NEWS AND NOTES

Penrose Conference – 2011 on Deformation Localization in Rocks: New Advances – Manish A. Mamtani (IIT, Kharagpur; Email: mamtani@gg.iitkgp.ernet.in)

The Penrose Conference of the Geological Society of America was held in Cadaques/Cap de Creus (Spain) from 27 June - 2 July 2011. The theme of the conference was *"Deformation Localization in Rocks: New Advances"* and was convened by Elena Druguet and Jordi Carreras (Barcelona, Spain), G. Ian Alsop (Scotland, UK), Paul D. Bons (Tübingen, Germany), Dyanna M. Czeck (Wisconsin-Kilwaukee, USA), Peter J. Hudleston (Minnesota, USA) and Christine S. Siddoway (Colorado Springs, USA). The conference brought together 71 scientists from Argentina, Belgium, Canada, France, Germany, Greece, India, Italy, Mexico, New Zealand, Norway, South Africa, South Korea, Spain, Sweden, Switzerland, UK and USA, all specializing in Structural Geology.

Field trips and Oral/Poster presentations were held on alternate days. A total of 39 oral and 24 poster presentations were made. The oral presentations were held in six sessions – (1) Shear zones: geometry and kinematics, (2) Shear zones: initiation and development, (3) Strain localization with regard to fluids, melts and metamorphism, (4) Structures related to strain localization, (5) Physical and numerical experiments of strain localization and (6) Strain localization in orogens: space, thermal and time constraints. The following seven keynote lectures were presented:

1. *Jordi Carreras*: Some problems of coupling strain partitioning, kinematic indicators and tectonic regimes.
2. *Cees W. Passchier*: Complex shear zones.
3. *Laurel B. Goodwin*: Evaluating controls on, and the rheologic significance of, deformation localization.
4. *Neil Mancktelow*: Brittle precursors, fluid-rock interaction and the localization or spreading of shear zones.
5. *John W. Cosgrove*: Rock anisotropy, buckling and strain localization.
6. *Scott E. Johnson*: The effects of strain localization and shear zone development on elastic anisotropy at a variety of scales.
7. *John Watkinson*: Deformation localization in orogens: spatiotemporal and thermodynamic constraints.

Apart from the above, several other interesting oral presentations were made. Amongst other topics, these led to deliberations on (a) structural gradients and brittle ductile behavior during high temperature solid-state deformation (b) shear zones between blocks with no differential block movement (c) partitioning of strain and vorticity across shear zones (d) stress-driven melt-segregation (e) kinematics of melt-present deformation zones (f) fabric analysis in syntectonic granites (g) strain localization at seismic scale (h) shear localization around porphyroblasts and porphyroclasts (h) cracks as initiators of sheath folds (i) control of olivine plastic anisotropy on structural reactivation (i) evolution of microstructure and rheology in simple shear (j) strain localization in hot orogens and also during dome formation. The discussions brought to light several interesting points and questions such as:

a. Commenting on the type of regional shear (simple/pure) based on asymmetry needs to be re-looked.
b. Change in stress field or rotation of rock may lead to flipping of foliation through the flow plane and going into the shortening field of the strain ellipse.
c. Influence of muscovite and biotite on shear strain is different.
d. Does fracture induced hydration cause localization more readily than pervasive fluid flow?
e. What is the role of metasomatism in the formation of shear zones? What drives widening – mineral reaction, porosity change, textural variation? How important is the role of disequilibrium between nucleated shear zone and metastable host rock in controlling widening of shear zones.
f. Effect of magnitude and orientation of anisotropy on deformation geometry.
g. Original orientation of layer with respect to flow plane and original geometry (tight or open) play an important role in localization of structures.
h. Olivine a, b and c axis have different stiffness and hence different seismic anisotropy, which can be related to mantle shear zones.
i. Can cracks perturb flow to generate sheath folds?
j. Normal stress is important during simple shearing of anisotropic materials.

Two earth scientists from India attended the conference. Manish A. Mamtani (Indian Institute of Technology, Kharagpur) made an oral presentation on *"Fabric analysis in granites: integrating field, microstructural and magnetic anisotropy data"* and Sayandeep Banerjee (Calcutta University, Kolkata) made a poster presentation on *"Evolution of microstructure in a Precambrian shear zone from eastern India"*.

Field trips included a visit to key areas of the pre-Variscan metasedimentary sequence of psammites and pelites including igneous intercalations and Variscan granitoids. In the metasedimentary units several interesting structures are preserved, many in three-dimension, which provides a unique opportunity to understand and discuss their genesis. These included – sheath folds, shear bands, drag folds, sheared leucocratic dykes, dissection and offsetting of ductile shear zones by brittle fractures, influence of later shearing on synthetic and antithetic shear bands, rotated quartz rods, boudinadge/apparent boudinadge, complex shear zones, pseudotachylites, intramylonitic folds and imbricate structure developed on quartz-feldspathic bands. Thefield trips generated considerable interest and led to exciting on-field discussions. The papers presented during the conference will be peer reviewed for publication in a special issue of the *Journal of Structural Geology*.