

**Crestone Seismic Software
Geophysical Software Toolkit
2011**

Wavelet Stretch Compensation (Stretcomp) - Corrects for wavelet stretch on the far offset traces of NMO corrected CDP gathers. Applying NMO correction to CDP gathers causes the seismic wavelet to stretch at shallow times and large offsets. Also wavelet stretch can occur on any pre-stack dataset with increasing offset and time. Using small windows, this tool moves down in time and applies a stretch correction filter and outputs CDP gathers with stretch removed.

Azimuthal Velocity Residual Analysis (Velresa) - Performs azimuthal and standard velocity residual corrections to pre-stack uncorrected CDP gathers. The output from this tool is a detailed (every trace and sample) VEL or VAZ velocity table. The velocity tables can then be used to apply NMO to the seismic data. In the case of the azimuthal velocities (VAZ), we can create azimuthal anisotropy computations like Ellipticity.

VAZ Tool - Manipulates the azimuthal velocity data in a VAZ parameter table. The user can 1) Select velocities from a single azimuth, 2) Output a VEL table that is the average for all azimuthal velocities, 3) Perform standard deviation of the azimuthal velocities, 4) Compute Ellipticity and Elliptical Azimuth from the azimuthal velocities.

3D High Frequency Enhancement (Homer) - Enhance seismic data by extending the usable bandwidth of the seismic spectrum into higher frequencies. A constrained inversion is performed to compute reflection coefficients. The coefficients are then convolved with a bandwidth enhanced wavelet to create the high frequency section. The reflection coefficient series can be analyzed, interpreted, and used in additional processing.

Hi Res RHO Filter (RHO) - Enhance frequency bandwidth by applying a zero-phase filter of the form f^x . The high frequency information from the RHO filter is combined with the original lower frequency data to produce the broadband output.

3D Volumetric Curvature (Curvy) - Volumetric curvature attributes are valuable in mapping faults, fractures, folds, and stratigraphic features. Curvature attributes such as Most Positive, Most Negative, Mean, Gaussian, and others can be output.

3D Wavenumber Noise Suppression (Wavy) - Suppress noise footprints like the acquisition footprint in seismic data by 3D wavenumber filtering. Special feature will smooth 3D data but leave the structural/stratigraphic geology intact.

Dip/Azimuth Semblance (Dazzle) - Builds a 3D dip and azimuth model using semblance. The model is then used to subtract noise patterns or increase the coherency of the data. Works on pre-stack or post-stack seismic data.

Low Frequency Kx-Ky Filter (Freqxy) - Attenuate surface wave noise by mixing adjacent traces and performing horizontal correlation filtering in the frequency-space domain. The tool is run in the shot domain and works especially well on cross-spreads in azimuthal mode.

SVD Filter - Attenuate surface wave noise by singular value decomposition and eign-image filtering.

Multi-Channel Adaptive Subtraction (Subtract) - Model the noise to the data and then subtract the noise from the data using predictive Deconvolution. Can output the signal or the modeled noise.

Spectral Decomposition (Specdecomp) - Image and map temporal bed thickness and geologic discontinuities over 3D seismic surveys. Outputs such as Frequency Spectrum, or Frequency Slices can be computed in time or on horizons.

FXY Interpolation - Interpolate and extrapolate missing spatial locations in 3D seismic data. Also performs pre-stack FXY Deconvolution. Input several types of ensembles and in-fill seismic data into empty locations to improve the spatial sampling of the data.

Block Move-Out (Blockem) - Perform high resolution normal move-out with no stretch effects. Time and space variant functions allow control over move-out in 3D.

Normal Moveout Correction - Compute dynamic normal move-out corrections. Options to control stretch mutes. Can perform azimuthal NMO using a VAZ table. Options to apply a 4th order (ETA) table.

Seismic Display - Interactive seismic display for 2D and 3D data on ProMAX datasets and SEG Y. Interactive options for spectral analysis, trace headers, first-break picking, ProMAX tables, CVS

velocity analysis, Semblance and ETA velocity analysis, Geometry building, phase, bandpass filter, AGC tests, time slices, geometry viewing and editing, and more. Can perform data overlays and very fast image scanning.

Crestone Mapper - Interactively map geometry information from ASCII files, the ProMAX database, or trace headers. Line ties, partial 3D extractions, printing, images, polygons, mapping attributes in 2D and 3D, and more.

3D Partial Extractions (Extract) - Extract partial volumes from 3D seismic data. A set of polygons define when a trace can be accepted or rejected from the dataset.

Paint CVS Stack - Use constant velocity stacks to build a seismic stacked section. A window from a CVS panel using the velocity model is painted into a stacked section.

TFD Noise Removal (TFDNoise) - Time and frequency domain noise suppression and spectral balancing. Attenuates noise bursts, spikes, air blasts, ocean swell, and other noise. Several options for analyzing noise including Frequency Variant and Median Frequency. Option to output noise only or filtered data.

Radial Trace Filter - Convert to the radial domain where bandpass filtering will attenuate or enhance wave modes whose move-out is linear. Great for ground roll removal.

Energy Envelope Scaling - Boost the amplitude of low energy zones relative to high energy zones in a time a space variant manner. Improve the amplitude of events that are over-shadowed by high energy seismic events.

Offset-Time Scaling - Boosts the amplitude of seismic data by offset and time. Two methods are employed to compute offset-time scalars: Mean Amplitude or Cross Correlation. A table of offset-time scalars is output that varies in space and time over the dataset.

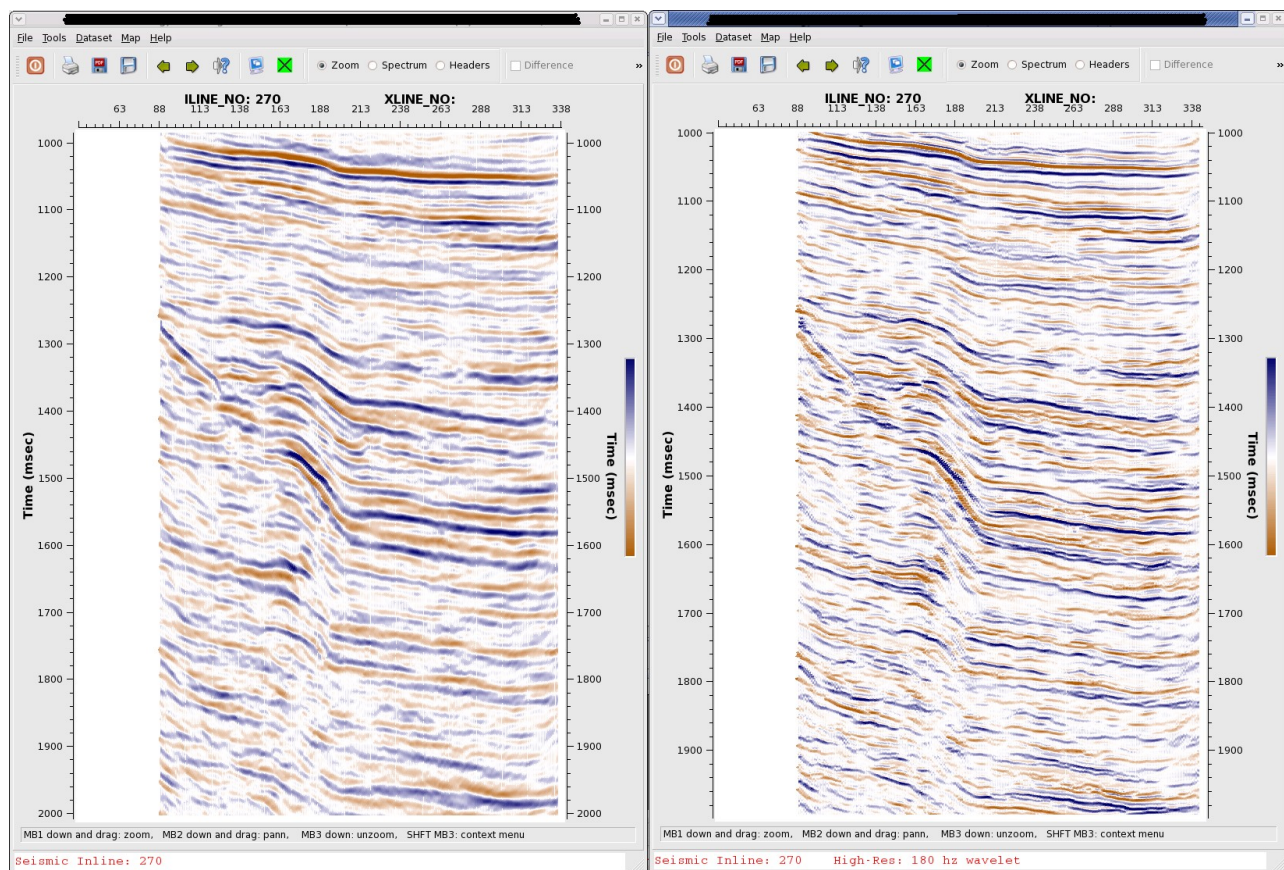
Time Slice/Un-Slice - Converts post-stack seismic data to time slices and back. Used in 3D spatial filtering tools like Volumetric Curvature.

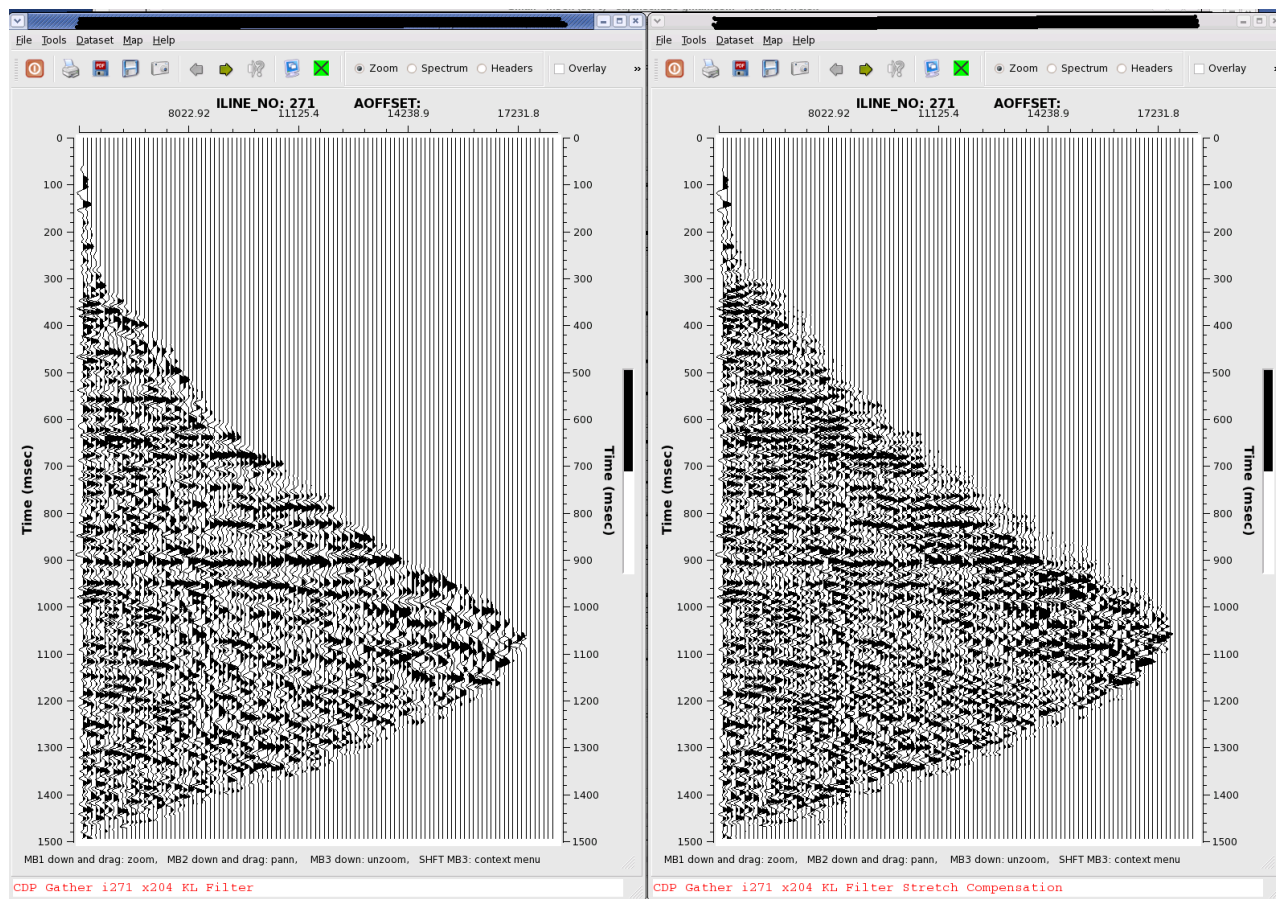
Smoothing/Edge Filters - Reduce noise in seismic data by smoothing in 3D. Three methods used are Gaussian Blur, Sobel Edge Detection, and Symmetric Nearest Neighbor smoothing.

Velocity Profile - Create a velocity profile that replaces the trace amplitude values at each sample with interpolated velocity values. A complete seismic dataset is output that matches the seismic amplitudes with a corresponding velocity.

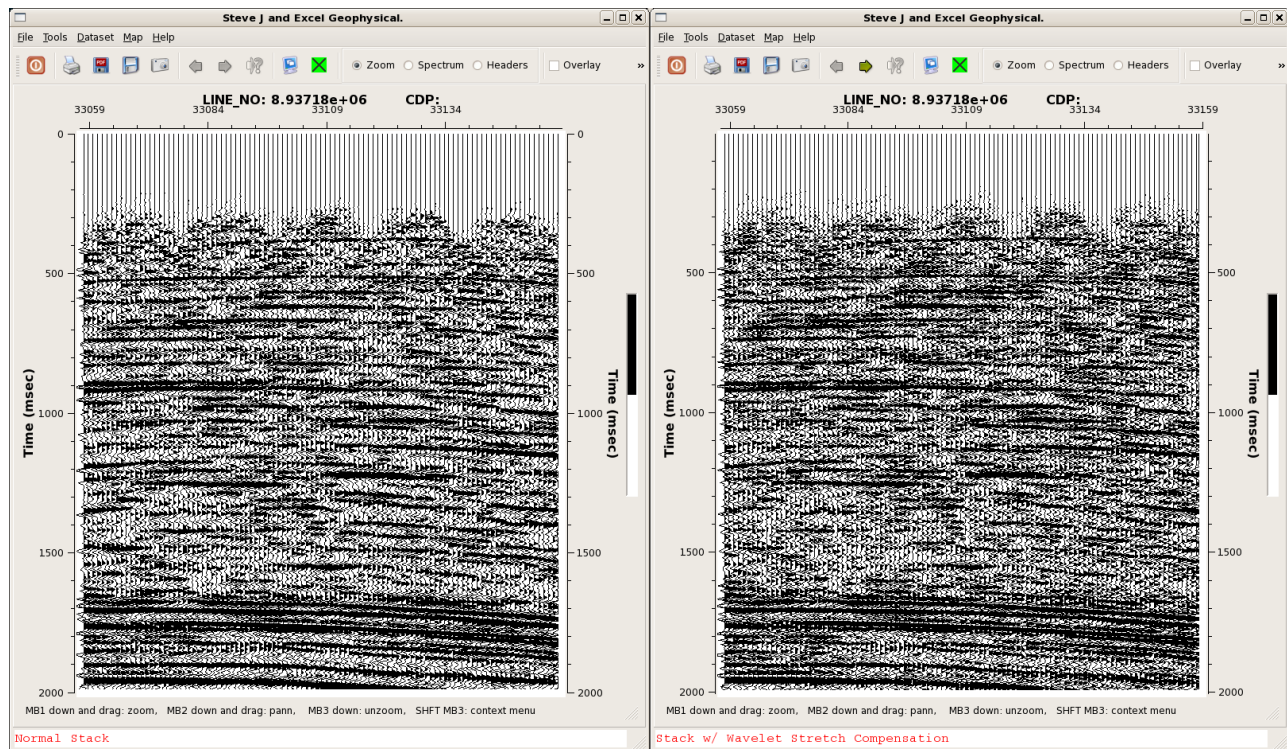
Ring Removal (Ringy) - Removes ringing noise from seismic data using a time domain adaptive filter. Ringing noise can be specified by a frequency range and typically has a velocity of propagation. A noise model is built at each frequency over a user specified range of frequencies. A filter is computed using the noise model and data at each frequency and then applied.

Other Tools - Deconvolution, Trace Killer, Hole Extraction, Common Offset Display, Vertical Stack, Primary/Secondary Exchange, Rolling Supergather Create, Tape Copy, ASCII XY to Z Header

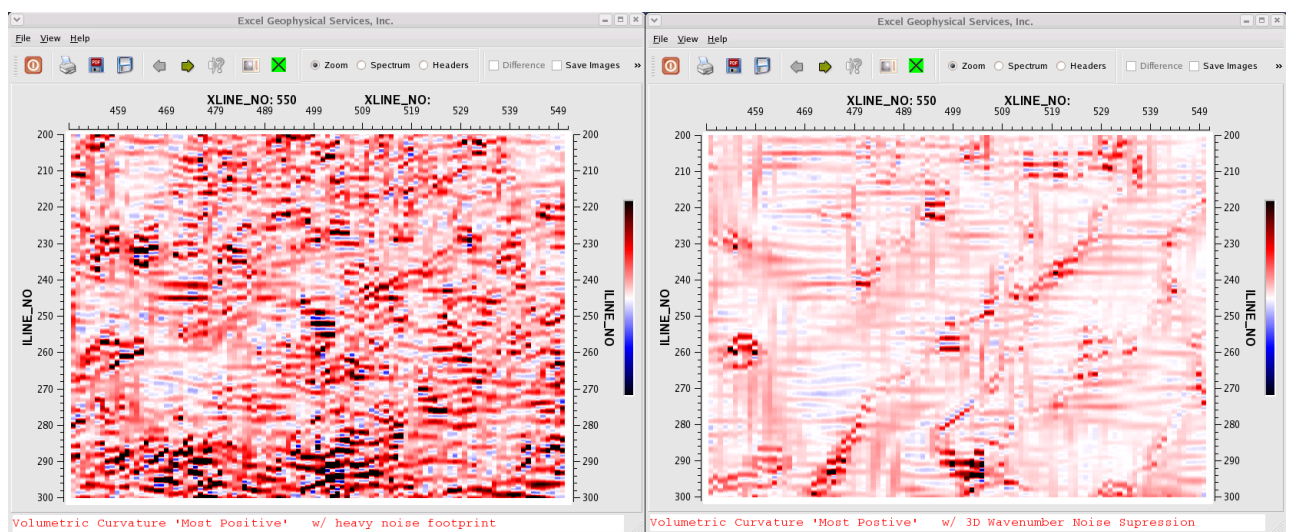




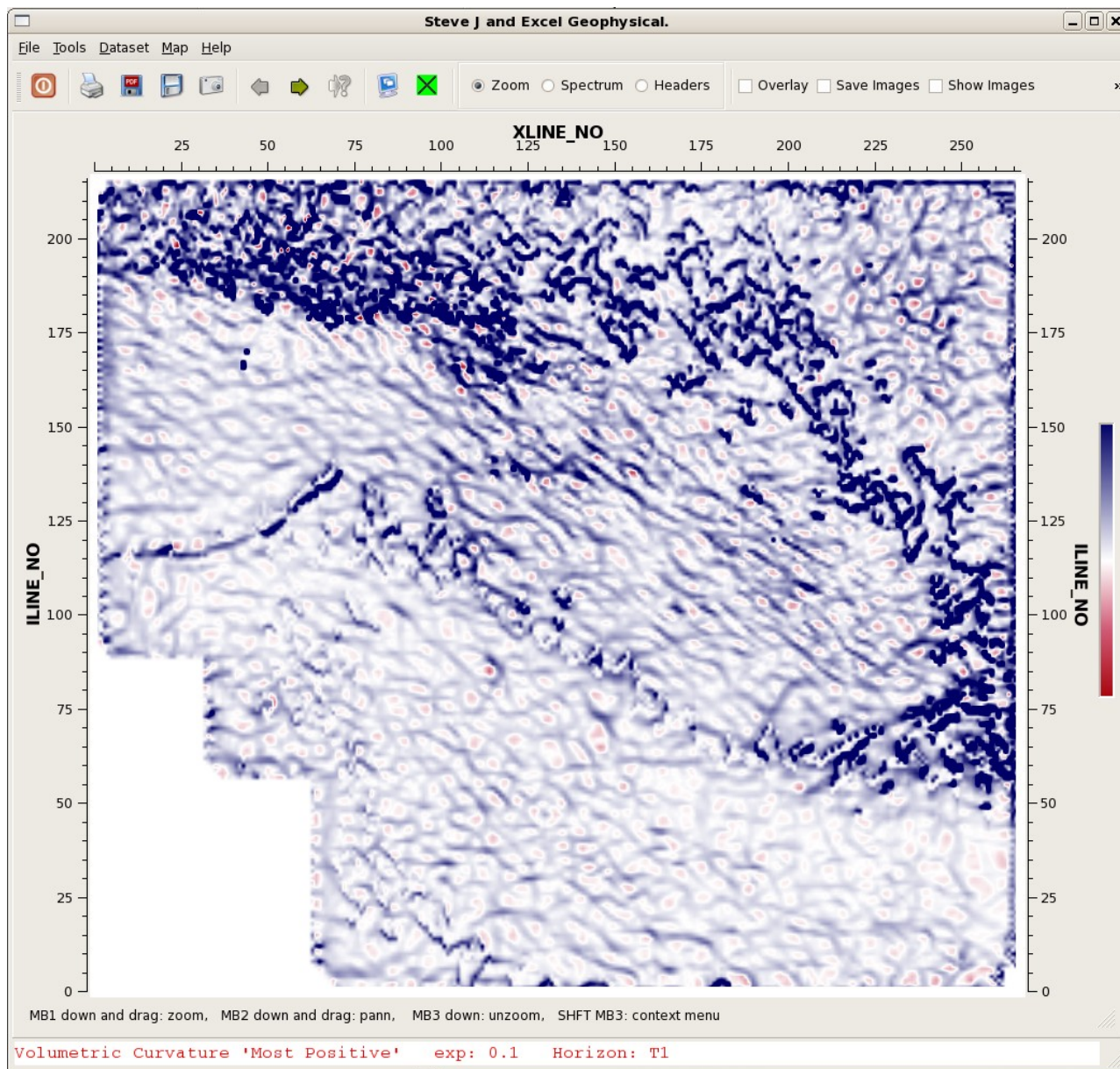
CDP gather with NM0 A) Normal B) Wavelet Stretch Compensation.



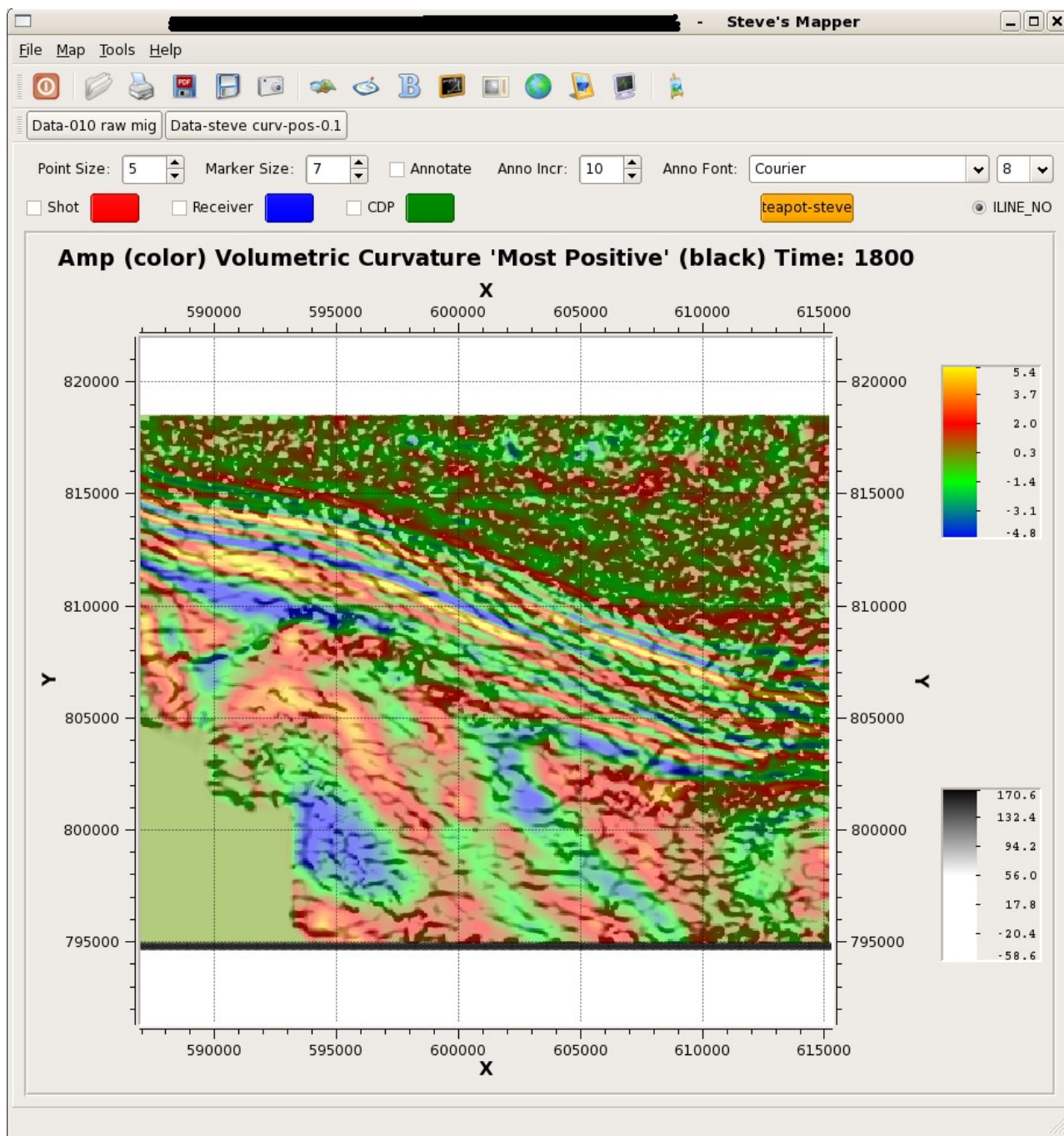
a) Normal seismic stack b) Seismic stack with Wavelet Stretch Compensation



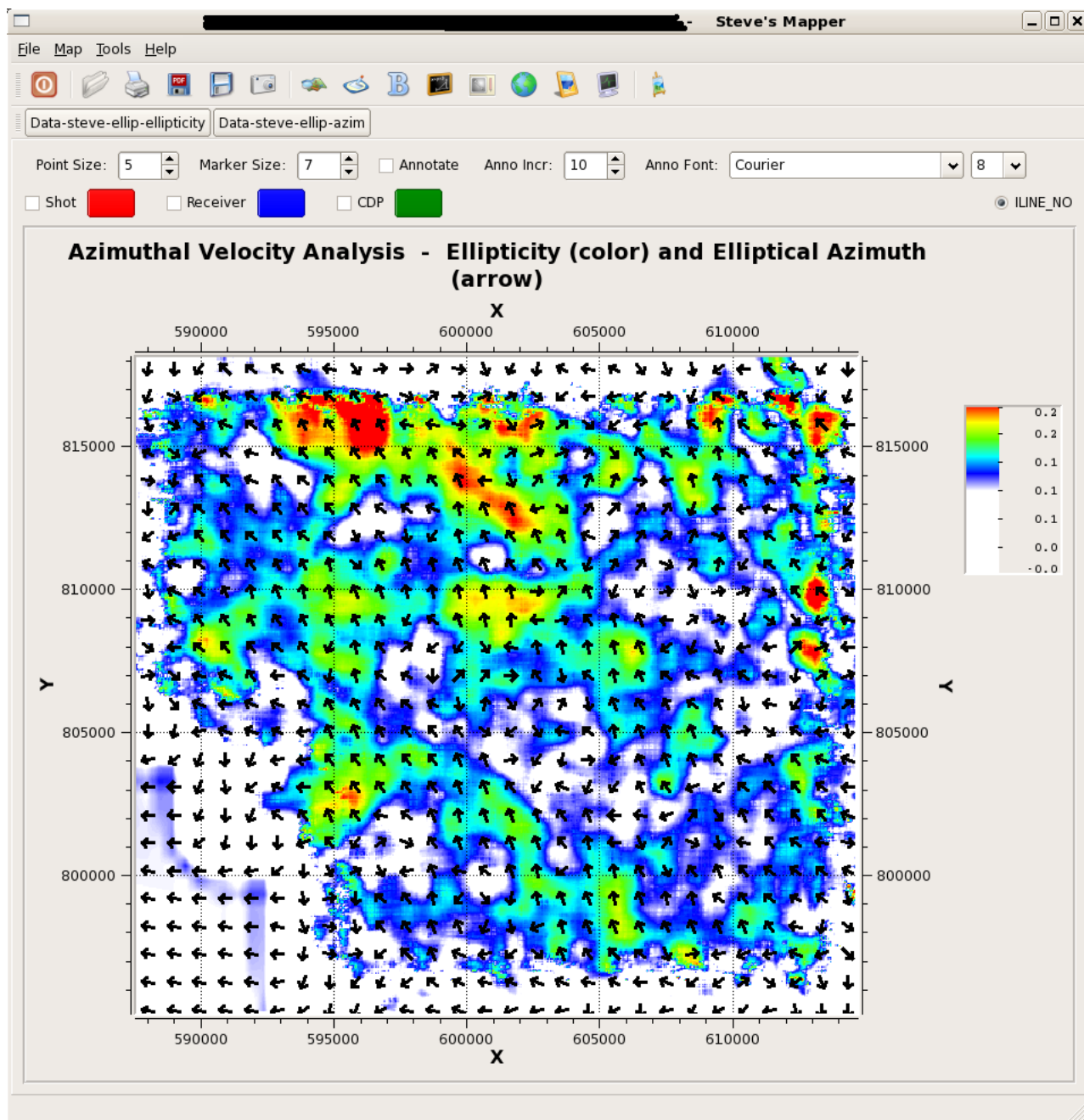
3D Wavenumber Noise Reduction for removing noise footprints.



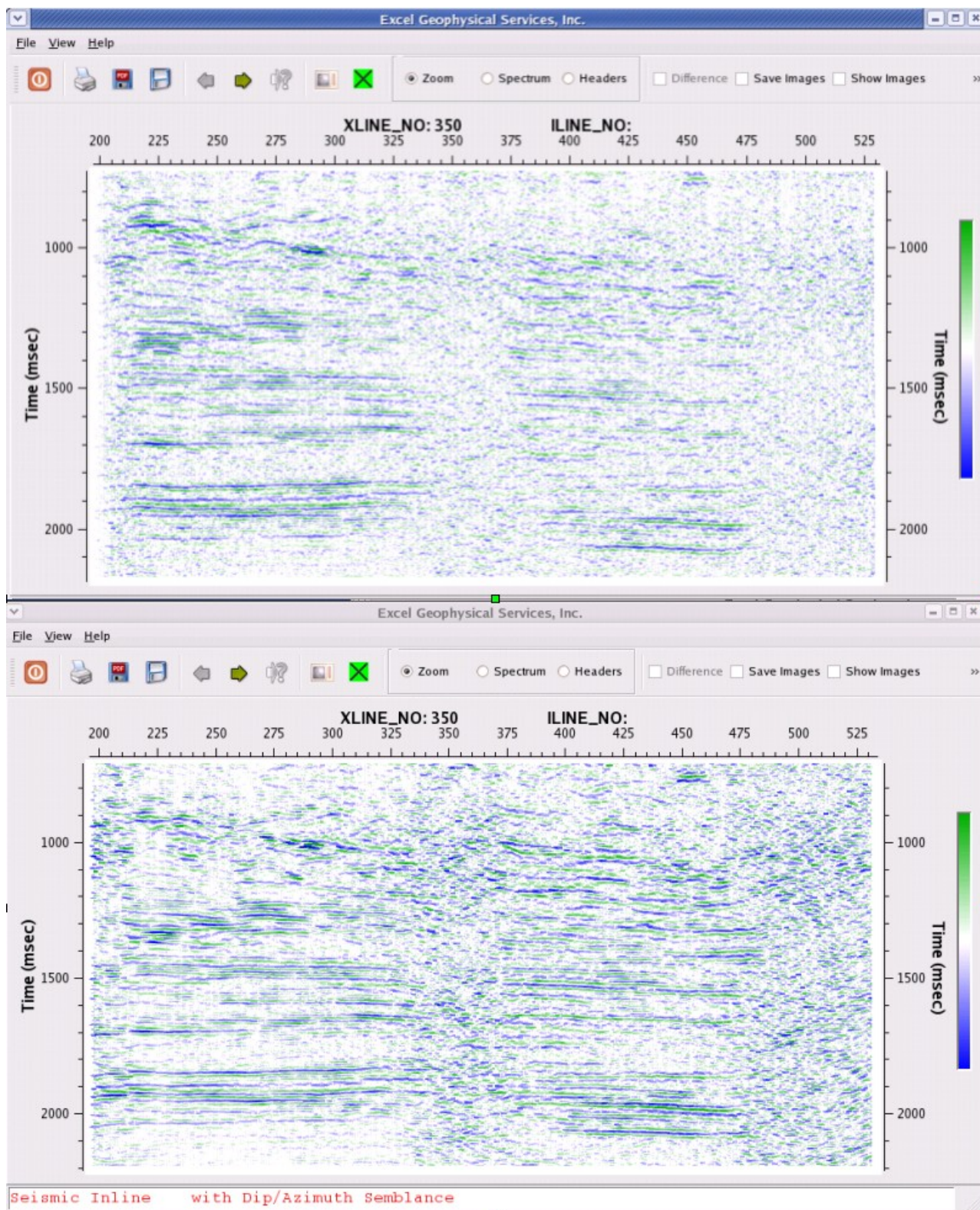
Volumetric Curvature 'Most Positive'



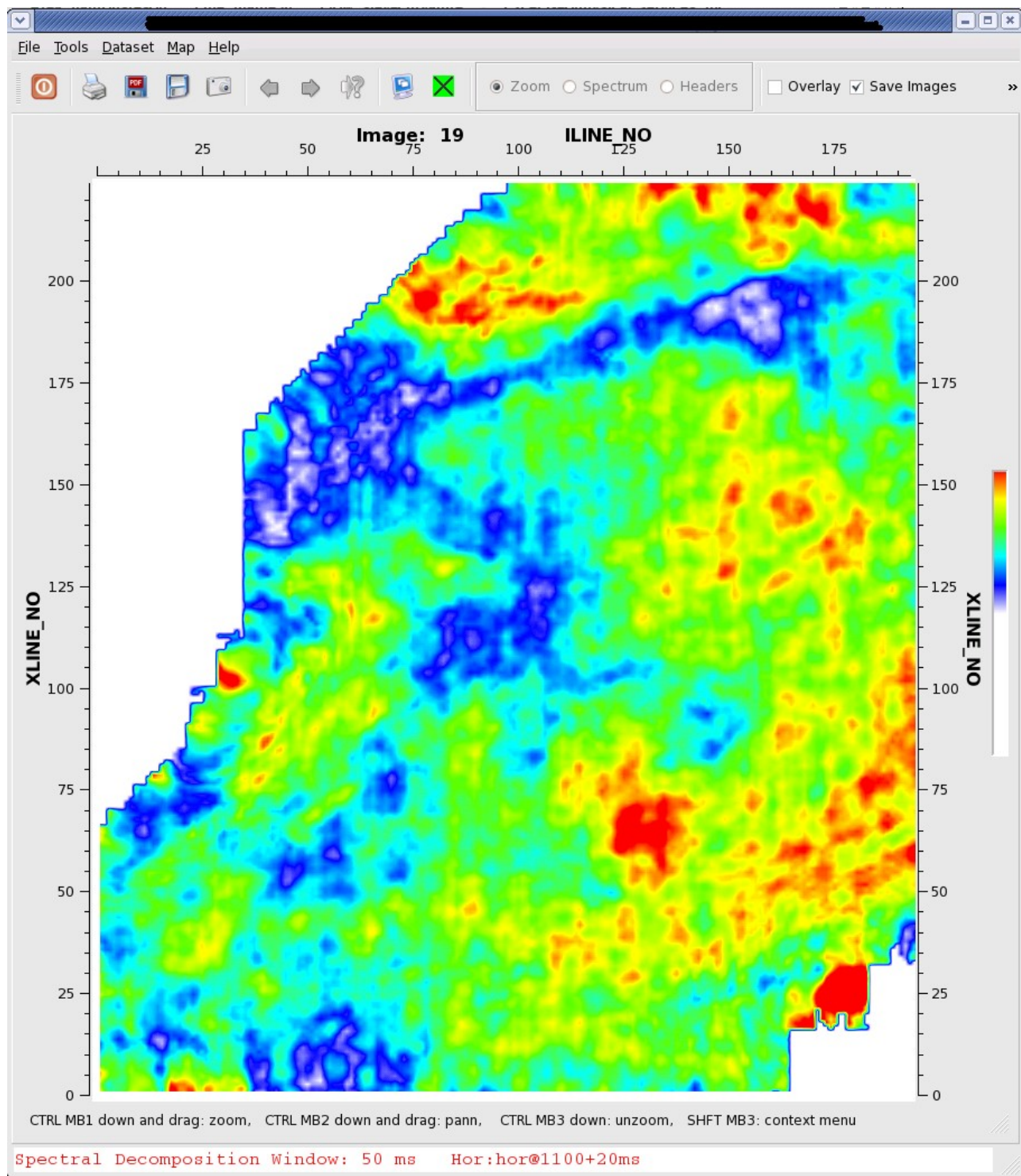
Overlaying Volumetric Curvature 'Most Positive' onto Amplitude in a time slice using Steve's Mapper.



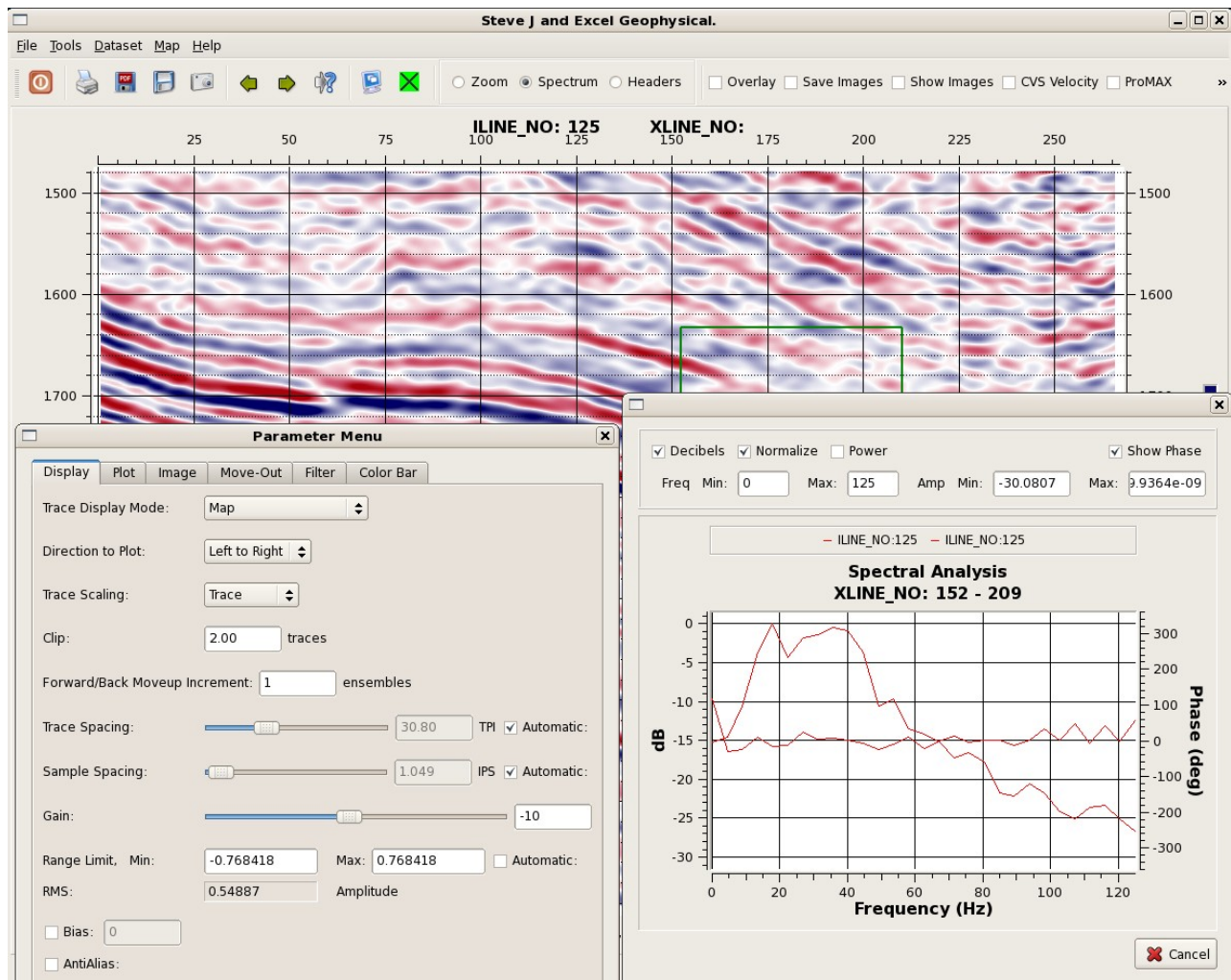
Azimuthal Velocity Analysis - Ellipticity in color with the Elliptical Azimuth on top using directional arrows showing the fast velocity direction.



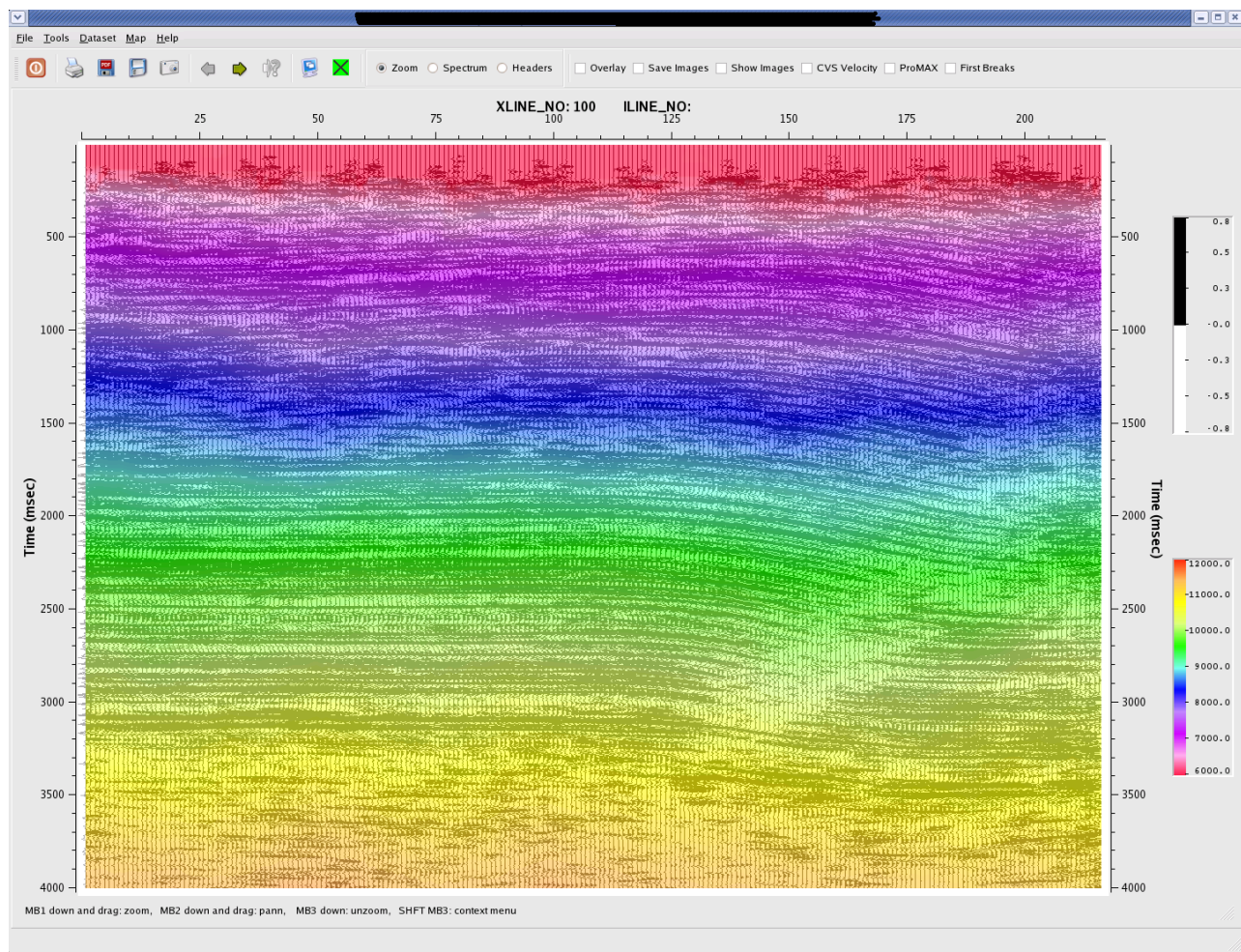
3D Coherency Filtering with Dip/Azimuth Semblance. Used to increase the coherency of seismic events in 3D.



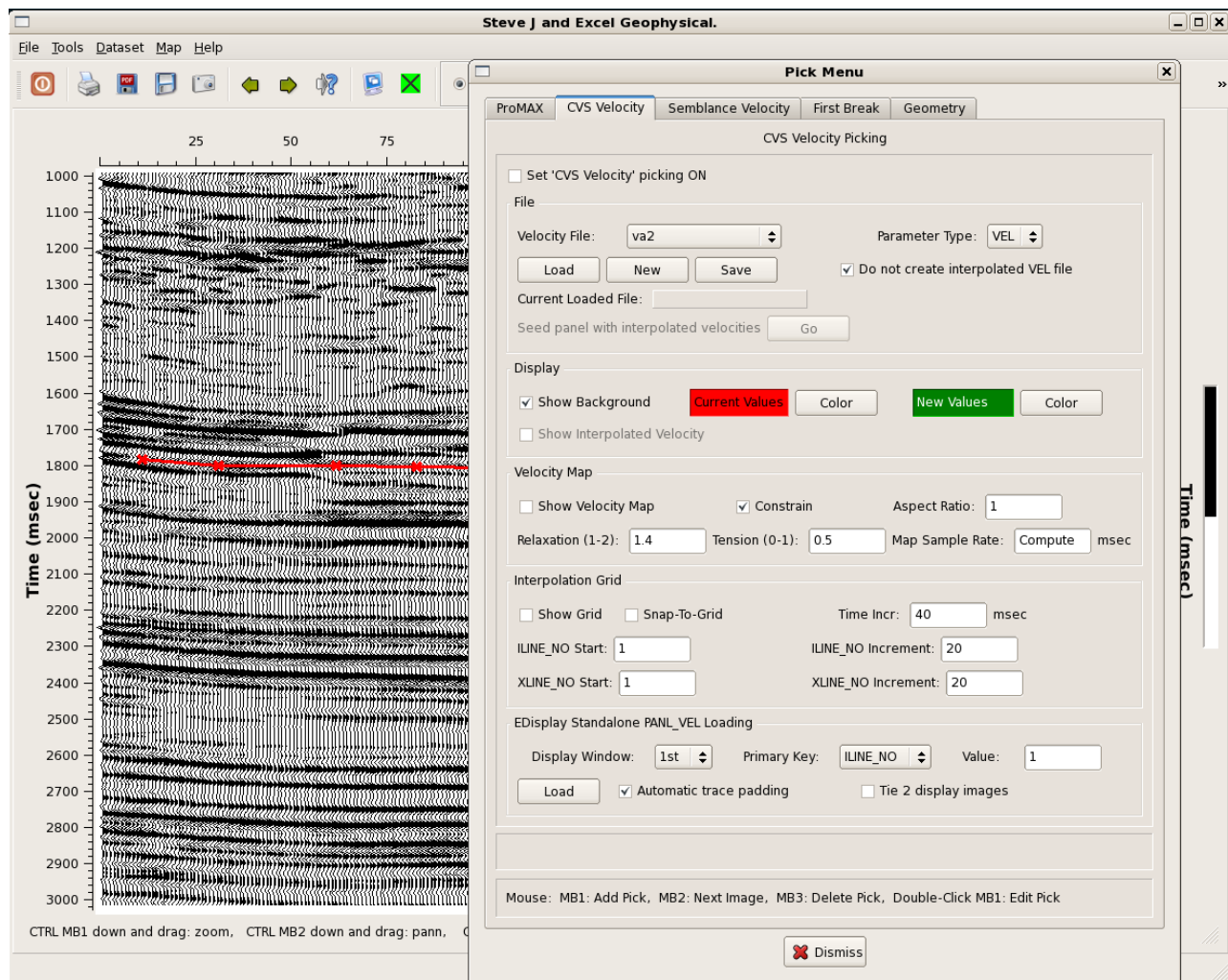
Spectral Decomposition on a horizon. See the channel.



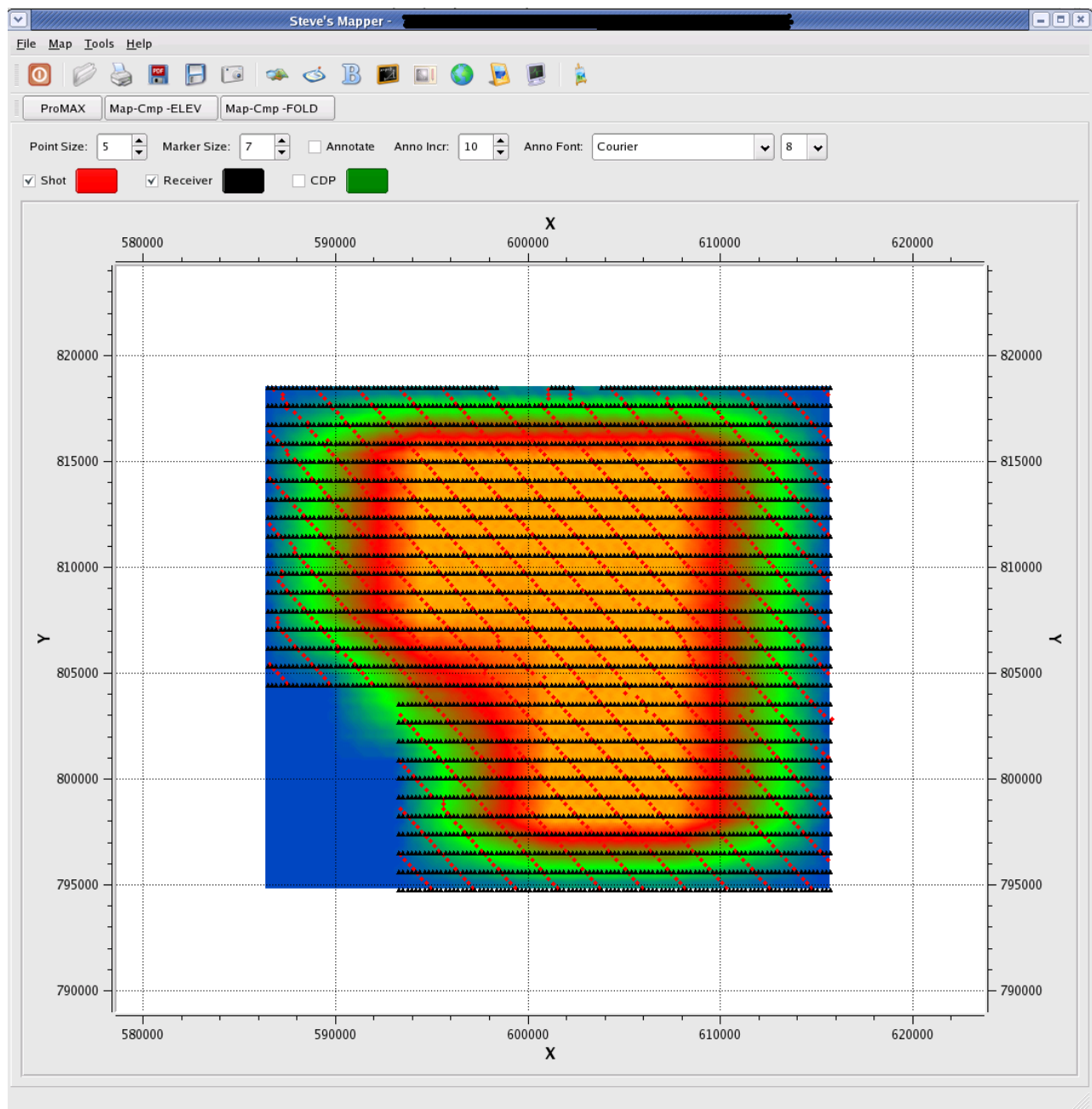
Seismic Display showing interactive menus and frequency spectrum. Can perform interactive AGC, Phase, Overlays, Bandpass Filtering, Moveout, Color Tables, High Speed Image Viewer, and more.



Seismic Display with RMS Velocity as an overlay.



Seismic Display showing some of the tools including ProMAX picking, CVS Velocity Analysis, Semblance Velocity Analysis, Refraction Picking, and Geometry Building.



Steve's Mapper showing shots/receivers and fold map.