

# Sedimentation in Submarine Canyons, Fans and Trenches

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Volume 6, numéro 4, december 1979

URI : [https://id.erudit.org/iderudit/geocan6\\_4br03](https://id.erudit.org/iderudit/geocan6_4br03)

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## Éditeur(s)

The Geological Association of Canada

## ISSN

0315-0941 (imprimé)

1911-4850 (numérique)

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## Citer ce compte rendu

Hendry, H. E. (1979). Compte rendu de [Sedimentation in Submarine Canyons, Fans and Trenches]. *Geoscience Canada*, 6(4), 225–226.

## Les Roches Volcaniques, Pétrologie et Cadre Structural

Édité par M. Girod  
*Doin Editeurs, Paris, 239 p., 1978.*  
\$38.40

Revu par R. Laurent  
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Ce manuel français écrit par M. Girod avec l'aide de sept collaborateurs est un essai de synthèse concise des connaissances actuelles ainsi que des problèmes non résolus concernant l'origine des magmas ou des séries volcaniques et de leur distribution. Le livre est construit autour d'un modèle explicite, celui de la tectonique des plaques, et les chapitres du livre sont agencés en fonction de ce modèle qui en constitue donc la ligne directrice.

Le livre se divise en quatre parties d'importance inégale. La première, qui correspond, au premier chapitre, est consacrée à une très bonne revue de la définition des séries magmatiques et de leur classification par M. Girod. La seconde partie, qui est constituée des chapitres 2 et 3, traite de pétrologie théorique. D. K. Bailey (chap. 2) insiste en particulier sur les conditions et processus de fusion fractionnée (partielle) contrôlant la genèse des magmas, tandis que R. Maury traite des modifications (limitées) de la composition des magmas par contamination. La troisième et plus importante partie du livre comprend quatre chapitres essentiellement descriptifs traitant avant tout de la distribution des séries volcaniques. Le cadre général de la tectonique des plaques est résumé par M. Girod dans le chapitre 4, tandis que B. G. Upton décrit les laves intra-océaniques (chap. 5), P. Baker les laves des zones de subduction (chap. 6), et M. Girod les laves du domaine continental (chap. 7). Le livre se termine par deux chapitres complémentaires formant la quatrième partie, l'un écrit par R. V. Fisher et H. Schmincke sur les ignimbrites et l'autre écrit par G. Rocci sur les spilites.

Ce livre est fort bien édité et généralement illustré par de nombreux

diagrammes et par des cartes simples et claires. Une exception cependant doit être signalée dans le chapitre 5 où il aurait été nécessaire d'inclure une carte du domaine océanique indiquant les localités mentionnées par B. G. Upton. Le niveau du livre se situe entre le manuel élémentaire et les publications spécialisées. Il s'adresse donc aux étudiants commençant des études de deuxième cycle ou aux géologues en quête d'une synthèse récente, en français, de la pétrologie des roches volcaniques. Ces deux catégories de lecteurs y trouveront aussi, grâce aux nombreux travaux cités, une excellente source de références pour approfondir leurs connaissances de l'un ou l'autre des sujets traités dans ce livre.

À côté des qualités du texte, de son organisation, de ses auteurs et de sa réalisation que nous venons de souligner, le livre de M. Girod présente de nombreuses lacunes et un défaut majeur qui nous paraît grave. Parmi les lacunes les plus évidentes, nous mentionnerons surtout l'aspect théorique. Les concepts de la cristallisation fractionnée en relation avec la différenciation magmatique ne sont pas traités d'une manière approfondie. La théorie des traceurs géochimiques, des coefficients de partage, des indices d'activité chimique, etc., qui constituent les meilleurs outils de l'analyse pétrologique moderne ne sont ni expliqués, ni utilisés.

Les méthodes, approches et formes de pensées souvent originales des scientifiques français font la valeur de leurs livres. À l'exception des chapitres de Girod, Maury et Rocci, les contributions les plus importantes proviennent d'auteurs anglais, ou publiant en anglais, dont les travaux sont déjà amplement diffusés. Nous aurions préféré un livre cent pour cent français, car l'école française de pétrologie a de nombreuses équipes de jeunes chercheurs, tant dans le domaine de la volcanologie océanographique que dans celle de la géochimie. Ce livre ne leur rend malheureusement pas justice.

MS received June 15, 1979

## Sedimentation in Submarine Canyons, Fans and Trenches

Edited by D. J. Stanley  
and G. Kelling  
*Dowden, Hutchinson and Ross,*  
395 p., 1978.  
\$39.50

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The majority of the papers in this collection was presented at the symposium 'Submarine Canyon and Fan Sedimentation in Time and Space' which was held at the Annual Meeting of the Society of Economic Paleontologists and Mineralogists in New Orleans in 1976. The editors acknowledge that the coverage provided by the 25 contributions is not comprehensive, but the topics discussed are wide-ranging and of current interest.

The book is divided into six parts: Bottom Currents and Biological Processes in Submarine Canyons; Gravity-Induced Processes in Submarine Canyons and Fans; Turbidite and Hemipelagic Processes in Submarine Fans; The Tectonic Setting of Some Submarine Canyons and Fans; Tectonics and Sedimentation in Arc and Trench Basins; and Synthesis and Prognosis. Within this organization the editors have managed to achieve several interesting groupings of papers and some pleasing juxtapositions. In Part I, for example, there are three separate papers that deal with processes in the Hudson Submarine Canyon, and in Parts III and IV, two papers discuss different aspects of sedimentation on the submarine fan off the Nile Delta. This overlap of contributions helps give cohesion to the volume.

The contrast provided by the combination of studies of ancient deposits and the investigation of processes and sediments of our present-day oceans was particularly pleasing to me. Of the 24 research papers in the volume, 11 are based on oceanographic investigations, 12 on

ancient rocks, and one uses data from both modern and ancient deposits. The collected papers provide a very clear picture of the differences in the methods used, and in the problems faced, by the marine geologist or oceanographer, and the land-based geologist.

None of the papers are purely review papers but the contributions by Shepard and Marshall on Currents in Submarine Canyons, by Piper on Turbidite Muds and Silts, and by Nelson *et al.* on Thin-Bedded Turbidites, provide up-to-date general accounts of our knowledge in these three fields. Most of the papers are fairly detailed and will be of interest principally to sedimentologists, marine geologists, and stratigraphers. Newcomers to the field of canyon, fan and trench sedimentation will find the book a useful up-to-date starting point and source of references.

The volume is a fairly large format, with print on substantial, matte paper that makes for easy reading; though the paper is not glossy most of the half-tones are sufficient contrast to show up well. On the other hand, several of the diagrams, particularly stratigraphic sections, have not fared well in reproduction. Some of the fault may lie with the printers because reproduction of similar cross-sections in one paper by Almgren varies from good to poor. However, more care in the selection of appropriate sizes for diagrams may have avoided some of the difficulties. In a paper by Mutti *et al.*, detailed cross-sections showing areal variations in thicknesses of turbidites occupy less than half a page each, are printed faintly, and are difficult to read, yet in the following paper (by Kepferle) a graph with only three grain-size distribution curves is accorded half a page. Proof-reading appears to have been done with care, and I found only a very few errors in the text; but the proof-reader may have been too close to the trees to see the forest because five photographs are missing from the paper by Pescatore! These problems with the figures are irritating but I found all of the papers understandable in spite of them.

The editors have provided a nice balance of studies of ancient and modern sediments; they have focussed attention on current major concerns

such as the role of bottom currents in the deep sea, the nature and origin of the very fine-grained and very coarse-grained sediments of fans, canyons and trenches, and on the role of tectonic setting and tectonic activity in the development of thick sediment wedges in the deep ocean. Their final chapter on the state-of-the-art is a stimulating and fitting conclusion to the book. Though the general geologist will find most of the papers too specialized, sedimentologists, petroleum geologists, stratigraphers and others working in deep-sea sediments will find much of interest in the volume. You can even read about one poor guy who got caught in a turbidity current!

MS received August 31, 1979

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## Modern and Ancient Lake Sediments

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Edited by Albert Matter and Maurice E. Tucker  
*Special Publication 2 of the International Association of Sedimentologists, Blackwell Scientific Publications, 290 pages, 1978.*  
 \$12.00 (soft cover)

Reviewed by Peter G. Sly  
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This second special publication by the International Association of Sedimentologists takes the form of a proceedings of a symposium held at the H. C. Ørsted Institute of the University of Copenhagen in 1977, and the 14 separate papers which comprise this publication have been authored by many well-known specialists.

Hardie, Smoot and Eugster present a review of arid zone saline lake deposits, with particular reference to North American examples. Stoffers and Hecky relate the mineralogy and microfossils in the deposits of the Kivu-Tanganyika basin to implied changes in lake stratification, response to climatic variations, and the influence of Rift Valley volcanic activity during the Pleistocene-Holocene period.

In the paper by Müller and Wagner, changes from low Mg calcite to high Mg calcite are related to decreasing water levels and increased evaporation in Lake Balaton; further, recent calcite precipitation is related to algal blooms. This work is followed by a study of algal lake carbonates in which Schafer and Stapf compare ancient and modern examples from the Permian Saar-Nahe basin and Lake Constance.

A different form of carbonate deposit is described by Smoot from the Eocene Green River Formation, Wyoming. Evidence is drawn from the Wilkins Peak member to demonstrate that lacustrine dolomitic carbonates have been formed as a reworked deposit, derived by the disintegration of surface crusts, tufas and caliches which were subsequently transported as clastic materials.