

as a leader. However, both Shackleton in his Nimrod Expedition and Scott in the Terra Nova Expedition learnt from the mistakes of the first expedition and made major scientific discoveries of lasting value. Both had better scientific staff and better equipment and even Shackleton, whose personal enthusiasm for science was not great, recognized that pursuing new knowledge was essential. The findings of the fossil *Glossopteris* leaves, the fossil fish at Granite Harbour, and the coal seams all proved that the Antarctic climate had been greatly different back to the Cambrian and that the continent had been connected at some point to the other southern continents. The collections of marine organisms, although often badly damaged, showed just how much life there was in the cold waters whilst the studies on the emperor penguins by Wilson provided new insights into the way animals had adapted to the extreme climate and killed the theory that penguin eggs would show the developmental aspects of the evolution of birds from reptiles. Bernacchi's gravity measurements allowed calculation of the exact shape of the southern end of the globe whilst the magnetic measurements allowed calculations of the movement of the magnetic pole. Debenham and Priestley made detailed studies on glaciers and the ice shelf whilst Taylor measured the air content of snow, its rate of compaction to ice and the way in which sea ice formed, effectively starting the science of glaciology in Antarctica. On the Nimrod Expedition James Murray's studies on freshwater lakes and pools provided unexpected biodiversity in such challenging habitats and Douglas Mawson began an illustrious career as an Antarctic geologist.

The building blocks in Antarctic geology, glaciology and zoology are all traceable to these early expeditions and Larson makes it clear that whilst achieving the Pole was a major objective of all three expeditions, science was equally important. What for me is missing here is a more detailed recognition of the importance of the science in the next 50 years before IGY started a new and more widespread interest in Antarctica. How did the *Glossopteris* find resonate with Wegener's continental drift theory? What did the discoveries on biodiversity mean for the biologists? How did the magnetic data influence thinking by the physicists? And what effect did the studies on ice have on the development of glaciology? None of these questions are answered, which I feel is a missed opportunity. In his Epilogue he very briefly comments on the later careers of many of the key players - again a chance was missed to show how Debenham's experience was put to use through the establishment and development of the Scott Polar Research Institute, little mention is made of how Taylor developed geography as a major discipline, how Wright became Director of Naval Research and Simpson became Director of the Meteorological Office, or indeed of Priestley's illustrious career in university administration. These Antarctic scientists were for the most part very talented young men who went on to major achievements. You would not conclude that from this book.

Larson writes at considerable length about the origins of the RGS, exploration in Africa and other more general features of the time to give an historical background. Whilst some will wonder at just how far away from Antarctica some of these digressions are I am sure many readers will find this helpful in understanding the questions of why the RGS was so obsessed with the Pole, why Scott opted for man hauling, and how the disasters in South Africa with the Boer War made heroic Antarctic achievements even more publically important. Yet I still feel the author has filled many pages with material that is already well known but has not provided the evidence for how the science data and specimens were used and interpreted. The book is certainly well written and although for me it contained little that was new for many readers the material in obscure reports and newspaper accounts will be novel as will the highlighting of the science undertaken.

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### Reference

Fogg, G.E. 1992. *A history of Antarctic science*. Cambridge: Cambridge University Press, 483 pp.

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### Globalizing polar science: reconsidering the International Polar and Geophysical years

R.D. Launius J.R. Fleming & D.H. DeVorkin  
Palgrave Macmillan, New York, 2011  
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This book is the outcome of an interdisciplinary conference at the Smithsonian in 2007 to mark the 50th anniversary of the IGY. Quite why it has taken four years to reach print is not clear but it has certainly been worth waiting for. The nineteen chapters are an attempt to address some broad and difficult questions as far as the Polar Years are concerned - how are science and technology related, what were the political and military consequences especially of IGY, what effect did these major international efforts have on the development of key science areas and what can we learn from them about the pursuit of scientific goals?

Organized into five sections the first is of four chapters on historiography. Putting the polar activities into a more general context of the history and development not only of science but of political structures is crucial in gaining perspective. For example, although Weyprecht is credited with developing the concept of the international polar year Rothenburg shows, in Chapter 2, that international

cooperation was an integral part of the Victorian era for most areas of science and commerce so his proposal was not a major step in the dark. Indeed, he suggests that the early cooperation over the Transit of Venus expeditions was an important precursor of the success of the polar years. Both the first two chapters make much of the need to develop standards as both a spur to international collaboration and, in a time of intense nationalism, as a problem if one country had to be seen as possessing a better system than the others. Cronenwett's short chapter on publishing the science from the early polar years makes several interesting points about how there was no funding for publication in the expedition budgets, the attention given to describing instrumentation, and how, despite the efforts to provide data collection guidelines, they were written too broadly to facilitate easy comparisons. Chapter 4 by Launius surveys the polar literature and concludes that, despite the wealth of material, few of the accounts are either especially critical or detailed in terms of the historiography of science and that there is still inadequate coverage of the history of the polar years. His interesting analysis of the literature into a number of different categories enables him to comment on a considerable number of titles, although I fear his comments on Huntford's analysis of Amundsen and Scott are remarkably uncritical. His recognition of science as a branch of imperialism, driven by nationalism as well as by curiosity, sits well with the colonial histories of several of the major nations including the UK, Germany, France and the United States. His very extensive series of notes on his chapter are of great value in identifying key works and his list of eight core questions indicate how further research could place polar science in a global context.

The second section provides a series of case studies - UK and USA in the 19th century, Sweden from 1880 to the present, Japan and China. All of them provide some interesting new insights into how and why countries were involved in the polar years. In his account of differences between the UK and USA in supporting polar science Carter is clear that in the US it was essential to sell the project to the public and Congress to get support whilst the UK's more autocratic system did not require either public or parliamentary support. His detailed example of magnetic research shows just how politicised these early expeditions were, especially the Wilkes Expedition. Lewander's account of Swedish activities emphasizes the Arctic expeditions but she notes that Sweden may have failed to follow up on Nordenskjöld's expedition simply because of a lack of knowledge of international law and a policy of non-intervention. There was apparently an Anglo-Swedish Antarctic project mooted in 1911 but this came to nothing because of the First World War. And her comments questioning the general assumption that the Norwegian-British-Swedish Expedition of 1949–52 was the primary example for the internationalization of Antarctic science

are noteworthy. Japan initially intended all its IGY geophysical research to be in Japan and the Northern Pacific and Stevenson relates in Chapter 7 how their involvement in the Antarctic was due to a campaign by the *Asahi* newspaper, who sold the venture to the public as an indication of Japanese rebirth. Chapter 8 makes clear that Chinese activities in IGY were dependent on following the Soviet agreement to participate and by 1957 they had made all the arrangements to take part with multiple stations across China. The sudden inclusion of Taiwan as an independent state in IGY, pushed by the USA, was too much politically, causing China to cancel its participation and setting back international science collaboration in China by many years.

Part 3 highlights the role of individuals in polar years, with most emphasis on IGY. Lüdecke's chapter deals with the early efforts of Georg von Neumayer to get Germany interested in the polar regions and then with the First German South Polar Expedition lead by Drygalski, noting his efforts to produce its valuable scientific outputs in a series of publications from 1905–31. The other three chapters are dedicated to looking at the influences of Sydney Chapman, Lloyd Berkner and Harry Wexler. The Chapman potted biography provides much new information on his life gleaned from the archives at University of Alaska. There are interesting details on the famous dinner in April 1950 hosted by James van Allen (which is said to be the birthplace of the IGY) suggesting that the dinner was no accident, the participants were carefully chosen and the agenda was already clear. Chapman's role as President of ICSU in pushing the IGY along is clearly outlined and his remarkable ability to make progress, even in politically difficult situations, marks him out as an outstanding scientific leader. Allan Needell's chapter on Berkner points up just how involved he was with the Pentagon and the State Department, and highlights the US national security concerns that in the end drove the negotiations for the Antarctic Treaty after IGY. Indeed, anyone interested in the broader context of linkages between science and US politics should read Needell's excellent and detailed biography of Berkner (Needell 2000), for which this paper provides just a taster. Whilst I had known that Harry Wexler, as chief scientist for the US IGY research, had played a major role in developing an understanding of the role of the Antarctic and the Southern Ocean in Southern Hemisphere meteorology, I had not previously appreciated the extent of his interests. Fleming's paper recounts his interest in Antarctic warming, his appreciation as early as 1962 of the role of halogens in destroying ozone, and his carefully thought out suggestions in 1958 for geo-engineering of the climate. This is a long overdue account of why and how his contribution to polar meteorology has proved so important.

In the fourth section on national roles in IGY Howkins discusses the IGY in the context of the rival political

claims to the Antarctic Peninsula area. Whilst describing the TransAntarctic Expedition as “Great Britain’s most blatantly politicized activity associated with IGY” he fails to note that the original idea was conceived by Fuchs many years earlier, that it was a Commonwealth project funded by Australia and New Zealand as well as the UK and that its scientific activities were an add on to what was essentially the last of the great Antarctic exploring expeditions. On the other hand the aerial survey of the Peninsula by FIDASE was primarily a political activity to allow the creation of accurate maps as part of evidence for governance. He does underline clearly that, as he puts it, “the rhetoric of scientific internationalism” provided a handy cloak for negotiating the Antarctic Treaty when the real driver was national security. Howkins goes on to expound his thesis on Western imperialism and the post-colonial nature of Antarctic governance apparently ignoring the 17 other countries that have become Consultative Parties and indeed that the total Treaty membership currently covers 65% of the global population. Chapter 14 by Dian Belanger is based on her book (Belanger 2006) which provides an exhaustive account of US involvement in IGY. Chapter 15 deals with satellite tracking stations in India and Japan whilst Chapter 16 describes the Markowitz Moon camera programme for geodesy.

The final section, on legacies from the IGY, has chapters on planetary science, polar politics with particular emphasis on the Saami and a final paper on stratospheric

ozone and greenhouse gases. This last paper provides a real attempt to link science with policy. The installation of the Dobson spectrometer at Halley in IGY led in due course to the discovery of the ozone hole above the Antarctic which in turn provided the stimulus for the Montreal Protocol. Likewise, Charles Keeling’s measurements of CO<sub>2</sub>, which began at the South Pole in 1958, proved to be crucial in establishing the trends in greenhouse gases in the atmosphere. Sherwood Rowland played a pivotal role in both these fields and the chapter provides the biographical context for this.

This is a really fascinating volume which provides many fresh insights into development and impacts of polar years, key features of the historical development of science in the polar regions. It provides many new suggestions about how we need to develop the history of polar science as an integral part of our understanding of its importance and relevance.

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### References

- BELANGER, D.O. 2006. *Deep freeze: the United States the International Geophysical Year and the origins of Antarctica’s age of science*. Boulder, CO: University of Colorado Press, 494 pp.
- NEDELL, A.A. 2000. *Science Cold War and the American State: Lloyd V. Berkner and the balance of professional ideals*. Amsterdam: Harwood Academic, 420 pp.