ANSIR NATIONAL RESEARCH FACILITY FOR EARTH SOUNDING

ANNUAL SUMMARY – 2010-2011

Component Reports:

(1) Portable Seismic Instruments
– The Australian National University

(2) Reflection Seismic
– Geoscience Australia

(3) Electromagnetics
– University of Adelaide

ANSIR: Portable Seismic Instruments The Australian National University, 2010 - 2011

Instrumentation

- 106 ANU solid state short period recorders
- 125 Lennartz LE-3Dlite 3-component 1Hz seismometers
- 40 Mark Products L4C vertical component 1 Hz seismometers
- 47 Mark Products L-28-3D 3-component 4.5 Hz seismometers
- 22 Wilmore IIIA/IIIC vertical component 1-Hz seismometers (nearly obsolete)
- 41 Earth Data PR6-24 portable recorders (10 of which are 6 channel)
- 34 Guralp CMG-3ESP seismometers (about 8 of which are 30s, the remaining are 60s).
- 28 Guralp GMG-40T seismometers (all 30s corner period)
- 5 Streckeisen STS2 seismometers (120s corner period)
- 2 Nanometrics Trillium seismometers (40s corner period)
- 4 Reftek 72A-02 three channel recorders (nearly obsolete)

Access for Researchers

Access for instrumentation is through application to ANSIR for equipment. This system has worked successfully for the past decade. The user base over the past five years includes:

- The Australian National University (ANU)
- Geoscience Australia
- Monash University
- The University of Tasmania
- The University of Western Australia

Project Facilitation

- Dr. Nick Rawlinson (ANU) deployed 53 ANU short period instruments (coupled with LE-3Dlites) in northern NSW as part of the EAL2 deployment. Instruments were installed in May 2010 and were removed in July 2011.
- Dr. Sara Pozgay & Prof. Brian Kennett (ANU) had a long term deployment of 25 broadband recorders (Guralp CMG-3ESP coupled to Earth data recorders) in central Australia (between Adelaide and Tennant Creek) that was finally removed in April 2011, after nearly 3 years of operation.
- Dr. Nick Rawlinson (ANU) and Dr. Anya Reading (UTAS) deployed 24 broadband instruments across southern Victoria, northern Tasmania and the Bass Strait Islands in June 2011. Each instrument consists of a Guralp CMG-40T coupled to an Earth data recorder.
- Dr. Tanya Fomin (GA) deployed 22 LE-3Dlite seismometers as part of a wide-angle experiment in WA between April 2011 and June 2011.

- *AuScope Support – passive seismic transects*:
  - Dr. Herb McQueen & Prof. Brian Kennett (ANU) deployed 30 ANU short period instruments (coupled with LE-3Dlites) near Mt. Isa in May 2009. The instruments were temporarily retrieved in September 2010

  - Dr. Herb McQueen & Prof. Brian Kennett (ANU) deployed 31 ANU short period

instruments (coupled with LE-3Dlites) adjacent to the above array (Cloncurry-Julia Creek region) in September 2010. The instruments were retrieved in August 2011.

Current Status

- 4 Earth Data loggers in central Australia, plus 4 Guralp CMG-3ESPs.
- 24 Earth Data loggers in southern Victoria/northern Tasmania, with 24 Guralp CMG-40T sensors.
- 15 LE-3Dlite seismometers are still in Tasmania

ANSIR: Reflection Seismic Component - Geoscience Australia 2010-2011

Capability

- Deep Crustal Reflection Seismic acquisition & processing, coordinated and undertaken by Geoscience Australia.

Access for Researchers

Access for seismic contracting is through application to ANSIR for projects/equipment. The user base during this reporting period was:

- Geoscience Australia
- GeoScience Victoria
- AuScope Earth Imaging
- Geological Survey of Western Australia (GSWA)

Project Facilitation

- Processing of the AuScope Southern Delamarian reflection data was completed in December 2010. These data were subsequently released to the public via the Geoscience Australia website in January 2011 and interpretations of these data were released at a public workshop in March 2011.
- Processing of the AuScope Capricorn reflection data was completed in August 2011. These data will be released via the Geoscience Australia in September 2011 and a public workshop releasing the interpretations is planned for November 2011.
- The contractor panel for acquiring of Deep Crustal Seismic expired on the 30th June 2011 and was subsequently extended as per the terms of the original contract whilst a refresh is undertaken. It is anticipated that an Open Tender process will be undertaken during September and October 2011 and a refreshed panel of contractors will be established by the end of 2011.

ANSIR: Electromagnetics - University of Adelaide 2010-2011

Instrumentation
With the aid of AuScope Investment:

- 25 broadband MT instruments and 40 low-frequency MT instruments.

Access for Researchers
Access for instrumentation is through application to ANSIR for equipment. The user base at present is:

- Geoscience Australia
- PIRSA
- Geological Survey of Western Australia
- The University of Adelaide
- The University of Western Australia
- Monash University
- IESE, University of Auckland

Project Facilitation

- Professor Mike Dentith (University of Western Australia), in collaboration with the Geological Survey of Western Australia (GSWA), had eight instruments across the western Musgrave Domain and collected over 50 sites;
- Mr Tom Hoskins (University of Western Australia) used 10 instruments to map geothermal prospects in the Perth Basin.
- Ms Sahereh Aivazpourporgou (Monash University) has used 12 long-period MT instruments to map deep lithospheric structure across the Newer Volcanic Province in western Victoria.
- A collaborative project between the University of Adelaide and IESE, University of Auckland, New Zealand, used 10 instruments to map geothermal prospects in Western Australia.
- Ms Tania Dhu and Dr Phil Heath (PIRSA) used nine sets of equipment across the Flinders Ranges to investigate the deep basement structure connecting the Curnamona with the Gawler Cratons;
- The Earth Imaging group at Geoscience Australia (GA) have used ten or more instruments along GA's Onshore Energy Security Program seismic lines in Western Australia;
- Dr Stephan Thiel (University of Adelaide) is using twelve sets of equipment for monitoring of geothermal systems at Paralana, northern Flinders Ranges. The aim is to observe time changes in MT signals during hydrofracturing to measure changes in rock permeability at depth;
- Professor Graham Heinson and his group (University of Adelaide) are using MT for imaging groundwater systems at the Mound Springs (Great Artesian Basin) and in the Flinders Ranges to map and delineate water resources;
- Funded by AuScope, The University of Adelaide group have collected over 30 new sites along the Southern Delamerian line in South Australia and Victoria, and 150 sites along the Capricorn line in Western Australia.

Current Status
Demand for instrumentation has been high, and applied to a variety of tectonic, geothermal, mineral and groundwater problems. Upcoming programs include:

- Dr Kate Selway will take 6 instruments to Tanzania on an ARC Discovery grant program to examine the petrophysical causes of electrical conductivity;
- Dr Stephan Thiel will take 9 instrument to Paralana, northern Flinders Ranges, to complete the 4D monitoring of a geothermal program, funded by the University of Adelaide and Petratherm;
- Professor Graham Heinson will plan to undertake a small 3D survey in Yorke Peninsula as part of the CRC for Deep Exploration Technology;
- Professor Mike Dentith will undertake a large survey with GSWA in the Kimberleys in 2012.