of the SR model to renewal models of earlier researchers.

Enescu and Ito report detailed analysis of seismic activity between 1996 and 1998 in a broad area surrounding the 1995 Kobe earthquake. Various precursory changes, such as quiescence followed by increased seismicity, b-value and fractal dimension, were reported before the occurrence of the main shock.

Arabelos et al. report underground water level and temperature changes with respect to earthquakes occurring during 1988-1989 in a seismically active area close to Thessaloniki, Greece. The magnitude of the underground water level change varies from 3 to 10 cm and that of temperature from 0.3 to 0.8°C. They applied a graphical method in order to detect observations that may unduly influence the sample autocorrelation coefficients. They observed a correlation between magnitude of earthquake and the magnitude of changes (level or temperature) of the underground water.

Popescu and Radulian report the source characteristics of two seismic areas in the eastern Carpathians foredeep region, Romania. The application of empirical Green's function deconvolution is proved to be highly efficient, and the recent broad band networks offer good opportunities for better constraints of the seismic source of future sequences in the region.

Giovambattista and Tyupkin report the relation of the time-to-failure model to the hypothesis of fractal structure of seismicity. The results of application of the long-periodic time-to-failure model to the analysis of the process of acceleration of seismic energy emission in the laboratory experiments on rock destruction and before strong earthquakes on Kamchatka and in Italy are also presented.

In the last paper, Gupta advocates intense monitoring of precursors in Koyna-Warna region in western India. This he feels, is an ideal site where earthquakes occur in a small area of 30 km x 15 km. Some precursory changes in b-value, fractal dimension, swarms are observed before moderate magnitude events in this area.

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## METALLOGENY OF THE BARBERTON GREENSTONE BELT

A summary of the "Metallogeny of the Barberton Greenstone Belt, South Africa and Swaziland" by J.H.W. Ward, published by the Geological Survey of South Africa in 1999 is presented in the following.

The Barberton Greenstone Belt is internationally renowned for its antiquity, preservation, exposures, lithologies, early life forms, structure and mineralisation. The Council of Geoscience has undertaken a metallogenic assessment of the region by a compilation of the mapping and other information on record, made available in various publications and otherwise by mining houses, research institutes, individual researchers and others, to produce a metallogenic map of the greenstone belt on 1: 100,000 scale. The process of compilation has facilitated a synoptical appreciation of the geology, structure, tectonogenesis and mineralisation of the region and has resulted in the publication of this memoir. To keep up the continuity of information over the entire greenstone belt extent, the South African Geological Survey has made a very commendable effort in incorporating the data from the adjacent kingdom of Swaziland over which the belt also extends.

Over the past century, more than 320 tons of gold have been won from mine workings on disseminated and lode gold deposits in the early Archaean Barberton Greenstone Belt. Additionally, some 28 Mt of high grade haematite ore, 5 Mt of chrysotile asbesots fibre, 500 000 t of magnesite ore, 1 25 000 t of talc and 56 000 t of crude barytes have been produced from the opencast and underground mines in the belt. Minor amounts of stibnite, cinnabar, cassiterite, and verdite have been recovered from prospects in the area. Extensive exploration for the ultramafic-mafic greenstones for nickel-copper sulphide ore bodies has located only one minor strata-bound deposit, while one small zinc-silver massive sulphide ore body has been discovered in the felsic volcanic rocks.

An overall account is given of the regional geology, as well as a more detailed description of the geology and mineralisation of the significant ore bodies, together with an appraisal of their metallogenesis. The book comprises chapters on antimony, barytes, chrysotile, gold, iron, magnesite, mercury, nickel-copper, talc, tin, verdite and 'buddstone', and zinc arranged in an alphabetical order,

than their strategic importance. In addition, a general summary is provided of the base- and precious-metal exploration which has been undertaken in this greenstone belt over the years. Tables compiled from the South African Mineral Deposit Database, which lists 433 economic mineral deposits and occurrences in the greenstone belt, are included as an appendix.

The Barberton Greenstone Belt represents an Archaean volcano-sedimentary terrain enveloped by invasive sial marking the geotectonic foundations and setting of the deformed depository. In addition to giving the stratigraphy, structure and metamorphism of the belt, the evidences for compression and inversion of the Barberton basin as a fold-and-thrust belt is recorded and interpreted, for modelling purposes, as a response to a primitive Wilson cycle.

Economic mineralisation in the belt is classified into three distinctive metallogenic groupings in terms of the major episodes of crustal shortening and accompanied compression and inversion of the Barberton basin.

Precollisional mineralistion is evidenced by syngenitic iron protore, stratiform barytes deposits, and a small Kuroko-like massive sulphide ore body. Syncollisional mineralisation is represented by epigenetic chrysotile-fibre deposits in serpentinised and deformed sill-like layered ultramafic bodies. Post collisional mineralisation is manifested by epigenetic, mesothermal-hypothermal, disseminated and lode gold ore bodies, and by epithermal stockworks of magnesite. Details of the mineralisation are recorded, analysed and interpreted in terms of the evidence for the geotectonic setting and metallogeny of the Barberton Greenstone Belt, as well as the general prospecting potential of the host rocks.

The author J.H.W. Ward, and the editors, Council for Geoscience, Geological Survey of South Africa deserve congratulations for producing a very informative and absorbing publication with an orientation on mineral deposits. The book is replete with very well produced geological and structural maps, cross sections, three dimensional block diagrams, presentation of all available petrological, mineralogical, isotopic and geochronological data and an extensive bibliography. The book makes an interesting reading for its scientific content, the clarity of the geological maps produced with soft colour schemes, and well reproduced photographs.

*(The memoir is available for sale from the Director, Council for Geoscience, Geological Survey of South Africa, 280, Pretoria Street, Silverton, Pretoria, 0001. A copy of the same is available for reference at the library of the Geological Society of India, Bangalore).*

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## GEOMORPHOLOGY AND GEOLOGY OF THE BAY OF BENGAL AND THE ANDAMAN SEA

'Geomorphology and Geology of the Bay of Bengal and the Andaman Sea' authored by V. Purnachandra Rao and Pratima M. Kessarkar forms the Chapter 21 of a two-volume book: **Indian Ocean – A Perspective,** edited by Rabin Sen Gupta and Ehrlich Desa (NIO, Goa) and published by A.A. Balkema in 2001. In the introduction, the authors briefly mention the uniqueness of the Bay of Bengal in reference to its sedimentary record and trace the history of geological and geophysical studies in Bay of Bengal and Andaman Sea dating back to the 19th century commencing with the Challenger Expedition (1872-1876). Major physiographic features of the area are described under Geomorphology. Detailed description on shelf-slope characteristics of the Eastern Continental Margin of India with generalized bathymetric profiles at selected places is given. Brief mention has been made on the submarine canyons/valleys off the East Coast of India and northeast margin of Sri Lanka, which supply sediments to the deep sea Bengal Fan, the world's largest delta. The Bengal Fan covers an area of about 2.8 - 3.0 x 106 km$^2$ (length: 2800 - 3000 km, width: 830-1430 km) between 20° N and 10° S latitudes with a sediment thickness of about 20 km. The most prominent geomorphic feature of the Bengal Fan domain is the Ninetyeast Ridge extending from 30° S to 10° N with subdued expression further north up to 17° N latitude, but has not received the attention of the authors. Similarly, the subduction zone occurring west of the Andaman-Nicobar Island extending southeast along the Sunda-Java-Sumatra trench, and the Nicobar Fan find no mention.

The chief physiographic features of the Andaman Sea