

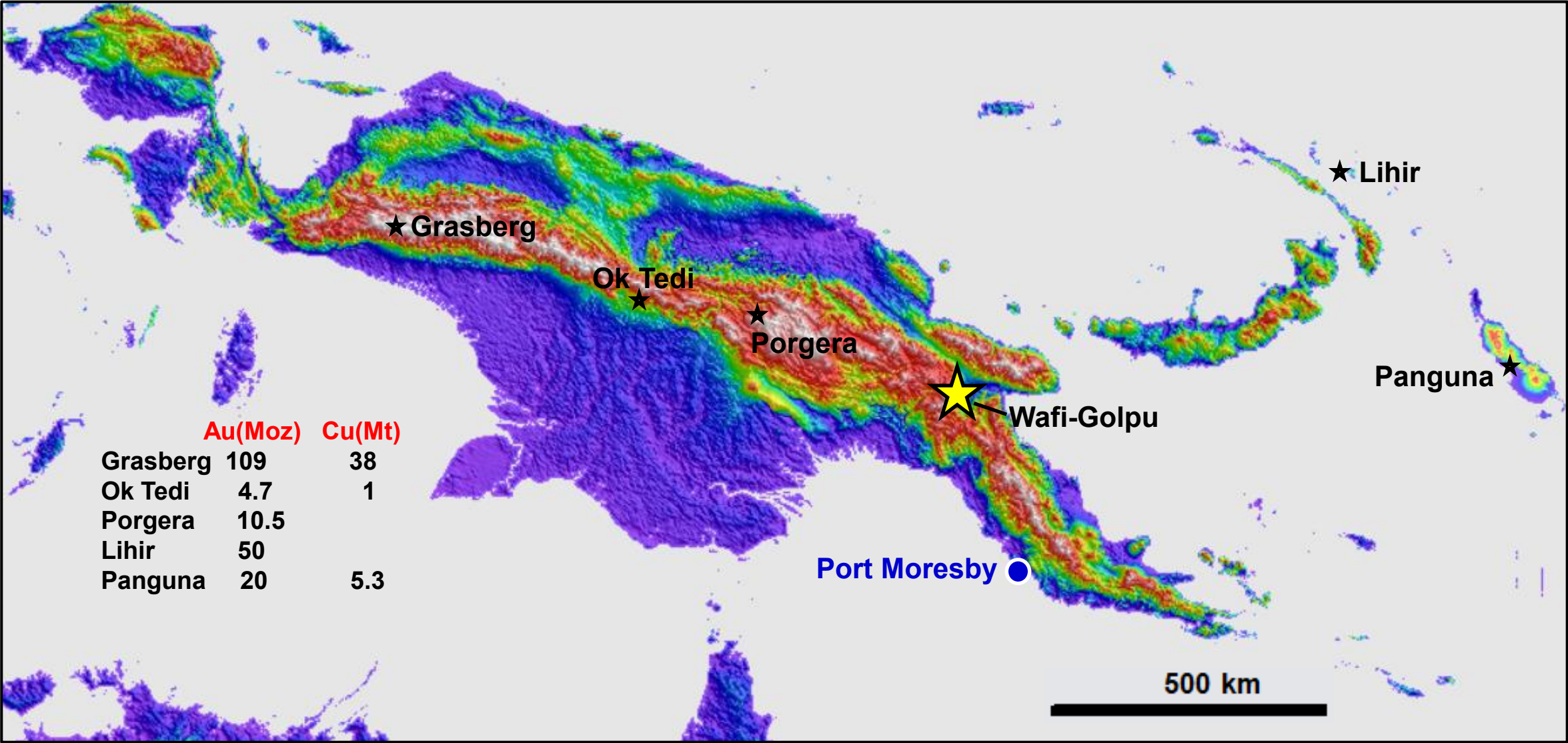
Geophysical response of alteration and mineralisation in the Wafi-Golpu porphyry system, Papua New Guinea



Terry Hoschke
Kim Frankcombe
ASEG 2024

Image from newcrest.com.au

New Guinea Major Au/Cu Deposits





Wafi – Golpu

JV between Harmony Gold and Newmont Mining

Three major deposits:

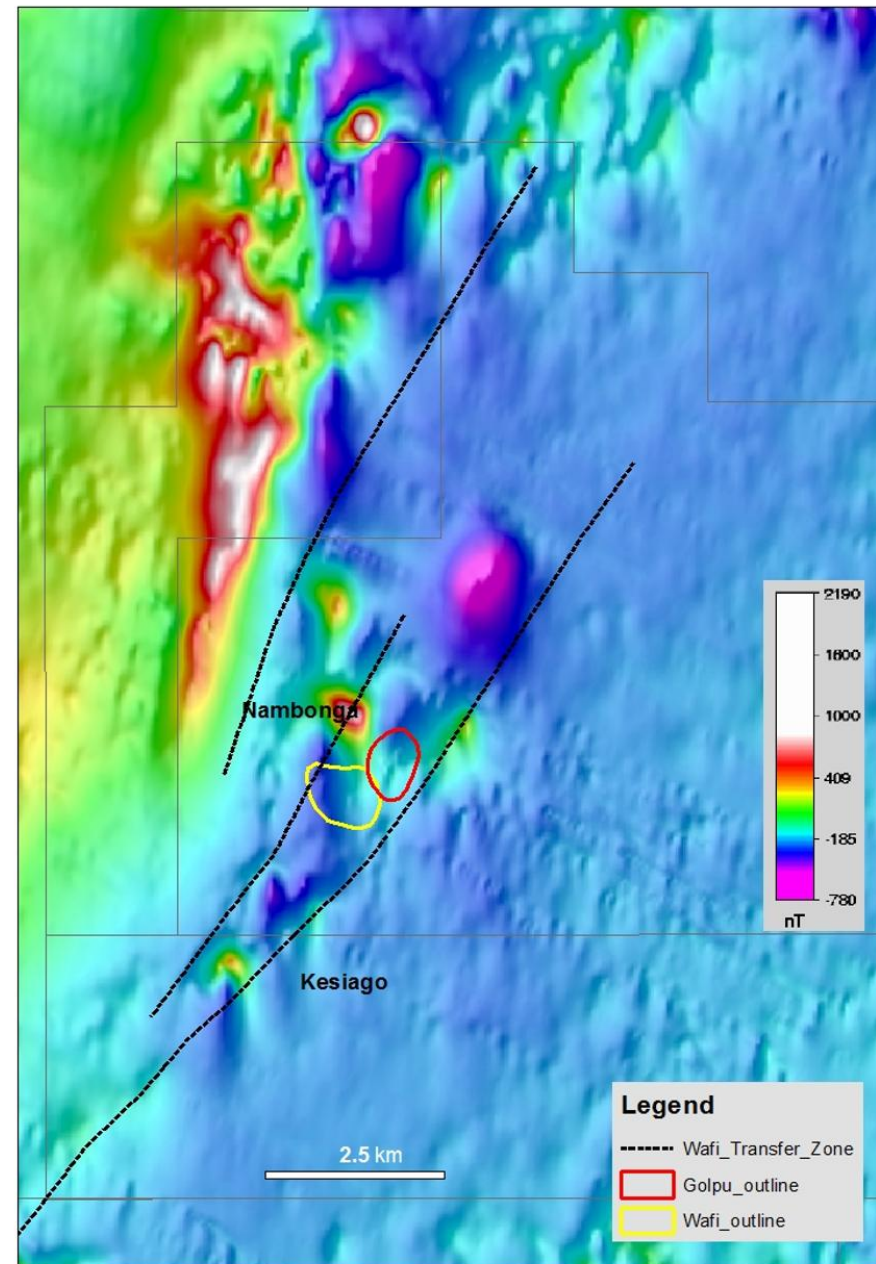
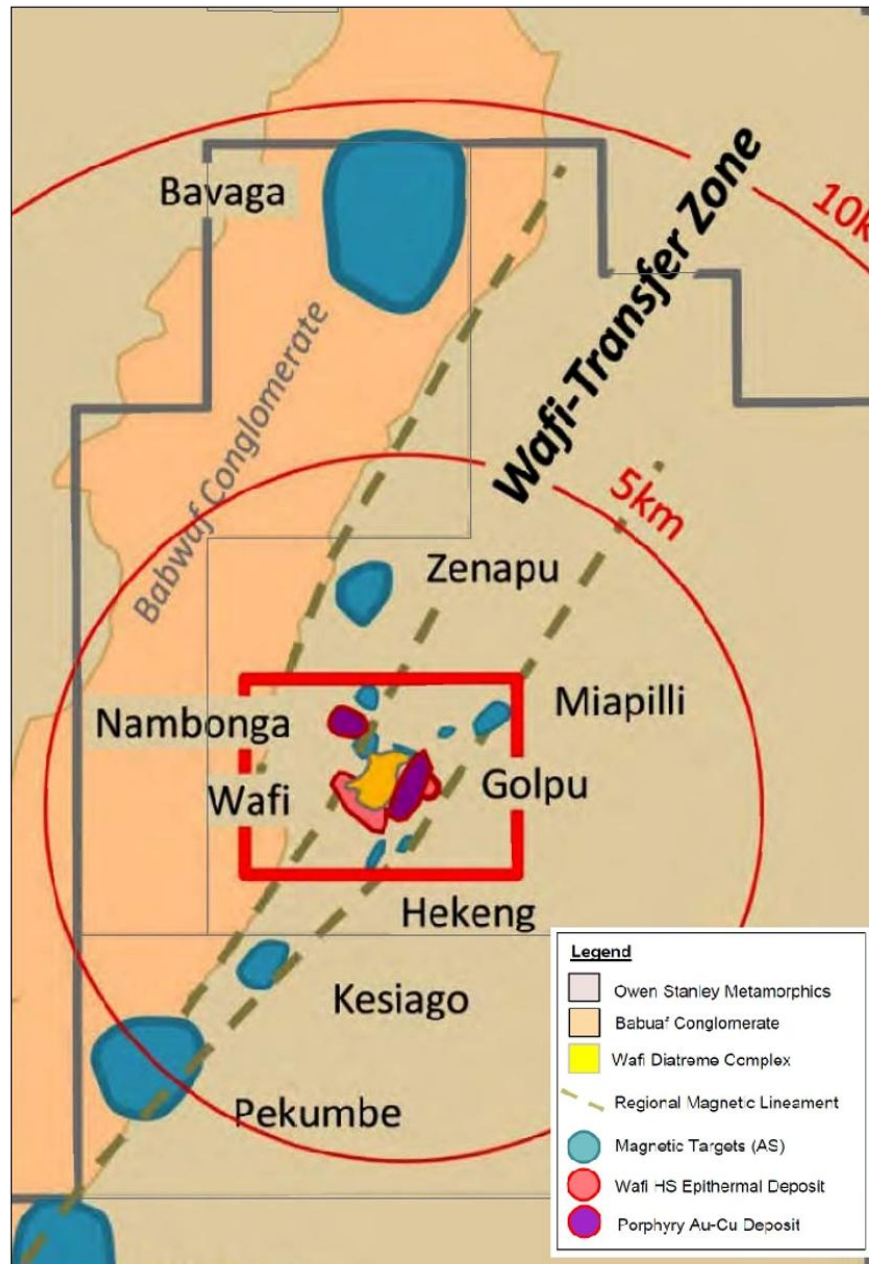
- Wafi high sulphidation Au deposit – discovered in the late 1970s by CRA
- Golpu porphyry Cu-Au deposit – first deep high grade intersection in 2009
- Nambonga porphyry Au-Cu deposit

Total Resource

26 Moz Au, 8.8 Mt Cu

(Newcrest Resource-Reserves Statement, 2018)

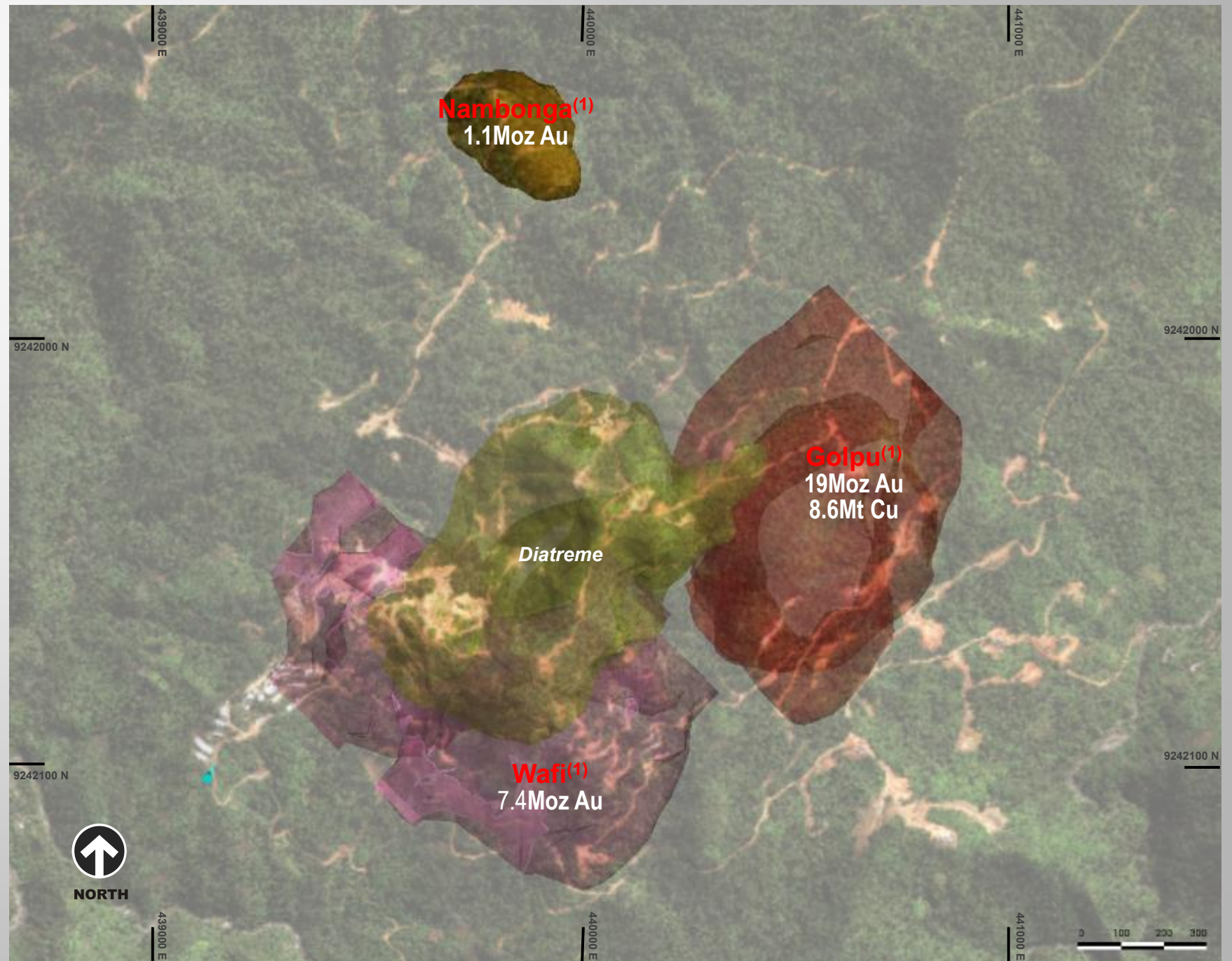
Regional Geology and RTP Magnetics



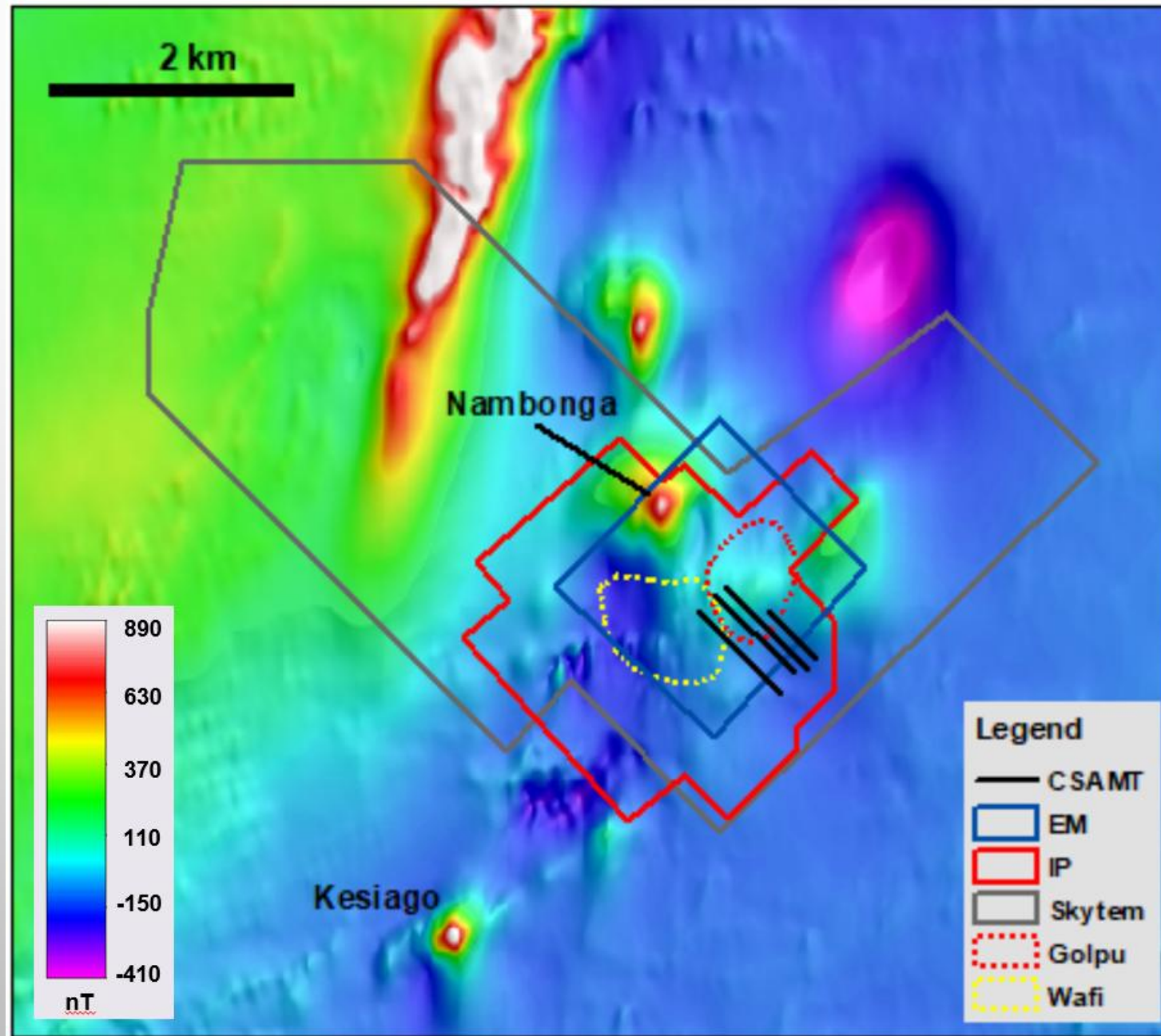
modified from Hayward et. al. (2011)

Wafi Golpu Overview

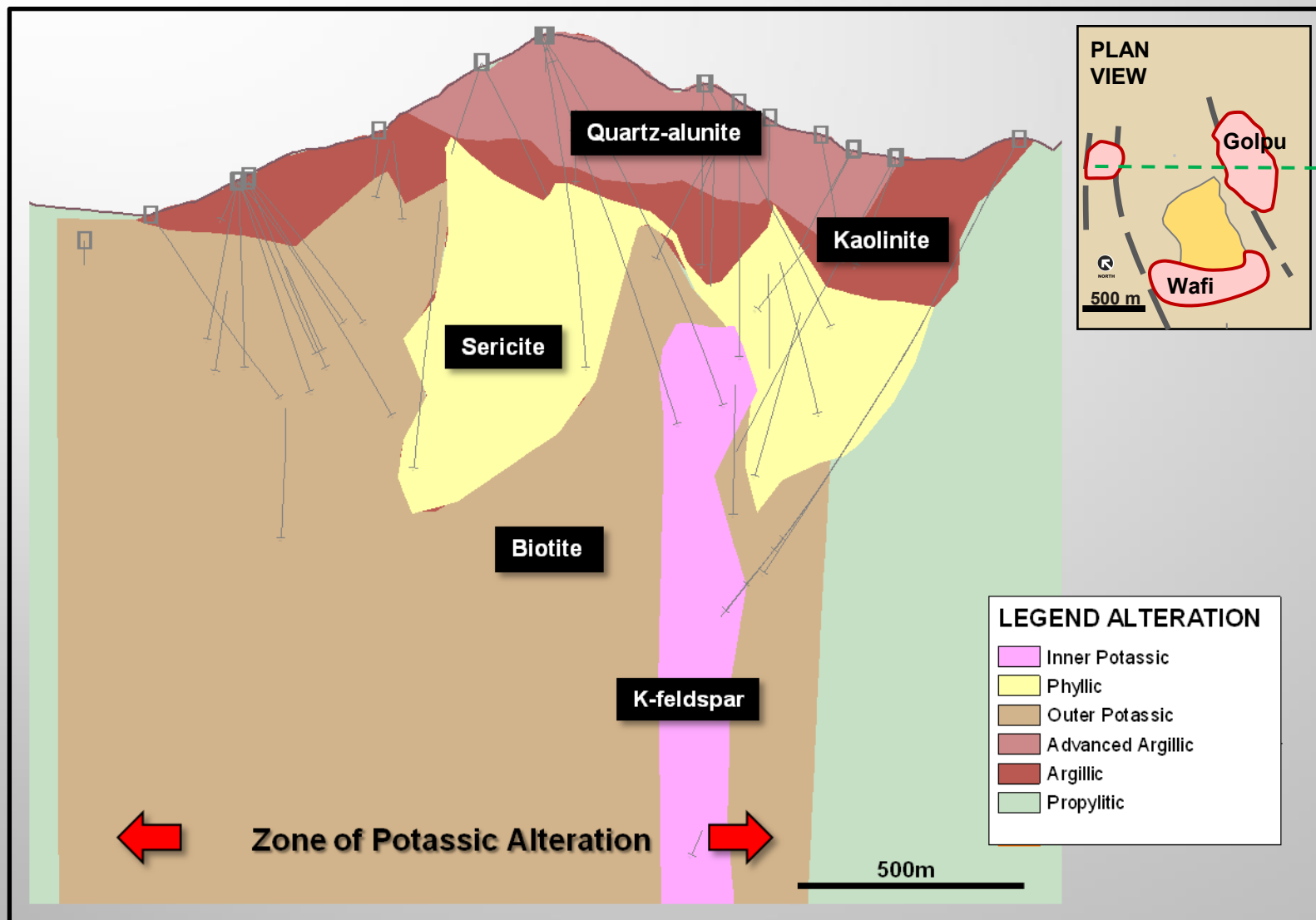
- Telescoped mineralisation events/systems
- Multiple Porphyry Cu-Au centres
 - Golpu, Nambonga
- High Sulphidation epithermal overprint
 - Wafi
- High grade Qz-Rhd gold veins at Link Zone
- (Newcrest Resource-Reserves Statement, 2018)



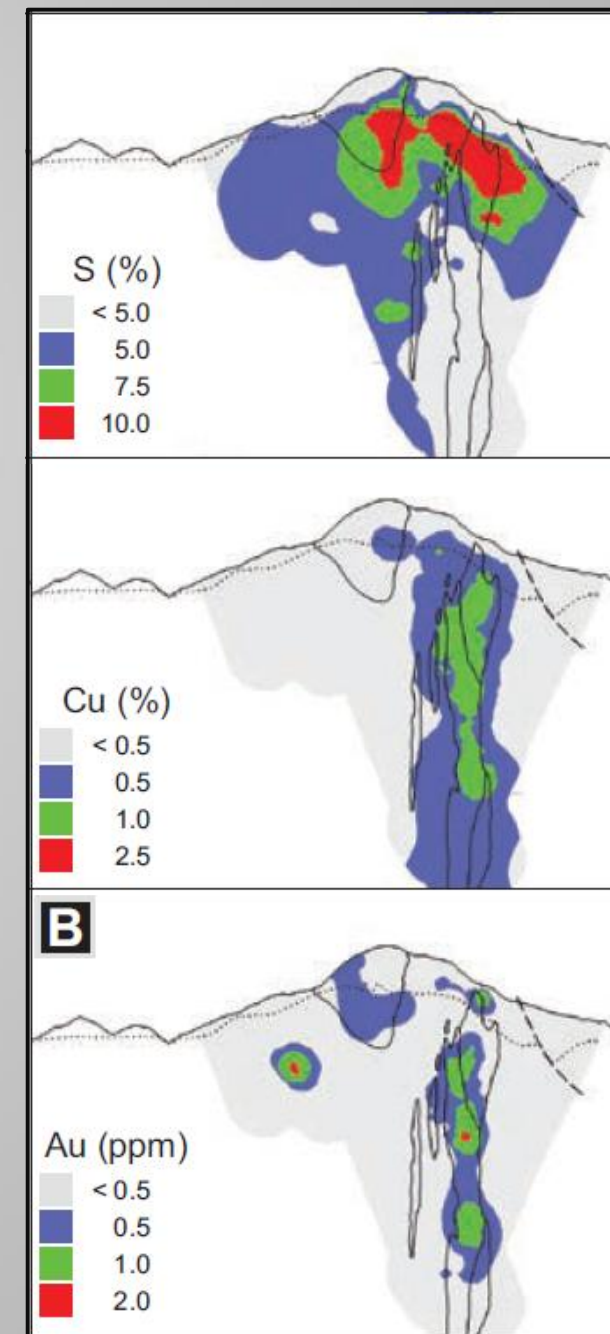
Geophysical Surveys



Wafi Golpu Alteration



modified from Hayward et. al. (2011)



modified from Rinne et. al. (2018)

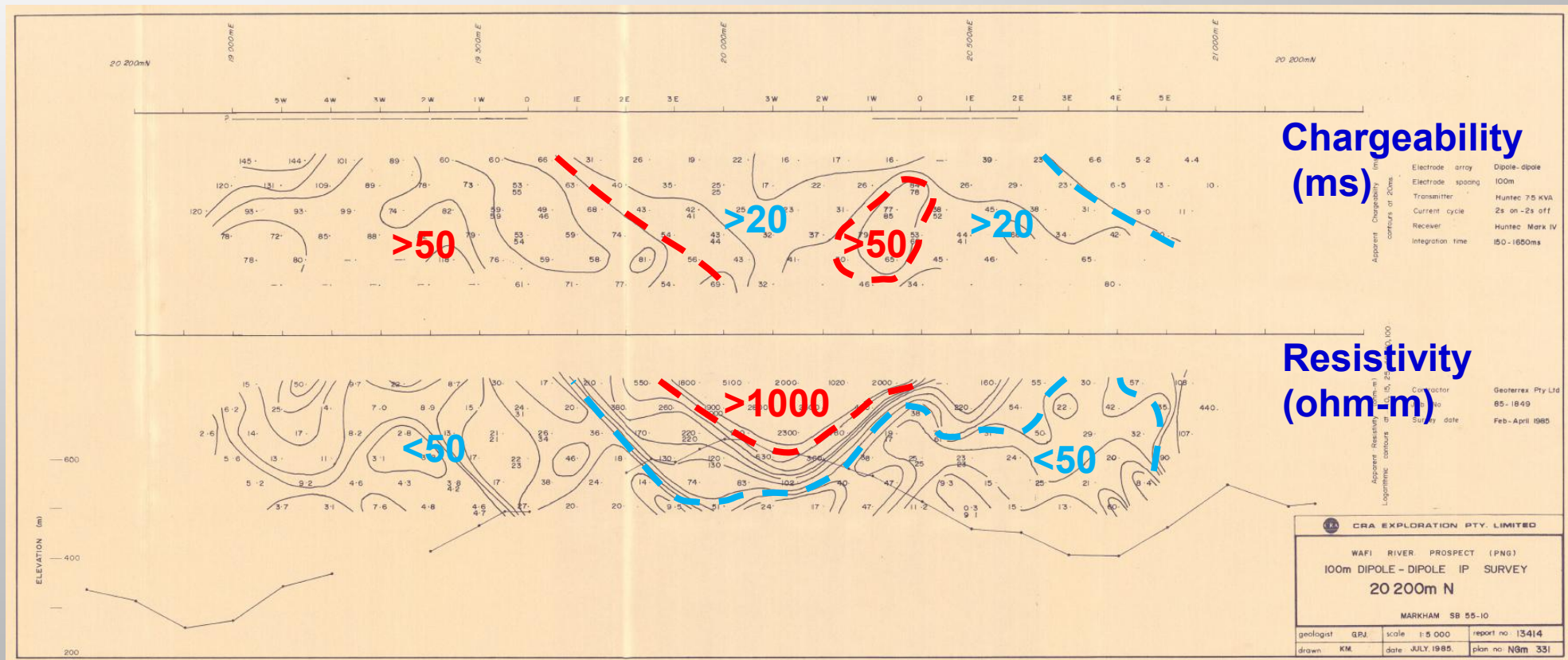
CRA Geophysical Surveys

1985 Airborne mag/rad survey

1985 IP Surveys – dipole-dipole IP with 100m and 200m electrode spacing

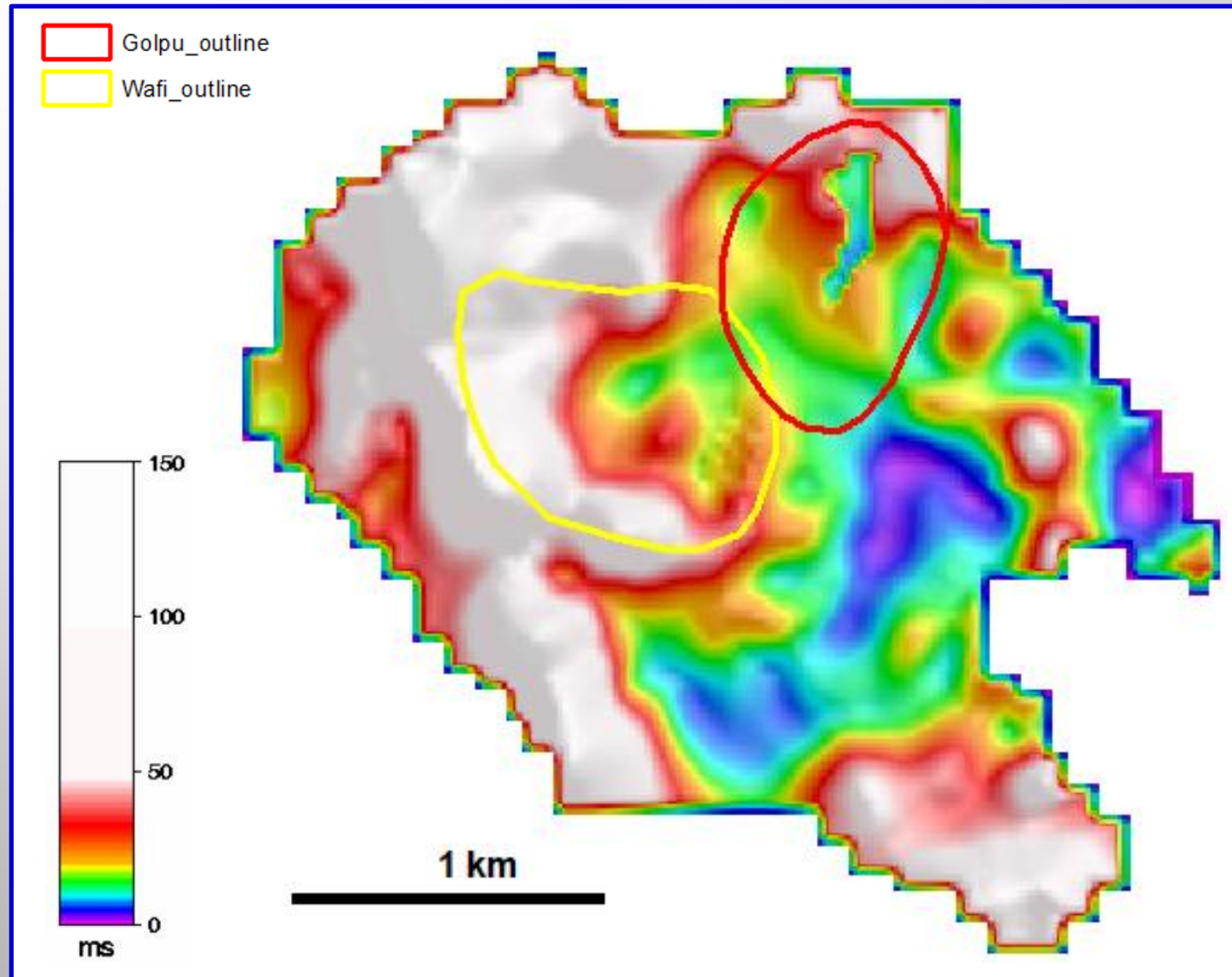
1990/91 TEM survey with 100m moving loop and 50m stations

1990 CSAMT Survey



Wafi Golpu IP

Chargeability Inversion DS 100m



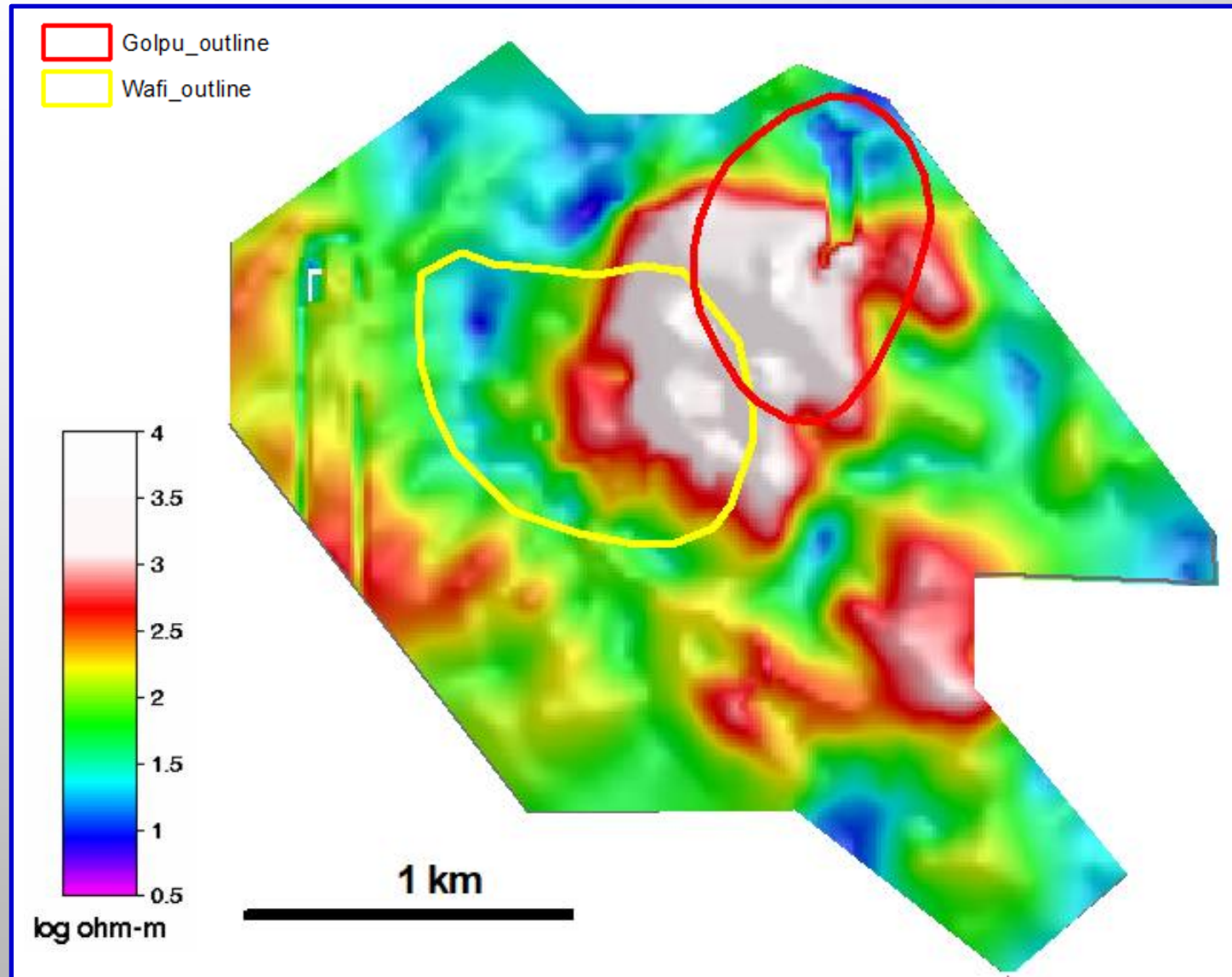
Depth slices are from a 3D inversion of chargeability

There are strong chargeabilities over a broad area which is typical of a porphyry system. The survey is not large enough to cover the extent of the alteration system .

Wafi Golpu Resistivity

3D Inversion Results

Resistivity Inversion DS 100m

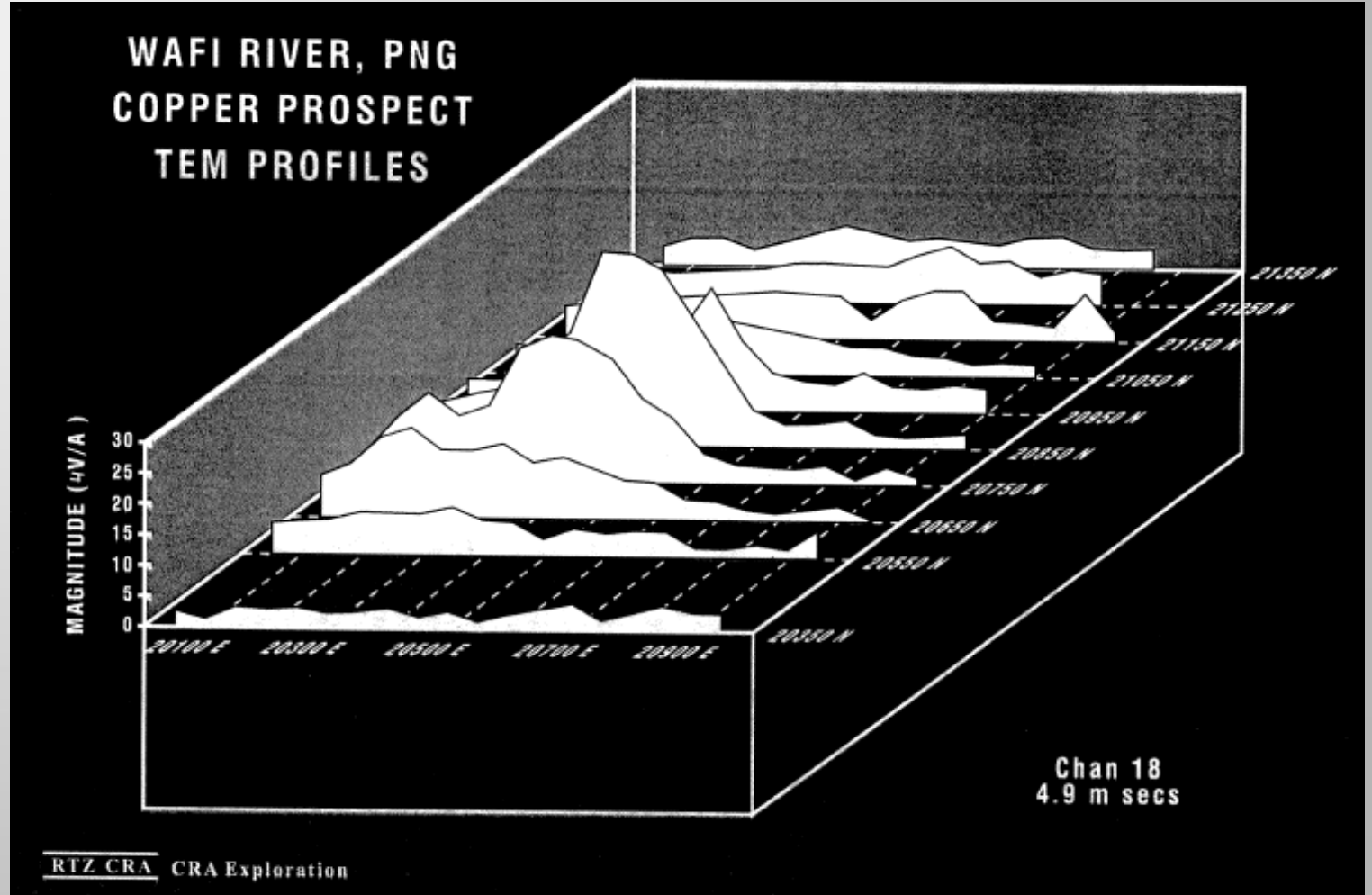


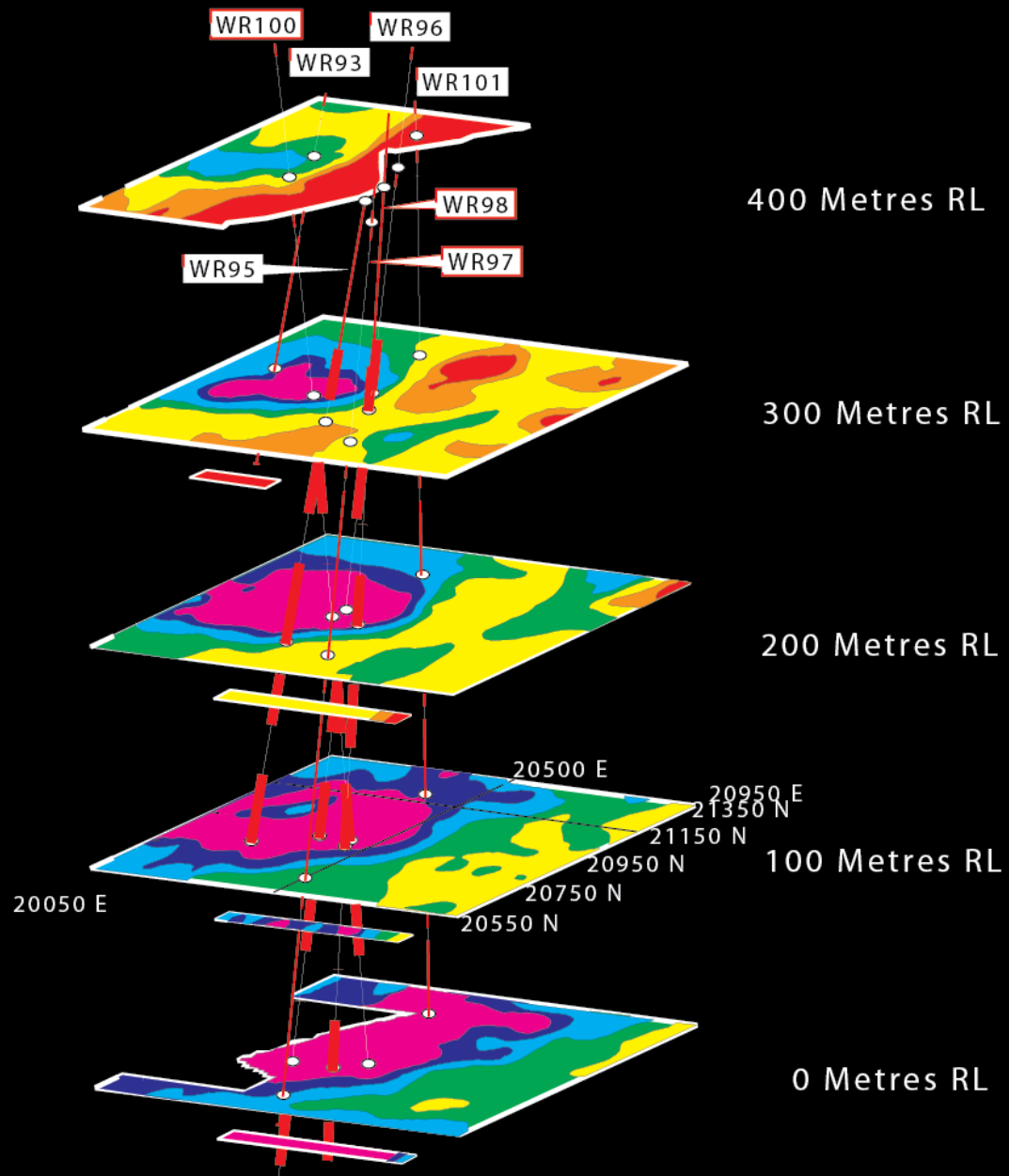
A dipole-dipole IP/resistivity survey was conducted by Geoterrex in 1994 with 100m and 200m dipoles

The strong resistivity anomaly covering part of Wafi and Golpu is probably due to the lithocap. The cause of this anomaly extends from the surface to about 200m below surface.

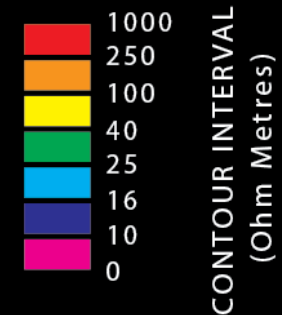


Wafi Golpu TEM





WAFI RIVER, PNG COPPER PROSPECT IMAGE RESISTIVITY DEPTH SLICES



CONTOUR INTERVAL
(Ohm Metres)

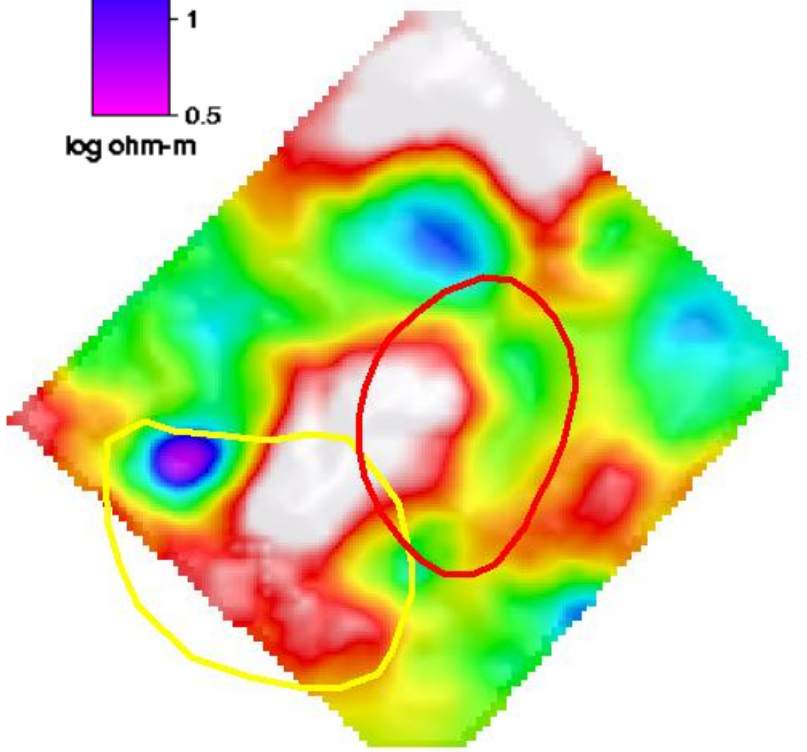
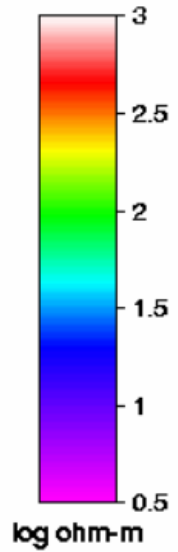


CRA Exploration

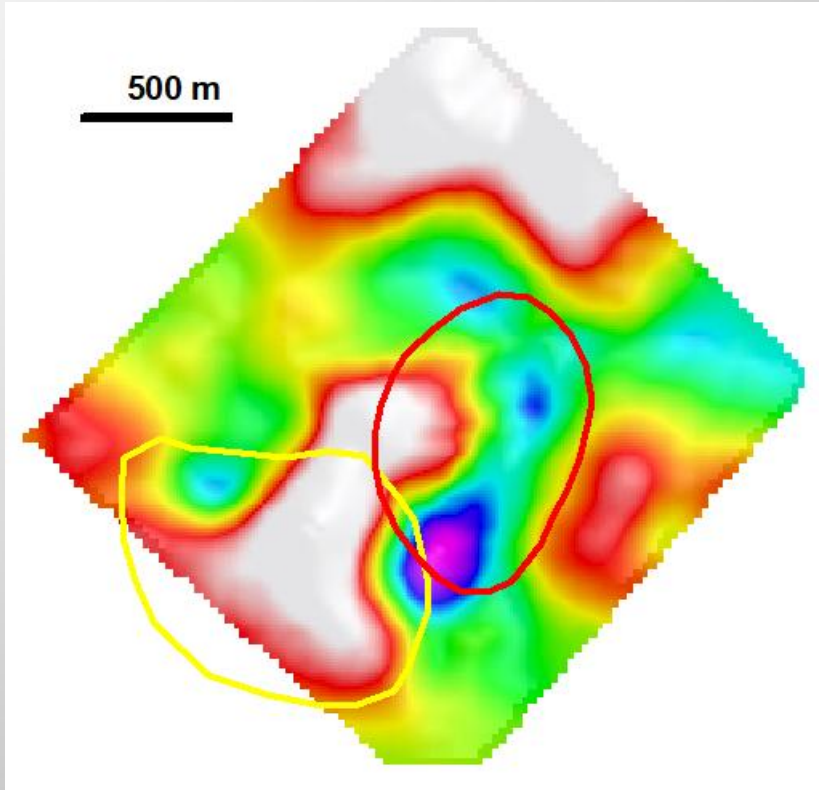
Wafi Golpu TEM

Depth slices are from a 3D inversion of conductivity from a ground 100m moving loop TEM survey

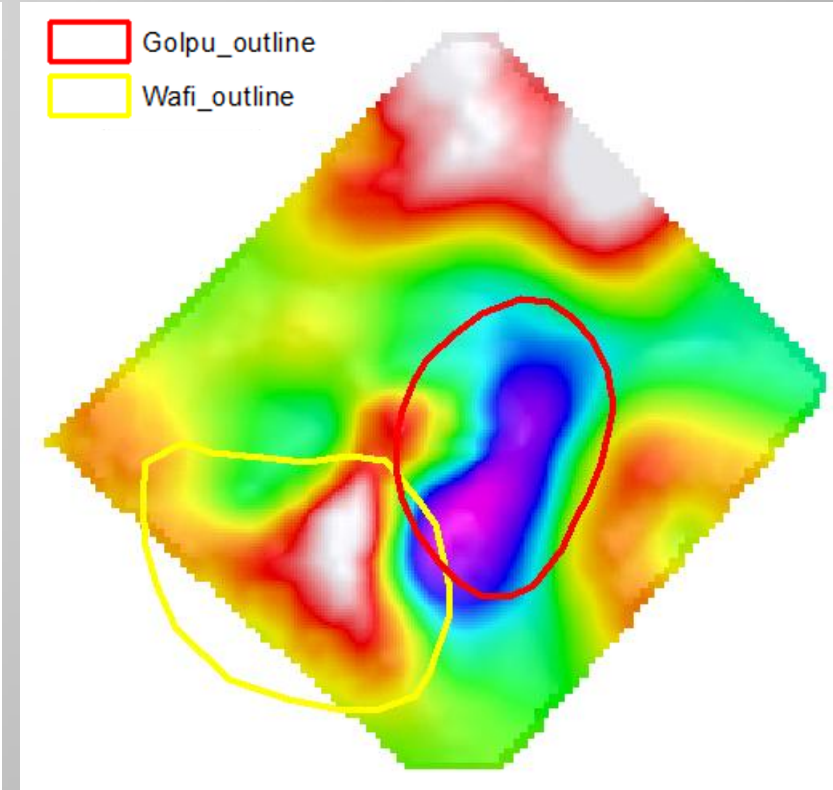
The top of the Golpu deposit is conductive, probably due to sulphide veining.



Conductivity Inversion DS 100m



Conductivity Inversion 200m

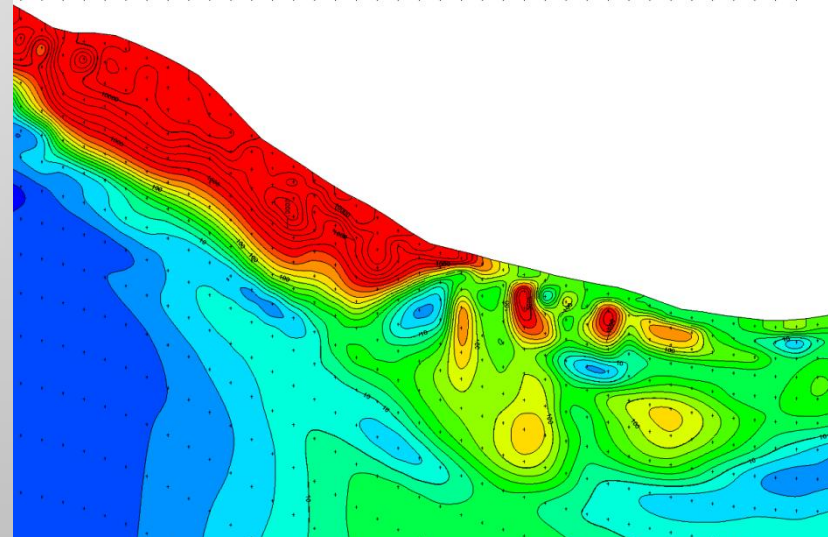
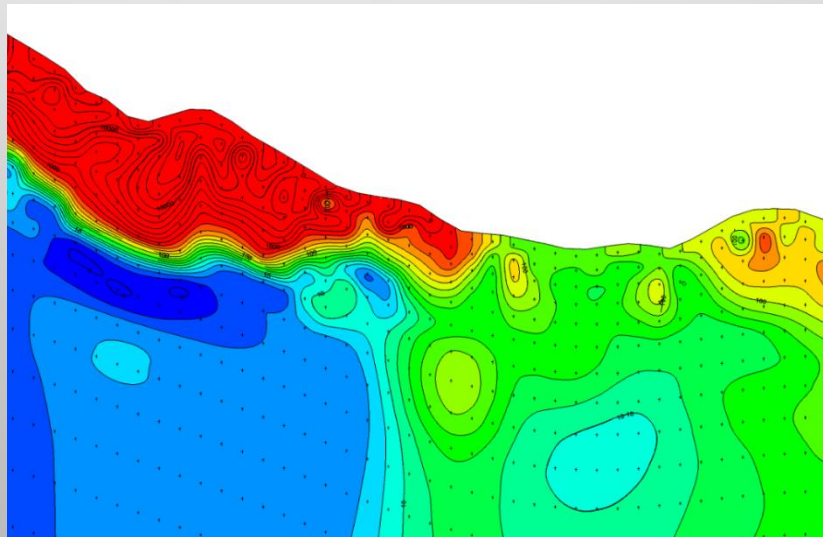
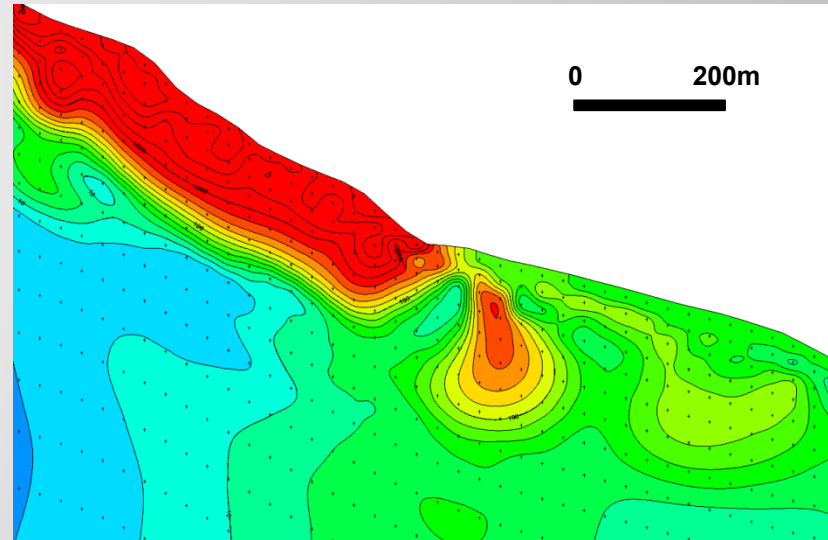
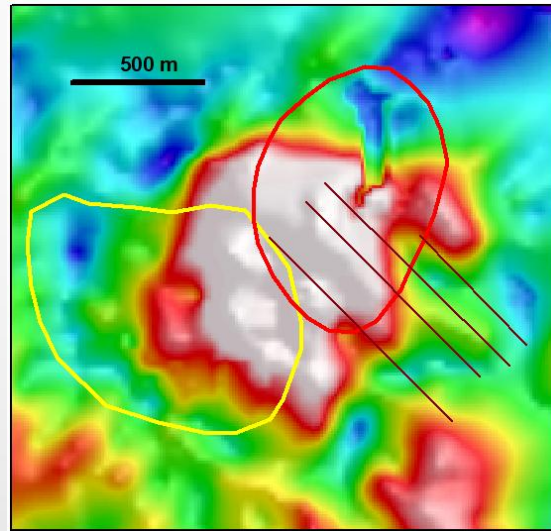


Conductivity Inversion DS 300m

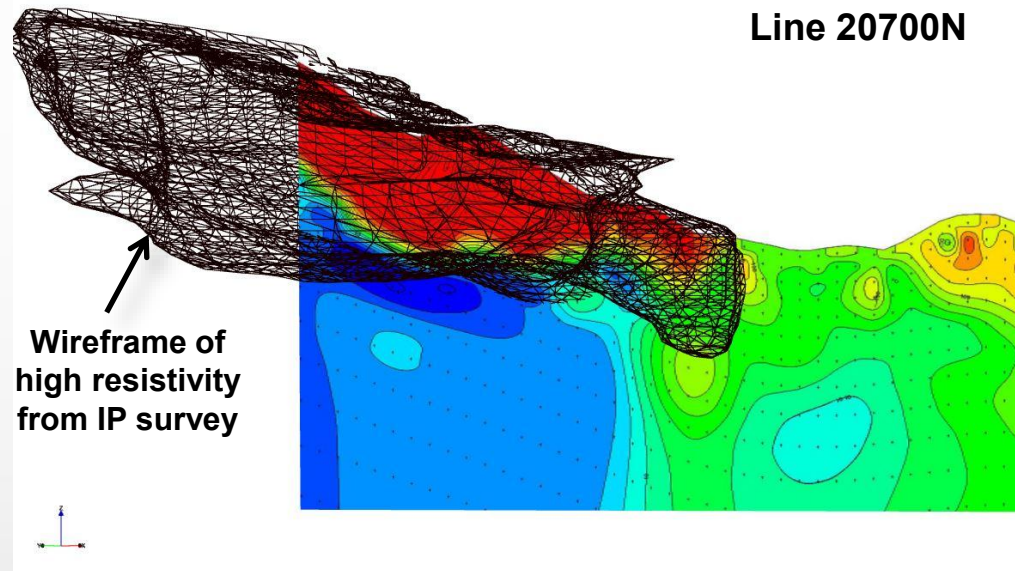
Wafi Golpu CSAMT Resistivity - 2D Inversion Results



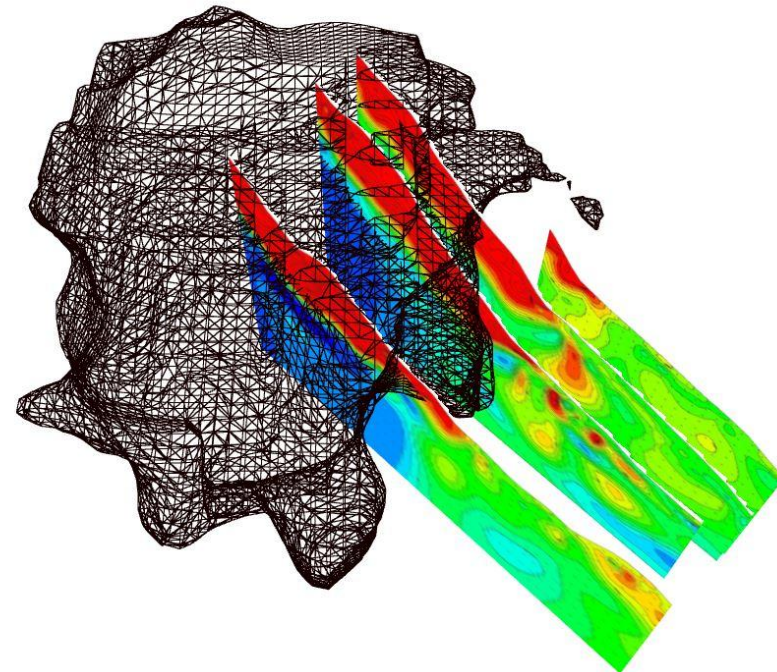
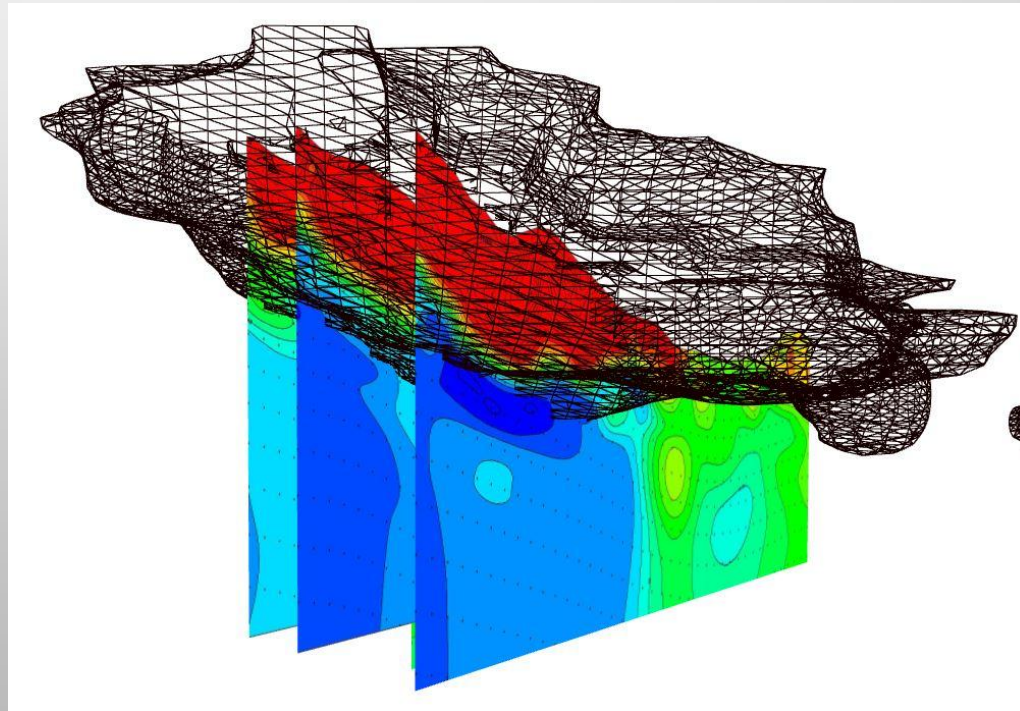
Location



Wafi Golpu CSAMT 2D Inversion Results



The strong resistivity anomaly as defined from the IP/resistivity survey is also well defined by the CSAMT. data covering part of Wafi and Golpu is probably due to the lithocap

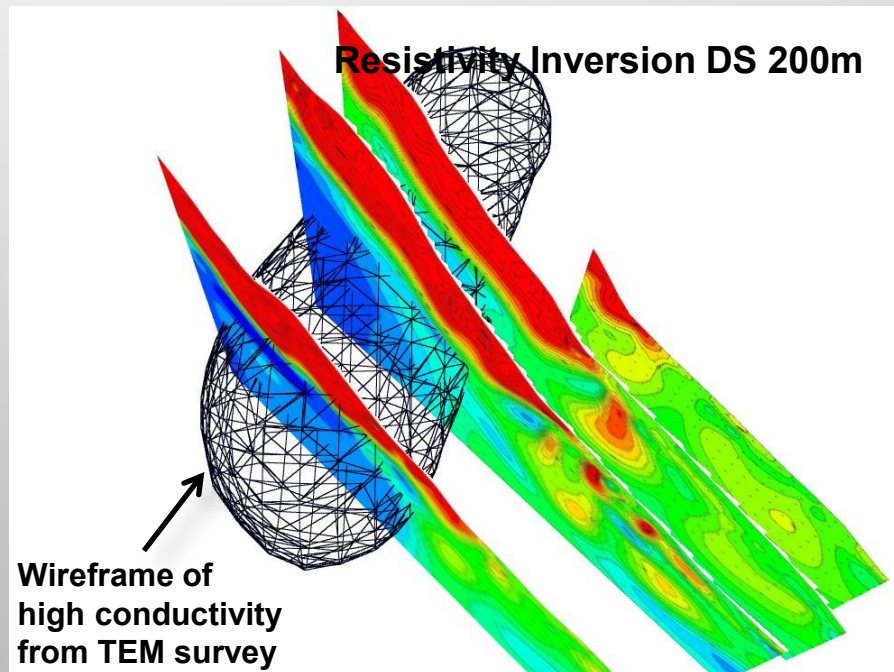
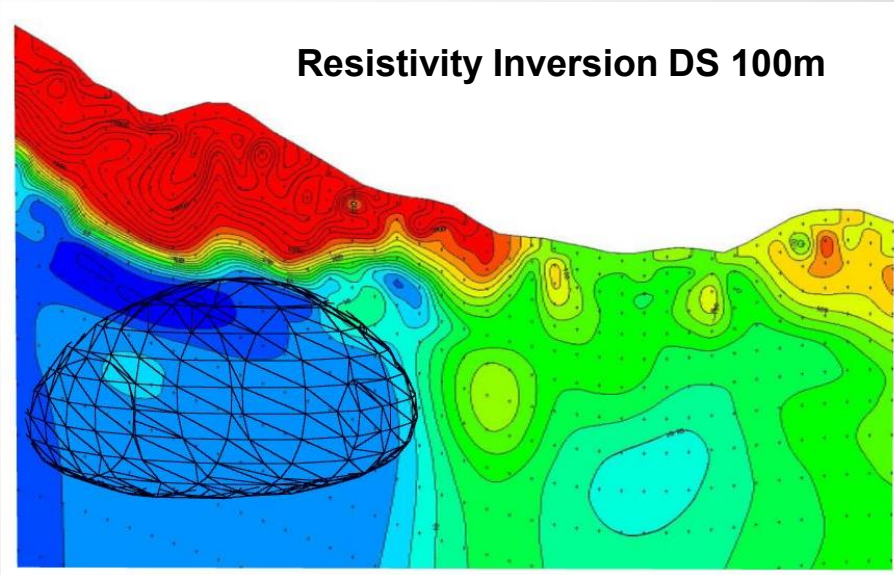


Wafi Golpu CSAMT

2D Inversion Results

The strong conductor above Golpu identified in the TEM (as shown in the wireframe) matches the low resistivity in the CSAMT reasonably well. This conductor is not closed to the west by the CSAMT.

It is difficult to tell if the CSAMT can discriminate between good conductors due to sulphide veining (<10 ohm-m) and moderate conductors due to clay pyrite alteration (20-50 ohm-m).



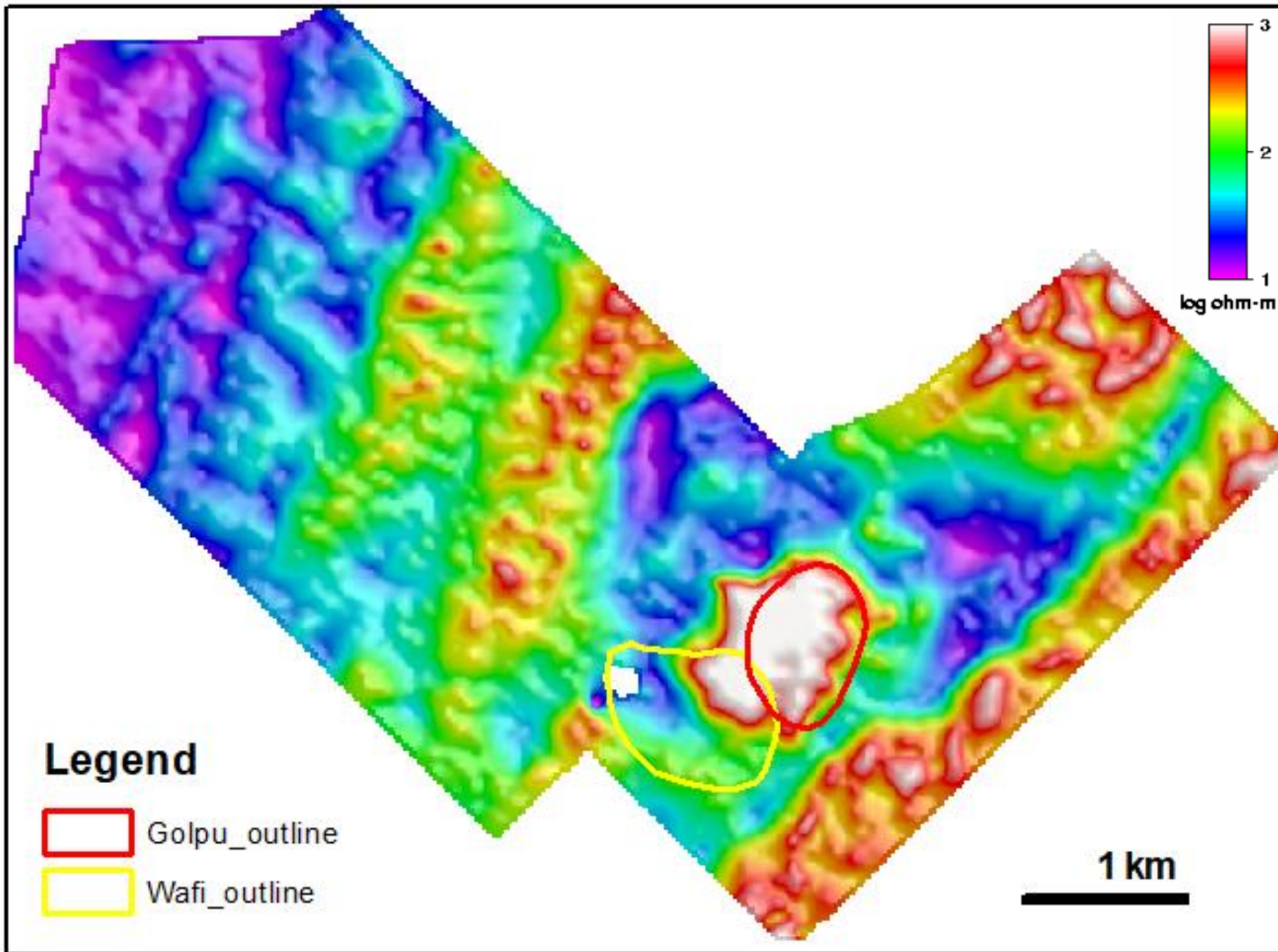
Wafi Golpu SkyTEM 2013



Skytem 50m Resistivity Depth Slice

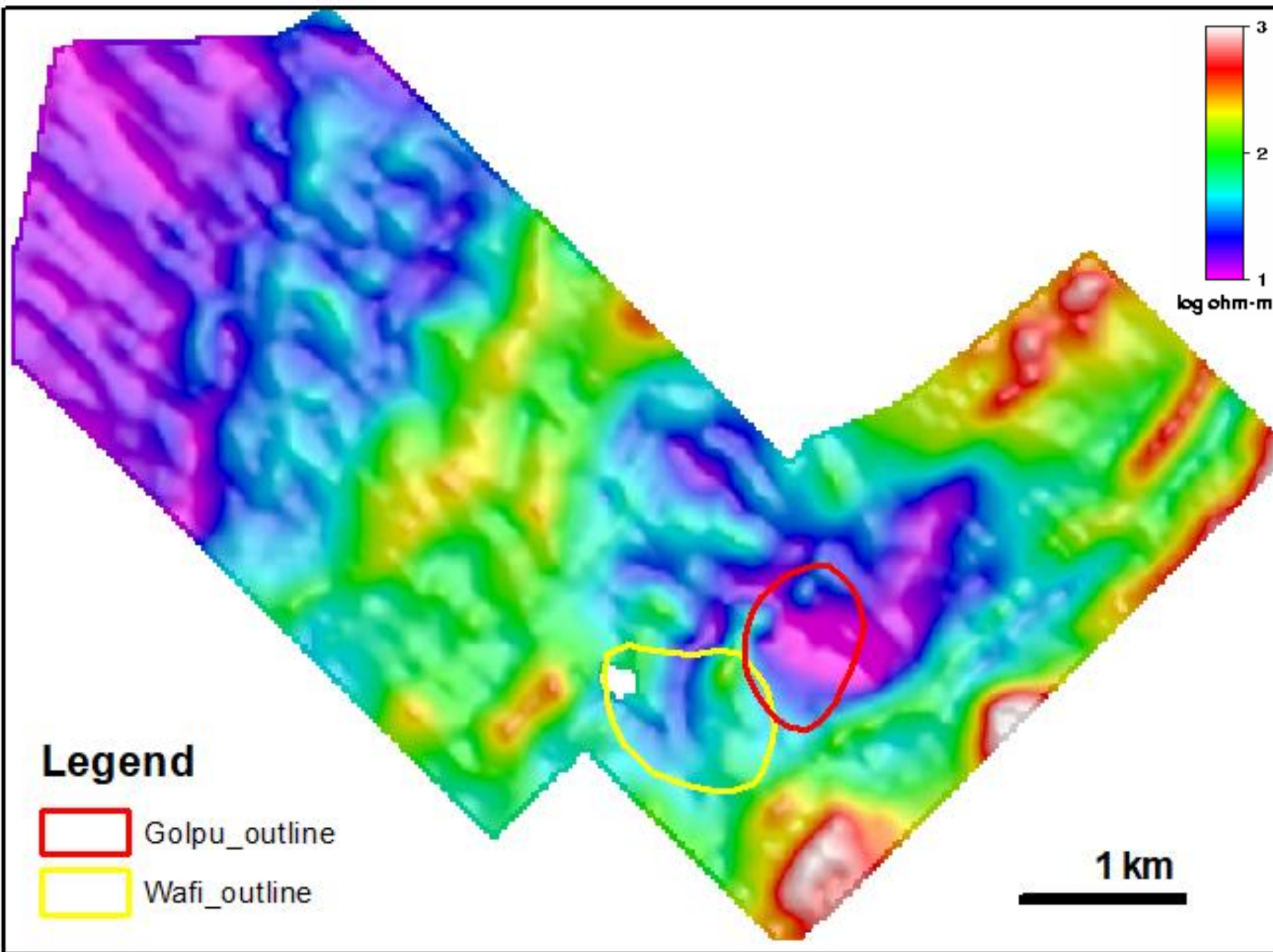
Resistive lithocap
within conductive
alteration system

Conductive sediments
to the west



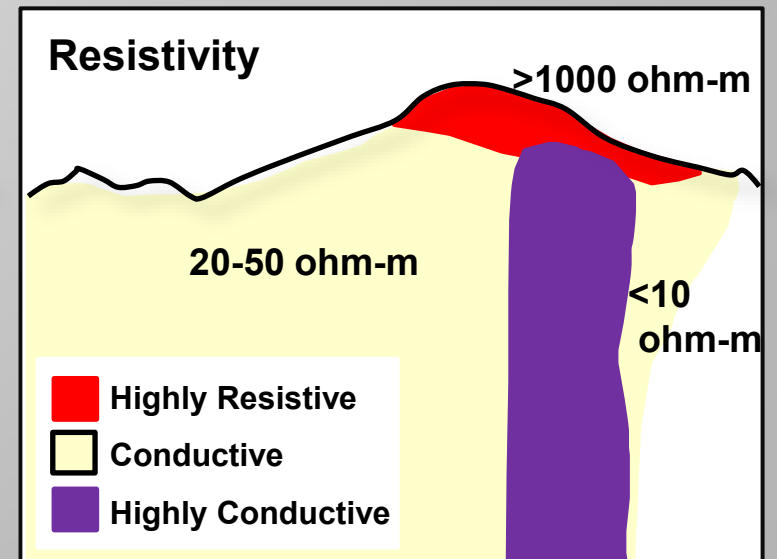
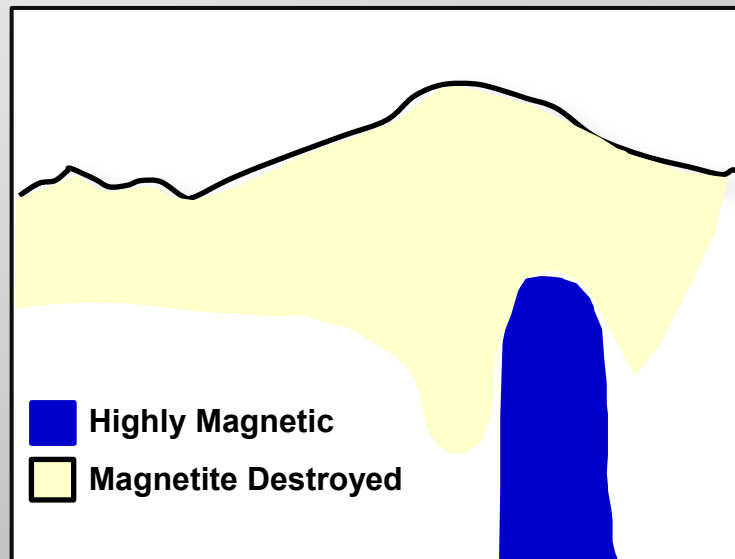
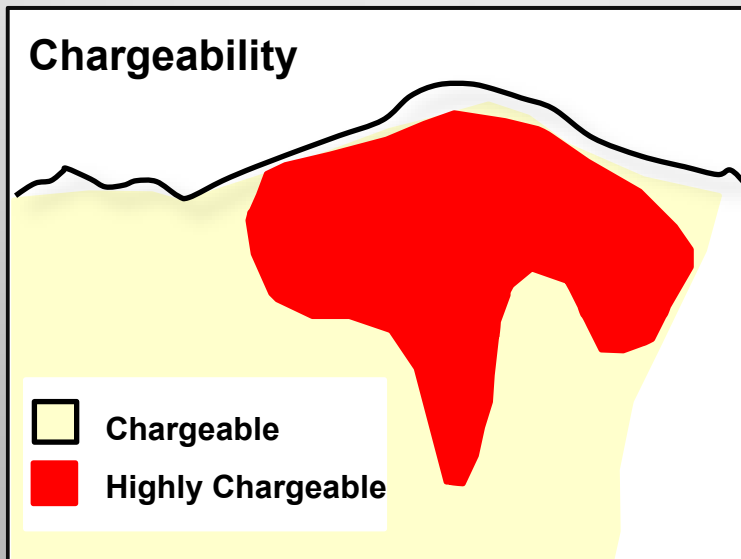
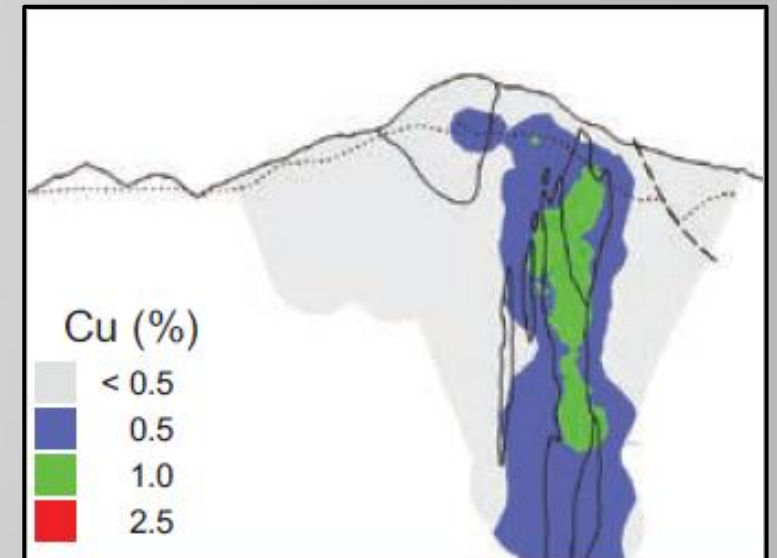
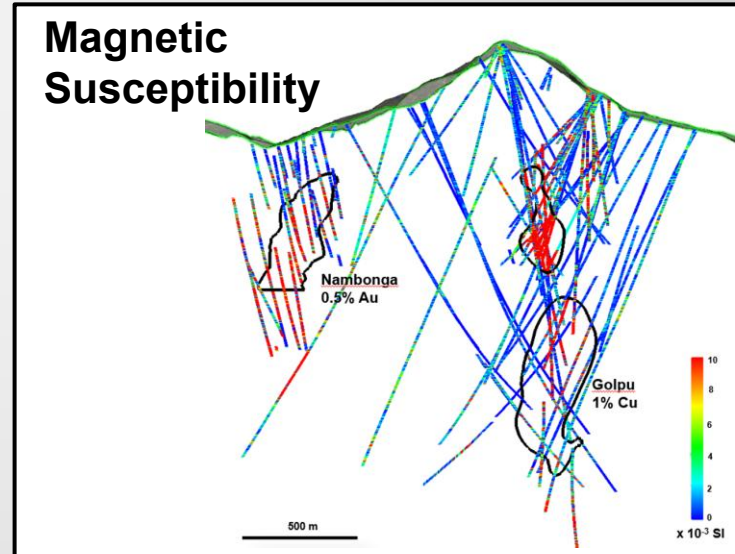
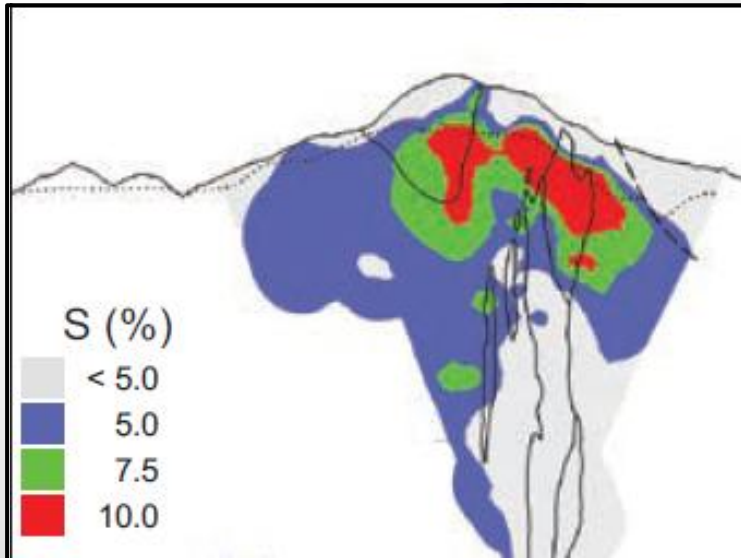
Skytem 200m Resistivity Depth Slice

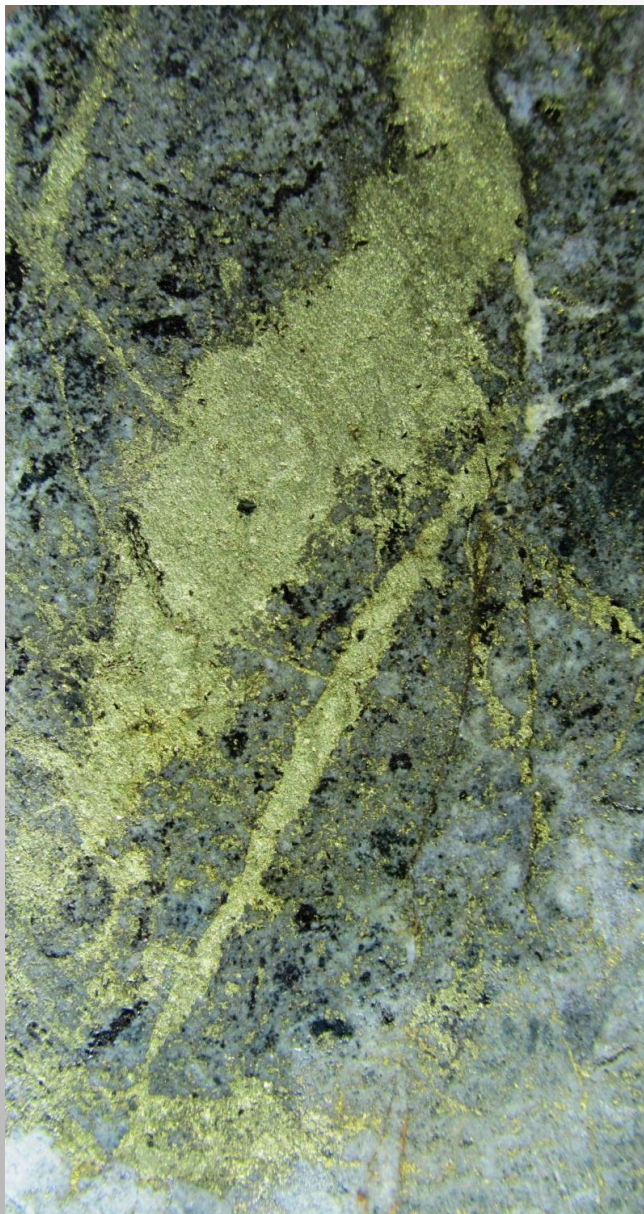
Conductor under the
lithocap is associated
with the Golpu
porphyry



Wafi Golpu Geophysical Response

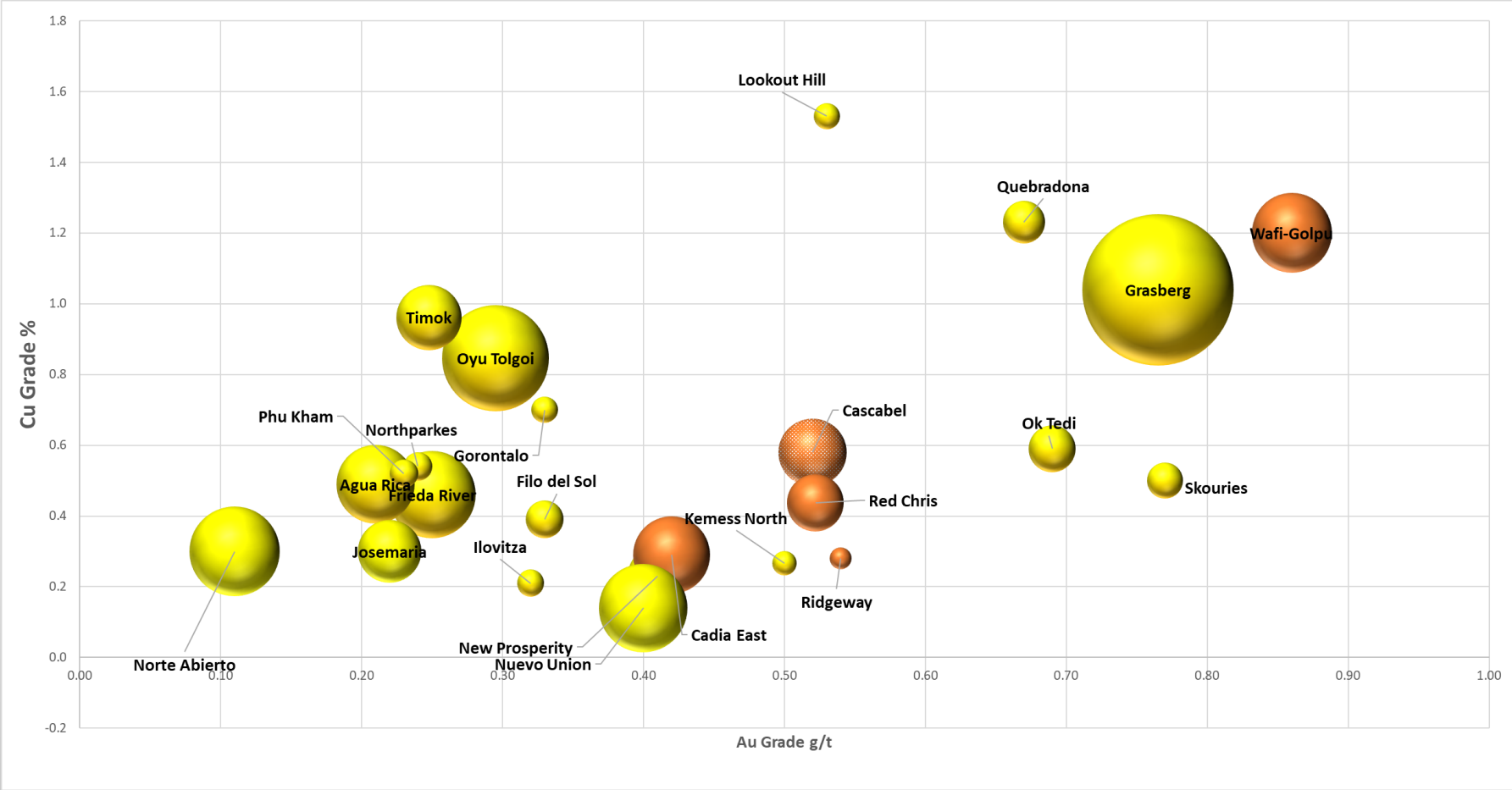
Geochemistry modified from Rinne et. al. (2018)





World Class Cu-Au Porphyry Deposits Reserves

Golpu ranks as one of the highest grade Cu-Au giant porphyry deposits globally.



* Bubble size set to total resource tonnes reported. Source S&P global, reported reserves Jan 2023.