

Antarctic Earth Sciences: Preface

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This Special Issue of the *Transactions* comprises an invited collection of five keynote papers presented by plenary speakers at the 11th International Symposium on Antarctic Earth Sciences (ISAES), held in Edinburgh, 10–15th July 2011. The conference attracted over 500 delegates from 25 countries and resulted in 580 original abstracts, including over 250 oral presentations. The papers in this volume cover a wide range of headline topics in Antarctic Earth Science and are written by experts in their field. The papers are arranged in broad geochronological order, from deep geological time to the present day, and are a testament to how many globally important scientific findings stem from research in Antarctica. Additional research papers given at the Symposium are collected in two separate special thematic issues to be published by the Geological Society (Hambrey *et al.* in press; Harley *et al.* in press).

In the first keynote paper, Ian Dalziel reviews the tectonic history of Antarctica – from supercontinent formation to continental break up and subsequent tectonic evolution. Since the classic early reconstructions of the 1930s, the southern continents have been rearranged to fit almost like gigantic geological puzzle pieces around the central ‘keypiece’ of Antarctica. Dalziel thoroughly reviews this evidence, both historical and modern, shedding new light on the supercontinent puzzle and expertly piecing together the complex geological evolution of the Antarctic continent.

The second keynote paper, by Bryan Storey *et al.*, continues the theme of continental break up, focusing on the evolution of Antarctica’s large igneous provinces. The paper reviews the existing petrogenetic models for igneous province formation, before considering their links to continental break up processes. Storey *et al.* then go on to explore the wider connections between the eruption of igneous provinces in Antarctica and other large-scale environmental changes during the Mesozoic and Cenozoic.

In the third keynote paper, Peter Barrett reviews the glacial history of Antarctica over the last ~20 Ma by revisiting the complex debate surrounding the Sirius Group deposits. This review charts the history of the debate, presenting the evidence and arguments in chronological order before attempting to resolve the different, apparently contradictory, hypotheses that have existed since the 1980s. Barrett’s carefully considered conclusion, that the Sirius Group deposits very probably represent

a significantly older (Oligocene–Miocene) sedimentary and biological archive, has important implications for all those studying the Cenozoic geological history of Antarctica.

The fourth keynote paper, by Jemma Wadham *et al.*, examines the increasingly important role of the Antarctic Ice Sheet in the global biogeochemical cycle. The paper reviews the current understanding of biogeochemical processes operating beneath the ice sheet, both in the shallow ice-bed interface zone (including lakes and sub-glacial channels), and at depth within sub-glacial sedimentary basins. Wadham *et al.* conclude that the export of nutrients and gases from sub-glacial environments in Antarctica make the huge ice-covered area an important part of the Earth’s carbon cycle.

In the final keynote paper, Alan Cooper addresses the unique care and management issues surrounding Antarctic data collection, storage and dissemination. The paper reviews the rapid technological and communication advances over the last ten years that have fundamentally changed the way data are acquired. Cooper goes on to make thoughtful recommendations for the future, including more rapid data sharing, more robust archiving and fully collaborative cross-discipline research. One hundred years on from the pioneering measurements made by the Shackleton, Mawson, Amundsen and Scott expeditions, the collection of high-quality data remains the foundation of high-quality science.

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References

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