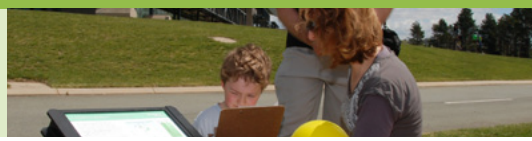
Australian Government
Geoscience Australia

Celebrating 20 years AUSGEO news ISSUE 100 Dec 2010

The real science experience

Promoting awareness of the geosciences



Kate List

Geoscience Australia has an extensive program to promote awareness and knowledge of the contribution that geoscience makes to the Australian economy, management of the environment, and the identification and mitigation of the impact of natural hazards. Geoscience Australia contributes to and supports a number of science education and awareness raising activities locally, nationally and internationally. These include the agency's Education Centre, professional development sessions for teachers, Open Days, and participation in relevant events such as Earth Science Week, National Science Week and the annual National Youth Science Forum.

Geoscience Australia's Education Program began with a broad aim of promoting earth science to school students. A dedicated Teacher Education program was inaugurated in 1996 by the Australian Geological Survey Organisation (the predecessor of Geoscience Australia). Its main activities were the development of teacher resources and provision of training and field excursions for teachers across Australia. By 2004 the program had developed and distributed teacher resource kits and educational material to more than a thousand primary and secondary schools around Australia.

The Education Centre

The Program expanded following the opening of the Earth Science Education Centre, a dedicated area within the agency's headquarters at Symonston ACT, on 11 October 1999. The Centre is staffed by trained educators, science communicators and geologists and offers structured hands-on activities with a science and geography curriculum focus for visiting school groups and special interest groups. A range of activities which enable students to experience real science have been made possible with the full support and direct involvement of many of Geoscience Australia's scientific and technical staff. These activities showcase the cross-disciplinary nature of geoscience, use authentic scenarios and involve Geoscience Australia's data, technology, equipment and geoscientists.

The Education Centre has continued to encourage a new generation of Australians to understand the earth sciences and become involved in geoscience. In March 2010 the Centre welcomed its 50 000th student visitor since opening in 1999 (figure 1). As the number of school excursions to the Centre has increased, the Program's focus has shifted to providing tailored visits for school students.

Figure 1. Geoscience Australia's Education Centre welcomed the 50 000th student visitor in March 2010.

A new attraction, a Geological TimeWalk was installed in the grounds of the agency's headquarters in November 2009. The one kilometre long walk celebrates and explains the immense age and geological diversity of the continent with information plaques marking each geological time interval (figure 2). The period since modern humans appeared on Earth represents less than the final five centimetres of the walk. Significant rock and fossil specimens have been sourced from around Australia

to complement the TimeWalk by illustrating important aspects of the geological history. A range of resources relating to the TimeWalk are available for free download from the Education web pages.

Public events and programs

In 1999 the agency also took on the leadership of international Earth Science Week (ESW) celebrations in Australia to encourage earth science awareness through participation by Australian universities, museums, industry and schools. Geoscience Australia has continued to promote celebrations through the production and distribution of an annual ESW poster, national student ESW competitions (such as *Geologi*), an annual Open Day at the agency's headquarters and a dedicated web page.

The national *Geologi* Short Film Competition has become a highlight of Earth Science Week celebrations since 2007 with the official screening of the winning entries and the presentation of awards at Geoscience Australia's headquarters. The competition is hosted by Geoscience Australia and the Australian Science Teachers Association (ASTA).

Figure 2. The Geological TimeWalk located at the front of the Geoscience Australia building in Symonston, ACT. Information plaques, which mark each geological time interval, have been spaced along the one kilometre walk and emphasise key events in the formation of Earth including five major mass extinctions.

This year more than 250 students from primary and secondary schools across Australia produced and submitted 60 short films for the competition. The films were judged on their science content, creativity and promotion of the theme highlighting the role earth sciences play in our interactions with an ever-changing Earth.

Film topics included natural hazards (such as earthquakes and volcanoes), Australia's natural resources, geological time and the formation of the Earth.

Geoscience Australia's annual Open Day is currently held during Earth Science Week. This year's Open Day saw around 1250 visitors participate in a variety of displays, activities and tours demonstrating how geoscience is being applied to some of Australia's most important challenges.

Curriculum development

In recent years, the work program of the agency has provided the background material and content for both school visits and teacher professional development sessions. Program context and relevance have been achieved by delivering initiatives which showcase and maintain strategic alignment with the agency's science programs. Geoscience Australia is supporting the implementation of the Australian Curriculum (particularly science and geography subject areas) through involvement

in the curriculum consultation process. Members of the Education Program team attend annual national science and geography teacher conferences to present teacher development workshops, participate in seminars or display at trade exhibitions. Staff also presented at the Australian Earth Sciences Convention in Canberra in July 2010.

The Office of Spatial Data Management (OSDM) is currently in discussions with Education Services Australia regarding the potential use of spatial resources across all subject areas in the school curriculum. Initially these services will be extended to Year Five and Year Six students. OSDM and Education Services Australia are keen to develop linkages with organisations interested in supporting the use of spatial capabilities within the education sector. Geoscience Australia is working to build on and develop further other partnerships with the education sector by making the relevance of its science to the Australian Curriculum more explicit and improving access to Geoscience Australia's science, data and products. The future looks promising for geoscience education with all stakeholder groups supporting and gaining improved access to online data and products.

Special events and professional development

Annual National Youth Science Forum visits to Geoscience Australia provide students with an opportunity to engage in real science, with geoscientific staff, in a working science environment. This year participants undertook an exercise designed by the agency's Carbon Capture and Storage project to determine the most suitable location for a carbon storage site. In previous years students have worked in groups using a range of geoscientific methods and equipment to ascertain the most likely location for a new gold deposit (figure 3).

Over the past year, the Japanese Science Teacher Association and Australian Science Teachers Association as well as the pilot Australian Science Teacher Summer School have participated in teacher development sessions at Geoscience Australia. Their visits included tours of the Joint Australian Tsunami Warning Centre and the Sensitive High-Resolution Ion Microrobe (SHRIMP) facility which produces high quality data about the age of Australian rocks. Architecture students also visit regularly to inspect the building's solar passive design and geothermal heating and cooling system.

Figure 3. Visiting students gain a hands-on experience in the interpretation of geological maps during a National Youth Science Forum program visit to Geoscience Australia.

Collaboration with schools

For the past three years, Geoscience Australia has been using ANUGA (free and open source hydrodynamic modelling software) to demonstrate numerical modelling concepts and basic hydrodynamic theory to Year 9 science students through the Science Experience. The Office of Spatial Data Management is currently piloting ANUGA for use in the high school environment at one school in the ACT. This has been achieved with the support of scientific and technical staff who are users of ANUGA within Geoscience Australia. It is planned to make an 'ANUGA package' including software, user guide and lesson plans available through Geoscience Australia's education web pages.

A scientific partnership has been established between Geoscience Australia and the Research School of Earth Sciences at the Australian

National University to aid in Sciences à l'École', an international initiative of the French Ministry of Education to install seismometers in schools. Telopea Park School/Le Lycée Franco-Australien de Canberra joined this international network with the installation of a seismic station within the school on 25 July 2008. The recorded signals, reflecting regional or global seismic activity, feed into an online database, creating a genuine seismic resource centre and a real world context for learning. This station is station number 44 in a network which now numbers 51 stations, and is the third in the Southern Hemisphere and the first in the Asia-Pacific area.

"The recorded signals … feed into an online database, creating a genuine seismic resource centre and a real world context for learning."

The French initiative is part of a broader challenge to encourage students' interest in science and steer them towards scientific studies and professional careers. Future applications of this development extend to an Australian 'Seismometers in Schools' program. The objective is to install 40 seismometers in schools across the nation to contribute to earth science awareness in school-age students through the formation of a national seismic education network. The project was initially funded by AuScope with Geoscience Australia and the Australian National University's Research School of Earth Sciences. AuScope is funded by the National Collaborative Research Infrastructure Strategy which utilises the practical applications of science to build bridges between the research communities and all Australians.

Future directions

While the value of delivering science in context and *in situ* to students cannot be underestimated, there is one significant limitation – access. A major challenge for the education program will be to ensure that our resources are accessible to and reach the widest possible audience. Geoscience Australia is working to build a culture of online innovation and collaboration by improving access to our data, information and products beginning with the adoption of Creative Commons licensing for online products. Obviously collaboration will be pivotal to the future success of Geoscience Australia's education program.

At its most fundamental level, raising community awareness of geoscience has the capacity to save and change people's lives. Although it is difficult to measure the broader impact of Geoscience Australia's education and awareness-raising activities, there is evidence that these activities play a significant part in combating the decline of interest in the study of geoscience by students and university graduates. The success of the education program, in conjunction with our cadetship and graduate recruitment programs, can be seen with a number of Geoscience Australia's current staff having either first visited the Centre as school students, participated in Geoscience Australia's National Youth Science Forum visits or applied for cadet or graduate positions within the Agency.

Related articles/websites

Geoscience Australia's Education website
www.ga.gov.au/education/