

**Trench-Forearc Geology:
Sedimentation and Tectonics on Modern
and Ancient Active Plate Margins**

Trench-Forearc Geology: Sedimentation and Tectonics on Modern and Ancient Active Plate Margins

edited by

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Preface

This book is a collection of papers on an aspect of plate tectonics of which our understanding is at present limited. In the mid-1970s, prior to the recent phase of IPOD active margin drilling, few geologists would have anticipated that at the start of the 1980s so many new questions concerning the nature of tectonic and sedimentary processes in forearc regions would have come to light.

1980 seemed to be a good time to synthesize current research and future problems. Several fascinating transects of active margins had been drilled in the preceding years, with largely enigmatic results. With the exception of drilling on the Barbados Ridge in early 1981, IPOD active margin activities were about to enter a period of abeyance. Several academic institutions had completed informative cruises on active margins, and numerous studies of emergent areas in modern forearc regions and of proposed ancient forearc terranes had come to fruition. For these reasons the British Sedimentological Research Group, a Specialist Group of the Geological Society of London, decided in 1979 to convene a three-day international conference on the theme of 'Trench and Forearc Sedimentation and Tectonics in Modern and Ancient Subduction Zones'. The meeting was held on 23–25 June 1980, at the Geological Society, Burlington House, Piccadilly, London. It was attended by more than 180 earth scientists from 17 countries.

Most of the contributions in this book were presented orally or as poster sessions. Many of the presentations were subjected to lengthy and often heated discussions. I consider it unfortunate that it has not proved possible to incorporate selections from those useful discussions in the final volume.

The ambitious title of the book is a concession to brevity rather than an exact description of the contents. The emphasis is on tectonics and sedimentation. However, in studies of forearc geology, perhaps more so than in any other topic in geology, it becomes difficult to consider tectonic and sedimentary phenomena independently. For this reason, these topics are discussed side by side in many of the papers. Metamorphic and igneous phenomena are also considered in several contributions.

The papers fall into three approximately equal categories: contributions with entirely new data, review papers on areas of special interest, and papers which combine reviews with new data and ideas. As at the original meeting,

the Publications Committee of the Geological Society decided to allow a relatively high amount of review material so that the final volume would be a useful comprehensive and up-to-date reference for the geologist interested in this field.

The papers fall into 11 more or less natural groups, the first eight of which are defined on the basis of geography. These concern Japan, Central America, South America, the Aleutians, Asia and Australasia, the Atlantic, the Mediterranean, and the Makran of Iran and Pakistan. All these sections include data from both land-based and marine studies. Papers on the geology of the Franciscan and Great Valley terranes of California, in section 9, have been separated from papers on other possible ancient forearc terranes, in section 10, whose setting in orogenic belts makes their reconstruction more equivocal. In the final section are three papers on facies models, petrology of forearc sediments, and the origin of forearc-related ophiolites.

In editing this collection of papers I have tried to provide the interested geologist with a clear impression of the current state of research on forearc regions of active plate margins. If this goal has been achieved, he or she will hopefully be impressed with the enormous amount of data which has accrued over recent years, though should be equally aware that there are many puzzling variations in the geology of forearcs and that there are many disagreements in the interpretation of individual forearc areas. Variations in forearc tectonics will become clear in comparing, for example, the Late Cretaceous and Palaeogene forearc geology of land areas of SW Japan in the Shimanto Belt (Taira *et al.*) with the Neogene behaviour of the Honshu offshore forearc (von Huene & Arthur). Equally impressive are the differences in tectonic evolution seen along the same active margin in South America (Kulm *et al.*; Moberly *et al.*) and highlighted in two drilled transects of the Central American margin (Moore *et al.*; von Huene *et al.*). Differences in interpretation of the same area include the Hellenic Trench, where Kenyon *et al.* and Le Pichon *et al.* arrive at differing conclusions using different geophysical techniques, and the Franciscan Complex of California, where Blake *et al.* and Bachman/Aalto arrive at differing palaeogeographic interpretations using detailed mapping of different parts of the same terrane. The paper by

Wezel gives a salutary reminder that perhaps we are all barking up the wrong tree in adhering too closely to the tenets of plate tectonics.

I have preferred not to attempt the traditional editor's summary paper. My overall impression is that the recent flood of data on the forearc geology of active margins has created just as many, if not more, new problems than it has solved. This is good for our science, and augurs well for a stimulating future. If this collection of papers achieves one thing, I hope it will be to encourage the funding which will be necessary to tackle these problems, both at sea and on land, over the next few years.

Note on editorial procedure:

As editor I have followed wherever possible the editorial procedures and format used in the *Journal of the Geological Society*. The papers are written by geologists whose specialities cover a variety of fields, and who hail from many different countries. I have tried to standardize scientific terminology, nomenclature, and spelling. I have made concessions to over-

seas authors regarding American spellings in some figure captions where I was so requested.

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I am greatly indebted to many people. First, to the Council of the Geological Society: without their agreement to fund the conference, coverage of the subject in this book would not have been so complete, and the conference participants would not have enjoyed the meeting as much as they did. Second, to the staff at the Geological Society: they tolerated endless impossible deadlines in the administration of the conference. Third, to the contributors: all very busy men, who nonetheless found time to produce their manuscripts on time. Fourth, to referees and advisors too numerous to mention: they put in hours of their time to assist—Gwyn Thomas in particular. Fifth, to Mac (W. S. McKerrow) for all his support and encouragement. Finally, to my parents, Jessie and Sally: they know what for.

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