

Data trends



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Exploring passive seismic file formats for data exchange

Passive seismic is emerging as an exciting field with new applications in mineral exploration and stratigraphy modelling. State surveys are now building archives of passive seismic data with lots of subsurface detail and, as a

consequence, the exchange of passive seismic data has been on our minds at the ASEG. An informal ASEG group contacted known academic, government and industry users for the how and why of their favourite passive seismic file formats. It turns out that it is not just a local problem, with Moho, the Italian manufacturers of the widely used Tromino™, interested in finding a better output format for their devices.

Successful candidate formats should have the following parameters:

- Broad software support for acquisition formats
- Broad software support for end users
- Compaction for data exchange without ‘lossy’ compression
- Metadata

An additional stipulation is that data should be at least in time series, if not also in the frequency domain.

The most common acquisition formats are SEED (Standard for the Exchange of Earthquake Data) and SAC (Seismic Analysis Code). SEED has a long history of use in earthquake monitoring, while SAC has the advantages of both binary and text formats. Both formats are effectively software and files, with the data produced by a program of the same name. SAC appears to be favoured by academic users, despite the considerable

volume of historical data in SEED. Conversation with IRIS (Incorporated Research Institutions for Seismology) showed a preference for SEED.

Other text file formats (GeoCSV, Simple ASCII) lack the metadata and popularity to warrant consideration.

SEG2 is used for the passive Rayleigh wave format ReMi in engineering, but is believed to be restricted to time series data. SEG-Y was originally out of favour due to storage size restrictions. Various SEG-Y ‘flavours’ sprung up as work arounds, and the recent revision (SEG-Y r2) in 2017 was generally welcomed by end users. It has arguably the widest software support of any geophysical format.

IRIS supply various utilities for transforming between SEED and SAC. Tim Dean of Curtin University mentioned a possible tool to convert between the various formats as a by-product of a passive wave project, possibly adding a SEG-Y output.

Do you have an opinion on the path we should take? Should the ASEG prefer one or two formats for passive seismic data, or pursue software conversion? The formats under consideration are summarised in Table 1. Please reply with your opinion and suggestions/ideas to technical-standards@aseg.org.au.

Table 1. Passive seismic data formats under consideration

Name	Original purpose	Channels	Software support	Stations per file	File or software	Known distributors	Metadata
SEED	Earthquakes	Single	Institutions	Single	Software	Most seismic institutions	Yes
SAC	Earthquakes	Single	Academic	Single	Software	USGS, academics	Yes
SEG-Y r2	Seismic	Multi	Wide	Multi	File	Petroleum	?
SEG2	Engineering	Multi	Engineering industry	Multi	File	Civil engineers	?



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