ANSIR NATIONAL RESEARCH FACILITY FOR EARTH SOUNDING

ANNUAL SUMMARY – 2011-2012

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, 2011 - 2012

Instrumentation

- 100 ANU solid state short period recorders
- 50 New generation ANU seismic 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)
- 65 Earth Data PR6-24 portable recorders (10 of which are 6 channel)
- 35 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 in 2011-2012 was:

- The Australian National University (ANU)
- Geoscience Australia
- The University of Tasmania
- Macquarie University
- Australian Antarctic Division
- Victoria University of Wellington
- Oz Minerals
- Newmont Mining Corporation

Project Facilitation

- Dr. Nick Rawlinson and Prof. Brian Kennett (ANU) deployed 45 ANU short period instruments (coupled with LE-3Dlites) in northeastern NSW as part of the EAL3 deployment. Instruments were installed in November 2011 and are due for retrieval in early 2013.
- 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-August 2011. Each instrument consists of a Guralp CMG-40T coupled to an Earth data recorder. The array will be retrieved in March 2013.
- Dr. Nick Rawlinson (ANU) and Dr. Y. Yang (Macquarie) deployed 46 new generation ANU seismic recorders (coupled with LE-3Dlites) in northeastern NSW and southeastern Queensland as part of the SQEAL1 deployment. Instruments were installed in November 2012 and are due for retrieval in December 2013.
- Prof. Tim Stern and Dr. Jesse-Lee Dimech (VUW) deployed 10 broadband seismometers (coupled to Guralp 3ESPs) between Mt Taranaki and Mt Ruapehu in the north Island of New Zealand. The equipment was shipped in July 2012, and will be returned at the end of 2013.

- OZ Minerals deployed 25 broadband seismometers (coupled to LE3D-lites) in Prominent Hill mine, South Australia, to record wide-angle seismic data to complement a coincident reflection survey. The experiment took place in April 2012.
- Newmont mining deployed two new generation ANU seismic recorders at one of their mine sites in the Tanami to record anthropogenic noise. This took place in early November, 2012.
- The Australian Antarctic Division Deployed two new generation ANU seismic recorders in Antarctica to record ice sheet movement. The instruments were sent in September 2012, and will be returned in early 2013.
- Tanya Fomin (GA) deployed 15 broadband seismometers (coupled to LE3D-lites) to record wide-angle data coincident with the Albany Fraser reflection transects in Western Australia. This experiment took place in May-June 2012.

Current Status

Demand for instrumentation has been high, and will increase in 2013 with at least three new experiments already scheduled for 2013. However, the complete set of 200 new ANU data loggers will also come on-line, which will help alleviate pressure on the instrument pool. This will be partially offset by the retirement of the 100 ANU solid state recorders, which are now obsolete. Instruments currently in the field include:

- 46 new generation ANU recorders plus LE-3Dlite seismometers (northern NSW/southern Queensland).
- 45 solid state ANU short period recorders plus LE-3Dlite seismometers (northern NSW).
- 24 Earth Data loggers in southern Victoria/northern Tasmania, with 24 Guralp CMG-40T sensors.
- 15 LE-3Dlite seismometers are still in Tasmania.
- 10 broadband recorders plus Guralp 3ESPs are in New Zealand.
- 2 new generation ANU recorders plus LE3D-lites are in Antarctica.
- 2 new generation ANU recorders plus LE3D-lites are in the Tanami.

ANSIR: Reflection Seismic Component - Geoscience Australia 2011-2012

Capability

- Deep Crustal Reflection Seismic acquisition coordinated and completed by Geoscience Australia under its panel of deed with commercial seismic contractors.
- Advice on reflection seismic survey parameters.
- Processing of reflection seismic data by Geoscience Australia (when capacity is available)

Access for Researchers

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

- Geoscience Australia
- AngloGold Ashanti

Project Facilitation

- Processing of the AuScope Capricorn reflection data was completed in August 2011. These data were released via the Geoscience Australia website in September 2011 and a public workshop was held releasing the interpretations in November 2011.
- The contractor panel for acquiring of Deep Crustal Seismic expired on the 30th June 2011. A new panel for Onshore Seismic Reflection Acquisition and Related Services was established with a two separate categories. One for shallow and small scale seismic reflection acquisition, imaging from surface to basement and one for deep crustal and regional scale seismic reflection acquisition, imaging from surface to depths below the Moho. Three companies have been chosen to be on this panel with two covering both categories and 1 covering shallow seismic only.
- In June 2012 Geoscience Australia in conjunction with Anglo Gold Ashanti and Terrex seismic acquired 80km of deep crustal seismic reflection data near Tropicana Gold Mine. This dataset is currently being processing by Geoscience Australia and is planned to be released in December 2013.

ANSIR: Electromagnetics - University of Adelaide 2011-2012

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 in 2011-2012 was:

- Geoscience Australia
- DMITRE (Geological Survey of South Australia)
- Geological Survey of Western Australia
- Geological Survey of Victoria
- The University of Adelaide
- The University of Western Australia
- RMIT
- IESE, University of Auckland

Project Facilitation

- 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 (July 2011).
- Dr Stephan Thiel (University of Adelaide) and PhD student Jared Peacock used twelve sets of equipment for monitoring of geothermal systems at Paralana, northern Flinders Ranges. The project observed time changes in MT signals during hydrofracturing to measure changes in rock permeability at depth (July and September 2011)
- Dr Mike Hatch and PhD student Kent Inverarity at the University of Adelaide used a number of instruments in their research on the groundwater flow at the Mound Springs, South Australia (August 2012)
- Dr Kate Selway (University of Adelaide, now at Yale) took 6 instruments to Tanzania on an ARC Discovery grant program to examine the petrophysical causes of electrical conductivity;
- Dr Matthew Currell from RMIT used 3 MT instruments to monitor time change during an aquifer storage and recharge program, west of Melbourne (December-January, 2012);
- Dr Xu Liu and Dr Simon Carter, with PhD student Sebastian Schnaidt undertook a small 3D survey (about 3 km by 1.5 km at 25 m site spacing) at the Hillside Deposit, Yorke Peninsula as part of the CRC for Deep Exploration Technology (January and June 2012);
- The Earth Imaging group at Geoscience Australia (GA) and AngloGoldAshanti – used AuScope MT instruments along a profile across the Albany-Fraser belt, Western Australia (April 2012);
- Professor Mike Dentith (University of Western Australia), in collaboration with the Geological Survey of Western Australia (GSWA), deployed AuScope MT instruments in a number of profiles across the Kimberleys (April-July, 2012);
- In a collaboration between the Geological Survey of Victoria and the University of Adelaide, about 40 new MT sites were collected along the AuScope Southern Delamerian line in South Australia and Victoria to increase the site density across regions of major conductivity change;

- In a collaboration between the Geological Survey of South Australia (DMITRE) and the University of Adelaide, about 40 new MT sites were collected through the Cariewerloo Basin, South Australia to define the depth to basement and tie in with existing Airborne EM Data).

Current Status

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

- Dr Mike Hatch and PhD student Kent Inverarity at the University of Adelaide will continue use a number of instruments in their research on the groundwater flow at the Mound Springs, South Australia (November 2012)
- Dr Stephan Thiel (University of Adelaide) and students will use AuScope equipment for monitoring of geothermal systems at Habenaro geothermal field, operated by Geodynamics in the Cooper basin during hydrofracturing to measure changes in rock permeability at depth (November 2012)
- Professor Mike Dentith (University of Western Australia), in collaboration with the Geological Survey of Western Australia (GSWA), will deploy AuScope MT instruments across the Albany Fraser belt (2013)