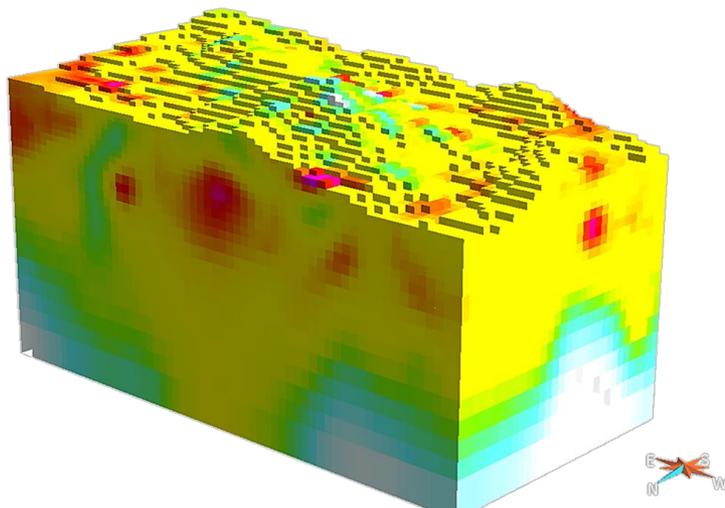




ORION **3D**

Case history, the Santa Cecilia Deposit, Chile ORION 3D DCIP- MT and CSAMT surveys



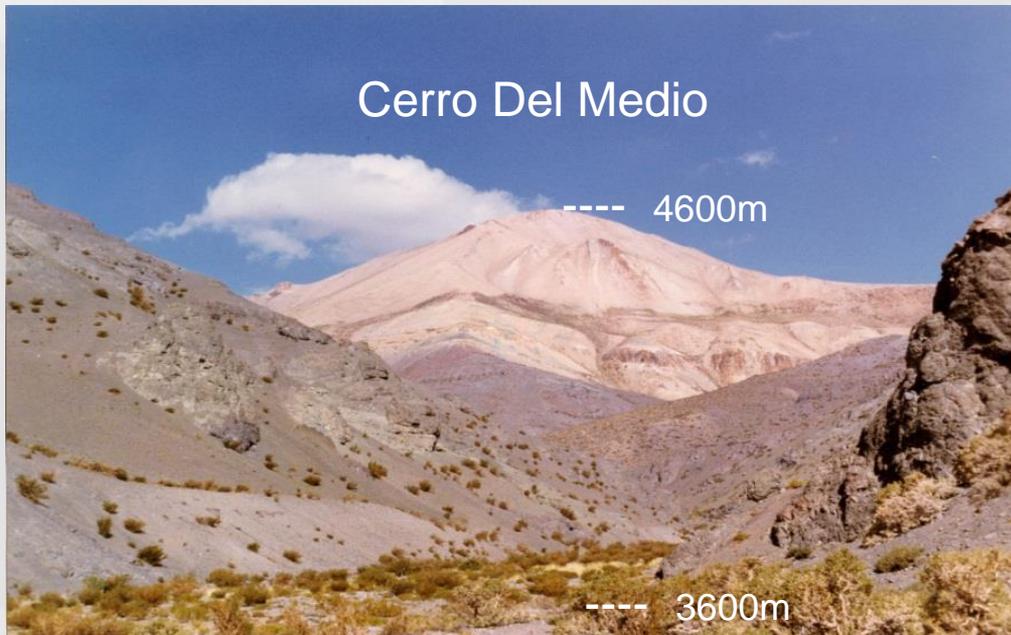
Nasreddine Bournas(1) and David Thomson (2)
(1) Quantec Geoscience, (2) Cerro Grande Mining
Corporation*



Introduction



- ❑ Location, High Western Cordillera, Maricunga Belt.
- ❑ Intensive Hydrothermal alteration.
- ❑ Magnetic, CSAMT and ORION 3D DCIP/MT.



History



- ❑ 1983- Helicopter-borne reconnaissance by M. Hernandez and D. Thomson
- ❑ 1984-1990- Anglo American Chile
- ❑ 2009- Ground magnetic survey
- ❑ 2010- CSAMT and Mobile Metal Ion (MMI)
- ❑
- ❑ 2011-2012- CSAMT coverage and drilling
- ❑ 2012- QUANTEC **ORION 3D** DCIP/MT



Regional Settings

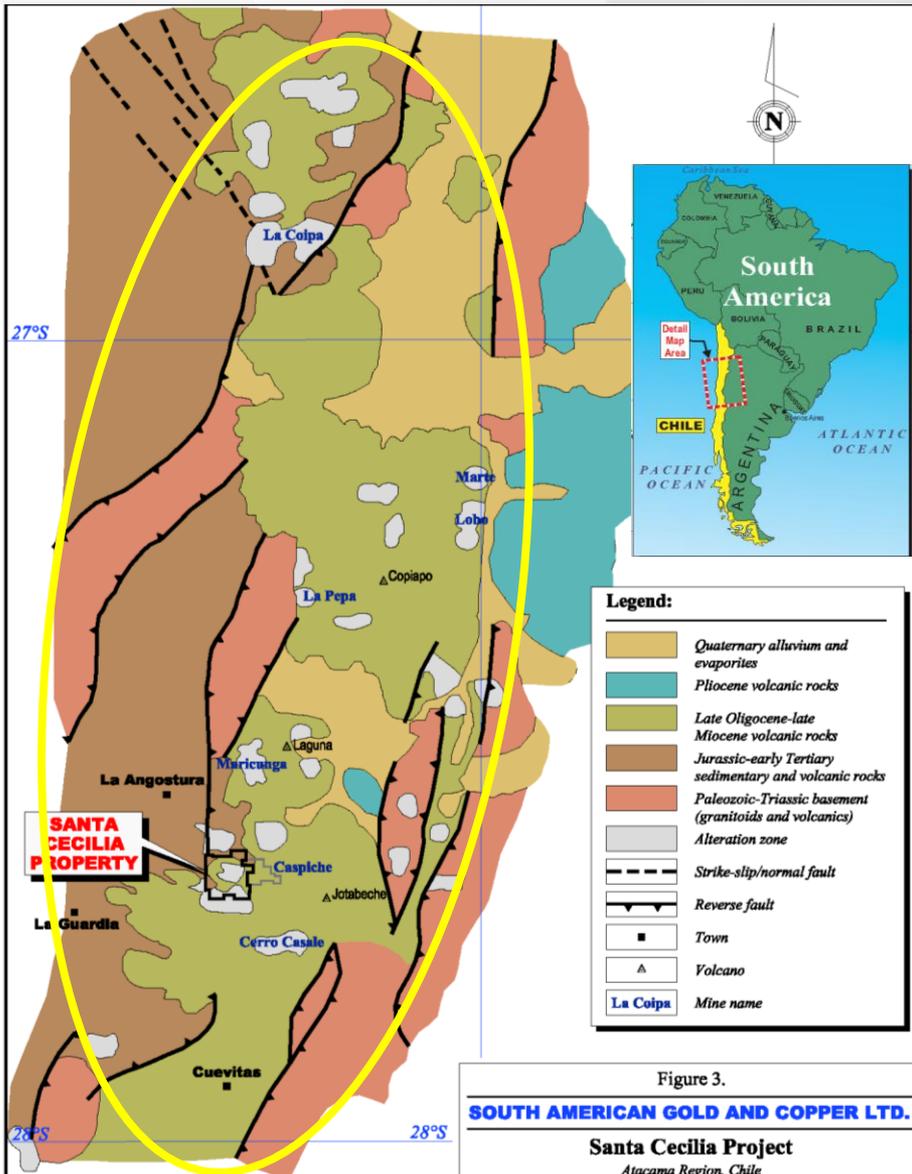


Figure 3.

SOUTH AMERICAN GOLD AND COPPER LTD.

Santa Cecilia Project
Atacama Region, Chile

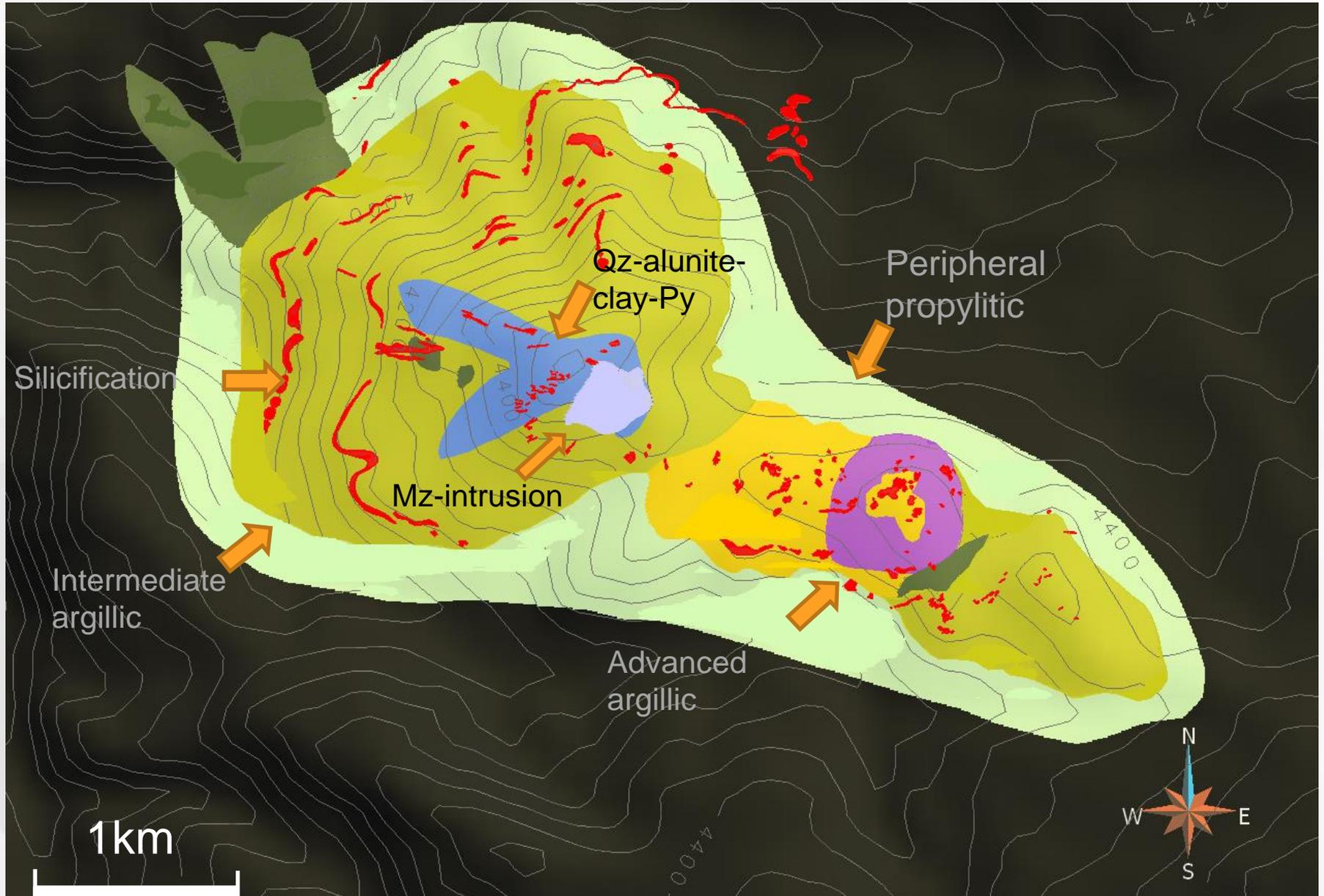
Regional Geology

- ❑ Maricunga Mining Belt (Mining District)
- ❑ Folded Formations of Upper Triassic Caspiche
- ❑ Oligocene to Lower Miocene Aguas Blancas and Rio Nevado Formations
- ❑ Porphyry intrusives, diorites and Qz-diorites & alteration zones

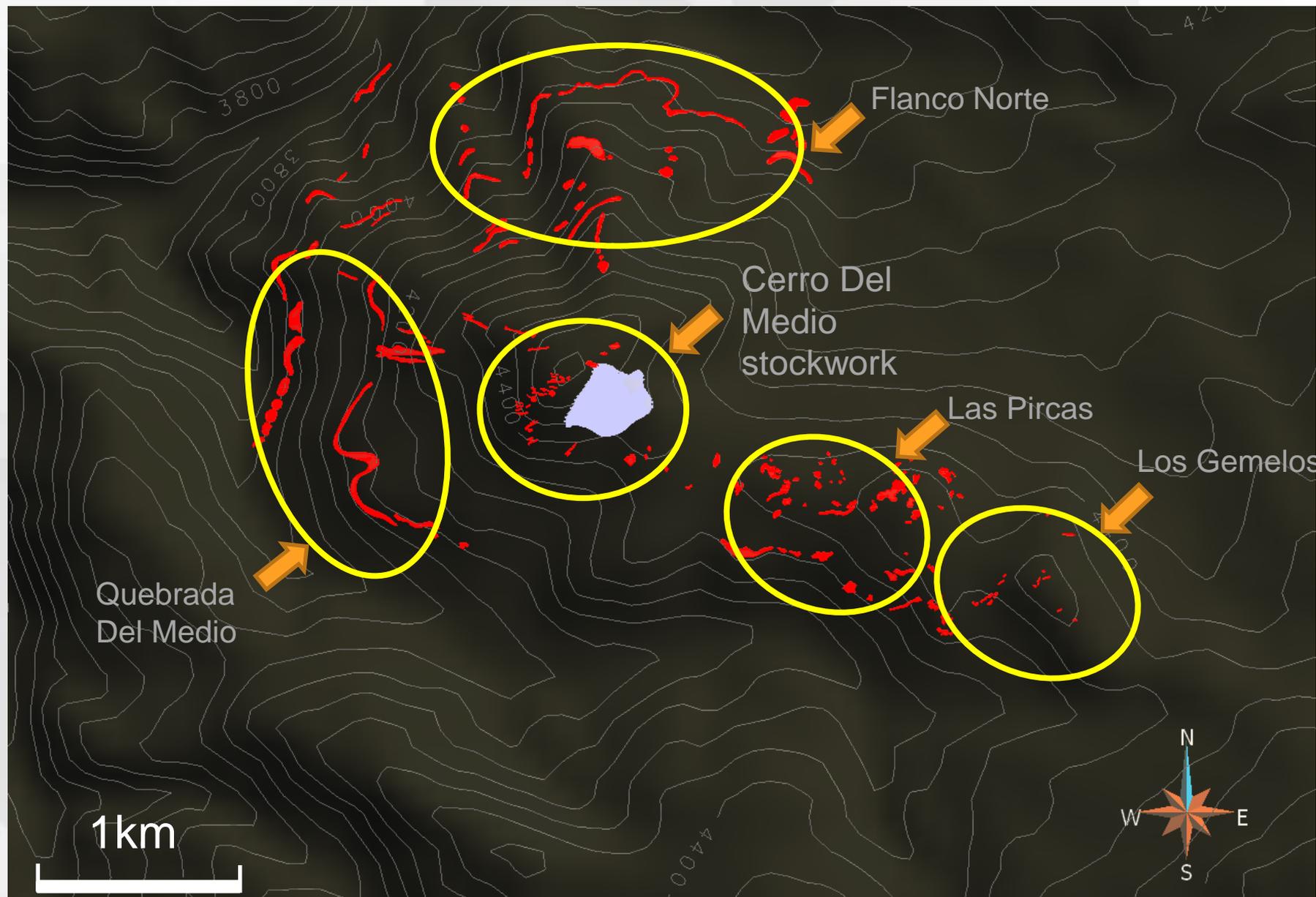
Cordillera Belt

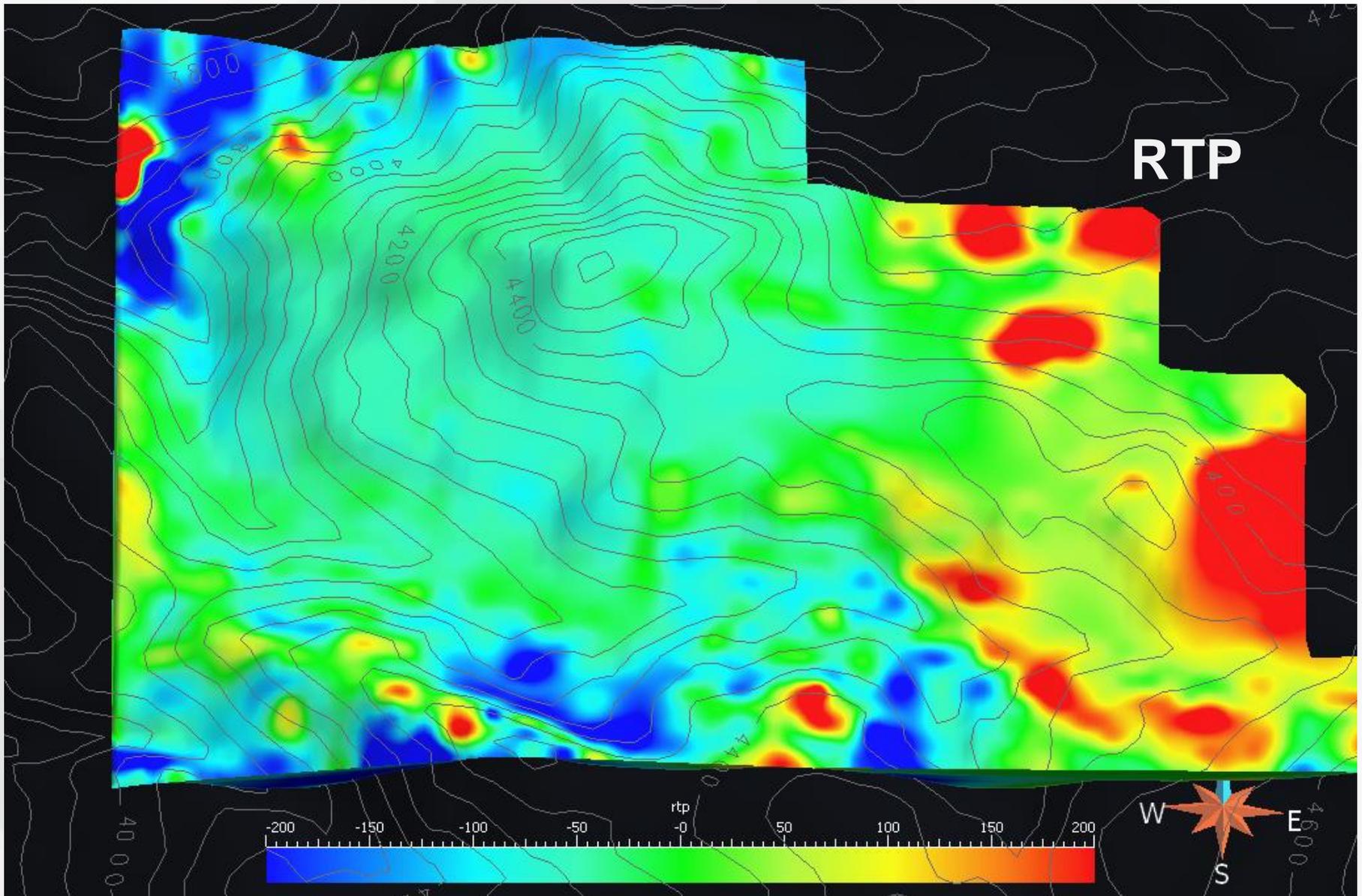


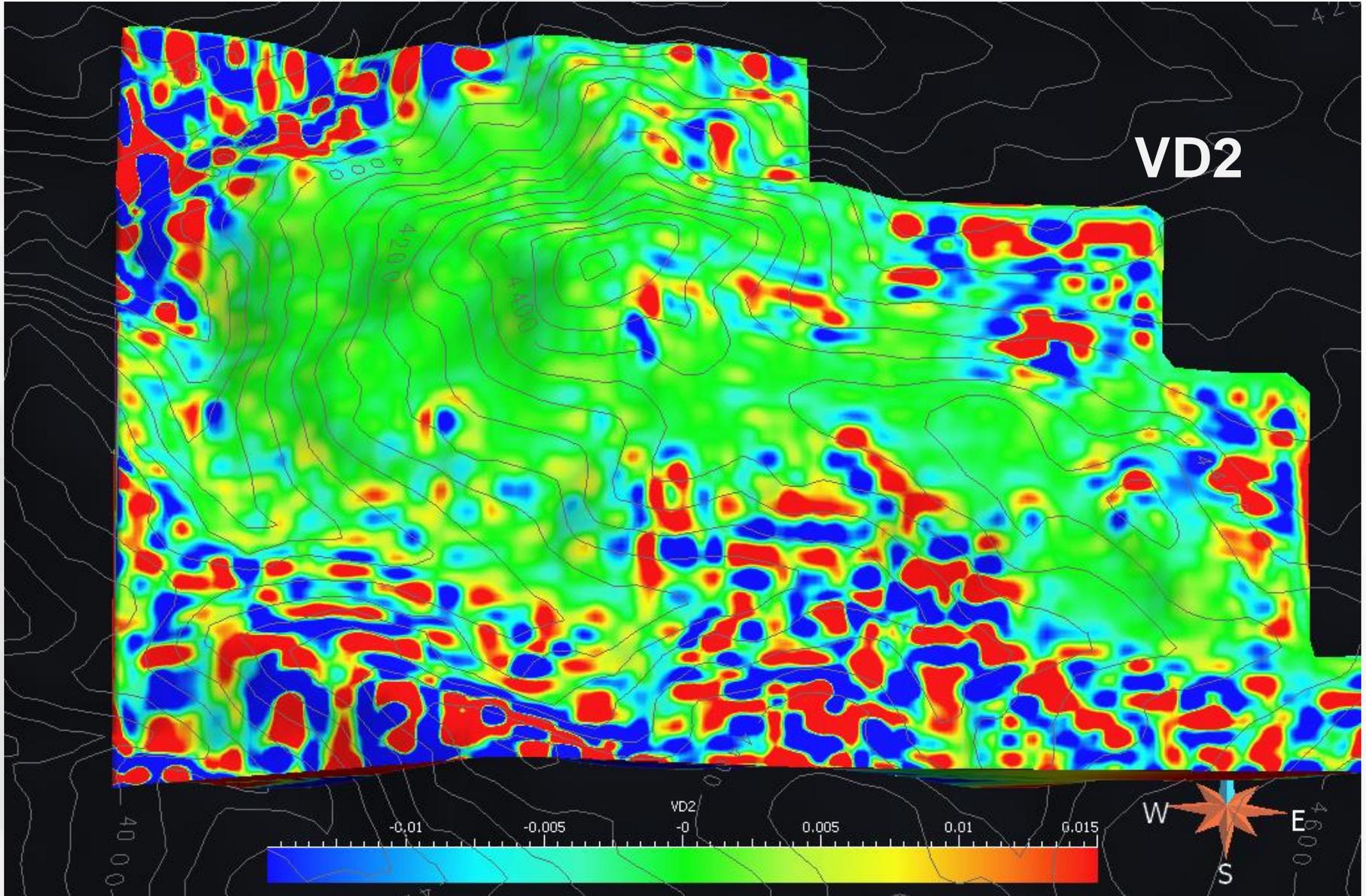
Intense Hydrothermal Alteration

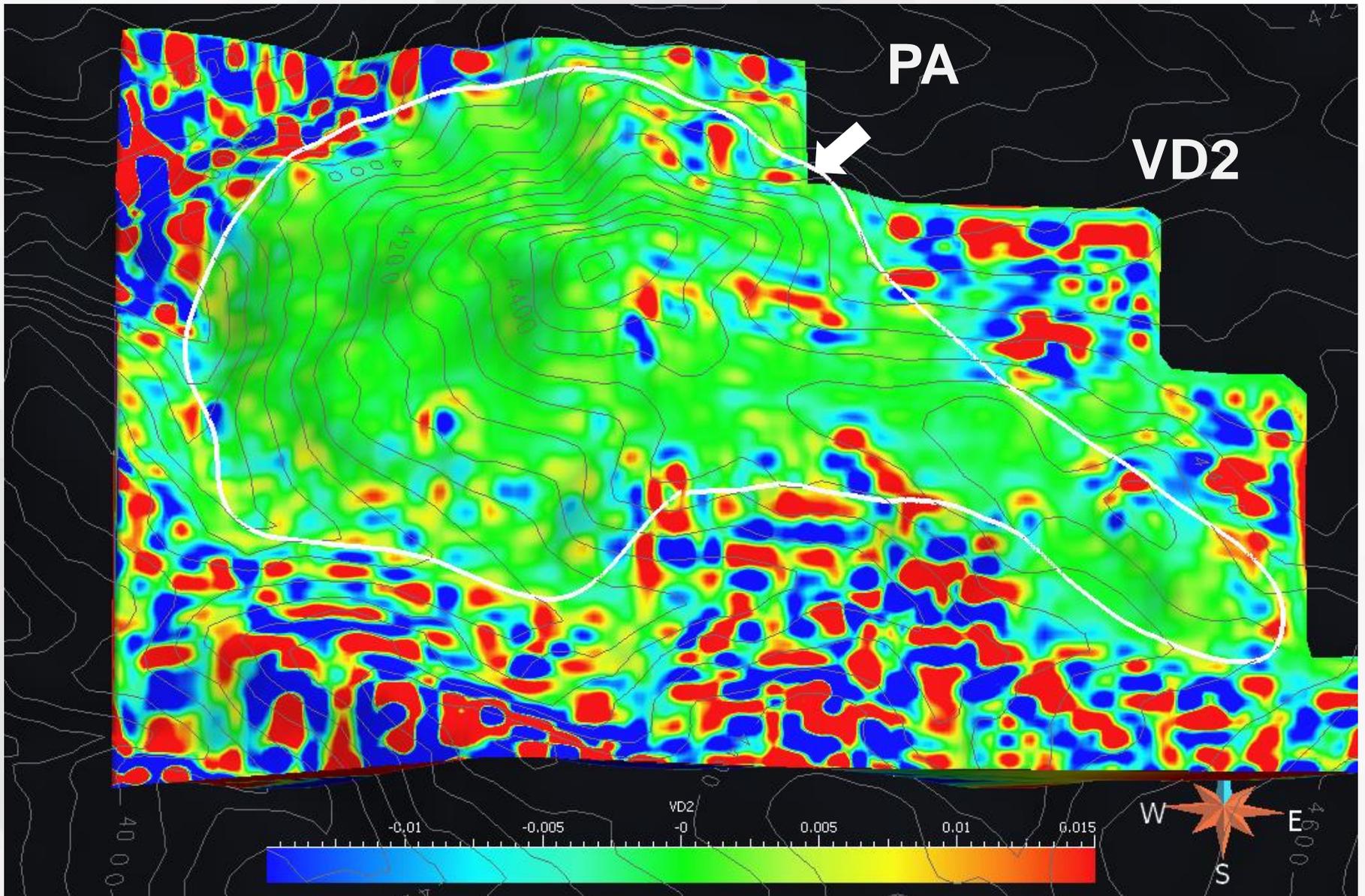


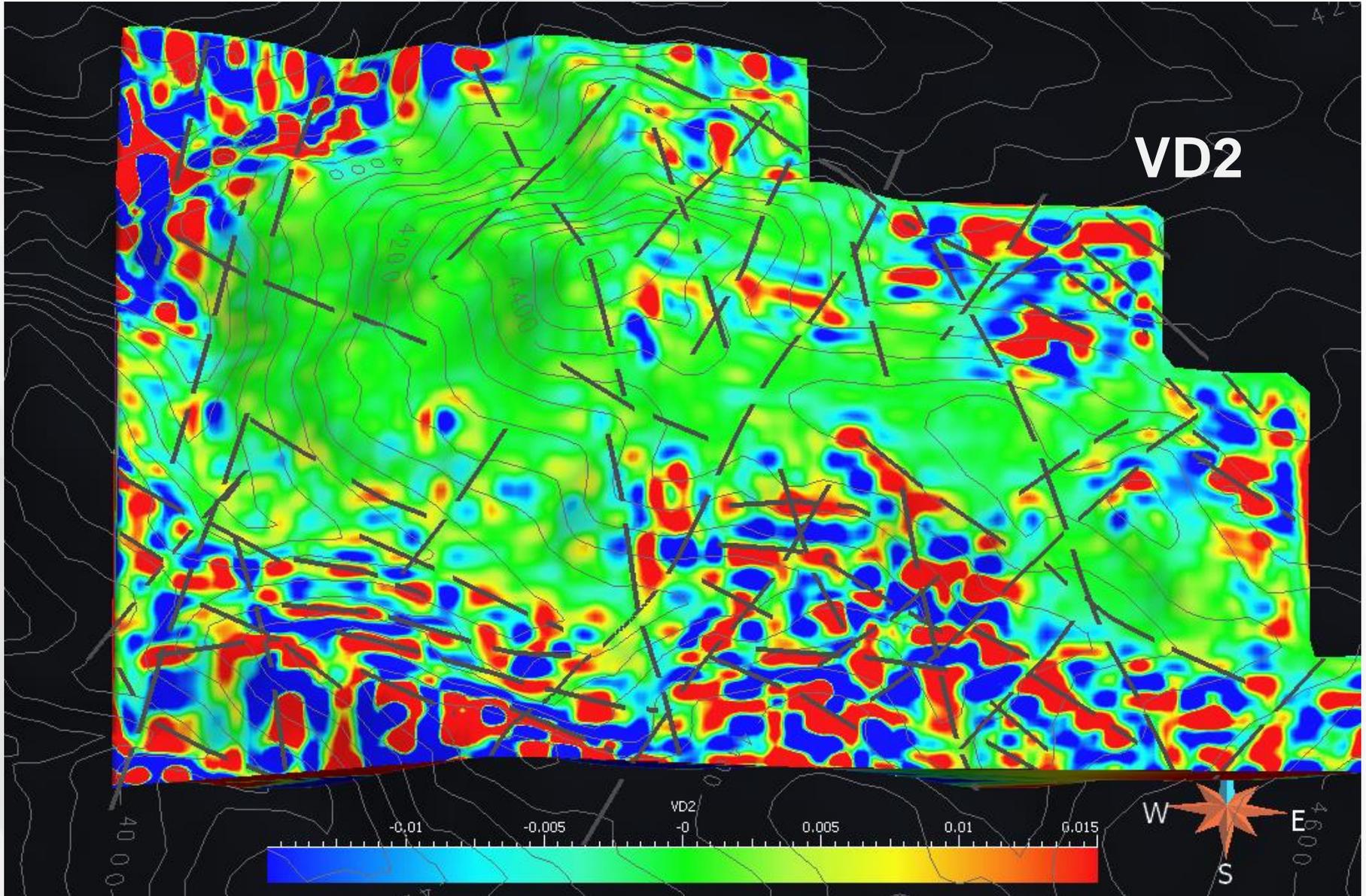
Widespread silicification

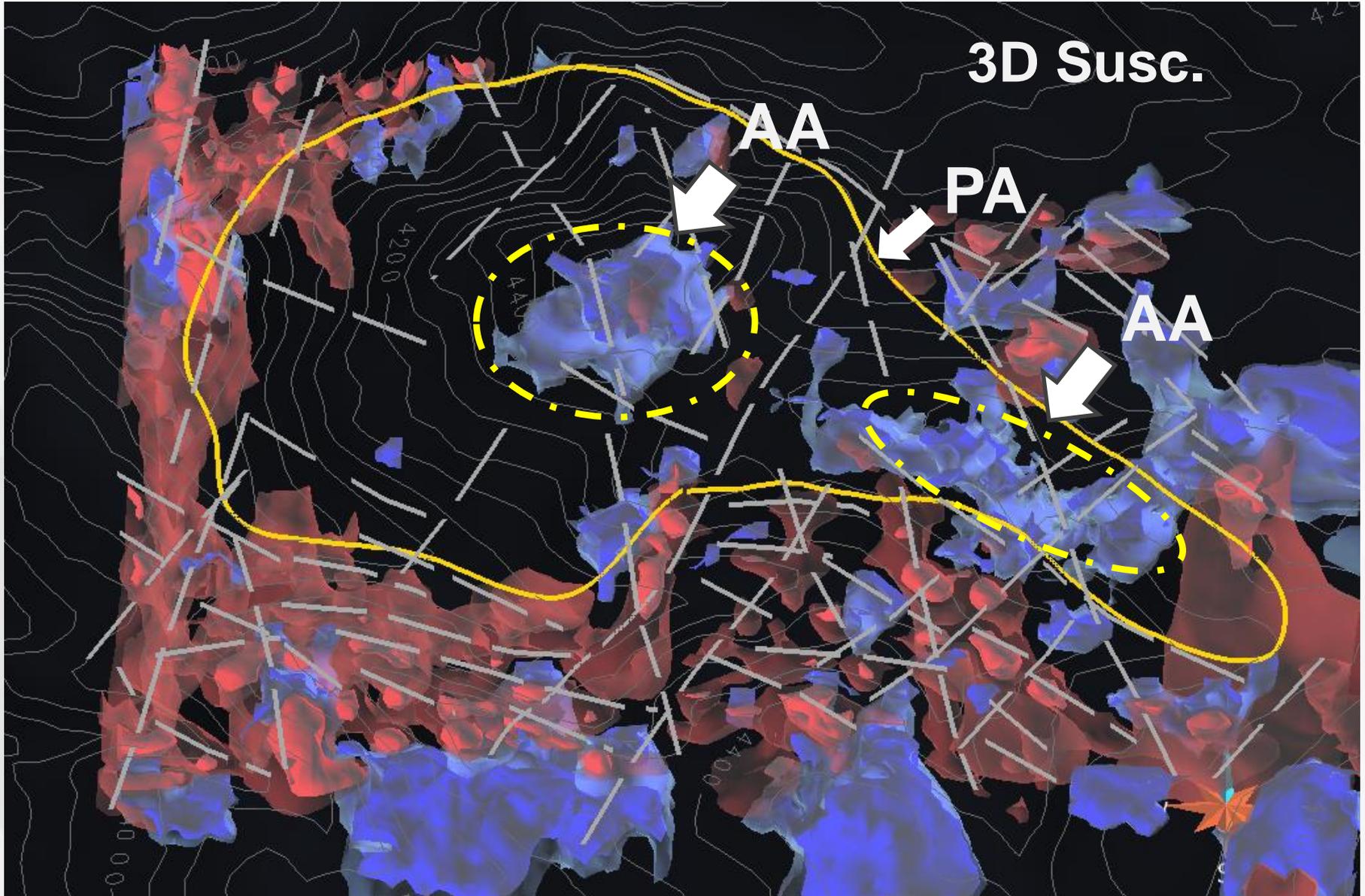




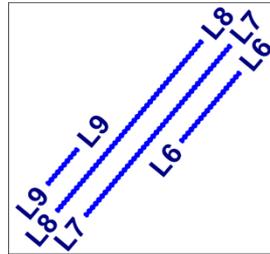
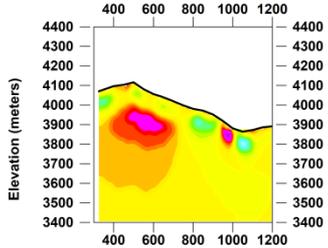




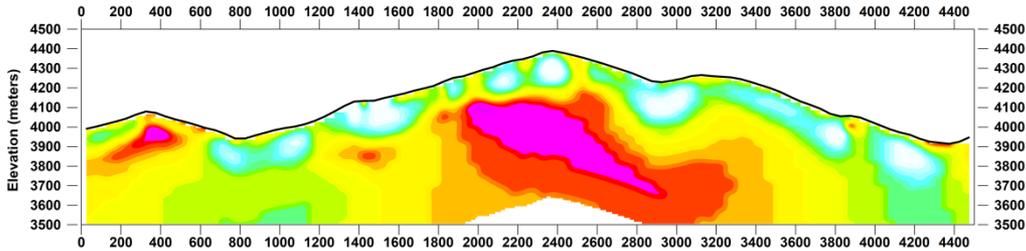




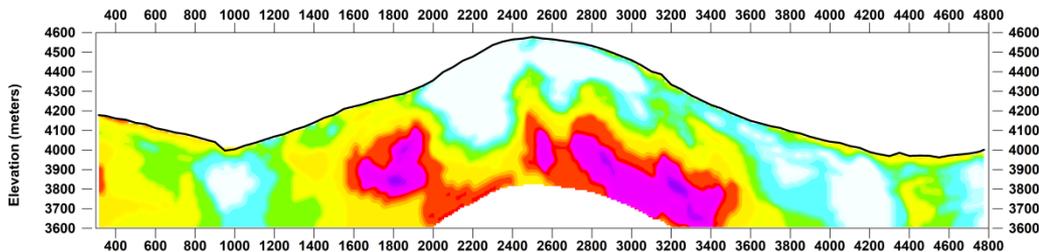
L9 2-D RLM Inversion



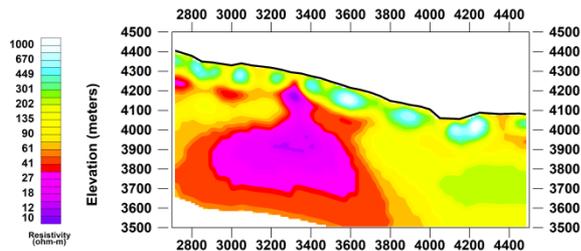
L8 2-D RLM Inversion



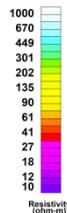
L7 2-D RLM Inversion



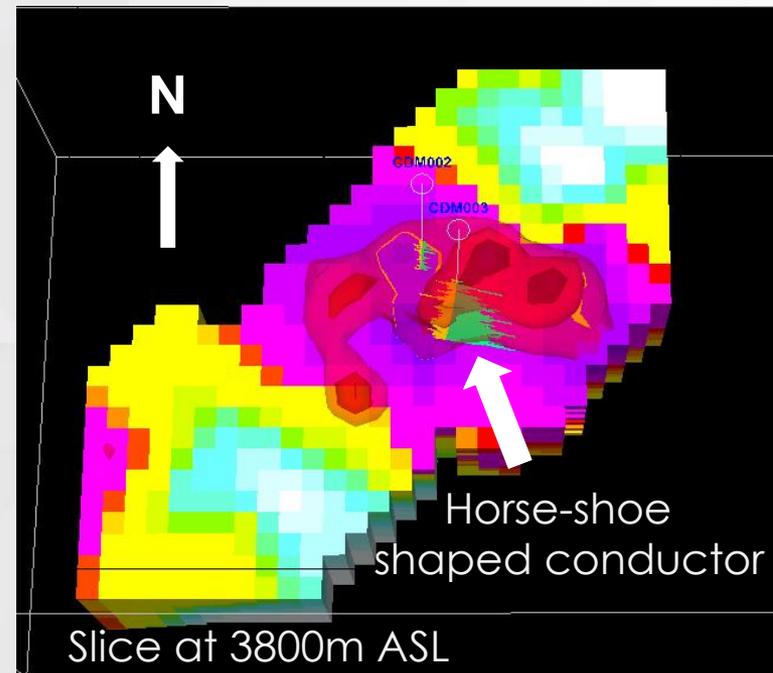
L6 2-D RLM Inversion



**CSAMT Survey
2010**

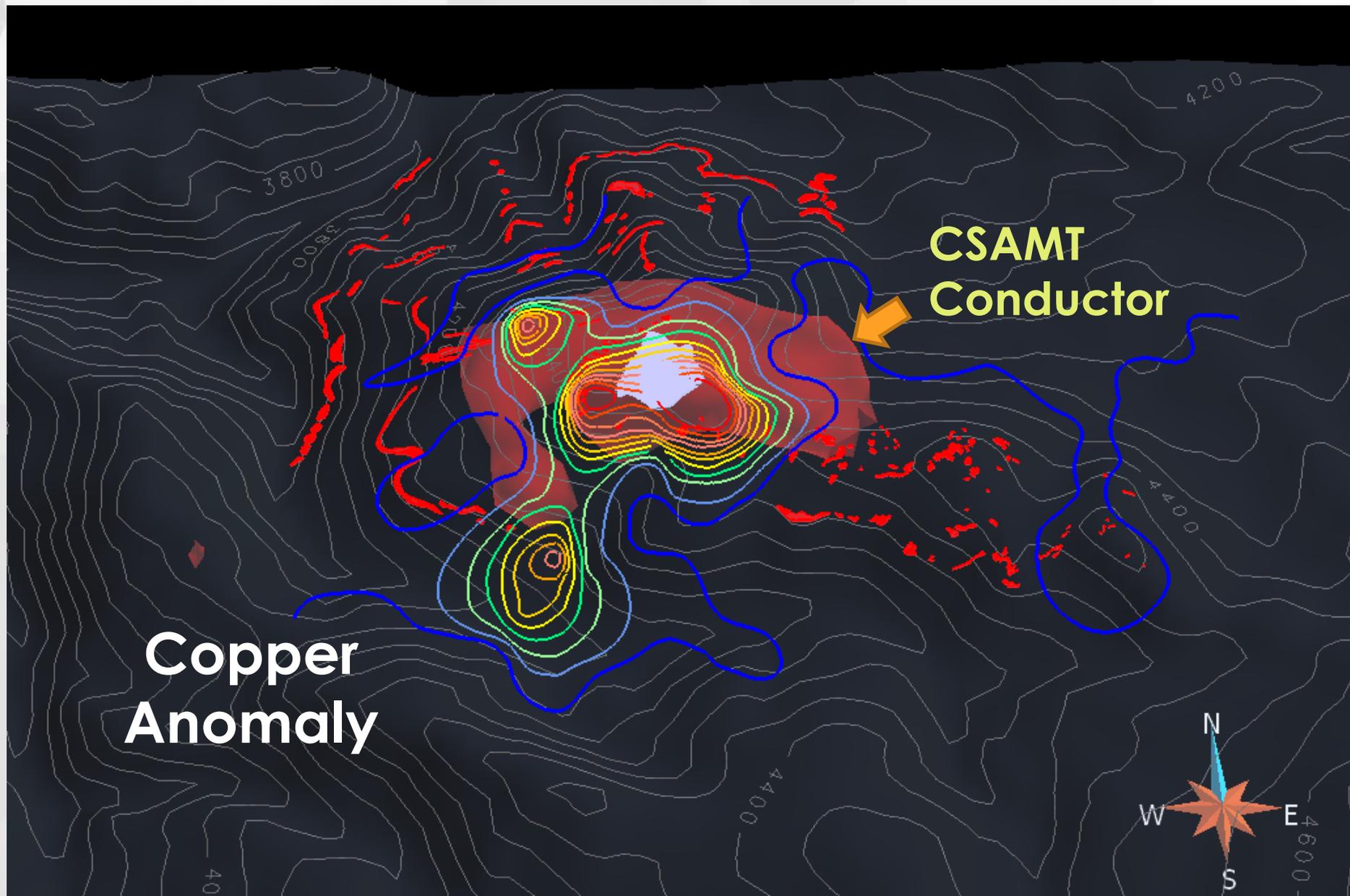


- ❑ Source dipole (3.5 km length)
- ❑ Current = 2-13 A
- ❑ Acq. Bandwidth= 2-9000 Hz
- ❑ Inv. Bandwidth=24-9000 Hz
- ❑ Bostick depth \approx 750m



MMI (Mobile Metal Ion) 2010 survey (SGS)

A Geochemical tool for deeply buried Mineralization

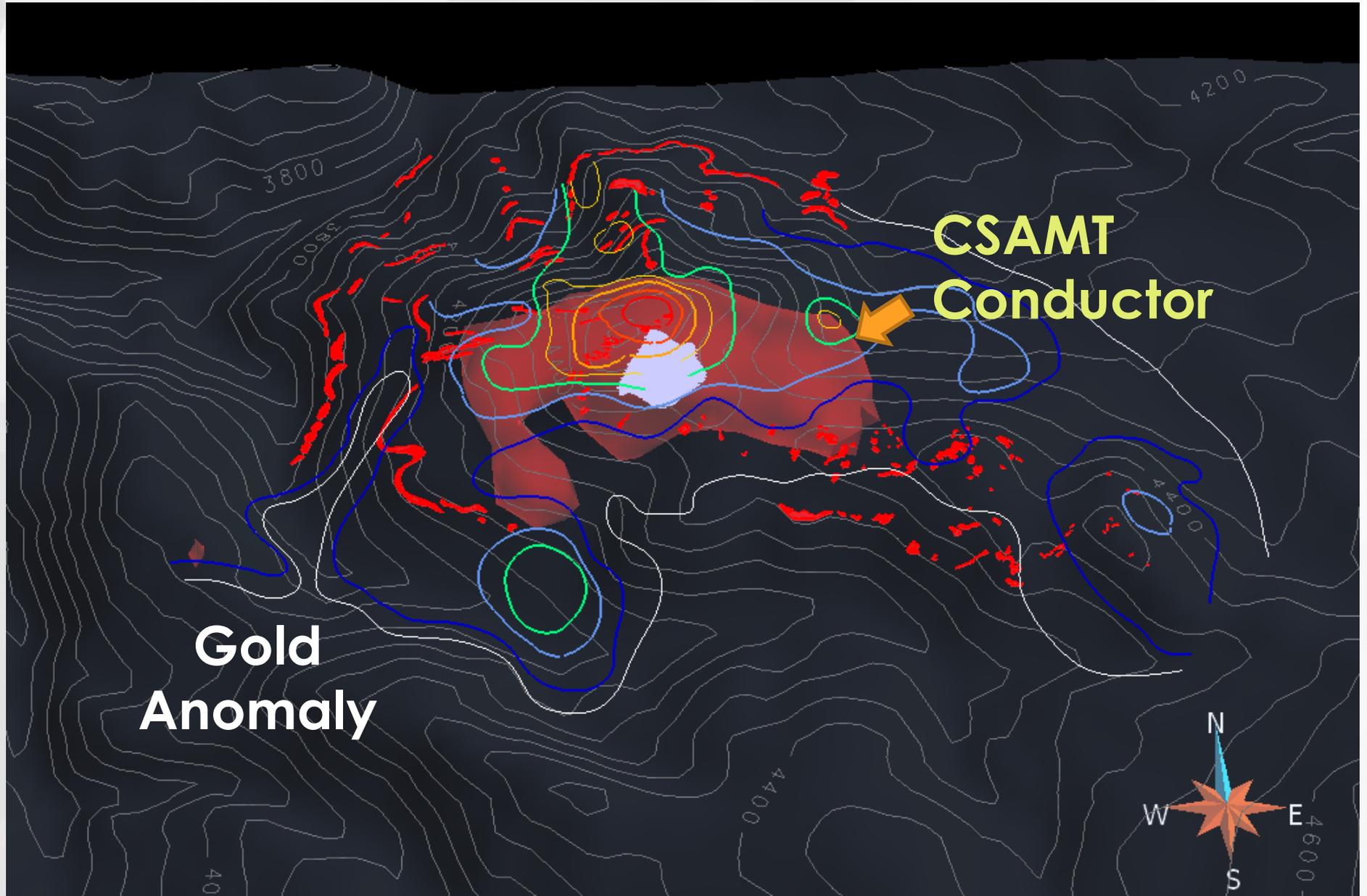


**Copper
Anomaly**

**CSAMT
Conductor**

**Gold
Anomaly**

**CSAMT
Conductor**



Discovery Holes (2011)

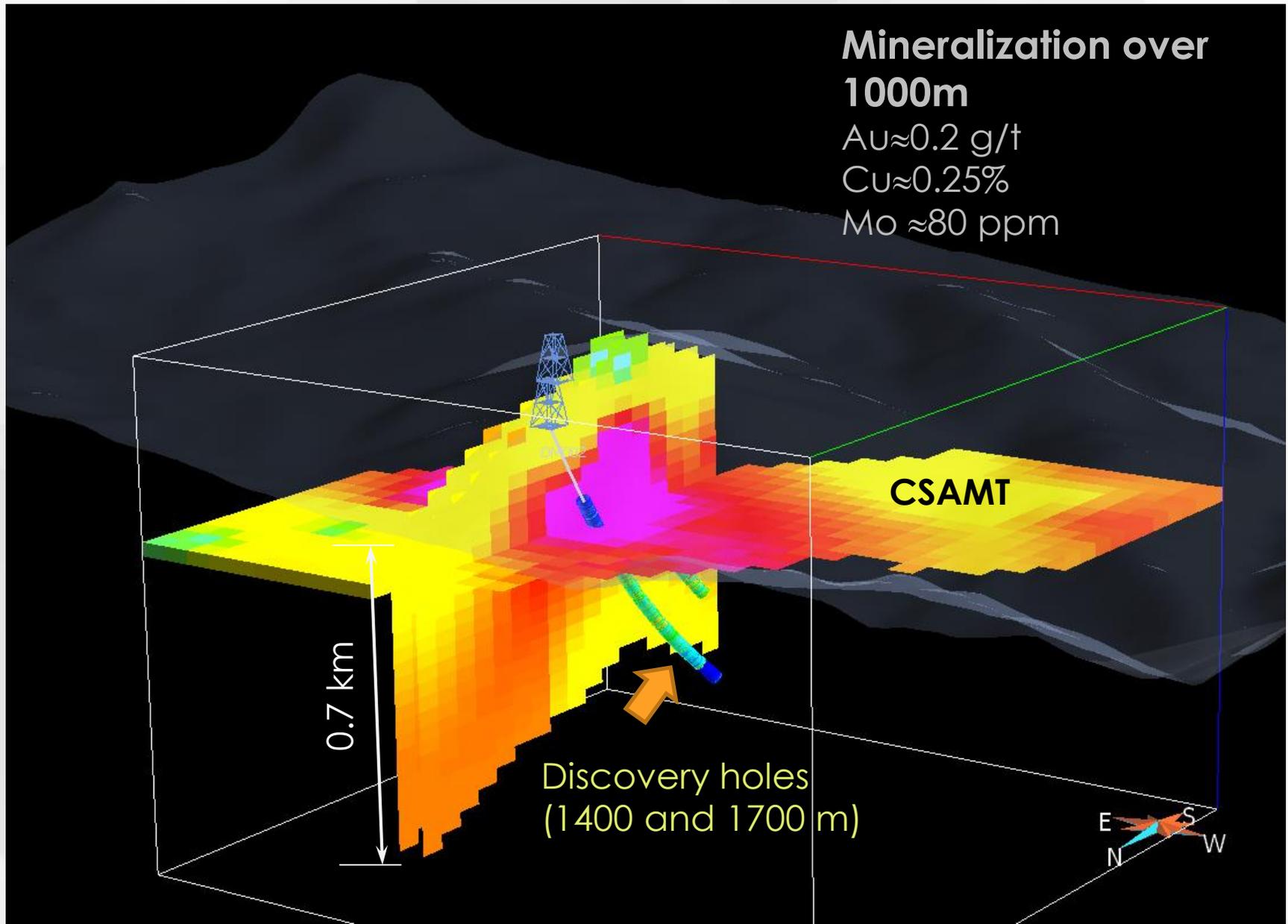


Mineralization over
1000m

Au \approx 0.2 g/t

Cu \approx 0.25%

Mo \approx 80 ppm



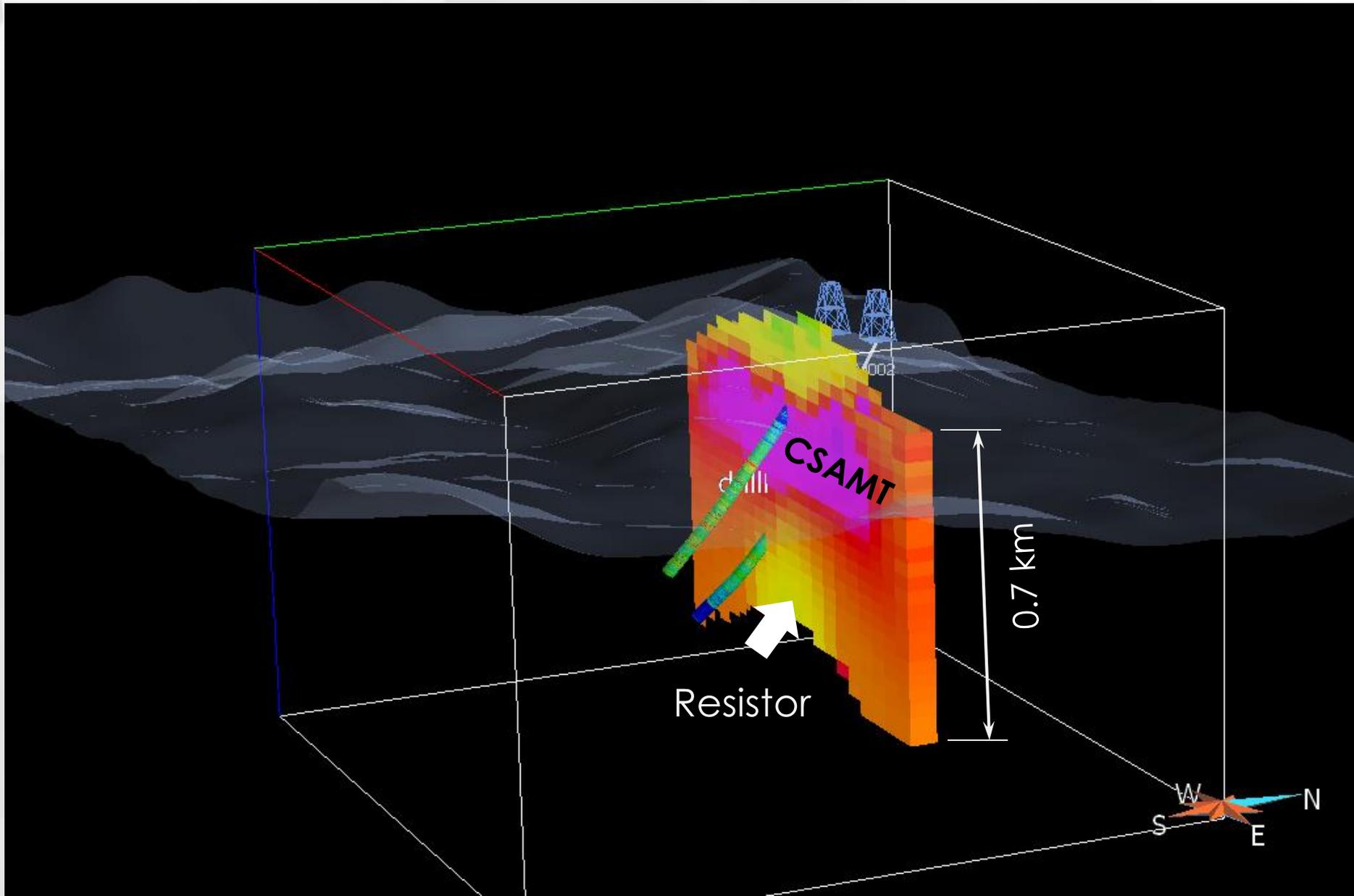
CSAMT

0.7 km

Discovery holes
(1400 and 1700 m)



Drill Testing the CSAMT Conductor



ORION 3D Survey (Fall 2012)

OBJECTIVE: 3D IMAGING OF MINERALIZATION AND ALTERATION

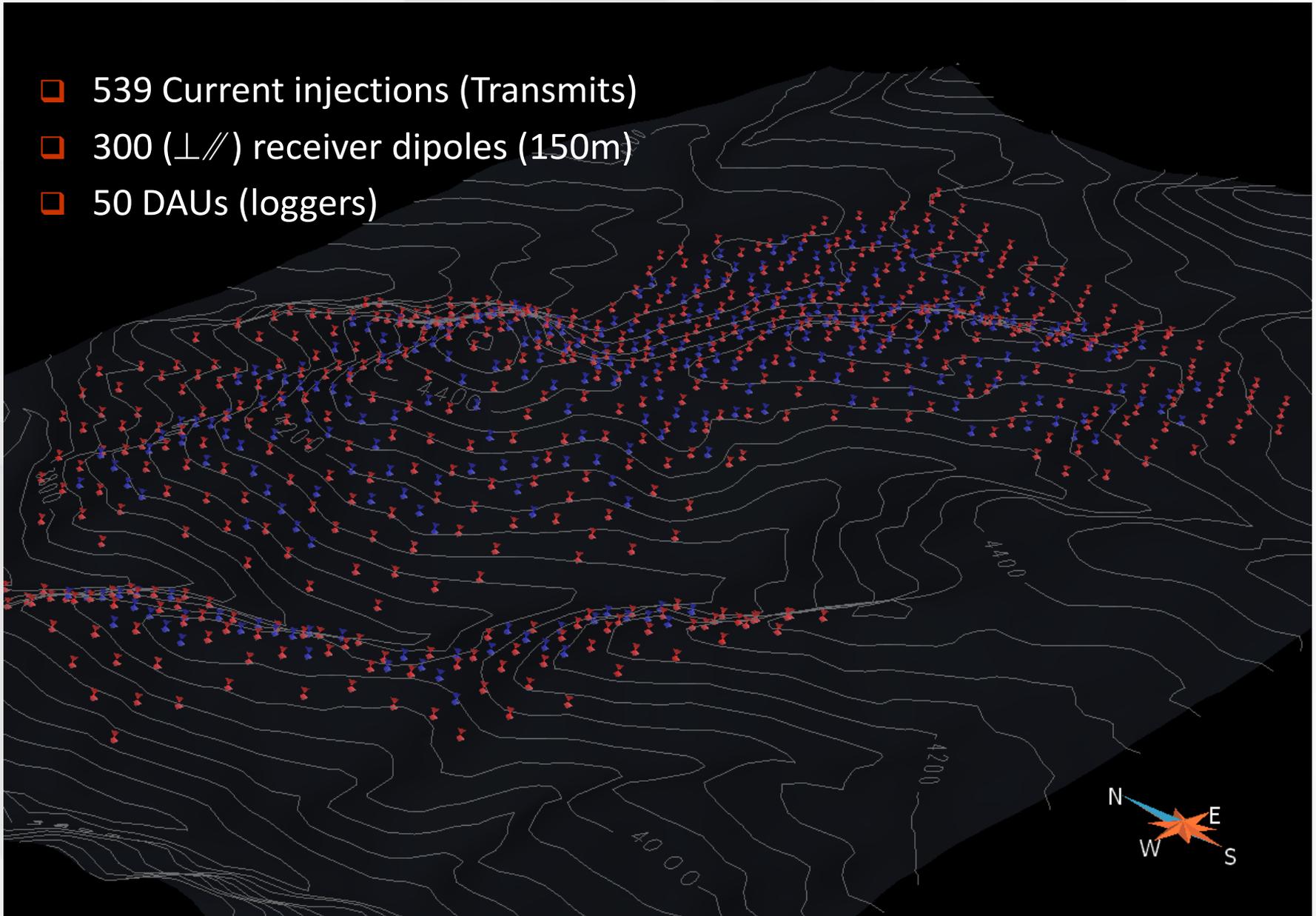


ORION **3D**

Orion 3D DCIP Survey



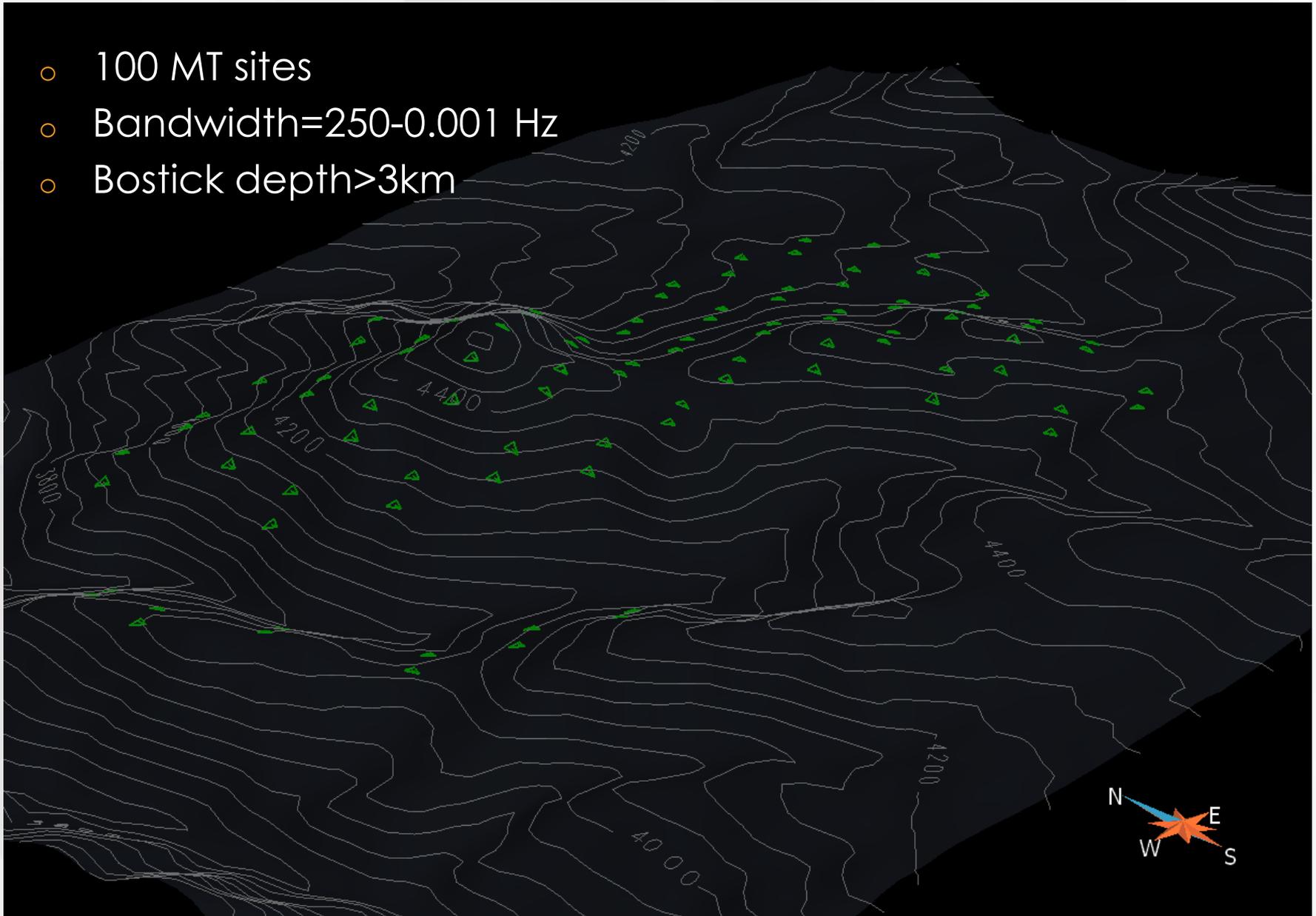
- 539 Current injections (Transmits)
- 300 (\perp / \parallel) receiver dipoles (150m)
- 50 DAUs (loggers)



Orion 3D MT Survey



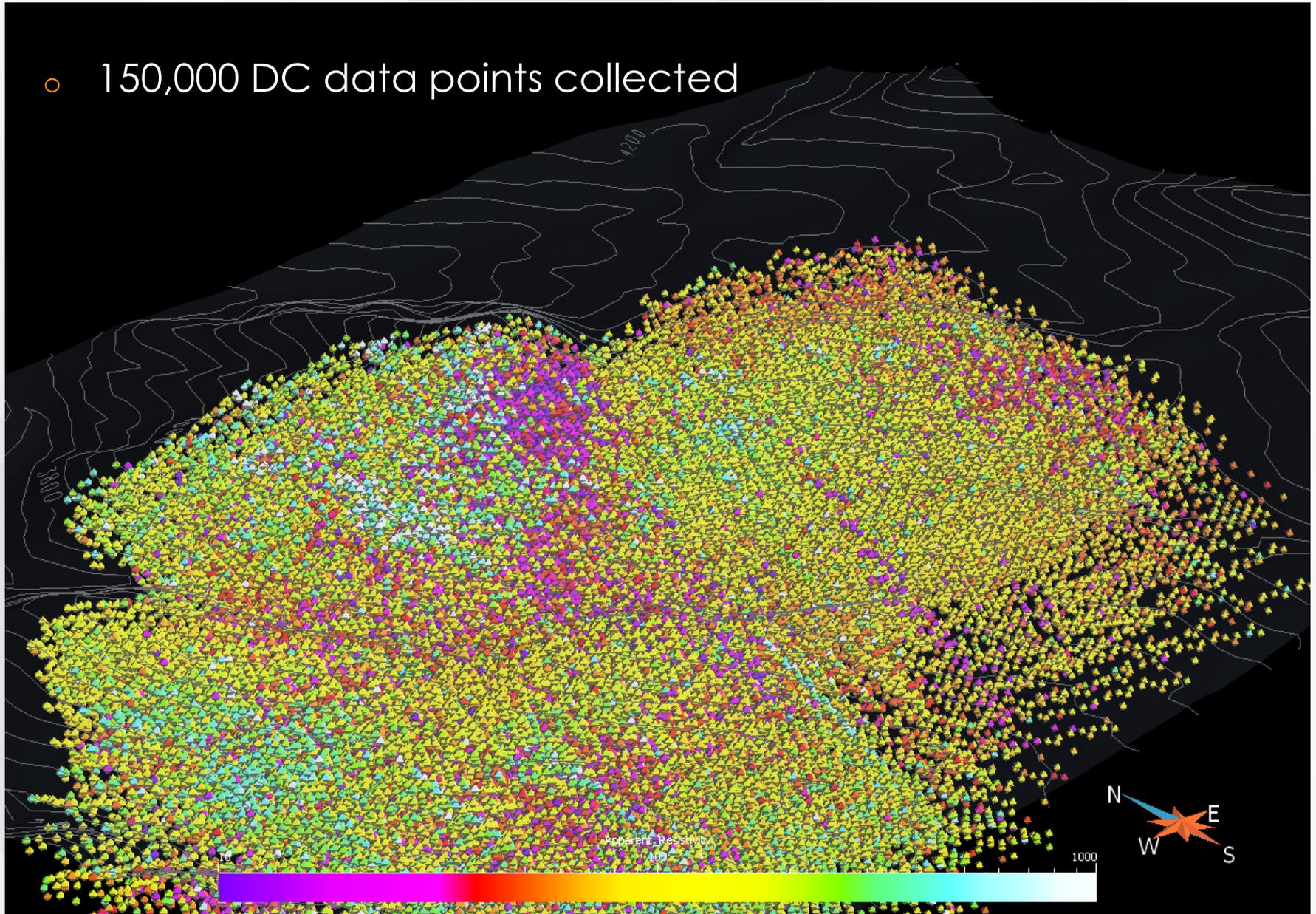
- 100 MT sites
- Bandwidth=250-0.001 Hz
- Bostick depth>3km



ORION 3D Survey



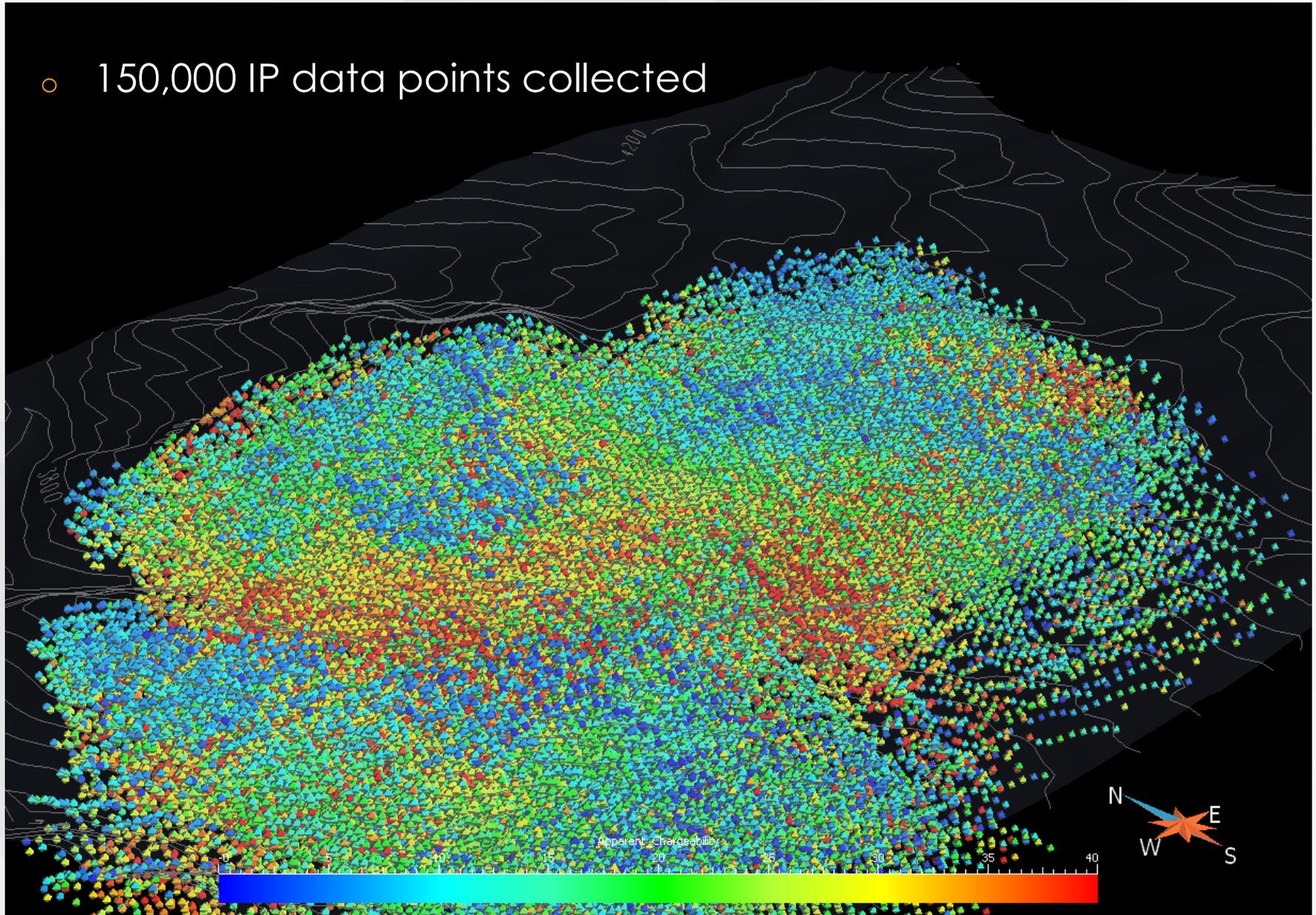
- 150,000 DC data points collected



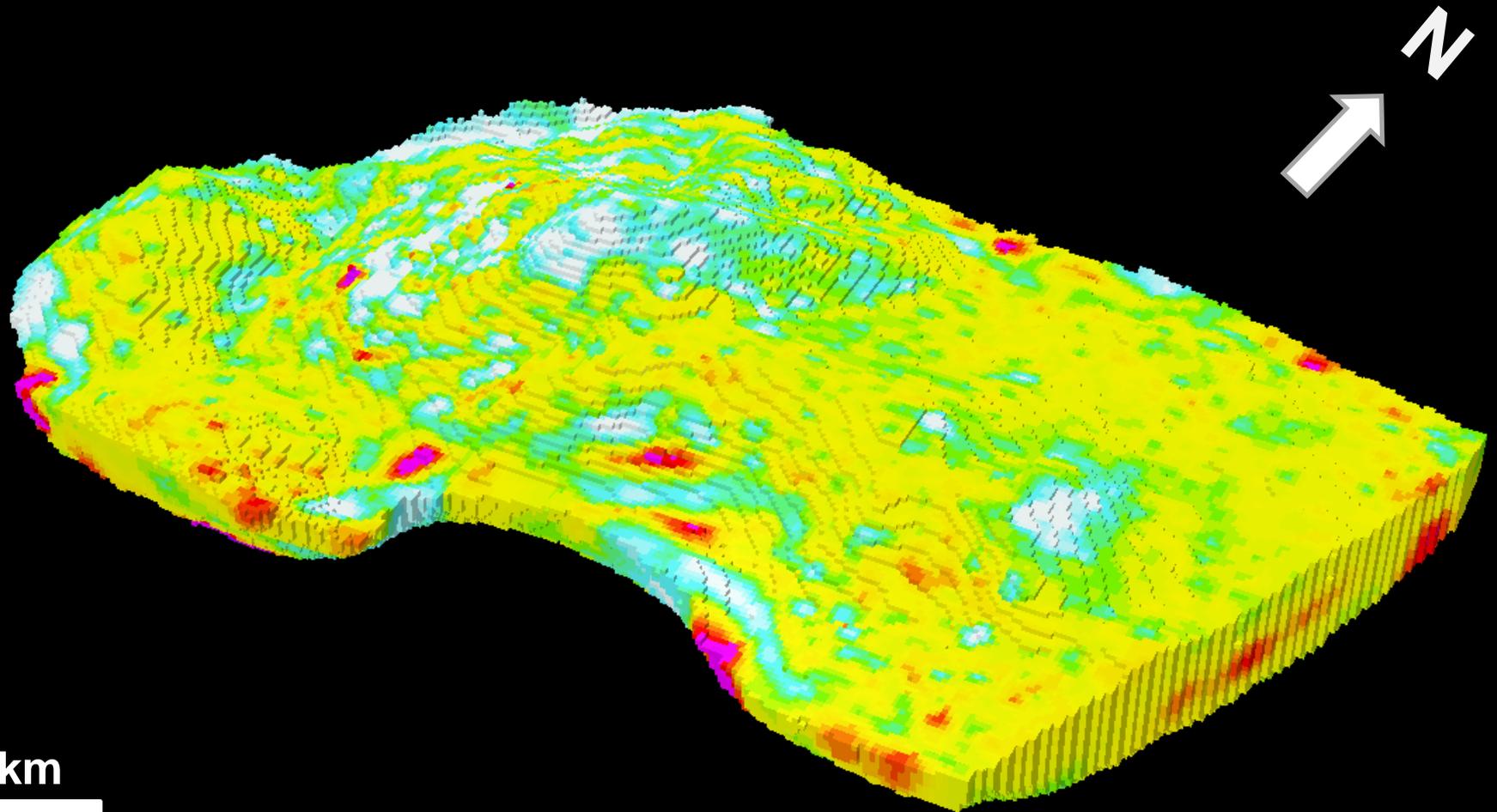
Orion 3D Survey



- 150,000 IP data points collected

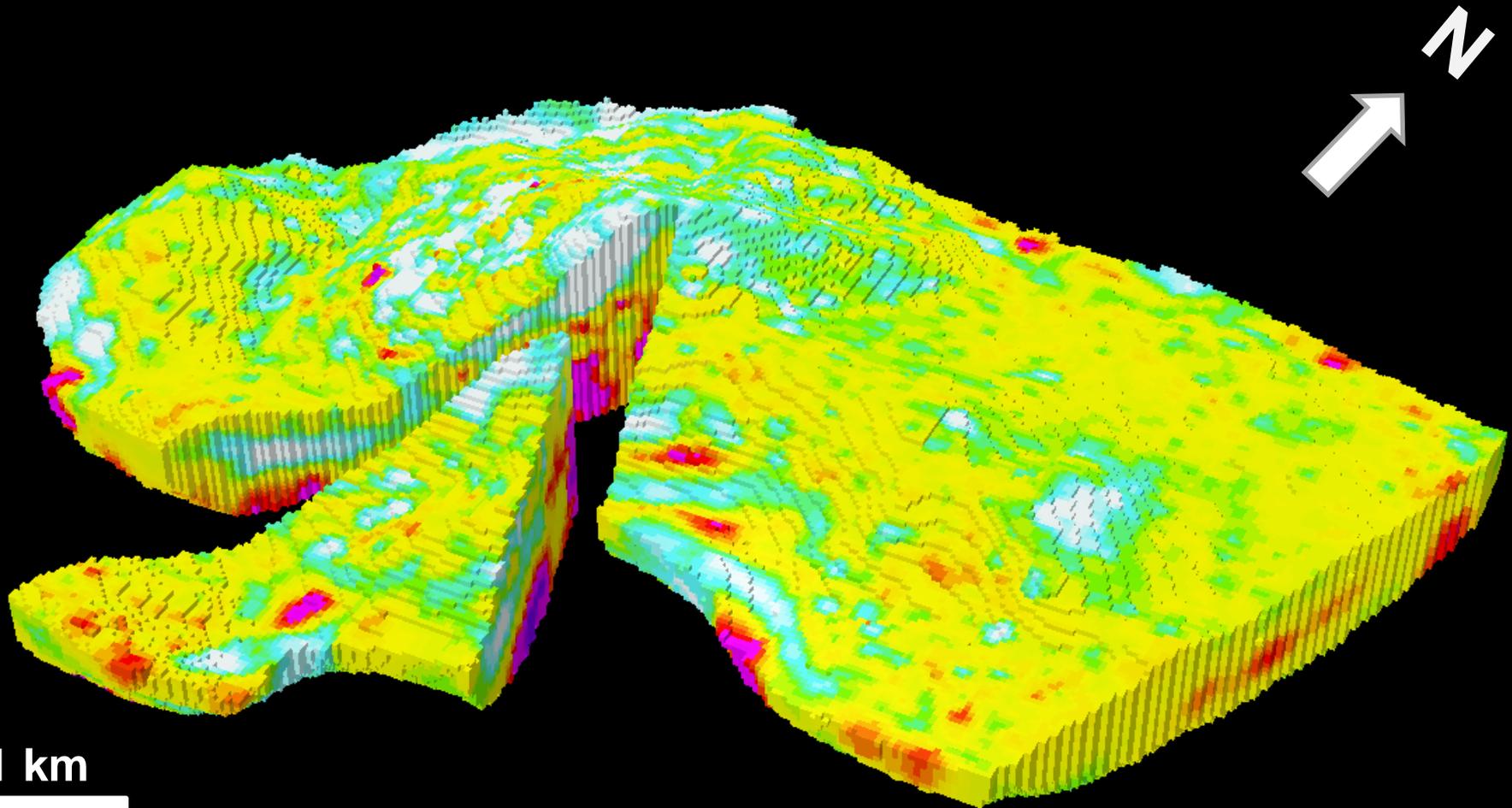


3D DC Resistivity Model



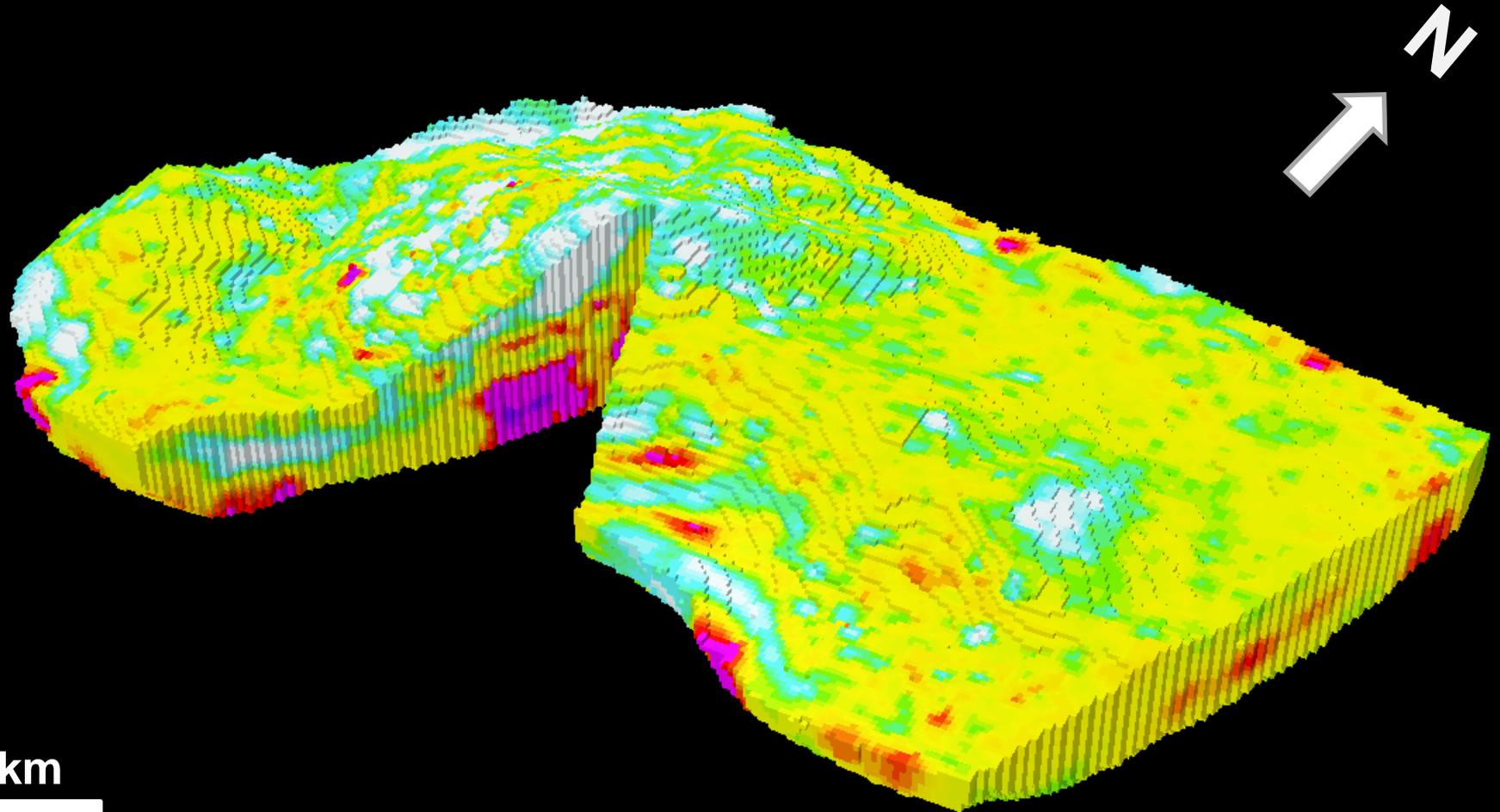
1 km

3D DC Resistivity Model



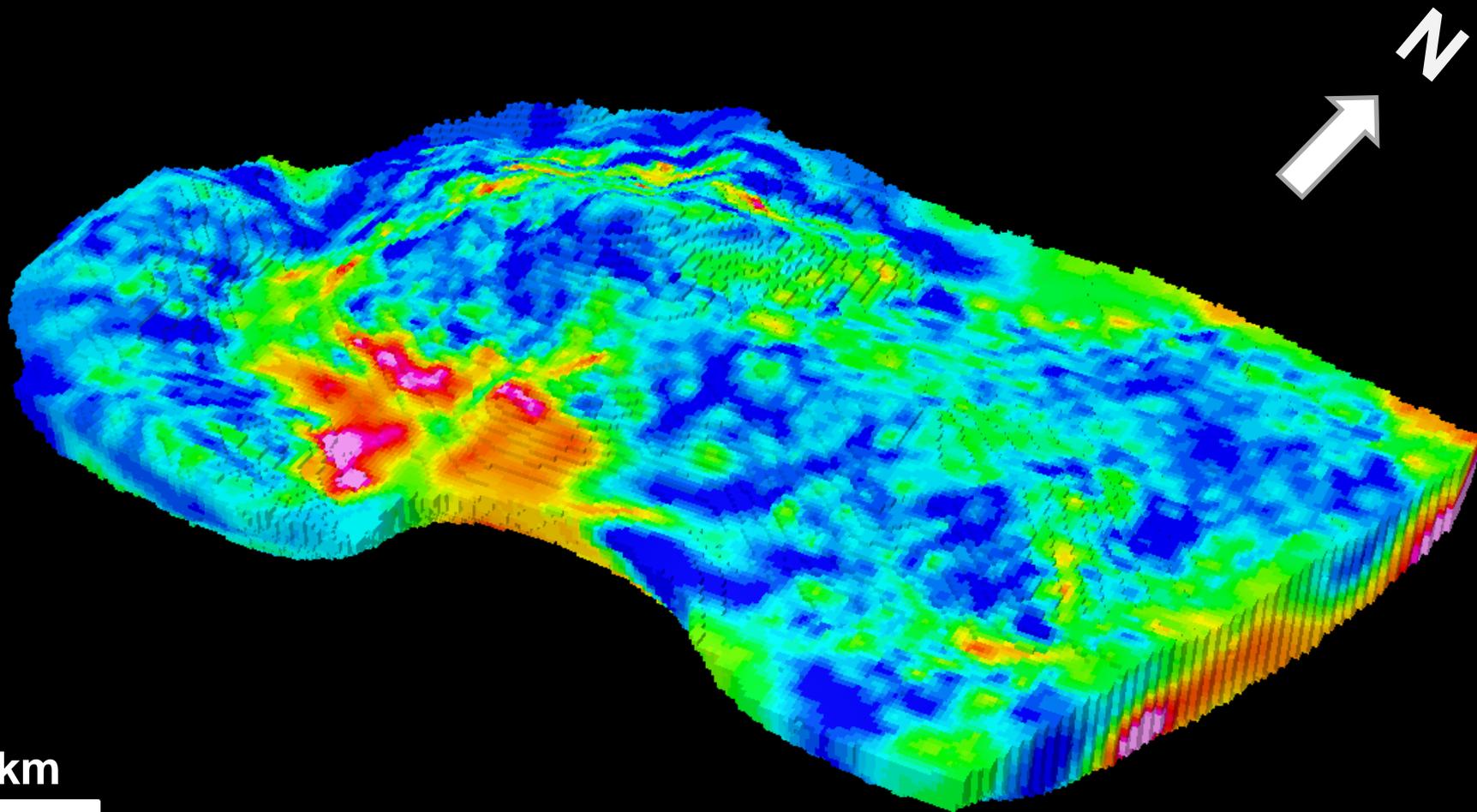
1 km

3D DC Resistivity Model



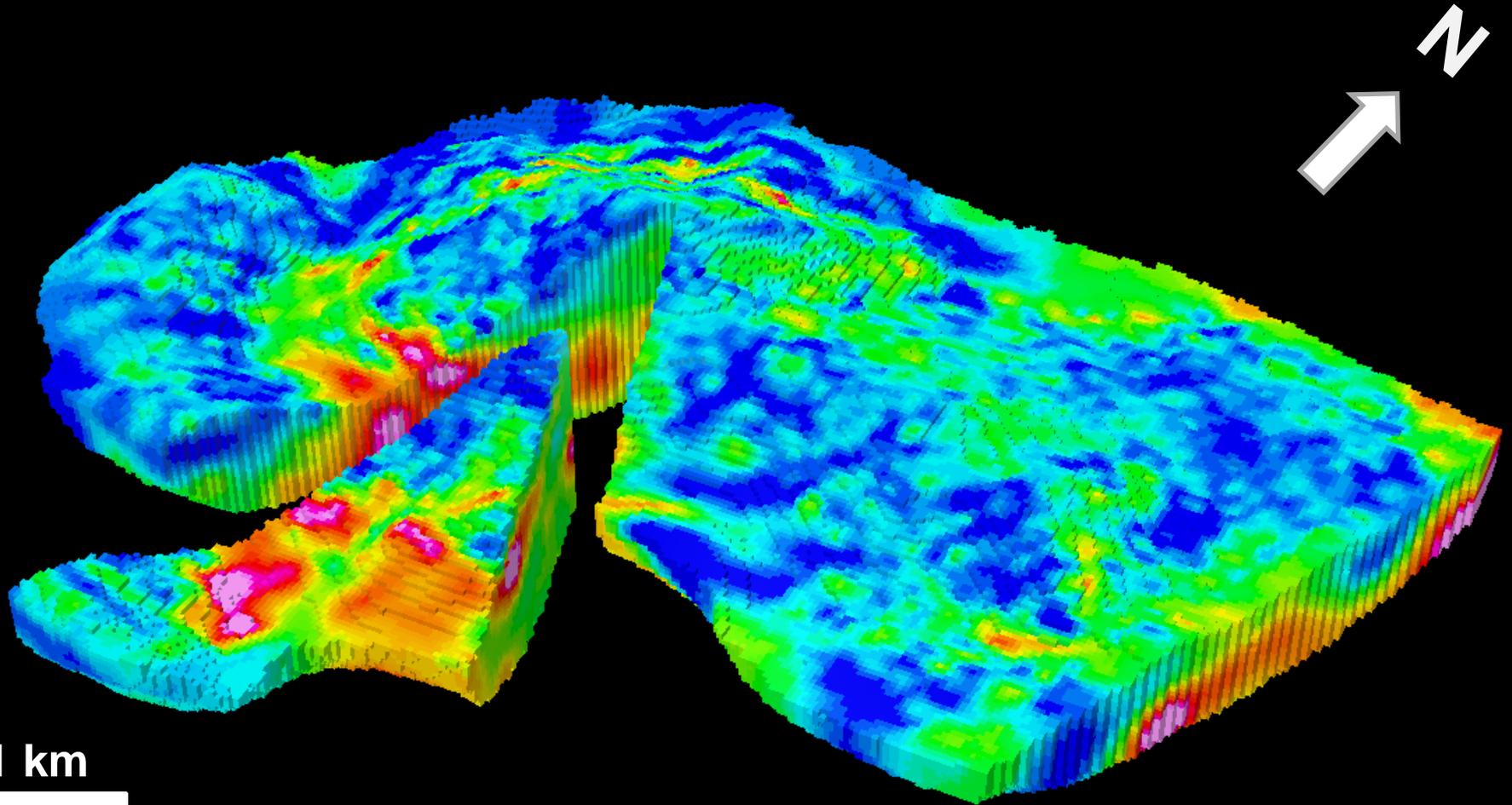
1 km

3D IP Model



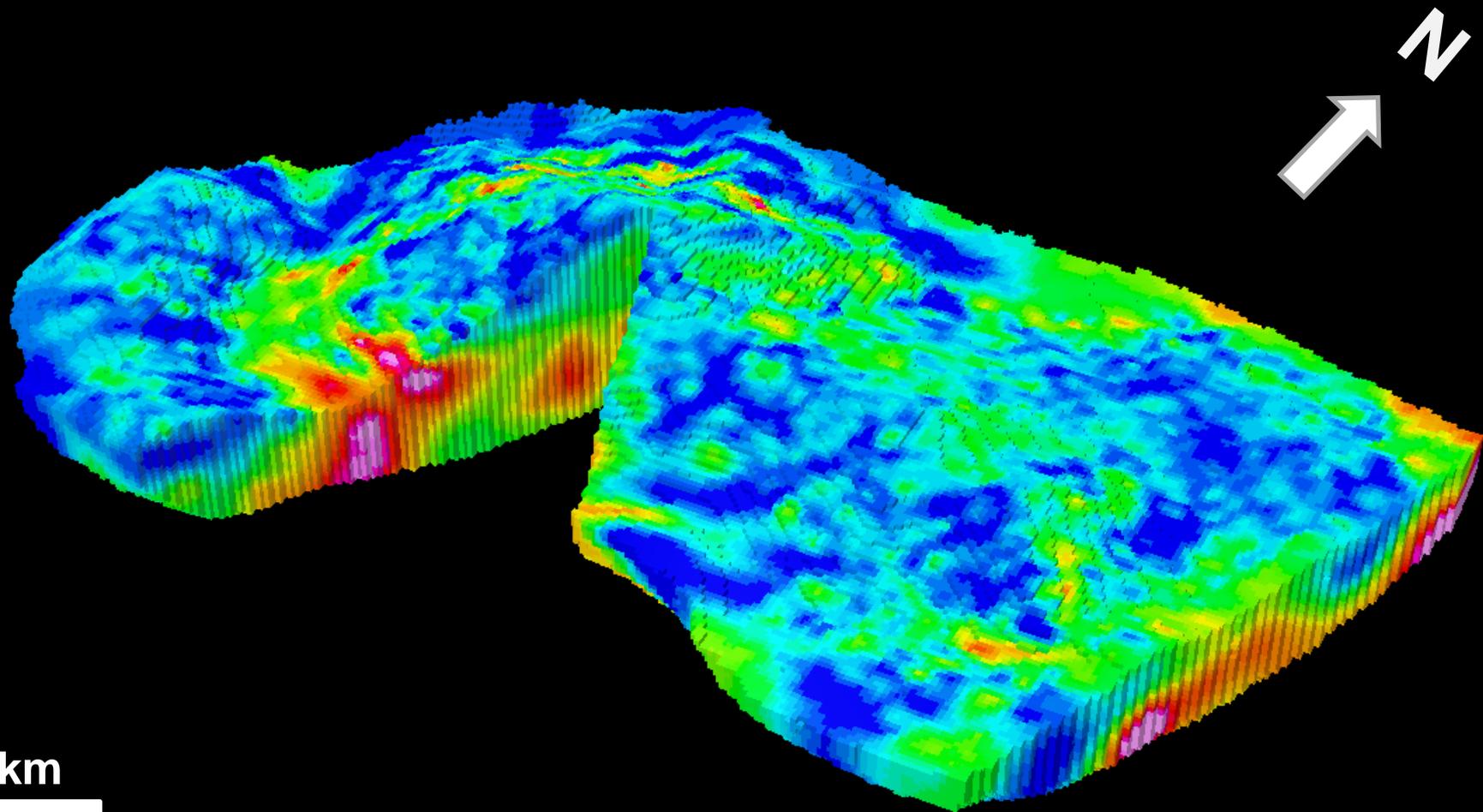
1 km

3D IP Model

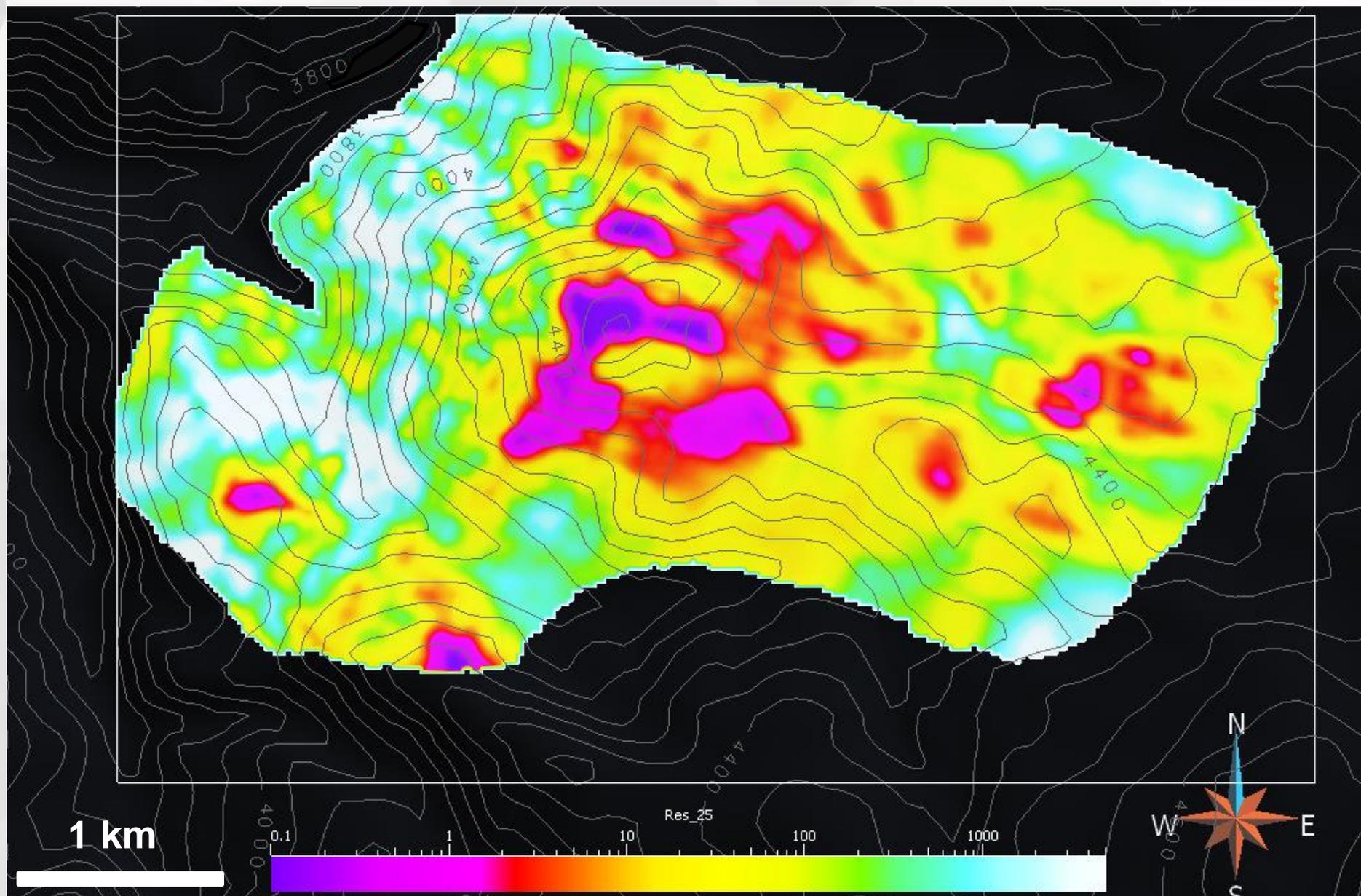


1 km

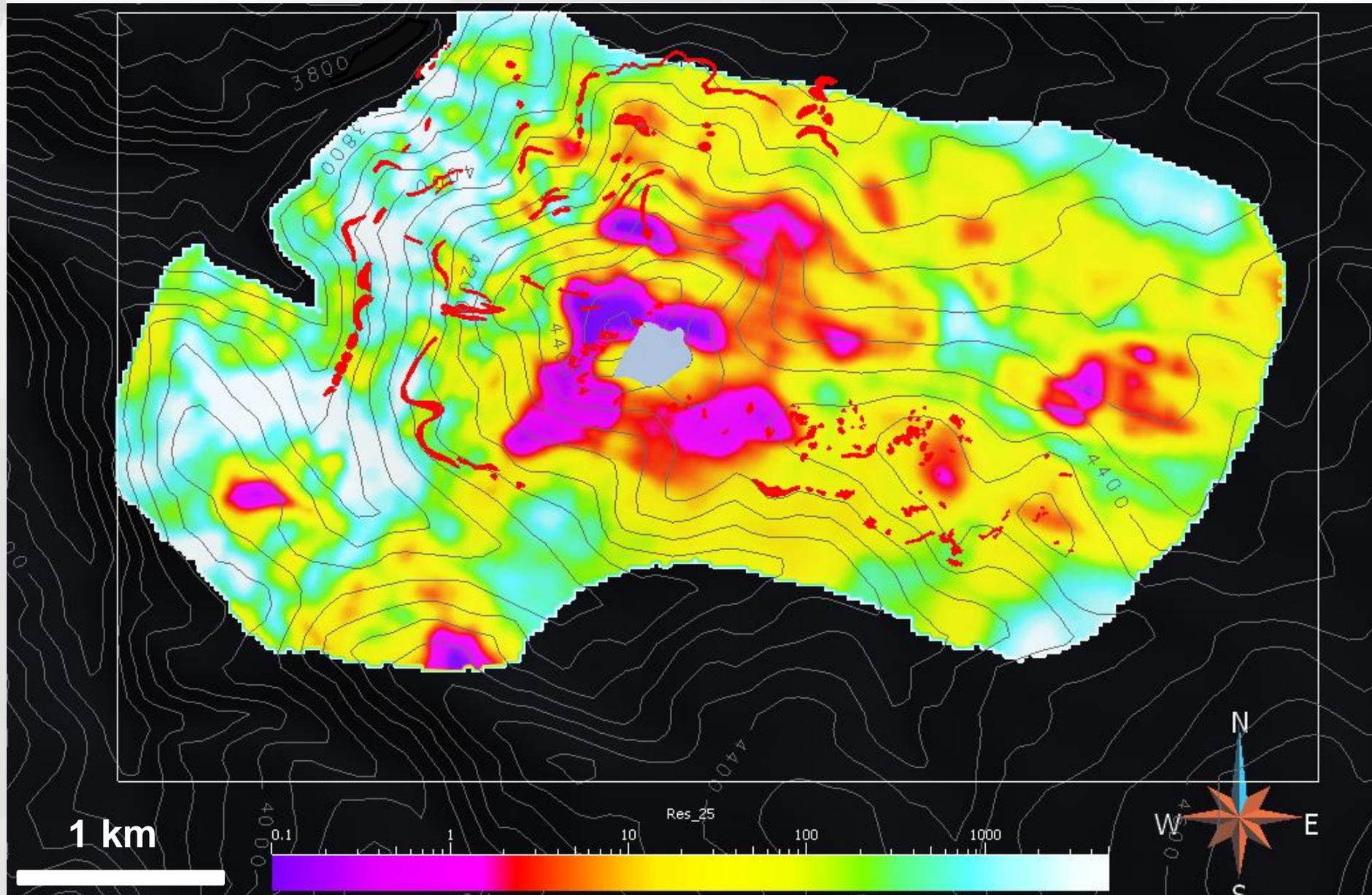
3D IP Model



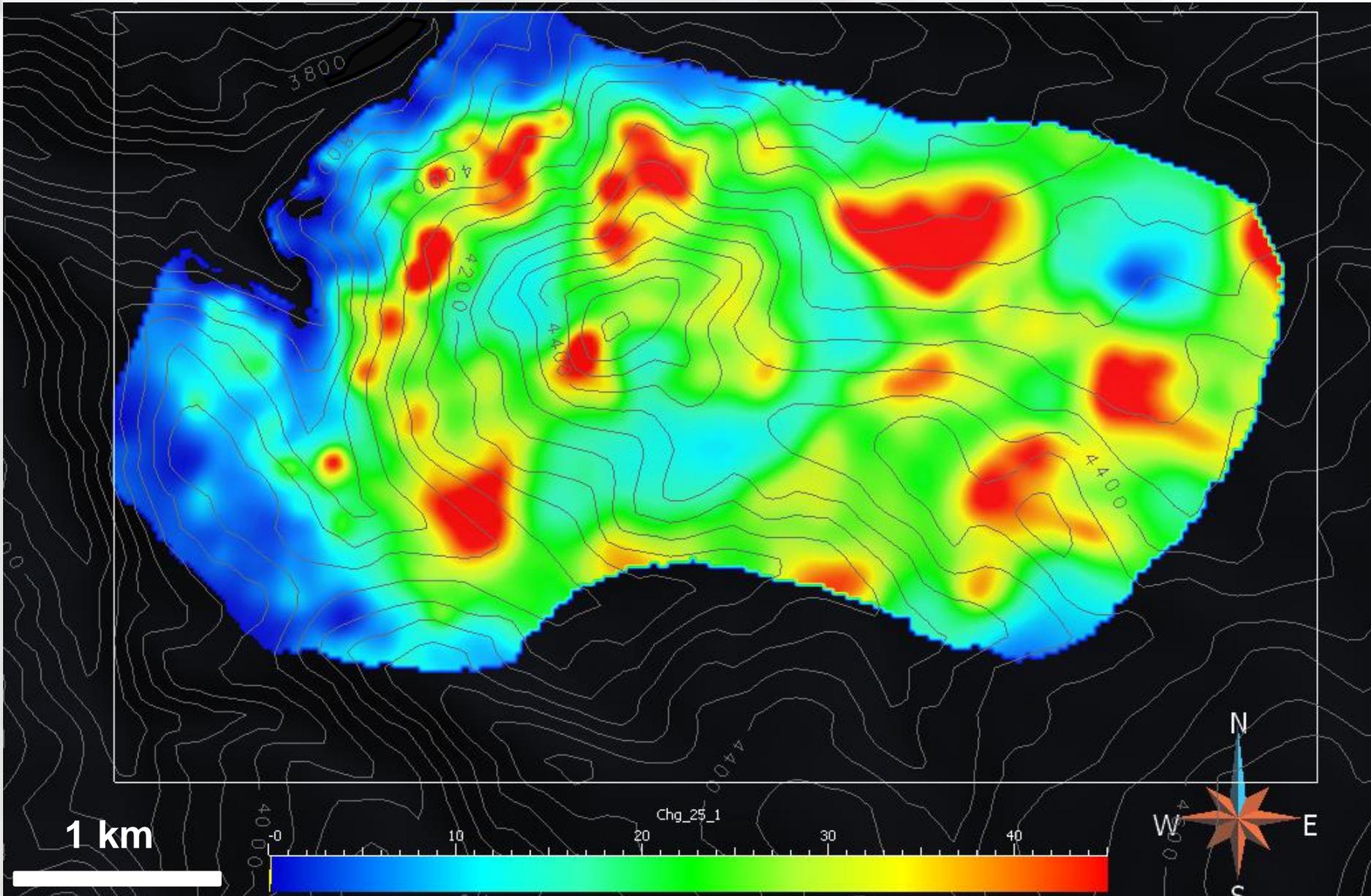
DC Res Horizontal Slice (3775m ASL) \approx 700m depth



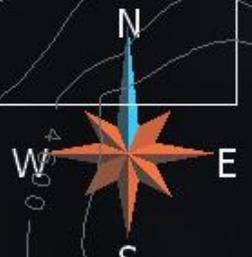
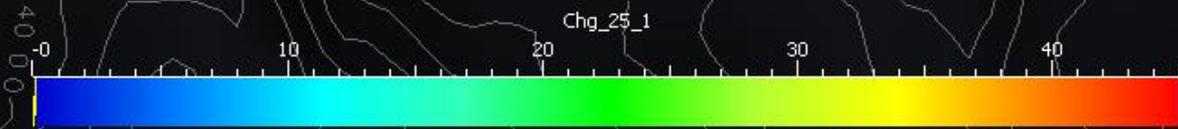
DC Res Horizontal Slice (3775m ASL) \approx 700m depth



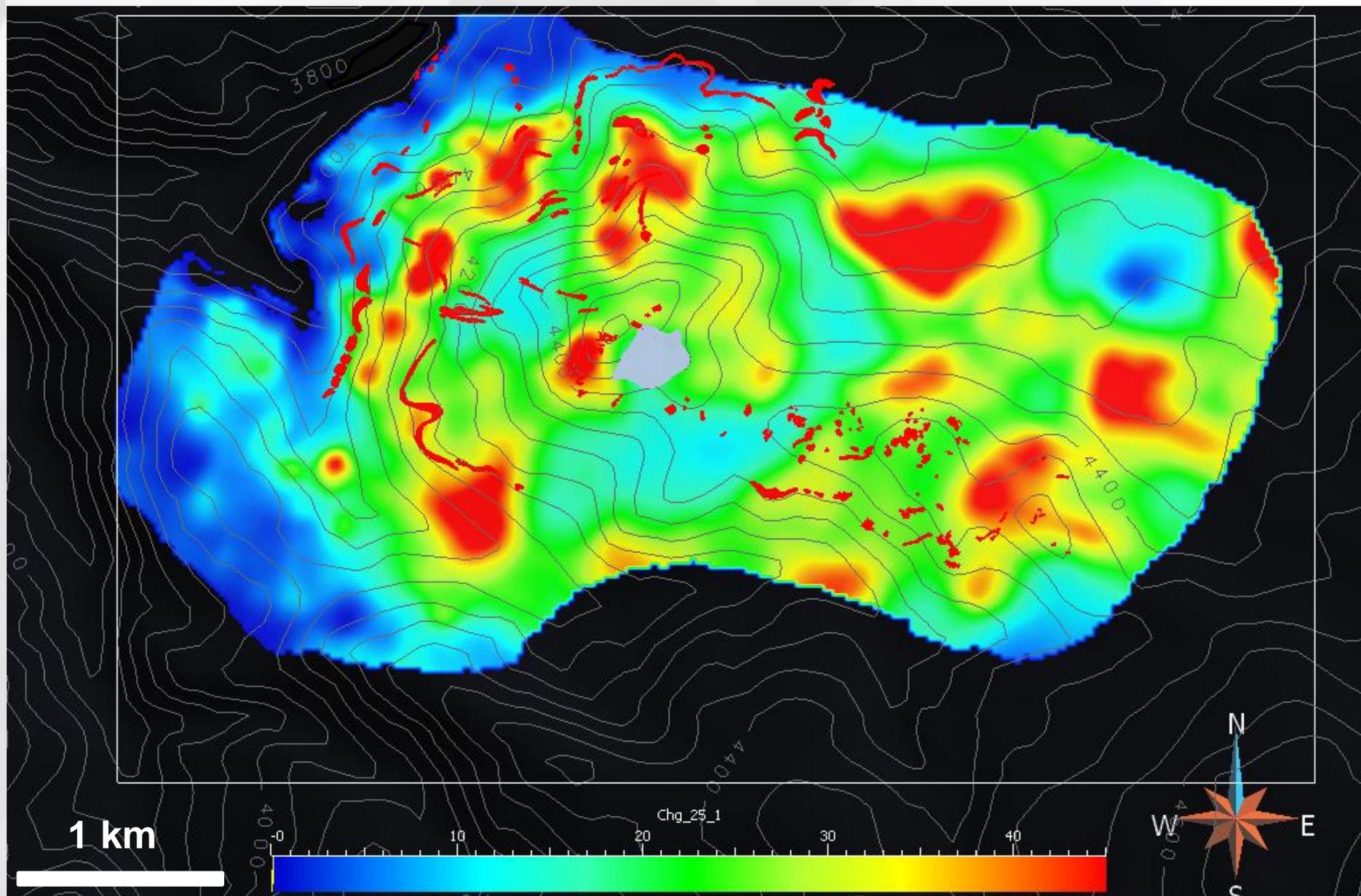
IP Horizontal Slice (3775m ASL) \approx 700m depth



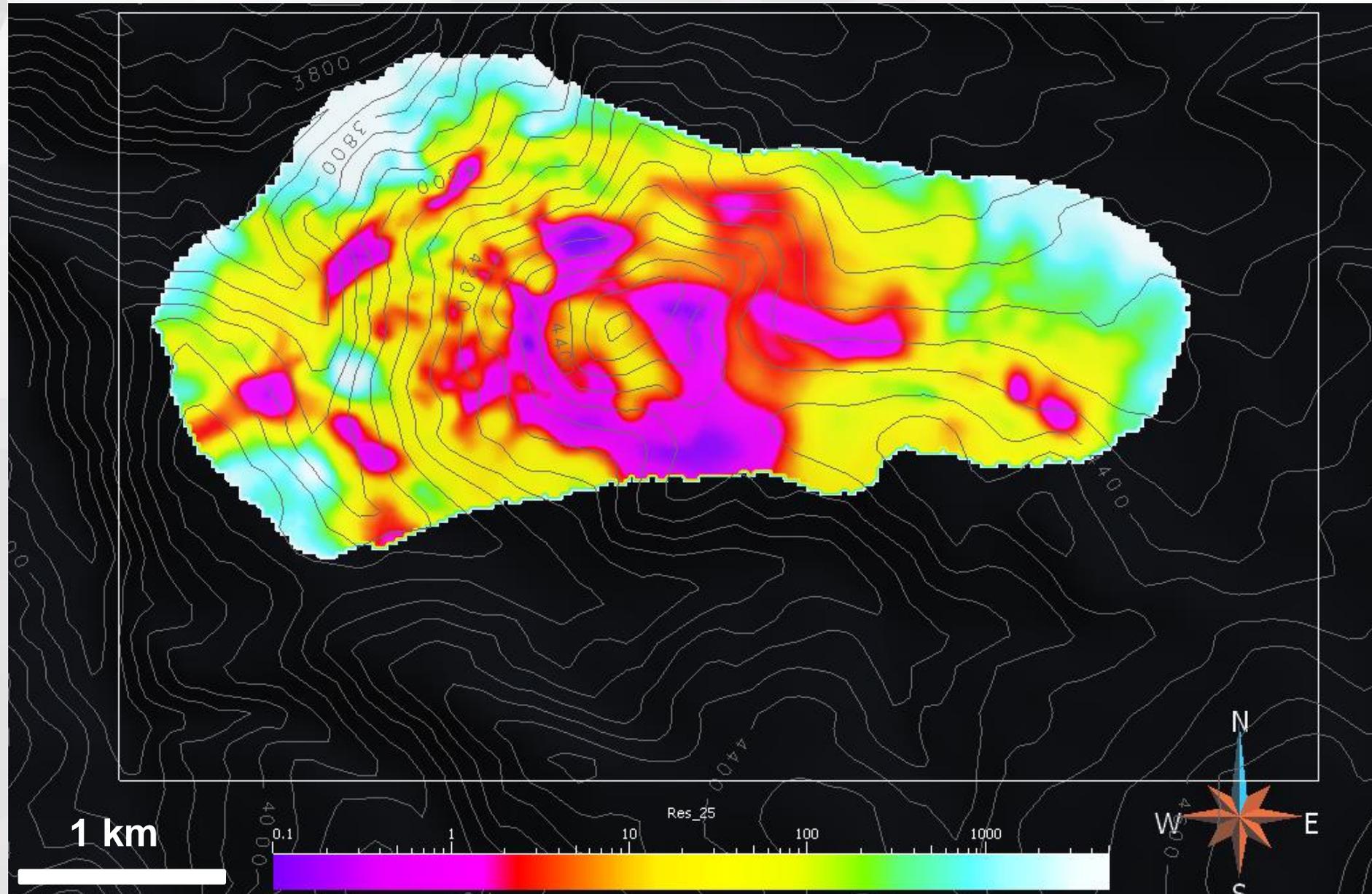
1 km



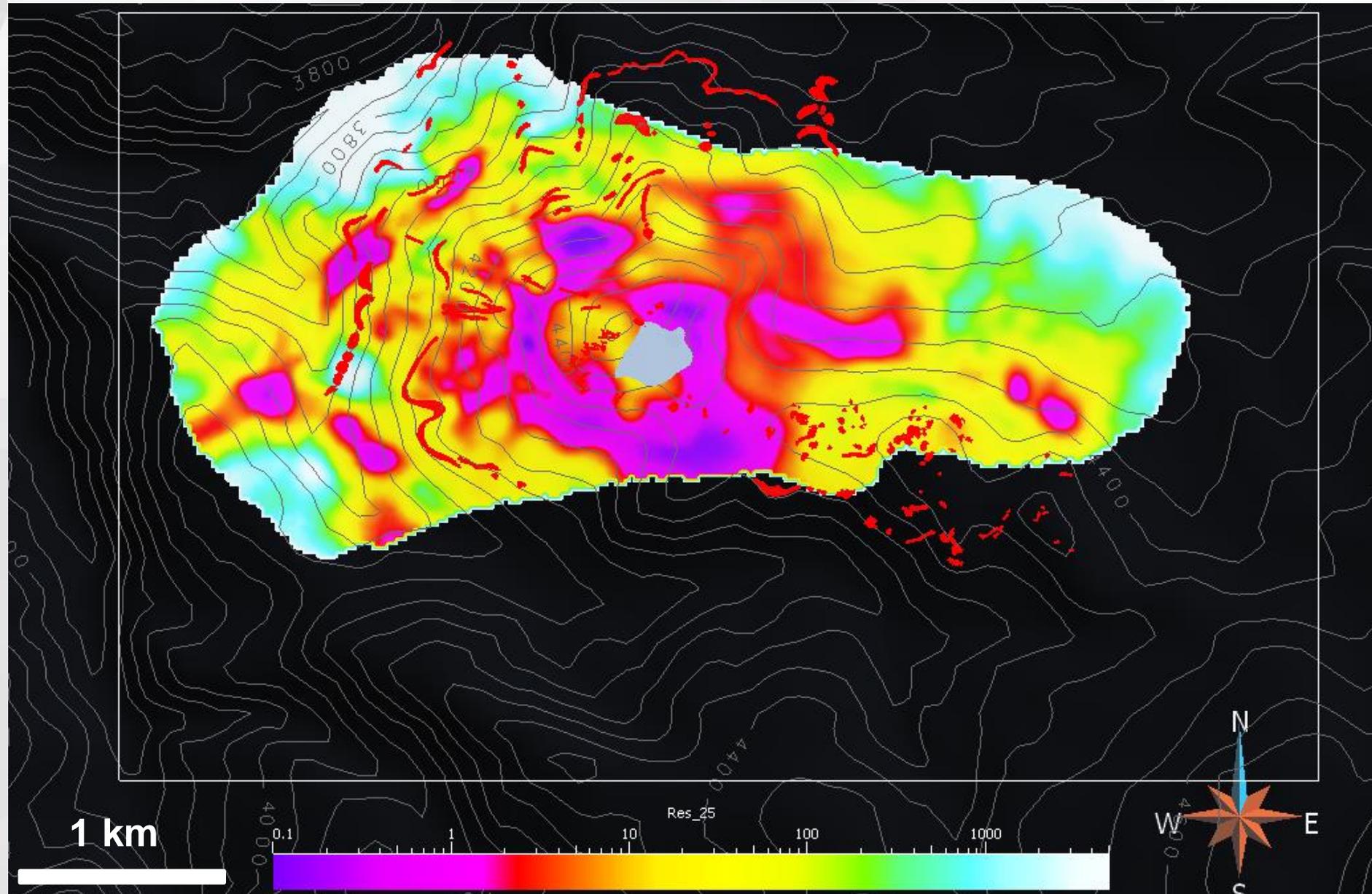
IP Horizontal Slice (3775m ASL) \approx 700m depth



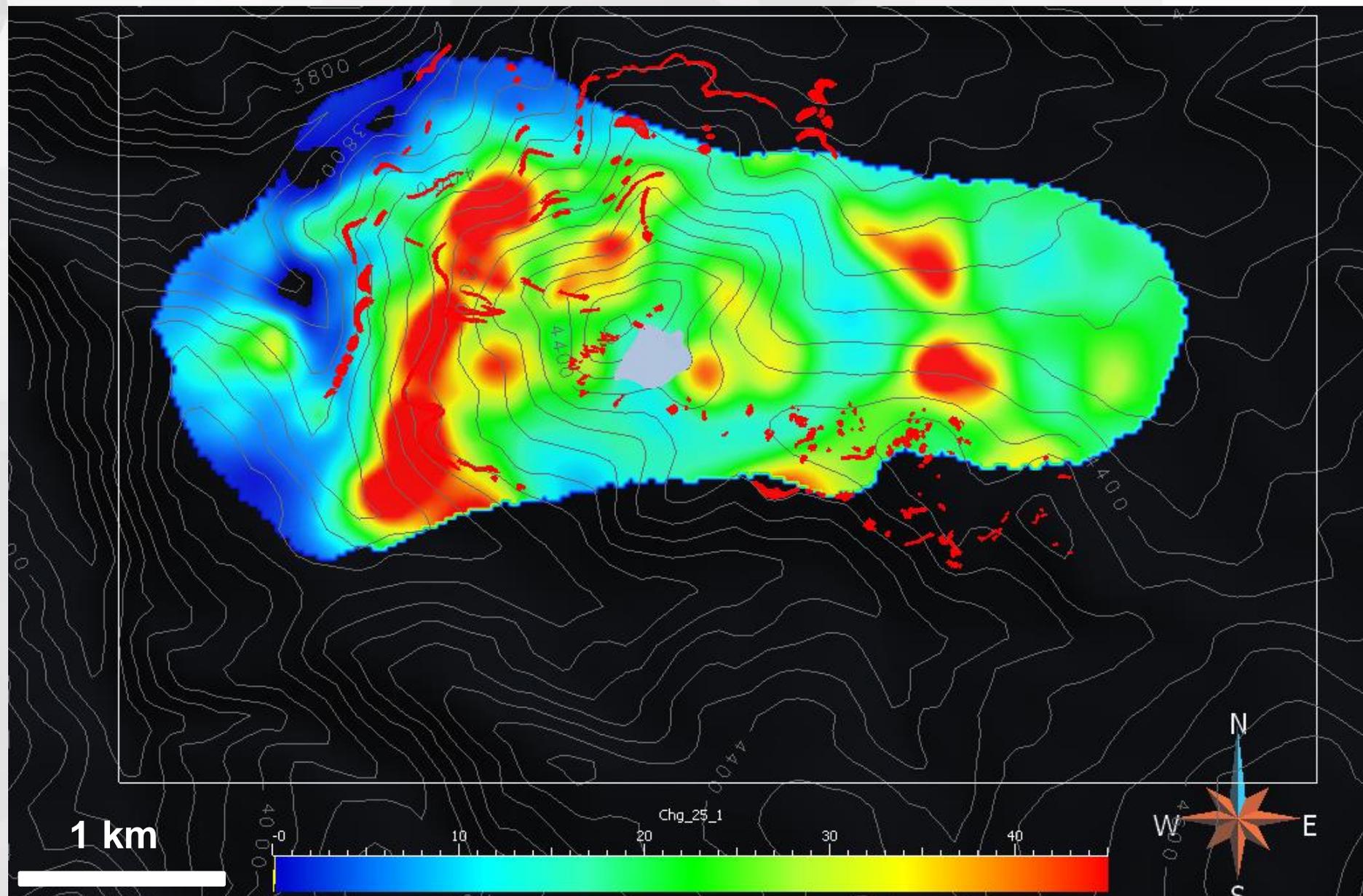
DC Res Horizontal Slice (3550 m ASL) \approx 900m depth



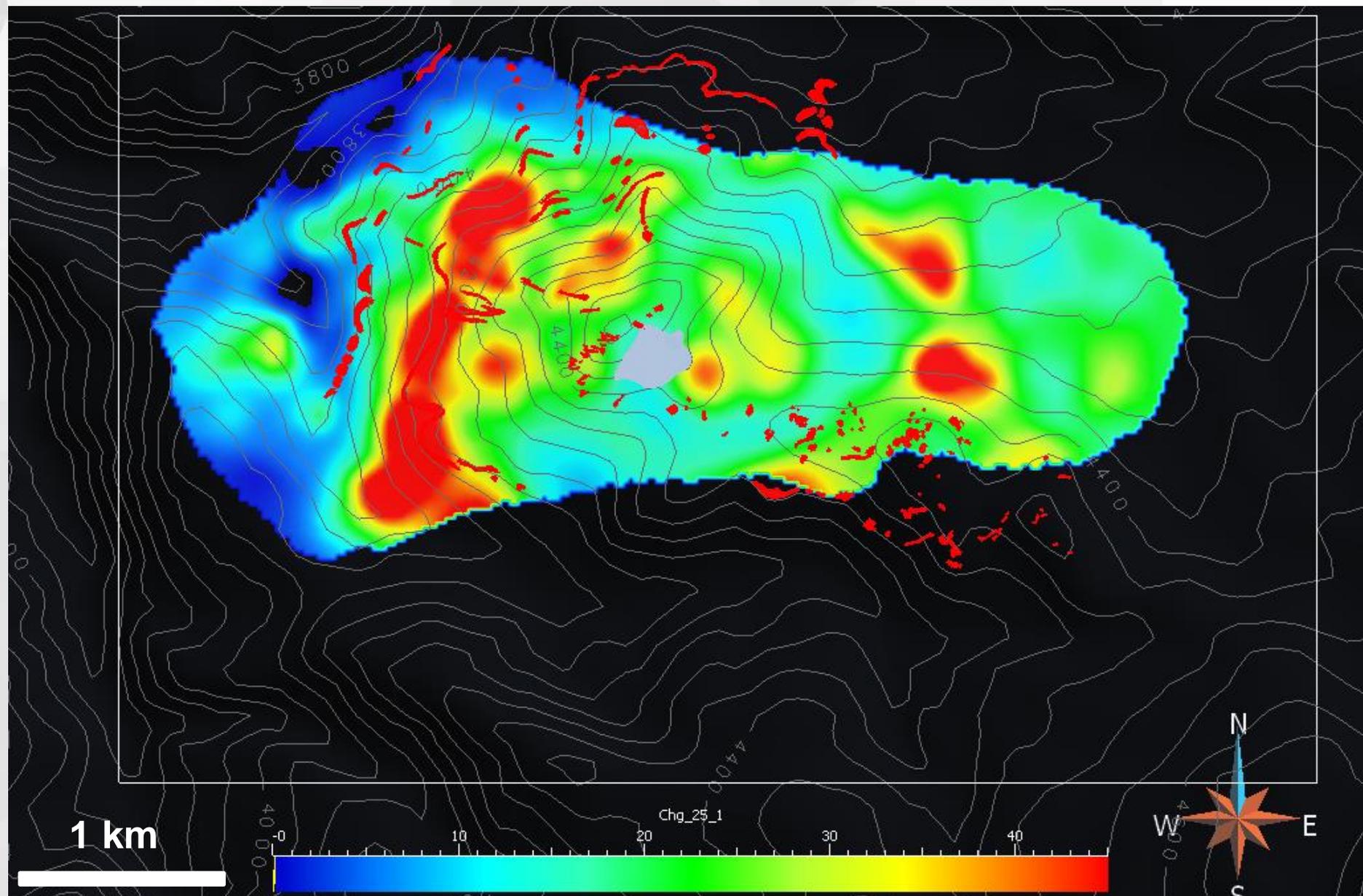
DC Res Horizontal Slice (3550 m ASL) \approx 900m depth



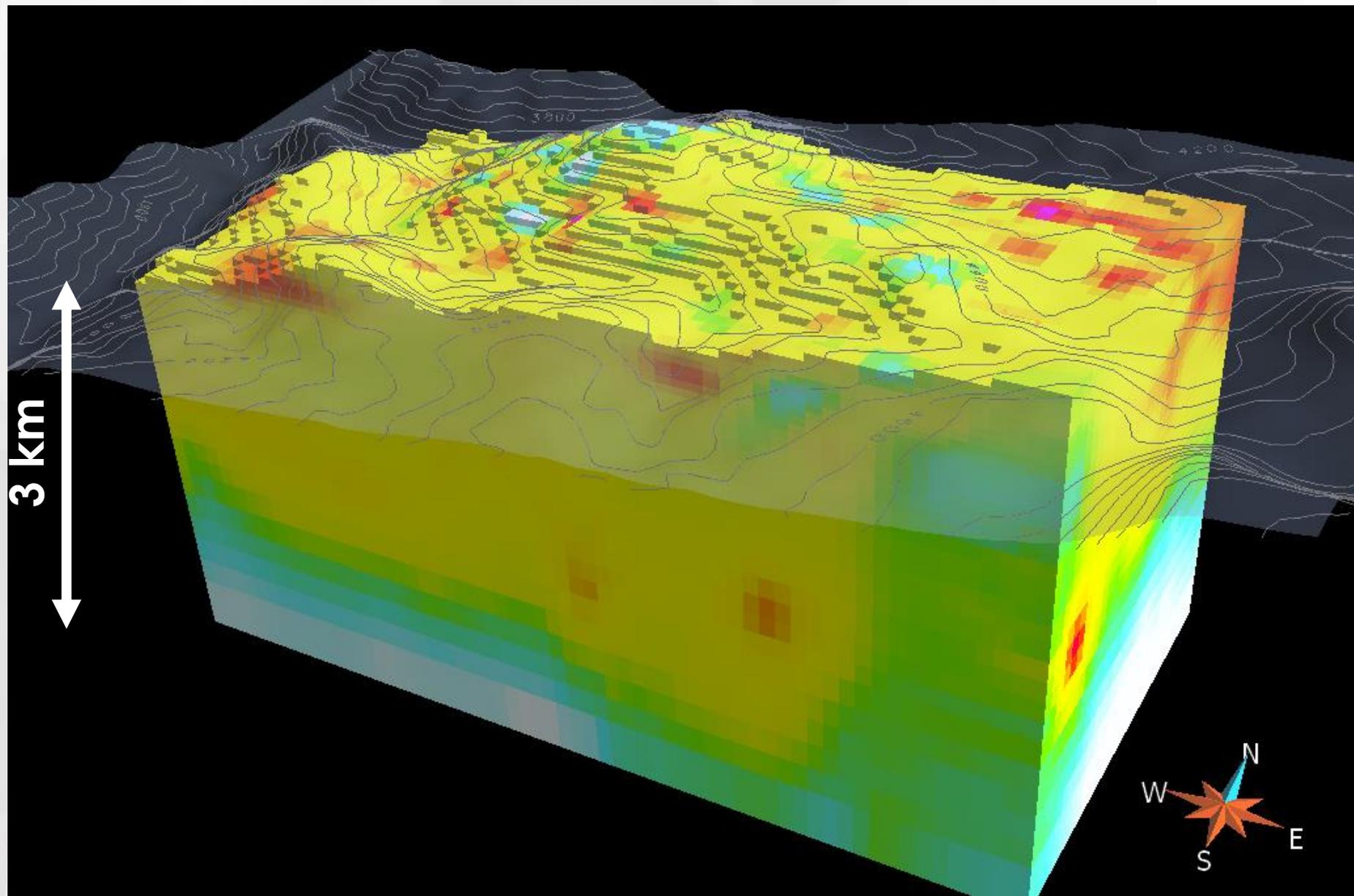
IP Horizontal Slice (3550 m ASL) \approx 900m depth



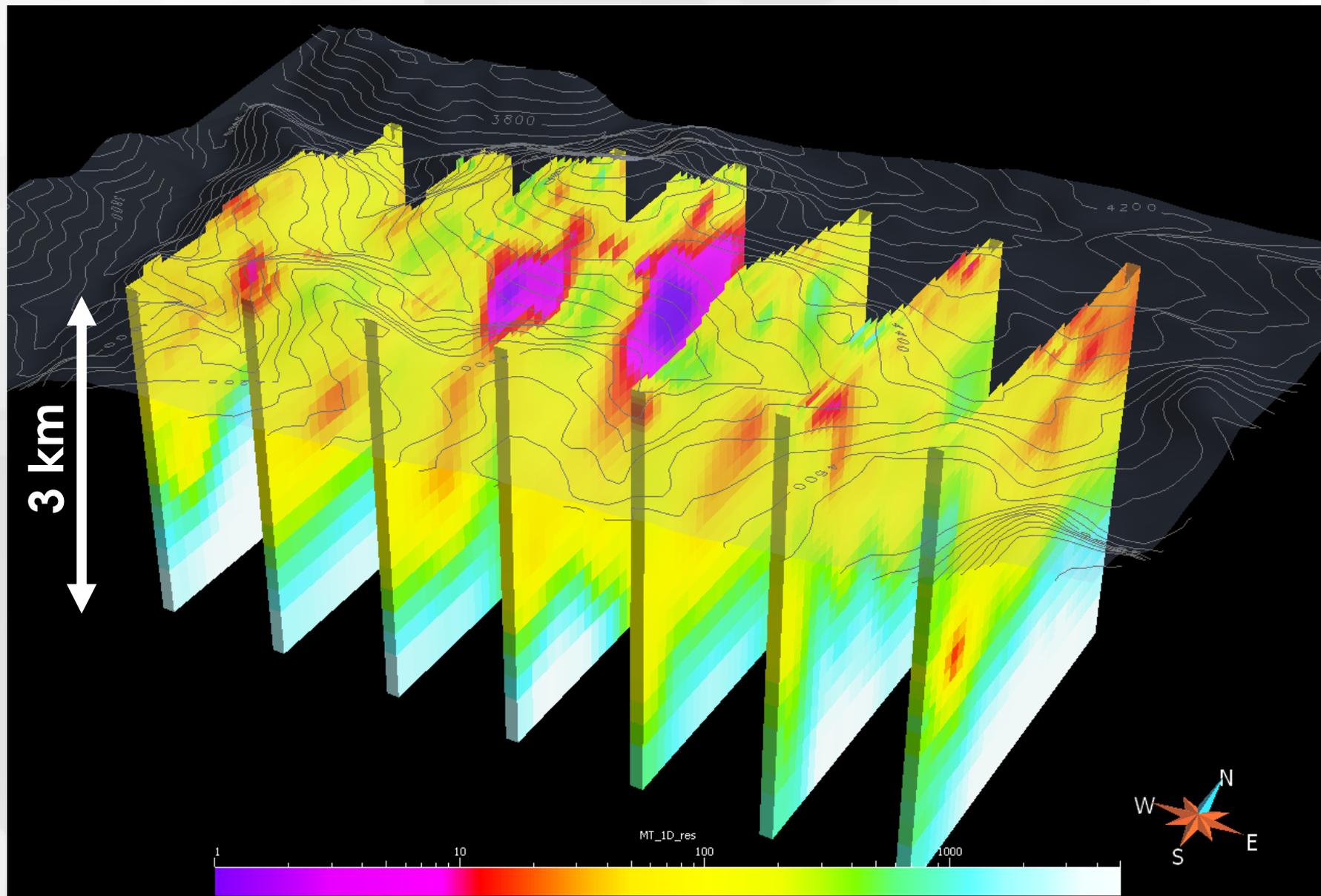
IP Horizontal Slice (3550 m ASL) \approx 900m depth



3D MT Model



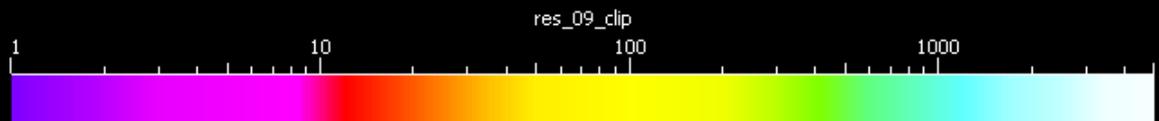
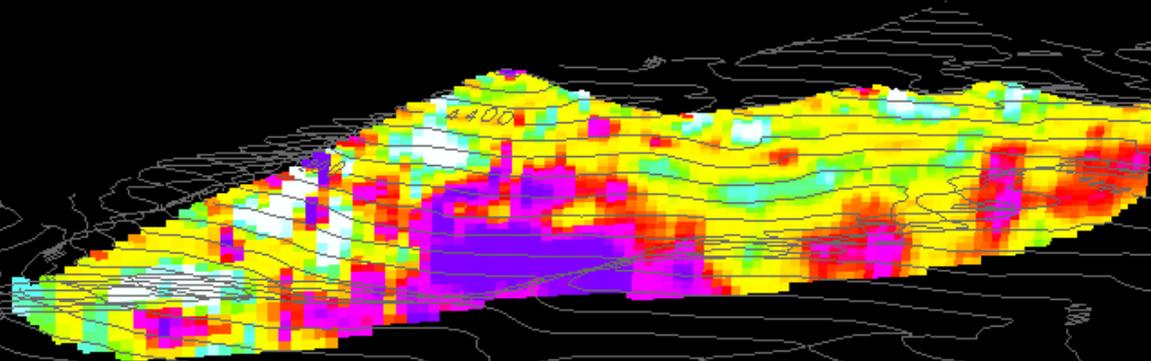
3D MT Model



DC Resistivity



1 km



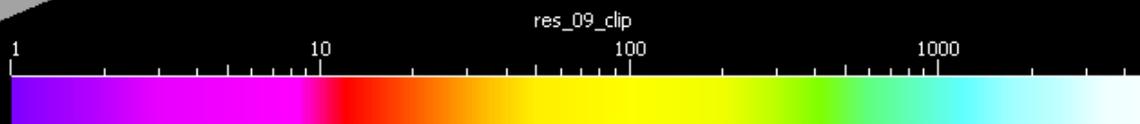
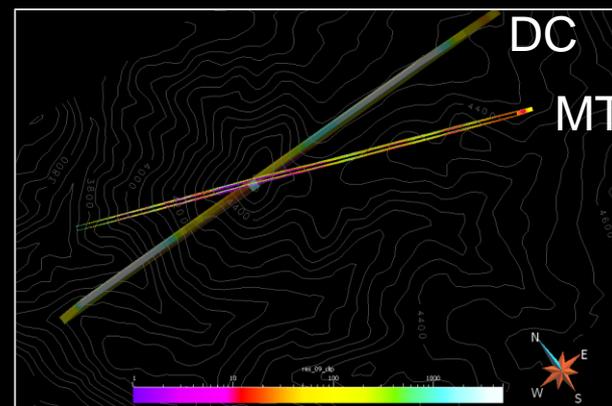
3D MT Model



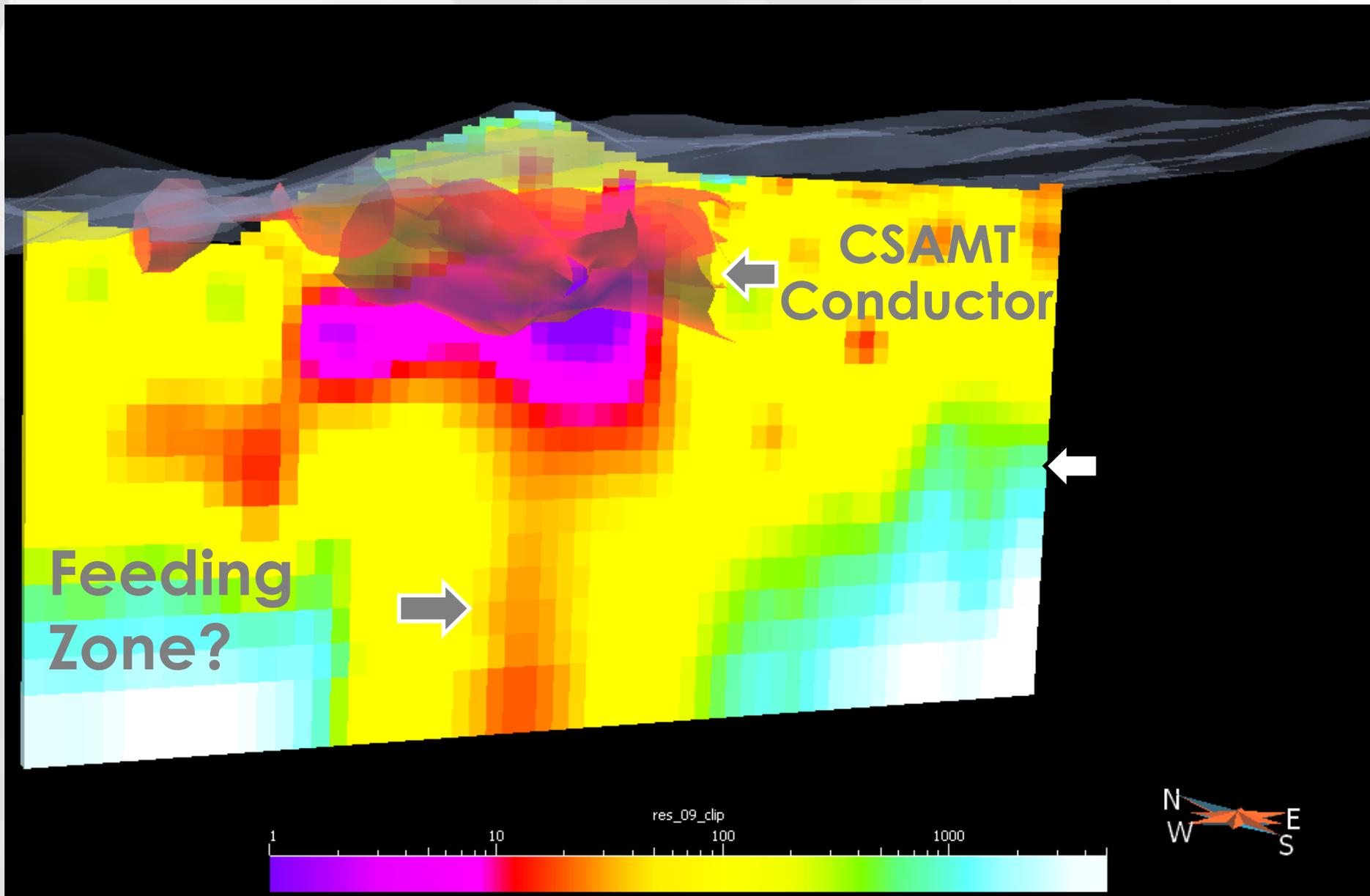
1 km

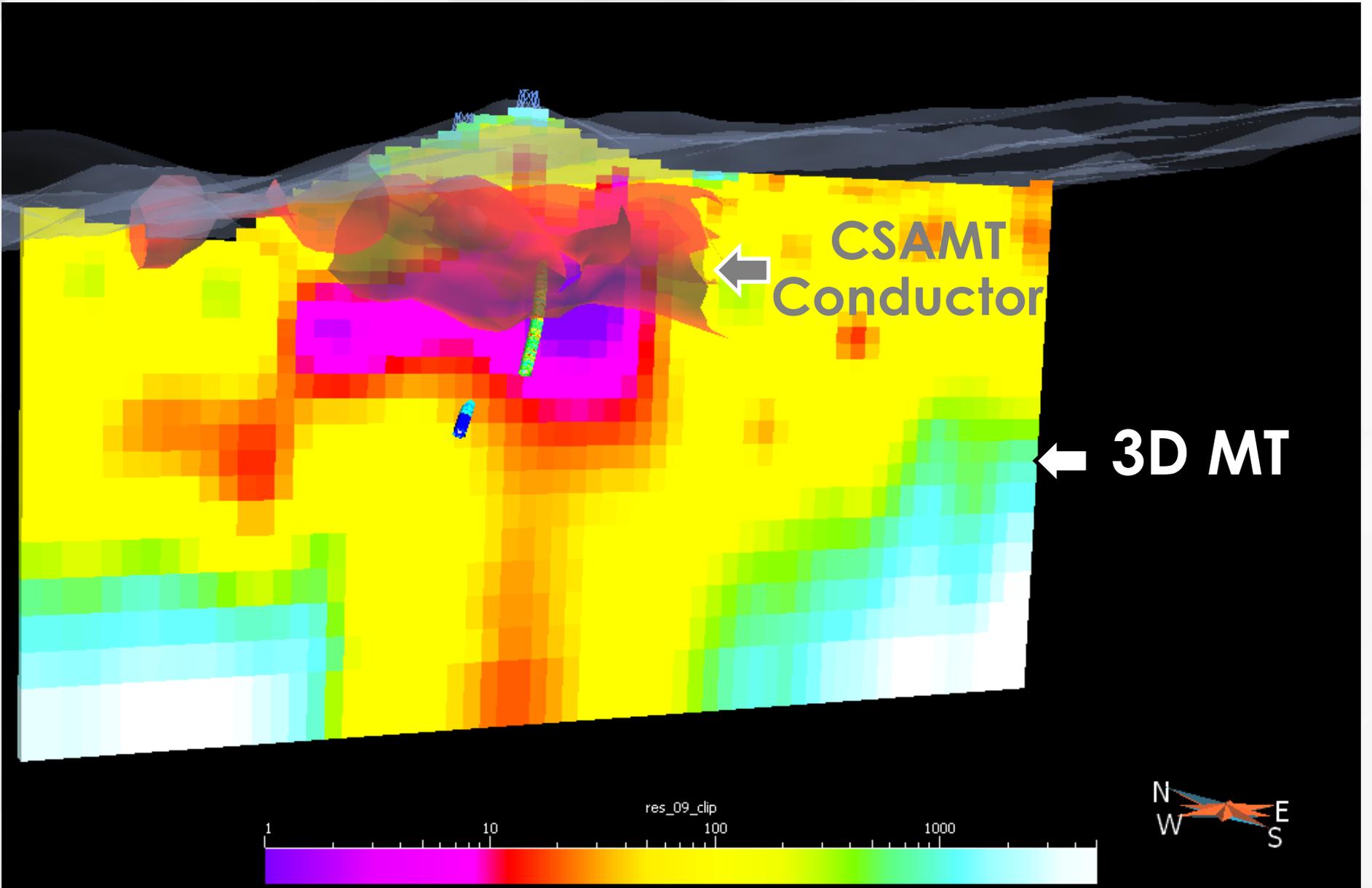
DC Resistivity

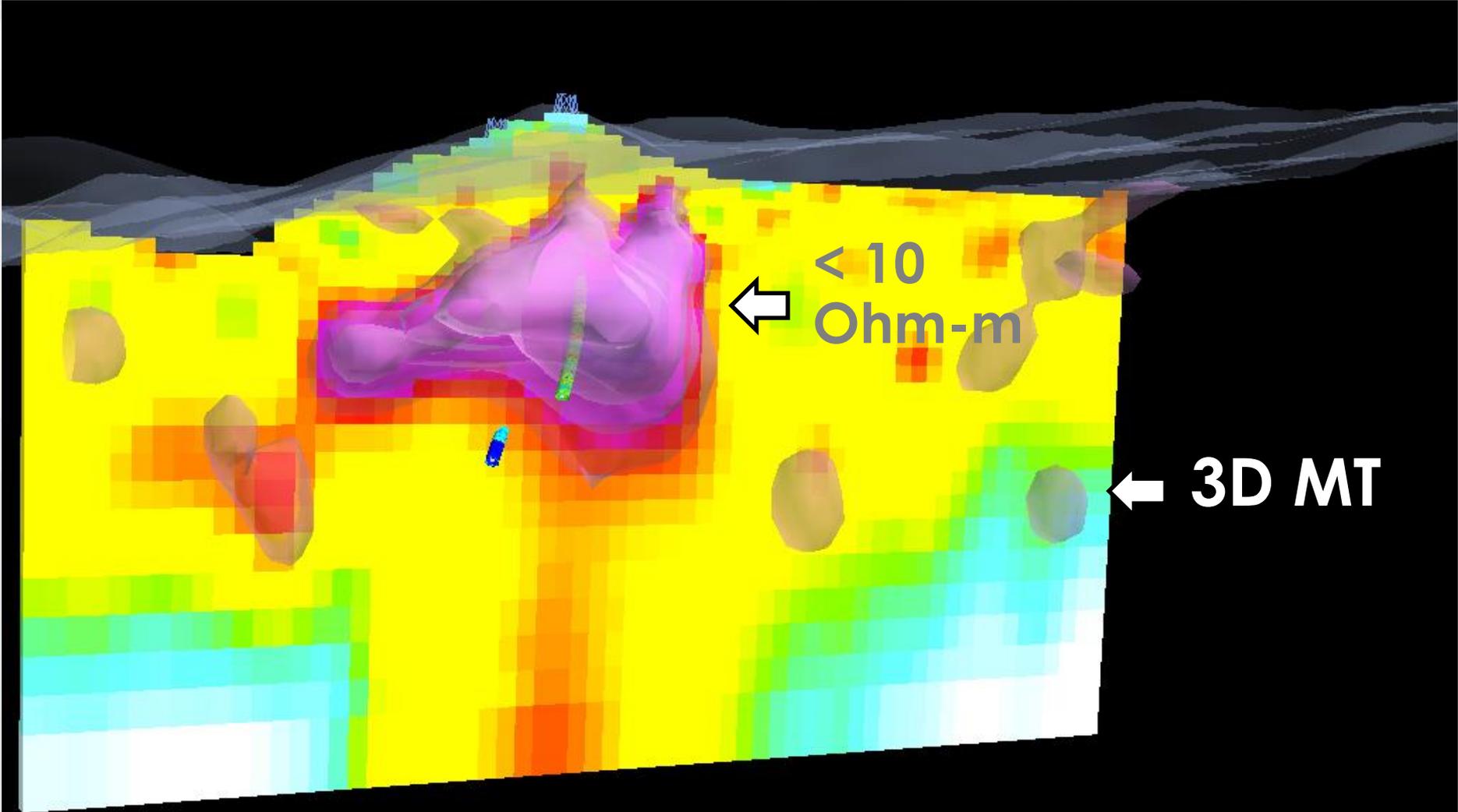
Deep-seated
Conductor



3D MT

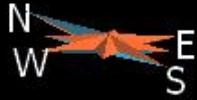


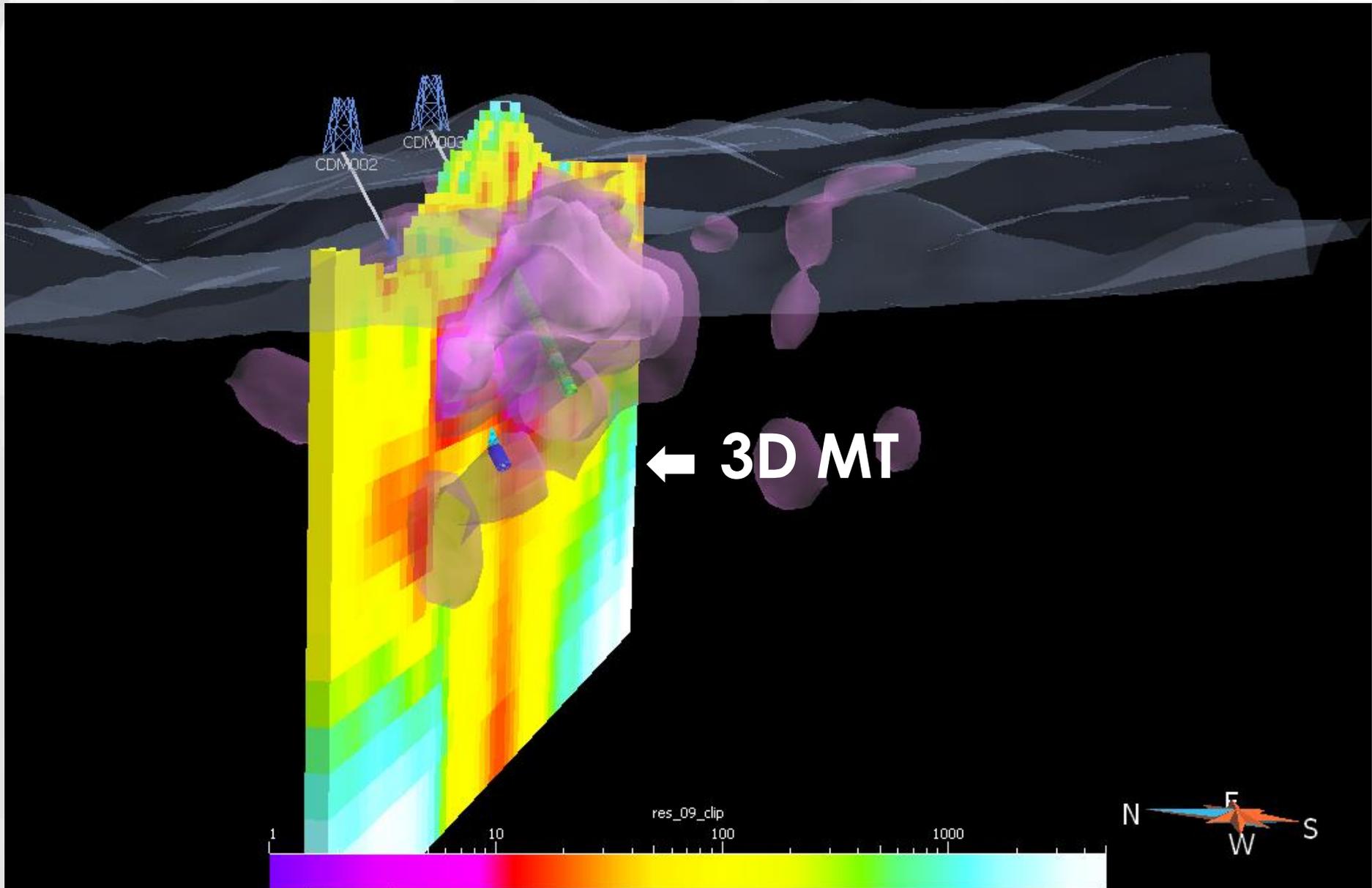




< 10
Ohm-m

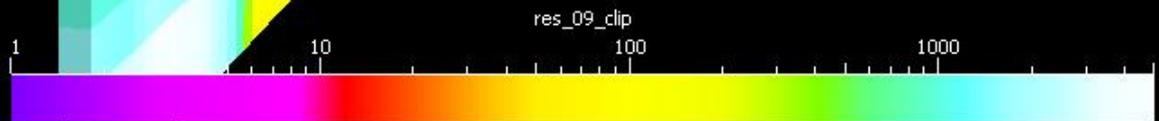
3D MT





CDM002
CDM003

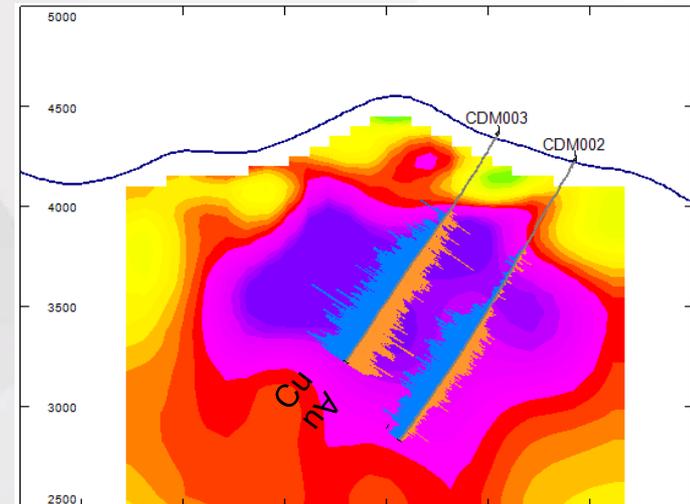
← 3D MT



Conclusions



- ❑ Accurate delineation of the outer alteration with the magnetic data.
- ❑ Strong CSAMT conductor in coincidence with MMI anomalies.
- ❑ Accurate delineation of alteration and stockwork intrusives (up to 1km) with the ORION 3D DCIP.
- ❑ Significant conductive zone, increasing the size and depth extension of the alteration zone and related mineralization to depth of 2km in the down dip direction with the ORION 3D MT.



Acknowledgements



- Cerro Grande
- Quantec Geoscience

