ASEG 2012 22nd ASEG International Conference and Exhibition: Final News Update

The clock is now winding down to what promises to be the best ASEG ever*. The papers committee, of which I was an unwitting member, has approved over 130 papers for oral presentation. Together with an outstanding selection of keynote presenters the conference program offers something for everyone. There will be five concurrent streams including two petroleum and two mineral streams. Seismic interpreters will have a stream directly catering to them. On the Tuesday of the conference there will be a coal geophysics stream that will include seismic as well as other methods that are now gaining acceptance. The final program (subject to change) is available on the web. Many thanks to Binzhong and his team.

The workshop program has been finalised and is also available on the web. Workshops start on 25 February and continue to 3 March. Ensure you take this opportunity as many of these presenters will not come this way again (well not soon anyway). Prices have been set so that attendees will find them easy to justify. Thanks to Koya and his team.

In a departure from previous conferences we will be giving extended time to more keynote speakers. Check out the keynote speakers on our web site.

Workshops

Petroleum/energy

- AVO Inversion *by Brian Russell*
- Operational Seismic Sequence Stratigraphy *by Robert Kirk*
- Microseismic Monitoring *by Peter Duncan*
- Geothermal Exploration *by Cameron Huddlestone*
- Coal Bed Gas *by Scott Thompson*
- Seismic Imaging: A Review of the Techniques, their Principles, Merits and Limitations *by Etienne Robein (EAGE Education Tour)*
- A Practical Overview of Seismic Dispersion *by Chris Liner (SEG DISC)*

Minerals

- Electromagnetics *by Douglas Oldenburg*
- Natural Electromagnetic (Magnetotelluric) *by Bob Smith*

Industrial workshops on minerals

(Presenters to be confirmed)

- Intrepid Geophysics
- Mira Geoscience
- Ikon Science

Please register for our conference and tell all your colleagues to do the same. No doubt you will find me in the exhibition area networking.

Website: www.aseg2012.com.au

Henk van Paridon

**Product may vary depending on individual usage.*

5th International Earth Science Olympiad, Modena, Italy: a student perspective

Jack Beard, Mehreen Qayyum, Eilidh Cassidy and Nichola Dart

Edited by Bronte Nicholls.

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In September 2011, four students from the Australian Science and Mathematics School in Adelaide were selected to travel to Italy in order to compete in the International Earth Science Olympiad (IESO). It was an opportunity for individuals with a passion for earth science to come together from a vast selection of countries across the globe to share knowledge and ideas on the earth sciences.

The first Australian team ever to participate in the IESO was made up of Eilidh Cassidy, Mehreen Qayyum, Jack Beard and Nichola Dart (Year 11 students from the Australian Science and Mathematics School, Adelaide, South Australia). The team's mentors were Dr Bronte Nicholls (Australian Science and Mathematics School) and Associate Professor Ian Clark (University of South Australia).

The team on arrival at Modena University student accommodation. From left: Mehreen Qayyum, Nichola Dart, Jack Beard and Eilidh Cassidy. (Photograph: Bronte Nicholls)

The team was sponsored by the Australian Geoscience Council, Geological Society of Australia – Federal Division, Australian Society of Exploration Geophysicists, Petroleum Exploration Society of Australia, Beach Energy, Pepinnini Minerals, Geological Society of Australia – SA Division, Flinders University and University of South Australia.

Preparing for the IESO was a joint effort by everyone in the team. We had regular team meetings over the course of the school year and worked through the syllabus provided by the organisers. Working together as a team was a great way to learn new, complex topics. Working with our peers was possibly the greatest contributor to the success of the team in Italy, because we were already accustomed to working through problems with like-minded students. Unfortunately, one of the team members, Nichola Dart, became ill and was unable to participate in most of the event.

The team was successful in gaining the following awards:

Individual Competition: Bronze Medal – *Jack Beard*

International Team Field Investigation: Most Creative Investigation – Winning team member: *Jack Beard*

Best Presentation – Winning team member: *Eilidh Cassidy*

The following reports the IESO experience from the point of view of each of the team members.

Eilidh Cassidy

For me, I felt one of the most beneficial experiences I had at the Olympiad was the International Team Field Investigation (ITFI). I found it was one of those once-in-a-lifetime opportunities that really had an impact on your perspective of learning. The ITFI was based in the Alps, Valle d'Aosta region, where we were split into teams (not based on country).

I stayed in a place called Saint Barthelemy where the topic the team was investigating was Astronomy. The problem my team was given to investigate was to determine the rising time of a star, Algenib, and I must admit I wasn't quite sure if this was something that would interest me.

However, my view quickly changed and I left there with a completely different attitude and a new love and interest in Astronomy. To find the rising time, we first had to design our own instruments as a team, which then allowed us to measure the peak of a mountain where we could calculate angular distance and then eventually determine when the star would be visible.

Saint Barthelemy Astronomical Observatory: one of the sites for the International Team Field Investigation. (Photograph: Bronte Nicholls)

We had to present our findings to a large audience, which happened to be exhilarating and intimidating at the same time. However, my team and I worked hard and put together a PowerPoint and in the end we must have done something right as we came away on the presentation night with the Best Presentation Award.

The Olympiad itself was any geologist's dream and although the exams themselves were very difficult, we took it as a learning experience. I can probably speak for both myself and my team when I say that attending the IESO changed all of us in terms of our confidence and our passion for Earth Science, and although we didn't come home with gold medals, it was a valuable learning experience. If Australia sends a team in the future, they can learn from our journey and maybe one day Australia will do Earth Science proud and come home with that gold medal.

Mehreen Qayyum

I expected the IESO to be very disciplined and thought that the team work referred to the country teams. However, the Olympiad was definitely not what I expected. It was more competitive and covered Earth Sciences of all spheres to a greater extent than what we had studied. Despite this, the atmosphere of the Olympiad was friendly, supportive and encouraging. We studied hard the last few nights in the lead up to the exam to maximise our marks. There

were also a few practical examinations, but these were made considerably easier as the guides showed us how to use the instruments we needed for the practical before the examinations. I think as a team we did well according to the amount of knowledge we had in the topics being examined.

Overall, I think being a participant of the IESO was a good experience and I was able to learn a lot from it. We learned how to communicate and interact with people of many nationalities, religious and cultural backgrounds and languages, as well as explore, develop and present ideas to achieve a common goal. Many of the presentation, cultural and earth science skills I have learned will help me in future studies in school and beyond.

Jack Beard

One of the highlights of the trip was the ITFI. I stayed in a place called La Thuile, a small village near the French-Swiss border at the base of Mt Blanc – Mehreen and I were in the same group but different teams.

The International Team Field Investigation site for Group 1: Mt Blanc in the background. (Photograph: Mehreen Qayyum)

Our task was to map the occurrence of gypsum in a valley near the village and what implications it had on the community (such as sink holes and the ability for income through mining).

This was one of the highlights as we really got to know many team members from other countries around the globe. After 24 hours of hard work, we finally presented our findings to an audience of 200 others. Here, the team I was in won the Most Creativity shown during the ITFI award.

The IESO will have a huge influence on me in the future. I will never get the opportunity to participate in such an event again, so this truly was a once-in-a-lifetime opportunity. Not only has it shaped the way I will look at my career plans, but it has also had an impact on the way I interact with others, for example, my peers at school and in other situations.

For further information about the 5th IESO visit http://www.ieso2011.unimore.it/.

Summary of the Australian team IESO and extension activities

Date	Students
5 Sep	Arrival and registration, welcome dinner
6 Sep	Opening ceremony Excursion: Salse di Nirano
7 Sep	Excursion: Venice – Hydrosphere practical exam
8 Sep	Written exam – all topics Excursion: Civil Protection Centre of Modena
9 Sep	Geosphere, atmosphere and astronomy practical exam Excursion: Villa Sorra
10 Sep	Excursion: Valle d'Aosta International Field Trip Investigation
11 Sep	Excursion: Valle d'Aosta International Field Trip Investigation
12 Sep	Local school visit Plenary conference, Terramare di Montale
13 Sep	Modena city centre Award ceremony and farewell party
14 Sep	Departure
15–20 Sep	Australian team post-Olympiad tour to the Bay of Naples and Rome
22 Sep	Return to Adelaide

IESO opening ceremony: flag bearers from each of the 26 participating countries. (Photograph: Eilidh Cassidy)

The Australian team during the Hydrosphere practical examination in the Venice Lagoon. From left: Mehreen Qayyum, Jack Beard, Eilidh Cassidy. (Photograph: Jack Beard)

The International Team Field Investigation teams examining an outcrop at La Thuile. (Photograph: Jack Beard)

The team enjoying the steep climb to the summit of Vesuvius: part of the post-Olympiad tour to southern Italy. From left: Eilidh Cassidy, Mehreen Qayyum and Jack Beard. (Photograph: Bronte Nicholls)

AuSREM: AusMoho and beyond

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The Australian Seismological Reference Model (AuSREM) is designed to capture the wide range of seismological information generated over the last few decades on the structure beneath the Australian region exploiting both natural and man-made sources. The objective is to provide a representation of the 3D structure beneath Australia and its environs in a form that summarises existing knowledge and provides a basis for future refinement from more detailed studies. Potential applications of the model include improved earthquake locations, both within Australia and at the immediate plate boundaries by using better representations of crustal and mantle structure. The AuSREM project is supported by AuScope and the Australian National University.

The AuSREM model is being constructed on a 0.5 × 0.5 degree grid and includes crustal structure and mantle structure to 350 km deep based on Australian specific observations. At greater depth and in surrounding areas, the AuSREM model is linked to S40RTS (Ritsema *et al.*, 2011), which builds on global observations of seismic surface waves and long-period body waves.

The first product from AuSREM is a new map of the Moho Depth for the Australian continent, *AusMoho11*, incorporating a wide range of observations (Kennett *et al.*, 2011). The compilation of Collins *et al.* (2003) used refraction results and receiver function information from about 60 portable or permanent seismic stations across the continent. Since that time much more information has become available, and a further 150 receiver functions have been employed in the new model. Recent years have seen major investments in full-crustal reflection profiling by Geoscience Australia, the State Geological Surveys and the AuScope infrastructure initiative. Many of these profiles provide detailed information in areas with previously sparse coverage. The new Moho map incorporates picks from over 10 000 km of reflection profile, which have been made specifically for the project.

AusMoho11 is represented in Figure 1 in terms of 0.5 × 0.5 degree pixels, together with the locations and nature of the varied observations. The new model provides a good definition of the Moho on the continent and into the surrounding oceanic areas, with only a few remote areas where information is lacking. A detailed description of the data sets used, and the construction of the model is present in Kennett *et al.* (2011).

The patterns of variation in Moho depth show a good general correspondence with the tectonic features of the continent, as noted by Clitheroe *et al.* (2000), but now reinforced by the much increased sampling across the continent particularly from recent reflection profiles. Thus, for example, the thicker crust of the Gawler and Curnamona cratons is now well constrained.

At the continental scale, it is not possible to provide a full representation of the local features such as the sharp Moho jumps (10 km or more) in central Australia that are associated with the major gravity anomalies, even though they show up clearly on reflection sections.

The oldest portions of the West Australian craton, the Pilbara craton and the northern Yilgarn craton, have Moho depths in the range from 30–35 km, whereas in the Capricorn orogen in between the cratons, Moho depths exceed 40 km. Within the Yilgarn craton greater Moho depth is associated with the younger parts of the craton in the west (as noted by Reading *et al.*, 2007). The thicker crust of the Western Yilgarn links across to Central Australia where the greatest crust thicknesses are found.

A very prominent feature in the Moho depth pattern is the strong gradient in Moho depth close to 135 E that juxtaposes 30 km crust in the Lake Eyre region against much thicker material (45 km or more).

Rather thick crust occurs in the Proterozoic parts of the North Australian craton and beneath the southern Lachlan fold belt in southeast Australia. In each case the transition from crust to mantle is

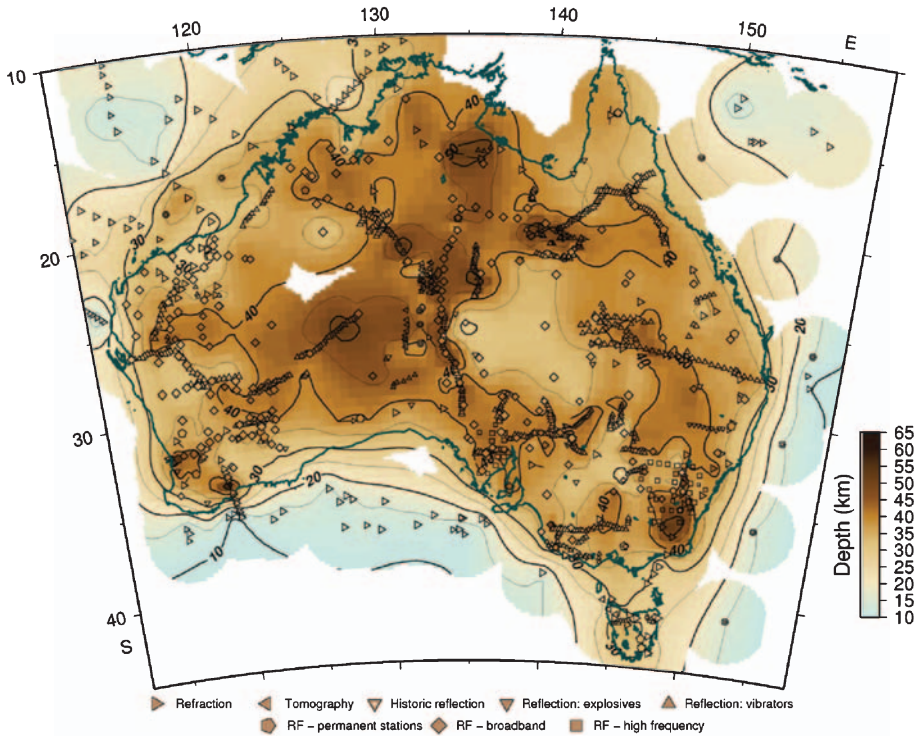

Fig. 1. *The depth to the Moho across Australia derived from a combination of seismic refraction, refraction and receiver function studies (Kennett* et al.*, 2011). The values obtained from different classes of observations are indicated by the colours attached to the distinctive symbols for each data type.*

not sharp and would be consistent with underplating.

The next step in the development of AuSREM is focussed on establishing a crustal model with definition of major crustal boundaries, seismic P and S wavespeed and density on a 0.5 × 0.5 grid. Most of the information comes from refraction experiments and receiver functions, but we are able to use the nationwide reflection profile dataset to provide structural controls.

In parallel with the crustal work, a collaborative project is underway building on prior studies of mantle structure principally based on surface wave tomography (Yoshizawa and Kennett, 2004; Fishwick *et al.*, 2008; Fichtner *et al.*, 2009), but supplemented by other results from body-wave tomography. In the mantle effective resolution is for horizontal scales around 200 km, but a smooth representation will be provided on the same 0.5 × 0.5 grid as for the crust.

A dedicated website has been established at http://rses.anu.edu.au/seismology/AuSREM where further information is presented on the AuSREM project and products such as *AusMoho11* are available for display and download.

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Update on Geophysical Survey Progress from the Geological Surveys of Queensland, Western Australia, New South Wales and Geoscience Australia (information current at 10 November 2011)

Tables 1 and 2 show the continuing acquisition by the States, the Northern Territory and Geoscience Australia of new gravity, airborne magnetic and radiometric data over the Australian continent. All surveys are being managed by Geoscience Australia.

Table 1. Airborne magnetic and radiometric surveys

Survey name	Client	Contractor	Start flying	Line (km)	Spacing AGL Dir	Area (km²)	End flying	Final data to GA	Locality diagram (*Preview*)	GADDS release
South Officer 1 (Jubilee)	GSWA	Thomson	1 Jun 10	180 000	200 m 50 m N–S	32 380	100% complete @ 22 Jun 11	TBA	148 – Oct 10 p23	QA/QC of final data in progress
South Officer 2 (Waigen – Mason)	GSWA	Thomson	28 Jun 10	113 000	400 m 60 m N–S	39 890	100% complete @ 5 Jan 11	TBA	148 – Oct 10 p24	QA/QC of final data in progress
North Canning 4 (Lagrange – Munro)	GSWA	Aeroquest	20 Sep 10	103 000	400 m 60 m N–S	36 680	100% complete @ 23 Jun 11	TBA	148 – Oct 10 p26	QA/QC of final data in progress
Grafton – Tenterfield	GSNSW	GPX	16 Jun 11	100 000	250 m 60 m E–W	23 000	100% complete @ 6 Nov 11	TBA	151 – Apr 11 p16	TBA
West Kimberley	GSWA	Aeroquest	29 Jun 11	134 000	800 m 60 m N–S Charnley: 200 m 50 m N–S	42 000	77.0% complete @ 9 Nov 11	TBA	150 – Feb 11 p20	TBA
Perth Basin North (Perth Basin 1)	GSWA	Fugro	11 Jun 11	96 000	400 m 60 m E–W	30 000	63.2% complete @ 6 Nov 11	TBA	150 – Feb 11 p20	TBA
Perth Basin South (Perth Basin 2)	GSWA	Fugro	22 Mar 11	88 000	400 m 60 m E–W	27 500	66.2% complete @ 6 Nov 11	TBA	150 – Feb 11 p20	TBA
Murgoo (Murchison 1)	GSWA	Thomson	28 Feb 11	128 000	200 m 50 m E–W	21 250	91.2% complete @ 6 Nov 11	TBA	150 – Feb 11 p20	TBA
Perenjori (Murchison 2)	GSWA	GPX	21 Oct 11	120 000	200 m 50 m E–W	20 000	19.4% complete @ 6 Nov 2011	TBA	150 – Feb 11 p21	TBA
South Pilbara	GSWA	GPX	TBA	136 000	400 m 60 m N–S	42 500	TBA	TBA	150 – Feb 11 p21	Expected to commence March 2012
Carnarvon Basin North (Carnarvon Basin 1)	GSWA	GPX	24 Jul 11	104 000	400 m 60 m E–W	32 500	100% complete @ 20 Oct 11	TBA	150 – Feb 11 p21	TBA
Carnarvon Basin South (Carnarvon Basin 2)	GSWA	GPX	TBA	128 000	400 m 60 m E–W	40 000	TBA	TBA	150 – Feb 11 p21	Expected to commence January 2012
Moora (South West 1)	GSWA	Aeroquest	13 Jun 11	128 000	200 m 50 m E–W	21 250	65.2% complete @ 1 Nov 11	TBA	150 – Feb 11 p22	TBA
Corrigin (South West 2)	GSWA	GPX	TBA	120 000	200 m 50 m E–W	20 000	TBA	TBA	150 – Feb 11 p22	Expected to commence January 2012
Cape Leeuwin – Collie (South West 3)	GSWA	Fugro	25 Mar 11	105 000	200/400 m 50/60 m E–W	25 000	75.8% complete @ 6 Nov 11	TBA	150 – Feb 11 p22	TBA
Mt Barker (South West 4)	GSWA	GPX	24 Apr 11	120 000	200 m 50 m N–S	20 000	12.7% complete @ 18 Sep 11	TBA	150 – Feb 11 p22	Survey on hold until January 2012

Table 1. *Continued*

Survey name	Client	Contractor	Start flying	Line (km)	Spacing AGL Dir	Area (km²)	End flying	Final data to GA	Locality diagram (*Preview*)	GADDS release
Galilee	GSQ	Aeroquest	11 Aug 11	125 959	400 m 80 m E–W	44 530	39.6% complete @ 6 Nov 11	TBA	151 – Apr 11 p15	TBA
Thomson West	GSQ	Thomson	14 May 11	146 000	400 m 80 m E–W	52 170	66.3% complete at 6 Nov 11	TBA	151 – Apr 11 p15	TBA
Thomson East	GSQ	Thomson	14 May 11	131 100	400 m 80 m E–W	46 730	66.3% complete at 6 Nov 11	TBA	151 – Apr 11 p16	TBA
Thomson Extension	GSQ	Aeroquest	22 Jun 11	47 777	400 m 80 m E–W	16 400	100% complete @ 10 Aug 11	TBA	151 – Apr 11 p16	QA/QC of final data in progress

TBA, to be advised.

Table 2. Gravity surveys

Survey name	Client	Contractor	Start survey	No. of stations	Station spacing (km)	Area (km²)	End survey	Final data to GA	Locality diagram (*Preview*)	GADDS release
Galilee	GSQ	IMT	3 May 11	6400	2.5 km regular	102 600	100% complete @ 10 Jul 11	October 2011	151 – Apr 11 p15	25 October 2011
Thomson	GSQ	Daishsat	1 Apr 11	7670	2.5 km regular	121 700	100% complete @ 30 Jun 11	TBA	151 – Apr 11 p15	QA/QC of final data in progress
Peak Hill – Collier	GSWA	Daishsat	29 Jul 11	9100	2.5 km regular	56 140	51.0% complete @ 6 Nov 11	TBA	153 – Aug 11 p18	TBA
Kimberley Road Traverses	GSWA	Daishsat	8 Aug 11	7560	400 m station spacing along 2700 km of gazetted roads	N/A	100% complete @ 26 Sep 11	TBA	153 – Aug 11 p20	TBA
Eucla Basin SW	GSWA	Atlas Geophysics	TBA	3798	2.5 km regular	23 030	TBA	TBA	154 – Oct 11 p23	TBA
Eucla Central	GSWA	Atlas Geophysics	TBA	5704	2.5 km regular	36 100	TBA	TBA	154 – Oct 11 p23	TBA
Eucla Basin East	GSWA	Atlas Geophysics	31 Oct 11	5201	2.5 km regular	31 340	24% complete @ 6 Nov 11	TBA	154 – Oct 11 p23	TBA

TBA, to be advised.

GA releases 12th edition of the Index of Airborne Geophysical Surveys and Index Maps

The *Index of Airborne Geophysical Surveys (Twelfth Edition)*, Geoscience Australia Record 2011/36, was released by Geoscience Australia on 14 October 2011. The new edition, which is available for free download from Geoscience Australia's website, is the latest compilation of metadata of Australian open file government airborne surveys and supersedes the previous 11th edition (May 2010). The Index includes specifications of approximately 1080 surveys conducted between 1951 and 2011, which comprise more than 32.8 million line km of mainly total magnetic intensity, gamma-ray spectrometric and land elevation data. Specifications for each survey are presented in tabular format, with four surveys per page and arranged in numerical order, based on assigned Geoscience Australia Project Numbers.

Clients can quickly identify airborne surveys of interest and obtain the relevant metadata by using two lookup tables:

- a table listing survey names in alphabetical order, with corresponding Geoscience Australia Project Numbers; and
- a table listing 1:250 000 map sheet names in alphabetical order, along with Geoscience Australia Project Numbers of surveys located on each map sheet.

Also released are two maps: the 2011 edition of the aeromagnetic and gamma-ray survey index maps, which indicate the standard of data coverage (based on survey line spacing) over Australia in relation to 1:250 000 map sheets. Areas covered by surveys conducted by the States during 2011–12 are also shown on these maps.

Further information or copies of the record and maps in PDF format can be obtained from Geoscience Australia's free download page: http://www.ga.gov.au/products/servlet/controller?event=GEOCAT_DETAILS&catno=72767.

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