

Exploration Syndicate, Inc.

Airborne AFMAG and the
ZTEM Exploration System

January 2008

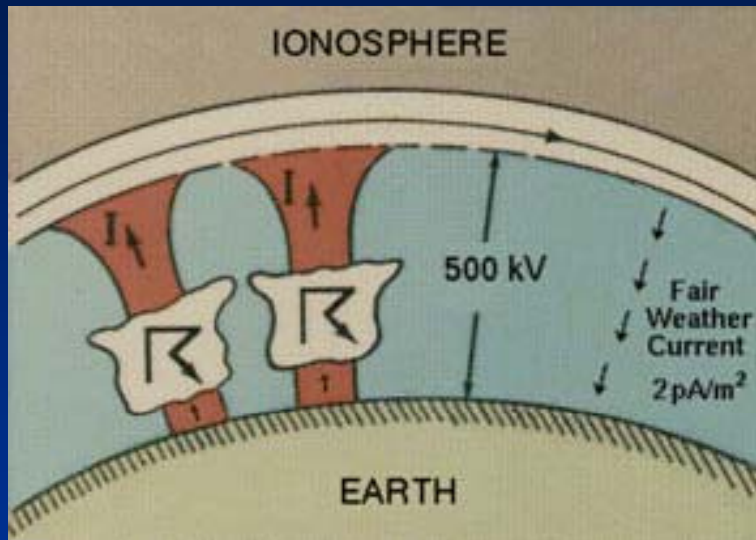


Outline

- Introduction to AFMAG and the ZTEM System
- ZTEM Test Survey
- 3D Presentation in Discover
- Conclusions and Recommendations

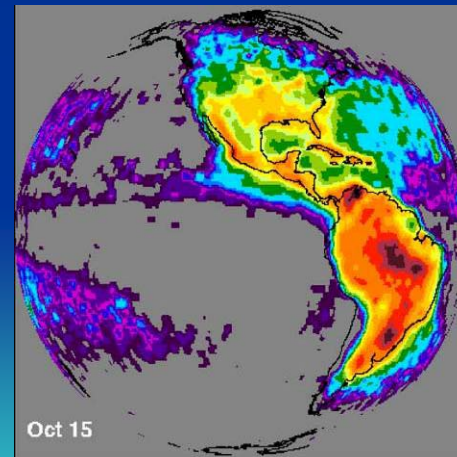
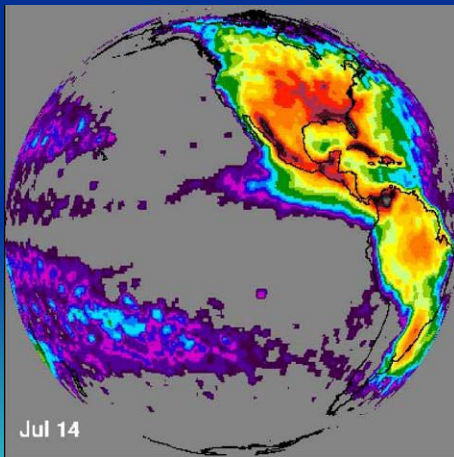
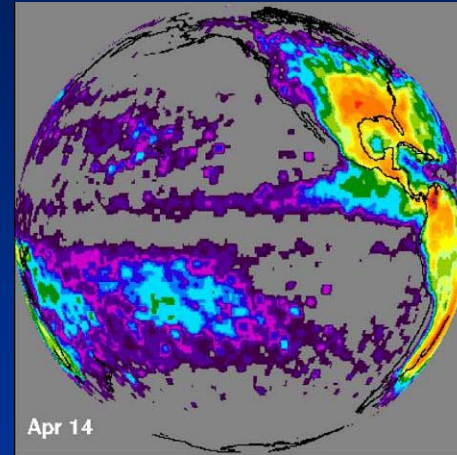
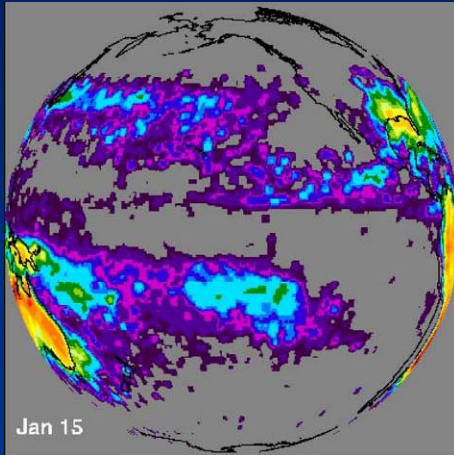


AFMAG – Where is the EM Transmitter?

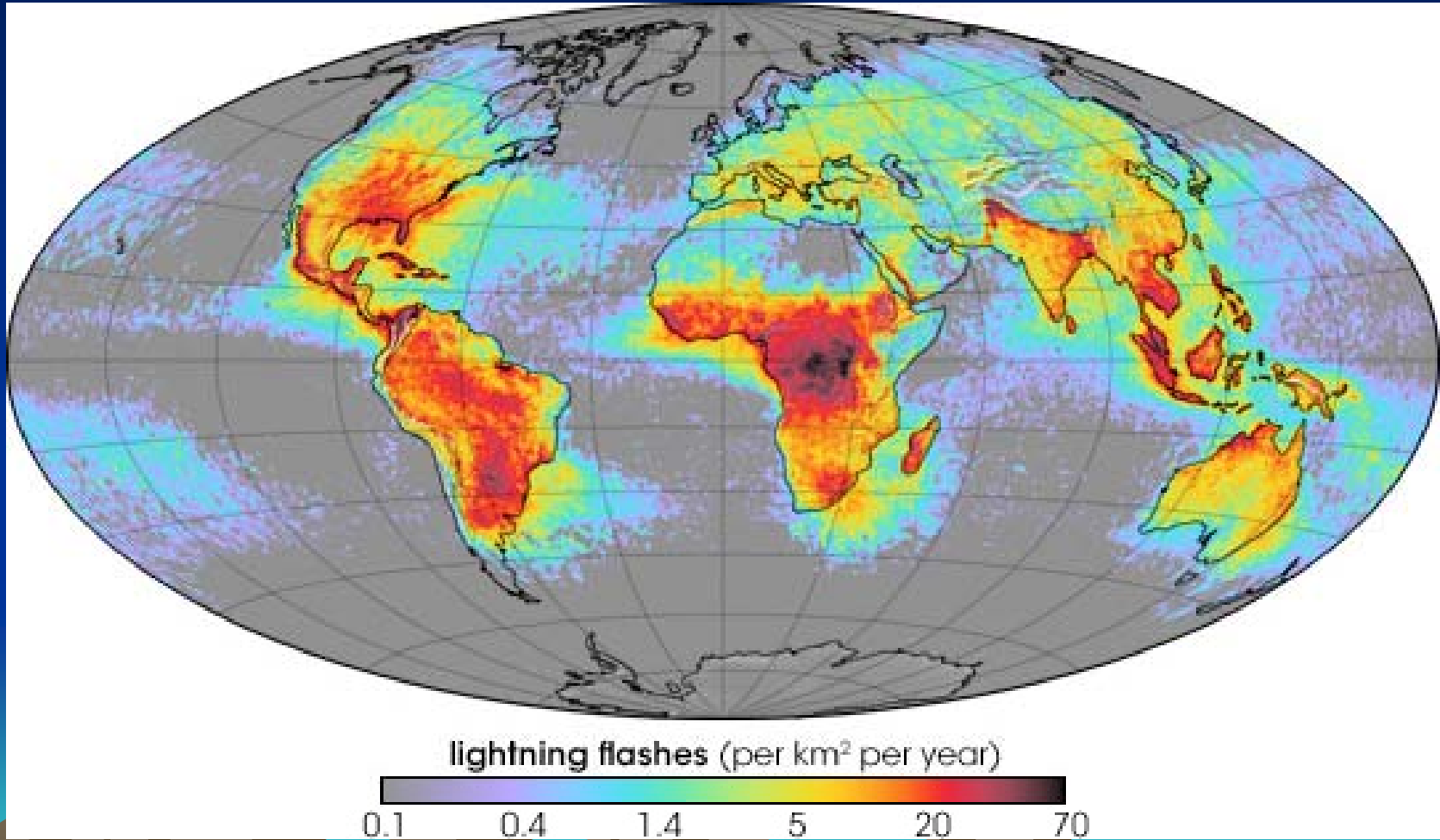


- During fair weather, there is a potential difference of 200,000 to 500,000 Volts existing between the Earth's surface and the ionosphere.
- Almost 1 ampere of current flows into the stratosphere during the active phase of a typical thunderstorm.
- Therefore, to maintain the fair weather global electric current flowing to the surface, one to two thousand thunderstorms must be active at any given time.

Pattern of Lightning Activity Over One Year in the Americas



Pattern of Lightning Activity

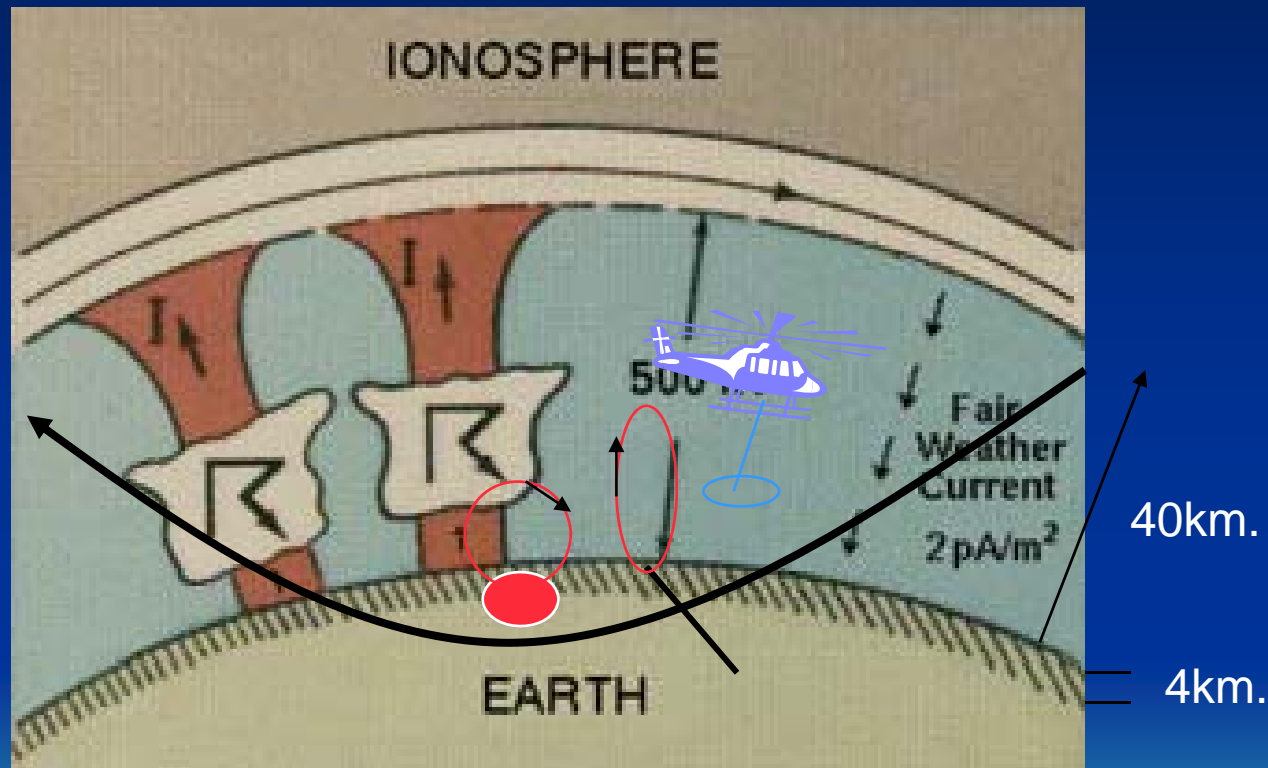


The Earth's Natural Electric Field is the AFMAG Transmitter

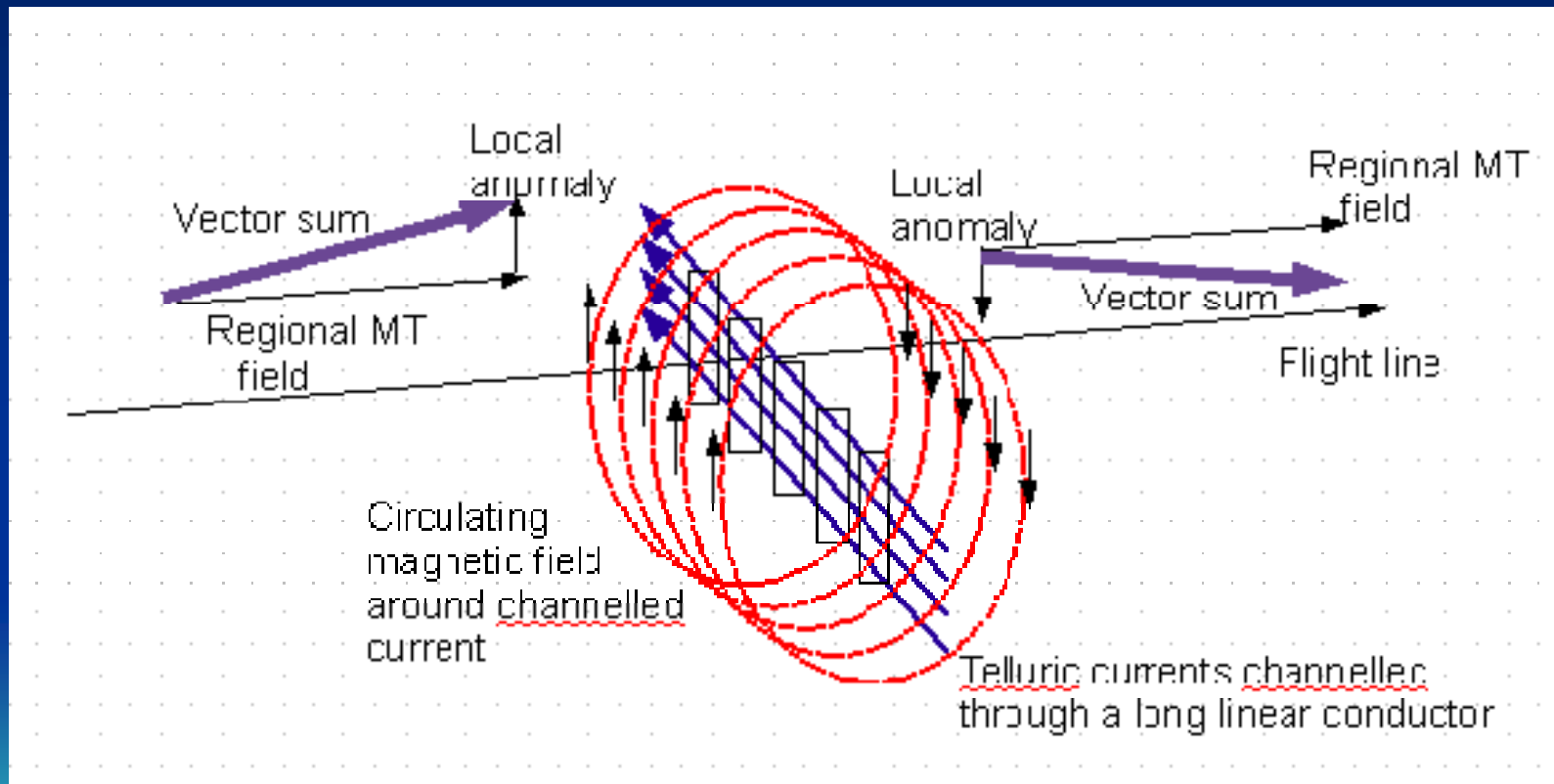
- Passive EM technique – does not have a man-made transmitter.
- Frequency range - “audio range” Geotech’s ZTEM AFMAG can operate from 22 to 2800 Hz (depending on the signal strength).
- The source is the natural field of Earth caused by lightning strikes at a distance.
- The Earth and the Ionosphere, both conductive, acts as a wave guide to “transmit” these energies a great distance.



The Earth's Natural Electric Field is the AFMAG Transmitter

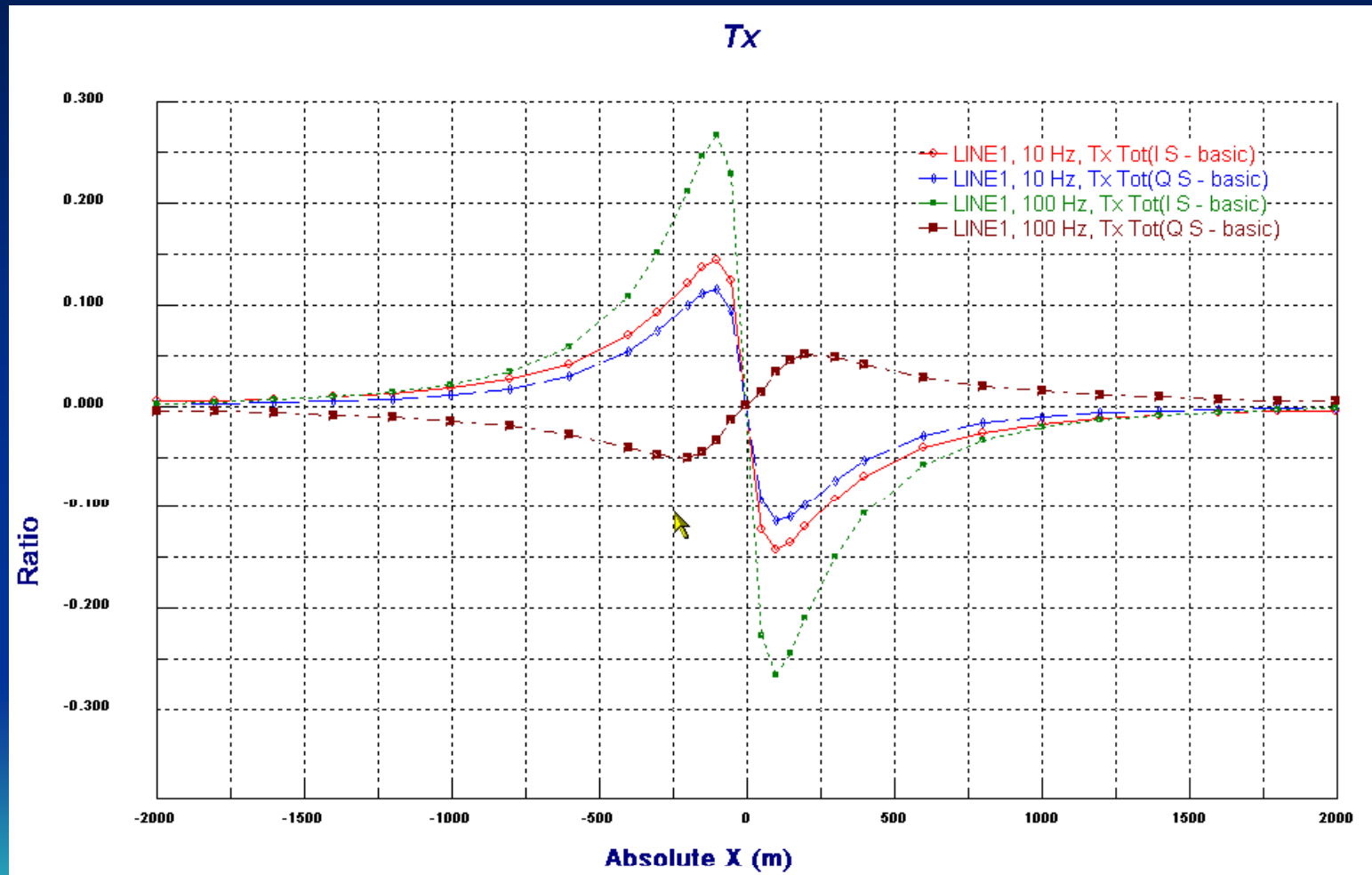


Anomaly from a Current Channelling Feature

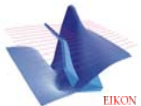


Airborne MT Models

Initial Model In-phase and Quad Response



(T_x) Inphase, Quad at 10 and 100Hz. Crossovers in In-phase and Quadrature.

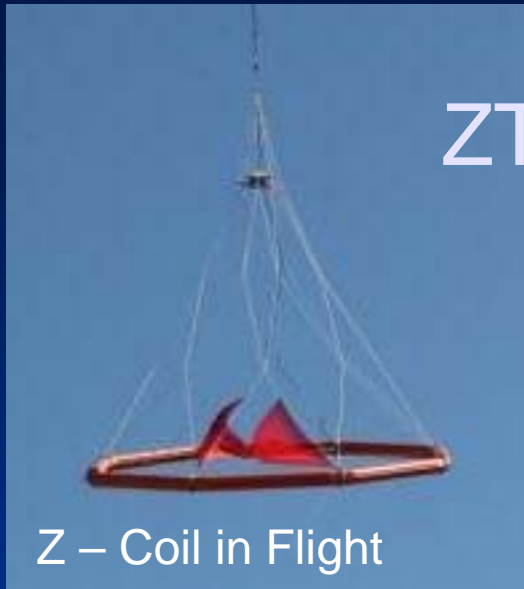


ZTEM Test Survey Results

April 2007



ZTEM Survey



Z – Coil in Flight



Z – Coil at Takeoff



X – Y Coils at Base Station



Simplified Geology in ZTEM Survey Area

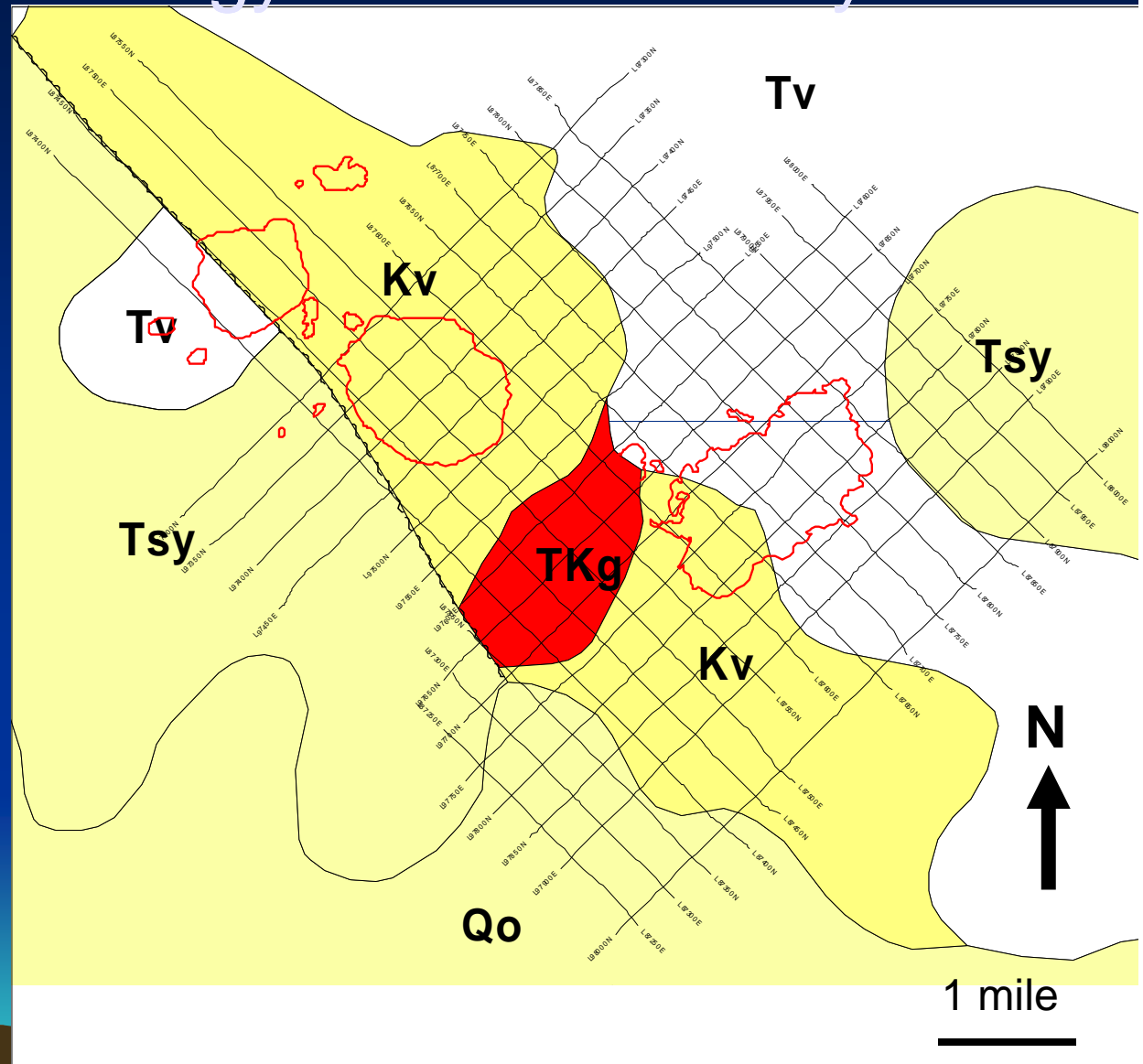
Qo=Surficial Deposits
(Holocene to mid Pleistocene)

Tsy=Sedimentary Rocks
(Pliocene to mid Miocene)

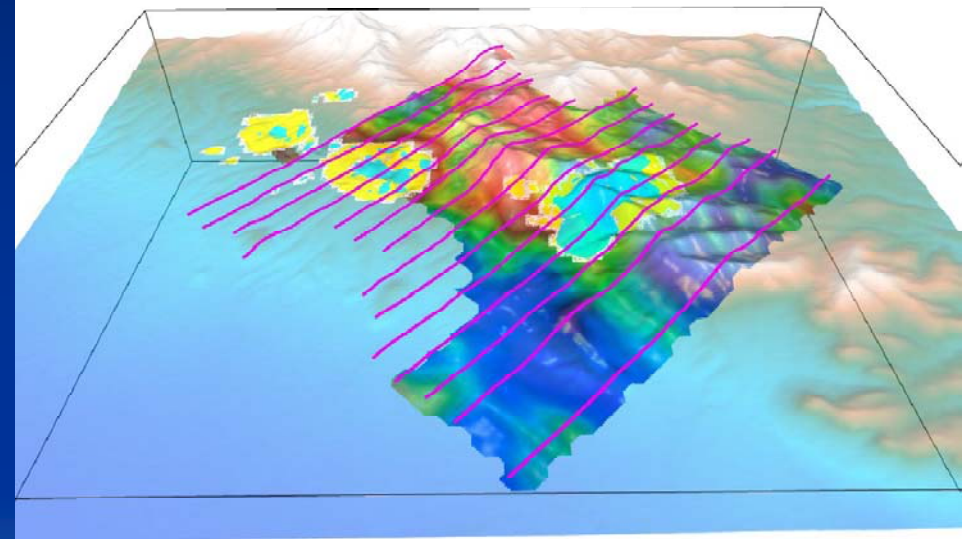
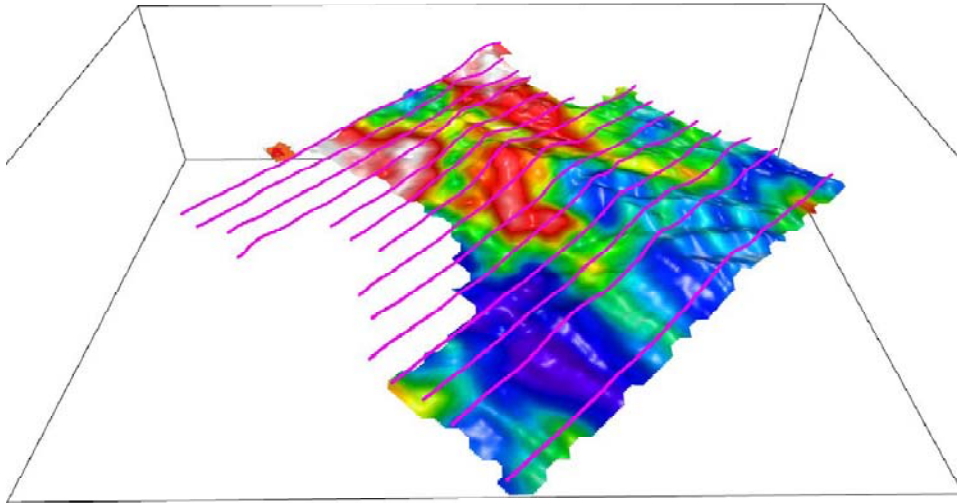
Tv=Volcanic Rocks
(Mid Miocene to Oligocene)

TKg=Granitoid Rocks
(Early Tertiary to Late Cretaceous)

Kv=Volcanic Rocks
(Late Cretaceous to early Tertiary)



Safford ZTEM Phase Rotated 109Hz NE Tipper Data



ZTEM Comparison of Line Direction

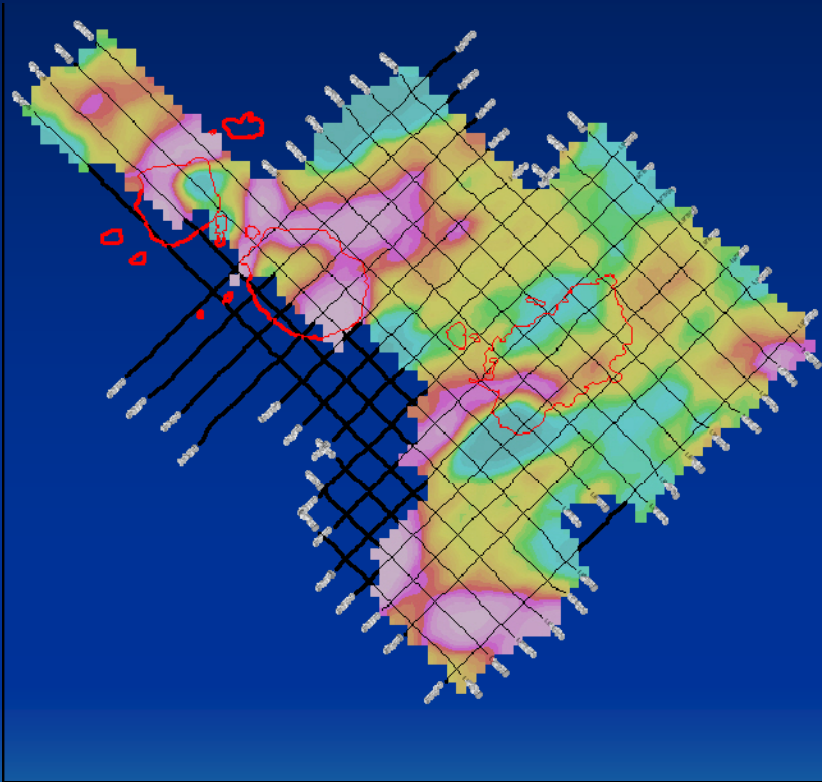


Image of Gridded Cross-line, Flipped, Dip Angles, 109 Hz, NW Lines, NOT Phase Rotated

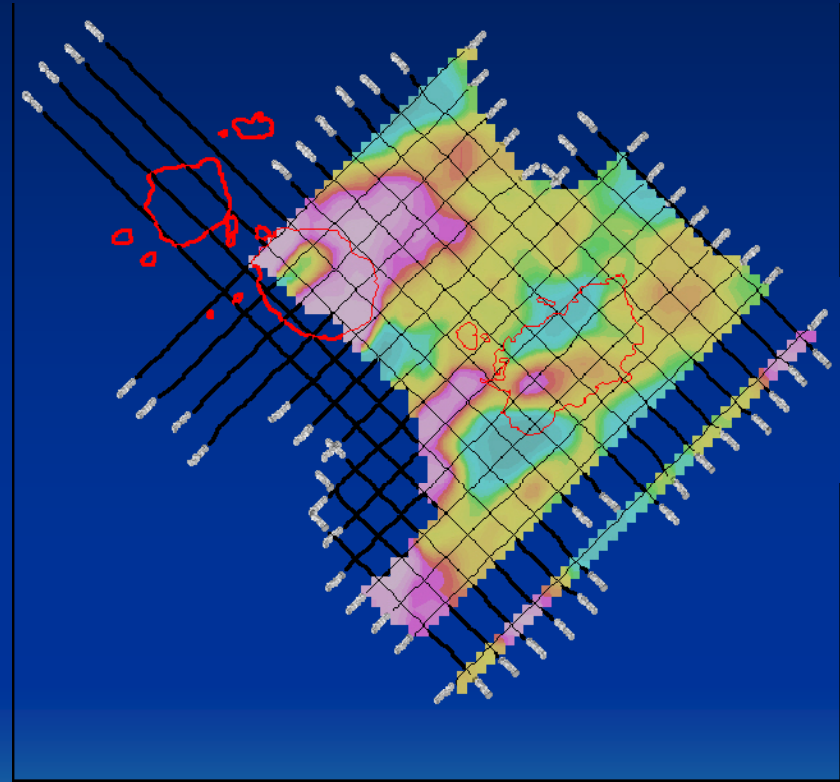
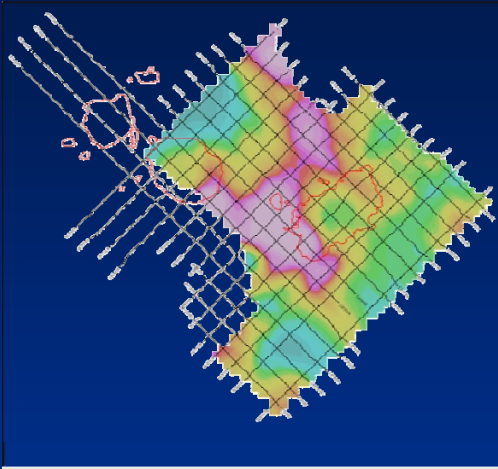
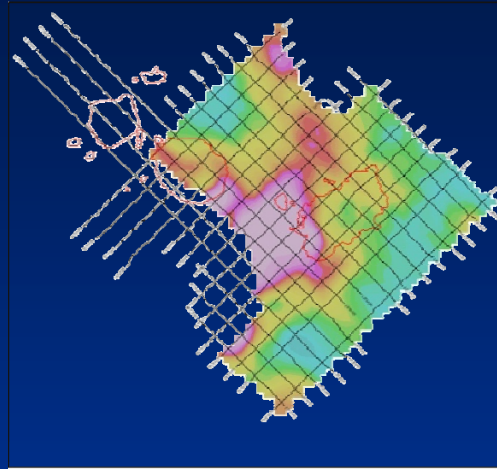


Image of Gridded In-line, Dip Angles, 109 Hz, NE Lines, NOT Phase Rotated

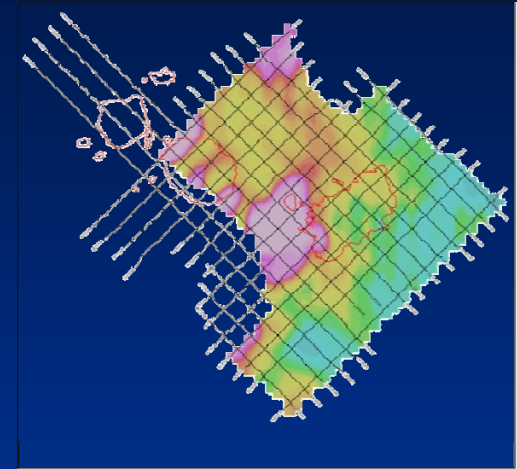
ZTEM Comparison of Frequency



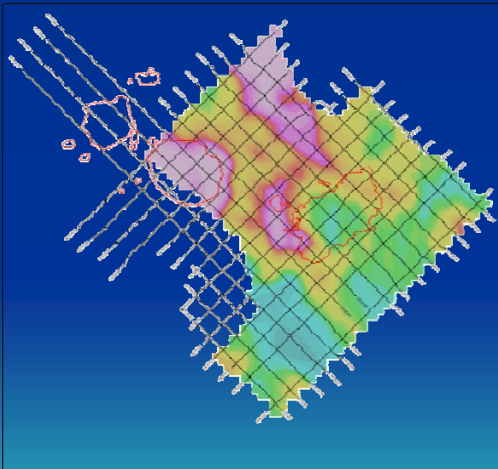
32 Hz



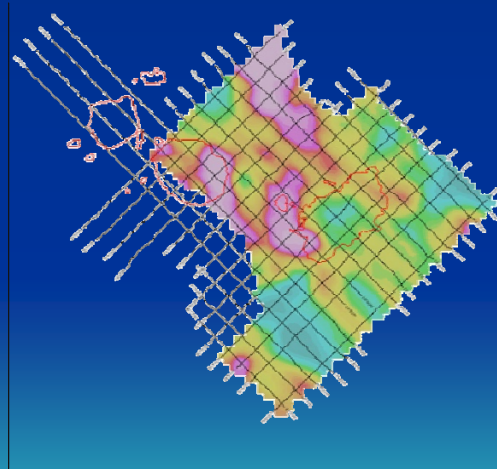
48 Hz



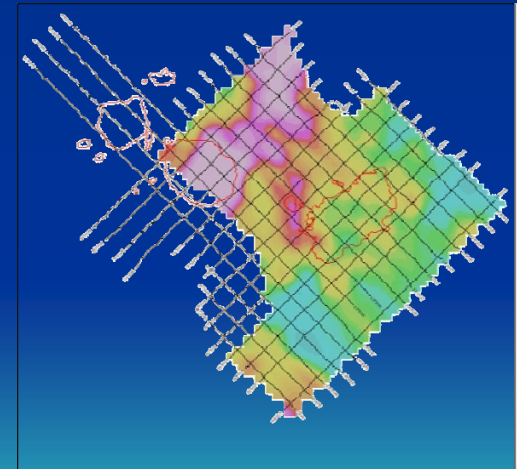
73 Hz



109 Hz



164 Hz

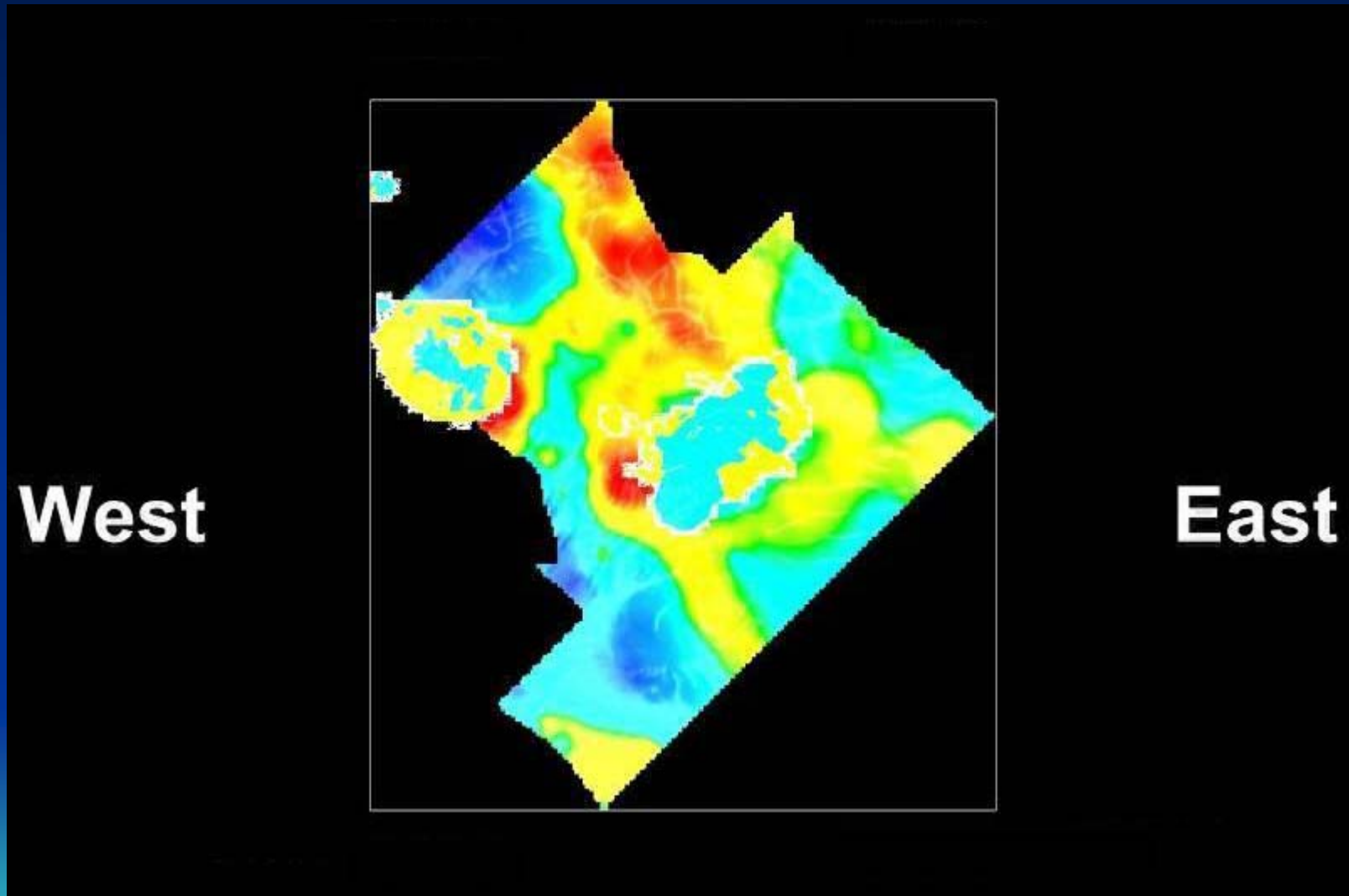


246 Hz

Images of Gridded In-line Dip Angles, NE Lines, Phase Rotated



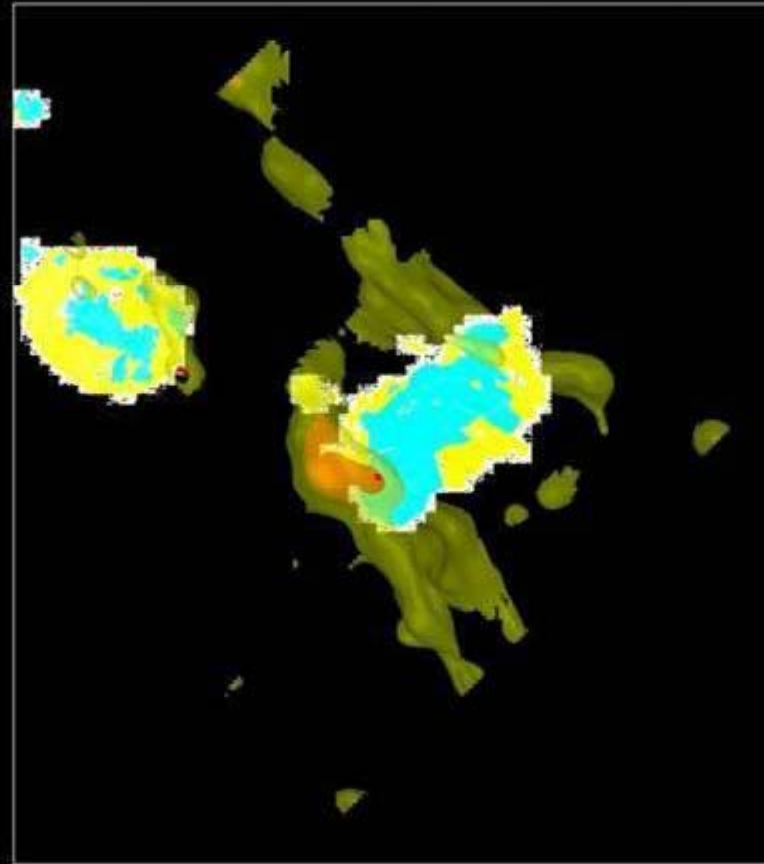
109 Hz Image, NE Direction - X Component



109 Hz Image, NE Direction - X Component

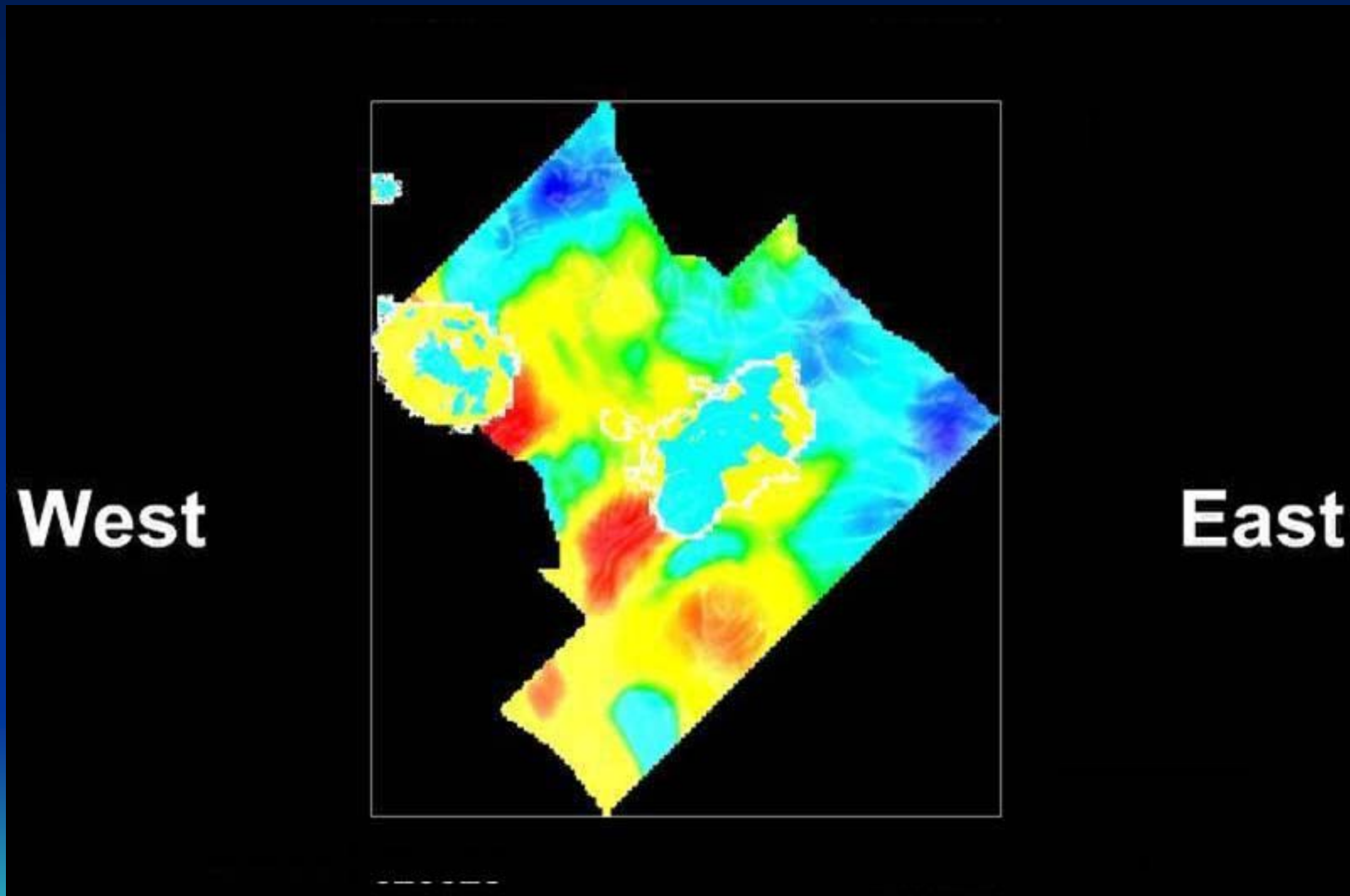
Karous-Hjelt filter and 3D volume of equivalent currents

West



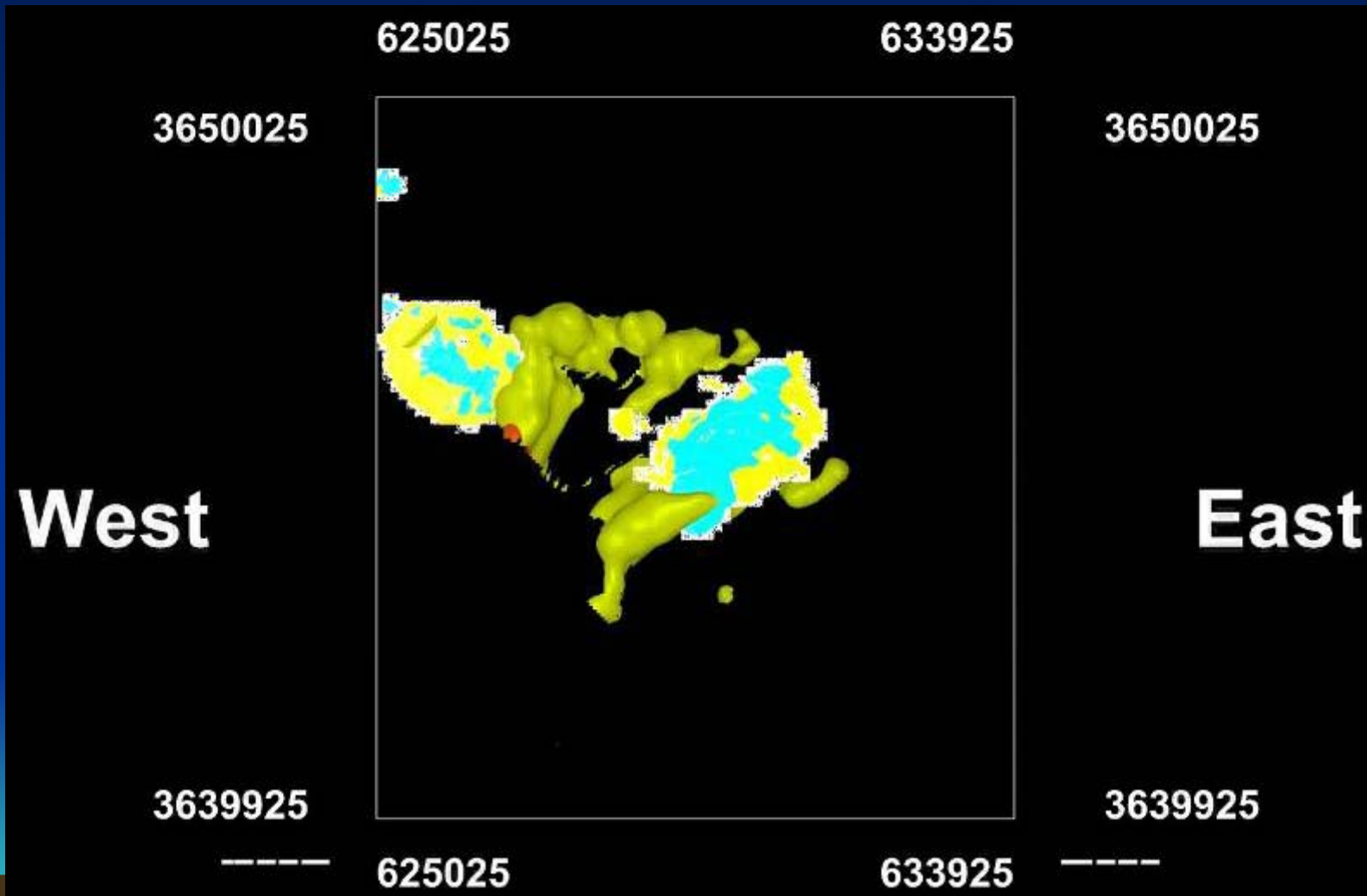
East

109 Hz Image, NE Direction - Y Component

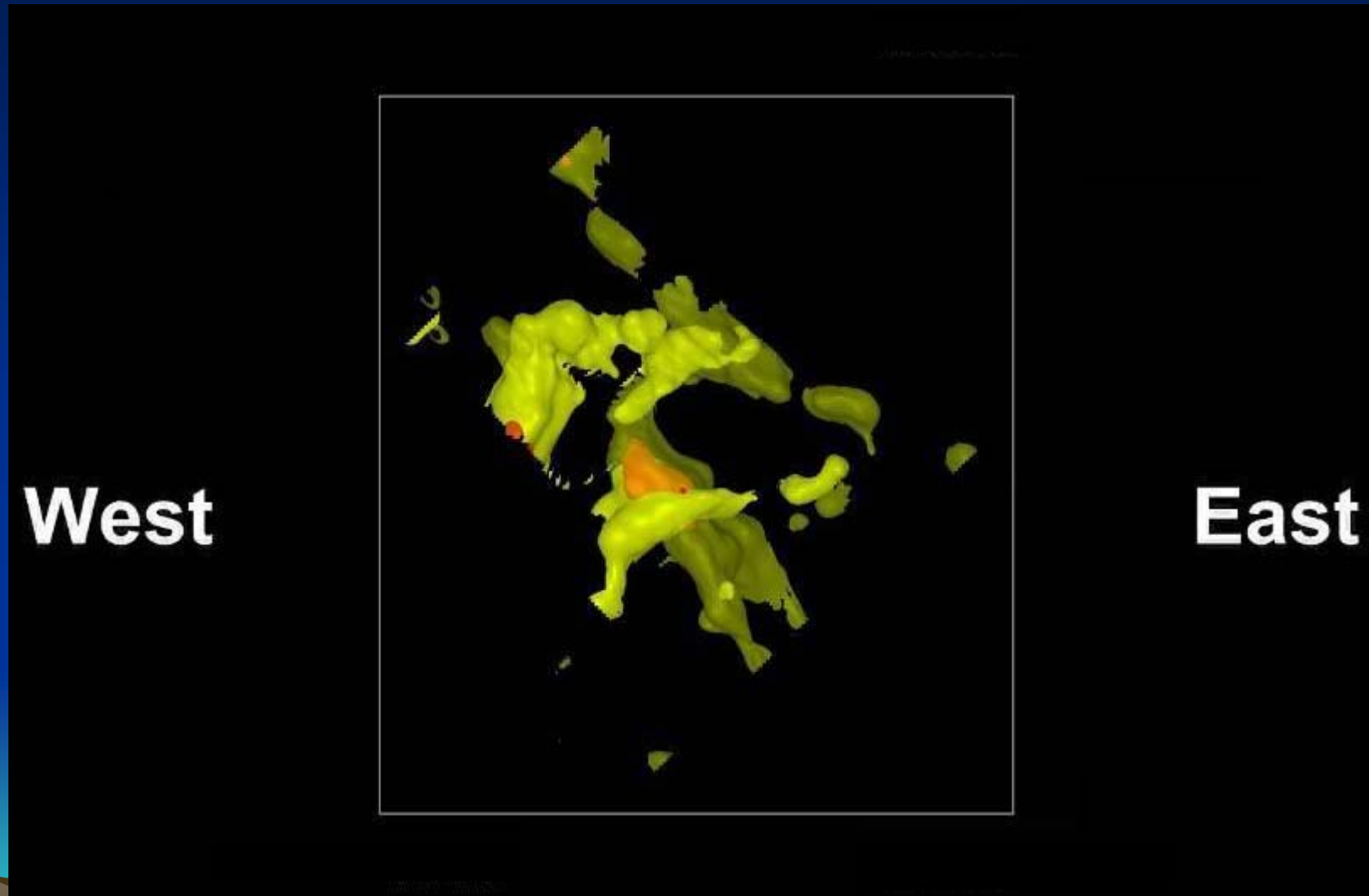


109 Hz Image, NE Direction - Y Component

Karous-Hjelt filter and 3D volume of equivalent currents

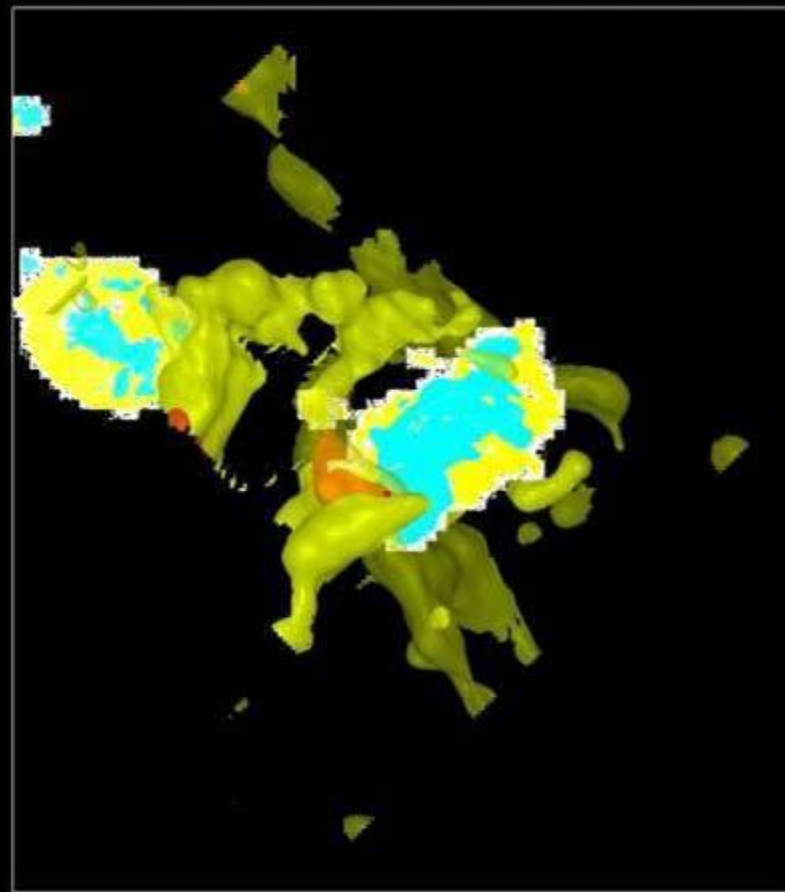


109 Hz Image, NE Direction – X & Y Component Karous-Hjelt filter and 3D volume of equivalent currents



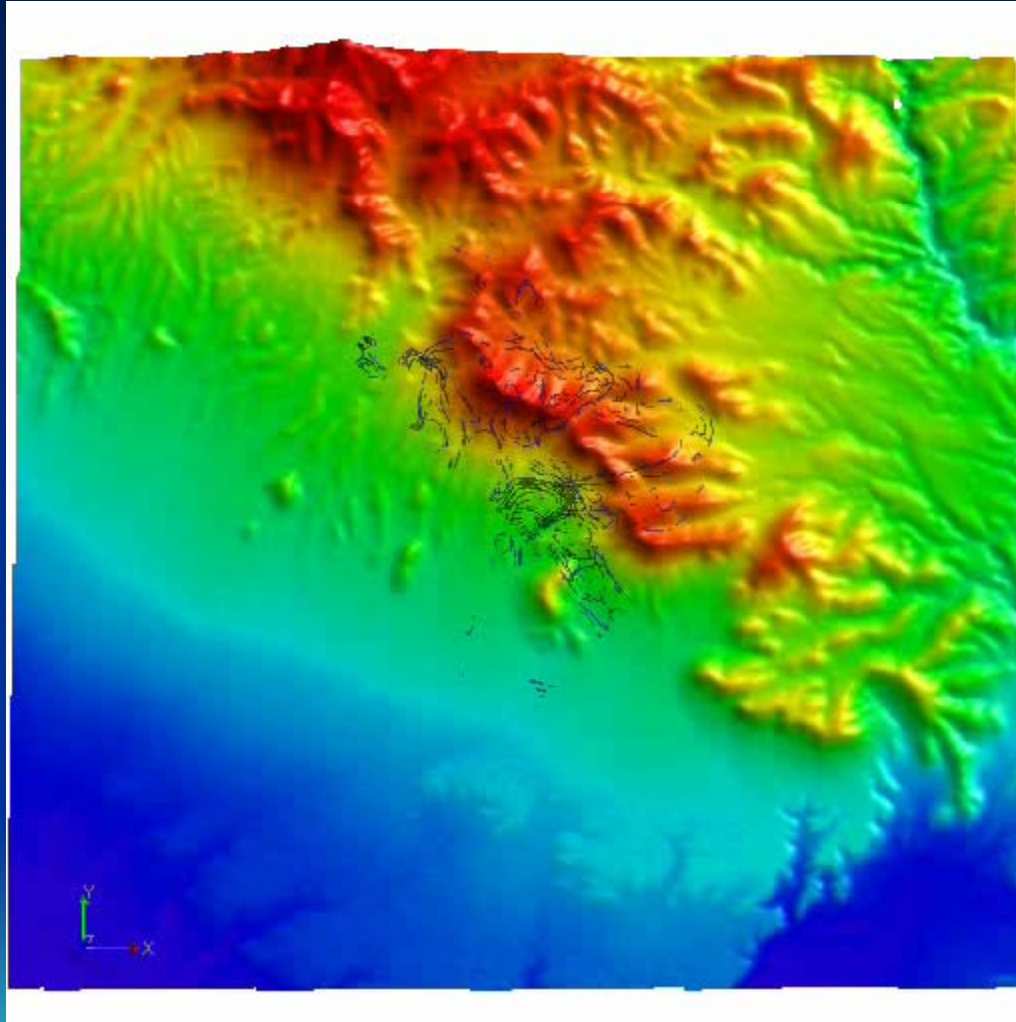
109 Hz Image, NE Direction – X & Y Component 3D Volume

West

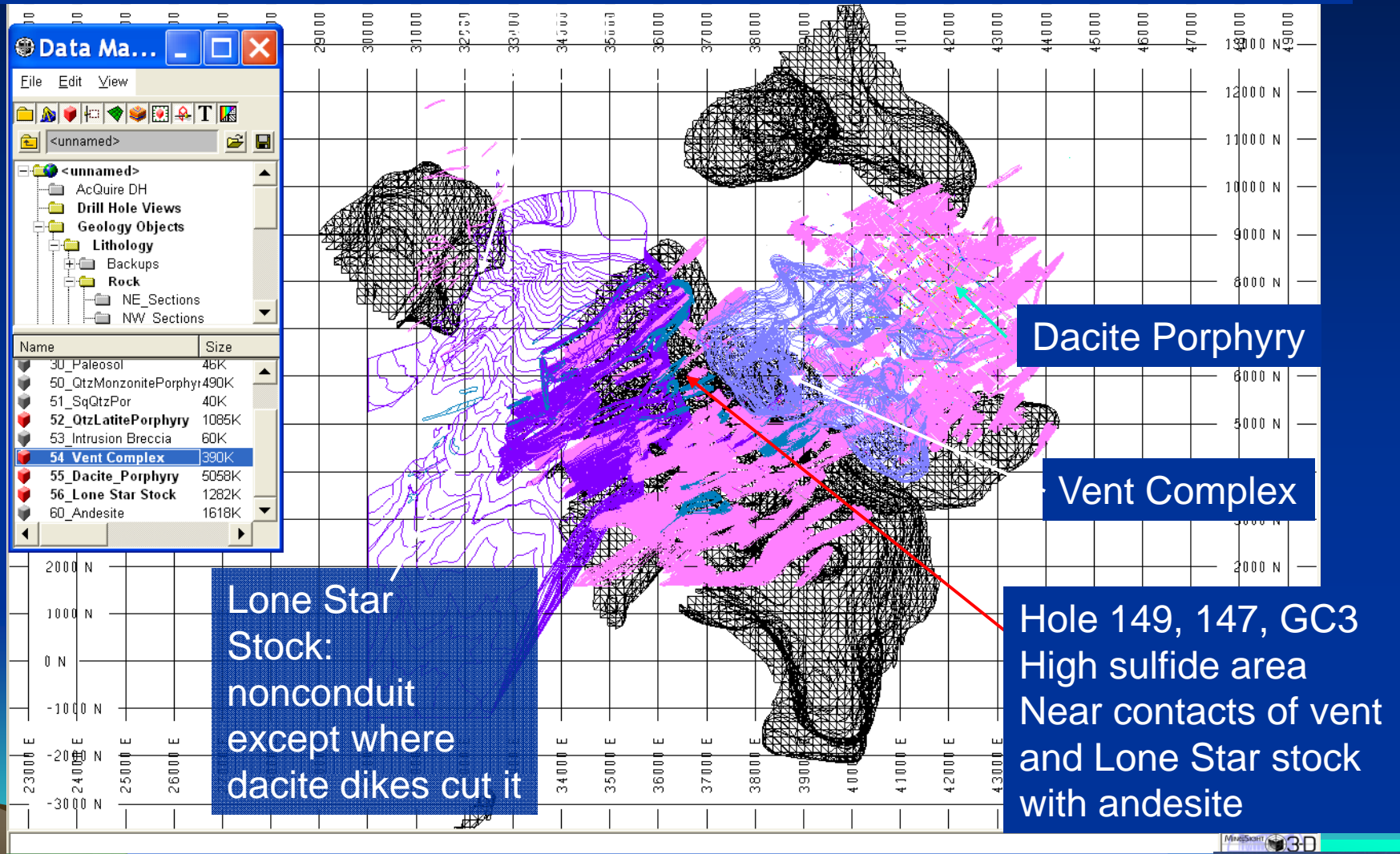


East

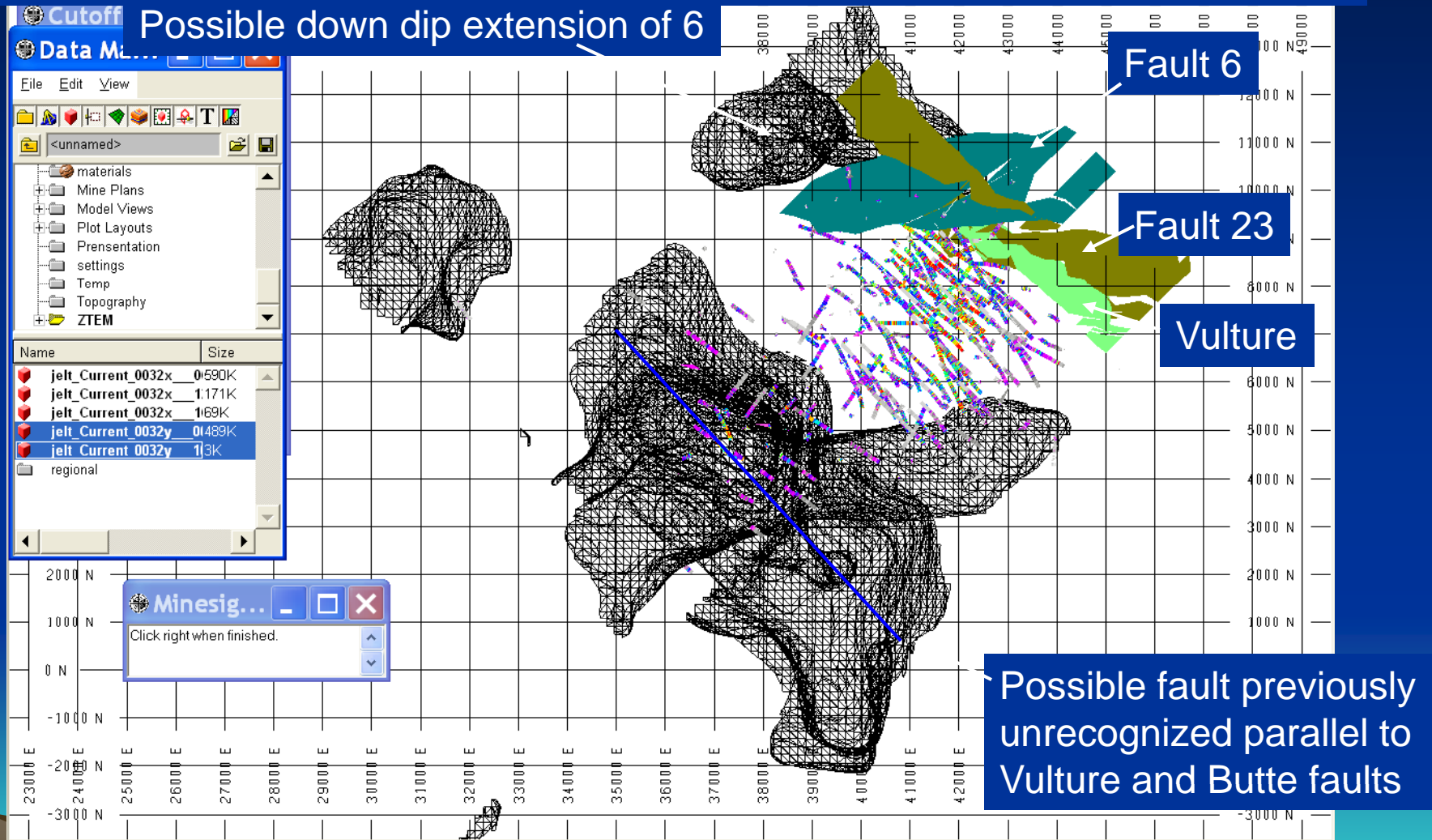
Topography and – X & Y Component Karous-Hjelt filter and 3D volume of equivalent currents



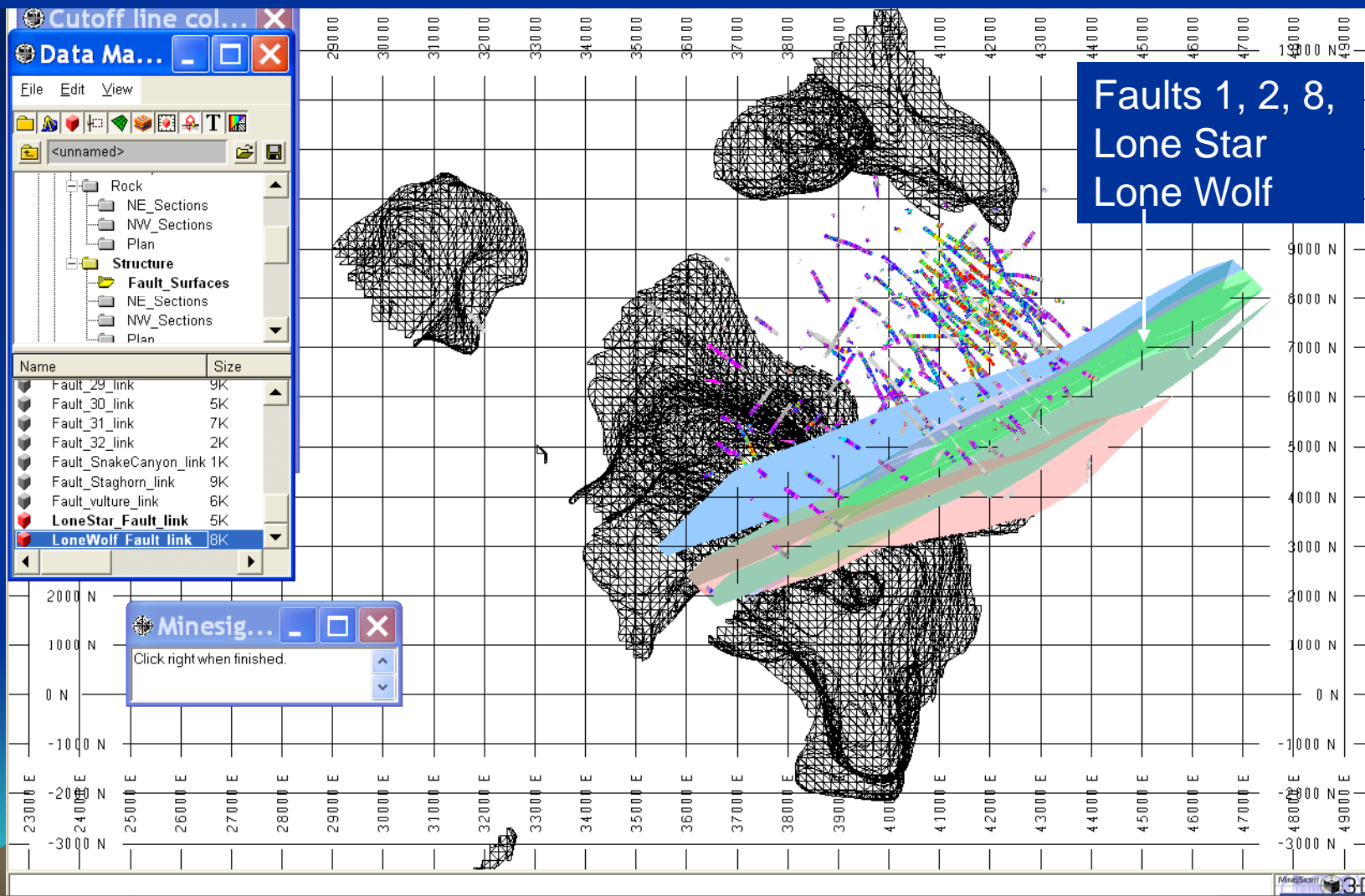
ZTEM Current Shells and Geology



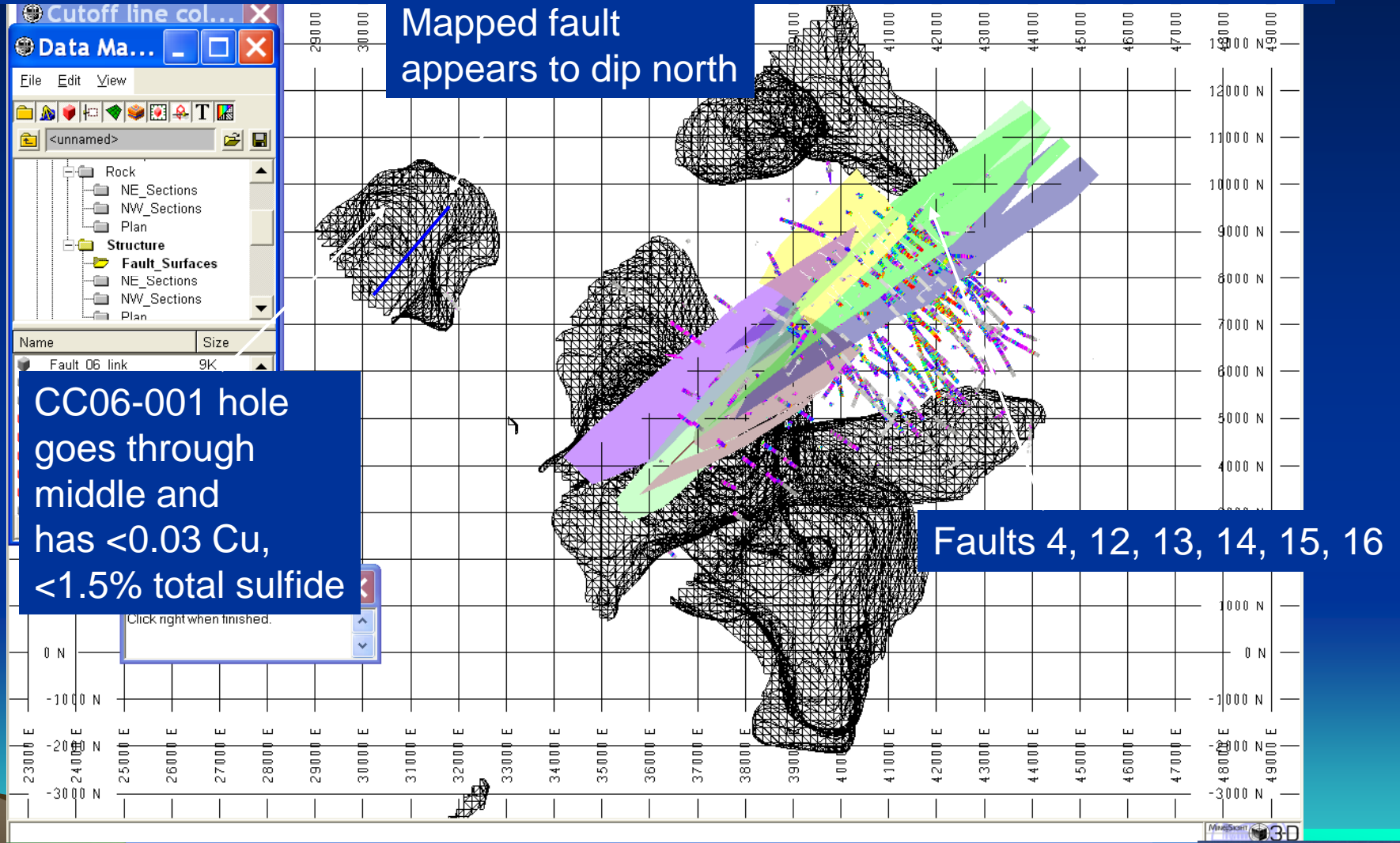
ZTEM Current Shells and Geology



ZTEM Current Shells and Geology

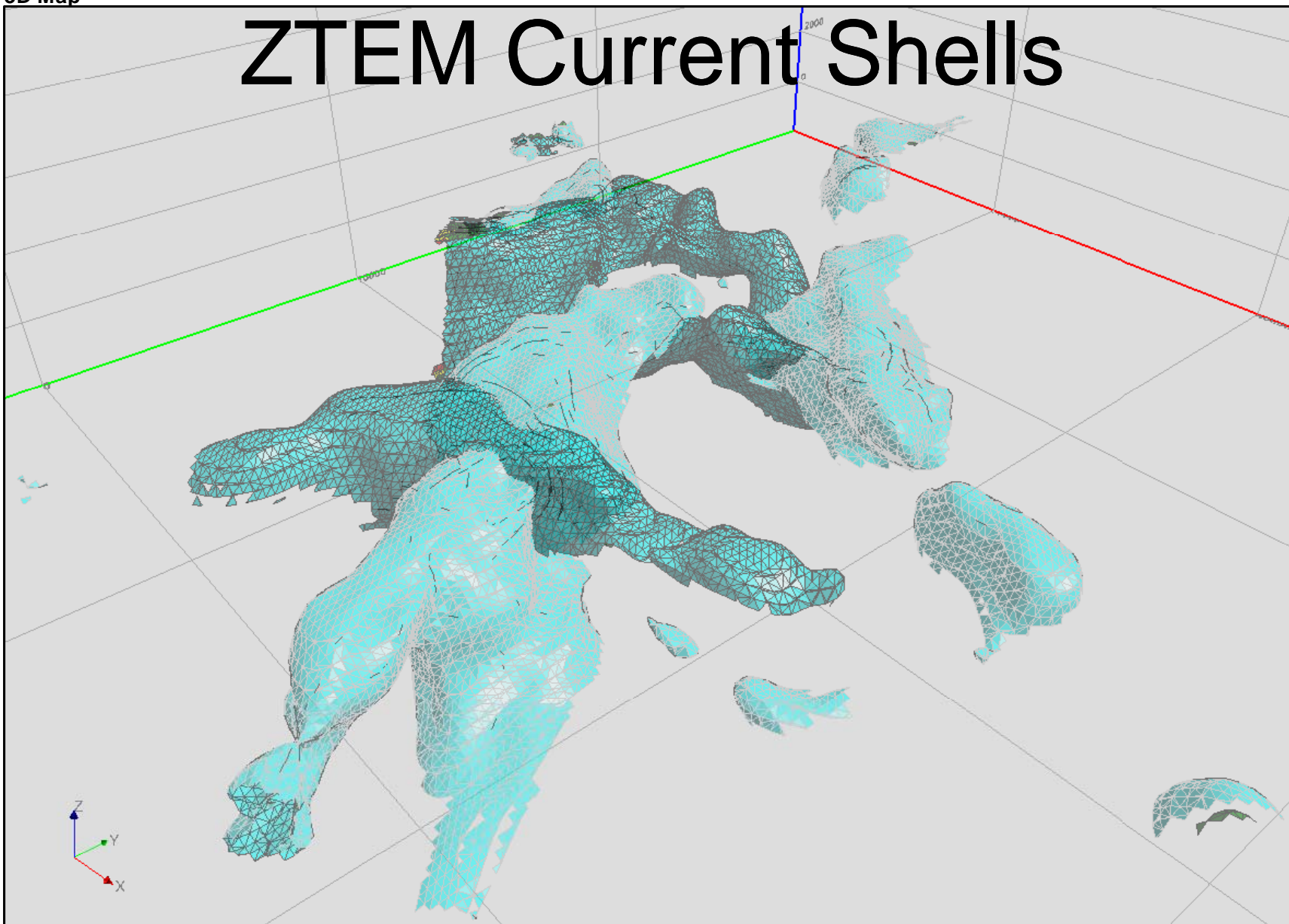


ZTEM Current Shells and Geology



3D Map

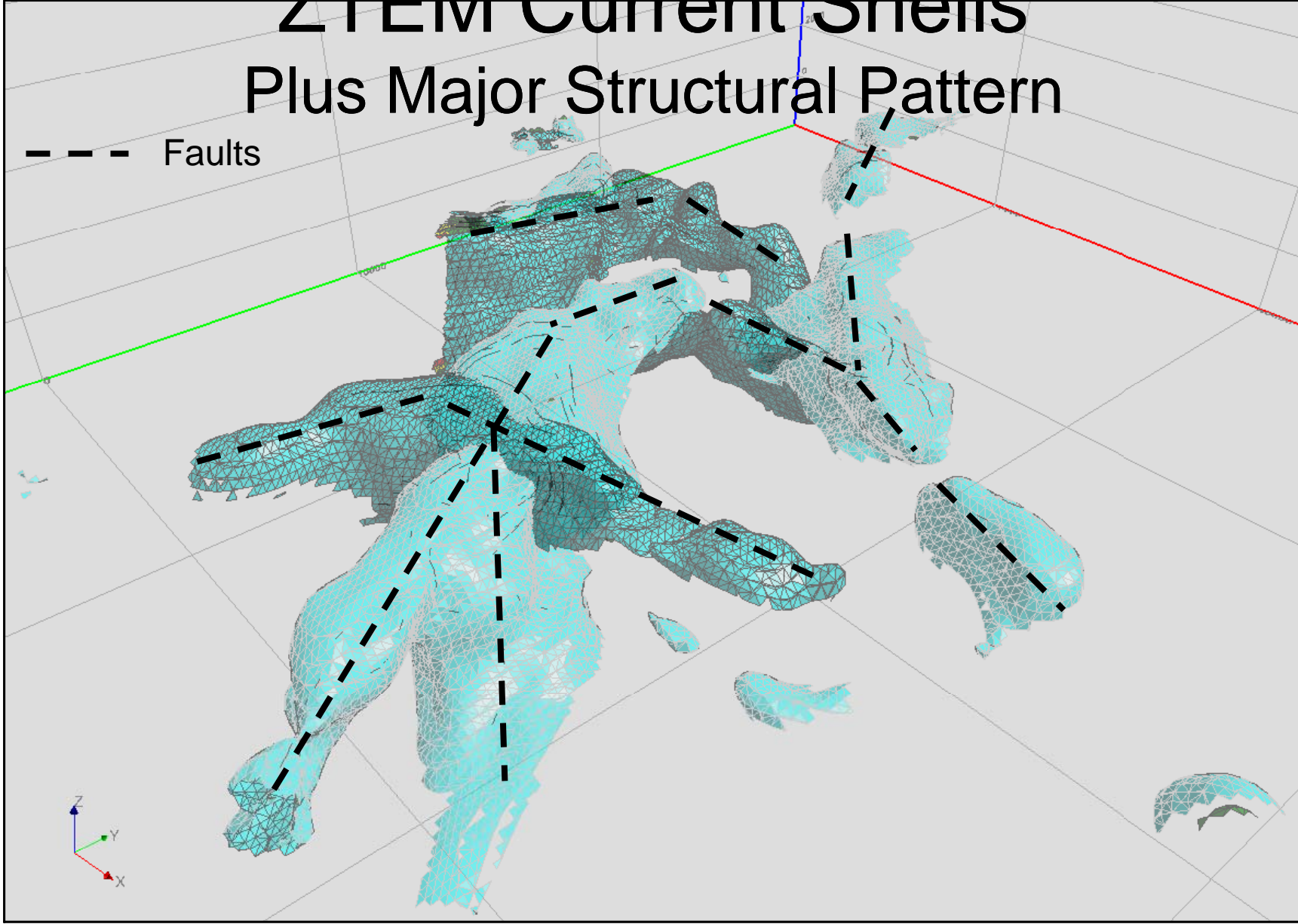
ZTEM Current Shells



3D Map

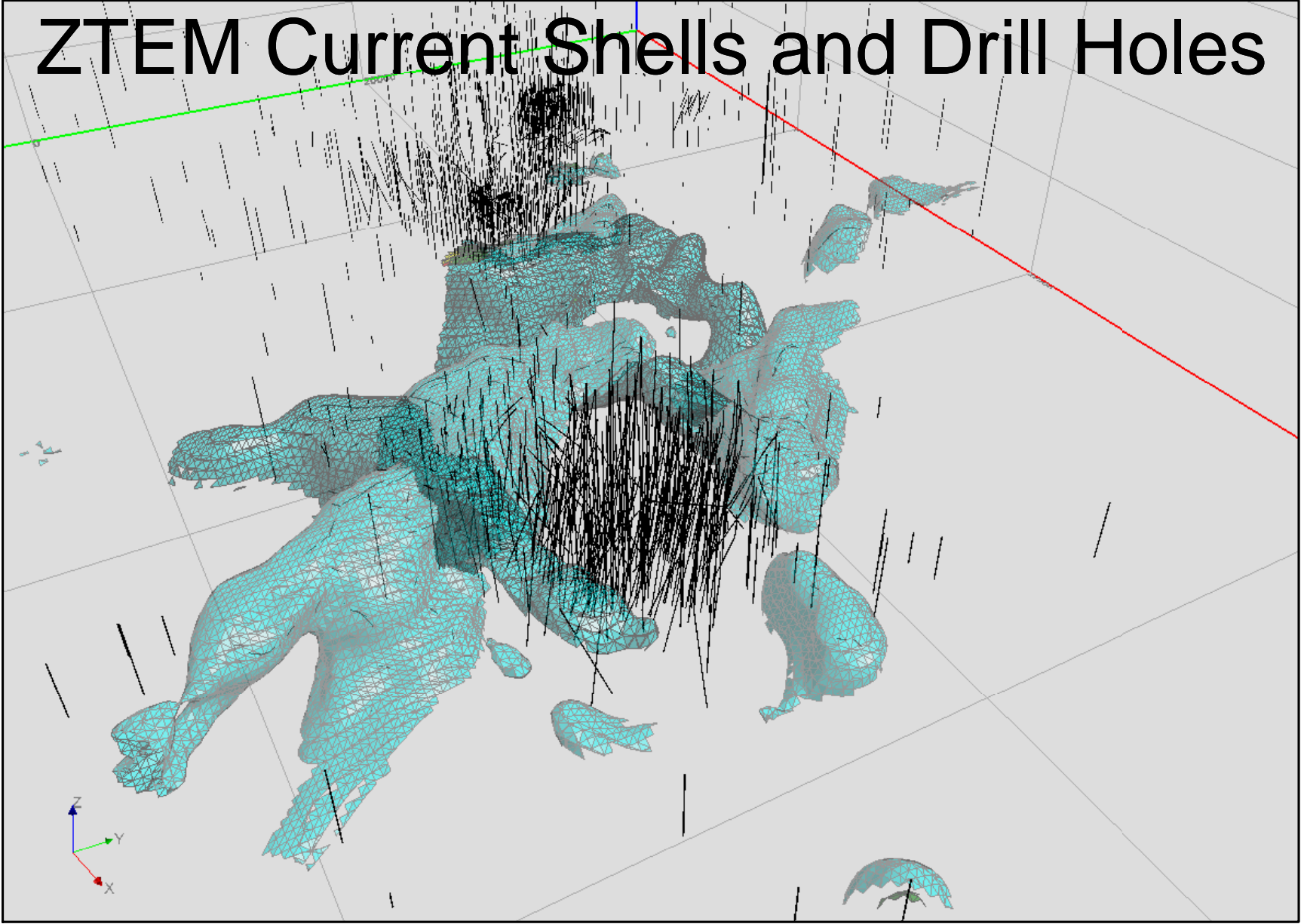
ZTEM Current Shells Plus Major Structural Pattern

--- Faults



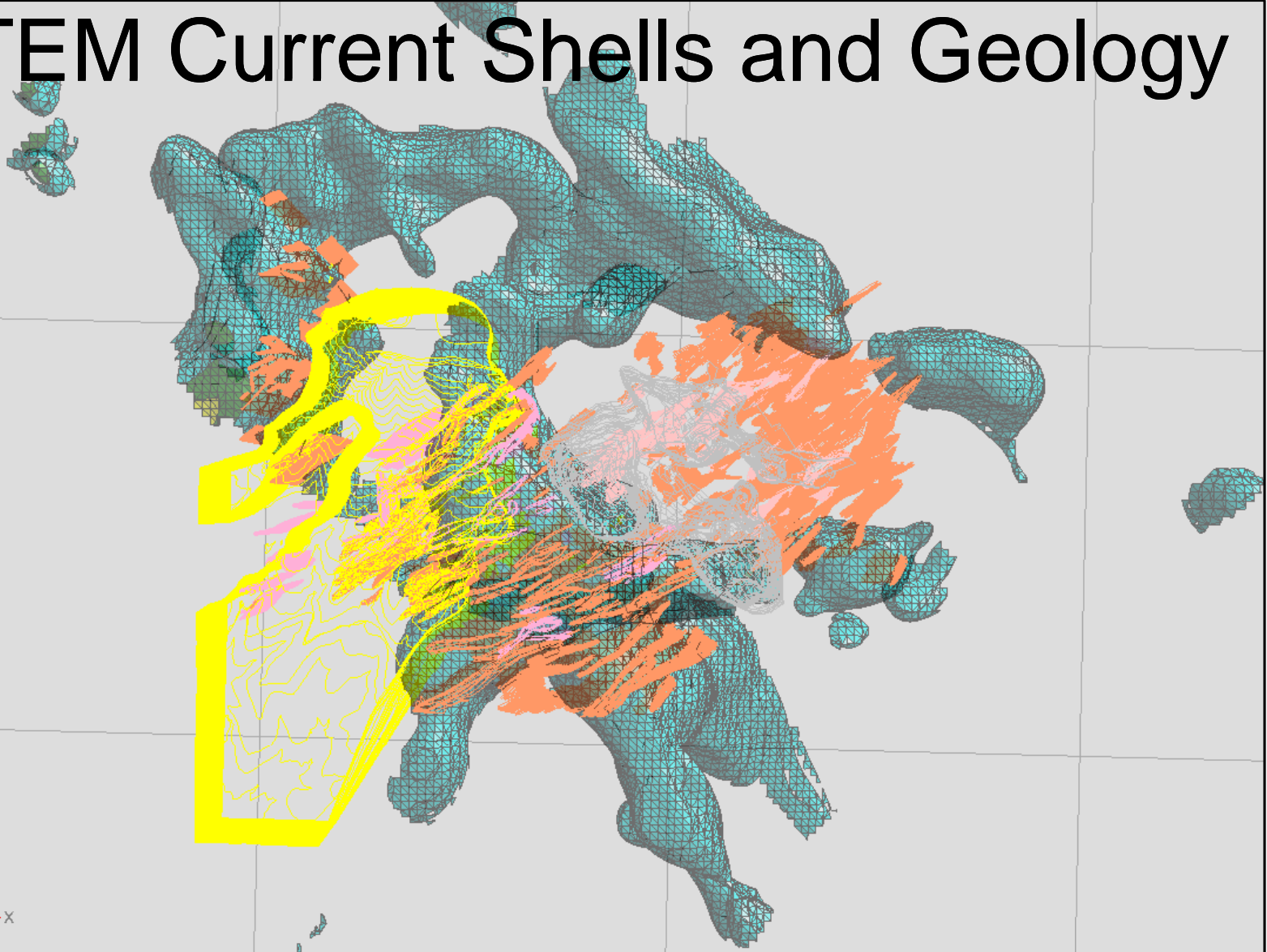
3D Map

ZTEM Current Shells and Drill Holes



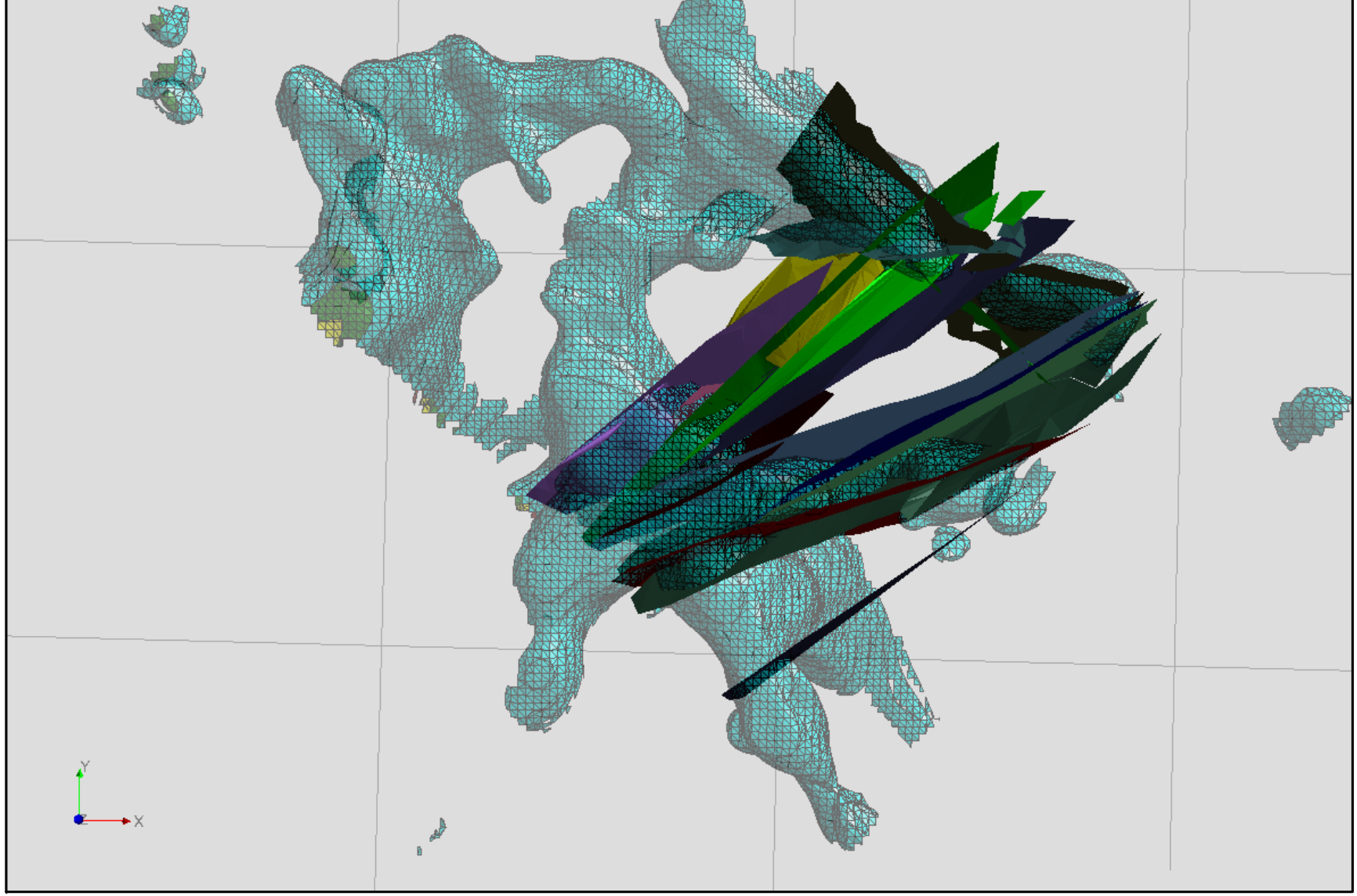
3D Map

ZTEM Current Shells and Geology



3D Map

ZTEM Current Shells and Faults



Conclusions and Recommendations

- The ZTEM system has unambiguously detected a robust anomaly coincident with part of the blind Lone Star deposit. The primary cause of the anomalies is structure.
- No other airborne system can detect targets of this type.
- The Lone Star anomaly is the largest detected in the survey. By inference big deposits should produce big anomalies.
- Optimal presentation of the data is dependant upon the interpretation purpose. Geological input is critical.
- The Karous-Hjelt filter is proving a useful interpretation aid. However, the algorithm is simple so care should be used not to over interpret the results.