

OpenMind Introduction Course

Interpretation techniques in OpenMind

- Run through workflow for seismic interpretation using OpenMind
- Summarize multiple ways to track and edit surfaces
- Well import, Well tie, Depth Conversion and Volume Calculations
- Test out on your own data

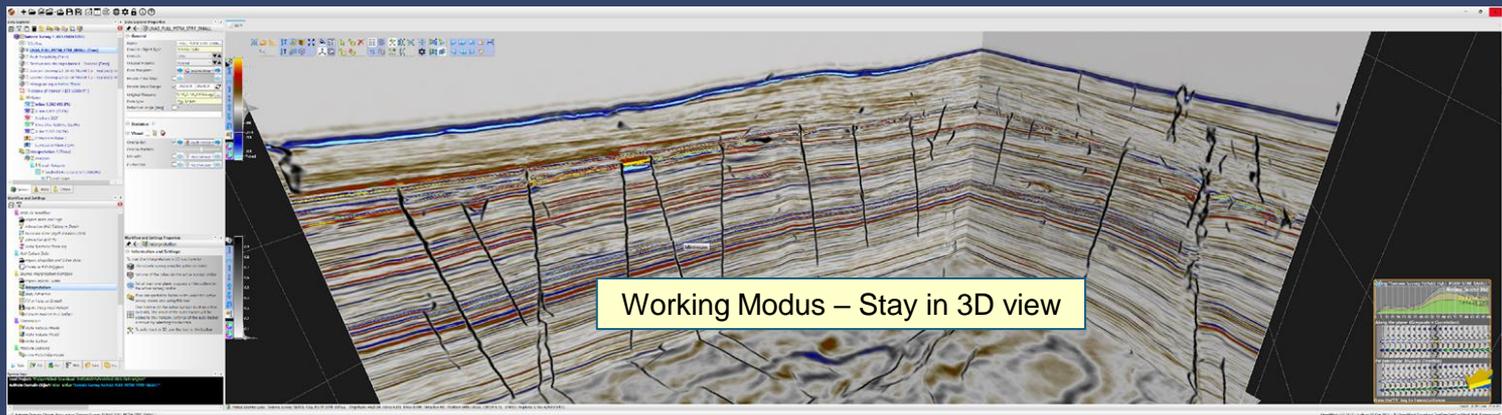
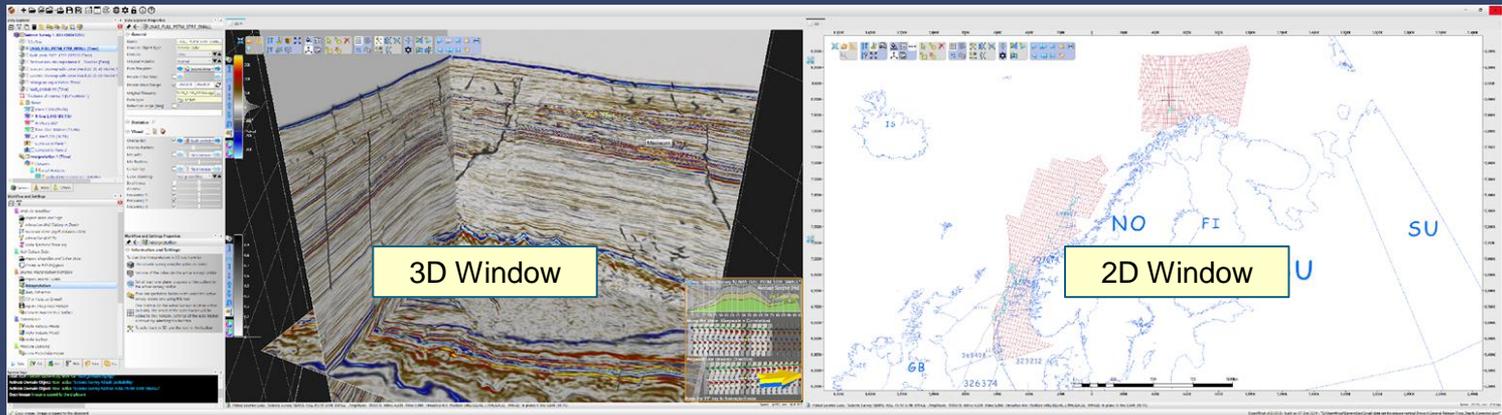


The screenshot displays the OpenMind software interface with several key components highlighted by yellow callout boxes:

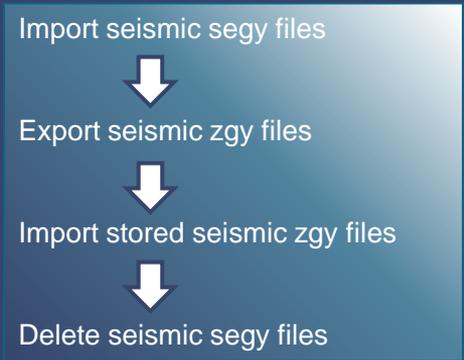
- Project Icons:** Located at the top left, pointing to the Data Explorer toolbar.
- Action Icons:** Located at the top right, pointing to the main 3D view toolbar.
- Explorer Window:** On the left side, showing a hierarchical tree of data objects.
- Properties:** A central panel showing detailed settings for the selected object.
- Workflow Window:** On the bottom left, showing a sequence of processing steps.
- Relevant info and actions:** A panel on the right side of the main view, providing context and options for the current view.

The main 3D view shows a seismic data cube with a color scale on the left ranging from -30K to 30K. A yellow circle highlights a specific feature labeled "Minimum". A blue arrow points to a "Mini-window" in the bottom right corner, which displays a "Frequency distribution" plot and an "X-line" view. The X-line view shows a detailed seismic trace with a yellow circle highlighting a specific feature. The inline view shows a series of seismic traces with a yellow arrow pointing to a specific feature.

View of OpenMind on a widescreen



Import seismic

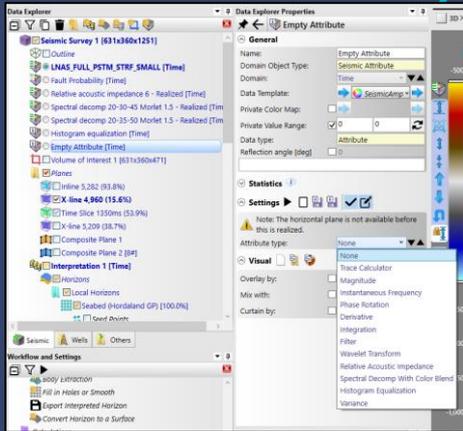
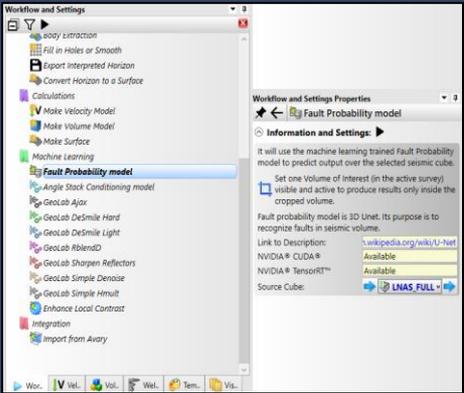
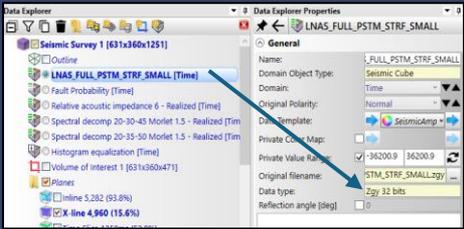


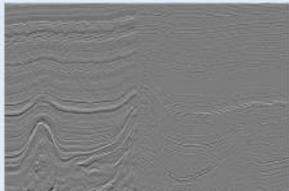
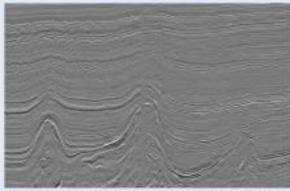
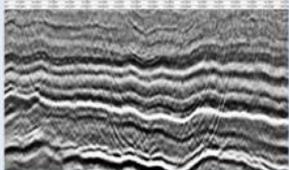
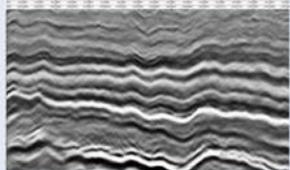
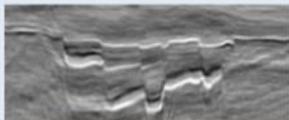
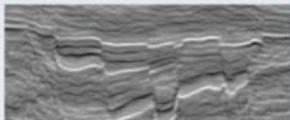
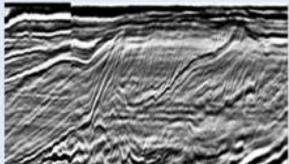
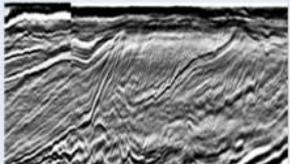
Improve seismic

- Run GeoLab functions
- Fault probability
- Ajax
- Denoise
- Hmult
- Etc.

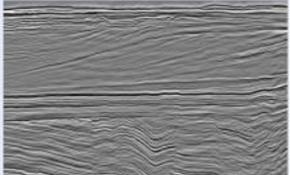
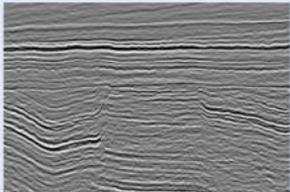
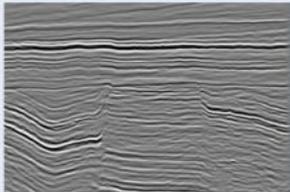
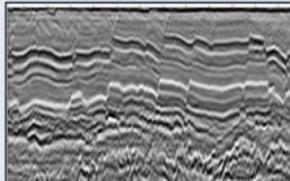
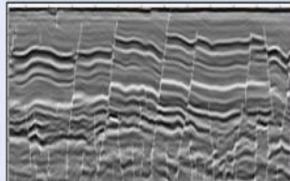
Extract from seismic

- Run Attributes
- Relative Acoustic Impedance
- Display in black & white
- Spectral color blend
- Check the frequency
- Magnitude
- Etc.



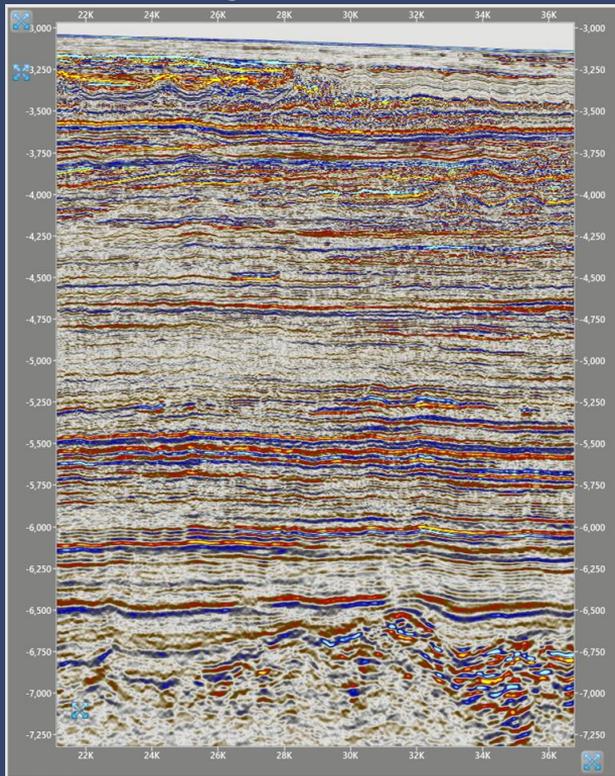
APPLICATION	INPUT	OUTPUT
Spectral Broadening Enhances low frequency poor data. Works on merges of different quality.		
De-smile Removes dipnoise and «smile» artefacts. NB! May attenuate injectites & imaged faults – be careful / apply on focus area		
Sharpen Reflectors Sharpens reflectors to simulate «square wave look». Some relamp is blended in also.		
Simple-H-mult Attenuates horizontal multiples. Tips: flatten input cube on seabed/bcu/top chalk first		

Attributes can be overlain or blended for improved visualization when autotracking

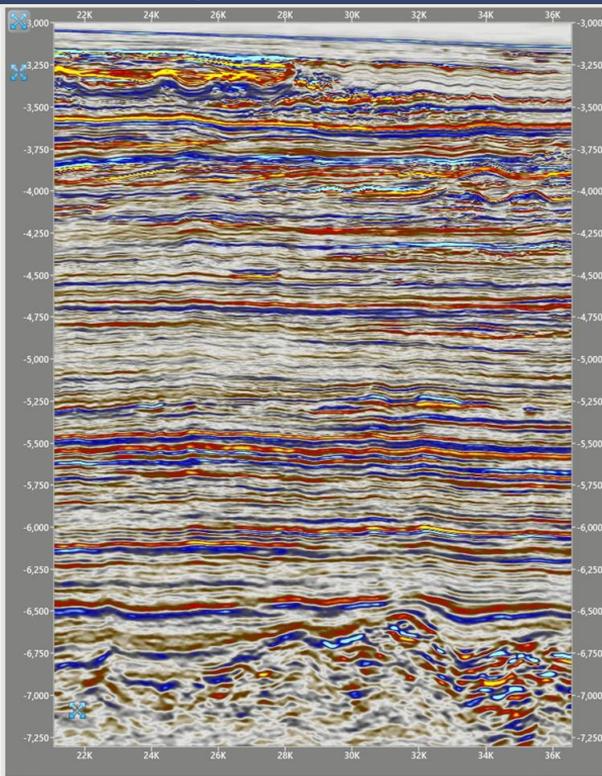
AJAX Typical inhouse processing scheme: frequency dependent structurally consistent noise attenuation++		
Simple denoise Removes "salt and pepper" / random noise. Nothing more nothing less		
Fault Identification (in progress) Current version is not generalized enough. Will work on some but not all volumes/faults.		

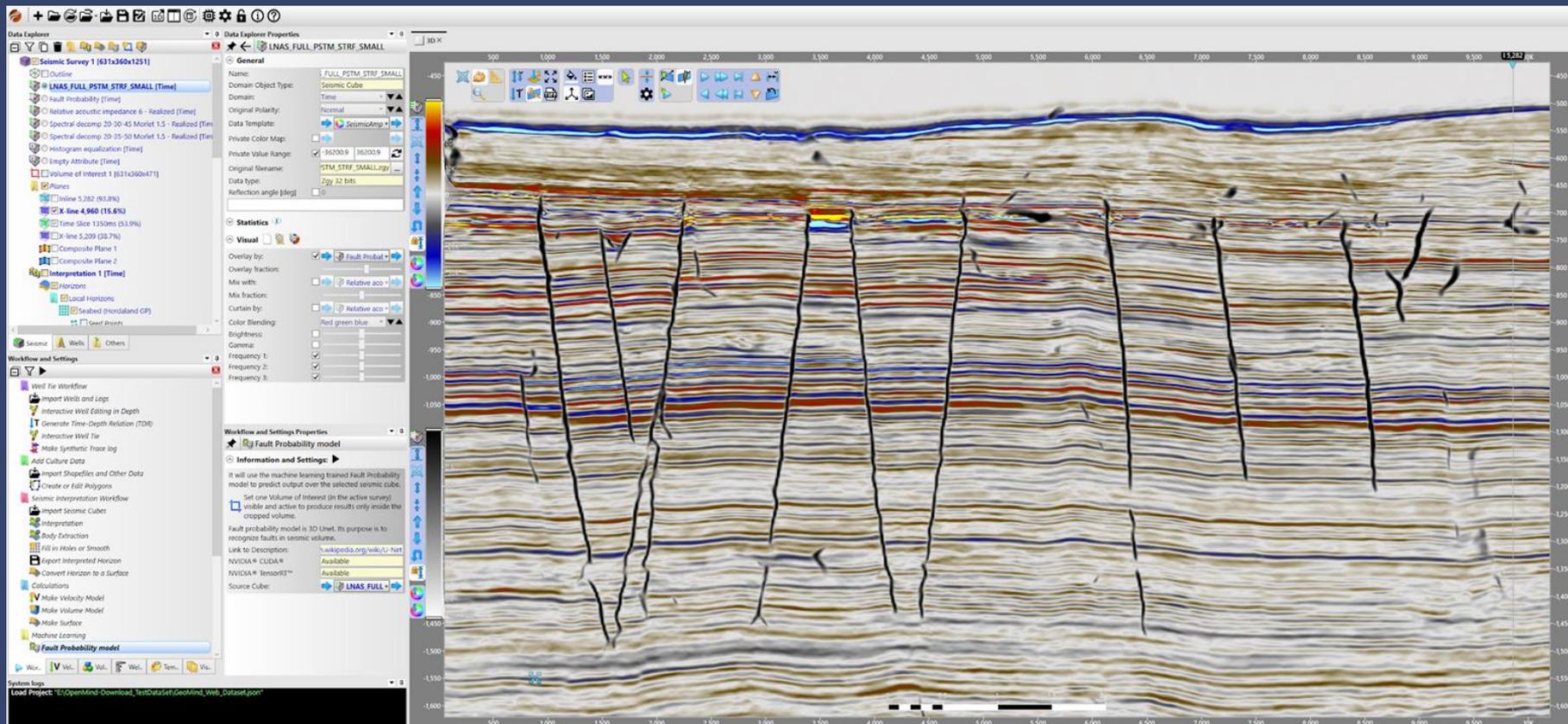
Ajax run to clean up the seismic – removing noise

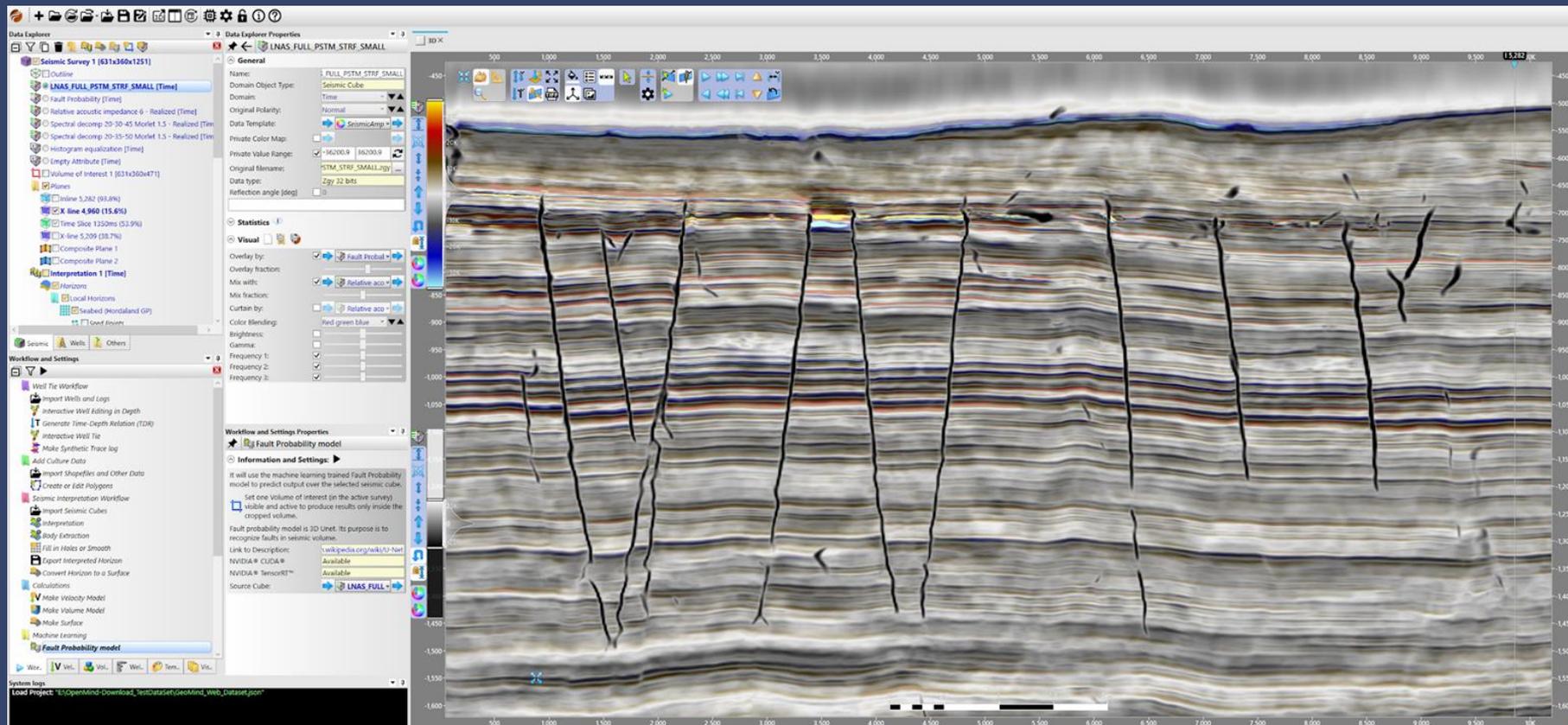
Original seismic



Ajax seismic

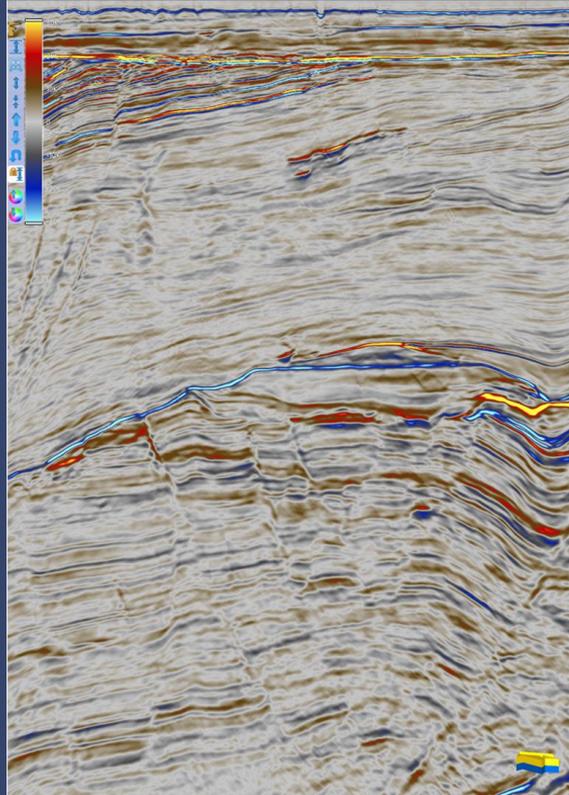




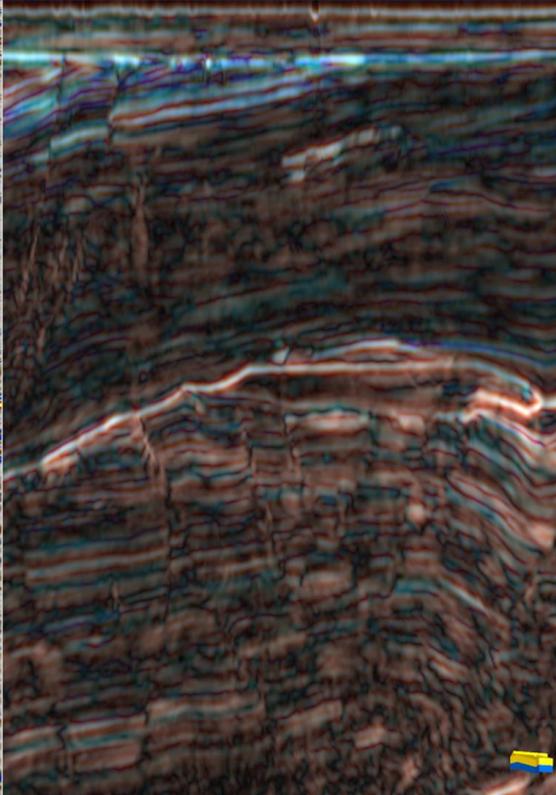


Example of flat spot shown with spectral color blend attribute

Original seismic

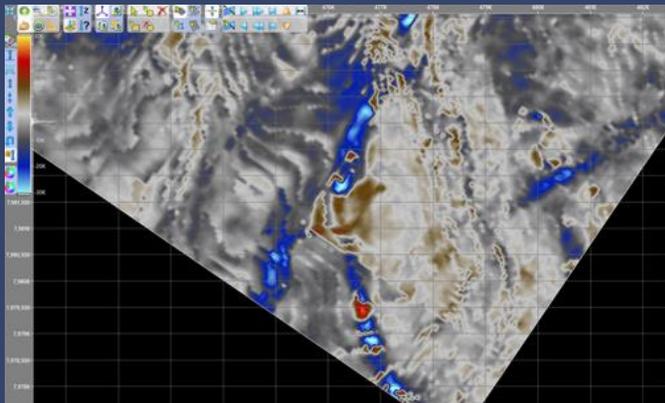


Spectral Color Blend

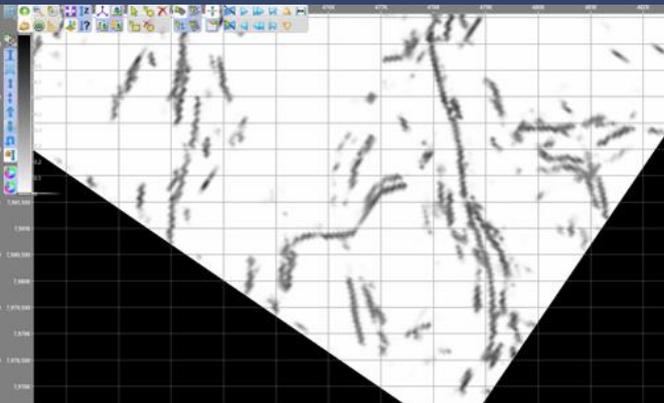


Four attribute examples to extract from seismic

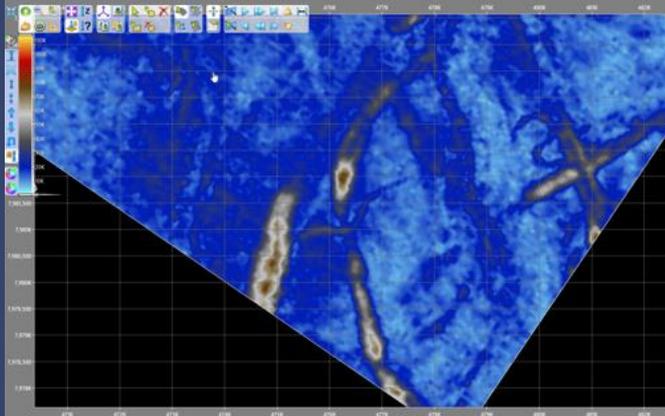
Amplitudes



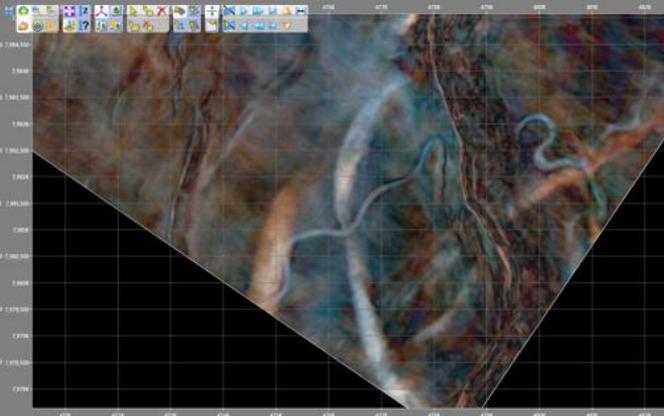
Fault
Probability



Magnitude



Spectral
Color Blend



Pick low hanging fruit first

- **Well calibration – Check seabed (hard)**
 - Eyeball a well tie if you have data - just to get started
- **Identify the best horizons to interpret**
 - Make those horizons first – Some may go from just one seed
 - Complete surfaces with circular brush
 - <https://geomind.tech/demovideos/?playlist=21188e4&video=7b82847>
- **Flatten on key surfaces**
 - Extract geology along timelines – Spectral Color Blend or RMS
 - Remove throw along faults for further interpretation
 - <https://geomind.tech/demovideos/?playlist=21188e4&video=0e9eb7b>

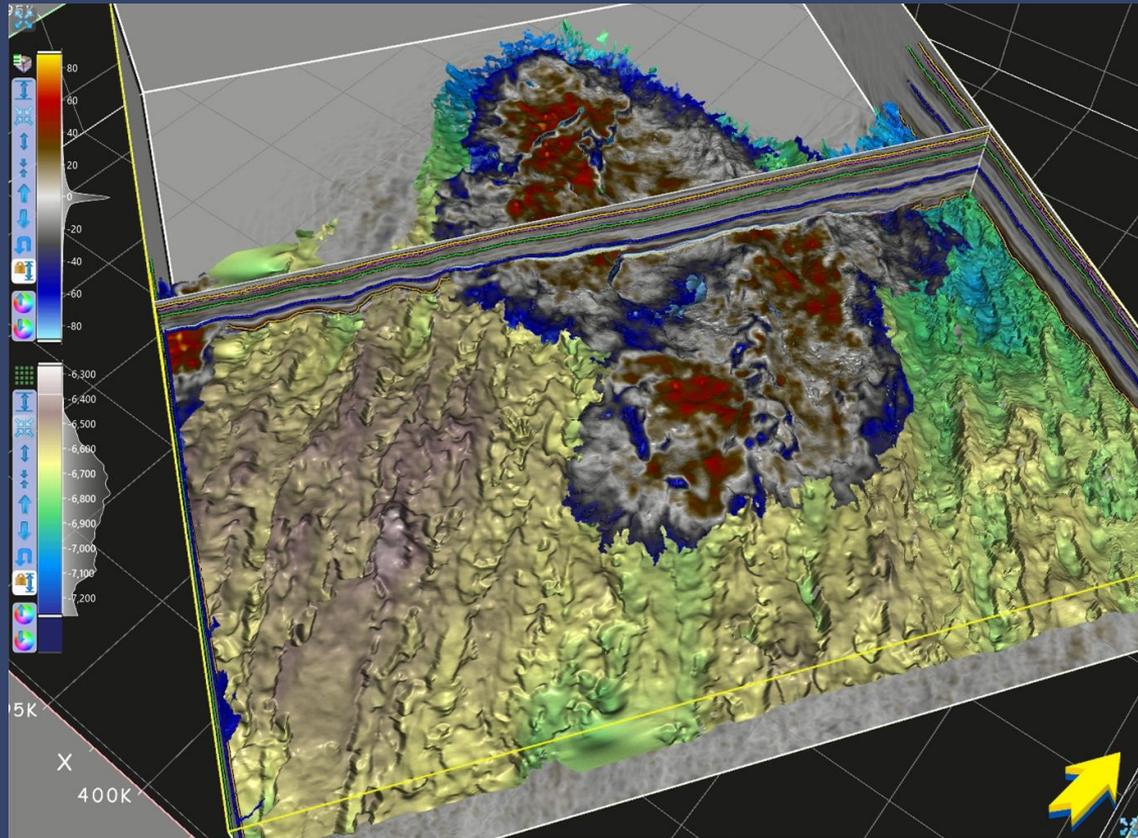
- **Body Extraction**

- Quick assessment of extent of high amplitudes
- Make sub horizons to track and investigate

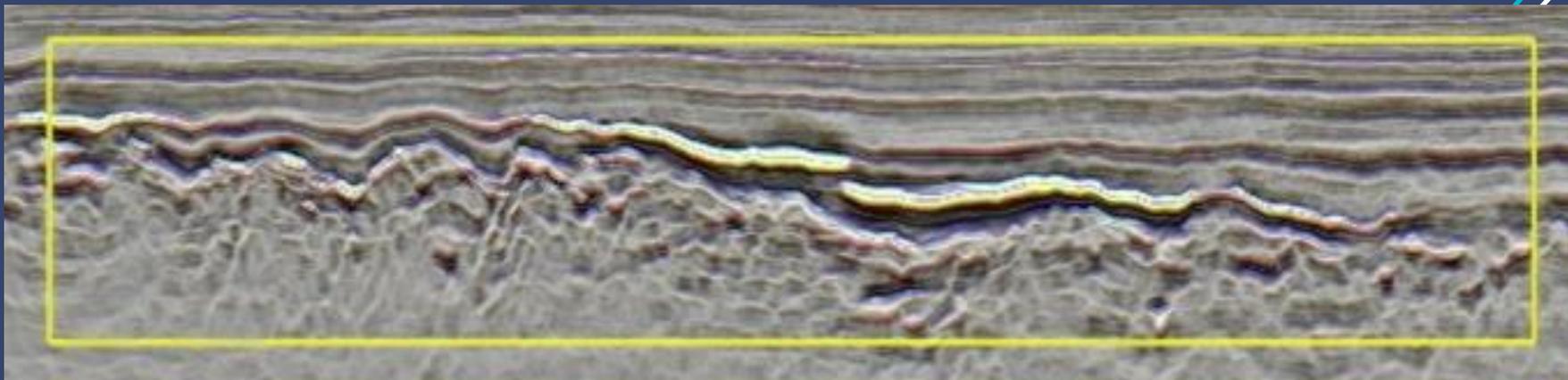
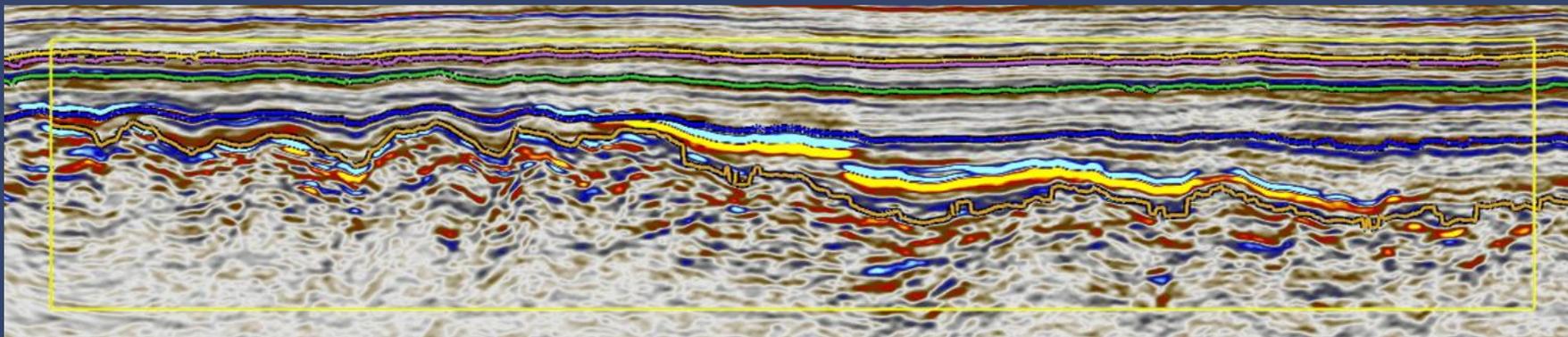
- **Quick-Look at leads to check volume potential**

- Make polygons and evaluate the areal extent

- Preliminary body extraction
- Pursue with horizon tracking
- Investigate RMS attributes
- Overlay on underlying structural surface

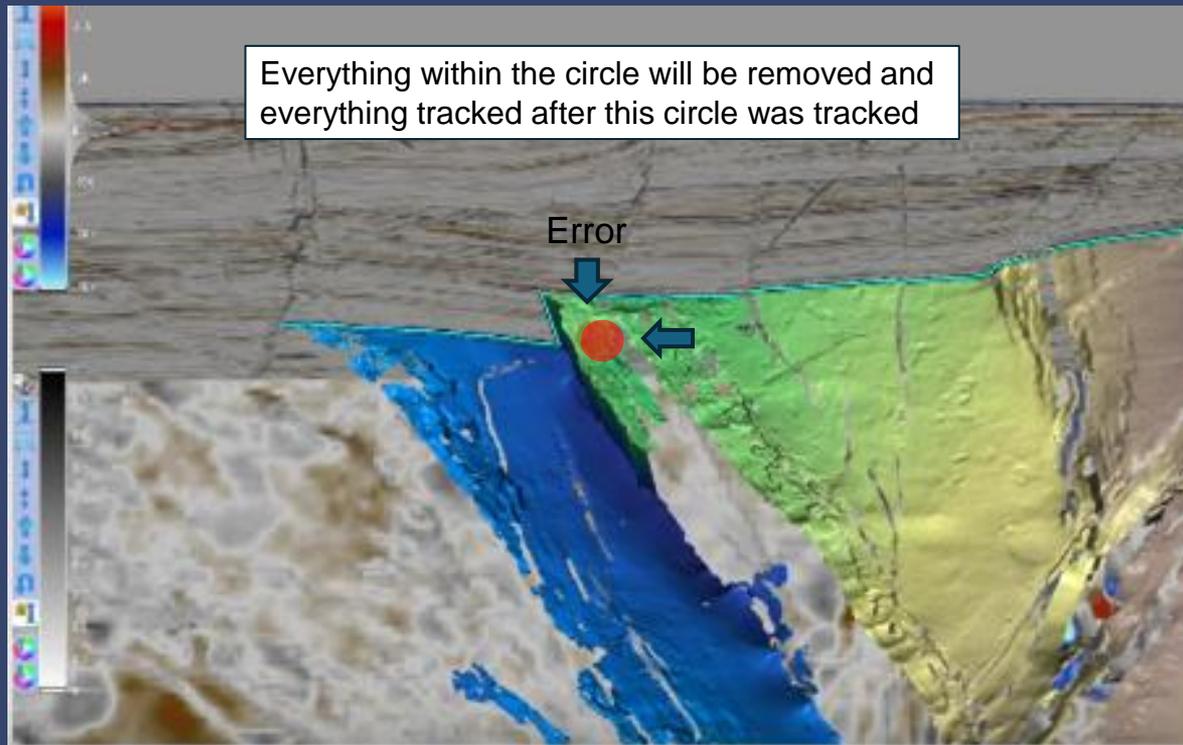


- **Use fault probability cube to guide your tracking if you have faults**
- **Flatten on a strong reflector above the unconformity**
- **Skew the tracking window to track above the unconformity, not below**
- **Blend Ajax and RAI**
- **Actively use minimum, maximum, z-crossing or s-crossing to autotrack**
- **Finally, small holes with faint signals may be tracked with “none”**
 - Smooth if surfaces becomes ruggid
 - None can be helpful over large areas as well – try it out
- <https://geomind.tech/demovideos/?playlist=21188e4&video=ac90ad9>



- **Use circular brush eraser with the icon “Hierarchy down”. This will remove everything in the circle, and everything tracked after the area within the circle.**
 - This carves out the erroneous area and removes it.
 - If this removes too much, just go back
- **Key: Don’t be afraid to remove part of the surface. You can always go back**
- **Select “region” under display options on your surface, where you choose z-values, tracked amplitudes etc.**
 - Every seed point creates a region. Here you can remove by region and stay in full control
- **Use circular brush eraser with the icon “none” instead of “Hierarchy down”. This will only remove what is within the circle**

Circular Brush Eraser



 **Circular brush eraser**

Erase by dragging a circular eraser by the left mouse button at a part of a domain object.

Change the size of the circular eraser by the mouse wheel.

Note: What you actually can erase is dependent of the *active operation* in the Operations tab.

Further tips, see video on homepage

<https://geomind.tech/demovideos/?playlist=21188e4&video=030213d>

- Extensive description in OpenMind under “?”:



- <https://geomind.atlassian.net/servicedesk/customer/portal/6/article/858357767>

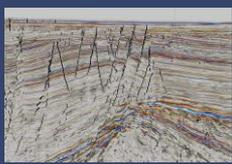
- Video of Well import on Geomind homepage:

- <https://geomind.tech/demovideos/?playlist=a233c5e&video=e084976>

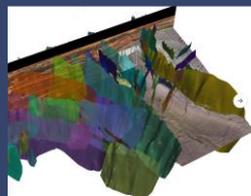
- **Prepare data**
 - Well header: choose coordinate system
 - Logs as individual las files
 - Deviation curve as las
 - OWT curve as ascii file
- **Link wells in depth to seismic in time by activating “Generate time-depth relation” in the explorer window**
- **Do an interactive well tie**
 - Check the relation between seismic tops and well tops. These tops are created based on different info and may differ. You need to understand what defines the break, justifying a well top
 - Use lock function actively to lock some tops while adjusting others.

Exploration at your fingertips

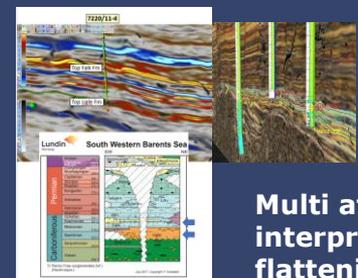
"One Click" AI fault probability guided interpretation



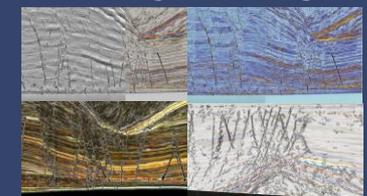
Fault model



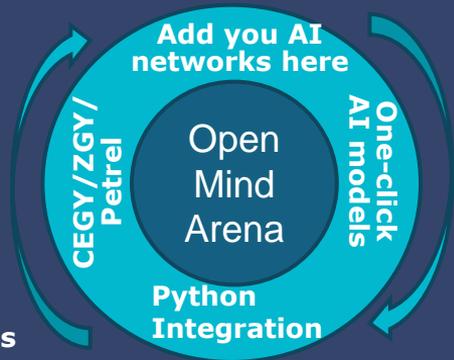
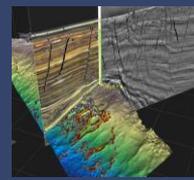
Well ties



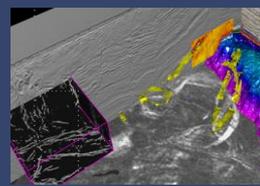
Multi attribute guided interpretation with flattening/blending/mix



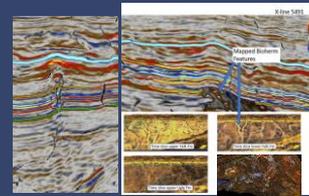
Instant updates with new data



Depth conversion & volumetrics Interactive switch



Geobody interpretation



Multi horizon interpretation Under development



Flow based
unconformity detection

Start with 1st order
sequences, geo-forms
and faults

Move into the next level
of sub-zonation

Iterative stratigraphic
zonation process

