Antelope Contributed Software
Development Status for Detectors, Focal Mechanisms, Moment Tensors, Locations

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Antelope User Group
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Current developments

• Detectors
• Focal Mechanisms
• Moment Tensors
• 3d Velocity Locations
Detectors

STA
LTA
filtered data
thresh
threshoff
ratio1
detection on
detection off
onset (pick) time
compute ratio2 noise floor here

LTA
STA
look for onset time here

Wednesday, May 29, 13
Detectors

• P wave detection
  • works extremely well

• S wave detection issues
  • P wave coda
  • N or E component?
  • S-P times may be too short

• Particle motion analysis
  • recursive singular value decomposition
  • distinguish P and S seismic phases
  • stream of three-component data
  • sample-to-sample resolution
TR and JF Arrays
• Testing configuration parameters

• Needs orbwfproc implementation

• Not ready for operations
• Several programs exist at various institutions
• No standard implementation in Antelope or Contrib
• No community accepted standard
  • fpfit
  • focmec
  • hash
  • ....
1) Antelope real-time system creates a database and observation of automatically processed real-time events and waveforms.

2) The dbevproc program runs against an entire database or a real-time data stream to compute automatic focal mechanisms.

3) A dbevproc "FM" object implements all necessary calculations for the focal-mechanism determination.

4) Automatic first-motions for each arrival are computed in a new 'libfm' library.

5) The FM module allows delegation to one of several external programs, or to an internal calculator [First versions of the Focal Mechanism Tool will most likely be restricted to one delegate].

6) Resulting focal-mechanisms are stored in the css3.0 fplane table.

7) dbevproc can also run against single orids in an analyst-review environment.

8) Display utilities, separate from the Focal Mechanism Tool and not part of this project, can display the focal mechanisms from the database.
Current Status

• Lindquist consulting completed
  • example parameter file
  • input database
  • command line that uses the new HASH driver for dbevproc
  • code is submitted to contrib
  • not ready for operations
• Lindquist consulting no longer available
• Future needs
  • testing, testing, testing
  • apply to many earthquakes
  • Fmhash.pm code may need to be tweaked and made more sophisticated.
  • implement fpfit and focmec algorithms
  • add DSP to produce the first motion measurements as input.
Preliminary Results of the Moment Tensor Code in Antelope

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So Far

• Get origins from Datascope tables.
• Subset stations in quadrants.
• Get Green's Functions from Datascope based on distance and depth of event.
• Extract, rotate and filter data from stations.
• Reject stations with bad cross-correlation.
• Invert the MT and extract the eigen values/vectors.
• Update Datascope with results.
Green’s Functions are build dynamically upon request if not already present in archive.

Newly constructed functions are stored on a database referenced by a wfdisc table.
Texas 2011/10/20 4.8 Mw

orid = 3830971
time = 10/20/2011 12:24:40
Strike 1 = 78
Rake 1 = -72
Dip 1 = 72
Strike 2 = 211
Rake 2 = -137
Dip 2 = 24
Mo = 1.340E+23
Mw = 4.718
% DC = 28.644
% CLVD = 71.356
% ISO = 0.000
VR = 3.624E-09
VAR = 3.624E-09
• Need to resolve problem in filtering waveforms

• testing, testing, testing

• Implement other moment inversion modules

• Not ready for operations
• Desire of many networks and experiments
• Design plan
  • Travel times created using Steve Roecker’s spherical eikonal solver code
  • Build ttgrid file
  • Use with orbassoc or dbgrassoc
  • Incorporate in genloc grid search
• Needs
  • 3d velocity structure on regular grid
  • grid spacing at highest level of resolution required
  • site table
Are there any other data products being developed in the community?