

Book Reviews

GRAVITY FIELD, SEISMICITY AND TECTONICS OF THE INDIAN PENINSULA AND THE HIMALAYAS. R. K. VERMA—Solid Earth Sciences Library. D. Reidel Publishing Company. Price : Rs. 130.

The book presents an overview of the gravity field of India in relation to geology, tectonics and seismicity. For the unfamiliar reader, the author has thoughtfully outlined the principles of reduction of gravity data as well as explained the various schemes of isostatic compensation and methods of computation of isostatic anomalies. There are individual chapters devoted to the Gondwana Basins, Dharwar and Bastar provinces, the Eastern Ghat belt and the Singhbhum area. The gravity picture over the Himalayas, Northeast India and North Burma has been discussed in relation to seismicity and tectonics. There is also a chapter on satellite gravity over the Indian subcontinent and the surrounding region. A notable feature of the book is the quantitative interpretation of significant gravity profiles in terms of subsurface models.

The major topographic features of the Peninsular Shield comprising the Aravallis, Vindhya, Satpuras, Western Ghats, the Nilgiri and Palani-Cardamom hills do not show the inverse relationship between gravity and elevation that is characteristic of isostatic compensation. Regional compensation has been inferred, therefore, for these hill masses as compensation may involve not only the Moho but even the lithosphere. The well-known geoid anomaly in the Indian Ocean lends some credence to it.

Gravity profiles across the Gondwana Basins and Dharwar schist belts throw some light on their structure. While the Godavari valley is suggested to be a rift the rest of the Gondwana basins are indicated to be controlled by normal faults and thus, corroborative of the prevailing geological view. The Shimoga schist belt appears to be a broad and shallow basin, while Chitradurga and Sandur belts are suggested to be fracture-controlled, narrow and deep. Gravity evidence points to the emplacement of large granitic bodies and certain high density rocks like gabbroic anorthosites, gabbros and pyroxene granulites in different areas of the southern Peninsula.

There is a pertinent reference to the boundary between Coastal Granulite Terrain (CGT) and the Dharwar/Bastar provinces. The gravity profiles across this feature are indicative of two distinct crustal blocks, of which the CGT has a larger thickness as compared to the Cuddapah/Bastar block. According to the author, this model is in conformity with the view that granulitic terrains of Archaean shields are usually underlain by thicker and denser crust as compared to terrains of lower grade metamorphism such as greenstone areas. He also points out the consistency of his model with Woollard's observation that 'as the crust thickens, the density also increases to maintain isostatic equilibrium'.

In striking contrast with the Peninsular shield, the Himalayan region is tectonically active, with the Indian plate pressing northwards. Isostatic equilibrium has not been attained and, in fact, geodetic evidence is indicative of appreciable movements still taking place along the various thrusts and fault zones. Focal mechanism solutions have been reproduced from several workers and it is concluded that thrust faulting represents the predominant mechanism of energy release. The observed correspondence between seismicity, depth of foci and negative isostatic anomalies to

the east of Arakan Ycma has also been cited to suggest that subduction processes are still operative. The lithosphere under the Eastern Himalayas is apparently experiencing compression resulting in the continued uplift of the Shillong plateau. Models for the evolution of Northeast India and the Himalayas, in general, have been presented as proposed by different workers.

While the author deserves to be complimented for his efforts, the book falls short of its ambitious title to an extent. For instance, important segments of the subcontinent have been virtually left out with but a passing mention in Chapter-3. These include the entire Deccan trap, the various Proterozoic basins of Southern and Central India, the Aravalli region as well as the Cambay Basin in the northwest. These deficiencies notwithstanding, the book is an asset for students and professional earth scientists alike.

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SHEET EVOLUTION OF CONTINENTS A MORPHO-STRUCTURAL APPROACH. By K. P. Rode—Himalaya Publishing House, Bombay, 1986, pp. 250, Figures 112, coloured plates, 24, Price Rs. 325.

The fact that concept of sheet movement and continental expansion first suggested by the author in 1952 has remained deeply entrenched in his thinking over a period of three decades, despite the advent of widely accepted concepts of plate-tectonics and sea-floor spreading, speaks of his personal conviction of the validity of his theory. Rode's concept stems from his identification of the morphogenic wonder of the globe centering around Tibet-Himalayan region, where he presumes all the sediments accumulated in closely set basins like a pile of books; with the basal part becoming mobile into which magmatic fluids permeated leading to upheaval and folding of sediments. When this pile tilted, the sheet packet got detached and gravitationally moved in all directions with the top pile migrating further and the basal ones stopping at shorter distances. With the fall of temperature and consequent solidification of intrusive magma, there was cessation of movement of sheets but, with the shifting centres of volcanic activity away from the continental border towards deeper seas a new series of lateral movements of sheets took place. This is how he explains the present architectural development of the globe. In support of this, he cites several geomorphic expressions on the globe like similarity of coast lines, river courses, rift valleys, submarine features, marine shelves, island arcs, oceanic trenches, diapirs and even unconformities as indicators of sheet movement. Rode dismisses the latest attempt of plate tectonics as assumptions 'which hardly stand scrutiny'. Can not the same remark apply to his sheet movement?

This review is out of place for any comment on the author's concept, but the doubt remains as to what extent science can accommodate a dogma. However, one aspect which stands aloft after reading through the book is the scholarship and the understanding of the global morphogenic features which the author has displayed in his writing. This alone compels the possession of this book, but unfortunately the price is high, thereby minimising its wide reader accessibility. But all geoscience libraries should have this book as a reminder of the long effort and independent thinking of an eminent professor.

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