PROTEROZOIC OROGENS OF INDIA – A CRITICAL WINDOW TO GONDWANA by T. R. K. Chetty. Published by Elsevier, 2017, Pages: 426, Price: US$ 79.95

There are a number of descriptions, reviews and books on the various cratons that comprise the Indian shield. Most of these describe the geology of the individual cratons, with little or no reference to the processes that amalgamated these disparate units to form the shield. Recent studies indicate that the cratons were possibly amalgamated along intensely deformed and metamorphosed mobile zones that may well represent ancient equivalents of the Himalayas and Alps, the culmination of continent-continent collision processes in the Proterozoic. Strangely, these ancient orogens have not been the dedicated subject of any book, and a conscious effort does not appear to have been made to interpret the geology of these belts from a plate tectonic perspective. It is for this reason that this book by T. R. K. Chetty is an interesting and important contribution to the available literature on Proterozoic orogens of India. Chetty has enviable experience of working on precisely this aspect of the Indian shield, and much of his work has been, and still is directed towards identifying and characterizing the tectonic processes associated with these mobile belts or Proterozoic orogens.

The book discusses four major Proterozoic orogens of India – the Southern Granulite Terrane, the Eastern Ghats Mobile Belt, the Central Indian Tectonic Zone and the Aravalli-Delhi Orogenic Belt, within an uncommon framework that attempts to assess their importance in the formation of the Gondwana supercontinent. The author has personally contributed substantially to the scientific dataset available from the first two orogens, but has also integrated information from a wide variety of sources along with his own personal perspective. He has also extensively covered the two orogens that were not subjects of his personal research, and has successfully integrated them into the framework constructed for the other two orogens.

The book is divided into a sequence of six chapters. The book begins with an introduction that outlines the basic concept of an orogen, and then defines the terminology that is used in this book to characterize Proterozoic orogens. The introduction is engaging as well as informative, and has the requisite historical documentation of the evolution of certain geological terms. The structure of the chapter is logical, and the combination of features that are used to identify orogens in the Indian shield are listed and defined. This is followed by separate chapters on each of the four orogens mentioned above. Each chapter divides the individual orogens into units (blocks, sectors or terranes) separated by distinct structural discontinuity zones (shear zones), and discusses each unit and discontinuity from the perspective of its structure, along with available metamorphic, geochronologic and geophysical data. For each such unit or discontinuity zone, the collated information is integrated into a plausible tectonic model through a section that is described as a 'synthesis'. This approach is perhaps what sets the book apart from others of its genre, as it emphasizes the importance of integrating information from various methods, including geophysics, if a viable tectonic mechanism is to be devised. Description of the individual orogens is adequate, and I consider it unnecessary to go into critical evaluation of the individual descriptions of the respective terranes, since aspects that may be missing are in any case available from a large body of existing, accessible literature. What sets this book apart is its approach, which concentrates on collating the information relevant to the formulation of the tectonic model.

The most unique aspect of the book is the last chapter, in which the orogens are described in the context of their relevance and contiguity with other orogenic belts that were utilized to construct Gondwanaland. The Indian orogens are compared and correlated with their supposed counterparts in other Gondwanaland fragments. The comparison is effected mostly by correlating radiometric ages. Unfortunately, the structural, metamorphic and geophysical information is not fully utilized for establishing these correlations, which is a little baffling since this information has actually been collated in the four chapters describing the orogens. In all, however, this chapter is potentially very useful for those interested in the position of India in reconstructed Precambrian supercontinents.

The treatment of the individual orogens is comprehensive and incorporates most recent references relevant to a tectonic interpretation. This is done largely without obvious partiality towards views that disagree with those of the author, which is commendable. However, there are instances where more classical, field-based studies appear to have been overlooked, and this could definitely be cited as one of the few short-comings of the book. An aspect that may also be construed as a weakness is the absence of hard data, apart from an occasional geological map with complete fabric orientation information. Indeed, many of the structural sections are schematic in nature, and sketches of individual outcrop sections lack supporting field structural data, which somewhat limits their usefulness. Field photographs are also lacking; these would certainly have been useful in representing key mesoscopic structures that form the bases of critical interpretations. Another aspect that is entirely missing is microstructural information. Considering that this book describes a number of major shear zones, photomicrographs and petrofabric information from these zones would have been of great value in places where they are available.

Any book that deals with a topic as broad as this is bound to have lacunae, and I have pointed out some of these. However, what makes this book particularly enjoyable is its language. The book is an excellent read, and is written in an extremely lucid manner. Given the topic, this is possibly best suited to a more specialized readership of people involved in research on mobile belts and their global tectonic significance. For a first hand reference on mobile belts in the Indian shield, I would be hard-pressed to think of an alternative to the "Proterozoic Orogens of India – a critical window to Gondwana" at the present time. I would personally thank Dr. Chetty for deciding to write a book on this topic at this juncture. Given the focus at present on supercontinent formation, and the role of mobile belts in assembling them, I am sure that I will not be the only delighted reader.

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