be useful for students. Features of event beds are described. However, there are many other types of event beds found in sedimentary successions which are not described.

Analysis of sedimentary succession is usually aimed to reconstruct the depositional environment which helps to understand the palaeogeography and basinfill history. The chapter on palaeogeography gives only a basic idea of the problem, but does not show how to use data collected in field on sedimentary succession for palaeogeographic analysis. The concept of sequence stratigraphy has been recently developed and helps in understanding the processes causing changes in sedimentary successions. A useful summary of the principles of sequence stratigraphy is given. It would have been good to have field criteria and examples to identify different types of sequence boundaries and sequence–boundary surfaces. The chapter on basinfill is also short and sketchy. The authors have included as appendix the code of stratigraphic nomenclature which I am sure would be useful to most of the readers, as it is not readily available in any textbook.

Overall, the book is well-written with many good illustrations. Despite emphasizing only certain aspects of sedimentary succession study in the field, it is a useful contribution.

To sum up, the book is a useful contribution to sedimentology using field methods. It gives an exhaustive account of sedimentary structures and their utility in interpretation of the succession. The book is well illustrated with a large number of sketches and photographs. It will be useful to students and to teachers of sedimentology and those organizing field courses in sedimentology. Published in India, the price is affordable to both the student and teaching community.

I. B. SINGH

*Department of Geology,*
*University of Lucknow,*
*Lucknow 226 007, India*

**Tectonics of Southern Granulite Terrain: Kuppam–Palani Geotransect. Memoir 50.** M. Ramakrishnan (ed.) Geological Society of India, Gavipuram P.O., Bangalore 560 019. 2003. 434 pp. Price: Rs 500/US$ 50.

The book under review is a collection of 17 papers, including three overviews, most of which developed from a multidisciplinary and multi-institutional research initiative to study the deep continental structure of the southern peninsular India – a work sponsored by the Department of Science and Technology under the Deep Continental Studies Programme. The importance of this region stems from the fact that it hosts the two parallel east-west trending, morphologically well-expressed, continental scale zones of ductile deformation. These are called Moyar–Bhavani and the Palghat–Cauvery shear belts and they fringe a much older crustal block of Dharwar craton (> 2500 m.y.). Published as a memoir of the Geological Society of India, the book deals with the geological and geophysical evidence collected along a 300-km-long transect – a corridor starting from Kuppam in the north and ending near Palani in the south, which encompasses part of the Dharwar craton and passes soon into the granulitic belt of southern peninsular India. The papers in this book primarily deal with the interpretations on the origin of the shear zones, their role in the Precambrian geodynamics and their relation to the Dharwar craton.

The southern granulite terrain (SGT) offers a rare type area that showcases one of the most ancient remobilized crusts in the world. These terrains preserve the imprints of early earth processes (initial forms of plate tectonics) that occurred between 2500 and 550 m.y. ago. This 1950 m.y.-long interval, representing about three-fourths of the earth's history, may have seen several cycles of rifting, plate movement, subduction, collision and mountain-building or other variants of these processes. As the rocks are buried during collisional episodes, their mineralogy changes during metamorphism and later, these lower crustal rocks (high-grade rocks of granulitic composition) return to the surface as the crust is exhumed or transported possibly along thrust faults. Obfuscated by eons of erosion and magmatism, what remains today are some hazy indicators of ductile deformation preserved in the rocks concentrated along some linear zones. Resolving the spatial and temporal aspects of the tectonic activities that took place billions of years ago can therefore be likened to solving an extremely difficult crossword puzzle. Some vague and complicated clues remain latent in these puzzles, but the odds of getting the correct picture depend on the chance encounter of the right indicators. But how do we know if the clues themselves are correct? As in a crossword puzzle, the right clue should not only make a perfect match locally, but it should also fit with the larger picture. The book under review tells us how some of our best geologists and geophysicists approached similar problems that display nuances of a jigsaw puzzle.

The book contains four broad sections – overviews, geophysical studies, structural geology and a final section consisting of varied topics of geochronology, geochemistry and petrology. The overview section starts with a perceptive article by M. Ramakrishnan, who also is the editor of this book. The article presents an exhaustive review on the status of Precambrian studies and goes on to build up a global perspective on the focal theme in terms of Pan African mountain-building activities (900–550 m.y. ago) and its relation to Precambrian tectonics and the Gondwana assembly of supercontinents. The article by K. Gopalakrishnan highlights the evolution of SGT by amalgamation of a number of microcontinents. T. M. Mahadevan in his overview, however, strikes a different note and cautions against the generalization of Precambrain tectonics in terms of collision models alone, and emphasizes the importance of vertical tectonics that may have been synchronous with thermal episodes at 2500, 750 and 550 m.y.

The articles under the second section deal with geophysical studies conducted along the transect corridor. Research groups from various organizations (mainly from NGRI, Hyderabad) have contributed to these efforts. The seismic reflection and refraction studies (Reddy *et al.*), magnetotelluric investigations (Harinarayana *et al.*), deep-resistivity studies (Singh, S. B. *et al.*) and heat-flow studies (Roy *et al.*) come up with the fact that the older Dharwar craton and relatively younger SGT show contrasting crustal properties in terms of thickness, resisti-

vity and heat flow. The gravity and magnetic anomalies (Singh, A. P. *et al.* and Rajaram *et al.*) also support the distinctiveness of the two crustal blocks, their collision and subsequent thrusting of the SGT block along the terrain boundaries. Considering this background, the palaeomagnetic results from basic dykes in Dharwar craton and parts of SGT (Radhakrishna *et al.*) suggesting end of crustal movements since 1650 Ma, are quite intriguing. If this were the case, how do we account for the subsequent orogenic phases, in particular, the Pan African mountain-building activities, presumed to have occurred between 900 and 550 m.y. that affected a large part of the Gondwana supercontinent? The isotopic age data from the region discussed elsewhere in the book, however, seem to support younger tectonic events.

The articles on the surface structures of shear zones (third section) reveal that the regional tectonic trends obtained by the geophysical modelling might look more chaotic at the outcrop levels. The question whether these differences in perception are a matter of scale or are of fundamental nature cannot be easily answered at the moment. A. K. Jain and his colleagues record the continuation of Dharwar structural trends to the south of Moyar shear zone, thus ruling out terrain boundary at this zone, but favour the theory that both the shear zones (Moyar–Bhavani and Palghat–Cauvery) show characteristics of dextral movement. T. R. K. Chetty and others also model the Palghat–Cauvery shear zone to have formed in a transpressional regime (with both dip- and strike-slip components) and believe that the Moyar–Bhavani zone is a Palaeoproterozoic thrust between the SGT and the Dharwar craton. Mukhopadhyay and others record evidence of N–S shortening near a site called Namakkal within the Palghat–Cauvery shear zone with no strike-slip component. How do we reconcile these varied inferences? One option is to study the entire shear zone comprehensively, rather than in sectors – as suggested by M. Ramakrishnan in his introduction. But the given format of 'geotransect' does not give the flexibility of extending the study laterally. From a theoretical point of view, it is also important to analyse the possible disparity in the level of crustal exhumation along various shear zones, a caveat mentioned by T. M. Mahadevan in his overview article. These points assume significance in the light of recent studies of the active transpressional plate boundaries (oblique convergence zones) in Southern Alps, New Zealand which have identified the influence of depth and rheology in separating lateral and convergent strain components. Therefore, the dominance of textural components representing either the dip-slip or the strike-slip mode of deformation in a particular site may depend on the level of crustal exhumation at a particular site. For example, a deeply exhumed oblique boundary (root zone) might display structures dominantly representing 'orogen-parallel' motion, whereas relatively higher level of crust may show structures mostly corresponding to convergence and these crustal level variations need not be necessarily associated with any change in plate vectors.

The fourth section of the book consists of themes related to geochronology, geochemistry and petrology, and their application in identification of characteristics of various geological terrains within the SGT and their boundaries. This part of the book starts with an article based on a new set of isotopic age data (Bhaskar Rao *et al.*), in which five geologically distinct domains in the region are identified. They also recognize the Moyar–Bhavani shear zone and another one located south of Palani (named as Karur–Oddanchatram shear zone) as representing the terrain boundaries. The metamorphic evolution and characterization of the continental crust forms the theme of two papers under this section. The paper by Srikantappa *et al.* deals with rock-types present along a transect that crosses both the Moyar–Bhavani and Palghat–Cauvery shear zones (from Vellar to Dharapuram), whereas the paper by Ravindra Kumar and Sukumaran focuses on the petrological and geochemical features of the granulitic rocks near the Alattur area within the Palghat gap and their significance in their genesis as fractionated units from a single magmatic source. Based on the petrological characteristics, Harish Kumar *et al.* present a geodynamic model of lateral accretion and subduction rather than collision tectonics for the eastern Dharwar craton. Although the rest of the articles in this book overwhelmingly favour a generalized model of collision tectonics, this article reminds us that the one-size-fits-all approach may not be appropriate for modelling the Precambrian tectonism, as our understanding of many of its aspects is still fragmentary.

The articles in this book reflect a representative cross-section of the diverse research on the tectonics and geology of the SGT and parts of the Dharwar craton. These studies have added new information to the current understanding of the deep crustal structure of the SGT, kinematics of the shear zones and chronological constraints on the tectonic evolution of the SGT terrains. In particular, the geophysical studies have generated an extensive database on the velocity structure of the crust. Traditionally, geologists are handicapped by their lack of knowledge on the structures at depth. This should not be a major hindrance any more. Imaging of the deeper horizons by geophysical techniques (e.g. deep seismic reflection, magnetotelluric, deep electrical sounding, gravity and magnetic studies) aids the outcrop studies by the geologists who themselves are now better equipped with the recent improvements in analytical techniques and isotopic dating. The Earth System Science Division and Deep Continental Studies working group under the Department of Science and Technology has done a commendable job by bringing together both the geologists and geophysicists to address a difficult problem. The Geological Society of India has done well by bringing out a valuable compendium to enrich the Precambrian researches in the country.

C. P. RAJENDRAN

*Centre for Earth Science Studies,*
*Akkulam,*
*Thiruvananthapuram 695 031, India*
*e-mail: rajen@md3.vsnl.net.in*