

## *The* GEOLOGY of AUSTRALIA

*The Geology of Australia* provides a vivid and informative account of the evolution of the Australian continent over the past 4400 million years. Starting with the Precambrian rocks which hold clues to the origins of life and the development of an oxygenated atmosphere, it then covers the warm seas, volcanism and multiple orogenies of the Palaeozoic which built the eastern third of the Australian continent. This illuminating history then details the breakup of Gondwana and development of climates and landscapes in modern Australia, and finally the development of the continental shelves and coastlines. Separate chapters cover the origin of the Great Barrier Reef, the basalts in Eastern Australia and the geology of the Solar System.

From Uluru to the Great Dividing Range, from sapphires to the stars,  
*The Geology of Australia* is a comprehensive exploration of the timeless forces  
that have shaped this continent and that continue to do so.

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in the School of Earth Sciences, James Cook University.

*The* GEOLOGY  
*of*  
AUSTRALIA

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*For my parents, Peter and Rua Johnson*

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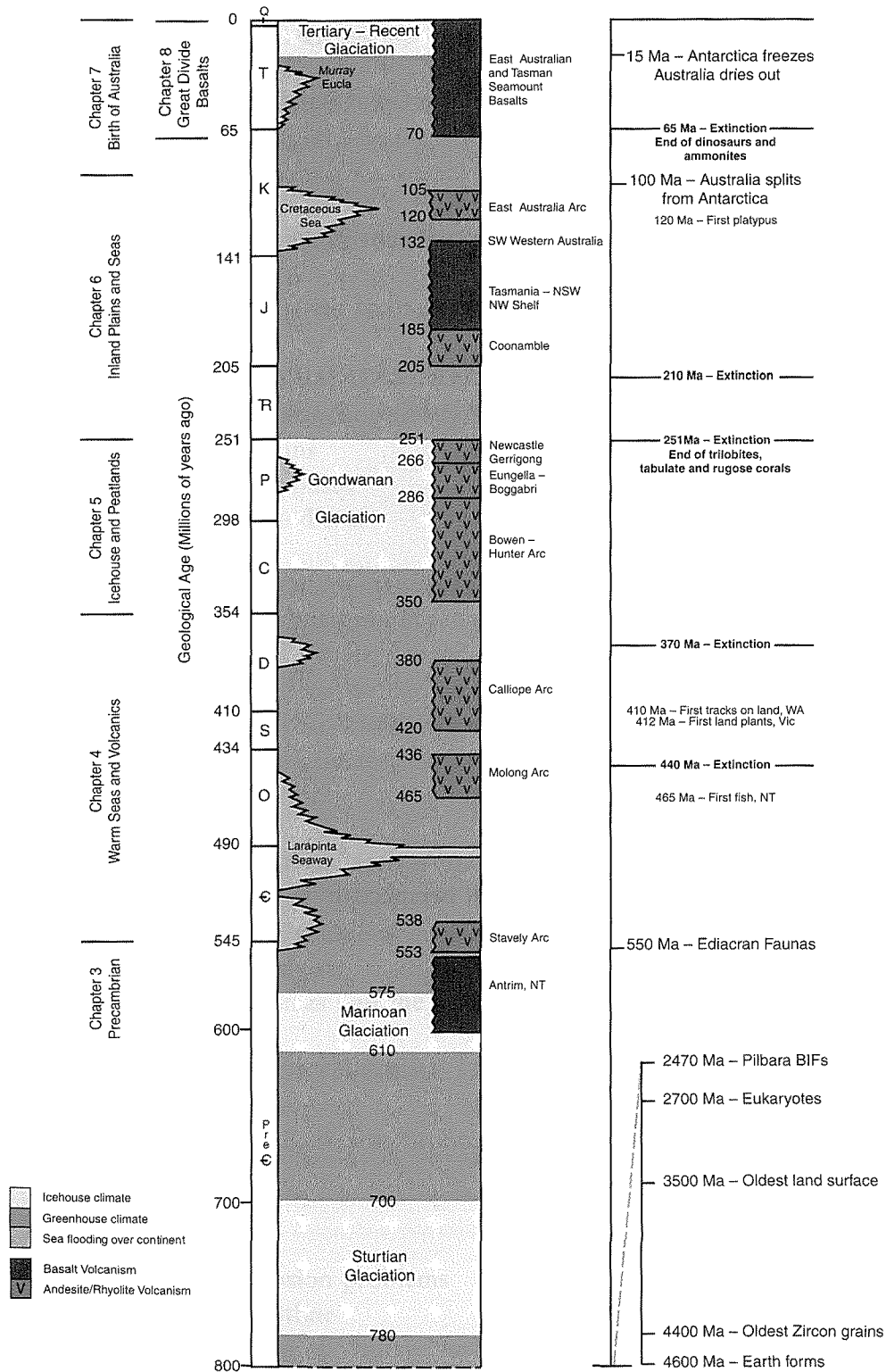


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## Preface

Most of the general books on Australian geology were written in the 1800s and early 1900s, and the popular classics by Charles Laseron, *The Face of Australia and Ancient Australia*, were published in the 1950s. A list of general books on the geology, soils and fossils of Australia is given at the end of Chapter 1.

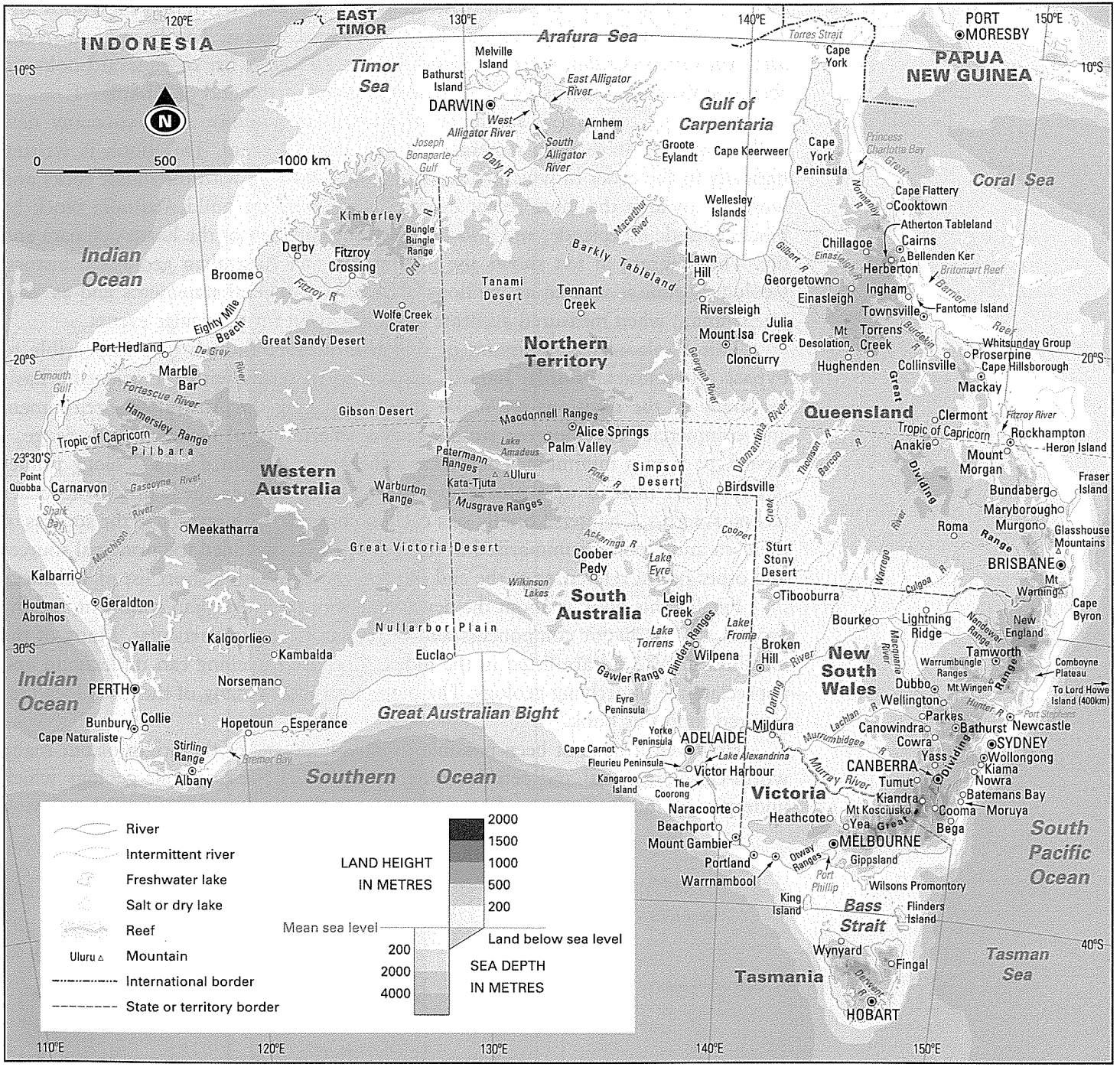
It is time for a new summary of Australian geology, since so many new understandings have been generated in the last 50 years. This book is written basically in the order in which Australia formed, starting with the oldest rocks and working towards the most recent events. In this way we build Australia block by block, episode by episode, and also trace the development of the Earth's climate and life. The diagram at left shows the major events in Australian geological history. Geological time is written as 'millions of years' for general statements and as 'Ma' (mega-anna) when measured accurate dates are given for particular events.

This book uses a minimum of scientific jargon, though it is impossible to bypass all technical words. Indeed, in coming to terms with the scientific basis for many of the decisions we make about managing the Australian environment and commercial development we all need a smattering of technical knowledge. I have kept it to a minimum. Each technical term is explained in a geology primer (Chapter 2). Instead of a glossary, which merely defines the word using other technical terms, Chapter 2 briefly sets each in context. With respect to the sources of the data and theories summarised in this book, I have included the principal sources and other useful references at the end of each chapter, with a short list of websites.

Finally, this book is about the development of the Australian continent and the evolution of its major components and of the landscape in particular. Many of the localities mentioned are listed in the index, so those travelling can understand and appreciate the underlying geology. The map (p. x) shows many of the main localities referred to in this book.

However, it has not been possible to include details of the origin of our many world-class ores, coal and petroleum deposits, and of the economic geology which underpins so much of our quality of life – that will have to wait for another day.





Main localities mentioned

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My particular thanks to my parents and especially my late father for fostering my interest in geology as a youngster and for the many outcrops and meat pies we sampled together. My thanks also to my wife and children who tolerated my absences from our family life on field trips.

I have been fortunate to study and work with a wide range of very knowledgeable geologists and other scientists during my time in industry and at the three universities with which I was associated as a student and staff member. It is impossible to single out every contribution made by these people – whether they were those who lectured me, my colleagues or my own students – but certainly all have contributed to my own knowledge and continued interest in Australian earth sciences. Because this is a general book I trust those scientists not cited individually will accept my apologies for I could not clog the text with every source as is normal in a scientific paper.

Many people have provided advice on source material and data, access to illustrations, or critical comments on sections of text, and the book has been much improved by their advice. I hope I have included everyone in this list and apologise if anyone has been omitted: Ross Andrew, Mark Barley, Al Bashford, Peter Betts, Alex Bevan, Ted Bryant, Gavin Birch, Ray Cas, Allan Chivas, Jonathan Claoue-Long, Lindsay Collins, Jim Colwell, Keith Crook, Mohinudeen Faiz, Michael Gagan, David Gillieson, Vic Gostin, Iain Groves, Bob Henderson, Chris Herbert, Robert Hill, Richard Jenkins, Barry Kohn, Bill Laing, Mark Leonard, Bernd Lottermoser, David Lowry, Ian MacDougall, Ken McNamara, Nick Oliver, Ken Page, Alex Ritchie, Mick Roche, Peter Roy, Mike Rubenach, Peter Schouten, Jeffrey Stillwell, Caroline Strong, Lin Sutherland, Fons VandenBerg, Peter Whitehead, Simon Wilde, Stephen Wroe, Ann Young, Bob Young.

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Stuart Johnson drafted most of the diagrams, and I am very grateful to him for his help, attention to detail and artistic balance of the visual material.

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DAVID JOHNSON  
Herberton, April 2004

*Length, thickness*

kilometres	km
metres	m
millimetres	mm
micrometres	$\mu\text{m}$
nanometres	nm

*Atmospheric pressure*

hectopascals	hPa
--------------	-----

*Temperature*

degrees Celsius	$^{\circ}\text{C}$
Kelvin	K

*Slope*

metres per kilometre	m/km
----------------------	------

*Time*

year	yr
second	s
million years ( $10^6$ )	Ma
billion years ( $10^9$ )	Ga

*Area*

square kilometres	$\text{km}^2$
hectares	ha

*Speed*

kilometres per second	km/s
metres per second	m/s
millimetres per year	mm/yr

*Volume*

cubic metres	$\text{m}^3$
cubic kilometres	$\text{km}^3$

*Density*

kilograms per cubic metre	$\text{kg}/\text{m}^3$
---------------------------	------------------------

*Vertical height*

metres above sea level	m ASL
------------------------	-------

*Pressure*

kilobars	kbar
----------	------

*Abbreviations  
and units*

*Units follow the International  
System of Units (SI).*