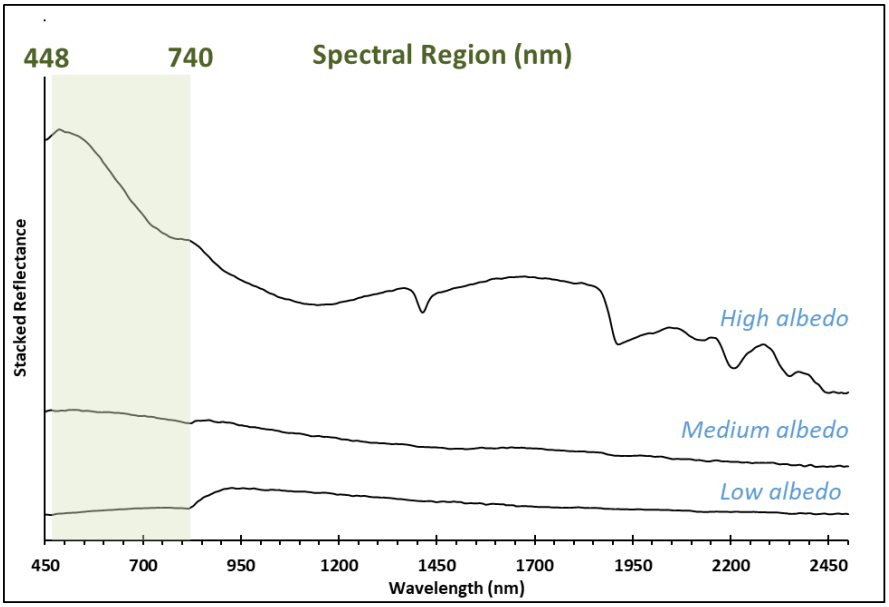
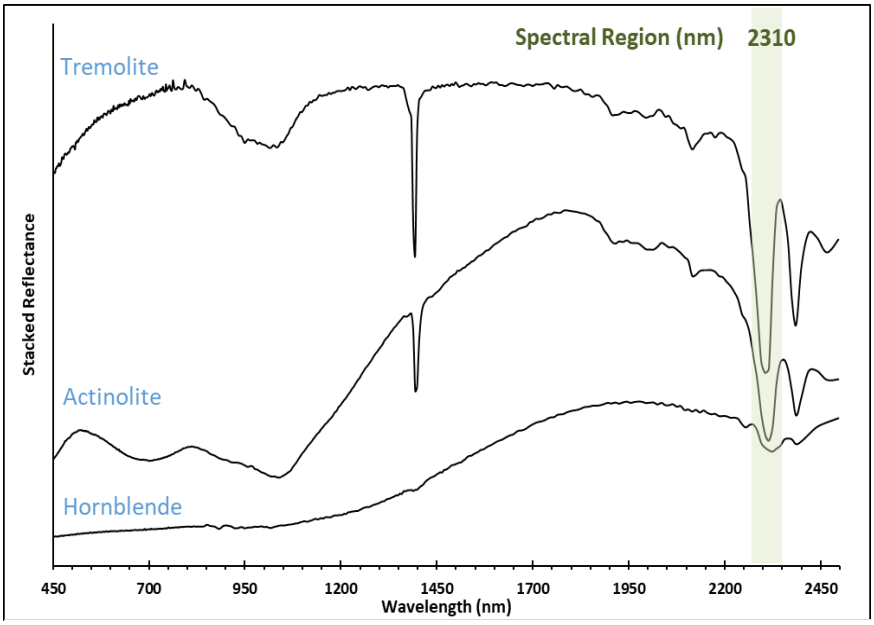
ALBEDO 448-740nm



- The Albedo 448-740 nm product represents the average reflectance or albedo calculated between 448 nm and 740 nm (VIS range).
- This product can aid in visualization of lithology; previous work has also shown correlation to Gamma Ray measurements.
- Albedo can also be directly related to the grain size of the sediment.

COMPOSITION – AMPHIBOLE (L2310)



- Variations in the ~2310nm feature in the amphibole group can be used to track variations between Mg- (~2310nm) to Fe-rich (~2335nm) varieties.

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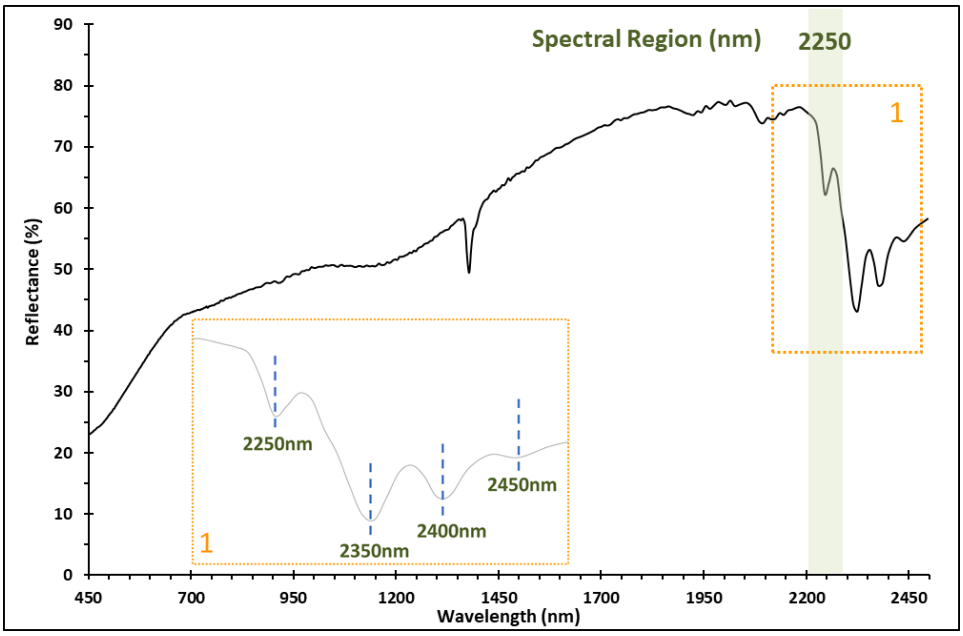
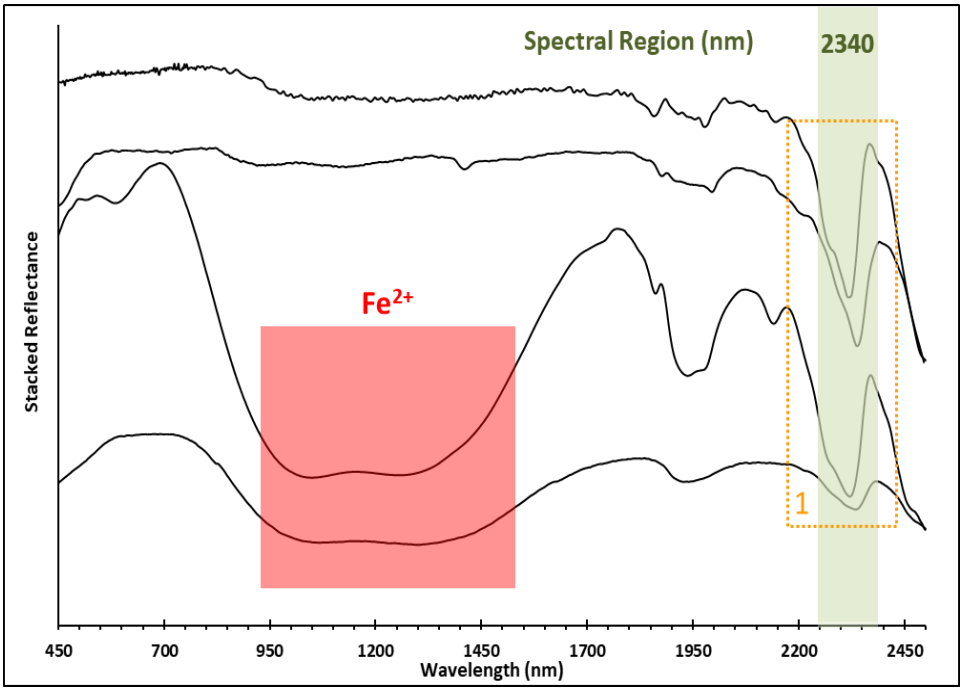
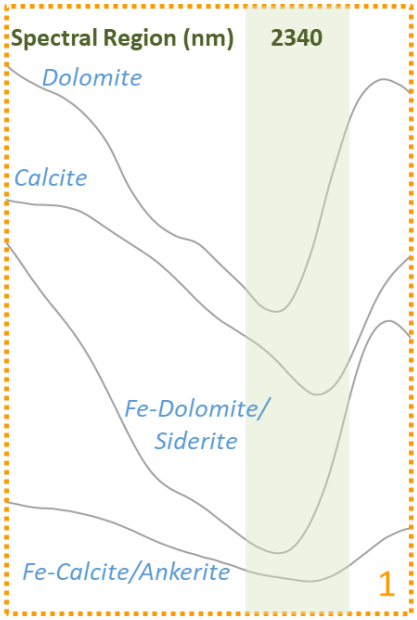
COMPOSITION – BIOTITE (L2250)



- Variations in the 2250nm feature in the biotite group can be used to track variations between Mg- (~2245nm) to Fe-rich (~2252nm) varieties.

COMPOSITION – CARBONATE (L2340)





- Variations in the ~2340nm feature can track compositional variations between Ca-rich (calcite) to Mg-rich (dolomite) carbonates, as well as Fe-dolomite/siderite to ankerite/Fe-calcite varieties.

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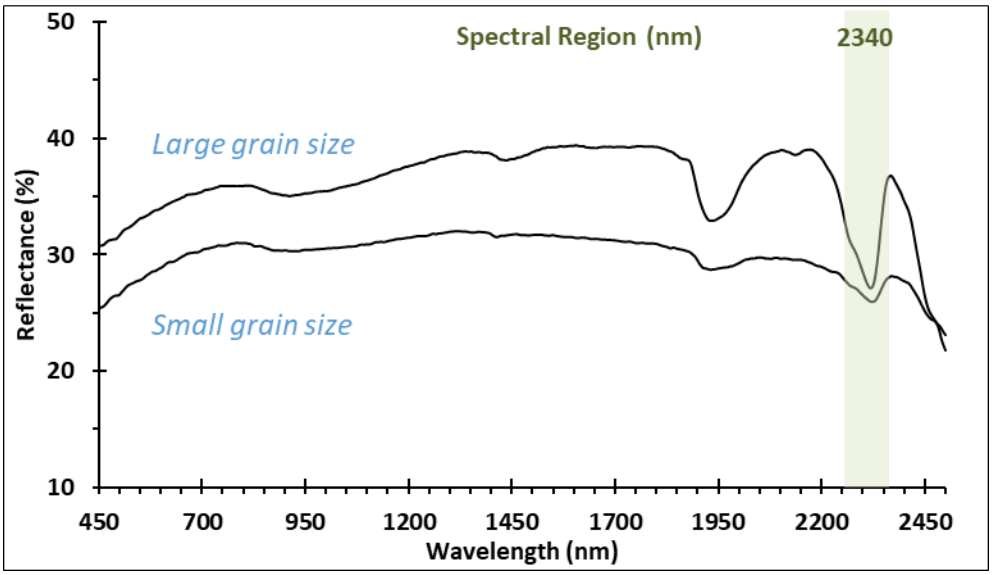
RELATIVE GRAIN SIZE – CARBONATE

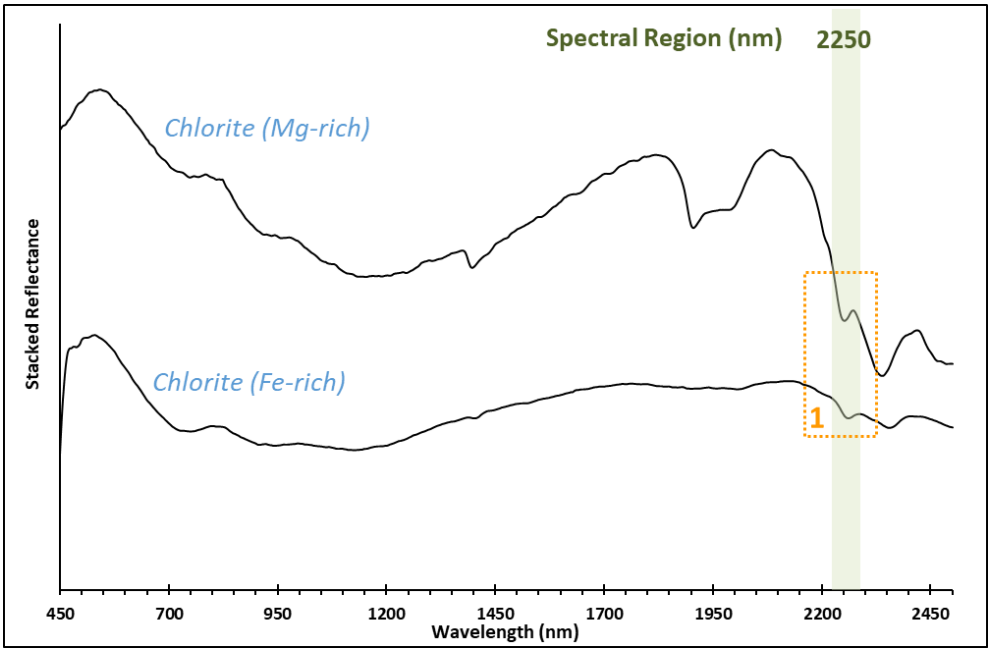


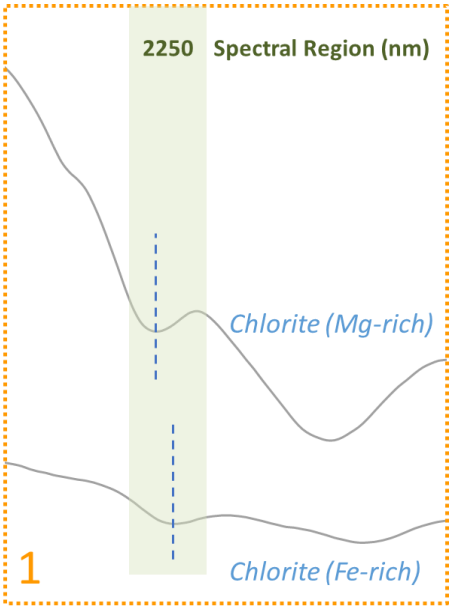
- According to Zaini et al. (2012) the depth of the 2340 nm absorption feature increases with the grain size up to 500 µm. In this project, this depth is then normalised by the deepest feature.

Reference:

***Zaini, N.**, van der Meer, F., & van der Werff, H., 2012. Effect of grain size and mineral mixing on carbonate absorption features in the SWIR and TIR wavelength regions. Remote sensing, 4(4), pp.987-1003.*

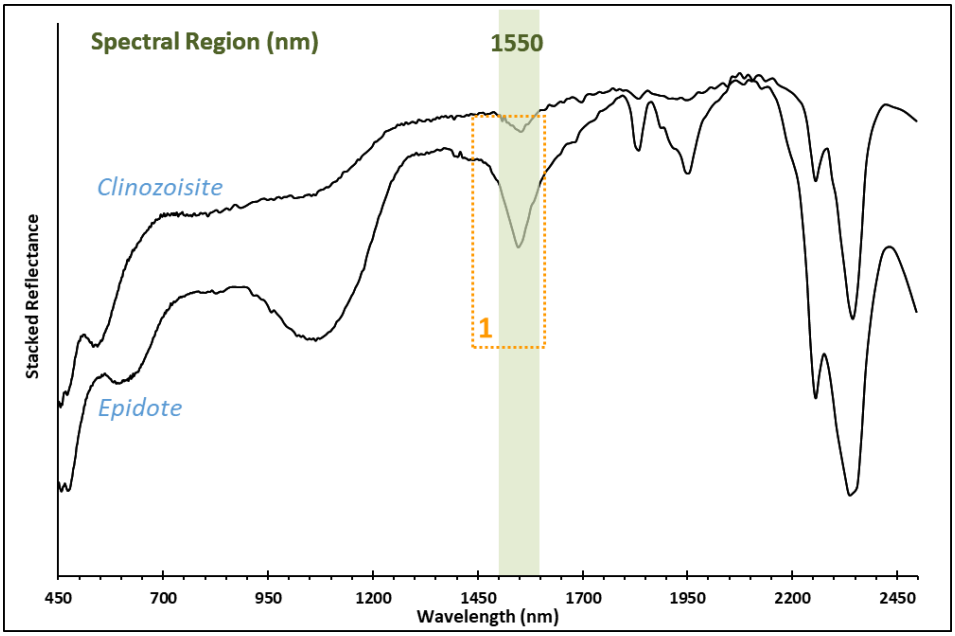
COMPOSITION – CHLORITE (L_{2250})

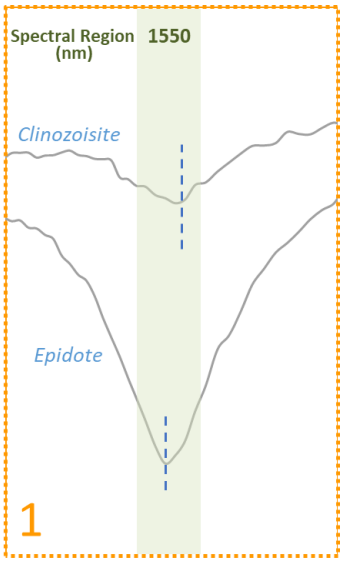




- Variations in the 2250nm feature in the chlorite group can be used to track variations between Mg- rich (~2240nm) to Fe-rich (~2270m) varieties.

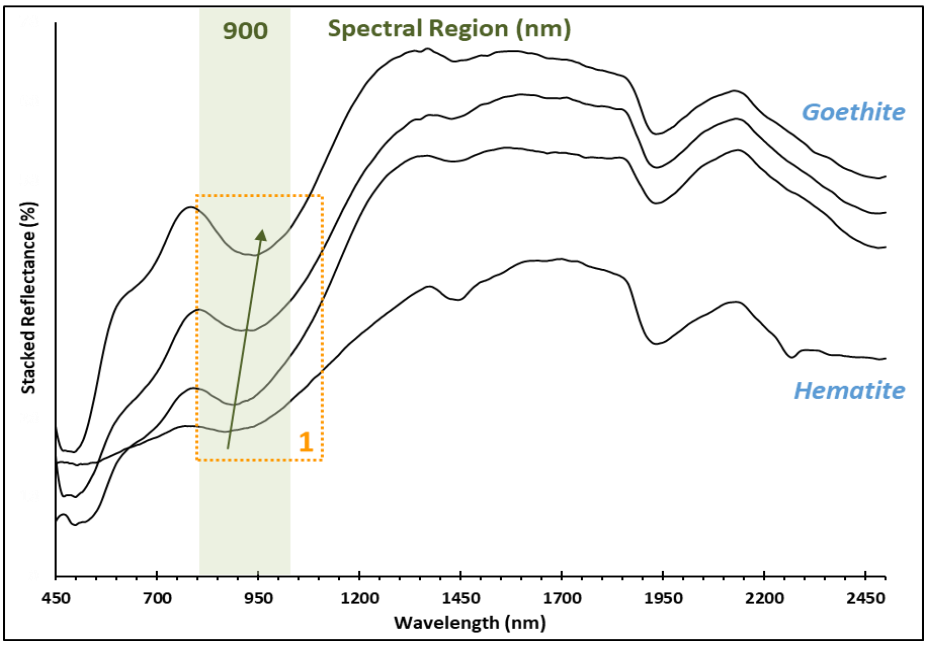
COMPOSITION – EPIDOTE (L_{1550})

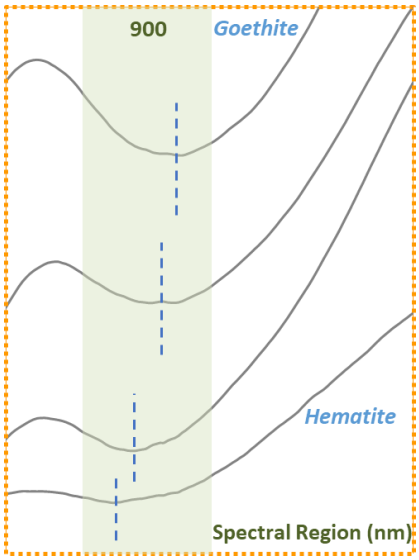




- Variations in the 1550nm feature can be used to track compositions between end-members epidote (1548nm) and clinozoisite (1558nm).

COMPOSITION – IRON OXIDE (L_{900})





- Variations in 900nm feature is used to differentiate between goethite and hematite.

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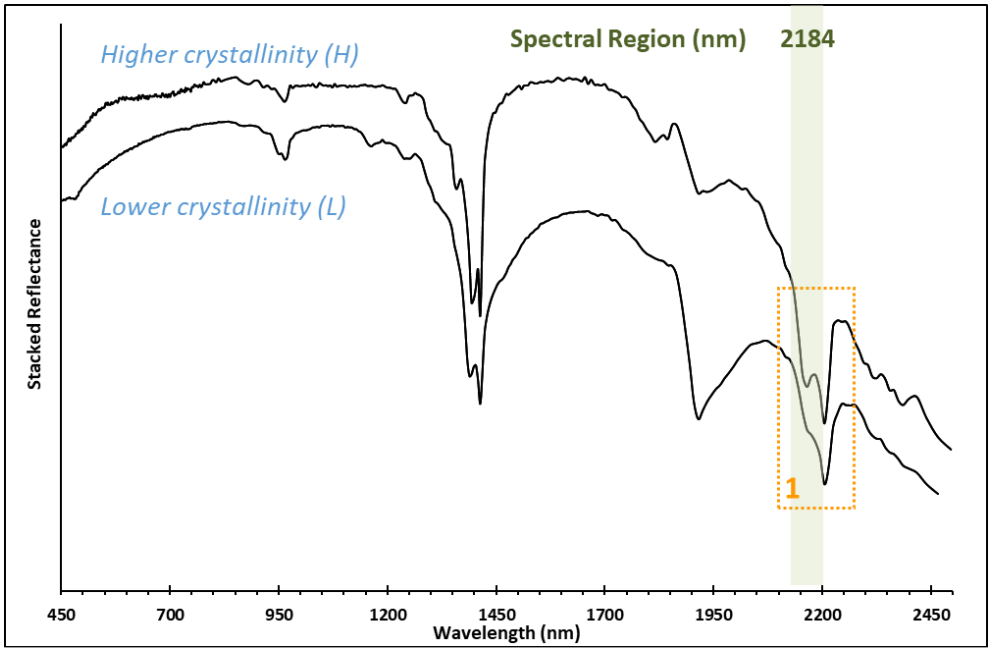
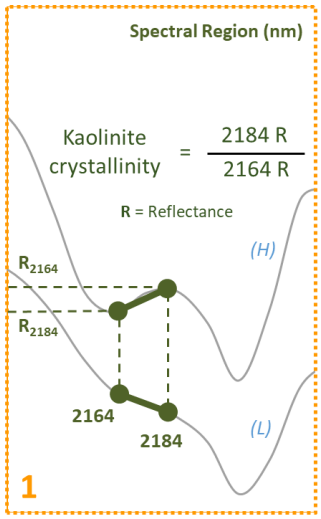
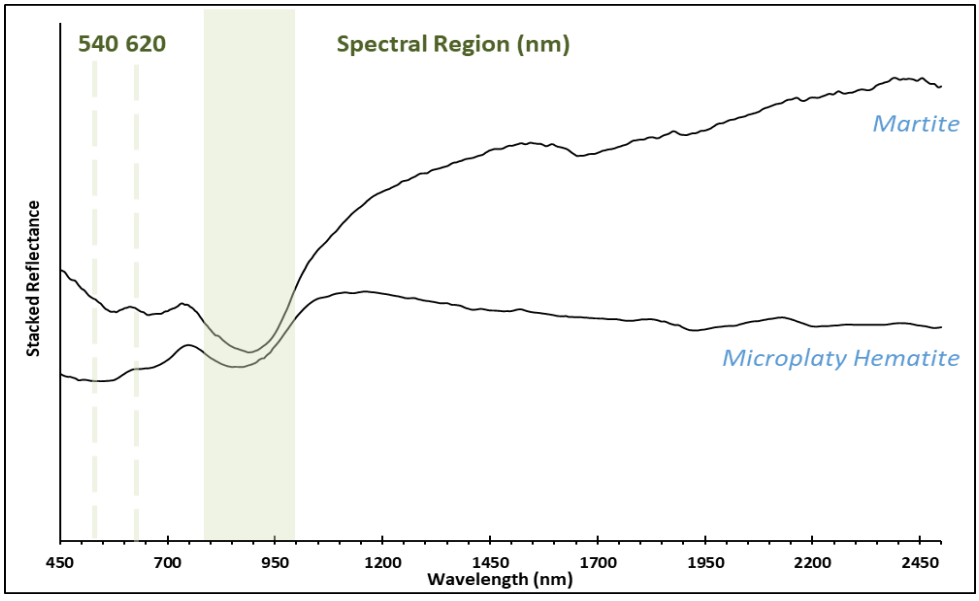
CRYSTALLINITY – KAOLINITE





- Variations in the reflectance ratio of features within the ~2200nm doublet are used to track kaolinite crystallinity.

COMPOSITION – MICROPLATY HEMATITE RATIO



- This ratio is used to differentiate martite/hematite over microplaty hematite.

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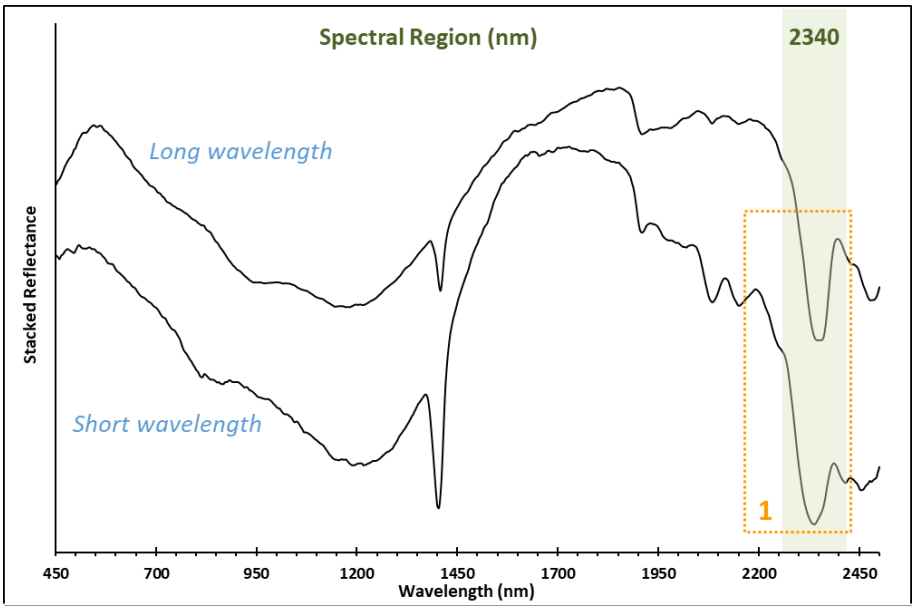
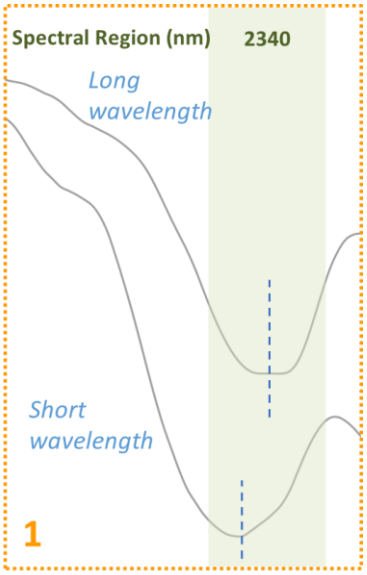
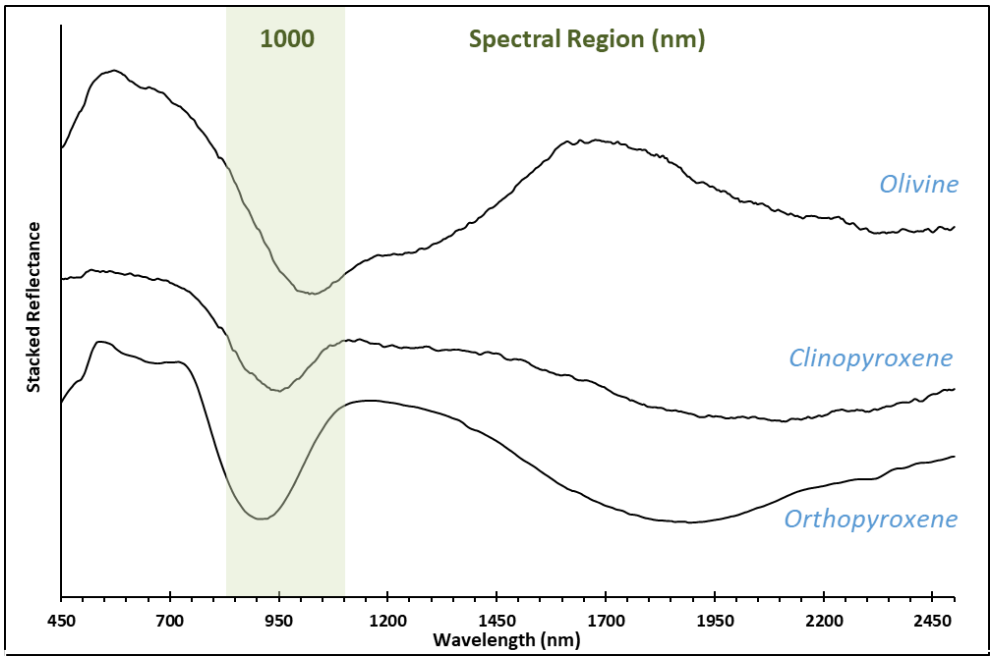
COMPOSITION – MINNESOTAITE (L_{2340})





- This feature is used to track variations in the 2340nm feature in minnesotaite which can either be related to compositional change or mixture with other minerals.

COMPOSITION – PYROXENE-OLIVINE (L_{1000})

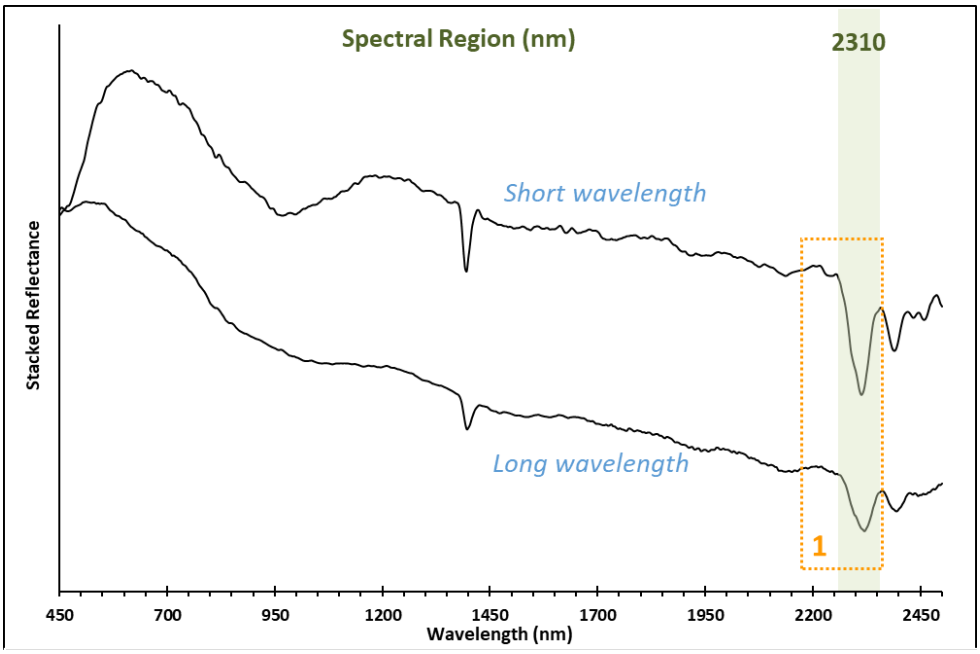


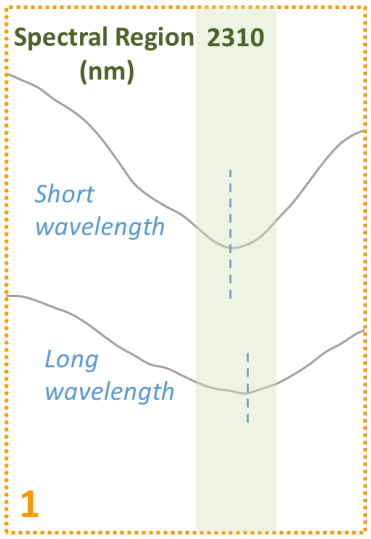
- The tracking of the position and the shape of this crystal field absorption feature can distinguish orthopyroxene from clinopyroxene from olivine (Horgan et al., 2014)

Reference:

***Horgan, B.H.**, Cloutis, E.A., Mann, P. and Bell III, J.F., 2014. Near-infrared spectra of ferrous mineral mixtures and methods for their identification in planetary surface spectra. Icarus, 234, pp.132-154.*

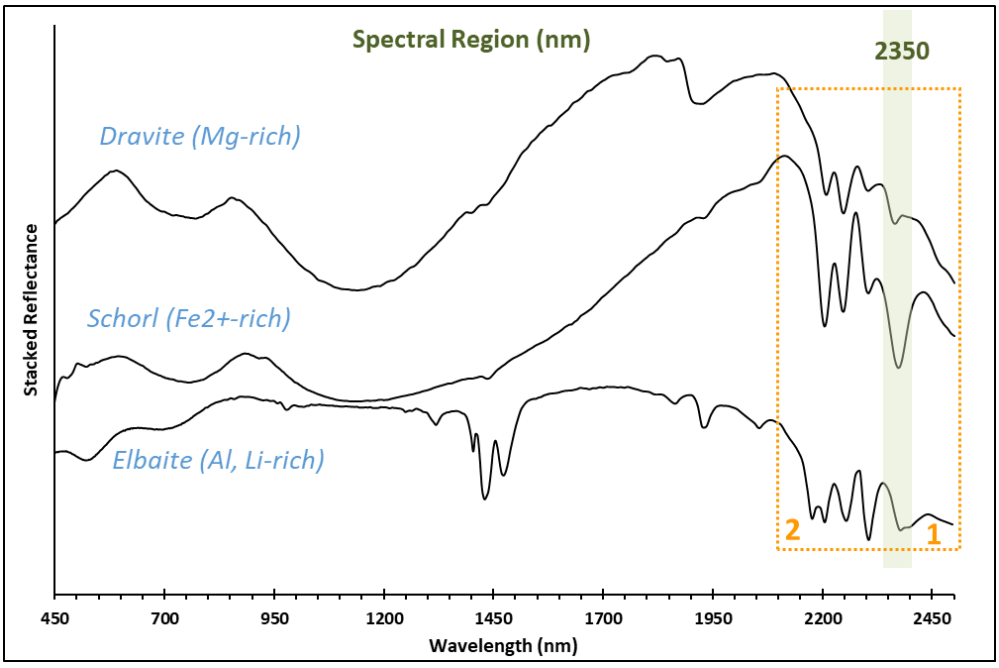
COMPOSITION – TALC (L_{2310})



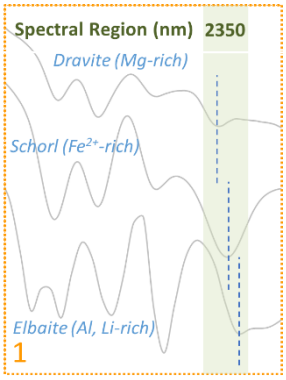


- This feature is used to track variations in the ~2310nm feature in talc which can either be related to compositional change or mixture with other minerals.

COMPOSITION – TOURMALINE (L_{2350})



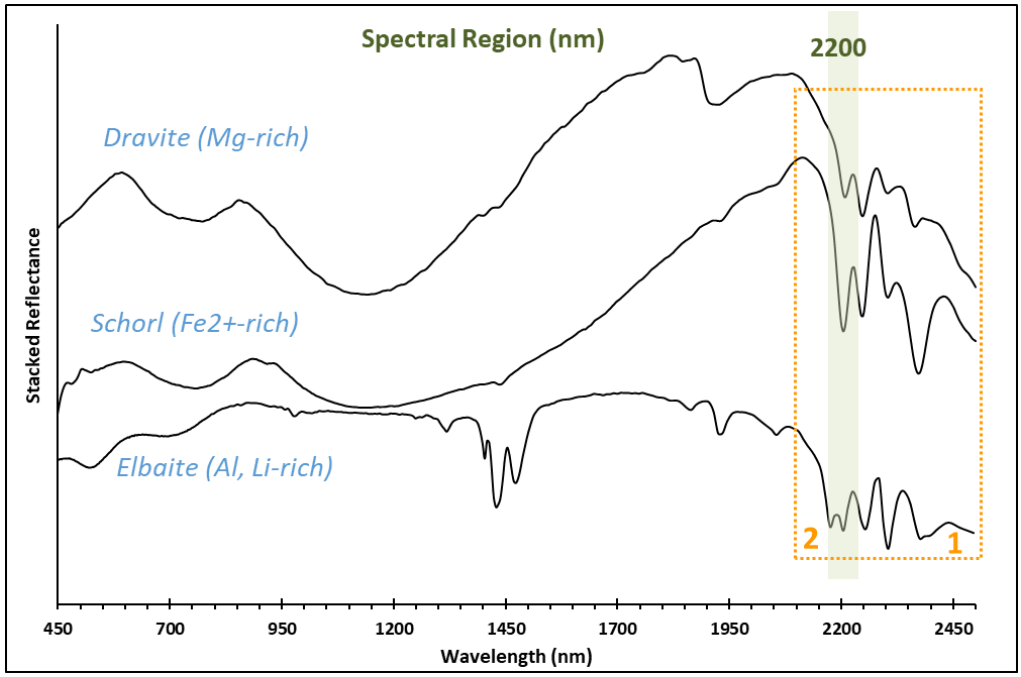
- Tourmaline spectra are complex but data from Bierwirth (2004) suggests variations in the 2350nm position can distinguish between species.



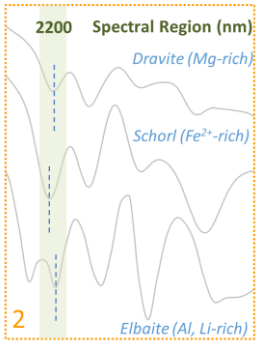
Reference:

***Bierwirth, P.N.**, 2004. Methods of spectral geology utilizing airborne hyperspectral and satellite remote-sensing applications for exploration and acid mine drainage. PhD Thesis, Australian National University, 212p.*

COMPOSITION – TOURMALINE (L_{2200})



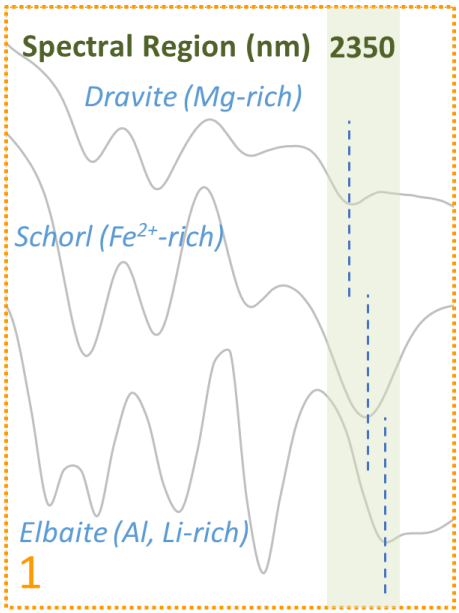
- Variations in the ~2200nm feature are attributed to changes in the Al content of tourmalines (negatively correlated with Mg and other Y-site cations; Duke, 1994).

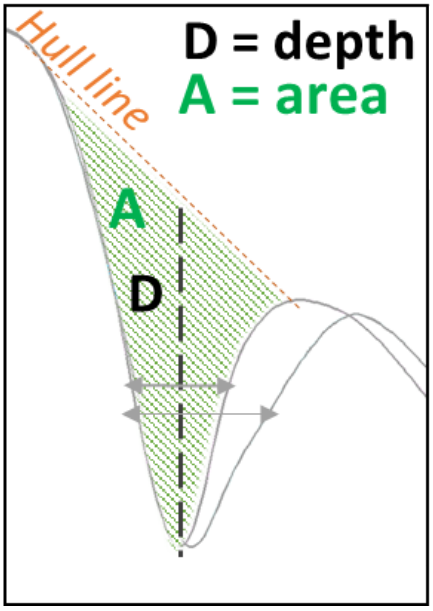


Reference:

***Duke, E.F.**, 1994. Near infrared spectra of muscovite, Tschermak substitution, and metamorphic reaction progress: implications for remote sensing: Geology, 22, pp.621-624.*

CRYSTALLINITY – TOURMALINE (X_{2350})





- This is a test parameter to explore variations in the 'crystallinity' of the 2350nm tourmaline feature.

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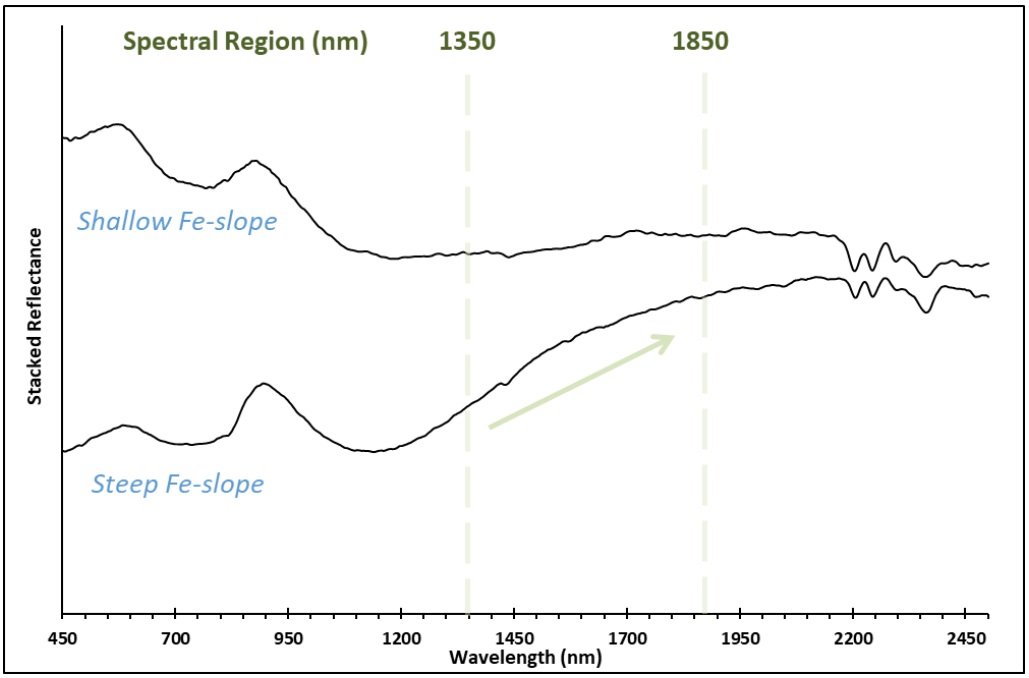
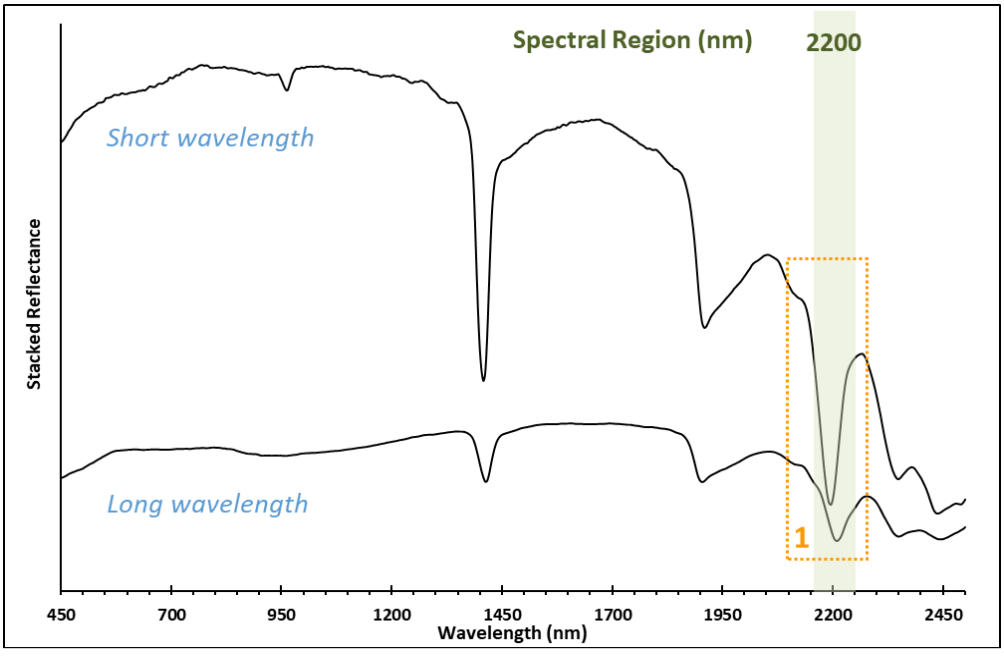
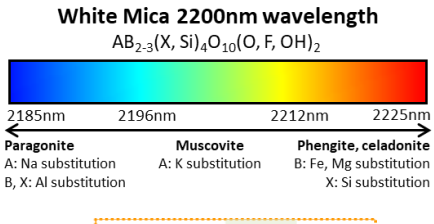
COMPOSITION – TOURMALINE (Fe-Slope)

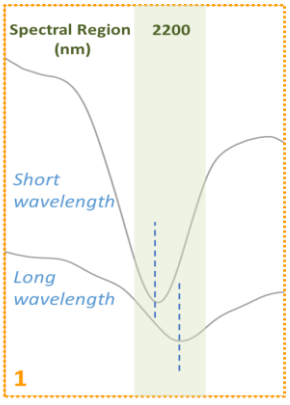


- This parameter is used to track changes in reflectance values between R_{1850nm} and R_{1350nm}.

COMPOSITION – WHITE MICA (L_{2200})







- Variations in the ~2200nm feature can track compositional variations in white micas (e.g., illites and muscovites) from paragonite through to phengite end-members.

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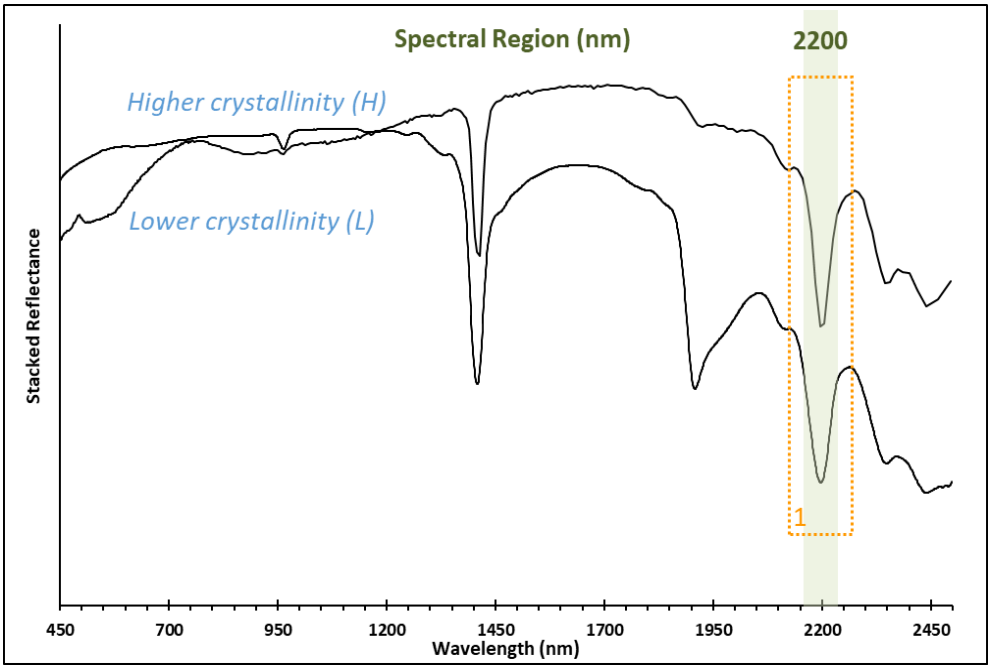
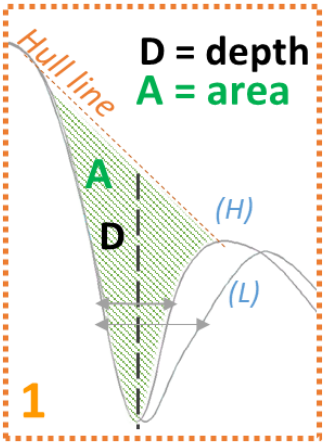
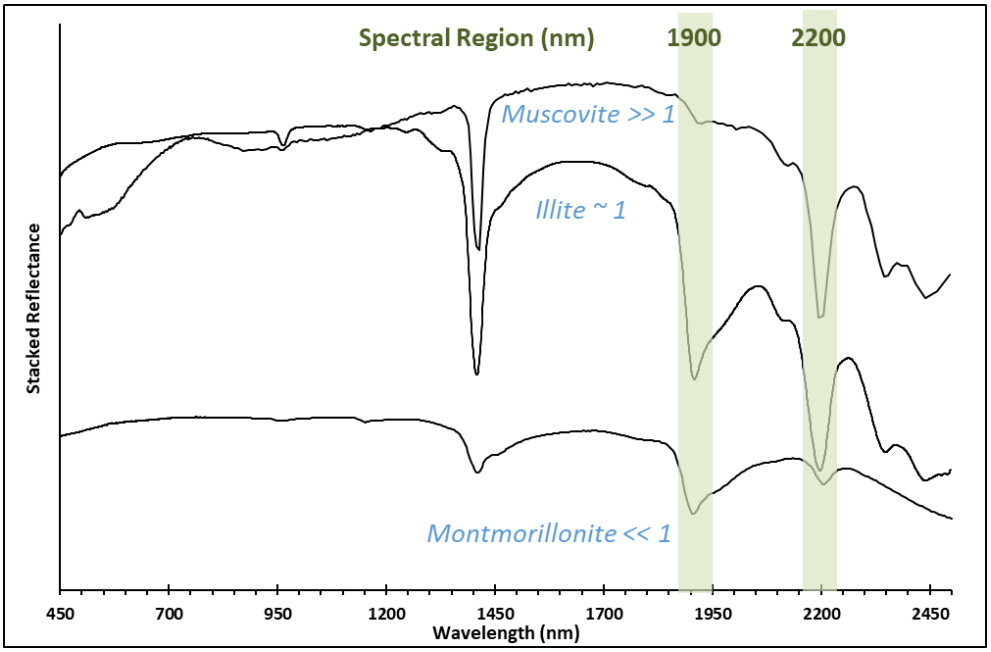
CRYSTALLINITY – WHITE MICA (X2200)



- Variations in the relative 'sharpness' (D/A) of the ~2200nm feature can track variations in crystallinity in the white mica group.



CRYSTALLINITY – ILLITE INDEX



High temperature/
High crystallinity

$$ICI = \frac{2200D}{1900D}$$

D = depth

Low temperature/
Low crystallinity

- The 'illite index' is another way to track variations in the relative crystallinity (or hydration) in the white mica group.

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