ASSOCIATION OF QUATERNARY RESEARCHERS

Society Reg. No. LUC/08076/2019-2020

2022-2023

Annual Report

Association of Quaternary Researchers (AOQR)

Address - Birbal Sahni Institute of Palaeosciences,
53 University Road, Lucknow – 226 007,
Uttar Pradesh, India.

Table of contents

ASSOCIATION OF QUATERNARY RESEARCHERS

Quaternary Chronicles

Happenings in the Sub-continent

Vol.4 No.1 April 2022

FROM THE AOQR DESK

Dear Quaternary enthusiasts,

We commenced the New Year by conducting the 1st IQC (Indian Quaternary Congress-2022), which was a great success. With the focal theme of "Integrative Quaternary Sciences for Societal Service", 267 researchers working across India in different aspects of the Quaternary sciences participated in it. On behalf of the AOQR family, I thank all the participants, the keynote speakers, and all involved in making the event a grand success. The beginning is made and now we need to take this research journey to the epitome of global research.

March 8 is a day to celebrate women, I would like to congratulate all the women scientists, professors, teachers, and students of Quaternary sciences, who are contributing in their ways to science and technology.

For the 2nd Foundation Day, on 12th December 2021, we were happy to listen to the 2nd Foundation Day Talk delivered by Professor Philip Gibbard, from the Scott Polar Research Institute, University of Cambridge, UK, on a very important and debatable title, 'The Anthropocene: an event or a division of geological time'. We try to bring to you the best of the speakers and researchers from the international Quaternary family.

This year too we will conduct activities and we invite all of you to take part in them. A one-day workshop on "Introduction to Diatoms" will be organized in May 2022 and the dates will be announced soon. As a part of the AOQR's capacity-building activities, we will be elated to do some joint programmes with your institution/university and will look forward to your support and keenness. Please use the AOQR as a platform to showcase your research, train students, and hold workshops. This is our association, a researchers association and we jointly have to make it grow and sparkle with the activities of Quaternary findings, research, and data which is of importance to academicians, government as well as society.

Things are coming to normalcy after the two-year grip of the pandemic, so we look forward to meeting in person and learning more from each other.

- Binita Phartiyal

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

PERSPECTIVES

SIWHA (Sea Ice and Westerly winds during the Holocene in coastal Antarctica) – a sneak peek into climatic mysteries

Global climate system is like a complex machine, with its heat transported from place to place by ocean currents and winds. The Antarctica and Southern Ocean is a vital link in this global oceanic heat engine. The Antarctic Circumpolar Current (ACC) that encircles the globe is the mightiest current in the Southern Ocean and connects the Atlantic, Pacific and Indian Oceans to form a global network of oceanic currents. The southern hemisphere westerly winds centered between 50°- 55°S, which drive the ACC, is key to the mixing and ventilation of the world's deep oceans as well as modulating the upwelling and transfer of heat and carbon between the atmosphere and the global ocean. The Southern Ocean is thus a "window" into the deep ocean because westerly winds drive upwelling of carbon-rich deep water, which along with sea ice, determines the capacity of the ocean surface for air–sea gas exchange. Separately, biological production in the surface ocean also exports carbon to the deep ocean via the biological carbon pump. Thus, the Southern Ocean can be both source and sink for greenhouse gases like CO_2.

Currently, the Southern Ocean absorbs about 43% of anthropogenic CO_2 emissions and uptakes 75% of the anthropogenic heat. This important air-sea exchange is modulated by the strength and position of the westerly winds and sea ice distribution. Studies have shown that the strength and geographical distribution of this CO_2 sink has varied over decadal to millennial timescales and even reported a weakening of the CO_2 sink in the face of global warming. However, an unequivocal link between Southern Ocean upwelling and atmospheric CO_2 in the past and present remains elusive. Models do not capture observed changes in both westerlies and sea ice over the Southern Ocean. Therefore, it is critical to have an integrated knowledge of westerlies, sea ice, and resultant CO_2 fluxes over a long period in predicting future climate change.

Proxy records of Antarctic ice cores are the only means of reconstructing southern hemisphere westerlies, sea ice and atmospheric CO_2 composition prior to the instrumental era. Since most Antarctic ice core records come from the interior plateaus, they are not suitable for sea ice reconstruction and also have lower accumulation rates, making them unfitting for decadal scale studies. Currently there are no ice core records from coastal sites of Antarctica that provide highly resolved and continuous records of CO_2, winds and sea ice to evaluate the strength of the Southern Ocean sink and/or source for the whole Holocene. Considering this gap in knowledge, an Indo-UK-Norwegian project entitled SIWHA (Sea Ice and Westerly winds during the Holocene in coastal Antarctica) is taken up during 2021-26. The ambitious SIWHA project aims to drill a new >500 m ice core from coastal Dronning Maud Land in East Antarctica that will unravel the role of westerly winds and sea ice on CO_2 air-sea exchange from a single archive for the entire Holocene at decadal to millennial timescales.

Dr. Thamban Meloth
Group Director, Polar Sciences
ESSO - National Centre for Polar and Ocean Research
Headland Sada, Goa 403004 INDIA

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

Everything is not everywhere!

Dr. Karthick Balasubramanian
Scientist E, Biodiversity & Palaeobiology Group
Agharkar Research Institute, Pune 411004

Palaeontology studies the history of life on Earth based on fossils. These fossils can be the remains of plants, animals, algae, fungi, bacteria, and other microorganisms. The study of palaeontology was established in the 18th century and developed rapidly in the 19th century. Palaeontology was primarily an observational science focused on discovering, naming, and describing fossil plants and animals during much of the nineteenth and twentieth centuries.

Since palaeontology entered the modern era, with development in microscopic techniques, it has developed specialized sub-divisions like micropaleontology, which focuses on microorganisms and microscopic remains of plants and animals. Microscopic evidence was used to reconstruct the past environmental conditions and events, such as rainfall, temperature, tsunami and earthquakes, to name a few, using biological proxies.

Amongst all the biological proxies, one of the most commonly used biological proxies is pollen. Fossilized pollen has been used as a palaeoecological and palaeoclimatological proxy for many decades. There are two reasons why pollen got established as a proxy. Firstly, fossil pollen records have been recovered from almost all regions of the world, including ocean sediments and ice cores from glaciers. Secondly, since plant types vary under different climate conditions and different geographical areas, the distribution of pollen can be used to infer the environmental condition for a particular location at that time.

Pollen is region-specific due to the restricted distribution of the plants; the restricted distribution of plants is due to the prevailing climatic conditions that shape the region's biodiversity. Researchers started identifying pollen distributed locally across the world, eventually leading to multiple identification guides on pollen. The better identification of pollens helped figure out even a minor climatic signal from that particular ecoregion. One classic example of the restricted distribution with high climatic indication is Dipterocarpus pollen from South and Southeast Asia, an indicator of monsoon regime. Another example is the pollen of mangrove plants used to reconstruct the palaeo seashore. Robust inference combined with intensive work at local and global scales has led to detailed research across space and time, making pollen a successful proxy indicator.

However, the scenario is not the same in the case of all other proxies, for example, diatoms. Diatoms (Bacillariophyceae) are siliceous, microscopic algae, often the dominant algal group across aquatic and terrestrial habitats. Since their cell walls are made up of silica, they are preserved better over time than other biological proxies in sediments, making them successful and the most widely used biological proxy, especially in temperate environments with sporadic work in tropics. Their signatures in the sediment archives provide high-resolution data while decoding the past environmental conditions.

Each diatom species can be distinguished from the other based on the size, shape, and sculpturing of their siliceous cell walls and harbors a unique taxonomic position. Thus, diatom taxonomy becomes central to using diatoms as a biological proxy for reconstructing the past environmental and climatic changes. Hence sound taxonomical knowledge about the regional flora and thorough identification is necessary for using diatoms as a proxy in various applications.

Quaternary Chronicles
Happenings in the Sub-continent

Diatom taxonomic studies in the tropics, particularly in the Indian subcontinent, mainly depend on identification guides based on temperate, especially the European/American diatom flora. Usage of non-native identification guides leads to 2 interconnected problems. First, misidentifying the "narrow" endemic flora as "widespread" taxa leads to underestimating the region's biodiversity. Secondly, misidentification leads to the loss of environmental inference offered by that taxa, eventually leading to coarse interpretation. The endemic taxa have their own unique, typical environmental signal; by identifying them as cosmopolitan due to 'force-fitting taxonomy,' we will lose unique signals offered by endemic taxa to infer environmental/climatic conditions at a regional scale.

Until the mid-19th century, many scientists thought "everything is everywhere", especially for microorganisms. But recent studies prove that factors controlling macro-organisms do control the microorganisms too. Recently many studies report hundreds of new species of diatoms from tropical fresh and saline waters that reconfirm the uniqueness of regional flora. South and Southeast Asia are biodiversity-rich regions, containing rich diatom diversity regionally. Hence a separate regional (at least southeast Asia) level diatom database is essential today. To overcome the above-discussed gap, we are trying to understand the diversity of modern diatoms from the Indian subcontinent and their distribution and ecology. In light of this, our work on modern Indian diatoms discovered many new taxa, even at a genus level.

During our study, we found that even closely related species have a varying distribution and ecological niche. A detailed understanding of these taxa will help us understand the country's biodiversity and its application in monitoring current and past environmental conditions. This method of understanding our contemporary diatom flora will be more relevant when working with biodiversity hotspots such as Western Ghats and Eastern Himalayas. I suggest that this is the time to shift our gears from 'force-fitting taxonomy' to 'developing local flora and everything is not everywhere. After all, we never identify our birds and flowers using European or American literature! Association of Quaternary Researchers (AOQR) efforts in bringing together people across the specialization under the theme of quaternary research is a promising platform to take diatom research in next level in Indian subcontinent.

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

Indian monsoon dynamics and its linkages with the global climate system

Dr. Upasana S. Banerji,
Paleoclimatologist, Hydrology Group,
ESSO-National Centre for Earth Science Studies (NCESS),
Thiruvananthapuram, Kerala

The Indian subcontinent, located in the central part of the monsoon domain, dominantly witnesses the Indian Summer Monsoon (ISM) along with the Western Disturbances (WD) and Northeast Monsoon (NEM), as a function of lateral migration of the Intertropical Convergence Zone (ITCZ). The ISM entering from the southwestern coast of India (Kerala) gradually progresses northwards and leads to varied intensity of rainfall, thereby paving the way for the socio-economic growth of India and nearby regions. A close teleconnection of ISM with natural forcing (orbital, solar, volcanic, etc.) and ocean-atmospheric processes [El Nino Southern Oscillation (ENSO), North Atlantic Oscillation (NAO), Indian Ocean Dipole (IOD), etc] has been established through instrumental dataset.

Despite the available datasets, the associations of climate factors with the monsoon system are tangled due to the limited extent of instrumental records that seldom goes beyond the last two centuries. Thus, the linkage of the Indian monsoon system with that of the other global climate variables (ENSO, IOD, NAO, etc.) needs to be well understood for the time span beyond the instrumental data.

Unprecedented efforts are being made in the last few decades to peer deep back in time especially for the 'Holocene Epoch' (10 ka to present), in order to comprehend the present climate variability and envisage future climate trends. Recently, the Holocene Epoch has been ratified into three stages viz., Greenlandian, Northgrippian and Meghalayan, based on two abrupt climatic events, the 4.2 ka and the 8.2 ka, which are globally observed as cold/dry climatic episodes.

In addition to 4.2 and 8.2 ka, there are several abrupt cooling events within the Holocene Epoch named as the Bond cycles, that were well recognised in the North Atlantic region, but gradually their prevalence was established from other global records, thereby demonstrating the global teleconnection of the climate system. The persistence of abrupt climatic events within the Holocene, kickstarted my interest in reconstructing the past monsoon variability with the help of sediments from coastal, marine and lacustrine systems. My research aims to demonstrate the response of ISM during such abrupt climatic events and to delineate the plausible processes and/or factors responsible for such variability. Further, to address the interplay of ISM with WD and NEM to yield an understanding of the simultaneous oscillation between summer and winter rainfall is also important. The extensive investigation on the ISM response towards the abrupt climatic events and its interplay with the WD and NEM, will provide cues on the ITCZ position and its migration over the Indian subcontinent.

During the last century, humans have made the planet extremely hostile with a frightening future of the Earth, that gets foggier as we try to look forward, invoking that we are at our own peril. Thus, an unambiguous picture of the climate system lies in extensive and high-resolution past climate reconstruction for the Holocene Epoch which might resolve the constraints on future climate projections.

AOQR is a good platform for the Quaternary Researchers to showcase their research as well as to connect to the Quaternary fraternity of India and this connection was very necessary.

I wish great AOQR success always.

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

SNEAKPEEK AND DISCUSSION

Reviewer anonymity in scientific publications

Dr.Aasif Mohmad Lone, University of Kashmir, Srinagar

Scientific manuscripts submitted in journals always find reviewer names being kept anonymous.Although certain journals have now started to replace this anonymity and happily reveal the reviewer names along with the published manuscripts.The anonymous reviewers significantly contribute to the improvement of good and clean scientific research and hence their names must be revealed and highly acknowledged in all scientific articles. Despite the anonymity provided by a journal, some reviewers voluntarily reveal their identity to the authors too. Recently one of my friends got a review on his submitted paper. One of the interesting things I noticed was that the reviewer in this case chose not to remain anonymous and happily wrote his name at the end.The statement he made was "I do not wish to remain anonymous: signed, (name)". I think this should be a usual practice in the scientific publication world now, and more and more reviewers should endorse this practice and make this anonymity obsolete.To be fair, both the reviewer and author's names should be revealed to each other and to the scientific community.This would, in a sense, pave the way for the reviewers to come forward and defend their comments. I therefore support the idea of this non-anonymity approach adopted by certain journals.

Dr.Aasif Mohmad Lone currently works as a Research Assistant in the National Himalayan Cryospheric Research group at University of Kashmir Srinagar (India). His keen research interests revolve around the reconstruction of paleo-climatic/environmental conditions using multi-proxy data from lacustrine and loess/paleosol sedimentary sequences.

Gangani, West Bengal-a museum of Quaternary geology where nature is the curator and river is the sculptor

Piyal Halder, BSIP, Lucknow &AcSIR, Ghaziabad.

Badlands have become one of the most potential areas of research for the last few decades.The term "badland" means a dry, infertile, rocky terrain with minimal agricultural possibility.This term has been derived from the word " Makhosica"used by the Lakota tribe of South Dakota, meaning "land bad". Badlands are the sites of extensive erosion where the soft sedimentary rocks have been converted into steeply sloping topography of unconsolidated soils or poorly consolidated bedrock with a very little amount of regolith and high drainage density forming active rills and gullies by the action of running water in a dry climate. In the Southern part of West Bengal, such a badland named "Gangani Danga" (Meaning-land of fire) is situated on the right bank of the Shilabati river near the Garhbeta town of West Medinipur district between the Ganga–Brahmaputra delta to the east and the Chotanagpur plateau fringe to the west.This lateritic upland is believed to have been developed during the Pleistocene period and is presently recognized as the "Grand Canyon of West Bengal"for its spectacular scenic beauty with different types of geomorphic features such as caves, escarpments,pinnacles, mesa & butte like structures, earth pillars, saw-tooth ridges, and geomorphosites etc.

Actually, Gangani is layered by duricrust lying over the multi-level lateritic profile which is mainly secondary in origin implying the polycyclic lateralization process.The duricrust here is red brown or brick red in colour and highly porous in nature where vesicles are filled up with red-brown or white earthy material. Below this hardpan, there is a thin layer of lithomergic clay which is overlain by a mottled sandy loam.Hence, a bulk mineralogical and geochemical study on the duricrust and laterites at different levels of this dynamic upland can be conducted to characterize the erosional mechanism and subsequent mobility of different chemical elements which will give an overview on the evolution of this badland. Especially, the chemical speciation of ferruginous nodules in the duricrust layer can shed light on understanding the mechanism of nodule formation as well as the chemical redistribution processes during erosion. Besides, clay mineralogical analysis of the samples collected from the different levels of the lateritic section can give insights into the altered mineralogy as well as the degree and stage of erosion.In addition, Grain size

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

analysis and determination of sand silt, clay percentage can be a useful proxy for interpreting the textural morphology and paleoenvironmental reconstruction of this badland. On the other hand, hole erosion tests, measurement of plasticity index, and critical shear stress in lithomargic clay samples can be a new method to analyze their erosional potentiality.

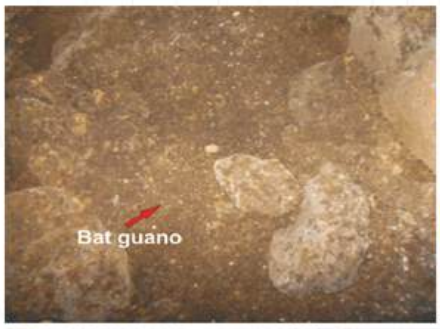
Generally, soils with fines whose plasticity indices are high, are less erodible compared to soils with fines whose plasticity indices are low. Last but not the least, earlier evidence of trace fossil assemblages in the Lower Lalgarh Formation of Lower Pleistocene, Sijua Formation of Holocene along with few other vertebrate fossils have made this "land of Fire" as a "land of geological archive".

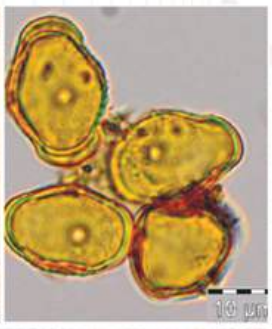
Piyal Halder, from Chandernagore, West Bengal, is working as a Junior Research Fellow (MoES, Govt. of India) in Birbal Sahni Institute of Palaeosciences (BSIP) and pursuing Ph.D. in Academy of Scientific and Innovative Research (AcSIR) under the supervision of Dr. Anupam Sharma (Sci-F, BSIP) and joint co-supervision of Dr. Kamlesh Kumar (Sci-D, BSIP) and Dr. Matsyendra Kumar Shukla (Sci-C, BGRL, MoES).

Quaternary Chronicles
Happenings in the Sub-continent

Bat Guano substrates: a tool for developing modern pollen analogue in Meghalaya

The state of Meghalaya includes Cherrapunjee, the wettest place on Earth, which holds two Guinness Book of World Records for receiving the maximum amount of rainfall in a single year and in a single month. These conditions make it difficult to interpret the fossil pollen data from the Meghalayan region of northeast India as it results in the over or under-representation and total decline of some of the key pollen taxa in the region due to soil erosion, rain wash, frequent forest fires and anthropogenic activities. Thus, there is a dire need to look for alternative protected substrate to determine the relationship between modern pollen and extant vegetation, which could aid in deciphering the palaeoecology of this region. The overall pollen data from the bat guano indicates a tropical mixed deciduous forest in the region composed of Shorea(sal), Terminalia (harr), Albizia (Indian siris), Syzygium (jamun), Duabanga, and Lagerstroemia. These taxa are mainly entomophilous in nature and their pollen became incorporated into the bat guano through the ingestion of insects by bat species feeding in and around the study area. The continuous presence of evergreen pollen taxa, Mesua, Schima, and Elaeocarpus in the pollen assemblage is indicative of high rainfall in the region.





The regular recovery of the Bombax–Schima–Shorea–Duabanga–Melastoma–Areca(supari) assemblage was marked and characterized in the bat guano sample. The high value of Bombax and Syzygium pollen was also marked and indicative of their secondary inclusion in the guano through the insectivorous diet of the bats. The presence of Bombax and Melastoma along with Asteroideae in the pollen assemblage is suggestive of the existence of the secondary forest in and around the study areas and also used by bats as an area for foraging. The recovery of cereal and Brassica(sarso) along with Guava, Citrus, and Areca pollen is indicative of the anthropogenic activity in the region. Ferns and fungal spores such as Dryopteris, Glomus, and Sporormiella are also indicative of the warm and humid climatic condition of the region. It is demonstrated from the pollen records that the bat guano from the cave sediments also act as a reliable substrate as that of the forest soil and moss cushions in relation to the modern palynological studies in the Garo hills, Meghalaya. This study also confirmed that bat guano deposits in caves when available should be considered a reliable data source which could precisely be utilized as part of the interpretation of the modern pollen precipitation and palaeoecological analysis.

Reference:

Tripathi S, Basumatary SK, Pandey A, Khan S, Tewari P, Thakur B. 2021. Palaeoecological changes from 580 to 1220 CE from the Indo-Burma region: A biotic assessment from the Barak Valley of Assam, northeast India. Catena 206: 105487.

Weblink: *https://www.sciencedirect.com/science/article/pii/S0341816221003453*

- Dr Swati Tripathy,
BSIP, Lucknow

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

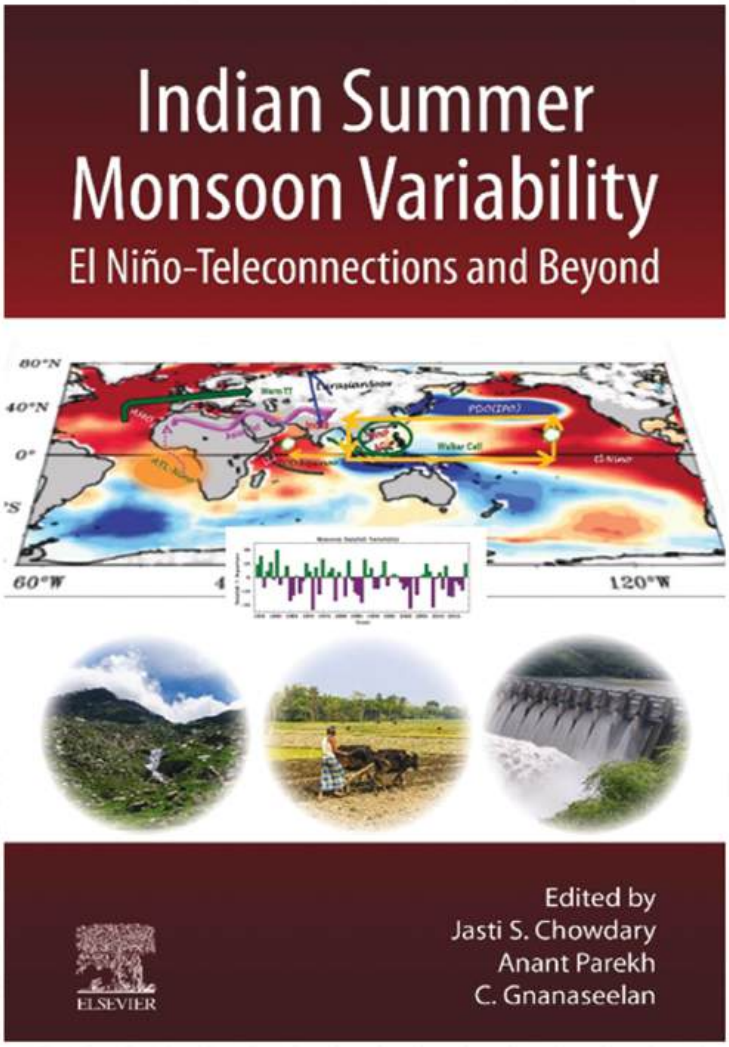
Book on "Indian Summer Monsoon Variability: El Niño-teleconnections and beyond"

Edited by
Jasti S. Chowdary, Anant Parekh and C. Gnanaseelan - Elsevier publication.

Review by:
Darshana P[1,2], Amole Vibhute[1,2] and Subrota Halder[1,2]
[1]Indian Institute of Tropical Meteorology, Ministry of Earth Sciences, Pune 411008, India
[2]Savitribai Phule Pune University, Pune 411007, India

For the hundreds of millions inhabiting in the monsoonal regions of the world, seasonality of rainfall is a life line. The Indian monsoons, estimated to be about 15–20 million years old, are a major annual climatic event, bringing rainfall to the Indian subcontinent. Indian monsoons exhibit spatio-temporal variabilities, from sub-divisional to regional scale and from intra-seasonal to multi-decadal time scale. The extremes in the year-to-year variations of the long-term mean precipitation manifest in the form of large-scale floods and droughts and cause devastating human and economic loss. The most significant influence on Indian Summer Monsoon (ISM) comes remotely from teleconnections. The El Niño southern oscillation (ENSO) is one of the leading remote driver/controller of ISM rainfall, which has been widely studied. A few studies revealed different flavors of ENSO, their role in spatial temporal variability of ISM. Further, many other non-ENSO climate modes associated to ISM modulate its predictability factors. Modes of variability from tropical to subtropical Indian ocean (viz. Indian ocean basin mode, Indian ocean dipole mode), Atlantic Ocean (viz. Atlantic Niño, Atlantic multi-decadal oscillations, North Atlantic oscillation), and mid-latitudes to extratropical regions (viz. Pacific-Japan mode, Southern Annular mode, Pacific decadal oscillation etc.) influence and drive ISM variability. Thus, improvement in the accuracy of monsoon rainfall predictions needs deep understanding of influence of internal and external forcing mechanisms.

However, most of these teleconnections to ISM rainfall are not stable in time. Thus, it is essential to know how these teleconnections alter under the climate change perspective and modulate rainfall over India and its predictability. This book, presents knowledge on Indian summer monsoon teleconnections (ENSO and Non-ENSO) and discussed advancements in the subject along with future steps to be followed. With growing monsoon rainfall extremes across the Indian subcontinent, understanding of monsoon environmental factors that driven remotely through teleconnections is a new aspect that has been covered in this book.



This book presents the state-of-the-art on ISM variability and teleconnections, which includes both ENSO and Non-ENSO forcing.

- The impact of various regional climatic modes of tropical and extra-tropical variability on ISM rainfall are discussed in-depth.
- Special emphasis is given to non-ENSO drivers of Monsoon.
- Each chapter is written by national and international experts in the field examining a particular aspect of that topic and provides cutting-edge information on both modelling and observational aspects of monsoon variability.

It gives a comprehensive review, literature survey and future prospects/ideas on various themes connected to monsoon teleconnections (23 chapters). The discursions are not limited to analysis of past observational data but also utilize the state-of-art coupled models to understand future changes in monsoon teleconnections. This book can serve as a specialized reference for early career researchers and post-graduate and graduate students in Atmospheric Science and Meteorology.

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

Research Publications:

Chakraborty, S., Burman, P.K.D., Sarma, D. et al. 2022. *Linkage between precipitation isotopes and biosphere-atmosphere interaction observed in northeast India. npj Clim Atmos Sci 5, 10. https://doi.org/10.1038/s41612-022-00231-z*

Anoop S., Manoj, M.C., Kawsar, M., Sivadas S.K., Beevi M.R. 2022. *Spatio-temporal distribution of heavy metals in sediments of Biyyam Backwater, Kerala, Southwest India; its environmental implications. Environmental Nanotechnology, Monitoring & Management. https://doi.org/10.1016/j.enmm.2022.100662.*

Roy, I., Ranhotra, P.S., Tomar, N., Shekhar, M., Agrawal, S., Bhattacharyya, A., Kumar, P., Patil, S.K. and Sharma, R., 2022. *Reconstruction of the Late Holocene climate variability from the Summer Monsoon dominated Bhagirathi valley, western Himalaya. Journal of Asian Earth Sciences, 227, 105080.*

Syed Azharuddin, Pawan Govil, Arun Deo Singh, Ravi Mishra, Shailesh Agrawal, 2022. *Mid-Holocene intensification of the oxygen minimum zone in the northeastern Arabian Sea, Journal of Asian Earth Sciences, 227, 105094, https://doi.org/10.1016/j.jseaes.2022.105094.*

Pawan Govil, Abhijit Mazumder, Shailesh Agrawal, Syed Azharuddin, Ravi Mishra, Hidayatullah Khan, Brijesh Kumar, Divya Verma, 2022, *Abrupt changes in the southwest monsoon during Mid-Late Holocene in the western Bay of Bengal, Journal of Asian Earth Sciences, 227, 105100, https://doi.org/10.1016/j.jseaes.2022.105100.*

Ratan Kar, Kriti Mishra, M. Firoze Quamar, Ruchika Bajpai Mohanty, Shailesh Agrawal, Swati Tripathi, Amit Kumar Mishra, 2022. *A high-altitude calibration set of modern biotic proxies from the Western Himalaya, India: Pollen–vegetation relation, anthropogenic and palaeoclimatic implications, CATENA, 211, 106011, https://doi.org/10.1016/j.catena.2021.106011.*

Mohan Kumar, Korobi Saikia, Shailesh Agrawal, Ruby Ghosh, Sheikh Nawaz Ali, Md. Arif, Dhruv Sen Singh, Anupam Sharma, Binita Phartiyal, Sunil Bajpai, 2022, *Climatic control on the C3 and C4 plant abundance during the late Pleistocene – Holocene in the northern Gangetic Plain, India, Palaeogeography, Palaeoclimatology, Palaeoecology, 591, 110890, https://doi.org/10.1016/j.palaeo.2022.110890.*

Rupesh Dhyani, Rajesh Joshi, Parminder S. Ranhotra, Mayank Shekhar, A. Bhattacharyya, 2022, *AGE DEPENDENT GROWTH RESPONSE OF Cedrus deodara TO CLIMATE CHANGE IN TEMPERATE ZONE OF WESTERN HIMALAYA, Trees, Forests and People, 8, 100221, https://doi.org/10.1016/j.tfp.2022.100221.*

Shabnam Choudhary, G. N. Nayak, Neloy Khare. 2022. *Biogenic Silica Indicator of Paleoproductivity in Lacustrine Sediments of Svalbard, Arctic. in Book, Climate Change in the Arctic, 1st Edition, CRC Press. Taylor & Francis Group. 9781003265177.*

Choudhary S., Nayak G.N., Khare N. (2022) *Nutrient Cycling and Productivity in Antarctic Lakes. In: Khare N. (eds) Assessing the Antarctic Environment from a Climate Change Perspective. Earth and Environmental Sciences Library. Springer, Cham. https://doi.org/10.1007/978-3-030-87078-2_9.*

Binita Phartiyal, Debarati Nag, 2022, *Sedimentation, tectonics and climate in Ladakh, NW Trans-Himalaya-with a special reference to Late Quaternary Period, Geosystems and Geoenvironment, 100031, https://doi.org/10.1016/j.geogeo.2022.100031.*

Debarati Nag, Binita Phartiyal, Pankaj Kumar, Priyanka Joshi & Randheer Singh (2022) *Geomorphological and sedimentological evidences of palaeo-outburst flood events from TanglangLa-Gya catchment of River Indus, Ladakh, India, Physical Geography, DOI: 10.1080/02723646.2021.2022339*

DISCLAIMER

As this is a community-driven newsletter, the role of the ECR team is limited to copy editing and reporting only. It will be the sole responsibility of the author/ contributor to ensure the accuracy and authenticity of the contributions. The ECR team is pro-active in collecting as much useful information as possible; however, we rely on community inputs and will not be responsible for any omissions.

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

NEW

FACILITIES AND INSTRUMENTS

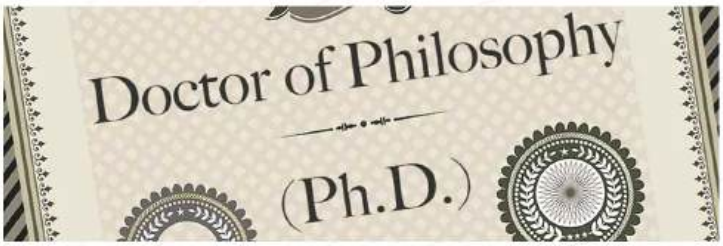
Birbal Sahni Clumped Isotope Lab

Prasanna K, BSIP Lucknow

Earth's climate has undergone sudden and swift changes many times in its history as revealed in the analysis of the geologic records. Knowledge about the nature of these extreme climate changes from the past can teach us to mitigate the challenges in the future climate change scenarios. Such questions are investigated in the field of palaeo-climatology. The backbone of palaeo-climatology is the reconstruction and accurate quantification of key climate parameters in the past. In this context, Birbal Sahni Institute of Palaeosciences (BSIP), Lucknow, India has established a clumped isotope lab – "Birbal Sahni Clumped Isotope Lab" whose goal is to better constrain past temperatures through the application of a new and powerful palaeo-thermometer: clumped isotopes in carbonates. Clumped isotope geochemistry involves studying the properties of isotopic species that contain more than one rare isotope. In carbonates, it is based on the measurement of the abundance of 13C-18O bonds in their mineral lattice. Unlike the classic oxygen isotope thermometer this method is independent of the composition of the water from which a mineral is formed. Therefore, it does not require assumptions of the composition of the water, which is commonly the largest source of uncertainty when reconstructing deep-time palaeoclimates and diagenetic processes. The clumped isotope thermometer is the only thermodynamically-based thermometer that can be used for the reconstruction of past climate change in a broad range of environments, ranging from paleosols, to lake sediments, to marine organisms. If original carbonate skeletons have not been altered by diagenesis, clumped isotopes allow the reconstruction of paleotemperatures with an accuracy of ± 2°C degrees. Clumped isotope measurements can shed light on a broad range of topics of interest to geoscientists, including geothermometry, biomineralization, tectonics, diagenesis, atmospheric budgets, and rates of geochemical processes. The newly established lab has the latest Thermo Fisher 253 Plus Mass spectrometer with 1013 Ohm amplifiers for the rare isotopologues of mass 47 to 49 and wide range of sample preparation setups.

RECAP

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS



PhD Awarded

1. Thesis title: *Climate and Glacial History during late Quaternary from the Dokriani Bamak Glacier, western Himalaya*
Ipsita Roy, *Birbal Sahni Institute of Palaeosciences, Lucknow*
Supervisors: *Dr. Parminder Singh Ranhotra (BSIP, Lucknow) and Prof. Y.K. Sharma (Botany department, University of Lucknow)*

The subalpine and alpine vegetation zones are more susceptible to change in climate as observed by receding glaciers, biodiversity changes and tree-line shifts. Long-term palaeoclimatic reconstruction from the available sedimentary archives at subalpine and alpine zones in the glaciated valleys of the Himalaya provides a better understanding of glacial and vegetation dynamics in response to climate change. In this work, the modern pollen-vegetation relationships and the vegetation-climate scenario since beyond the Holocene were studied, and possible forcing mechanisms were deciphered. Modern pollen-vegetation relationship from the alpine and sub-alpine zones provided a regional scenario while the temperate altitudes gave a local picture (Roy et al., 2021). Up-valley winds are found to have a stronger role in pollen transportation than down-valley winds. This modern pollen-analogue was used to interpret past hydroclimatic changes in the valley from ~17 ka BP till recent times, at a centennial to decadal time resolution. Sub-surface sedimentary profiles were studied both from the oak-dominated temperate altitude at Nachiketa (~2,500 m asl) and sub-alpine meadow of the valley (~3,500 m asl). The proxies studied were palynology, stable carbon isotope, and magnetic susceptibility of radiocarbon dated sediments and peat deposits. The high-resolution study could interpret several short-lived and abrupt climatic phases along with major climate events of 1) pre-Holocene viz. Older Dryas, Bolling-Allerod and Younger Dryas; 2) Holocene viz. 8.2 ka cold event, 4.2 ka cold event, Medieval Warm Period and the Little Ice Age. The Pleistocene-Holocene boundary was reported at ~11.8 ka BP. A strong role of total solar insolation was inferred during the last millennium when solar minima phases coincided with the high presence of dry-indicating pollen taxa (Amaranthaceae, Artemisia and other Asteraceae genera) and high 13C org. values (-21‰). This phase also bracketed the Little Ice Age period (Roy et al., 2022). The study has addressed the existing gap of a continuous record of vegetation and climate dynamics from the subalpine altitude of the summer monsoon dominant region of the western Himalaya.

References

Roy, I., Ranhotra, P.S., Shekhar, M., Bhattacharyya, A., Ghosh, R. and Sharma, Y.K., 2021. Modern Pollen-vegetation Relationships along the Vegetation Gradient in the Bhagirathi Valley, Western Himalaya, India. Journal of the Geological Society of India, 97(6), 571-578.

Roy, I., Ranhotra, P.S., Tomar, N., Shekhar, M., Agrawal, S., Bhattacharyya, A., Kumar, P., Patil, S.K. and Sharma, R., 2022. Reconstruction of the Late Holocene climate variability from the Summer Monsoon dominated Bhagirathi valley, western Himalaya. Journal of Asian Earth Sciences, 227, 105080.

2. Thesis Title: *Late Quaternary Glacial Chronology, Palaeoclimatic Reconstruction And Their Climatic Implications In The Thangu Valley, Sikkim Himalaya, India*
Jyotsana Dubey, *Birbal Sahni Institute of Palaeosciences, Lucknow*

Supervisors: *Dr. Sheikh Nawaz Ali, (BSIP, Lucknow) and Prof. Vaibhava Srivastava (BHU, Varanasi)*

The variations in precipitation and temperature play a key role in the spatio-temporal distribution of glaciers. Recent studies indicate that the Himalayan glaciers are melting at an alarming rate and are affecting the hydrology, biodiversity, and ecosystem services in mountain regions. The receding glaciers provide striking evidence of glacier-climate interactions and how climate shapes the planet Earth. Hence, the studies pertaining to modern glacier retreats and comparing them to the past changes in glacier boundary condition is critical, as it provides a benchmark towards assessing the causes and possible future response of glaciers to climate change. This can be achieved by resolving the timing of glaciation and understanding the role of different weather sys-

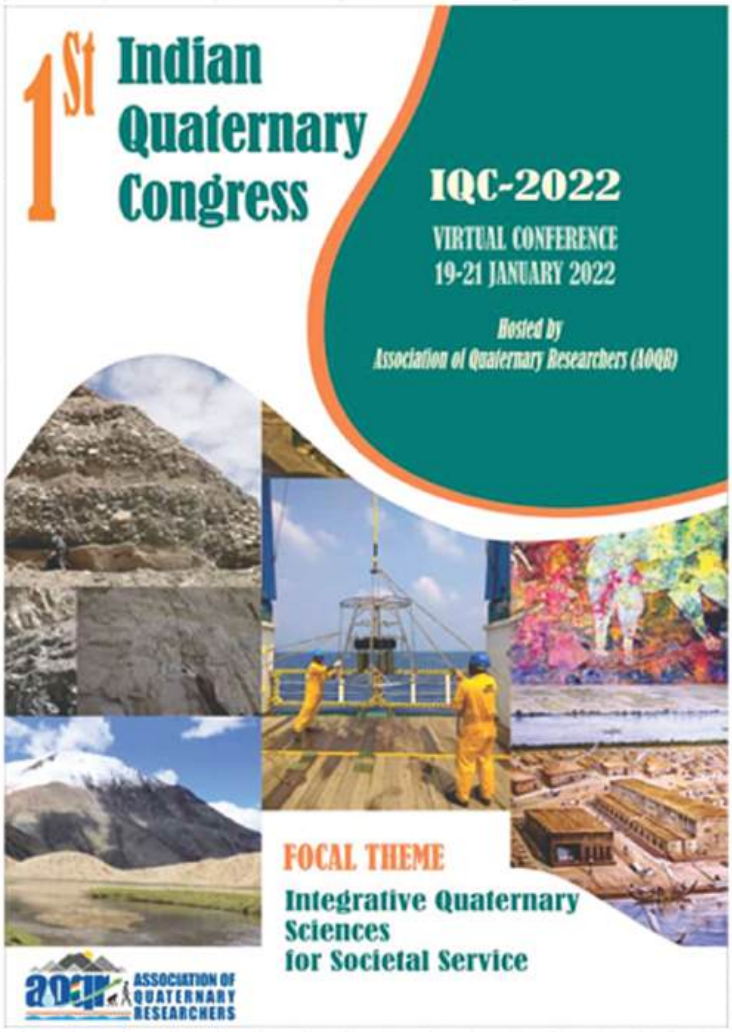
tems in driving glacier advances and retreat. It has been observed that there is a spatial heterogeneity within the Himalayan glaciers which is generally attributed to orography and geographic location that modulates the weather systems. This heterogeneity is manifested in spatial variability in glacier ice volume and its length. Although there is a broad consensus on the role of Indian Summer Monsoon (ISM) and Mid-latitude westerlies (MLW), in dictating the pattern of variability of the Himalayan glaciers, however, such studies from the Indian eastern Himalaya are still at an embryonic stage.

Although the glaciers sensitively record the changes in precipitation and temperature, the discontinuous nature of moraines leads to gaps in reconstructing a continuous climatic record. Hence, to have a continuous/ quasi-continuous record of climate variability, sediment profile located in the glaciated terrain becomes important. Therefore, the present study focused on establishing the glacial chronology and multiproxy palaeoclimatic reconstruction using a 3m deep peat profile from the proglacial area of the Chopta valley near Thangu Village. The present day palynoassemblage of the area has also been analysed to infer the relationship between palynoassemblage and climate variables (modern analogue) (Dubey et al., 2018). To quantify the Indian summer monsoon (ISM) variability from the Sikkim Himalaya we used combined high resolution δ13C, total organic carbon (TOC), sediment texture and environmental magnetic data of the samples from sedimentary profile. Our decadal to centennial-scale records suggest five positive and three negative excursions of the ISM since last ~13 ka. The most prominent abrupt negative ISM shift was observed during the termination of the Younger Dryas (YD) between ~11.7 and 11.4 ka. While, ISM was stable between ~11 and 6 ka, and declined prominently between 6 and 3 ka. A strong ISM phase is observed in this part of the Himalayas during the Medieval Warm Period (MWP) and Little Ice age (LIA) spans. These regional changes in ISM were coupled to southward shifting in the mean position of the Intertropical Convergence Zone (ITCZ) and variations in East Asian monsoon (EAM) (Ali et al., 2019).

The Cosmogenic radionuclide, optical, and radiocarbon dating techniques allowed in understanding the causes, and patterns of glacial advances/retreat in the eastern Himalaya. Our data provide a record of four glacial advances, named as Thangu Glacial Stage (TGS)-I to TGS-IV between 28±2.8 and 21.3±1.6 ka, 12.5±0.6 and 10.7±0.5 ka, a minor advance/standstill at 8.2±0.4 ka, and between 5.2±0.3 and 4.1±0.3 ka. The major deglaciation postdating TGS-I is dated between 18±2.2 and 15±2.6 ka whereas the second deglaciation following TGS-II is dated to 11±0.8 and 9.9±0.8 ka. A close correspondence of glacial advances with periods of temperature minima would imply that the glaciers have actively responded to the cooler temperature associated with the winter monsoon in response to global variations, and retreated during the enhanced monsoonal episodes.

2nd Foundation Day of AOQR

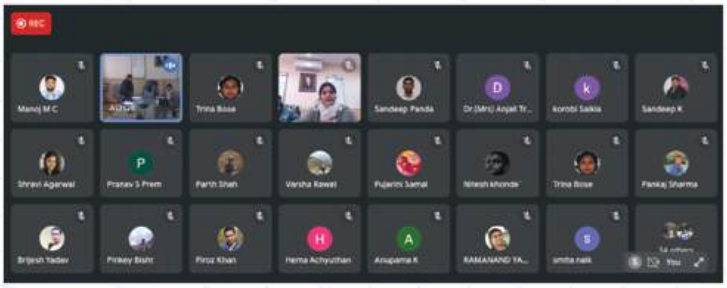
On Sunday, December 12, 2021 the second Foundation Day Function of the Association of Quaternary Researchers was celebrated. Professor Philip Gibbard, Scott Polar Research Institute, University of Cambridge, UK, was the Chief Guest and delivered the 2nd Foundation Day Talk on Title-The Anthropocene: an event or a division of geological time. Professor D. M. Banerjee, Chairman, INSA-INQUA Committee, India presided over the function. The programme was conducted on a virtual platform.



IQC-2022 Report

This first IQC with a focal theme of "Integrative Quaternary Sciences for Societal Service", brought out three keynote addresses and contributions from 267 researchers working across India in different aspects of the Quaternary sciences. The papers received by the congress were classified into thematic sessions on Climate: Past, Present, and Future; Earth Surface Processes in Quaternary; Oceans in Quaternary; Humans in Quaternary; Fossil records from Quaternary and Quaternary landscape evolution. Three keynote were delivered by Professor Robert James Wasson, Emeritus Professor at Australian National University, Adjunct Prof. at James Cook University, Australia; Prof. Peter Clift, Charles T. McCord Professor of Petroleum Geologyat Louisiana State University, USA; and Prof. Rajeev Patnaik, Center of Advanced Study in Geology, Panjab University, India. A special session on Science, Philosophy Management and Policy was conducted in which President of INSA-IUGS-INSA committee Prof. D.M. Banerjee, past vice president of INSA and INQUA Prof. AK Singhvi and eminent Quaternary scientists along with INQUA Prof. Thijs van Kolfschoten, President INQUA and Prof. Francesco L. Chiocci, President of upcoming INQUA-Roma discussed the future strategies on which Indian Quaternary Science should look upon and also how a good contingent can make its way on an international platform of quaternary like the INQUA. The session was moderated by Dr. P. Morthekai, BSIP, Lucknow who also presented his views on the "philosophy of Scientific research".

The Congress, that was convened by Dr Binita Phartiyal, Birbal Sahni Institute of Palaeosciences and Dr. Pradeep Srivastava, Department of earth Sciences, IIT-Roorkee was a success and could bring in a wide range of topics under Quaternary Science.



Session: Climate: Past, Present and Future and Earth Surface Processes

For the two sessions on Day 1 on the themes Climate: Past, Present and Future and Earth Surface Processes we received 38 abstracts, of which 17 were oral and 21 poster presentations. The papers dealt with a wide range of data from estuaries, creeks, fluvial sediments, river beaches, debris flows and landslides in the earth surface processes. Data from the Medieval Roman Period to the Neogene/Quaternary Boundary were presented through interesting case studies. Ensemble modeling approach to predict the past and future climate suitability; Variations in the Indian Summer Monsoon Record in Last 20 ka and its evolution in the Bengal region during the past ~ 10 ka were some topics that were discussed apart from the Holocene climatic records from different physiographic provinces of India. A good discussion and very novel proxies were used in some work. A way to a high resolution and a multi proxy data was seen in most of the papers.

- Dr. Binita Phartiyal, Secretary AOQR
BSIP, Lucknow

Session: Oceans in Quaternary

We received a good response from the researchers working on oceanic archives to reconstruct the past climate and oceanographic conditions. A total of 22 abstracts were submitted under the Theme: Oceanic realms in Quaternary. 10 oral and 11 poster presentations included novel proxies as well as application of various proxies such as microfos-

sils assemblages, grain-size, rock magnetic properties, isotopic ratio and elemental composition of biogenic carbonates and geochemistry of the whole sediments to reconstruct the paleoclimate and paleoceanography from the Bay of Bengal, Arabian Sea, Southern Indian Ocean, Japan Sea, Atlantic Ocean. A few abstracts were based on the work done on the sediments drilled during the International Ocean Discovery Program expeditions in the Indian Ocean and also the Japan Sea. The paleoclimatic studies covered the time frame from the Holocene to the entire Pleistocene. However, a large number of presentations focussed on the last glacial-interglacial transition.

Dr. Rajeev Saraswat, Group Head, OCRELQAT-AOQR
CSIR-National Institute of Oceanography

Session:Humans in Quaternary and Fossil records in Quaternary

In Sessions Humans in Quaternary and Fossil records in Quaternary, there were a total of 8 oral presentations and 5 poster presentations. The papers and posters presenting on the human element included topics such as Stone Age evidence in Bhima Basin of Maharashtra and Sagileru Basin of Andhra Pradesh, utilizing slow-accumulating-palimpsests concept across South Asian Palaeolithic sites, long-term natural and anthropogenic forcing on aquatic systems using biogeochemical proxies, a phytolith analysis from Agaram (Tamil Nadu), tourist perspectives and socio-economic development in coastal contexts along eastern India, Mesolithic cultural evidence and ostrich eggshells from Gaudgaon (Maharashtra), and geoarchaeological investigations in the Lower Bori Basin (Maharashtra). The papers and posters related to paleontological research included the following topics: preliminary stable isotopic results on select Pleistocene vertebrate fossils from central and western India, a study of Palaeoloxodon turkmenicus from Kashmir, investigating paleodiets and habitats from stable isotopes of mammals in the Ganga Plains, inferring Late Quaternary coastal changes in Kerala based on invertebrate fossils and a report of the first known ratite eggshell fossils from the Siwalik Hills of India.

- Dr. Parth Chauhan, Group Head,
HUCLIMQAT-AOQ;, IISER Mohali

Session: Quaternary Landscape Evolution

A total of 5 oral and 9 posters were presented in the Session titled "Quaternary Landscape Evolution." The topics covered mainly investigated the interplay of tectonics and climate with response of the rivers to climatic and tectonic shifts. The area of study included Assam (where erosional and depositional environment at Majuli Island was assessed), Chitwan intermontane valley (where tectonic and climatic clues were deciphered from the topography and sediments of the valley), Ladakh (where climatic variability was linked to landforms and sedimentation history), and the northeastern Himalayan foreland basin (where influence of sea-level fluctuation was inferred from the fluvial architecture). A work relating sedimentary record to the past 2.6 ka climatic variation through multiple proxies from Mahanadi River delta was also presented. Highlights of the posters include characterization of tectonically active zones of Kachchh basin, study of Lendi River deposits from Maharashtra, investigation of lithologic and tectonic controls on the flexural bulge of India, Quaternary climatic change record from fluvial sediments from Mahadeo Piparia, aggradation and reactivation timing of MCT along the Kali River, evidences of late Quaternary activity along STDs in western Himalaya, evidences of response to climatic changes from Dhauliganga valley, spatial analysis of cirques in NW Himalaya and glacial geomorphology of the Nubra valley, Ladakh were presented.

Dr. Vimal Singh, Group Secretary, HIALTQAT-AOQR
Department of Geology, University of Delhi

YouTube Recordings - IQC 2022

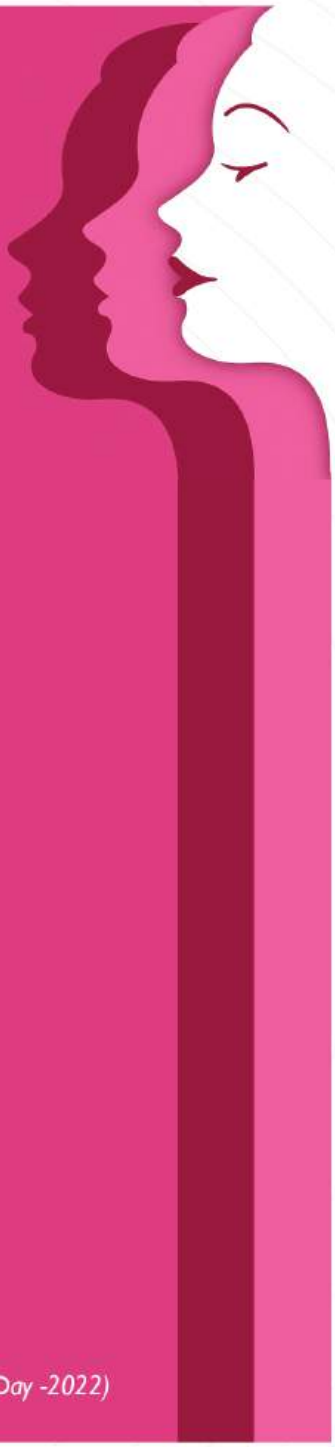
Day 1: Session 1 - https://youtu.be/CdxI1wPI0Ss?list =PLPRc4LmKoLysN14K0z2qtE9x9xexq18SH
Session 2 https://youtu.be/VG9jJ7a0IU4?list=PL PRc4LmKoLysN14K0z2qtE9x9xexq18SH
Day 2 Session 1 - https://youtu.be/T_6uP2aT788?list=PLPRc4LmKoLysN14K0z2qtE9x9xexq18SH
Session 2 - https://youtu.be/kUyzWrogEnc?list=PLPRc4 LmKoLysN14K0z2qtE9x9xexq18SH
Day 3 Session 1 - https://youtu.be/QB2s_Na6AqY?list=PLPRc4LmKoLysN14K0z2qtE9x9xexq18SH
Session 2 - https://youtu.be/2_-_H7-vC-k?list=PLPRc4LmKoLysN14K0z2qtE9x9xexq18SH

AOQR President, Dr. Vandana Prasad and other AOQR members and Quaternary Researchers of BSIP, Lucknow after the completion

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

International Women's Day - 2022

'WOMEN'



She nourishes a life, she is a wife.
She is a mother and a proud daughter.
She is a sister, a friend and a companion to the end…

She works hard to make her home,
Cooks, clean, laugh and hides her pain….

She can raise families and organization too,
We call her Maa and sometimes Madam too….

She is all of this, but what do we do?
Complain and create a mess
Provide stress and leave her feeling depressed
Push her away and ignore her advice
Tell her she is nothing without thinking twice….

Today is the celebration and we all are reciting a poem,
But do we dare, to casually appreciate her..?

Women's day, Daughter's day, Mother's day, are just simply days,
But do we care about the worries she pays to make best of our days….?
People call them sensitive and emotional,
But have you ever met those women who are fighting for the NATION….?
But,
My definition is quite different….
I call her strong, smart, caring, giving, surviving, tolerant and powerful….
I call her NAARI,
I call her WOMEN….

- Arya Pandey, BSIP, Lucknow
(A Poem written for the International Women's Day -2022)

To join QuatChron_AOQR Google Group: open https:// groups.google.com, login (using Gmail account), search for "QuatChron_AOQR" and ask to join.]

Miss Arya Pandey *is an INSPIRE Fellow working at the Birbal Sahni Institute of Palaeosciences, Lucknow. Her research interest includes Quaternary vegetation and climate change through palynology to reconstruct the palaeoclimatic and palaeovegetation and the anthropogenic impact in upper Brahmaputra valley of Assam.*

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

Quaternary Chronicle (QC) publishes three issues a year seeks to publish perspectives, recently published peer-reviewed papers in Quaternary science, new developments in Quaternary science methods/ techniques, past events, awards, abstracts of recently awarded Ph.D./MS thesis; Quaternary publications, obituaries and details on forthcoming conferences/opportunities/fellowships the world over. Each issue of the newsletter will therefore, comprise news on on/from the Indian sub-continent;. It will also have a platform for discussion on emerging questions and ideas in Quaternary science and details on new books/ monographs/ reviews. QC seeks to share original results, new ideas and innovative development for the common good and a possibility to serve as a catalyst for the initiations of major and coordinated initiatives in the country.

We now accept submissions for our upcoming issues. Submit all the contributions to ***aoqr2019@gmail.com****. Themes for contributions are given below:*

1.Perspective: *Perspective write-ups on emerging trends and new possibilities in Quaternary Science (500 words).*

2.Sneak-peek and Discussion: *Share any exciting findings/questions from your ongoing (unpublished) work already to facilitate discussion. Any other intriguing facts/ unanswered questions are also welcomed for discussion (150 words).*

3.Significant new manuscripts/ books/ monographs/ reviews: *Corresponding authors of recently published peer-reviewed papers are invited to submit a brief summary of their work (not published abstract) with complete reference, web-link, and corresponding email address (200-300 words). Also, include a PDF copy of the paper in the email (for reference only).*

4.Facilities and Instruments: *A list of available facilities at various Indian institutes will be given and updated as contributions are received. In-charge of the available facilities, mentioning whether it is open access or available on payment basis, may submit the details with contact details.*

5. Achievements: *Share national or international awards/ fellowships/ recognitions with the larger Quaternary community. Also, approved SERB/ DST/CSIR/ national/ international Quaternary projects with the title, affiliation details of the awardee and a brief abstract (200 words) may be submitted with a copy of the award letter (for reference only).*

6.Projects/Collaborations: *New projects and collaborations related to Quaternary Science may also be sought for enhancing the quality of ongoing/proposed research. Submit a brief summary of the project, collaborations required and the contact details for correspondence (200 words).*

7. New Thesis: *Abstracts of awarded PhD/MS degree are invited for contribution (250 words).*

8.Opportunities: *Submit details with web-link of any new openings and opportunities for wider circulation.*

9. Social media: *Follow, discuss and share Quaternary India News on https://twitter.com/ AOQRIndia (Twitter) and https://www.facebook.com/ AOQRIndia (Facebook).*

Come join us!

The Association of Quaternary Researchers (AOQR) invites all of you to register yourself for AOQR Membership and also ask your colleagues and students to make the AOQR Fraternity stronger and become a part of the AOQR family. See the details in https://www.aoqr.org/#

ISSUES	Deadlines (Last date for submission)
Issue -1 (April)	**March 10**
Issue -2 (August)	**July 10**
Issue -3 (December)	**November 10**

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

COMING SOON

A National Level Virtual Training on Freshwater Diatoms - 24-25 May 2022

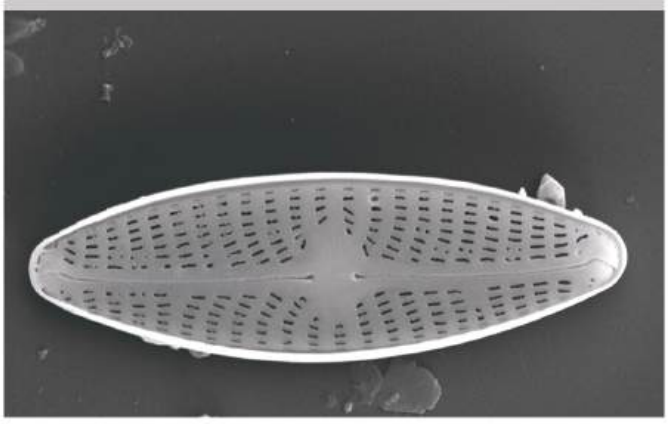
Association of Quaternary Researchers (AOQR) will conduct a two-day virtual training on "Freshwater Diatoms" with the main focus on identifying diatoms from freshwater environments. Diatoms are commonly used proxies in the paleoenvironment reconstruction, yet our understanding of the diatom diversity of India is minimal.

This course emphasizes the taxonomy and ecology of major groups of diatoms to illustrate relationships between their form and function in various environments.

This course is exclusively designed to apply diatoms in paleoenvironmental applications. The course consists of online lectures, online microscopy sessions, discussion and quizzes. The course will also help the participants gain and sharpen their skills in traditional and modern aspects of diatom taxonomy.

PhD students and college/university/research institute faculties interested in current trends in diatomology are encouraged to participate in this two-day virtual training.

For more detail stay connected!



AOQR MEMBERSHIP CALL

Researchers of Quaternary Science of Indian sub-continent are welcome to submit your application. Be a part of a multidisciplinary team of researchers, and practitioners of Quaternary Science and represent Indian Quaternary Science at an international level. Members can get priorities at our annual e-conferences, publish in the edited books/ journal volumes by the members of the AOQR, access to webinars, e-conferences and specialized thematic workshops etc.

Write to us at **aoqr2019@gmail.com** *for membership application form.*

The membership of the AOQR is open to all individual of academia and industry subject to verification.

Welcome!

ASSOCIATION OF QUATERNARY RESEARCHERS

Quaternary Chronicles

Happenings in the Sub-continent

Vol.4 No.2 August 2022

Dear Quaternary enthusiasts,

The QuatChron newsletter Volume 4(2) August issue is here. Thanks to our ECR team who meticulously worked and successfully compiled this issue bang on time. It contains the Quaternary sciences news of the last three months (April-July 2022) with reference to the Indian Subcontinent. Apologies if something is missed.

We have had a successful 3rd Paleoanthropology field school/workshop conducted in Madhya Pradesh, from 6 to 10 June 2022, jointly organized by IISER Mohali, CHARUSAT, AOQR and BSIP. Two laboratory trainings will shortly be announced - one on Geochemistry of Biogenic Carbonates and another on diatoms. The students will benefit from these training sessions. We request you to come up with such proposals and AOQR will be happy to host it jointly with your institution/university. To reach out to all Quaternary researchers is one of the objectives of this association and we need your support.

The next issue of the QuatChron newsletter will come out in December 2022. Do share the Happenings in the field of Quaternary sciences with the ECR team so that it can be incorporated in the next issue.

Please join AOQR, and be a part of the AOQR family.

With best wishes,
Vandana Prasad

FROM AOQR DESK

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

PERSPECTIVES

Dr. Rahul Mohan
Group Director
International Cooperation and Outreach
National Centre for Polar and Ocean Research,
Ministry of Earth Sciences, Govt of India,
Headland Sada, Vasco Da Gama,
Goa, 403804 INDIA

STAPLES: Spatio-temporal investigations of polar lacustrine systems- clues to the past, implications to the present, and road map to the future.

The Polar Regions are integral parts of the Earth system and are interconnected through various domains viz., ocean, atmosphere, lithosphere and their ecological systems. Their pristine environments are currently experiencing stresses through the effects of global warming trends because a variety of anthropogenic induced feedback processes are amplifying warming. Observational and instrumental data on recent dynamics in sea-ice, ice shelf collapse, glacier retreat, lake ecology, etc. indicate that the polar and glaciated regions are being evidently impacted by recent warming trends. However, the most precarious aspect is the uncertainty in the nature and rate of projected climate change which can be resolved by studying possible analogies to warmer climate in the Earth's history. Such analogs can be obtained from past climate records such as sediment archives of aquatic systems. By studying modern conditions and transposing the knowledge to past environmental records, we will better understand and anticipate the magnitude, nature, and direction of future climate changes. It is here that paleolimnology plays a key role in reconstructing past environmental variations using indirect proxy methods to infer past climatic and environmental conditions.

Lakes are prominent features of polar landscapes that record catchment processes and ecological properties in response to subtle environmental variations. Polar lakes are integrators of environmental change because their biotic and abiotic processes are strongly governed by seasonal differences and climate change. These lakes are ideal for studying paleoenvironmental variations since they are pristine, have excellent spatial coverage, and contain sedimentary records that extend thousands of years back in time. Their sediment archives help to piece together how different components of the Earth's system have interacted on timescales beyond the instrumental record. Most lakes in Antarctica are found in the ice-free oases where ice sheet retreat or isostatic rebound have created ice-free regions where water can accumulate in glacier scoured depressions, tectonic faults and natural

basins. Antarctic lacustrine studies employ a combination of physical, chemical, and biological methods to deduce paleoenvironmental variations.

STAPLES is NCPOR's long-term MoES-sponsored collaboration effort (multi-national and multi-institutional) and a part of the Polar Science and Cryosphere Research (PACER) scheme. The current focus is on the paleoenvironmental reconstructions and modern biogeochemical studies of lakes from ice-free oases across East Antarctica (Larsemann Hills and Schirmacher Oasis). This project uses a multiproxy approach by examining physical (environmental magnetism) biological (microfossils, pigments, metagenomics), sedimentological (granulometry, mineralogy), and geochemical (organic and inorganic geochemistry, stable and radiogenic isotopes) proxies to reconstruct past records. A high-end percussion UWITEC corer and a vibracorer was successfully used to retrieve sediment cores during the 41st Indian scientific expedition to Antarctica at Larsemann Hills. The sediment coiring campaign was exectuted during the Antarctic summer of 2021-22. The longest record from this project spanned the last 43 kyr from the Schirmacher Oasis and 25.4 kyr from the Larsemann Hills reconstructing glacial-interglacial paleoenvironmental changes. Additionally, detailed Holocene Lake records delineate the changes associated with local deglaciation, terrestrial weathering, ice sheet dynamics, biotic development of the lakes, variations in relative sea level, and glacio-isostatic rebound. Furthermore, the project also incorporates studies on modern lacustrine and terrestrial processes concurring with the climate change scenario.

The information obtained will be used to develop models, develop new proxies, and corroborate with other marine and terrestrial records across East Antarctica. Furthermore, proficiency gained from Antarctic Lake research will be used as a paradigm for understanding lacustrine responses in the Arctic and other glaciated regions, and perhaps comprehend the bipolar see-saw and interhemispheric teleconnections. The project also focus on instituting carbon budget studies and constraining the fluxes of greenhouse gas from Antarctic lacustrine systems to the atmosphere. Overall, the work undertaken in the project will support future long-term joint programs aimed at expanding and combining our paleolimnological and biogeochemical studies across East Antarctica's ice-free regions. Our research contributes directly to the fore mentioned priorities of the Intergovernmental

Dr. Rahul Mohan's Field team - Dr. Mahesh Badnal, Dr. Cheryl A. Noronhae D Mello and Mr. Aviraj

Panel on Climate Change (IPCC), as well as the aims of the Scientific Committee on Antarctic Research (SCAR)-Horizon Scan priority research area and the Past Global Changes (PAGES) Climate Variability of the Southern Ocean (CLIVASH) (2018-2020) program. The NCPOR along with other national and international research institutes will collaborate to develop holistic records for the lacustrine systems along the East Antarctic ice-free regions.

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

SNEAK PEEK

Non-pollen palynomorphs (NPPs): a tool for palaeoecological interpretation

The increased focus on Non-pollen palynomorphs (NPPs) has brought a new approach to corroborate the ecological conditions of the past and throw light on the local environment as well. NPPs are the organic-walled microfossils that are often found in palynological slides and are studied simultaneously. The utility of NPPs as palaeoecological indicators has grown rapidly during the last decade or so because of their frequent occurrence along with pollen and spores (van Geel and Aptroot, 2006).

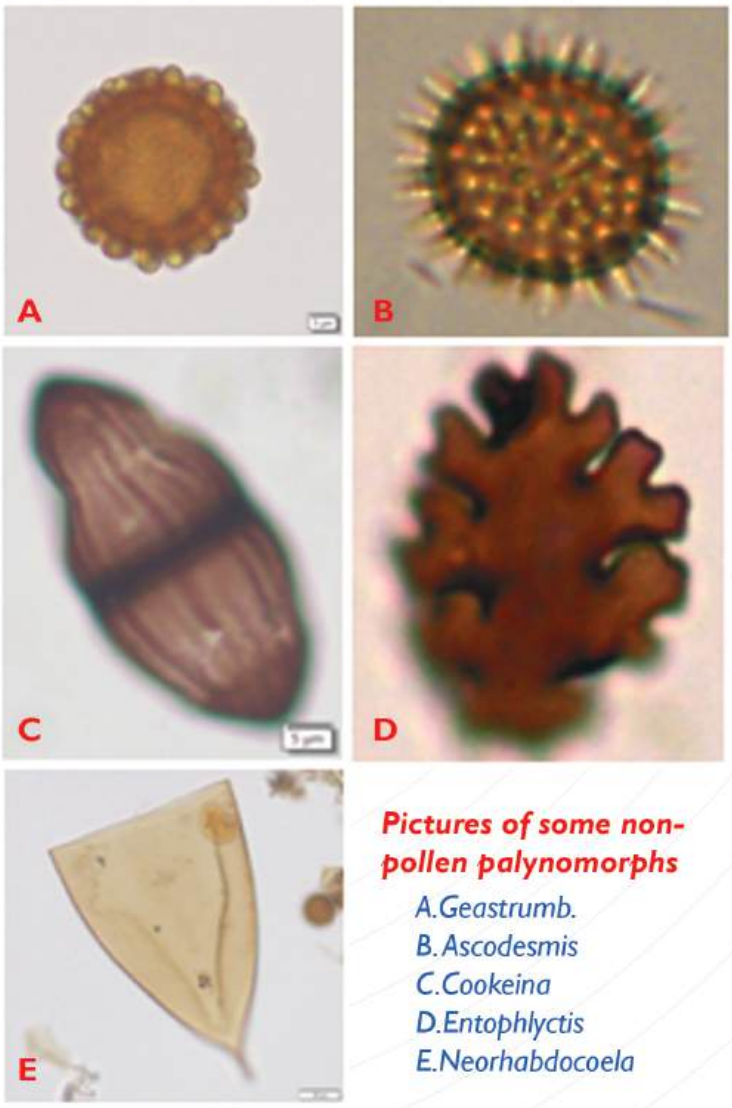
Thus, it has proved to be an auxiliary tool for the reconstruction of past communities, palaeoenvironmental conditions and anthropogenic involvement. The study area, 'Majuli Island' is considered as the world's largest 'River Island', situated in Assam, India (recorded in the Guinness book of world record) and falls within the Indo-Burma biodiversity hotspot. It is comprises of many endangered wetlands like Sakali, Duboi, Johai, amongst others. It records the most intensive present-day rainfall and humidity due to the high impact of the Indian summer monsoon.

The major objective of our research is to identify and demonstrate these encountered NPPs, especially fungal and zoological remains, to trace the past ecological and climatic conditions on the island. The favourable climatic condition nurtures a very unique combination of forests in Assam which comprises of tropical evergreen, deciduous forests, mixed deciduous forests, riverine grassland, bamboo orchards and numerous wetland ecosystems.

This river island is facing a major problem of soil erosion caused by the annual floods, and has reduced to less than half of its original size. Based on the recovered NPPs like Neorahbdocoela, Tetraploa and Glomus, it can be concluded that the studied area is a blend of scattered forest with fresh water bodies around the island. The presence of some non-coprophilous fungi like Gelasinospora, Alternaria & Valsaria indicates warm and humid climatic conditions, whereas the presence of Entophlyctis lobata indicates cold and relatively less humid climatic conditions.

The practice of cultivation around the island with an adequate signature of human settlement and palaeoherbivory could also be decoded by the presence of coprophilous fungi, especially Ascodesmis, Sordaria and Podospora. Some cosmopolitan saprophytic fungal spores like Geastrum and Ascospore of Cookeina can also be seen, which indicate the presence of woody plants that serve as the substrate for these fungalspores. The generated database of NPPs could provide a baseline information for the precise reconstruction of past ecological and anthropogenic activities in this high-flood and erosion-prone region, which is sometimes tedious to examine through pollen and spores due to high fluvial activity in the Majuli Island.

Arya Pandey & Swati Tripathi,
BSIP, Lucknow



Pictures of some non-pollen palynomorphs

A. Geastrumb.
B. Ascodesmis
C. Cookeina
D. Entophlyctis
E. Neorhabdocoela

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

QUATERNARY DEPOSITS OF LADAKH: A GEOLOGICAL HERITAGE

Akhtar R. Mir* and Rakesh Chandra
Department of Geology, University of Ladakh, UT-Ladakh, 194101
*E-mail: mirakhtar.r@gmail.com

Ladakh houses varied rock types ranging from Precambrian to recent. This region is rich in intra oceanic subduction, Andean type subduction and continental – continental collision related rock varieties. Ladakh Himalayas have deep marine and shallow deposited sedimentary rocks in addition to high pressure and temperature metamorphic rocks. Note worthy to mention here are Quaternary lacustrine deposits, exposed at number of places along the course of Indus, Shyok and Nubra Rivers. Himalayas have experiences extreme orogenic activities during the Quaternary era (Gee, 1989). Such activities had resulted the debris avalanches from slope failures which in turn blocked the courses of rivers in the Ladakh Himalaya (Sangode and Bagati, 1995; Kotlia et al., 1997a, b, 1998). Here, in brief, geological characteristics of Spituk and Lamayuru paleo-lake deposits and River terrace deposits of Nubra-Shyok Valley is given and followed by significance of these deposits.

Fig. 1. Panoramic view of paleo-lake deposits at Spituk, Ladakh.

Spituk Paleo-lake deposits

The Spituk paleo-lacustrine deposits are exposed (about 70m thick section) on Leh-Srinagar national highway (NH-1) near Leh Airport at an altitude of 3090m above mean sea level. Spituk paleo-lake extended for about more than 40km in length and 3-4km in width and was formed due to the damming of the Indus River by landslide /alluvial fan(Phartiyal et al., 2005; Lal et al. 2018). This lacustrine section over lies the Ladakh batholithwith pebble conglomerate as base and is divided into seven litho units made of sand and clay (Fig. 1). Radiocarbon ages indicate an average sedimentation rate of ~110 cm/1000 years and 232 cm/1000 years for older and younger sections respectively. Such sedimentation rates inferred that the base of the paleolake was formed about ~>50,000 years BP. Sangode et al., 2013 suggested, three major cycles of sedimentation have formed Spituk lacustrine section and each cycle shows fining upward trend and different facies successions. The bottom 12 m thick depositions occurred under fluvial-lacustrine settings in fluctuating warm and cold climatic conditions. The middle 20m thick unit, formed under lake settings in cold conditions, is composed of thin clay and silty-clay beds respectively at lower and upper parts. The upper 36 m thick unit, formed underhigh energy fluvial environment, is made of coarse sand and shows varved lacustrine facies. Syn- and post sedimentation structures such as laminations, cross laminations, ripple marks, fining upward sequence, flame structures, convolute bedding, pinch and swell structures, pseudo-nodules, microfolds, and micro-faults are preserved in the Spituk lacustrine deposits (Fig. 2).

Lamayuru paleo-lake deposits

Lamayuru paleo-lake deposits are situated near Lamayuru village on the Leh-Srinagar national highway (NH1, 114Km from Leh city) at an altitude of 3600 m (Fig. 3). This paleo-lake was the result of damming of the Lamayururiver due to the tectonically triggered landslide(Burgisser et al. 1982; Fort et al. 1989). These deposits (more than 100m thick)are made ofcarbonaceous muds, sands, silty clays and matrixsupported breccia and have yielded nine fossiliferrous horizons offreshwater ostracods and gastropods (Kotlia et al., 1998). These sediments are a product of complex interplay of lacustrine, fluvio-deltaic to colluvial processes and laze over the Lamayuru Flysch deposits. However, the dominance of vervesindicates existence of pervasiveness of glacio-lacustrine conditionsduring the development of these paleo lake deposits. Kotlia et al., 1998 suggested that the base of the fluvio-lacustrinesection was deposited 35,500 ka BP. The occurrence of gastropods and ostracods in the Lamayuru lacustrine deposits suggests the shallower depth of the lake and presence of softsedimentary deformational structures (e.g., microfaulting, composite contortions, anticlinal/synclinal features) favors the role of tectonic activity during the formation of lake deposits.

Fig. 2. Syn- and post deformation structures in paleo-lake deposits at Spituk, Ladakh

The presence of waterfalls, river terraces, deep gorge, and entrenched meanders along the course of Lamayuru river are well known indications of neotectonic activity in the area.

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

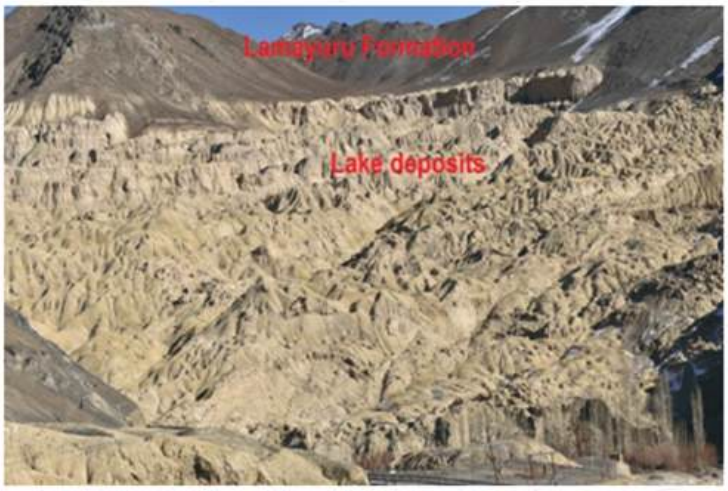


Fig. 3. Panoramic view of paleo-lake deposits at Lamayuru, Ladakh.

Fig. 5. Syn-deformational features in river terrace deposits at Tirith, Nubra-Shyok Valley, Ladakh

River terrace deposits of Nubra-Shyok Valley

A huge Quaternary deposit is seen down valley from Khardung village in the Nubra-Shyok valley. All along the Shyok River the Quaternary deposits are seen perched about ~1000m above the riverbed, directly over the countryrocks are visible at the confluence of Shyok and the Nubra rivers. Quaternary stratigraphic succession begins with indurated lateral moraine that can also be traced as hanging scars on the either side of the river valley (Fig. 4). At places, these deposits are showing penecontemporaneous deformational features formed by seismically induced liquefaction (Fig.5). Such deposits having glacial, palaeo-lacustrine, fluvial and aeolian origins are common in Nubra-Shyok Valley. Besides, these dunes occur in clusters at Hunder, Udmaru, Waris and Tirath are present on river bed of Shyok and Nubra (Fig. 6).

Fig. 6. Panorama showing sand dunes at Hunder, Nubra-Shyok Valley, Ladakh

The above-mentioned Quaternary deposits offer a great opportunity to carry out paleoclimatic, neotectonic, magnetostratigraphic, micropaleontological and palynological studies of geologically recent past. Presence of carbonaceous and charcoalrich muds in above mentioned sediments are potential candidates to carry on radiocarbon geochronological studies.

Fig. 4. Panorama showing hanging lateral morrains on Saltoro Molasse at Charasa Village, Nubra-Shyok Valley, Ladakh

References

Burgisser, H.M., Gansser, A., Pika, J., 1982. LateGlacial Lake sediments of the Indus valley area, northwestern Himalaya. Ecogal. Geol. Helv. 75, 51–63.

Fort, M., Burbank, D.W., Freytet, P., 1989. Lacustrine sedimentation in a semi-arid alpine setting: an example from Ladakh, northwestern Himalaya. Quat. Res. 31, 332–352

Gee, E.R., 1989. Overview of geology and structure of the Salt range, with observations on related areas of North Pakistan. Spec. Pap.-Geol. Soc. Am. Washington 232, 95–112.

Kotlia, B.S., Bhalla, M.S., Shah, N., Rajagopalan, G., 1997a. Palaeomagnetic results from the Pleistocene–Holocene Lake deposits of Bhimtal and Bhowali (Kumaun Himalaya) and Lamayuru (Ladakh Himalaya) with reference to the reversal events. J. Geol. Soc. India 51 (1), 7–20.

Kotlia, B.S., Schallreuter, I.H., Schallreuter, R., Schwarz, J., 1998. Evolution of Lamayurupalaeolake in the Trans Himalaya: palaeoecological implications. Eiszeitalt. Ggw. 48, 177–191.

Kotlia, B.S., Shukla, U.K., Bhalla, M.S., Mathur, P.D., Pant, C.C., 1997b. Quaternary fluvio-lacustrine deposits of Lamayuru basin, Ladakh Himalaya: preliminary palaeolake investigations. Geol. Mag. 134 (6), 807–812.

Lal, R., Saini, H. S., Pant, N. C., and Mujtaba, S.A. I., 2018. Tectonics induced switching of provenance during the Late Quaternary aggradation of the Indus River Valley, Ladakh, India. Geosci. Front. 92, 102–119.

Phartiyal, B., Sharma, A., Upadhyay, R., Ram-Awatar, Sinha, A. K., 2005. Quaternary geology, tectonics and distribution of palaeo- and present fluvio/glacio lacustrine deposits in Ladakh, NW Indian Himalaya—a study based on field observations. Geomorphology, 65, 241–256.

Sangode, S. J., Rawat, S., Meshram, D. C., Phadtare, N. R., and Suresh, N., 2013. Integrated mineral magnetic and lithologic studies to delineate dynamic modes of depositional conditions in the Leh valley basin, Ladakh Himalaya, India. J. Geol. Soc. India 82, 107–120.

Sangode, S.J., Bagati, T.N., 1995. Tectono-climatic signatures in higher Himalayan lakes: a palaeomagnetic rock magnetic approach in the lacustrine sediments of Lamayuru, Ladakh, India. J. Himal. Geol. 6, 51 – 60.

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

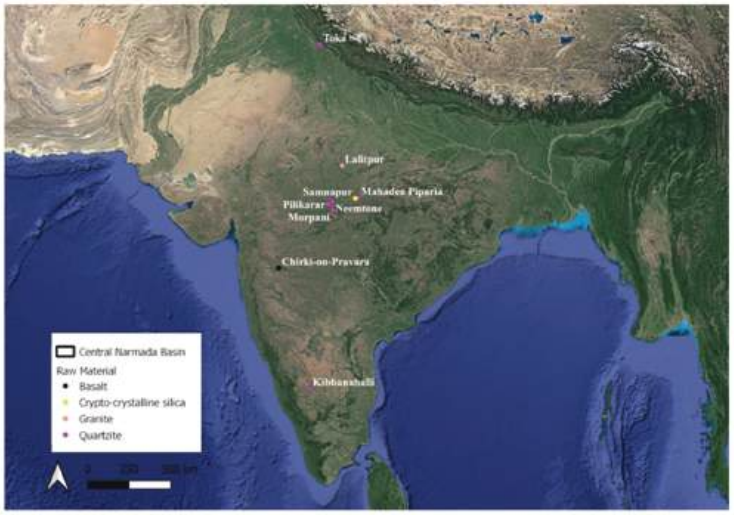
Beyond the Biface: Investigating Variability in the Mode 2 technology of the South Asian Palaeolithic through the holistic analysis of select lithic assemblages

Akash Srinivas
Department of Humanities and Social Sciences
Indian Institute of Science Education and Research (IISER), Mohali
Thesis supervisor: Dr. Parth R. Chauhan

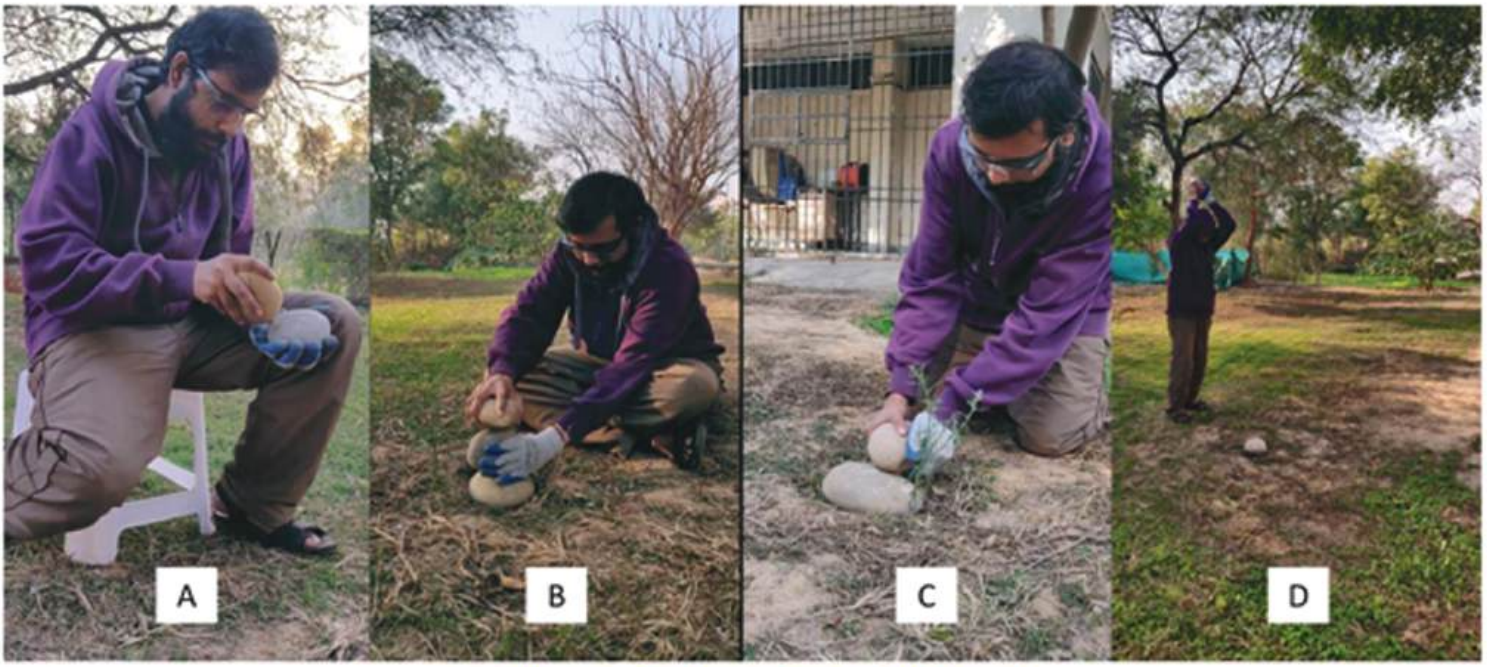
South Asia occupies a unique position as being somewhat centrally located in the Old World (i.e., the continents of Africa, Asia and Europe). The large landmass it encompasses displays a wide range of ecological and environmental settings, and the region is rich with many natural resources necessary for prehistoric subsistence. This natural setting and its central location could have made this region an important area for the expansion and movement of Palaeolithic hominin populations. Evidence for this can be seen through the rich lithic archaeological record of this region, dating back to about two million years, and the noted diversity in the genetic record of the modern-day populations (second only to Africa). However, despite this rich archaeological record and the deep historiography for prehistoric studies in the region, it is seldom, if ever, considered in ongoing and contemporary discussions in global prehistory and palaeoanthropology. This doctoral research project tries to tackle this perceived exclusion of the South Asian (Lower) Palaeolithic record by undertaking primary research along currently accepted trends and paradigms in Palaeolithic archaeological research. Along with generating new datasets from the rich archaeological record, this research project also attempts to reinvestigate archival collections to update our understanding of them, and enable their active inclusion into the ongoing discourse in South Asian and global archaeological studies.

The Lower Palaeolithic of India has generally been characterised on the basis of select stone tool elements called 'bifaces' (such as handaxes and cleavers). However, the focus of study on these 'diagnostic' lithic elements has skewed our understanding of the archaeological record, in general, and of the technological variability expressed amongst these assemblages. This doctoral dissertation attempts to expand our understanding of the lithic technological behaviours of the South Asian Lower Palaeolithic through a comprehensive and holistic analysis of nine Palaeolithic assemblages through: 1) fieldwork for the primary collection and analysis of stone tool assemblages; 2) reinvestigations of historically significant lithic assemblages housed in various archives and repositories in India and abroad; 3) actualistic studies to qualify the various trends and patterns resulting from the study of the archaeological assemblages, and 4) developing various theoretical and methodological models for a better understanding and reconstruction of past human lifestyles and behaviours - which is the primary aim of archaeology. The nine sites included in the study are: the Neemtone Palaeolithic Complex, Morpani, Pilikarar, Mahadeo Piparia and Samnapur (all from Madhya Pradesh), Chirki (Maharashtra), Lalitpur (Uttar Pradesh), Toka (Himachal Pradesh) and the Kibbanahalli Palaeolithic Complex (Karnataka).

The lithic assemblages originating from these sites were subjected to detailed technological and reduction sequence analyses, qualifying and quantifying various technological and dimensional parameters, such as the type and nature of the raw material used, the technological dimensions of the lithic elements, and the various aspects of the methods and techniques used in their manufacture. This detailed comparative analysis highlighted the various trends of similarities between



Studied Palaeolithic sites and the predominant raw material exploited in their assemblages.



Actualistic trials undertaken as part of the study.

these lithic assemblages, hinting at the structural uniformity between these sites; as well as highlighting trends of variability at a multi-scalar resolution at the intra-site, inter-site, spatial, temporal, functional, environmental and cultural levels. The research project also outlines novel methods for undertaking holistic and integrated lithic analysis and theoretical models for understanding the archaeological record of slow-accumulating palimpsests, and presents a schema for the technological ascription of Mode 2 lithic assemblages in South Asia.

Lake sediments as an archive of long-term climate-human-environmental interactions in Indian Himalayas

Ankit Yadav
Indian Institute of Science Education and Research (IISER-Mohali)
Thesis Supervisor: Dr. Anoop Ambili

Three lake systems have been investigated from the Indian Himalayan Region (IHR). The work emphasized understanding the climate-human-environment relations, constraining the fate of organic carbon and assessment of the pollution levels using SOM-derived biogeochemical proxies in a lake ecosystem. The work from Ahansar Lake (NW Himalaya) provides a detailed understanding of environmentally sensitive molecular proxies, which could also be transferable for interpreting paleo data in similar settings. Likewise, the historical record (~70 years) of distribution and concentrations of faecal stanol (coprostanol) and the polycyclic aromatic hydrocarbons (PAHs) in the lake sediments from Garur lake in the Central Himalayas shows propelling anthropogenic activities. Further, to understand the role of climate variability on the lake environment, we have investigated the geochemical and grain-size data of the radiocarbon-dated lake sediments from Shilloi Lake (NE India).

The results and outcomes from this thesis will serve as a baseline for future investigations in the aquatic environments from the Indian Himalayas and helpful in framing the management decisions and strategies for similar lake systems worldwide.

To join QuatChron_AOQR Google Group: open https:// groups.google.com, login (using Gmail account), search for "QuatChron_AOQR" and ask to join.]

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

"It is made by chili, not curry' is the title of the talk delivered by my fellow Fulbright visiting scholar from Taiwan, where he talked about intercultural communication. And yes, that title was the result of his never-ending discussions with me regarding 'Indian curry rice', a dish available in restaurants in Taiwan."

"This and many such openminded, diverse, and multidimensional experiences embellish the exhilarating Fulbright fellowship 2021 bestowed on me, molding me as a person as well as a professional. Since the day the fellowship results were announced, the Fulbright Commission in India, the US embassy in India, the host university and its professors, and everyone who come into my life during that span made me feel special. This well-designed fellowship program boosted my confidence, strengthened my sense of responsibility, ignited the thirst for collaboration, instilled humility and changed me as a person forever. Trust me, it is a Cultural Exchange program in its true sense.

Though research was my primary objective to apply for the fellowship, I was always motivated throughout the program to take part in cultural exchange and community activities. The event organized by the Fulbright team such as the 'Home Hospitality Dinner' are truly worth mentioning. During the event, each Fulbright Visiting Scholar in the US was invited for dinner at residence of a Chicagoan, who is either an internationally-minded Chicagoan or had once participated in the Fulbright Program. Such events were the occasions where your passion gets an opportunity to resonate. I could personally witness the cultural diversity, professional relations, and family bonding through my US professor. He made sure that I accompanied him to every event he attended. Be it Thanksgiving or Christmas family dinner, New Year or birthday party, official picnic or pot-luck-lunch; I was always there on each and every occasion. It helped me a lot to closely witness and understand the US culture and customs. Such small gatherings were the vents I could share and demonstrate the customs and culture of India.

Interactions with my fellow Fulbright visiting scholars were rewarding to the fullest. Our joint ventures to explore local landscapes and communities are all lifetime experiences. Last but not the least, the one-month visit of my family to the US was a bundle of sweet memories in our hearts. I am sure, my daughter will remember those snowstorm days, those delicious pizzas in Chicago, the skyscrapers in New York, the freezing cold and a bundle of little friends she made there, throughout her life".

Fulbright-Nehru Academic and Professional Excellence Fellowship 2021

Prabhin Sukumaran
Dr. K C Patel Research and Development Centre, CHARUSAT

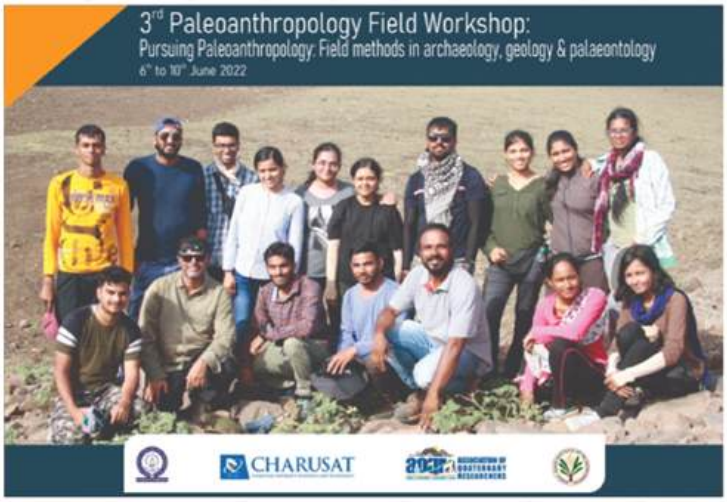
Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

The 3rd Paleoanthropology fieldschool / workshop was held in Narmadapuram, Madhya Pradesh from 6 to 10 June 2022.

The co-organisers were Parth R. Chauhan (IISER Mohali) and Prabhin Sukumaran (CHARUSAT) and the event was co-sponsored by IISER Mohali, AOQR and BSIP. Wide publicity for the event was done through social media platforms, emails, and personal and institutional communications. Applications for the workshop were collected through an online platform. Each application included basic academic details of the applicant, a detailed CV, and a statement of purpose. Applications were received from across the states of India and reputed universities/institutes, such as the AIHC & Archaeology Department, Vikram University Ujjain; Banaras Hindu University, Varanasi; Birbal Sahni Institute of Palaeosciense, Lucknow; Cotton University, Guwahati; Deccan College Post-Graduate and Research Institute, Pune; Delhi Institute of Heritage Research & Management, New Delhi; Department of Anthropology, Panjab University, Chandigarh; Doon University; H. N. B. Garhwal University; IIT BHU; Indira Gandhi National Tribal University; Jawaharlal Nehru University; Kerala State Department of Archaeology; Kurukshetra University; Mahatma Gandhi University; Nalanda University; Panjab University; Pt. Deendayal Upadhyaya Institute of Archaeology; Savitribai Phule Pune University; Tamil University; University of Ladakh and Vasanta College for Women, B.H.U.

The organizers of the event critically examined these applications and candidates were selected on the basis of their academic credentials and statement of purpose. A total of 19 participants were shortlisted out of the 41 applications and 15 students confirmed their participation. The selected candidates were provided online lectures prior to the fieldschool to facilitate smoother discussions at the sites. Participants were taken to both well-known and lesser-known prehistoric sites including stone tool occurrences, rock paintings, fossil vertebrate sites, and important Quaternary type-sections.

The visited sites included Hathnora, Bhimbetka, Sardarnagar, Dhansi, Pilikarar, Talpura, among others. Students were shown how to survey for sites, what and how to document and interpret geological and palaeontological observations, and how to collect samples for multiproxy high-resolution studies. All participants were highly enthusiastic, asked relevant questions, and provided important feedback for future workshops. Overall the event was a great success and participants were satisfied with its overall aspects. Most of the participants suggested organizing such events more frequently. The next such workshop is planned for the winter session along with international experts and this time we plan to apply for external funding.



Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

UPCOMING EVENTS

IISc-NIO-AOQR

Workshop on Geochemistry of Biogenic Carbonates

Organisers: R. Saraswat and S. Misra

Host Institution: Indian Institute of Science, Bangalore

Duration: 2 Weeks (12 days)

Dates: To be announced soon.

Objective: Basic training in foraminiferal / coralline trace metal concentration and isotope ratio determination.

Description: The concentration and isotope ratio of select trace metals in foraminiferal and coralline calcite are utilized as proxies for reconstruction of physio-chemical properties of the past ocean. For example, foraminiferal Mg/Ca and coralline Sr/Ca ratios are proxies for seawater temperature, whereas the boron isotopic composition (delta^{11}B) of all types of biogenic carbonate is a proxy for seawater pH. In this workshop we will train people to chemically clean and analyze biogenic carbonates for their trace metal composition. The participants will be exposed to community accepted methods of multi-step foraminifera / coral cleaning followed by their major and trace metal concentration analyses on ICP-MS and ICP-OES.

ARI_AOQR

One-day e-workshop on the "Introduction to Diatoms".

The workshop will be focusing on Masters and PhD scholars working towards various aspects of Quaternary research using freshwater diatoms as a proxy.

Session - 1: Introduction to Diatoms (60 mins)
Session - 2: Diatom Taxonomy (60 mins)
Session - 3: How to go about Diatom Identification – (60 mins)
Session - 4: Assessing the Diatom Community – (60 mins)
Session - 5: Discussions/Student Project – (60 mins)

Sessions 1 and 2 will be online talks, and sessions 3 and 4 will be practical. The microscope will be connected to the zoom/google meet for the practical sessions.

Dates will be announced soon!

University of Delhi

Department of Geology, University of Delhi will be holding following seminars (offline):

'National Conference on Challenges and Future Directions for Geosciences in India'
16th-18th November 2022.

&

'38th Indian Association of Sedimentologists Conference' From 9th – 11th December 2022.

34th National conference of Indian Institute of Geomorphologists (IGI)

Focal theme: Geomorphology, Natural Hazards and Environment
2nd - 4th November 2022.

Convener:
Prof. Sudhakar D. Pardeshi
Head, Dept. of Geography, SPPU, Pune

AOQR MEMBERSHIP CALL

Researchers of Quaternary Science of Indian sub-continent are welcome to submit your application. Be a part of a multidisciplinary team of researchers, and practitioners of Quaternary Science and represent Indian Quaternary Science at an international level. Members can get priorities at our annual e-conferences, publish in the edited books/ journal volumes by the members of the AOQR, access to webinars, e-conferences and specialized thematic workshops etc. The membership of the AOQR is open to all individual of academia and industry, subject to verification.

Write to us at **aoqr2019@gmail.com** for membership application form.

You're Welcome!

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

Ali et al. (2022) present a detailed moraine stratigraphy supplemented with luminescence dating of three moraine and two relict lake sequences in the Kunti-Banar valley of the Central Himalaya, India. Their study reveals that the penultimate glacier advance was significantly more extensive compared to its LGM counterpart, and corresponded to the cool and dry Marine Isotopic Stage (MIS) 4 and pluvial early to the MIS 3.

Behera et al. (2022) studied alluvial sediments from Sina River basin in Maharashtra, and based on the geochemical, sedimentological and geochronological analyses, provide a detailed understanding of complex interplay between climate and cultural dynamics during the late Holocene. Their findings throw light on the disruption, migration and resettlement of the indigenous societies against fluctuating climatic conditions.

Chaturvedi and Loveson (2022) conducted sedimentological and foraminiferal studies on a 650 cm sediment core from the Poompuhar beach, Tamil Nadu- an area that has witnessed the tsunami's occurrences in the recent and ancient past. They identify a distinct break around 200 cm core depth, which could be due to the mega-tsunami events and associated phenomena such as coastal submergence, shifting of the river course, and reduced supply of river sediments in the study area around 1540 ± 25 years ago.

Khan et al. (2022) presents multiproxy analyses of sediment from a trench from western Himalaya to reconstruct the vegetation pattern and climatic changes during the last (approx) 15.2 ka. The authors identify several phases of cool and dry climate, and warm and humid climate- findings which are broadly consistent with previous Himalayan palaeoclimatic reconstructions with the absence of any major shift in vegetation during the Younger Dryas.

Luirei et al (2022) reconstruct the evolution of the Quaternary landform in the Champawat area of the outer Kumaon Lesser Himalaya using landscape's geometry and palaeolake sections. The authors identify a conjugate set of normal faults in the bedrock and Quaternary deposit, and suggest that the landform around the region evolved through extensional tectonics.

Pattanaik et al. (2022) reports the paleo-lake deposits from Upper Alaknanda Basin in the Badrinath Valley, and based on OSL dating and sedimentology show that the deposition of the lake sediments occurred between 21.6 ± 4.7 ka to 10.5 ± 1.4 ka, and establish two phases of paleo-lake deposit and subsequent outburst. Their study indicates that the glaciers in the region responded to the fluctuations in the palaeo-climate.

PUBLICATIONS

Quamar (2022) conducted pollen analyses of a 90 cm deep lacustrine sediment profile the Mahasamund District of Chhattisgarh, and reconstructs monsoonal climatic variations. The author suggests a dry climate between ca 3600 and 2500 cal yr BP, warm and humid climate between ca. 2500 and 1650 cal yr BP, a warm and relatively less humid climate with reduced monsoon rainfall between ca. 1650 and 950 cal yr BP, followed by more humid climate ca. 950 cal yr BP to the present.

Shrivastava et al (2022) studied the Teesta Khangtse glacier region located in the North District, Sikkim, which has preserved many glacial and glacio-fluvial geomorphic features, and based on OSL dating provides proper evidence of episodic deglaciation and corresponding landform evolution of the region. Their data show that the major recession of the Teesta glacier system took place around 52 ± 3 ka, and was followed by many episodic deglaciations between 11.4 and 1.4 ka.

Singh et al. (2022) presents a multiproxy record of grain size and stable carbon isotope from the Lilaur lake, Ganga Basin, India combined with radiocarbon and OSL chronologies. The authors suggest a transition from river to lake during ~5800 to 5189 cal yr BP which is supported by reduced precipitation with weakening of the Indian summer monsoon, which ultimately culminated in a severe arid phase during 4250 and 4050 cal yr BP.

Sodhi et al. (2022) presents the results of multiproxy study on a high-resolution sedimentary record from the Gulf of Khambhat region, representing two alternating climatic phases of relatively arid and humid climatic conditions (relating to the strength of the ISM) that coincides with the widely reported Dark Ages Cold Period (AD 680 – AD 920) and Medieval Warm Period (AD 920 to AD 1400).

References:

Ali, S.N., Singh, P., Arora, P., Bisht, P. and Morthekai, P., 2022. Quaternary Science Reviews, 284, p.107464.

Behera, D., Mishra, P.K., Sabale, P., Bhattacharya, S. and Anoop, A.,

.2022. Geological Society, London, Special Publications, 515.

Chaturvedi, S.K. and Loveson, V.J., 2022. Quaternary International.

Khan, I., Trivedi, A., Ali, S.N., Bali, R., Sangode, S.J. and Deepak, O., 2022. Journal of Asian Earth Sciences, 233, p.105245.

Luirei, K., Longkumer, L., Kothyari, G.C., Rawat, S. and Nain, M.Z., 2022. Journal of Asian Earth Sciences: X, p.100102.

Pattanaik, J.K., Singh, A., Kumar, H., Shah, S.S., Semwal, P., Naik, M.S., Nayak, K., Jaiswal, M.K., Banerjee, A., Nainwal, H.C. and Shankar, R., 2022. Journal of Asian Earth Sciences, 227, p.105079.

Quamar, M.F., 2022. Palynology, 46(1), pp.1-18.

Shrivastava, P.K., Singh, G., Thapa, S.J., Chunchekar, R., Srivastava, H.B. and Mugal, V.V., 2022. Polar Science, p.100868.

Singh, S., Gupta, A.K., Rawat, S., Bhaumik, A.K., Kumar, P. and Rai, S.K., 2022. Quaternary International, 629, pp.65-73.

Sodhi, A., Das, A., Prizomwala, S.P., Vedpathak, C. and Makwana, N., 2022. Quaternary International.

Arya Pandey (DST-INSPIRE Fellow, BSIP) won the second best poster award for the paper entitled 'Non-Pollen Palynomorphs preservation from the sediments of Majuli Island, Assam (Indo-Burma region) India: Implications to palaeoenvironmental studies' authored by Arya Pandey, Swati Tripathi, Sadan K Basumatary, Hema Singh, in the 28th Indian Colloquium on Micropalaeontology and Stratigraphy, Pune.

DISCLAIMER

As this is a community-driven newsletter, the role of the ECR team is limited to copy editing and reporting only. It will be the sole responsibility of the author/ contributor to ensure the accuracy and authenticity of the contributions. The ECR team is pro-active in collecting as much useful information as possible; however, we rely on community inputs and will not be responsible for any omissions.

National Geoscience awards

AOQR congratulates all the awardees of the National Geoscience Awards - 2019 announced recently.

Congratulations to

Prof. A D Singh, Prof. Dhruvsen Singh, and Dr Piyoosh Rautela

Award Category: Ocean Development: Oceanography and Marine Geology.

Dr. Arun Deo Singh

Banaras Hindu University.

Award Category: Geo-Environmental Studies relating to mining, urban industrial, coastal and deserts management, paleoclimate, paleoenvironment, medical geology, climate change and studies related to their impact on ecosystem.

Dr. Dhruvsen Singh

University of Lucknow.

Award Category: Natural Hazard Investigations including scientific studies related to natural hazards such as earthquakes, landslides, floods and tsunamis.

Dr. Piyoosh Rautela

Department of Disaster Management
Government of Uttarakhand
Individual Award Field

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

Quaternary Chronicle (QC) publishes three issues a year seeks to publish perspectives, recently published peer-reviewed papers in Quaternary science, new developments in Quaternary science methods/ techniques, past events, awards, abstracts of recently awarded Ph.D./MS thesis; Quaternary publications, obituaries and details on forthcoming conferences/opportunities/fellowships the world over. Each issue of the newsletter will therefore, comprise news on on/from the Indian sub-continent;. It will also have a platform for discussion on emerging questions and ideas in Quaternary science and details on new books/ monographs/ reviews. QC seeks to share original results, new ideas and innovative development for the common good and a possibility to serve as a catalyst for the initiations of major and coordinated initiatives in the country.

We now accept submissions for our upcoming issues. Submit all the contributions to ***aoqr2019@gmail.com****. Themes for contributions are given below:*

1.Perspective: *Perspective write-ups on emerging trends and new possibilities in Quaternary Science (500 words).*

2.Sneak-peek and Discussion: *Share any exciting findings/questions from your ongoing (unpublished) work already to facilitate discussion. Any other intriguing facts/ unanswered questions are also welcomed for discussion (150 words).*

3.Significant new manuscripts/ books/ monographs/ reviews: *Corresponding authors of recently published peer-reviewed papers are invited to submit a brief summary of their work (not published abstract) with complete reference, web-link, and corresponding email address (200-300 words). Also, include a PDF copy of the paper in the email (for reference only).*

4.Facilities and Instruments: *A list of available facilities at various Indian institutes will be given and updated as contributions are received. In-charge of the available facilities, mentioning whether it is open access or available on payment basis, may submit the details with contact details.*

5. Achievements: *Share national or international awards/ fellowships/ recognitions with the larger Quaternary community. Also, approved SERB/ DST/CSIR/ national/ international Quaternary projects with the title, affiliation details of the awardee and a brief abstract (200 words) may be submitted with a copy of the award letter (for reference only).*

6.Projects/Collaborations: *New projects and collaborations related to Quaternary Science may also be sought for enhancing the quality of ongoing/proposed research. Submit a brief summary of the project, collaborations required and the contact details for correspondence (200 words).*

7. New Thesis: *Abstracts of awarded PhD/MS degree are invited for contribution (250 words).*

8.Opportunities: *Submit details with web-link of any new openings and opportunities for wider circulation.*

9. Social media: *Follow, discuss and share Quaternary India News on https://twitter.com/ AOQRIndia (Twitter) and https://www.facebook.com/ AOQRIndia (Facebook).*

Come join us!

The Association of Quaternary Researchers (AOQR) invites all of you to register yourself for AOQR Membership and also ask your colleagues and students to make the AOQR Fraternity stronger and become a part of the AOQR family.
See the details in https://www.aoqr.org/#

ISSUES	Deadlines (Last date for submission)
Issue -1 (April)	**March 10**
Issue -2 (August)	**July 10**
Issue -3 (December)	**November 10**

ASSOCIATION OF QUATERNARY RESEARCHERS

Quaternary Chronicles

Happenings in the Sub-continent

Vol.4 No.3 December 2022

FROM AOQR DESK

Celebrating 3 Years

Dear Quaternary enthusiasts,

The Association of Quaternary Researchers (AOQR) that was registered in the year 2019, as an Association under The Societies Act, 1860, (Act No. 21 of Yr. 1860) with its Headquarters at Birbal Sahni Institute of Palaeosciences (BSIP), Lucknow, and is going to celebrate its 3rd Foundation Day soon. In just three years' time we were able to connect the Quaternary researchers of the country under one platform. It is indeed an achievement to be proud of. I thank all the Office Bearers and the Governing Members, along with the Group Heads, Group Secretaries, the dynamic ECR team and the members of AOQR who have made this dream a reality.

We have good plans for the coming year too and soon you will hear the announcements for various field trainings, laboratory trainings and other courses which are being prepared under different groups of AOQR. The 4th Palaeoschool Field Workshop in the Central Tapi Valley (30th December 2022 - 1st January, 2023) and the National Training Workshop on Palaeoclimate Archives-Proxies and Analysis / Measurement Techniques in Pune (16 - 20th January 2023) and LEM-International School and Symposium are already announced. It will be a good platform of learning for young researchers from the stalwarts of Quaternary studies in our country.

This year, unfortunately, we lost a legend of Quaternary sciences, Professor Sukumar S. Merh, Founder Head of the Department of Geology, M.S. University of Baroda, Vadodara, who left for their heavenly abode on 3rd November, 2022, in London. He initiated Quaternary studies in the late 1970's. Condolences to his family from the entire Quaternary family who are grieving his demise.

I invite you to the Foundation Day functions of AOQR on 12th December 2022. AOQR is a team effort and can be successful in its venture with the support of the entire Quaternary research fraternity of India.

I wish the Association of Quaternary Researchers a great success in all its future endeavours and assure every possible support.

Happy New Year to you all, in advance.
May this New Year 2023 be a great leap for you in all dimensions.

With best wishes,
Vandana Prasad

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

AOQR MEMBERSHIP CALL

Researchers of Quaternary Science of Indian sub-continent are welcome to submit your application. Be a part of a multidisciplinary team of researchers, and practitioners of Quaternary Science and represent Indian Quaternary Science at an international level. Members can get priorities at our annual e-conferences, publish in the edited books/ journal volumes by the members of the AOQR, access to webinars, e-conferences and specialized thematic workshops etc.

Write to us at **aoqr2019@gmail.com** *for membership application form.*

The membership of the AOQR is open to all individual of academia and industry subject to verification.

Welcome!

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

PERSPECTIVES

Geoscience: *Evolution is Happening*

- Chandra Mohan Nautiyal

Dr. CM Nautiyal is a Scientist, Science Communicator, educationist, writer and broadcaster. After education at University of Roorkee (1977) and PRL, Ahmedabad (1977-1985), was with Birbal Sahni Institute of Palaeobotany (1985-2016) and headed the Radiocarbon Dating Lab for over a decade. He published in Planetary and later Quaternary Science and has been interested and active in Science Communication too.

With climate change emerging as one of the most relevant sciences, the study of recent changes in the patterns of climate, weather and natural phenomena has taken central stage. This enhanced focus has also led to the emergence of more laboratories and more journals, with more researchers entering the arena. A welcome development.

Having said that, we need think about some more aspects. Some of the basic things so vital for geoscience are not being pursued simply because it requires efforts which'd fetch these workers fewer publications after more efforts and time. Talking of geochronology, the dates generated today are based on the arduous efforts of the earlier generations that meticulously determined or calculated production rates, decay constants or cross sections of isotopes, even when computation and experimental facilities were meagre. The developments in cosmochemistry in the 1970s and 1980s were in a big way related to the focus on lunar samples brought during Apollo and Luna missions. It provided impetus to geochemical studies in due course. However, with sample-return missions discontinued, these developments have slowed down.

A decade after this, aided by remarkable advancements in computation and electronics, the instrumentation has continued to flourish. The flip side was excessive prices and also wet Chemistry going out of fashion. For instance, despite its tremendous value for finding sedimentation rates for a few hundred-year-old sediments, Lead-210 (Pb-210) dating is now virtually out of use. Despite great scope, Uranium-Thorium dating is not getting the attention it deserves. We also have to think of the unfair evaluation of such efforts and expectation of 100% success was also behind marring their desired progress.

The consistent loss of experimental skills in instrumentation is another concern. It has not happened overnight. It is a consequence of decades of negligence, and lack of appreciation for these skills. School education may also be linked, where experimental work is ignored. Easy availability of funds and ease of import have definitely promoted the establishment of laboratories, making the lab setting-up an easier process. Quaternary Geoscience has definitely been a beneficiary of enhanced instrument availability. Naturally, people have chosen the softer path. No one can deny that it may not be worth spending long time to refabricate an instrument over a decade, obsolete by then, and be left behind in science while a better one can be purchased off the shelf. Perfectly logical, but complete absence of experience in laboratory may make maintenance a more challenging task than it should be. Being left behind in these skills also means we may never develop an instrument of our own.

What seems to be a more serious concern is that so often the feel for the numbers generated is missing. Given a sample and a machine, some

numbers will definitely emerge which may also look very precise. But are they accurate too? There is a strong need to help the users of data appreciate the meaning of the data generated which are too abundant in many cases. This also implies appreciation of the working of the instrument and feel for the data-processing by the instrument. The lack of communication between those who generate numbers and the ones who had planned, or will interpret, can be disastrous. Cases are known where sedimentation rates were calculated (and also published) using uncalibrated radiocarbon dates.

The appearance of many mass spectrometry laboratories, the Accelerator Mass Spectrometers (at PRL, IUAC and Bombay University); a number of Palaeomagnetism, OSL and TL laboratories along with many other analytical equipment augers well. A portable radiocarbon dating equipment was being developed in the USA which would provide dates on site. Techniques developed earlier (like Be-10, Al-26 and others) are also becoming possible to apply more widely with the advent of AMS. But we should also remember that the scientists behind these developments were those who had set up their laboratories in the 1960s and 1970s, and had acquired skills working for decades. Is such a crop being nurtured now?

Geoscience is no longer just a descriptive science. The involvement of more geologists in the laboratory work, of more physicists and chemists in problem formulation and field trips and interpretation is a welcome trend. Mathematicians and statisticians have to be involved in evolving data treatment. Now a geoscientist has to grasp the meaning of various statistical parameters. Therefore, the learning of mathematical and statistical tools is also becoming essential.

The thinning and blurring of borders between water-tight compartments of natural sciences has begun to happen in India too, and will definitely lead to the improvement in the quality of science produced. The approach will also have implications for other fields like Archaeology where many monuments and materials are waiting to be precisely dated, needing in-situ measurements too. Finding more and more commercial applications will also drastically help.

The quality of research output in geoscience will be greatly dependent on the quality of geoscience education in colleges and universities. An enhanced interaction between teaching institutions and research institutions is essential. Various societies and academies need to take up this call.

Recent advances and future strategies for cryospheric research in Himalaya:

Prof. Rameshwar Bali
Department of Geology, University of Lucknow
rameshbali@rediffmail.com

The Himalayan and Tibetan regions (known as the Third Pole or Asia's water tower) play an important role in the earth's cryosphere. The study of this geographically and topographically vast region can help us understand several important social and scientific issues, such as the quantum of fresh water and sediment supply downstream, the occurrence of flash floods, the distribution of flora and fauna, besides being one of the best repositories of past climate changes. Despite their importance, Himalayan glaciers have received little attention in the recent past, owing to their geopolitical location and a lack of scientific infrastructure and trained geoscientists.

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

Pindari glacier

The Himalayan region and its glaciers are nourished by two major weather systems, viz. the Indian Summer Monsoon (ISM) and the mid-latitude westerlies (Western Disturbances, WD). However, due to the spatial and temporal variability of these weather systems, the overall health of the Himalayan glaciers vary on centennial to multi-millennial time scales, from the northwest to the northeast. Glaciers are an essential entity for understanding past climate variability because of their dynamic response to a range of factors, as well as their sensitivity to temperature and precipitation variations.

In response to the significance of the Himalayan glaciers, the Geological Survey of India established the Indian glaciological programme in the early twentieth century. They have primarily focused their efforts on understanding basic geomorphology and have conducted systematic mass balance and snout monitoring studies, mainly for the Central Himalayan glaciers. Recently, a number of international and national research groups have been working in the region to better understand high-resolution Himalayan palaeoclimatic variability using multiproxy parameters and evolving dating techniques. The overall strategy has been to establish the chronology of glaciations in various segments and correlate them with global atmospheric drivers. Several national and international groups are working in different geographical segments of the Himalaya, developing various models for glaciation chronology and attempting to link them with atmospheric circulation models.

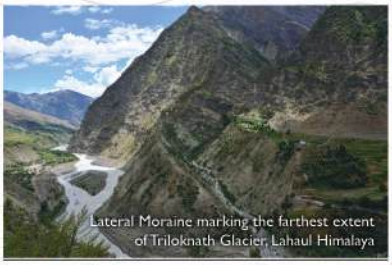
The general methodology used has been right in considering the geomorphic disposition of the glacial sediments and establishing moraine stratigraphy, dating those using OSL and or 14C radiometric techniques, and correlating them with palaeoclimatic reconstructions based on multiproxy data. Boulders and polished valley surfaces in glacially sculpted valleys are now being dated using CRN exposure dating techniques. However, it is argued that this technique has a very high probability of both overestimating and underestimating glaciation ages, and the ages show a high variance with the established chronologies established using the OSL dating technique (e.g. Heyman et al., 2011; Eugster et al., 2016). The diverse approach, methodology and dating of glacial sediments results in the reconstruction of various palaeoclimatic and palaeogeographic models in time and space. Given that, both OSL and CRN dating techniques have significantly improved our ability to define glacial chronologies and comprehend past climate variability. However, considering their limitations, it is critical to reach an agreement and implement a consistent methodology, particularly for dating glacial sediments.

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

Deglaciation not only reduces freshwater reserves but also exposes vast amounts of glacial sediments. As a result of the multifold increase in sediment supply, dams and reservoirs in river valley projects downstream are filling up at a faster rate than anticipated. In addition, the areal and volumetric loss of glaciers as a result of climate change has significantly increased the number and size of lakes in the Himalayan region in recent decades. Rapid glacier melting has resulted in the formation and development of a large number of glacial lakes. As water pressure rises, natural glacial lake dams tend to fail, resulting in catastrophic floods (Glacial lake outburst floods; GLOFs) in high mountain areas. GLOFs can be devastating because flash floods can devastate downstream communities with little warning. GLOFs also endanger long-term infrastructure such as dams, given the number of hydropower projects in the region. With such high stakes, it is critical to conduct research and observations to anticipate and assess disasters caused by reservoir siltation, GLOFs, and avalanches, and chalk out strategies to mitigate their effects.

Furthermore, studies suggest that soot, after carbon dioxide, may be an important component of global warming. Black soot in snowflakes not only darkens snow and ice surfaces, but it also warms the air mass, causing higher temperatures in the cryosphere and melting of its ice. As a result, it is critical to limit the emissions of this "short-lived climate pollutant" and conduct additional research into it in order to reduce its contribution to climate change. In addition, attention should be paid to other types of frozen water in the Himalayas, such as permafrost, which is an important component of the cryosphere. It has received little attention with respect to its potential as a source of fresh water, and carbon and methane sequestration. It is reported that the permafrost active layer is depleting, which implies that it's losing its ability to hold fresh water and may release sequestered carbon. However, the actual amount of water stored in permafrost and the amount of sequestered carbon that can be released is yet to be estimated. As a result, more research is needed to quantify the distribution of permafrost, its future climatic trajectory, and the consequences for high-altitude ecosystems.

Another very important aspect that needs to be looked into is ice core study. More efforts are required to excavate deep time ice cores from two contrasting climatic regions, i.e. one from ISM and another from WD dominated Himalaya to understand high resolution palaeoclimatic changes. Unless we have ice core-based studies it would be extremely difficult to identify and quantify the temporal changes in the mid-latitude WD verses ISM.


Lateral Moraine marking the farthest extent of Triloknath Glacier, Lahaul Himalaya


OSL sample being collected from the lateral moraine of Triloknath glacier


Palaeolake site (Kame terrace) at Triloknath glacier being studied before


Latero-frontal moraine in Pindari glacier valley, Uttarakhand


Recessional moraine in Pindari glacier valley


2.13 meter pit in paleolacustrine deposit for collection of closely spacedsamples for multiproxy data and OSL dating for high resolution studies in Triloknath glacier area.

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

PERSPECTIVES

Does global warming really affect the Himalayan glaciers: A case study from Gangotri glacier system, Garhwal Himalaya

- B. S. Kotlia, Harish Bisht and Kireet Kumar

Almost all the valley glaciers in the Himalaya have always been an issue of debate in the perspective of global warming. During the 20th century, a continual retreat of glaciers along the Himalayan arc has been reported (Vohra 1981) and this process still continues. Due to its inaccessible terrain and logistic difficulties, the glaciers of the Indian Himalayan Region (IHR) have hardly been studied. However, with the increase of scientific awareness, advance technologies, working facilities, and more recently with the availability of high resolution satellite and GPS data, emphasis is being made to carry out studies of these glaciers with higher accuracy. The Gangotri is one of the largest glaciers in the IHR, which has always been a subject of discussion due to its dynamic nature and varying rate of retreat. During the last few years, there has been much controversy and conflicting statements being issued on the position of the Gangotri glacier and its melting. We have estimated a recession rate of the Gangotri glacier at a sub-centimeter level of accuracy during the ablation season (May to September) in the years 2005 and 2015 by using rapid static and kinematic GPS surveys. The GPS dataset show that the total average retreat along the snout has been 102.57 ± 0.05 m from 2005 to 2015 with an average rate as 10.26 ± 0.05 m/yr. Our results reveal that the retreating rate has been comparatively more declined than that shown by earlier studies. The decrease in retreating rate supports the view that apart from global warming, the retreat rate of the glacier is also governed by local aspects and glacier characteristics. Further, if global warming is the only reason for the retreat of the Gangotri glacier, then the rate of retreat for all the glaciers situated in a similar climatic regime should be identical (see also Singh et al. 2017). However, different retreat rates have been observed in different glaciers and a few glaciers have advanced too, which supports the claim that local factors and glacier characteristics play a vital role for varying retreating rate, apart from global warming.

Recent studies on the Himalayan glaciers also indicate that the rate of recession of some of the glaciers, in general, is on the decline. Bhattacharya et al. (2016) reported decreased retreat rates during the recent years, compared to other debris covered glaciers in the Himalayan region. The Pindari glacier in Kumaun Himalaya also shows decreased recession from 1966 to 2007 (Bali et al. 2009). Satellite and ground based studies carried out by Ali et al. (2019) also prove that the retreat rate of the Pindari glacier has slowed down since 2010. Similarly, the Milam glacier has retreated at a rate of 9.54 m/yr after 2004 (Dumka et al. 2013), significantly slower than 30.32 m/yr from 1966 to 1997 (Shukla and Siddiqui 2001). Likewise, the Satopanth glacier which provides water to the Ganga basin, has receded at a rate of 22.86 m/yr before 2005 but slowed down to 6.5 m/yr in the next years (Nainwal et al. 2008). Most evidently, the 70 km long Siachin glacier, too, has been in a steady state for the last several decades, with almost no retreat (Sinha and Shah 2008). By comparing our data with earlier studies, we believe that the recession rate of many glaciers has slowed down in different parts of the Himalayan region. These studies are in disagreement with the widely accepted concept of human induced global warming being a major impact on the glaciers, and demonstrate that glacier dynamics is not only controlled by climatic changes, but is also governed by debris cover, glacier characteristics and local aspects.

Finally, we conclude that the retreating rate of the Gangotri glacier has been comparatively more declined than that observed by the previous studies. Our results also prove that the high load of debris cover and isolated boulders on the surface of the glacier with passage of time is one of the major factors for reduction in the retreating rate of the glacier, as high sediment load prevents solar insolation that protects the ice to melt. It also has been documented in other glaciers of the Himalayan region (Swaroop et al. 2001; Raina and Srivastava 2008; Nainwal et al. 2008).

References

Ali SN, Singh R, Pandey P (2019) Earth Sci India 12(3):146–157. https ://doi.org/10.31870 /ESI.12.3.2019.11
Bali R, Agarwal KK, Ali SN, Rastogi SK, Krishna K (2009) Proc Ind Sci Cong 96:79–80
Bhattacharya A, Bolch T, Mukherjee K, Pieczonka T, Kropacek J, Buchroithner MF (2016) Jour Glaciol 62(236):1115–1133. https ://doi.org/10.1017/jog.2016.96
Dumka RK, Kotlia BS, Miral MS, Joshi LM, Kumar K, Sharma AK (2013) India. Intern J Eng Sci 2:58–63
Nainwal HC, Negi BDS, Chaudhary M, Sajwan KS, Gaurav A (2008) Curr Sci 94(5):653–660
Vohra CP (1981) The Himalayas: aspects of change. In: Moddie AD (ed) Lall JS. Oxford University Press, New Delhi, pp 138–151
Raina VK, Srivastava D (2008) Glacier Atlas of India. Geological Society of India, Bangalore
Shukla P, Siddiqui MA (2001) Geol Sur Ind Spec Pub 53:71–75
Singh DS, Tangri AK, Kumar D, Dubey CA, Bali R (2017) Quat Int 144:172–181. https ://doi.org/10.1016/j.quain t.2016.07.025
Sinha LK, Shah A (2008) Temporal analysis of Siachen Glacier: a remote sensing perspective. In: Nat. Sem. Glacial Geomorphology and Paleoglaciation in Himalaya, pp 43–44
Swaroop S, Oberoi K, Srivastava D, Gautam CK (2001) In proceedings of the Symposium on Snow, Ice and Glaciers- a Himalayan perspective, 9–11 March 1999, Lucknow. India. Geol Surv India 53:77–81

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

PERSPECTIVES

Optically Stimulated Luminescence (OSL) Dating - A brief Appraisal

Manoj Jaiswal

Dating a sedimentary deposit has always been challenging due to its complex nature of origin and mixing. Each grain is an archive of its parent rock, providing valuable information of the source/provenance. However, after its detachment from the parent rock, it goes in a complex cycle of erosion, transport, mixing with grains of a variety of sources, and then several cycles of deposition and erosion, making it complex to date. Optically Stimulated Luminescence dating is an absolute radiometric method of determining the age of the geological material since a key event - typically burial (in the case of sediments) or firing (in the case of ceramics or burnt stone, artifacts of archaeological importance). It provides a measure of time since sediment grains were deposited and shielded from further light or heat exposure, which often effectively resets the luminescence signal. It is based on retrospective dosimetry methods making the use of natural dosimeters, i.e. Quartz and Feldspars, available in a sedimentary deposit acquiring and absorbing radiations from radioactive elements (U,Th and K mainly) present in the sediment. Like other available dating techniques, OSL has its own advantages and disadvantages. However, it is still preferred and has been used widely as it offers some benefits than others: (i) a wide range of datable time (from the last few tens of years to a few hundred thousand years; extended further to few millions of years with new methods like Red Thermoluminescence and Infrared Stimulated Luminescence with some correction procedures), (ii) ubiquitous nature of dating materials, i.e. Quartz and Feldspar, in almost all sediments, (iii) direct dating of the depositional event, making it less dependent on the correlation of sediment and dating material. Since it dates the last daylight exposure of the sediment, it may not be free from some geological signals, making it less accurate in case of very young samples of a few thousand years; however, with the development of methods of single aliquot regeneration dating on small aliquots/single grain, these issues may be resolved successfully. Apart from that, some uncertainty is caused by poorly known moisture history and heterogeneity in radioactive elements, and the changing and poor luminescence/signal (signal to noise ratio) in some cases.

In India, Luminescence Dating was introduced through the pioneering work of Prof. Ashok K. Singhvi (retired from PRL, Ahmedabad, India) on the Thar Desert, who established a chronology of sand dunes and the role of climate in shaping them. Since then, Luminescence dating has been used extensively in various Quaternary landforms and archaeological sites, with various new laboratories established in institutes all over the country. Now there are more than 10 laboratories in India, for example, PRL Ahmedabad, WIHG Dehradun, NGRI Hyderabad, IISER Kolkata, Delhi University New Delhi, GSI Faridabad and more. Currently, Luminescence Dating has been explored to new promising and successful applications offering - (i) provenance studies and quantification of mixing of sediments from multiple sources using the luminescence characteristics of dating material, (ii) surface exposure dating using the penetration power of daylight in the rock surfaces though up to very low depth of millimetres and (iii) low temperature thermochronology to estimate rate of exhumation as a compliment to fission track dating technique, and (iv) terrestrial dating of meteorites and its properties.

Association for Luminescence Dating (ALD) is looking into the regular assessment of Luminescence Dating applications across the laboratories through conferences and workshops. The aim is to provide a platform for training and interaction, to share new results and create synergies for collaborative initiatives. Special emphasis has been on capacity building through presentations by young researchers and students. This time, the 4th workshop is proposed during 1-3 February, 2023 in IISER Kolkata. Due to space constrains, references were not provided but can be contacted to receive for suggested reading and papers.

Dr. Manoj Jaiswal
Associate Professor
Dept. of Earth Sciences
IISER-Kolkata, WB.

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

PERSPECTIVES

Reconstructing vegetation biomes from palaeoecological (fossil pollen) data and species distribution modelling

Jyoti Srivastava
BSIP, Lucknow

Global anthropogenic environmental change has led to serious impacts on species diversity, distribution and persistence in the last three decades, which in turn will be a major cause of species loss (Pacifici et al. 2015; Mishra et al. 2021). The tropical biome is one amongst the four worldwide climate domains (i.e., tropical, subtropical, temperate and boreal), which undergoes maximum forest deterioration and over-exploitation (Hansen et al. 2013). Southern and Northern continental Southeast Asia bears a monsoon-driven climate with an extensive seasonal reversal in the wind system and summer-dominant precipitation (Loo et al. 2015). Climate change is the main driving feature in these regions for rising temperature and changing precipitation patterns (Sivakumar and Stefanski 2011; Loo et al. 2015). In the past 100 years, global warming and land-use changes have caused substantial variation in the spatiotemporal environmental patterns (Hughes 2000; Benito et al. 2009), and these changes, in turn, cause a major threat to biodiversity and conservation of forest ecosystem through habitat depletion and changes in plant species composition (Hughes 2000; Walther et al. 2002). A major part of the plant species in the world is from the tropical forests which cover only 7% of the Earth's surface. These tropical forests are wrecked by anthropogenic activities (Morris 2010), leading to forest degradation clearing nearly 85% of the tree species (Tiwari et al. 2021; Baboo et al. 2017; Kittur et al. 2014). The rate of loss of species due to human activities is 3–8 times higher than through natural disturbances leading to habitat alterations (Costanza et al. 1997; Karki et al. 2017).

Several geostatistical tools and modelling approaches, for example, Cartographic models (Dudov 2017), Doup and CLIMEX (Coban et al. 2020), and Autoregressive and Classical logistic regression (LR) methods (Sahragard et al. 2019) have been recently used to model the plant species distribution (Adhikari et al. 2012), species diversity pattern (Graham and Hijmans 2006) and climate change impacts (Saran et al. 2010). Several investigators have studied tropical forests, but few studies have employed advanced geospatial approaches and tools. The potential effect of anthropogenic climate change on species distribution can be effectively assessed through species distribution models (SDMs), using current climatic conditions and species occurrence data to model the realized niche of the plant species (Hutchinson 1957). These distribution models are further projected in geographic space by using estimations of past and future climatic patterns (Varela et al. 2011). To understand how climatic changes affected, and would affect, the plant species distribution is essential for studying biogeography and develop conservation strategies through the evaluation of potential distribution for different time periods (past and future time scenarios) using ecological parameters projected with present occurrence information (Riberio et al. 2019). The Maxent SDM is a bioclimatic model which uses presence-only data, finding that absence data are hardly found or consistent, and evaluates the distribution of a species depending on climatic controls (Phillips et al. 2006; Deb et al. 2017; Kumar and Saikia 2020), and has performed well among various modelling approaches (Elith et al. 2006; Ortega-Huerta and Peterson 2008).

The model uses species presence record and current climatic variables, such as precipitation, temperature and altitude, to detect the best suitable distribution of the plant species across the region of interest. Past model projection for the targeted species can be cross validated by fossil pollen evidence of the species from various palaeovegetation reconstruction studies. This has considerable potential to bridge the gaps between paleoecology and species distribution modelling by integrating palaeoproxy analysis that spans longer time scales such as the Last Glacial Maximum and Middle Holocene, along with climate modelling that highlights the spatial context for range contraction/expansion and migration.

The findings of these studies could be helpful in establishing a conservation approach for key species in India by recognizing non-conducive habitats and probable climatically fit regions where restoration strategies can be implemented for forest rejuvenation. The local population in several regions of India has their major reliance on such key plant species for livelihood, hence they also need to be educated with the right techniques for collection of various plant products (Patil et. al. 2006). Studies evaluating the influence of climate change on the distribution of such species of both ecological and economical values also help in forest carbon management strategies for the country.

Due to space constrains, references were not provided but can be contacted to receive for suggested reading and papers

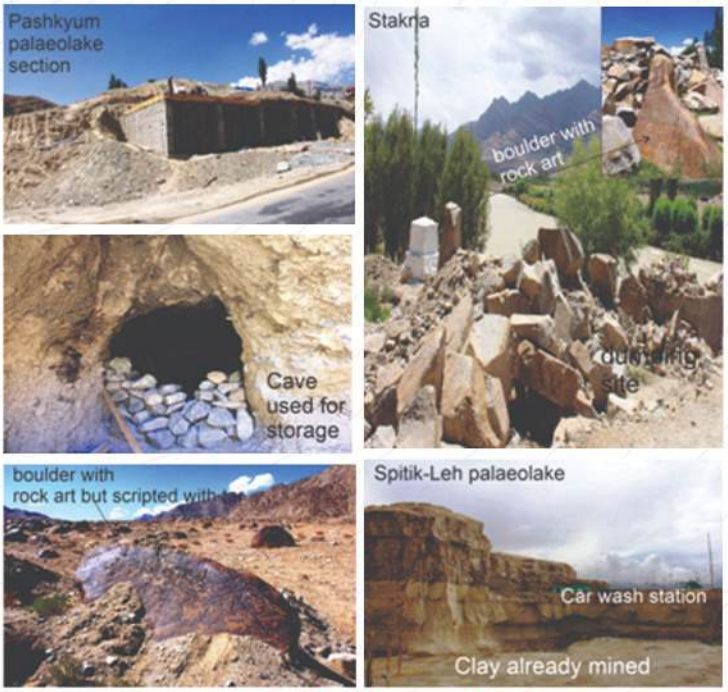
Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

Geoheritage sites of Quaternary deposits in Himalaya: A necessitate protection

Binita Phartiyal, *BSIP, Lucknow*

In the last 20 years of my research work in the northwest Himalaya, I have noticed that Quaternary deposits (lacustrine and aeolian) are being exploited and are facing several threats. Some of these sites are a treasure trove of information on the geomorphology, landscape evolution, palaeoclimate, palaeoecology and neotectonics of this recent period. These can prove very helpful in the understanding of climate change, hydroclimate, ecology, mountain geomorphology etc., of this important part of the Third Pole which attracts over a million tourists every year to the beautiful Himalayan states of India. Apart from the natural threats, anthropogenic activities in the recent decade have proved to be ruining these valuable sources (palaeolake deposits, caves, petroglyphs/rock art; sand ramps etc.,) of information for Quaternary researchers.

The first, and biggest, threat is the placement/location of these sediments in the young mountain chain lying under the influence of both the Western Disturbances and the Indian Summer Monsoon, thereby making these sites susceptible to physical weathering as well as erosion. The other major concern is the neotectonic activities in the region, as the entire mountain belt of the Himalaya (youngest fold mountain belt) is still tectonically active. A combined effect of the climatic variations and neotectonic activities result in seismic tremors, earthquakes, landslides, GLOF(s), and cloud bursts, as natural threats make these deposits susceptible to loss. Every year a large quantity of sediments is being lost because of erosion in these areas of the Himalaya. In addition to these natural calamities, which we know is not in our hands to prevent, there is a constant threat of anthropogenic intrusion for the endless game of infrastructural development for decades. Ever since the post-industrial revolution, new technological invention caused the evolution of society, population growth, expansion in urbanization at the consequence of environmental degradation. To cater the floating population, construction activities have been taking a toll on these sites and the mysteries in their records are being depleted. Erosion, mining, agriculture, urbanization and industries are causing a major harm to them. Some of these geosites have a great geotourism potential which can prove helpful in enhancing the socio-economic status of local populations. To cater to the needs of the locals as well as tourists a lot of pressure is put on these Quaternary sediment deposits which are easy targets for mining to provide the raw material. In no time, several of these sites will be replaced by modern day constructions and hence it needs a necessitate protection & a realization of the importance of using geo-resources in a sustainable manner. Although all these geosites cannot be preserved, a few with comparatively greater scientific importance need to be retained and preserved for present scientific research and for future generations. Worldwide, geoheritage sites are being conserved as archives for future generations, and the Indian sites, especially the Quaternary sections/deposits, need a mention and a conservation policy. Different countries around the world have different legislations, social conditions and historical links to the conservation of natural and geological resources, due to which, the geological heritage of the planet is not well preserved & protected.



Some of the Geosites under threat of Ladakh sector, NW Himalaya

It is our duty to list these sites in the area of our work and talk to the local as well as administrative authorities of that region about their importance and their conservation. The least we can do is to start with the designation of these geosites as geotourism sites that would create ample employment for local youths, which would ultimately increase their socio-economic status in the society. If the present rate of ignorance and mining continues, in the coming few years all the Geosites of the Himalayan region would be ruined.

Let Us Protect our Quaternary Geosites!

AOQR congratulates the New Fellows of Indian National Science Academy (INSA - FNA)

Prof. Javed N Malik
IIT Kanpur

Dr. Pradeep Srivastava
IIT Roorkee

INSA

*The fellowship is awarded to **Prof. Malik** on account of his colossal contribution in the field of Quaternary Geology, Active Tectonics, Paleoseismology and Paleotsunami studies, where he contributed significantly in the field of Paleoseismology and Paleotsunami. Prof. Malik has published over 70 research articles having citations crossing 2700 and has supervised 07 PhD students.*

*The fellowship is awarded to **Dr. Srivastava** on account of his colossal contribution in the field of Quaternary Geosciences where he contributed significantly to the landscape of Himalaya and the Ganga foreland. Dr Srivastava has published over 100 research articles having citations crossing 3000 and has supervised 7 PhD students*

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

Geological Society of India

In the cause of earth science in India

Award from Geological Society of India

Dr Vikram Gupta received the prestigious Geological Society of India Sesquicentennial Commemorative award for the year 2022, for his exemplary work in the field of Engineering Geology. He has over 80 publication and 45 technical reports to his credit. The award is constituted by the Geological Society of India.

Dr. Vikram Gupta,
Scientist 'F ',
Wadia Institute of Himalayan Geology, Dehra Dun, Uttarakhand

Prof. S.K. Singh Memorial Gold Medal (for 2020) of Paleontological Society of India was awarded to Dr. Poonam Chahal, WIHG, Dehradun and HNBGU, Srinagar. The paper entitled "A preliminary assessment of the geological evidence of the megafloods in the Upper Zanskar catchment, NW Himalaya" was selected as the best scientific contribution in the journal for 2020. The study produces evidence of glacial lake outburst flood events in the upper Zanskar of Ladakh Himalaya during the warm and wet conditions of the MIS-3 and post-LGM time period.

Dr. Poonam Chahal, presently a Post Doctoral Fellow at the Institute of Earth Sciences, Hebrew University of Jerusalem, Israel.

AOQR fraternity congratulates all the awardees

DISCLAIMER

As this is a community-driven newsletter, the role of the ECR team is limited to copy editing and reporting only. It will be the sole responsibility of the author/ contributor to ensure the accuracy and authenticity of the contributions. The ECR team is pro-active in collecting as much useful information as possible; however, we rely on community inputs and will not be responsible for any omissions.

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

The man who started Quaternary geological studies in India way back in the early nineteen-seventies

Prof. S. S. Merh
(1928 – 2022)

Professor Sukumar S. Merh, a renowned earth scientist, Founder Head of the Department of Geology and former Dean, Faculty of Science, The M. S. University of Baroda, Vadodara, left for his heavenly abode on 3 November, 2022, in London. Profoundly mourned by his family, friends, admirers, colleagues and students from all over the country and abroad, he will always be fondly remembered by fellow geo-scientists. Professor S. S. Merh was born on 2nd October 1928 in a Gujarati family in Varanasi. He studied geology at the Banaras Hindu University, Varanasi, and took his M.Sc. degree in 1948 with First Class. He joined the M. S. University of Baroda (1951) in the civil engineering department. He was deputed by the M.S. University to the Imperial College of Science and Technology, London (1957) for his doctoral studies and worked under Professor John Sutton and came in close contact with Professors Janet Watson and Johan Ramsay, the eminent metamorphic and structural geologists of those days. Professor Merh worked on the Moinian rocks of Scottish Highlands for his Ph.D., emphasizing on the structural complexities of the area. On his return to India (1960) he was entrusted with the task of setting up a full-fledged Department of Geology at Baroda and was appointed as a Professor of Geology (1963) and then a Senior Professor (1972) at a young age of 44 years. Professor Merh published a large number of research papers, books and monographs, and supervised about 50 doctoral students.

In recognition of his contribution to teaching and research in geology, Professor Merh was elected Fellow of all the three Science academies of the country, viz., the Indian National Science Academy, New Delhi, the Indian Academy of Sciences, Bangalore and the National Academy of Sciences, Allahabad. He was associated with numerous educational and professional organizations. He worked as a Chairman of the Governing Body of the Wadia Institute of Himalayan Geology, Dehra Dun (1985-88). He was President of the Geology-Geography Section of the Indian Science Congress (1980); and the Indian Geological Congress (1982). He was INSA Council Member (1987-89) and served as an INSA Senior Scientist (1989-91). Professor Merh was also a recipient of the DN Wadia Medal of INSA (2001). He was very friendly with his peers and students, a wonderful orator and his balanced attitude to all problems earned him admiration and respect. However in his personal life, he faced several odds. He lost his wife and his only son at a very young age, and he had to shift to London for taking care of his daughter-in-law and two granddaughters: an accountability which he squared commendably. Prof. Merh will remain in the hearts of many and will be deeply missed by his family, friends and students.

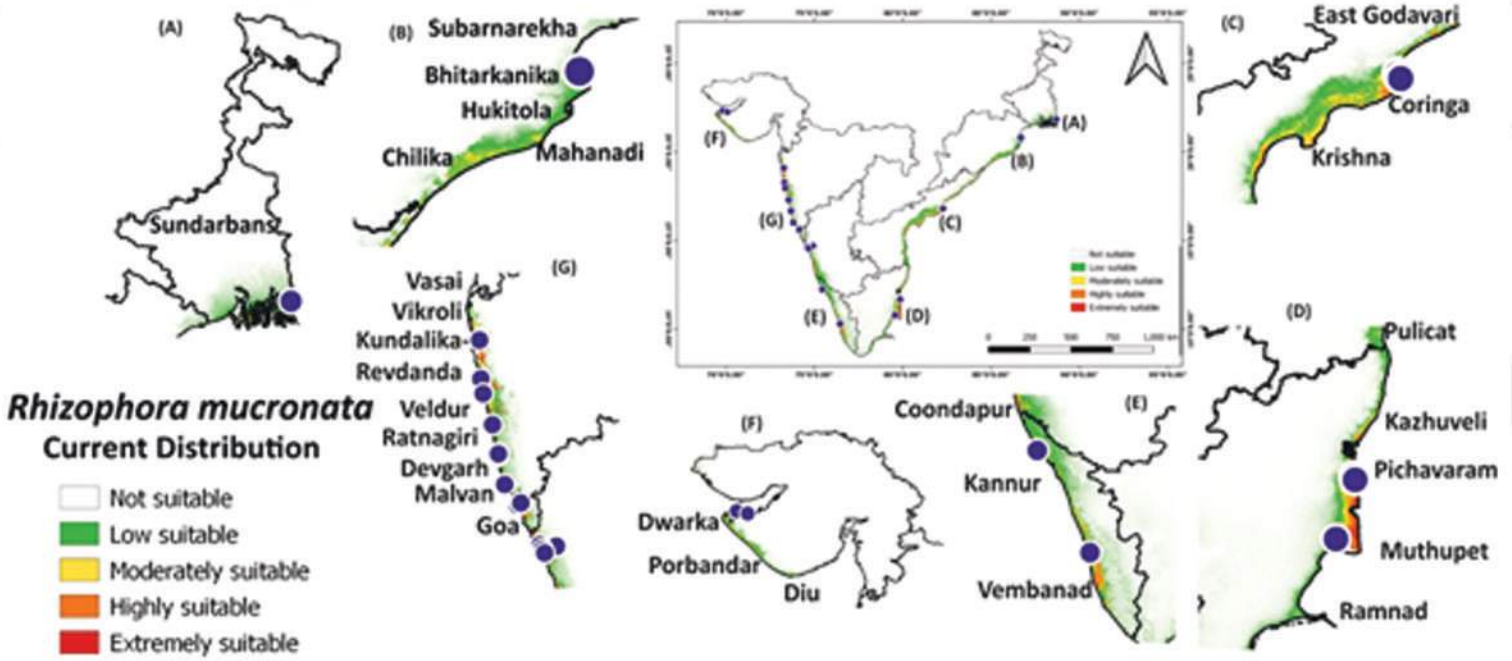
L. S. Chamyal,
Former Professor and Head,
Department of Geology,
The M. S. University of Baroda,
Vadodara.

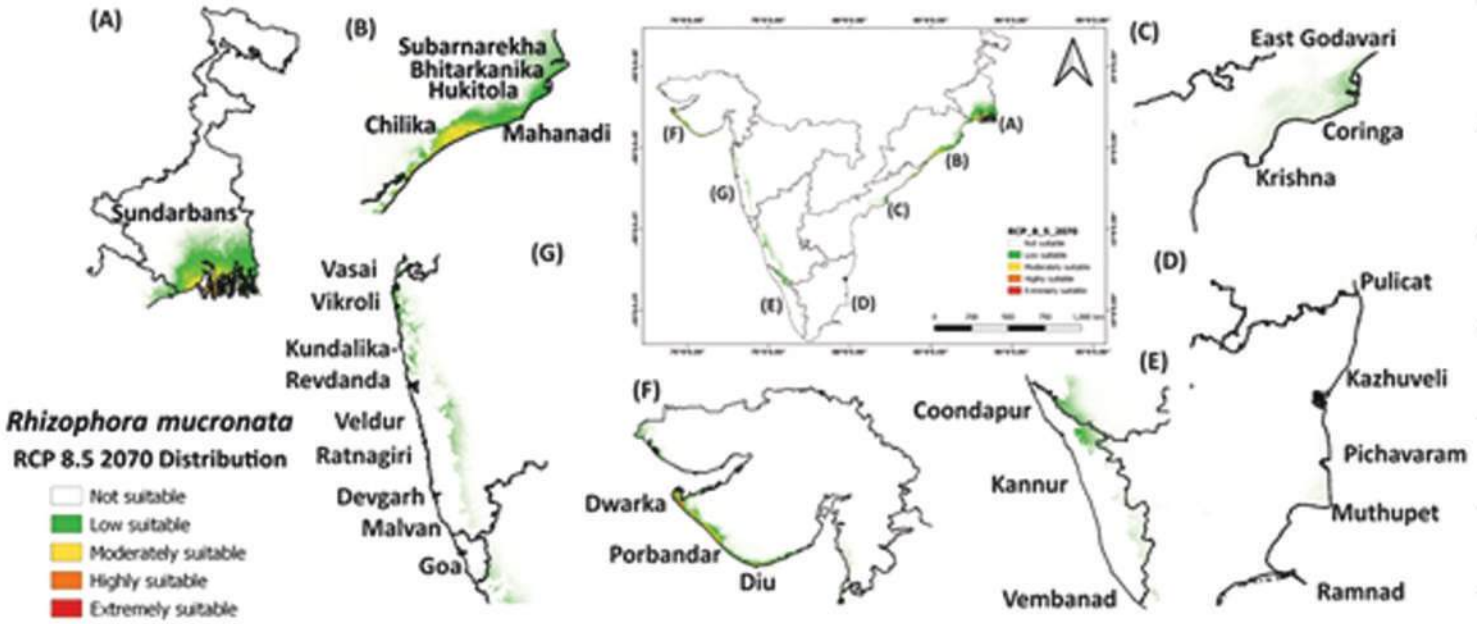
Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

Significant New Manuscripts

Pujarini Samal, Jyoti Srivastava, Singarasubramanian SR, Pooja Nitin Saraf, Bipin Charles (2022). Ensemble modeling approach to predict the past and future climate suitability for two mangrove species along the coastal wetlands of Peninsular India. **Ecological Informatics 72, 101819.**

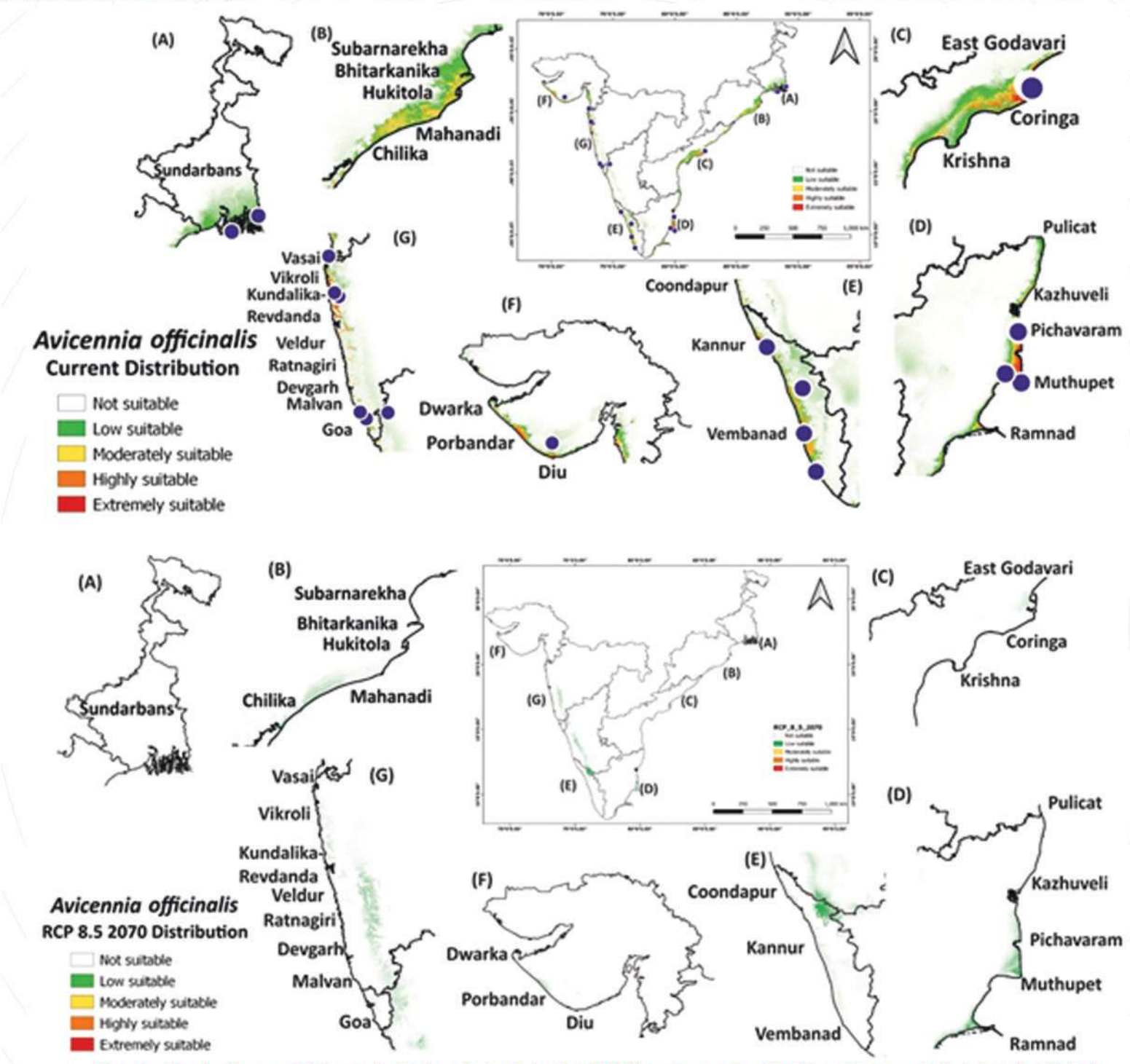
Mangroves support numerous ecosystem services and help in reducing coastal ecological risks. Yet, they are one of the severely endangered ecosystems, declining rapidly due to climate change, sea level fluctuations and human activities. Increasing urbanization, coupled with improper waste management practices, is severely affecting the coastal wetlands of India which is negatively impacting the 'blue economy' supported by numerous industries in India such as fishing, transport, tourism and pharmaceuticals. A limited understanding of mangrove spatial distribution and species habitat requirement has reduced the success of conservation initiatives in





Map showing the Current and future distribution of suitable habitat (2070) under extreme global warming scenario for Rhizophora mucronata

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS



Map showing the Current and future distribution of suitable habitat (2070) under extreme global warming scenario for Avicennia officinalis

many parts of the Indian coastline. Hence, we are in an urgent need to develop mangrove distribution models, based on fine scale species and climate data to identify conservation target areas at spatio-temporal scales, specifically in rich mangrove biodiversity regions along the Indian coastline.

Past, current and future prediction of two mangrove species along the Indian coastline through Ensemble Species Distribution model showed a reduction and landward shift of mangroves in the future (2070) due to the decline in suitable habitats specifically along the Southeast and Southwest coasts of India, in response to precipitation and sea level changes in the future. However, maximum range expansion was mapped in the past which was validated by fossil pollen data. Species distribution models (SDM) have been widely used as an effective approach to prepare conservation strat-

egies for threatened/endangered species. An ensemble model integrates the advantages of numerous single algorithms and provides the most accurate and robust prediction for the potential distribution of any species. The Indian coastline is vulnerable to the impact of climate and sea level changes and there is not much attempt for coastal wetland species prediction and management, with limited research carried out for their future habitat mapping. To fill this gap, this study aimed to project the potential impact of climate change on coastal wetland species using an ensemble modelling approach. The model combines the climate variables and species present occurrence points to predict the potential distribution and habitat suitability of the species both temporally and spatially under novel climatic conditions. The total area of the suitable habitat was also estimated in sq. kms for the mangrove species in the current, past and future climate scenarios.

The study outcomes help to identify highly suitable areas for conservation and management for the future. Most importantly, the highly suitable habitat areas, i.e., Chilika and Sundarbans along the east coast and Dwarka and Porbandar along the west coast of the India for 2070 must be protected and conserved. Effective buffer zones must be established in these conserved areas to narrow down the effect of non-conservative areas on the core conservative zone. Moreover, preventive measures should be adopted in these areas which are projected to turn into highly suitable regions in future scenarios to facilitate the growth of these mangrove species.

Recent Publications:

Achyuthan, H., Chen, M.-T., Liu, S. 2022. Understanding the Late Quaternary Paleomonsoon and Paleoenvironmental Shifts of Asia. Quaternary International 629, 1-3. https://doi.org/10.1016/j.quaint.2022.06.002.

Ajay, A., Sanyal, P. 2022. The Imprint of Southern Ocean Stratification on the Isotopic Composition of Antarctic Precipitation. Earth and Space Science Open Archive, 18. https://doi.org/10.1002/essoar.10512681.1.

Ambokar, M., Panchang, R., Govil, P., Azharuddin, S. 2022. Implications of finding Peraclis spp. in the Holocene sediments of the northeastern Arabian Sea. Marine Micropaleontology 177, 102182. https://doi.org/ 10.1016 /j.mar micro. 2022. 102182.

Ankit, Y., Chirakkal, A., Kataria, V., Anoop, A., Mishra, P. K. 2022. From biomass to fossil fuels: A contemporaneous transition to anthropogenic driven environmental changes recorded in a Central Himalayan Lake. Journal of Hazardous Materials Advances 8, 100186. https:// doi.org/ 10.1016/ j.hazadv. 2022. 100186.

Behera, D., Bhattacharya, S., Rahman, A. et al. Molecular tracers for characterization and distribution of organic matter in a freshwater lake system from the Lesser Himalaya. Biogeochemistry (2022). https://doi.org/10.1007/s10533-022-00984-y

Bhadra, S. R., Saraswat, R. 2022. Exceptionally high foraminiferal dissolution in the western Bay of Bengal. Anthropocene, 40, 100351. https://doi.org/ 10.1016/ j.ancene.2022. 100 351.

Bijesh, C.M., Twinkle, D., Susanth, S. et al. Large-scale submarine landslide in the Cochin offshore region, southwestern continental margin of India: a preliminary geophysical understanding. Landslides (2022). https://doi.org/10.1007/s10346-022-01969-6.

Choudhary, S., Nayak, G.N. & Khare, N. Sedimentary processes, metal enrichment and potential ecological risk of metals in lacustrine sediments of Svalbard, Arctic. Environ Sci Pollut Res (2022). https://doi.org/10.1007/s11356-022-23600-w

Ghosh, R., Saikia, K., Biswas, O., Agrawal, S., Morthekai, P., Arif, M., Phartiyal, B., Sharma, A., Singh, N., Paruya, D. K., Maharana, P., Shekhar, M., Bera, S. 2023. Last 10 millennial history of Indian summer monsoon in the Bengal region – a multi-proxy reconstruction from a lacustrine archive. Palaeogeography, Palaeoclimatology, Palaeoecology,609. https:// doi.org/ 10. 1016/j.palaeo.2022.111308.

Kumar, K., Sharma, A., Srivastava, P., & Thakur, B. (2022). Implications for catchment weathering, provenance, and climatic records from a late Pleistocene to present sedimentary sequence in Gujarat, India. Quaternary Research, 1-18. doi:10.1017/qua.2022.39.

Maurya, S., Rai, S. K., Sharma, C. P., Rawat, S., Chandana, K.R. Dhabi, A. J., Bhushan, R., Sarangi, S. 2022. Paleo-vegetation and climate variability during the last three millennia in the Ladakh, Himalaya, CATENA 217, 106500. https:// doi.org/ 10. 1016/j.catena.2022.106500.

Phartiyal B & Nag D 2022. Sedimentation, tectonics and cli-

climate in Ladakh, NW Trans-Himalaya-with a special reference to Late Quaternary Period. Special Issue-Continental Lithosphere: Integrated Geoscientific Aspects. Geosystems and Geoenvironment. 1-100031:1-12 https:// doi.org/ 10.1016/j.geogeo.2022.100031

Reddy, A.P., Gandhi, N., Yadava, M.G. et al. The indian monsoon variability during the last two millennia and links to the tropical equatorial Pacific. Clim Dyn (2022). https:// doi.org/ 10. 1007/s00382-022-06513-9

Sasikumar, K., Nath, D., Wang, X. et al. Recent enhancement and prolonged occurrence of MJO over the Indian Ocean and their impact on Indian summer monsoon rainfall. Clim Dyn 59, 2585–2598 (2022). https://doi.org/10.1007/s00382-022-06230-3.

Sharma, C.P., Kumar, A., Chahal, P. et al. Debris flow susceptibility assessment of Leh Valley, Ladakh, based on concepts of connectivity, propagation and evidence-based probability. Nat Hazards (2022). https://doi.org/10.1007/s11069-022-05619-x

Singh, A. K., Sinha, D. K. 2022. Plio-pleistocene planktic foraminiferal biochronology of ODP site 762b, exmouth plateau, Southeast Indian Ocean. Journal of Foraminiferal Research, 52(4), 248–263.

Singh, N. D., Singh, S. K., 2022. Distribution and cycling of dissolved aluminium in the Arabian Sea and the Western Equatorial Indian Ocean. Marine Chemistry 243, 104122. https://doi.org/10.1016/j.marchem.2022.104122.

Suresh, K., Kumar, A., Ramaswamy, V. et al. Seasonal variability in aeolian dust deposition fluxes and their mineralogical composition over the Northeastern Arabian Sea. Int. J. Environ. Sci. Technol. 19, 7701–7714 (2022). https://doi.org/ 10. 1007/s13762-021-03503-y

Suresh, K., Singh, U., Jha A.K., Matta, V. M., Sudheer, A.K., Kumar, A. 2022. Assessment of aeolian dust concentration, elemental composition, and their wet and dry deposition fluxes over the Northeast Arabian Sea. Journal of the Air \& Waste Management Association 72 (10), 1161-1173. https:// doi.org 10.1080/10962247.2022.2100509.

Verma S, Phartiyal B and Chandra R. 2022. Quaternary Geoheritage sites of Northwest Himalaya: Loesss-Palaeosol and palaeo fluvio-lacustrine-a necessitate protection Geoheritage 14:109 https://doi.org/10.1007/s12371-022-00743-3.

Samal, P., Singarasubramanian, S.R., Manoj, M.C., Srivastava, J., D'Souza, N., Balakrishna, K., Chauhan, Md M., Ali, S. 2022. Heavy metal contamination assessment and its associated human health risk evaluation in the Mahanadi River sediments, India. International Journal of Environmental Science and Technology. https:// doi.org/ 10.1007/ s13762 - 022-046 30-w.

Kawsar, M., Manoj, M.C., Weber, M.E. 2022. Reconstructing dynamics of Northern and Southern sourced bottom waters sortable silt records in the lower Bengal Fan during last 200 ka. Zeitschrift der Deutschen Gesellschaft für Geowissenschaften (ZDGG) (Journal of Applied and Regional Geology). https://DOI:10.1127/zdgg/2022/0318.

Morthekai, P., Thakur, B., Murari, M.K., Manoj, M.C., Singh, P., Singh, V.K., Kumar, K., Ali, S.N., Rai, J., Dubey, P. 2022. Further investigations towards luminescence dating of diatoms. Radiation Measurements. https://doi.org/ 10.1016/ j.radmeas. 2022.106803.

Srivastava, J., Manoj, M.C., Manjunatha, B.R., Yoganandan, V., Jose, J., Balakrishna, K., Kumar, A.N., Ahmed, A. 2022. Delineation of terrestrial and marine productivity in the Southwestern Continental margin of India. Journal of Asian Earth System Science 230, 105203. https://doi.org/ 10.1016/ j.jseaes. 2022.105203.

Annapureddy P Reddy,
Indian Institute of Tropical Meteorology, Pune.

Title of the thesis: Study of Indian monsoon variability on multi-decadal to centennial scales using oxygen isotope records of Speleothems

Supervisor name: Dr. Naveen Gandhi, Sc-E, IITM, Pune.
Awarded in August 2022 from Savitribai Phule Pune University, Pune.

Speleothem records have shown the potential for reconstructing ISM for millennial to orbital scales with high temporal resolutions, and were used to infer the interrelation between

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

monsoon and climate system.ISMR variations reconstructed from a peninsular Indian stalagmite for the last 1800 years are coherent with the other terrestrial monsoon records.The present ISMR record suggests monsoon was in wettest phase during Dark Age Cold Period and is forced by La Niña events and strong low level monsoon circulation. High amplitude ISMR variability during Medieval Climate Anomaly is associated with multi-decadal scale north-south latitudinal migration of ITCZ.The large volcanic eruptions and reduction in net shortwave flux at the top-of-the atmosphere, downward net surface heat flux, and upper ocean heat contentcould have resulted in the sudden decrease of ISMR during Little Ice Age (LIA).ISMR record from the composite speleothem samples from the same cave suggests that the 'mean monsoon state' shifted at the edge of Roman Warm Period(RWP).

Signature of such climate shift is evidently available in the different monsoon proxy records from the subcontinent. Investigation of climate reconstructions reveal that the dramatic increase in ENSO variability and intensification of positive-IOD events around 1.75-2 kyr BP would have forced the monsoon climate's mean state to departure from the solar insolation driven drying trend which was continuing since the mid- to late Holocene.The Himalayan & peninsular (Core Monsoon Zone& the Bay of Bengal) regions show a decreasing (increasing) trend in ISMR from pre-LIA to the present.The regional differences might be linked with the interaction between internal variability and external forcing on short time scales. Spectral analysis of proxy records exhibited 2-3 years to Multi-centennial periodicities in ISMR. The peninsular region shows a strong ~5year cycle attributed to theENSO. The tropical and North Pacific and North Atlantic Oceans influence the 5-20 years periodicities in ISMR. Coherency on multi-decadal time-scales hints at possible linkages between ISMR and climate phenomenon through teleconnections.The centennial to multi-centennial ISMR cycles are tied with the North Atlantic circulation.The results presented in this study yield a new insight into the spatial and temporal heterogeneous behaviour of ISM to the different climatic phenomena as well as natural forcing during late Holocene.

References

Phanindra Reddy,A., Naveen, Gandhi., Yadava, M. G., & Krishnan, R. (2022) The Indianmonsoon variability during the last two millennia and links to the tropical equatorialPacific. Climate Dynamics. DOI: 10.1007/s00382-022-06513-9.

Phanindra Reddy,A., Naveen, Gandhi., Krishnan, R. (2021). Review of speleothem records of the late Holocene:Indian summer monsoon variability& interplay between the solar and oceanic forcing.Quaternary International.https:// doi.org/ 10.1016/j.quaint.2021.06.018.

Phanindra Reddy,A., & Naveen, Gandhi (2021). Indian Summer Monsoon Variability ondifferent timescales and deciphering its oscillations from irregularly spaced paleoclimatedata using different spectral techniques. In: NavnithKumaran and DamodaranPadmalal(ed). Holocene Climate Change and Environment(1st ed). Elseveir.

Himani Patel
Birbal Sahni Institute of Palaeosciences, Lucknow

Thesis title: Early farming in prehistoric India: New insights into agronomy, genetics and subsistence strategies in North-Western and Central India.

Supervisor: Dr. Niraj Rai (BSIP, Lucknow) and Prof. (Dr.) R. P. Sinha (Botany department, BHU, Varanasi)

Awarded in November 2022 from BHU,Varanasi.

India is a treasure trove of fascinating and exquisite landforms and landscapes along with its diversity of floral and animal species, climatic patterns and rainfall, soil types and agricultural practices that result in immense cultural variability. Plants are very essential to human survival on this earth and only source of food and oxygen.The emergence of agriculture has always been a central point of discussion in ar-

chaeology. India has very less representation in archaeobotanical study during Early Iron Age to Late Historic period and ancient genomics literature despite the wealth of archaeological samples in all over the country. Archaeobotany, a branch of environmental archaeology deals with the study of botanical remains recovered from archaeological excavations. Archaeobotanical studies thus provide the clues for the past human-subsistence-climate interaction by analyzing the biological remains from ancient settlement sites. More recently, multidisciplinary applications of different methods in archaeology (including macro-remains, pollen, phytolith, radiometric dating, stable isotope analysis, and ancient DNA) have provided more sophisticated insights into the palaeodiet, palaeoenvironment, palaeoecology since prehistoric times in the Indian subcontinent. The study of archaeobotany can thus help us to understand the agricultural practices in time and space, the introduction of new plant species, maritime contacts, domestication, and diffusional diversification. The outcomes of the study undertaken on agronomic, genetics and subsistence of these region will also unrevealed spatio-temporal early farming/land use and past peopling from Early Iron Age to Post- Medieval times in the Indian subcontinent.

The present work comprises of five archaeological sites, utilizing various proxies viz. archaeobotany, Phytolith, as a main proxy from each site along with stable carbon (C) and nitrogen (N) isotope analysis on archaeobotanical remains and soil sediments and ancient DNA from the archaeological sites of north-western and central India. The study of the archaeological sites i.e. Rithi Ranjana, Phupgaon, Nagardhan, Ubali, Maharashtra and Vadnagar, Gujarat provide insights into agricultural strategies, palaeo-vegetation in the context of variable climatic conditions, and human genetic history from ~770 BCE to 1900 CE (the Early Iron Age and subsequent cultures). The multiproxy work at all five archaeological sites supports that the founder elements of Chalcolithic subsistence in the region persisted in the agricultural economy of early Iron Age settlers, and still continued up to late medieval period (~770 BCE to 1300 CE). The high diversity of plant taxa, including cereals and legumes, indicates continuity in the cultivation pattern. The abundance of rice indicates good rainfall conditions in this region (North-Western and Central India), leading to diversification of agriculture during this period. In Post Medieval times (1300 CE to 1900 CE), the plant assemblage with a major shift to drought-resistant taxa or small grained millets indicates depleted water availability in these region, which experienced a weaker SW monsoon. This period is confirmed by global climatic event i.e. Little Ice Age (LIA).

This study also presents the analysis of ancient DNA of a megalithic human tooth specimen to trace the ancestry of past peoples and also presents the results of ancient DNA studies in archaeobotanical grains/seeds. The ancient DNA analysis on the tooth sample associated with Megalithic culture of Vidarbha region of Central India was highly advanced in terms of knowledge and ideas. We conclude that advanced dental ceramics were in practice and used as tooth fillings during the megalithic period by the locals, mainly tribal communities as suggested by the genetic analysis. Recent advances in DNA extraction methodology and sequencing technology have allowed archaeological plant remains to thrive in the field of archaeogenetics over the past decade. However, in India, a DNA extraction method has been observed to fail (mainly in charred macro-remains) due to the harsh climatic conditions, which mainly affects DNA preservation.

To join QuatChron_AOQR Google Group:

Open https:// groups.google.com, login (using Gmail account), search for "QuatChron_AOQR" and ask to join.]

Quaternary Chronicles
Happenings in the Sub-continent

National Training workshop: Paleoclimate archives-proxies and analysis/ measurement techniques for final year Masters and early stage (upto 2nd year) PhD students. https://www.tropmet.res.in/354-news_details

National training workshop: Paleoclimate archives-proxies and analysis/measurement techniques

16-20 January 2023

राष्ट्रीय प्रशिक्षण कार्यशाला: पेलियोक्लाइमेट अभिलेखागार-प्रॉक्सी और विश्लेषण/माप तकनीक

(Organized by Development Skilled Manpower (DESK), IITM, MoES, Pune)

About: India is a land of rich heritage and great geological, biological, and cultural diversity. The Indian region is highly influenced by the monsoon system and the house of several unique geological terrains. The entire continent is unique in its setting, geology, populace, and interactions between all its spheres. In view of the expertise, we have in the MoEs and other academic institutes, the young students and early career researchers should be trained in various archives, proxies, advanced techniques, statistical tools/software packages, and state-of-the-art instruments, for the vision, overall progress, and development of paleoclimate research in India. In line with the above view, this training workshop is organized for students, pursuing their master's degree courses or Ph.D. in India. The training workshop is the part of the activities of the Association of Quaternary Researchers (AOQR) with aims to motivate young students by making them aware of the advancement of the field of paleoclimate research in India.

Theme: This workshop would focus on key and emerging topics regarding physical, chemical, and geological processes governing the climatic variations in Quaternary. The workshop themes are land and aquatic proxies and related measurement techniques. The format of this workshop includes lectures, laboratory training, and fieldwork.

- Dendroclimatology
- Speleothem
- Sediments geochemistry
- Paleobiology
- Hands on training on instrument handling for data analysis
- Fieldwork: One-day field excursion in the Western Ghats

25 students will be selected for the workshop.

Travel, accommodation, and local amenities will be provided to the participants.

Register Here

https://iitmjobs.tropmet.res.in/job/workshop-nt-paleo-2023.php

National training workshop: Paleoclimate archives-proxies and analysis/measurement techniques

राष्ट्रीय प्रशिक्षण कार्यशाला: पेलियोक्लाइमेट अभिलेखागार-प्रॉक्सी और विश्लेषण/माप तकनीक

Under activities of the Association of Quaternary Research

16-20 January 2023 at Indian Institute of Tropical Meteorology (IITM), Pune

Organized By Development of Skilled Manpower (DESK-ESSC), MoES, IITM

Resource Persons


Prof. J. S. Ray, Director
NCESS, Thiruvananthapuram


Prof. Kanchan Pandey
IIT, Bombay

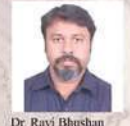

Dr. H. P. Borgaonkar
IITM, Pune

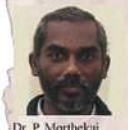

Dr. Navin Juyal
PRL, Ahmedabad

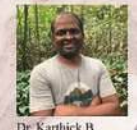

Dr. R. Panchang
SPPU, Pune


Dr. Binita Phartiyal
BSIP, Lucknow

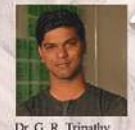

Dr. D. Chattopadhyay
IISER, Pune


Dr. Ravi Bhushan
PRL, Ahmedabad

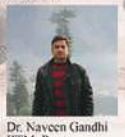

Dr. P. Morthekai
BSIP, Lucknow

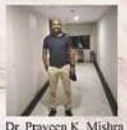

Dr. Karthick B.
ARI, Pune


Dr. S. R. Managave
IISER, Pune


Dr. G. R. Tripathy
IISER, Pune

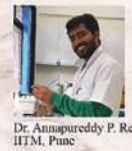

Dr. Waliur Rahaman
NCPOR, Goa


Dr. Naveen Gandhi
IITM, Pune


Dr. Praveen K. Mishra
Cluster University of Jammu


Dr. Anoop Ambili
IISER, Mohali


Dr. Somaru Ram
IITM, Pune


Dr. Annapureddy P. Reddy
IITM, Pune


Dr. Uttam Pandey
IITM, Pune


Dr. Anupam Samanta
IITM, Pune

Themes and Topics

- **Dendroclimatology:** *Ring width index, stable isotopes*
- **Sediments:** *Microfossils, geochemical and isotopic analyses, biomarkers, grain size, environmental magnetism*
- **Paleobiology:** *Mollusc, geochemical, and isotopic analyses*
- **Diatoms:** *Environmental inference indicator*
- **Speleothem:** *Stable isotopes, trace elemental analyses*
- **Instruments:** *Isotope Ratio Mass-spectrometer, Quadrupole ICP-MS, GC-MS, Ion Chromatograph, AAS, CO_2-coulometer, CHNS Analyzer, Scanning Electron Microscope, Tree ring width measurement system, Accelerated solvent extraction, etc.*
- **Dating methods:** *Radio Carbon (^{14}C), Thermoluminescence (TL), and Optically Stimulated Luminescence (OSL)*
- **Software:** *Statistical tools and related packages*
- **Fieldwork:** *One-day field excursion in the Western Ghats*

Application Online: https://iitmjobs.tropmet.res.in/job/workshop-nt-paleo-2023.php

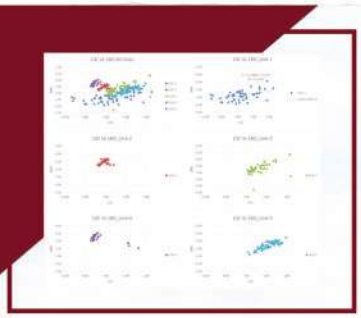
Participation: Final year M.Sc. students and early years (up to 2nd year) of PhD
Last Date of Application: **December 10th, 2022**
Contact: desk_training@tropmet.res.in

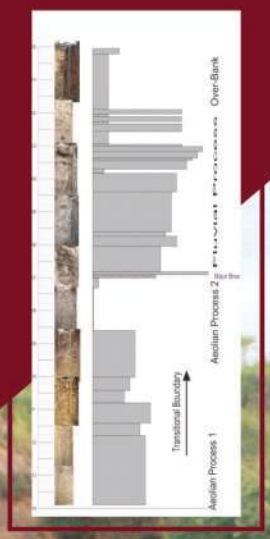
Quaternary Chronicles
Happenings in the Sub-continent

4th Paleoschool Field Workshop: 2022-2023

(For early career researchers)

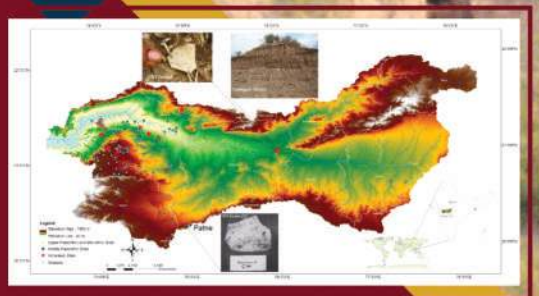
Integrating field and lab results in Human-Climate interactions





WHEN:
3 days in the field 30th to December 2022 to 1st January 2023

WHERE:
Central Tapi Valley,



FEES:
All field expenses will be shared by participants**

QUERY:
paleolithic.india@gmail.com

TO APPLY:
SCAN ME

Last Date- November 10, 2022
Short listed candidates will be notified by 25th November

WHAT: Covering Stable isotope Geochemistry topics such as sample collection, analytical protocols, and interpretation.
Stone tool technologies and human evolution research.
High-resolution multi-proxy analysis, land form building process, and integration of results in a spatial and temporal manner using modern tools and technologies.

WHO: Prof. Stanley Ambrose, Parth R. Chauhan & Prabhin Sukumaran
(Guest of honor) (Resource Person) (Organizer)

Sponsors* & Organizers:

CHARUSAT
CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

ASSOCIATION OF QUATERNARY RESEARCHERS

**See application form for more details

quatchron@gmail.com

Vol.4 No.3 December 2022

LEM 2023 International School & Symposium

INQUA

ASSOCIATION OF QUATERNARY RESEARCHERS

"Landuse-landcover mapping and modelling using pollen and isotopic data in different ecological regions of the monsoon"

13-25 March 2023

International Union For Quaternary Research (INQUA) under the Humans & Biosphere Commission (HABCOM) funded "Landuse-landcover mapping and modelling using pollen and isotopic data in different ecological regions of the monsoon" (LEM) project welcomes participators for the LEM-International School and Symposium-2023 in western Vidarbha, Maharashtra, India during 13-25 March 2023. LEM-ISS-2023 is open to present or future enthusiasts/researchers in earth sciences, botany, ecologists, naturalists, wildlife biologists, and allied subjects from all over Asia especially those from monsoon domains.

Important Dates

Registration closes: 14-01-2023 at 12.00 am Indian Standard Time

Announcement of Selected candidates via email including funding information: 10-02-2023 12.00 am Indian Standard Time

Contact: lem.inqua@gmail.com

Organizing Committee:

Dr. Trina Bose, BSIP
Dr. Anjali Trivedi, BSIP
Dr. Navya Reghu, MAHE
Dr. Mayank Shekhar, BSIP
Dr. Anurag Kumar, BSIP
Dr. Prabhin Sukumaran, CHARUSAT
Dr. Akash Srinivas, Ashoka University
Dr. Vijay Vishnu Wagh, NBRI
Ms. Priyanka C. Rana, GSI
Mr. Shashi B. Mehra, IISER
Ms. Priyanka Joshi, BSIP

Registration:

Registration Link

Biodata Template

Abstract Template

LEM 2023

The LEM-ISS-2023 will cover :

- Field training
  - Spatial distribution data collection of the present vegetation and pollen assemblages to measure the Relative pollen productivities (RPPs) and their applications for the quantitative reconstruction of the vegetation of the past by the REVEALS mode
  - Tree ring and floral sample collection with processing, physical and isotopic measurement, and data interpretation with modelling
- Methods Training and discussion
  - Data interpretation & integration ideas for biodiversity studies and fore/hindcasting strategies with climate change effects on species distribution, composition, and function of biomes
  - Interaction with experts of various related disciplines
- Symposium
  - Interactive sessions by the participants sharing their ideas or a future work plan.

Registration information requested:

- Name, gender, birth year, affiliation, email, phone number, highest degree received, subject / specialization, state, country
- Statement of interest: A write-up on the usefulness of training in future research upto 200 words
- Funding declaration: A write-up describing funding category and related information upto 100 words
- Indicate any health, accommodation or dietary restrictions
- One-page biodata in pdf with photo
- Optional: abstract for symposium

Funding information

- Funded participants: There are 30 funded seats available.
- Early payment (before 18-02-2023 12.00 am IST) = ₹1000 (Students, Early Career Researcher), ₹5000 (Scientists)
- Late payment (before 05-03-2023 12.00 am IST) = ₹1500 (Students, Early Career Researcher), ₹7500 (Scientists)
- Self-funded participants i.e. people who were registered and selected but not granted funding, may pay a workshop participation fee of ₹35000/- to join the event.
- Self-funded accompanying persons may be adjusted at per person charge of ₹25000/-.
- A limited number of travel support grants will be available for presenting students and ECRs, based on the calibre of application and abstract.
- In addition to the academic calibre, funding decisions will be based on:
  - demographic backgrounds from under represented areas in India,
  - demonstrated financial need,
  - identify as a female,
  - have never studied or collaborated outside of their home state
  - in the early years of their degree program.

INQUA

ASSOCIATION OF QUATERNARY RESEARCHERS

Quaternary Chronicles

Happenings in the Sub-continent

ASSOCIATION OF QUATERNARY RESEARCHERS

Quaternary Chronicles
Happenings in the Sub-continent
ASSOCIATION OF QUATERNARY RESEARCHERS

Qc CALL FOR CONTRIBUTIONS

Quaternary Chronicle (QC) publishes three issues a year seeks to publish perspectives, recently published peer-reviewed papers in Quaternary science, new developments in Quaternary science methods/ techniques, past events, awards, abstracts of recently awarded Ph.D./MS thesis; Quaternary publications, obituaries and details on forthcoming conferences/opportunities/fellowships the world over. Each issue of the newsletter will therefore, comprise news on on/from the Indian sub-continent;. It will also have a platform for discussion on emerging questions and ideas in Quaternary science and details on new books/ monographs/ reviews. QC seeks to share original results, new ideas and innovative development for the common good and a possibility to serve as a catalyst for the initiations of major and coordinated initiatives in the country.

We now accept submissions for our upcoming issues. Submit all the contributions to ***aoqr2019@gmail.com****. Themes for contributions are given below:*

1.Perspective: *Perspective write-ups on emerging trends and new possibilities in Quaternary Science (500 words).*

2.Sneak-peek and Discussion: *Share any exciting findings/questions from your ongoing (unpublished) work already to facilitate discussion. Any other intriguing facts/ unanswered questions are also welcomed for discussion (150 words).*

3.Significant new manuscripts/ books/ monographs/ reviews: *Corresponding authors of recently published peer-reviewed papers are invited to submit a brief summary of their work (not published abstract) with complete reference, web-link, and corresponding email address (200-300 words). Also, include a PDF copy of the paper in the email (for reference only).*

4.Facilities and Instruments: *A list of available facilities at various Indian institutes will be given and updated as contributions are received. In-charge of the available facilities, mentioning whether it is open access or available on payment basis, may submit the details with contact details.*

5. Achievements: *Share national or international awards/ fellowships/ recognitions with the larger Quaternary community. Also, approved SERB/ DST/CSIR/ national/ international Quaternary projects with the title, affiliation details of the awardee and a brief abstract (200 words) may be submitted with a copy of the award letter (for reference only).*

6.Projects/Collaborations: *New projects and collaborations related to Quaternary Science may also be sought for enhancing the quality of ongoing/proposed research. Submit a brief summary of the project, collaborations required and the contact details for correspondence (200 words).*

7. New Thesis: *Abstracts of awarded PhD/MS degree are invited for contribution (250 words).*

8.Opportunities: *Submit details with web-link of any new openings and opportunities for wider circulation.*

9. Social media: *Follow, discuss and share Quaternary India News on https://twitter.com/ AOQRIndia (Twitter) and https://www.facebook.com/ AOQRIndia (Facebook).*

Come join us!

The Association of Quaternary Researchers (AOQR) invites all of you to register yourself for AOQR Membership and also ask your colleagues and students to make the AOQR Fraternity stronger and become a part of the AOQR family.
See the details in https://www.aoqr.org/#

ISSUES	Deadlines (Last date for submission)
Issue -1 (April)	**March 10**
Issue -2 (August)	**July 10**
Issue -3 (December)	**November 10**

M/S ASSOCIATION OF QUATERNARY RESEARCHERS
53 , BIRBAL SAHNI INSTITUTE OF PALAEOSCIENCES
UNIVERSITY ROAD , LUCKNOW U.P

Balance Sheet As on 31st March 2023

LIABILITIES		AMOUNTS Rs. P.	ASSETS	AMOUNTS Rs. P.
Capital Fund			**Current Assets, Loans & Advances**	
Opening Balance	457280.46			
Members Fee	35001.00		Bank Balance	452308.16
Less: Exps.over Income	-39973.30	452308.16		
Total		**452308.16**	**Total**	**452308.16**

For ASSOCIATION OF QUATERNARY RESEARCHERS

President Seceratory

For Navdeep Maheshwari & Associates
Chartered Accountants

Navdeep Maheshwari
(Proprietor)
M.No.:419269

Place: Amroha
Date: 29/07/2023

M/S ASSOCIATION OF QUATERNARY RESEARCHERS
53 , BIRBAL SAHNI INSTITUTE OF PALAEOSCIENCES
UNIVERSITY ROAD , LUCKNOW U.P

Receipts & Payment account for the year ending on 31/03/2023

PARTICULARS		AMOUNTS Rs. P.		PARTICULARS		AMOUNTS Rs. P.
To Opening Balance			By	Expenses On AOQR		39973.30
Cash	0.00					
Bank	457,280.46	457280.46	By	Closing Balance		
To Donation Received		0.00		Cash	0.00	
To MmbershipFees		35001.00		Bank	452,308.16	452308.16
		492281.46				**492281.46**

Income & Expenditure account for the year ending on 31/03/2023

To Bank Expenses on AOQR	77.30	By Excess of Expenses over Income	39973.30
To Expenses Others	39896.00		
Total	**39973.30**	**Total**	**39973.30**

For Navdeep Maheshwari & Associates
Chartered Accountants

Navdeep Maheshwari
(Proprietor)
M.No.:419269

Place: Amroha
Date: 29/07/2023

For ASSOCIATION OF QUATERNARY RESEARCHERS

President **Seceratory**