

Superposition from India

Ghosh, S.K., Sengupta, S. and Mandal, N. (editors) 1995 *Progressive and superposed deformations* Special Issue, Indian Academy of Sciences, Volume 104, Number 3.

This collection of 14 papers on progressive and superposed deformations marks an important event in Indian structural geology. The conference of this title in October 1993, at Jadavpur University, was the occasion when the Indian Tectonic Studies Group was initiated. As it is remarked by the Editors in the preface to the volume, there have been few opportunities for interaction among Indian structural and tectonic geologists, and research has accordingly been quite dispersed. It is hoped that the ITSG can continue to bring geologists in the region together, and to encourage special publications.

I do not intend to review the 14 papers in this volume on an individual basis, but to give a general flavour of the contents. This is a valuable collection of current research from Indian Universities, and the title reflects the problems facing structural geologists in this region. Papers address complex structures in Precambrian rocks of Rajasthan and Dharwar provinces and in the Singhbhum shear zone, reveal a wealth of small-scale structural information and illustrate some beautiful poly-phase structures. The Indian tradition of theoretical and model-based research and careful attention to geometrical problems are maintained by some of the contributions to the volume, which nicely complement other field-based contributions. The interplay of brittle and ductile processes of metamorphism and intrusion, and mineralisation, are also considered in this useful collection of papers.

Progressive and Superposed Deformations is not a stand alone text book, but this Special Issue of the Indian Academy of Sciences nevertheless deserves the attention of geologists interested in polyphase deformation, particularly those with interests in the Indian Subcontinent.

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Fractography Collection

Ameen, M.S. (editor) 1995. *Fractography: fracture topography as a tool in fracture mechanics and stress analysis*. Geological Society of London Special Publication No. 92. 240pp. List price \$93/£50 for non-members, \$48/£29 for members.

In the introduction the Editor informs us that "The discipline of fractography (as a science) in geology is...new...", and defines fractography as "the science which deals with the description, analysis and interpretation of fracture surface morphologies (fracture topographies) and links them to the causative stresses, mechanisms and subsequent evolution of the fractures" (p. 1). Given this definition, and the title of the volume, one would expect much of the volume to deal with new quantitative methods for understanding fracture surfaces. Many of the papers, however, use the same methods of analysis as were used by Hodgson (1961) in his classic studies of jointing in the Colorado Plateau. This is true even for the two long contributions to the volume by the Editor, which are largely on patterns of fracture traces, rather than on the interpretation of surface topographies. Thus I do not feel that the title of the book and the opening paragraphs of the introduction represent the contents of the volume. Many of the authors use the term fractography in their papers, although I do not think they necessarily use the same definition as the Editor.

This volume contains 11 chapters, each of which was presented at a joint Petroleum Group-Tectonic Studies Group meeting held at the

Geological Society in September 1993. The book is broken down into two parts: fractographic studies (8 chapters), and non-fractographic studies (3 chapters).

The volume starts with an introduction by the Editor, tracing the history of fractographic studies. In the Editor's opinion this is an undervalued field of geology, and this volume is the first thematic volume on fractography in geology; although there certainly have been other recent books on the subject (e.g. Bahat 1991, Kulander *et al.* 1990). Given the large number of fracture studies in the literature I would not agree that this is an undervalued area of endeavor. With the exception of the papers by Cosgrove and Gross *et al.* (which are not considered fractographic studies by the Editor) there is no application of fracture mechanics and stress analysis to understand surface morphologies (as suggested by the volume title). Fracture surfaces have been described in detail for some time (e.g. Hodgson 1961, Engelder 1985), and there is nothing new in the procedures or processes presented in this book.

An attempt to look at surface characteristics with respect to different fracture types is the subject of the first paper (Aydan & Shumuzu). These engineers have measured profiles on different types of fractures and sedimentary structures. Their conclusion was that they could not distinguish any differences between fracture types. Part of the problem may come from the fact that engineers have a very different view of fractures than geologists do. Other studies of fracture surfaces include work by Jessell *et al.* on anisotropy of surface roughness from an analysis of photographs of fracture surfaces. The paper summarizes (but gives no details) of a method for measuring surface roughness to look for fractal behavior. The paper compares the photogrammetric method with other methods, but does not go into any details of characterizing different fracture surfaces.

Although the volume has weaknesses in its overall structure, it does contain some nice contributions: Bankwitz & Bankwitz on an analysis of fractures in core recovered from a deep well in Barvaria; Kulander & Dean who describe various surface features of joints; and Goodwin's description of joint geometry in chalk are nice contributions that use well-established techniques to study fractures. Two more quantitative papers worth mentioning are those by Gross *et al.* who explore factors controlling joint spacing in interbedded sedimentary rocks, and the paper by Cosgrove on the importance of a large differential stress on controlling a fracture pattern—a high differential stress will give a very organized fracture pattern, whereas a low differential stress gives a less-well organized pattern.

In summary there are some nice contributions in this book, but they are relatively routine in the nature of the work, and some have already been published elsewhere. Aside from these contributions, the contents do not live up to the volume's promise of providing tools for reading fracture topography, or even providing examples of new progress in this area. So I did not feel that the book lived up to its title, or the expectations I had after reading the introduction. All the papers in the volume apply standard structural analysis techniques to fracture patterns, and present nothing very new in fractography.

REFERENCES

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