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r Range, South-West Tasmania.
Dombrovskis, Tasmania's best-known wilderness photographer, who died
The view looks SSE from further north on the range. The Arthur Range
metamorphosed quartzites of Precambrian (probably Mesoproterozoic) age
of the 'old folded rocks' of Tasmania. The two peaks on the left skyline are
and Precipitous Bluff, both capped with Jurassic dolerite above Permian
iddle age' of Tasmanian geology (150–300 my). The glacial sculpting of the
cene Ice Age, 10,000 to 2 my ago, and the more recent rock slide, represent
l history.
rovskis.

Geological Evolution of Tasmania

Editors: Keith D. Corbett, Patrick G. Quilty, Clive R. Calver

Designer/compiler: June Pongratz

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Foreword

Like the reclusive and almost legendary Tasmanian Tiger, Tasmanian geology continues to emerge from hiding. Ninety five percent of the inland hardrock geology is covered by a rich mosaic of temperate rainforest, coastal heath, wild and cultivated gum forests, and farmlands. The basement geology is further obscured by overlapping post-Carboniferous basins, and glacial deposits. These facts have always made the work of documenting and understanding the subsurface Tasmanian architecture difficult.

The Tasmanian climate, too, rapidly erases many of the man-made windows into the geology, particularly in the high rainfall northern and western parts of the state. This removes the possibility of re-studying many of our older road and hydro-electric canal sections. Within 10 years of their creation, many once-splendid cuttings along the Anthony Road northwest of Queenstown — roadage that was created to service one of the most recent hydro-electric schemes in the state — have returned to crumbling saprolite beneath thick brows of lichen. These extensive incisions across the sub-alpine and alpine ridges of the west coast range motivated a generation of volcanologists between 1993 and 2003 to re-evaluate the stratigraphy and textures of the Cambrian Mount Read Volcanic Belt, revolutionising our understanding of its formation. Today, while there are still many useful cuttings, the natural weathering of others is so advanced that they can no longer be used for study or tuition … so in Tasmania, one often only gets one shot at documenting and understanding the rocks. This book will help preserve the discoveries and new insights of recent times for the next generation.

In 1989 Burrett & Martin's "Geology and Mineral Resources of Tasmania" was the comprehensive update that our generation needed. Since then there have been outstanding scientific advances in many quarters of the state, and this body of knowledge now needs to be framed in a modern context. In geophysics, large parts of western Tasmania have now been mapped for their regional electromagnetic character. Aerial hyperspectral mapping has revealed rich surface alteration detail in places like the Mt Lyell field. Offshore, the first regional seismic reflection profiles of the east, north and west coasts have been produced, along with onshor seismic detail of the geology below the Tasmania Basin in centra and southeast Tasmania, all contributing to the evolving thre dimensional map of Tasmania. A new global ore deposit styl has emerged with the discovery of the Avebury nickel deposit Continued mining has more fully revealed the size and zonatio of Tasmania's largest orebodies: Mt Lyell, Rosebery, Hent Beaconsfield, Savage River and Renison. A brief mining reviva also has created a new chapter in the geology of Hellyer. Regiona mapping by Mineral Resources Tasmania has vastly improve knowledge of many aspects of Tasmanian geology, a good exampl being the Tasmanian Precambrian, revealing that this foundatio of Tasmania was a single rifted margin that had very differen post-depositional histories in different parts of the state. Perhap the greatest change has been the contribution of high resolutio SHRIMP and LA-ICPMS dating; this dating revolution has cas new light on virtually every rock sequence in the state.

It is one thing to recognise a need for a task to be done, bu it is another thing altogether to carry it out, and to make it commercial success. This third edition summarising the geolog of our state has benefited greatly from the tasteful judgemen and experience of our desktop publisher June Pongratz, who ha used rich colour, wide format, and careful page setting to creat a modern product that will have as wide an appeal as possibl Gathering all of the scientific details from a large authorshi group, and achieving a harmonious level of continuity across th works, has also been a long and involved task. Our Division owe a great debt of thanks to the Editor-In-Chief Keith Corbett, an to his co-editors Pat Quilty and Clive Calver, for their selfles devotion to completing this daunting project. Their work wi not be the last chapter on Tasmania geology, but it will be th yardstick by which all future work is judged.

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President, Tasmania Division, Geological Society of Australia
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It is one thing to recognise a need for a task to be done, but it is another thing altogether to carry it out, and to make it a commercial success. This third edition summarising the geology of our state has benefited greatly from the tasteful judgement and experience of our desktop publisher June Pongratz, who has used rich colour, wide format, and careful page setting to create a modern product that will have as wide an appeal as possible. Gathering all of the scientific details from a large authorship group, and achieving a harmonious level of continuity across the works, has also been a long and involved task. Our Division owes a great debt of thanks to the Editor-In-Chief Keith Corbett, and to his co-editors Pat Quilty and Clive Calver, for their selfless devotion to completing this daunting project. Their work will not be the last chapter on Tasmania geology, but it will be the yardstick by which all future work is judged.

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Preface

This is the third compilation of the geological knowledge of Tasmania prepared as a volume sponsored by the Geological Society of Australia Tasmania Division. The previous ones were published in 1962 (edited by A. H. Spry and M. R. Banks) and 1989 (edited by C. F. Burrett and E. L. Martin), indicating approximately 25 years between volumes. Production of the present volume was initiated in 1999, after the previous edition had virtually sold out. Editors Keith Corbett and Pat Quilty were appointed in 2000, and the third editor, Clive Calver, in 2007. All three editors have also, necessarily, been required to write large sections of the volume, such is the relatively small pool of human geological resources available in the state.

Chapters in the volume have been arranged in such a way as to give the reader a reasonably chronological view of Tasmania's geological evolution, with the major tectonic, magmatic and mineralisation events placed in their order of occurrence. In addition, a simplified account of the geology, and of the geological history, written for the interested layman, has been added to make the volume more accessible to the general reader.

The volume has had a long gestation period of 13 years, and it is fair to say that the stop-start production process has been difficult and at times frustrating. One of the main reasons for the many delays has been the involvement of most of the authors, based at Mineral Resources Tasmania, in a series of ongoing special projects through most of the 2000–2010 decade. These projects have generated much new geological data, and new interpretations, which have had to be incorporated in the volume, making it difficult to draw a stop line. It has also been the case that many of the full-time professional scientists who might have contributed have generally found it too difficult to find time for 'extra-curricular' writing, such are the pressures of the modern-day work environment. Although a few chapters came in relatively quickly, most were slow to crystallise, and some required the concentrated efforts of all three editors, and some additional helpers in some cases, to get to the finish line.

Illustrations have been something of an issue overall. Because of the limited funds available from the local Division, after the ravages of the Global Financial Crisis on investments, authors have had to be responsible for their own colour illustrations. While most of these have been of good or acceptable standard, we have had to accept a wide range of offerings, with the ability to upgrade only a limited number. Our sincere thanks go to June Pongratz for this work, and for her admirable design and compilation work on the volume overall. This is very much June's publication, as well as that of the authors and editors.

Special thanks must also go to Nick Direen, Garry Davidson and Peter McGoldrick, who in their roles as senior committee members of the local Division at different times, have taken a particular interest in initiating and keeping things moving on 'the Book'; to John Everard and Clive Calver of MRT, who stepped in when required to write particular sections of the geology which did not have designated authors; and to Jean McClenaghan, who took on the difficult task of compiling the Index in the final year. We also acknowledge the generosity of Mineral Resources Tasmania in providing digital copies of many of the geological and related maps of the state, and the considerable amount of geochemical data, for the compact disc included with this volume.

For the editors, it has been a long long labour of love, driven by our enthusiasm for this state and for its wonderful geological heritage. We are delighted that the volume will finally see the light of day.

Our thanks go to all those who have contributed.

Keith Corbett, Pat Quilty, Clive Calver

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A summary of Tasmania's geology and geological history

K. D. Corbett

1.1 INTRODUCTION

This introduction to Tasmanian geology is written in generally non-scientific language, and is aimed at all those interested in geology.

Within its relatively small area of about 68,000 km^2, the island of Tasmania has a great diversity of geological rock types and ages, and may be considered as something of a geological showcase. It is a mountainous island, and its wild landscapes—much influenced by the geology—are justly famous. Many of these in the west, southwest and central parts of the state are contained within the Tasmanian Wilderness World Heritage Area. The 'Roaring Forties' latitude means the climate is temperate and bracing, and there was considerable glacial activity in the higher central and western areas during the recent Pleistocene Ice Age. The east and southeast of the state are somewhat warmer and drier, and have scenic coastal areas. Geology has played a major role in the human development of the island, particularly in the patterns of settlement and agriculture. The rich soils on the Cenozoic (Tertiary) basalts of the northwest and elsewhere, although difficult to develop initially because of their dense forest cover, have been particularly important, whereas the barren Precambrian quartzite country of the south-west remains largely untouched. The island is well endowed with mineral deposits, mainly in the rugged western area, and early exploration and settlement in that area was related to a vibrant mining industry, which is ongoing. The geological diversity is exemplified by the fact that all of the major geological periods of earth history, excluding only the very old rocks of the early Precambrian (Archaean), are represented by rock units in the state.

1.2 THE MAJOR GEOLOGICAL REGIONS

The hill-shaded geological map (Fig. 1.1) shows the state to consist of several major geological-physiographic regions or provinces. Most prominent is the sheet-like covering of central and southeast Tasmania by Jurassic dolerite (orange) and the associated Permian mudstones (blue) and Triassic sandstones (green). This cover of horizontally layered rocks, resembling a poorly-applied layer of icing, covers the Central Plateau, extends in subdued form through Longford and the Tamar Valley (the Midlands Graben), rises to the east to form the Mt Arthur-Ben Lomond line of mountains (Fig. 1.2), then extends to the east coast near Freycinet Peninsula and forms the coastline from here around to South Cape. The layer consists of one or more sheets of dolerite, a hard igneous rock like basalt, and the sedimentary beds of mudstone and sandstone which the dolerite has intruded. This mudstone-sandstone-dolerite succession is the typical geology of most parts of southeast and central Tasmania, with no older rocks exposed. Large patches of the mudstone (blue) can be seen around the edges of the area, usually where the dolerite has been eroded back. Many faults have affected this region, raising and lowering the level of the dolerite and controlling drainage in many areas and the area is referred to as the fault structure province.

Most of the rest of Tasmania consists of rocks older than the Permian-Jurassic layer. These older rocks have been compressed and folded by old tectonic events, so they form ridges and valleys which appear as wrinkles on the map (the fold structure province). The older rocks continue under the Permian-Jurassic layer as a hidden basement (Fig. 1.2), seen only in a few drill holes. Separating the two groups of rocks is an old erosion surface, where the original mountain ranges of folded rocks were eroded, over