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Geological Evolution of Antarctica

EDITED BY

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Contents

Preface ix
Acknowledgements xi

Crustal development: the craton
Uplift history of the East Antarctic shield: constraints imposed by high-pressure experimental studies of Proterozoic mafic dykes 1
S.M. KUEHNER & D.H. GREEN
The crustal evolution of some East Antarctic granulites 7
S.L. HARLEY
Structural evolution of the Burger Hills area of East Antarctica 13
P. DING & P.R. JAMES
Structural geology of the early Precambrian gneisses of northern Fold Island, Mawson Coast, East Antarctica 19
P.R. JAMES, P. DING & L. RANKIN
The intrusive Mawson charnockites: evidence for a compressional plate margin setting of the Proterozoic mobile belt of East Antarctica 25
D.N. YOUNG & D.J. ELLIS
A review of the field relations, petrology and geochemistry of the Borgmassivet intrusions in the Grunehagina province, western Dronning Maud Land, Antarctica 33
J.R. KRYNAUW, B.R. WATTERS, D.R. HUNTER & A.H. WILSON
Volcanic rocks of the Proterozoic Jutulstruomen Group in western Dronning Maud Land, Antarctica 41
B.R. WATTERS, J.R. KRYNAUW & D.R. HUNTER
The timing and nature of faulting and jointing adjacent to the Pengskjøttet, western Dronning Maud Land, Antarctica 47
G.H. GRANTHAM & D.R. HUNTER
The tectonic and metamorphic evolution of H.U. Sverdrupfjella, western Dronning Maud Land, Antarctica 53
A.R. ALLEN
Granulites of northern H.U. Sverdrupfjella, western Dronning Maud Land: metamorphic history from garnet–pyroxene assemblages, coronas and hydration reactions 61
P.B. GROENEWALD & D.R. HUNTER
A structural survey of Precambrian rocks, Heimefrontfjella, western Neuschwabenland, with special reference to the basic dykes 67
W. FIEITZ & G. SPAETH
Reflection seismic measurements in western Neuschwabenland 73
A. HUNGELEI & F. THYSSEN
Geology and metamorphism of the Sør Rondane Mountains, East Antarctica 77
K. SHIRAISHI, M. ASAMI, H. ISHIZUKA, H. KOJIMA, S. KOJIMA, Y. OSANAI, T. SAKIYAMA, Y. TAKAHASHI, M. YAMAZAKI & S. YOSHIKURA
Late Proterozoic paired metamorphic complexes in East Antarctica, with special reference to the tectonic significance of ultramafic rocks 83
Y. HIROI, K. SHIRAISHI & Y. MOTOYOSHI
Petrographic and structural characteristics of a part of the East Antarctic craton, Queen Maud Land, Antarctica 89
Structural and petrological evolution of basement rocks in the Schirmacher Hills, Queen Maud Land, East Antarctica (Extended abstract) 95
S. SENGUPTA
Metamorphic evolution of granulites from the Rauer Group, East Antarctica: evidence for decompression following Proterozoic collision 99
S.L. HARLEY
Fault tectonics and magmatic ages in the Jetty Oasis area, Mac. Robertson Land: a contribution to the Lambert Rift development 107
J. HOFMANN
Major fracture trends near the western margin of East Antarctica 113
P.D. MARSH
Mesozoic magmatism in Greater Antarctica: implications for Precambrian plate tectonics 117
T.S. BREWER & P.D. CLARKSON
Crustal development: the Transantarctic Mountains
Sedimentary palaeoenvironments of the Riphaean Turnpike Bluff Group, Shackleton Range 123
H.-J. PAECH, K. HAHNE & P. VOGLER
Precambrian ancestry of the Asgard Formation (Skelton Group): Rb-Sr age of basement metamorphic rocks in the Dry Valley region, Antarctica 129
C.J. ADAMS & P.F. WHITLA
The Priestley Formation, Terra Nova Bay, and its regional significance 137
D.N.R. SKINNER
The myth of the Nimrod and Beardmore oxygenies 143
E. STUMP, R.J. SORSCH & D.G. EDGERTON
Age of the metamorphic basement of the Salamander and Lanterman ranges, northern Victoria Land, Antarctica 149
C.J. ADAMS & A. HöHENDORF
Recovery and recrystallization of quartz and ‘crystallinity’ of ililte in the Bowes and Robertson Bay terranes, northern Victoria Land, Antarctica 155
W. BUGGISCH & G. KLEINSCHMIDT
Contents

The boundary of the East Antarctic craton on the Pacific margin 161
N.W. Roland
Northern Victoria Land, Antarctica: hybrid geological, aeromagnetic and Landsat-physiographic maps 167
B.K. Lucchitta, J.A. Bowell, F. Tessensohn & J.C. Behrendt
Setting and significance of the Shackleton Limestone, central Transantarctic Mountains 171
A.J. Rowell & M.N. Rees
Lower mid-Palaeozoic sedimentation and tectonic patterns on the palaeo-Pacific margin of Antarctica 177
M.G. Laird
The pre-Devonian Palaeozoic clastics of the central Transantarctic Mountains: stratigraphy and depositional settings 187
M.N. Rees & A.J. Rowell
The Devonian Pacific margin of Antarctica 193
M.A. Bradshaw
The palaeo-Pacific margin as seen from East Antarctica 199
J.W. Collins
Permo-Carboniferous glacial sedimentation in the central Transantarctic Mountains and its palaeotectonic implications (Extended abstract) 205
J.M.G. Miller & B.J. Waugh
Clay mineralogy and provenance of fine-grained Permian clastics, central Transantarctic Mountains 209
L.A. Krieske & T.C. Horner
Evidence for a low-gradient alluvial fan from the palaeo-Pacific margin in the Upper Permian Buckley Formation, Beardmore Glacier area, Antarctica 215
J.L. Isbell
Provenance and tectonic implications of sandstones within thePermian Mackellar Formation, Beacon Supergroup of East Antarctica 219
R.S. Frisch & M.F. Miller

Crustal development: Weddell Sea–Ross Sea region

Evolution of the Gondwana plate boundary in the Weddell Sea area 225
Y. Kristoffersen & K. Hinz
 Petrology and palynology of Weddell Sea glacial sediments: implications for subglacial geology 231
J.B. Anderson, B.A. Andrews, L.R. Bartek & E.M. Truswell
A multichannel seismic profile across the Weddell Sea margin of the Antarctic Peninsula: regional tectonic implications 237
P.F. Barker & M.J. Lonsdale
Verification of crustal sources for satellite elevation magnetic anomalies in West Antarctica and the Weddell Sea and their regional tectonic implications 243
M.E. Ghidella, C.A. Raymond & J.L. Labrecque
Aeromagnetic studies of crustal blocks and basins in West Antarctica: a review 251
S.W. Garrett
Palaeomagnetic studies of Palaeozoic rocks from the Ellsworth Mountains, West Antarctica 257
M. Funaki, M. Yoshida & H. Matsuda
Seismic reflection profiling of a sediment-filled graben beneath ice stream B, West Antarctica 261
S.T. Rooney, D.D. Blankenship, R.B. Alley & C.R. Bentley

The aeromagnetic survey of northern Victoria Land and the western Ross Sea during GANOVEX IV and a geophysical–geological interpretation 267
W. Bosum, D. Damaske, J.C. Behrendt & R. Saltus
The Ross Sea rift system, Antarctica: structure, evolution and analogues 273
F. Tessensohn & G. Wörner
Structural and depositional controls on Cenozoic and (?Mesozoic strata beneath the western Ross Sea 279
A.K. Cooper, F.J. Davey & J.C. Behrendt
Crustal extension and origin of sedimentary basins beneath the Ross Sea and Ross Ice Shelf, Antarctica 285
A.K. Cooper, F.J. Davey & K. Hinz
Chemical characteristics of greywacke and palaeosol of early Oligocene or older sedimentary breccia, Ross Sea DSDP Site 270 293
A.B. Ford
Extensive volcanism and related tectonism beneath the western Ross Sea continental shelf, Antarctica: interpretation of an aeromagnetic survey 299
Geochronology and tectonic implications of lower-crustal granulites included in Cenozoic volcanic rocks of southern Victoria Land 305
R.J. Kalamarides & J.H. Berg
Geology, petrology and tectonic implications of crustal xenoliths in Cenozoic volcanic rocks of southern Victoria Land 311
J.H. Berg
Geochronology and petrology of ultramafic xenoliths of the Erebuses volcanic province 317
F.M. McGibbon
Lithospheric flexure induced by the load of Ross Archipelago, southern Victoria Land, Antarctica 323
T.A. Stern, F.J. Davey & G. Delisle
The structure and seismic activity of Mount Erebus, Ross Island 329
K. Kaminuma & K. Shibuya

Crustal development: the Pacific margin

Mid-Palaeozoic basement in eastern Graham Land and its relation to the Pacific margin of Gondwana 335
A.J. Milne & I.L. Millar
Basement gneisses in north-western Palmer Land: further evidence for pre-Mesozoic rocks in Lesser Antarctica 341
S.M. Harrison & B.A. Piercy
Granitoids of the Ford Ranges, Marie Byrd Land, Antarctica 345
S.D. Weaver, J.D. Bradshaw & C.J. Adams
Turbidite sequences on South Georgia, South Atlantic: their structural relationship and provenance 353
P.W.G. Tanner
Dredged rocks from Powell Basin and the South Orkney microcontinent 361
P.L. Barber, P.F. Barker & R.J. Pankhurst
Geochronological evolution of the Antarctic Peninsula magmatic arc: the importance of mantle-crust interactions during granoidi genesis 369
M.J. Hole, R.J. Pankhurst & A.D. Saunders
Variation in amphibole composition from the Andean Intrusive Suite across the Antarctic Peninsula 375
A.B. Moyes
Mesozoic metamorphism, deformation and plutonism in the southern Antarctic Peninsula: evidence from north-western Palmer Land 381
B.A. Piercy & S.M. Harrison

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Contents

Rb-Sr study of Cretaceous plutons from southern Antarctic Peninsula and eastern Ellsworth Land, Antarctica 387
R. J. PANKHURST & P. D. ROWLEY

Magnetic evidence for gabbronoritic plutons in the Black Coast area, Palmer Land (Extended abstract) 395
K. J. McGBBON & H. E. WEVER

A new look at the geology of Thurstont Island 399
R. C. STOREY, R. J. PANKHURST, I. L. MILLAR, I. W. D. DALZIEL & A. M. GRUNOW

An aeromagnetic study of southern Palmer Land and eastern Ellsworth Land 405
J. A. JONES & M. P. MASLANYJ

Stratigraphy, provenance and tectonic setting of (?) Late Palaeozoic–Triassic sedimentary sequences in northern Graham Land and South Scotia Ridge 411
J. L. SMELLE

Subduction-complex rocks on Diego Ramirez Islands, Chile 419
T. J. WILSON, A. M. GRUNOW, R. E. HANSON & K. R. SCHMITT

Structural and metamorphic evolution of the Elephant Island group and Smith Island, South Shetland Islands 423
R. A. K. TROUW, A. RIBEIRO & S. V. PACHULLO

Chronology of provenance, deposition and metamorphism of deformed fore-arc sequences, southern Scotia arc 429
F. HREVÉ, W. LOSKE, H. MILLER & R. J. PANKHURST

Accretion and subduction processes along the Pacific margin of Gondwana, central Alexander Island 437
T. H. TRANTER

Strike-slip tectonics within the Antarctic Peninsula fore-arc 443
P. A. NELL & B. C. STOREY

Basin shallowing from the Mesozoic Fossil Bluff Group of Alexander Island and its regional tectonic significance 449
P. J. BUTTERWORTH & D. M. MACDONALD

Petrolology of sedimentary rocks from the English Coast, eastern Ellsworth Land 455
T. S. LAUDON

Tectonic evolution of south-eastern Antarctic Peninsula 461
K. S. KELLOGG & P. D. ROWLEY

Tectonic setting of the English Coast, eastern Ellsworth Land, Antarctica 467

New geophysical results and preliminary interpretation of crustal structure between the Antarctic Peninsula and Ellsworth Land 475
K. J. MCGIBBON & A. M. SMITH

Evolution of the Bransfield Basin, Antarctic Peninsula 481
J. D. JEFFERS, J. B. ANDERSON & L. A. LAWVER

The geological and geochemical evolution of Cenozoic volcanism in central and southern Filde Peninsula, King George Island, South Shetland Islands 487
L I ZHAO NAT & L I XIAOHAN

The Late Cretaceous–Cenozoic structural history of King George Island, South Shetland Islands and its plate-tectonic setting 493
A. K. TOKARSKI

Tectonostratigraphic models of the crust between the Antarctic Peninsula and the South Shetland trench 499
A. GUTERCH, M. GRAD, T. JANICKI & E. PERCHUC

The Bransfield rift and its active volcanism 505
O. GONZÁLEZ-FERRÁN

210Pb activities in Bransfield Strait sediments, Antarctic Peninsula: additional proof of hydrothermal activity 511
J. W. A. VAN ENST

Volcanism on Brabant Island, Antarctica 515
M. J. RINGE

Geochemistry and tectonic setting of Cenozoic alkaline basaltts from Alexander Island, Antarctic Peninsula 521
M. J. HOLE, I. L. SMELLE & G. F. MARRINER

Geophysical investigation of George VI Sound, Antarctic Peninsula 527
M. P. MASLANYJ

Tectonic significance of linear volcanic ranges in Marie Byrd Land in late Cenozoic time (Extended abstract) 531
W. E. LEMASURIER & D. C. REX

Crustal development: Gondwana break-up

Evolution of the Antarctic continental margins 533
L. A. LAWVER, J. Y. ROYER, D. T. SANDWELL & C. R. COLFISE

Triassic–Early Cretaceous evolution of Antarctica 541
D. H. ELLIOT

Palaeomagnetism, K–Ar dating and geodynamic setting of igneous rocks in western and central Neuschwanbeland, Antarctic 549
P. M. PETERS, B. HAVEREKAMP, R. EMERMMANN, H. KOHNEN & K. WEBER

Crustal evolution in the Pensacola Mountains: inferences from chemistry and petrology of the igneous rocks and nodule-bearing lamprophyre dykes 557
W. W. BOYD

The geochemistry of the Kirwan and other Jurassic basalts of Dronning Maud Land, and their significance for Gondwana reconstruction 563
C. HARRIS, A. J. ERLANK, A. R. DUNCAN & J. S. MARSH

The geochemistry of Mesozoic tholeiites from Coats Land and Dronning Maud Land 569
T. S. BREWER & D. BROOK

Magmatism related to the break-up of Gondwana 573
R. J. PANKHURST, B. C. STOREY & I. L. MILLAR

Cretaceous dispersal of Gondwana: continental and oceanic spreading in the southwest Pacific–Antarctic sector 581
J. D. BRADSHAW

The crustal blocks of West Antarctica within Gondwana: reconstruction and break-up model 587
B. C. STOREY

Hotlines and Cenozoic volcanism in East Antarctica and eastern Australia 593
A. G. SMITH & R. A. LIVERMORE

Evolution of Cenozoic palaeoenviromnents

A review of the Cenozoic stratigraphy and palaeontology of Antarctica 599
P. N. WEBB

Foraminiferal biogeography of the Late Cretaceous southern high latitudes 609
B. T. HUBER

First record of dinosaurs in Antarctica (Upper Cretaceous, James Ross Island): palaeoecological implications 617
E. B. OLIVERO, Z. GASPARINI, C. A. RINALDI & R. SCASSO

Palaeoclimatic significance of Cretaceous–early Tertiary fossil forests of the Antarctic Peninsula 623
J. E. FRANCIS
Contents

Tertiary glaciation in the South Shetland Islands, West Antarctica: evaluation of data 629
K. Birkenmajer

Late Palaeocene carbonate deposition on the Southwest Indian Ridge 633
S.W. Wise Jr., R.C. Tjalsma & D.H. Dailey

Middle Eocene carbonate-bearing marine sediments from Bruce Bank off northern Antarctic Peninsula 639
V. Toker, P.F. Barker & S.W. Wise Jr

Preliminary results of subantarctic South Atlantic Leg 114 of the Ocean Drilling Program (ODP) 645
P.F. Ciuffielski, V. Kristoffersen & The Scientific Party of Ocean Drilling Program Leg 114

Cenozoic glacial and tectonic history from CIROS-1, McMurdo Sound 653
P.J. Barrett, M.J. Hambrey & P.R. Robinson

A subaerial eruptive environment for the Hallett Coast volcanoes 657
W.C. McIntosh & J.A. Gamble

Origin and age of pectinid-bearing conglomerate (Tertiary) on King George Island, West Antarctica 663
K. Birkenmajer, A. Gazdicki, R. Gradziński, H. Krużer, B.J. Porębski & A.K. Tokarski

Cenozoic diatom biogeography in the southern high latitudes: inferred biogeographic barriers and progressive endemism 667
D.M. Harwood

The Dominion Range Sirius Group: a record of the late Pleocene-early Pleistocene Beardmore Glacier 675
R.C. McKelvey, P.N. Webb, D.M. Harwood & M.C.G. Marin

The geology of Marine Plain, Vestfold Hills, East Antarctica 683
P.G. Quilty

Seismic and sedimentological record of glacial events on the Antarctic Peninsula shelf 687
J.B. Anderson, L.R. Barter & M.A. Thomas

Mid-Holocene ice sheet recession from the Wilkes Land continental shelf, East Antarctica 693

Benthic foraminiferal ecology of the Antarctic Peninsula Pacific coast 699
S.E. Ishman

Index 707
Preface

Scientific research in Antarctica has seen many changes and developments since the discovery of the Antarctic Peninsula in 1820 but perhaps none so rapid as those experienced in the last ten years. With the exception of a few areas where access is extremely difficult, all the exposed rock on the continent has been mapped geologically, at least at a reconnaissance level, and an increasing amount of marine geophysical work is building up a broad general picture of the geology of the Antarctic continental shelf and its surrounding oceans. Thus, although many scientific discoveries have yet to be made in Antarctica and much greater effort is needed to investigate the 98% of rock beneath the ice, a good overall picture of the continent's exposed geology now exists.

Not many years ago a good geological description of a hitherto unexplored area was sufficient to justify publication. In recent years, however, Antarctic geologists have recognized a need to place greater emphasis on interpreting their findings within a broader framework and they have been using their results to help test and constrain such important global theories as that of plate tectonics. Furthermore, the importance of Antarctica in providing a primary input into the understanding of some of the wider geological issues of our planet, e.g. the significance of the region as a centre of biological evolution in Mesozoic and Cenozoic times, and of its Cenozoic glacial record stretching back perhaps more than 30 million years, are becoming more apparent.

The number of nations actively engaged in the scientific study of Antarctica has been increasing steadily and by July 1985, when the Fifth International Symposium on Antarctic Earth Sciences was first advertised, 32 nations had signed the Antarctic Treaty. When the symposium was held in August 1987 that figure stood at 36 and, at the time of writing, it has risen further to 38.

Against such a background, the British National Committee on Antarctic Research felt that, if Britain were to host the next Antarctic Earth Sciences Symposium, then the scientific objectives of the meeting had to be more focused than they had been in the past. Such a decision did not meet entirely with international approval. A number of scientists felt that one of the primary roles of Antarctic symposia is to bring scientists of many nations together, and focusing a meeting too closely could have the effect of excluding some nations, purely by some geographical accident of their area of operation. Furthermore, it would be difficult for those nations new to Antarctica and who had only just begun their programmes, to participate in and contribute to the meeting. There was therefore a problem of finding a focus which would have some global relevance and yet would enable the widest possible participation by Antarctic earth scientists. In the event the answer was provided by the 19th Meeting of the Scientific Committee on Antarctic Research (SCAR) in San Diego, July 1986, at which the Working Groups on Geology and Solid Earth Geophysics recognized the need for research initiatives in the 'Structure and Evolution of the Antarctic Lithosphere', and in the 'Evolution of Cenozoic Palaeoenvironments of the Southern High Latitudes', and convened two Groups of Specialists to investigate these problems further.

The Fifth International Symposium on Antarctic Earth Sciences now had two major foci, albeit under the slightly different titles of 'Tectonic Evolution of the Antarctic Crust' and 'Palaeoenvironmental Evolution of Antarctica since the Late Mesozoic'. How successful the meeting was in addressing these problems must be left for the reader to judge, but a glance at the list of contents will show that evidence from a wide range of areas and rock units was brought to bear. Inevitably there were some significant gaps, none more noticeable than the dearth of papers on the Ellsworth Mountains and Marie Byrd Land, but to some extent these may be taken as pointers to those areas where further research is badly needed. In addition, the small number of papers offered on the geophysical investigation of Antarctica’s continental shelves was disappointing, particularly since these are areas which have come under increasing scrutiny by several nations in recent years.

On the day, the symposium attracted nearly 200 participants from 19 countries. During the course of the five-day meeting, 138 papers were presented orally and a particularly gratifying aspect was a well-prepared and well-attended poster session with a further 34 contributions. It provided authors with the opportunity for a longer display of their work than 20 minutes on the rostrum and helped to keep the number of parallel sessions to the absolute minimum. By the nature of their work, Antarctic geologists have somewhat catholic interests and too many parallel sessions can be particularly irksome. Nevertheless, it is an inevitable consequence of Antarctica’s growing scientific community and the rate at which new scientific information is being generated that parallel sessions, often
more than two, are here to stay. However, the need to hold meetings more frequently than every five years or so is also clearly indicated.

As with many earth science meetings, field excursions have always been an integral part of Antarctic symposia. Two excursions, each demonstrating a classic area of British geology, were run to great acclaim from their participants. These covered the crustal evolution of north-west Scotland and the evolution of the Wessex Basin. The north–south divide was much in evidence with the southerners enjoying their geology against a backdrop of cream teas, fine weather and rural scenery, and the northerners claiming that studying the Moine Thrust in torrential rain made it all the more meaningful.

Notes
1. Place names. The use of a place name in this volume does not necessarily imply its acceptance by the editors or that it has received formal approval by an Antarctic place-names authority.
Acknowledgements

Symposia do not just happen. They are the result of a great deal of hard work by large numbers of people, many of whom may not be particularly conspicuous during the proceedings. It is therefore my pleasure to record their names here and to express my gratitude to them. Without them the Fifth International Symposium on Antarctic Earth Sciences would never have been possible.

First there was the Local Organizing Committee which, together with George Hemmen (Executive Secretary SCAR), guided the meeting through its initial stages and gave me much needed support during the difficult early months. With an outline for the symposium established it was then the task of a small but dedicated band of helpers to make the whole thing happen. My special thanks go to Gill Clarke (cheerful ace typist, compiler of endless lists and minder) and to Peter Clarkson (treasurer) who, with Alistair Crame and Janet Thomson, helped me to knock the whole programme into shape. The excellent field excursions were ably organized and led by David Macdonald and Jane Francis (south coast, England) and by John Smellie, Bryan Storey, Philip Nell and John Mendum (north-west Scotland). Candy Smellie made sure that accompanying persons were not left out. During the symposium Gill Clarke, Peter Clarkson and Hanni Willan were always on hand to ‘man’ the desk and to help anyone in need. Janet Thomson organized the poster displays and many BAS geologists beavered away behind the scenes to ensure that participants arrived safely from the station and that all the rooms were set up and ready for use: Peter Butterworth, Peter Doyle, Steve Harrison, Malcolm Hole, Philip Howlett, Philip Nell, Phil Marsh, Duncan Pirrie, Tim Tranter and Andy Whitham. George and Vi Wood actually enjoyed making up all the document cases, or so they said. Dick Laws and David Drewry (previous and present Directors of the British Antarctic Survey) kindly put at my disposal all the office facilities so necessary for organizing an international meeting of this kind.

Those who provided for our creature comforts are also not forgotten and, on behalf of all symposium participants, I wish to extend my thanks to the Warden and staff of Robinson College for the use of accommodation and facilities, to the Scott Polar Research Institute for a very pleasant evening, and to the Master of Darwin College for allowing us use of the grounds of the college for the punting party.

Finally, there is this book, a truly mammoth task for the editors. There is no doubt that it would never have come to fruition if I had not had the assistance and support of Alistair Crame and my wife Janet who really did all the work. As senior editor, I take any criticism that may be due; any credit belongs to Alistair and, especially, Janet.

Michael Thomson