Understanding the Himalayan Seismicity: An Ultimate Geodynamic Challenge

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The Himalaya is one of the most active seismic intra-continental regions, where devastating earthquakes result due to the continued continent-continent collision between India and Asia. The earthquake of October 8, 2005 in the Muzaffarabad region in the western Himalaya is the most recent example. The earthquake destroyed several parts of Pakistan and north Indian states, Jammu & Kashmir, which claimed more than 80,000 lives. Understanding the processes of earthquakes with the purpose of assessing the potential of seismic hazard has been a challenging issue for earth science community from very early times.

The Himalayan arc has witnessed 4 great earthquakes and recently inducted GPS measurements corroborate that the sections of Himalayan arc between the ruptured zones of these great earthquakes, recognized as seismic gaps, have accumulated strains to drive one or more great earthquakes. However, these are being questioned in the light that the central seismic gaps is under going quiescence of > 1000 years. Further given that large fraction of major and moderate earthquakes are concentrated on higher level thrusts and it is suggested that part of strains are released by seismogenic slips on these high level thrusts.

In the Outer and Lesser Himalaya, the well designed seismological monitoring coupled with the adoption of modern processing tools has allowed imaging 3-D velocity structure. The evidence of north-dipping low velocity layer, identified independently as low resistivity zone, map the geometry of detachment more precisely, which serve to define the cut-off depth of crustal seismicity. Improved locations of earthquake parameters provide strong evidences on the seismicity-tectonic linkages wherein the nucleation of strain at the junction of the duplex and transverse structures with mega thrusts tend to explain the clustering of seismicity in localized zones.

Intense seismological monitoring coupled with geophysical imaging of deep structures have began to give new insight on the operating geodynamic processes and possibly identifying centres of nucleation of strain. These inputs from on-going investigations can pave way to launch inter-disciplinary programs for earthquake precursory research. Integrated approaches involving multi-parametric approaches should be the direction of future research.

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Prof.M.P.Singh
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Dear Prof. Singh,
I have received both of your e-mail and letter.The lecture date will be suitable for me between 18-21 September.After that we will have our Puja holiday and there will be a rush for tickets.Please let me know whether I can avail airways for my to and fro journey.
The topic of my lecture is, **The Mesozoic Marine Revolution: An Overview of a Biological 'Arms Race'.**
It will deal with the role of predation in shaping the evolutionary trends of major fossil groups since especially the Jurassic.In most of our universities, students are taught about invertebrate marine fossils like gastropods,bivalves, ammonites,brachiopods,echinoids,forams etc.I have rarely seen in my long teaching career any holistic approach to synthesise the evolution of these groups.I feel my lecture will be students friendly.Below please find the essence of my lecture.
Vermeij(1977,1987) in a brilliant introspection notices a sudden escalation of bloody battle between marine predators and their prey in Mesozoic.This rise of extensive predation set the evolutionary trends of many benthic groups,which continue even today.Though prey communities responded to a single cause,evolution followed diverse lines.This is known as Mesozoic marine revolution.Its impact on different organisms appears to be quite stunning and holistic.The effect of this revolution was felt at different hierarchical levels and appeared punctuational mode of evolution involving species selection.While intense predation pressure thoroughly reorganised the prey community, it did not ensue extinction at higher levels,like the mass extinction events caused by abiotic factors.Mass extinction events appear to have derailed the evolved trends of benthic communities by taking toll of the adaptive forms, which arose in response to Mesozoic marine revolution.But, same antipredatory trends persist in the stragglers across the mass extinction boundary,say K-T.
With best regards,

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(Subhendu Bardhan) 18 July, 2006
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Recent Advances in the Siwalik Group of northwestern India: Palaeontologic and magnetostratigraphic aspects

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The Siwalik Group of northwestern India has yielded rich mammalian fauna in last four decades and palaeontologic and stratigraphic (including magnetostratigraphic) studies have been confined mainly to Jammu, Bilaspur (Himachal) and Chandigarh regions. The Lower Siwalik Subgroup exposed at Ramnagar, Jammu, comprising mainly red mudstones and grey sandstones, has yielded rich Chinji Fauna (Astaracian). However at Nurpur (Kangra, Himachal), similar lithology has yielded Dhok Pathan Fauna (Turolian). This shows that red mudstones, generally considered characteristic of the Lower Siwalik Subgroup, are time transgressive. Multistoried sandstone bodies, which are considered characteristic of the Middle Siwalik Subgroup, have yielded typical Pinjor Fauna near Paonta. One of the most significant recent discovery of the Upper Siwalik Subgroup is the recognition of the pre-Pinjor beds (equivalents to Tatrot beds) in the type area of the Pinjor Formation of Chandigarh. In this region, various faunal discrepancies concerning the Tatrot and Pinjor faunas are referred to a transitional zone between the pre-Pinjor and Pinjor beds of the Upper Siwalik Subgroup. Magnetostratigraphic studies of the fossiliferous areas are limited and have been carried out in Haritalyangar, Bilaspur and Nurpur, Kangra (both places belong to Middle Siwalik Subgroup of Himachal), Jammu and Chandigarh regions (Upper Siwalik Subgroup). It is found that the upper part of the succession of the Lower Siwalik Subgroup (also referred as Nahan Sandstone) at Haritalyangar belongs to the Middle Siwalik Subgroup. Magnetostratigraphic study at Nurpur supports an age equivalent to the Dhok Pathan Fauna and the Middle Siwalik succession spans a time interval from 8.14 to 5.26 Ma. The type section of the Pinjor Formation is dated 2.58 to 0.63 Ma. Tatrot/Pinjor faunal break both in Jammu and Chandigarh regions coincide with Gauss/Matuyama magnetic boundary and is dated at 2.58 Ma. The contact between the Pinjor and Boulder Conglomerate is found to be time-transgressive and ranges from 1.77 to 0.6 Ma in different sections of Jammu and Chandigarh. In other words, Pinjor Fauna became extinct from the Himalayan foothills at 0.6 Ma. On the basis of combined palaeontologic and magnetostratigraphic studies, two biostratigraphic interval-zones, *Elephas planifrons* Interval-Zone (3.6 to 2.6 Ma) and *Equus sivalensis* Interval-Zone (2.6 to 0.6 Ma), are recognized in Chandigarh region.