Birbal Sahni Institute of Palaeosciences

Monthly summary on Research Activities

(May, 2023)

1. Areas of Focus:

The institute carries out research on fundamental as well as applied aspects of Palaeosciences that includes Evolutionary history of biota, Paleoclimate, studies of past civilization, Human history and contemporary Climate Change issues, following an integrated and multi-disciplinary approach.

Key research activities under following objectives:

- Understanding origin and evolution of life through time and space.
- Understanding climate change in recent and deep geological times.
- Understanding past civilization and human history.
- Application of Palaeosciences in exploration of fossil fuel and coal industry.

2. Important Highlights of Major Research Programmes

a. Key Scientific Findings of the Month (May 2023)

1. A chronologically constrained sedimentary sequence from the south-eastern part of the Mahanadi River delta was analyzed here to decode the paleoclimate and palaeovegetation condition since ~2.6 Ma. During IACP, the region experiences increased aridity, as demonstrated by a high percentage of herbaceous species, a growing trend in the aridity index, decreased clastic inputs, greater illite values, and an abundance of fine EM.At the height of RWP, a shift to a warm and humid environment is associated with the domination of mangrove vegetation, an increase in rainfall intensity, a peak in moisture index, an increase in chemical weathering intensity, and the deposition of EM3 under high energy conditions.Increased aridity during DACP and MCA is demonstrated by lower clastic input, herbaceous species dominance, and excess EM2 deposition associated with a weakened monsoon condition (Figure 1; Samal et al. 2023).

2. The Trans-Himalayan hostprings, the only active continental collision site in the world, have extremely high quantities of boron and tungsten. This research work presents significant results about this connection. This work has persuasively shown that extreme concentrations of these elements are sourced by magmatic water/brine, in contrast to other studies that had sceptically indicated rock-leaching as the major source of high concentrations (Figure 2; Ansari et al., 2023).

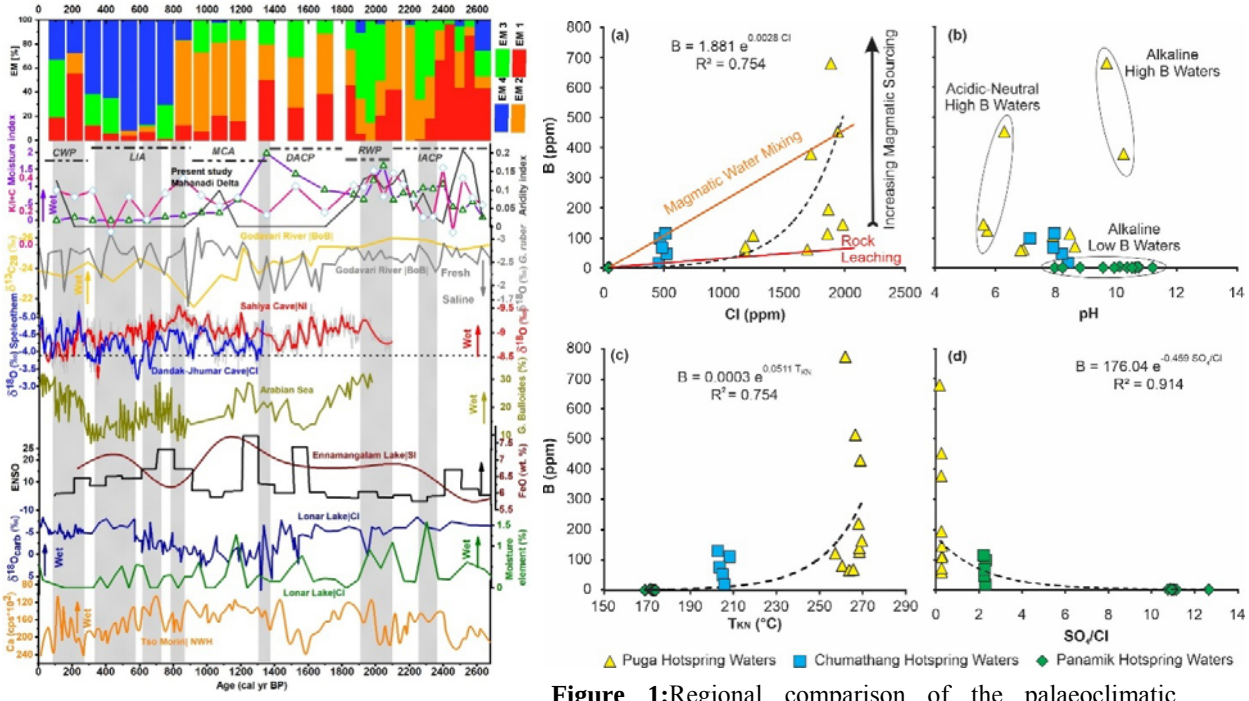

Figure 1: Regional comparison of the palaeoclimatic records: Ca cps*10^2, Tso moriri (Mishra et al., 2015); $\delta^{18}O_{carb}$, Lonar lake (Prasad et al., 2014); FeOwt%, Ennamangalam lake (Mishra et al., 2019); G. bulliodes, Arbean sea (Anderson et al., 2002); $\delta^{18}O$, Sahiya cave (Sinha et al., 2015); $\delta^{18}O$‰ speleothem, Dandak, Jhumar Cave (Sinha et al., 2011); $\delta^{18}O$‰of *G. ruber,* and $\delta^{13}C_{28}$‰,Godavari River (Bay of Bengal)(Ponton et al., 2012); Moisture index and Aridity index from the present study.**Figure 2:**The cross plots of: a) B vs. Cl showing B sourcing from rock-leaching and magmatic waters, b) B vs. pH showing three possible end members of B, c) B vs. TKN showing influence of reservoir temperature and B enrichment, d) B vs. SO□/Cl. Pearson coefficient for each regression equation is found < 0.05.

b. Swachhta Pledgeand Swachhta Action Plan, 1-15 May, 2023

S. No.	Date	Cleanliness campaign
1.	May 1, 2023	BSIP staff took a Swachhta Pledgeunder Swachh Bharat Abhiyan.
2.	May 10, 2023	BSIP teamed up for a plantation drivein the campus garden as part of Jan Bhagidari & Swacch Bharat Abhiyan to inspire others towards environmental conservation & fight against Climate Change.
3.	May 12, 2023	Water quality testing in different labs & units at BSIP under the SwachhtaActionPlan ensuring clean water for all.
4.	May 14, 2023	A cleanliness campaign near Gau ghat (Gomti Riverbank) was conducted by BSIPunderSwachhBharatAbhiyan.

A Cleanliness campaign was conducted in the BSIP premises under Swachhta Action Plan during 1-15 May 2023 where monitoring and cleaning of laboratories/ lavatory and plantation in the Institute premises was done.

c. Campus Outreach Activity

S. No.	Institution	Standard	No. of Students	Details of Visit& Date
1.	Maharishi University of Information Technology, Lucknow	BSc	40	Visit to Museum, SEM lab, Central Geochemical Facility (22-05-2023)
2.	Acharya Narendra Deo Kisan P.G. College Babhnan, Gonda U.P.	BSc	40	Visit to Museum, SEM lab, Central Geochemical Facility (23-05-2023)
3.	Techno institute of Higher Studies	BSc	60	Visit to Museum, SEM lab, Central Geochemical Facility (24-05-2023)

d. Friday lecture series talks

S. No.	Speaker	Title of the talk	Date
1.	Dr. Stuti Saxena, BSIP	Neogenebiostratigraphy & palaeoceanographyof Andaman & Nicobar Basin	April 28, 2023
2.	Dr. Shreya Mishra,BSIP	Deccan Volcanism: Extinction paradigm & ClimateChange across K-Pg boundary	May15, 2023

Scientists, Project staff and Researchscholars of the institute attended the talks of the Friday Lecture series.

e. Outstation Scientific outreach Program

- BSIP scientists(Dr Veeru Kant Singh, Dr Santosh K Pandey and Dr Arvind K Singh) visited Salkhan FossilPark for educating and spreading awareness among local people on spectacular preservation of 1.6 billion years old circular stromatolites of Fawn Limestone, Kheinjua Formation, Sonbhadra, Uttar Pradesh. The park exhibits earliest signatures of life on the Earth and managed by UP forest department and UP Tourism.

- BSIP Team (Drs. Srikanta Murthy, Anju Saxena, S Suresh K Pillai & Mr Suraj Kumar Sahu) displayed fossils at Rastriya Madhya Vidyalaya Maal Godda District, Jharkhand & at auditorium of District Collectorate Sahibganj, Jharkhand as part of the JanBhagidari Program.

- Dr. Shilpa Pandey Scientist, BSIP was invited to deliver a talk on "World Earth Day 2023" by AIR Radio Lucknow"Shaam-E-Awadh" on 22nd April, 2023.

- Dr. Shilpa Pandey Scientist, BSIP delivered a presentation on "Mangroves & Peatlands in India" at C-PEAT Workshop, Indonesia emphasizing their crucial role in preventing & mitigating climate change.

List of research publications (May 2023):

1) **Samal, P.**, Subramanian, S.R., **Srivastava, J., Kawsar, M., Manoj, M.C., Gurumurthy, G.P., Chauhan, M.M.**, Ali, S., **Alam, M., Sharma, A.**, Jena, P.S., Shivam, A., Bhushan, R. (2023). A 2600-yr multiproxy record for climate and vegetation reconstruction along the Mahanadi River delta, east coast of India. The Holocene. DOI.: 10.1177/09596836231163492**(Impact factor: 3.092).**

2) **Bhatia, H., Srivastava, G.**, Mehrotra, R.C. (2023). *Duabanga* (Lythraceae) from the Oligocene of India and its climatic and phytogeographic significance. Geobios. DOI.: 10.1016/j.geobios.2023.05.003**(Impact factor: 2.115).**

3) Bhattacharyya, A., Dhyani, R., Joshi, R., **Shekhar, M.**, Kuniyal, J.C.,**Ranhotra, P.S.**, Singh, S.P. (2023). Is survival of Himalayan *Cedar* (*Cedrus deodara*) threatened? An evaluation based on predicted scenarios of its growth trend under future climate change. Science of The Total Environment 882. DOI.: 10.1016/j.scitotenv.2023.163630**(Impact factor: 10.745).**

4) Shukla, A., Chandra, K., Shukla, S., Mehrotra, R.C. (2023). Miocene Wood Assemblage from the Saurashtra Basin, Gujarat and Its climatic significance. Journal of the Geological Society of India 99, 509–514. DOI.: 10.1007/s12594-023-2338-5**(Impact factor: 1.466).**

5) Garg, A., Singh, P., Quamar, M.F. (2023). Pollen morphology of family Thymelaeaceae Juss. in India and its taxonomic implications. Flora 303. DOI.: 10.1016/j.flora.2023.152291**(Impact factor: 2.22).**

6) Kavali, P.S., di Pasquo, M., Kushwaha, S.K. (2023). Multidisciplinary analysis to interpret the Palaeoclimate and depositional environment of the late Paleozoic Post-glacial sediments from Wardha Basin, Maharashtra, central India. Journal of the Geological Society of India volume 99, 635–646**(Impact factor: 1.466).**

7) **Ansari, A.H., Singh, V.K.**, Kumar, P., **Sharma, M., Sharma, A.**, Patnaik, S., **Gurumurthy G.P., Rahi, I.C., Ansari, M.A.**, Ramanathan, A.L. (2023). Hydrogeochemistry, Geothermometry, and Sourcing of High Dissolved Boron, Tungsten, and Chlorine Concentrations in the Trans-Himalayan Hotsprings of Ladakh, India. Hydrology 10(6), 118 DOI.: 10.3390/hydrology10060118.

Photographs showing important highlights of major programs/research activities organized duringMay, 2023: