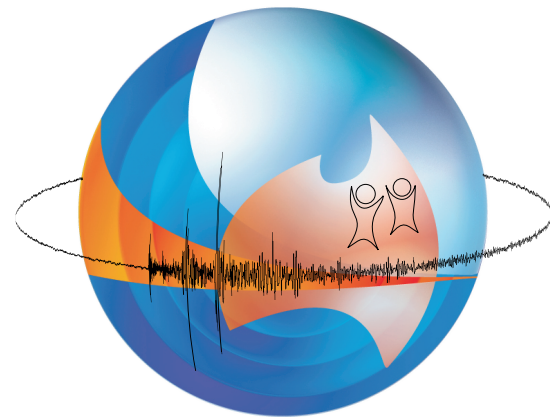




Australian  
National  
University

# AuSIS: The Australian Seismometers in Schools Network



Natalie Balfour

AUG Meeting June 2013



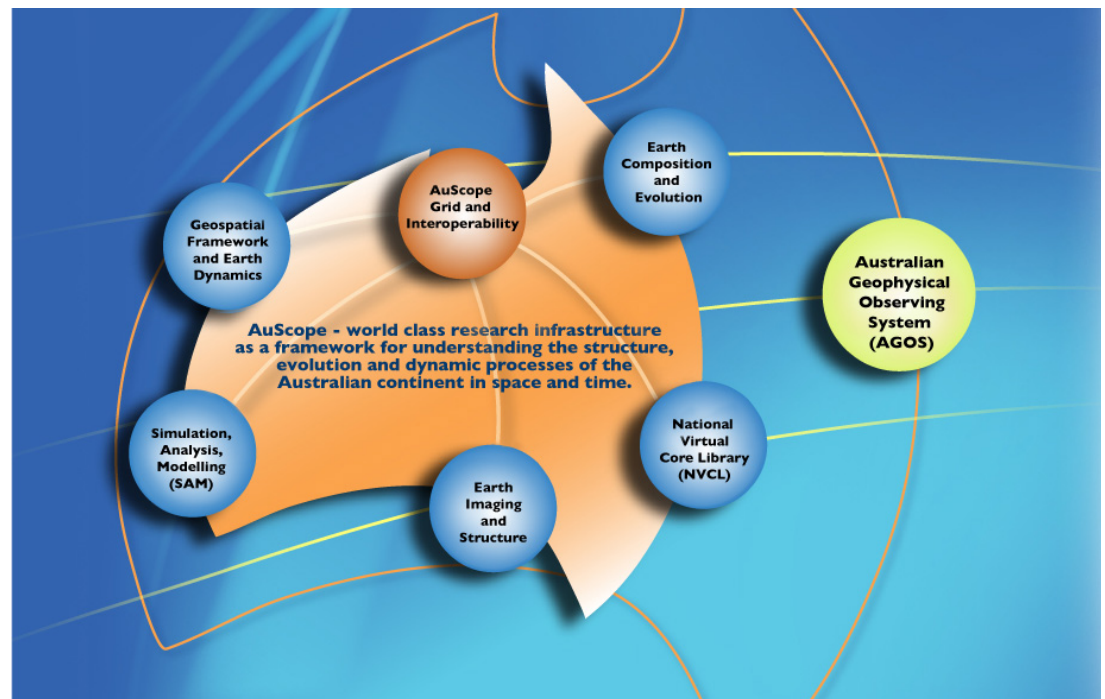
# Overview

- Introduction to AuSIS
- Current state of AuSIS
- Networking with Scream!
- Data sharing and archiving with Antelope
- Education and Outreach
- Future Developments



# AuSIS Funding

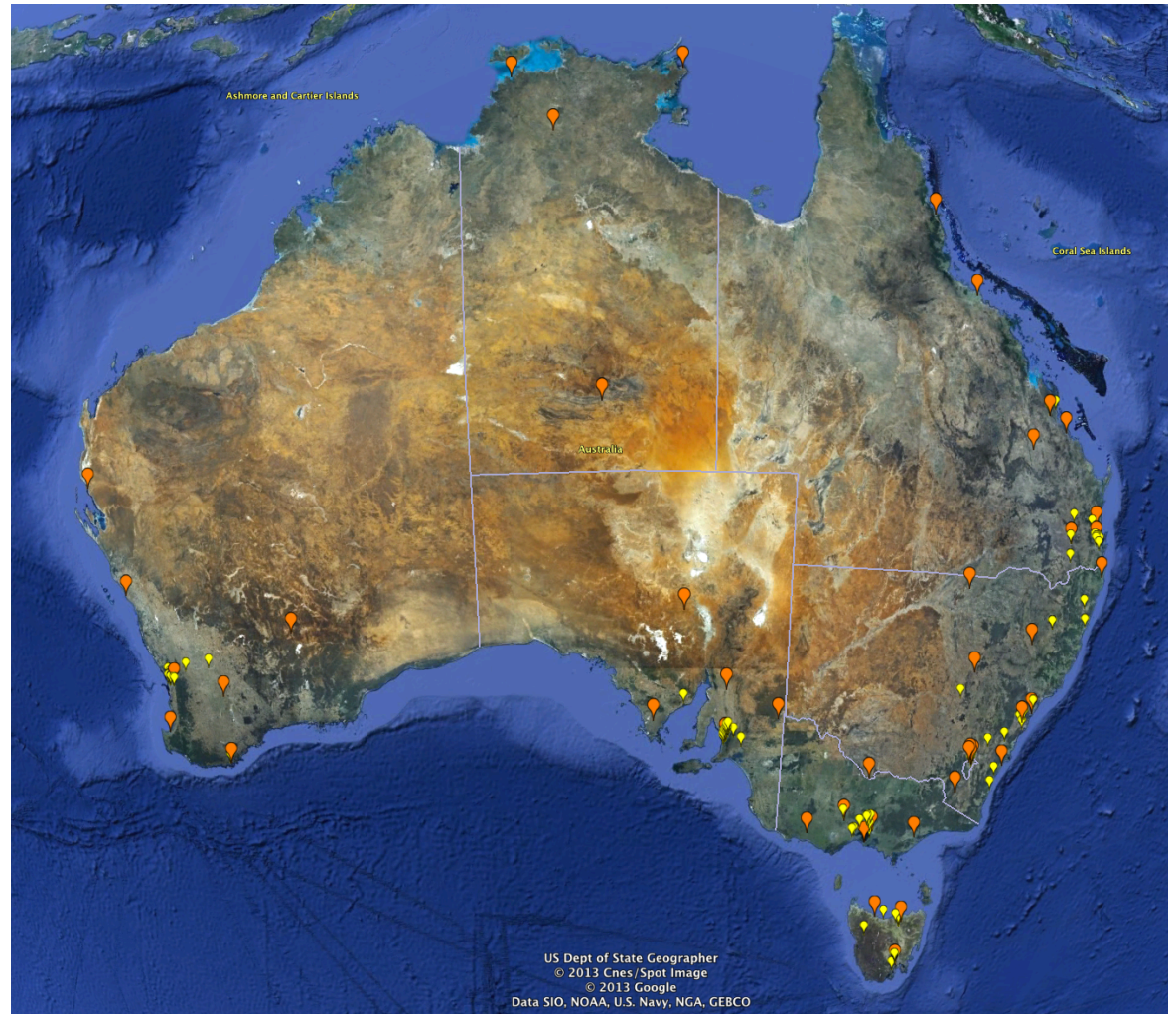
- AuSIS is a four-year project (2011-2014) run by the Education component of AuScope Australian Geophysical Observing System (AGOS) which is funded by the Federal Government's Education Infrastructure Fund (EIF).
- AuSIS – additional funding from state government.
- AuSIS – hope to engage resources industry to sponsor instruments at local schools.





# AuSIS Description

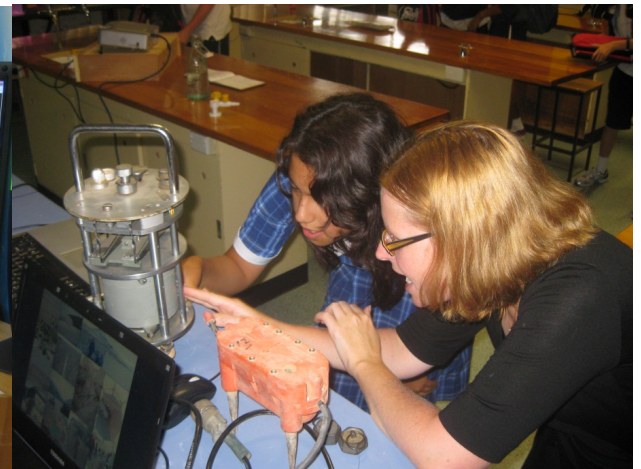
- 40 seismometers installed in high schools across the nation to provide real-time monitoring of the Australian continent and raise awareness of geoscience through observing our dynamic earth in motion.





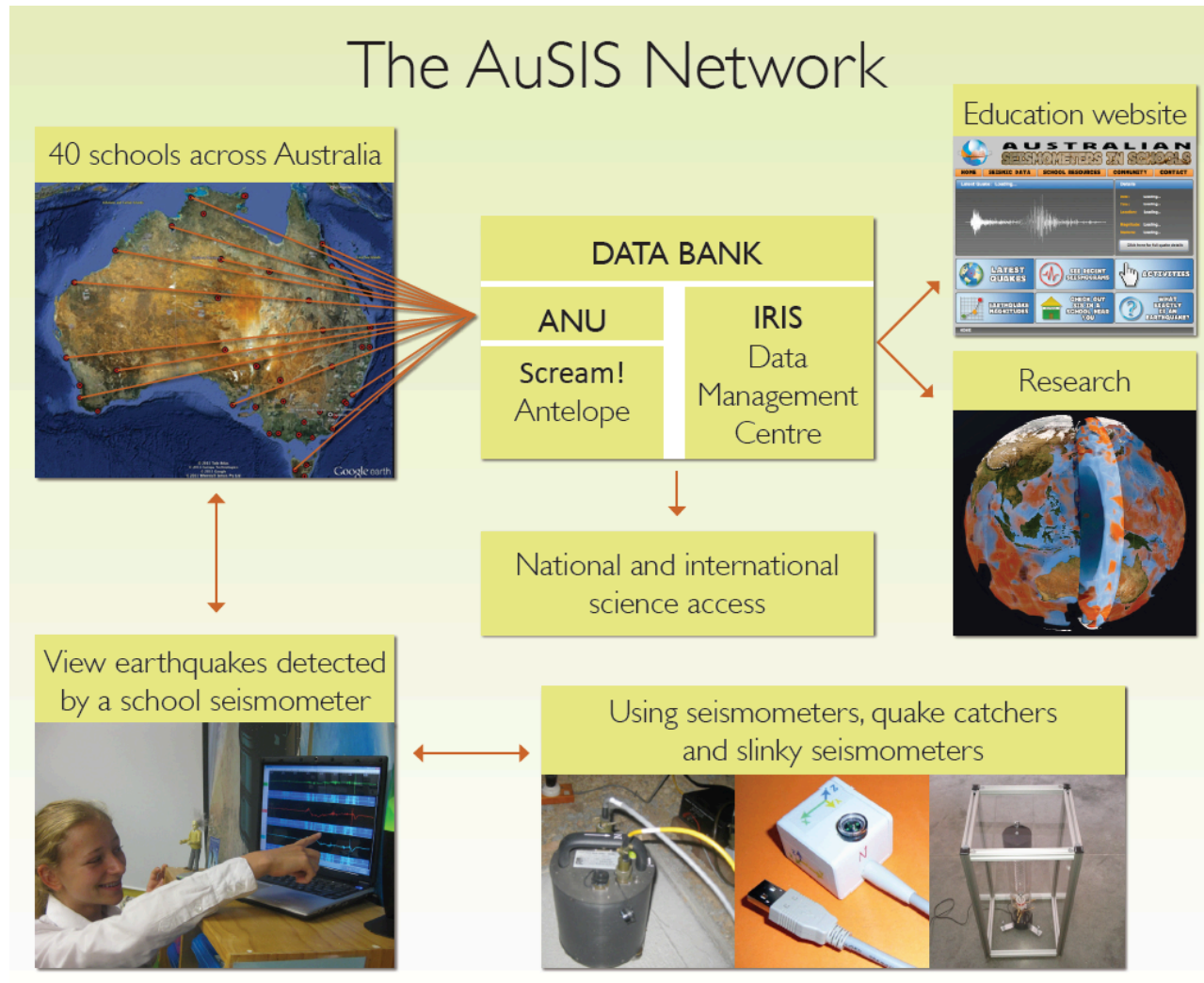
# AuSIS Goals

- The Australian Seismometers in Schools project aims to:
  - Raise community awareness of regional earthquakes;
  - Raise awareness of seismology and, more generally geoscience, as a field of study;
  - Promote science as a possible career choice;
  - Provide a tool to assist teachers in educating high school students in Physics and Earth Science.





# AuSIS Infrastructure





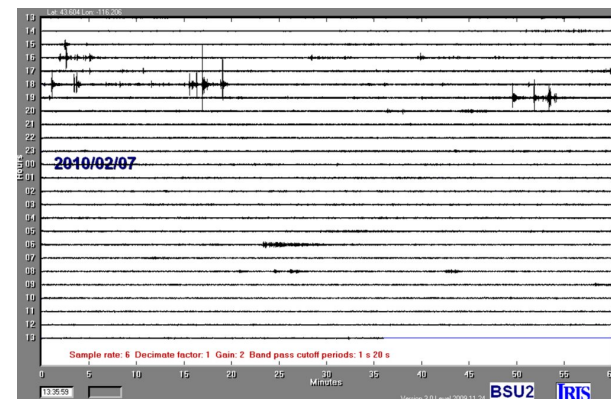
# AuSIS Equipment

- Primary instruments:
  - 3-component broadband seismometers
  - Guralp CMG-6TD
  - Response 30s-100Hz
  - Sampling 50-100Hz
  - Near real-time data transfer to ANU via Guralp Scream! Software, then on to IRIS via BRTT Antelope software
  - Sensitive enough to record local and distant earthquakes



# Alternative AuSIS Equipment

- Secondary instruments:
  - “Slinky Seismometer”
  - Developed by Boise State University and being used in US programs
  - Share data online via the IRIS website
  - Sensitive enough to record local and large distant earthquakes
  - Limited data quality for research

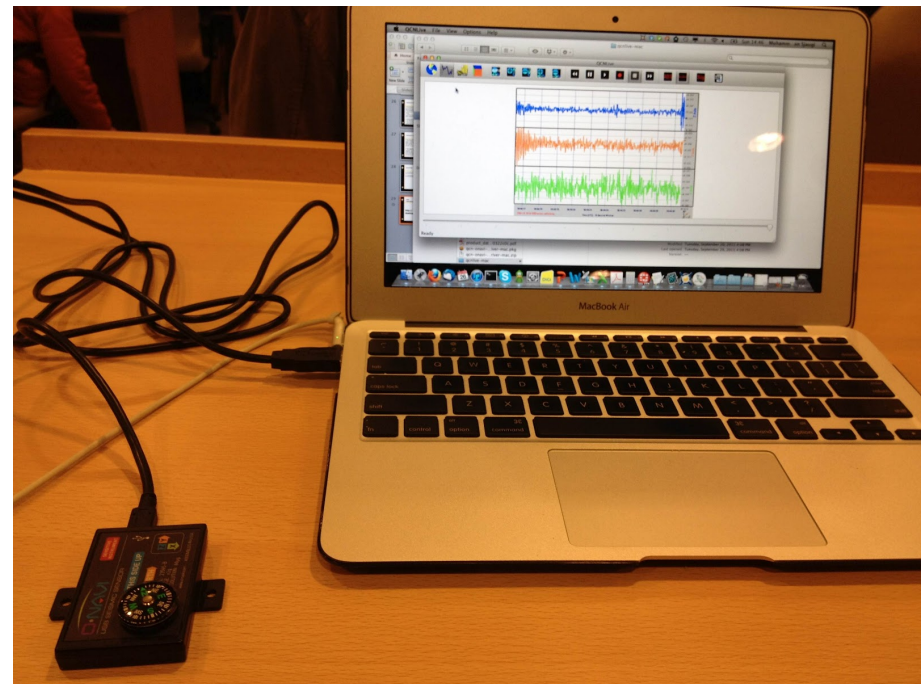






# Alternative AuSIS Equipment

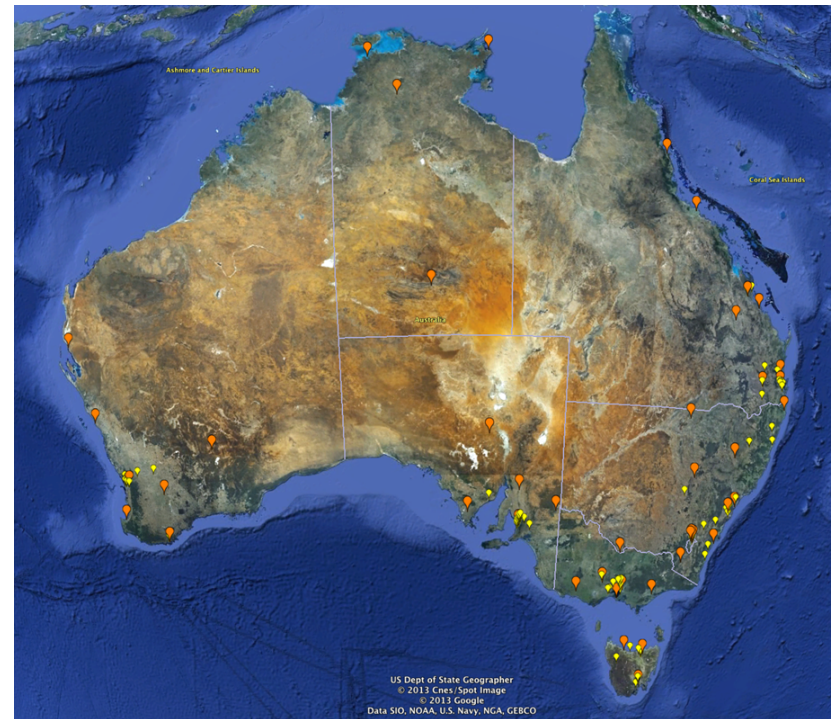
- Tertiary instruments:
  - Quake-Catcher
  - USB accelerometer
  - Low sensitivity, will record local felt earthquakes
  - Good for urban areas and classroom demonstrations
  - Data can be sent to California based repository
  - Limited data quality for research

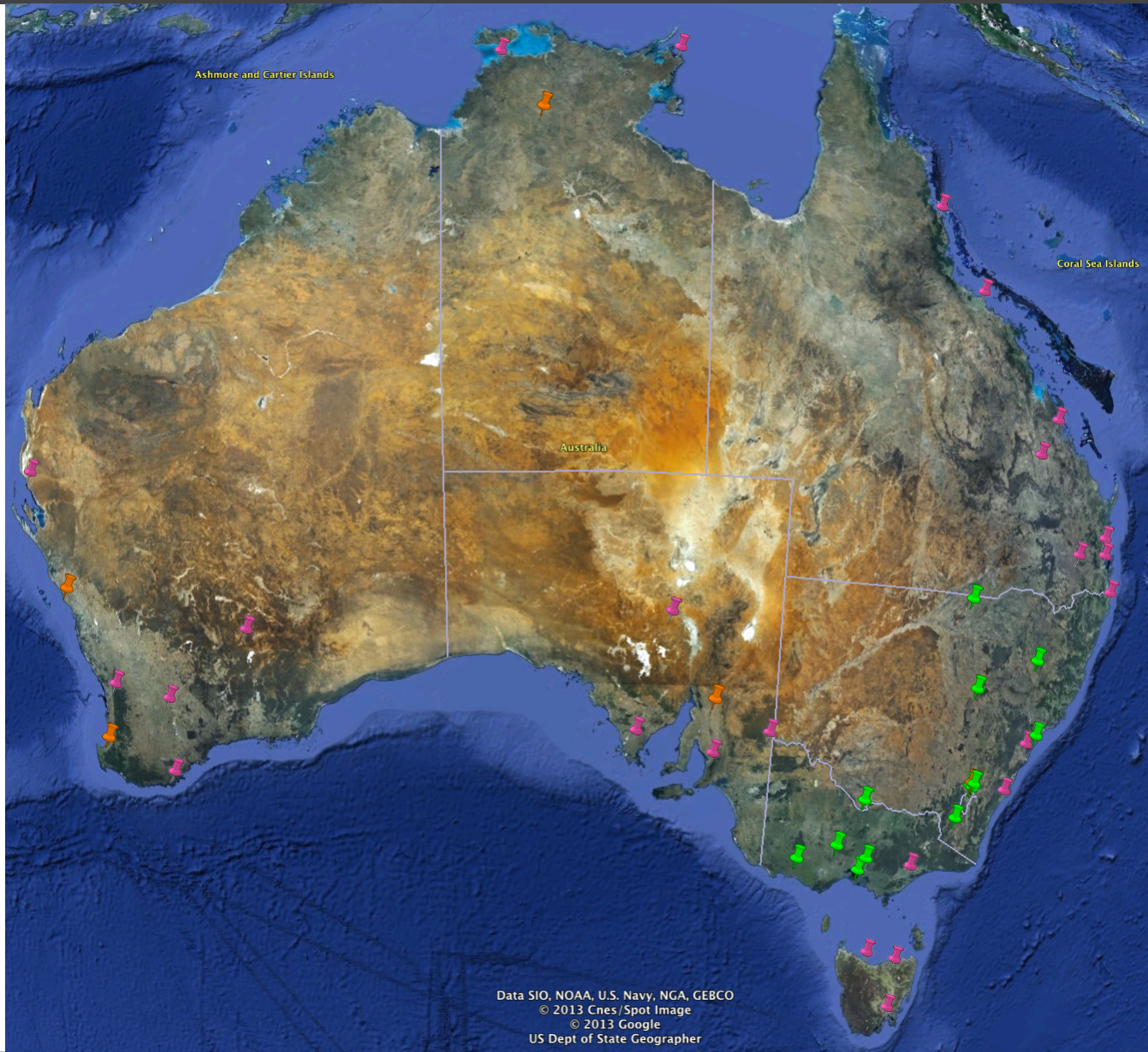




# Current State of AuSIS

- Over 125 Expressions of Interest
- 12 Installed
- 25 Planned
- 5 Proposed
- 1 unassigned for Northern Territories
- Total 43 (includes sponsored sites)







# Seismometer Installation

- Team effort – school staff (IT, facilities, lab techs, teachers) and AuSIS staff
- AuSIS staff will help set up the seismometer and provide basic training





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# Data Quality

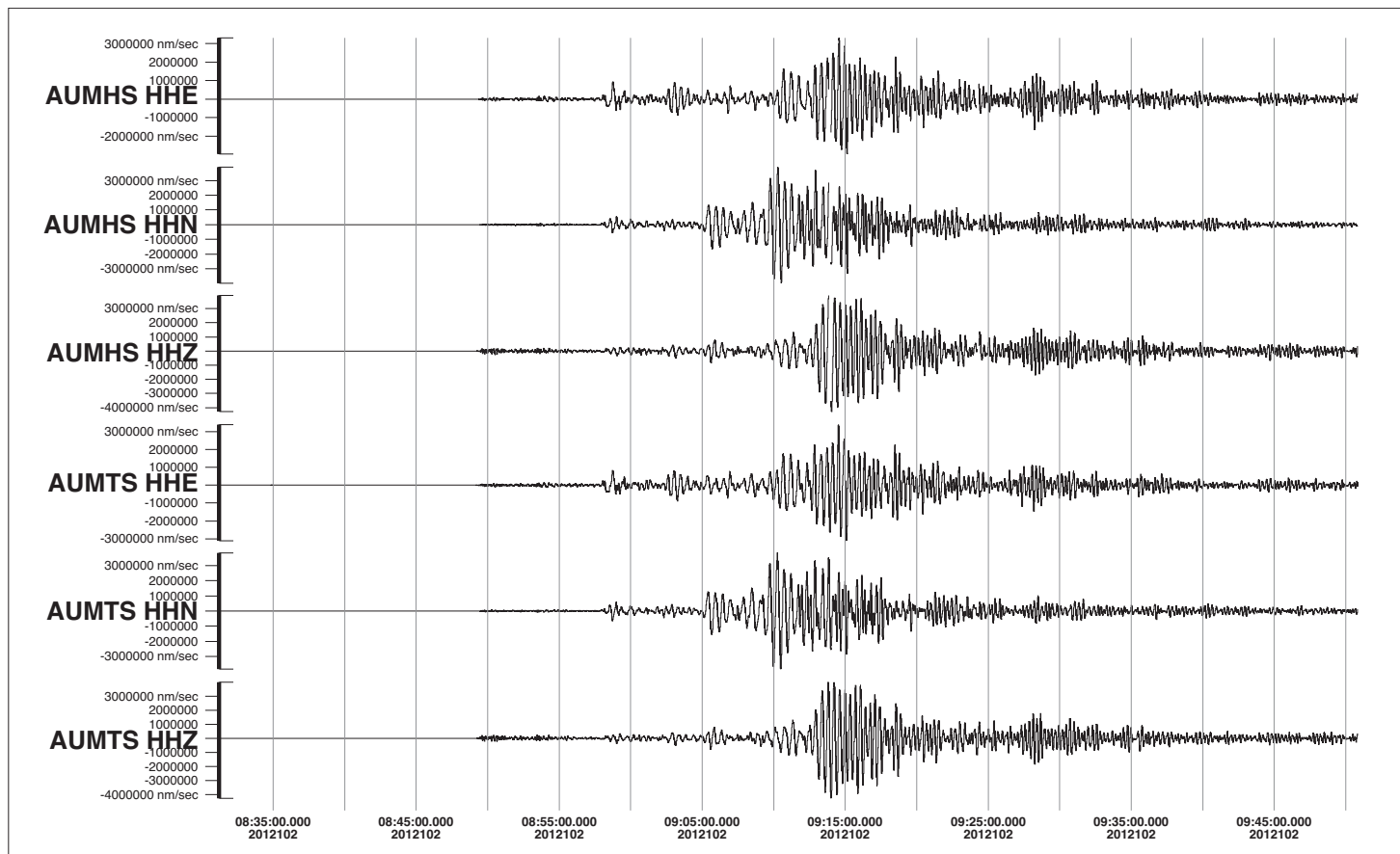
- Every school is different
  - Location of school
  - Location within the school
  - Number of levels in attendance
  - Type of installation





# Recording Distant Earthquakes

Sumatra, Indonesia, 11<sup>th</sup> April 2012, M ~7.1

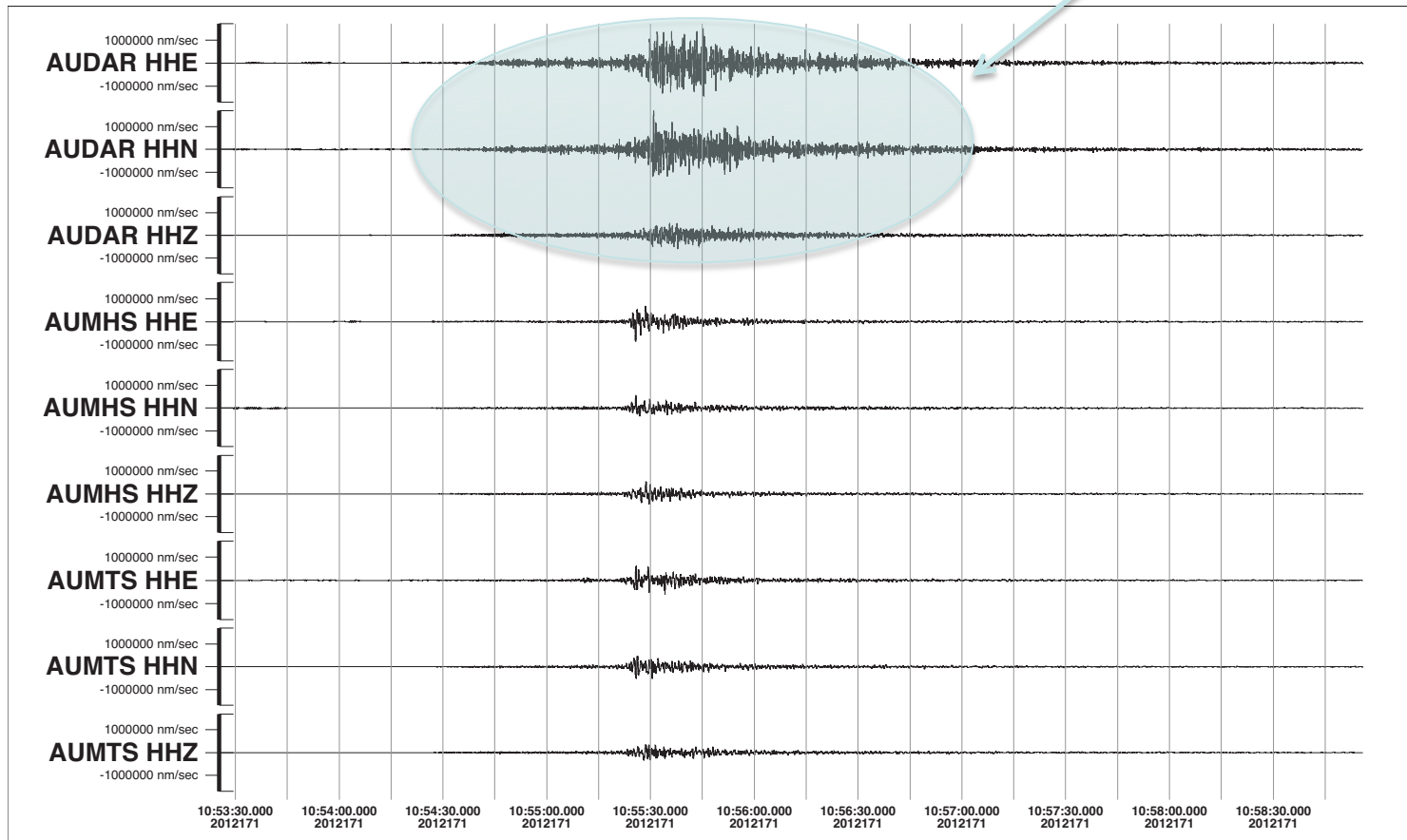




# Recording Regional Earthquakes

Moe, Victoria, Australia, 19<sup>th</sup> June 2012, M ~5.1

Site Amplification

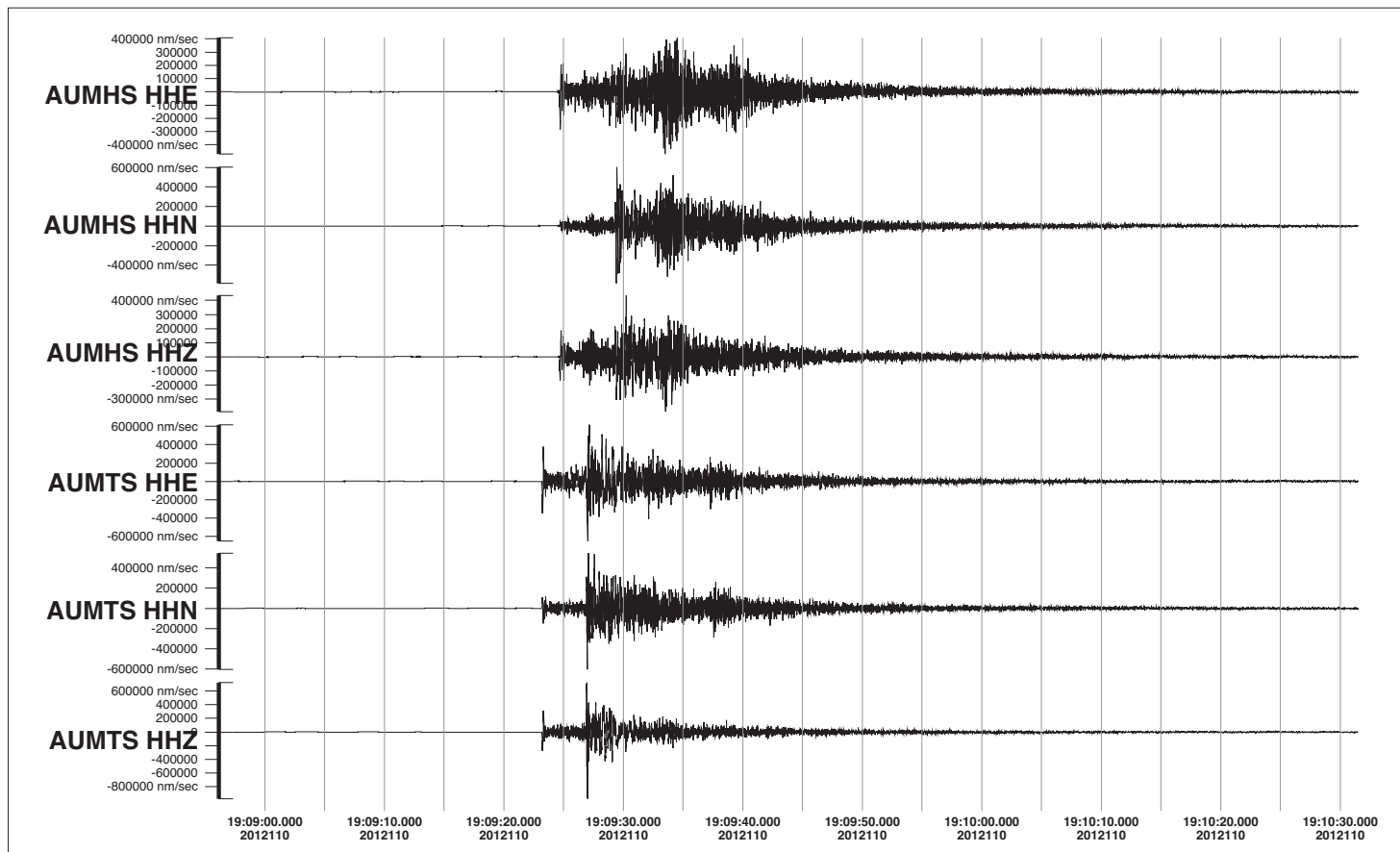






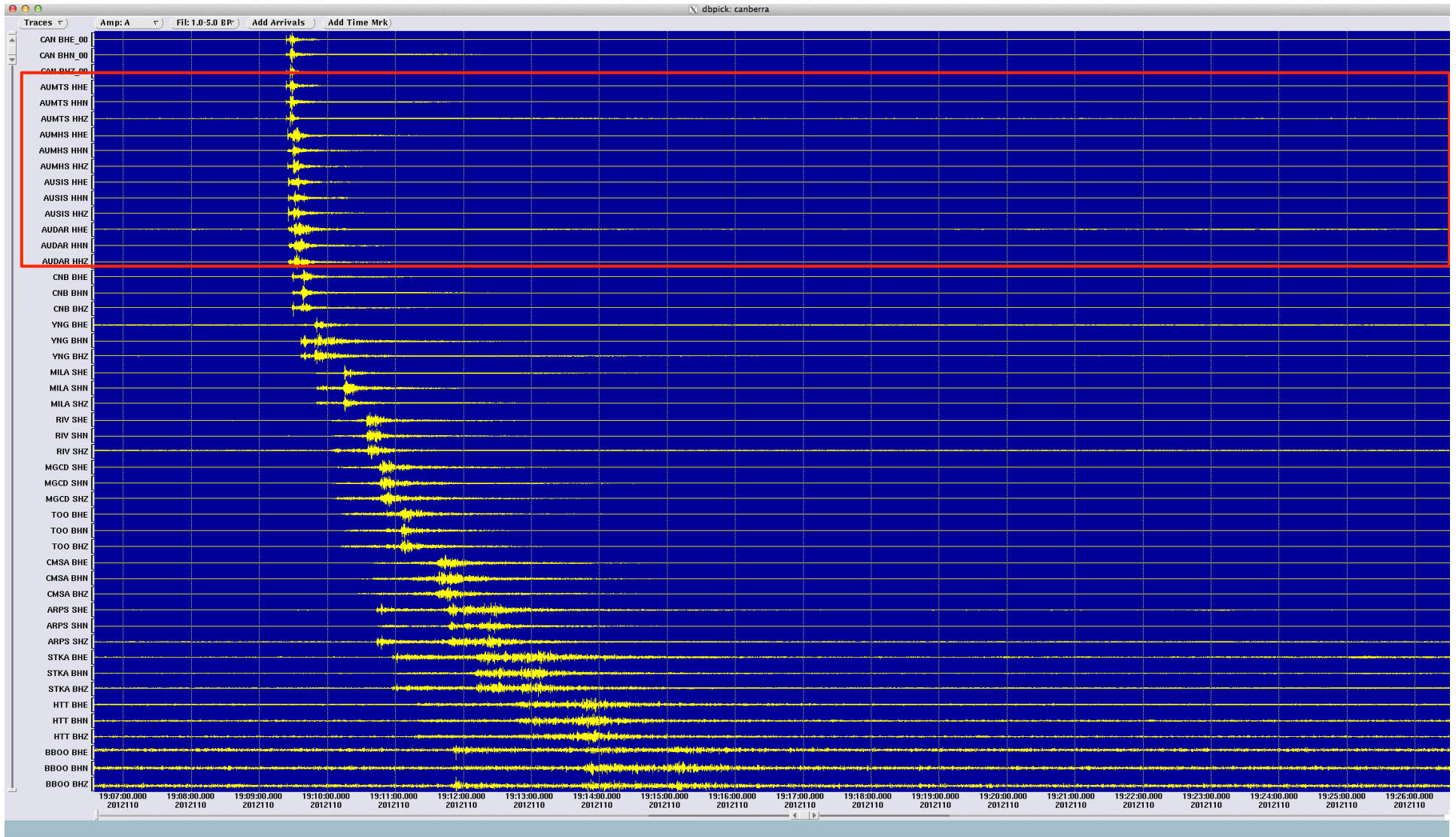
# Recording Local Earthquakes

Canberra, Australia, 20<sup>th</sup> April 2012, M ~3.2



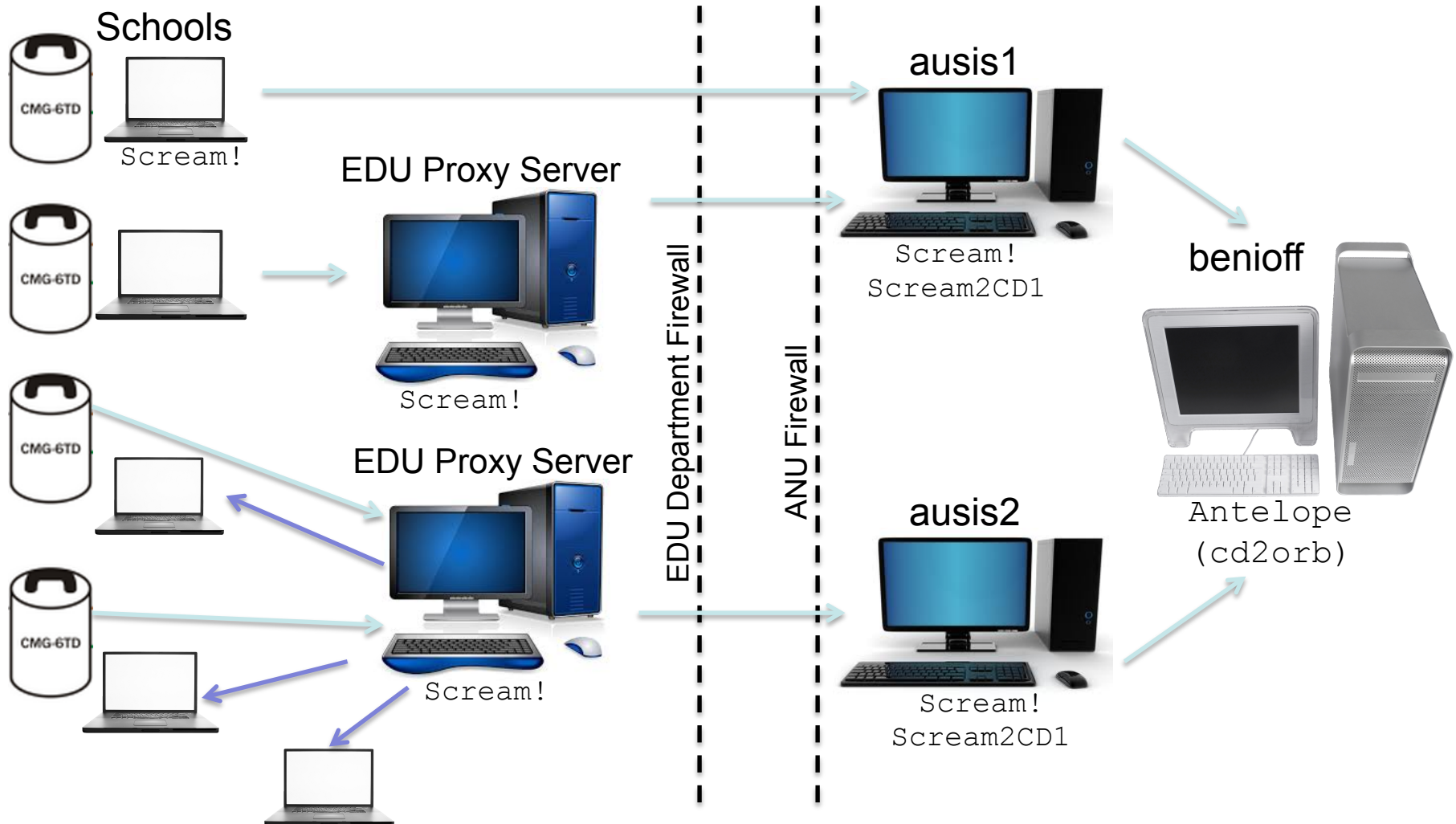


# AuSIS Pilot Program – Canberra Earthquake



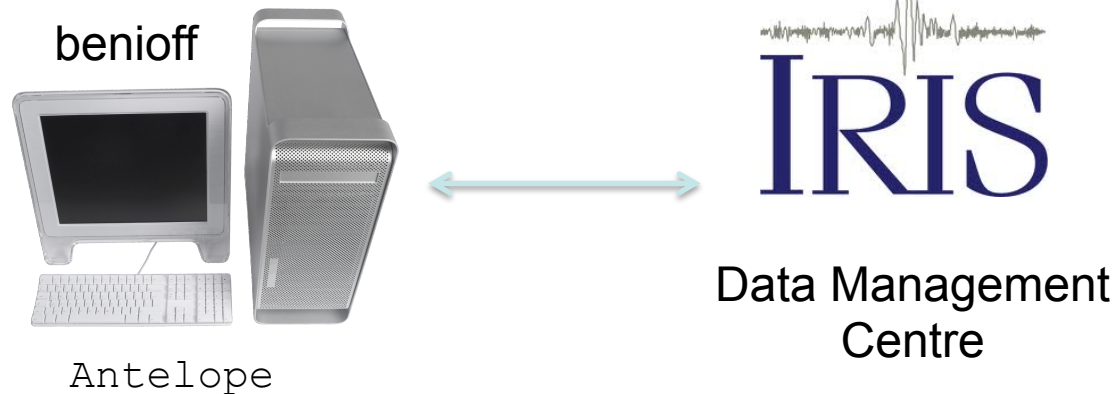


# Networking with Scream!

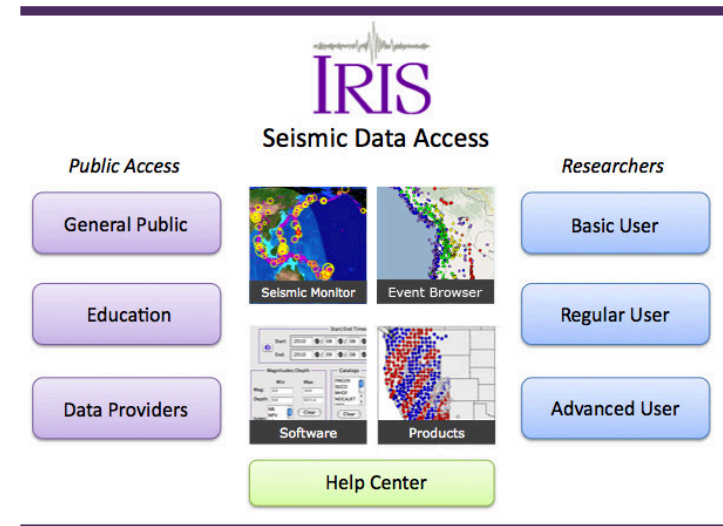




# Data Sharing with Antelope



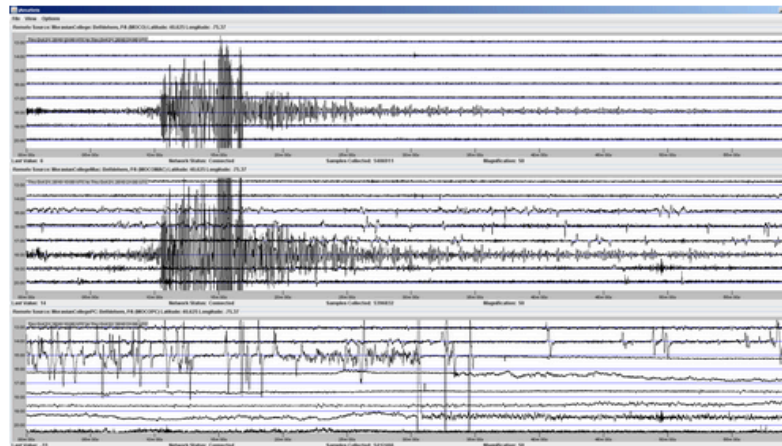
- Direct all end-users to IRIS
  - Monitoring agencies
  - Researchers
  - Websites
  - To some extent schools – Wilber3, jAmaSeis
- Network Code “S”, Seismographs in Schools
- Site codes start with AU???



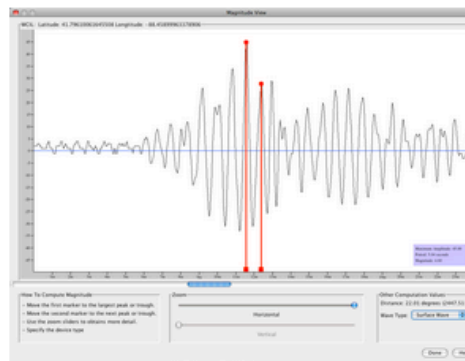


# jAmaSeis

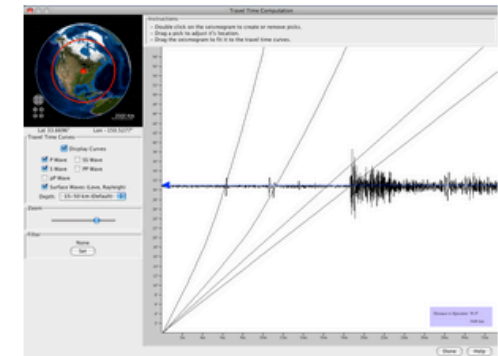
- In development by IRIS Education and Outreach



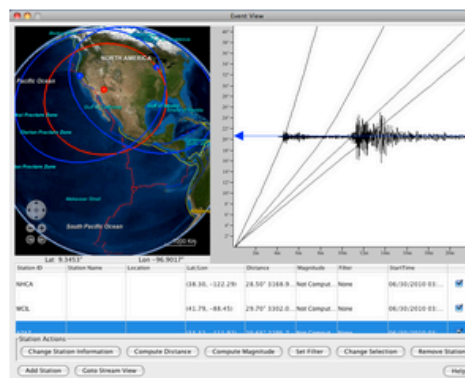
**Stream View-** The helicorder screen now has the flexibility to display up to three streams of data simultaneously. These can include a local educational seismometer, a remote educational seismometer over the jAmaSeis network (in true real-time), or research-quality seismometers stored at the IRIS Data Management Center (in near real-time).



**Computing Magnitude-** For each stream, an event can be extracted allowing the user to pick amplitudes to calculate either a body wave or surface wave magnitude.



**Computing Distance-** For each stream, an event can be extracted allowing the user to pick arrivals by double-clicking on the seismogram. A travel time curve is available to align the picks, and as the seismogram is slid along the travel time curve, the numeric values update and a circle with the appropriate radius is shown on the globe.



**Event View-** All of the analysis for an earthquake comes together in the event view. Multiple traces can be loaded, either from the stream view or from a sac file. All of the individual distance calculations are displayed in both table and map form in addition to the individual magnitude calculations. In this view, a user can make the final determination of the location and size of the earthquake.



# Education Portal



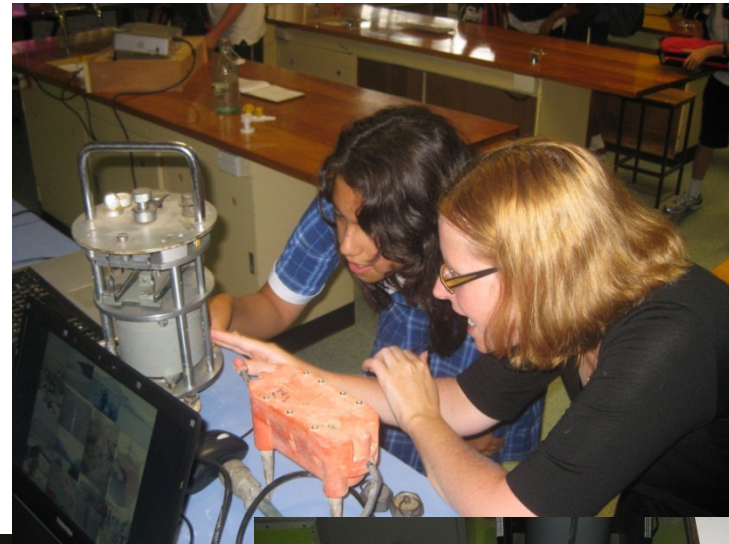
- Online education portal for teachers and students
- Links to existing educational resources and Australian specific examples.
- Expression of Interest form and information on hosting





# AuSIS Education and Outreach

- Hands-on experience





## School initiated activities

- Melrose High School (7-10) - ACE Science Mentor Project



### Characterisation of Cultural Noise in Melrose High School's Seismometer

9ACE Mentor Program (2012) with Dr Natalie  
Balfour

By: Tristan Khaw, Oliver Cross, Paul Nilsson and Josh  
Tomlin





Australian  
National  
University

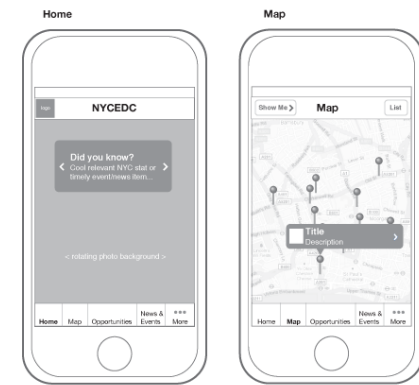
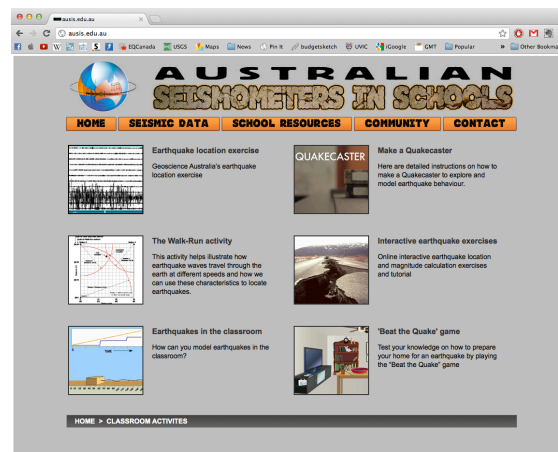
# AuSIS Launch Activities





# Future Developments

- Improve website design
- App for mobile devices
- Educational Resources
  - PD workshops for teachers





# Thank you!

- Website: <http://www.ausis.edu.au>
- Email: [ausis@anu.edu.au](mailto:ausis@anu.edu.au)
- Facebook: <http://www.facebook.com/ausisnetwork>
- Twitter: @AuScope or @nat\_hazard

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**IMPROVED OUTLOOK**  
BUDGET SET TO FUND  
CITY-WIDE SPRUCE UP  
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## A seismic shift in learning

### School to see quakes

By Mark Sawa

THERE is going to be a seismic shift in education in the ACT and across the nation with the launch of a pilot program in schools to monitor earthquakes.

The Territory's Melrose High is the first school in Australia to get a seismometer and join the AuScope Seismometers in Schools (AuSIS) program.

Melrose High principal George Palavestra said it was exciting to be involved in the network, which would complement the schools already strong connections in the scientific community.

"Connecting student learning to real life situations and working collaboratively with the scientific community to collect, analyse and problem solve reinforces the importance and rigour of their learning," Mr Palavestra said.

"The use of technology, like the Seismometer in Schools project, enables students to communicate and connect beyond the classroom is paramount to that relationship."

Eventually the program will establish a network of 40 seismometers and 100 lower grade 'quakecatcher' units in school and community sites nationwide to record seismic activity.

As part of the network students at Melrose High will have an active role in recording seismic activity, including earthquakes. The seismometers will provide real-time monitoring of the Australian continent that will feed into national and international datasets.

Senator Lundy said. The program is part of a broader federal government push to invest in science and research in an effort to drive Australian innovation and international competitiveness.

"Students will get hands-on experience and have an opportunity to be involved in international science,"

Minister for Science and Research, Senator Chris Evans, said the government was investing almost \$9 billion into science for 2012-13. "Projects like the seismometer not only raise community awareness of regional earthquakes, but also provide an avenue to assist in teaching of earth science and physics in the classroom and inspiring our next wave of young scientists,"

Senator Evans said. Four test instruments will be put into two ACT schools. The first two have been placed at Melrose High while the second two will be placed at Daramalan College.

■ Schools are invited to apply to host the AuSIS seismometers online at [www.ausis.edu.au](http://www.ausis.edu.au)

Picture: Picture: Elena Lee