

### Developments in Neotectonics

Whitten, C. A., Green, R. & Meade, B. K. (editors) 1979. *Recent Crustal Movements, 1977*. Elsevier, Amsterdam. 633 pp. Price: hard-cover US \$78.00.

This book, the Proceedings of the Sixth International Symposium on Recent Crustal Movements held at Stanford University in July 1977, is the thirteenth in the series *Developments in Geotectonics* and is a reprint of volume 52 of *Tectonophysics*. It contains 663 pages and comprises 51 papers, 37 abstracts, 2 special reports of related meetings, and Clarence Allen's well chosen words of introduction. Excluding the opening remarks and special reports the book is organized into seven sections of unequal length.

1. Crustal deformation using extra-terrestrial geodesy (62 pp.).
2. Measurement of strain, tilt and gravity (62 pp.).
3. Observed vertical crustal deformation (178 pp.).
4. Geological studies of Holocene deformation (139 pp.).
5. Observed horizontal crustal deformation (64 pp.).
6. Seismology (85 pp.).
7. Experimental and theoretical models (59 pp.).

Undoubtedly the editors were faced with the familiar problem of assigning papers to an appropriate section when their contents overlapped several themes; such as dilemma is likely to arise when a conference proceedings, such as this one, is conceived by a panel of editors who do not exercise firm control at the planning stage and who do not request particular experts to review certain topics.

Although appreciating that reviewer prejudice must operate when selecting a few articles for special mention the exercise is justified when attempting to guide potential readers. I have chosen papers which I believe contain material or ideas of direct relevance to structural geologists; some praiseworthy articles whose appeal is principally geophysical or geodetic are therefore excluded from my list.

'Recent Quaternary tectonics in the Hellenic Arc: examples of geological observations on land' (pp. 267–275) by Jacques Angelier of the University of Paris VI is a clearly written and well illustrated short article which relates an analysis of faults displacing Neogene and Quaternary rocks to ideas about Aegean plate tectonics. It provides for English-speaking geologists an account of some aspects of Angelier's work which is published elsewhere mainly in French.

Using examples from Japan or Peru, the paper on 'Migration of crustal deformation' (pp. 329–341) by Keichi Kasahava of the Earthquake Institute, Tokyo, demonstrates that crustal deformation migrates landwards at velocities of 10–100 km/year, a rate comparable with that of some migrating earthquake foci.

A thorough analysis of 1200 fault-plane solutions of low magnitude earthquakes generated by displacements on the Calaveras and San Andreas fault zones is presented by N. Pavoni of the Geophysical Institute, Zurich in a paper entitled 'A study of earthquake focal mechanisms in the Hollister area, Southern Coast Ranges, California' (pp. 363–371). The author's attempt to show the distribution of *P*-axes of different orientations (his figs. 2 & 3) is ingenious but is less vivid than plotting trajectories.

Perhaps because of its piquant flavour the short paper by D. J. Stierman, E. Zubrow and L. Atkinson of Stanford University on 'Remains of prehistoric human in strata deformed by the San Andreas fault near Stone Canyon, San Benito County, California' (pp. 381–387) attracted my attention. The naturally buried bones which were discovered in river terrace sediments are dated as about 5000 BP and allow the authors to conclude that the active fault zone extends at least 20 m beyond that part of the trace of the San Andreas fault which is being monitored for creep.

W. D. Page, J. N. Alt, L. S. Cluff and G. Plafker in a carefully presented article 'Evidence for the recurrence of large-magnitude earthquakes along the Makran coast of Iran and Pakistan' (pp. 533–547) argue from field observations of raised beaches and terraces that "... uplift occurs as discrete increments along different parts of the coast at different times". They consider that the recurrence of an earthquake of magnitude 8+ is likely within 125–250 years.

'Recent crustal movements in the Sierra Nevada-Walker Lane region of California-Nevada' are described in three separate papers which are parts 1, 2 and 3 (pp. 561–597) of a contribution by combinations of the authors D. B. Slemmons, D. van Warner, E. J. Bell, M. L. Silberman and C. O. Sanders from institutions in Nevada or California. Their linked papers demonstrate the value of integrating seismological, geological and geomorphological observations when attempting to interpret the neotectonics of a region.

Despite these six contributions and about another ten worthwhile papers it is difficult to recommend the purchase considering its price of US \$78.00 and that it has appeared already as volume 52 of *Tec-*

*tonophysics*. Although the inclusion of so many abstracts of less than one page is understandable in the original volume which reported on the symposium it is to be regretted that when the editors/publishers compiled the book they did not take the opportunity either to delete such ephemeral contributions or to request their authors to provide more extended texts. Perhaps the most glaring abuse of retaining an abstract is one which, occupying a page of the book, is a nine-line contribution by four authors in which they conclude that the advantages of a particular instrument will be explained and its features described.

P. L. Hancock

### Progress report on the Arabian-Nubian Shield

Tahoun, S. A. (editor) 1979. *Evolution and Mineralization of the Arabian-Nubian Shield*, Vol. 1. (Institute of Applied Geology, King Abdulaziz University Bulletin No. 3). Pergamon, Oxford. 187 pp., 2 folded maps, 68 figs. Price: hard-cover US \$33.00.

The modern study of the geology of Saudi Arabia can be said to have begun in 1950 when King Abdulaziz asked the USGS to investigate the rocks of western Arabia. Shortly afterwards in 1954 the Directorate General of Mineral Resources was established and since then groups from the United States, France, Britain and Japan have been cooperating with the DGMR in the location and evaluation of mineral deposits other than oil.

The investigations have utilised various techniques; satellite imagery, airborne geophysical surveys, ground surveys and aerial photography—and in 30 years or so a number of deposits have been located, the general outlines of the geology established, and theories put forward for the origin of the Arabian Shield. It seemed therefore to Dr. A. M. S. Al-Shanti of the Institute of Applied Geology of the King Abdulaziz University in Jeddah that the time was ripe to take stock of the current situation, not only in the Arabian Shield but also in the adjacent Nubian Shield.

The result was a symposium convened by Dr. Al-Shanti in February 1978 at which 320 participants from 25 different countries attended conference sessions and took part in field excursions. The papers presented ranged from reviews of the regional geology to accounts of research projects completed, and reports on others still in progress. They are to be published in four volumes of which this book is the first, the others being promised shortly.

The area under consideration includes rocks ranging in age from 1150 to 450 Ma and it was suggested that the term Pan-African should be extended from its original more restricted usage to cover this time interval during which the non-cratonic part of 'Africa' was evolving.

Recent work has provided much information on the distribution of rock types, their ages, geochemistry and associated metallogeny, and there are at present two main schools of thought on the origin of the Arabian-Nubian Shield. One suggests that the shield evolved essentially as intra-cratonic ensialic belts within a basement of older materials, whereas the other proposes that the shield resulted from the welding together of a series of island arcs with slices of ocean floor caught between them. As far as can be judged from the papers published in this volume these two models formed the central theme around which discussion centred.

Volume I is divided into four sections with a variable coverage. Structure and evolution (6 papers), Metallogeny (5), Plutonic rocks (3), Ophiolites (1). The overall plan of the four volumes has not been revealed but it would seem that other papers on these topics will be printed later.

*Structure and Evolution* begins with a rather brief overview of the geology of Western Arabia by Brown and Jackson who began working in the Yemen in the early 1950s and who were coauthors of the 1:500 000 geological map. They propose and describe eight major groups or super-groups in a lithostratigraphic sequence with a geochronological control. The plutonic and associated volcanic sequence has an overall trend from older basaltic oceanic suites to alkaline and peralkaline igneous rocks. Ophiolite suites are recognized and also two metallogenic episodes at 658 and 550 Ma. Unfortunately there is no attempt to delimit the groups on a map nor to display the proposed lithostratigraphy in tabular form (though one does appear later in the book accompanying the paper by Rye *et al.*)

In the second paper Gass proposes an evolutionary model for the Pan-African basement in Saudi Arabia, Egypt and the Sudan. He suggests on the one hand that the granitic rocks might be derived from descending plates from above subduction zones, and yet from the pos-