

Phytogeochemistry Bedrock Fault Mapping Tool

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**Minerals Exploration & Environmental Geochemistry
Reno, Nevada**

GSN Symposium, Sparks Nevada, May 4, 2022



Metal Uptake & Distribution

Evapotranspiration

Biogeomicrobiome

Metal Compartments

Ore Indicators – Galaxy

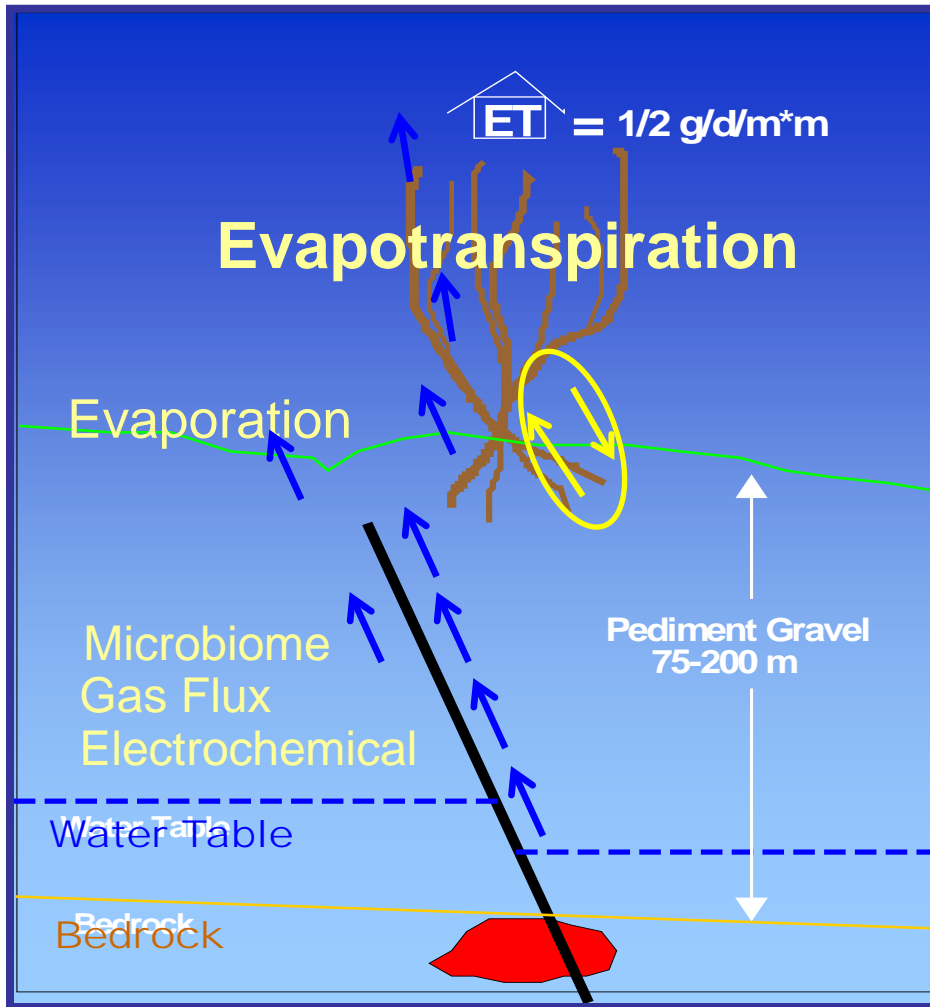
Phyto Survey Patterns

Ohm Tests & Conductivity (Tsalt)

Case History

N. Simpson Park Mountains

Conclusions

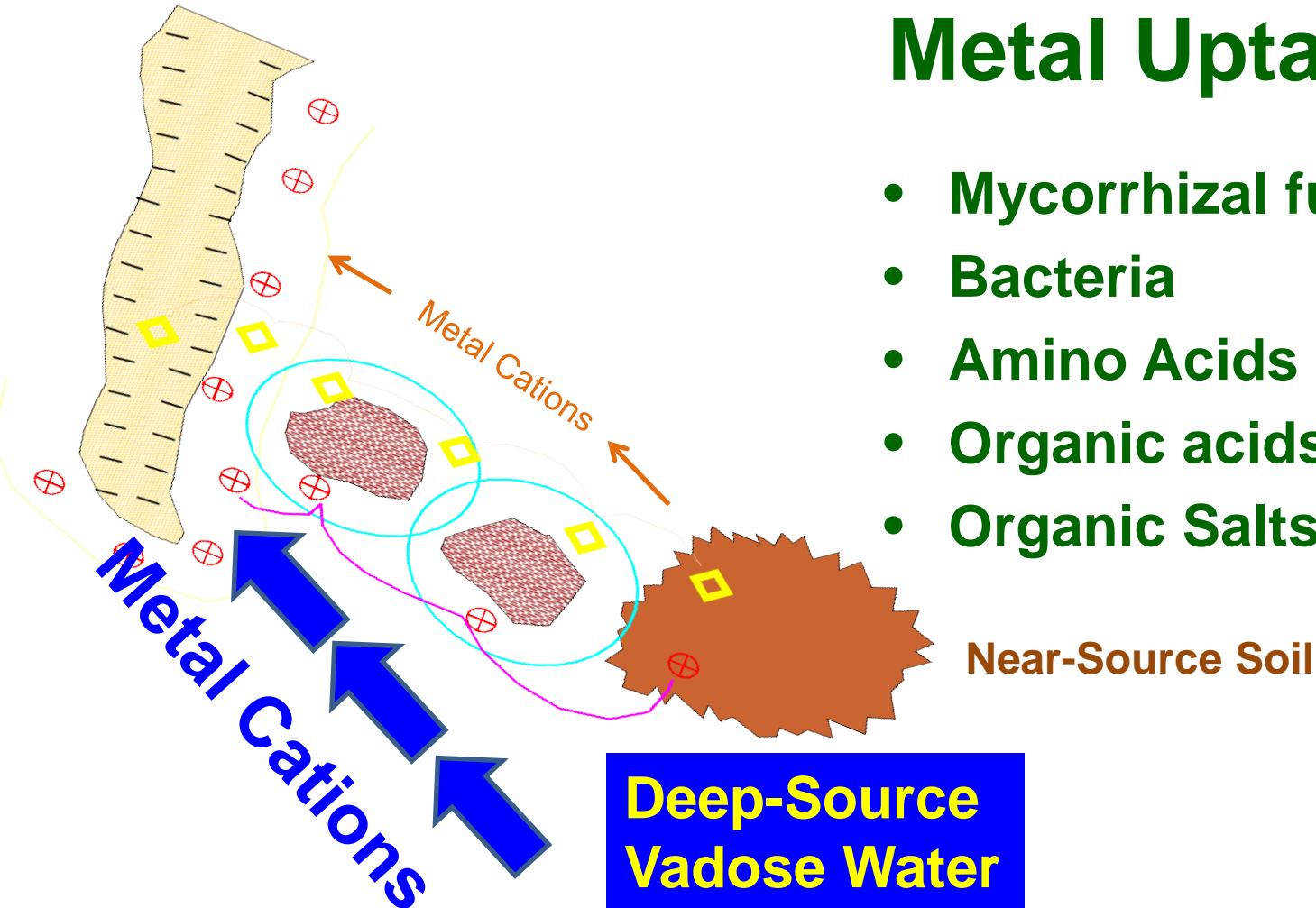


Phytogeochemistry

- Water / Rock interaction
- Ion migration
 - Organo-Metallic species
 - Structure pathways
- Evapotranspiration
- Passive metal uptake
 - Active nutrient uptake
- Dynamic metal flushing
- Accumulation in tissue
- Soil / Plant metal cycling

Metal Uptake

- Mycorrhizal fungi
- Bacteria
- Amino Acids & Sugars
- Organic acids
- Organic Salts



TRACE METAL DISTRIBUTION IN SAGEBRUSH

PINSON MINE



| | Au ppb | As ppm | Sb ppm | Hg ppm | Br ppm | Mo ppm | W ppm | Sr ppm | Co ppm | Zn ppm |
|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| FLOWERS | 9 | 0.6 | 0.0 | -0.05 | 1.2 | 0.3 | 0.1 | 38 | -0.1 | 17 |
| LEAVES | 21 | 1.1 | 0.1 | -0.05 | 1.5 | 0.5 | 0.2 | 40 | 0.2 | 16 |
| TWIGS | 35 | 3.7 | 0.2 | 0.07 | 1.0 | 0.5 | 0.5 | 45 | 0.3 | 10 |
| BRANCHES | 13 | 2.4 | 0.2 | 0.07 | 0.7 | 0.4 | 0.4 | 23 | 0.3 | 7 |
| U. TRUNK | 6 | 1.4 | 0.1 | -0.05 | 0.6 | 0.3 | 0.3 | 21 | 0.2 | 8 |
| L. TRUNK | 3 | 0.7 | 0.0 | -0.05 | 0.6 | 0.3 | 0.1 | 27 | -0.1 | 7 |
| | Ba ppm | Fe % | Ca % | Na ppm | K % | Cr ppm | Rb ppm | Sc ppm | Se ppm | Cs ppm |
| FLOWERS | 22 | 0.01 | 0.5 | 184 | 1.2 | 0.3 | 1 | 0.03 | 0.5 | -0.05 |
| LEAVES | 27 | 0.02 | 0.5 | 110 | 1.2 | 0.3 | 1 | 0.05 | 1.2 | -0.05 |
| TWIGS | 51 | 0.05 | 0.3 | 175 | 0.8 | 1.3 | 2 | 0.16 | -0.1 | 0.12 |
| BRANCHES | 40 | 0.04 | 0.2 | 138 | 0.5 | 0.9 | 2 | 0.14 | -0.1 | 0.09 |
| U. TRUNK | 25 | 0.03 | 0.3 | 125 | 0.4 | 0.6 | 1 | 0.09 | -0.1 | 0.05 |
| L. TRUNK | 21 | 0.01 | 0.3 | 130 | 0.4 | 0.3 | -1 | 0.04 | -0.1 | -0.05 |
| | La ppm | Sm ppm | Ce ppm | Nd ppm | Yb ppm | Lu ppm | Hf ppm | U ppm | Th ppm | Ir ppm |
| FLOWERS | 0.14 | 0.02 | 0.2 | -0.3 | 0.01 | -0.001 | -0.05 | -0.01 | -0.1 | -0.1 |
| LEAVES | 0.24 | 0.03 | 0.4 | -0.3 | 0.02 | -0.001 | -0.05 | 0.03 | -0.1 | -0.1 |
| TWIGS | 0.71 | 0.10 | 0.9 | 0.4 | 0.04 | 0.003 | -0.05 | 0.10 | 0.2 | -0.1 |
| BRANCHES | 0.57 | 0.09 | 0.8 | 0.4 | 0.03 | 0.006 | 0.08 | 0.05 | 0.1 | -0.1 |
| U. TRUNK | 0.35 | 0.05 | 0.5 | 0.3 | 0.02 | 0.004 | -0.05 | 0.03 | -0.1 | -0.1 |
| L. TRUNK | 0.15 | 0.02 | 0.2 | -0.3 | 0.01 | 0.001 | -0.05 | 0.01 | -0.1 | -0.1 |

GSN 2020 Symposium Proceedings

Phytogeochemistry: Ore Related Histories as Guides to Discovery in Nevada

Shea Clark Smith, MEG Inc., Reno, Nevada



CARLIN



BALD MTN



GALAXY

GALAXY

ALLIGATOR



ALLIGATOR

YANKEE

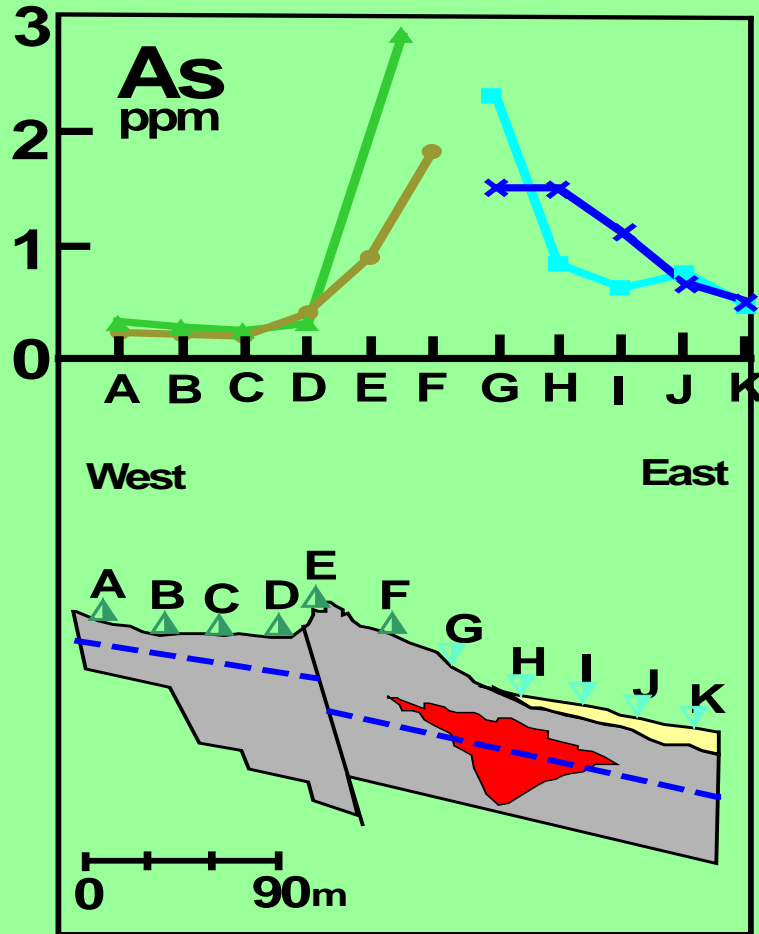
YANKEE



10.2 km

Image Landsat © 2015 Google

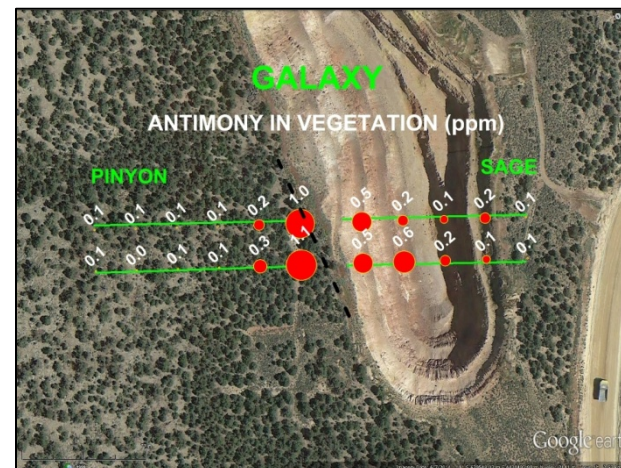
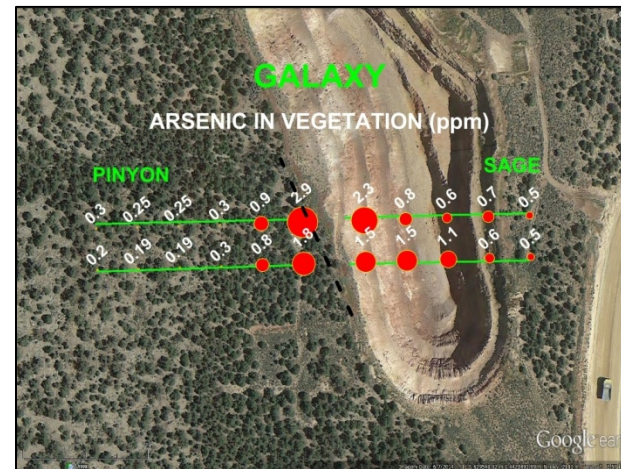
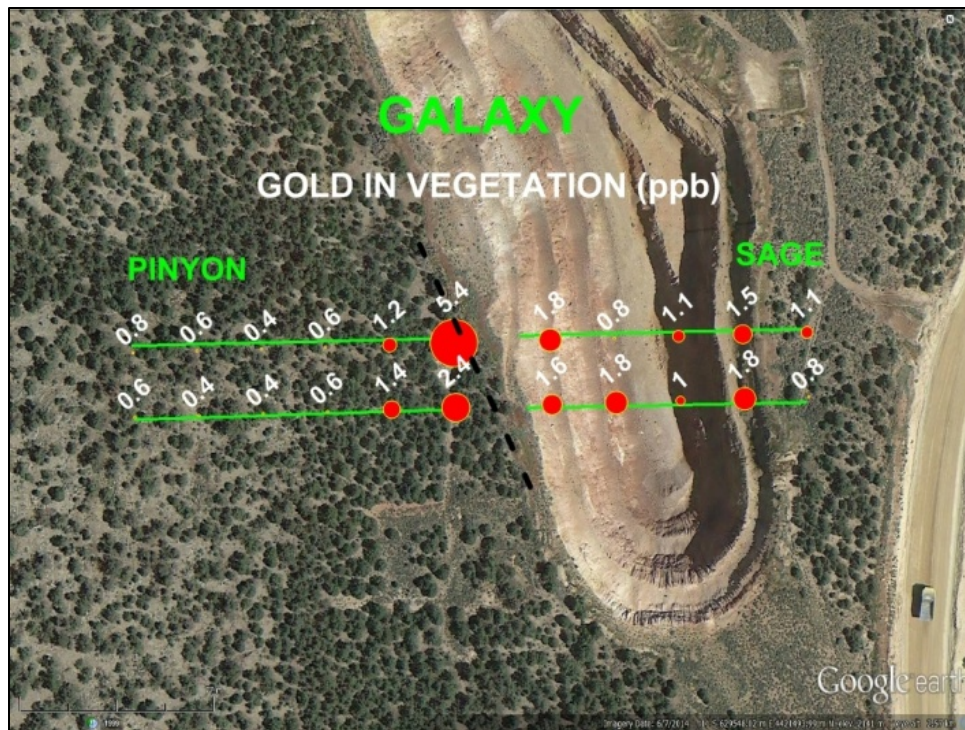
Google



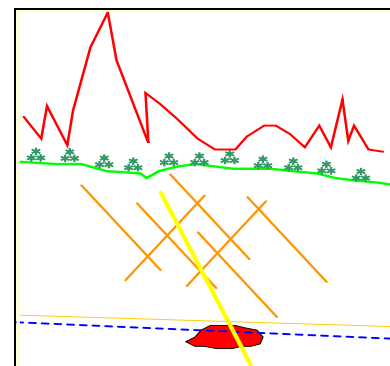
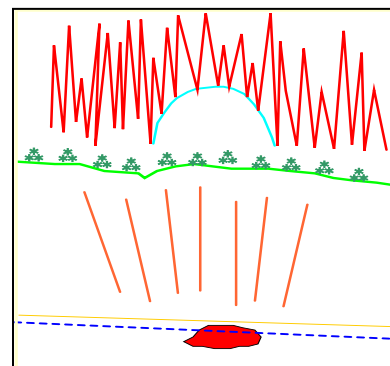
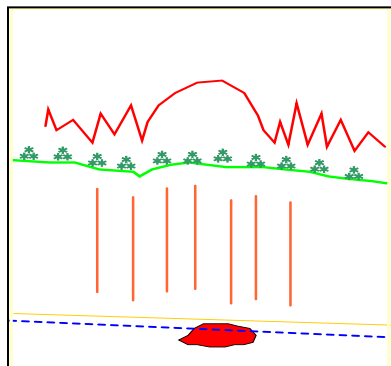
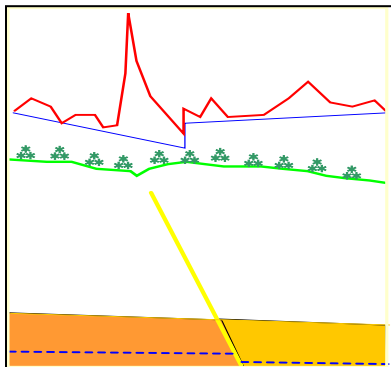
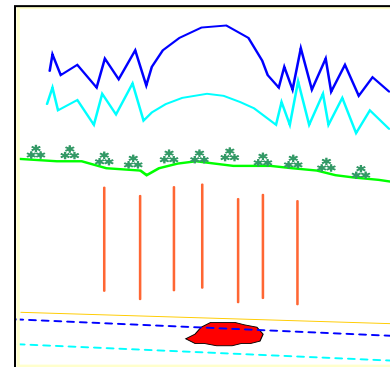
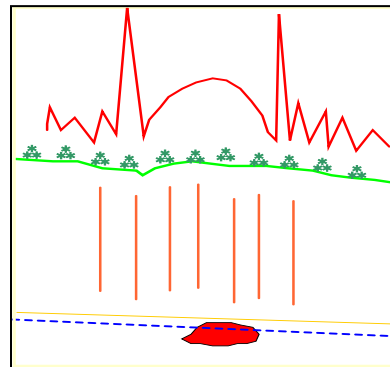
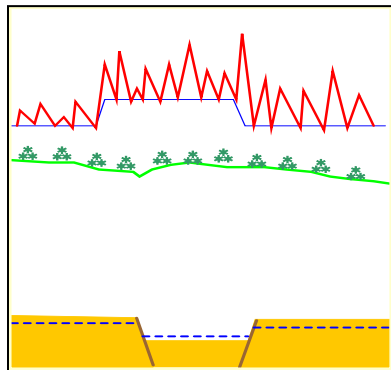
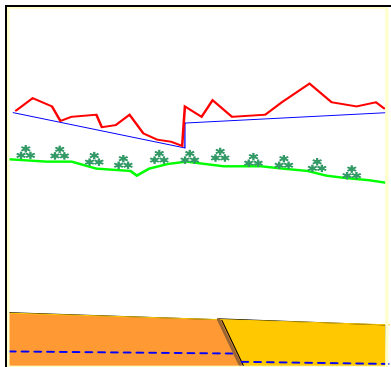
GALAXY

- Pinyon & Sagebrush
- Pilot Shale host
- Alluvium & shale overburden
- 80 ft to top of ore
- Major vertical ion pathway
- Minor down-slope dispersion

McGraw-Hill Yearbook of Science & Technology, 1992



Galaxy Mine Today

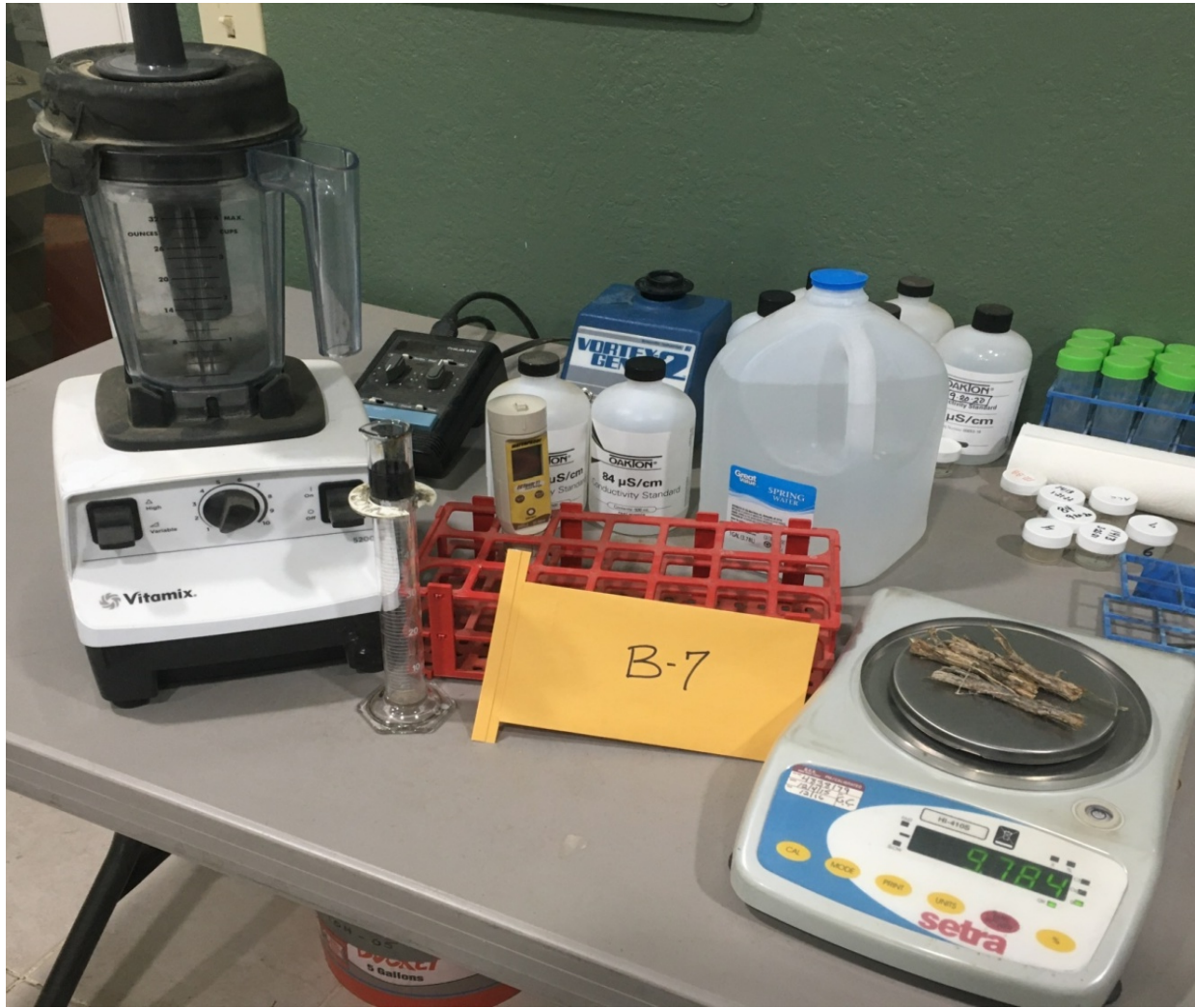


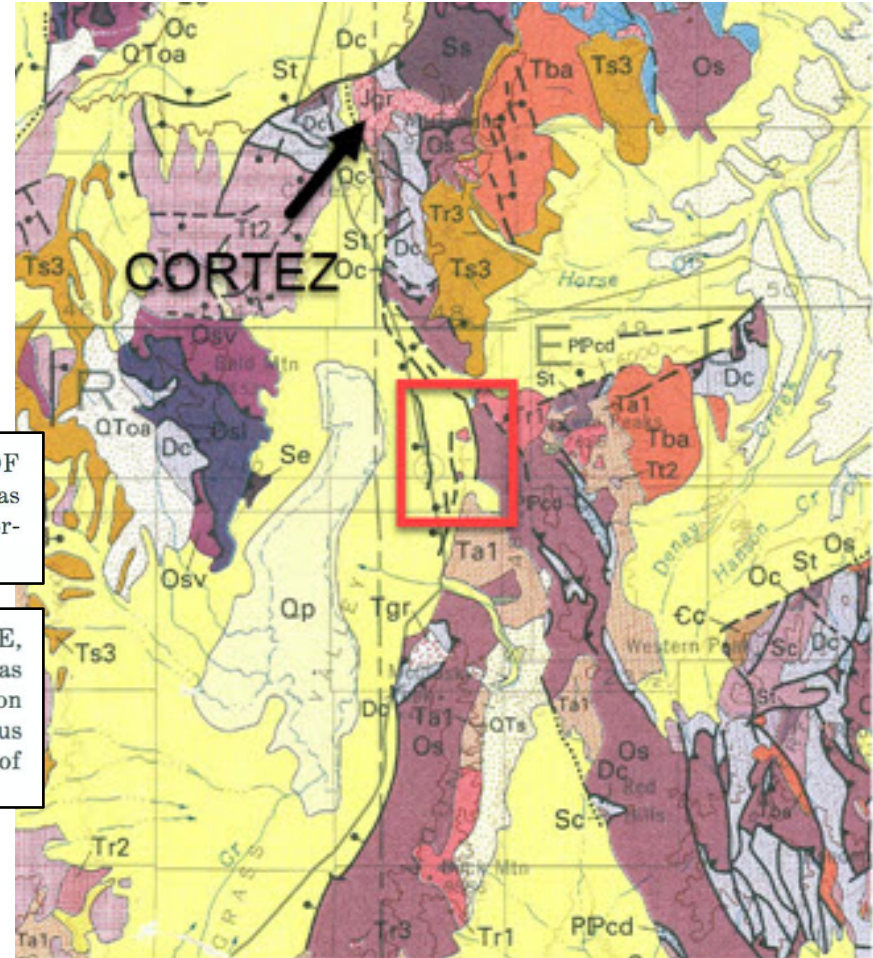
Tsalt

Total Salt









Dc DOLOMITE, LIMESTONE, AND MINOR AMOUNTS OF SANDSTONE AND QUARTZITE—Includes units such as Sevy and Simonson Dolomites, Guilmette and Nevada Formations, and Devils Gate Limestone

Os SHALE, CHERT, AND MINOR AMOUNTS OF QUARTZITE, GREENSTONE, AND LIMESTONE—Includes units such as Vinini Formation of north-central Nevada, Palmetto Formation in southern and central parts of Esmeralda County, and Comus Formation in Humboldt County. Locally includes rocks of Silurian and Devonian age

Geochemical Exploration for Gold Through Transported Alluvial Cover in Nevada: Examples from the Cortez Mine

JOHN MUNTEAN & PAUL TAUFEN

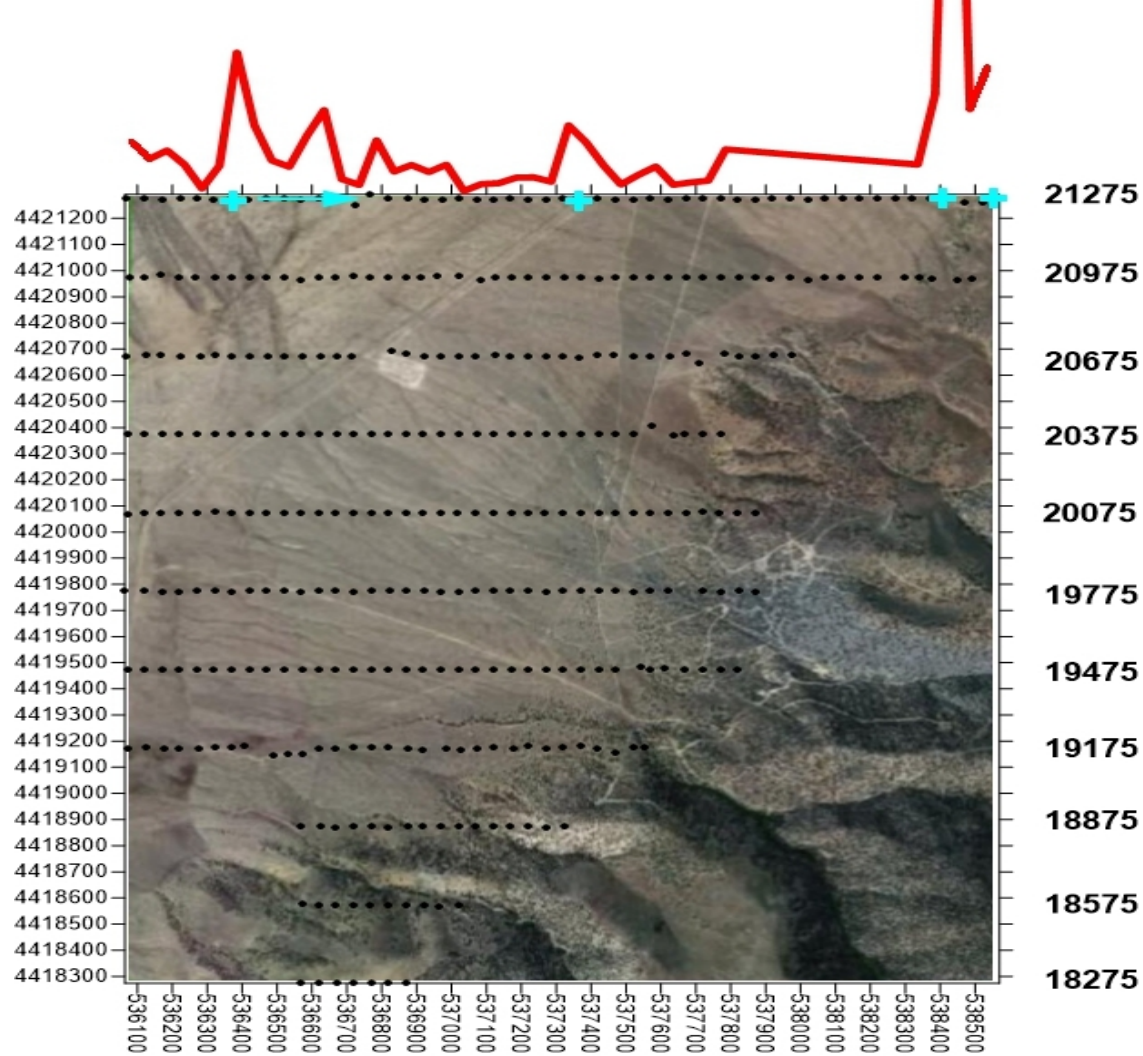
Economic Geology, 2011, v. 106, pp. 809–833

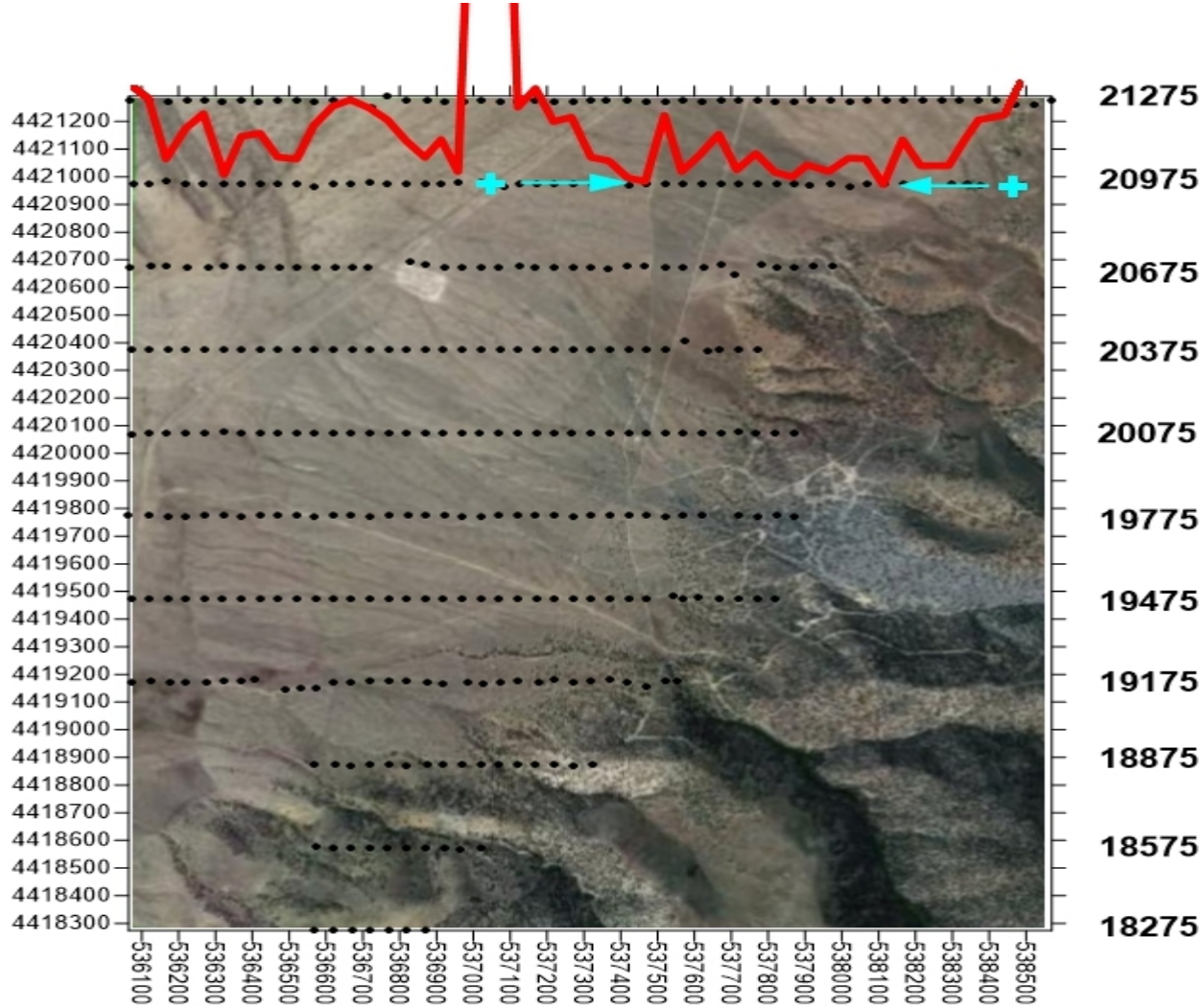
McEwen Keystone

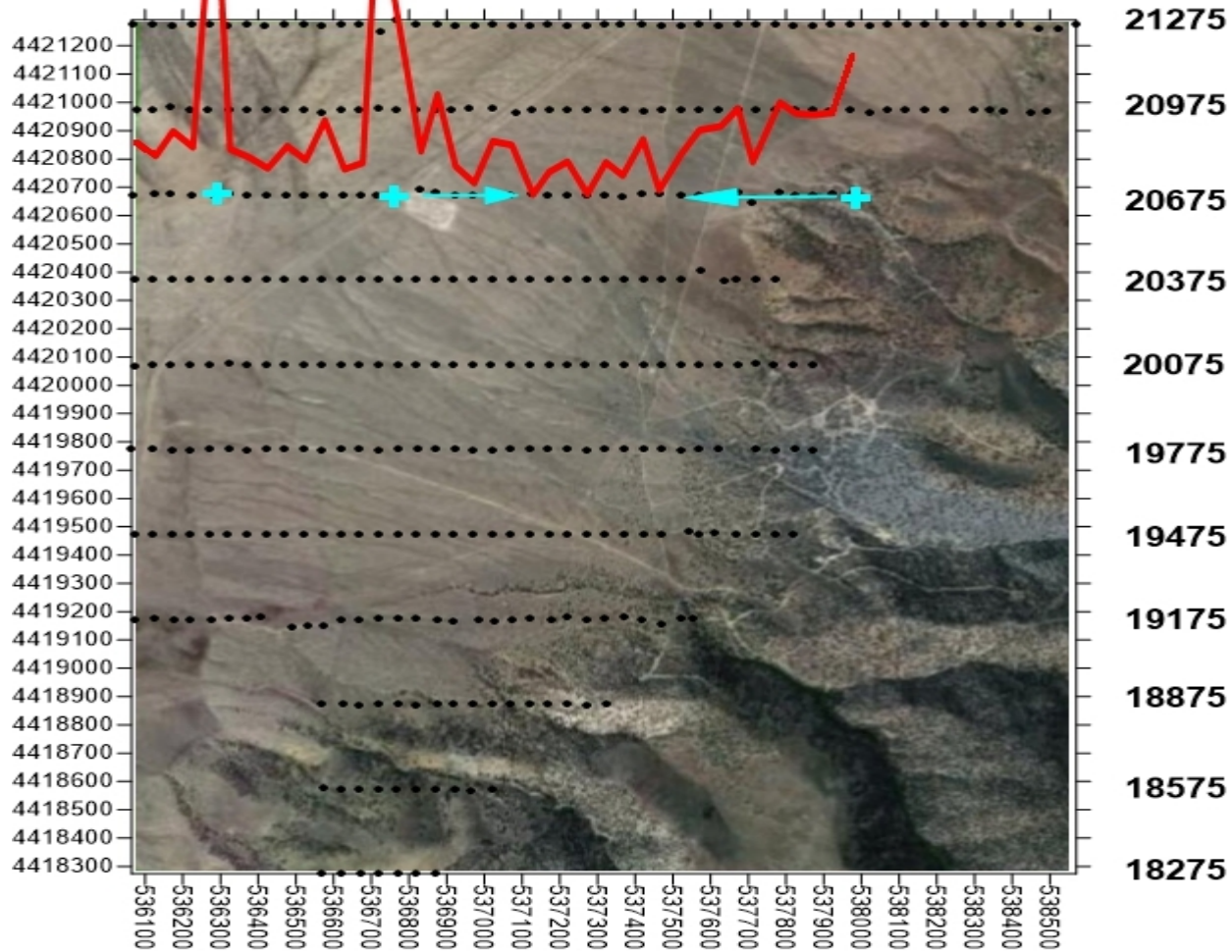
2013 Sagebrush Survey

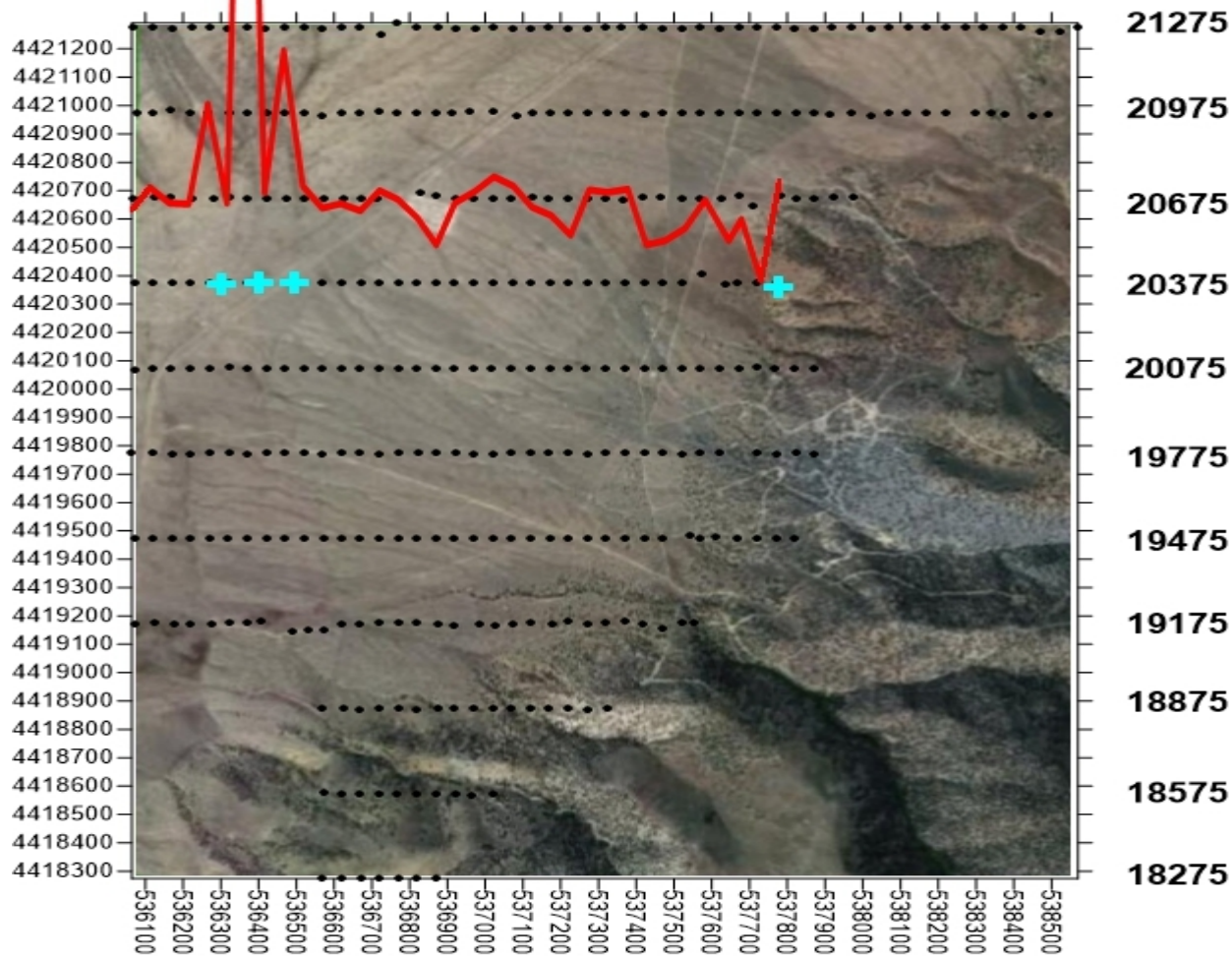


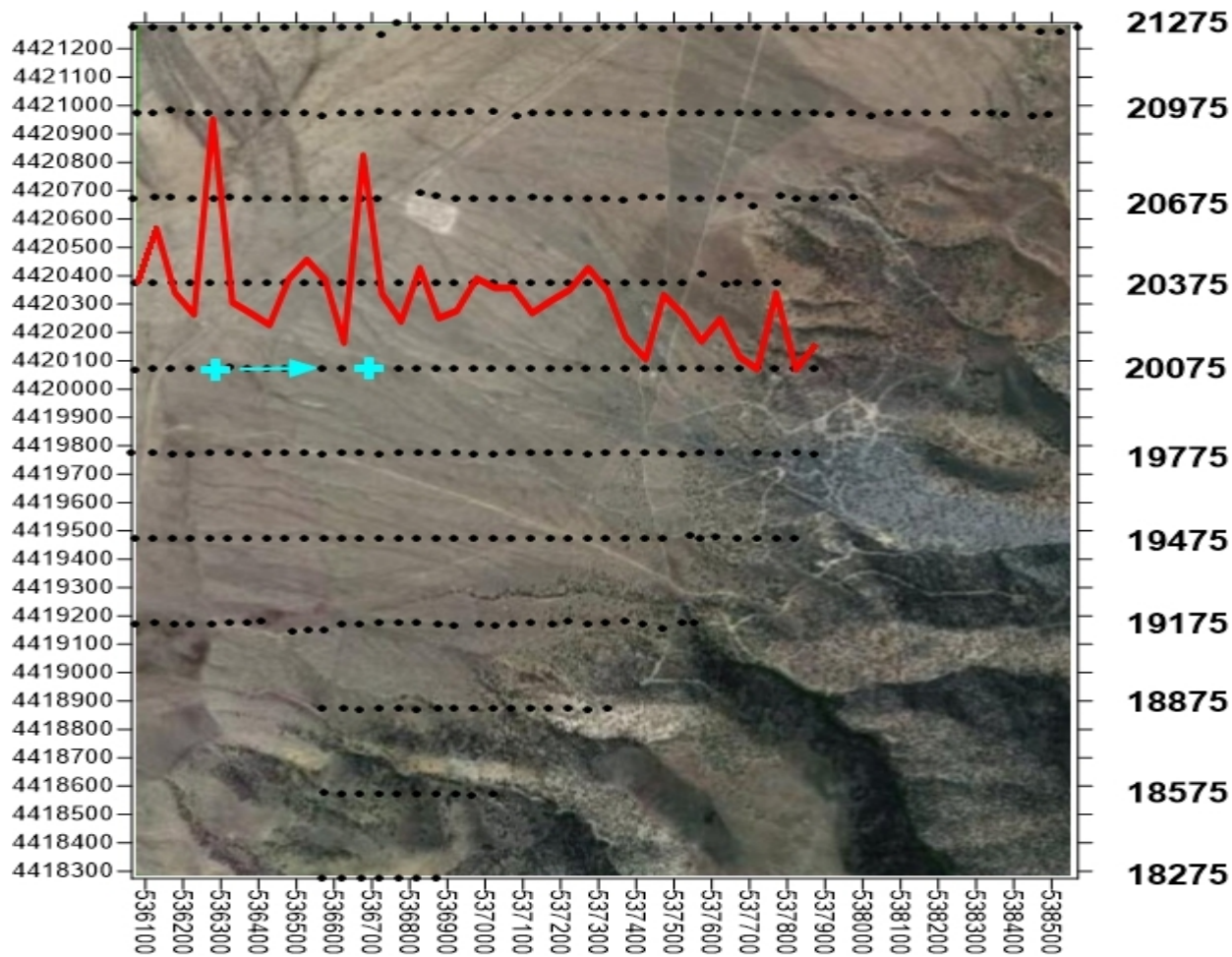
3 km

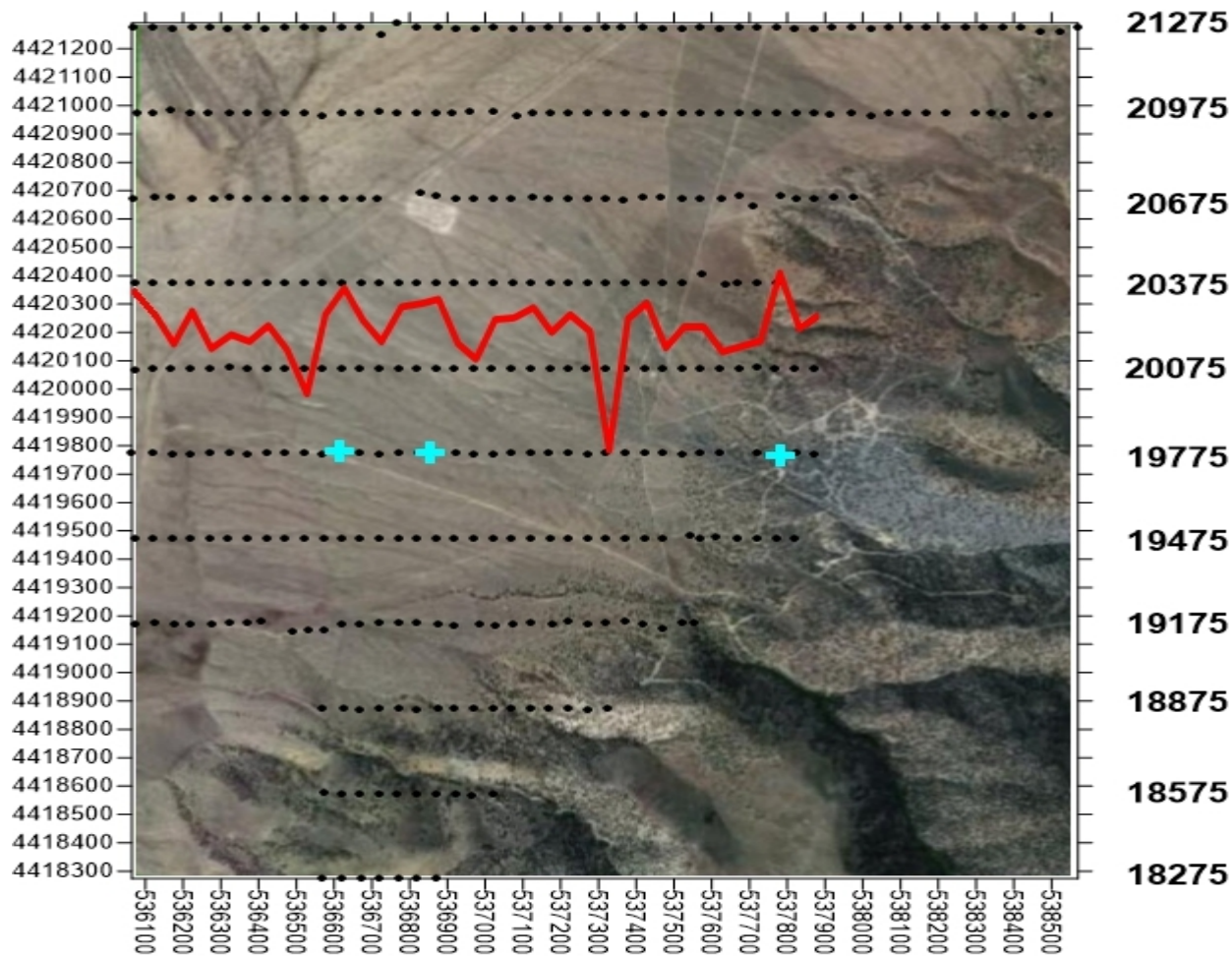


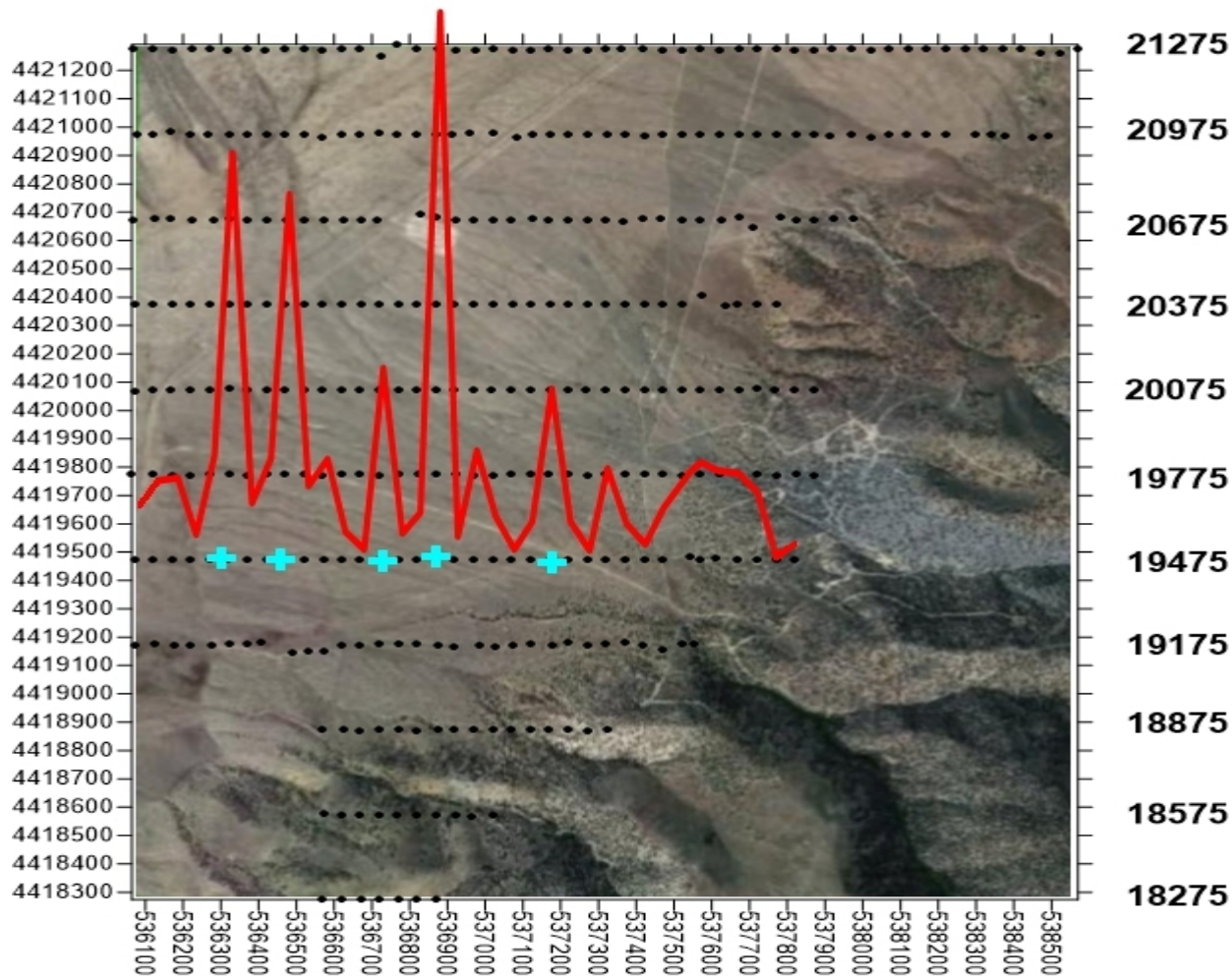


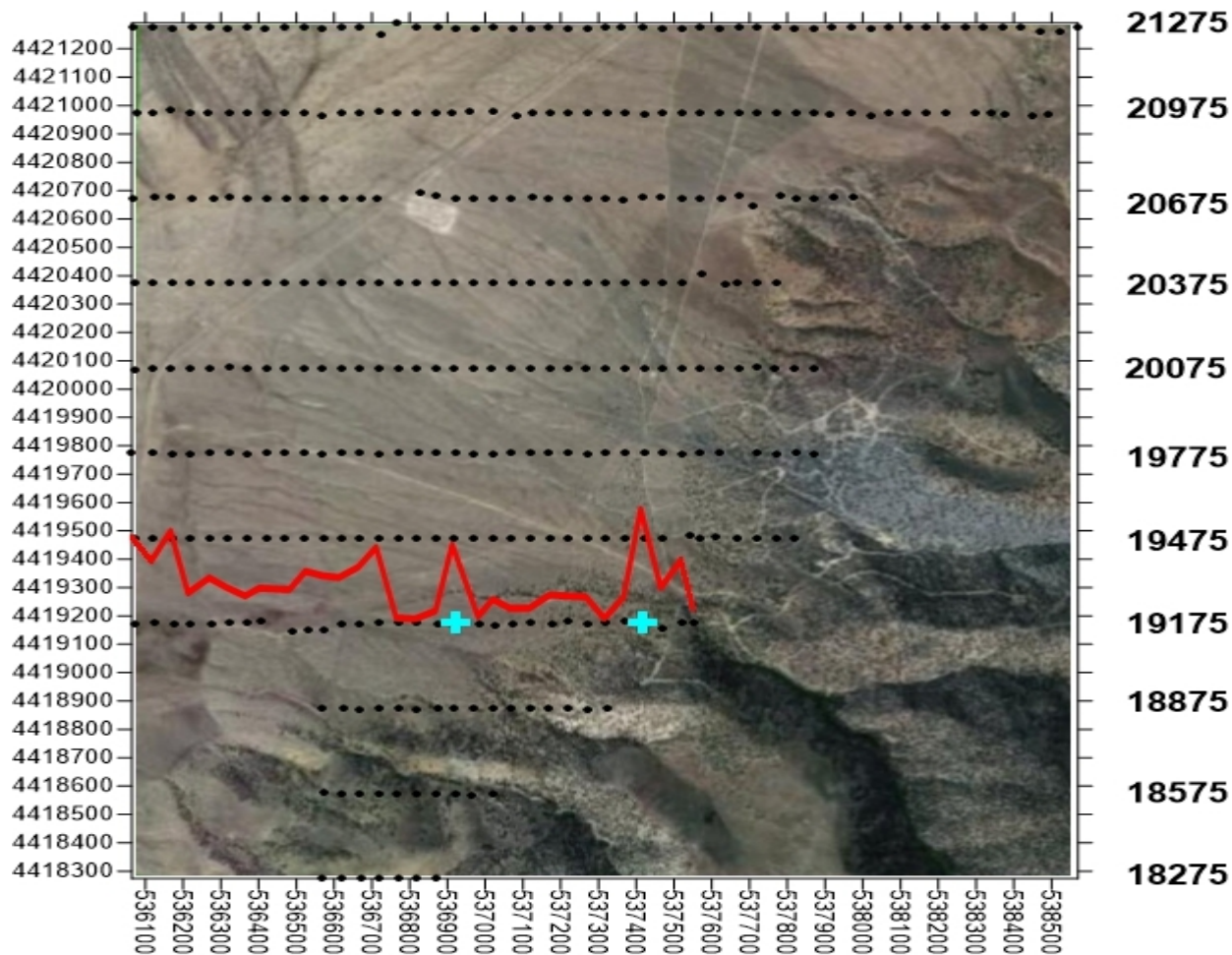


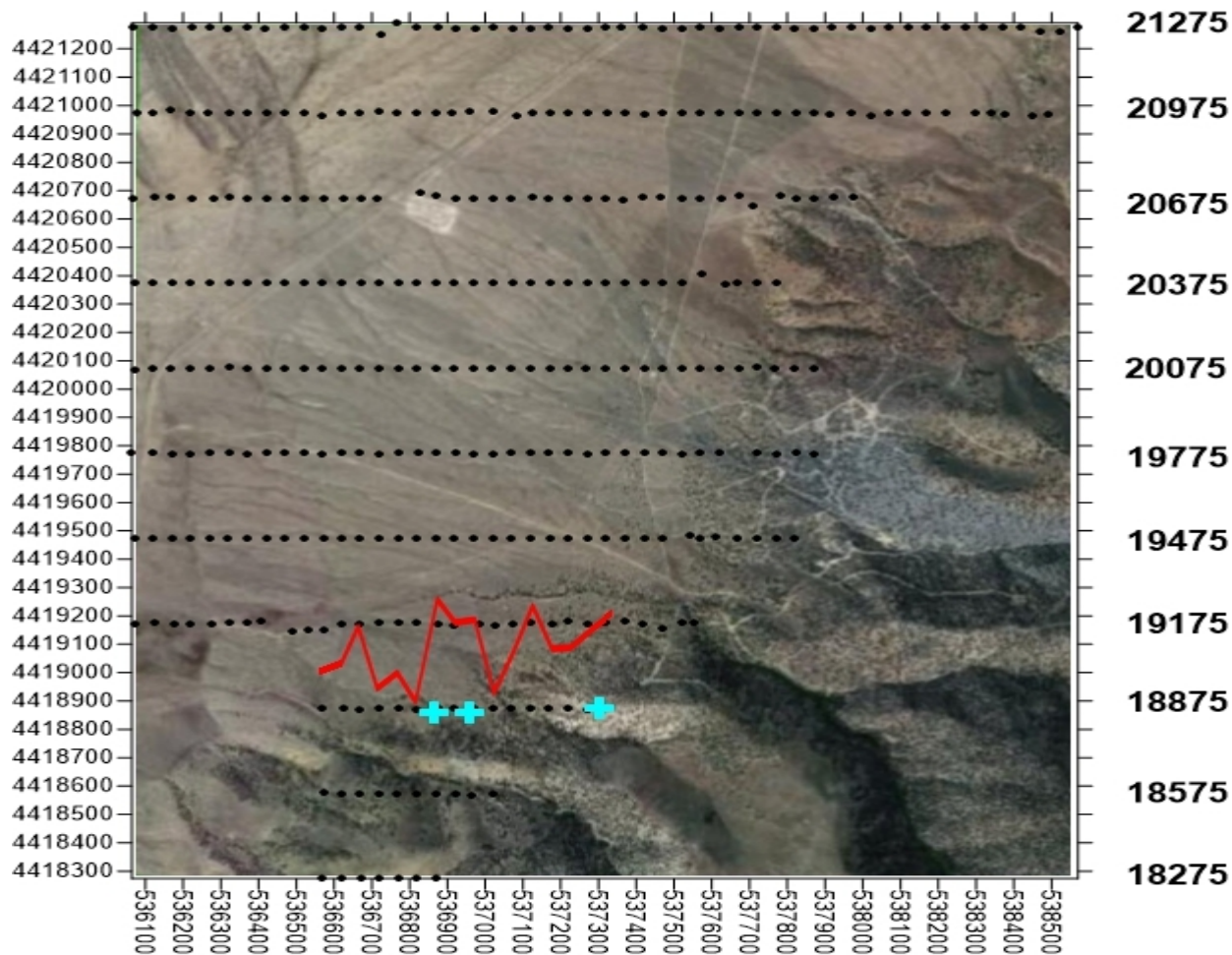


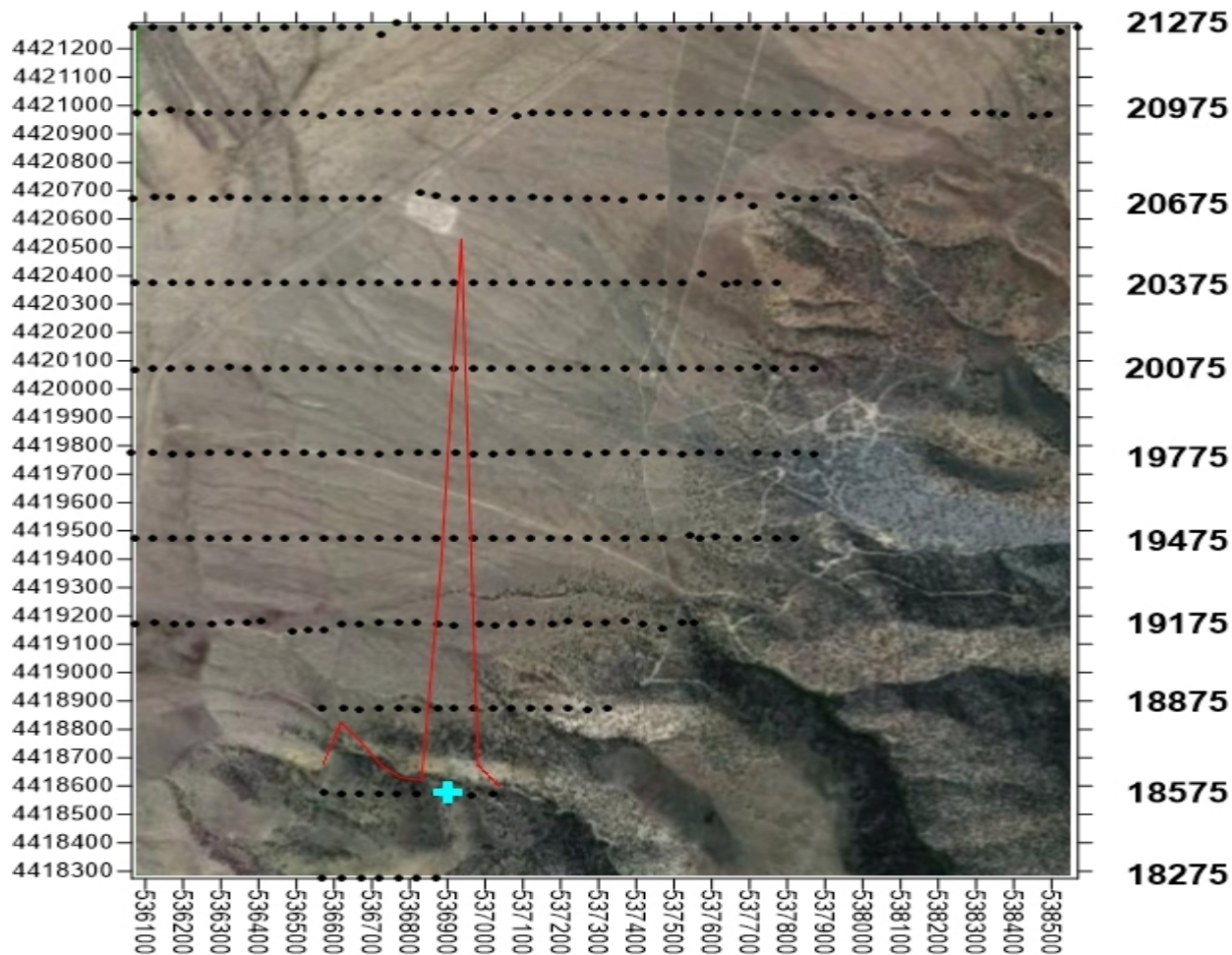




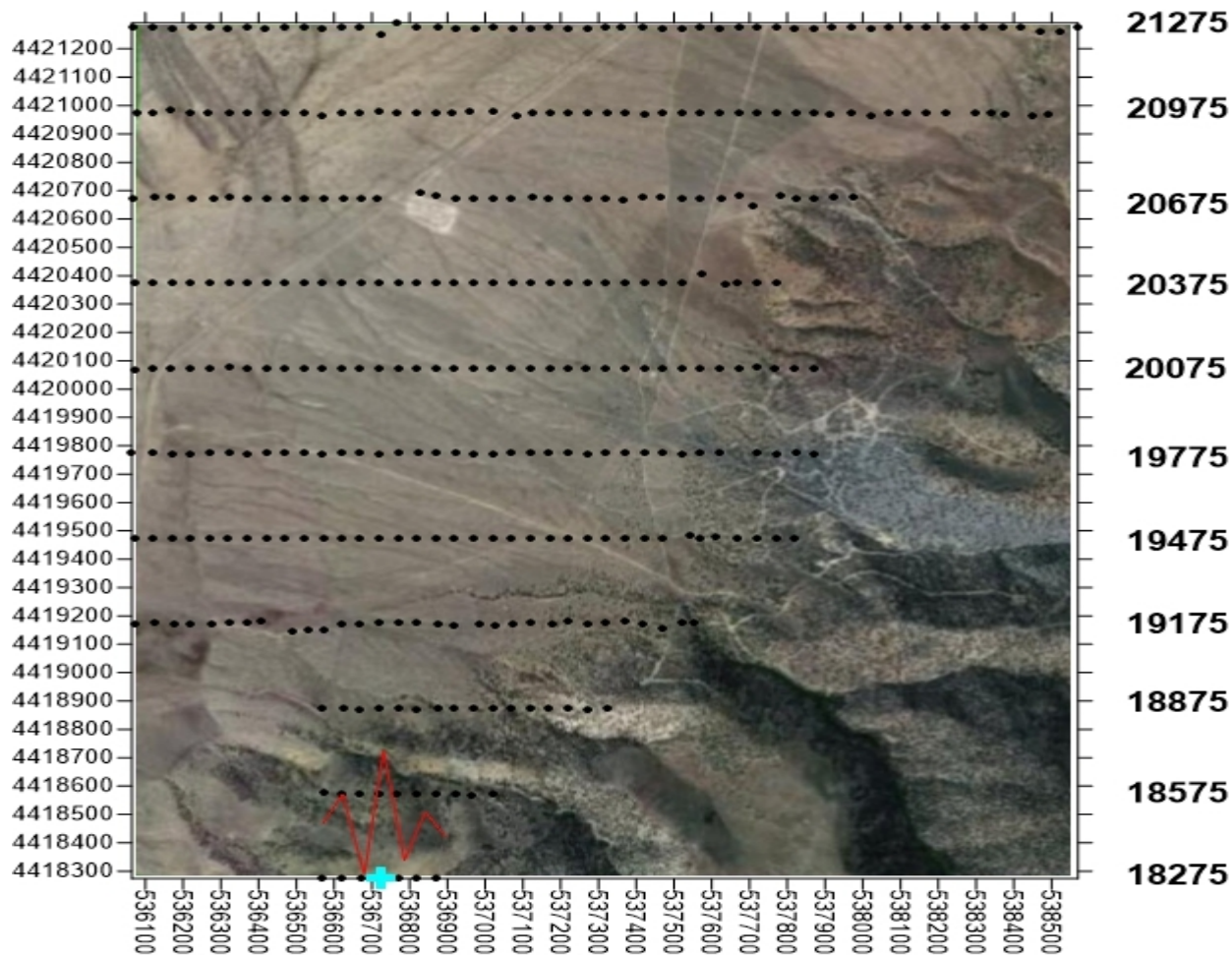


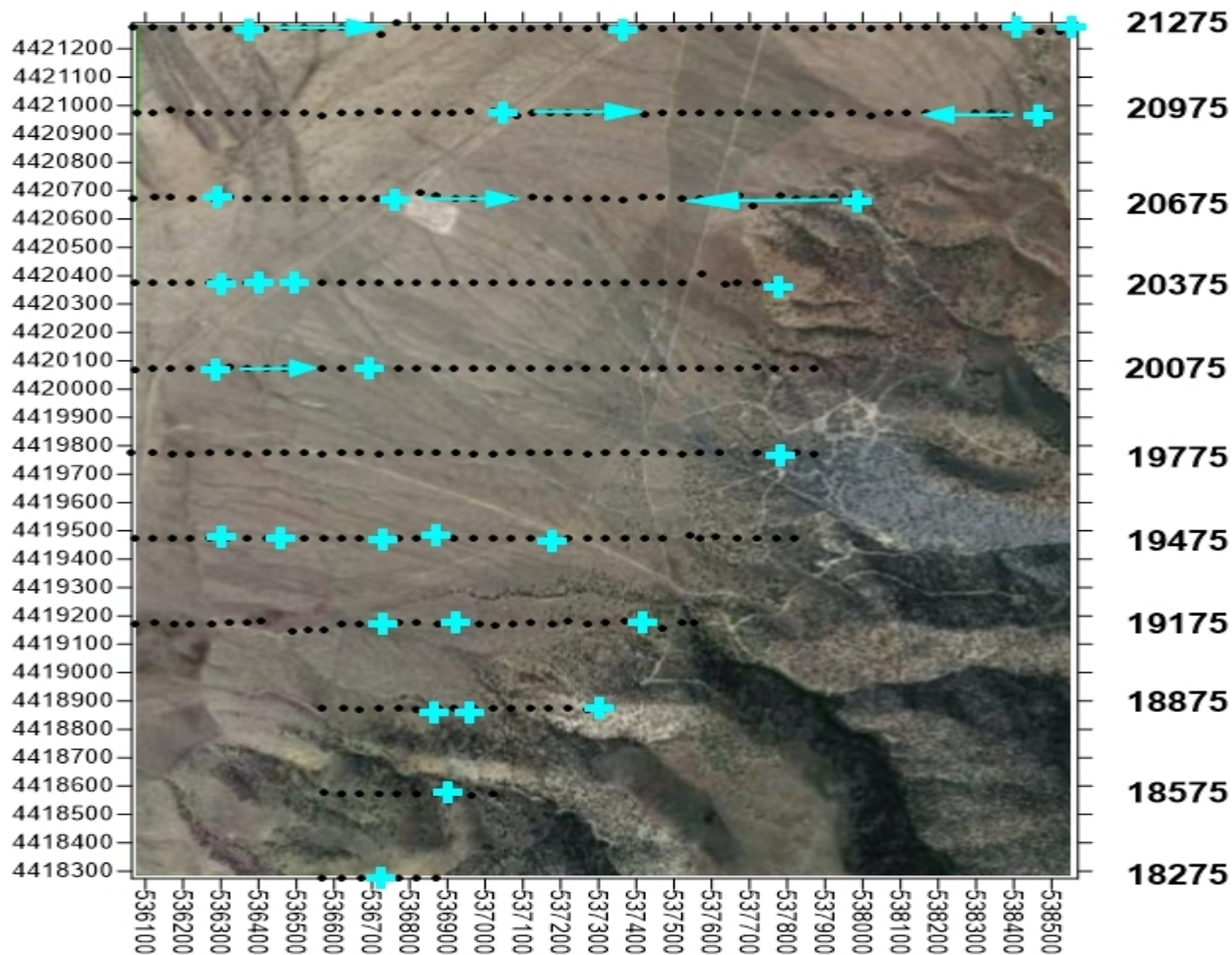


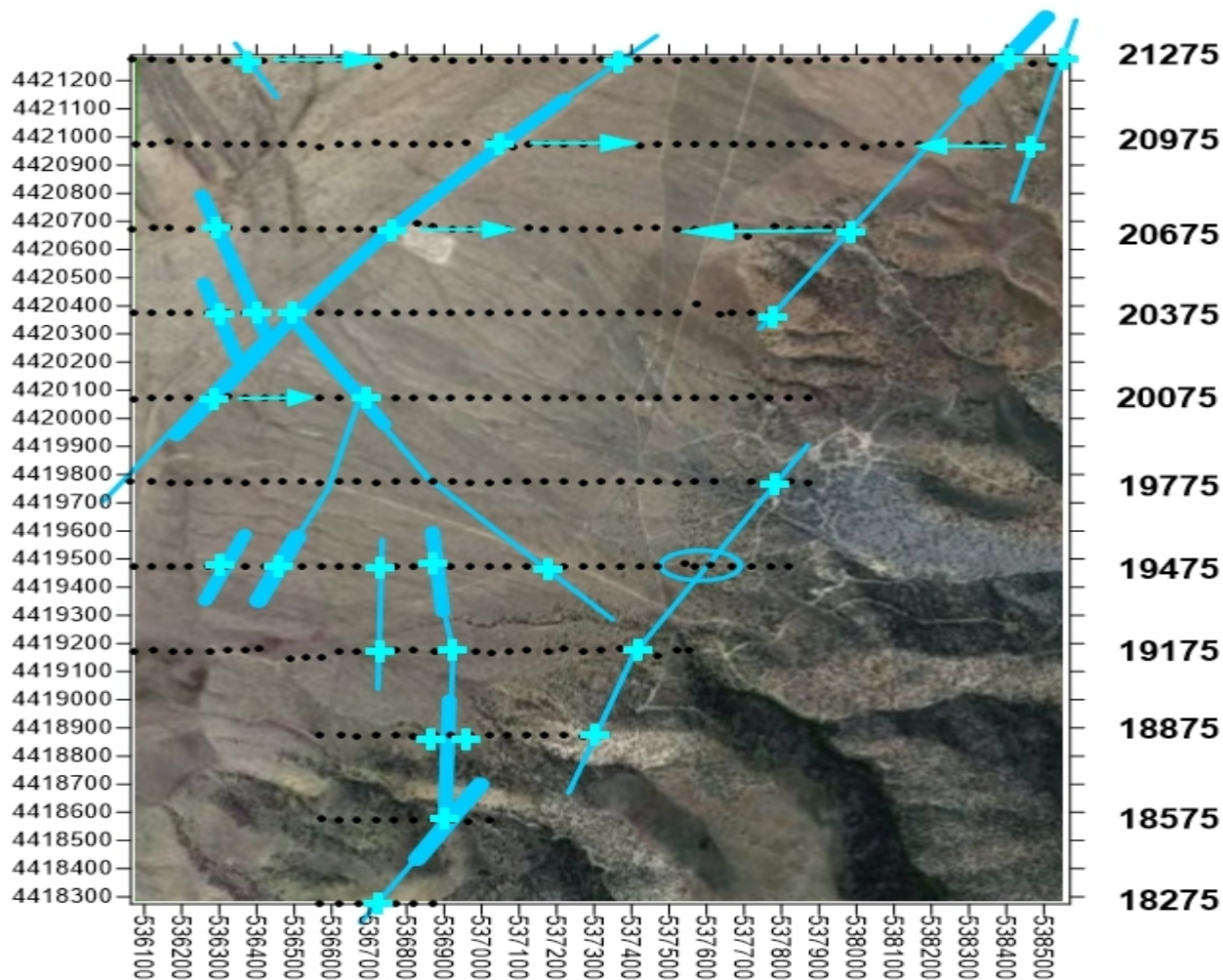


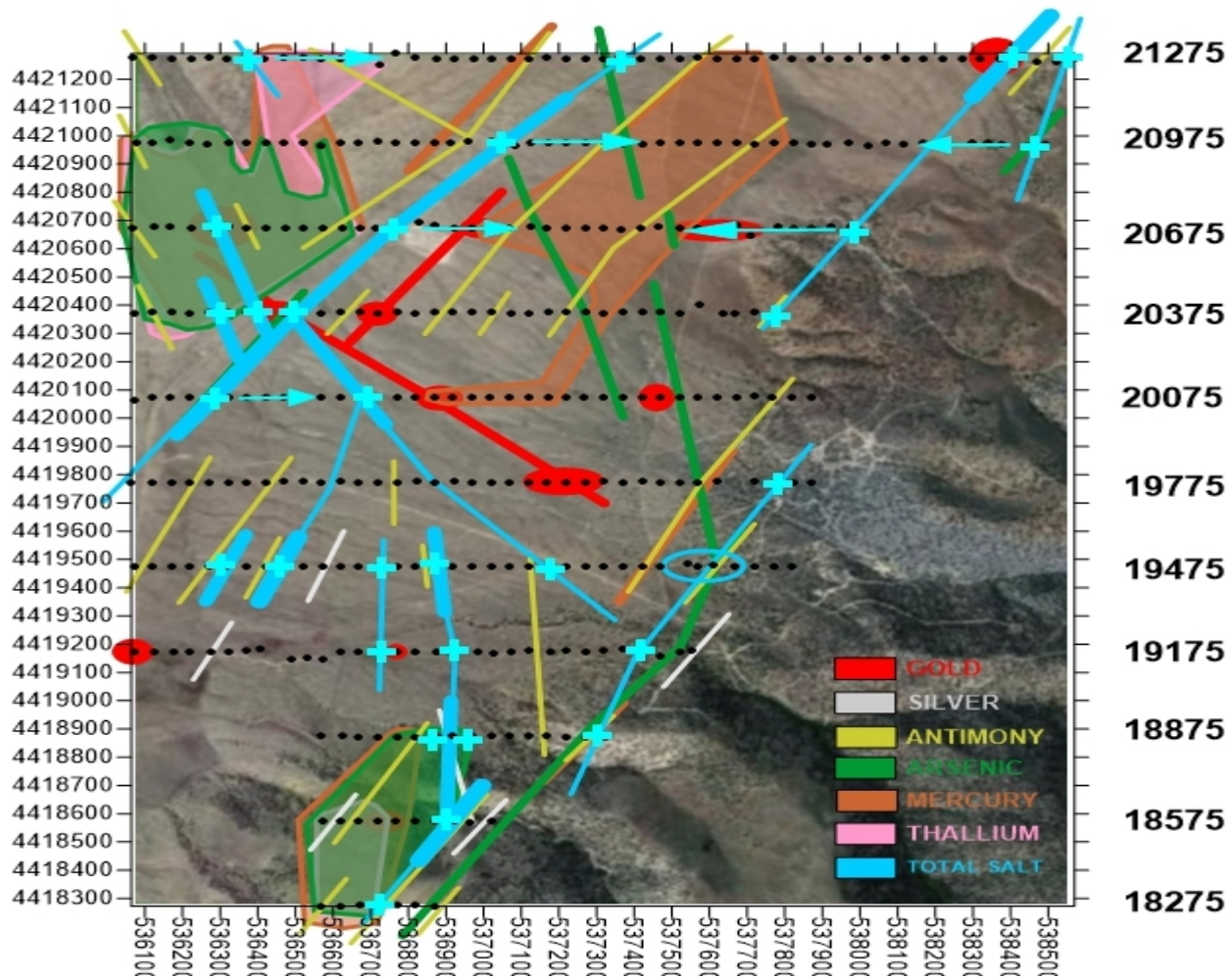


21275
20975
20675
20375
20075
19775
19475
19175
18875
18575
18275









Early Structure Information
Continuity into Cover
Strikes & Dips
Horst / Graben
Rotations & Offsets
Constraints & BoundriesTemplate
Low Cost

Phytogeochemistry Bedrock Fault Mapping Tool

**Wishing you success
for discovery under cover**

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