



अंक : 2016/5

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दृष्टिकोण

वाडिया हिमालय भू-विज्ञान संस्थान

भारत सरकार के विज्ञान एवं प्रौद्योगिकी विभाग के अधीन
एक स्वायत्तशासी संस्थान

Drishtikon

A half yearly newsletter of research scholars
Wadia Institute of Himalayan Geology



सम्पादकीय

निरन्तर गुणवत्ता वर्धन को प्रयासरत रहते हुए 'दृष्टिकोण' का यह नवीन अंक पुनः आपके अवलोकनार्थ प्रस्तुत है।

आज के सन्दर्भ में 'जलवायु परिवर्तन' एक व्यापक विषय है। यद्यपि पृथ्वी की विकास प्रक्रिया में जीव – जन्तुओं ने जलवायु – परिवर्तन की दीर्घ अवधि के साथ सामंजस्य बनाया है और जो नहीं बना पाये वो विलुप्त हो गये। परन्तु विगत कुछ दशकों से जलवायु परिवर्तन की तेजी ने इस परिवर्तन के साथ सामंजस्य स्थापित करने में मुश्किलें उत्पन्न की हैं। इन तीव्र गति के जलवायु परिवर्तन के जो भी कारण या कारक हैं उनमें मानवीय गतिविधियाँ अधिक जिम्मेदार हैं। प्राकृतिक संसाधनों का अनियंत्रित दोहन हो या आधुनिक विकास के मानकों द्वारा पर्यावरण का बढ़ता प्रदूषण हो, मनुष्य की भागीदारी इसमें सुनिश्चित ही है। मनुष्य की ऐसी ही भूमिका, जल दोहन में नजर आती है। बढ़ते जल दोहन के कारण आने वाले समय में जल की स्थिति पर 'अरविन्द सिंह' का विश्लेषण, 'जूली' की पर्यावरण संरक्षण के प्रति अपील एवम् प्राकृतिक संसाधनों के प्रति मानवीय लिप्सा से त्रसित धरा की पुकार को 'अतुल' ने अपनी कविता में खूबसूरती से इस अंक में पिरोया है। इन सब के साथ 'कपिल केसरवानी' द्वारा जमा किये गये अपनी पी.एच.डी शोध प्रबन्ध का सारांश, सत्यव्रत दास द्वारा पिचावरम बगीचों की शोचनीय दशा का विवरण, संस्थान में जनवरी 16 से जून 16 तक आने वाले नवागंतुक शोध अध्येताओं की जानकारी 'दामोदरन' की प्रेरक कविता, 'गोविन्द' की शीशे पर जानकारी के साथ ही, हाल ही में सम्पन्न NGEOSM-16 पर 'खोगेन' के दृष्टिकोण के साथ 'दृष्टिकोण' का यह अंक एक बार फिर आपकी टिप्पणियों एवं सुझावों की प्रतीक्षा में आपके सम्मुख है।



फोकस में

Water: An Elixir of Life or Soon to be a Mirage

The scene of village life balancing an earthen water pot on her head in many paintings and exhibitions has been a romanticized inspiration for centuries to artists and storytellers. The image is also a flourishing symbol of resplendent rural life. We have all grown watching this image in thin and thick of various movies or paintings as well, but have we ever wondered that why it has become an apt emblem of our village life or it has become an indelible part of every villager's life. When I was a child, I always epitomized the village life as peaceful and satisfying because I believed that villagers are always happier than city dwellers as they have plenty of resources at their disposal and will. Water, one such resource which India once had in surplus few decades ago, is fast depleting due to indiscriminate use across the masses and regions without understanding its importance in sustaining every life on this planet.

Water is an essential resource because flora and fauna cannot sustain life without water. It is needed to maintain food security among plants and animals, ensure industrial sustenance and conserve environment and biodiversity. Earth is the only planet in our solar system that has plenty of water which makes it an ideal place for supporting life. But its reckless abuse and growing demand due to increasing population and extravagant lifestyle, many countries are heading to severe water crisis and India is no exception in this. India has never been water scarce country but severe neglect and over-exploitation has turned it into a water deficit state, particularly peninsular part. This alarming situation needs immediate attention by the various stakeholders to make sustainable use of the available water resources.

Earth has 70 percent of its surface covered with water and rests are occupied by continents. 97.5 percent of this water reside in oceans and is not fit for domestic or industrial use. Out of total fresh water (2.5%), 69 percent is locked in snow and ice caps, 30 % runs down as groundwater and only one percent becomes the part of surface water in various forms such as lakes, swamps and rivers (data from Anon, 2006). Although, the distribution of this water on the earth surface is not uniform and some areas have surplus water while many other areas are already facing scarcity of water. However, India is blessed with good monsoonal system which causes rainfall distributed over 5 – 6 months in the year. But changing environment and climate dynamics over the globe, efficient monsoonal system of India is suppressed heavily and its performance depends on El Niño phenomenon occurring in Pacific for unknown reasons. Weak monsoon over several decades has severely affected water capacities of aquifers along with increased stress caused by growing population and unsustainable lifestyle.

Although India is continuously making efforts to availability and quality of drinking water systems, its huge population has caused a severe stress on planned water resources and rural areas are completely left out. Apart from availability and improvements, many water resources are contaminated with bio or chemical pollutants, thus, making it unsustainable and unfit for use. India ranks 120 on quality of portable water in the list of 122 nations

though it possesses almost 4% of world's water. World Bank studies show that average water availability is shrinking steadily and it is estimated that India will become a water stressed nation by 2020 and water scarce condition will be prevailing by 2025. This would further challenge the food security as scarcity of water will directly reduce the agricultural production. Very recently, we have witnessed a drastic water scarce condition in Latur district of Maharashtra where people received water supply once a month as all the nearby reservoirs dried up recently. The first water train of the country carried water from Miraj to Latur and is one of the largest relief operations in recent years. Unfortunately, Latur is not alone and Hyderabad, Rajasthan, Maharashtra, NCR, Odisha, Bundelkhand and Kerala are all reeling under same water crisis. Seeing the current situation, day is not far when people will start migrating from places of deficient water to places of surplus water. This will be very devastating as it will lead to excessive stress on available water resources in surplus region and there is no mentioning of the fact that people to people clashes over water supremacy will further aggravate the situation.

India has never been a water deficit country, but due to severe neglect, unsustainable lifestyle and lack of monitoring of water resources development projects, several regions of the country experience water stress condition from time to time. Further negligence in this sphere will lead to forceful water scarce condition in one or two decades. It is, therefore, necessary to preclude this crisis by making best use of the available technologies and resources to conserve the existing water resources, convert them into utilizable form and make efficient use of them for agriculture, industrial production and human consumption. Imposing regulatory measures to prevent the misuse of water and introducing rewards and punishment to encourage judicious use of water, will be helpful to conserve water. Finally, awareness and orientation of all the people to change their lifestyle to conserve water can help the country to bridge over the water crisis in the future otherwise day is not far when water will become a distant reality or it will be just like a mirage where you can only see it.

by **Aravind Singh (RA)**

अभिव्यक्तियाँ

व्यथित धरा

है व्यथित धरा पुकारती,
हे मनुज तुझको क्या हुआ।
चिरकाल के अनुभव लिए,
फिर भी अज्ञानी बना हुआ।

विसर्पों सरिता है पूछती,
नर वक्र क्यों मुझसे अधिक।
भूकम्प कम्पित हो कह रहा,
नर सत्यता हुई मुझसे क्षणिक।
है सत्यता ये पुकारती,
हरिश्चन्द्र सा नर क्या हुआ।
है व्यथित धरा पुकारती,
हे मनुज तुझको क्या हुआ।

ज्वालामुखी अब शांत है,
मानव क्रोधाग्नि को देखकर।
हिमखंड संकुचित हो रहे,
मानवीय लिप्सा से सहमकर।
है दानशीलता ये पुकारती,
कर्ण से दानियों का क्या हुआ।
है व्यथित धरा पुकारती,
हे मनुज तुझको क्या हुआ।

भ्रंशों की भ्रंशता मिट गयी,
देख मानवी अपभ्रंशता।
चक्रवातों ने चक्रण कम किया,
देखकर मनुज प्रत्ययनीयता।
है विश्वसनीयता पुकारती,
उस रघु परंपरा का क्या हुआ।
है व्यथित धरा पुकारती,
हे मनुज तुझको क्या हुआ।

सुनामी लहर मद्धिम हुई,
मानवी उद्विग्नता देखकर।
पत्थर भी अब कोमल हुए,
मानव हृदय टटोलकर।
है दयालुता ये पुकारती,
युधिष्ठिर सा नर क्या हुआ।
है व्यथित धरा पुकारती,
हे मनुज तुझको क्या हुआ।

by Atul Kumar (JRF)

Pat's Lead

For a literate person Lead is a p-block element with atomic number 82 but for Clair Cameron Patterson it was answer to many broach. Clair Cameron Patterson (Pat, named by Harrison Brown), an American was an expert of spectrometry, worked at Manhattan project. Harrison brown his doctoral advisor assigned the task for the calculation of age of the earth through the Ur-Pb dating of Zircon crystal of Canyon Diablo meteorite as his Ph.D. thesis. The dating task was an ail job. His graduate colleague who was assigned to calculate amount of uranium present in the same grain was consistently obtaining constant result. Whereas Pat's calculation of the lead was showing high variations in lead count. He got obsessed and thought that result might be hindered by contamination present in the environment. He performed all the cleaning activities. Including acid sterilising of the apparatus but the effort was vague. In 1953 Pat was invited to California Institute of Technology. Where he worked in ultra clean labs of Argonne national laboratory and reckon the age of the earth to be 4.55 B.Y. by magneto-spectroscopy.

Simultaneously to this, threat of lead poisoning was hovering the globe in 20th century and 1937, Robert A. Kehoe published work on constant lead proportion in the environment leaves the lead poisoning cause inexplicable. Later on Pat's Atlantic and Pacific oceans expedition discoveries concluded the high concentration of lead present in the ocean surface water in contrast to bottom water. But result was again moot of aerial contamination. Finally he used ice core samples from the Greenland and published his work "contamination of common lead in some Atlantic and Mediterranean water and in snow." In the nature, 1963. This

publication sets oil industries on fire. The moot was heard into the senate for almost 30 years when finally the ban of lead from the gasoline and other products was put to law.

by Govind Chaurasia (JRF)

You Can Do It....

Oh my dear.....!!! Come forward, you can do it,
The God is always with you, come forward with faith,
It's your way;
Take your own path, flow like a river, everyone will follow you,
The Victory of your each step will adorn your name,
And, you will get the apex in every ones heart,
Oh my friend.....!!! Come forward you can do it.

Oh my friend.....!!! Believe in you, you can do it,
You can't lose today, while dreaming of tomorrow,
Your dreams will come true while you not sleep,
Do not forget; if we sow today it will raise tomorrow,

Work till your last breath; and raise your life time,
The making of tomorrow is here in today, with you
Oh my sibling.....!!! Come forward you can do it.

Oh my sibling.....!!! Don't be shy, you can do anything
The Sky is at the top and the earthy materials at the bottom,
We are in between;
It's a boat, No one is high or low, we all are on same
Don't only dream; Work hard, make the dream come true
Just remind it,
Yesterday is a bounced check; tomorrow is a cat on wall; today is like a *Chenda*

So, beat it... my confident mate.....!!! Come forward, you can do it.....

by Dhamodharan Sacrates (JRF)

Pichavaram Mangroves: A Need for Conservation

Mangrove wetlands are prominent features of the coastal zone of tropical countries. A mangrove forest harbors in the estuarine areas – where salinity undergoes constant changes due to freshwater flow. In the light of security, mangroves (i) act as a barrier against cyclone and prevent entry of saline water inland (ii) act as a buffer against flood and prevent coastal erosion. Pichavaram mangrove wetland (latitude: 11° 23' to 11° 30' N and longitude: 79° 45' to 79° 50' E) is located between Coleroon and Vellar estuary in the state of Tamil Nadu (Second largest in world in area). The wetland comprises of ~11 sq. km mangrove cover.

Except its majestic beauty and tourist attraction it is a home ground of many commercial fishes, migratory birds, prawns and crabs. Although the 2004 Tsunami left a trail of destruction in Cuddalore district, areas near Pichavaram remains unscathed due to 3000 acres of mangrove. Negligence by the government towards the conservation of this natural bio-shield and ecological zone causes it to decrease from 44 sq. km to 11 sq. km in last century. Though the area is protected by the government, no steps have been taken to

prevent the dumping of waste. Dumping of garbage from a nearby plastic factory makes the situation worse. Further slaughter and poultry wastes are dumped near mangrove. As a result the backwater is severely contaminated and pollutants are trapped by the roots of mangrove leading to their destruction. The use of fertilizers in nearby paddy fields and their runoff degrades the water quality, creating a long term effect on the existing biodiversity. Action plan should be planned to protect the mangrove. Plastic, polythene should be banned. The affected mangroves should be restored by planting of mangrove saplings on the back waters bringing estuarine areas under mangrove cover. Local people should be aware of all the facts and benefits of mangrove also about threats.

by **Satyabrata Das (JRF)**

पर्यावरण वर्ष

पर्यावरण हमारे जीवन का अभिन्न अंग है। यह उसी प्रकार आवश्यक है जिस प्रकार मछली के लिए जल। जिस प्रकार जल के दूषित होने से मछली काल के गाल में समा जाती है, उसी प्रकार हमारे पर्यावरण के दूषित होने के कारण सम्पूर्ण मानव जाति मृत्यु की ओर अग्रसर हैं। अभी हाल में ही हमने विश्व पर्यावरण दिवस – 05 जून को मनाया और पर्यावरण को स्वच्छ रखने का संकल्प भी लिया। इस अवसर पर राष्ट्रीय एवं अन्तर्राष्ट्रीय स्तर पर सम्मेलन आयोजित किए गए, जूलूस निकाले गए, वृक्षारोपण किया गया, गो-ग्रीन के नारे भी लगाए। लेकिन क्या हमने ये सोचा है कि पर्यावरण दिवस हम क्यों मनाते हैं? क्या वर्ष भी की गई गड़बड़ियाँ एक दिन में सुधारी जा सकती हैं? स्पष्टतः नहीं। कितना अच्छा होता यदि हम नारों की जगह पौधे लगाए और पर्यावरण दिवस की जगह पर्यावरण वर्ष मनायें। प्राकृतिक संसाधनों को सदुपयोग एवं संरक्षण करें। अपशिष्ट न फैलाए। Reduce-Reuse-Recycle की पद्धति अपनायें। हर दिन अपने पर्यावरण को कल से बेहतर बनाए और इस प्रकार हमारे छोटे – छोटे प्रयास एक बड़े सपने को साकार करेंगे।

by **Jooly Jaiswal (JRF)**

Looking Back on NGEOSM – 2016

From the Kerguelen hotspot to the mighty Himalayas, from the Arabian Sea to the Indo-Myanmar range, from our depleting ground water to the third pole glaciers, and again from the unsolved mysteries of earthquakes to the changing enigma of climate; hundreds of abstracts looking for solution to these research problems made their entry to the National Geo-Research Scholars Meet (NGEOSM) -2016, which was held from 1-4 June, 2016 at the Wadia Institute of Himalayan Geology, Dehradun. The event, which was also first of its kind in the country, was well organized without any loopholes in terms of management and from scientific point of view. Fresh and unripened yet promising young researchers from every corner of the country thronged into the campus of Wadia Institute to participate in this scientific national event on the first day itself. The inaugural day was graced by the presence of eminent scientists; Prof. A.K. Gupta, Prof. Harsh K. Gupta, Prof. S.K. Tandon and few others. A remarkable statement by Prof. Harsh K. Gupta during his key note lecture was worth remembering. He said “To become a successful researcher, the person must learn to take research as a habit but not as something that will bring bread and cloth at home”. One has to be deadly focused on that particular thing he/she is looking for. Research is not a profession but a passion.

Oral and Poster sessions were both intriguing and every single day was rejuvenated by new topics and discussions. This event has

encouraged the participants in at least three different aspects. First, it has given a sense of importance or existence of research scholars who are normally negatively feed backed by some section of society for taking up research as their choice of carrier. Second, this event has let young minds to explore their hidden thoughts, speak up and interact confidently by killing away that kind of hesitation that they normally possess while attending other conferences where majority of the participants are either professors or well established scientists. Their feeling of “I am like a mouse in the middle of Elephants” while attending those common conferences was not there in this kind of only-for-research-students-program. And finally, it was an opportunity for those lucky participants to have a chance to visit the state of art laboratories that Wadia Institute owns, especially for those students who work with poor equipment at the far flung region. Hopefully and for sure, this meet has given some valuable knowledge, some sweet memories and most importantly, a spark of silent competition among the participants that will push them to work better and better. There were too many honest hearts of Wadia Institute who relentlessly worked at the back stage to make this event successful. I believe this institute will continue to make the next NGEOSM more fascinating and more scientific.

by **S. Khogenkumar (SRF)**

नवागंतुक

Name

Supervisor

Structure and Tectonics Group

Mr. Atul Kumar (JRF)	Dr. R. J. Perumal
Mr. Purbajyoti Phukan (JRF)	Dr. Kaushik Sen
Mr. Aranya Sen (JRF)	Dr. Kaushik Sen
Mr. Govind Chaurasia (JRF)	Dr. Vikas

Petrology and Geochemistry Group

Mr. Manas M. (JRF)	Dr. B. K. Mukherjee
Mr. Satyabrata Das (JRF)	Dr. S.K. Rai
Mr. N Lakhan Singh (JRF)	Dr. A.K. Singh
Mr. Puneet Singh (JRF)	Dr. H.K. Sachan

Sedimentology Group

Dr. Arvind K. Singh (RA)	NA
Dr. Praveen K. Mishra (RA)	NA
Mr. C Pankaj Sharma (JRF)	Dr. Pradeep Srivastava

Biostratigraphy Group

Ms. Tanu Rastogi (JRF)	Dr. R.R. Yadav
Ms. Shweta Singh (JRF)	Prof. A.K. Gupta

Geomorphology and Environmental Geology Group

Mr. Ambar Solanki (JRF)	Dr. Vikram Gupta
Ms. Siddhi Garg (JRF)	Dr. Aparna Shukla

Geophysics Group

Dr. Arco Prabho Biswas (RA)	NA
Ms. Monika Wadhawan (SRF)	Dr. Devajit Hazarika & Dr. Vikram Gupta
Mr. Arun Prasath R (JRF)	Dr. Ajay Paul
Mr. Dhamodharan S (JRF)	Dr. Gautam Rawat & Dr. Sushil Kumar
Mr. Jhon P Pappachan (JRF)	Dr. S Rajesh & Dr. G Phillip
Mr. Sachin Sinhore (JRF)	Dr. Gautam Rawat
Mr. Vivek G Babu (JRF)	Dr. G. Phillip

Welcome all!

उपलब्धियाँ एवं पुरस्कार

शोध पत्र

- **Khogenkumar, S.,** Singh, A.K., Singh, R.K.B., Khanna, P.P., Singh, N.I., Singh, W.I., 2016. Coexistence of MORB and OIB-type mafic volcanics in the Manipur Ophiolite Complex, Indo-Myanmar Orogenic Belt, northeast India: Implication for heterogeneous mantle source at the spreading zone. *Journal of Asian Earth Sciences*, 116, 42–58.
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पुरस्कार

- **Mr. Sanjay Singh Negi** was appointed as Assistant Professor at P.G. College, Gopeshwar, Uttarakhand from February, 2016.
- **Mr. Rakesh Singh** was awarded 'Young Scientist' by Uttarakhand Science Congress (UCOST), Dehra Dun during February, 2016.
- **Ms. Jooley Jaiswal** is recruited as a Geologist in Geological Survey of India.
- **Mr. Sonu** qualified the NET-JRF examination in December, 2015.
- **Dr. Kaushick Sen and Dr. Banu Thakur** were recruited as Scientist B in NCAOR, Goa.
- **Mr. Vipin Kumar, Mr. Anupum Gokhle, Mr. Anshuman Misra and Ms. Divya Thakur** were promoted to Senior Research Fellows.
- **Mr. S. Khogenkumar** was awarded "Prof. D.N. Wadia Prize" for best paper presentation in the NGEOSM-2016 held at WIHG, Dehradun.

शोध सारांश

Thesis Title: "Energy Balance and Mass Fluctuation of Himalayan Glaciers: A case Study of Chorabari Glacier, Garhwal Himalaya"

Summary:

Studying the effect of climate variations on the water resources originating from the glacierized basins is an increasing demand in the current climate change scenario that has become an increasingly important. Keeping in view this thesis aims to study the Surface Energy Balance (SEB) of thickly debris-covered Chorabari Glacier located in the Mandakini basin of Garhwal Himalaya and its temporal and spatial variations using near-surface meteorological parameters. SEB at glacier surface was estimated using physically based Debris Energy Balance (DEB) and Bare Snow-Ice models during 2011-2012 and 2012-2013 glaciological year. The DEB model specifies subsurface heat conduction through supraglacial debris layers at debris-ice interface calculated from a heat-conservation equation based on Fourier's law to estimate the glacier surface melt at debris-ice interface which is non-existence for the Indian Himalayan glaciers. To compute the subsurface heat conduction more precisely, debris internal temperature was calculated using an iterative Newton–Raphson method.

In order to validate these models, study of glacier surface mass fluctuation was also carried out using *in-situ* glaciological method and correlation between simulated and observed melt was performed at point scale as well as glacier-total scale. Studies on the terminus retreat and frontal area vacated by the Chorabari Glacier were also carried out from 1962 to 2013 using Survey of India topographical maps of 1962, Landsat satellite imagery of 1990 and *in-situ* measurements available since 2003. To understand the glacier sensitivity and its response to future climate change, the sensitivity analysis was performed on the developed

models by altering the meteorological conditions and the surface characteristics. The results demonstrated that these models are capable to compute the surface melt rates with much higher accuracy. This represents that these model could be useful tool for the assessment of climatic forcing factors on glacierized basins in response to future melting with ongoing climatic scenario. This study is also useful for the application of poorly gauged glacierized basins where *in-situ* measurements are not possible to estimate the glacier mass budget.

by **Kapil Kesarvani** (ESRF)

आमंत्रित लेख

Cold Seeps: An Oasis in the Deep Sea

Human endeavors to unravel the mysteries in deep sea have led to numerous deep sea explorations and insights into unprecedented biogeochemical processes. Cold seeps are one of such discovery which has fascinated scientific community over the last few decades. Cold seeps are areas along the ocean floor characterized by the occurrence of relatively cool fluids, rich in methane and other reduced compounds migrating from subsurface reservoirs to the seabed and overlying water column. They are distinguishable from hydrothermal vents, which are fluid seepages that release hot, chemically diverse fluids to the sea floor. Cold seeps do not produce any significant temperature differences to their seepage environments. Such seepages host an array of chemosynthetic microbial communities and associated fauna forming a rich ecosystem, independent and far away from the sun lighted photic zones of water column. Such observation of unanticipated large biomass with thriving benthic communities from otherwise sparingly inhabited ocean floor earned them the name Oasis in sea-floor. Methane that is induced to the seafloor at cold seeps is of significant scientific interest as an important greenhouse gas and as a unique biomolecule for deep sea biosphere. This geologic process of seabed fluid flow facilitates a unique geosphere-biosphere coupling through complex, microbially mediated biogeochemical processes. They are now known to impact the marine ecology, ocean chemistry and atmospheric composition over a wide spatial-temporal scale and to play a significant role in the chemical and biological composition of the oceans and the global carbon cycle (Judd and Hovland, 2007). Methane seeps have been identified to play an important role in carbon and associated biogeochemical cycling in the continental margins (Peckmann and Thiel, 2004). Ever since the first active marine methane seep was reported in Gulf of Mexico, the number of methane seeps discovered in oceanic system has massively increased in past three decades and our estimate of natural methane seepage to the seafloor has massively increased. On the seafloor, seeps are commonly associated with chemosymbiotic biological communities and authigenic carbonates.

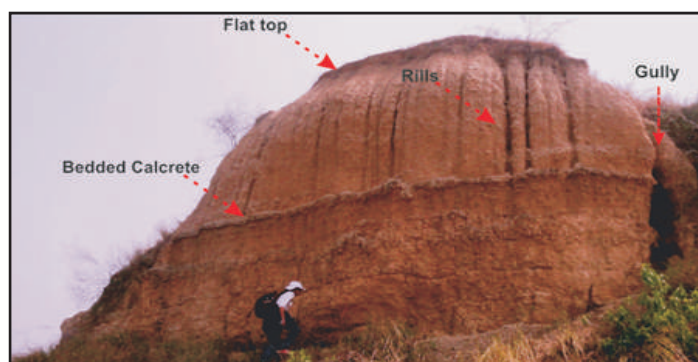
However, the details and magnitude of biogeochemical cycling at the sites that involve interaction between fluid composition, fluxes and biota that results in characteristic hydrocarbon-metazoan-microbe-carbonate association (Suess, 2014) are poorly

understood. Authigenic carbonate precipitation is a significant carbon sequestration process of the methane and also serves as one of the few permanent records of these dynamic biogeochemical interactions and seepage events in the past. Carbonate rock records observed at seep sites are thus an important archive for geologists to understand their biogeochemistry and geological implications. Understanding the mechanism of carbonate authigenesis at these sites will in turn help us to understand the evolution of biogeochemical processes at these dynamic zones of geosphere-biosphere coupling zones, their role in carbon sequestration and its impact on the global carbon cycle. Plethora of developments has occurred in modern seep research, ranging from the identification of microbial communities responsible for the biogeochemical interactions, the possibility of the existence of methane-based microbial worlds on other planets and hydrocarbon seepages from subsurface reservoir contributing to an important pre-aged carbon source to the organic carbon reservoir of the ocean basins. Unravelling the biogeochemistry associated with cold seeps and their implication to earth systems is a an important scientific objective and has been taken up by various research clusters like Deep Carbon Observatory (DCO), Center for Dark Energy Biosphere Investigations (C-DEBI), Climatic and Biotic Events of the Paleogene (CBEP) and NASA astrobiology. Observations of active cold seepages in Makran accretionary prism off Arabian Sea (von Rad, Ulrich, et al., 1996) and paleo seep activity from the offshores of Bay of Bengal (Mazumdar et al., 2009), provides further prospects of such explorations in Indian subcontinental marine systems.

by **Sajjad A**
University of Texas at Austin

फील्ड फोटो

1. Sedimentary structures preserved in marginal Ganga Plain



Geological Significance: Cliff located along Senger river, highly dissected by ravines and gullies, with flat top and marked by bedded calcrete.

by **Rupa Ghosh**

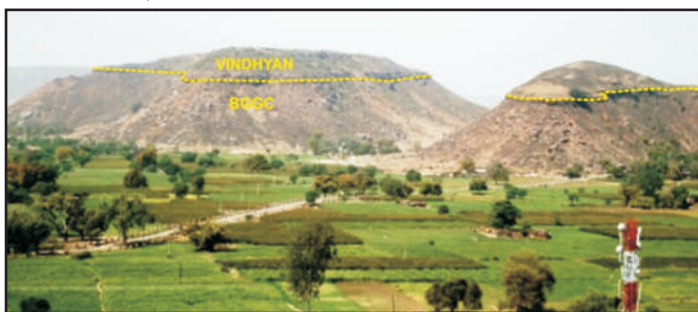
2. Panoramic View of Chorabari Lake



Geological Significance: Panoramic view of Chorabari Lake which was just captured (03 June 2013) before the Tragedy in Kedarnath area (16-17 June 2013).

by Kapil Kesarwani (ESRF)

3. Panoramic View of Bihara (Left) and Sangrampur (Right) Hillocks, Chitrakoot



Geological Significance: In this region, Semri group of rocks (Lower Vindhyan) directly overlies BGGC (Bundelkhand Granite-Gneiss Complex) and is underlain by Kaimur Sandstone (Upper Vindhyan).

by JoolyJaiswal (JRF)

4. Pinch and Swell Structure



Geological Significance: A structural condition recorded in quartz vein in gneiss host rock of Mansunsa, Rudraprayag District, Uttarakhand. It is a true shear sense indicator.

by Siddhi Garg (JRF)

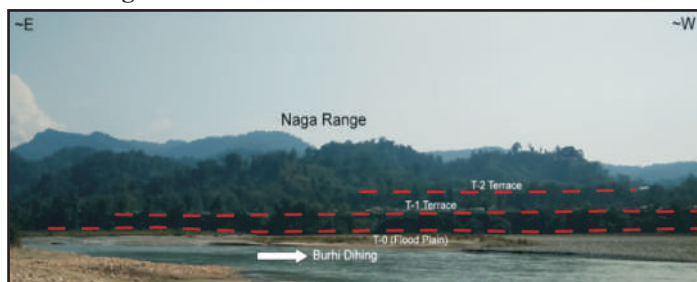
5. Herringbone Cross-Stratification in Scarp Sandstone, Phareedpur, Ahraura, Vindhyan Supergroup.



Geological Significance: It is a type of cross bedding in which fore sets alter in direction. It is formed from back-and-forth tidal water flow and indicating tidal environment of deposition.

by Govind Chaurasia (JRF)

6. Preserved Fluvial Terraces on the Left Bank of the Burhi Dihing River.



Geological Significance: A result of climate and tectonic interaction. They are used to study variation in tectonics, climate, and erosion, and how these processes interact.

by Ishwar Singh (JRF)

7. Soda straws in Jhumar Cave, Chattisgarh.



Geological Significance: Soda straw are hollow, elongate, generally translucent tubes of calcite that represent the earliest growth of stalactites.

by Sonu Jaglan (JRF)

8. Magma mingling and mixing of Ramanagaram, Closepet granite.



Geological Significance: Such feature of magma mingling and mixing is the conclusion of two types of magma derived at different times. The black magma represents the intrusive facies of clinopyroxene-hornblende bearing dark grey quartz-monzonite and light color represents equigranular pink granite.

by **N. Lakhan (JRF)**

9. GPR Survey



Ground Penetrating Radar survey for debris thickness estimation at Dokriani glacier.

by **Jairam (SRF)**



Group photo of participants NGEOSM-2016

Cover Photo : Kishansar and Vishansar - Twin Glacial Lakes in Kashmir Captured by Ms. Tanu Rastogi

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