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University Department of Geology, Ranchi University, Ranchi. Estd:1962

Editorial:

Chamoli Glacial Outburst- AHimalayan Blunder?

The recent most Glacial Lake Outburst Flood **(GLOF)** on Feb 8, 2021 near Joshimath in Basin of Alakhnanda, Chamoli district of Uttarakhand has caused a huge loss to mankind, livestocks and national developmental projects like two Hydroelectric power projects, numerous dams and Chardham Highway projects and other human activities. This has also resulted into massive soil erosion and cloud bursts leading to destruction of the rich flora and fauna of the Himalayan range causing ecological imbalance. The area had also suffered huge damages in the past in 1991 and 1999 due to high magnitude earthquakes and tremendous devastation due to cloud burst in 2013. Large scale deforestation and rampant commercial activities do still continue unabated in these ecologically vulnerable areas of Himalayas.

Asian countries in particular are bestowed with bountiful natural resources like rivers, seas, oceans and huge beautiful mountain like The Himalayas. These are required to be protected with strict measures to ensure the sustainability of the ecosystems especially in areas like Uttarakhand which are provenly prone to disasters. All the developmental and industrial activities like tourism and Hydroelectric power generation projects must be eco-friendly and balanced manner in nature..

There is likely a general consensus regarding the role of climate changes as a catalyst in this ecologically fragile zone. The latest assessment of UN Intergovernmental Panel on Climate Changes (IPCC) has found that the glacier retreat and thawing of permafrost are projected to decrease the stability of mountain slopes. The Global Climate Risk Index 2020 has also identified India to be the fifth most vulnerable country to the effects of climate change out of 181 nations.

An obvious linkage between global geological events and development and meteorological or climate changes. The Earth systems science deals with four spheres called lithosphere, hydrosphere, atmosphere and biosphere. There exists a very close impact influence and interaction between these four spheres and especially any major change in the lithosphere such as a Super volcanic eruption or Glacial bursts have to have a telling impact on atmosphere, hydrosphere and biosphere. As a practitioner of Earth and Planetary Sciences we have noticed that palaeoclimate has a clue to the present climate change. Study of historical geology over the last 4500 millions of years of Earth's existence reveals that the past catastrophes were driven by natural reasons and not anthropogenic reasons. For the geoscientific analysis of such phenomena the observation, imagination and chronology play as key elements of geology which requires blending of lithosphere-hydrosphere-troposphere complex systems.

Thus, there is an urgent need to understand the climate science in a holistic way. The role of geological factors responsible for climate change needs to be emphasized in its true perspectives. Hope the earth science fraternity will undertake more and more focussed studies in the country and outside India and many research projects will be initiated in all countries by their government departments and universities to understand this

"The best geologist is the one who has seen the most rocks" -H.H. Read

utmost important issue of great social concern. UN agencies and IPCC can also play a pro-active role in this regard. Modern technologies, Robotics and numerical models, RS-GIS/GPS studies and relentless radar and satellite data assimilation can help us interpret the global climate scenario as well as local phenomena to mitigate the future such losses. The Univ. Department of geology of Ranchi University has also initiated a Certificate Course in Global Sustainability and climatology since this academic session to start with.

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-Chief Editors' Desk

Honours and Achievements of Faculties

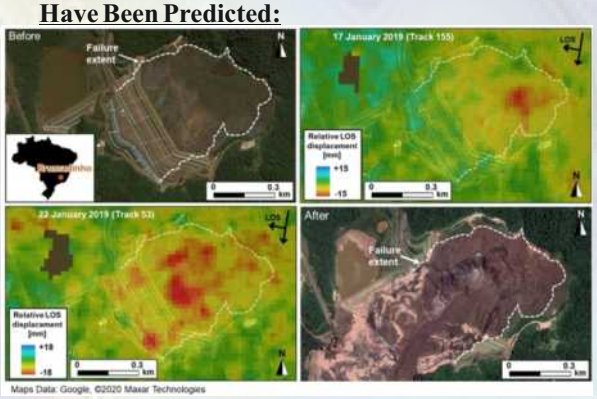
- The Hon'ble Vice-Chancellor has nominated **Dr. Bijay Singh,** Head University Department of Geology, Ranchi University, Ranchi, as the Co-ordinator for **Outreach Online Learning Programme Scheme of IIRS-ISRO (Department of Space, Govt. of India)** on 06.02.2021.

- The Departmental Council of University Department of Geology, Ranchi University, Ranchi has proposed to dedicate the **Departmental Museum I** (State Museum) in the name of **Late P.N. Bose (1885-1934)**- who was a legendary geologist of this region instrumental for the establishment of the TATA STEELS at Jamshedpur in 1907.

- Director, CIMFR has approved **Dr. (Mrs.) Chanchal Lakra** as "**Women and Minority Representative**" in the selection committee for an interview at Research Centre, Ranchi, for Project Assistant/ Associate-I during 15.02.2021 to19.02.2021.

- Mr. Suresh Kumar Samad, has been nominated and selected for the training programme entitled "Advanced Training Program on Water Resource Management and Glacier Monitoring" organised by DST center of excellence Department of Geology, Sikkim University from 15th Feb. 2021 to 07th March 2021.

- **GLOBAL NEWS:**
  - **Deadly Dam Collapse – That Caused One of Brazil's Worst Environmental Disasters – Could Have Been Predicted:**



  - One of Brazil's worst environmental disasters - a dam collapse that also killed more than 200 people - could have been foreseen with the right monitoring technology, according to a new study by the University of Nottingham and Durham University. The high-profile catastrophe took place on January 25, 2019 at a tailings dam near the Córrego do Feijão iron ore mine, close to the town of Brumadinho, in Minas Gerais state, south-east Brazil. When the dam collapsed, it caused a torrent of sludge to cover surrounding land; taking lives, destroying homes and livelihoods and polluting rivers with toxic material. Owned by Vale, Brazil's largest mining company, the tailings dam was used for more than 40 years to hold waste from the mine. There are growing concerns about the stability of this particular type of dam and a significant number need enhanced monitoring says lead author Assistant Professor Stephen Grebby from the Nottingham Geospatial Institute at the University. Dr. Grebby, an expert at mapping the Earth's surface from space, said: "Most mining companies currently rely upon ground-based sensors to monitor the stability of dams. However, these typically offer an inadequate coverage of measurements over the whole of the dam, which can make it difficult to detect movement or other signs of distress." Applying InSAR (satellite radar imaging) to check for small ground movements in and around dams is not current standard practice and this is something Dr. Grebby would like to see change. He collaborated with Durham University and University of Nottingham spin-out company Terra Motion Ltd on the study to identify whether failure at Brumadinho could have been foreseen. They used an advanced InSAR technique called Intermittent Small Baseline Subset (ISBAS), developed by the University of Nottingham and Terra Motion, which can help overcome the limitations faced when using some of the more conventional InSAR techniques over vegetated terrain. Dr. Grebby adds: "Our ISBAS InSAR results revealed that different areas of the dam were moving at different rates and some of these were seen to accelerate suddenly during the two months preceding the collapse. "If monitored routinely, using the ISBAS InSAR technique, the failure date could have

- been predicted to within a week of it happening. This could have led to more in-depth monitoring or other mitigation measures to avert the loss of life and environmental disaster that tragically unfolded." Professor David Toll, Co-Director of the Institute for Hazard, Risk and Resilience at Durham University, said "Identifying an acceleration of ground movements during a period of wetting, just prior to the failure, helped to corroborate the anticipated failure mechanism. The collapse of the tailings dam can be explained by a reduction in suction in the tailings contributing to internal strains that could induce static liquefaction in the brittle materials." Professor Jon Gluyas, Executive Director of Durham Energy Institute at Durham University said, "The novel use of InSAR satellite data to monitor the stability of dams is a real breakthrough as it means that you don't need to instrument the ground in and around the dam to monitor it. Monitoring is thus no longer solely in the hands of the operating company." The researchers are now looking to develop the technology as a software that could be offered to the mining industry, which is looking out for a reliable, early warning system to predict the risk of imminent collapse at tailing dams.

Courtesy: SciTechDaily

Old Faithful just got even older! Yellowstone hotspot dates back at least 50 MILLION years - 33 million years older than previously thought, scientists say:

Poto Credit: BrianJonesadventure

The source of heat that powers the volcanic system of Yellowstone National Park in the western US dates back to at least 50 million years ago, scientists say. Known as Yellowstone hotspot, this vast volcanic system has long been thought to have initiated about 17 million years ago. 'A growing volume of geological evidence', however, suggests Yellowstone hotspot has been around much longer - at least 50 million years and maybe even earlier, US experts now reveal. The geologists claim there are chemical and physical traces of Yellowstone hotspot in the ocean waters of the Pacific Northwest many hundreds of miles away. 'Through years of careful accumulation of data and evidence, however, the case has become quite strong - the Yellowstone hotspot is a long-lived feature that dates back to at least 50 million years ago, and perhaps even earlier. The Yellowstone park sits above a melting anomaly within the Earth, called a 'hotspot'. 'This hotspot is powered by a plume of hot (but not molten) material that may extend as deep as the boundary between the planet's mantle and core,' the USGS experts explain. 'As hot material rises buoyantly, it decompresses and melts near the surface, generating magma that feeds the magma chambers beneath Yellowstone and provides the heat that powers the many geysers and hot springs.' Erupting an average of 130 feet into the air at 200°F the thermal attraction could prove fatal to anyone in close proximity when it blows. Researchers explain that Yellowstone hotspot is stationary relative to the moving tectonic plates that make up Earth's surface. Because Yellowstone hotspot is stationary, it leaves its mark over different areas- essentially leaving a trail of historical activity as the North American plate moves.

As the North American plate moves to the southwest over the hotspot, the centre of volcanic activity appears to be migrating to the northeast. 'There is thus a trail of volcanism that stretches to the southwest from present-day Yellowstone across the Snake River Plain of southern Idaho, getting progressively older along the trend,' USGS experts say. The start of the trail is the 17-million-year-old McDermitt volcanic system and similar-age volcanism in northern Nevada and southern Oregon. As there were no obvious signs of older volcanic systems to the southwest of McDermitt, the trail essentially 'went cold' - which explains the generally accepted 17-million-year estimate for the origin of Yellowstone hotspot. Some of the lava from these eruptions was scraped up and welded onto the North American coastline by subduction – where two plates converge, and one plate is thrust beneath the other – and still more exists on the ocean floor offshore of the Pacific Northwest.

This similarity indicates that the two large lava flow provinces are related and the Siletzia terrane may have formed due to 'an early version of the Yellowstone hotspot'. Researchers add that volcanism from Yellowstone hotspot continued to leave its mark on the North American plate as the latter continued to move. But these eruptions declined dramatically about 22 million years ago and stopped altogether about 20 million years ago, beginning a hiatus of several million years. This was likely due to a 'slab of previously subducted ocean crust' trapped beneath the North American continent, where magma was still being generated, but it was backing up behind the barrier.

'This barrier effectively blocked the flow material from the Yellowstone hotspot to the surface,' USGS experts say. 'The accumulated magma finally punched through 17 million years ago, breaking the ancient slab and resulting in the Columbia River Basalt eruptions. 'Then began the progression of volcanic calderas to present-day Yellowstone.' Victor E. Camp from San Diego State University and Ray E. Wells from USGS have detailed the research further in a paper published in GSA Today.

Courtesy: Mail online

- **NATIONAL NEWS**
- **1. Uttarakhand Glacier Burst:**

Uttarakhand Glacier Burst: A large piece of Nanda Devi glacier broke off on a chilly winter morning of February and fell into a river, triggering an avalanche and glacial lake outburst flood (GLOF). Another massive tragedy struck Uttarakhand on February 7, 2020 when a glacier burst took place in Chamoli district of the state. A large piece of Nanda Devi glacier broke off on a chilly winter morning of February and fell into a river, triggering an avalanche and glacial lake outburst flood (GLOF) in Dhauli Ganga, Rishi Ganga and Alaknanda rivers. Over 150 people are feared missing after the flash flood. This is a second massive blow for the Himalayan state after the 2013 Kedarnath Tragedy. Two hydroelectric power projects, namely, NTPC's Tapovan-Vishnugad hydel project and Rishi Ganga Hydel Project got completely washed away along with five bridges and scores of houses after the waters came rushing in.

Photo Credit: Jagran Josh

Glacial Outburst

When glaciers break off, the space underneath them develops into a glacial lake filled with water. The breaking off of the glacial lake is termed as Glacial Lake Outburst Flood (GLOF) or glacial outburst. The glacial outburst occurs when the water level of lake rises or when the glacier retreats. The occurrence of GLOF is very rare. Some experts are calling the Uttarakhand glacier burst as the GLOF. However, the researchers and scientists are yet to investigate the real reason behind the incident.

Earthquakes, erosion, volcanic eruptions, build of water pressure or an avalanche of heavy snow can cause the glaciers to burst. The glacier outburst can also happen after the displacement of massive water pocket in a glacial lake when an adjacent glacier retreats into it.

Uttarakhand glacier burst

In case of Uttarakhand glacier burst tragedy, it is not yet clearly known that what caused the outburst of Nanda Devi glacier. As per the experts, the breaking off of this huge chunk of Nanda Devi glacier into the Dhauli Ganga river is a rare incident as the Google Earth images and satellite did not show any glacial lake underneath the glacier that broke off. Usually, Glacial Lakes are formed beneath the big glaciers and flow within these massive ice sheets. At times, these lakes create enough pressure causing the glacier chunks to break off. The glacial lakes are not like usual lakes; they comprise ice boulders that have potential of bursting the glacier banks. In Uttarakhand glacier burst case, it is believed that the watepockets might have developed within the Nanda Devi glacier that led to this incident. Some experts also link this tragedy to climate change and global warming. High temperatures and less of snowfall can lead to increase in melting of glaciers, causing glacial lake water to rise beyond the levels. A 2019 study published in the Science Advances journal had warned that the Himalayan glaciers are melting at an alarming speed and the 2013 Kedarnath-like tragedy may occur again. The study had warned that glaciers of the Himalayas have been melting twice as fast since the beginning of this century due to the climate change. The study was based on satellite observations of 40 years across India, Nepal, Bhutan and China. The study showed that glaciers have been losing half of their ice every year and the formation of glacial lakes had increased by 50% since 2000. The formation of increased number of glacial lakes pose an existential threat to Himalayan glaciers and the rivers flowing from near them.

The 2013 Kedarnath tragedy was caused by the cloudbursts that led to severe floods and landslides. In case of Uttarakhand Glacier Burst, it is yet to know what actually triggered the glacier burst at Chamoli district of Uttarakhand Courtesy: Jagran Joshr

- **ONGC to usher in India's first geothermal energy at Ladakh:**

The Ministry of New & Renewable Energy has provided a letter of support to OEC vide letter dated April 9, 2020, for the Ladakh Geothermal Project.

This project of ONGC will put India on geothermal power map of the world. Geothermal energy is clean and is available 24 hours a day, 365 days a year. Geothermal power plants have average availabilities of 90 per cent or higher, compared with about 75 per cent for coal plants.

State-owned Oil and Natural Gas Corporation (ONGC) on Monday said it will implement India's maiden geothermal field development project in Ladakh that will use the heat generated by the Earth's core to generate clean energy.A memorandum of understanding (MoU) to formalise this has been inked by ONGC Energy Centre (OEC) with the Union Territory of Ladakh and Ladakh Autonomous Hill Development Council, Leh on February 6," the company said in a statement.

. This project of ONGC will put India on geothermal power map of the world. Geothermal energy is clean and is available 24 hours a day, 365 days a year. Geothermal power plants have average availabilities of 90 per cent or higher, compared with about 75 per cent for coal plants. "Geothermal resource development can revolutionise farming in Ladakh, which is now totally dependent for supply of fresh vegetables, fruits from outside the UT round the year. Further, direct heat energy applications make it most relevant to Ladakh," the statement said. ONGC has planned this field development in Ladakh in three phases. Phase-I involves exploratory-cum-production drilling of wells up to 500 metres depth and setting up of a pilot plant of up to 1 megawatt (MW) power capacity. Phase-II would involve a deeper and lateral exploration of the geothermal reservoir by drilling of an optimal number of wells and setting up of a higher capacity demo plant and preparing a detailed project report. Phase-III would involve commercial development of the geothermal plant. "Puga and Chumathang in Eastern Ladakh happen to be the most promising geothermal fields in India. These areas were discovered in the 1970s and initial exploratory efforts were made in 1980s by the Geological Survey of India (GSI). "But, development efforts to exploit geothermal energy by the government as well as private agencies did not materialise for some reasons. After the creation of UT Ladakh, efforts were taken up earnestly by ONGC Energy Centre, culminating in this MoU," the statement said. Geothermal energy is an energy source that is stored in the form of heat beneath the earth's surface, which is clean, renewable, sustainable, carbon-free, continuous, uninterrupted and environment-friendly. It is the only renewable energy available 24×7 to mankind not requiring storage and unaffected by day-night or seasonality variance. India has seven geothermal provinces and a number of geothermal springs. Geothermal resources in India have been mapped by GSI and broad estimate suggests that there could be 10 gigawatt (GW) geothermal power potential, as per the Ministry of New and Renewable Energy (MNRE). ONGC, with its mission of 'retaining a dominant position in the Indian petroleum sector and enhancing India's energy availability and recognising the fact that petroleum resources are dwindling worldwide', has taken steps to look at all forms of alternative energy. It founded ONGC Energy Centre Trust (OECT), under the Indian Trust Act, on August 8, 2005, with a mandate to undertake or assist in programmes/projects of fundamental and applied research. It will help in improving and developing commercially viable energy mediums and sources beyond hydrocarbons, especially in clean and/or renewable energy options. The Ministry of New & Renewable Energy has provided a letter of support to OEC vide letter dated April 9, 2020, for the Ladakh Geothermal Project.

Courtesy: The Financial Express

- **STATE NEWS:**
  - **Preparation to extract Coal Gas from CCL's Ashoka Project:**

Photo Credit: Zimbio.com

The Coal Ministry has set an aim to extract gas from five coal blocks in the next phase (Phase-II). One of these coal blocks is also from the Jharkhand (Ashoka Project). The target is to extract 1 MT from Shipanchal (West Bengal) and Utkarsh (Maharastra), 1.5 MT from Mahamaya (Chattisgarh) and 4 MT from Neyvelli (Taminadu) per year. It has low ash content in West Bengal, Maharastra and Mahamaya. The Ashoka has high ash content. From here, 2.5 MT of coal will be used every year. The Coal Ministry has conducted a study of these mines. Its establishment is considered to be financially profitable. The Coal Ministry can extract methane gas at three coal blocks at any time. The process is almost complete. It has Jharia, Raniganj and Sohagpur coal bed methane blocks. Jharia is in Bharat Coking Coal Limited (BCCL), Raniganj is in Eastern Coalfields Limited (ECL) and Sohagpur is in South Eastern Coalfields Limited (SECL). At most 25 billion cubic meters can be extracted from Jharia. Raniganj has capacity of 2.2 and Sohagpur has 0.7 billion cubic meters. Tender process is under process to commercially extract gas from the Jharia. The agency will be engaged in this work after the tender is finalized. The Government of India has targeted to convert 100 MT coal into gas by 2030. There are plans to develop the Talcher and Dankuni plants in the first phase. There will be an investment of 13277 crore in Talcher of Odisha. For this, an agreement has been completed between Coal India, Rashtriya Chemicals & Fertilizers (RCF) and Gas authority of India Limited (GAIL). All will spend 28%. The remaining 72% amount will be taken as loan from the bank. There is a plan to invest 5800 crore rupees on Dhankuni plant. Investor is being searched for this. It will be operated through BOO (Built, Own and Operate) model.

Courtesy: Prabhat Khabar

Faculties of the Department

1. Name : Dr. Nitish Priyadarshi
2. D.O.B. :22/8/1966
3.Date of PhD. registration-1993(Dec)
4. Topic: Distribution and Behaviour of the trace elements in Permian coals of Bachara, North Karanpura coalfield, Dist. Hazaribagh, Bihar and their significance in health and environmental problems.
5. Supervisor: Dr. Guneshwar Jha
6. Year of PhD. award: 23/12/1997
7. Years of Experience - 20 years

1. Name :Dr. Jinia Nandy
2. D.O.B. :15/01/1984
3.Date of Ph.D. registration : 07/09/2009
4.Topic:Study of Kadiri greenstone Belt and adjacent granitoids, Eastern Dharwar craton, Southern India: Petrogenesis and tectonic setting
5. Supervisor: Dr. Sukanta Dey
6. Year of PhD. award:30th April, 2014
7. Years of Experience - 3 Years

1. Name : Dr. Neha Mallick
2. D.O.B. :5 September 1983
3.Year of Ph.D. registration-2012
4. Topic: RS-GIS based Hydrogeomorphic Characterisation of Groundwater Recharge Sites In Bhera River Watershed, Ranchi and Ramgarh Districts, Jharkhand, India.
5. Supervisor: Dr (Prof.). Uday Kumar
6. Year of Ph.D. award:2015
7. Years of Experience - 6 years

1. Name :Dr. Jugnu Prasad
2. D.O.B. :10.06.1984
3.Date of Ph.D. registration-07.07.2010
4. Topic:Tectonomagmatic Evolution of Peridotitic Komatiite Around Daltonganj, Palamau District, Jharkhand and its Relevance to Regional Geological Settings.
5.Supervisor: Prof. Deepak Kumar Bhattacharya
6. Year of Ph.D. award:2013
7. Years of Experience - Research:12,Teaching :6

Non-Teaching Staff

Name :Sanjay Kumar Sinha
D.O.B :01.08.1963
Post :Artist
Date Post : 21.05.1983
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Name :Barun Singh
D.O.B :15.03.1968
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Date Post :03.12.1989
Qualification :Matric

Name :Ram Tirkey
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Date Post :21.09.1982
Qualification :Non-Matric

Name :Kiran Hembrom
D.O.B :02.02.1971
Post :Safai Karmi
Date Post :24.05.2006
Qualification : Non-Matric