

Antelope Contributed Software

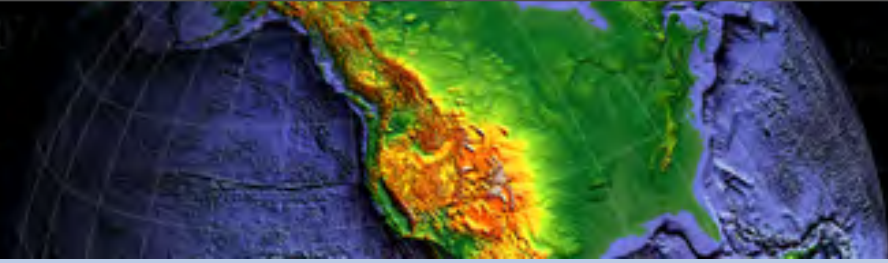
Development Status for Detectors, Focal Mechanisms, Moment Tensors, Locations



Frank Vernon
IGPP
UCSD

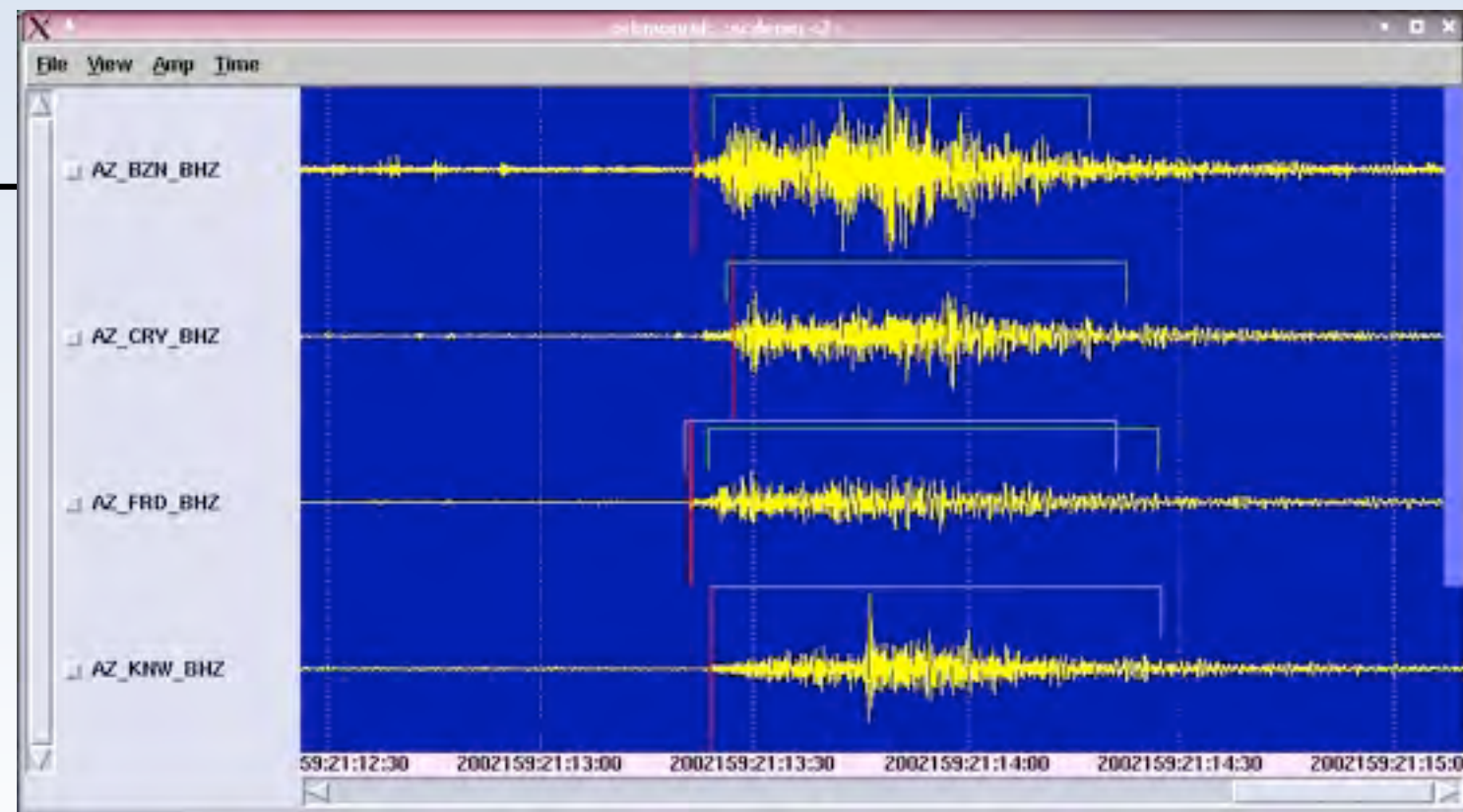
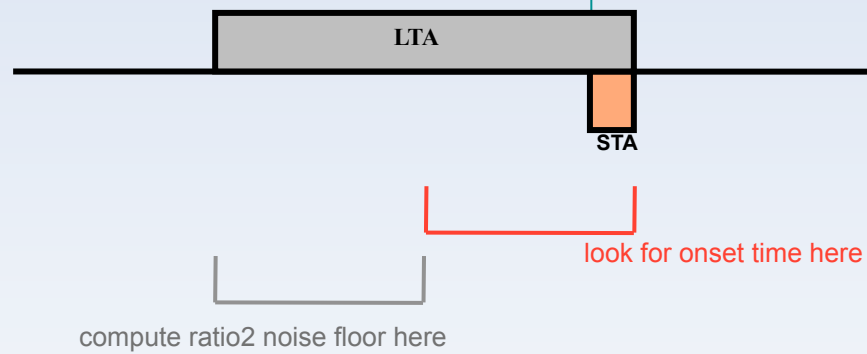
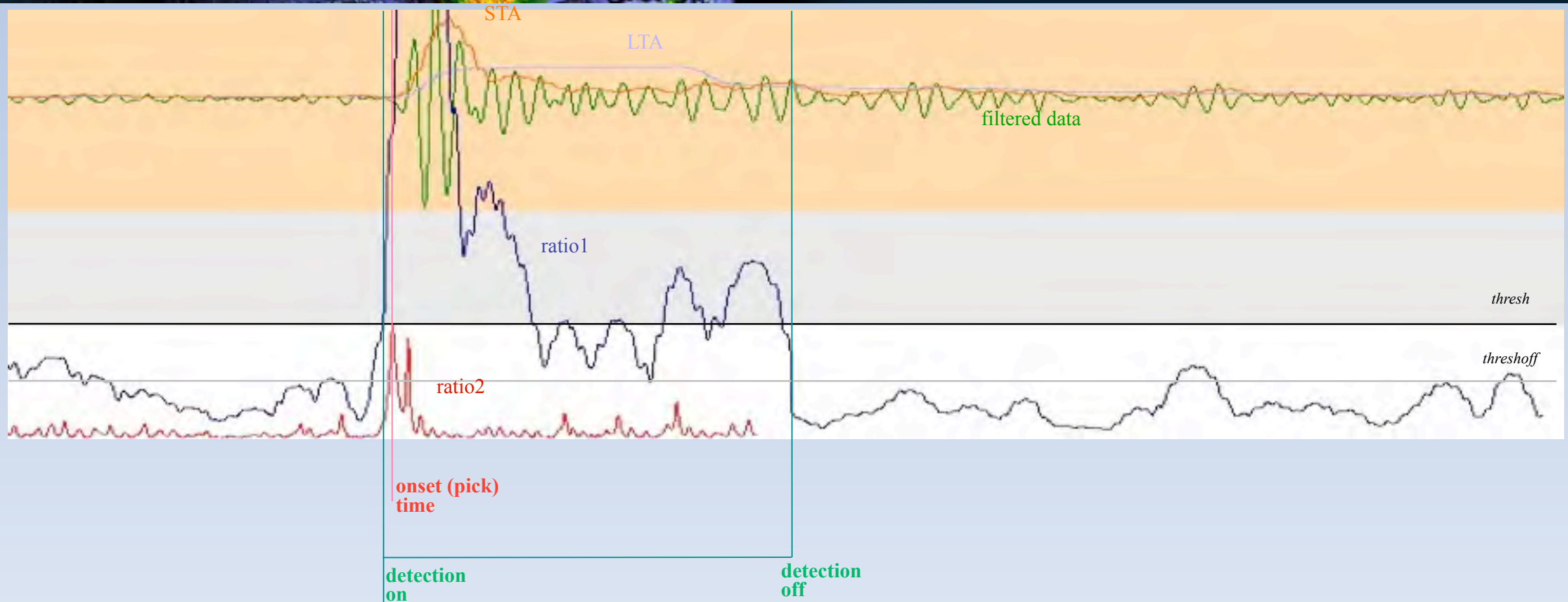
Antelope User Group
Muscat, Oman
2-4 March 2013

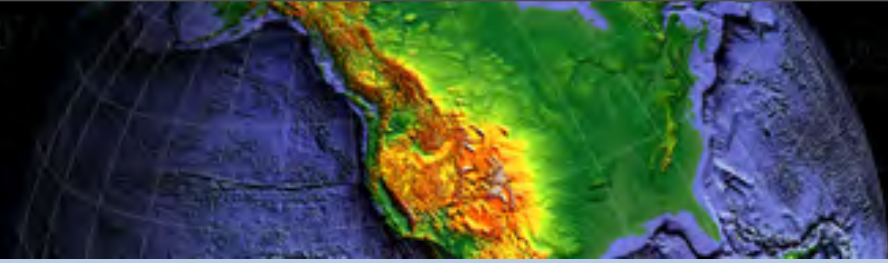




Current developments

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

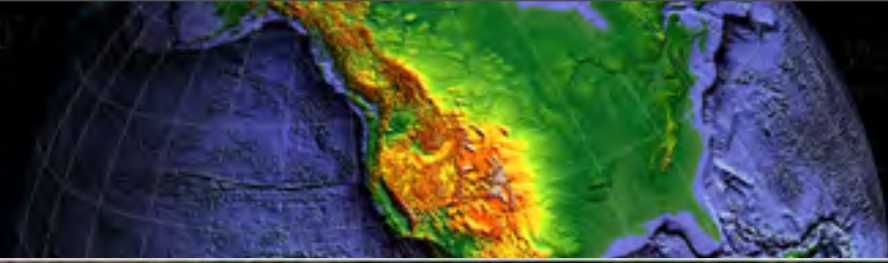




- P wave detection
 - works extremely well

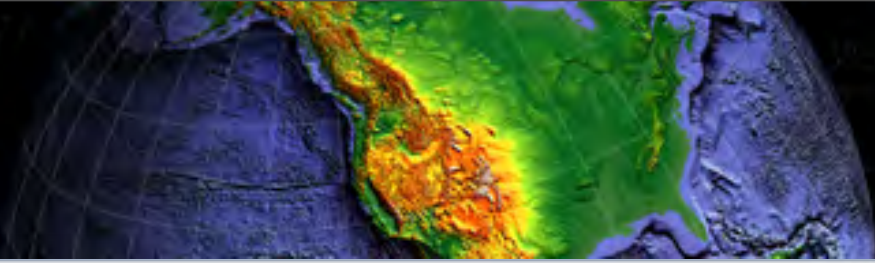
- S wave detection issues
 - P wave coda
 - N or E component?
 - S-P times may be too short

- Particle motion analysis
 - recursive singular value decomposition
 - distinguish P and S seismic phases
 - stream of three-component data
 - sample-to-sample resolution
 - Rosenberger, Bulletin of the Seismological Society of America, Vol. 100, No. 3, pp. 1252–1262, June 2010, doi: 10.1785/0120090265



San Jacinto Fault Zone Experiment





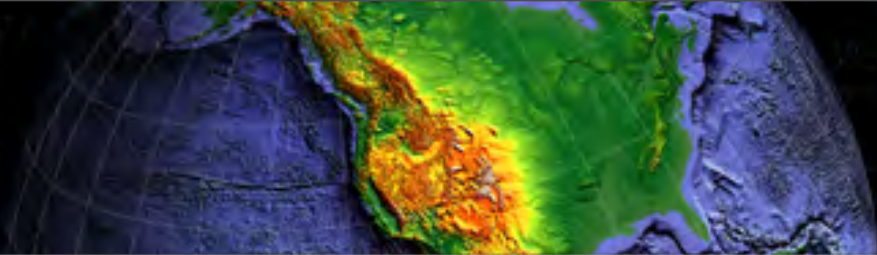
TR and JF Arrays

Google Earth



Image © 2013 DigitalGlobe

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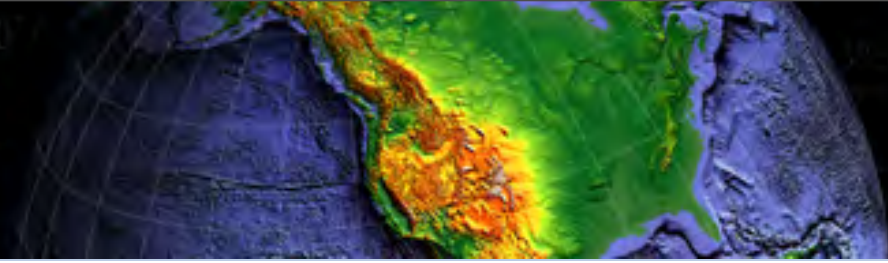
TR and JF Arrays

Google Earth

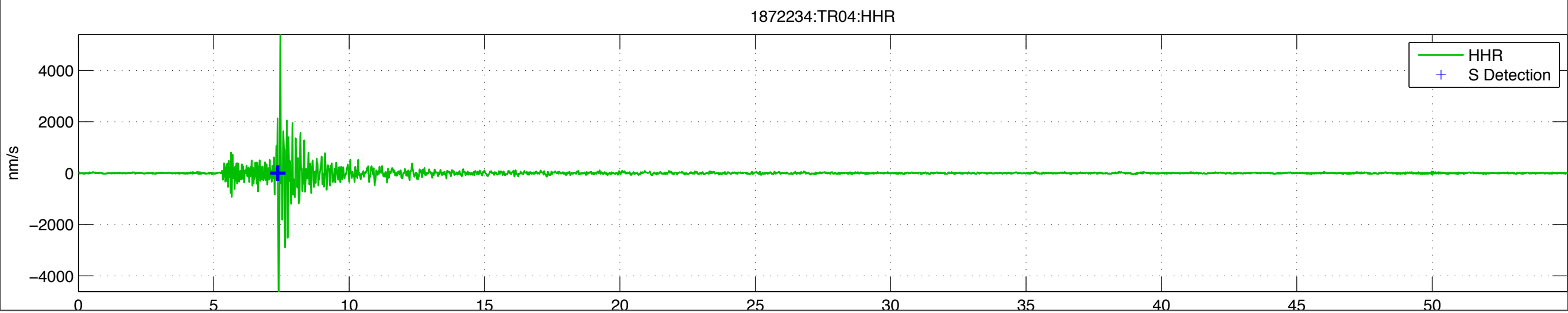
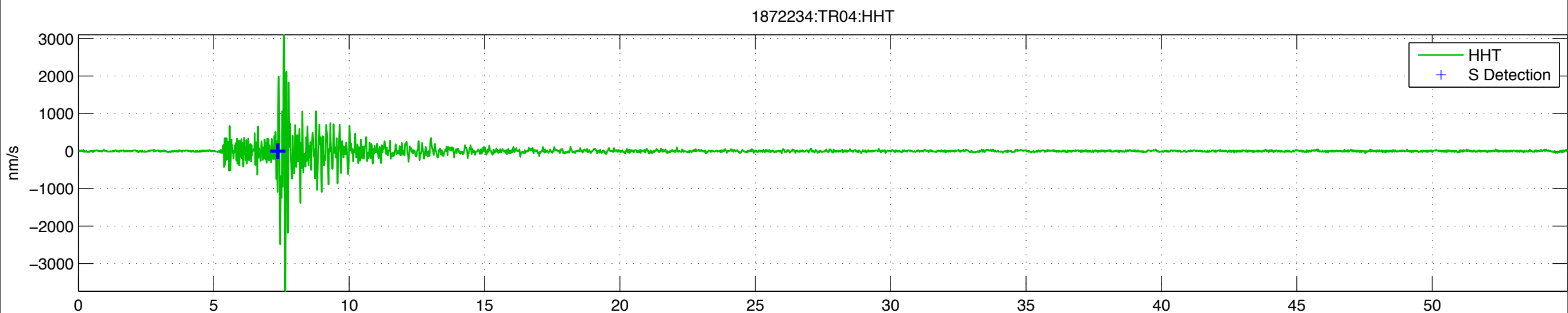
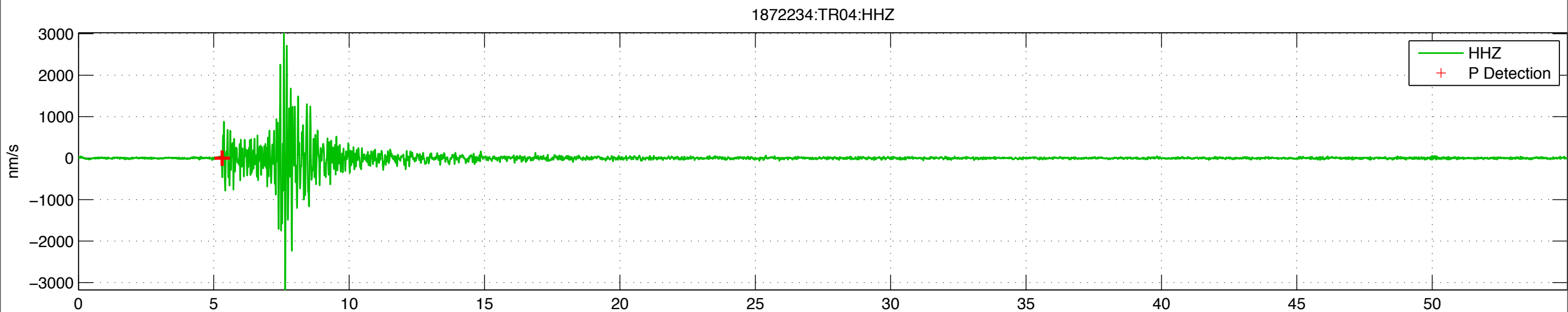


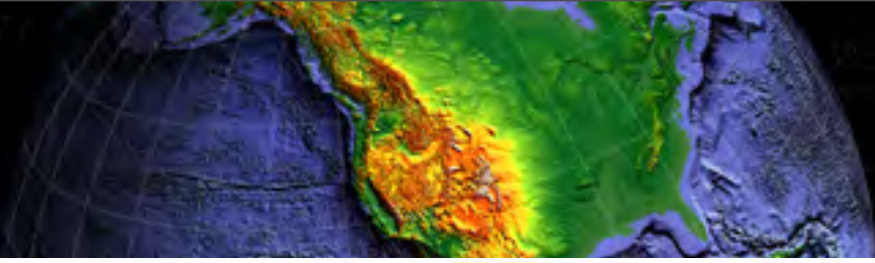
Image © 2013 DigitalGlobe
Image © 2013 TerraMetrics
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

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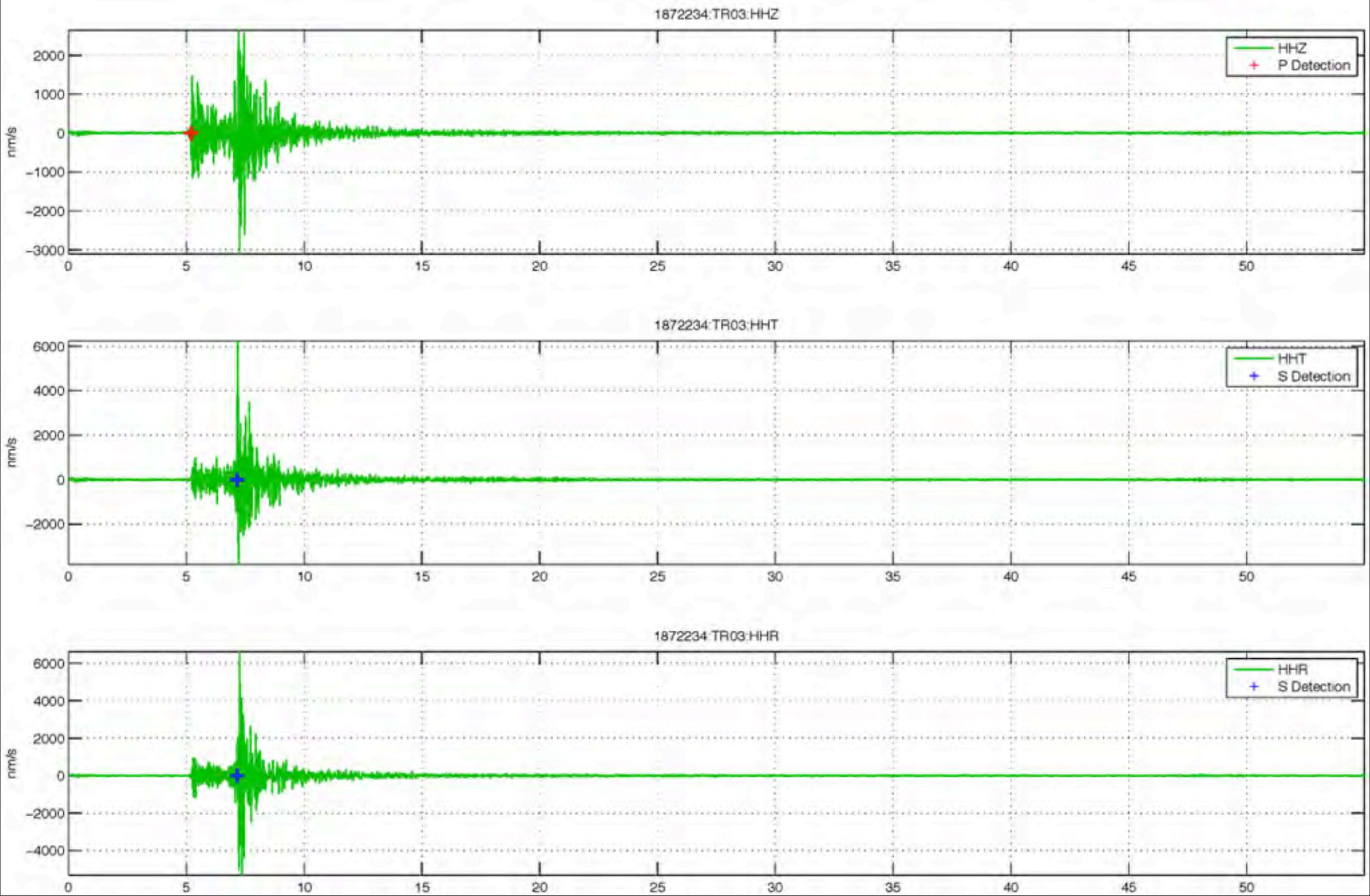


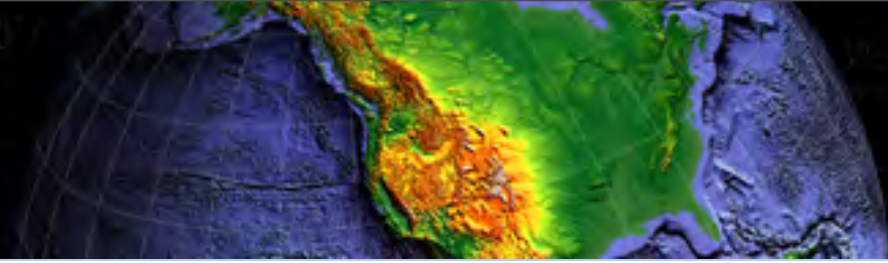
TR04





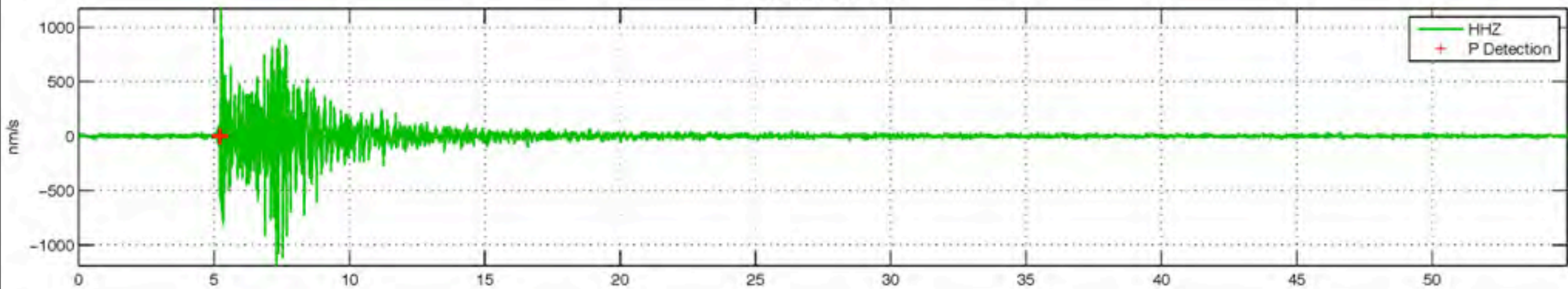
TR03



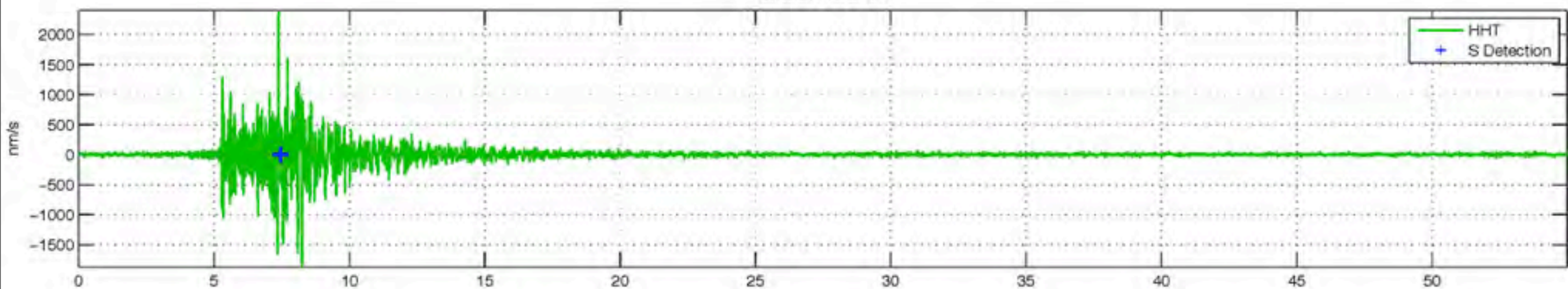


TR02

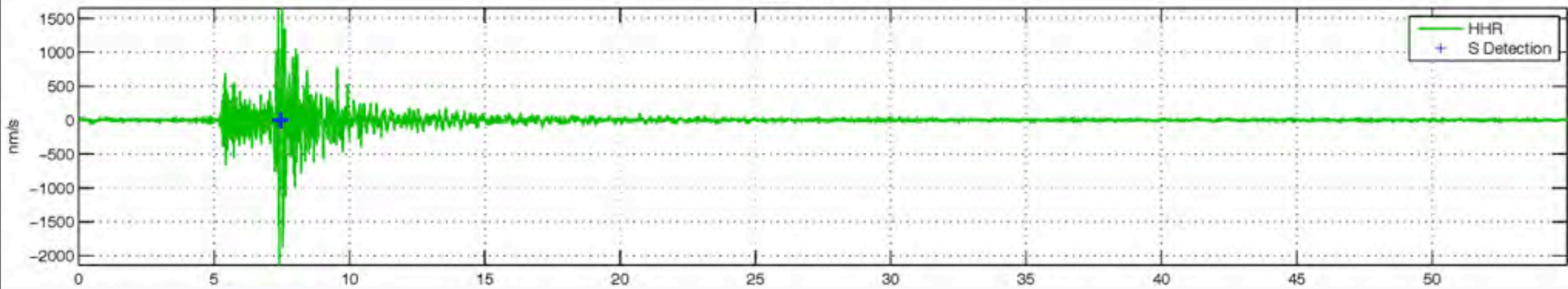
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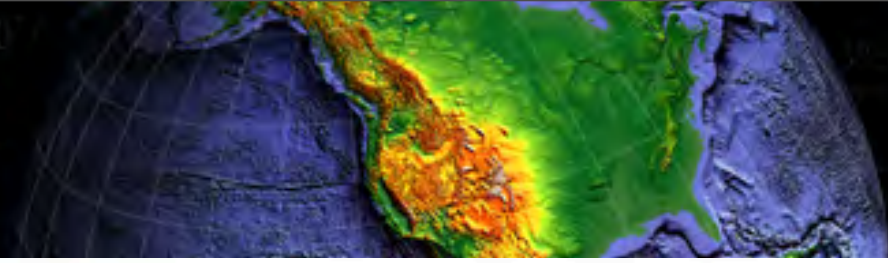


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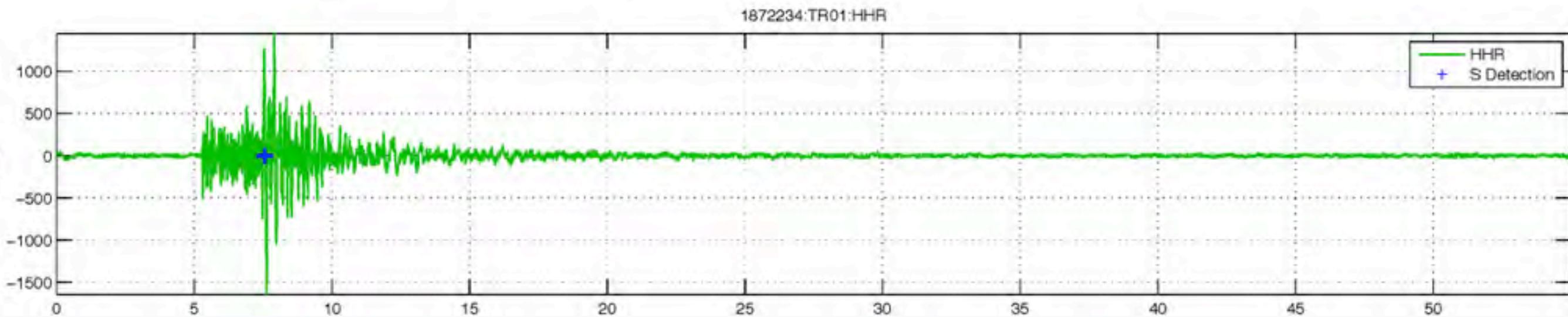
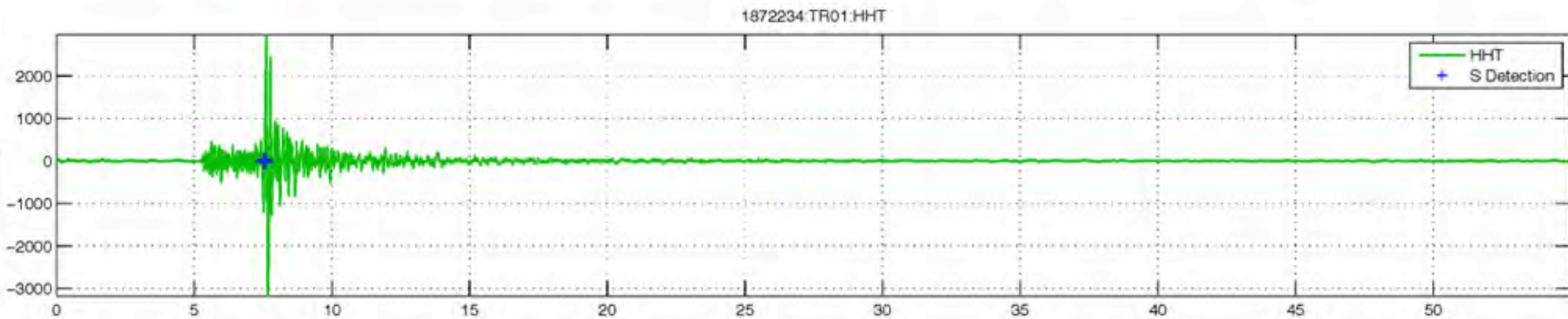
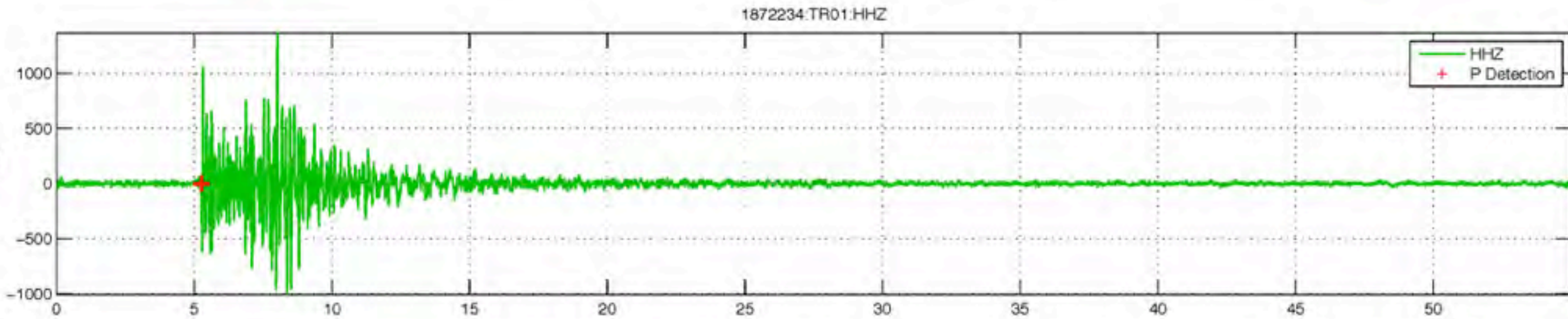


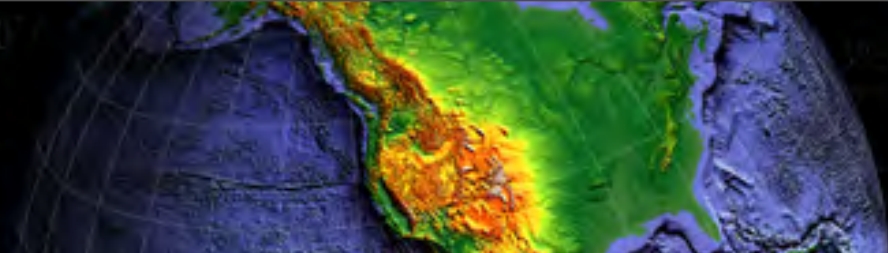
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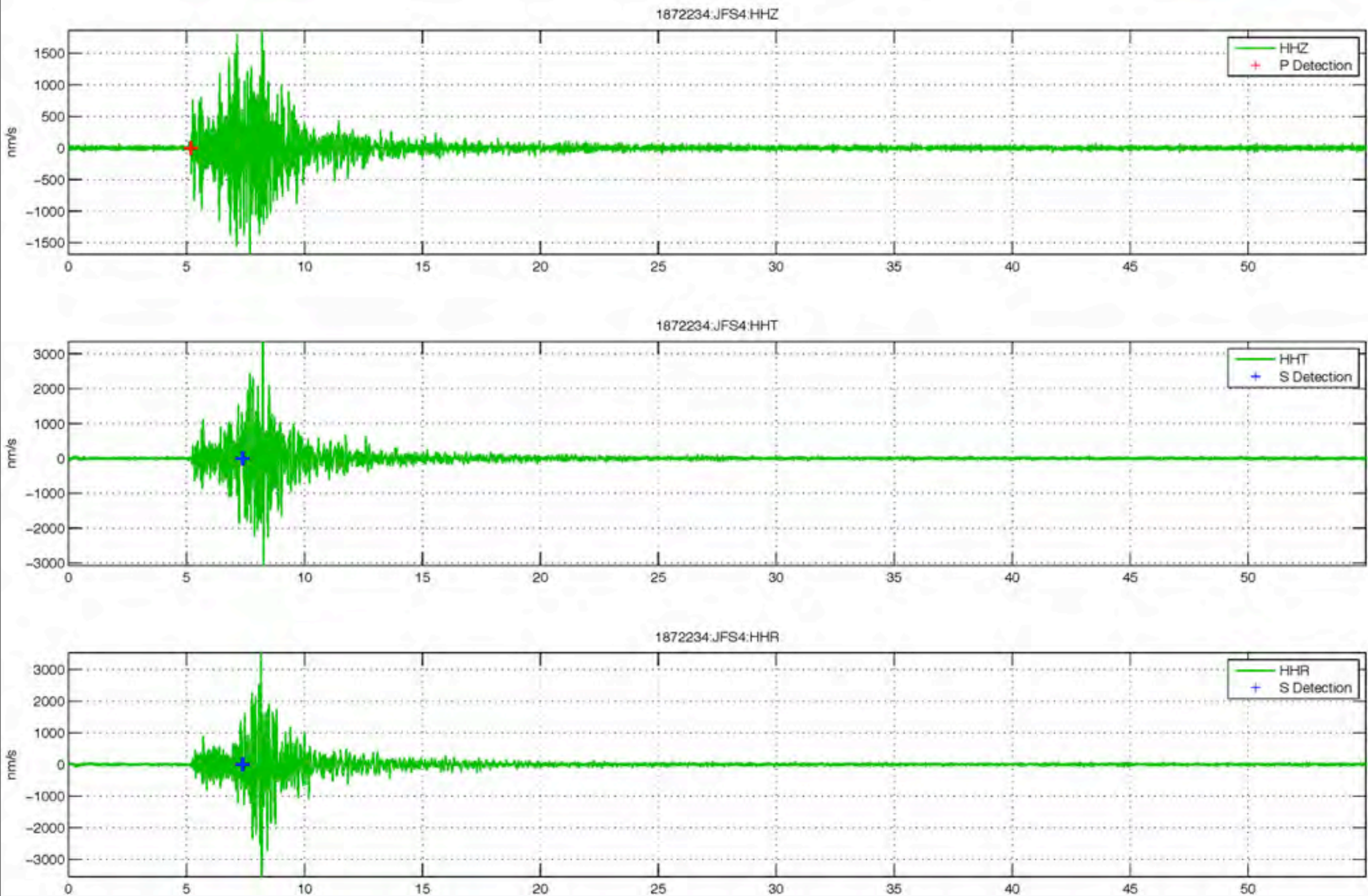


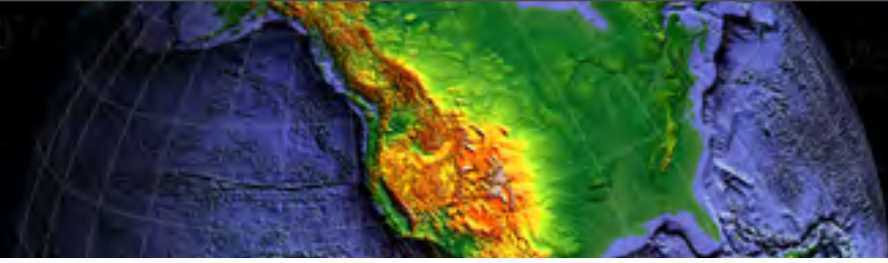
TR01



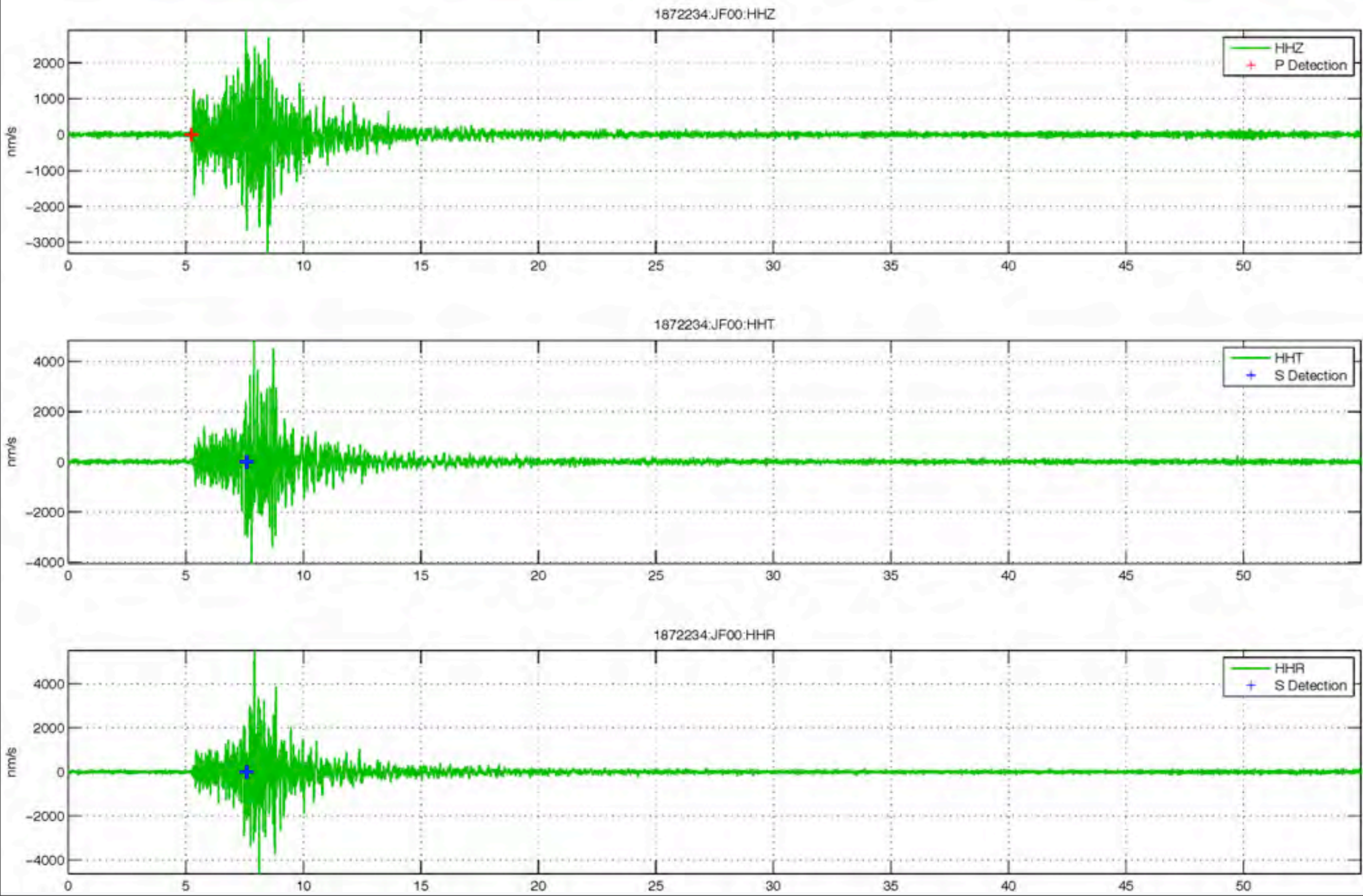


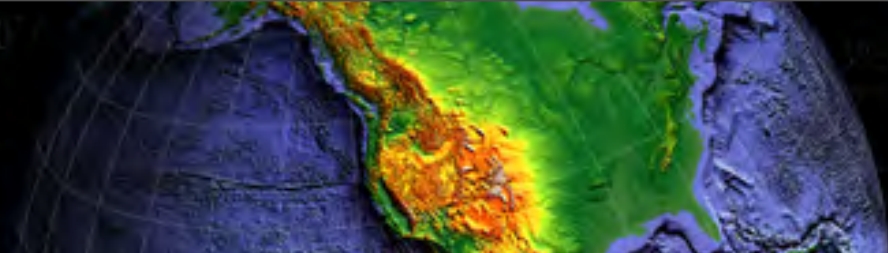
JFS4



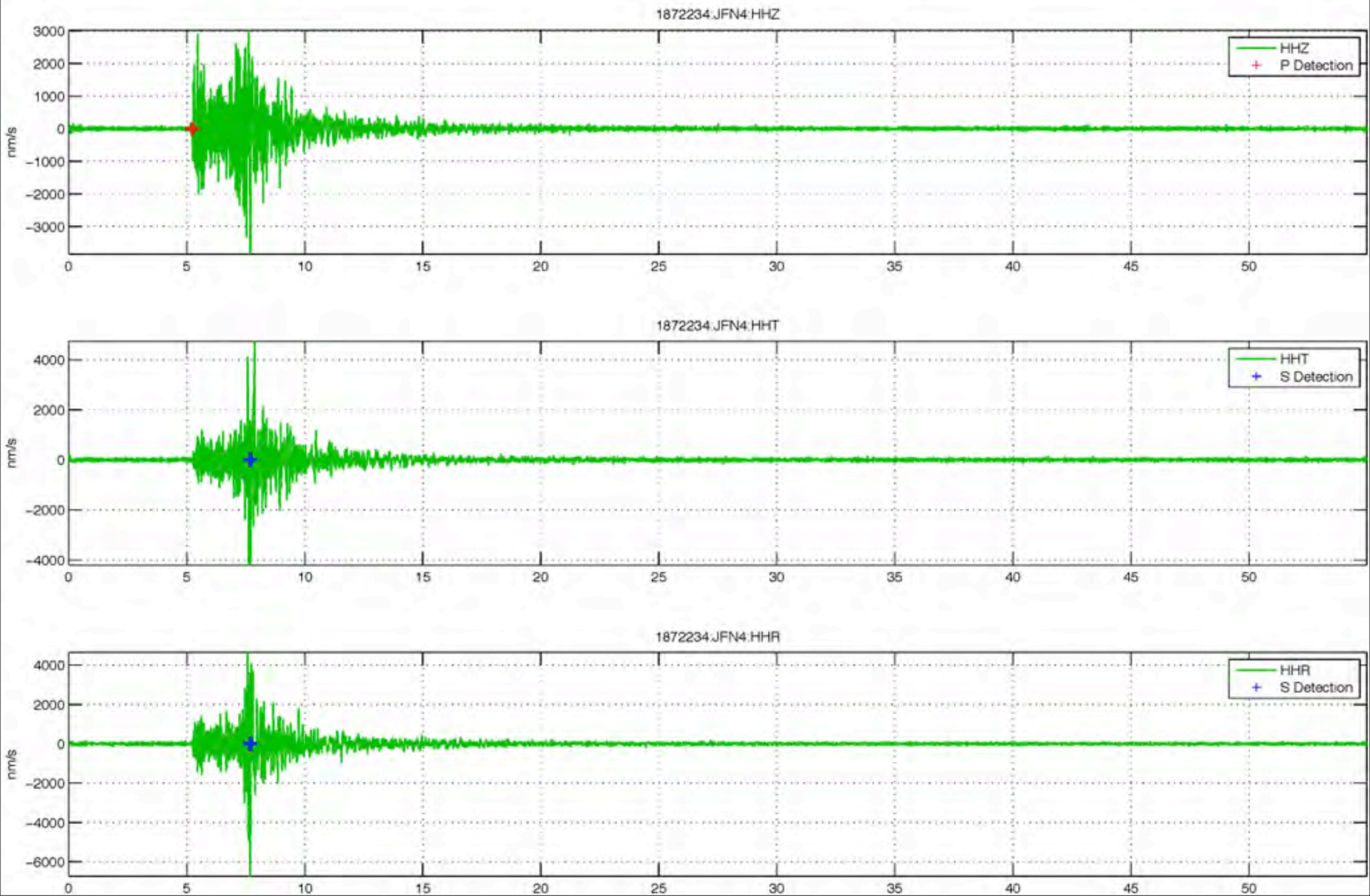


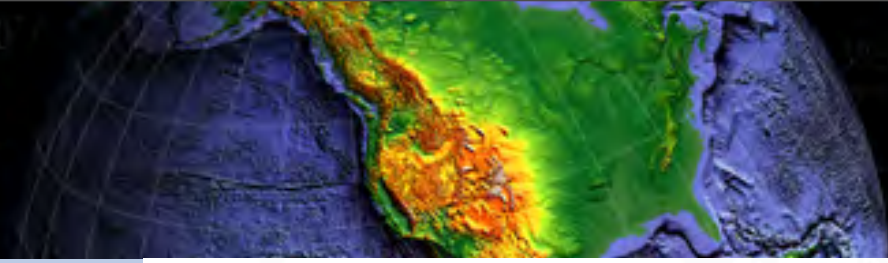
JF00



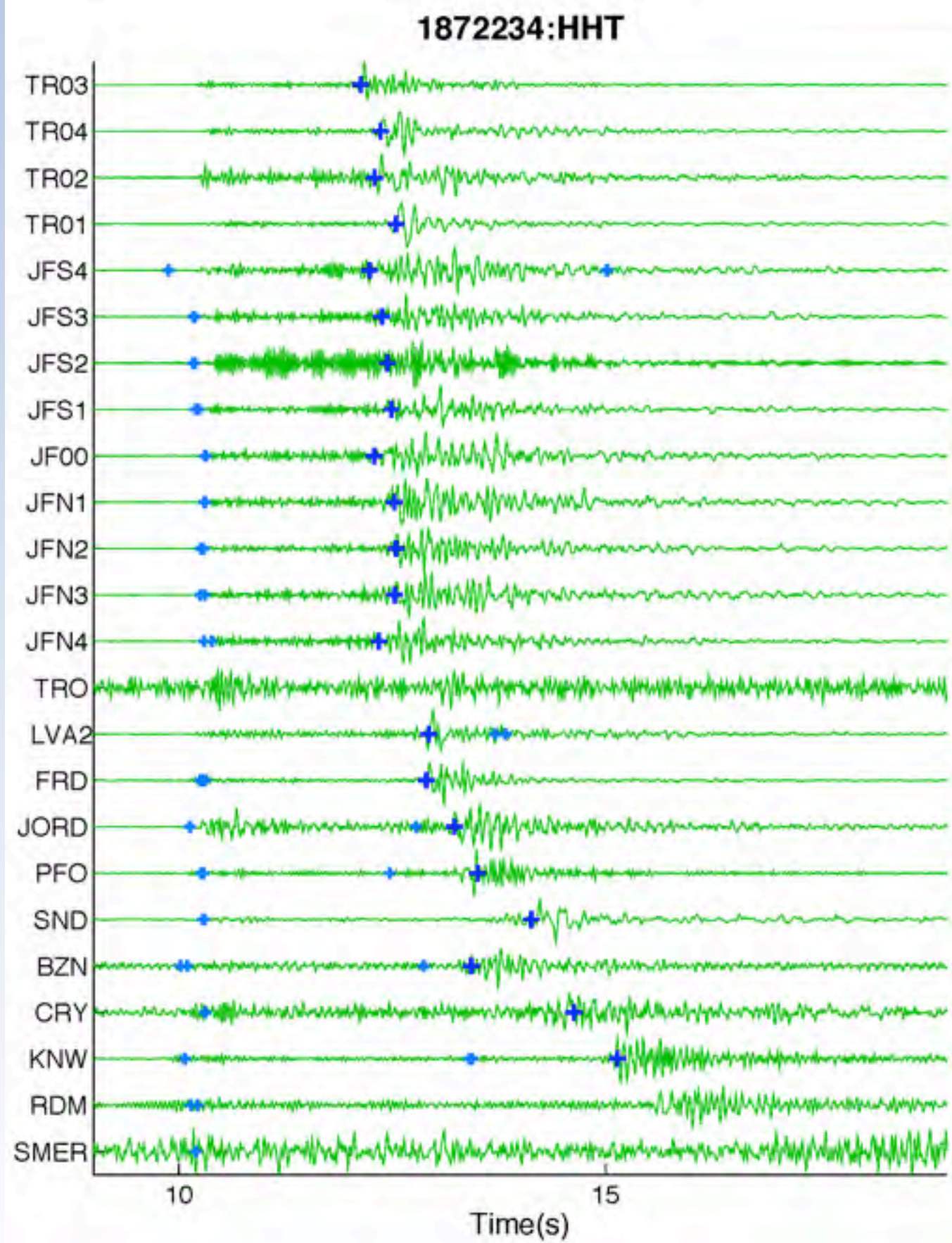


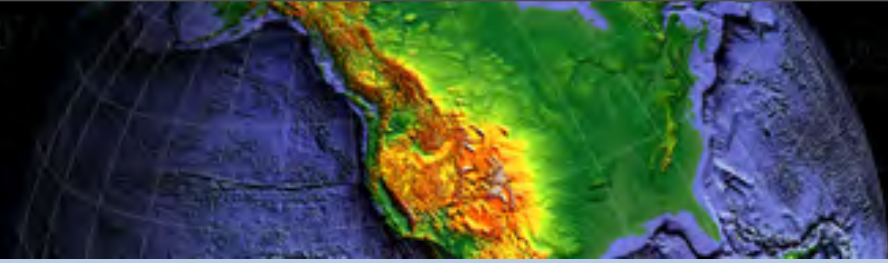
JFN4



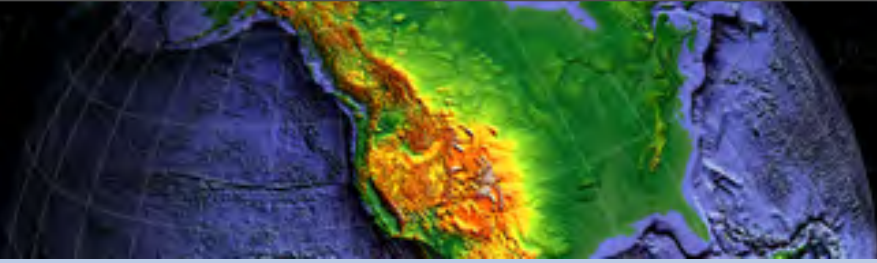


TR and JF Arrays Transverse



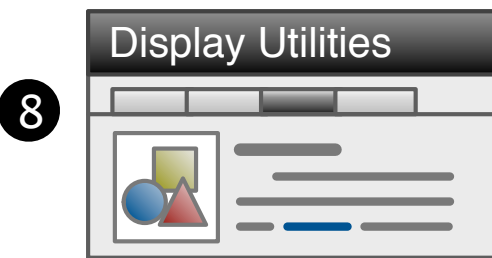
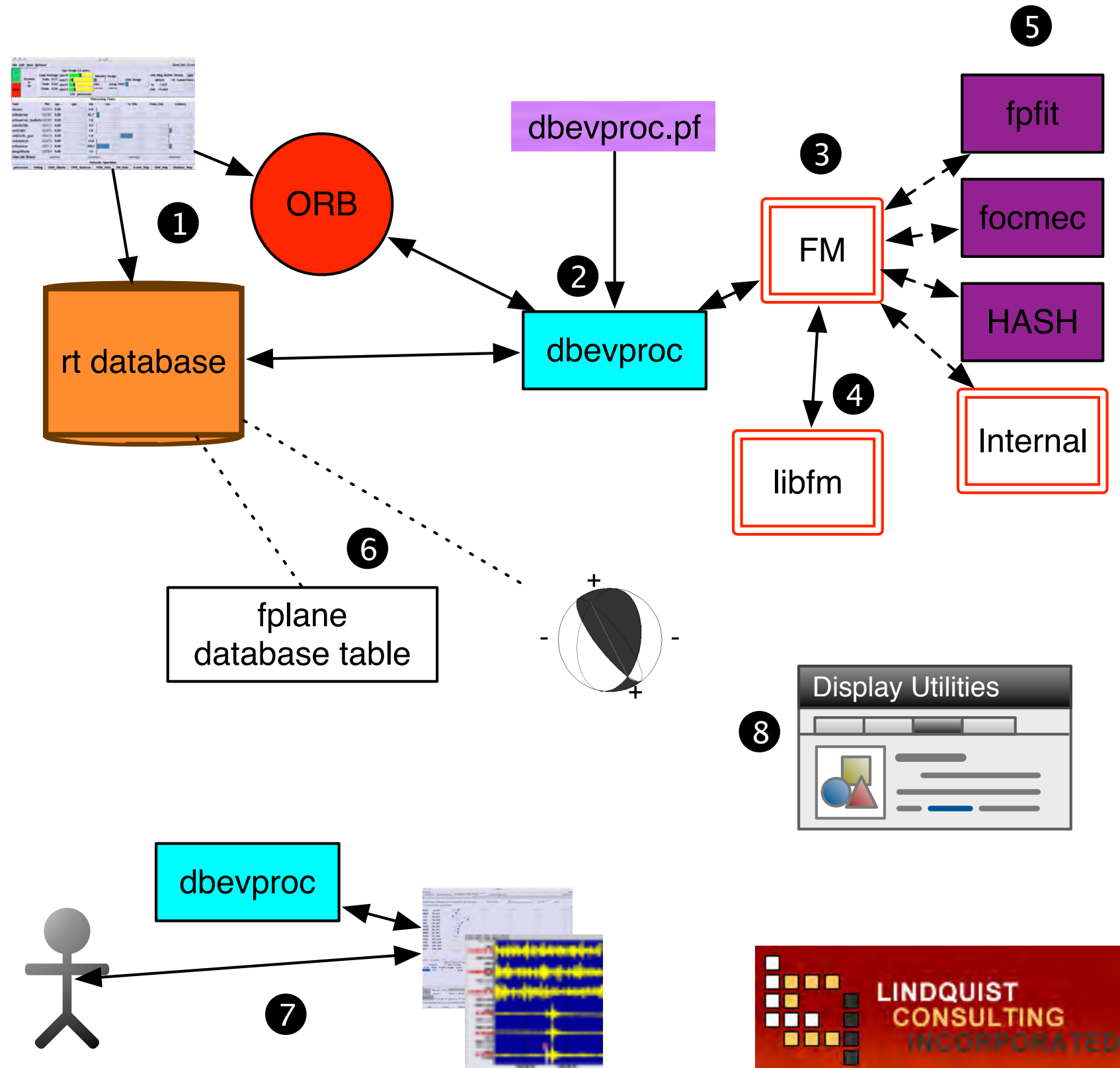


- Testing configuration parameters
- Needs orbwproc implementation
- Not ready for operations



- Several programs exist at various institutions
- No standard implementation in Antelope or Contrib
- No community accepted standard
 - fpfit
 - focmec
 - hash
 -

Concept of Operations




- 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

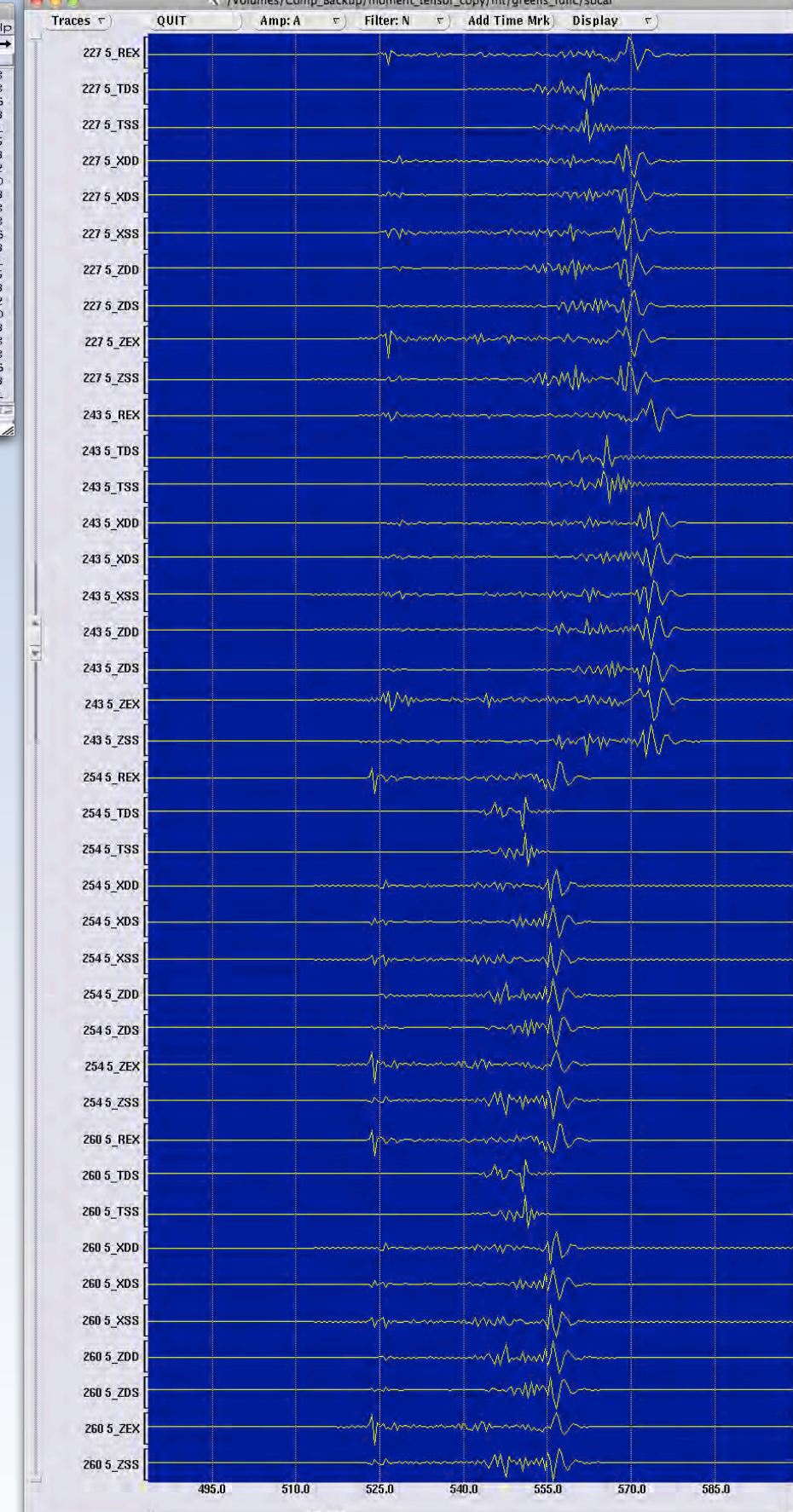
Frank L. Vernon
Juan C. Reyes
Robert L. Newman



Moment Tensor and Focal Mechanism Code

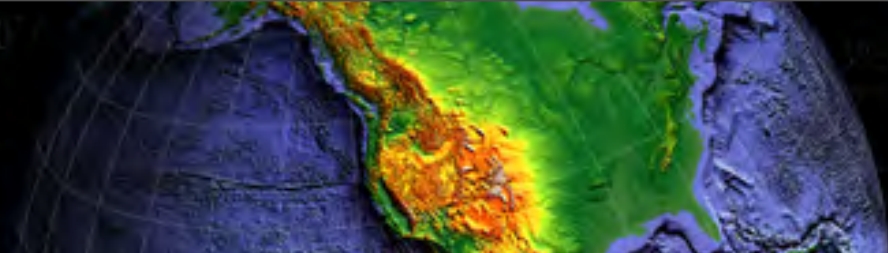
- Get origins from Datascope tables.
- Subset stations in quadrants.
- Get Green's Functions from Datascope based on distance and depth of event.
- Extract, rotate and filter data from stations.
- Reject stations with bad cross-correlation.
- Invert the MT and extract the eigen values/vectors.
- Update Datascope with results.

sta	chan	time	endtime	nsamp	samprate	calib	instype	sectype	datatype	dir	dfile	foff	
138	5_XDS	1/01/1970 (001)	0:00:01.00000	1/01/1970 (001)	1:08:17.00000	2048	2.0000000	1	V	as	socal/5	138_5_socal.gf	53168
138	5_XSS	1/01/1970 (001)	0:00:01.00000	1/01/1970 (001)	1:08:17.00000	2048	2.0000000	1	V	as	socal/5	138_5_socal.gf	66598
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138	5_ZDS	1/01/1970 (001)	0:00:01.00000	1/01/1970 (001)	1:08:17.00000	2048	2.0000000	1	V	as	socal/5	138_5_socal.gf	92903
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172	5_TDS	1/01/1970 (001)	0:00:01.00000	1/01/1970 (001)	1:08:17.00000	2048	2.0000000	1	V	as	socal/5	172_5_socal.gf	13652
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172	5_ZDS	1/01/1970 (001)	0:00:01.00000	1/01/1970 (001)	1:08:17.00000	2048	2.0000000	1	V	as	socal/5	172_5_socal.gf	92903
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200	5_XDS	1/01/1970 (001)	0:00:01.00000	1/01/1970 (001)	1:08:17.00000	2048	2.0000000	1	V	as	socal/5	200_5_socal.gf	53168
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200	5_ZDS	1/01/1970 (001)	0:00:01.00000	1/01/1970 (001)	1:08:17.00000	2048	2.0000000	1	V	as	socal/5	200_5_socal.gf	92903
200	5_ZEX	1/01/1970 (001)	0:00:01.00000	1/01/1970 (001)	1:08:17.00000	2048	2.0000000	1	V	as	socal/5	200_5_socal.gf	105811

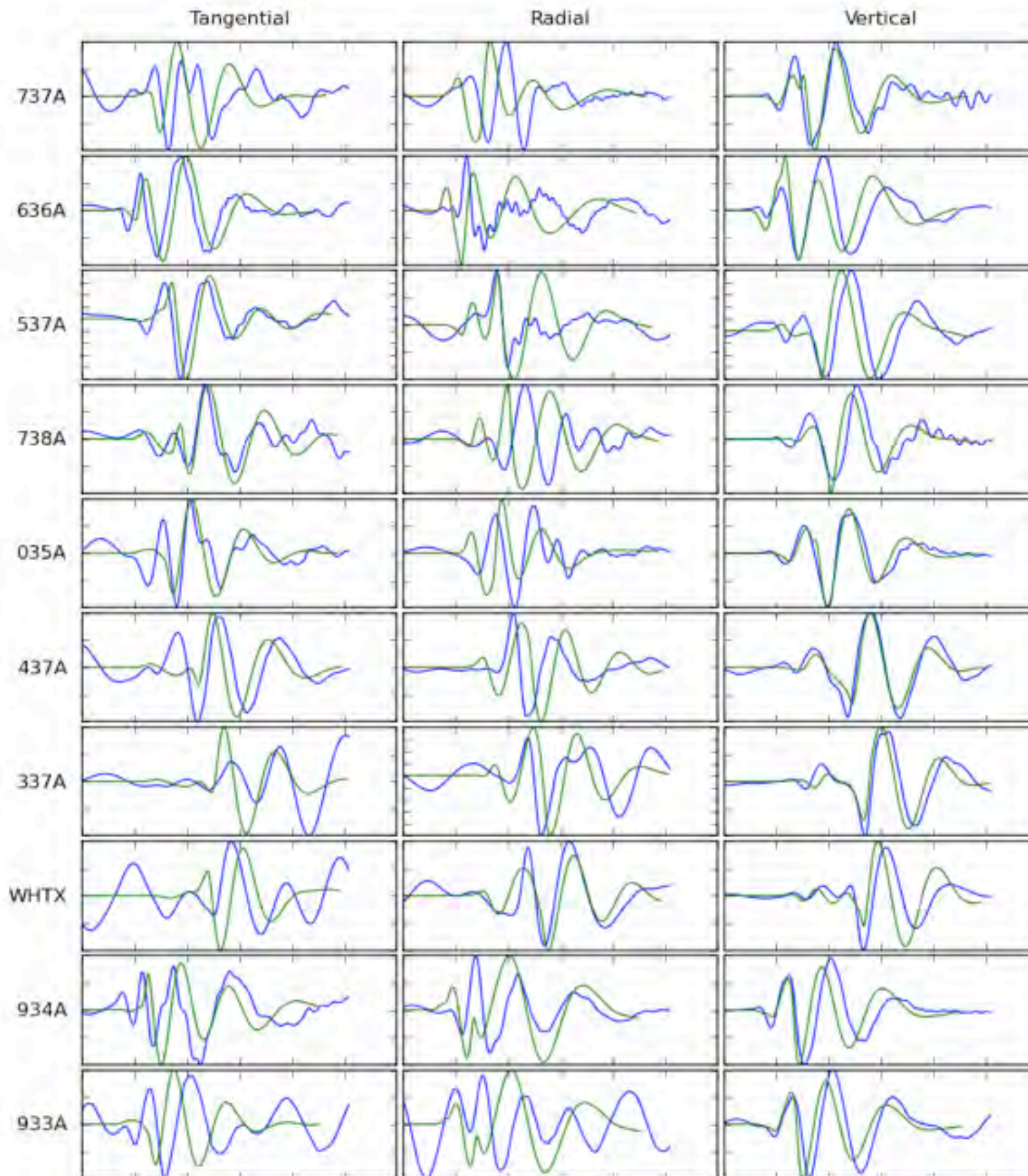


Green's Functions are build dynamically upon request if not already present in archive.

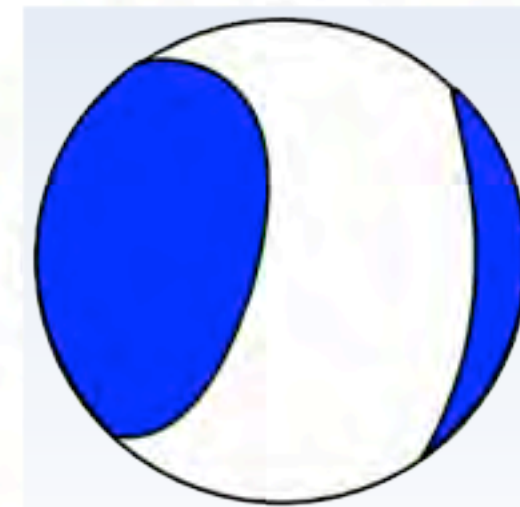
Newly constructed functions are stored on a database referenced by a wfdisc table.

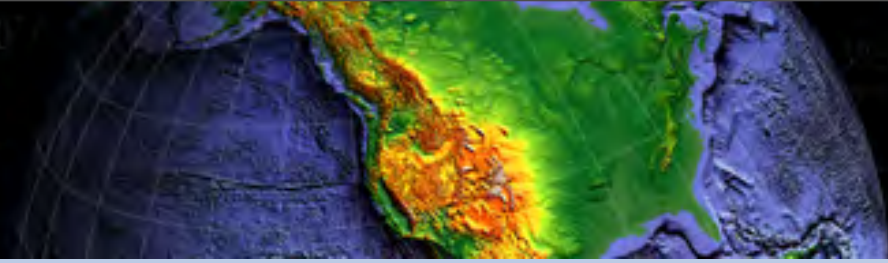


Texas 2011/10/20 4.8 Mw



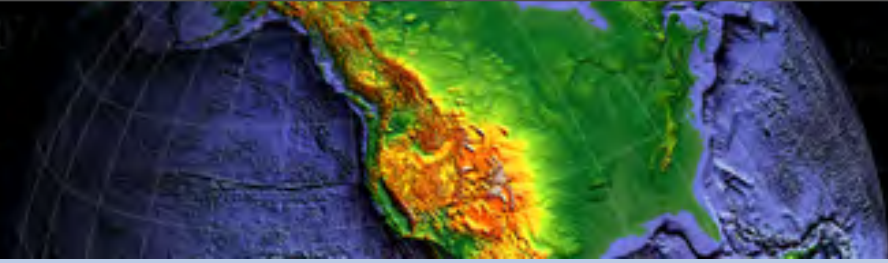
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 Dip 1 = 72
 Strike 2 = 211
 Rake 2 = -137
 Dip 2 = 24
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 Mw = 4.718
 % DC = 28.644
 % CLVD = 71.356
 % ISO = 0.000
 VR = 3.624E-09
 VAR = 3.624E-09





- 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



Other developments?

Are there any other data products being developed in the community?