

MARINER

Mid-Atlantic Ridge INtegrated EXperiments at RAINBOW

R/V Marcus G. Langseth MGL1305

April 10 - May 19, 2013

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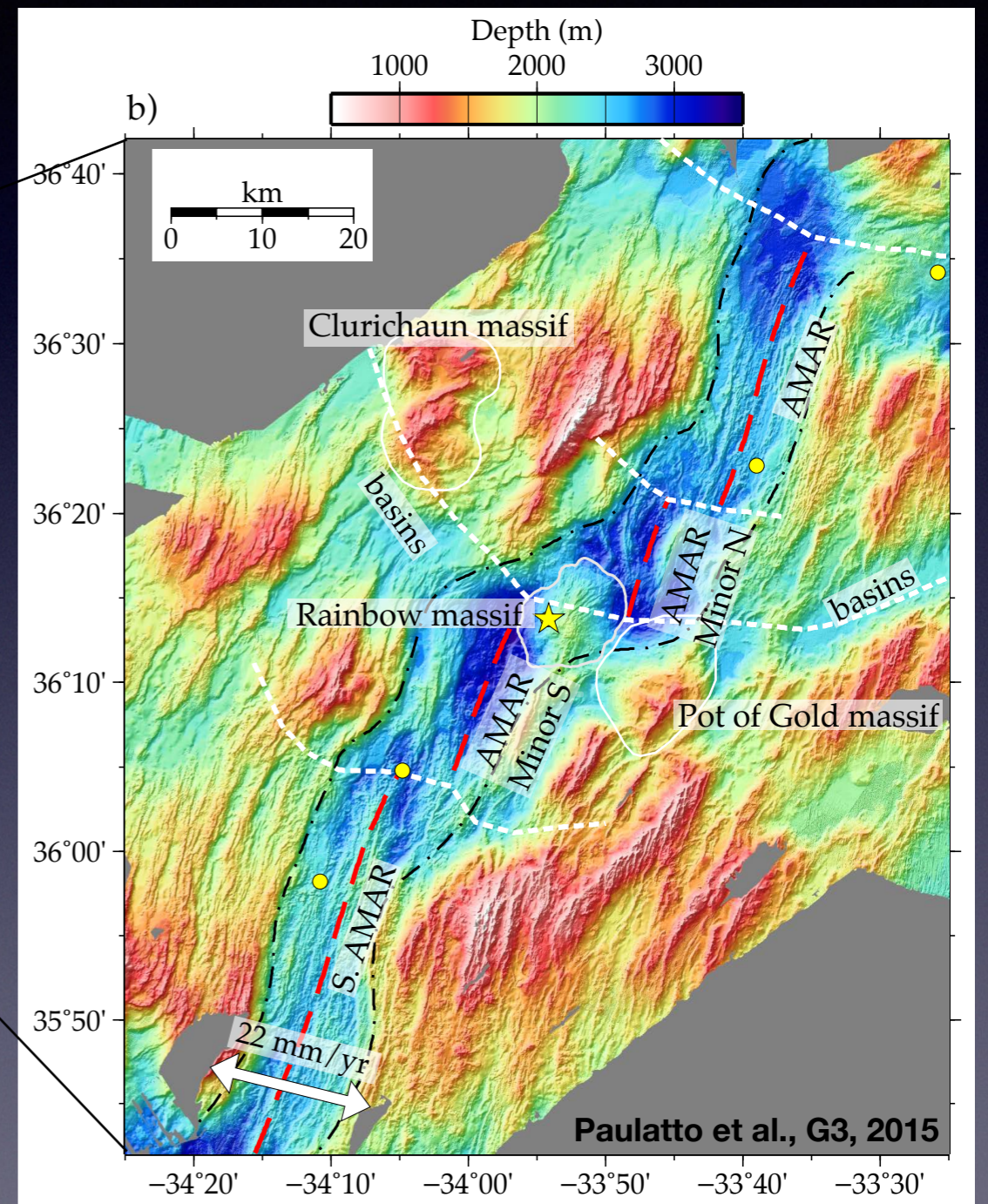
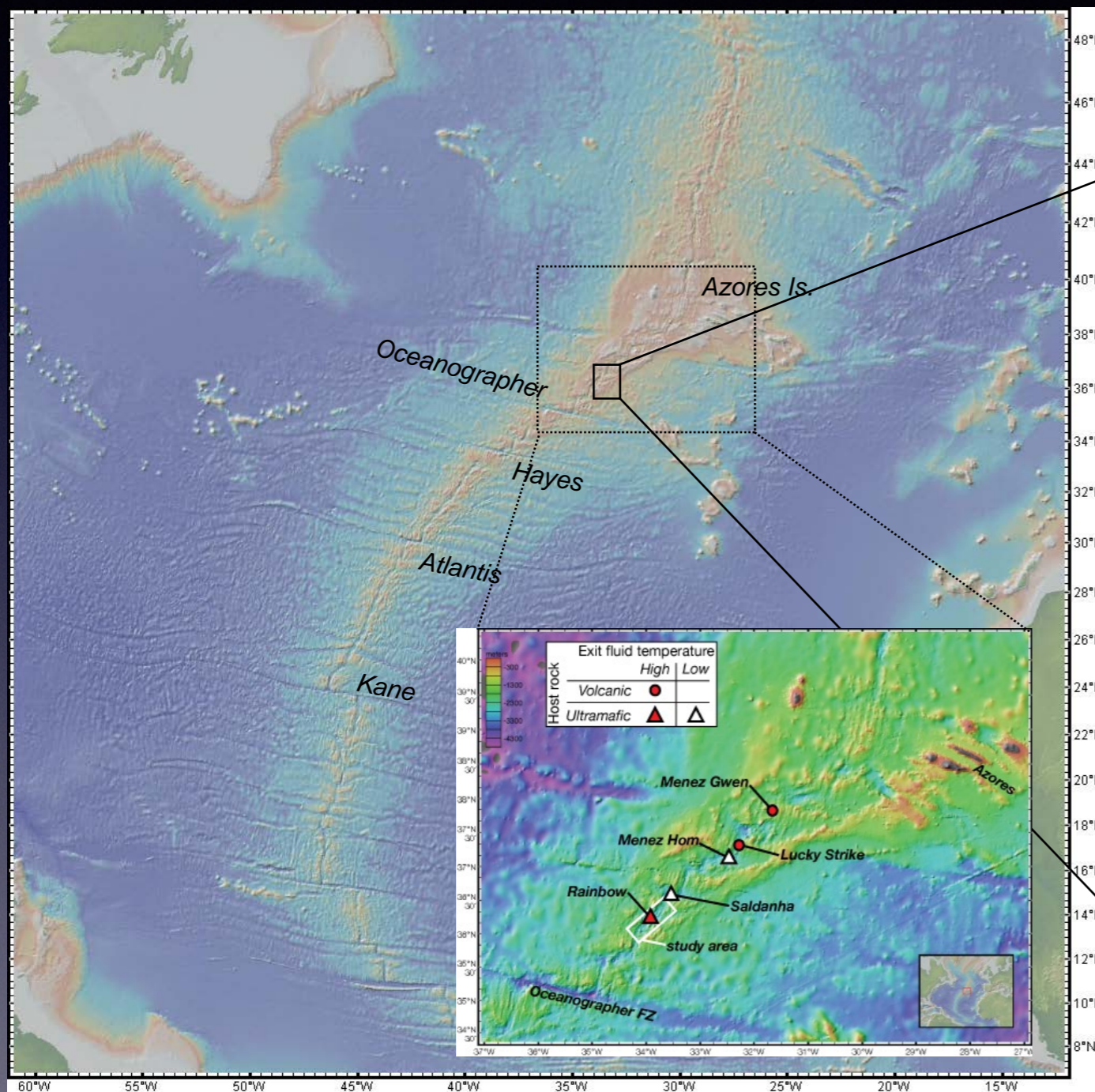
April 10 - May 19, 2013

What are the relationships between magmatism, faulting, substrate lithology, and hydrothermal circulation at Rainbow?

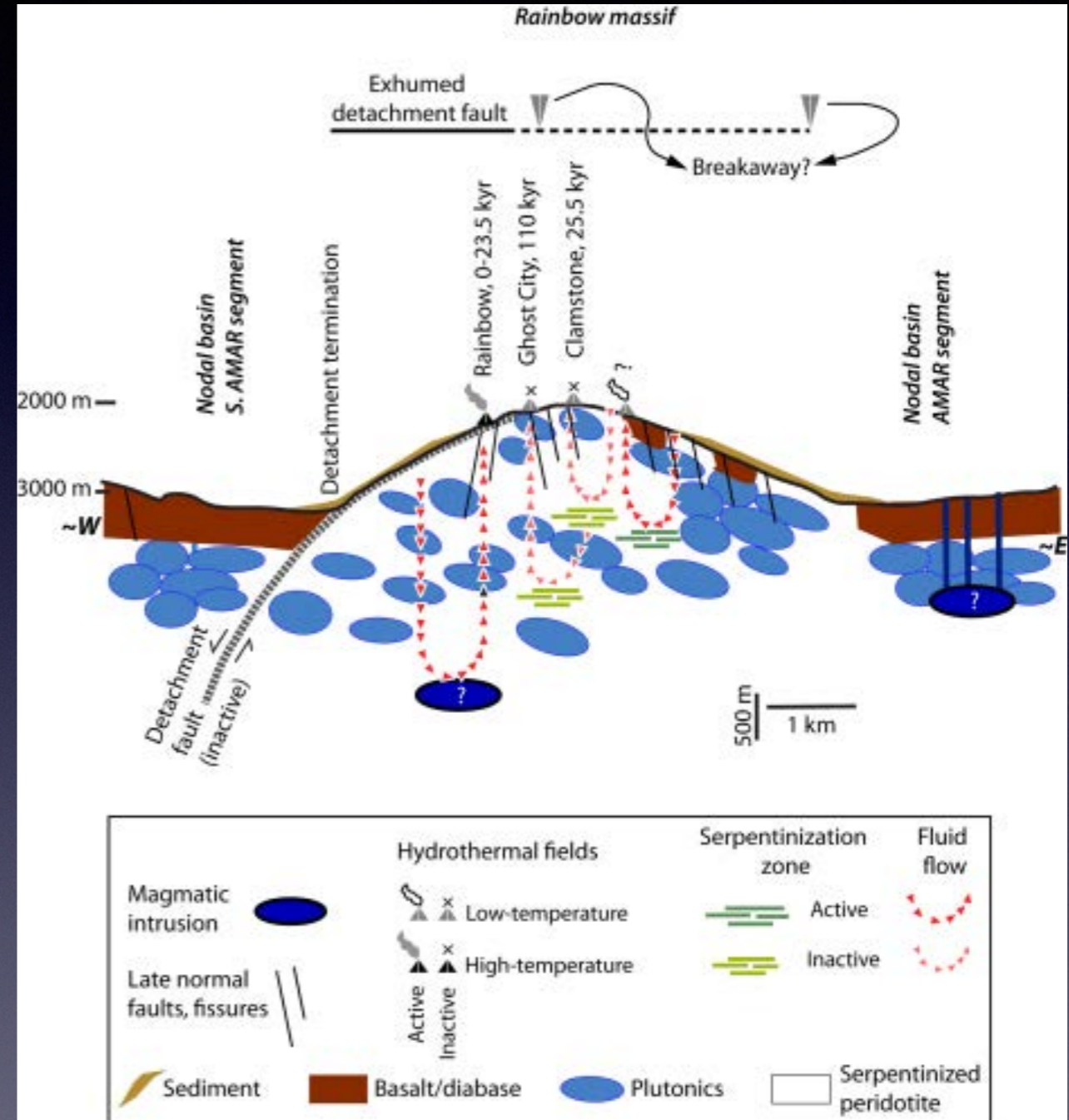
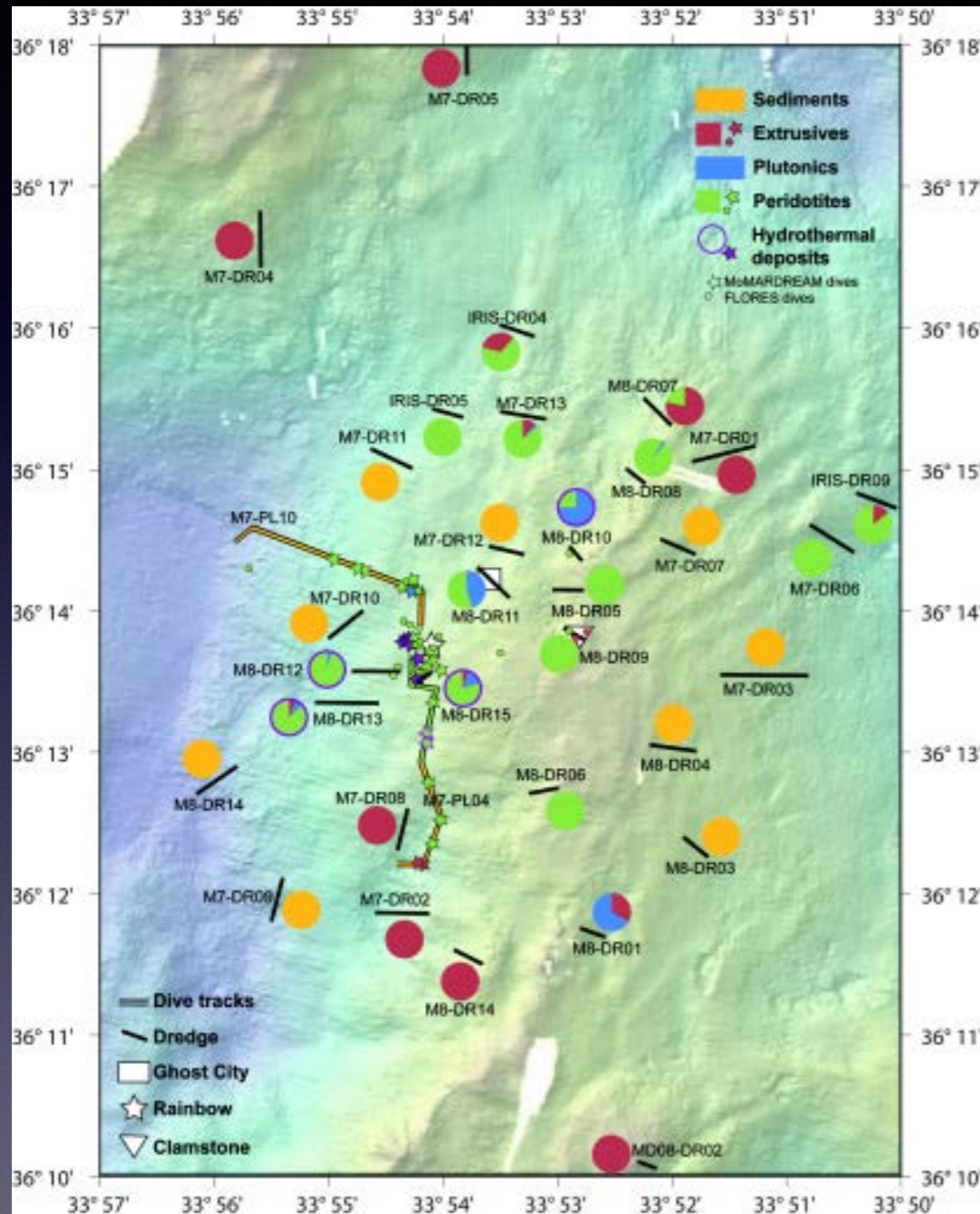
- 3D active-source OBS seismic tomography (~30km x 80km)
- Long-streamer (8 km) 2D Multichannel Seismic profiling
- Network of 15 OBSs for 9-month passive monitoring
- Multibeam bathymetry and backscatter echosounding
- Gravity and Magnetics



RAINBOW: Geological Context



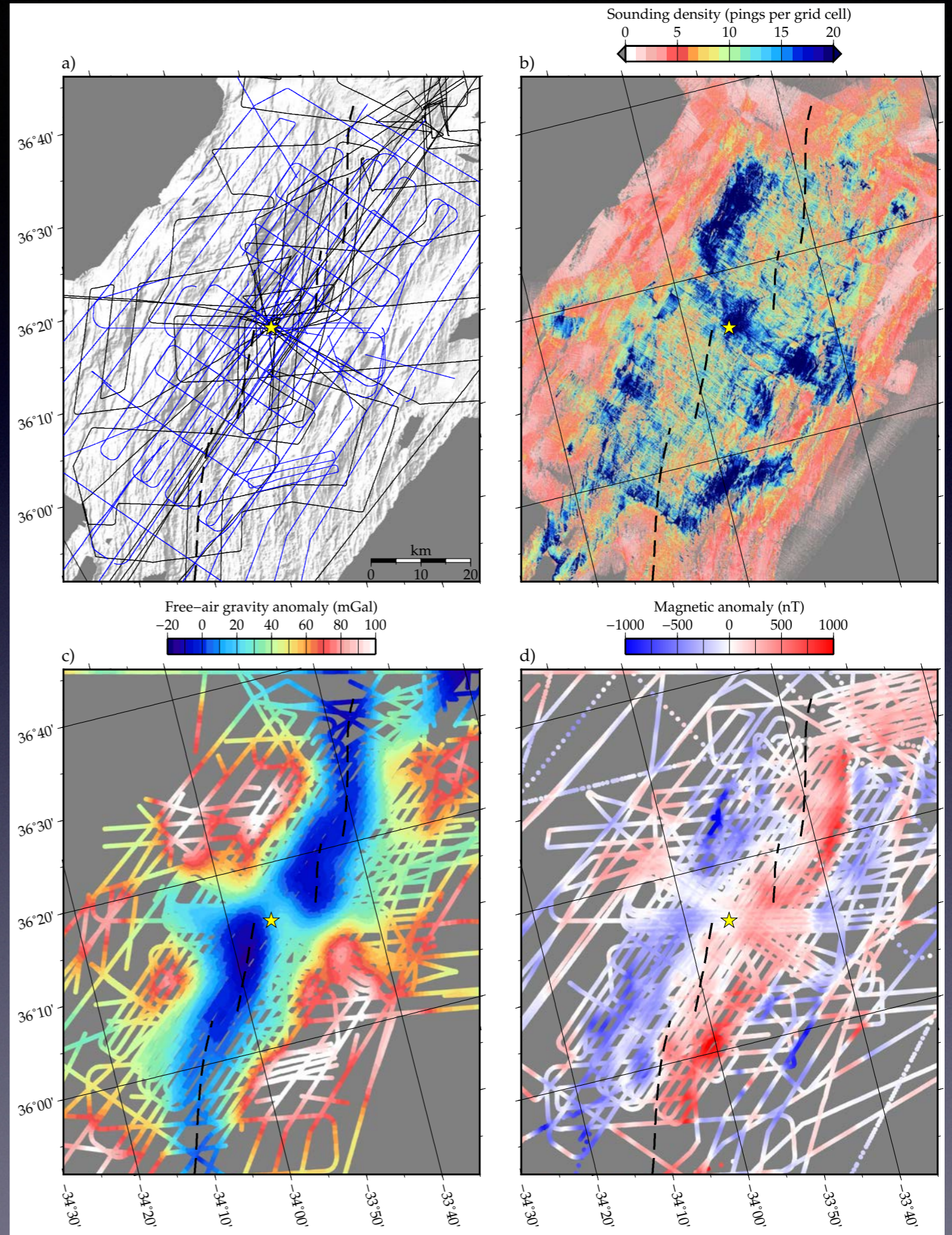
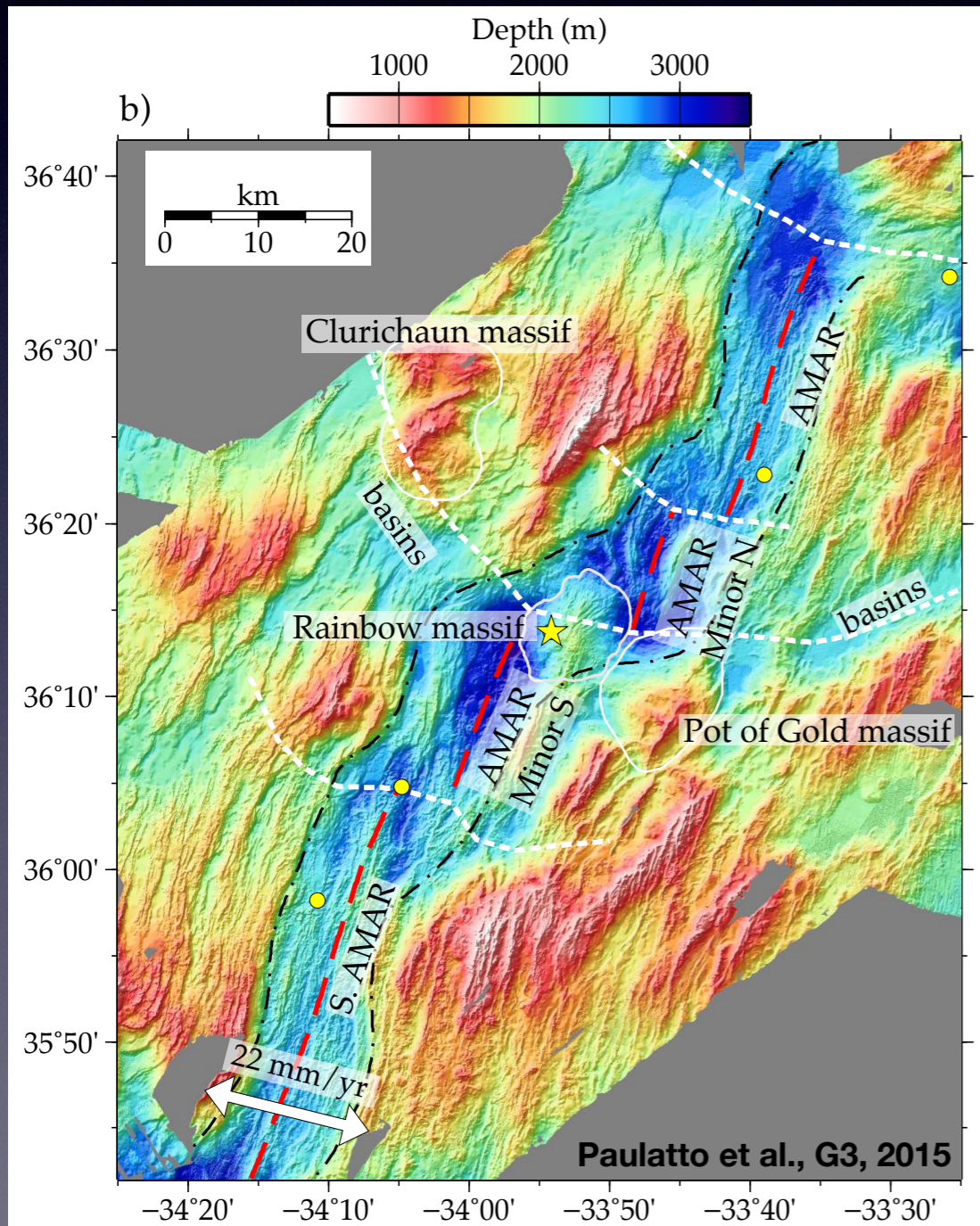
RAINBOW: Geological Context



Andreani et al., G3, 2014

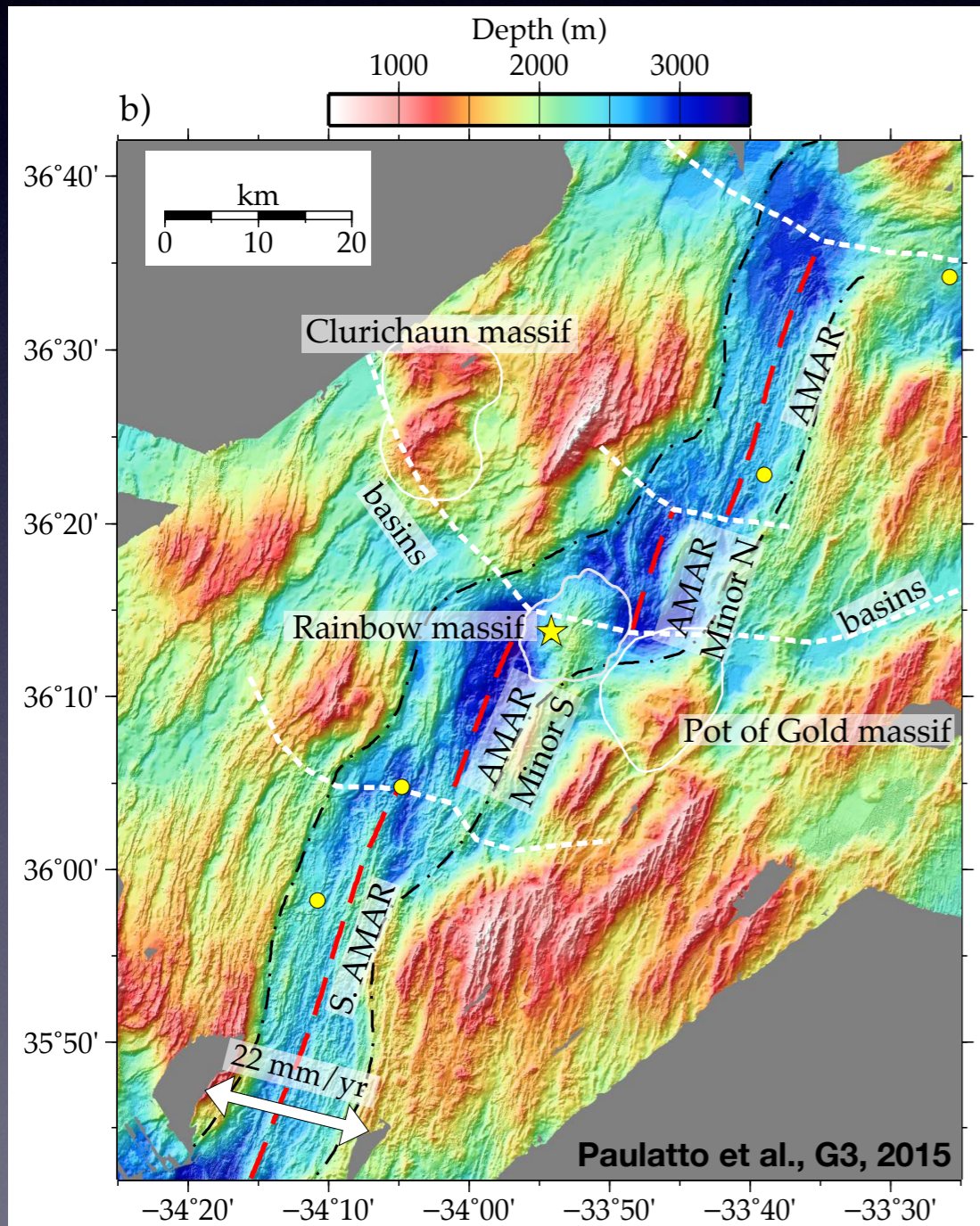
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Multibeam Bathymetry and Potential Fields Surveys

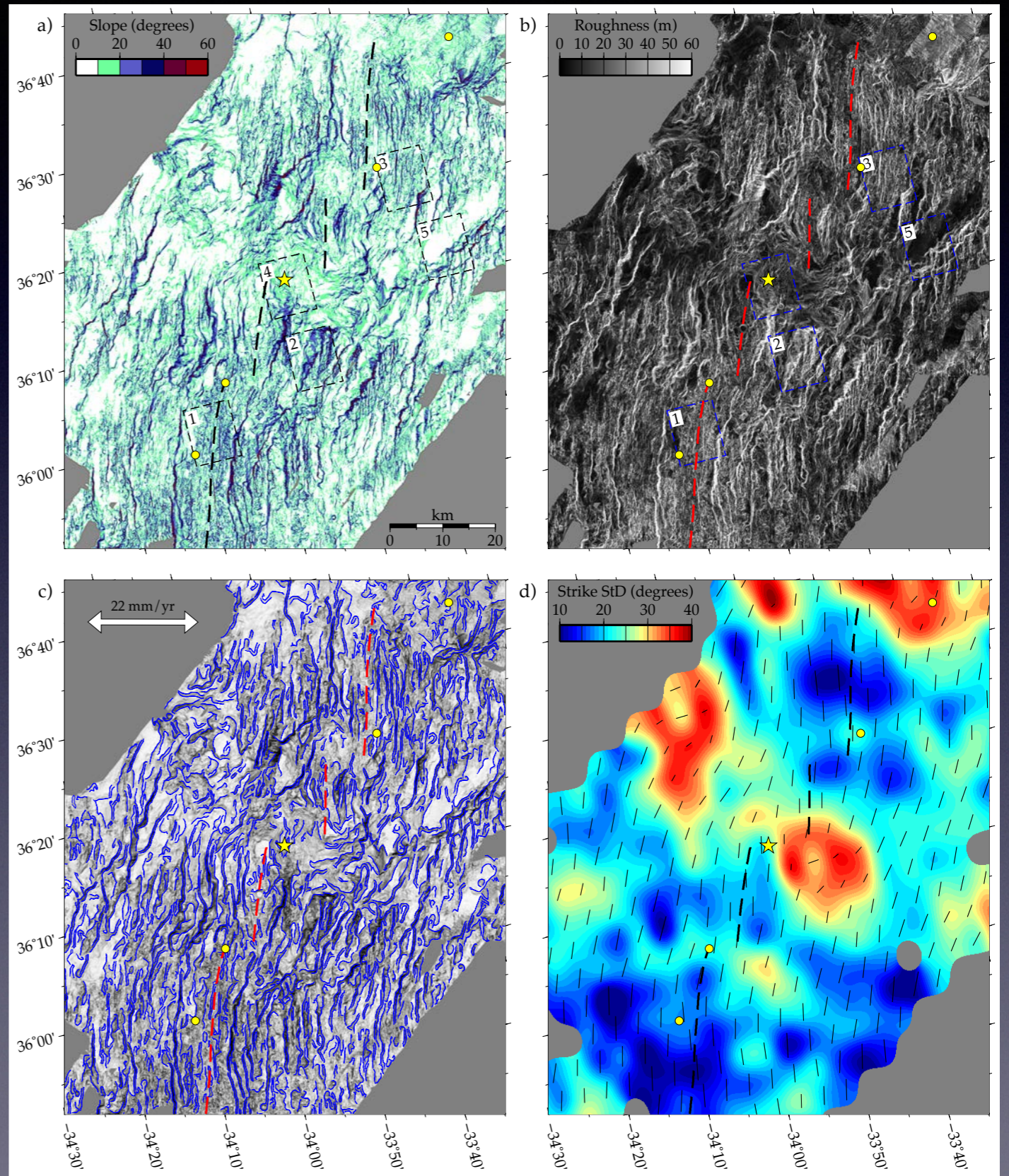


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Multibeam Bathymetry and Potential Fields Surveys

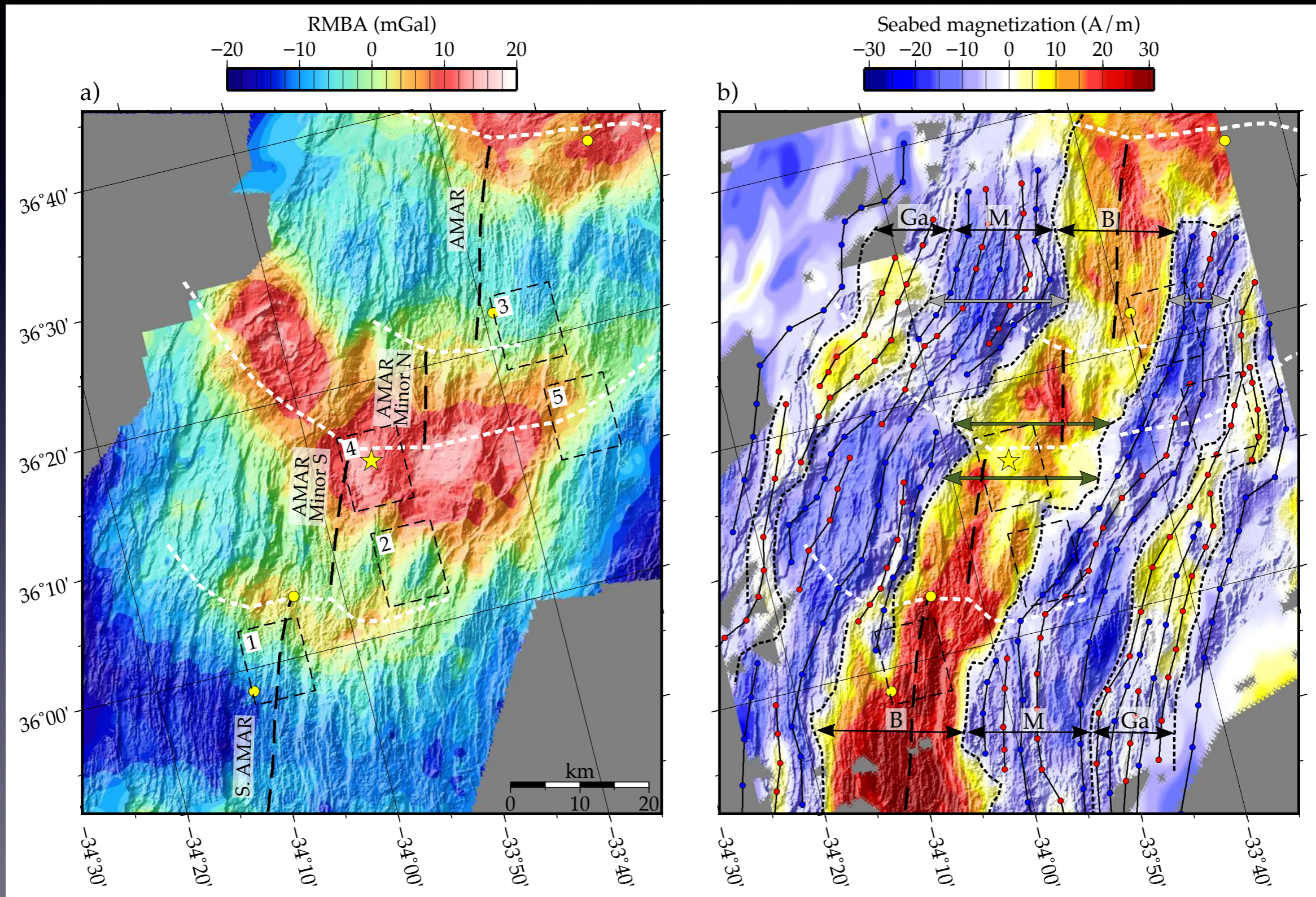


Morphometric parameters



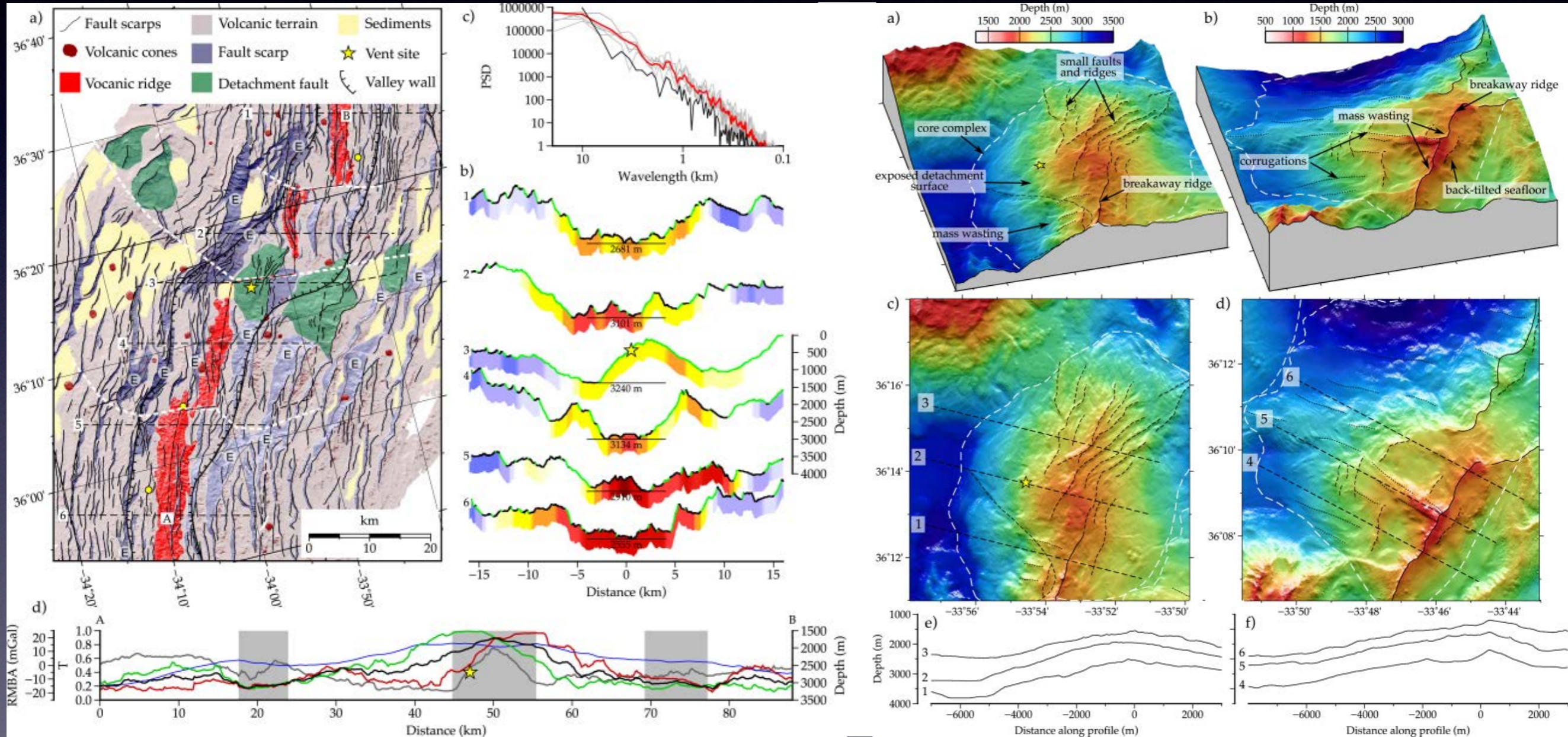
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Multibeam Bathymetry and Potential Fields Surveys



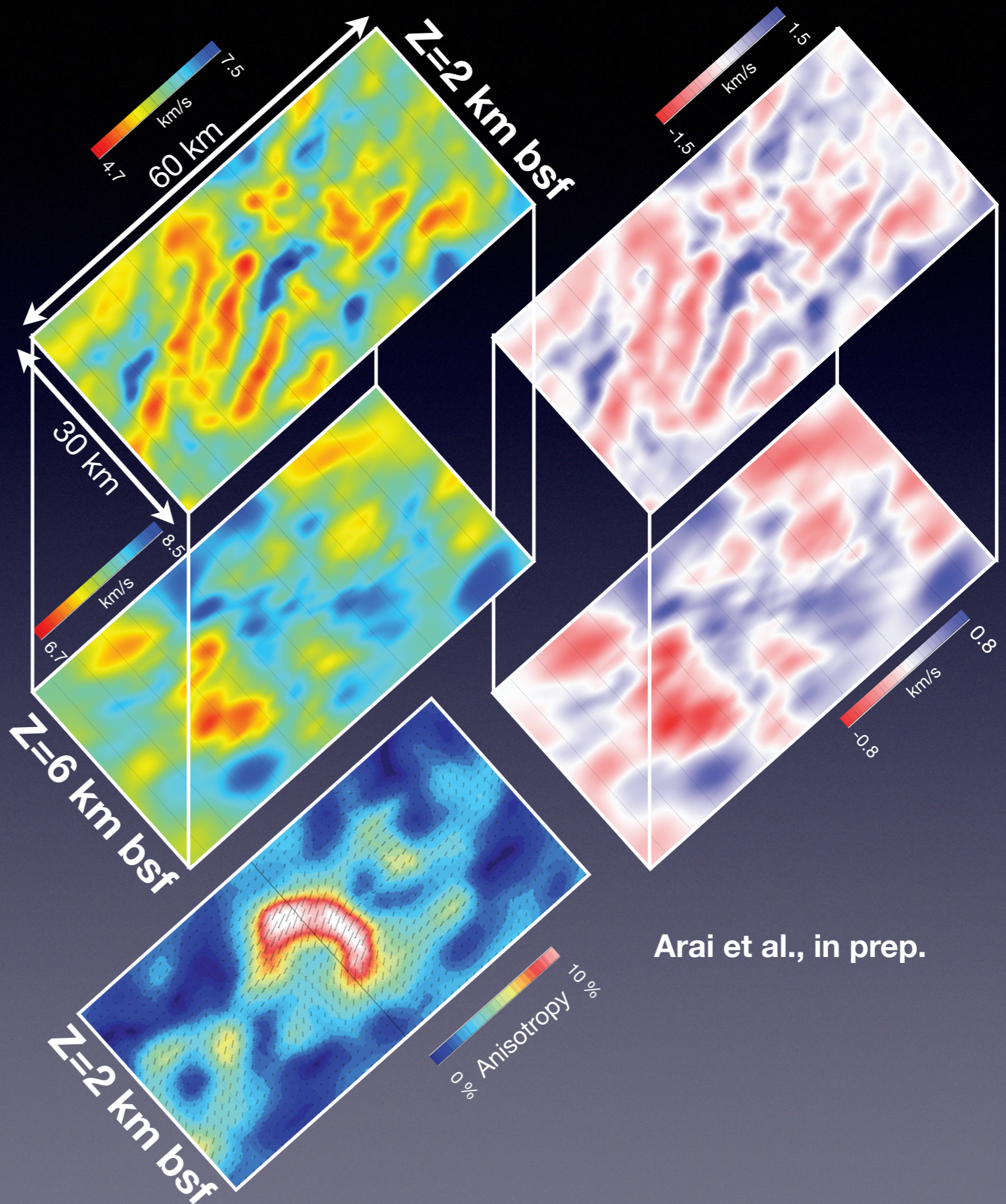
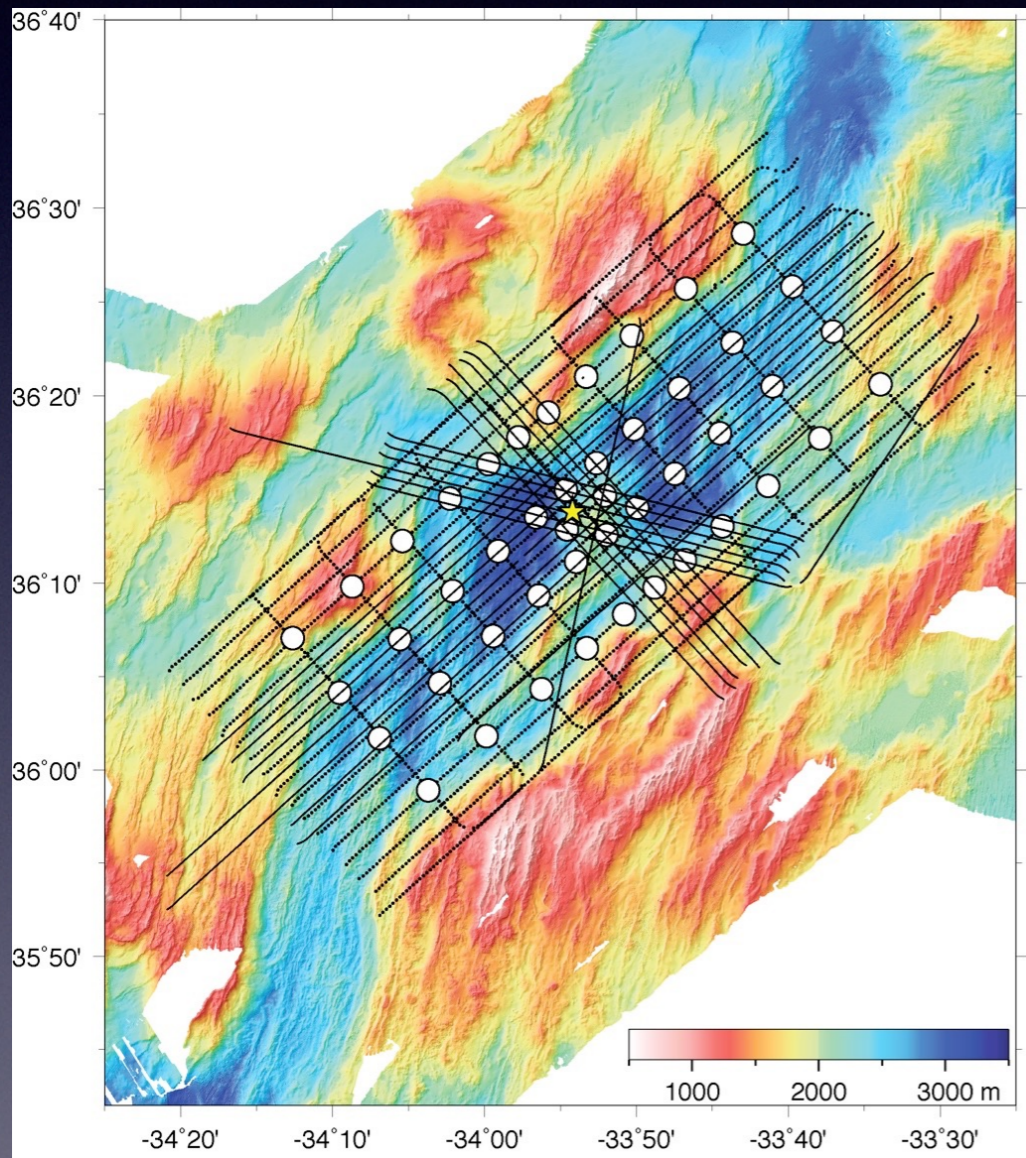
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Multibeam Bathymetry and Potential Fields Surveys



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3D OBS Tomography Experiment

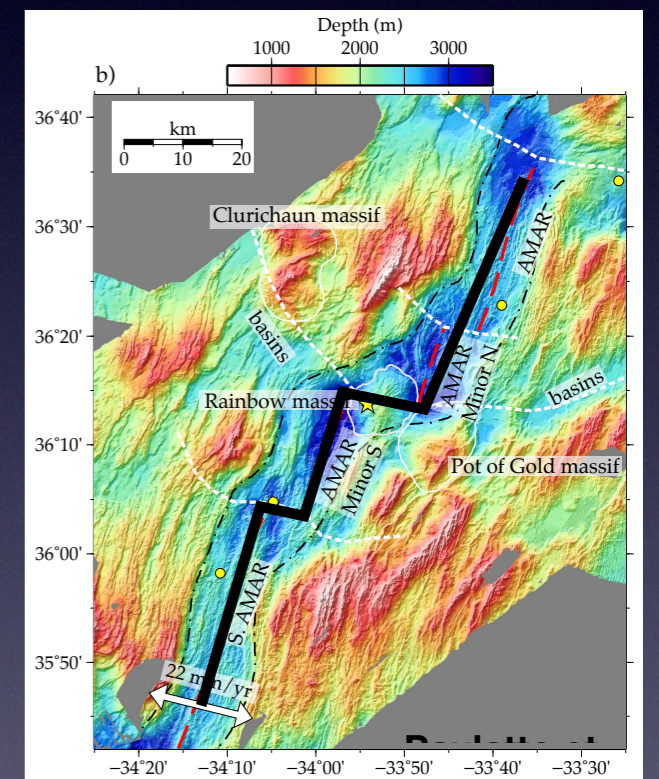
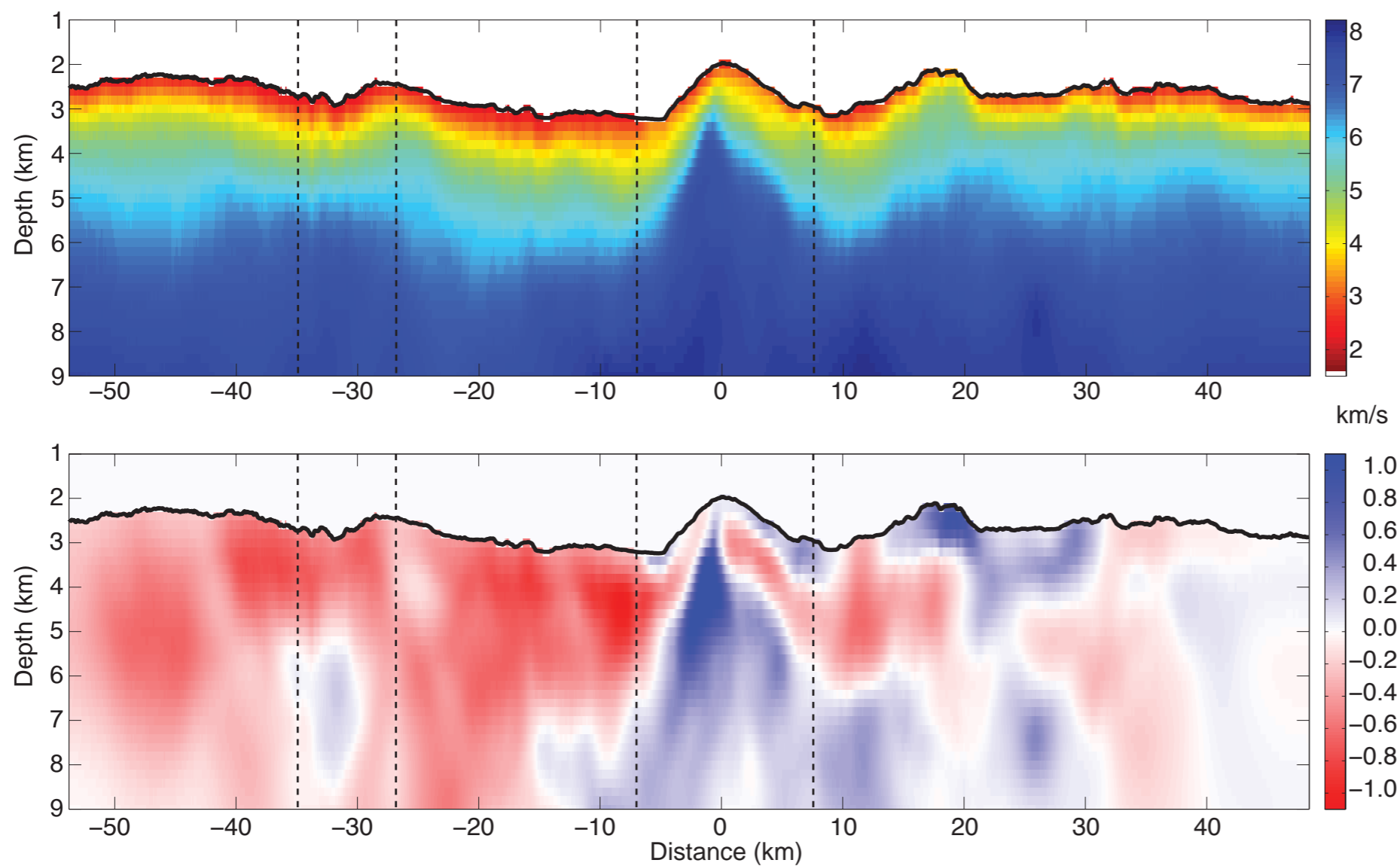


Arai et al., in prep.

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3D OBS Tomography Experiment

S. AMAR **AMAR minor S** **AMAR minor N** **AMAR**

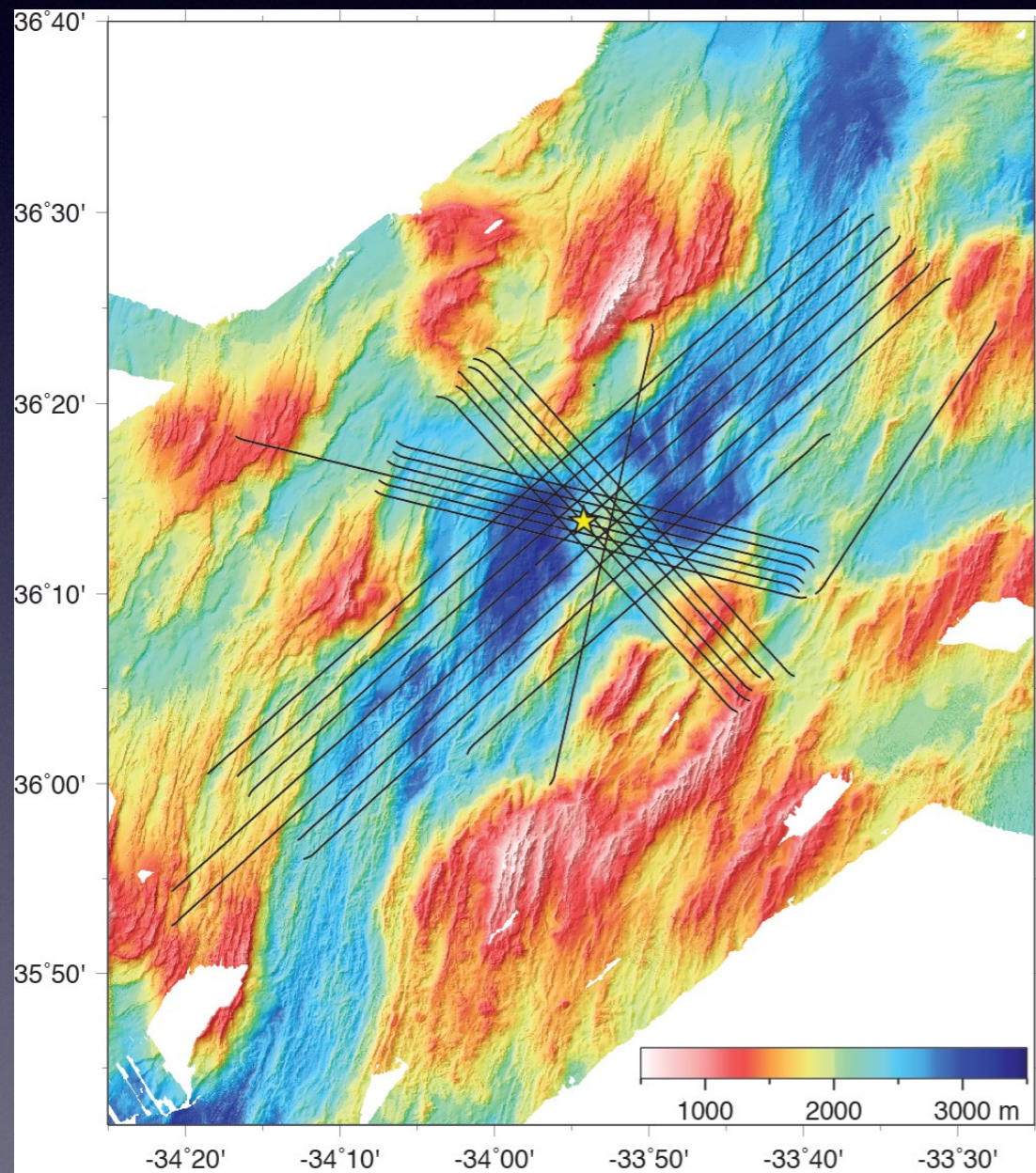


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2D Multichannel Seismic Reflection Profiles

Data Acquisition

- 8-km-long streamer, 636 channels, 12.5 m group spacing
- Source volume: 6,600 cu.in. (36 units)
- Source pressure: 2000 psi
- Source interval: 37.5 m



Processing

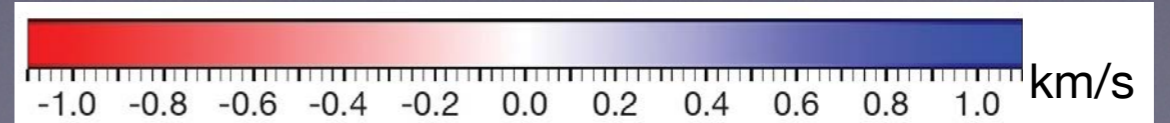
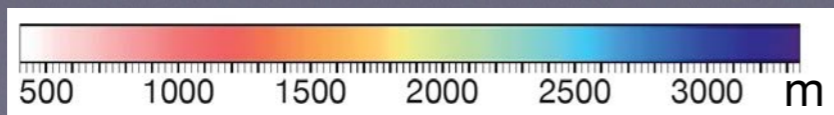
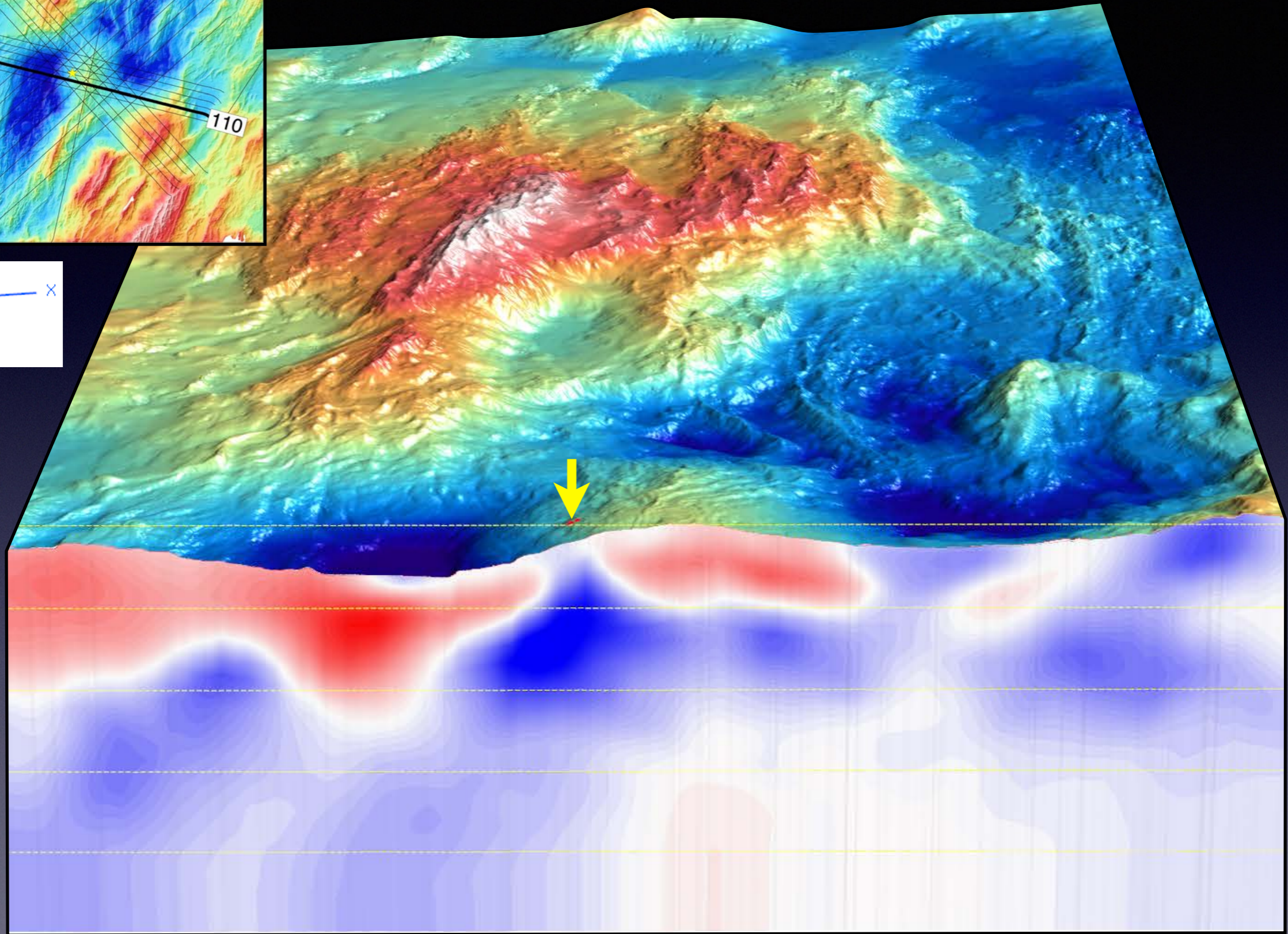
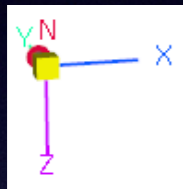
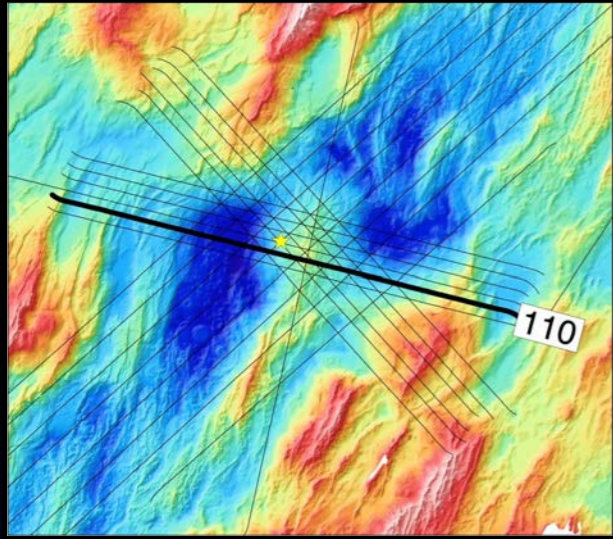
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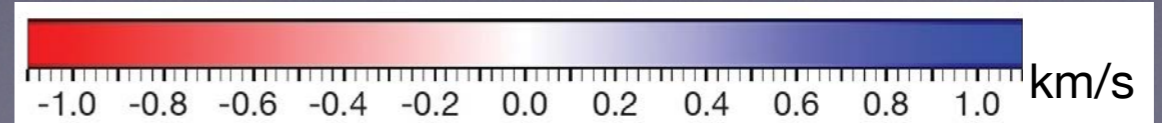
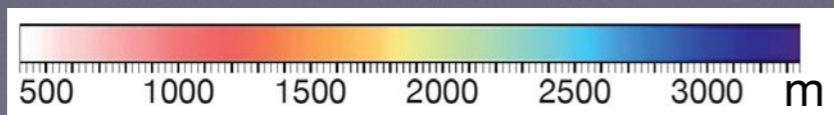
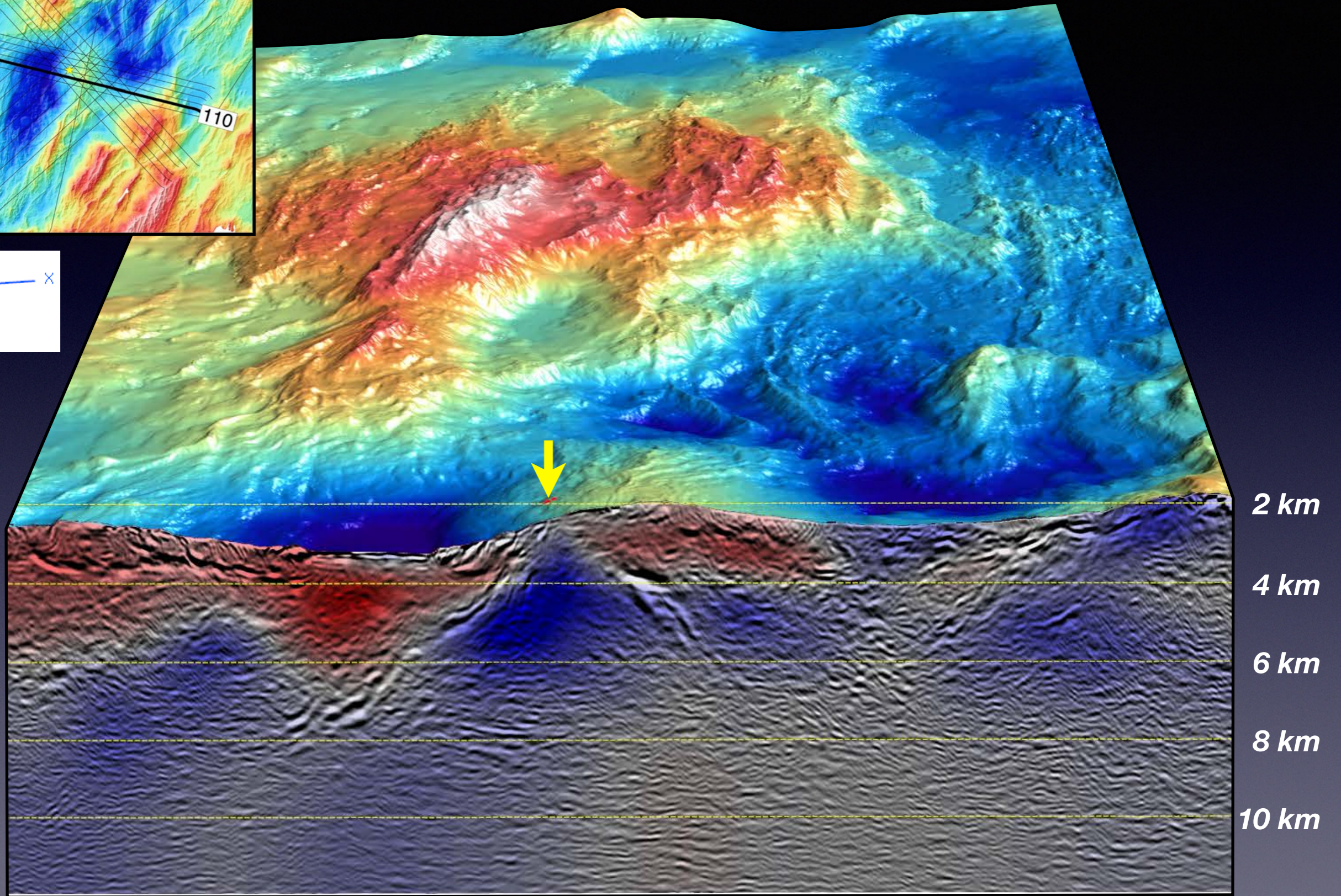
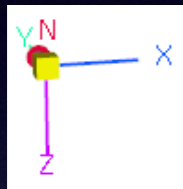
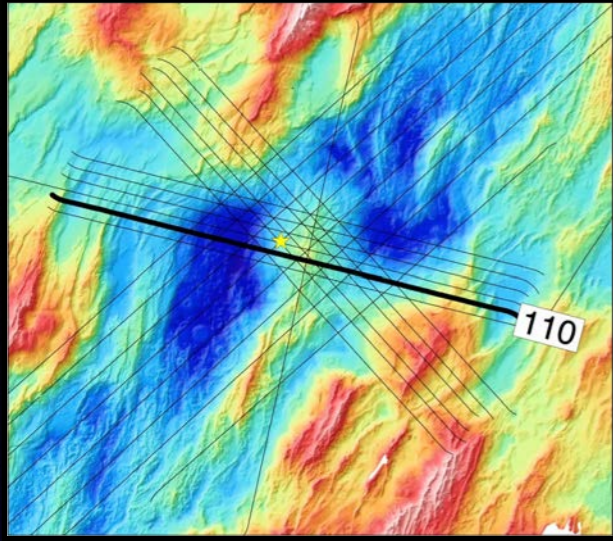
- Geometry definition (6.25 m CMP bin, max. fold 106)
- Bandpass filtering
- Spherical divergence correction
- Spike noise suppression (LIFT method)
- Surface-consistent amplitude balancing
- Source wavelet deconvolution
- Bottom mute below first free-surface multiple

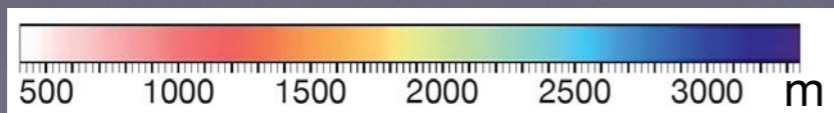
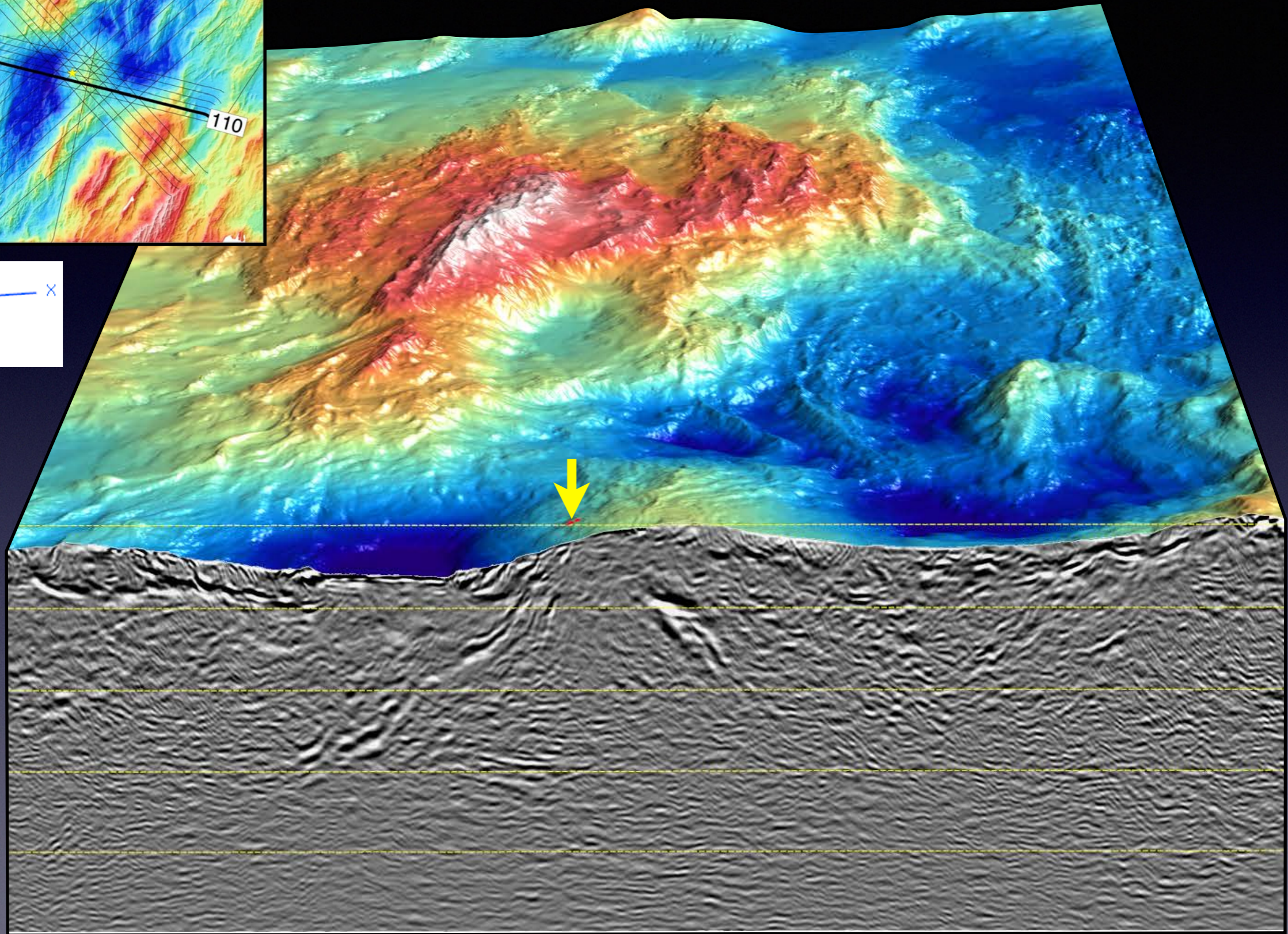
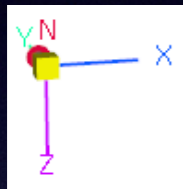
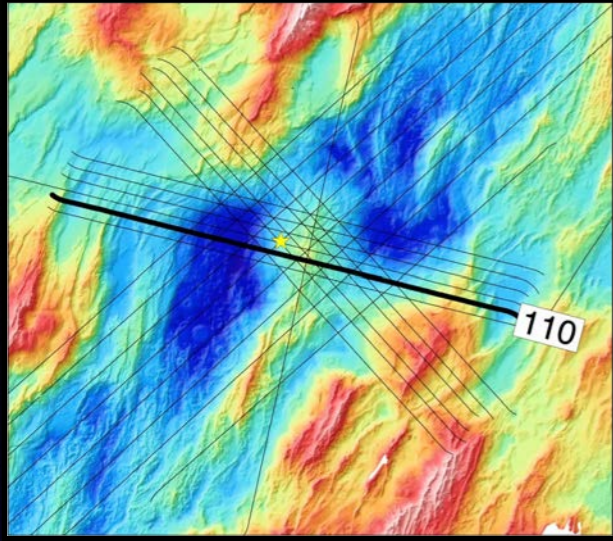
2. Pre-Stack Depth Migration (wave equation-based FX using OBS-derived anisotropic V_p volume)

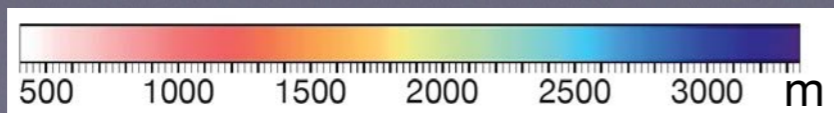
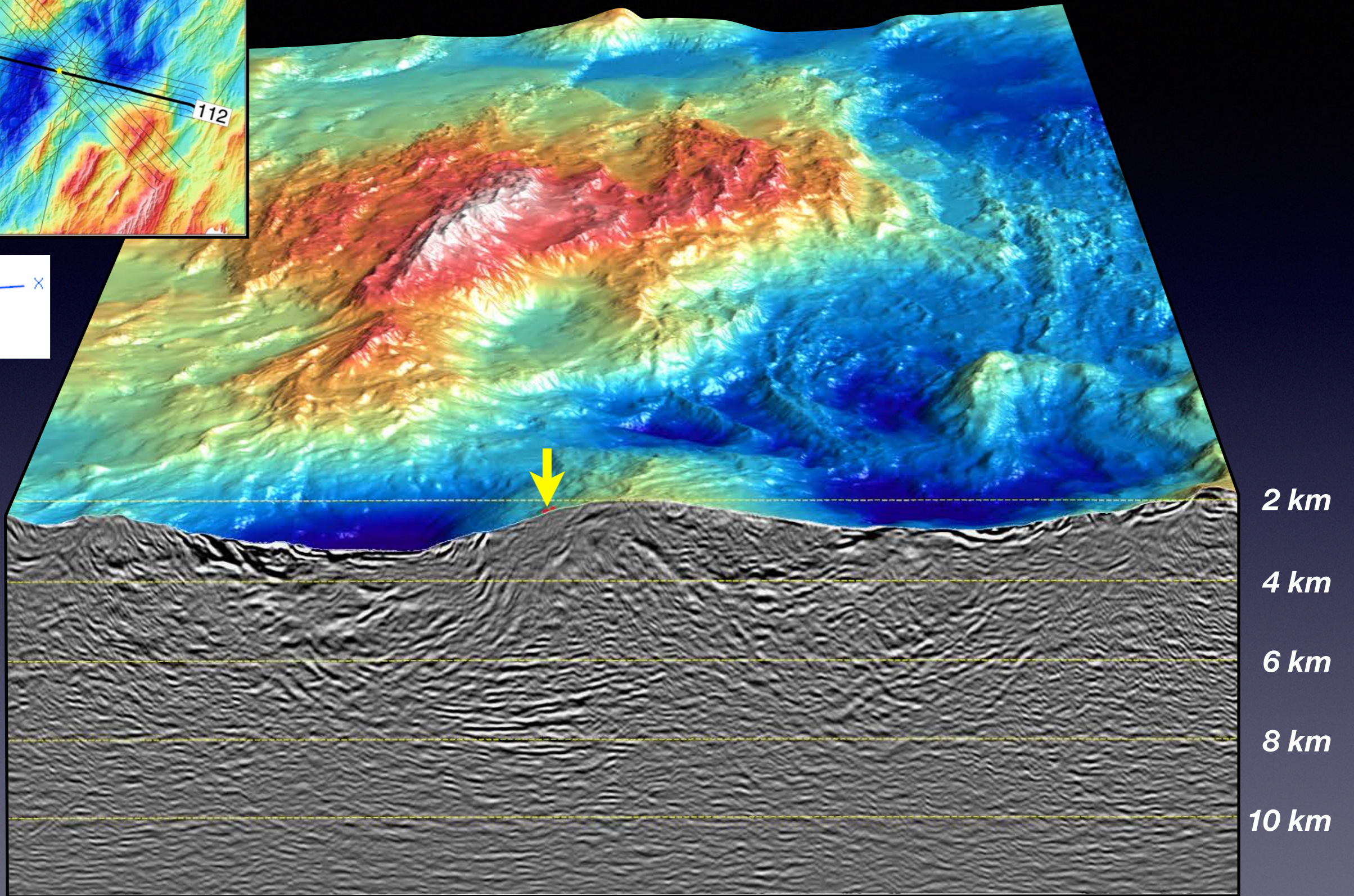
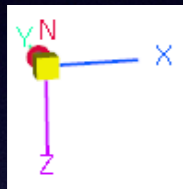
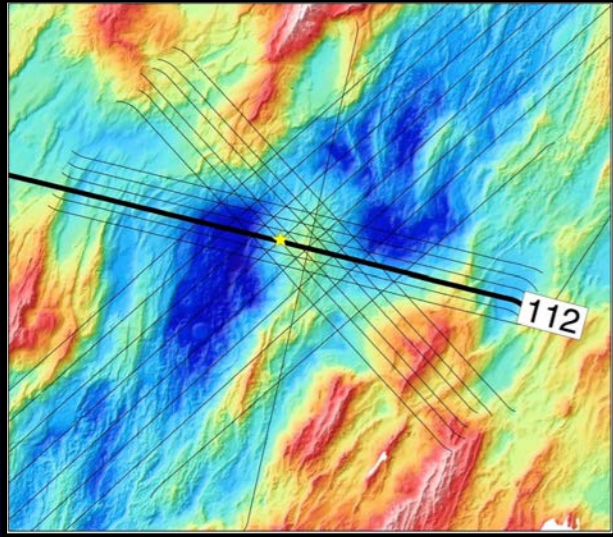
3. Post-migration Image Enhancement

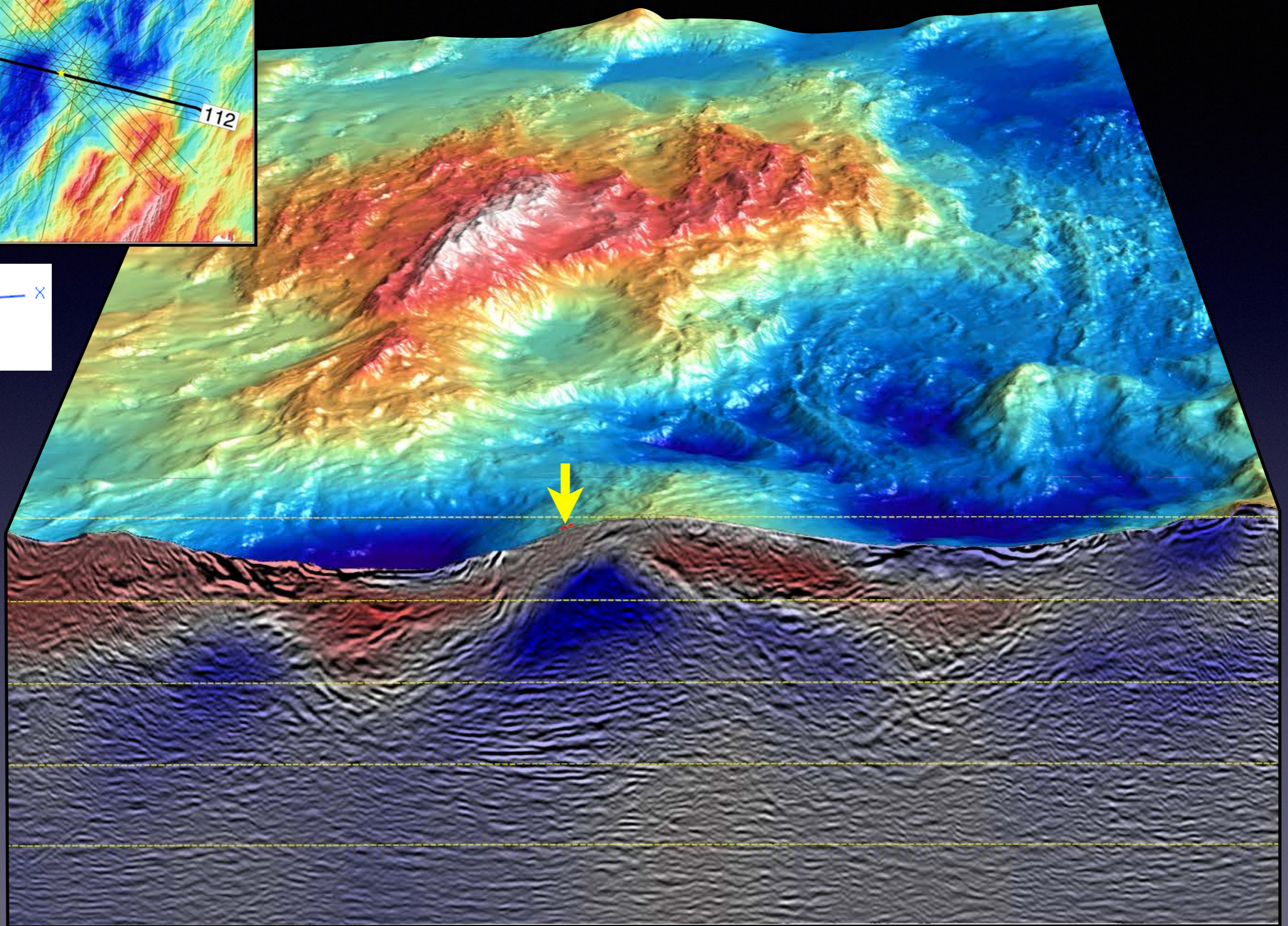
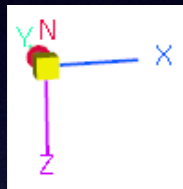
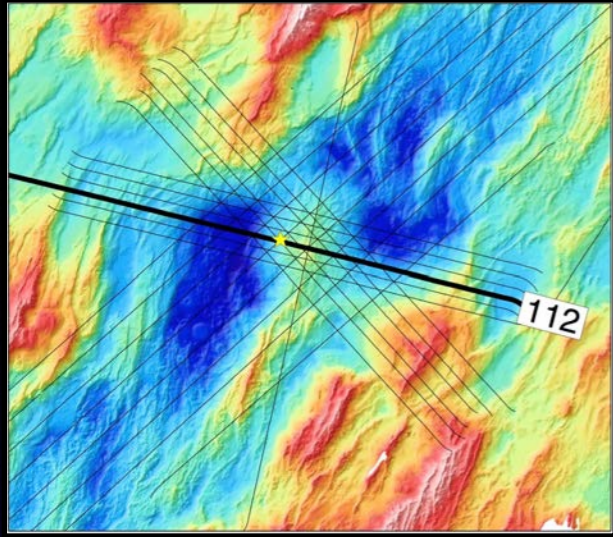
- Long-wavelength-pass filter (200-83 m)
- F-K enhancement of flat or dipping events
- Lateral running mean filter
- Depth-dependent gain











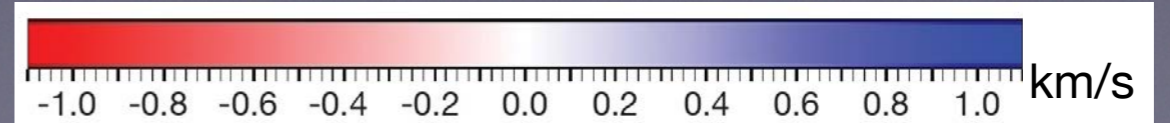
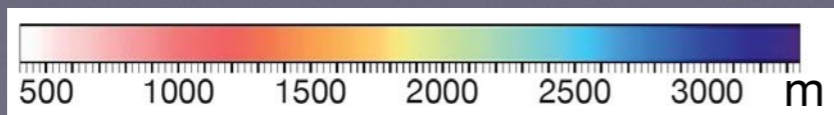
2 km

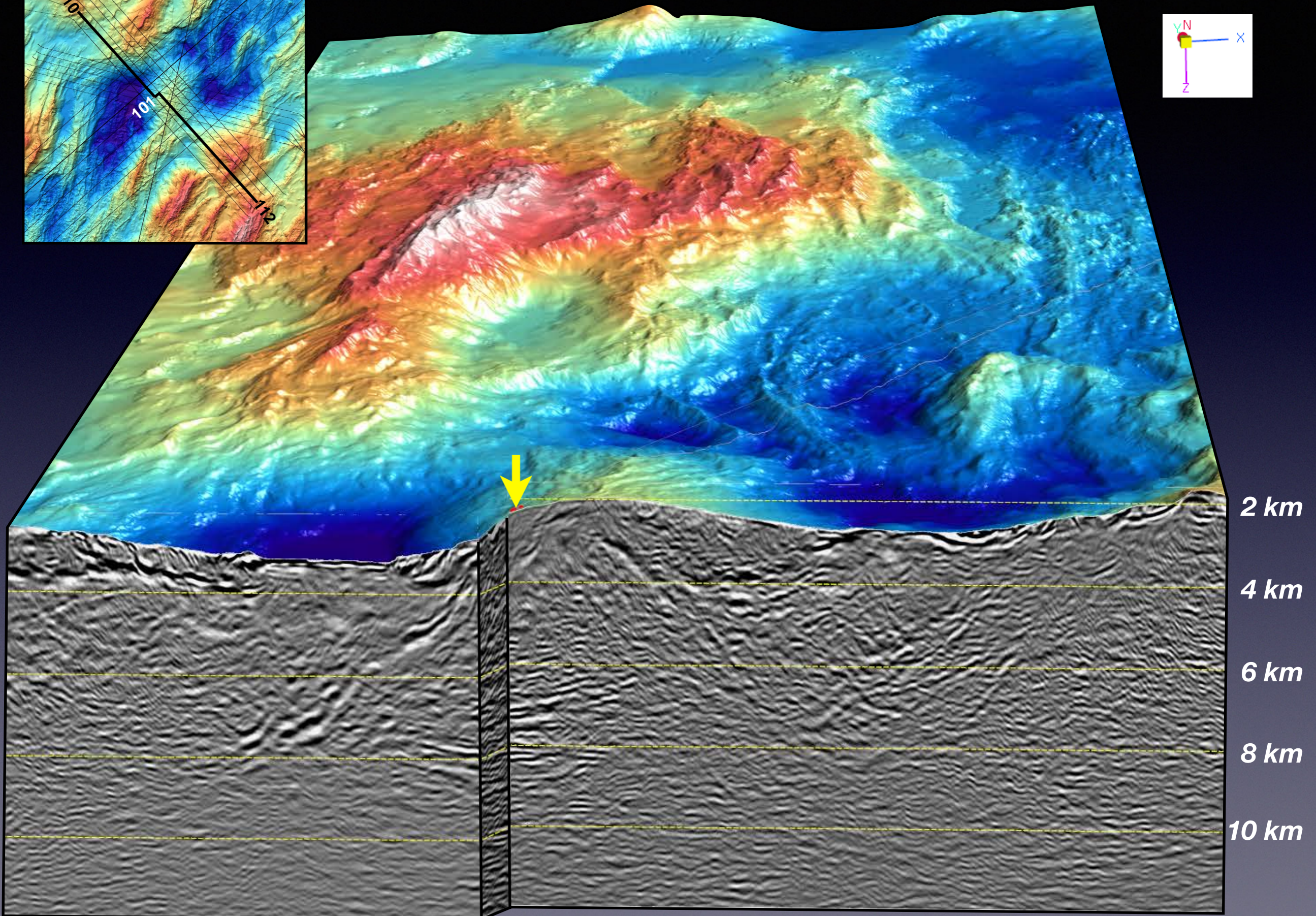
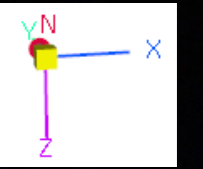
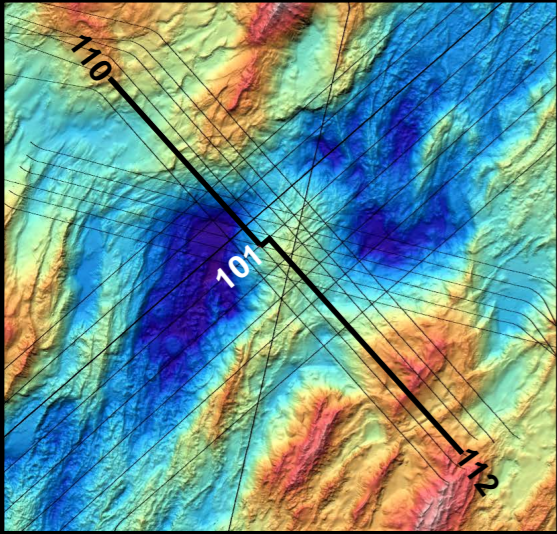
4 km

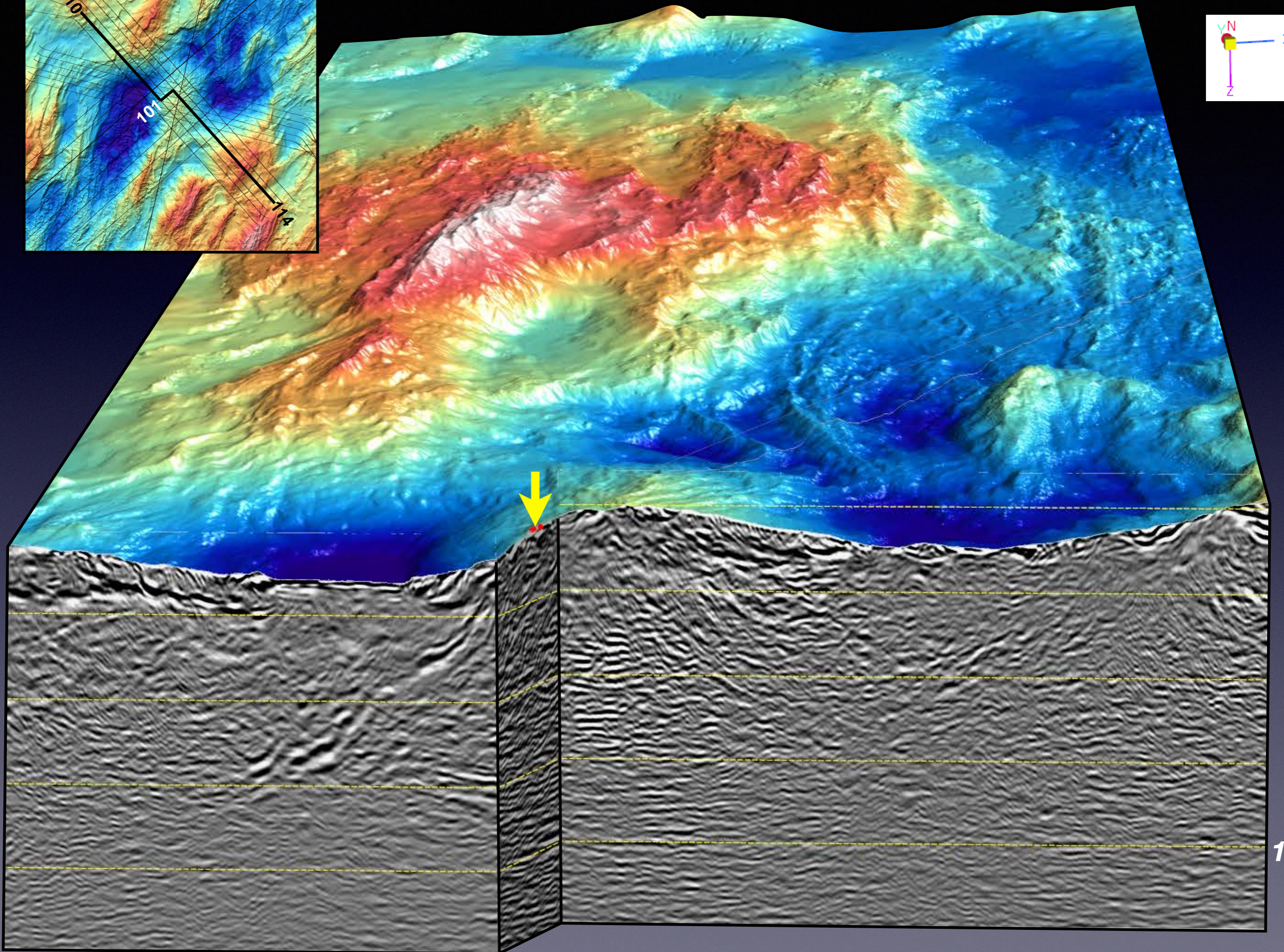
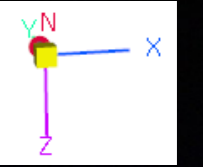
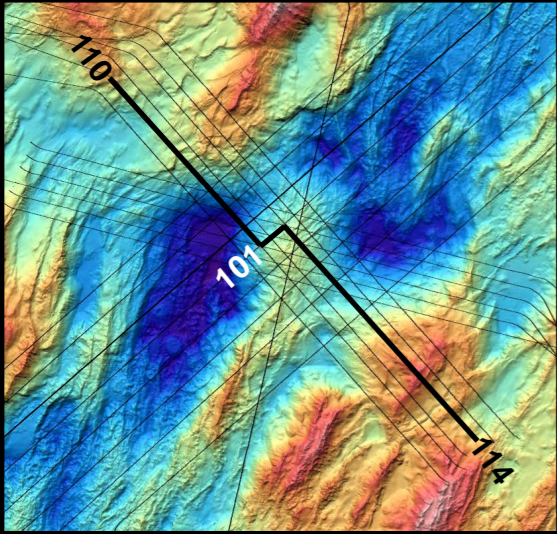
6 km

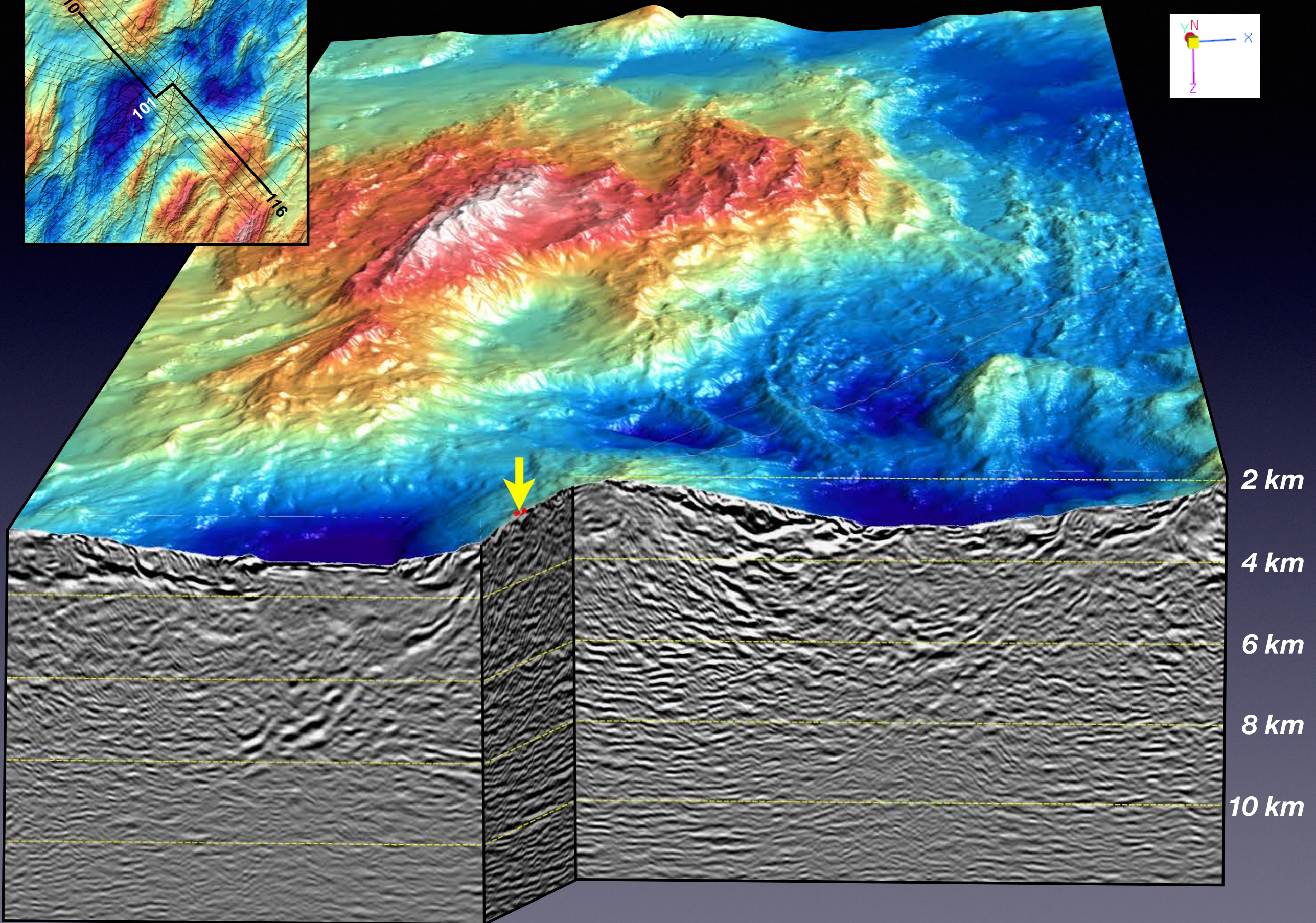
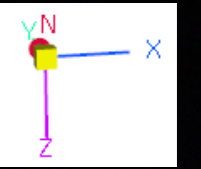
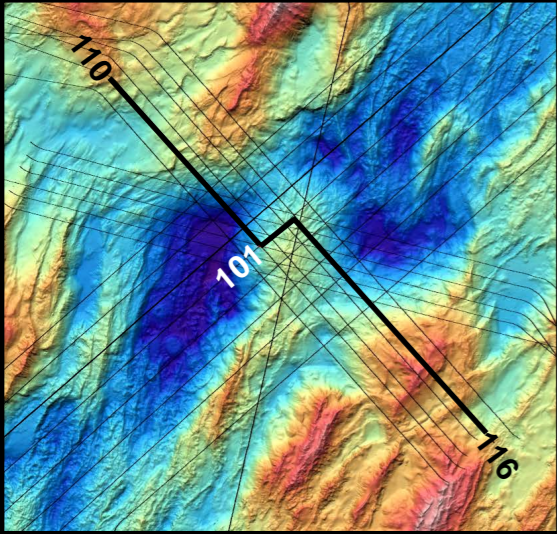
8 km

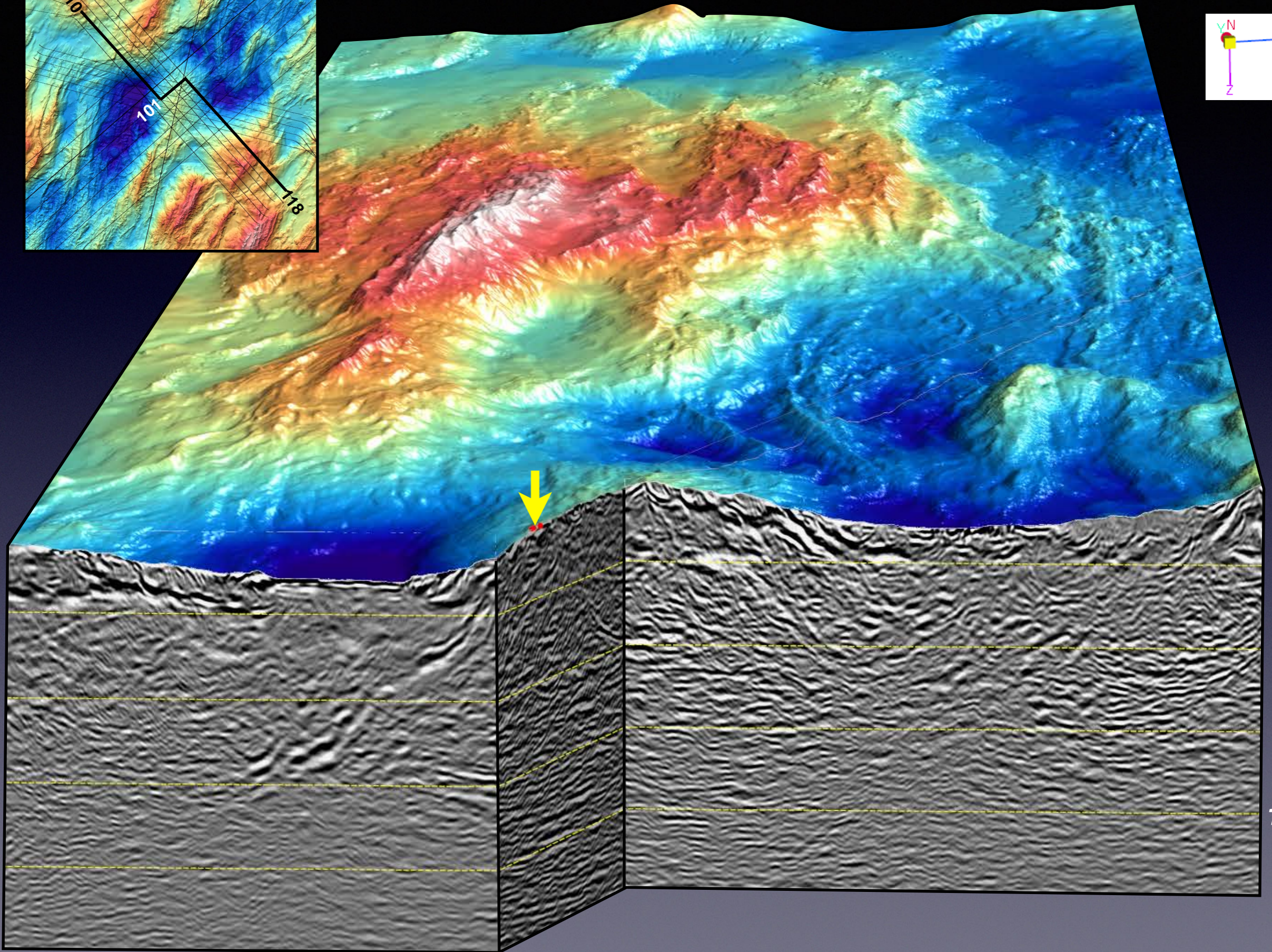
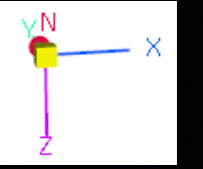
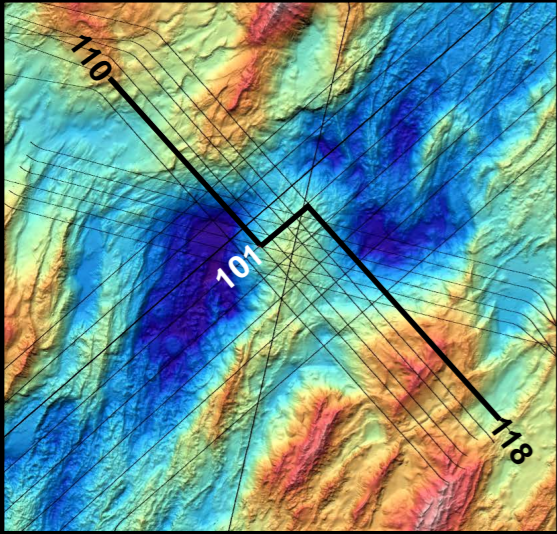
10 km









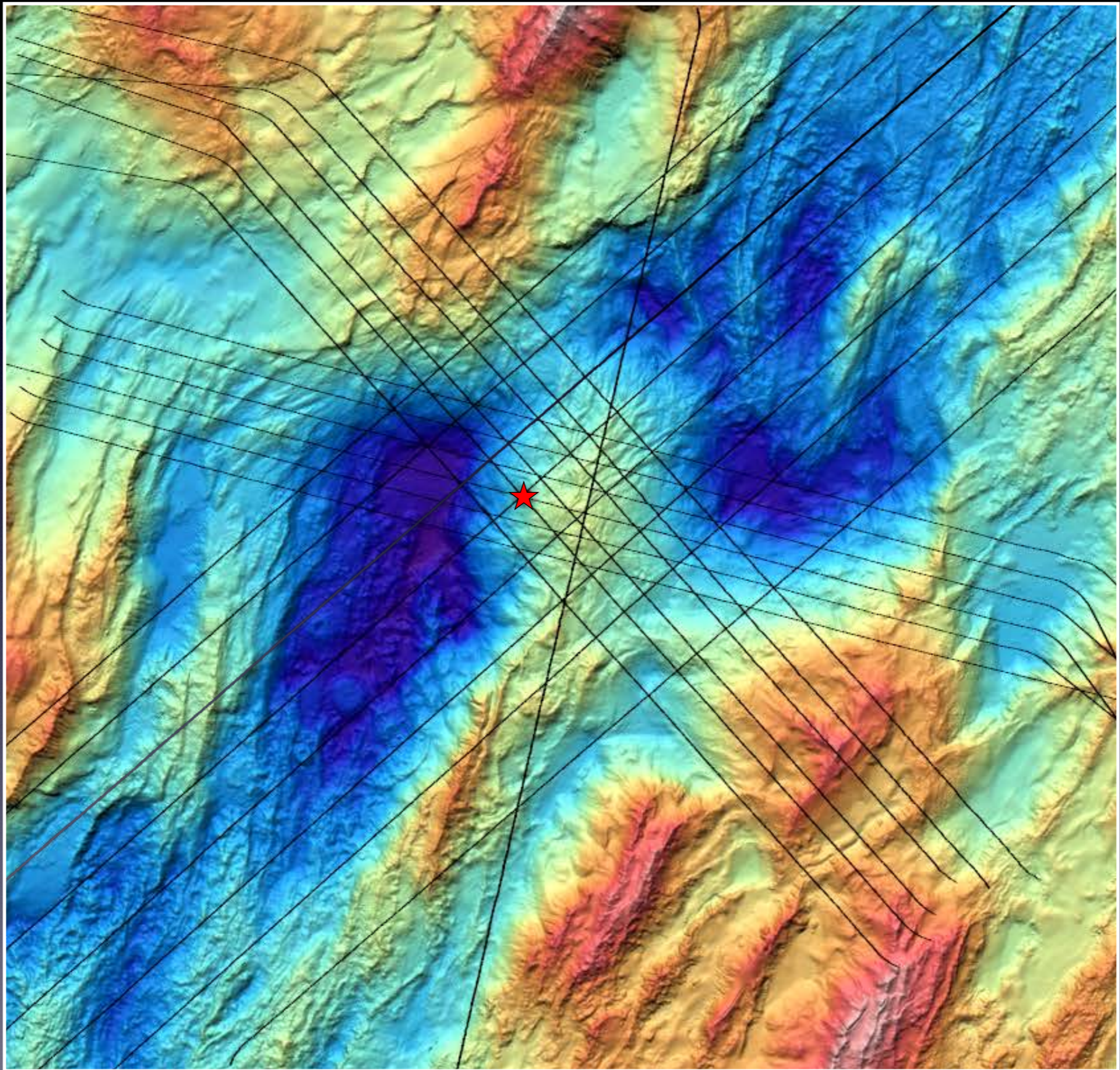


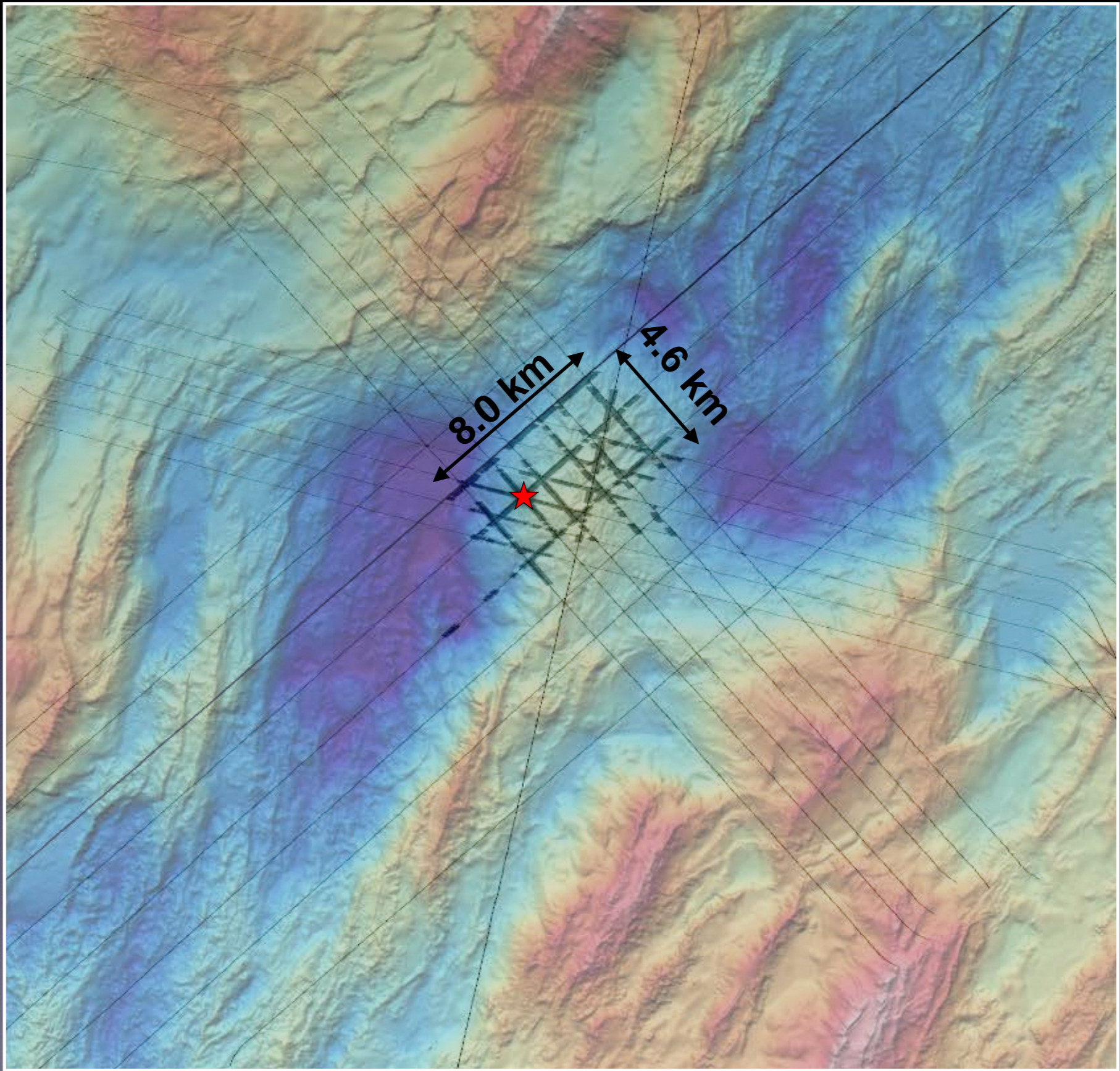
4 km

6 km

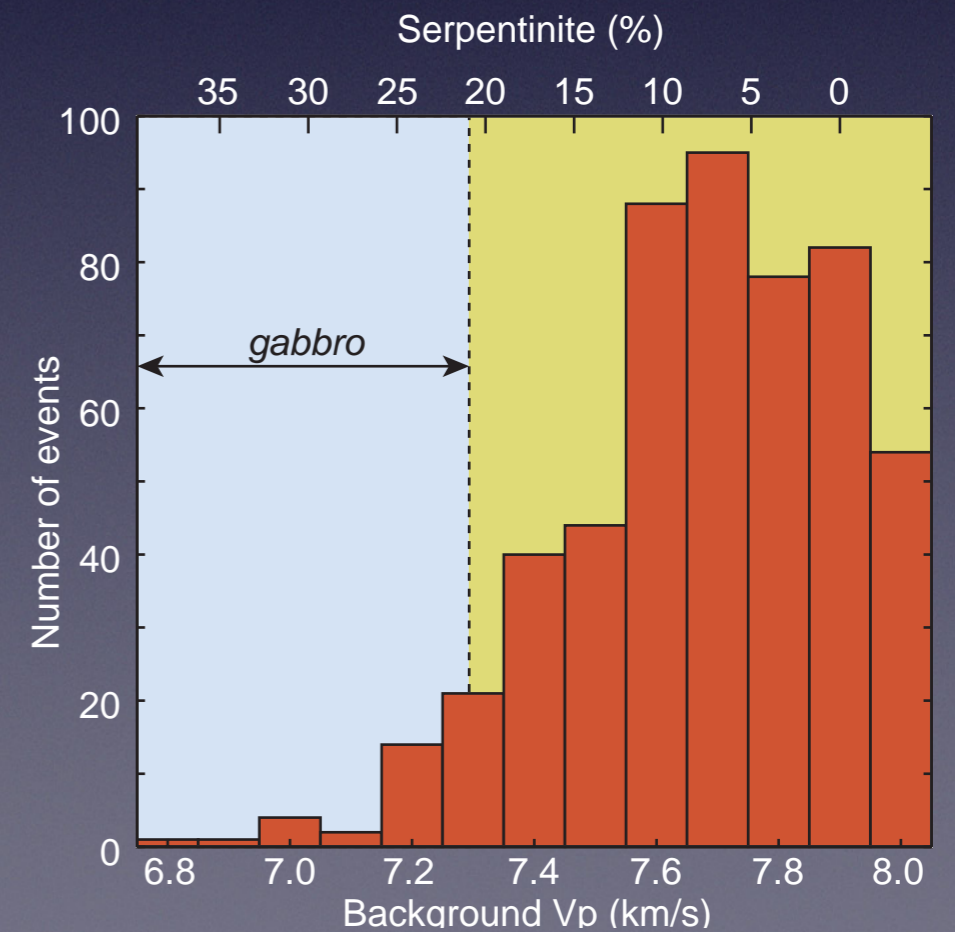
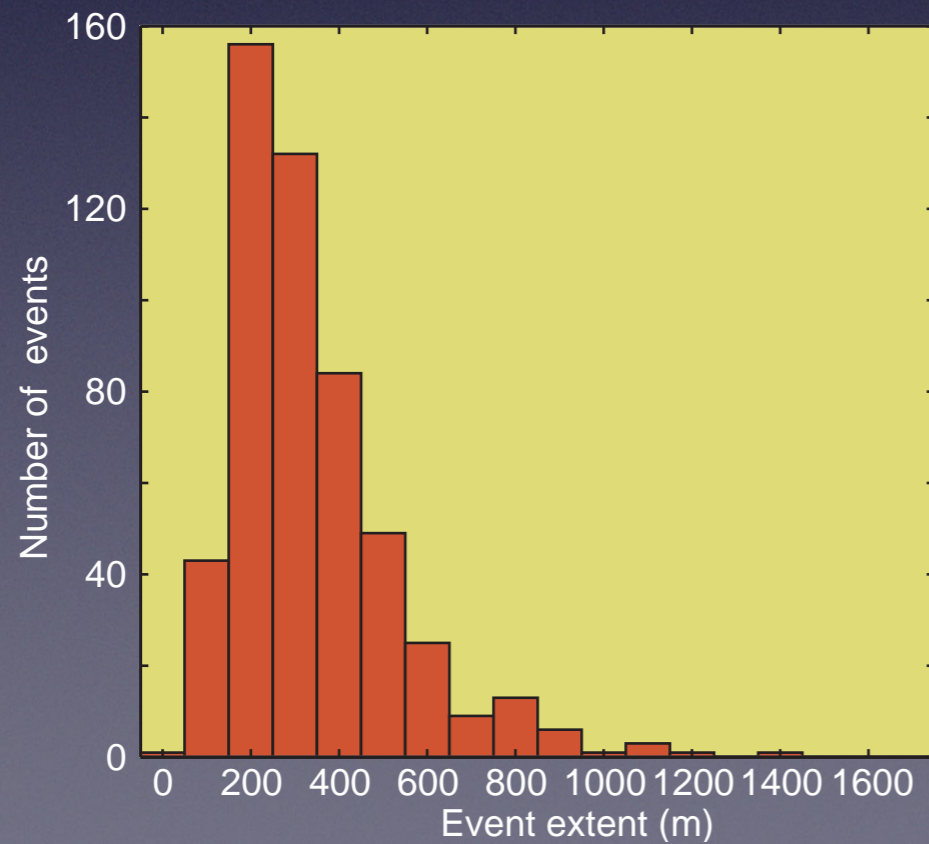
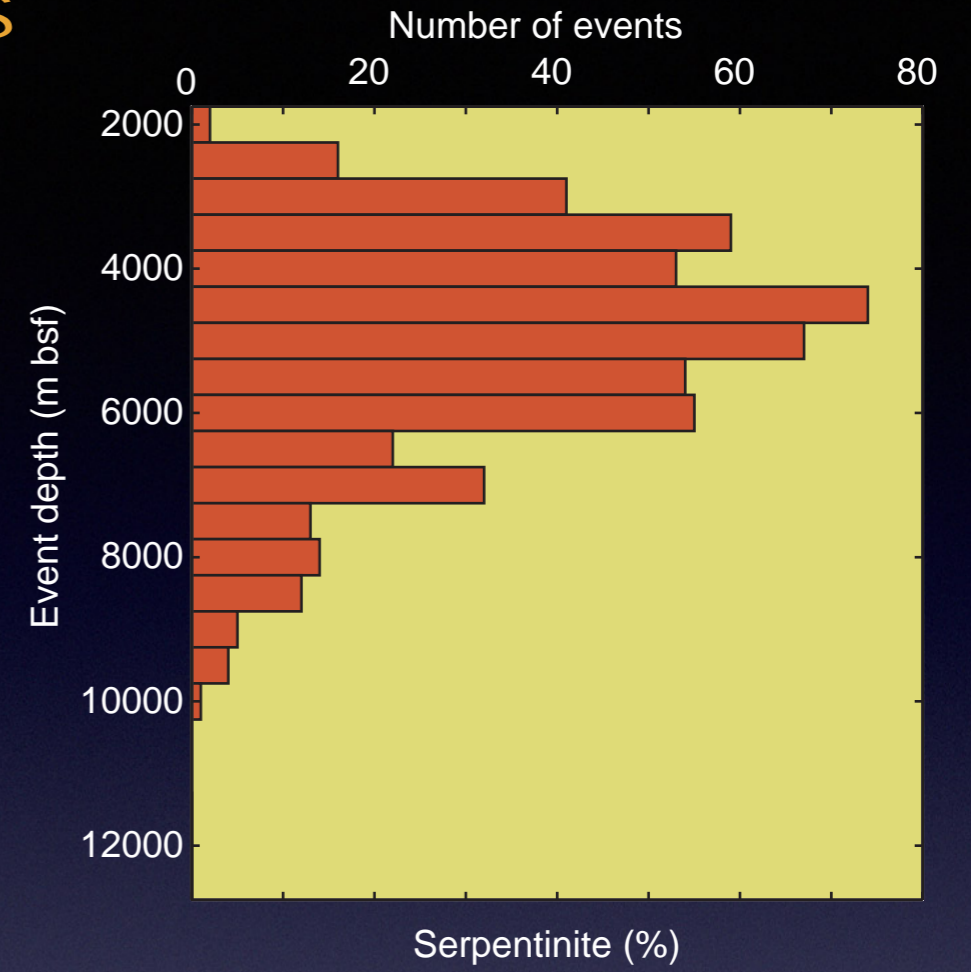
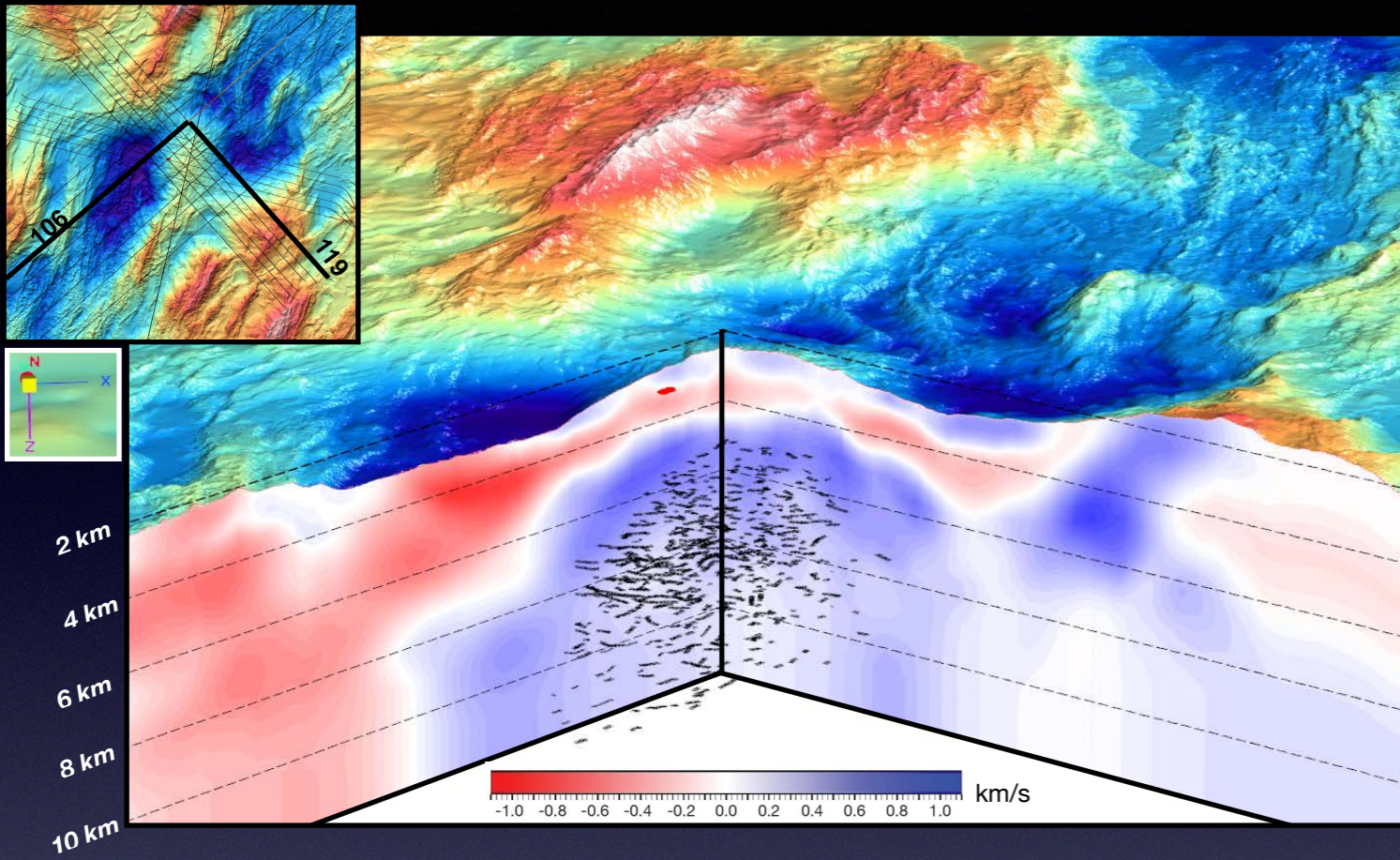
8 km

10 km





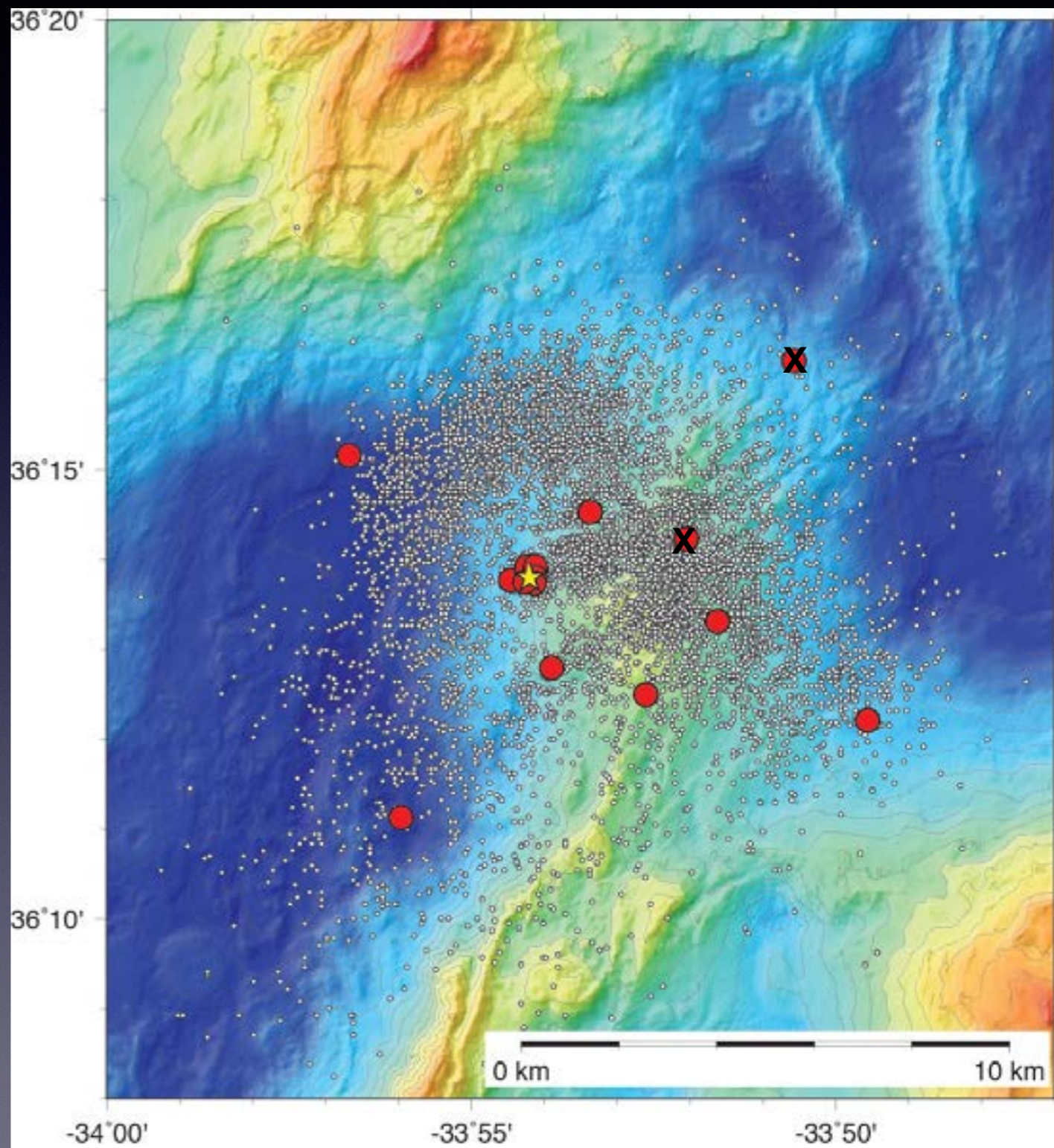
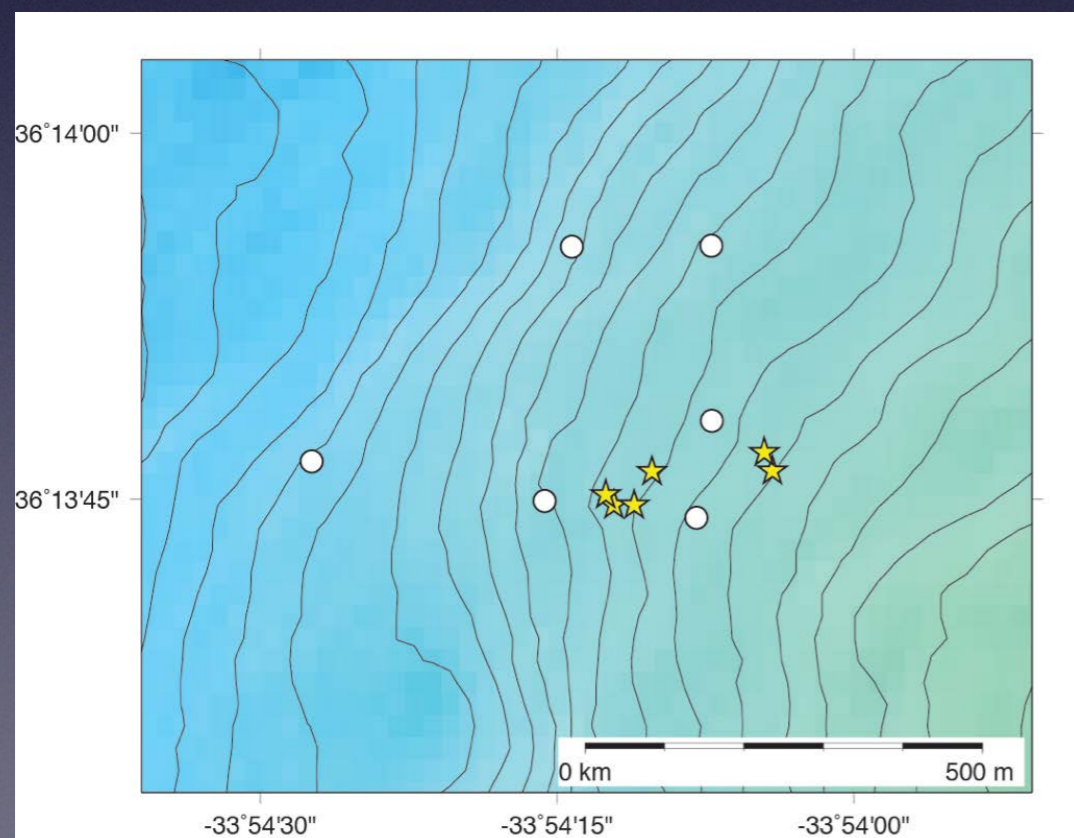
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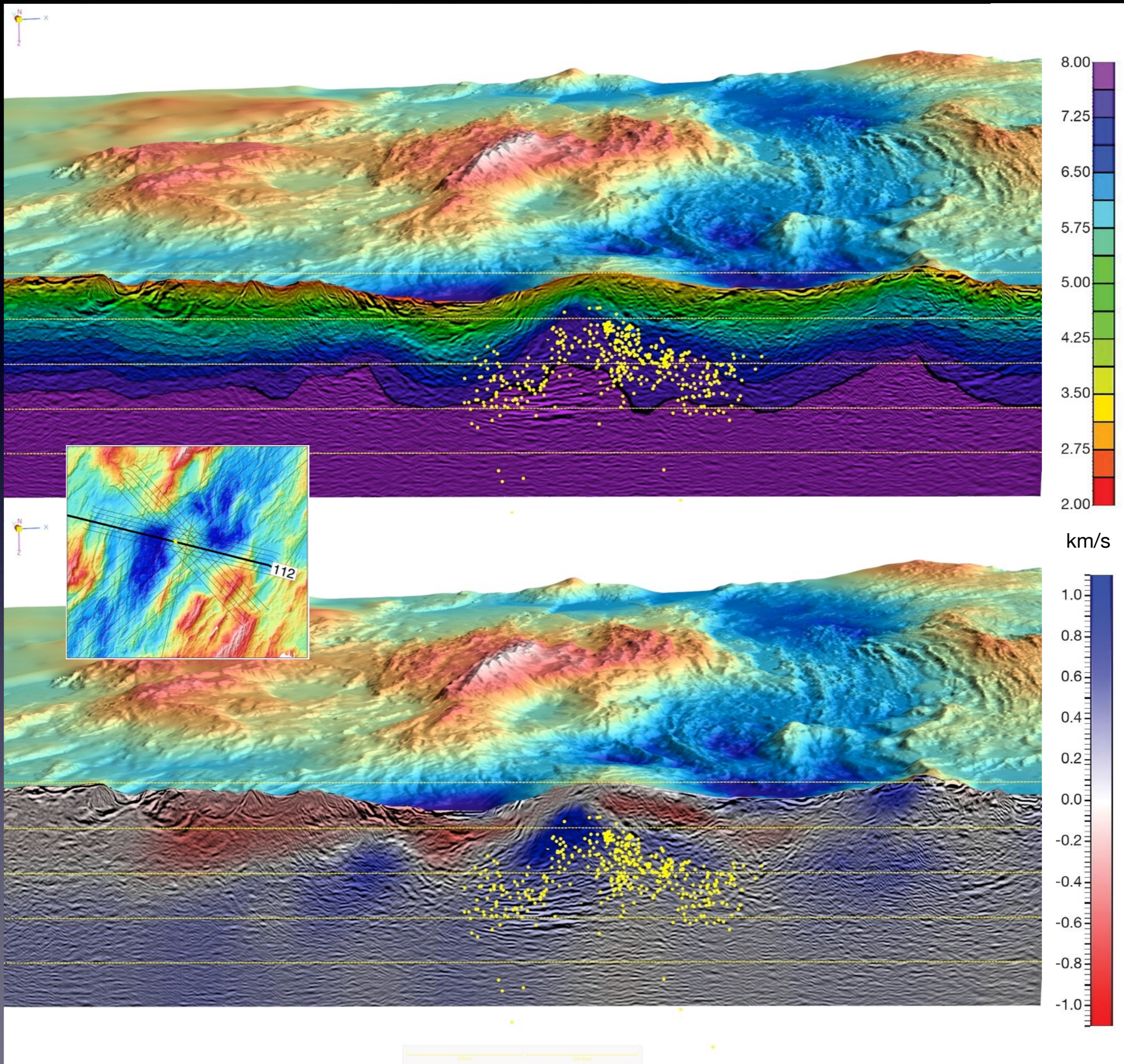


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Passive Microseismicity Survey

- 9-month deployment
- 15 OBS deployed, 13 recovered
- >20,000 events (only 8,000 displayed)
- Polarities do not fit double-couple mechanism





Summary of MGL1305 Datasets and Results

