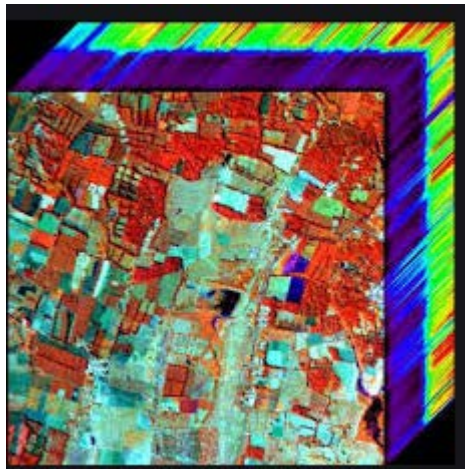
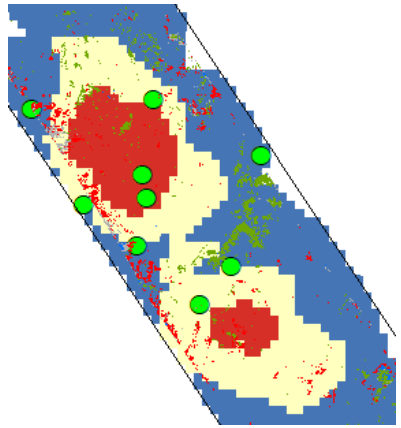
EGU General Assembly 2021

Mineral Prospectivity Modeling using AVIRIS-NG VNIR-SWIR data and Gravity data for Gold-Sulphide mineralization in parts of GADAG schist belt, Karnataka





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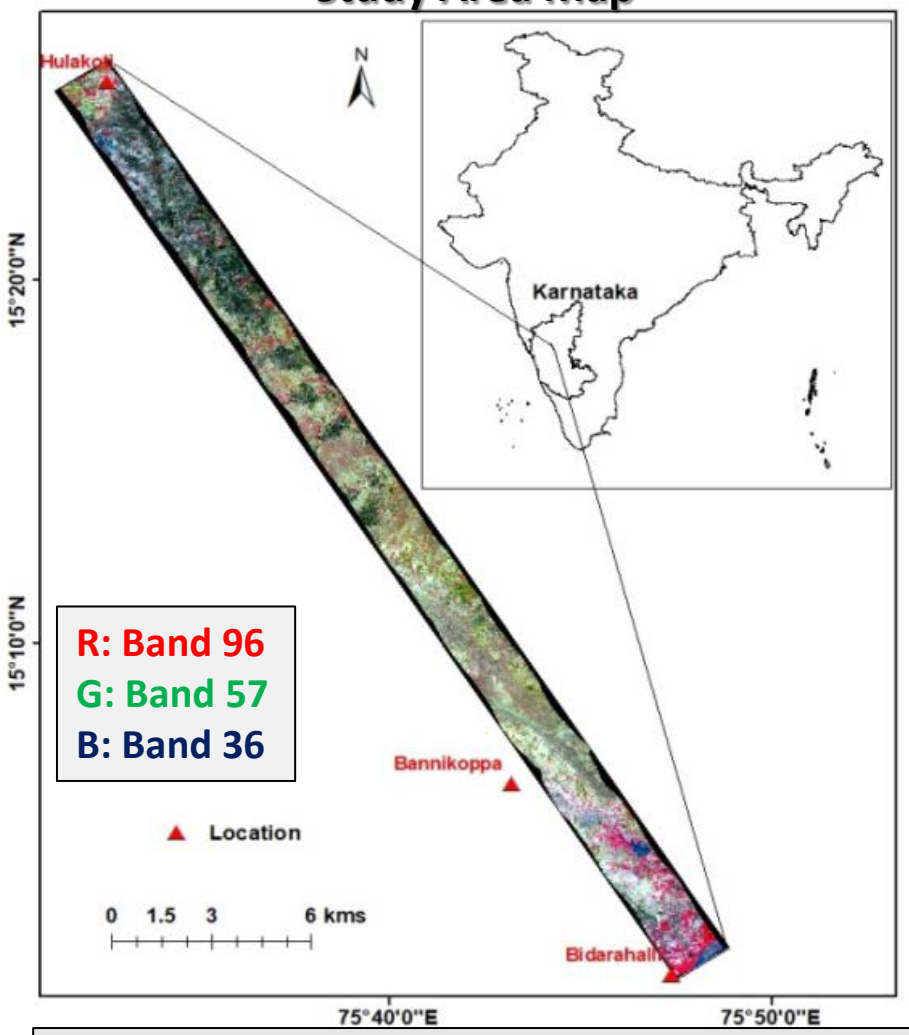
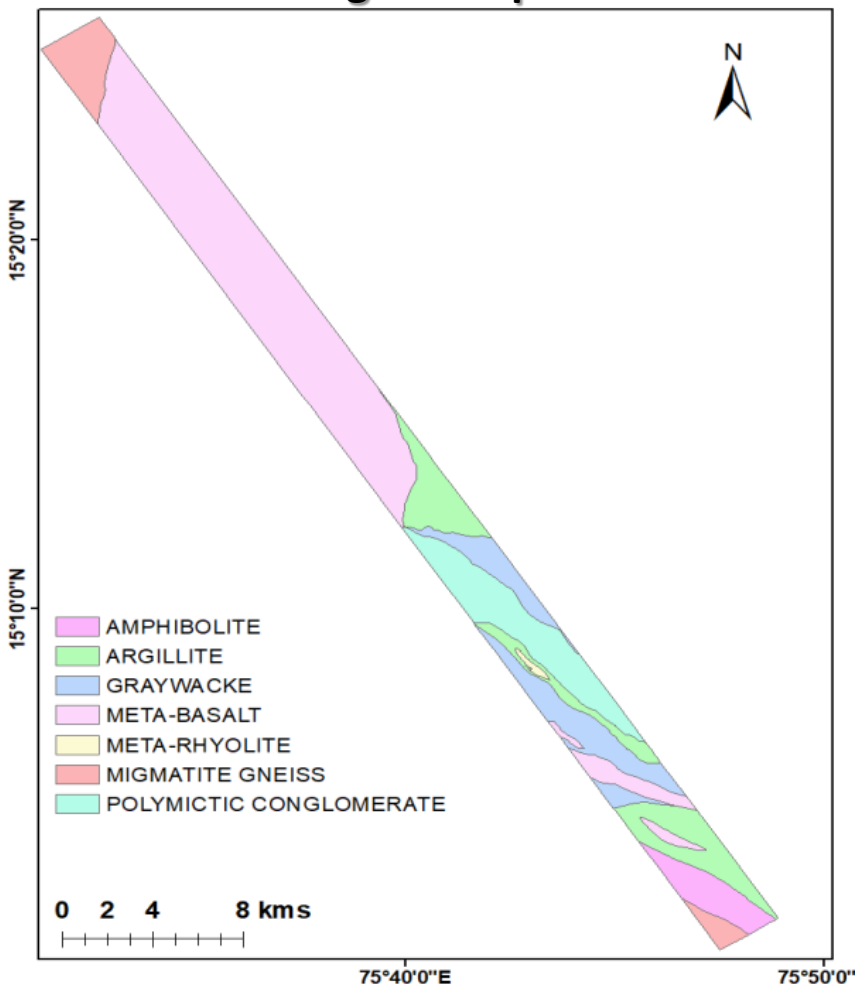
19-30 APRIL, 2021

Study Area Map



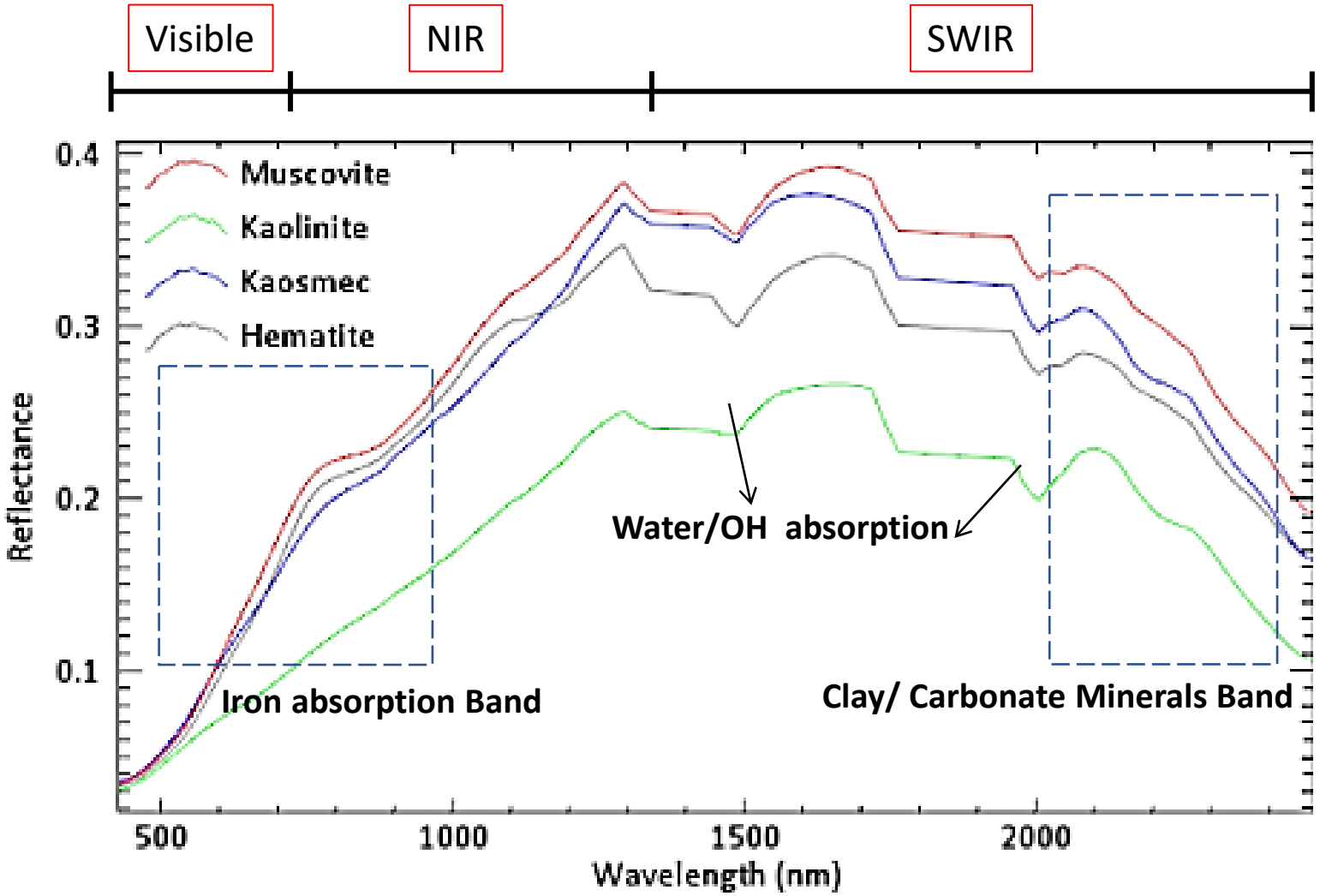
Geological Map



- The host rocks for gold mineralization is Metabasalt and lithological boundaries of Metabasalt with the other rocks (e.g. Argillite and Graywacke etc.).
- Structures are also the important factor in deposition of minerals in the present study area.
- Altered minerals are such as Muscovite, Kaolinite and hematite etc. are also important indicators of gold mineralization in the present study area.

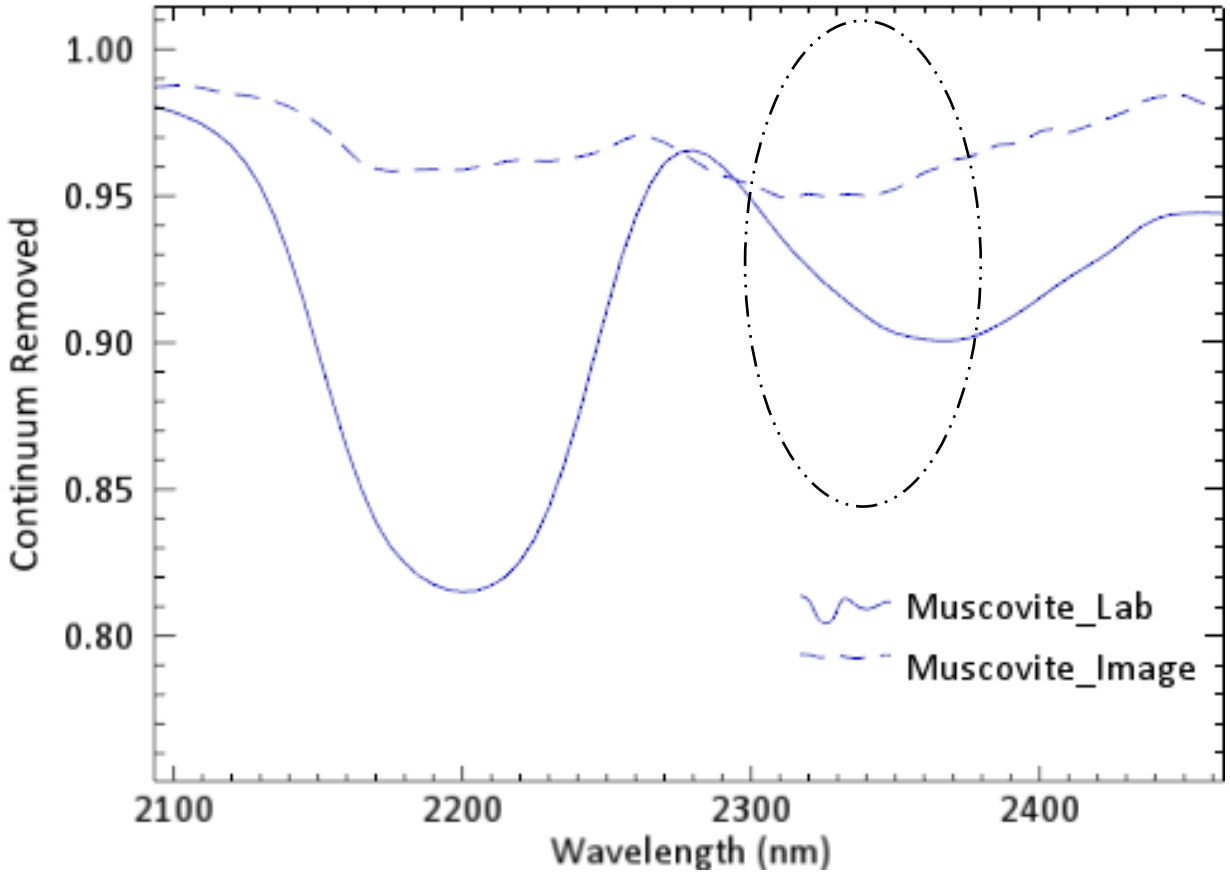
Date of Acquisition: March 24, 2018
Spectroradiometer: VNIR and SWIR
No. of Bands: 1 to 425 (380 nm – 2510 nm)
Spectral Resolution: 5 nm ± 0.5 nm
Spatial Resolution: 4 m
Radiometric Resolution: 14 bits

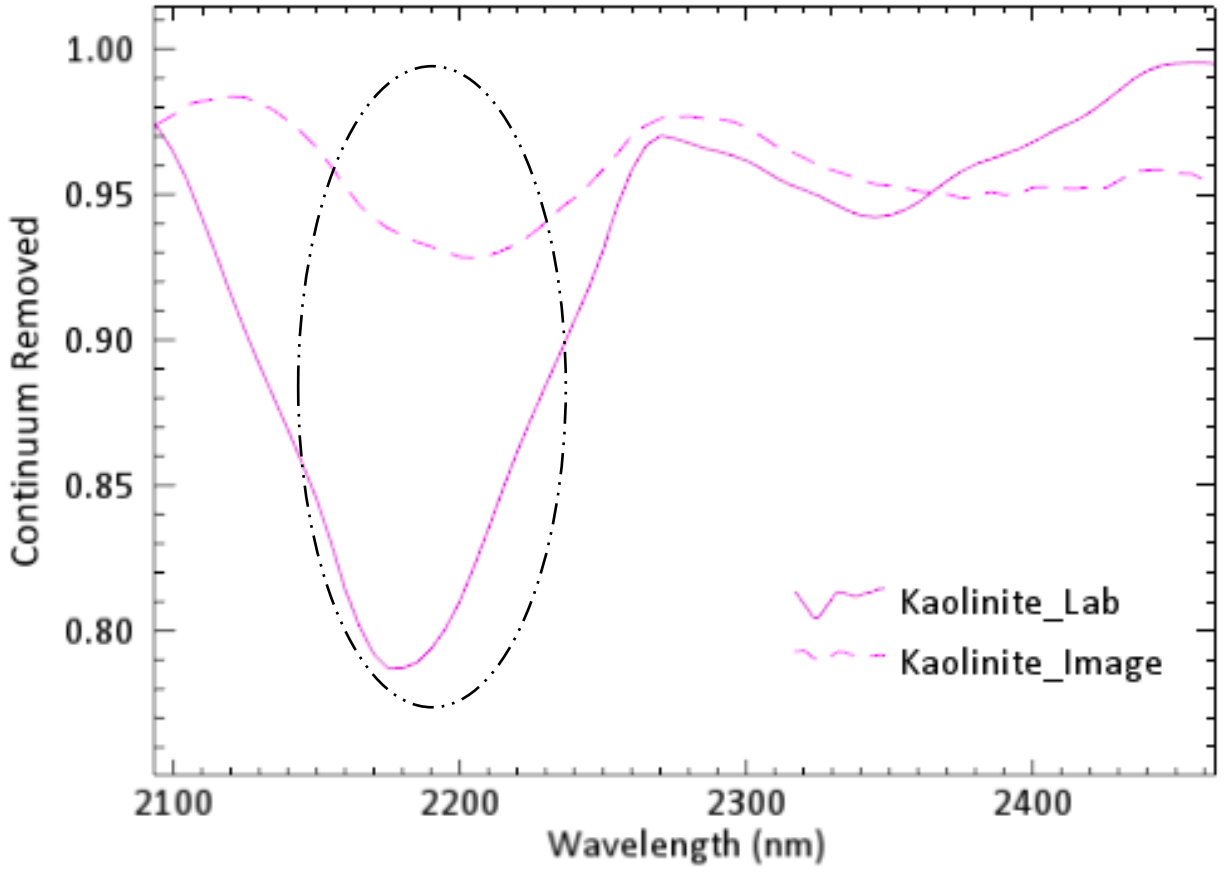
- Muscovite shows a prominent spectral signature at 2315.22 nm.
- Kaolinite shows prominent spectral signature at 2205.2 nm.



- Kaosmec shows spectral signatures of both Kaolinite and Smectite at 2200 nm and 2300 nm.
- Hematite show spectral signatures at 517.10 nm and 860 nm.

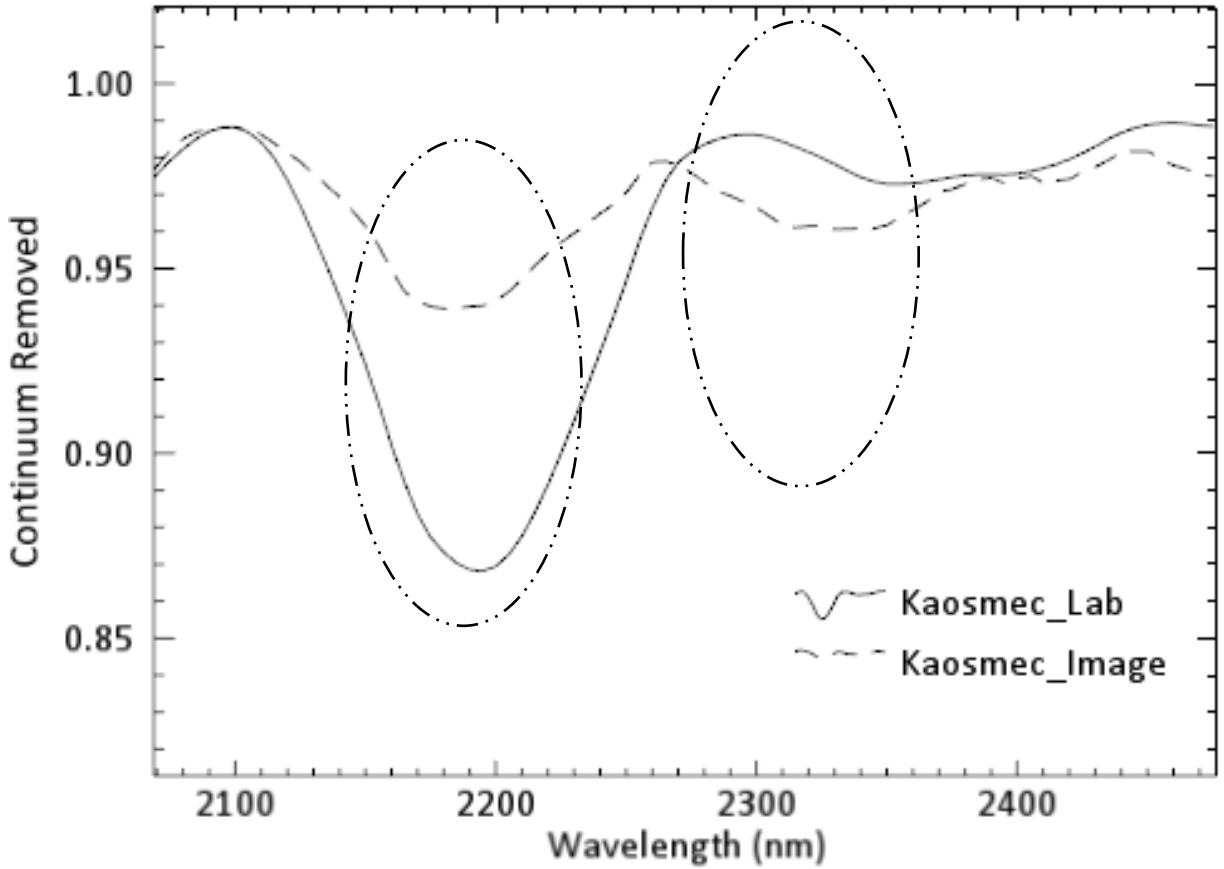
Spectral signatures of Altered Minerals

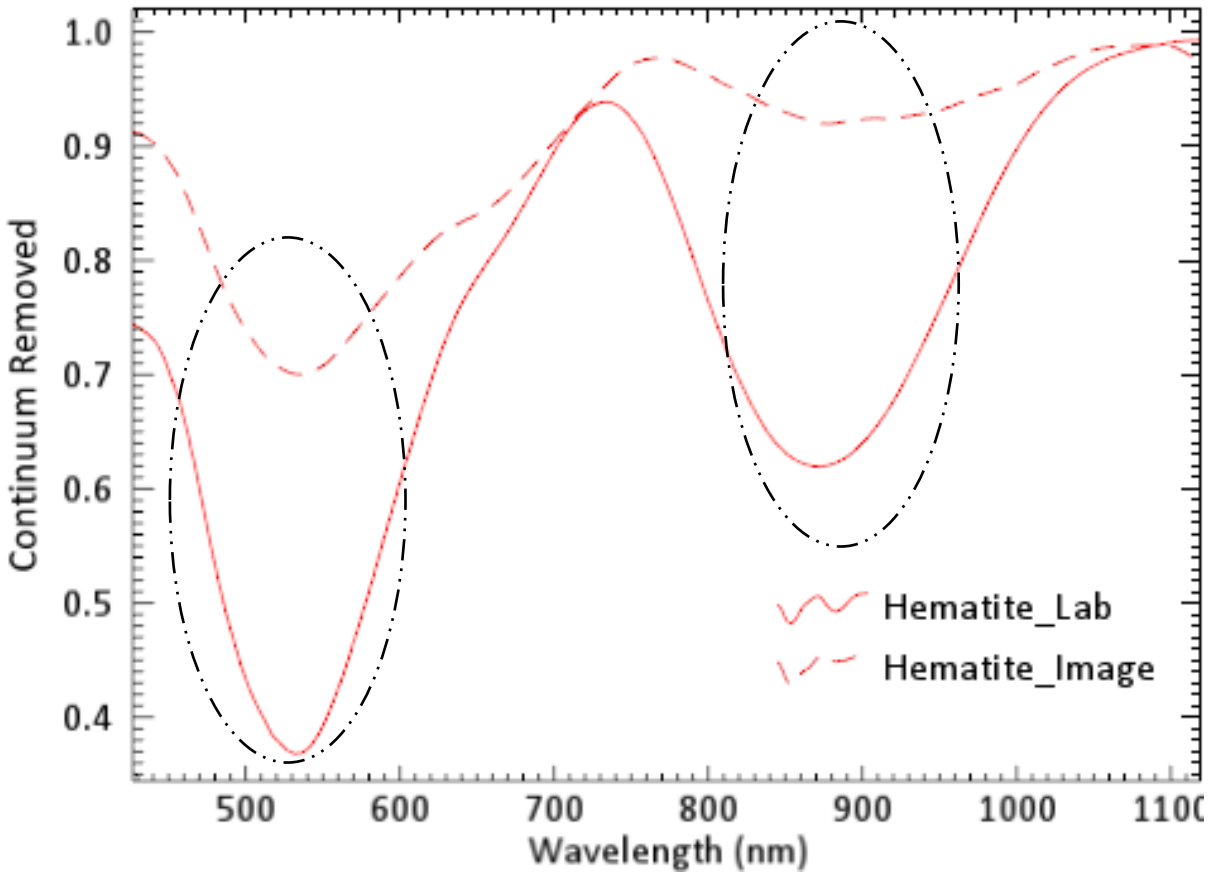




- ***Muscovite Image spectra have a strong absorption minima at 2315 nm due to Fe/Mg-OH bond vibration and Kaolinite have absorption minima at 2205 nm due to Al-OH bond vibration***

Spectral signatures of Altered Minerals

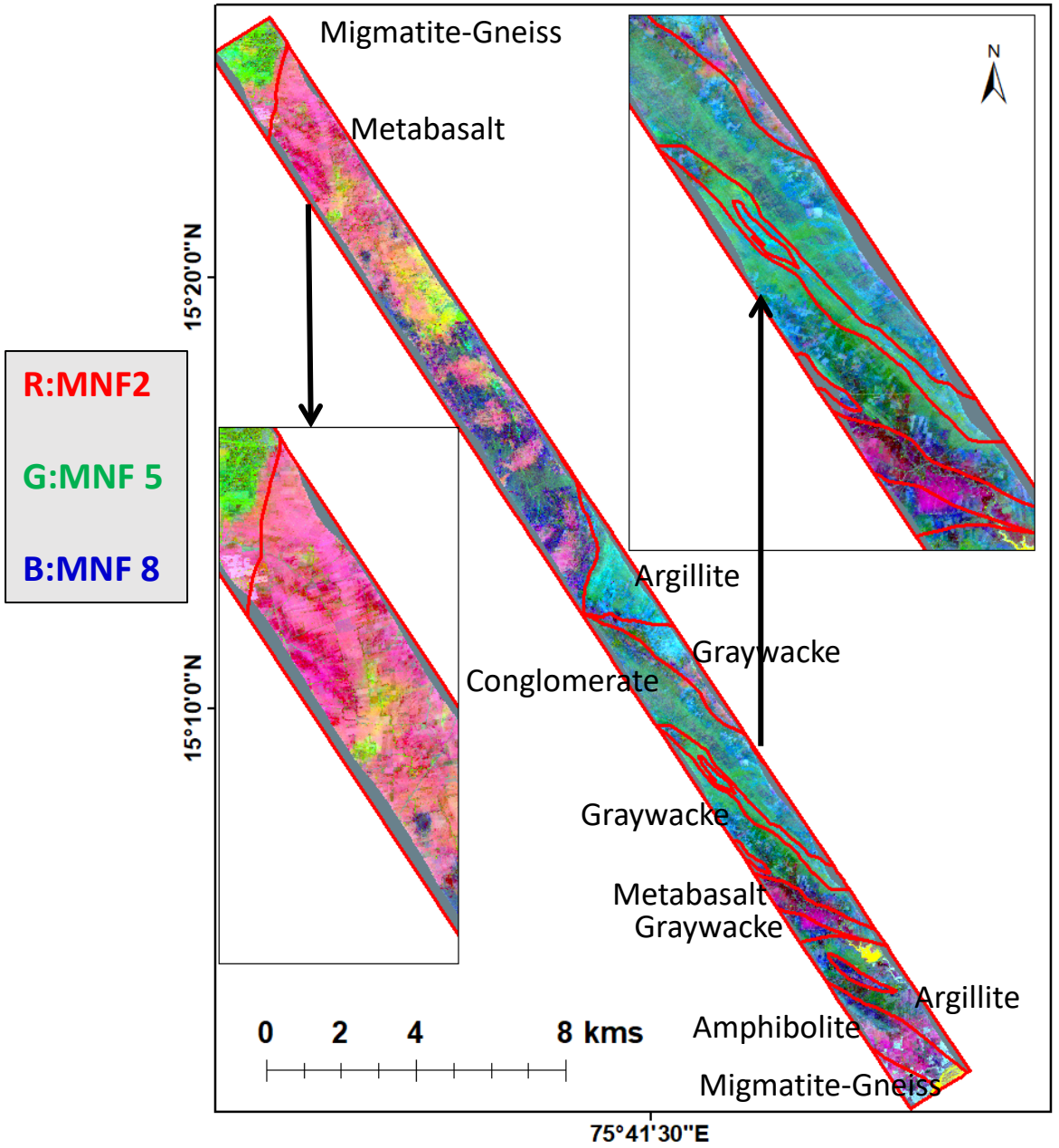




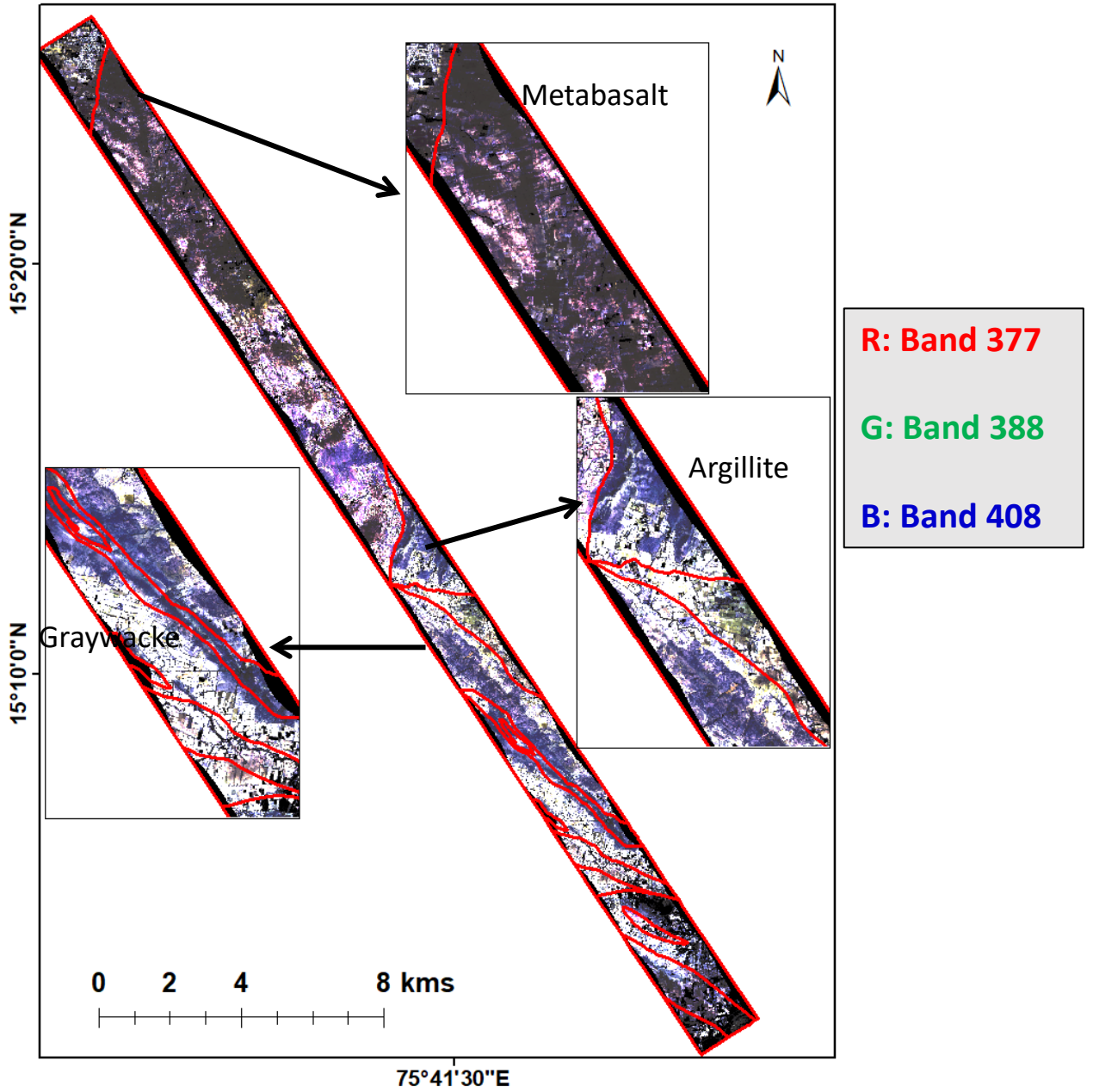
- ***Kaosmec have absorption feature at 2210 nm due to Al-OH and at 2315 nm due to Fe/ Mg-OH bond vibration.***

- ***Spectral absorption for iron rich alteration mineral is found in the VNIR spectral region i.e. at 517 nm and 860 nm due to electronic transition at 517 nm and 860 nm due to Fe^{+3} and Fe^{+3}/Fe^{+2}***

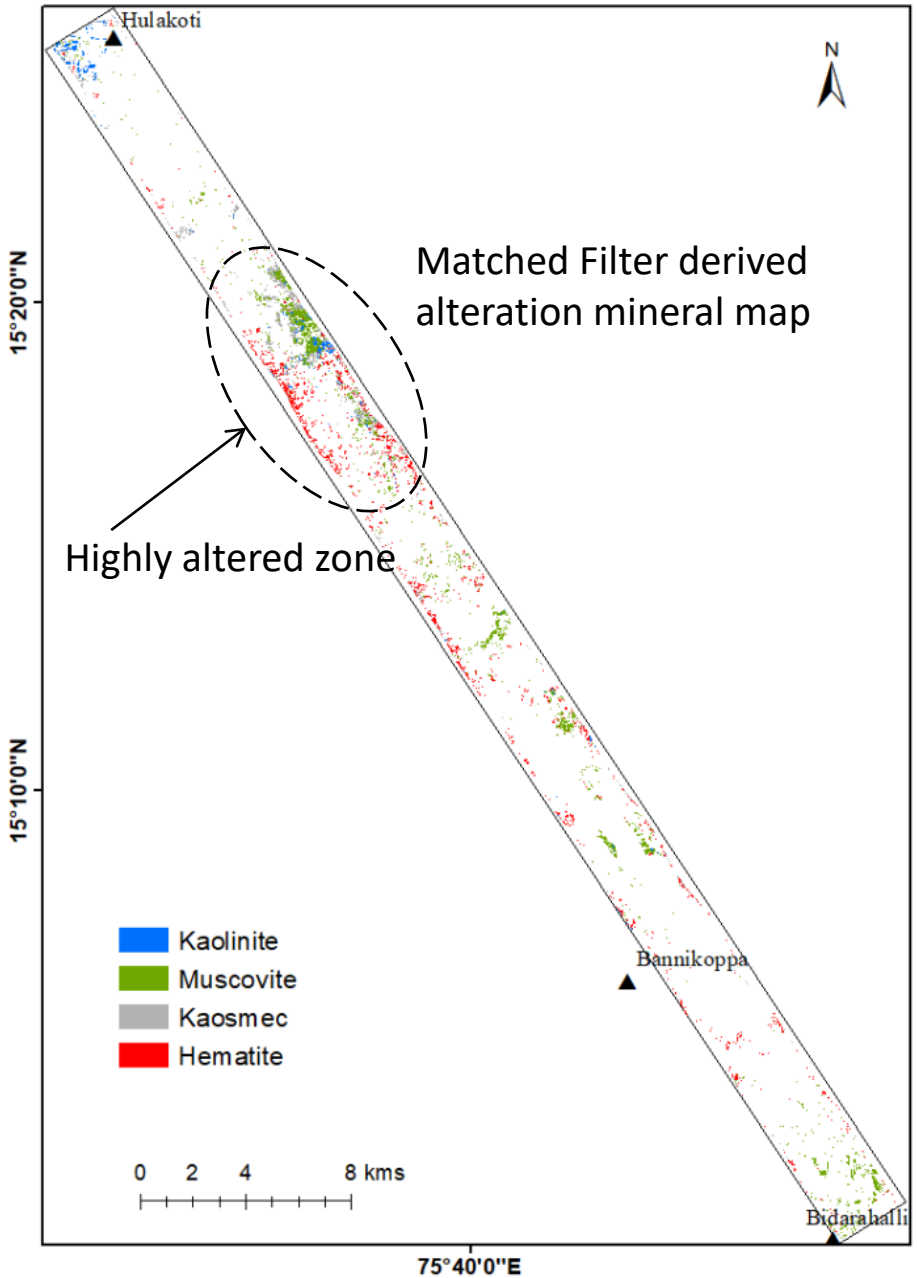
MNF Color Composite



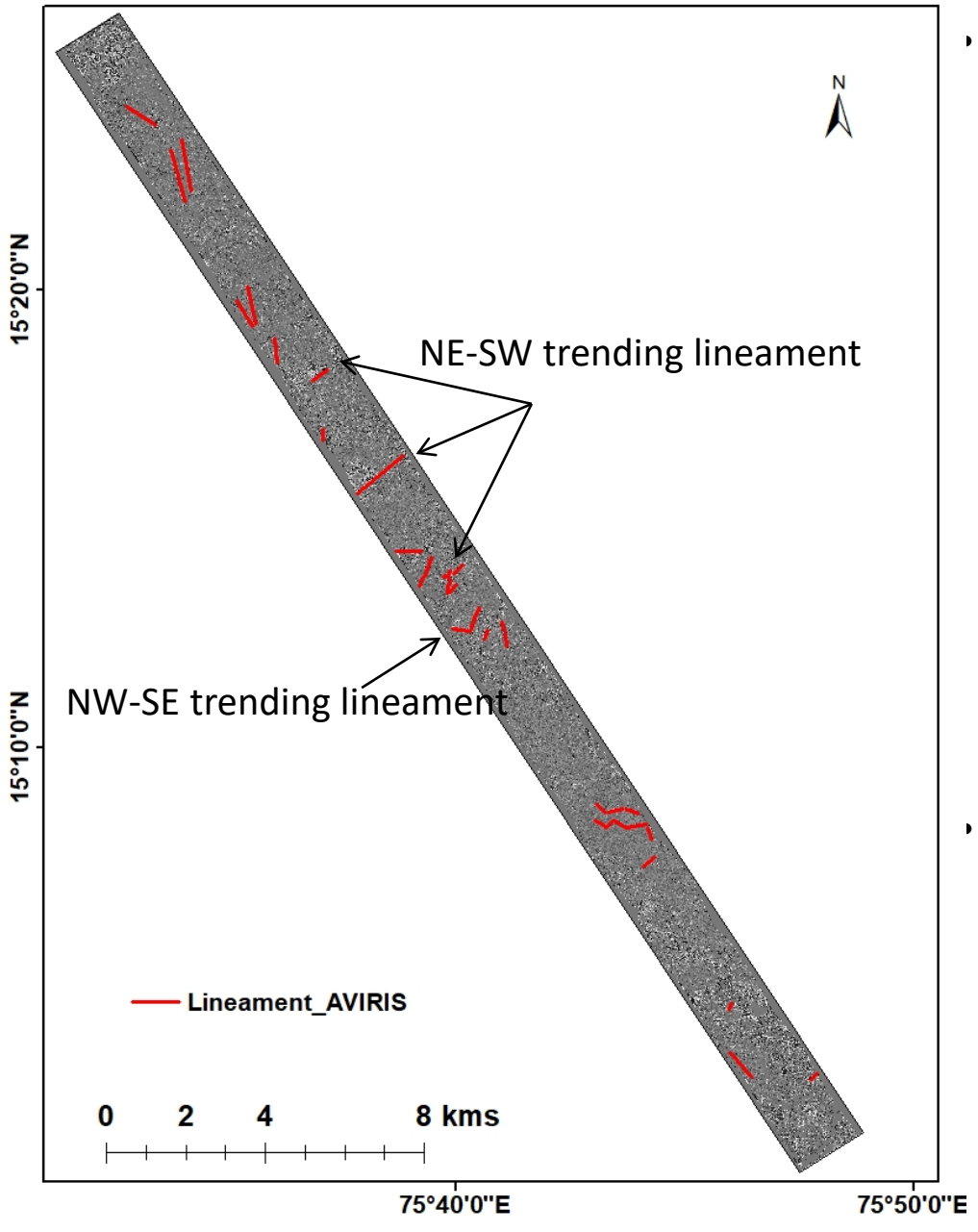
Low Pass Filter Color Composite



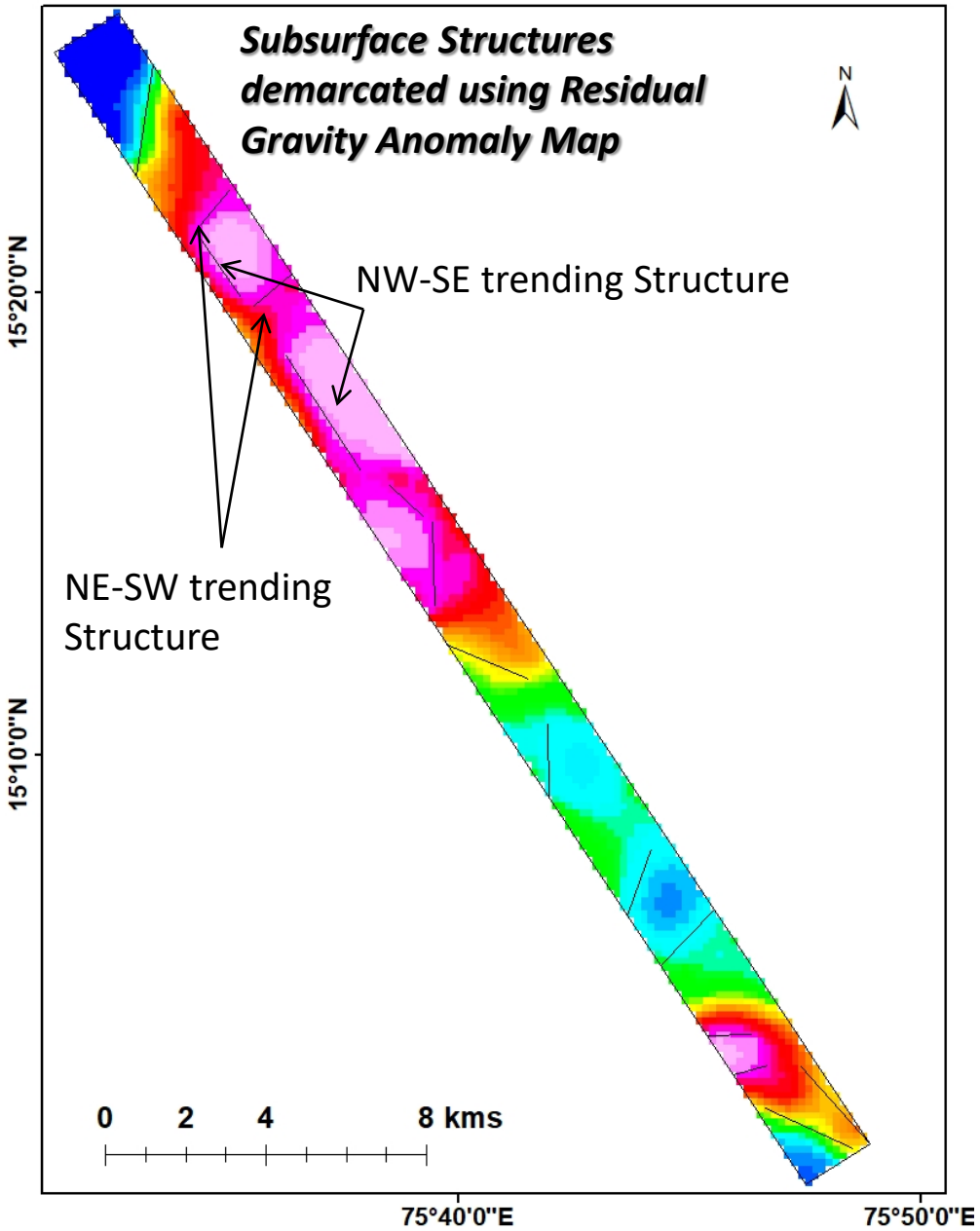
Spectral Anomaly Map

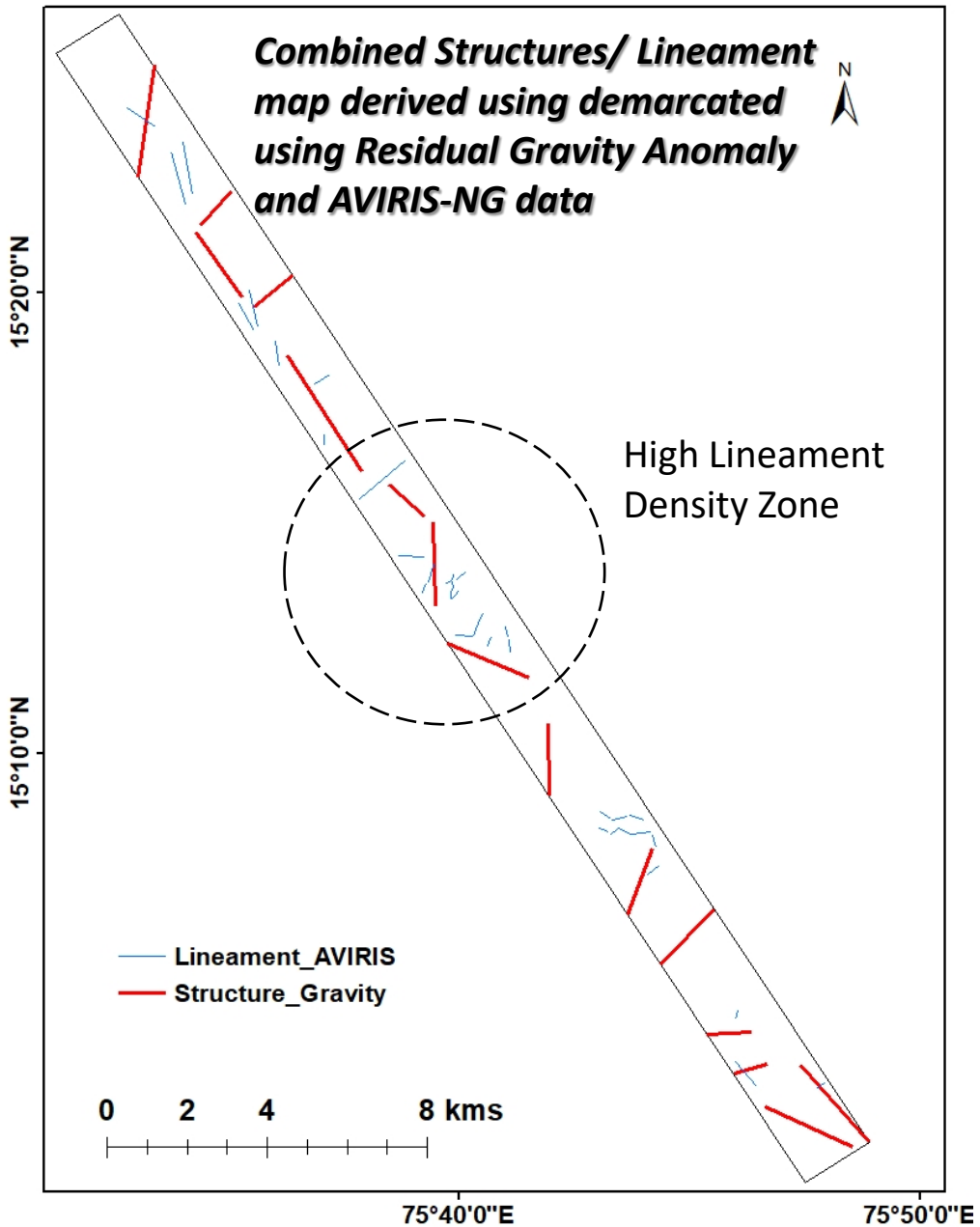


Lineament Map derived from High Pass Filter Image

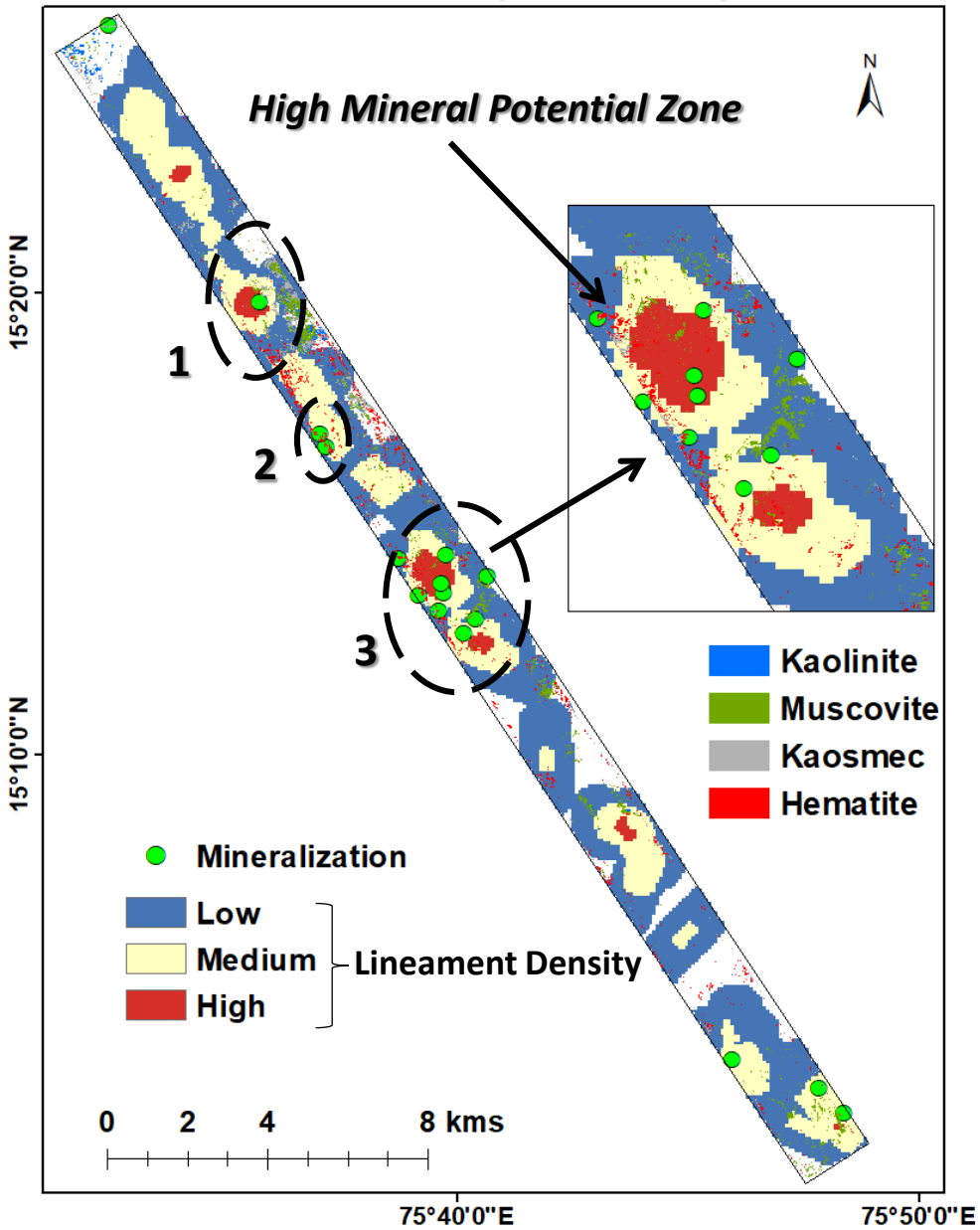


- Lineaments are demarcated using the Color Composite image (R: band 96, G: band 56, B: band 37) using the vegetation alignment, lithological boundaries as structural signatures and
- high pass filtered images as this will enhance the linear features in an image.


Subsurface Structures demarcated using Residual Gravity Anomaly Map
N
NW-SE trending Structure
NE-SW trending Structure
15°20'0"N
15°10'0"N
0 2 4 8 kms
75°40'0"E
75°50'0"E


Combined Structures/ Lineament map derived using demarcated using Residual Gravity Anomaly and AVIRIS-NG data
N
High Lineament Density Zone
15°20'0"N
15°10'0"N
Lineament_AVIRIS
Structure_Gravity
0 2 4 8 kms
75°40'0"E
75°50'0"E

Mineral Prospective Map



Conclusion:

- Three Mineral Prospective Zone has been identified in the study area.
- In all the three zones the primary and secondary evidences are showing the high values (Primary evidences: Subsurface Structures and surface lineament, Lithology ; Secondary Evidences: Mineralization, Spectral Anomaly).
- This approach of deriving the Mineral Prospective Zones can be utilized for identifying Gold Mineralization which is developed under the similar geological environment.
- Further, more detailed geophysical surveys can be done over the identified prospective zones to narrow down the exploration areas.

THANK YOU