Announcement
3rd Circular

Central University of Himachal Pradesh
&
Geological Society of India
Cordially invites you to be the part of
National workshop on

GEODYNAMICS IN HIMALAYA
&
DISASTER MANAGEMENT

6-8 Nov. 2023
&
Annual Convention of Geological Society of India
6th Nov. 2023 (afternoon)

Venue:
Auditorium
Central University of Himachal Pradesh

About The Event

The Dhauladhar Mountain is one of the most spectacular places known for its scenic beauty. Apart from this aspect, it is also one of the favorite's topics of geological research for scientific community. The Dhauladhar Mountains are extending from Dalhousie's in the west to Mandi in the east covering a length of about 200 km. The sothern slopes of the Dhauladhar range have whispering pines which speak a million words. The beauty of the flora and fauna is unmatchable. The natural beauty spreads like a big, beautiful carpet covering the majestic mountains. Watching the amazing sunrise and sunset is a blessed feeling. Geologically, the region is unexplored so far as the scientists and researchers could not be attracted to this part of mountains which has complete field geology in its lap. The Kangra valley which is so beautiful in its setting have lot of hidden information on past earthquakes, archeological and on past climatic events as characterized by the presence of longitudinal and transverse faults which poses great threat to the region from natural hazards. The GPS observation of the Himalayan region has shown variation in the convergence rate from west to east and indicated that lot of energy had been accumulated which can lead to future earthquake in any part of Himalayan segments. Seismic vulnerability of India is well known as more than 60% of its area lies in high hazard zones due to the presence of major active faults in its plate boundaries and continental interiors, which produced large earthquakes in the past and have potential to generate major earthquakes in future.

Further, the frontal part of the Himalaya is housing lot of urban population and prone to seismic hazards and site amplification factors, thus there is a need for resilience infrastructure to reduce disaster risk from ensuing earthquakes. Identification and characterization of active faults and deciphering their seismic potential are of vital importance in seismic hazard assessment of any region. The Himalayan region is also housing number of power projects and have a major concern of their safety due to the natural hazards. Recently Uttarakhand region had witnessed glacial outburst due to which Rishi Ganga Hydel and Tapovan Hydel projects suffered a lot. Thus, glacier lake outburst floods (GLOFs) have become emblematic of a changing mountain cryosphere. The Himalaya suffered the highest losses from these sudden pulses of meltwater but lack a quantitative appraisal of GLOF hazard. This necessitates a fresh appraisal of the operative geodynamic processes, sustainable exploration of mineral & energy resources, meteorological changes, climate changes and global warming, seismotectonic models, level of stress accumulation, current seismicity patterns to identify zones prone to such natural disaster in Himachal Pradesh. To make comprehensive assessment of the progress in these vital issues, a 3 day program is planned at Central University of Himachal Pradesh, Dharamshala in association with Geological Society of India to coincide their Annual General meet on 6th to 8th November 2023. The program is also planned to evolve different projects on different natural hazards focusing on Himachal Pradesh after due recommendation of the experts during valedictory session. One session of the workshop will focus on mineral/Natural resources of Himachal Pradesh level focusing recent landslide issues which had caused lot of devastation in 2021 in the entire Uttarakhand and Himachal state and their mitigation measures. The last half day will be focused on field work around Dharamshala

Chief Patrons

Prof. S. P. Bansal
Hon'ble VC, CUHP

Dr. Harsh K. Gupta
President, GSI

Dr. Srivari Chandrasekhar
Secretary, DST

Dr. M Ravichandran,
Secretary, MoES

Sh Vivek Bhardwaj
Secretary, MOM

National Advisory Committee

Dr. B.K Bansal-Vice President, Geological Society of India
Dr. V.P. Dimri – Former Director, NGRI
Dr B. Mahabaleswar-Vice President, Geological Society of India
Dr. K.V. Subbarao-Vice President, Geological Society of India
Dr Manish A Mamtani, Vice President, Geological Society of India
Prof. G. M. Bhat, Editor, Geological Society of India (GSI)
Dr. Kamal Kishore-Member, National Disaster Management Authority
Prof R.P.Tewari, Vice Chancellor, CU Panjab
Dr. Janardan Prasad, Director General, Geological Survey of India
Dr. K.V. Krishnamurthy-Secretary, Geological Society of India
Mr N Rajendran, Secretary General Geological Society
Dr. Kalachand Sain-Director, WIHG and Council member GSI
Dr Prakash Kumar- Director, NGRI
Dr Dilip Saha-Indian Statistical Institute and Council member GSI
Dr. V.M Tiwari- Former Director NGRI
Dr O.P. Mishra, Director, NCES, MOES, Delhi
Dr Sunil Kumar Singh, Director, NIO, Goa
Dr Thamban Meloth, Director, NCPOR, Goa
Dr Sushma Rawat, Director Exploration, ONGC
Dr Surya Prakash – Scientist, National Institute of Disaster Management
Member Secretary, HIMCOSTE, Govt. of Himachal Pradesh
Member Secretary, H.P. State Council of Science and Technology
Dr V.N. Vasudev, Treasurer, Geological Society of India
Dr. R. Baskar, Professor, IGNOU and Council member GSI
Prof Pradeep Kumar, CUHP
Prof Vishal Sood, CUHP
Prof Suman Sharma, CUHP
Prof Sunil Thakur, CUHP

Exhibition Stalls

An exhibition of geosciences and allied instruments and services will be organized during the workshop. The exhibitor will have scope to make video scrolling not exceeding 2 to 3 minutes during lunch hours. The Exhibition stall (9x9 ft) fee: Rs. 75,000/-.

Local Organizing Committee

Chairman
Prof. Ambrish Kumar Mahajan
Co-convenors
Dr. Chinmaya Maharana
Dr. Alok Kumar Pandey
Members
Prof Deepak Pant
Dr. Ankit Tandon
Dr. Dilbag Singh

Registration Form

Name: Prof./Dr./Mr./Ms:……

Designation:……

Organization:……

E-mail:……

Presenting a Paper

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Title of the Paper:

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Phone: ……Fax: ……

Accommodation required: Yes /

No……

Details of the Bank Draft:

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Draft No. & Date: …….

Amount: Rs. ……

Issuing Bank: ……

Signature

About the Central University of Himachal Pradesh

Central University of Himachal Pradesh was established in 2010 under the central University act 2009. The aim of the university is to strive for inclusive access to excellence in higher education and research to emerge as premier institution. The Department of Environmental Science, School of Earth and Environmental Sciences offers Master's as well as PhD Degree. The department is dedicated to protect the Himalayan Environment by training the students and achieving excellence in the modern and relevant scientific research in the field of Environmental Science.

About Dharamshala

Dharamshala city is located 18 km North of Kangra town. It is a part of District Kangra. Dharamshala is also the District Headquarter. The town Dharamshala is well connected both by road and air from New Delhi and Chandigarh and also by rail from Pathankot. The town is approx. 100 km from Pathankot, approx. 250 km from Chandigarh and approx. 500 km from New Delhi which are well connected from rest of the country. The climate during November is pleasant, however alight warm clothing is required. The venue is located approx. 30 km away from Dharamshala on Mandi – Pathankot highway (NH-20) towards Pathankot.

Major Themes

Geosciences & Geodynamics of the Himalaya
Tectonics & Evolution of the Himalaya
Seismic Hazard & Seismic micro zonation Studies
Active fault mapping
Hydrocarbon
Key issues in Himalayan geological disaster
Natural Hazards of Himachal Pradesh
Mineral & Energy resources of Himalaya region

Abstract Volume & Souvenir

The national workshop on **Geodynamics in Himalaya & disaster management and Annual Convention of Geological Society of India** will bring out a volume containing abstracts, messages from luminaries, geoscientific work of eminent scientists/researchers. The full-length articles & research papers will be published as a special publication of Geological Society of India. We will also bring out a souvenir reflecting achievements of different research institutes, universities and other organizations (Industries & Instrument Manufacturers) who are willing to highlight their achievements.

The tariffs for publication of Advertisements in abstract volume are listed below:
Back Cover: Rs. 1,00,000/-
Inside front Cover: Rs. 75,000/-
Inside back Cover: Rs. 50, 000/-
Inside Full Page: Rs. 25,000/-

The tariff for publication of achievements of institution/organization are listed as below:

Back Cover: Rs. 50,000/-
Inside Full-Page color: Rs. 25,000/-

Registration amounts and all other payments who are interested in publication of their products/Details of their organization need to send necessary information to: geohim23cuhp@gmail.com by 31st July, 2023. The tariff has to be paid/transfer in favors of Finance officer payable at Central University of Himachal Pradesh, Dharamsala.
The accounts details are as under:
Name: Finance officer, Central University of Himachal Pradesh
Bank Name: Canara Bank, Dharamshala
Acctt. No: 2062101009761
IFSC code: CNRB0002062

Registration Fee:

Delegates:	Rs. 3000/-
Students and Research Scholars:	Rs. 1000/-
Representatives from Industries:	Rs 10000/-

Registered participants will receive Seminar materials, Tea and Lunch during the program. The registration fee should be paid as bank draft drawn in favor of "Finance Officer, Central University of Himachal Pradesh, Dharamshala".

Abstract

Interested participants are requested to send their abstracts in Times new roman style with font size 12 (not more than 500 words) to the Chairman of the seminar before 31st July 2023. For the publication, selected full length paper after peer review would be published in Journal of the Geological Society of India. Scientific posters are also invited.

Calendar of Events:

Deadline for submission of: -
Abstracts & Registration form: 31st July 2023
Communication of acceptance: 31st August 2023
Submission of full length paper: 30th September 2023
Venue: Auditorium CUHP, Dharamshala
Send your all correspondence at below mentioned email Id: geohim23cuhp@gmail.com

Accommodation:

Accommodation is available in the Hotels which can be arranged only on advance payment. The city hotel tariffs are from Rs. 3000 to Rs. 5000. For more information related to nearby interesting locations, you can refer to this article: https://www.fabhotels.com/blog/places-to-visit-in-dharamshala/

Contact: All correspondence should be addressed to:
Prof. Ambrish Kumar Mahajan (Chairman)
Department of Environmental Sciences, School of Earth and Environmental Sciences, Central University of Himachal Pradesh Dharamshala-176215
Distt. Kangra- Himachal Pradesh Mob: 9418648086
geohim23cuhp@gmail.com

Session Report Day1

GEO HIM-23

National Workshop on Geodynamics in Himalaya and Disaster Management

Plenary Session

Coordinator: Prof. A. K. Mahajan

The plenary session of the workshop was attended by distinguished speakers who shed light on critical issues concerning the Himalayan region and disaster management.

SPEAKER -1

Topic: The Himalayan Earthquake Belt, Seismic Gaps, and related issues.

Speaker: **Padam Shri Prof. H. K. Gupta** from CSIR-National Geophysical Research Institute, Hyderabad.

Professor H. K. Gupta's presentation primarily revolved around seismic activities and earthquakes. He delved into the intricacies of the Himalayan belt, focusing on the seismic gaps within the region. His discussion encompassed several vital aspects, including the earthquake campaign, school sanitization programs, ensuring the safety of essential infrastructure from seismic activities, the establishment of an earthquake early warning system in Uttarakhand and IIT Roorkee. Notably, he proposed four key recommendations: the annual celebration of an earthquake day, educating school children about earthquakes, promoting public engagement and participation, and advocating for the construction of earthquake-resistant buildings.

SPEAKER -2

Topic: Delineating Groundwater for future India.

Speaker: **Prof. Abhijeet Mukherjee** from IIT Kharagpur (Santi Swarup Bhatnagar Awardee).

Prof. Abhijeet Mukherjee’s discourse centered on the crucial role of groundwater in shaping India's future. He highlighted the pressing issues related to groundwater, emphasizing its significance in various domains. These included addressing water scarcity issues, concerns about water quality and pollution, agricultural applications, and collaborative efforts with

institutions like NASA-UT(CSR)-GFZ/DLR in conducting gravity recovery and climate experiments. He further elaborated on the working principles for estimating changes in groundwater storage, discussing groundwater drought, scientific reports, and strategies for the replenishment of groundwater. Conclusively, Prof. Mukherjee emphasized the importance of policy interventions aimed at effectively managing and utilizing groundwater resources.

The session brought to the forefront the multifaceted challenges and potential solutions regarding seismic activities in the Himalayas and the crucial role of groundwater in India's future. It encouraged active discussions and proposals for future directions in these critical areas.

Theme: Geodynamics of Himalaya

Technical Session - 1

Chairman: Mr. D. C. Rana (IAS)

Co-chairman: Dr. O. P. Mishra

The technical session focused on the in-depth exploration of the geodynamic aspects of the Himalayas, chaired by Mr. D. C. Rana and co-chaired by Dr. O. P. Mishra.

SPEAKER - 1

Topic: Fractal Approach for Himalayan Earthquakes

Speaker: **Dr. V. P. Dimri** (Scientist CSIR-NGRI, Hyderabad)

Dr. Dimri's presentation primarily revolved around the application of fractal approaches to understanding Himalayan earthquakes. He introduced the concept of fractals, discussing the Butterfly effect and fractal objects, emphasizing their role in understanding seismic activities. The essence of fractals and power laws in seismology were detailed, focusing on the seismic events in the Himalayan region over the last 100 years. Dr. Dimri highlighted the frequency-size distribution of Himalayan earthquakes and explored the multifractal (heterogeneous) properties of the aftershocks following the Nepal earthquake in 2015. He also discussed the correlation between the fractal dimension and the energy released during large earthquakes, contextualizing it within the background seismicity. The session concluded with a comprehensive summary encompassing the key points discussed.

SPEAKER - 2

Topic: How real is the threat of a great Earthquake along the Himalayan arc.

Speaker: **Prof. B. R. Arora** (Wadia Institute of Himalayan Geology, Dehradun)

Prof. Arora's presentation addressed the imminent threat of significant earthquakes along the Himalayan arc. He discussed the rupture zones of major earthquakes (M>8) along the Himalayan arc, focusing on the seismic gaps and the distribution of instrumentally recorded and paleo-seismologically inferred great earthquakes. The discussion included Indian plate motion, rates of convergence, slip potential, and interseismic coupling along the main Himalayan region. Prof. Arora also explored the distribution of earthquakes of varying magnitudes along the Himalayan arc and delved into topics such as dehydration reactions in amphibolite-grade metamorphic rocks, the mechanism for trapping fluids in the mid-crust, and the seismogenic implications of fluid involvement. The session concluded with a discussion on reconciling differences between seismological and GPS-based slip rates.

SPEAKER - 3

Topic – Challenges in Ground Response Analysis at Sites Covered with Alluvium.

Speaker: **Dr. Sumer Chopra** (Institute of the Seismological Research Department of Science and Technology, Govt of Gujarat)

Dr. Chopra began by delineating the seismic hazard assessment protocol, shedding light on the effects of damage during earthquakes, particularly concerning the influence of local site conditions on ground motions. His presentation highlighted the influence and dependence of soil response, discussing various types of site response analyses. Furthermore, Dr. Chopra elaborated on nonlinear effects and presented evidence supporting this phenomenon. He discussed the approximate ranges of applicability of equivalent linear and nonlinear site-response analysis, emphasizing the complexities involved in nonlinear soil response. Dr. Chopra's presentation significantly contributed to the understanding of challenges in ground response analysis at alluvium-covered sites, offering valuable insights into the complexities and methodologies involved in assessing seismic risks in such terrains. The practical examples presented added depth and context to the theoretical discussions, providing a holistic perspective on the subject matter.

The technical session provided an insightful understanding of the geodynamics and seismic threats in the Himalayan region, showcasing diverse perspectives and research approaches towards comprehending and mitigating potential seismic risks in the area.

Technical Session - 2

Chairman: Dr. V. P. Dimri

Co-Chairman: Prof. B.R. Arora

The second technical session of the workshop addressed an array of critical subjects focusing on disaster resilience, seismic hazards, crustal structure, dynamic triggering of earthquakes, seismic structure beneath the Kopili Fault Zone, and landslide occurrences in the Himalayan region. Distinguished experts presented comprehensive insights on these vital topics, shedding light on various challenges and mitigation strategies.

SPEAKER-1

Topic: Disaster Resilience Infrastructure in Himalayan Region: A Crucial Sustainable Mitigation Measure

Speaker: **Prof. A. K. Mahajan**, CUHP

Prof. Mahajan underscored the paramount significance of disaster resilience infrastructure in safeguarding communities, economies, and ecosystems in the Himalayan region. He elaborated on the significance of such infrastructure designed to withstand various hazards, such as earthquakes, floods, tsunamis, and hurricanes. Integration of resilience into infrastructure development aligns with economic prosperity and sustainable development principles, as emphasized in the Sendai Framework 2015. This approach can mitigate disaster impacts, reduce economic losses, enhance community safety, and contribute to the long-term welfare of society.

SPEAKER-2

Topic: Seismic Microzonation: A Tool of Earthquake Risk Mitigation and Safety

Speaker: Dr. O.P. Mishra (Director, NCS, Minister of Earth Sciences)

Dr. Mishra highlighted methods to reduce seismic hazards through prediction, early warning systems, and the development of earthquake-resistant structures. He referred to the 2005 Muzaffarabad earthquake as the 2nd most damaging earthquake of the century and pointed out that approximately 59% of India's land area is vulnerable to seismic hazards. He emphasized the role of the National Centre for Seismology as a nodal agency in conducting seismic microzonation in several Indian cities.

SPEAKER-3

Topic: Imaging the Crustal Structure at the Northeast Corner of the Indenting Indian Plate in the Eastern Himalayan Syntaxis and its Implications for Understanding Seismotectonics

Speaker: **Dr. Devajit Hazarika** (Wadia Institute of Himalayan Geology)

Dr. Hazarika provided insights into the crustal structure in the Eastern Himalayan syntaxis using receiver function analysis. He discussed seismicity, focusing on the spatial distribution of seismic events around the tidding-tuding suture zone, revealing seismically active crust up to a depth of around 40km. Contrary to the western and central Himalayas, the Main Himalayan Thrust (MHT) does not play a major role in seismogenesis. Instead, seismicity in the Indo-Burma Ranges (IBR) extends to a depth of 200 km, suggesting active subduction.

SPEAKER-4

Topic: Dynamic Triggering in the Himalayan Belt

Speaker: **Dr. Abhey Ram Bansal** (CSIR-National Geophysical Research Institute)

Dr. Bansal delved into the phenomenon of dynamic triggering of earthquakes in the Himalayan belt. He delineated the distinctions between triggered earthquakes and tremors, emphasizing the short durations of triggered earthquakes and the role of static and dynamic stresses. He presented various methodologies for earthquake analysis and highlighted instances of dynamic triggering across the Himalayan belt.

SPEAKER-5

Topic: 3-D Seismic Structure Beneath the Kopili Fault Zone & its Implications for Local & Regional Tectonics

Speaker: **Dr. A. P. Singh** (National Center for Seismology)

Dr. Singh discussed the significance of the Kopili fault zone, an area prone to large and moderate earthquakes. Using tomographic methods, he identified anomalies in seismicity, suggesting specific zones as potential sources of seismic events associated with highly compact and competent rocks.

SPEAKER-6

Topic: Landslide in Northwestern Himalayas & Strategies for Mitigation and Disaster Risk Reduction

Speaker: **Dr. Harish Bahuguna**

Dr. Bahuguna highlighted the various geohazards causing extensive socio-economic and ecological damages globally, emphasizing India's vulnerability to natural disasters. He specifically focused on landslides, their triggers, and the most affected areas in India, particularly in the Himalayan Mountain belt, Western Ghat, and Nilgiri hills. He discussed the Geological Survey of India's comprehensive perspective plan aimed at fulfilling the United Nations' Sustainable Development Goals.

The technical session encompassed an extensive spectrum of topics related to disaster resilience, seismic hazards, crustal structure, earthquake triggering, and landslide occurrences in the Himalayan region. The presentations offered comprehensive insights, contributing significantly to the understanding and mitigation of risks associated with geohazards in the area.

Session Report Day2

GEO HIM-23

National Workshop on Geodynamics in Himalaya and Disaster Management

Technical Session- 3

Theme: Seismic Hazard and Microzoning

Chairman: Dr. H.K. Gupta

Co-Chairman: Dr. Harish Bahuguna

The technical session on Seismic Hazard and Microzoning was an insightful event featuring four distinguished speakers shedding light on various critical aspects of geology and seismology within the Himalayan region. The event encompassed discussions on seismic activities, fault analysis, liquefaction studies, and landslide warning systems in the context of the Indian Himalayas.

Speaker 1: **Prof. Soumyajit Mukherjee** (IIT Mumbai)

Topic: Arc-parallel shears in collisional orogens: Global review and paleo-stress analyses from the NW Lesser Himalayan Sequence.

Prof. Mukherjee elaborated on the presence and characteristics of arc-parallel shears in the Garhwal lesser Himalayas, providing comprehensive insights into the paleo-stress analysis and its relevance within the Himalayan context. His discussion highlighted the documented orogen-parallel extension and compression, suggesting historical activity that is no longer active due to geographic constraints.

Speaker 2: **Dr. Manoj Kumar** (GIS)

Topic: Identification of thrust coupled normal fault and its implication in the landslide zone of Himachal Pradesh.

Dr. Kumar's presentation centered on the identification and implications of thrust coupled normal faults in Himachal Pradesh, emphasizing the tectonic movements and subsequent adjustments. He provided a detailed map of the litho-tectonic domains of Himachal Himalaya, shedding light on their significance in understanding landslip zones and showcased real geological sections, culminating in the standard tectoco-structural configuration.

Speaker 3: **Dr. H.S. Mandal** (NCS, MoES)

Topic: Identification of earthquake-induced soil liquefaction of Yamuna soil using liquefaction potential index of NCT of Delhi– A case study.

Dr. Mandal's presentation delved into the identification and criteria of soil liquefaction caused by seismic activities, employing mathematical expressions, conventional methods, and laboratory analyses. His case study specifically focused on the NCT Delhi and the Yamuna riverbank, emphasizing the potential risks and methodologies to identify and assess liquefaction.

Speaker 4: **Dr. Mahesh Thakur** (Panjab University)

Topic: The Development of Landslide Early Warning System (LEWS) for Manikaran, NW Himalaya, India.

Dr. Thakur presented the development and functionality of a Landslide Early Warning System (LEWS) designed for Manikaran in the NW Himalayas. Utilizing 3D demography and rockfall simulations, he demonstrated the identification of rockfall-prone areas, focusing on the rock-rock interaction and propagation of rockfall, crucial for early warning systems.The presentations collectively underscored the diverse geological challenges and seismic hazards prevalent in the Himalayan region. The session provided valuable insights for further research, risk mitigation strategies, and the development of systems to monitor and predict seismic events, landslides, and soil liquefaction in the region.

This comprehensive session was instrumental in advancing our understanding of seismic hazards and microzoning in the Himalayas, serving as a catalyst for future research and mitigation efforts in the region.

Technical Session Report- 4

Theme: Advancements in Geological and Seismic Studies

Chairman: Dr. V.P. Dimri

Co-Chairman: Prof. B.R. Arora

The technical session on geological and seismic studies featured a cohort of esteemed speakers who provided a comprehensive understanding of diverse geological aspects in the Indian subcontinent. The presentations covered a wide array of topics, from structural geology at various scales to seismic hazard assessments and disaster resilience in the Himalayas and Western Ghats.

Speaker 1: **Prof. Manish A. Mamtani** (IIT Kharagpur)

Topic: Structural Geology in the 21st Century – from Mountain Belts to Atoms, from Mega Scale to the Nano Scale.

Prof. Mamtani's presentation delved into the intricacies of structural geology, focusing on kinematic studies from a macro to nano scale. He presented the kinematic analysis of peninsular Gneiss, nanostructures in magnetite, and detailed in-plane FIB lamella excavation techniques, highlighting the diverse scales and methodologies used in structural geology research.

Speaker 2: **Dr. Naresh Kumar** (WIHG)

Topic: Imaging high-resolution shear wave crustal velocity structure in the Eastern part of NW Himalaya using Ambient-noise cross-correlation data.

Dr. Kumar's presentation centered on the collision of India and Asia and its seismic implications. He elaborated on the collection and analysis of seismic data, showcasing Rayleigh wave cross-correlation data, local dispersion curves at multiple grid points, and shear-wave velocity profiles. He concluded with insights into variations in crustal velocity in different layers of the crust.

Speaker 3: **Dr. Himanshu Mittal** (NCS, MoES)

Topic: Seismic hazard assessment in northeast India by developing a Ground Motion Prediction Equation using a combination of observed and simulated data.

Dr. Mittal provided a detailed overview of the Ground Motion Prediction Equation (GMPE) and its methodology, emphasizing the combination of observed and simulated data. He discussed the techniques used in creating GMPE data, validated simulated data, and highlighted the limitations associated with GMPE approaches.

Speaker 4: **Dr. Sudesh Kumar Wadhawan** (Amrita Vishwa Vidyapeetham)

Topic: Understanding Multi-hazards and Enhancing Capacity for Disaster Resilience – Catchment-based case studies in parts of the Himalayas and Western Ghats, India.

Dr. Wadhawan emphasized disaster resilience through a multi-hazard approach, elucidating the increasing frequency and impact of extreme weather events. He highlighted visible multi-hazard characteristics, citizen science approaches, and strategies for reducing the impact of extreme climatic events, including mapping drainage basins and fostering a culture of prevention and resilience.

Speaker 5: **Dr. Priyom Roy** (NRSC)

Topic: Estimates of crustal shortening and 2D strain in the Central Seismic Gap from NRSC/ISRO GNSS CORS Network.

Dr. Roy's presentation revolved around Himalayan earthquakes, focusing on the central seismic gap. He shared data from GNSS for plate velocity and strain, highlighting the crustal shortening across major faults in Himachal Pradesh and Uttarakhand. Additionally, he discussed the estimation of 2D strain using map data collected from 2016 to 2021, providing insights into strain estimation for earthquake studies in the Himalayan arc.

The session showcased cutting-edge research and methodologies in structural geology, seismic studies, hazard assessments, and disaster resilience. The collective presentations emphasized the complexities of geological studies in the Indian subcontinent and offered valuable insights for future research and risk management in the region.

Technical Session Report- 5

Theme: Mineral Exploration

Chairman: Prof. Soumyajit Mukherjee

Co-Chairman: Dr. Sumer Chopra

The technical session on Mineral Exploration in the Himalayas provided an in-depth understanding of the diverse mineral resources and their geological occurrences in the region. Expert speakers presented valuable insights into the mineralization, deposits, and exploration methodologies in the Himalayan provinces.

Speaker 1: **Dr. Prem S. Misra** (GSI)

Topic: Mineral Resources of the Himalayas

Dr. Misra's presentation extensively covered mineral occurrence, particularly in the Himalayan region. He provided a comprehensive overview of metallic minerals found in India and elaborated on the metallogenic associations and major mineral depositions in the Northwest Himalayas. The discussion included significant mineral discoveries in Jammu and Kashmir, as well as the deposition of various minerals such as gypsum, bauxite, limestone, sapphire, and phosphite, with a focus on recent resource investigations and metallogenic events in Uttarakhand.

Speaker 2: **Prof. P.K. Srivastava** (University of Jammu)

Topic: Sapphire: A treasure from the Himalayas

Prof. Srivastava delved into the unique properties and occurrences of Kashmir sapphire. He discussed the crystal habit, color, and characteristics of sapphires, including rutile arrangement and fluid inclusions. The presentation included a discussion on pegmatites, barren pegmatites, and their geochemistry, focusing on corundum and metasomatism associated with sapphires.

Speaker 3: **Dr. Rajesh Sharma** (WIHG)

Topic: A visit to the mineralization in Himachal Himalayan province: From ores to ore forming fluids

Dr. Sharma's presentation highlighted the geological domains and the mining activities in the Himachal region. He discussed the various mines and minerals found in Himachal Pradesh, focusing on Uchich mineralization, ore observations using Raman spectra, and the discovery of hydrothermal fluids. Additionally, he shared insights on barite, uranium, and magnesite mineralization in the region.

Speaker 4: **Dr. N. S Nayyar** (GSI)

Topic: Vanadium Resource Assessment in Lesser Himalayas, Sirmaur district, Himachal Pradesh & Gypsum Resource Assessment in NW Himalayas, Lahaul and Spiti district, Himachal Pradesh

Dr. Nayyar's presentation covered two essential topics: vanadium and gypsum resource assessments. He discussed vanadium resources, exploration methodologies, and field evidence gathered, particularly phosphorate, barite, and other mineral deposits. Additionally, he detailed the exploration techniques and uses of vanadium. The discussion further delved into gypsum resource assessment, including drilling methodologies and the exploration of selenite and alabaster varieties.

Speaker 5: **Dr. Rajesh Sharma** (IIT Roorkee)

Topic: Evaluation of Structural Style and Inferred Thrust Kinematics with Implications for Hydrocarbon Prospects in Sub-Himalayan Fold-Thrust Belt of Himalayan Foreland Basin.

Dr. Sharma focused on the structural style and thrust kinematics in the Sub-Himalayan Fold-Thrust Belt of the Himalayan Foreland Basin. His presentation included discussions on oil and gas seepages, structural series, geological eras, and hydrocarbon prospects, offering insights into the geological and hydrocarbon potential of the region.

The session provided a comprehensive overview of mineral resources, exploration, and geological occurrences in the Himalayan region, offering critical insights for further research, mining, and exploration strategies in the area.

E-Poster Session 1

The E-Poster Session featured a diverse array of research presentations, exploring seismic activity, tectonics, seismic hazard assessment, and site characterization in the Himalayan region. The session showcased the latest advancements and research contributions from esteemed researchers and institutions in India.

The first presentation in the poster session was given by **Cyril Shaju from IIT Roorke** on the topic of "Interseismic period analysis of the northern Himalayas using a modified chaos game representation," followed by **Dr. Archana Das from ISR** on "Assessing the along-strike variability in tectonic activity along the NW and NE segments of the Himalayan Frontal Thrust (India) using Relative Index of Active Tectonics." Then **Rajiv Kumar from NCS** spoke about

his topic, "Probabilistic Seismic Hazard Assessment of Delhi (National Capital Region), India." Soon after that **Shikha Vashisth from NCS** justified her topic on the “Rudra Prayag earthquake (Mw 5.3) and Implication of site conditions on vibrant ground shakings in the far field regions of Delhi in 2017”. Later, **Sindhu Kumari from NCS** presented her topic, "Source Characterization Doda (Kashmir) Earthquake on June 2023," followed by **Dhaneshwari Sharma from CUHP**, who exhibited the topic, "Analysis of Seismic Migration Trend Behaviour in Reasi-Katra Belt, J&K, India (Northwest Himalayan Region)." Following that, **Atul Saini of NCS** discussed "Seismic hazard evaluation of Nepal region: a special emphasis on 2015 Gorkha earthquake scenario," and **Sukh Sagar Shukla of IIT Mandi** discussed "Forecast Model of Annual Seismic Energy For Himachal Pradesh Using Machine Learning Approaches**." Anshul Panwar of IIT Roorke** then justified his topic, "Comparison of reservoir induced crustal motion study of Koyna-Warnaand Tehri Dam," and **Varun Sharma of IIT Mandi** spoke about his topic, "Broadband Ground Motion Simulation for 1905 Kangra Earthquake Using Physics-Based Response Spectra Generator." later on **from CUHP, Komal Kundal** explained her topic based on “Site Characterization of Kathua City, Jammu and Kashmir (UT) Using Horizontal-to-Vertical Spectral Ratio (HVSR) Methodology” furthermore **Romani Choudhary from IIT Mandi, Harsh Sharma from CUHP** described their topic on “Effect of Declustering on Seismic Hazard Assessment of Himachal Pradesh”, “Comprehensive Geophysical Approaches for site effects Assessment and Vulnerability Analysis in Shimla City, NW Himalaya, India” respectively and at the last on the behalf of **Dr. Pankaj Kumar from IIT Roorke**, the presentation was given on the topic “ Development of a model to estimate magnitude from regional low-cost sensor instrumentation”.

The diverse range of topics covered in this session showcases the depth and breadth of research in seismology, tectonics, seismic hazard assessment, and site characterization in the Himalayan region. These presentations offer valuable contributions to the scientific community and provide a foundation for further exploration and understanding of seismic events and tectonic activities in the region.

Technical session -6

Theme- Geodynamics of Himalaya

Coordinator: Dr. Alok Pandey

Chairman: Dr Prem Shankar Misra

Co-chair: Dr. Rajesh Sharma

Speaker – 1

TOPIC-Enclaves in Granitoids: A key to understanding the magmatic processes and dynamics in the evolution of the granitoid plutons

Speaker- **Prof. Santosh Kumar** (Department of Geology, Centre of Advanced Study, Kumaun University)

Prof. Santosh Kumar enlightened us about the enclaves in granitoids. He says that the enclaves cover all types of lithic materials or bodies enclosed within the granitoids, which may represent country-rock or deeper-derived xenolith, fine-grained marginal facies, or cognate or mafic schlieren having congenetic affiliation with felsic host magma, restite as residual assemblage left after partial melting of the source regions.

In this paper he discussed and documented the progressive development of igneous fabrics in response to complex flowage of magma during mafic-felsic mixing, mingling and changing using field and microstructural features of enclave, synoplutonic dykes and granitoid.

Speaker-2

TOPIC- First report of Eocene Echinoids from the Sylhet limestone, Mikir Hills if Assam, India: Paleontological, paleogeography and paleoenvironmental significance

Speaker- **Dr. Kapesa Lokho** (Wadia Institute of Himalayan Geology)

In this report, Dr. Kapesa reported two echinoid taxa viz. Ilarionia sindensis Duncan and Sladen, 1884, and Porocidaris schmidelli Munster in Goldfus,1830 from the middle Eocene Sylhet Limestone of Mikir Hills, Assam. The material studied in this presentation represents the first report from the middle Eocene of India and it significantly expands the geographical extension of Eocene marine echinoids in the northeastern part of India.

Speaker-3

TOPIC- Holocene Paleoclimatic record from Chakarta Area, North West Himalaya

Speaker- **Dr. Narendra Kumar Meena** (Wadia Institute of Himalayan Geology)

Here, Dr. N.K. Meena presented monsoon variability records for the Holocene using a multi-proxy approach from a 146 cm thick sedimentary profile in the Kotikansar meadow (Chakrata), Northwest Himalaya. He also said that environmental magnetics indicates high variability in

the Early Holocene with high concentrations of magnetic minerals during high monsoon conditions and vice-versa.

Speaker -4

TOPIC- The position of MCT in Darjeeling Himalaya

Speaker- **Dr. Madhusmita Samal** (Geological Survey of India, Southern Region, Hyderabad)

In this, Dr. Madhusmita explained the position of Main Central Thrust (MCT) IN the Darjeeling Himalayas that has been a matter of controversy as several workers have placed MCT in a different structural position. She speaks about the MCT separating the Lesser Himalaya from the Greater Himalaya marked in Darjeeling Himalaya in the northern contact of the Jaishidanda Formation. She also speaks of the absence of shearing in the Daling group and Darjeeling gneiss, their structural and metamorphic discordance concerning the Jaishidanda sheet indicate these are separated from the latter by thrusts. The thrust contact in the South between Jaishidinda and the Daling group is documented as the Jaishidinda thrust.

E-Poster Session-2

The first presentation in poster session 2 was given by Rajesh Kumar Dash from CBRI on the topic “Debris flow runout modeling studies in India: Review and Recommendations” followed by Sonali Das from Central University of Kerala on “Appraisal of DEM-derived Valley Width-Height Ratio and Mountain Front Sinuosity Index at Upper Beas Valley”. After that Ch. Narshimha from the Centre of Advanced Study, Kumaun University speaks about the topic” Syntectonic shear-induced emplacement of crystallizing granite magmas evident from magmatic shear sense, mafic schlierens, and microgranular enclaves in the Mesoproterozoic A-type Kanigiri pluton, Nellore Schist Belt, Southeast India followed by M.R. Singh from WIGH his topic was “Geochemistry of tholiitic dykes from the Banjar Formation, Himachal Himalaya: implications for Paleoproterozoic arc magmatism”. Later, Hyder Ali from MeaTech Soln spoke on the topic “Landslide Monitoring with Early Warning System Using Ground Based Lidar Scanning” then Kapil S Panwar from Centre of Advanced Study, Kumaun University spoke about “Geochronology and Petrogenesis of granite gneisses from Askot-Chiplakotklippe, Kumaun Lesser Himalaya, India”. Following that Thejavinuo mere from Nagaland University explained her topic “Joint Analysis of the Lithounits of the Belt of Schuppen of Nagaland across Chumukedima- Piphema Section and its Tectonic Implications” further Bharti Sharma Geologist and founder of AADYA- Planetary & Geoscience Research

keeps her presentation on the topic " AADYA- Planetary & Geoscience Research". Following that Divya Singh from the University School of Environment Management, Guru Gobind Singh Indraprastha University justified her topic"Glacial lake inventory of Baspa River Basin, Himachal Pradesh, India derived from Lansat images" and Soniya Bhandari from Central University of Himachal Pradesh discussed her topic "Assessment of Snowline Altitude using Machine learning Algorithm: A Case Study in Parvati Basin". Finally Ms. Lopamudra (Garware) on "A real-world success story: Overcoming nature's challenges in Himachal Pradesh "followed by Ms. Hemlata Gupta from Convolution Engineering Consultancy speaks on" Landslide Stability at Raj Bhawan, Guwahati: A Detailed Case Study.

Technical Session-7

Co-ordinator: Dr. Ankit Tandon

Chairman: Dr. Santosh Kumar

Co-Chair: Prof. Pankaj Srivastav

Speaker -7

TOPIC- An overview of the 2023 monsoon disaster in Himachal Pradesh

Speaker- **Mr. D.C Rana**, IAS (Himachal Pradesh State Disaster Management Authority)

Here, Mr. D.C Rana explains that Himachal Pradesh is environmentally fragile and ecologically vulnerable. Geologically Himalaya is considered to be the youngest mountain chain in the world and are still in the building phase. In his presentation, he also shed some light on the various calamities like floods and landslides that happened recently in July and August. He explains all the work done during that time to save people and also tells about the amount of destruction caused at that time.

Speaker-8

TOPIC- Post- Post-disaster landslide studies in Shivamoga and Uttara Kannada district of Southern Karnataka, India during monsoon2021

Speaker- **Dr. Santosh Kumar Tripathi** (Geological Survey of India)

In this presentation, Dr. S.K Tripathi explains the post-disaster studies of various landslides in Shivamoga District situated in Karnataka and Uttara Kannada district of Karnataka, the

causative effect, and remedial measures. He also explains the correlation of rainfall data, geology, and triggering factors has been attempted.

Speaker-9

TOPIC- Snow cover variability and its sensitivity to temperature changes in the Himachal Himalaya

Speaker- **Dr. SS Randhawa** (HIMCOSTE)

Dr. S.S. Randhawa says the temperature rises can have a considerable influence on snow accumulation and melt runoff, causing serious concerns. Hence, an attempt was made to map the geographical extent of snow cover in different basins of Himachal Himalaya, using a remote sensing-based normalized snow difference index(NDSI). Meteorological data from six IMD stations were used to detect trends in mean maximum and minimum temperatures using ITA(Innovative Trend Analysis) and percent bias (PBIAS). He showed an increasing trend of both maximum and minimum temperatures for all stations except Keylong, which showed a decreasing trend for the minimum temperature.

Speaker -11

TOPIC- Emerging teleconnections of Indian summer monsoon- rainfall in the warming world

Speaker- **Prof. Suneet Dwivedi** (University of Allahabad)

Prof. Dwivedi's presentations show that the frequency, intensity, and distribution of extreme rainfall events over India are changing in a warming climate during the summer monsoon season. Climate change has also impacted the frequency of intra-seasonal active and break spells. He says that efforts have been made to identify new and relatively less studied sources of potential predictability of the ISMR on different time scales. It is demonstrated that the SAM and SCF teleconnections of ISMR are emerging as the dominant non-stationary sources of ISMR predictability in a warming world on a multi-decadal time scale.

Speaker-12

TOPIC- Slope stability analysis and risk evaluation of selected landslides using standard Geotechnical Techniques: Case studies from Sikkim

Speaker- **Dr. Anil Kumar Misra** (Department of Geology, Sikkim University)

Dr. Misra explained that one of the greatly affected locations by the landslide in Sikkim is National Highway 10 (NH 10), which serves as a crucial lifeline connecting Sikkim to the rest of India. This research has significantly enhanced the prediction capabilities related to landslides and facilitated the development of effective methodologies for assessing landslide hazards. He says that the findings from this study are crucial for the authorities responsible for disaster risk reduction and management in Sikkim. Implementing these findings can aid in the formulation of effective strategies to mitigate the impact of landslides along NH 10 and safeguard the connectivity and safety of Sikkim's residents and visitors.

E-Poster session- 3

The first presentation in the Poster session-3 was given by Dr. Amit Katoch, He spoke on the topic "Geotourism: A new prospect to develop tourism and conserve Geosites in Dharamsala" followed by DR. Swati Sharma from Amity University on the topic "Automated Estimation and Mapping of Soil Erosion using Arc-EPM Toolbox to Evaluate the Debris-Flow Volume and landslide activities in parts of Himalayan Foothills". Further Varun Mandotra from GSI delivered his speech on the topic "Landslide Hazard Studies Using Remote Sensing, GIS: A case study from Bilawar -Machedi Road corridor, Kathua District, Northwest Himalaya, Jammu and Kashmir".


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