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

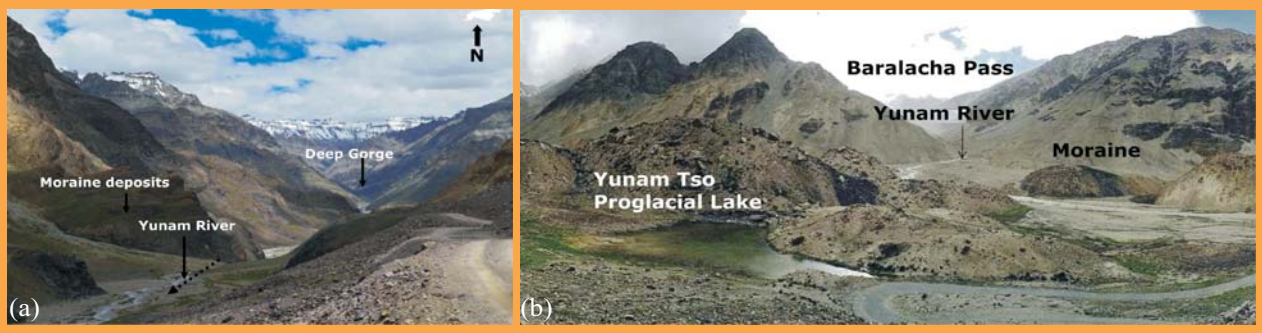
Bhugarbh Vani

Volume-5, No. 1
January to March, 2015

RESEARCH ACTIVITIES

Tectono-climatic signatures during Late Quaternary in the Yunam basin, Baralacha Pass (upper Lahaul valley, India), derived from multi-proxy records:

This study provides evidence of the monsoon record over the past 25 ka from the Kilang Sarai palaeolake which is located in NW Himalaya in the rain shadow zone of the Indian Summer Monsoon (ISM). The multi-proxy study by using geomorphology, carbon isotopes, mineral magnetism, clay mineralogy and elemental chemistry of a 8 m thick laminated lacustrine sediments indicates that the area experienced fluctuating precipitation conditions during the last 25 ka. The time period between 12 and 5 ka BP can be regarded as a very wet interval of the Last Glacial to mid Holocene due to a combined effect of ISM and Westerlies, followed by aridity after 5 ka BP. Tectonic triggers may have caused the development of terraces and closure of lake. At the millennial time scale, a correlation of precipitation and vegetational changes between our data and other records from similar geographical settings suggests that Kilang Sarai basin responded to periods of strengthening in precipitation during the Last Glacial to early Holocene.



(a) Photograph showing the deep gorge and moraine deposits near Yunam river. (b) Panoramic view of Baralacha Pass showing different topographic structures.

Drainage response to active tectonics and evolution of tectonic geomorphology across the Himalayan Frontal Thrust, Kumaun Himalaya:

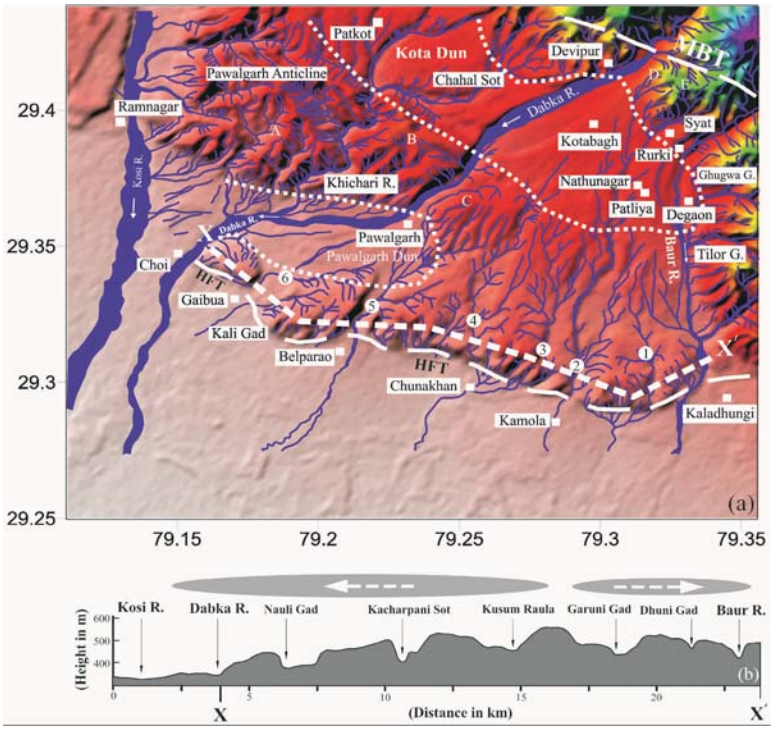
Results of integrated studies of geomorphic indices of drainage networks and landforms developed across the mountain front along the Himalayan Frontal Thrust (HFT) between the Dabka and Baur rivers, Kumaun Himalaya are given under this study. The HFT is a morphogenic structure in nature, creating a 100-m-high E–W trending escarpment that extends ~21 km. Geomorphological evidence indicates ~10.5 km westward migration of the Dabka River and ~5.2 km eastward migration of the Baur River. These migrations are a result of uplift of the hanging wall along the HFT. The HFT is offset by a transverse fault, which suggests that the latter postdates the reactivation of the HFT between 500 and 100 ka. Presence of different levels of strath terraces along the mountain front suggests the active nature of the HFT. To assess the relative tectonic activity, morphometric indices such as stream gradient (SL) index, mountain front sinuosity (Smf) index, and ratio of valley floor width

Announcement

30th Himalaya-Karakoram-Tibet Workshop - 2015

Wadia Institute of Himalayan Geology is organizing the 30th Himalaya-Karakoram-Tibet Workshop-2015. The workshop will be held during October 6-8, 2015. For detailed information and registration visit: www.hktwadia2015.org

to valley height (Vf) have been analyzed. Results of the former two are consistent with the tectonic landforms developed in thrust zones. Paleochannels of the Dabka and Baur rivers are characterized by high Vf values while other valleys show low Vf values. Quaternary alluvial sediments have been deformed along the Pawalgarh Thrust, a splay of the HFT. Deformation has resulted in the formation of the Pawalgarh Anticline, a thrust-related asymmetric fold. (*Geomorphology, 239:58-72*).



(a) Geomorphological map of Ramnagar-Kaladhungi area. (b) Cross-section drawn parallel to the Himalayan Frontal Thrust, showing width of Dabka and Baur river valleys.

Influence of debris cover and altitude on glacier surface melting: a case study on Dokriani Glacier, central Himalaya, India:

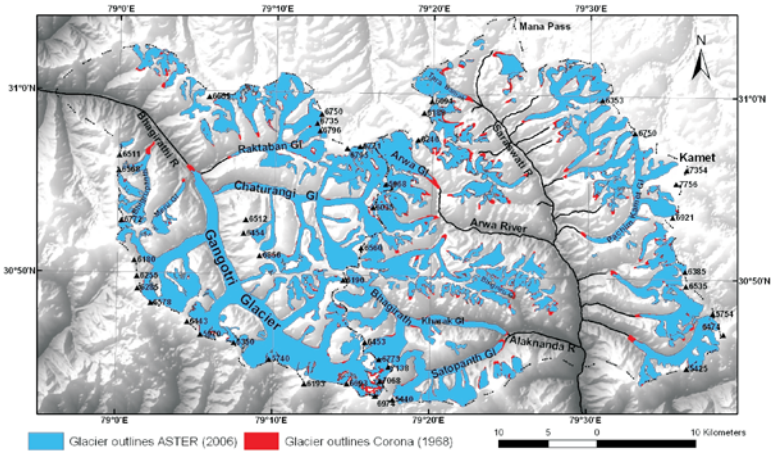
Most of the central Himalayan glaciers have surface debris layers of variable thickness, which greatly affect the ablation rate. An attempt has been made to relate debris-cover thickness to glacier surface melting. Thirty stakes were used to calculate ablation for debris-covered and clean ice of Dokriani Glacier (7 km^2) from 2009/10 to 2012/13. The study revealed significant altitude-wise difference in the rate of clean and debris-covered ice melting. High correlation (R^2=0.92) between mean annual clean-ice ablation and altitude, and a very low correlation (R^2=0.14) between debris-covered ice melting and altitude has been found Debris-covered ice ablation varies with variation in debris thickness from 1 to 40 cm; ablation was maximum under debris thicknesses of 1–6 cm and minimum under 40 cm. Even a small

Temporal changes in debris cover, landform and surface morphology of Dokriani Glacier in 1995,1992 and 2013: (a) ablation zone; (b) glacier surface show substantial surface lowering; (c) glacier extension; (d) recession and debris enhancement over terminus.

debris-cover thickness (1–2 cm) reduces ice melting as compared to that of clean ice on an annual basis. Overall, debris-covered ice ablation during the study period was observed to be 37% less than clean-ice ablation. Strong downwasting was also observed in the Dokriani Glacier ablation area, with average annual ablation of 1.82 mw.e. a–1 in a similar period. Our study suggests that a thinning glacier rapidly becomes debris-covered over the ablation area, reducing the rate of ice loss. (*Annals of Glaciology, 56(70): 9-16*).

Variable Response of Glaciers to Climate Change in Uttarakhand Himalaya, India:

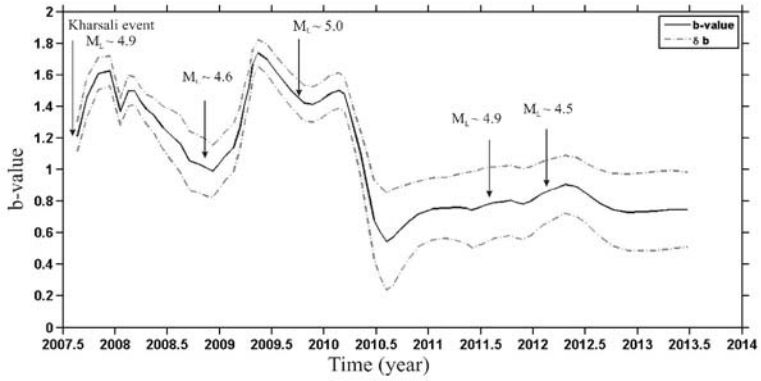
The glaciers are fragile and dynamic in nature and influence the climate system (e.g. albedo feedback) and as well as key indicator of climate change. The reduction in mass, volume, area and length of glaciers are considered as clear signals of a warmer climate. Uttarakhand Himalaya contains 968 glaciers out of the total 9,575 glaciers in Indian part of the Himalaya, covering an area of 2,888.37 km^2 with 213.74 km^3 of ice volume lies between the altitudes 6,600 and 3,860 m with different dimensions. The observations made during the end of nineteenth century over the Uttarakhand Himalayan glaciers indicate that there is continuous retreat of glaciers but rate of retreat are different to different glaciers. In this study, the results of a detailed mapping campaign and ground-based measurements of terminus retreat, area vacated and mass/volume change has been carried out on few glaciers for the period between 1962 and 2010. The study shows continuous negative mass balance on Tipra, Dunagiri, Dokriani and Chorabari glaciers during last three decades. In general, Uttarakhand Himalayan glaciers are under substantial thinning (Mass loss) and reduction of length and area in the present climate conditions. (*Dynamics of Climate Change and Water Resources of Northwestern Himalaya, Society of Earth Scientists Series, 8-12*).



Glacier change in the Uttarakhand Himalaya from 1968 to 2006 (*red* and *blue* glacier outlines derived from Corona and ASTER images respectively (Adobpted from Bhambri et al. 2011).

Space time clustering properties of seismicity in the Garhwal-Kumaun Himalaya, India:

The earthquake data of Garhwal-Kumaun Himalaya from 2007-2013 have been used to study the spatio-temporal behaviour of seismicity. The b-value analysis under Entire Magnitude Range (EMR) method has been adopted to study spatio-temporal behaviour of seismicity. The fractal dimension (Dc) for the seismicity of the region has been calculated using correlation integral method. The maximum likelihood estimates for whole region provides the b-value as 1.05±0.05. A significant spatial variation is observed in b-value for Garhwal region, where the value varies in three different spatial domains as 1.42±0.2, 0.97±0.08 and 1.17±0.13 from the northwest Garhwal towards the Kumaun region. An increase is observed in the temporal b-value after the Kharsali earthquake of 22nd July, 2007, after which there is a significant lowering of the earthquake magnitude

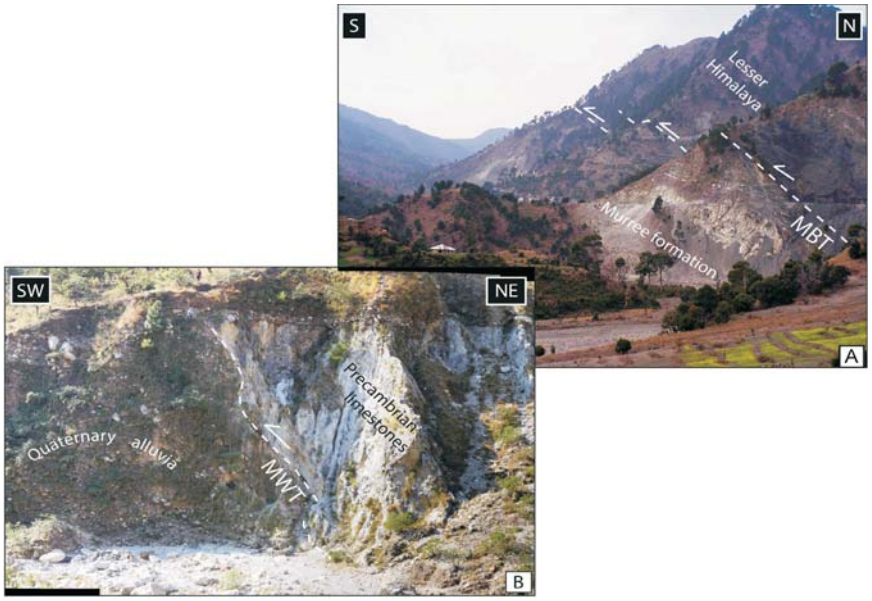


The plot shows the b-value with time. The arrow shows significant earthquakes $M_L \geq 4.5$ recorded in the study region.

levels in the region. This was subsequently followed by a sudden fall in b-value. The temporal analysis of b-value indicates significant decrease in b-value in 2009. The b-value decreases from 1.3±0.1 to 0.86±0.08 for the period of July 2007 to august 2010 and September 2010 to November 2013, respectively. The correlation integral analysis indicates a straight portion observed in the range between 12.39-45.65 km with fractal dimension Dc=1.53±0.04. The observation from correlation integral analysis indicates a relative increase in recent seismic activity in the region (northwest Garhwal) and C (Kumaun) compared to the region B (southeast Garhwal) with low b-value due to decrease in the number of small magnitude earthquakes probably indicate accumulation of high stresses in the region. (*Himalayan Geology, 36 (1): 91-101*).

Distribution of the Late-Quaternary deformation in Northwestern Himalaya:

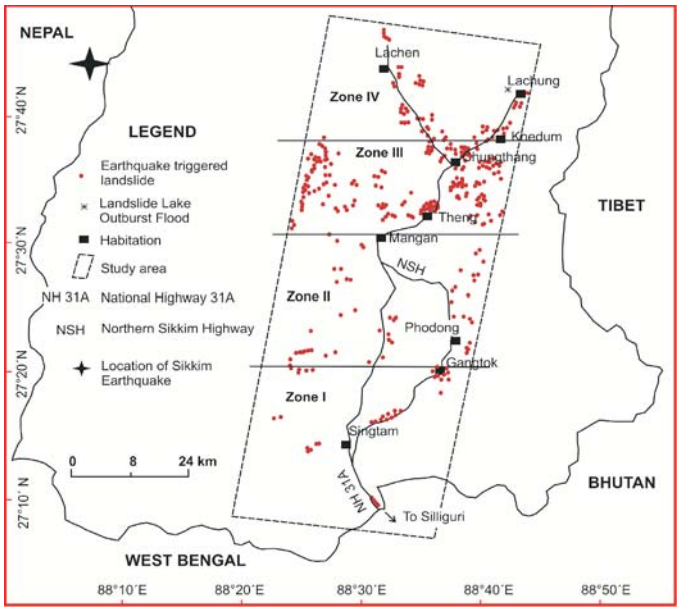
Three main Cenozoic thrusts at the front of Northwestern Himalaya have accommodated most of the India–Eurasia convergence across the belt over the last million years and produced the present relief. Their recent tectonic activity is poorly known because of the long period of inaccessibility of the Jammu and Kashmir state, and because the latest and only large earthquake recorded in the region occurred in 1555 AD. The present work shows where the deformation is localized during the Late-Quaternary, and determine shortening rates across the structures by analysing the geometry and chronology of geomorphic markers. The Main Boundary Thrust in this region ceased moving at least ~30 ka ago. On the contrary, the more external Medlicott–Wadia Thrust (MWT) and Main Frontal Thrust, both merging at depth on the sub-flat detachment of the Main Himalayan Thrust, exhibit hectometric-scale deformations accumulated during the last thousands of years. The total shortening rate absorbed by these faults over the last 14-24 ka is between 13.2 and 27.2 mm/yr (11.2 ±3.8 and 9.0 ±3.2 mm/yr, respectively). Part of this deformation may be associated to the geometry of the Chenab reentrant, which could generate an extra oblique component. However, the lower bound of our shortening rates is consistent with previously determined geodetic rates. Active deformation on these structures follows an in-sequence/out-of-sequence pattern, with breaking of both ramps being possible for earthquakes triggered on the main detachment. *(Earth and Planetary Science Letters, 411*: *241-252*).



Emergence at surface of the MBT (A) and MWT (B), revealed by river incision, where old formations (Lesser Himalaya series, Precambrian limestones) overthrust much younger detrital formations (Tertiary or Quaternary fluvial deposits).

A study on landslides triggered during Sikkim Earthquake of September 18, 2011:

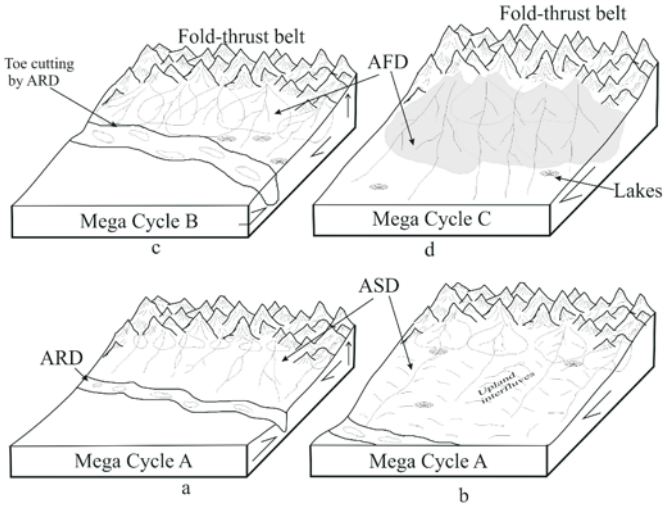
The Sikkim earthquake of September 18, 2011 at the Indo - Nepal border triggered several hundreds of landslides in the Sikkim, Nepal, Tibet and Bhutan Himalaya. In the Indian Territory, the earthquake triggered landslides were reported as far as 100 km away from the earthquake rupture zone. These landslides are mainly shallow and disrupted failures and are classified as rock falls, rock slides, disrupted soil slides & soil falls, and are typical of the earthquake induced landslides reported from around the world. Based on the type, distribution and frequency, these earthquake triggered landslides have been categorized into four zones. The greatest density of landslides was concentrated in the Mangan - Chungthang- Khedum (MCK) zone, having an average landslide density of 0.213 per km^2. This zone has suffered the highest intensity of IX on the European Macroseismic Scale - 98 (EMS-98). The number and the density of landslides decrease away from this zone. The least landslide density of 0.026 per km^2 has been observed from near Gangtok and towards its south. Further, because of the directivity effect greater numbers of landslides were reported on the eastern and southeastern facing slopes i.e. right valley slopes cf. the left valley slopes. (*Himalayan Geology*, *36* (*1*): *81-90*).



An inventory of earthquake triggered landslides due to the September 18, 2011 Sikkim earthquake. Note the highest concentration of landslides in Zone III.

Late Miocene expansion and contraction of the piedmont plains in the Himalayan foreland basin: implications to tectonic vs. climatic forcing:

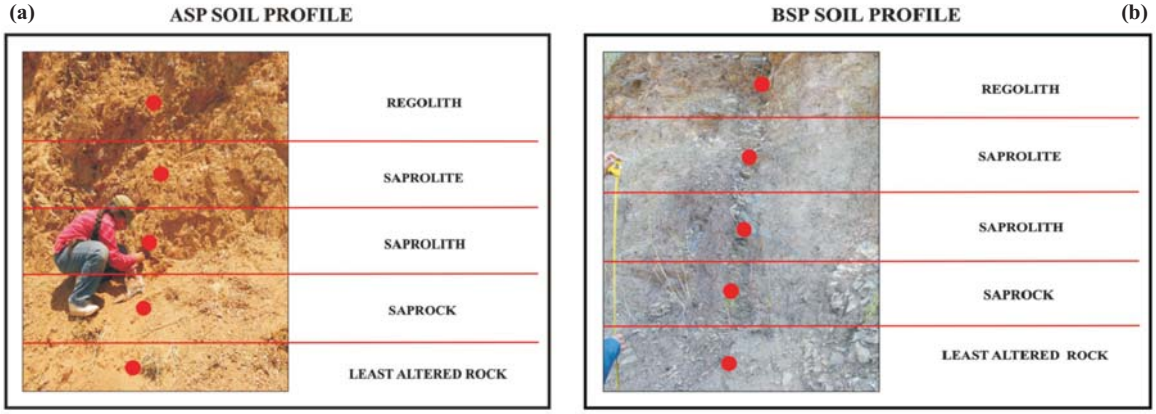
The Late Miocene stratigraphic records of the Himalayan foreland basin demonstrate an oscillation amongst the lithofacies expressed by floodplain facies assemblage (FFA), Channel facies assemblage (CFA) and Alluvial fan facies assemblage (AFFA). The study based on lithostratigraphic and magnetostratigraphic attributes of the Lower, Middle and Upper Siwalik succession (-12.77 and 4,48 Ma) exposed in the Ravi re-entrant of NW Himalaya demonstrates cyclic arrangements of the CFA and FFA till 5.71 Ma and capped by AFFA. The FFA constitutes paleosols bound mudstone, levee, lacustrine and buff ribbon sandstone deposited by transverse rivers in the form of stream flow deposits in the piedmont zones close to the basin margin. The CFA represents multistory, fine- to coarse -grained grey sandstone deposited by easterly flowing braided axial river. The AFFA comprises pebble to boulder size clasts deposited by high gradient confined to unconfined braided rivers and occupies a broad area along the basin margin with prismatic geometry. Vertical stacking of FFA and CFA exhibits cyclicity of the order of 30 to 300 m and marked expansion and contraction of FFA due to flexure tilt. This resulted in gradual migration of the axial river toward and away from the orogen in the order of 50 to 560 Ka. The CFA remains at the depositional site in the order of $1xl\ 0^4$ to $2xl0^4$ years and reoccupies almost the same geomorphic site after $8xl0^3$ to $12xl0^3$. These large-scale cycle stacking patterns show significant change in basin-fill architecture through time, including deformation along basin margin, dislodging of FFA and CFA by AFFA with increased basin slope, sediment flux and grain-size suggest the role of both tectonics and climate. *(Himalayan Geology, 36 (1): 48-64*).



Schematic diagram depicting the effect of stratigraphic base level change and its impact on fluvial architecture at different time intervals.

Comparative study of soil profiles developed on metavolcanic (basaltic) rocks in two different watersheds of Garhwal Himalaya:

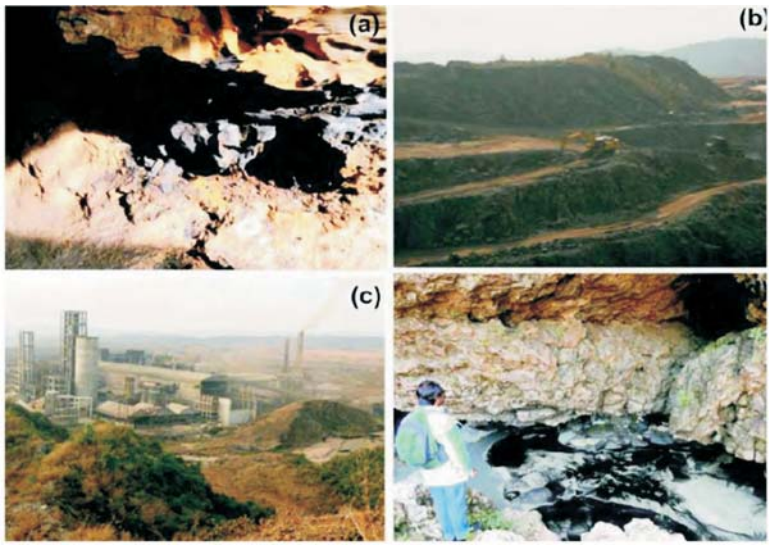
Soil profiles are rarely preserved in the Himalaya due to active tectonics and erosion. Two rarely well-preserved soil profiles developed on metavolcanic rocks namely Alaknanda soil profile (ASP) and Bhilangna soil profile (BSP) in Alaknanda and Bhilangna watersheds of the Garhwal Himalaya were studied. Geochemical studies were carried out to understand the elemental mobility with reference to the least altered rock (LAR) in both the profiles and are compared. Differences in major element behaviour noticed are depletion of Ca and K in ASP, and depletion of Ca and Na in BSP. Trace elements also show variable mobility such as leaching of Rb, U and enrichment of Sr, Ni in ASP. In BSP, behaviour of these elements is just the opposite. Accumulation of ΣREEs in saprolitic layer and depletion in regolith of ASP suggest that rare earth element (REE) mobility took place during advanced stages of weathering. In BSP, increase in REE content from LAR to regolith suggests dominance of chemical weathering over physical weathering. This is also reflected in chemical index of alteration values which suggest variation of climatic parameters such as rainfall in the region. (*Current Science, 108(4):699-707*).



Field photographs of (a) ASP metavolcanic soil profile in Alaknanda river valley showing different altered layers; (b) BSB metavolcanics soil profile in Bhilangana river valley showing different altered layers. Red dots are sample locations.

Impact of limestone mining activities on major ion geochemistry of Krem Markhyrdop water, Meghalaya, India:

The Meghalaya state is facing serious environmental degradation due to rapidly increasing cement industry in the last few decades. The cement factories are directly draining their effluents into the fresh water streams. The exotic caves present in these areas are under major threat with extensive mining of limestone and mixing of untreated factory effluents in the cave water. Major ion chemistry of water samples collected from Krem Mawkhyrdop, Wah Mawkhyrdop stream and Krem Umsynrange revealed that the Krem Mawkhyrdop water contains Ca^{2+} and SO_4^{2-} ions more than permissible limit in drinking water. Carbonate weathering is the major source of Ca^{2+} and HCO_{3-} ions in the area. Anthropogenic activities are responsible



(a) Rat hole coal mine above Mawkhydop cave, (b) Open cast limestone mine of a cement factory, (c) cement factory and (d) Mawkhyrdop stream contaminated with cement factory effluent near the main entrance of Mawkhydop cave.

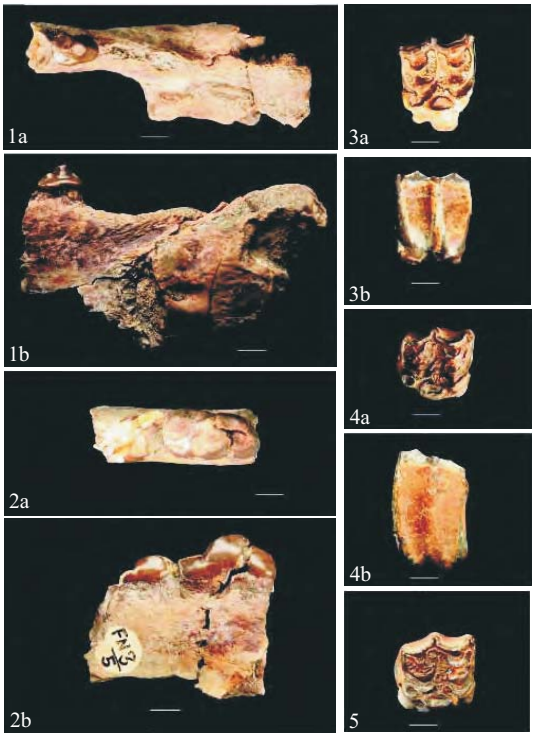
for high concentration of calcium and sulphate in the cave water. The untreated effluent discharge from cement factories located upstream of caves, added by limestone and coal mining influence the major ion chemistry of the cave water and polluting. The surface, cave and ground water system. *(Himalayan Geology, 36 (1): 74-80*).

Petrofabric and magnetic strains in the Garhwal Himalaya: A comparative study in the region of superimposed folding:

Strain estimates have been made in the Lower Himalayan Paleoproterozoic rocks of Mussoorie and Garhwal synclines. The petrofabric strain was estimated by Fry and Inverse surfor wheel techniques and the magnetic strain was determined by anisotropy of magnetic susceptibility (AMS) technique. The different methods revealed different values of strain. The maximum axial ratios were obtained by Fry method and the minimum by AMS. The strain-t0-anisotropy correlation was carried out using an empirical power relationship. The power law relationship between the anisotropy and the axial ratios for Mussoorie area is 0.73 whereas for Garhwal area it is 0.16. The correlation exponent for the Mussoorie syncline (0.3774±0.2186) is different from the Garhwal syncline (0.1288±0.1980). The discrepancy results because the petrofabric strain reflects the early deformation and the magnetic strain reflects the superposed deformation. Hence for understanding complete deformation history of a region, both the methods of strain measurement should be used. (*Himalayan Geology, 36(1): 39-47*).

Mammalian faunas from the Siwalik sediments exposed around Nurpur, District Kangra (H.P.): age and palaeo biogeographic implications:

A rich mammalian assemblage has been recovered from the red mudstone succession of the Middle Siwalik Subgroup, exposed in the vicinity of Nurpur, District Kangra and Himachal Pradesh. Out of a total of nine species described *Dissopsalis carnifex*, *Aceratherium perimense*, *Tetraconodon minor*, *Dorcatherium minus* and *Hydaspitherium megacephalum* are reported for the first time from this area. The fossil material includes elements from the lower and upper dentitions. The characters used for taxonomic identification of the dentition are well preserved. All the above mentioned taxa are known from the Middle Siwalik Subgroup. The material representing *Hydaspitherium megacephalum,* hitherto unknown from the Nurpur area, is known to be restricted to the Dhok Pathan Formation of the type area in the Potwar plateau, Pakistan. In view of the new fossil discoveries described herein, the prevailing stratigraphy of the fossil bearing horizons of Nurpur have been modified and some strata are considered to be equivalent Dhok Pathan Formation. Besides enumerating systematic palaeontology, the palaeobiologeographic analysis of the faunal assemblage is attempted. The bulk of the mammalian assemblage corresponds to the Turolian Land Mammal successions of Europe and its equivalents in Africa. (*Himalayan Geology, 36 (1): 9-22*).



1. Dissopsalis carnifex a: occlusal view, b: lateral view; 2. *Amphicyon palaeindicus* a: occlussal view; b: lateral view; 3. *Cormohipparion theobaldi* a: occlusal view, b: lateral view; 4. *Cormohipparion theobaldi* a: occlusal view b: lateral view; 5. *Cormohipparion theobaldi* a: occlusal view, b: dorsal view.

RESEARCH PUBLICATIONS

Gupta, V., Mahajan, A.K. and Thakur, V.C. 2015. A study on landslides triggered during Sikkim Earthquake of September 18, 2011. Himalayan Geology, 36 (1): 81-90.

Jowhar, T.N. 2015. P-T paths from Gibbs method and its applications. In: Srivastava, K.L. and Srivastava, P.K. (eds.), Frontiers of Earth Science. Scientific Publishers (India): 457-463.

Luirei, K., Bhakuni, S.S. and Kothyari, G.C. 2015. Drainage response to active tectonics and evolution of tectonic geomorphology across the Himalayan Frontal Thrust, Kumaun Himalaya. Geomorphology, 239: 58-72.

Negi, S.S. and Paul, A. 2015. Space time clustering properties of seismicity in the Garhwal-Kumaun Himalaya, India. Himalayan Geology, 36 (1): 91-101.

Perumal, J.G., Devrani, U. and Dubey, A.K. 2015. Petrofabric and magnetic strains in the Garhwal Himalaya: A comparative study in the region of superimposed folding. Himalayan Geology, 36 (1): 39-47

Pratap, B, Dobhal, D.P., Mehta, M. and Bhambri, R. 2015. Influence of debris cover and altitude on glacier surface melting: A case study on Dokriani Glacier, central Himalaya, India. Annals of Glaciology, 56(70): 9-16.

Rawat, R.S., Jowhar, T.N. and Bhandari, K. 2015. Homogenisation experimental studies of alkali feldspars from the northwestern Himalayan granites, India. In: Srivastava, K.L. and Srivastava, P.K. (eds.), Frontiers of Earth Science. Scientific Publishers (India): 437-449.

Sehgal, R.K. 2015. Mammalian faunas from the Siwalik sediments exposed around Nurpur, District Kangra (H.P.): age and palaeobiogeographic implications. Himalayan Geology, 36(1): 9-22.

Sinha, S., Kumar, R., Ghosh, S.K. and Sangode, S.J. 2015. Late Miocene expansion and contraction of the piedmont plains in the Himalayan foreland basin: implications to tectonic vs. climatic forcing. Himalayan Geology, 36(1), 48-64.

Tiwari, S.K., Singh, R.K., Singh, J., Gupta, A.K., Bartarya, S.K. and Rai, S.K. 2015. Impact of limestone mining activities on major ion geochemistry of Krem Mawkhyrdop water, Meghalaya, India. Himalayan Geology, 36(1): 74-80.

Vassallo, R., Mugnier, J-L., Vignon, V., Malik, M.A., Jayangondaperumal, R., Srivastava, P., Jouanne, F. and Carcaillet, J. 2015. Distribution of the Late-Quaternary deformation in Northwestern Himalaya. Earth and Planetary Science Letters, 411: 241-252.

Vyshnavi, S., Islam, R. and Sundriyal, Y.P. 2015. Comparative study of soil profiles developed on metavolcanic (basaltic) rocks in two different watersheds of Garhwal Himalaya. Current Science, 108(4): 699-707.

Book/Chapter

Dobhal, D.P. and Pratap, B. 2015. Variable Response of Glaciers to Climate Change in Uttarakhand Himalaya, India. In: Joshi, R. et al. (ed.), Dynamics of Climate Change and Water Resources of Northwestern Himalaya. Springer International Publishing Switzerland 2015, Society of Earth Scientists Series: 8-12.

PARTICIPATION IN CONFERENCES/SEMINARS/WORKSHOPS/MEETINGS

Conference

Dr T.N. Jowhar attended 102nd Indian Science Congress held at University of Mumbai, Mumbai during January 3-7, 2015 and presented a paper entitled:

- P-T Paths from Gibbs Method and its Applications.

Dr Jowhar also chaired one session in the Earth System Sciences section.

Seminar/Symposium

Dr P.S. Negi participated in International Symposium on Transforming Mountain Forestry organized at Forest Research Institute (FRI), Dehra Dun during January 18-22, 2015.

Mr Parkasam, Mr Narender Kumar & 6 students attended Urja Sangam-2015 organized by ONGC at New Delhi on 27.03.2015.

Meetings

Dr Vikram Gupta attended a meeting of the Joint Expert Committee (JEC) constituted by the GoUA to discuss about damages/slope stability along the rim of the Tehri reservoir in Four Points Sheraton Hotel, Dehradun on January 31, 2015.

Dr Vikram Gupta attended a meeting with Dr Bhoop Singh, Head, NRDMS, Department of Science and Technology, New Delhi regarding various activities of the National Geotechnical Facility (NGF) on January 28, 2015.

Drs S.K. Bartarya, D.P. Dobhal and Vikram Gupta participated in the Task force meeting on "National Mission for Sustaining the Himalayan Eco-system (NMSHE) project programme, DST" on February 5, 2015 at New Delhi.

Dr Rajesh Sharma attended the 54th Central Geological Programming Board meeting of the Geological Survey of India held on February 5-6, 2015 at Vigyan Bhawan, New Delhi.

Drs G. Philip and Aparna Shukla participated in the IIRS User Interaction Meet (IUIM-2015) on Recent Advances in Geospatial Technologies, held at Indian Institute of Remote Sensing Dehradun, during February 26-27, 2015.

Drs D. P. Dobhal and P.S. Negi participated in a meeting on "IPCC AR-5 Uttarakhand Outreach High Level Public Event" on March 10, 2015 at FRI, Dehra Dun.

Dr S.K. Bartarya attended Working Group meeting of National Institute of Hydrology (NIH) at Roorkee during March 19-20, 2015.

Dr D. P. Dobhal attended Working Group Committee meeting on "Study of the Glacial Lake Outburst Flood (GLOF) at South Lhonak Lake Sikkim Himalaya" on March 27, 2015, at MoES, Lodhi Road, New Delhi.

LECTURE DELIVERED

Dr D.P. Dobhal delivered a lecture in the DST Sponsored Training Course on 'Climate change: Vulnerabilities and adaptation Strategies" for Scientists and Technologists at FRI campus, Dehra Dun on February 04, 2015. His lecture was entitled: "Climate Change Impact on Glaciers".

FOREIGN VISIT

Dr D. P. Dobhal visited ICIMOD Kathmandu, Nepal for the meeting on project "Himalayan Adaptation, Water and Resilience (HI-AWARE) Research Commponet-1" during January 28-30, 2015.

Pradeep Srivastava attended a workshop on "Future Floods: An Exploration of a Cross-Disciplinary Approach to Flood Risk Forecasting" at the Lee Kuan Yew School of Public Policy, National University of Singapore (NUS) during February 26-27, 2015. Pradeep Srivastava delivered invited talks at National University of Singapore during a workshop on "Future Floods: An Exploration of a Cross-Disciplinary Approach to Flood Risk Forecasting". The talk entitled:

- Paleoflood records in Himalaya and
- Application of luminescence dating technique in understanding fluvial landscape of Himalaya.

TRAINING ATTENDED

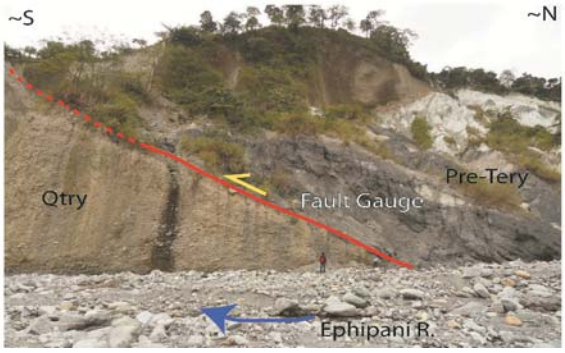
Dr Rajeev Ahluwalia attended a training course on "Application of Isotopes in Hydrological Studies" in National Institute of Hydrology, Roorkee during February 25-27, 2015.

MEETING HELD IN THE INSTITUTE

To promote Rajbhasha, Hindi a workshop was organised in the Institute on February 6, 2015. On this occasion presentations by distinguished personalities in the field of Hindi, Sanskrit and Science were delivered. Dr Basanti Mathpal, Dr G.P. Joshi, Dr Ram Vinaya Singh and Dr Vidhya Singh were the main invitees on this occasion. They presented their views especially on history, development and present use of Hindi in everyday life, especially at office and home. They have emphasised that Rajbhasha Hindi has played a significant role in the progress of our nation that has become one of the fastest developing nation in the World. Dr Gautam Rawat and Dr N.K. Meena of our Institute have also presented their scientific deliberation which were highly appreciated.

FIELD VISITS

Dr Pradeep Srivastava, Dr RJG Perumal, Ms Priyanka Singh Rao, Sh Rajeeb L. Mishra, Sh Ishwar Singh, Sh Arjun Pandey carried out fieldwork along the Subansiri to Lohit river valleys, Arunachal Pradesh during November 19, 2014 to January 15, 2015 to i. investigate the paleo-earthquake event(s) and thus to prepare paleoearthquake catalogue; ii. map the active fault surface traces and iii. estimate the long term deformation rate along the Himalayan Frontal Thrust (HFT) and Mishmi Thrust (MT). New active faults were identified in the Himalayan foothill zone using high resolution satellite images in the laboratory, followed by the field survey. The potential sites for paleoseismological studies were selected based on RTK GPS survey. Three pits were dug and five trenches were excavated. Beneath the fault zone datable materials were sampled to provide the timing of the earthquake event(s), along with the detailed topographic mapping of the Quaternary terraces and fault-scarps across the HFT and MT. Along Ephipani river valley, the Pre-Tertiary rocks have been thrust over the Quaternary deposit by the HFT as shown in the figure given below. Several sediment samples were systematically collected for dating to understand the long-term vertical uplift pattern of strain released along the HFT.



Dr Kishor Kumar carried out 16 days field work in Vastan South, Valia and other nearby open-cast lignite mines of Surat District in western India for prospecting new horizons and sites and collecting early Eocene land vertebrate remains that occur in the lignite-bearing sub-surface beds of the Cambay Shale Formation. The new fossil material collected from exposure surfaces comprise several snake and mammal vertebrae, jaws, limb bones, and dentitions of varied vertebrates representing primates, tillodonts, bats, perissodactyls, and artiodactyls. Apart from the vertebrate fossils, several rather large seeds/fruits of plants and a few fragments of *Teredolites*-infested fossil wood were also collected. Around 1000 kg of bulk samples of fossiliferous sandy clay were screen-washed in the field itself and about 30 kg of residue transported to the laboratory for sorting and recovery of smaller skeletal elements. A few test samples were also taken for miscellaneous studies. The image below shows a section of subsurface beds of the fossiliferous Cambay Shale Formation exposed in one of the open cast mines in Surat.

Dr Kapesa Lokho has carried out 22 days field work in Manipur and Nagaland of the Tertiary sections in the Indo-Myanmar range, northeast India. Around 140 rock samples were collected from the various sections from Disang and Surma groups for the microfossil recovery. Ichnofossils and fossil leaves were collected from the outcrops.

A. Fossil leave B. Ichnofossil outcrop

Dr S.K. Bartarya carried out field work in Chakrata area on February 13, 2015 and collected water samples for various analysis.

Dr Rajeev Ahluwalia carried out field work in Bhagirathi valley during Feb. 18-20, 2015 and collected water samples for isotopic studies.

Dr Vikram Gupta carried out field work along the rim of the Tehri reservoir to identify the villages/ slopes affected by the filling and drawdown of the Tehri reservoir during January 23-25, February 6-8 and February 19-22, 2015.

Sh Rakesh Singh has visited seismic sites at Chakrata, Nahan, Kotkhai, Deoband, Gaurikund, Tapovan and Adibadri, Nahan and Kotkhai during March 13-18, 2015 to check the connectivity of data acquisition system to download the required seismic data.

Ms Rupa Ghosh and Sh Ishwar Singh have carried out 12 days geological field work in the western part of Marginal Ganga foreland basin. Deeply incised gullies and ravined region along Yamuna River were mapped using DGPS survey to understand the volume of sediments eroded during the ravine formation. Some new sections along Yamuna and Betwa rivers were identified and lithologs prepared. Fracture orientation data was also collected to understand the tectonic regime vis-à-vis ravine formation in the area. Samples were collected for geochemistry, grain size analysis, luminescence dating, and petrography.

Dr. Rajita Shukla carried out one week field work to study the Ediacaran-Early Cambrian sequences of Birmania Basin, Rajasthan. The Birmania Basin in western Rajasthan is the last exposure of the Ediacaran–Cambrian time span, on the southern side of the Himalaya. Samples from different sections of the Randha-Birmania formations were collected for microfossil studies with the aim of getting an age constraint for the so far unfossiliferous basin and extending the vista of Ediacaran-Early Cambrian sequences for biostratigraphic correlation.

INVITED/INTERACTIVE LECTURES

Dr Philip delivered an invited talk in the IUIM-2015. The talk entitled:

- Geospatial Technology for Active Faults and Seismic Hazard Assessment.

Dr Pradeep Srivastava delivered invited talks at National University of Singapore during a workshop on “Future Floods: An Exploration of a Cross-Disciplinary Approach to Flood Risk Forecasting”. The talks entitled:

- Paleoflood records in Himalaya, and
- Application of luminescence dating technique in understanding fluvial landscape of Himalaya.

Ph.D. DEGREE AWARDED

Ph.D. degree was awarded to Sh Matsyendra Kumar by University of Jammu, Jammu under the joint supervision of Prof S.K. Pandita (Jammu Univ.) and Dr N.S. Siddaiah (JNU). The title of his Ph.D. thesis is "Field relationship and petrogenesis of the brecciated unit of Jangalgali Formation, Jammu, India".

Ph.D. degree was awarded to Sh Aditya Kharya by University of Petroleum & Energy Studies (UPES), Dehradun under the joint supervision of Prof A. K. Gupta and Dr P. K. Mukherjee of WIHG. The title of his Ph.D. thesis is "Isotopic and Geochemical Studies of the Ladakh Accretionary Prism, Northwest Himalaya".

CELEBRATIONS

Republic Day: The Institute celebrated India's 66th Republic Day. The celebration started with flag hoisting by the Director followed by National Anthem by the employees of the Institute. Prizes were distributed to winners of Badminton tournament. Prizes of essay writing competition held on Good Governance day were distributed to Dhamodharan S. (First), Smita Gupta (Second) and Rakesh Kumar (Third).

National Science Day: The Institute celebrated National Science Day on February 28, 2015. A talk entitled "Exploration of the Martian surface environment: dawn of sedimentology on our neighbouring planet." was delivered by Prof S.K. Tandon, D.N. Wadia Chair Professor at IIT, Kanpur. Various programmes like Science Quiz, Essay Competition for school students and slogan competition and essay competition for the Institute's employees were held in the Institute to mark the occasion.

AWARDS/HONOURS

Dr. T.N. Jowhar was elected as President of the section of Earth System Sciences of 103rd Indian Science Congress for 2015-2016. He was also elected as council member of the Mineralogical Society of India for 2015-2017.

Dr Devajit Hazarika received ISES (Indian Society of Earthquake Science) Order of Merit Award for Young Scientist-2015 during the International Symposium on "Reducing Earthquake Losses and Advances in Earthquake Sciences" held during January 5-7, 2015 at Institute of Seismological Research (ISR), Gandhinagar, Gujrat.

Mr Anil Kumar has been selected as one of the scientist member in International Ocean Discovery Program Expedition 355 for Arabian Sea Monsoon.

RESPONSIBILITY

Dr Rajesh Sharma took over the charge of Project Director, National Geotechnical Facility (NGF) w.e.f February 20, 2015.

SUPERANNUATION

Shri Pratap Singh, FCLA, superannuated on January, 2015. Shri Pratap Singh joined the Institute on May, 1976. He was a polite and sincere worker of the Institute.

Shri Abhay Kumar Pandit, Sr. Artist-cum-Modellor, superannuated on February 28, 2015. Shri Pandit joined the Institute on Febraury 17, 1986 as Jr. Artist-cum-Modellor and promoted to Sr. Artist-cum-Modellor. Shri Pandit was known for his quite nature and dedication towards his work.

Shri Vijay Kumar Kala,Senior draftsman, superannuated on February 28, 2015. Shri Kala joined the Institute in 1977. He was very energetic and hard worker.

Shri Ashok Kumar, Mali, superannuated on February 28, 2015. Shri Ashok Kumar joined the Institute on May, 1983. He was known for his passion for his work.

Dr A.K. Mundepi, Scientist D, superannuated on March, 2015. Dr Mundepi joined the Institute in 1985 as STA in the SSTH project and retired as Scientist 'D' of the Institute. Dr Mundepi's contribution was mainly related to Seismic hazard, Seismic microzonation, Disaster Management, shallow subsurface investigation using geophysical instruments, Himalayan glacier studies and earthquakes related studies.

Shri S.S.Bisht, Assistant, superannuated on March 31, 2015. Shri Bisht joined the Institute as LDC in January 9, 1980 and promoted upto Assistant. He was a hard working and sincere employee of the Institute.

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

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