

A new network of low-cost recorders in WA

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A new network of budget seismic recorders has been developed in WA, mainly to service the mining industry in WA, but with spin-off benefits to the monitoring of natural seismicity. Many mines already operate in-house seismic arrays to monitor small events within the mine, but are incapable of locating the occasional larger events which occur outside the immediate mine environment. This project sees a collaborative approach, initiated by the Australian Centre for Geomechanics (ACG), which allows the industry as a whole to better appreciate their tectonic environment.

The new network is based around the low cost digitizer marketed by Larry Cochrane of the Public Seismic Network, California USA (<http://quake.psn.net>). To this has been added communications software developed by ACG, based at the University of Western Australia in Perth. The basic cost of the hardware, excluding a sensor and a PC, but including a GPS unit, is under \$500 US.

Arie Verveer has been using PSN software to operate a high-quality seismic station at the Bickley Astronomical Observatory, just east of Perth, since 1995. Seismograms from his site are posted to www.geosn.com.

The ACG has two networks functioning at present – one in the Kalgoorlie – Kambalda region (8 stations) and another (5 stations) between Perth and Broome, the West Coast Network. The Kambalda-Kalgoorlie network was installed in March 2006. An additional network is planned for installation in the Leinster region (approximately 200 km north of Kalgoorlie) in October 2006.

Data is recorded at 200 s/s, using windows-based software supplied with the digitizer. New software developed at the ACG compresses the data, reduces it to an effective rate of 50 s/s and then sends it via the internet to a node at the ACG in hourly blocks.

The data can be viewed by organisations participating in the project, and accurate phase picking is available. When events of interest are identified, a signal is sent to the remote system and data at the full 200 s/s resolution is downloaded. Automatic phase picking and earthquake location is planned for the future.

In most cases, inexpensive 4.5 Hz, 3-component geophones are used as sensors, but the West Coast network also has a Willmore Mark 1, a Marks products L4C, and a long period Sprengnether, all single component seismometers, in service.

In the event of a break in the internet connection, data is stored on site, and then downloaded in bulk when the connection is re-established.

The geophones are not the best sensors available, but they are inexpensive, and adequate for monitoring nearby events, which is the main interest for the mining companies. Because of the requirements for mains power and an internet connection, it is not often possible to find good seismically quiet sites, and a degree of noise must be tolerated. Calibrating the signal in order to get good magnitude estimates is still a problem to be adequately tackled.

In addition to the hourly downloads of binary signal data, some of the stations of the West Coast Network send data plots in GIF format to UWA several times a day, using FTP. These plots are available for viewing via the internet at <http://cyllene.uwa.edu.au/~vdent/SEISMIC>

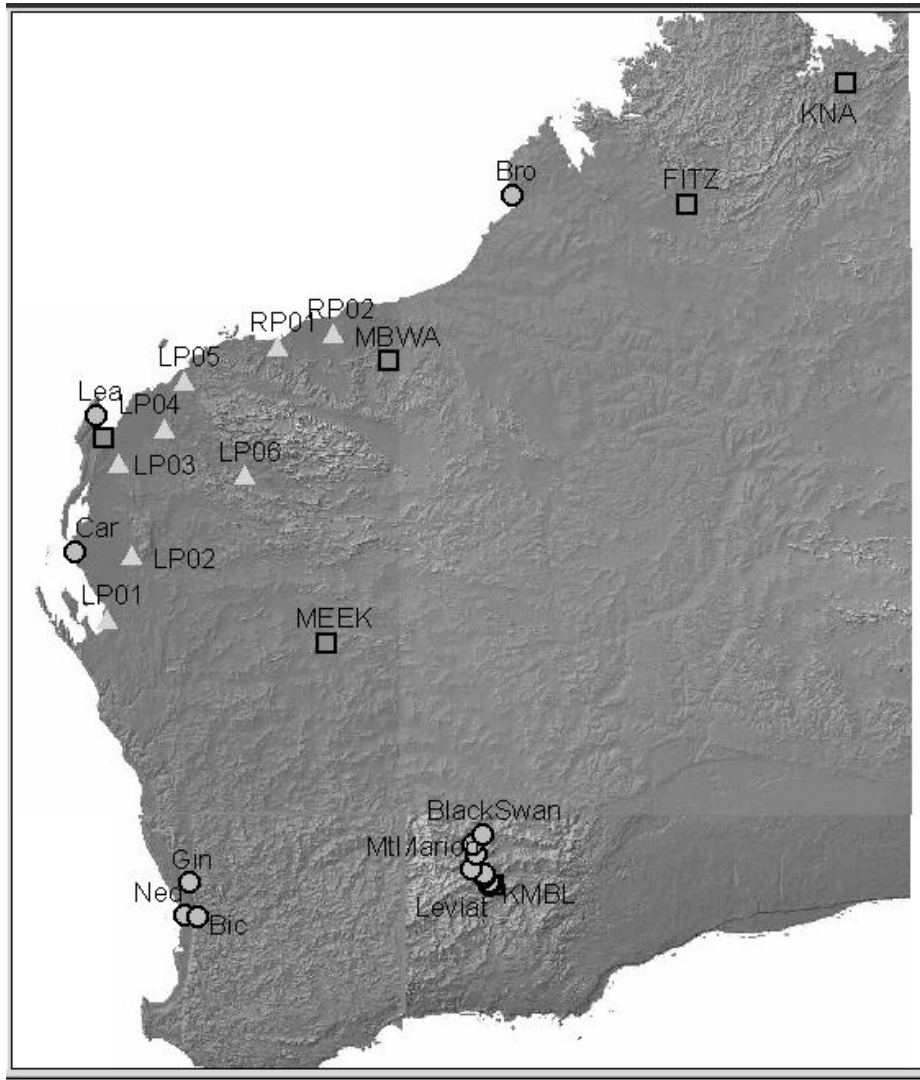


Figure 1 Distribution of new stations in the ACG network (circles); new Reftek stations (triangles), GA stations (squares).

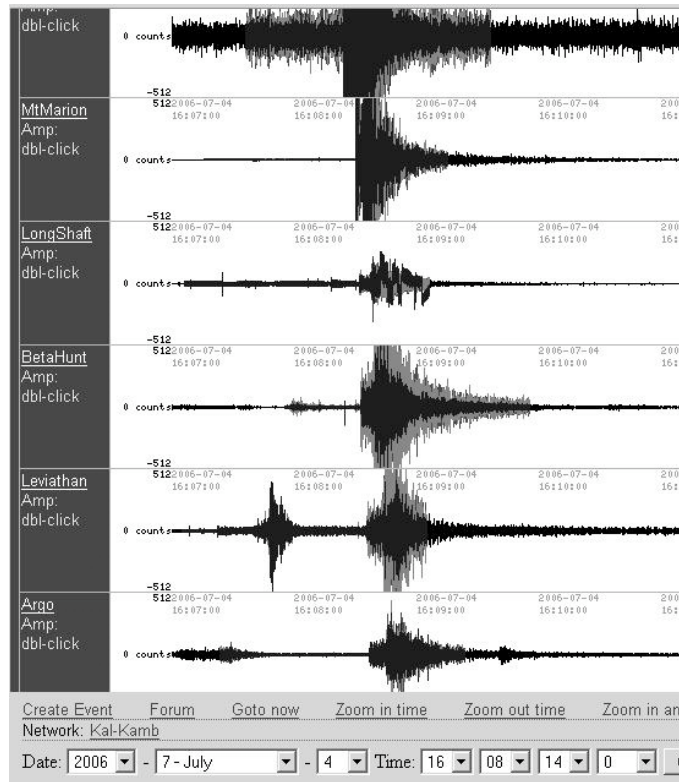


Figure 2 Screen display from the ACG website showing waveforms from a magnitude $ML \sim 3$ Kalgoorlie earthquake on 4 July 2006.



Figure 3 Installing the first ACG recorder at Longshaft Mine

