9 to 310 micrograms per litre throughout the year.

SOURCE: thehansindia.com

Bihar district in spotlight after Centre's largest gold reserve remark

Karmatia village under Sono block in Bihar's Maoist-infested Jamui district has hogged the limelight following Union minister Pralhad Joshi's statement in the Lok Sabha that the sleepy hamlet claimed to have India's largest gold reserves.

On Wednesday, the Union minister in a written reply to a question raised by BJP Bihar state president Sanjay Jaiswal, MP, revealed that around

222.885 million tones of gold metal is available, including 37.6 tones of mineral-rich ore, in Jamui district alone.

"The country has a total primary gold ore reserve of 501.83 tonnes. Of which, 654.74 tonnes are gold. Of this, 44% gold has been found only in Bihar," said Jaiswal, quoting the reply of the union mining minister in his letter in the lower House.

On being contacted, Jamui District Magistrate Avneesh Kumar Singh said, "I sought a report from Sono Circle Officer Rajesh Kumar after the matter was raised in the parliament. The CO's report is based on a survey earlier conducted by a Geological Survey of India (GSI) team in the Karmatia goldfield in the district, near the Jharkhand border."



Reference picture of the part of surveyed area

GSI had last visited the area to conduct a survey in 2015.

"The team stayed at the Sono block headquarters for several months after which it submitted its report to the Union government. Since then there is no development on this front," the DM told TNIE. He, however, revealed that it would prove a game-changer for the entire Naxal affected belt, if the high-ups in the union ministry took up the matter and excavation started in the goldfield.

Karmatia village under Churhait panchayat is spread over 1,000 acres of land, which has a strong possibility of having gold reserves, the DM said.

SOURCE: newindianexpress.com

STATE

Solar-based lift irrigation to be implemented across Jharkhand: Agriculture secretary

The Jharkhand government has rolled out multiple schemes to boost the agriculture sector and lift irrigation system is one such initiative, Agriculture Secretary Agriculture Secretary Abu Bakar Siddiqui said on Tuesday. Renewable energy based lift irrigation schemes will prove to be a game-changer for agriculture sector in Jharkhand, a top of



official said. The Jharkhand government has rolled out multiple schemes to boost the agriculture sector and lift irrigation system is one such initiative, Agriculture Secretary Abu Bakar Siddiqui said on Tuesday. Lift irrigation is primarily targeted at the farmers who cannot afford diesel pumps or other traditional boring systems.

Siddiqui who visited Simdega to take part in “Kisan Samvad Karyakram” after listening to the experiences of farmers said multiple schemes are being rolled out. He said, “Utilizing renewable energy projects for irrigation will help in creating a thriving agro-based economy. Looking at projects implemented by the simdega district administration and listening to farmer's experiences, solar-based lift irrigation system can be a game changer for farmers across the state. And, soon we will implement this project across the state.”

In Simdega, a solar-based lift irrigation system has been developed and is providing irrigation facilities to farmers, a statement from state government said. More than 250 solar-based irrigation schemes have been implemented across different parts of the district, it said, adding more than 175 schemes have been taken for solar-lift irrigation. One solar lift irrigation system can be used for irrigating 10 acres of land.

SOURCE: energyworld.com

Maithon Dam set for a makeover

Keeping the New Year in mind, such a step has been taken. The picturesque Maithon dam situated on the bank of river Barakar in Nirsa block of Dhanbad, considered one of the most popular picnic spots of the east has geared up to welcome the new year revelers and picnickers.

This comes in the wake of fresh sets of ornamental plants having been planted and pruning of existing plants and weeding carried out in Shatabdi Park near the dam which is cynosure for visitors. This apart, altogether 70 LED street lights have also been installed across corridors to the dam to ensure proper lighting during the evening.

Intensive cleaning and refurbishment of a dozen toilets and lavatories is in progress and are likely to be completed within a day or two while the sprucing of guest houses have also been completed.

Talking to *The Telegraph Online* on Tuesday, Apurba Saha, public relation officer of Damodar Valley Corporation in Maithon, said, “Almost all the preparation for the new year has been completed at the dam and the facilities will be inaugurated within a week.”

Divulging more details, Saha said, “We will also be making new arrangement for parking of vehicles

near the sporting hostels as due to the parking spot near the lake, congestion takes place which obstructs the movement of ambulances and others,” said Saha adding recommendation of CISF authorities for choosing the parking spots will be taken.

“We will also be putting up several signboards at different spots across the dam requesting people not to put up garbage,” Saha elaborated.

Notably, a large number of dustbins have been put up across the length and breadth picnic spots of the dams but many visitors litter away the spots by throwing away the garbage in the open.

Situated about 48 km from Dhanbad district headquarters, the major attractions of Maithon include the 15712 feet long and 165 feet high Maithon Dam, besides a deer park and Shatabdi park.



The scenic beauty around the Maithon dam: Image by Gautam Dey

Boating around several islands situated in the lake including Sabuj Deep and Chamoch Deep is an experience. Maa Kalyaneshwari Temple of Maithon situated less than 100 meter away from the dam is other center of attraction.

This apart around 35 species of migratory birds including Grebes; Cormorant; Rail, Crakes, Moorhens, coots; King Fisher, Herons Egrets and Bitterns; Storks; Plower, Lapwings; Swallows; sandpiper, stints, snipe and Curlew; Wagtails & Pipes besides around 55 species of other birds like Pigeons and Doves; Hoopoe; Crows, Jays, Magpies and Ravens; Barbets; Parrots and allies; Mynas; Owl and Owlet; Sunbirds and spiderhunts present in the lake area are other attractions for the visitors arriving in the lake during the new year.

SOURCE: telegraphindia.com