Quarterly Newsletter
Wadia Institute of Himalayan Geology, Dehradun
(www.wihg.res.in)

Bhugarbh Vani

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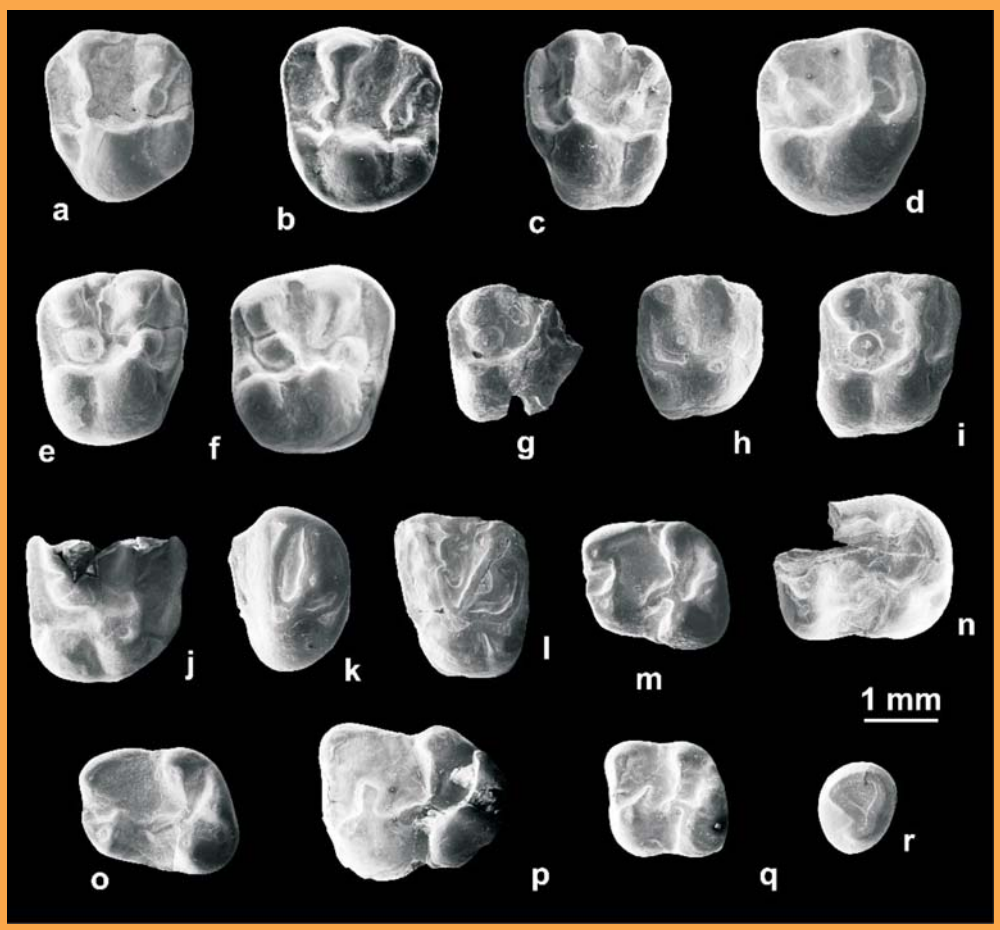
RESEARCH ACTIVITIES

Early Eocene rodents from Subathu succession, NW sub-Himalaya:

Two new early Eocene rodent taxa, *Subathumys solanorius* and *S. globulus*, and three others (*Birbalomys* cf. *sondaari, Birbalomys* sp., cf. *Chapattimys* sp.) are recorded from the older red beds in the lower-middle part of the Subathu Formation of the type area in Himachal Pradesh. The new rodents exhibit closest morphological affinities with the Chapattimyidae,

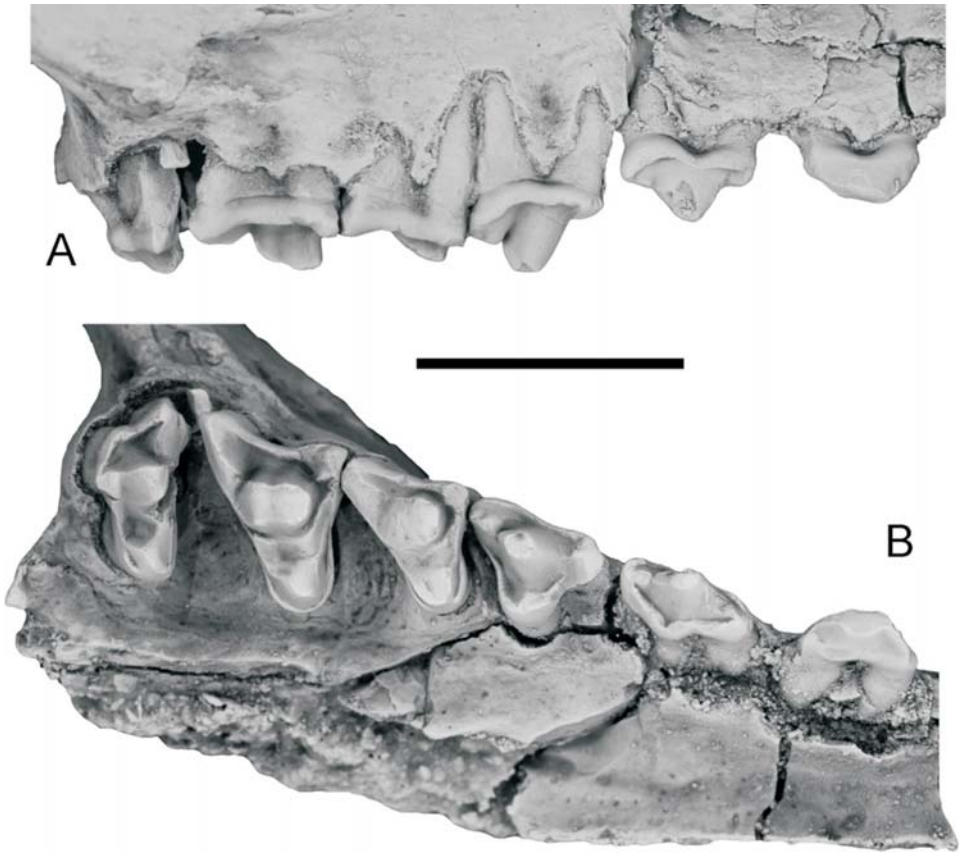


Isolated cheek teeth of chapattimyid rodents from the early Eocene older Subathu red beds, (Himachal Pradesh). Scale bars represent 1 mm.

which is also represented in the assemblage from the younger red beds (middle Eocene) of the Subathu Formation. They are younger than the previously documented early Eocene rodents from the Indian subcontinent, and are chronologically intermediate between the early Eocene ailuravines from Gujarat and the middle Eocene chapattimyids from northwestern India and Pakistan. They suggest that chapattimyids originated in the sub-Himalayan region during the Ypresian, which is earlier than previously believed. The absence of ailuravines in the present as well as younger assemblages from the subcontinent seems to suggest that ailuravines, within a short time after their appearance in Gujarat in the early Eocene, may have been replaced by the indigenous chapattimyids. The co-occurrence in the early Eocene Subathu assemblage of three or more chapattimyids indicates their early radiation and dominance during the early and middle Eocene. (*Jl. Earth System Science*, *124 (6)*: *1201-1221*)

Craniodental and postcranial morphology of the hyaenodontid *Indohyaenodon raoi* from the Early Eocene:

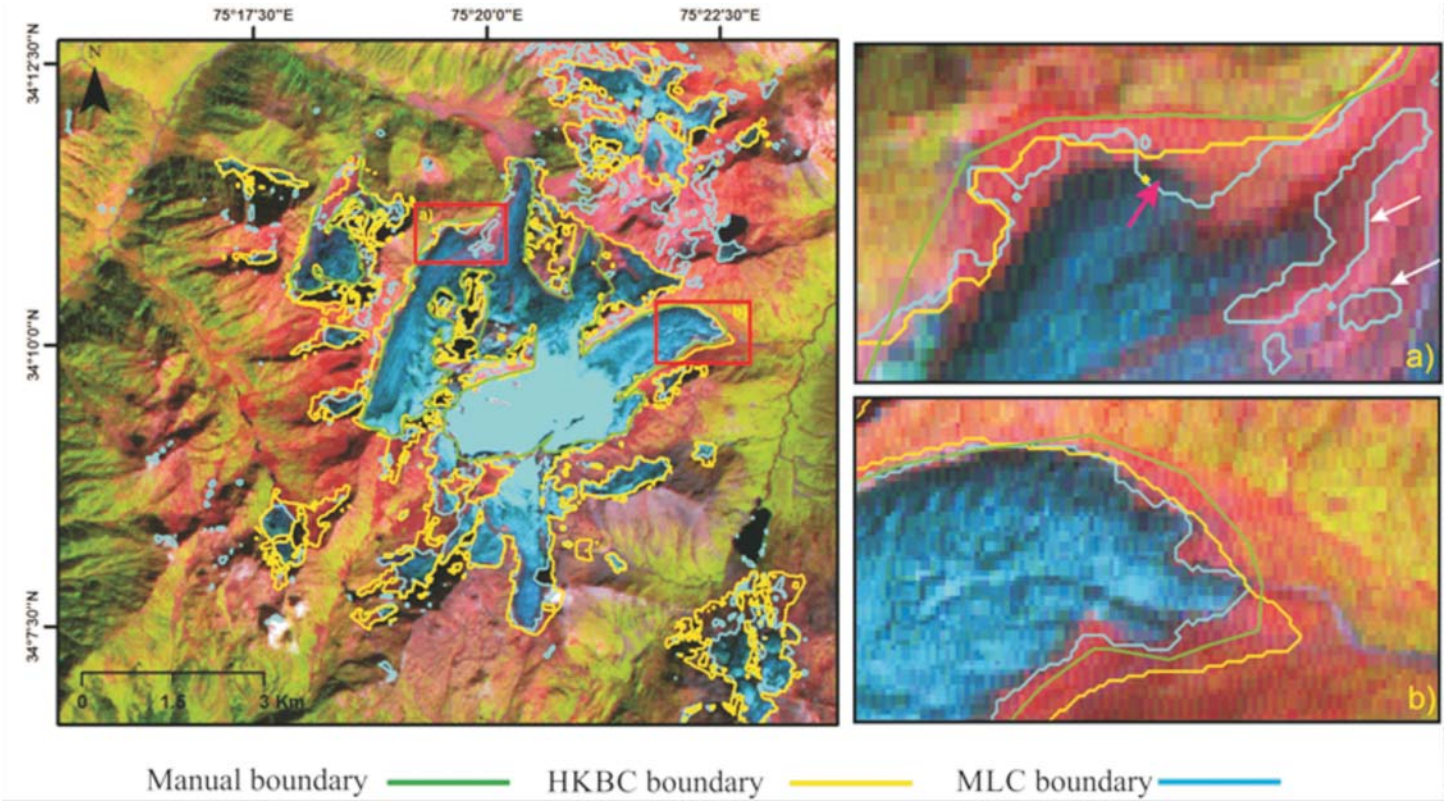
New fossils of the early Eocene hyaenodontid *Indohyaenodon raoi* from the Vastan Lignite Mine in Gujarat, including the first known rostrum, upper dentition, and postcrania, substantially expand our knowledge of the species and provide insights into its functional morphology and relationships. Craniodental morphology suggests that *I. raoi* had a broad diet, including non-vertebrate material as well as flesh of a diversity of prey species. Postcranial morphology, broadly similar to that of other early hyaenodontids, suggests a scansorial locomotor behaviour. Dental morphology indicates that *I. raoi* is closely related to other South Asian hyaenodontids, with shared features including strong cingula, narrow premolars, and a reduced P4 protocone. A comprehensive phylogenetic analysis of Hyaenodontidae corroborates this relationship but finds South Asian hyaenodontids to be the stem of a group that includes most African hyaenodontids. The new phylogeny is consistent with either an African or an Asian origin for the group. *(Jl. Vertebrate Paleontology, 2015)*



Upper dentition of *Indohyaenodon raoi*. Right P2–M3 of GU 1680 in A, buccal and B, occlusal views. Scale bar equals 10 mm.

A hierarchical knowledge based classification for glacier terrain mapping - A case study from Kolahoi glacier:

A glacierized terrain comprises different land covers, and their mapping using satellite data is challenged by their spectral similarity. We propose a hierarchical knowledge-based classification (HKBC) approach for differentiation of glacier terrain



Comparison of the glacier boundary derived from the present approach with the MLC boundary and the manual interpretation. (a) Delineation of the boundary where glacier margin is heavily debris-covered. White arrows show SGD areas misclassified as PGD by MLC and hence excluded from glacier area. Pink arrow shows exclusion of IMD from glacier area by MLC-derived boundary. (b) Glacier boundary mapping at the secondary snout of Kolahoi Glacier. Note that while MLC boundary follows the edge of exposed ice and manual boundary relies on debris hues, the HKBC boundary follows the edge of ice extensions beneath debris cover.

classes and mapping of glacier boundaries, using Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) imagery and Global Digital Elevation Model (GDEM). The methodology was tested over Kolahoi Glacier, Kashmir Himalaya. For the sequential extraction of various glacier terrain classes, several input layers were generated from the primary datasets by applying image-processing techniques. Noticeable differences in temperature and spectral response between supraglacial debris and periglacial debris facilitated the development of a thermal glacier mask and normalized-difference debris index, which together with slope enabled their differentiation. These and the other layers were then used in several discrete tests in HKBC, to map various glacier terrain classes. An ASTER visible near-infrared image and 42 field points were used to validate results. The proposed approach satisfactorily classified all the glacier terrain classes with an overall accuracy of 89%. The Z-test reveals that results obtained from HKBC are significantly (at 95% confidence level) better than those from a maximum likelihood classifier (MLC). Glacier boundaries obtained from HKBC were found to be plausibly better than those obtained from MLC and visual interpretation.

A Quantitative Analysis of the Ramganga Drainage Basin and Structural Control on Drainage Pattern in the Fault Zones, Uttarakhand:

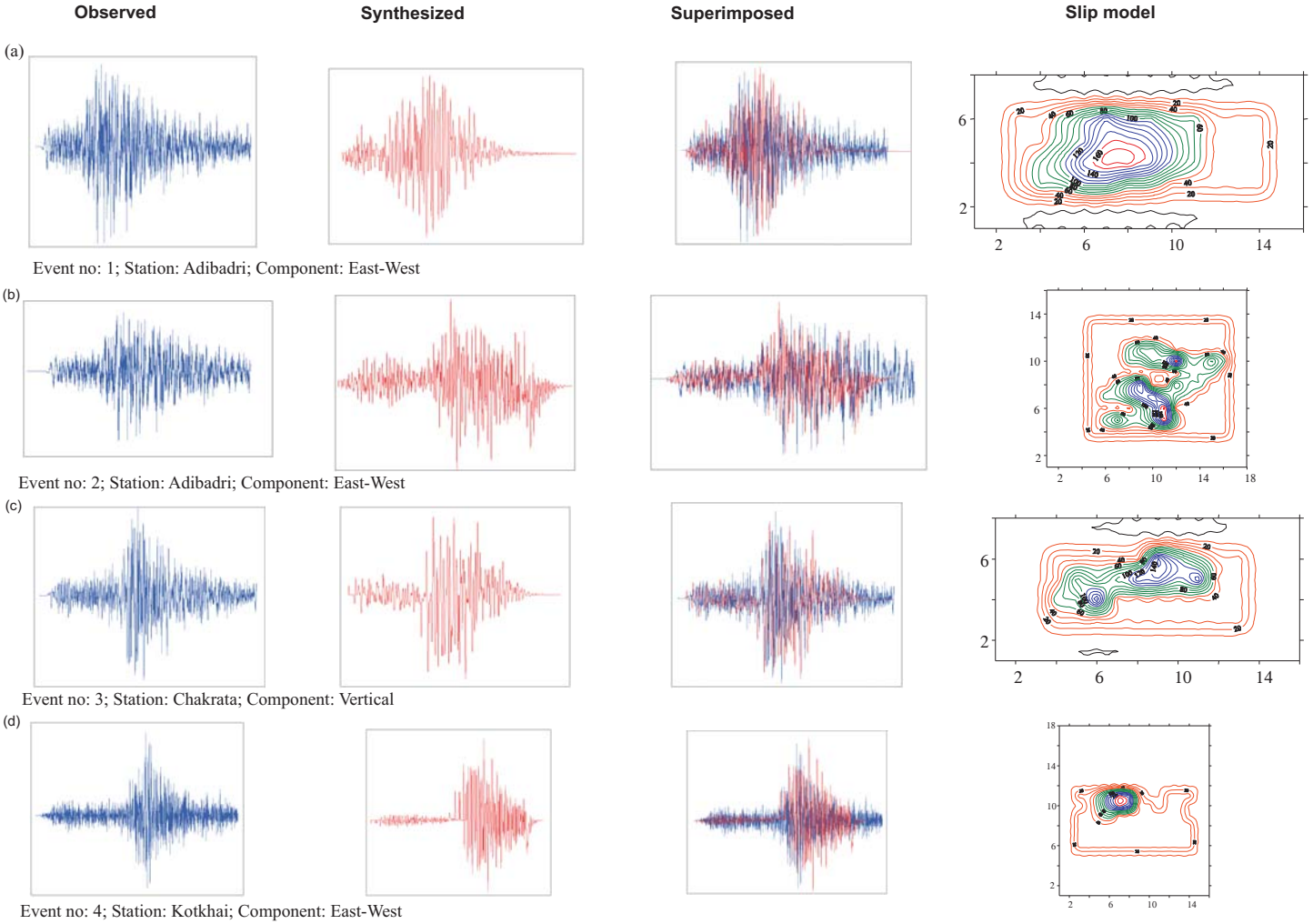
A quantitative analysis of drainage of the Ramganga basin in Garhwal Himalaya, Uttarakhand was done. The drainage parameters (linear, areal and relief) of the Ramganga basin from Dudhatolidhar peak to Kalagarh are covered. The impact of the morphological characters on the terrain is reflected by the drainage basin of the area. The calculated values of all the morphometric parameter of 38 Vth order intrabasins for different lithotectonic units were computed under four sectors viz., NE of NAT, between NAT and SAT, between SAT and MBT and downstream of MBT. In the lower reaches of Ramganga basin the various morphometric parameters shows existence of proportionality between stream length and catchment area while such proportionality is non-existence in the crystalline zone. Structural control on the drainage patterns of the Ramganga river and its tributaries are observed in the form of straight course, wide valleys with thick fluvial deposits and relatively gentle

(a) Four levels of fluvial terraces developed on the right bank of Ramganga River at Chaukhutia. (b) showing lacustrine deposits at Jainal. (c). showing the Quaternary deposits at Syalde. (d) V-shaped narrow valley in the upper reaches of Ramganga River between Mehalchauri and Chaukhutiya.

stream gradient along the transverse faults to incised valleys; less fluvial deposits in the banks and steeper stream gradient with knick points in the hanging wall of thrusts. *(Journal Geological Society of India, 86: 9-22)*

Slip heterogeneities evaluated for earthquakes M>4.0 using waveform modelling in the Garhwal region of Central Seismic Gap in Northwest Himalaya, India:

Himalaya Mountain is one of the seismically active regions in the world. A potential for a great earthquake exists in the Central Seismic Gap (CSG) in the Northwest Himalaya in India. Slip distribution on the fault plane have been evaluated from waveform modeling of earthquakes of M_L>4.0 occurred in CSG using geometric ray theory and Green's function approach. The seismograms have been synthesized and compared with the observed ones to obtain the slip distributions (figure). It has been found that the large slip regions cover a very small area as compared to the total area of fault plane as shown in the figure. Some of the fault plane shows multiple asperities and the focus lie close to the nearby thrust. In another terms these earthquakes are the sources of low energy releases occurring in larger time span in lieu of a one time high energy release from one earthquake and have been termed as slow earthquakes. Analysis of the slip distribution suggest that these slow earthquakes are continuously releasing the strain energy. *(Himalayan Geology*, *36* (*2*): 153-160)



RESEARCH PUBLICATIONS

In SCI Journals

Asthana, A.K.L., Gupta, A.K., Luirei K., Bartarya, S.K., Rai, S.K. and Tiwari, S.K. 2015. A Quantitative Analysis of the Ramganga Drainage Basin and Structural Control on Drainage Pattern in the Fault Zones, Uttarakhand. Journal of the Geological Society of India, 86: 9-22.

Gupta, S. and Kumar, K. 2015. Early Eocene rodents (Mammalia) from the Subathu Formation of type area (Himachal Pradesh), NW sub-Himalaya, India: palaeobiogeographic implications. Journal of Earth System Science, 124 (6): 1201-1221.

Paul, A., Prasath, A.R. and Singh, R. 2015. Slip heterogeneities evaluated for earthquakes M>4.0 using waveform modelling in the Garhwal region of Central Seismic Gap in Northwest Himalaya, India. Himalayan Geology, 36 (2): 153-160.

Rana, R.S., Kumar, K., Zack, S., Sole, F., Rose, K.D., Missiaen, P., Singh, L., Sahni, A. and Smith, T. 2015. Craniodental and postcranial morphology of Indohyaenodon raoi from the early Eocene of India, and its implications for ecology, phylogeny, and biogeography of hyaenodontid mammals. Journal of Vertebrate Paleontology, 35 (5): e965308 (22 pages). DOI:10.1080/02724634.2015.965308.

In Non-SCI Journals

Ali, I. and Shukla, A. 2015. A Knowledge based approach for assessing debris cover dynamics and its linkages to glacier recession. Proceedings of International Geoscience and Remote Sensing Symposium: 2072-2075.

Shukla, A. and Dar, I. 2015. Influence of varying sensor characteristics on LST estimations in a glacial terrain. Proceedings of International Geoscience and Remote Sensing Symposium: 2083-2086.

Books

Mukherjee, S., Carosi, R., van der Beek, P. A., Mukherjee, B.K. & Robinson, D.M. (eds): Tectonics of the Himalaya. Geological Society, London, Special Publications, 412, http://doi.org/10.1144/SP412.14

PARTICIPATION IN CONFERENCES/SEMINARS/WORKSHOPS/MEETINGS

Conferences

Dr Aparna Shukla attended "International Geoscience and Remote Sensing Symposium (IGARSS-2015)" at Milan, Itlay during July 26-31, 2015 and presented posters entitled:

- Influence of varying sensor characteristics on LST estimations in a glacial terrain. (Shukla, A. and Dar, I.)
- A Knowledge based approach for assessing debris cover dynamics and its linkages to glacier recession. (Ali, I. and Shukla, A.)

Dr Suman Rawat attended "XIX INQUA Congress" during July 27 – August 2, 2015 at Nagoya Japan and presented a paper entitled:

- Reconstruction of climate variability during the last ~13000 years in the Lahaul, NW Himalaya: A multi proxy approach (Rawat, S., Gupta, Anil K., Sangode, S.J., Srivastava, P. and Nainwal, H.C.).

Dr Meera Tiwari attended "Akhil Bhartiya Rajbhasha Sammelan aur chintan Shivir" during June 17-19, 2015 at Ooti organized by 'Rajbhasha Seva Sansthan, New Delhi. The Hindi magazine "Ashmika" was selected as one of the best magazine for its high grade technical articles.

Seminars/Symposium

Dr Archana Bohra attended "13th International Paleolimnology Symposium (IPS2015) at Lanzhou University, China during August 4- 7, 2015 and presented a paper entitled:

- Late Quaternary climatic history of the Yunam Basin, Upper Lahaul Valley, India.

Km Shubhra Sharma attended "XII International Symposium on Antarctic Earth Sciences, Goa' during July 13-17 July, 2015 and presented a poster entitled:

- Ascertaining the Role of Indian Summer Monsoon and Mid-latitude Westerlies in Driving the Glaciation in Sarchu Plain, Zanskar Himalaya. (Shubhra Sharma, P.Bisht ., P.C. Sharma , A.D. Shukla, S.K. Bartarya, , Y.P. Sundriyal, and Navin Juyal)

Workshops

Drs Vikram Gupta and D.P. Dobhal attended Scientific Exchange workshop on vulnerability, risk and hazards and adaption: Indian Himalayan region at New Delhi during July 2-3, 2015. Dr Vikram Gupta presented the General Hazard scenario in the Himalayan region and the work to be carried out by the Wadia Institute under the National Mission for Sustaining the Himalayan Ecosystem (NMSHE) program.

Dr Archana Bohra attended "PAGES workshop" at Lanzhou University, China on August 3, 2015.

Meetings

Dr Archana Bohra attended 6th Group Monitoring Project Review Meeting of the SERB during June 29 -30, 2015 at Vignan University, Vadlamudi, Andhra Pradesh.

Prof Anil K. Gupta and Dr Vikram Gupta attended the Department of Science and Technology, Autonomous Body Conclave (DST-ABC) meet at Hyderabad during July 6-7, 2015.

Dr Vikram Gupta and Dr S.S. Bhakuni attended meeting of the Joint Expert Committee (JEC) constituted for assessing the collateral damage caused by the filling and drawdown of the Tehri reservoir at Dehradun at Dehradun during July 10-11 and Aug. 03, 2015.

Dr Vikram Gupta attended a meeting of the expert team at Sidcul Bhawan, IT Park under Uttarakhand Disaster Recovery Project for assessing the hazard and risk of Uttrakhand during Sept 18, 2015.

Dr S.K. Bartarya and Dr Vikram Gupta attended a meeting at Uttarakhand Secretariat, Dehradun on various issues of climate change during Sept 21, 2015.

FOREIGN VISIT

Dr Aparna Shukla visited Milan, Itlay during July 26-31, 2015 to attend the International Geoscience and Remote Sensing Symposium (IGARSS-2015).

Dr Suman Rawat visited Nagoya, Japan to participate paper in the XIX INQUA Congress during July 27 – August 2, 2015.

Dr Archana Bohra visited Lanzhou University, China to attend "13th International Paleolimnology Symposium (IPS2015) during August 4 -7, 2015.

TRAINING ATTENDED

Ms Shubhra Sharma attended field training workshop in Zanskar valley (Ladakh Himalaya) from August 24 to September 9, 2015.

FIELD VISITS

Dr Aparna Shukla, Dr Manish Mehta and Mr Vinit Kumar visited Zanskar Valley, Ladakh Himalaya, Jammu & Kashmir for glaciological field work during September 5 - 26, 2015. The Pensilungpa glacier (4643±5m) located in Ladakh Himalaya, Jammu & Kashmir marks the origin of the Suru River. Lower ablation zone of the glacier is heavily debris-covered. The height of the ice-wall at the snout ranges from 22 to 28 meters, with ice-caves underneath from which the melt-water streams issue. The lower ablation zone of the Parkachik glacier (3593±6m) is marked by numerous transverse and radial crevasses which testify high ice velocity. Asymmetric retreat of glacier was also observed, as the glacier showed accelerated degeneration on its left-side.

Snout of Pensilungpa glacier, Ladakh Himalaya, Jammu & Kashmir.

Snout of Parkachik glacier (3593±6m) located in Ladakh, Jammu & Kashmir. Lower ablation zone of the glacier is marked by numerous transverse and radial crevasses which testify high ice velocity. Asymmetric retreat of glacier was also observed, as the glacier showed accelerated degeneration on its left-side.

Vikram Gupta carried out fieldwork in Nainital during August 9-11 and Mandakini valley during September 11-16 with students to assess the landslide hazard potential in the area.

Drs Jayendra Singh, Nilendu Singh and Pankaj Chauhan carried out field trip in Din Gad valley (Tela camp) area, Uttarkashi District, Uttarakhand during September 14-22, 2015 and collected around 300 tree cores from 3 conifer and 4 deciduous species for palaeoclimatic studies in different locations of the region.

INVITED/INTERACTIVE LECTURES

Dr Aparna Shukla delivered two lectures at the DRDO Continuing Education Program (CEP) course on "Application of state-of-the-art geospatial techniques for Cryospheric studies" for the DRDO officials at Snow and Avalanche Study Establishment (SASE) RDC, Chandigarh during July 06-10, 2015. The lectures entitled:

- Digital image information extraction techniques for snow cover mapping using remote sensing.
- Mapping of debris-covered glaciers using satellite image processing techniques.

CELEBRATIONS

Independence Day:

The Institute celebrated Independence Day on 15th August, 2015. Flag hoisting was followed by a formal address by Prof A.K. Gupta, Director of the Institute. Various programmes took place on this occasion such as tree plantation, drawing competition and games for the Institute employees and their children.

Hindi Pakhwara:

In order to promote Hindi language in office work and everyday life, Hindi Pakhwara was celebrated in the Institute during September 14-28, 2015. Inauguration lecture was delivered by Dr Rajendra Dobhal, DG, UCOST, Dehradun. In his lecture he stressed the need of science outreach through Hindi language. Dr V.K.S. Dave, former Prof of IIT Roorkee, also stressed the need of correct use of Hindi language. Various other programmes like essay writing and debate for school children, essay writing, lectures and recitation of self-written poems by Institute employees were also organised. Dr S.K. Rai, Dr Sameer Tiwari, Shri Raj Kishor, Shri Harish Chandra delivered their specialized talks in Hindi. On Sep 28, 2015, the chief guest of the concluding program Dr Savita, Director, FRI and V.C., FRI deemed University delivered a talk on use of Hindi language. Prizes were distributed to winners of different competitions among school children and Institute employees.

AWARDS/HONOURS

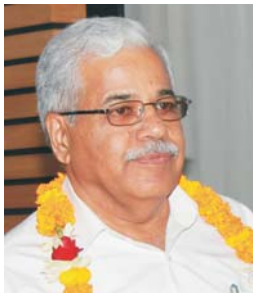
Ms Shubhra Sharma received Best Poster Award in "XII International Symposium on Antarctic Earth Sciences, Goa (13-17 July, 2015).

NEW APPOINTMENTS/UPGRADATIONS

Shri Pankaj Kumar has joined as Registrar of the Institute on September 30, 2015.

SUPERANNUATION

Dr Rohtash Kumar, Scientist 'G', superannuated on July 31, 2015 after 31 years of service in the Institute. Dr Kumar joined the Institute in 1984 as Scientist 'B' in Sedimentology Group. His main area of interest was Late Cenozoic succession in the Himalayan foreland Basin to understand the fluvial dynamics and consequence of tectonic and climate. The most significant feature of Dr Kumar's work is that he has develop chronology of Siwalik succession through reversal magneto-stratigraphy between Ganga and Ravi Rivers. Three drainage systems are established in the Himalayan foreland basin using clay mineralogy. Dr Rohtash Kumar is a recipient of National Mineral award in 2005. Dr Rohtash Kumar authored several papers in his field of interest that are published in journals of repute.



Dr Param Pal Khanna, Scientist 'G' and Group Head (Geochemistry and Petrology) superannuated on July 31, 2015. Dr Khanna joined this institute on 01.11.1977 in Geochemistry & Petrology group. Having a strong background in Chemistry, Dr Khanna nurtured research in Analytical geochemistry and played a major role in development of wet-chemical instrumental facilities and research including development of Reference Rock standard from Himalayan orogenic belt. Strict QA/QC measures enabled to extend the analytical services not only to the institute scientists, but catered the needs of a majority of the researchers and Industry users from all over India. Dr Khanna also carried out research in environmental geochemistry, wildlife forensic sciences, industrial raw material characterization and analysis of ayurvedic medicines and spices. Dr Khanna also rendered administrative services of institute in different capacities. Dr Khanna was a very soft spoken, social, and admirable personality with positive helping attitude.

Dr N.K. Saini, Scientist 'G' (Geochemistry and Petrology) superannuated on July 31, 2015. Dr Saini joined this institute as scientist 'B'. Dr Saini nurtured various sophisticated instrumental analytical techniques being used in analysis of complex geological materials. Dr Saini laid the foundation of modern analytical techniques through establishing X-Ray diffraction, X-ray fluorescence, Scanning electron microscope and associated instrumentation. He played an important role in procurement and development of sophisticated instrumental facilities in the institute by providing technical expertise and as expert member.

Shri Dinesh Chandra, Registrar, superannuated after rendering about two decades of eventful service at this Institute on July 31, 2015. Shri Chandra served in Geological Survey of India from 1989 to 1995 in different posts. Shri Chandra joined Wadia Institute in 1995 as Store and Purchase Officer and served the Institute as Registrar from 2002 till retirement. Shri Chandra is known as a soft spoken person and remembered for his excellent services towards the Institute.

WIHG family wishes a long, happy and prosperous life ahead to these members.

Contact
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