

Chapter Eighteen

Solid-Earth Geophysics Specialist Group

F.E.M. LILLEY, H.W.S. McQUEEN, C.D.N. COLLINS, D. DENHAM,
C.E. BARTON, D.M. FINLAYSON, J.C. DOOLEY & B.J. DRUMMOND

INAUGURATION

The Specialist Group on Solid-Earth Geophysics (commonly known as SG²) was formed at the suggestion of John Webb, University of Queensland. The original intention was to model it on the American Geophysical Union, though at a reduced scale. The Group was to provide a forum for whole-Earth geophysicists who were, for example, studying geomagnetism, crustal and mantle structure, earthquakes, etc., and for whom no appropriate forum existed in Australia.

The Specialist Group on Solid-Earth Geophysics was formally brought into being at a meeting held during the 7th Australian Geological Convention (AGC) at Macquarie University, Sydney, in August 1984. The meeting was convened by Barry Drummond (Bureau of Mineral Resources) and chaired by David Denham (also BMR) after the successful lithosphere symposium at the convention. The aim of the group, as stated in its charter, is to advance the understanding of the physics of the solid Earth, with emphasis on the Australian region.

ACTIVITIES

The Specialist Group has supported a variety of activities. Prominent amongst these has been the production of a regular newsletter, and the convening of sessions on Solid-Earth Geophysics at AGCs held at Adelaide (1986), Brisbane (1988), Hobart (1990), Ballarat (1992) and Perth (1994). In addition SG² has directly organised, or co-organised, a number of workshops and meetings.

The largest meeting organised to date by SG² was held in Canberra during the Australian Bicentenary in 1988. This meeting was the third in a series of international conferences on "Seismic Probing of Continents and their Margins". Previous meetings were held at Cornell University, USA, and Cambridge University, UK, to report on the latest research into the deep structure of continents using seismic techniques. The meeting attracted 183 registrants from 19 countries. A three-day workshop on seismic methodology was followed by a three-day symposium on the geological interpretation of seismic data.

A field excursion to the Tumut Trough was

organised during the conference to visit the location of a deep seismic survey. The proceedings of this meeting were published as a special volume of *Tectonophysics*.



Fig. 1 Repeating the 1792 measurements of geomagnetism at Recherche Bay.

In 1992 SG² commemorated the bicentenary of the magnetic intensity measurements made in southern Tasmania in 1792 by the French expedition of D'Entrecasteaux. These measurements were the first to be made for geophysical research in Australia. To mark this historical occasion, a two-day meeting was held in Hobart which reviewed progress in the study



Fig. 2 Plaque placed at Recherche Bay by SG² to commemorate 200 years of geophysical research in Australia.

of geomagnetism in Australia over the last 200 years. This was followed by a visit to the site of the first measurements in Recherche Bay south of Hobart, where the measurements were repeated on 11 May 1992, the anniversary of the earlier readings. The meeting has been well reported in *Geophysics Down Under*, and in Lilley and Day (1993). Members of the public were included in the activities of the meeting.

Eleven workshops and meetings have been organised or co-organised by SG². These are:

- 1985 "First Australian Geomagnetic Workshop", 14–15 May, Canberra.
- 1985 "Rheology of the Lithosphere Workshop", 2–3 September, and "Symposium on Intraplate and Interplate Earthquakes", 4–5 September, Canberra.
- 1986 Earthquake Engineering Symposium "Earthquake Risk in the Australian Region", 2–3 December, Sydney.
- 1987 Workshop on "The Applications of Numerical Techniques in Earth Sciences", 24–25 August, Canberra.
- 1988 International Symposium and Workshop on "Seismic Probing of the Continents and their Margins", 1–8 July, Canberra (an Australian Bicentennial Event).
- 1988 "Rock Magnetism, Palaeomagnetism and Geomagnetism", 24 November, Sydney.
- 1989 Earthquake Seismology Symposium: "Seismicity and Earthquake Studies of the Australian Plate and its

Margins", 13–16 February, Canberra.

- 1990 "Recent Interplate Seismicity Studies", 5–7 September, Perth.
- 1992 "The D'Entrecasteaux Bicentenary Meeting" celebrating two centuries of geophysics in Australia, 9–11 May, Hobart.
- 1992 Earthquake Engineering Symposium "Earthquake Resistant Design", 25 September, Sydney.
- 1993 "Third Australian Geomagnetic Workshop", 20–21 April, and "Palaeomagnetism Seminar" 22–23 April, Canberra.

These meetings usually have a record of proceedings printed in a conference abstract booklet, and accounts of them are also generally included in SG² newsletters. In addition, some of the meetings have been marked by a variety of "external" publications, including particularly the following:

LILLEY F.E.M. & BARTON C.E. (eds) 1986. Geomagnetism in an Australian Setting. *Exploration Geophysics* 17, 1–58.

LEVEN J.H., FINLAYSON D.M., WRIGHT C., DOOLEY J.C. & KENNETT B.L.N. (eds) 1990. Seismic Probing of the Continents and their Margins. *Tectonophysics* 174 (Nos. 1–4, published as a single volume of 641 pp).

DRUMMOND B.J. (ed.) 1991. The Australian Lithosphere. *Special Publication Geological Society of Australia* 17.

LILLEY, F.E.M. & DAY, A. A. 1993. D'Entrecasteaux, 1792: Celebrating a Bicentennial in Geomagnetism. *EOS Transactions of the American Geophysical Union* 74, 97 & 102–103.

NEWSLETTER

SG² publishes a newsletter as its main vehicle for keeping the members informed of significant Australian geophysical events and research. Rather than merely publishing routine information, the SG² committee decided soon after the formation of the Group that the newsletter should adopt a magazine format and contain newsworthy articles, along the style of those to be found in international publications such as *EOS* and *New Scientist*. At that time there were no large-format publications of this type for Australian geophysicists.

Since 1985 the Group has published two newsletters per year. Initially the publication, edited by D.M. Finlayson, was called the SG² Newsletter. Commencing with issue No. 11 of June 1990, the distinctive name *Geophysics Down Under* was added to the newsletter when J.C. Dooley took over as editor, reflecting the fact that the publication had

developed well beyond a news-sheet and provided a focus for ongoing articles with some substance. Indeed, there have been cases where the SG² publication has been quoted as a scientific journal — very flattering, but not strictly correct practice since articles are not refereed as in mainline journals. Authors are solely responsible for the content of articles.

SG² can be justifiably proud of its publication. Editors have sought articles of a high standard across the range of geophysical activity and research in Australia. The reporting of scientific meetings has also provided Australian geophysicists with news of the direction that specialist geophysical research is taking in Australia and overseas. The publication generally exceeds thirty pages and usually contains informed comment by the Chairman of SG², an editorial, and numerous short items as well as longer articles, often as part of a theme developed for a particular issue.

Feature articles have covered the application of a broad range of geophysical techniques to the investigation of a variety of geological problems. Articles on the Earth's magnetic field have covered aspects of basic research as well as the application of geomagnetic methods. Examples include the use of geomagnetism to study past climatic changes and the use of magnetic surveying techniques in

archaeological research. Various aspects of seismic research in Australia which have appeared range from model studies to descriptions of large earthquakes. Other articles have emphasised the application of seismic techniques, from hydrocarbon exploration and crustal studies to nuclear test monitoring. Some of the other topics which have been addressed in the newsletter are gravity and electrical methods, rock mechanics, mantle convection and Australian extraterrestrial impact structures.

In all issues of the SG² Newsletter and *Geophysics Down Under* there are regular reports of significant earthquakes in the Australian region and nuclear tests detected by the Australian Seismological Centre. The reporting of (often small) specialist geophysics meetings has been a feature of the publication, providing an avenue for informing the wider geophysical community of developments and research.

The future of *Geophysics Down Under* is linked to the enthusiasm of the SG² membership, which is a comparatively small group of about 120 members within the Geological Society of Australia. But if the geosciences are to develop in Australia there must be vehicles for news and information transfer. We think that *Geophysics Down Under* can fulfil at least part of that role.

BELOW THE OROGENIC BELT

"Did my pleasing construction lead me to subduction? -
Oh tell me Doctor please,
There's a persistent spine down my orocline
And I've got the IAT's."

"Tell me the story and try to not worry",
The kindly doctor frowned:
"Were you ever led to a pillowed bed
'Neath forams floating down?"

"Did turbidites stroke your palaeoslope?
Do you have a marked sole?
Did a million nights of sheeted dykes
Cause your spreading limbs to glow?"

"Did you let calc-alks or some plain basalts
Intrude your HAB'S?
Did you take delight when an ophiolite
Rose shining from the seas?"

"Were you overthrust by obducting crust?
Did you cross the suture line?
Was your modesty swayed by blueschist and jade,
Or did you stop your drift in time?"

"Well Doctor dear, my Asthenosphere
Was in constant agitation,
And I got hot spots and mafic clots
All up and down my craton."

"But no rigid plate was ever my mate,
No island arc accretion;
I was never a wench for an ocean trench,
In spite of my declination."

"I have to think," said the Doctor's wink,
"That your age precludes this mating,
Being Proterozoic is quite heroic,
But much too old for dating."

"The trouble lay quite another way,
Your sialic crust's reworking.
Your spreading girth? Just expanding Earth.
And I find it quite provoking."

— from Newsletter No. 14, June 1977.