MEETING REPORT

DST-sponsored field workshop

A DST-sponsored field workshop on 'Deformation style in the Great Boundary Fault around Chittaurgarh, Rajasthan', was held on 26 and 27 January 2013, with the participation of research students and faculty members from different academic institutions in the country. The field trip was led by D. C. Srivastava (IIT Roorkee), in which the participants could identify and interpret mesoscopic planar and linear structures in Great Boundary Fault.

The Great Boundary Fault as a major tectonic lineament with NE extension for about 400 km has a great tectonic importance in the geology of Rajasthan as it separates the Meso- to Neoproterozoic Vindhyan sedimentary rocks from the Late Archean (2500 Ma) Berach Granite and the low-grade metamorphic Palaeoproterozoic volcano-sedimentary rocks of Hindoli Group (earlier assigned to Aravalli System by Heron in 1953). Some geologists consider the Great Boundary Fault to be of pre-Vindhyan in age. The kinematic indicators/structures observed in greater detail in three sections in the vicinity of Chittaurgarh, revealed that Vindhyan rocks were subject to brittle and brittle–ductile shear during the transpressional deformation along the Great Boundary Fault, implying that the Great Boundary Fault, even if it constituted the Vindhyan basin boundary, must have been reactivated after the basin was filled and uplifted.

The Fort section at Chittaurgarh shows impressive outcrops indicative of deformation in the fault/shear zone. Here synclinally folded Kaimur sandstone with en echelon quartz veins (tension gashes), conjugate pair brittle–ductile shear zones and thrust faults can be seen. Core part of the Great Boundary Fault is exposed in the Berach river section, where superposed folds, concordant and discordant ductile shear zones as well as small brittle faults in the Nimbahera shale of the Lower Vindhyan Group are exposed. Examination of these features was followed by a study on the nature of deformation and petrogenesis of the Berach granite exposed near Bassi village on the hanging wall of the Great Boundry Fault. The 2 km long Railway section near Bassi exposes the main central part of the Great Boundary Fault. Here non-cylindrical, non-plane folds and brittle–ductile shear zones as well as brittle thrust of a 5–15 m extension were studied in the Sawa sandstone and Sawa shale beds.

The participants were successful in deducing sense of shearing from the kinematic indicators recorded in the Vindhyan rocks of the three sections. They were also able to deduce lateral and vertical displacements along faults and shears in the studied sections. Observations in a series of outcrops on both days provided students with the opportunity to improve their critical thinking skills and to develop an understanding of the stratigraphic sequence of the Vindhyan rocks.

The Department of Science and Technology (DST), New Delhi facilitated the convergence of experts and young researchers on the spectacular outcrops of the Great Boundary Fault. Experts had brain-storming discussions on several outcrops, whereas the young graduate students learnt the art of critical observations and the significance of evidence from outcrops in framing a big regional picture.

Such programmes are sure to motivate graduate students who can acquire a solid foundation on which to build a successful career in geology. Although many earth sciences institutes work tirelessly to provide a foundation of the geological studies with ample field excursions, field geology is becoming a neglected science for some reason. It is therefore highly desired if field training programmes in structural geology like the one discussed here could become a regular feature so that trained manpower is developed in a short time in the country.

The geologic education differs from other branches of science in its emphasis on fieldwork in order to study the Earth materials and its changes. Some geologists conduct experiments in the laboratory under controlled conditions, as do physicists and chemists. But nature has already conducted the experiments and the geologist is faced with deducing the conditions under which a particular geological event occurred. DST has been encouraging such field workshops on earlier occasions also and each time about 15 graduate students get trained mainly in structural analysis. It is time that experienced faculty in other branches of geosciences come forward to shoulder the responsibility of conducting about six field trips in well-studied areas in the country. Active geologists need to seek new knowledge by their research, which includes data collection in the field, besides those collected in the laboratory and library to test a hypothesis. We must realize that there is a rapid increase in field studies in recent years and Indian students need exposure to rocks by learned geoscientists.

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