



## **ANNUAL SUMMARY**

**2006/2007**

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ANSIR is a National Research Facility operated as a joint venture by The Australian National University and Geoscience Australia.

Up to June 2005 ANSIR operated as a Major National Research Facility under Contract to the Commonwealth of Australia. The owners agreed to continue the National Facility with the same terms of access by merit until, at least, 31 December 2007. The new designation “National Research Facility for Earth Sounding” reflects expansion of activities beyond purely Seismic Imaging through, e.g., the enhancement of magnetotelluric work.

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## **THE ROLE OF ANSIR**

ANSIR seeks to strengthen research and education in the Earth Sciences in Australia, and to provide a national focus and leadership through its work in Seismic Imaging and other aspects of Earth Sounding, which helps to foster collaboration between individual scientists, between institutions and across sectors.

ANSIR provides equipment and training for seismic imaging experiments. The staff of the facility provides help to researchers with the design and implementation of experiments and facilitate data processing and interpretation. The Director and Deputy Director maintain active research programs at ANU and GA and are thereby able to provide their experience to prospective applicants for use of the facility.

ANSIR has established a pool of equipment capable of imaging the Earth's interior at a variety of scales using different styles of seismic techniques. ANSIR's equipment is portable and can be moved to any part of the Australian Continent. Components of the equipment have been used overseas in international collaborative experiments. The ANSIR equipment can record energy from many types of sources, including earthquakes, explosions and truck-mounted vibrators; it can operate in a wide range of environments, including the remote hot and dusty conditions of the Australian outback, the humid tropics of the north and the freezing conditions of Antarctica.

The resources of ANSIR are available to all researchers. The scientific merit of the proposed research is the main criterion used to determine priority for access, but researchers have to be able to cover the operating costs for their projects.

- ANSIR coordinates all activities from ANU (as Financial Agent), support of reflection profiling is provided primarily from Geoscience Australia, support of magnetotelluric profiling is provided by Adelaide University.
- ANSIR has supported scientific research through regional reflection profiles, mine-scale investigations, and several projects using the portable equipment in Australia.
- ANSIR at Geoscience Australia maintains legacy seismic reflection and refraction data acquired over the last 50 years by GA and its predecessors. As custodian of these data sets ANSIR supplies these to researchers, government agencies and companies on request.

## **ANSIR ACTIVITIES IN 2006/2007**

### ***Portable Instrument Deployments***

- A cooperative experiment between ANU, UWA and GA, supported by ARC linkage funds has seen 8 portable broad-band instruments installed mostly along the coast of northwestern Australia to improve monitoring of seismicity and understanding of neotectonics.
- 20 instruments were deployed in May 2006 from the Pilbara across the Capricorn Orogen into the northern Yilgarn Craton, and from Marble Bar into the Rudall Paterson province. These instruments were recovered in May 2007. The dataset will be used for structural studies of the crust and upper mantle, in conjunction with the coastal instruments.

- 50 short period instruments were deployed in the SETA project covering Tasmania from October 2006 – September 2007 for delay-time tomographic studies. This deployment links with earlier work in the TIGGER project in northern Tasmania (with a few stations in the west) and the entire data set is being processed to produce a unified tomographic model for Tasmania.
- 35 short period instruments and 5 broadband instruments were deployed in the northern Murray basin in the SEAL2 experiment with support from the Geological Survey of New South Wales from February 2007. The results will be used with earlier data to produce a comprehensive model of crustal and upper mantle structure beneath southeastern Australia.

### ***Reflection Profiling***

- The Mt Isa Seismic Survey was a joint research project (Survey L180). The project was completed in December 2006 and was a collaborative activity between Geoscience Australia, the Geological Survey of Queensland, Zinifix Mining and the *pmd*\*CRC. In total 900 km of 60 fold deep seismic reflection profiling was undertaken, making it the largest mineral province seismic survey ever undertaken in Australia.
- Three investigations using the high frequency mini-Vibe as a source were undertaken in the Yilgarn Craton, Western Australia. These surveys were designed to investigate Archaean stratigraphy and structure hosting mesothermal lode gold deposits in the Yandal greenstone belt and the Jundee Areas of the Eastern Goldfields.
- An investigation using ANSIR's high frequency mini-Vibe as a source was undertaken in the Argyle Diamond area of northern Western Australia. This survey was designed to gain an understanding of the petrophysics, geometry, and architecture of the Southern Devonian Basin in the Argyle State Agreement Area. This will provide baseline information to help design the most appropriate approaches to exploring the area for concealed diamond pipes.
- Further seismic survey investigations of Neotectonic faulting were undertaken by GEMD at GA as a small scale high resolution investigation faulting using ANSIR geophones.
- The MiniVib's last job for 2006 was in the Perth Basin where it undertook a groundwater project involving the Western Australia Water Board.
- ANSIR commenced the 2007 Isa-Georgetown-Charters Towers deep seismic reflection traverses between the Mt Isa Province and the Georgetown Province in northern Queensland. The survey involved some 1200 km of new seismic data and is anticipated to finish in September of the next reporting year.

### ***Magnetotelluric Profiling***

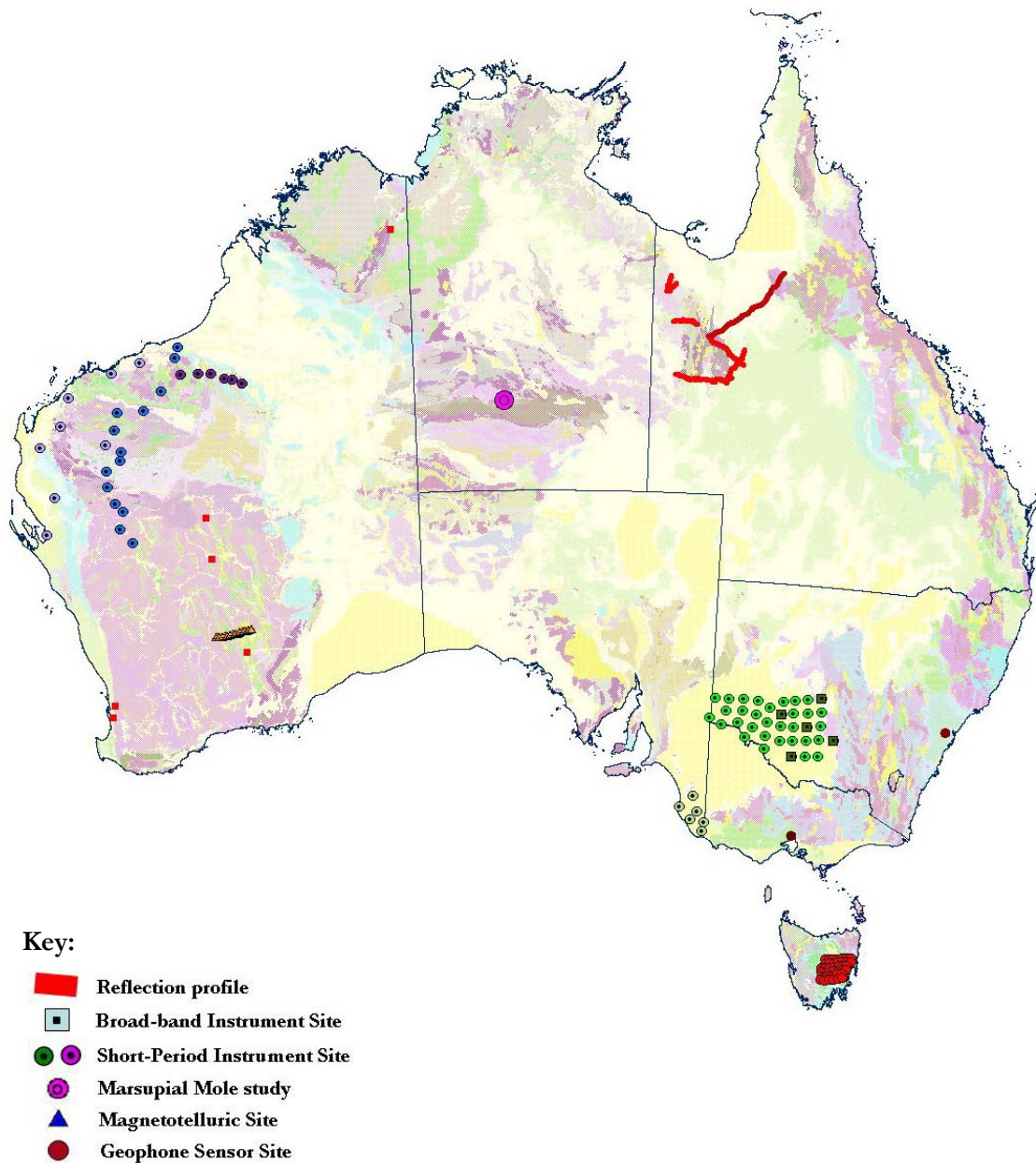
- ANSIR commenced its second magnetotelluric survey in northern Queensland. This survey was positioned to record a magnetotelluric profile coincident with the 2007 Isa-Georgetown-Charters Towers deep seismic reflection traverses between the Mt Isa Province and the Georgetown Province. The magnetotelluric profile involved some 140 new magnetotelluric sites and is anticipated to finish in September of the next reporting year. The magnetotelluric traverses will cross the eastern edge of the Mt Isa Province, the unknown regions between

the Mt Isa and Georgetown provinces, then the series of Provinces between the Georgetown and Charters Towers region.

### *2006/2007 Experiments and beyond*

Figure 1 shows the range of experiments carried out in the 2006/2007 using the portable equipment, the magnetotelluric sites and reflection surveys. Some equipment was also in use in Antarctica in the Lambert Graben area. Table 1 shows the work program for experiments undertaken over this period whilst Table 2 shows the proposed work program for 2007/2008.

**Figure 1. ANSIR Experiments undertaken in 2006/2007**



**Table 1: ANSIR experiments undertaken in 2006/2007**

Proponent	Institution	Location	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Reading, Kennett, 02-00T	ANU, RSES	Antarctica	A4	A4	A4	A4	A4	A4	A4	A4	A4	A4	A4	A4
Kennett, Heintz, Fontaine, 04-12T	ANU	Mt Gambier, SA	B6	B6										
Keep, Kennett, Cummins, (LEIF)	UWA, ANU, GA	Seismicity N.W. WA	B8	B8	B8	B8	B8	B8	B8	B8	B8	B8	B8	B8
Mason, 05-11R, (L180)	GSQ, GA	Mt Isa Region, Qld				VR	VR	VR						
Kennett, Reading, 05-12T	ANU	N.W. WA	B20	B20	B20	B20	B20	B20	B20	B20	B20	B20	B20	B20
Asten, 05-14T	Monash Univ.	Microseismic, Vic	G8	G8	G8	G8	G8	G8						
Benshemesh, 05-15T	Monash Univ.	Marsupial Moles, NT	G32	G32	G32	G32	G32	G32	G32	G32	G32	G32	G32	G32
Rawlinson, 06-02T	ANU	S. Eastern Tas				S40	S40	S40	S40	S40	S40	S40	S40	
Collins, 06-06R	GA	Lapstone, NSW	G 100											
Urosevic, 06-07R	Curtin Univ.	Leinster, WA					mv							
Meyers, 06-09R	Curtin Univ.	Argyle, WA				mv								
Harris, 06-11R	Curtin Univ.	Pinjar, Perth Basin, WA						mv						
Rawlinson, Kennett, Robson, 06-13T	ANU, DPI NSW	SEAL2, Murray Basin, NSW								S35	S35	S35	S35	S35
Fontaine, 06-17T	ANU	Murray Basin, NSW								B5	B5	B5	B5	B5
Meyers, 06-18R	Curtin Univ.	Jundee, WA					mv							
Goleby, 06-20R	GA, GSQ	North Queensland											VR	VR
Goleby, 06-21M	GA	Yilgarn, WA	MT 10											

**Key:**

S – Short period instruments (+number); B – Broad band instruments (+number);  
A – Broad band instruments in Antarctica (+number); R – Reflection recording system;  
V – Vibrators; mv – minivibrator; G – Geophone strings (+number); 3C – 3 component geophones; M – Seismometers (+number).  
MT – Magnetotelluric Survey(+ number)

**Table 2: ANSIR proposed schedule for 2007/2008**

Proponent	Institution	Location	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Reading, Kennett, 02-00T	ANU, RSES	Antarctica	A4	A4	A4	A4	A4	A4	A4	A4	A4	A4	A4	A4
Keep, Kennett, Cummins, (LEIF)	UWA, ANU, GA	Seismicity N.W. WA	B8	B8	B8	B8	B8	B8	B8	B8	B8	B8	B8	B8
Benshemesh, 05-15T	Monash Univ	Marsupial Moles, NT	G32	G32	G32	G32	G32	G32	G32	G32	G32	G32	G32	G32
Collins, Lister, 06-05R	AuScope (JCU, ANU)	North Qld		VR										
Rawlinson, Kennett, Robson, 06-13T	ANU, DPI NSW	Murray Basin, NSW	S35	S35										
Fontaine, 06-17T	ANU	Murray Basin, NSW	B5	B5	B5	B5	B5	B5	B5	B5	B5	B5	B5	B5
Goleby, 06-20R	GA, GSQ	North Qld	VR	VR	VR									
Fontaine, Tkalcic, 07-03T	ANU	Southern Australia (SA & NSW)			B20	B20	B20	B20	B20	B20	B20	B20	B20	B20
Mantaring, Robson 07-04R	DPI NSW	Darling-Rankins Springs, NSW										VR		
Rawlinson, Kennett, 07-05T	ANU	SEAL3 - SE Australia					S58	S58	S58	S58	S58	S58	S58	S58
Goleby, 07-06M	GA	North Qld	MT	MT	MT									
Lyons, 07-07R	GA	Gawler, SA										VR	VR	
Bernecker, Goleby, 07-08R	GA	Perdika, Warburton SA, NT												VR

**Key:**

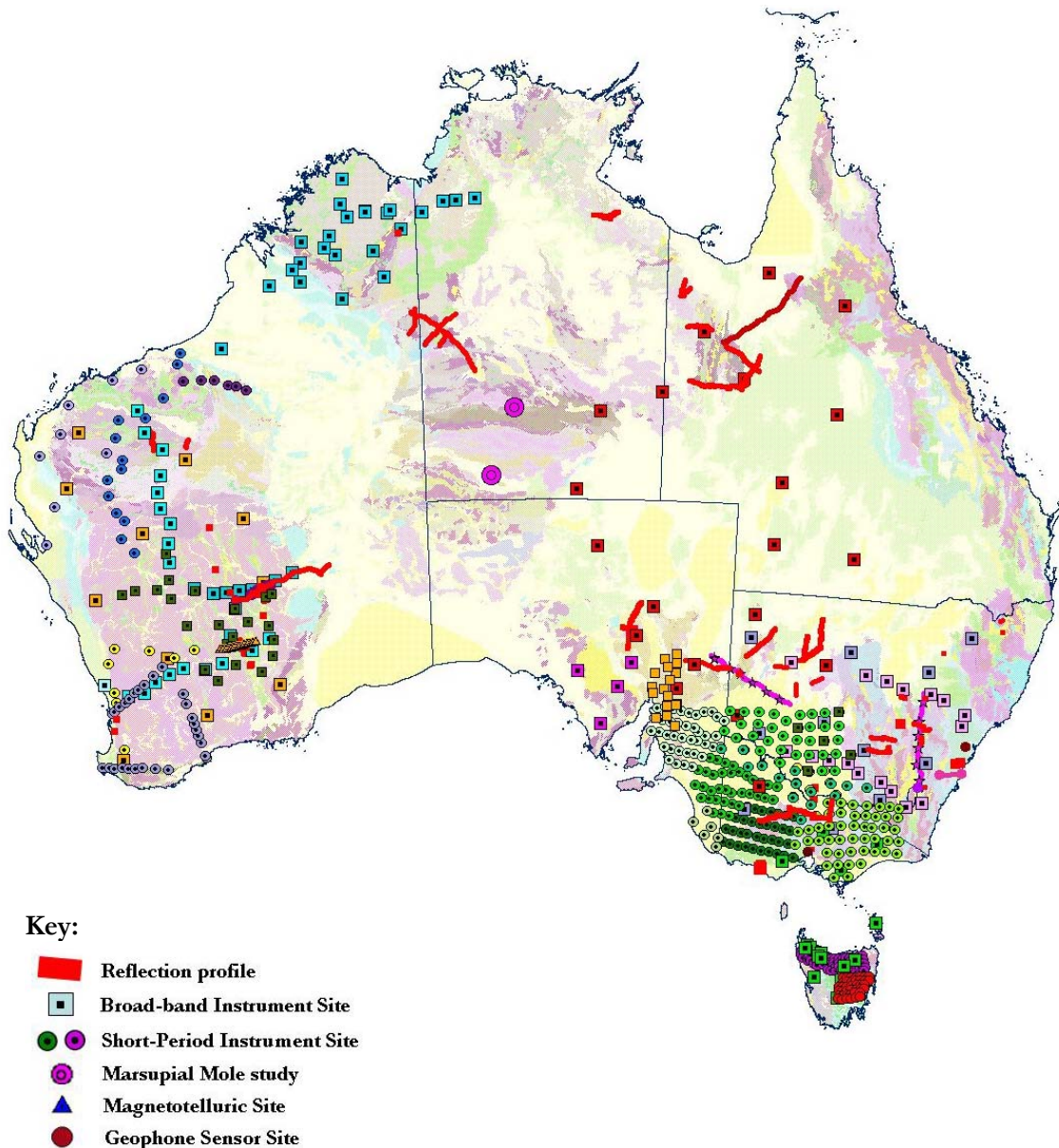
S – Short period instruments (+number); B – Broad band instruments (+number);  
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MT – Magnetotelluric Survey (+ number)



## Cumulative Coverage by ANSIR Experiments 1997/2007

The impact made by the ANSIR Facility since its inception is most clearly seen in Figure 2 which shows all of the work undertaken between 1997 and June 2007. Work has been carried out across the whole continent, with an increasing number of line kilometres for reflection profiling in recent years and larger scale (and longer term) deployments of portable instruments.

Figure 2. ANSIR Experiments undertaken from 1997 to 2007





## **ANSIR STRUCTURE AND MANAGEMENT**

ANSIR is an unincorporated joint venture of The Australian National University (ANU) and Geoscience Australia (GA). The Director of the Research School of Earth Sciences at ANU and the Chief Executive Officer of GA are advised on the broad management directions of ANSIR by a Steering Committee, whose membership is listed in Table 3.

The Steering Committee met twice in 2006/2007 (November 2006 and June 2007). This Steering Committee replaced the previous Management Advisory Board which had been in operation from the inception of the facility in 1997 until the completion of the DEST Commonwealth Agreement in June 2005.

Since July 2002, all the equipment assets have been owned by The Australian National University, which also acts as the Financial Agent for the Facility. Professor Brian Kennett (ANU) is Director, supported from Geoscience Australia by the Deputy Director (Dr Bruce Goleby) and Executive Officer (Mr Tim Barton, till June 29 2007) who provide the main interaction with users of the reflection profiling equipment.

The operation of the facilities has been supported by the owners. A modest mobilisation fee is charged for the use of the portable equipment, with deployment costs the responsibility of the user. For the reflection equipment the full cost of the profiles has to be provided to ANSIR who then engage a commercial Facilities Manager, Terrex Seismic Pty Ltd, to undertake the surveys.

The portable short-period and broad-band recorders housed at RSES are supervised by Mr Stefan Sirotjuk (Assistant Operations Manager) with support from Mr Tony Percival. RSES staff have both prepared equipment for field use and provided training (sometimes in-field). Dr Nicholas Rawlinson acts as Assistant Director at RSES providing oversight of the short-period recorders.

Proposals are vetted by the ANSIR Access Committee, see Table 4, which then advises the Director of the scientific merit of each proposal. The Director then prepares a work plan for the coming year that is notified to the Steering Committee.

The Director, Deputy Director and Executive Officer provide assistance and support to proponents in the development of proposals, particularly with regard to equipment needs for the proposed projects.

In 2006/2007 all but one submitted proposal were considered to be worthy of support. The one proposal, proposal **06-16R**: Agnew Anticline seismic investigation, WA by Dr Ned Stolz of Goldfields was not accepted as an ANSIR project as it was a solely a commercial project. ANSIR referred the Principal Investigator to several possible commercial providers as part of its facilitation role. In addition, and as in previous years, some proposals have yet to secure sufficient financial resources to enable the project to be scheduled.

**TABLE 3: ANSIR Steering Committee Members, 2006/2007**

Prof. Ross Griffiths (to September 1 2006)	Interim Director, Research School of Earth Sciences, ANU.	Representing ANU.
Prof. Brian Kennett (from September 4 2006)	Director, Research School of Earth Sciences, ANU.	
Dr James Johnston	Chief, Onshore Energy and Minerals Division, GA.	Representing Geoscience Australia as delegate of CEO.
Dr Neil Williams	Chief Executive Officer, GA.	Alternate Geoscience Australia representative.
Prof. Brian Kennett	ANSIR Director, ANU.	
Dr Nick Hayward	BHP Billiton	Representing the Australian Exploration Industry (Minerals)
A/Prof. G. Heinson	The University of Adelaide.	Co-opted member.
Dr Ted Tyne	Primary Industries, South Australia.	Representing State and Territory Geological Surveys.

**TABLE 4: ANSIR Access Committee, 2006/2007**

Dr Bruce Goleby	GA, ANSIR Deputy Director	Access Committee Chairman
Prof. Brian Kennett	ANSIR Director	
A/Prof. Mike Dentith	University of Western Australia	
Dr S. Hearn	University of Queensland, VELSEIS	
Dr Michael Roach	University of Tasmania	

## EQUIPMENT

A summary of the equipment that was available in 2006-2007 through ANSIR can be found in Appendix 3. Most of the equipment is based in Australia, but the previous ANSIR Management Advisory Board had agreed to allow a number of portable broad-band stations to be permanently based in Antarctica to allow full year deployment with a consequent reduction in the complexity of logistics and transport costs.

All of the ANSIR assets are based at the ANU, and the sets of broad-band and short-period equipment formerly operated by RSES have been merged into the ANSIR pool to provide a substantially larger number of recorders to projects. The seismic reflection acquisition system and seismic vibrators are usually stored at the end of each project at locations which minimise mobilisation and storage expenses between projects.

Although ANSIR has a significant number of portable instruments, much of the stock is ageing and has been heavily used. Discussions with a number of University groups have identified the benefits of having both seismic and electromagnetic recording capability to provide additional

information on lithospheric structure. A successful application was made to the LIEF infrastructure program of the Australian Research Council in 2005 for enhanced equipment for earth sounding by ANU with involvement from the University of Adelaide and Macquarie University. Sufficient funding was secured to purchase a set of 15 instruments equipped with both broad-band seismic and electromagnetic sensors. Maintenance costs for the seismic Vibroseis trucks has been steadily increasing, and some commercial use of these equipment has allowed ANSIR to offset these costs to a significant degree.

Researchers are asked to acknowledge ANSIR's role in their research when presenting their results at conferences and in formal publications. Users of the facility who undertake approved projects are also requested to submit annual returns on their work. This provides ANSIR with a quantitative measure on the impact of the facility and also provides an indication as to where the facility is being promoted.

The long-term agreement between ANSIR and its Facility Manager, Terrex Seismic, expired on 2007 June 19, and on that date all the reflection equipment was sold to Terrex Seismic. This means that from July 2007 on, ANSIR operates by commercial arrangements for the provision of reflection experiments, building on the arrangements organised by Geoscience Australia for their extensive program for Onshore Energy Security.

## **EXECUTIVE ACTIVITIES**

The Director received the Beno Gutenberg Medal in Seismology from the European Geosciences Union in April 2007. He maintains links with a number of international initiatives, in particular the development of seismological studies in Antarctica in the context of the forthcoming International Polar Year.

The Deputy Director visited Japan after being awarded a JSPS (Japanese Society for the Promotion of Science) short-term fellowship in February 2006. He attended the 2006 Deep Seismic probing of the Continents of the Crust and mantle Symposium in Hayama, Japan. He is continuing chairman of IGCP project 474 "Images of the Earth's Crust & Upper Mantle" which aims to provide ready access to seismic images of the Earth's basement geology, deep crust and upper mantle. He maintains links with many of the international deep seismic reflection programs.

The Director was a member of the AuScope Steering Committee that prepared an Investment Plan submitted to the NCRIS Committee, the Deputy Director acted as an alternate during Professor Kennett's absence overseas. The Director was on the panel interviewed by the NCRIS Committee and a grant of \$42.8M over the next five years was announced by the Minister for Education, Julie Bishop, in December 2006. Approximately \$8M will flow to the Earth Imaging component to support the acquisition of data infrastructure through Geotransects including reflection profiling and also for the upgrade of seismic and magnetotelluric recording equipment.

ANSIR had a poster and two oral presentations on the deployment of active and passive seismology through the Facility at the Australian Earth Sciences Convention in Melbourne in July 2006. This was an important meeting as the Australian Society of Exploration Geophysicists and the Geological Society of Australia joined forces with a comprehensive program.

The Director gave an invited presentation at the Goldschmidt Meeting, in Melbourne in August 2006, on understanding the Australian Lithosphere to a varied audience of geochemists from around the world.

### APPENDIX 1: PROJECTS UNDERTAKEN IN 2006/2007

PROJECT TITLE	PRINCIPAL INVESTIGATOR	OBJECTIVE
<b>02-00T:</b> The deep seismic structure of East Antarctica.	Dr A.M. Reading, RSES, ANU.	Deployment of broad band seismic instruments at Davis Station and Beaver Lake. Recorded seismic events will allow the first determinations of deep crustal and mantle structure in this part of East Antarctica.  This is a continuing project from 2004/2005 and project 00-14T.
<b>04-12T:</b> Mt Gambier, Victoria – South Australia.	Prof. Brian Kennett, RSES, ANU. Dr M Heintz RSES, ANU. Dr F. Fontaine RSES, ANU. Dr Mike Etheridge, ScopeEnergy	Geothermal exploration licences cover the entire Newer Volcanics province in southeastern South Australia. The most likely source of the anomalous temperature gradients measured in the area is intrusions of Newer Volcanics source magma. Little is known about the likely number, size, location or depth of such intrusions. Adequate modelling, risk evaluation and exploration planning for the commercial geothermal prospects are critically dependent on this knowledge.  This is a continuing project from 2004/2005.
<b>Linkage:</b> Seismicity NW WA	Dr M. Keep, Prof. Kennett, RSES, ANU. Dr P. Cummins, GA.	Continuing monitoring of seismicity in northwest WA.
<b>05-11R:</b> Mt Isa regional seismic survey, Qld.	Dave Mason, Geological Survey of Qld. Dr George Gibson, GA.	This project involves the acquisition, processing and interpretation of deep seismic reflection data within the Mt Isa region, and will also focus on the geometries of the basin boundaries.  Survey L180.
<b>05-12T:</b> Seismic constraints on cratonic assembly in northwest Australia, WA.	Dr A.M. Reading, RSES, ANU. Prof. Kennett, RSES, ANU.	Deployment of broad band seismic instruments to provide improved control on crustal and mantle structure in Northwest Australia.

## APPENDIX 1 (CONT.): PROJECTS UNDERTAKEN IN 2006/2007

<b>05-14T:</b> Microseismic, Victoria	Prof. M. Asten, Monash University	Microtremor array survey of Port Melbourne area, extending previously published work to low frequencies (0.5-2 Hz) in order to gain shear velocity profile to bedrock beneath Coode Is silt and basalt layers.
<b>05-15T:</b> Conservation ecology of Itjaritjari (Southern Marsupial Mole <i>Notoryctes typhlops</i> ) in Central Australia, NT.	Dr Joe Benshemesh, Biodiversity Conservation, Dept NRETA (NT).	To detect Itjaritjari (marsupial mole) underground and track their movements using seismic sensors; describe the activity budget of Itjaritjari; compile an inventory of animal sounds/vibrations underground; relate the movements of Itjaritjari to the distribution and abundance of their foods.  The is a continuing Project.
<b>06-02T:</b> SETA – South East Tasmania seismic Array.	Dr N. Rawlinson, RSES, ANU.	This project will map variations in seismic wave speed in the crust and upper mantle beneath south east Tasmania by deploying a large array of short period seismometers to record distant earthquakes. It will delineate major structural features associated with the Early – Mid Palaeozoic evolution of the Tasmanian lithosphere from 3-D tomographic images produced from the teleseismic data.
<b>06-06R:</b> High-resolution seismic imaging of recent faulting and sedimentary structures for earthquake hazard assessment.	Clive Collins, Geoscience Australia	Project will image faulting and shallow sedimentary structures associated with recent fault scarps along the Lapstone structural complex and/or Crookwell area, NSW, using high-resolution seismic reflection and refraction profiling.
Continuation of program in NSW.		
<b>06-07R:</b> Seismic reflection profiling for mapping Archaean stratigraphy and structure hosting nickel sulphide deposits in the Leinster area, Wiluna greenstone belt, Western Australia.	A/Prof. Jayson Meyers, Dr M Urosevic, Exploration Geophysics, Curtin University of Technology.	Project involves seismic reflection profiling across key stratigraphic horizons that host Archaean nickel sulphide mineralisation near the base of komatiite lava flows. High-resolution seismic reflection profiling from the surface down to a target depth of 4 kilometres.
<b>06-09R:</b> Investigating the structure of the Southern Devonian Basin in the Argyle State Agreement Area.	A/Prof. Jayson Meyers, Exploration Geophysics, Curtin University of Technology.	The aims of the research programme are to gain an understanding of the petrophysics, geometry, and architecture of the Southern Devonian Basin in the ASAA. This will provide baseline information to help design the most appropriate approaches to exploring the area for concealed diamond pipes.  Survey L181.

## APPENDIX 1 (CONT.): PROJECTS UNDERTAKEN IN 2006/2007

<p><b>06-11R:</b> High Resolution Seismic Reflection for hydrogeology over the Pinjar Anticline below the Northern Gngalara Water Mound of the Perth Basin; Western Australia.</p>	<p>Brett Harris, Curtin University of Technology</p>	<p>The objective of the Pinjar Anticline high resolution seismic reflection survey is to resolve the complex hydrostratigraphy of the Yeal area in the depth range 25 to 1000m. The results from the seismic reflection survey will provide key inputs for hydraulic modelling of the wider Perth Basin and will ultimately feed into decision making for Perth's future groundwater resource management.</p>
Survey L183.		
<p><b>06-13T:</b> SEAL2 - South East Australia Linkage Project, Part 2.</p>	<p>Dr N. Rawlinson, Prof. B.L.N. Kennett, RSES, ANU and  D. Robson, DPINSW</p>	<p>The aim of this project is to deploy an array of ~30 short period seismic recorders across southern New South Wales to detect distant earthquakes from plate margins (e.g. Fiji, Indonesia). Seismic records from these events will be used to build 3-D images of the crust and upper mantle using teleseismic traveltome tomography.</p>
<p><b>06-17T:</b> MBALE – Murray Basin Asthenosphere and Lithosphere Experiment.</p>	<p>Dr. Fabrice Fontaine, RSES, ANU</p>	<p>The goals of this seismic experiment are to determine the plate thickness and the depth to Moho with receiver function analysis, to evaluate the deformation of the upper mantle using seismic anisotropy, and to increase the coverage of previous seismic deployments in South East Australia in order to improve the 3-D images of the crust and upper mantle.</p>
<p><b>06-18R:</b> Seismic reflection profiling for mapping Archaean stratigraphy and structure hosting mesothermal lode gold deposits in the Jundee area, Yandal greenstone belt, Western Australia.</p>	<p>A/Prof. Jayson Meyers, Exploration Geophysics, Curtin University of Technology.</p>	<p>Seismic reflection profiling across key stratigraphic horizons that host Archaean mesothermal lode gold mineralisation within west dipping dolomite units and structures surrounding felsic porphyry intrusive stocks. High-resolution seismic reflection profiling is designed to image reflectors from the surface down to a target depth of 3 kilometres.</p>
Survey L182.		
<p><b>06-20R:</b> Isa-Georgetown-Chartiers Towers Deep Seismic Reflection Survey.</p>	<p>Dr Bruce Goleby, Geoscience Australia, and  Dr Ian Withnall, Geological Survey of Queensland.</p>	<p>This project involves the acquisition, processing and interpretation of deep seismic reflection data from a series of seismic traverses and will provide a better understanding the geological potential of onshore Australia for both minerals and petroleum.</p>
Survey L184 & L185.		
<p><b>06-21M:</b> Yilgarn MT Survey</p>	<p>Dr Bruce Goleby, Geoscience Australia</p>	<p>The project involved the collection of a series of MT soundings coincident with the 1991 seismic reflection survey to investigate crustal structure variation seen on the seismic.</p>

## APPENDIX 2: ANSIR PROJECTS RECEIVED IN 2006/2007

PROJECT TITLE	PRINCIPAL INVESTIGATOR	STATUS @ 30/10/07
<b>06-05R:</b> North Queensland Geotransect, Qld.	Prof. W.J. Collins, School of Earth Sciences, James Cook University (JCU).	Project Scheduled August 2007 with support from NCRIS AuScope funds.  Survey L186.
<b>06-06R:</b> High-resolution seismic imaging of recent faulting and sedimentary structures for earthquake hazard assessment.	Clive Collins, Geoscience Australia.	Project will image faulting and shallow sedimentary structures associated with recent fault scarps along the Lapstone structural complex and/or Crookwell area, NSW, using high-resolution seismic reflection and refraction profiling.  Continuation of Projects 03-04R and 05-06R but now in NSW.
<b>06-07R:</b> Seismic reflection profiling for mapping Archaean stratigraphy and structure hosting nickel sulphide deposits in the Wiluna greenstone belt, WA.	A/Prof. Jayson Meyers, Exploration Geophysics, Curtin University of Technology.	Project Completed.
<b>06-08R:</b> Capricorn Orogen transect, WA.	Professor Peter A. Cawood  School of Earth and Geographical Sciences, University of Western Australia .  and Ian Tyler,  Geological Survey of Western Australia..	Awaiting decisions on AuScope Funding and Timetabling.
<b>06-09R:</b> Argyle, WA.	A/Prof. Jayson Meyers,  Exploration Geophysics, Curtin University of Technology.	Project Completed.
<b>06-10R:</b> 3D Seismic Reflection for Hydrogeology; Beenyup Treated Wastewater Injection Trial, Perth WA.	Brett Harris,  Curtin University of Technology.	Project Cancelled.
<b>06-11R:</b> High Resolution Seismic Reflection for hydrogeology over the Pinjar Anticline below the Northern Gngangara Water Mound of the Perth Basin, WA.	Brett Harris,  Curtin University of Technology.	Project Completed.
<b>06-12R:</b> St Ives high resolution seismic investigation, WA.	Dr Ned Stolz,  Gold Fields.	Project Cancelled.



## APPENDIX 2 (CONT.): ANSIR PROJECTS RECEIVED IN 2006/2007

<b>06-13T:</b> SEAL2 - South East Australia Linkage project, part 2, Vic.	Dr. Nicholas Rawlinson, RSES, ANU.	Project Commenced.
<b>06-14R:</b> Koonenberry Belt / Thomson Orogen Seismic Survey, NSW.	David Robson, Geological Survey of NSW, Department of Primary Industries.	Project Awaiting Funding.
<b>06-15R:</b> Cobar / Thomson Orogen Seismic Survey, NSW.	David Robson, Geological Survey of NSW, Department of Primary Industries.	Project Awaiting Funding.
<b>06-16R:</b> Agnew Anticline seismic investigation, WA.	Ned Stolz, Goldfields.	Proposal not endorsed by Access Committee in current form.
<b>06-17T:</b> MBALE – Murray Basin Asthenosphere and Lithosphere experiment, NSW.	Dr Fabrice Fontaine, RSES, ANU.	Project Commenced.
<b>06-18R:</b> Seismic reflection profiling for mapping Archaean stratigraphy and structure hosting mesothermal lode gold deposits in the Yandal greenstone belt, WA.	A/Prof. Jayson Meyers Exploration Geophysics, Curtin University of Technology.	Project Completed.
<b>06-19R:</b> Wentworth Trough to Stawell-Bendigo Zones Seismic Survey, NSW.	John Watkins, Geological Survey of NSW, Department of Primary Industries.	Project Awaiting Funding.
<b>06-20R:</b> Isa-Georgetown-Chartiers Towers Deep Seismic Reflection Survey, Qld.	Dr Bruce Goleby, Geoscience Australia.	Commenced.
<b>06-21M:</b> Yilgarn MT investigations, WA.	Dr Bruce Goleby, Geoscience Australia.	Completed.
<b>06-22M:</b> AWAGS2 MT.	Dr P Milligan, Geoscience Australia.	Project test successfully completed. Full project withdrawn.
<b>07-01R:</b> Seismic Imaging beneath Basalts, Moranbah, Qld.	Dr Evans & Dr M. Urosevic, Curtin University.	Project Cancelled.
<b>07-02R:</b> Time Lapse 3D seismic for C02CRC, Vic.	Kevin Dodds, CSIRO (C02CRC).	Project Cancelled.
<b>07-03T:</b> SOC - Structure of Cratons From Gawler craton to Curnamona craton Southern Australia (SA & NSW).	Dr F. Fontaine, Dr H Tkalcic, RSES, ANU.	Project Commenced, Continuing to August 2008.

## APPENDIX 2 (CONT.): ANSIR PROJECTS RECEIVED IN 2006/2007

<b>07-04R:</b> New South Wales Department of Primary Industries, Rankins Springs and Yathong Trough 2007 Seismic Survey.	Dr Aristeo "Ricky" Mantaring, Dr John Watkins and Dr Dave Robson,  DPI NSW.	Project Scheduled April-May 2008.
<b>07-05T:</b> SEAL3 - South East Australia Linkage project, part 3.	Dr Nick Rawlinson, Professor Brian Kennett,  RSES, ANU.	Project Scheduled November 2007.
<b>07-06M:</b> Isa-Georgetown-Chartiers Towers Magnetotelluric Survey, Qld.	Dr Bruce Goleby,  Geoscience Australia.	Project Scheduled July 2007.
<b>07-07R:</b> Gawler-Curnamona OESP Traverses, SA.	Dr P. Lyons,  Geoscience Australia.	Project Scheduled May-June 2008.
<b>07-08R:</b> Perdika, Warburton OESP Traverses, SA-NT.	Tom Bernecker, Dr Bruce Goleby,  Geoscience Australia.	Project Scheduled May-June 2008.

## APPENDIX 3: ANSIR SEISMIC EQUIPMENT: 2006/2007

### SEISMIC REFLECTION ACQUISITION SYSTEM:

ARAM24 (24 bit Delta-Sigma) comprising the following components:

- GPS True-time option
- 48 x RAM units @ 8 channels per RAM (384 channels)
- 4 x CRU Line Interface Cards
- 5 x Line Tap Units (LTU)
- 80 x 24V 12 AH Battery Packs
- 65 x ARAM24 Telemetry cable with 8 takeouts @ 43m
- 10 x ARAM24 Telemetry cable with 4 takeouts @ 40m
- 10 x ARAM24 Telemetry baseline cable 348m
- 5 x ARAM24 Telemetry baseline cable 105m
- 46 x ARAM24 Telemetry cable with 8 takeouts @ 12.5m

For technical specifications see:

Geo-X website: <http://www.aram.com/main/default.asp>

### ENERGY SOURCES:

#### Vibroseis:

- 4 x IVI Birdwagen Mk 4b with Hemi-60 Vibrator 60,000 lb P-wave Vibrators.
- 1 x IVI T15000 truck mounted Minivib 6,000 lb P and S-wave, 10 to 500Hz.  
(This vibrator may also be interfaced with other seismic systems eg Strataview)

For technical specifications see:

Industrial Vehicles International website: <http://www.indvehicles.com/>

#### Explosives:

- Pelton ShotPro Dynamite radio firing system.

For technical specifications see:

I/O website [http://www.i-o.com/content/includes/pdfs/ShotProII\\_datasheet\\_121065.pdf](http://www.i-o.com/content/includes/pdfs/ShotProII_datasheet_121065.pdf)

### VIBRATOR ELECTRONICS:

- Pelton Advance II Vibrator Controller

### GEOPHONES:

- 432 x Strings of 12 x GS-32CT 10 Hz, 395 ohm vertical, 4m spacing (6S x 2P) in PC-801-LPC case.
- 200 x Strings of 4 x GS-32CT 10 Hz 395 ohm vertical, 4m spacing (2S x 2P) in PC-801-LPC case.
- 144 x Strings of 4 (2S x 2P) GS-20DH 40 Hz 600 ohm vertical in PC-21 case.
- 144 x Single GS-100 100 Hz 975 ohm vertical in PC-801-LPC case.
- 119 x 14 Hz Single 3 component GS-20DM 14 Hz geophones, PC-3D case

For technical specifications see:  
Geospace website <http://www.geospacep.com/>

1 x SENSOR SMT 200 geophone tester  
For technical specifications see: <http://www.geosys.co.jp/GEO/Sensor/img/SMT-200.pdf>

2 x Geostuff BHG-3, Borehole Geophone, 3 component with fluxgate compass servo orientation system and motor driven, wall-lock mechanism, 80m cable.  
For technical specifications see: <http://www.georadar.com/geophone.htm>

#### **FACILITIES MANAGER:**

Field operations for the ANSIR reflection seismic facility are carried out by:  
Terrex Seismic Pty. Ltd.  
Unit 2, 1st Floor,  
37 Howson Way,  
Bibra Lake,  
Western Australia 6163  
Phone: 08 9434 4388  
Fax: 08 9434 5211  
Email: [steve@terrexseismic.com](mailto:steve@terrexseismic.com)

#### **PORTABLE INSTRUMENT COMPONENT:**

From July 1, 2002 the instrumentation available includes both equipment bought with the ANSIR capital grant and equipment owned by the Research School of Earth Sciences, ANU (when not required by ANU researchers)

#### **SHORT PERIOD RECORDERS:**

50 x 16 bit recording units -  
Solid state, 512 Mb flash card memory  
1 Hz seismometer  
4.5 Hz three-component geophone

50 x 13 bit recording units  
Solid state, 80 Mb flash card memory  
1 Hz seismometer

#### **BROAD BAND SYSTEMS (based in Australia):**

15 x Earth Data recorders  
24 bit, 3 channel  
9 Gbyte disc storage, Solar power assembly

10 x Earth Data recorders  
24 bit, 6 channel  
9 Gbyte disc storage, Solar power assembly

15 x Nanometrics Orion recorders  
24 bit, 3-channel  
2 Gbyte disc storage, Solar power assembly

4 x Reftek 72A-02 recorders  
16 bit, 6 channel  
2 Gbyte disc, Solar power assembly

**BROAD BAND SEISMOMETERS:**

- 3 x Streckeisen STS2 seismometers
- 22 x Guralp CMG-3ESP seismometers
- 15 x Guralp CMG-40T seismometers
- 2 x Nanometrics Trillium seismometers

**BROAD BAND SYSTEMS - (based in Antarctica):**

- 7 x Nanometrics Orion recorders
  - 24 bit, 3-channel
  - Dual solar power assembly
  - 2 Gbte disc storage
- 6 x Guralp CMG3ESP seismometers
- 1 x Streckeisen STS2 seismometer

## APPENDIX 4: ANSIR CONTACT DETAILS 2006/2007

### General Enquiries

Email [ANSIR@anu.edu.au](mailto:ANSIR@anu.edu.au)

ANSIR Director: Prof. B. L. N. Kennett,  
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Fax: 02 6257 2737  
Email: [brian@rses.anu.edu.au](mailto:brian@rses.anu.edu.au)

ANSIR Deputy Director: Dr Bruce Goleby  
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Fax: 02 6249 9972  
Email: [Bruce.Goleby@ga.gov.au](mailto:Bruce.Goleby@ga.gov.au)

ANSIR Executive Officer: Tim Barton. (to 29 June 2007)  
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Mrs Lisa Pope (to 20 April 2007)  
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(to 22 June 2007)

ANSIR website: <http://rses.anu.edu.au/seismology/ANSIR/ansir.html>

### **LEGACY DATASETS**

ANSIR is the custodian of BMR, AGSO and Geoscience Australia onshore controlled source seismic datasets acquired since 1949. Details of seismic lines may be obtained using the Geoscience Australia on-line mapping tool at: <http://www.ga.gov.au> or contact the Project Leader of Geoscience Australia's Seismic Acquisition and Processing Group.