



AGOS Progress Quarter 1 2013

At the conclusion of Quarter 1 2013 (30 September 2012), most planned milestones had been reached in line with the AGOS Agreement. The majority of equipment and physical infrastructure for the AGOS infrastructure has now been acquired or is under construction. Deployments by end-user groups have commenced.

The Earth Sounding Network



As the new equipment pools come on stream the Earth Sounding network is being deployed demonstrating the high demand for the infrastructure. Specifically, 20 Earth Data recorders were used in South Australia by Oz Minerals in a refraction experiment; 10 units are now in New Zealand for passive seismic experiments; and a number of units form part of the BASS array in southern Victoria and northern Tasmania.

The new generation ANU seismic recorders are now in production, with the first 50 completed. These units will be deployed immediately in northern NSW/southern Queensland as part of the SQEAL1 array. The remaining 150 units will be completed in the first half of 2013. Two of the prototype units have just been sent to the Australian Antarctic division for deployment in Antarctica.

Construction of the electric field loggers at Adelaide University are in the final phases.

The Ocean Bottom Seismometers are currently being constructed in the UK, and will be delivered within the next six months. Negotiations are continuing with GA and the MNF regarding ongoing storage and maintenance.



The Geohistory Laboratory

Work on the new AGOS-GEO Laser-ablation ICP-Mass Spectrometry laboratory in Melbourne has continued with calibration and integration of the new facility with the Automated Fission Track Analysis facility for low-temperature thermochronology. Detailed studies have been undertaken on fundamental aspects of a number of age standard materials. Applications during this time have included studies of the extensional tectonics of the Gulf of California Extensional Province in both Sonora and Baja California in Mexico; evolution of the transform margin of western Tasmania; the evolution of the Krishna-Godavari Basin in eastern India and its hinterland; and the tectonics of the Longmen Shan and eastern Tibetan Plateau in China. All of these projects have involved international collaborations.

At Curtin, the Resonetics Excimer Laser Ablation System and ICP-MS (Agilent 7700X series) integration was completed and was fully operational at end of July 2012. The first Curtin AGOS Geohistory data was presented at the International Geological Congress (IGC) in Brisbane in August 2012.



The Helium mass spectrometer (Alphachron) installed in the last Quarter has undergone hardware acceptance testing which is 95% completed by end of Sept 2012. Final integration and commissioning awaits delivery of ultra-high vacuum cell attachment which is now scheduled for November 2012.

Joint activities between Curtin and Melbourne AGOS Geohistory node began in August 2012 at Thermochronology 2012 meeting in Guilin, China.

Critical Minerals consultant Dudley Kingsnorth (IMCOA) tours AuScope AGOS Facility and discusses potential applications of REE characterization and mineral department microanalysis with industry partners.

The Subsurface Observatory

The petrophysics lab at the University of Melbourne is now fully operational and the facility is being utilised at close to capacity. One logging job for the Deep Exploration Technologies CRC has been completed. This involved logging of their entire diamond core suite from their Adelaide Hills drill hole (providing density, magnetic susceptibility, P-wave velocity, electrical resistivity and natural gamma logs). A logging project for the DPI Victoria which included a number of samples from a series of geothermal wells in central Victoria and on a suite of holes that had previously been logged using the AuScope Hylogger instrument has been completed. The data from these logging runs will be made public in the near future.

Construction of the 7 borehole seismometers supplied by IESE in New Zealand has also been completed. One instrument is being shipped to Perth for deployment in monitoring wells associated with the EIF funded Pawsey Centre geothermal project while the others will be deployed from Melbourne in the coming quarter. A series of five initial deployment locales have been identified along the margin of the multi-use Latrobe Valley and in the hanging wall of the active fault system that extends from Thorpdale to Korumburra. This will augment the aftershock kits currently deployed in this region that have been receiving very high quality data as a result of the Thorpdale and subsequent earthquakes. A real-time trace from several of the AGOS aftershock seismometers is available from the University of Melbourne website and a delivery portal is currently under development to provide the feeds from all stations. (<http://www.earthsci.unimelb.edu.au/seismic-station>).



The borehole thermal logging and in-situ thermal conductivity logging capability is now in place with the receipt of an AP-Sensing GeoDTS system including several lengths of active and passive optic fibre sensors. A new deployment system has been developed and the equipment has been successfully tested in the field at Tynong.

Several equipment deployments have been finalised to monitor seismicity from a well in the Perth Basin, tie surface and downhole electrical measurements in the Cooper Basin and log strategic wells throughout SA for a variety of petrophysical properties.

The Inversion Laboratory

Progress at the ANU ilab is as follows:

- A major update was to create the fortran interface to the library. This required some changes to the way the results are accessed. There are now fortran calls to all the forward model routines for 1D and 2D including the hierarchical and MPI versions. Much of the code base was cleaned up.
- Python and R interfaces were updated to maintain compatibility.
- Three new applications software were initiated using the library:
 - Surface Wave Dispersion (SWD)
 - Receiver Function (RF)
 - Plate Tectonics Regression (PT)

Progress at the UQ iLab is as follows:

- Successfully replicated 3D gravity inversion results from the UBC software (industry standard).
- integrated inversion source into escript code base to be included in the next escript release
- implemented readers for netCDF & ER Mapper files (additional to UBC input)
- numerous bug fixes & improvements to implementation
- progress on integration of escript & inversion module into VGL portal workflow so inversions can run via Nectar cloud
- preparation of data base of gravity and gravity data for testing and benchmarking
- 3D visualization of gravity inversion data results

Progress on Terrawulf upgrade:

All of the new TIII compute servers are now installed and a draft version of the OpenSUSE 12.1 operating system has been configured and imaged onto the new nodes. Testing of the cluster and installation of system utilities, batch queues, and application software is underway.

Stocks of 2TB Hitachi enterprise disks, unavailable earlier because of manufacturing issues, have now become available at sensible prices and an order for 12 of them for the data server has been filled. A disk interface expansion kit was installed in the data management server to provide more slots for solid-state disks in order to expand the read and write cache area.

The Geospatial Observatory

Procurement and establishment of Tranche 1 and 2 of GNSS instrument pool is complete. The Access Committee is assessing research proposals that propose use of the instrumentation. In Q1 2013, proposals from the Australian Antarctic Division and the University of Tasmania have been supported.

The antenna calibration facility design has been finalized and submitted to the ACT Planning authority for development approval. The first robotic antenna calibration system has been delivered to Canberra. The second robotic system will be delivered to Canberra in Q2 2013.

The National Collaborative Framework agreements with the WA, NSW, and Tasmanian Governments for the 4 AGOS CORS are being developed.

Work on the remote sensing portal continues. A proposal has been submitted to the European Space Agency (ESA) to gain open access to Australian satellite data for the AuScope community was successful. A proposal to the German Space Agency to gain open access to Terra-SAR satellite data for the AuScope community was successful. A proposal to the Japanese Space Agency (JAXA) to gain open access to ALOS satellite data for the AuScope community is currently being developed.

Prototype radar reflectors are currently being developed for testing using satellite data in Canberra before they are deployed to the Surat Basin, Queensland, to support the measurement of subsidence in Coal Seam Gas extractions areas.

Contractual discussions with the Queensland Government are progressing regarding the build of a survey network in the Surat Basin and with the NSW Government regarding the build of a survey networks in NSW.

The Geophysical Education Observatory

This quarter the Australian Seismometers in Schools Network has been focusing on promoting the program and AuScope. This has been done through attending and presenting at workshops and conferences, including CONASTA and IGC. This promotion has proven successful with the receipt of 111 applications from Secondary schools spread over all states and territories. This provides us with a good base to select schools in appropriate locations with enthusiastic teachers. In addition to this, one of the teachers involved in the pilot, Geoff McNamara won the Eureka prize for Science Teaching.

Outcomes for this quarter include:

- Staff involved in the installations and setup of seismometers have been familiarised with the recently receive batch of seismometers.
- Successful promotion of the program, which has resulted in 111 applications from schools.
- Workshops and seminars at CONASTA62 (Australian Science Teachers Association Conference, July 2012). Our presence at this conference helped promote the program and show teachers how seismology can be incorporated in the classroom and curriculum. It also helped strengthen relationships with organizations interested in promoting the program, such as Geoscience Australia and the Teacher Earth Science Education Programme (<http://www.tesep.org.au/>). 27 teachers signed up for more information about the program.
- 3 schools in Tasmania have been selected to host seismometers. An arrangement has been made with University of Tasmania to assist with the installation.

In relation to the GPS in Schools project, the purchase of the 16 receivers and antennas for the Schools equipment is now complete. National Collaborative Framework (NCF) Agreements are currently being developing after which the receivers and antennas will be sent to the relevant State and Territory Governments. The aim is to install 16 sites in total as follows: NT - 3, SA - 3, NSW - 3, ACT - 1, Vic - 3, and Tasmania -3. The sites are likely to use a roof mounted monument as opposed to the rock mounted version used in AuScope NCRIS. This is mainly related to the restricted space in Schools and the security / OH & S issues of having the antenna accessible to children.

Project Milestones

The status of project milestones is shown in the table below. Note that milestones 35 and 38 shown incomplete in the Quarter 4 2012 Report are included below to show that progress has been made. In particular the overwhelming response for AuSIS has necessitated more planning and consultation prior to implementation.

No.	Milestone	Projected completion Date	Status
Milestones to 30 June 2012 (reported not complete in Q4 Report)			
35	Earth Sounding Network: Second batch of 50 electric field loggers constructed	30 June 2012	55% complete, delays in receipt of parts order has delayed final construction by 3 months
38	Geophysical Education Observatory: Specifications and design final stage complete	30 June 2012	90% Complete through success of pilot sites, Finalisation requires processing EOI's from 111 interested schools
Indicative Milestones to 30 September 2012			
43	Geospatial Observatory: 4 new permanent GNSS CORS stations installed	30 June 2013	Delay approved by DIISRTE to end June 2013
44	Geohistory Laboratory: Software interface established	30 September 2012	95% complete at Melbourne Laboratory. 50% complete at Curtin where minor delays in installation and hardware acceptance testing
45	Subsurface Observatory: Second stage sites selected	30 September 2012	2nd Stage sites completed with Access Committee considering new proposals for final stage sites
46	Annual Report 2	30 September 2012	Complete and approved by DIISRTE
47	Milestone Report 7	30 September 2012	Removed by Variation; internal report complete