

**5<sup>th</sup> International Symposium on the Tibetan Plateau and 24<sup>th</sup> Himalaya-Karakorum-Tibet Workshop** – *Santosh Kumar (Kumaun University, Nainital) and R.K. Ganjoo (University of Jammu, Jammu)*

5<sup>th</sup> International Symposium on the Tibetan Plateau and 24<sup>th</sup> Himalaya-Karakoram-Tibet workshop was jointly organized by various scientific research bodies of Chinese Academy of Sciences (CAS) and International Centre for Integrated Mountain Development (ICIMOD) at Jihua Resort and Convention Centre, Beijing, China during 11-14 August 2009. About 430 registered delegates (130 from 22 countries and more than 300 from host country China including 100 Chinese graduate students) actively participated in the joint conferences. The opening

ceremony of the joint conference was chaired by Prof. Honglie Sun, President of Chinese Academy of Sciences. Besides, Prof. Zhong Din, Vice President of Chinese Academy of Sciences, Zhou Li, Representative of People's Government of Tibetan Autonomous Region, Xianli Meng, Minister of Land and Natural Resources, Government of People's Republic of China, Prof. M.P. Searle, Oxford University, UK and Prof. Volker Mosbrugger, Germany were the other dignitaries on the dais.

After a brief opening ceremony (only of 40 minutes) the plenary session began

with talk of Michael Searle who provided a good synthesis of his earlier works and some new evidences of thermal and structural evolution of Himalayan (Indian plate) and Karakoram (Asian plate) continental crust which upon collision and deep crustal subduction produced sillimanite grade gneisses and anatectic leucogranites of Greater Himalayan sequence during the Early Miocene (ca 24-15 Ma) period of Channel Flow. Zhiquin Xu described dynamic elements and mechanism of Asia-India collision responsible for the material extrusion of

Tibetan plateau. Eric Kirby suggested the role of lower crust flow for evolving the geomorphic expression and active deformation in eastern Tibet. Chengzao Jia made an assessment of hydrocarbon resource availability based on tectonic features of the Circum-Tibet Plateau basin range system. Four more speakers in the plenary session-2 extensively covered the aspects of climatic and atmospheric changes over the Tibetan plateau based on studies of vegetation cover, numerical modeling and ice-core records.

Subsequent to plenary sessions, fourteen scientific sessions on various sub-themes were organized in 3 to 4 parallel sessions on each day of the joint conferences. About 175 oral including 20 keynote presentations were deliberated during four-day of the conference. Although a large number of poster presentations were scheduled, about 50 posters were displayed on third day (August 13, 2009) during an exclusive poster session covering the entire sub-themes of the conferences. Deliberation in scientific sessions covered the following sub-themes of the joint conference.

(1) Continental collision, Himalayas and Karakoram, (2) Tibet geology, uplift and climate change, (4) Great Wenchuan earthquake and neotectonic movement of southeast Tibetan plateau, (6) Lacustrine sediments and environmental changes (7) Cryosphere and environmental changes, (8) Climatic changes in the past 2000 years, (9) Energy and water cycles of the Tibetan plateau, (10) Alpine ecosystems and biological resources, (11) Remote sensing applied in the environmental changes, (12) Disaster control and environmental protection, (13) Resources, environment and regional development, (14) Anthropogenic pressures on Tibet/Himalayas' environment, (15) Quaternary landscape evolution and palaeoenvironmental change, (16) Geomorphology and environmental changes (there were no sessions numbered 3 and 5 for reasons best known to the organizers)

Salient features of some deliberations related to major session 1 are summarized. Thirty-five speakers spoke on geology, geophysics, geochemical, geochronology and geodynamics of collisional components of Himalaya and Karakoram. Palaeo-

magnetic studies revealed the style and mechanism of India-Asia collision and formation of Abor volcanics as Permian-Gondwana rift volcanic series. Structural analysis and seismic profiles suggested the architecture of colliding tectonic plates and varying nature (thick, continental and high velocity) of lithosphere across the Tibetan plateau. There are some records of 1.8 Ga basement and pan-African ages which probably point to location of northern margin of Gondwana-derived units in the Tibetan plateau. It was further argued that most parts do not belong to Gondwana except some components included in the Gangadese, etc. Occurrence of Na-rich adakite and core-ward exhumation (Rim 15 Ma- Core 20 Ma) and formation of Yordoi gneiss (ca 35 Ma) dome in the southern Tibet have been recognized. An exhaustive U-Pb ages and Hf-isotopes of zircons from magmatic units of Gangadese batholith were presented which strongly suggest significant contribution of mature Proterozoic crust, mantle-derived juvenile source regions and mafic-felsic magma mixing (57-45 Ma) process in the evolution of batholith. GPS geodesic vectors combined with structural mapping suggested arc-parallel extrusion of Himalaya caused by convergence variation obliquity. Spatial and temporal variations in post-collisional magmatism have also been recorded. Chronological emergence of Himalaya-Tibetan plateau: 43-36 Ma collision and subduction between Asia and Eurasia plates; 18-15 Ma activity of STD (South Tibetan Detachment); 12 Ma end of STD's activity and 3 Ma as time of rapid exhumation have been proposed. This idea opposes the Channel Flow model and hence received tremendous criticism on the fundamental ground as and how the occurrences of 30-35 km section of high grade metamorphic sections bounded by leucocratic granites (24-12 Ma) in Greater Himalaya can be explained, and possibly is not applicable to Tibetan Plateau. Based on structural and geothermo-chronological database an illustrative 3-D view of Dzakaa Chu section demonstrated the generation of 11 Ma felsic melts derived from 986 Ma old orthogneissic protoliths. Santosh Kumar, India recognized five felsic magmatic lithounits and suggested the contribution of Indian cratonic units in the

evolution of western Arunachal Himalaya based on magnetic susceptibility, phase petrology, geochemistry and geochronology. In another presentation, Santosh Kumar suggested that the Ladakh batholith is a composite mafic-silicic intrusive (MASLI) system based on detailed field, micro-structure and geochemical investigations of microgranular enclaves and syn-plutonic mafic dykes.

Multi-stage exhumation history of Khagan valley Ultra-High Pressure (UHP) series of northwest Pakistan Himalaya has been documented integrating the U-Pb, Ar-Ar, fission track, and U-Th/He chronological database. UHP minerals and unusual minerals from Luolusa ophiolites chromites and peridotites in Tibet are also reported. Paleogeodynamic evolution and tectonics of east Kunlun ophiolite belt, as part outcome of International Tectonic Map of Asia programme, were also discussed. Geothermobarometric data of Tso-Morari dome, timing (ca 67 Ma) of felsic magmatism at Chumathang and suturing along the Indus Suture Zone were also constrained.

Paleogeography and stratigraphy of west Kunlun-Karakoram regions and evidences against Quaternary slip along the northern Karakoram fault were documented well. Palaeocene Radiolarian bearing strata of Giyrong country have been referred to as integral part of "Tethyan-Himalayan sub-province of strata" in the southern Tibet.

Combined evidences from magneto-stratigraphy, basin analysis, palaeocurrent measurements,  $^{40}\text{Ar}/^{39}\text{Ar}$  and fission track dating suggested that in response to Indian-Asian plate collision growth of the plateau started from its interior (Lhasa and Qiangtang regions at ca 40 Ma) and expanded to the Qilian mountains as its northern margin at ca 7 Ma. Based on U-Pb dating and Hf isotopes of zircons, hidden magmatism (ca 90 Ma) formed by melting of lower crust and a felsic magmatism (ca 152 Ma) derived from re-melting of middle crust with mature continental materials beneath the western Lhasa terraine have been recognized. Thermotectonic evolution of eastern Tethyan Himalaya was constrained from palaeomagnetic, structural and metamorphic records of Cretaceous dykes in southeast Tibet. Huge amount of

geological, geodesic and structural datasets was used to understand the tectonic evolution of Tibetan plateau and its basins.

There were six sessions dedicated to various aspects of climate and landscape change during Quaternary times of Himalaya, Tibet and Karakorum. The research contributions on Quaternary climate and landscape changes were spread over in the S-2, S-6, S-7, S-8, S-15 and S-16. Although there were total 77 papers presented during these sessions, the salient findings of interesting papers are summarized below.

V. Mosbrugger, Germany emphasized on the building of Regional Climate Models (RCM) rather than fit the data into Global Climate Model (GCM). Besides, he also pointed at the fact that climate change enhances speciation and also changes the distribution and migration of flora and fauna of any given region. Hence, climate change is a triggering agent to bring out changes in a region. T. Koike, Japan highlighted the role of seasonal variation in causing the NW part drier than the SW part of Tibetan plateau. Andreas Schild, Director General, ICIMOD, invited the attention of scientists towards the impact of mountain climate change on future generations. He also emphasized on the increasing demand for food and water in times to come, and urged the scientists to work in close coordination with each other to understand the changes that are taking place in Himalaya-Tibet-Karakorum mountain chain as a consequence of climate change and its underlying effect on mountain livelihood. Tandong Yao, China based on studies of ice cores from Guliya, Malan, Puruogangri, Dundu, Dasuopu and Tanggula glaciers of demonstrated difference in the climate pattern between northern and southern parts of Tibetan plateau. The isotopic studies of ice cores further demonstrated that temperatures in last 100 years were the warmest and in past 2000 years the

temperatures have been increasing with oscillations. Cores have been retrieved from. This is interesting to observe that during the past 100 years the northern Tibetan plateau has been warming with more precipitation whereas the southern Tibetan plateau was warming with less precipitation. The studies further indicate that records from Tibetan Plateau match more with the southern hemisphere records. The Dasuopu glacier core records are well correlated with the Indian monsoonal precipitation records. The droughts of 1790-1796 and 1876-1877 were attributed to a very high temperature, high dust concentration over Tibetan plateau and high content of chloride that collectively caused failure of monsoon. Based on Erhai Lake sediments studies Shen Ji, China recognized Holocene climatic fluctuation in the Yunnan province of China and identified 8.4-6.4 Ka as the warmest period. He further suggested high resolution climatic oscillation in this part of China occurred between 2.7 Ka and 0.3 Ka. Mukunda Paudel, Nepal discussed the climatic history in parts of Nepal during past 40 Ka based on detailed sedimentological, geochemical and palynological investigation of lake and fluvial sediments. Based on luminescence dating of lacustrine sediments, Zhongping Lai, China opined the existence of high lake levels during MIS-3, and during this period the temperature was 2° to 4° C higher and precipitation was 50 to 100% higher than present in the northeastern part of Tibetan plateau. It is further argued that the desertic conditions in Lhasa and eastern part of Qinghai plateau are essentially caused due to excessive exploitation by human since 5 Ka. Oxygen isotope and major ion study of 124m long ice core from Mt. Nyainqentanglha, Tibetan Plateau has provided an insight of dust storm effect on Tibetan glaciers. Aerosol index (AI) of upper 84m of ice core reveals the impact since 1854 AD.

Zhou Liping, China cautioned the geoscientists while using Terrestrial

Cosmogenic Nuclide (TCN) dating technique. Jakob Heyman, Sweden agreeing with the view of Zhao Liping discussed the likely causes of wide TCN age spread. Jason Dortch USA proposed three glacial stages, ranging from 145 Ka to 45 Ka for Nubra-Shyok valleys (Ladakh) on the basis of TCN ages. Mathias Kuhle, Germany shared his thirty years of research experience on Himalayan glaciers and fully disagreed with the TCN ages and believed that TCN ages are 4 to 10 times escalated and hence cannot be applied building chronology of Quaternary landforms. Jonathan Harbor, USA through his works on glacial deposits of Bayan Har Shan, NE Tibetan plateau suggested a number of alternative mechanisms to overcome the major shortcomings of TCN dating technique. S. Vyshnavi, India spoke on geochemistry of weathered-crust and soil profiles developed over granite gneiss of Narwhal Lesser Himalaya. There were several other scientific presentations on the aspects of Neogene-Quaternary landforms and landslides from western Carpathian range including the Tatra Mts, central Europe.

A spectacular cultural evening of water ballet "Swan Lake", performed by Russian Corps de Ballet, in the splendid Water Cube building of 2008 Olympic Games Campus. About 45 participants attended the post-conference excursions to the Tibetan Plateau. A high-resolution conference group photograph of participants can be seen or download at [http://www.itpcas.ac.cn/5istp\\_24hkt/](http://www.itpcas.ac.cn/5istp_24hkt/). The next (25<sup>th</sup>) HKT will be held in San Francisco June 7-13, 2010 (website: <http://online.sfsu.edu/~leech/hkt25sf.html>).

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