The Ø 13,5 x 10 km Ajuy Crater on Fuerteventura (Canary Islands)

- RAMAN Spectra of selected Rock Samples -

by Harry K. Hahn / Germany - 16.3.2022

Summary :

Here a summary of the Raman-spectroscopic analysis a of rock-samples which I have collected near the **Ø 13,5 x 10 km "Ajuy Impact Crater"** on Fuerteventura, and on other interesting sites on the Island.

The Gravity Anomaly Map of the Canarian Islands indicates a large scale Impact Event. This impact event probably was the result of Ejecta from the PTI (Permian Triassic Impact) which formed a large secondary crater, the hypothetical **Ø 430 x 290 km Gibraltar Crater (GIC).** (see gravity anomaly map on the next page). The smaller oblique (ellipitical) impact craters indicated on this Gravity Anomaly map, offshore of the Islands Fuerteventura, Tenerife and Lanzarote, belong to this impact event and are located along the hypothetical crater-wall (-rim) of the **GIC**. A magnetic anomaly map of the Atlantic Ocean-floor south-west of Spain provides indication for this Ø 430 x 290 km Gibraltar Crater.

(→ see the explanation on **pages 28** & **29** of my **PT Impact Hypothesis:** **Part 2** (or alternative here: **P2**))

The hot spots which caused the Canary Islands originally were impact sites of large ejecta fragments, which were ejected from the Permian Triassic Impact Crater in the Arctic Sea. And I am sure that these impact sites (hot spots) were produced by the same large-scale secondary impact event (caused by the PTI), that also has formed the **Bay of Lyon Crater** (or **BLC**) and **other impact structures in Spain** (or **L2**).

In all collected rock samples no quartz was found. This makes it difficult to provide evidence for the secondary impacts of the PTI which probably have caused the hotspots of the Canarian Islands.

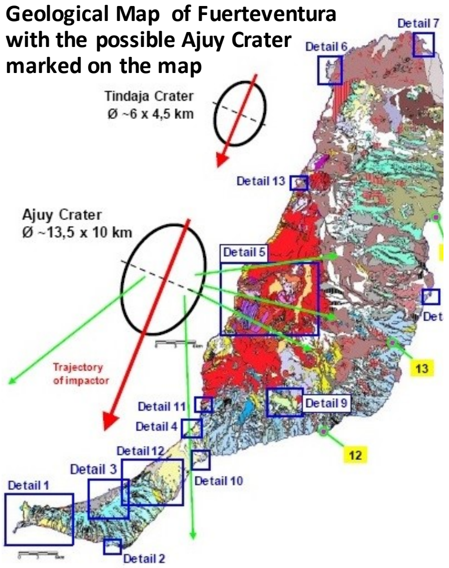
Some of the analysed feldspar-samples may show Raman-spectra which indicate (W) weakly-shocked or (M) moderately-shocked Alkali-Feldspar. But these Raman-spectra must be analysed by experts who have the experience to correctly assess such spectra. The shown Raman-spectra of feldspar-samples from the sample sites No.: **21-A, 35-A, 45-B, 45-D & 56-A** may indicate shocked feldspar minerals.

(an explanation to Raman spectra of shocked Alkali-Feldspar : → see at page **38** in the **Appendix 3**)

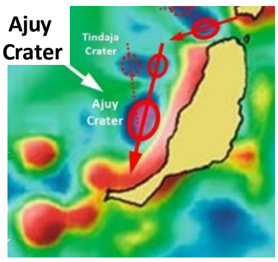
Beside possible shocked feldspar minerals other minerals found on the island may also indicate an impact event. On sample site 35-A, a small rock island on the south-west coast of Fuerteventure, which probably represents ejecta material of the Ajuy Crater, the mineral Uranpyrochlore was found. And on sampe-sites 45 & 48 fragments of old oceanic sediments (>100 Myr old !) embedded in magmatic rocks were found. This mix of magmatic-rocks and old Earth-crust-fragments may also be an indication for an impact event, because it seems to represent ejecta material from the Ajuy Crater. Further rare-earth metals are present in the described ejecta-impact-areas near Ajuy. Other minerals found in the analysis: Albite, Annite, Augite, Aegirine, Corvusite, Coronadite, Dolomite, Flourophlogopite, Kutnohorite, Labradorite, Reyerite, Siderite, Sonolite, Titanite, Tengerite etc. Please see also: **Lanzarote Impact Event**

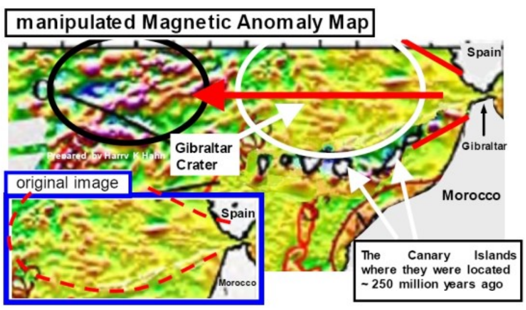
- → Images of the analysed rock samples and photos of the sample sites are in the Appendix at page **32**
- → A general summary to all analysed samples regarding my **PTI-hypothesis** (**P1**) → in **Part 6** (**P6**)
- → More images of all sample sites are available on www.permiantriassic.de or www.permiantriassic.at

Geological Map of Fuerteventura with the possible Ajuy Crater marked on the map

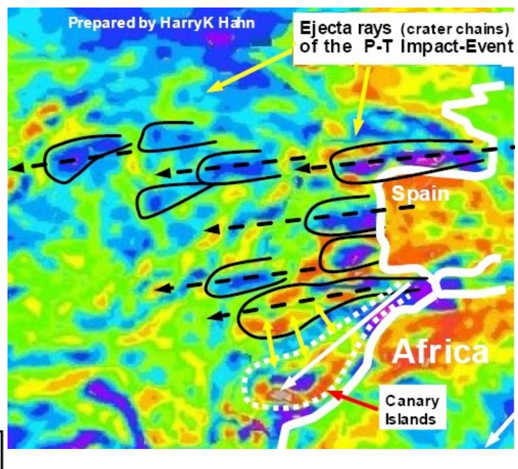


Gravity Anomaly Map of Fuerteventura :
with the possible two impact Craters marked on the map. (indicated by blue & purple color)
→ negative anomalies



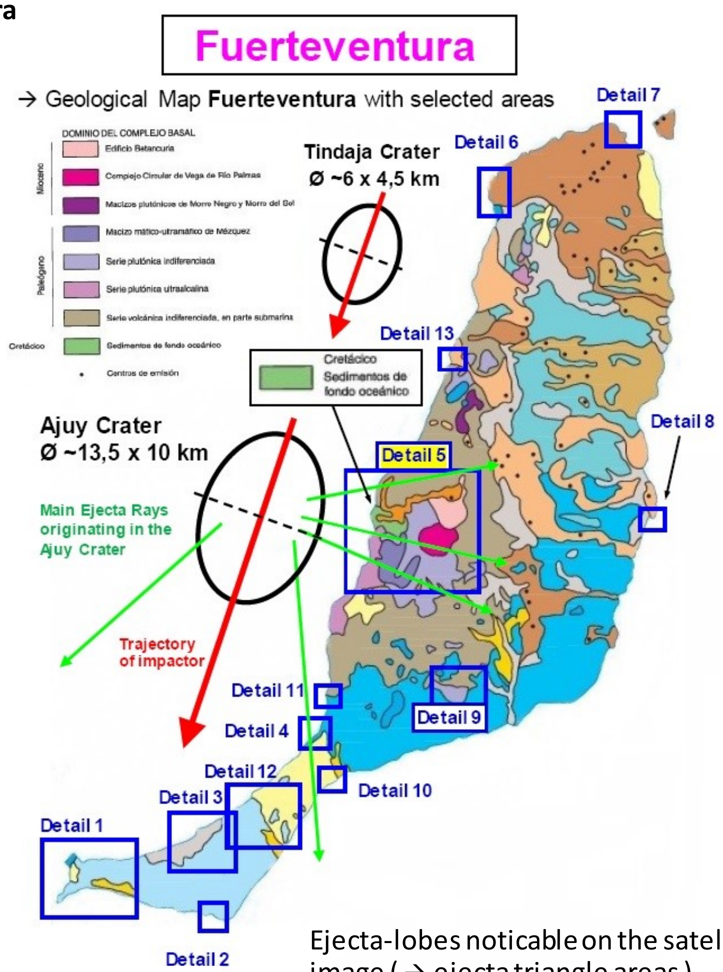


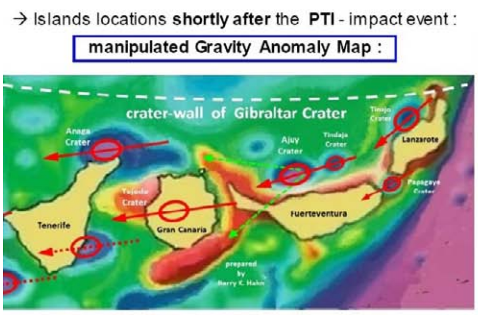
Gravity Anomaly Map of the Canarian-Island-area

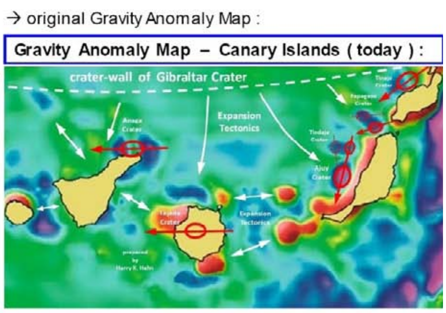


The Ø 13,5 x 10 km Ajuy Crater offshore of Fuerteventura

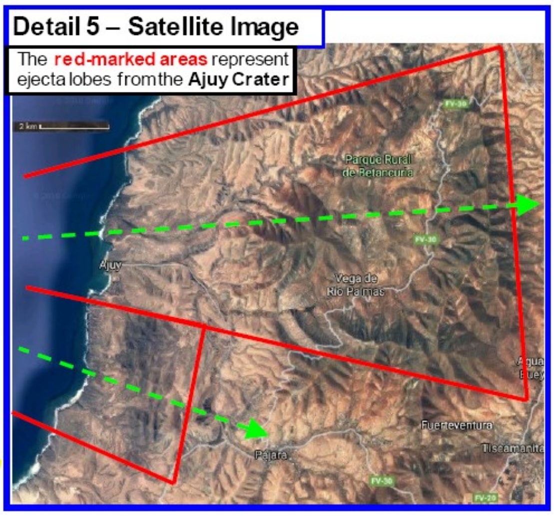
The gravity anomaly map of the Island Fuerteventura indicates an Impact Event. This is the **Ø ~13,5 x 11 km** hypothetical **Ajuy Crater** just east (offshore) of the village Ajuy and probably a smaller crater a bit further north. The elliptical **"Ajuy Crater"** in all probability was caused by an oblique Impact (a secondary impact) caused by the Permian-Triassic Impact Event (PTI). This secondary impact event probably caused hotspots in the area which are responsible for the volcanism on this island. **On the canary island "Fuerteventura" old oceanic sediments with an age of >100 Ma can be found as fragments embedded in magmatic material near the village Ajuy**, on the west-coast of Fuerteventura. The oldest fragments may have PTI-age ! It seems an impact has caused these fragments of old ocean sediments during the impact, and they were then mixed with (magmatic) ejecta material. (→ see image below !) These fragments can be found in the **"Ejecta-triangle structures" visible in Detail 5** of the Geological Map of Fuerteventura and clearly noticeable on a satellite image. Evidence of shock-metamorphic effects in minerals and specific minerals to confirm an impact event should be present on the sample sites located in the "ejecta triangle areas", on the sample sites 35-A (a small rock island) and on sample site 21-A, where impact-breccia seems to be present





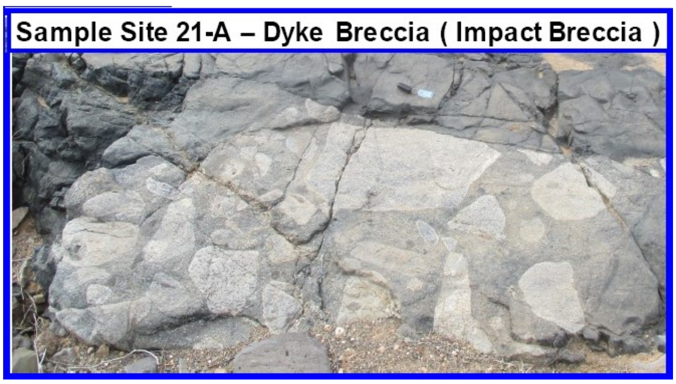


Ejecta-lobes noticable on the satellite image (→ ejecta triangle areas)

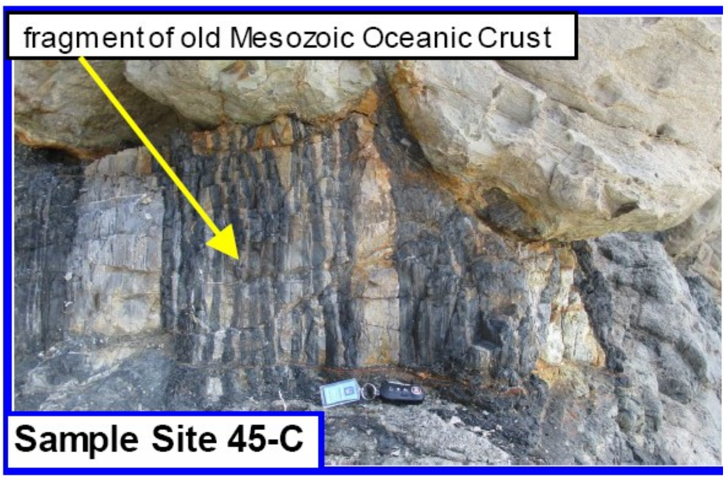


The rocks on the **site 35A** probably represent ejecta material from the Ajuy Crater.

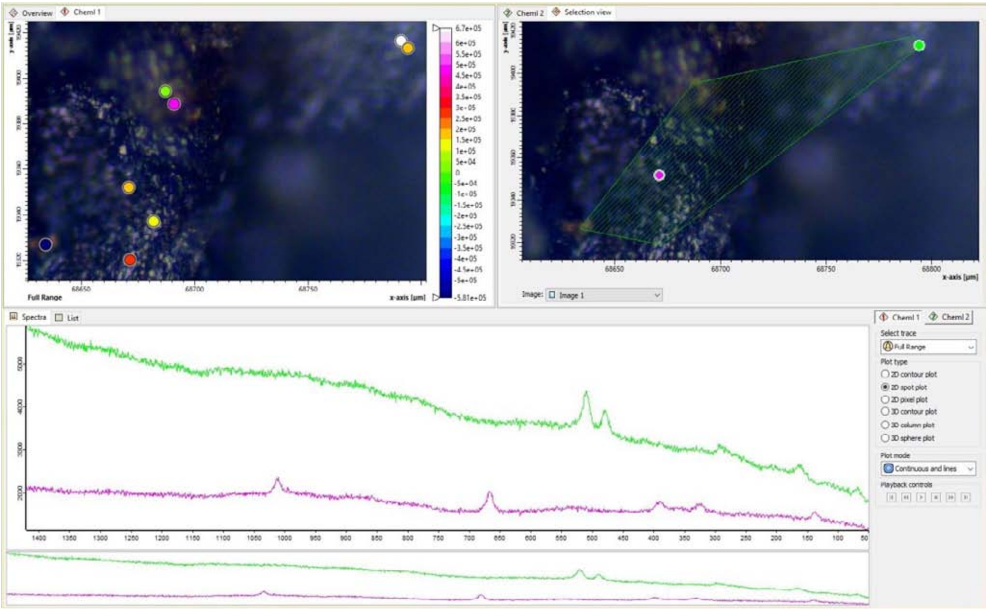
On site **21-A** impact breccia seems to be present.



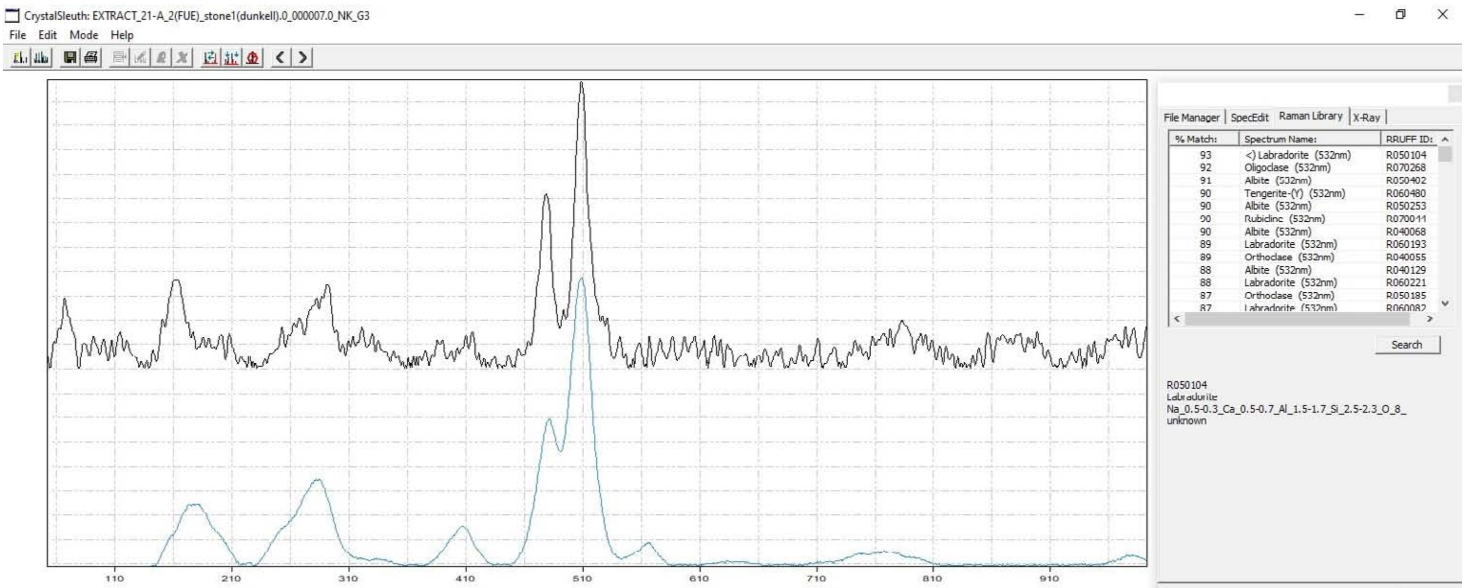
Fragment of old oceanic sediments (>100 Ma) embedded between magmatic rocks on **site 45-C**

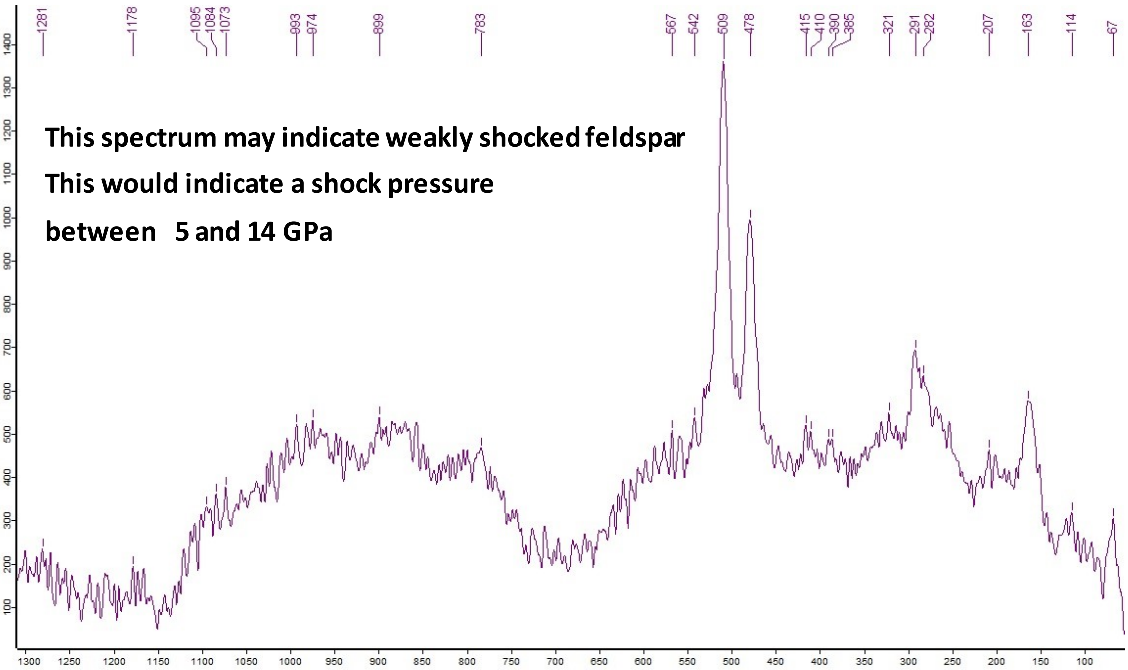


Sample Site 21-A : Stone 1_spectra 1 (dark mineral) indicates : Labradorite (→ see RRUFF_CS results)



Sample :



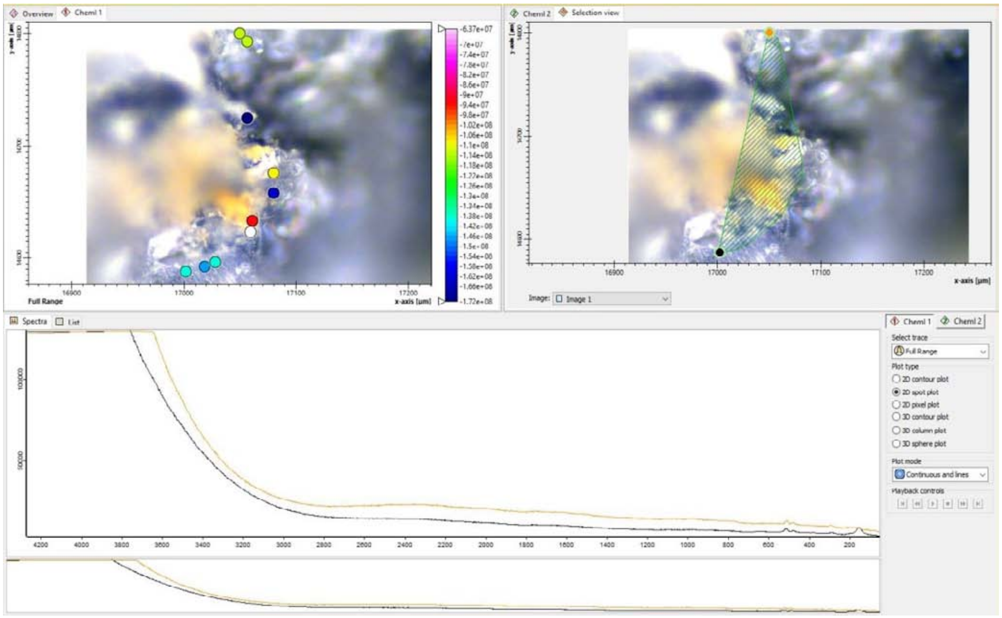


This spectrum may indicate weakly shocked feldspar

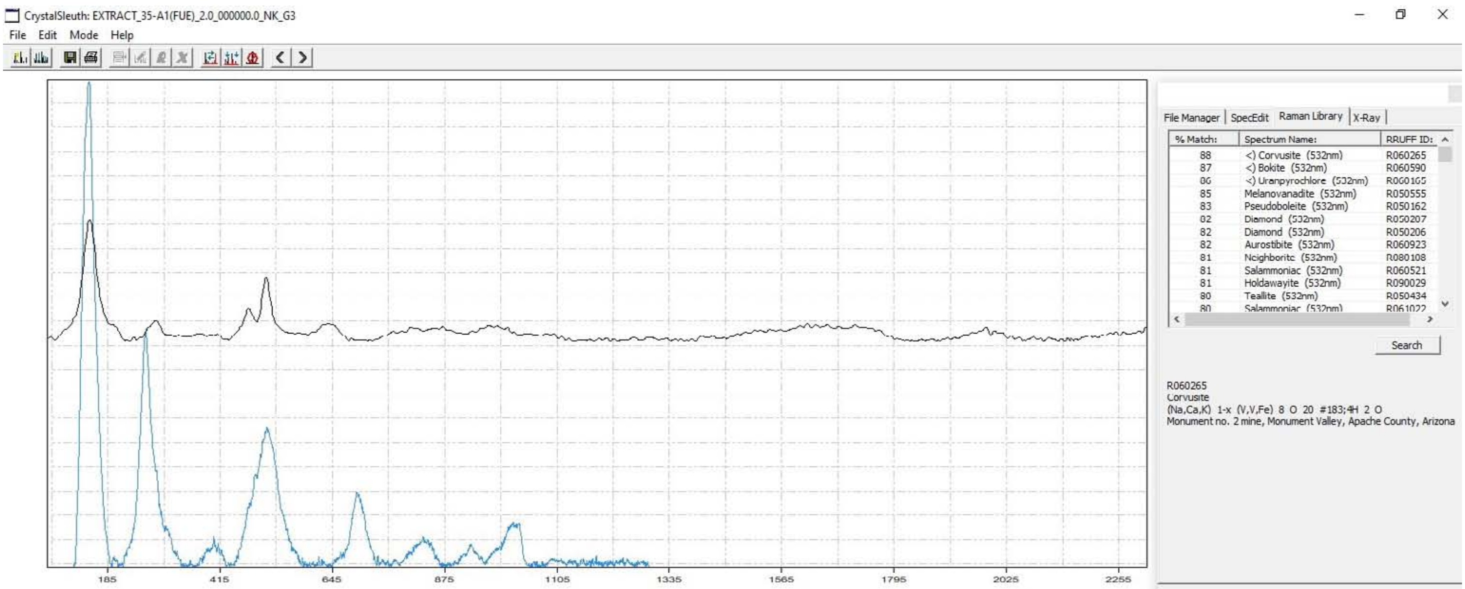
This would indicate a shock pressure

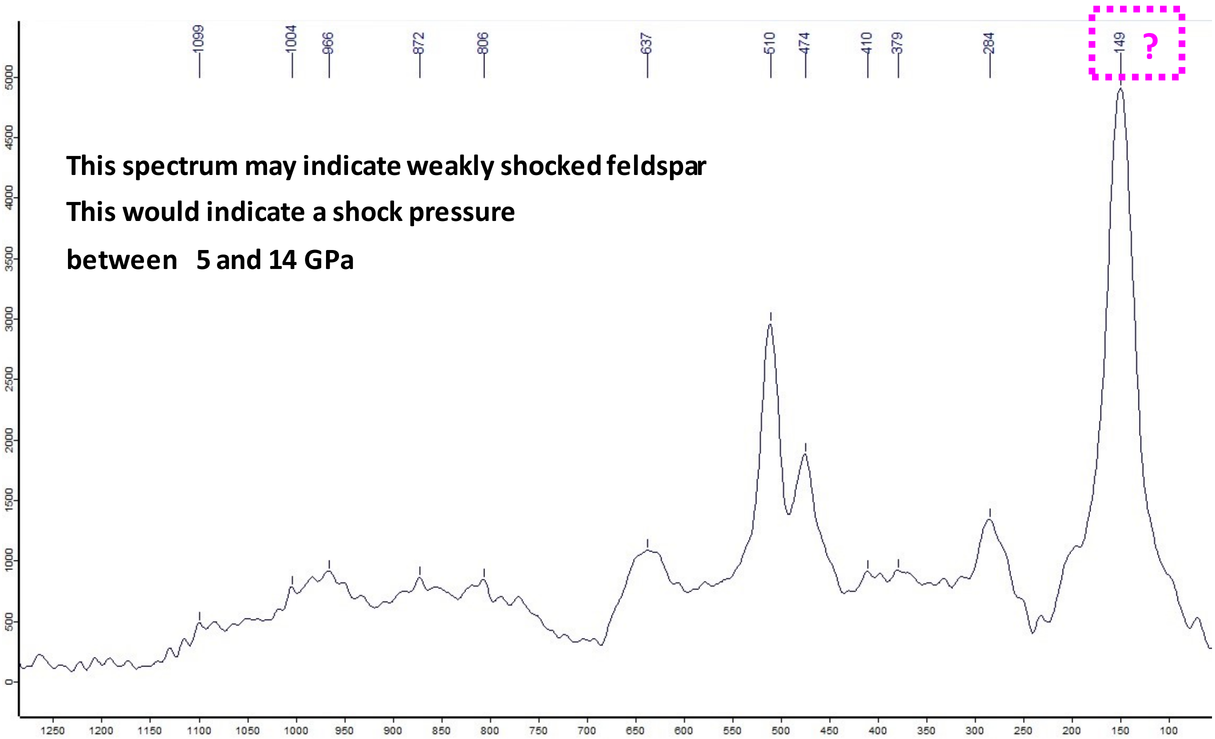
between 5 and 14 GPa

Sample Site 35-A : Stone 1_spectra 3 indicates : Corvusite ? + Orthoclase, Labradorite ? (→RRUFF_ search)

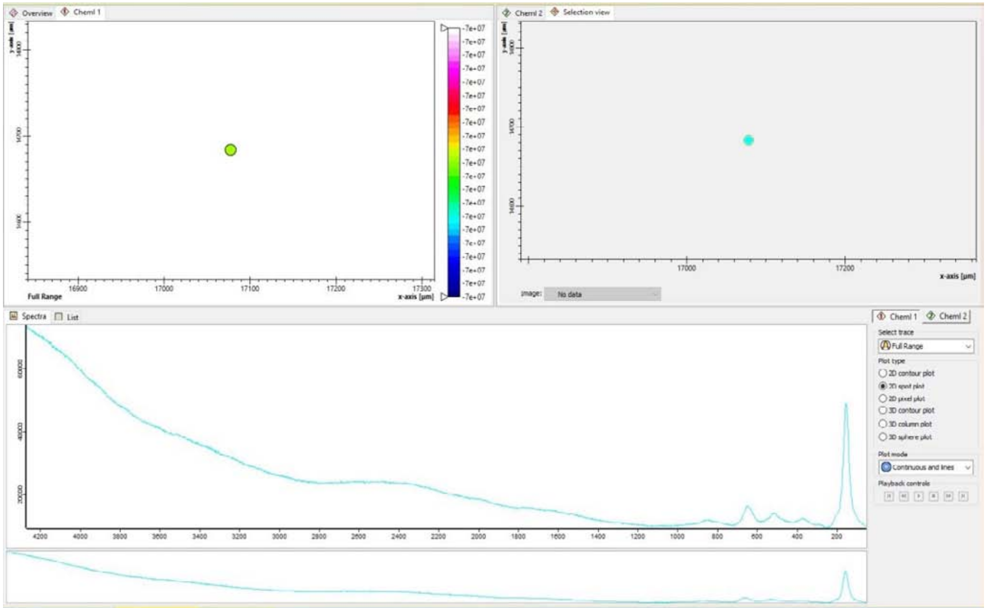


Sample :





Sample Site 35-A : Stone 1_spectra 2 indicates : Uranpyrochlore (→ see RRUFF_CS search)

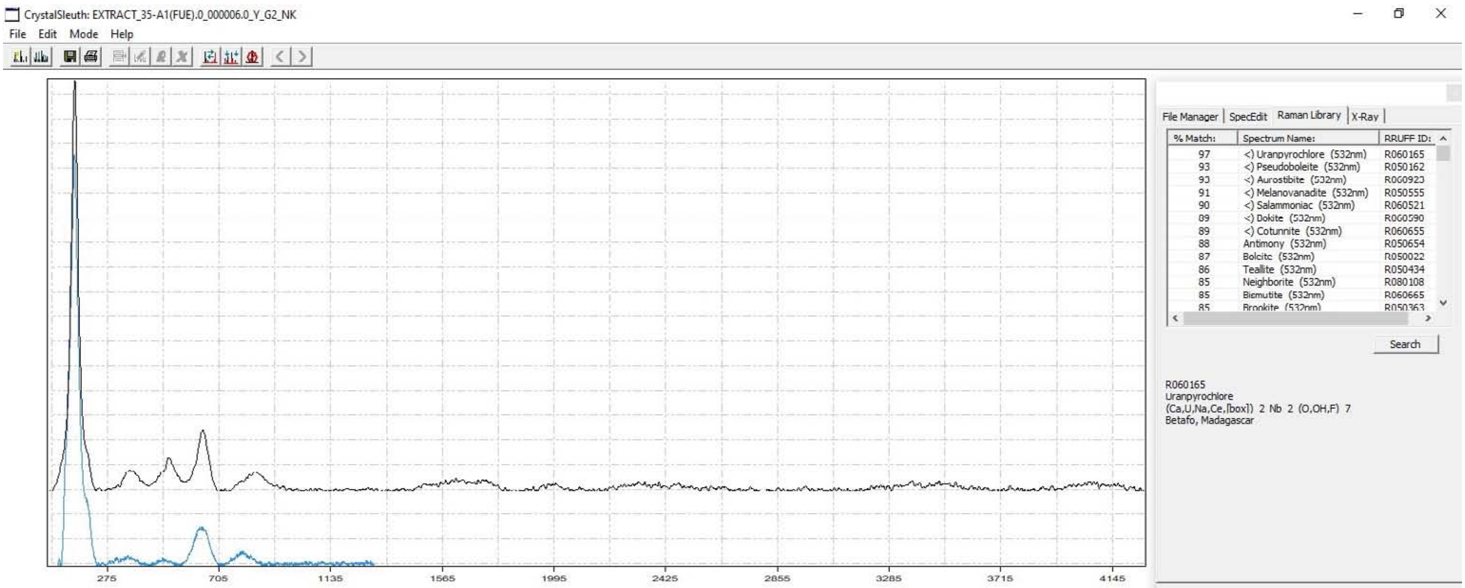


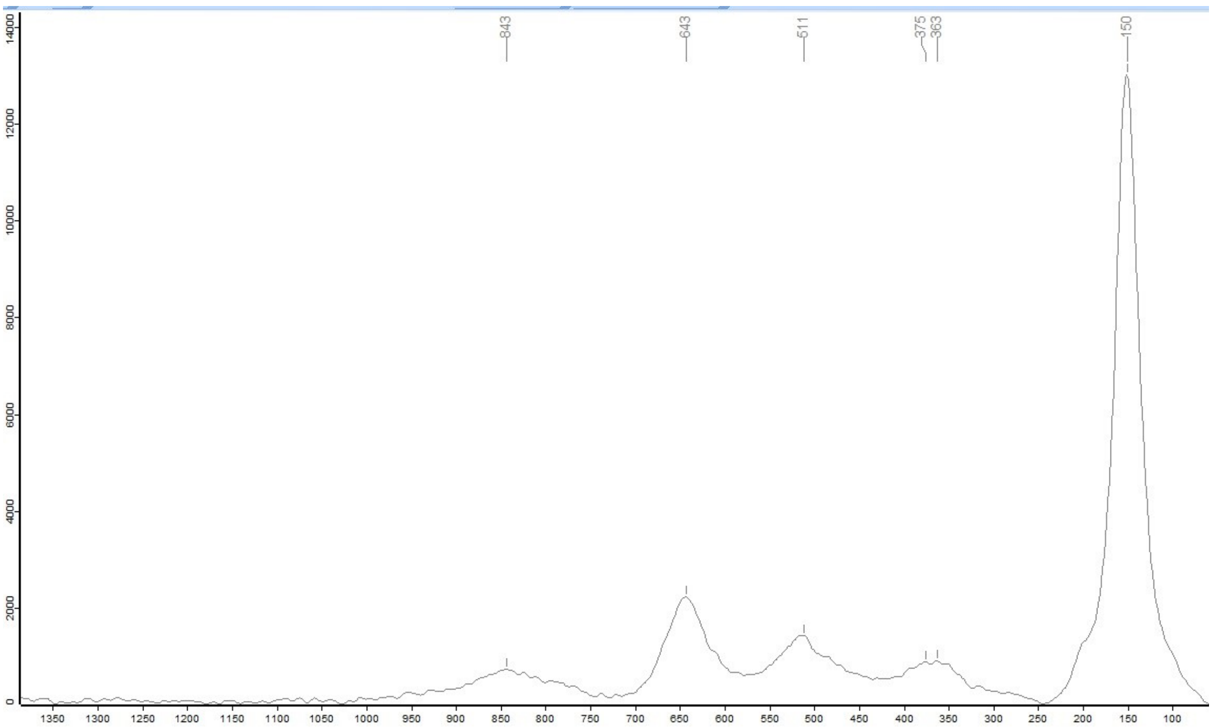
Note : mineral contains Uranium !

Mineral is similar to a rare earth mineral found in Madagascar

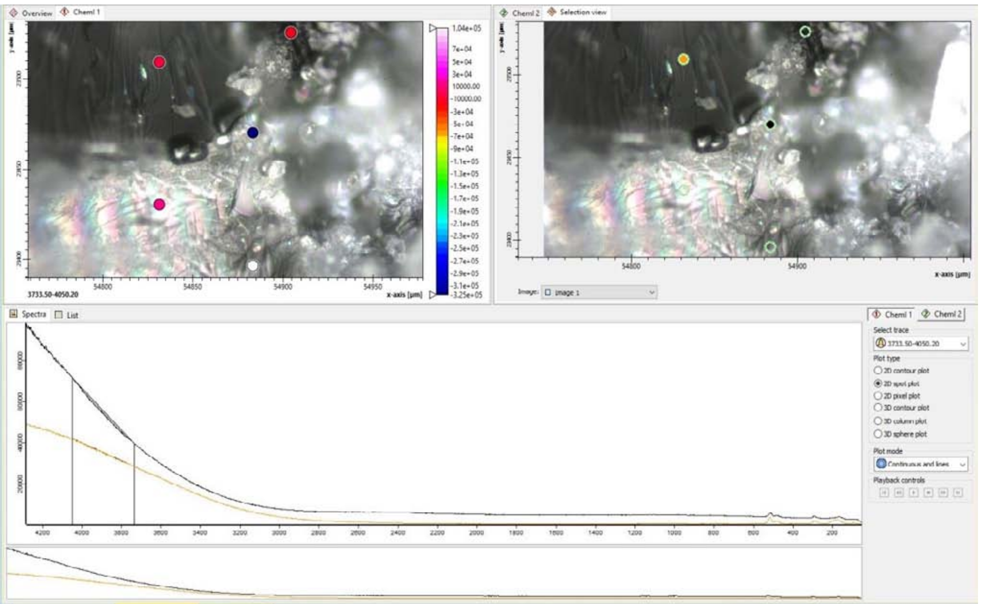
(→ Ejecta Ray R4 !)

Sample :

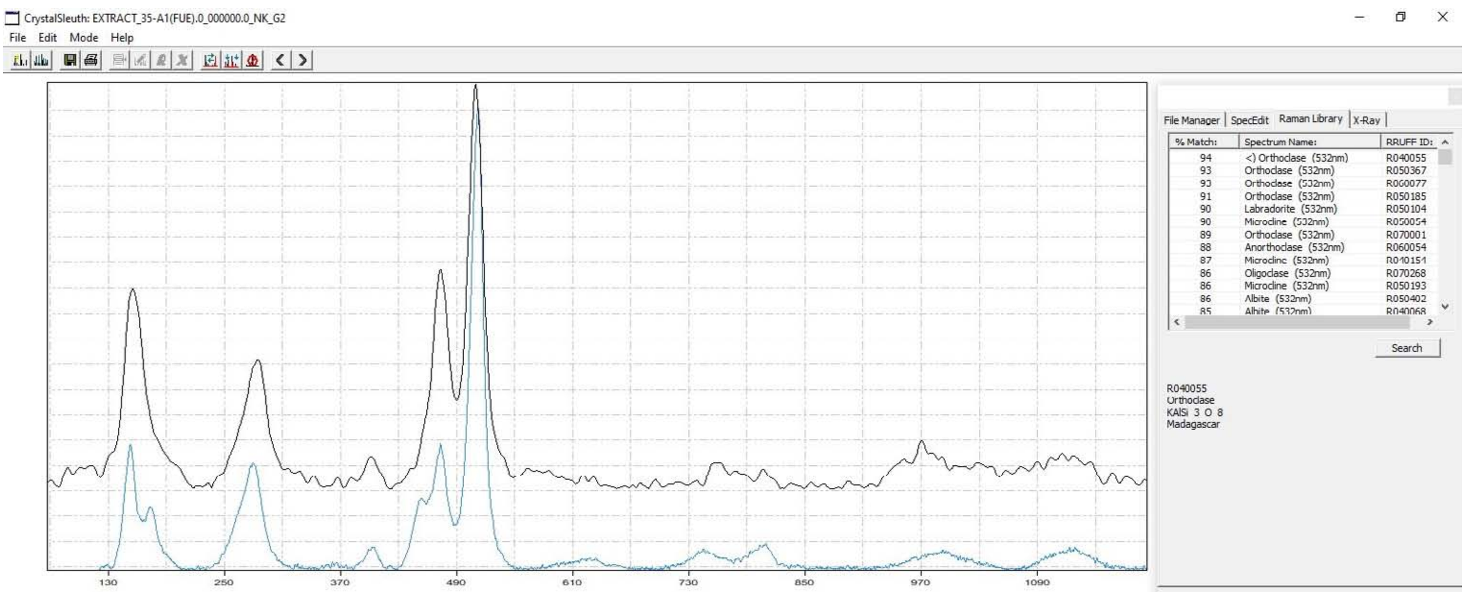


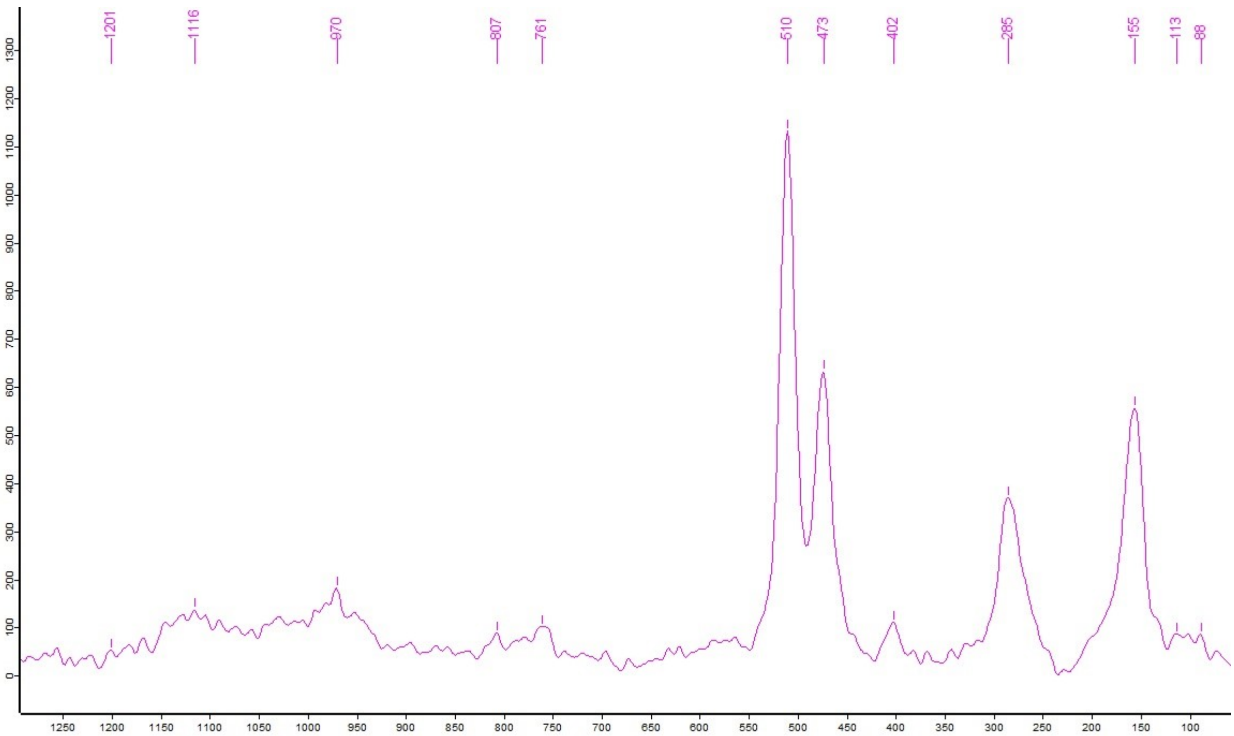


Sample Site 35-A : Stone 1_spectra 1 indicates : Orthoclase, Labradorite (→ see RRUFF_CS)

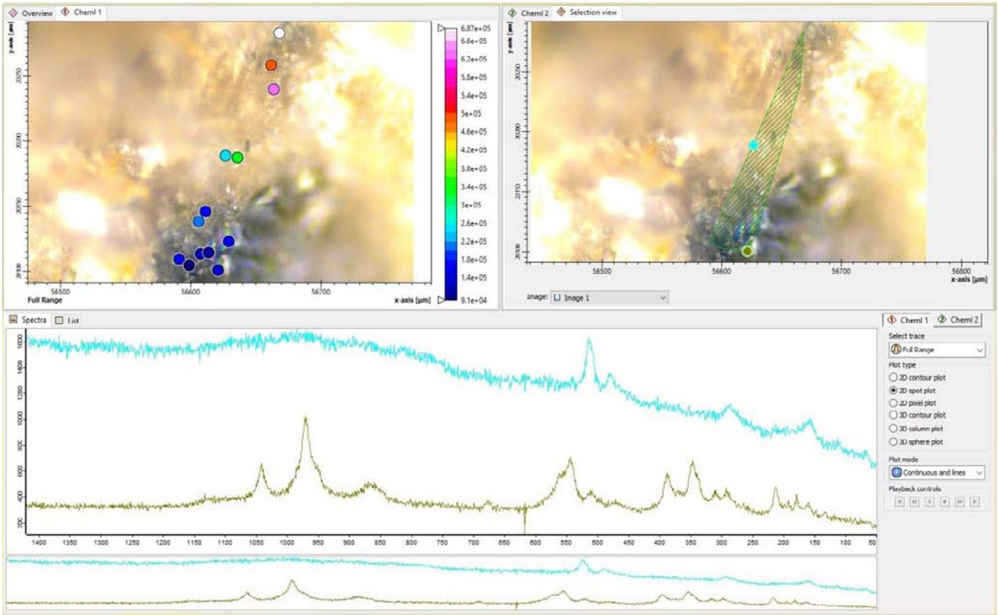


Sample :

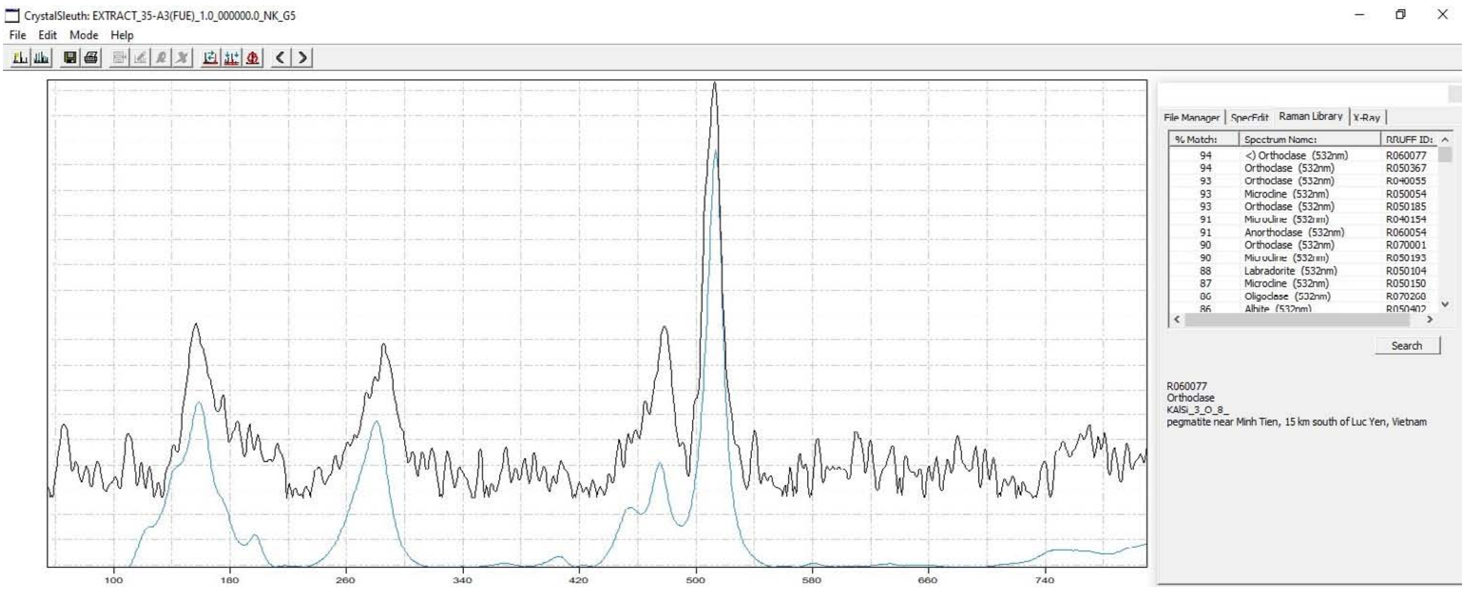


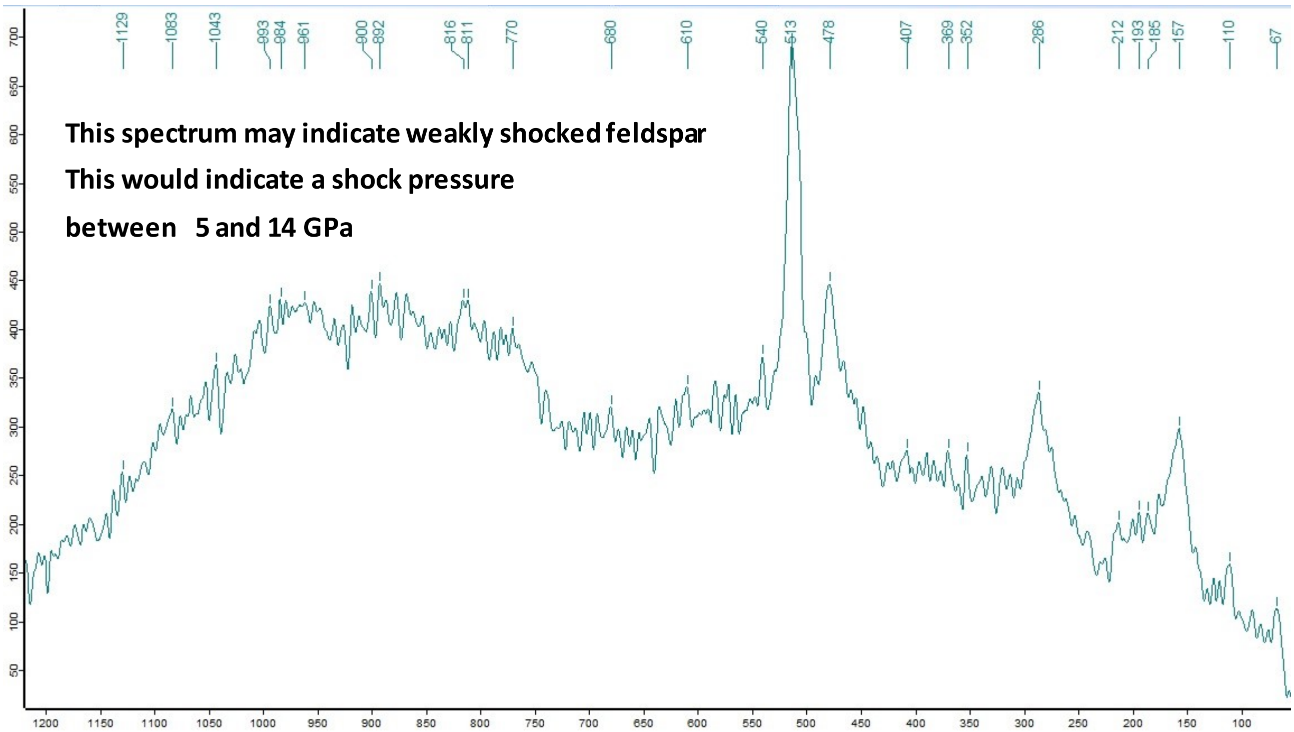


Sample Site 35-A : Stone 2_spectra 1 indicates : Orthoclase (→ see RRUFF_CS search)

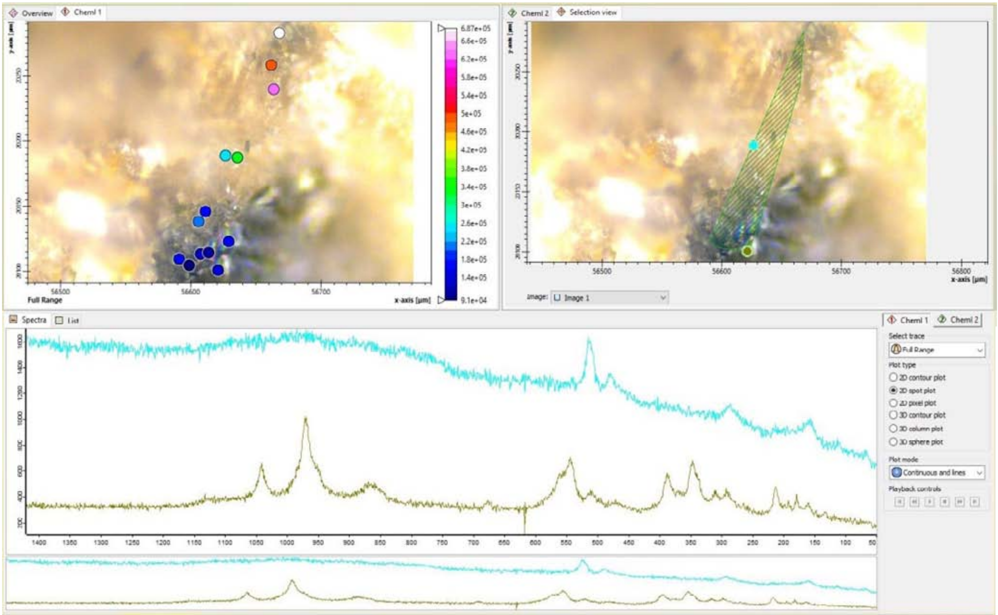


Sample :



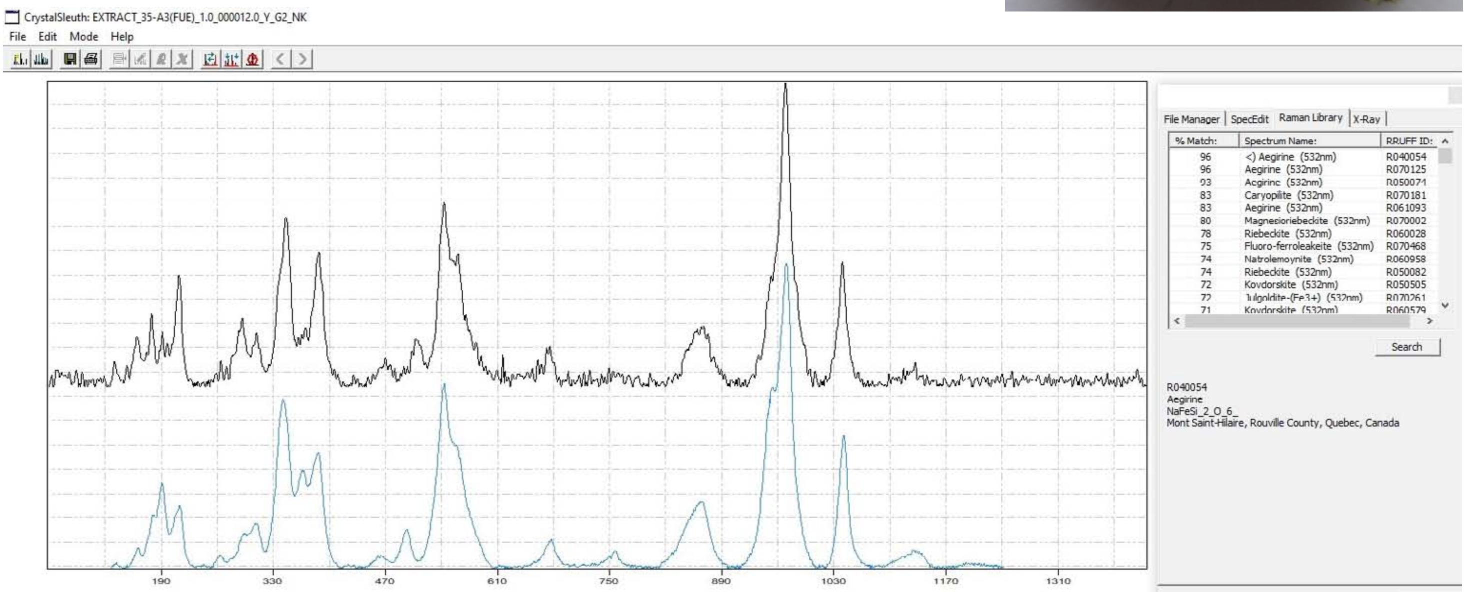


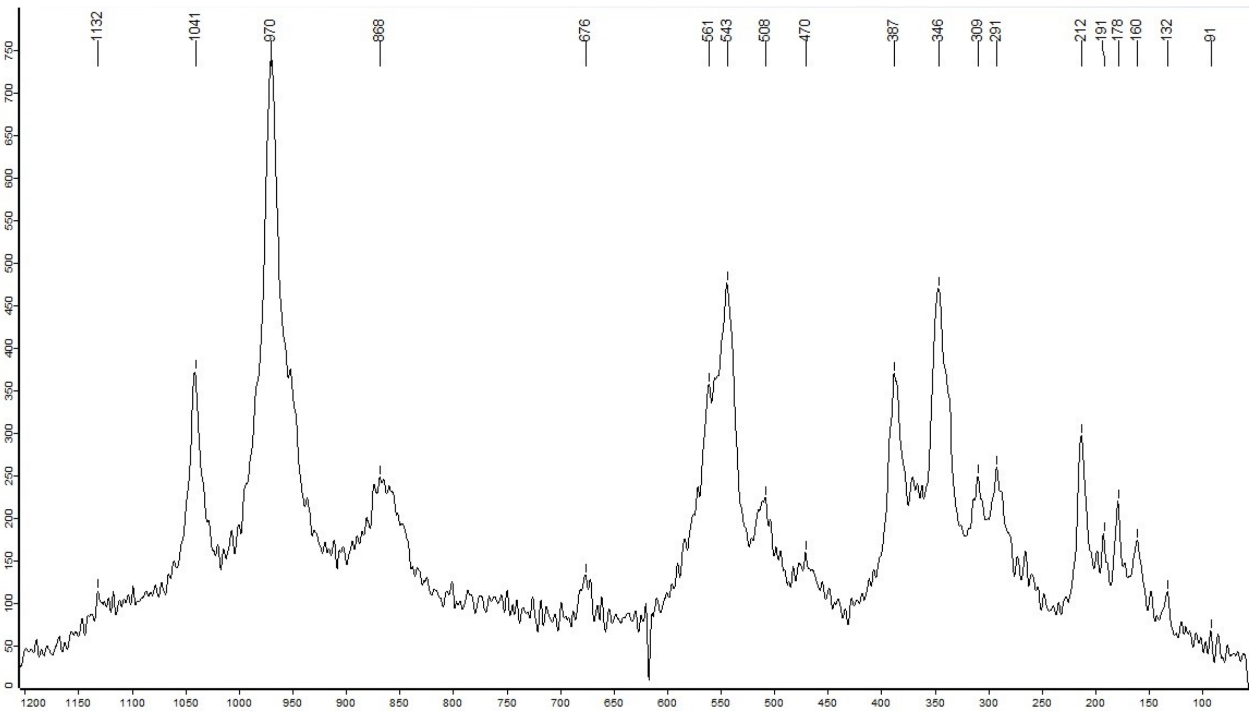
Sample Site 35-A : Stone 2_spectra 2 indicates : Aegirine (→ see RRUFF_CS search)



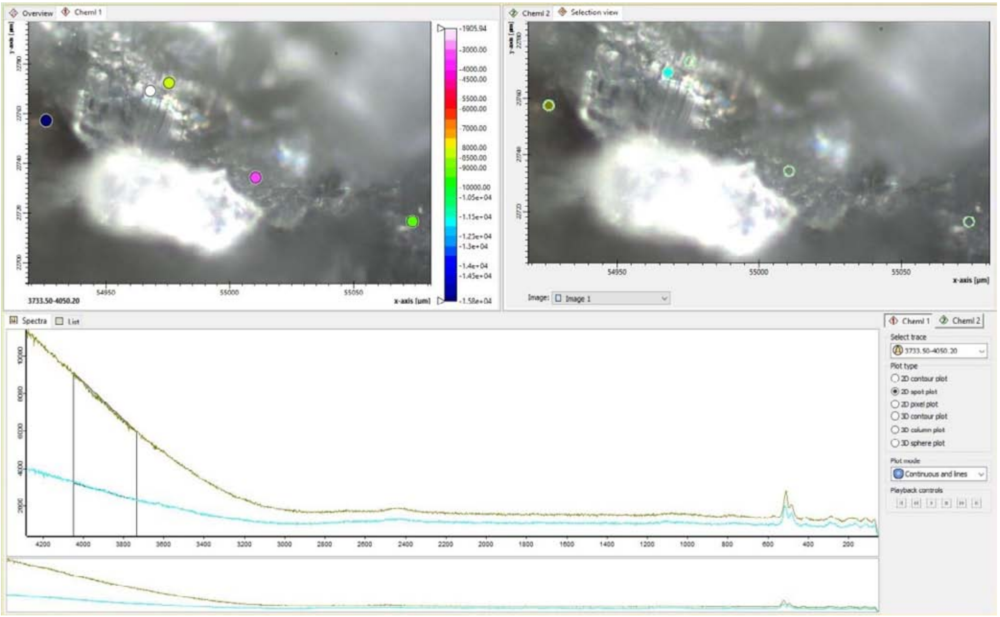
Note : Aegirine is an Iron-bearer mineral

Sample :

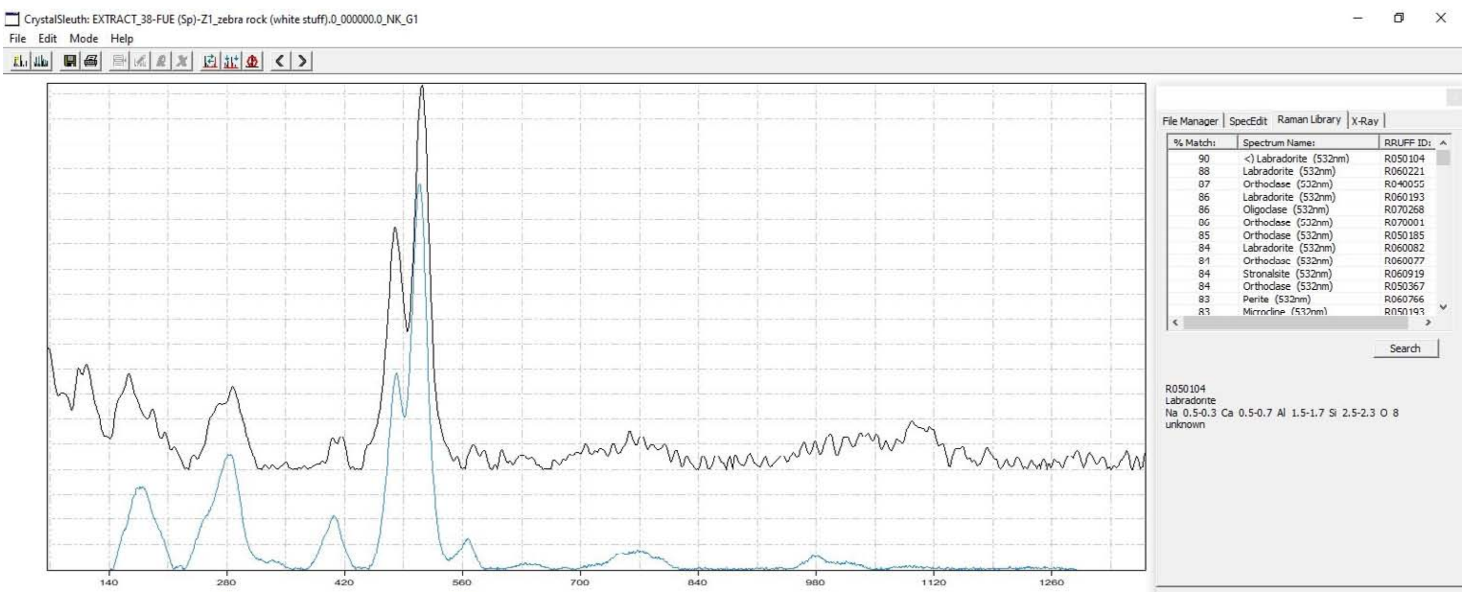


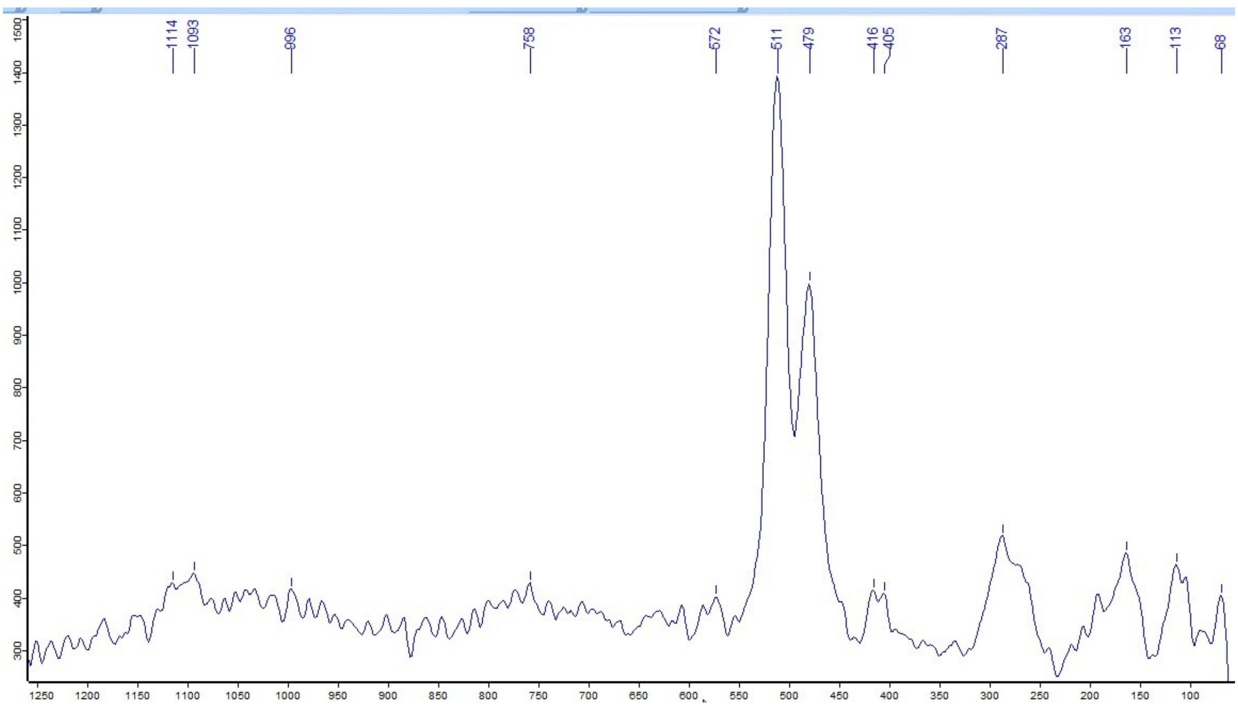


Sample Site 38 : Stone 1_spectra 1 indicates : Labradorite (→ see RRUFF_CS search)

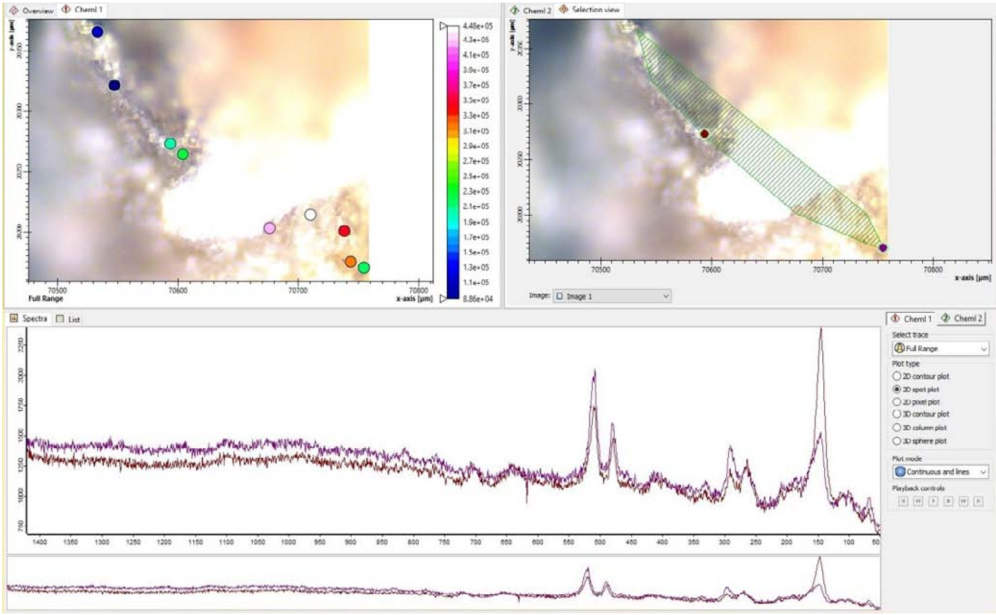


Sample :



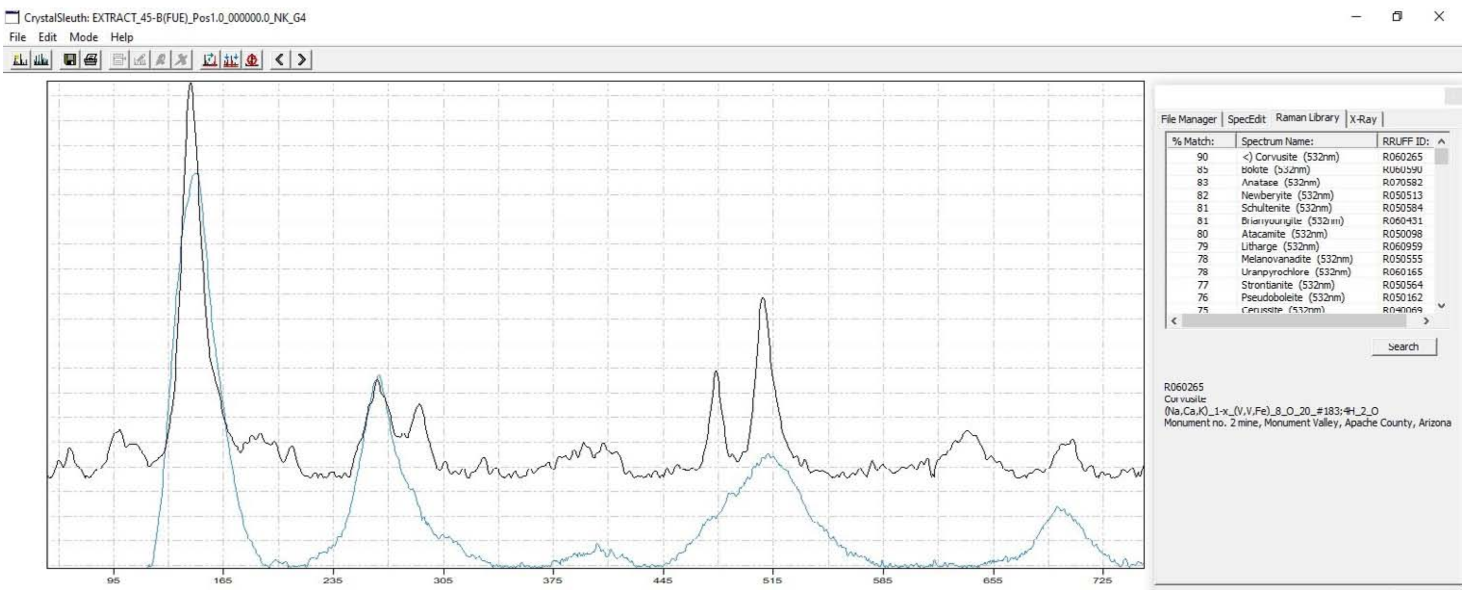


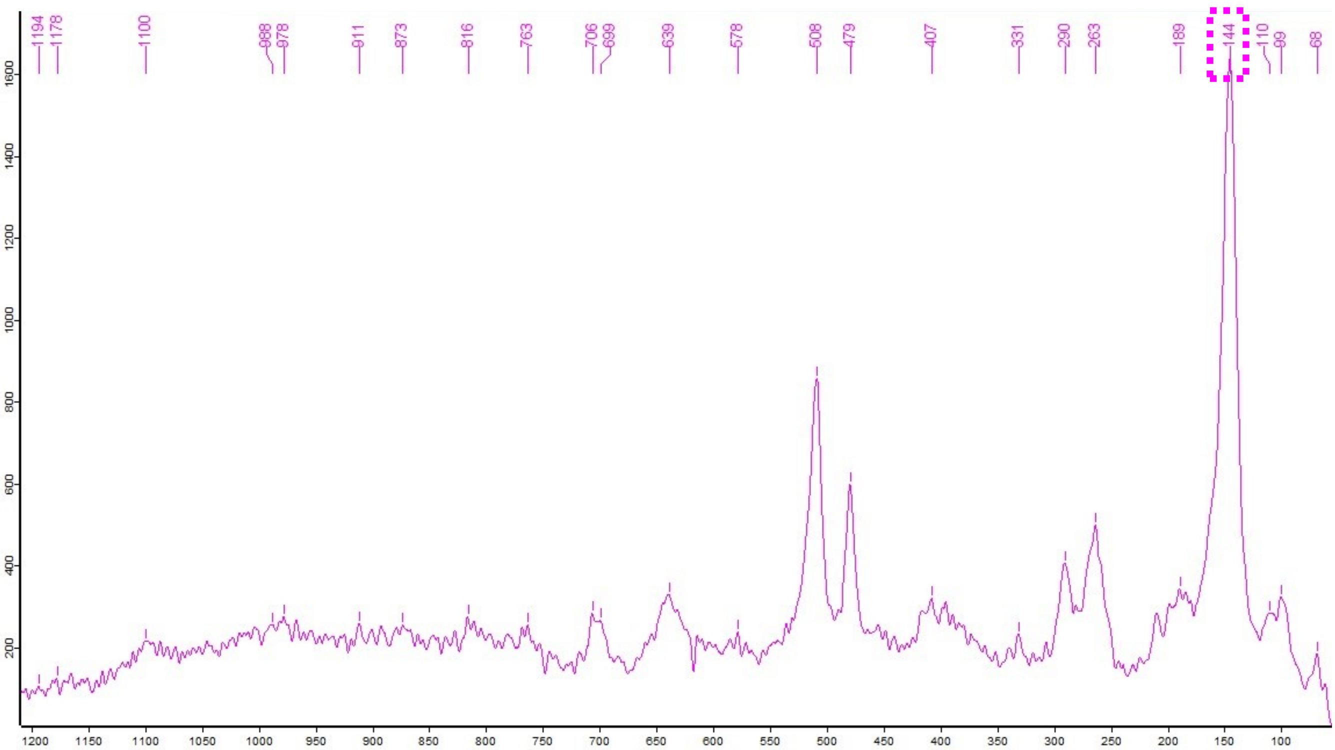
Sample Site 45-B : Stone 1_spectra 1 indicates : Corvusite (+ Orthoclase, Labradorite ?) (→ RRUFF_ search)



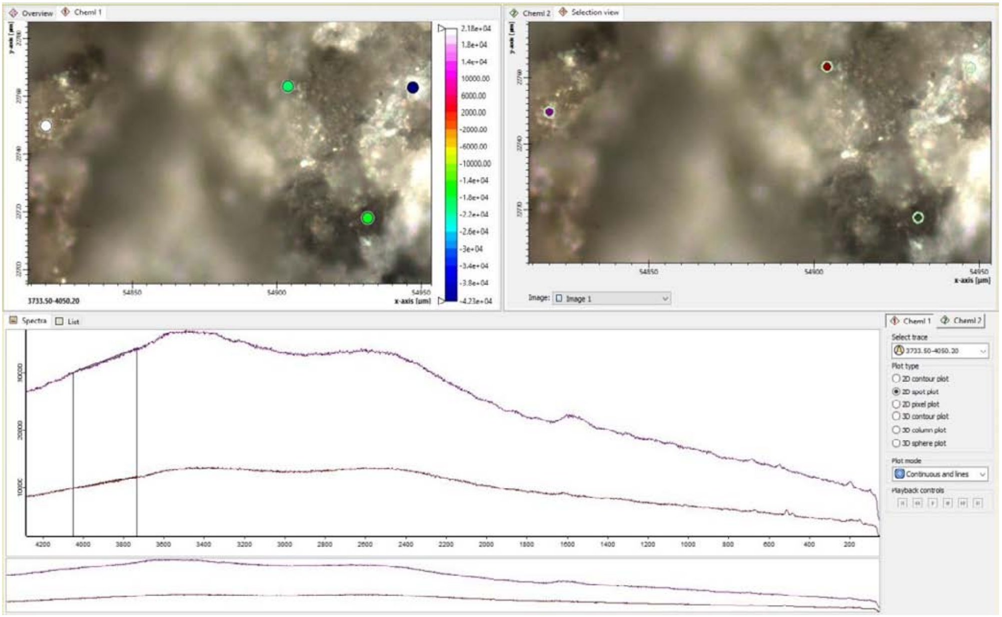
Note : Corvusite is an Iron-bearer mineral

Sample :



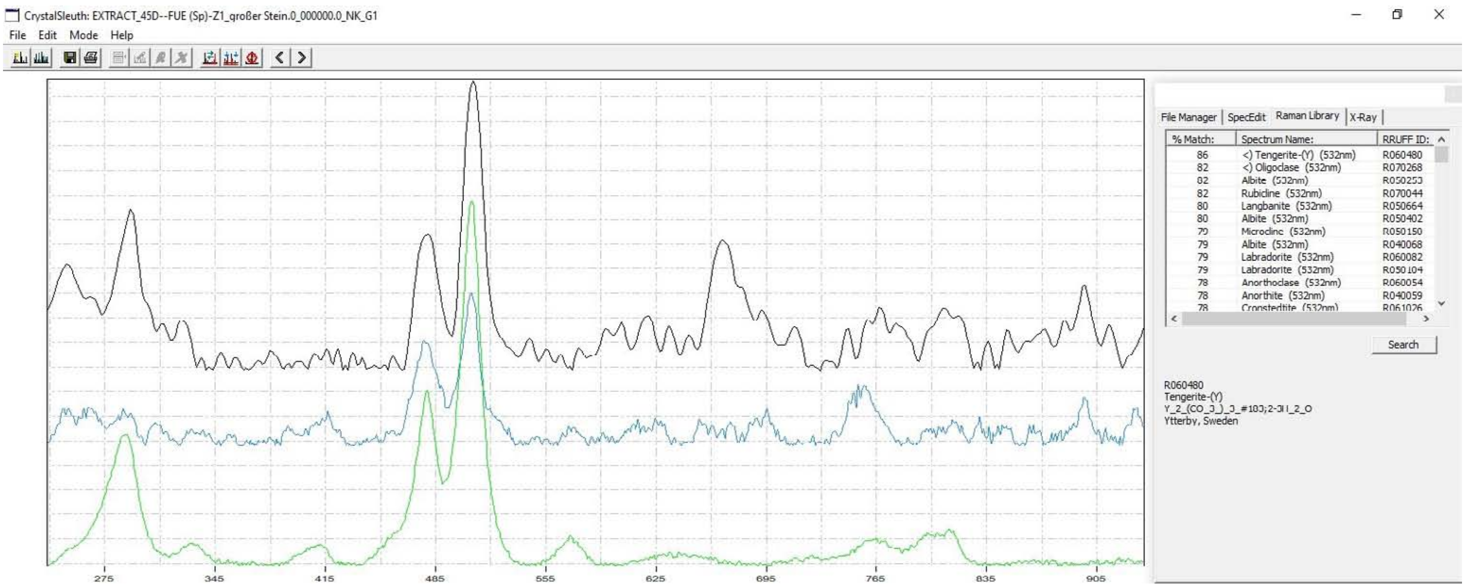


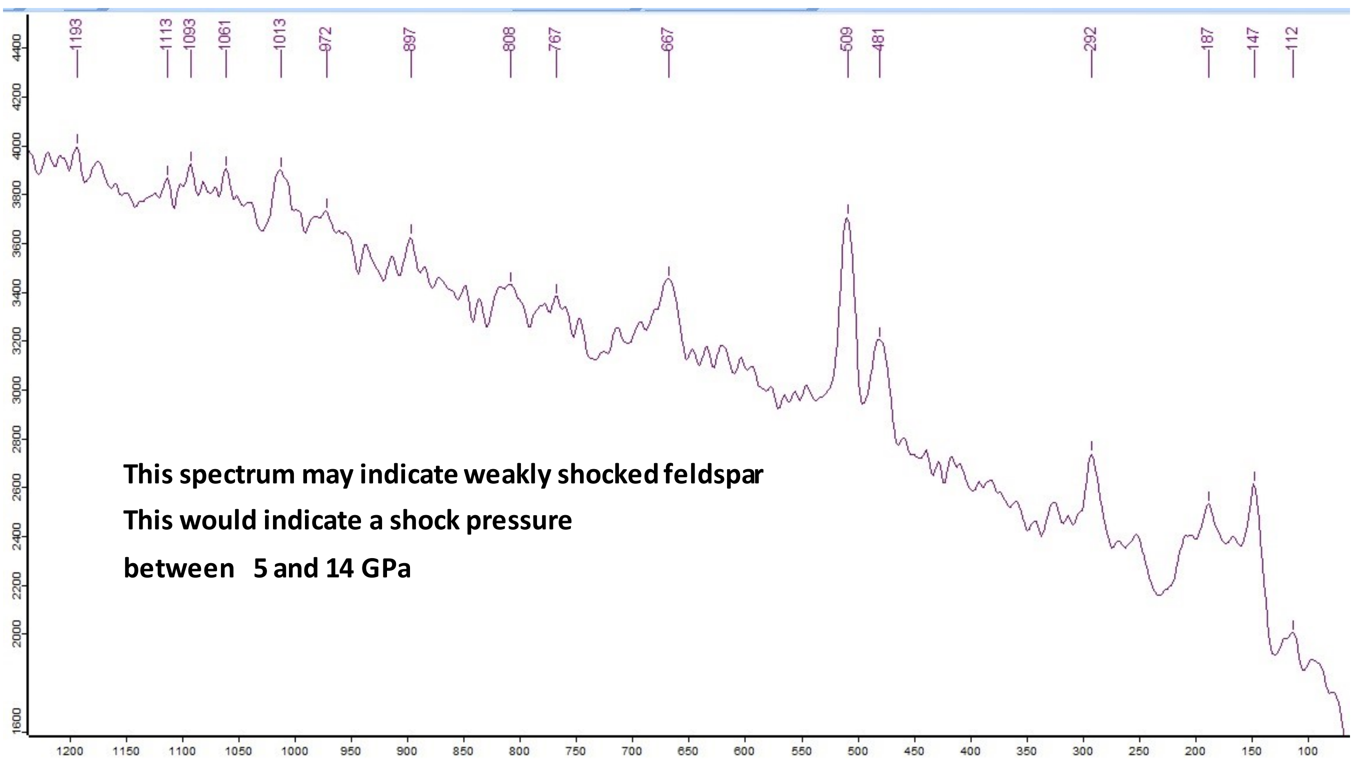
Sample Site 45-D: Stone 1_spectra 1 indicates : Oligoclase, Tengerite-Y (→ see RRUFF_CS search)



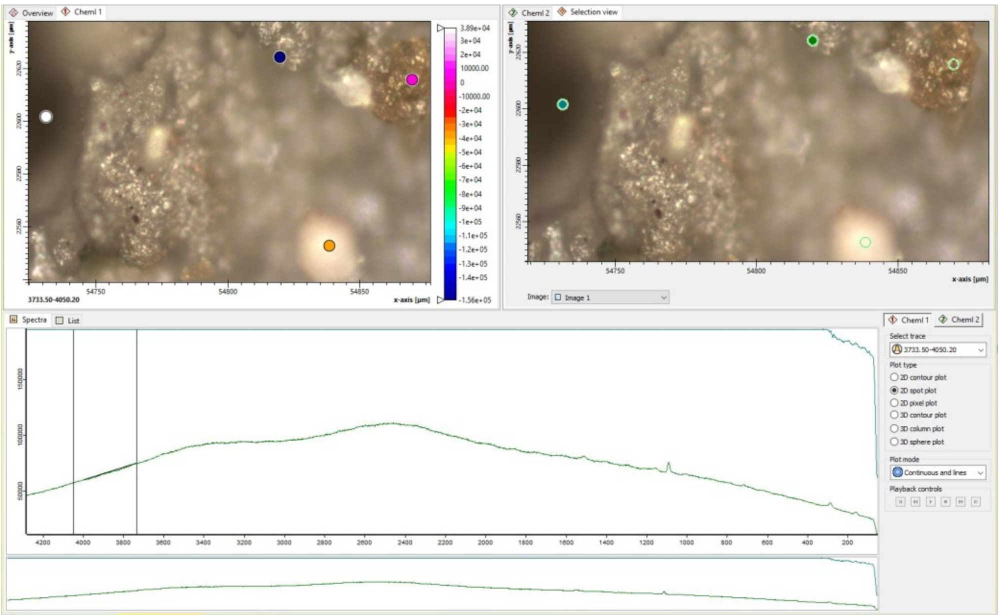
Sample from old ocean sediments which are > 100 million years old !

Sample :





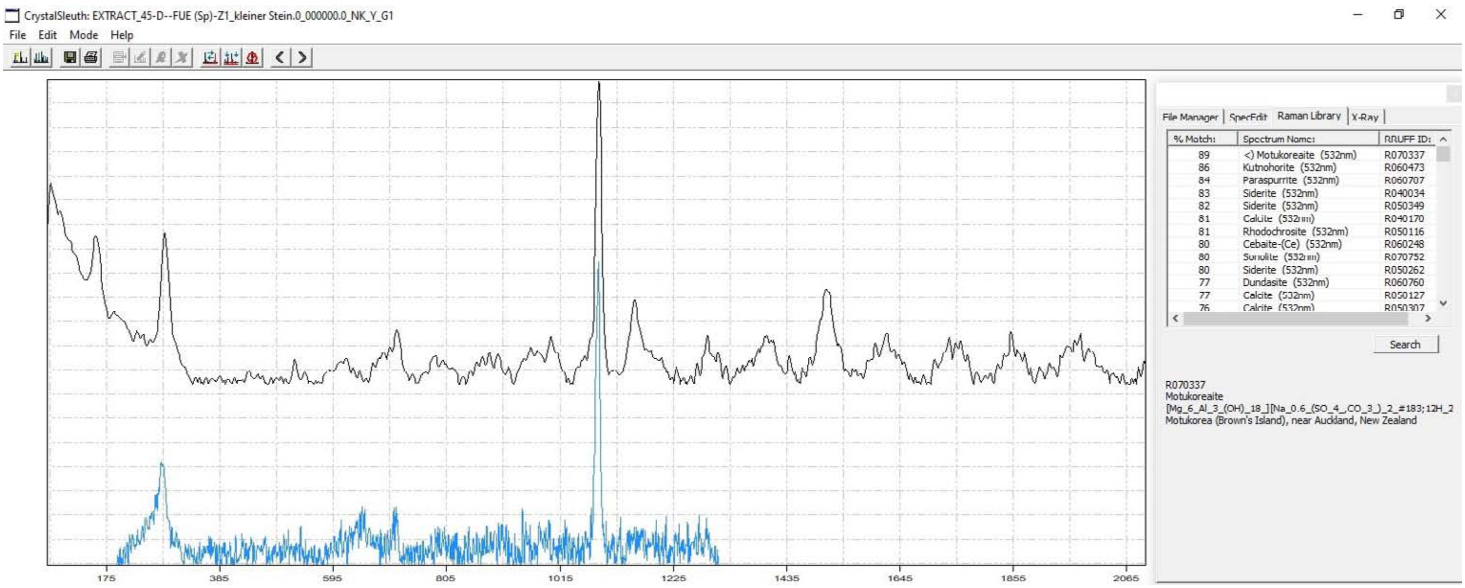
Sample Site 45-D: Stone 2_spectra 2 indicates : Motukoreaite (→ see RRUFF_CS search)

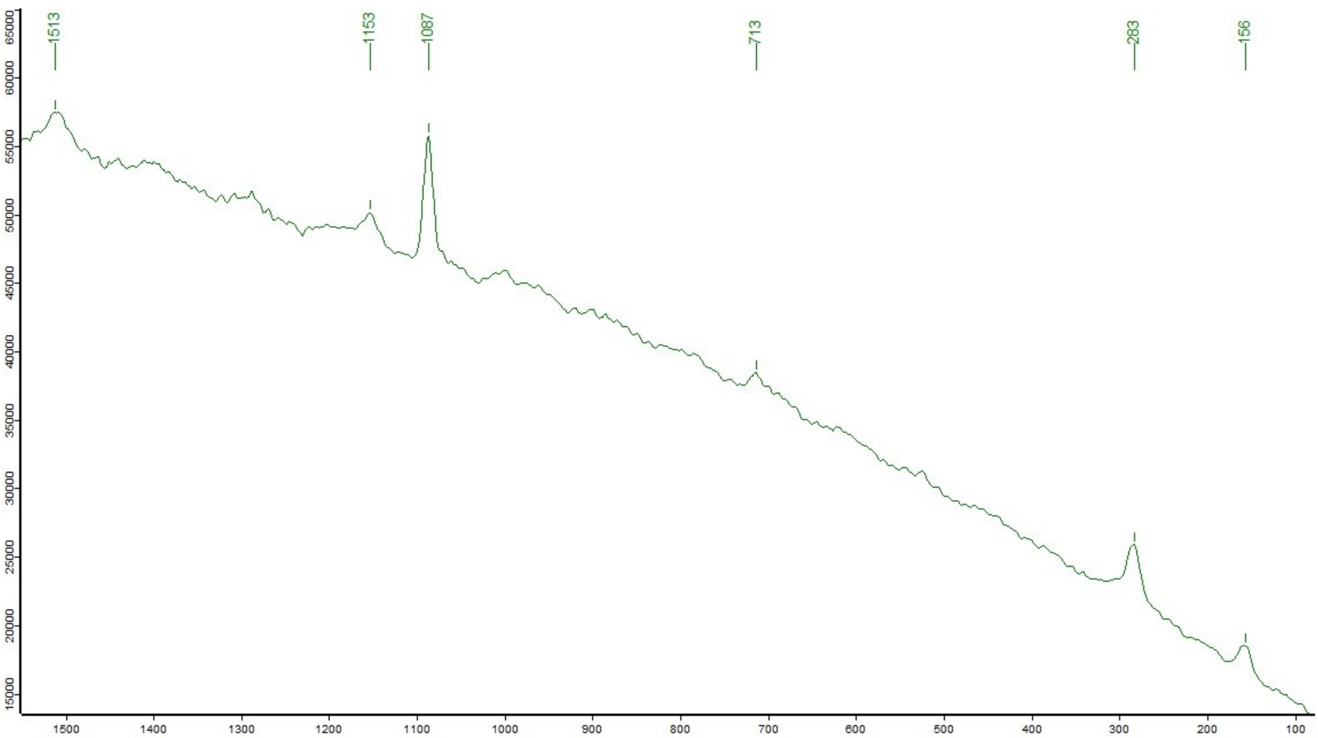


Note :

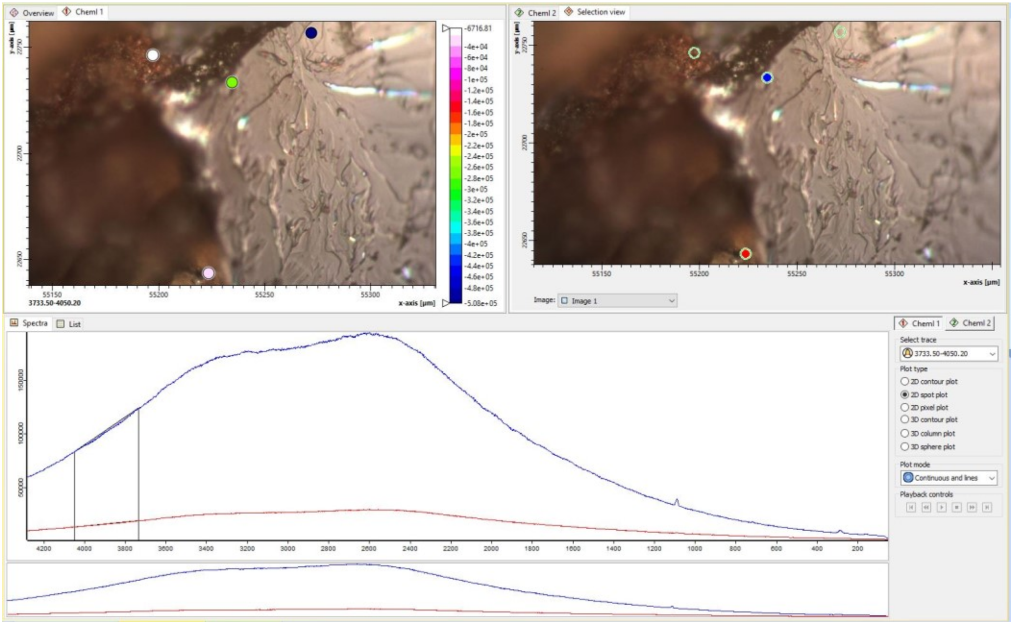
Motukoreaite is metamorphed (> 100 million year old) ocean sediment, which was metamorphed below 150 Grad into Motukoreaite !

Sample :



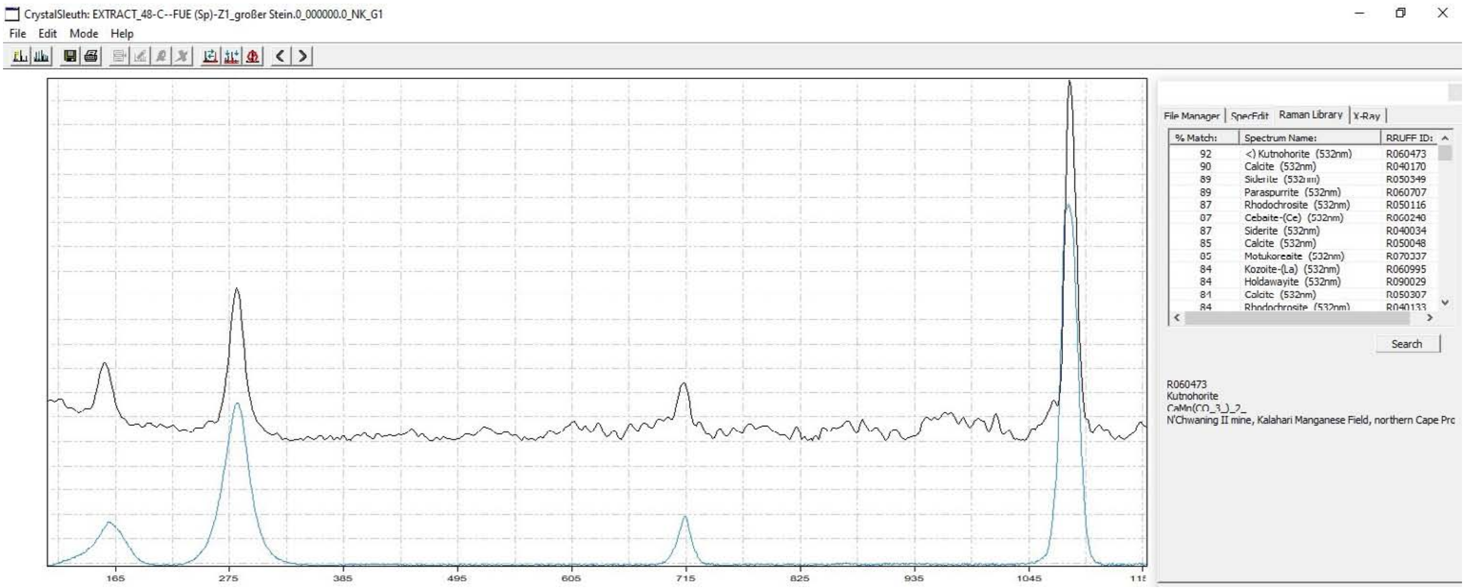


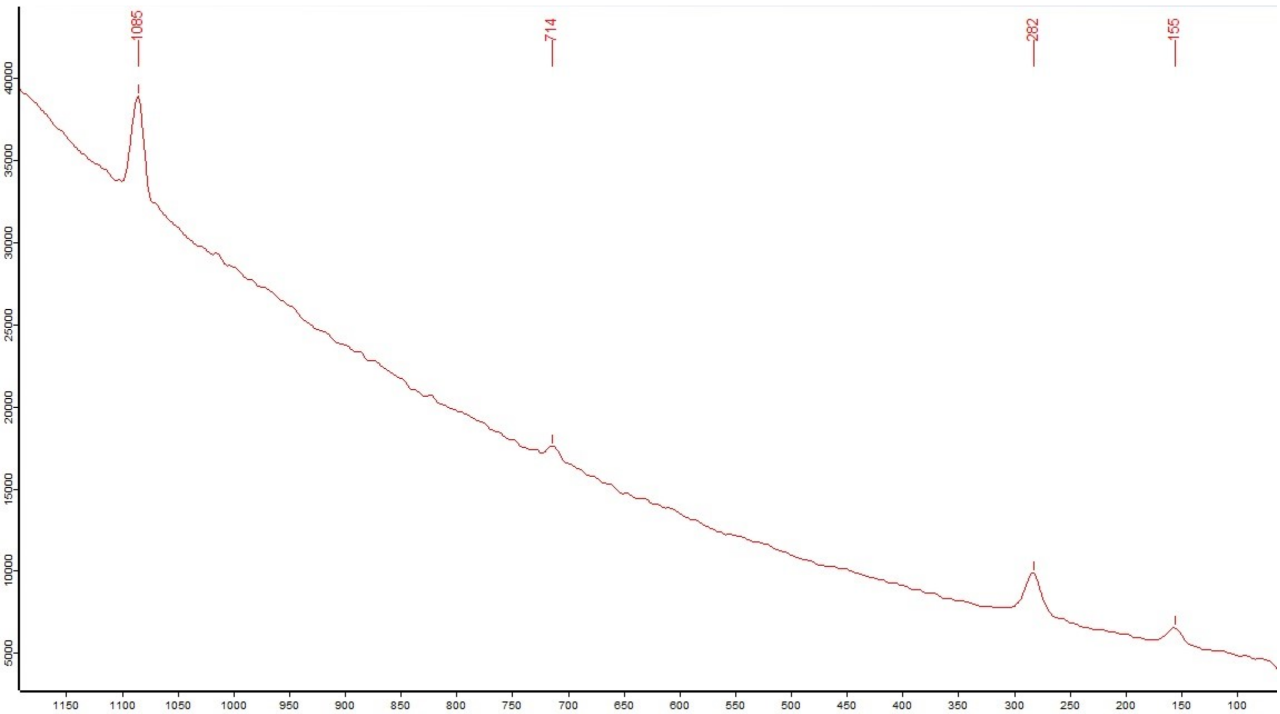
Sample Site 48-C : Stone 1_spectra 1 indicates : Kutnohorite, Calcite (→ see RRUFF_CS search)



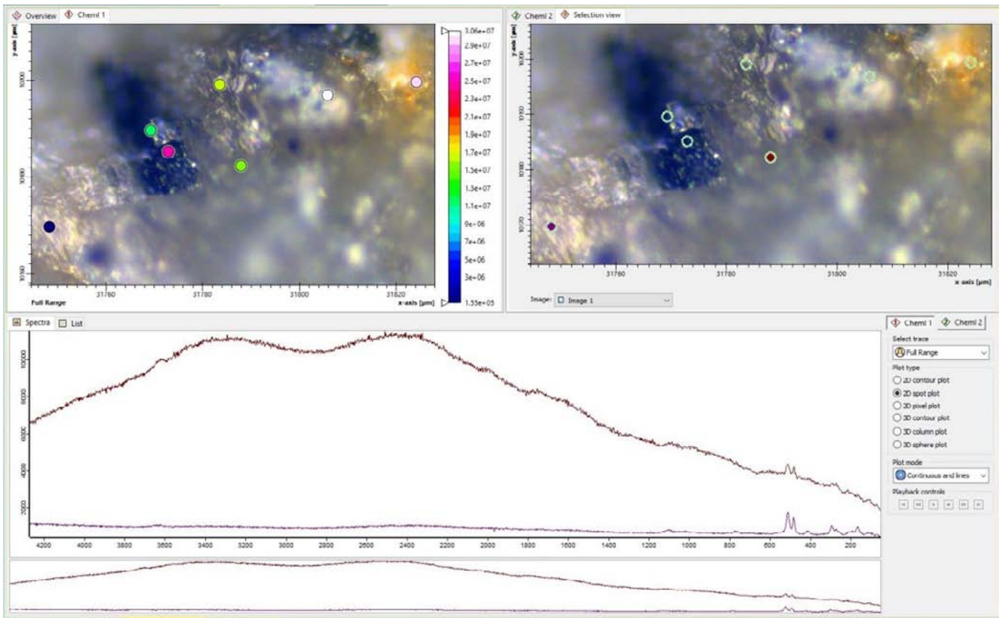
Crystal inclusion from a sample from old ocean sediments which are > 100 million years old ! (Ajuy Beach)

Sample :

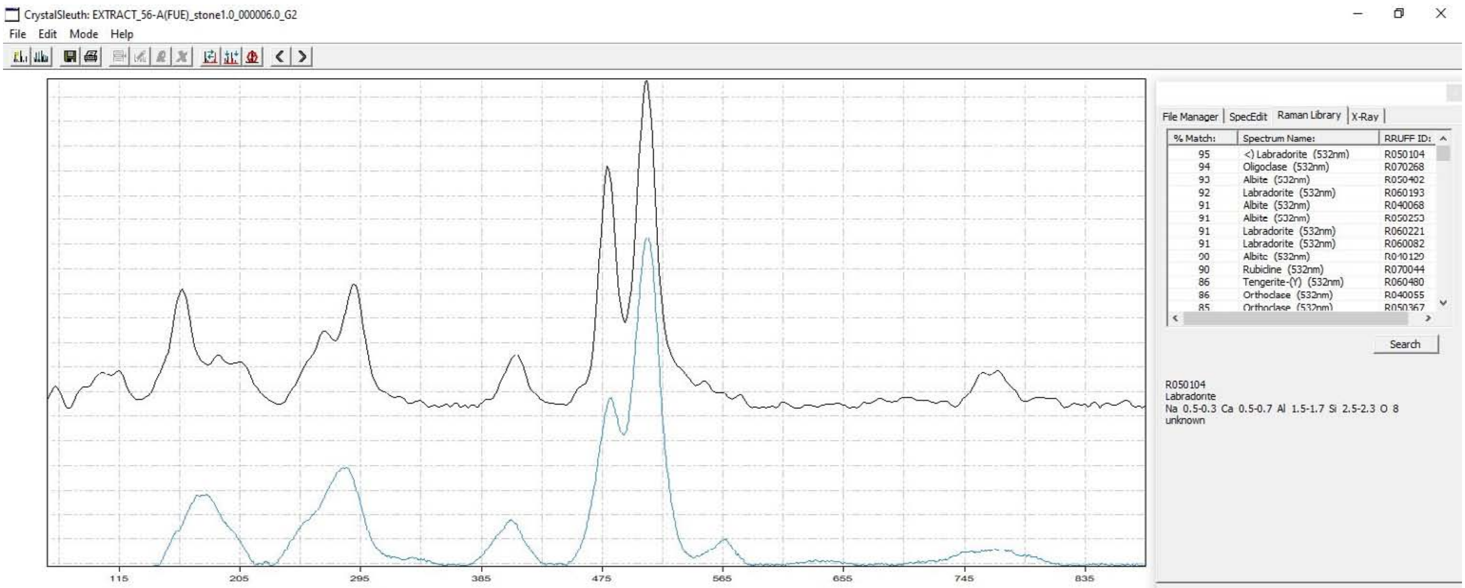


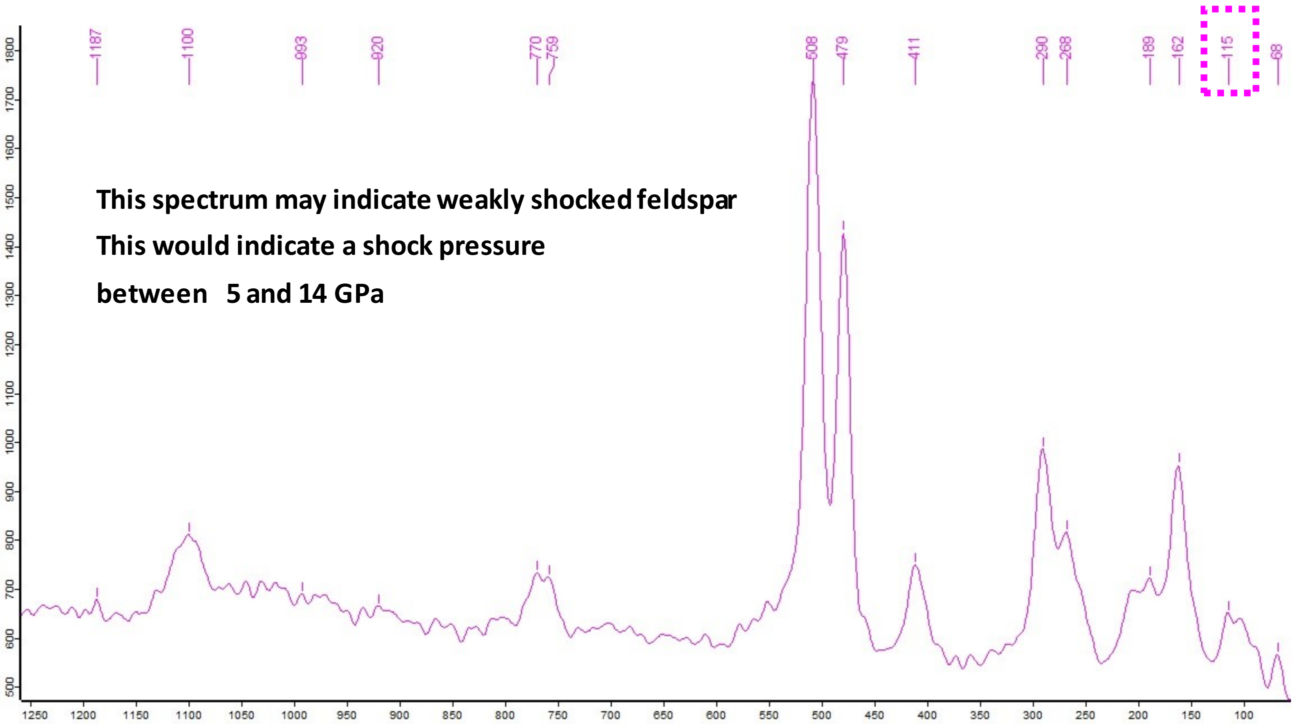


Sample Site 56-A : Stone 1_spectra 1 indicates : Labradorite (→ see RRUFF_CS search)

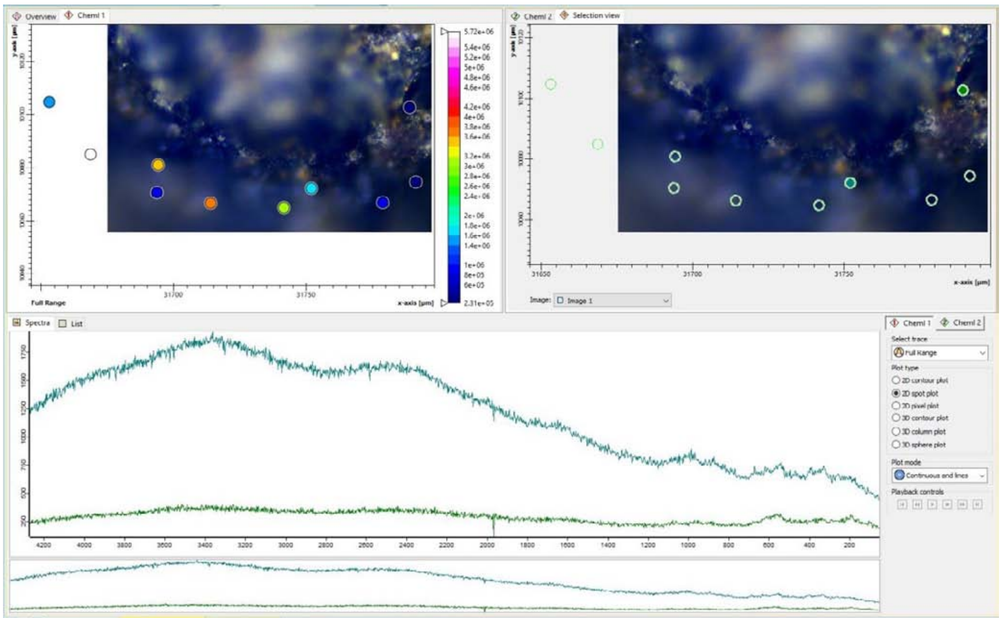


Sample :

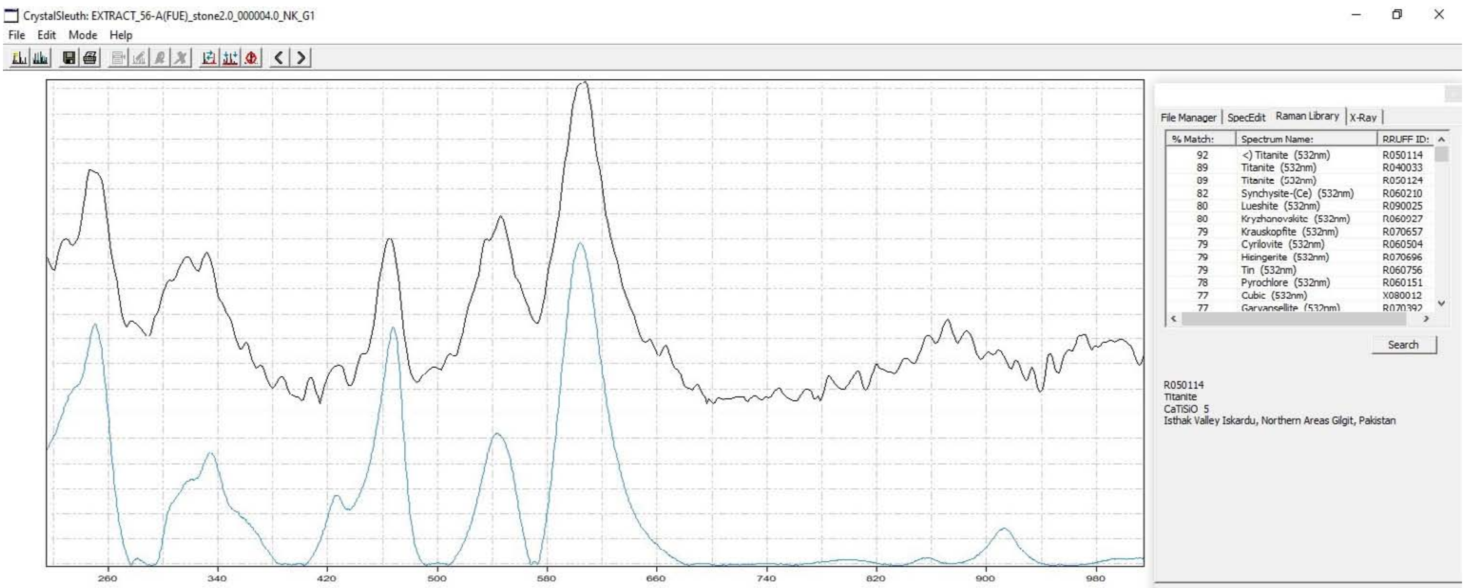


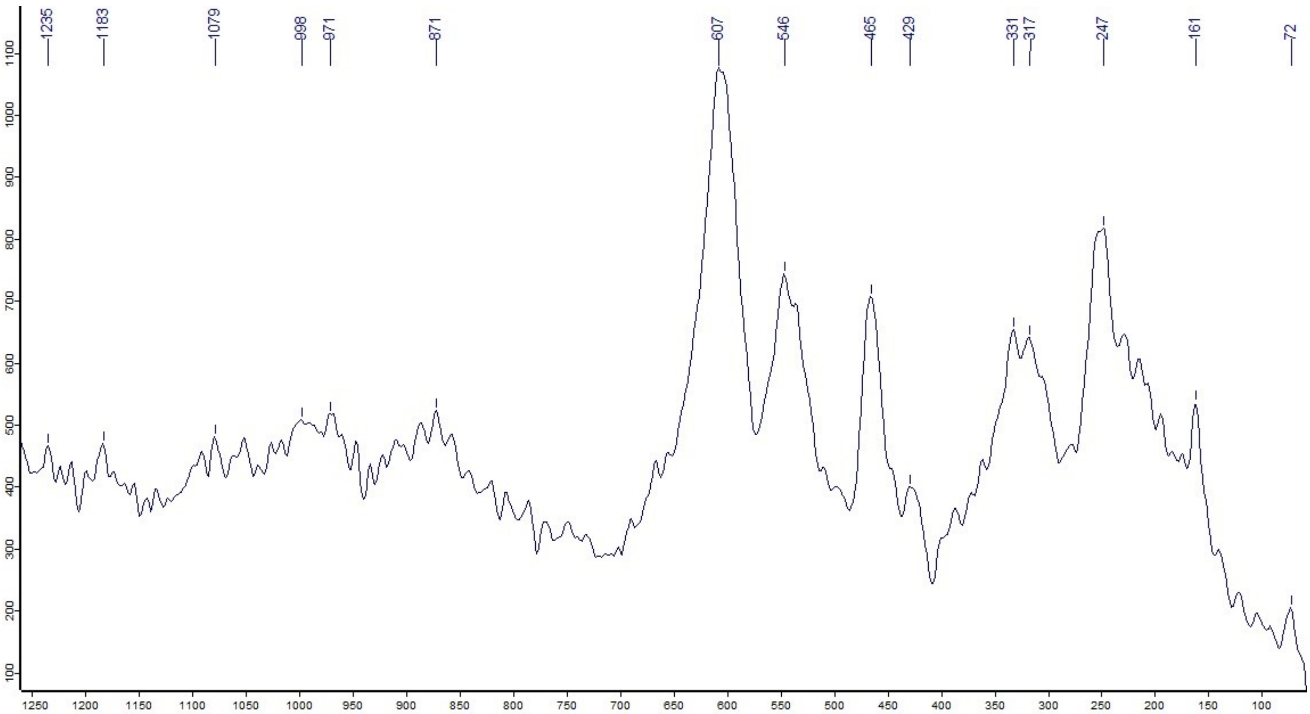


Sample Site 56-A : Stone 2_spectra 1 indicates : Titanite (→ see RRUFF_CS search)

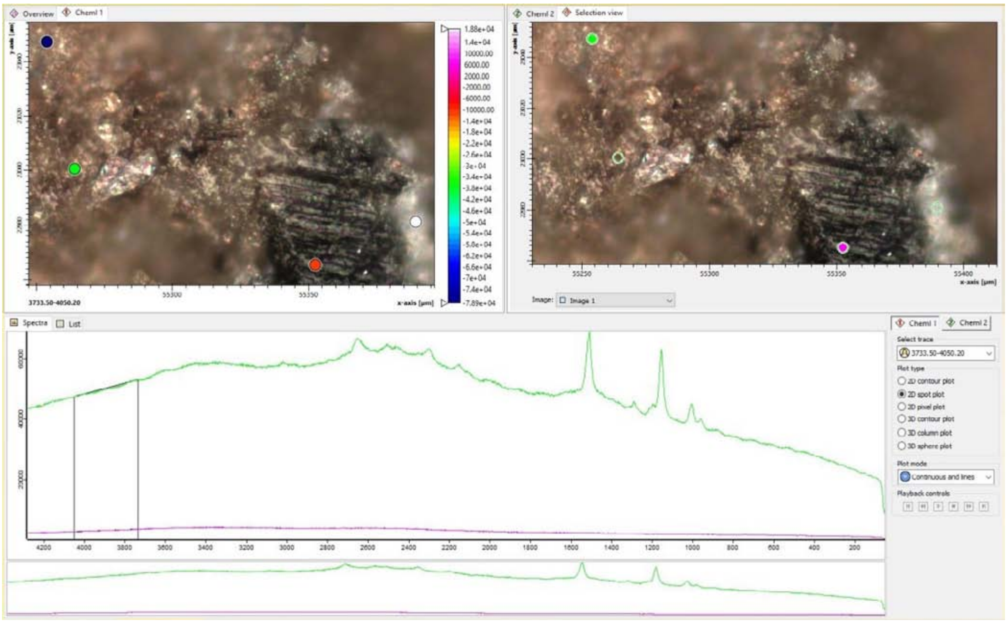


Sample :

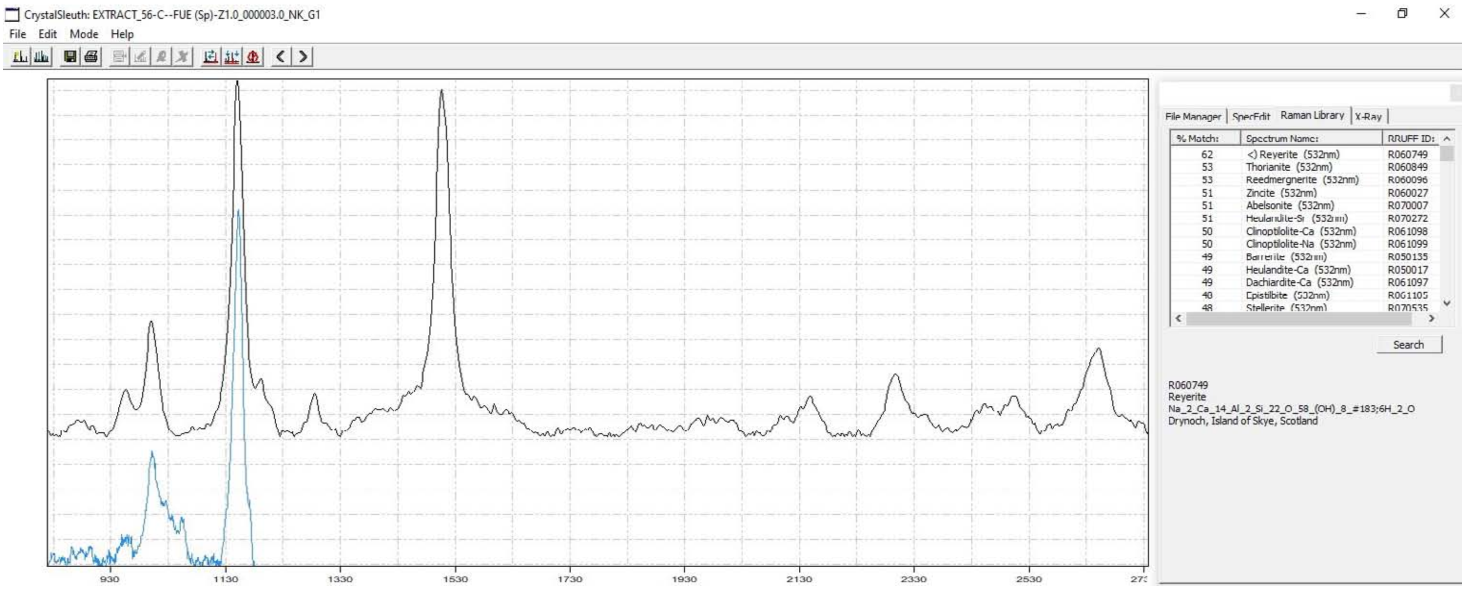


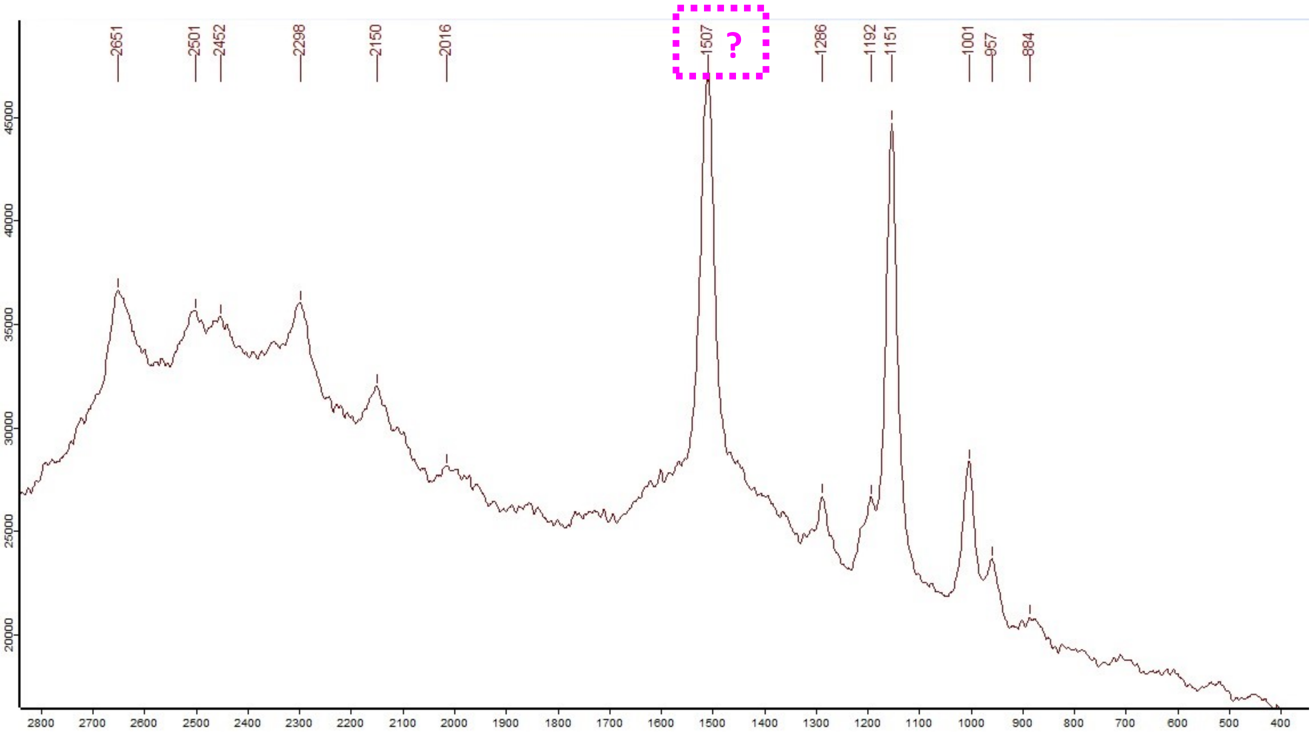


Sample Site 56-C : Stone 1_spectra 1 indicates : Reyerite ? (→ see RRUFF_CS search)

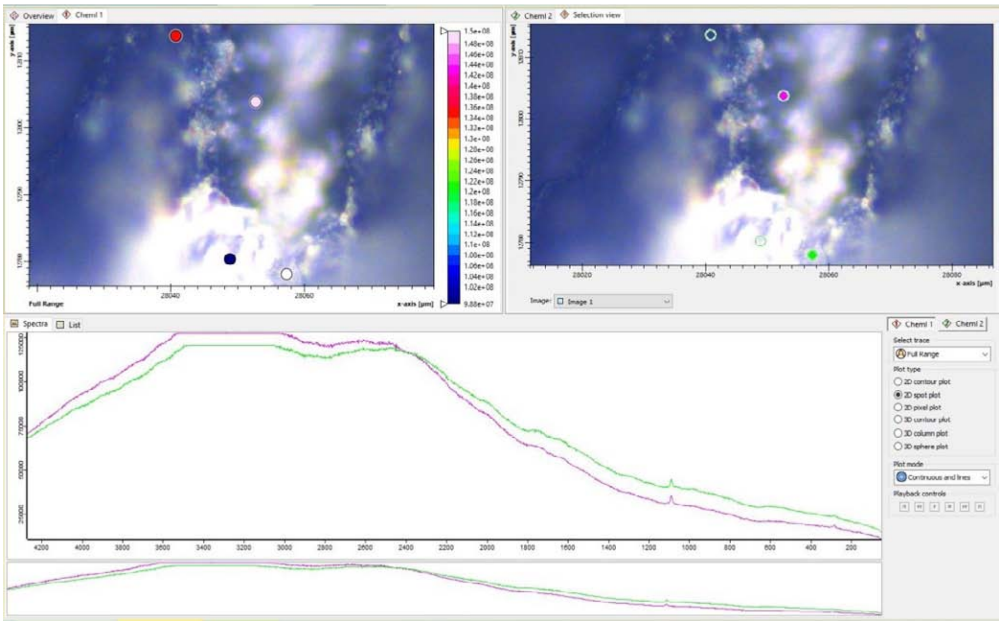


Sample :





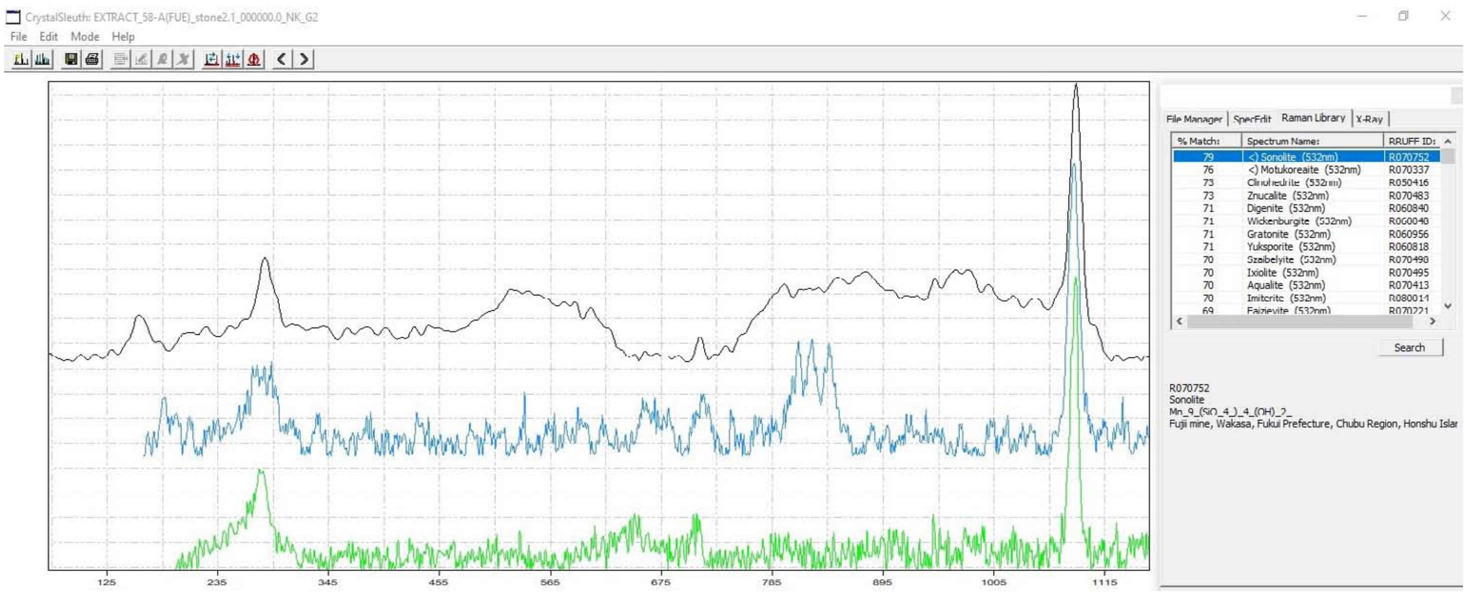
Sample Site 58-A : Stone 2_spectra 1 indicates : Sonolite, Motukoreaite (→ see RRUFF_CS search)



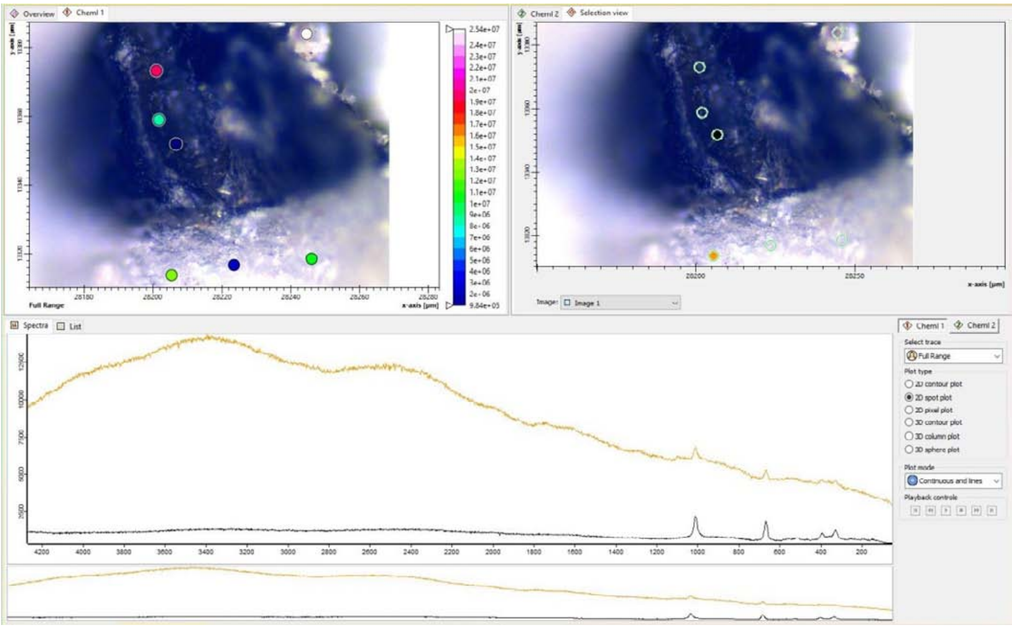
Note :

Motukoreaite is metamorphed (> 100 million year old) ocean sediment, which was metamorphed below 150 Grad into Motukoreaite !

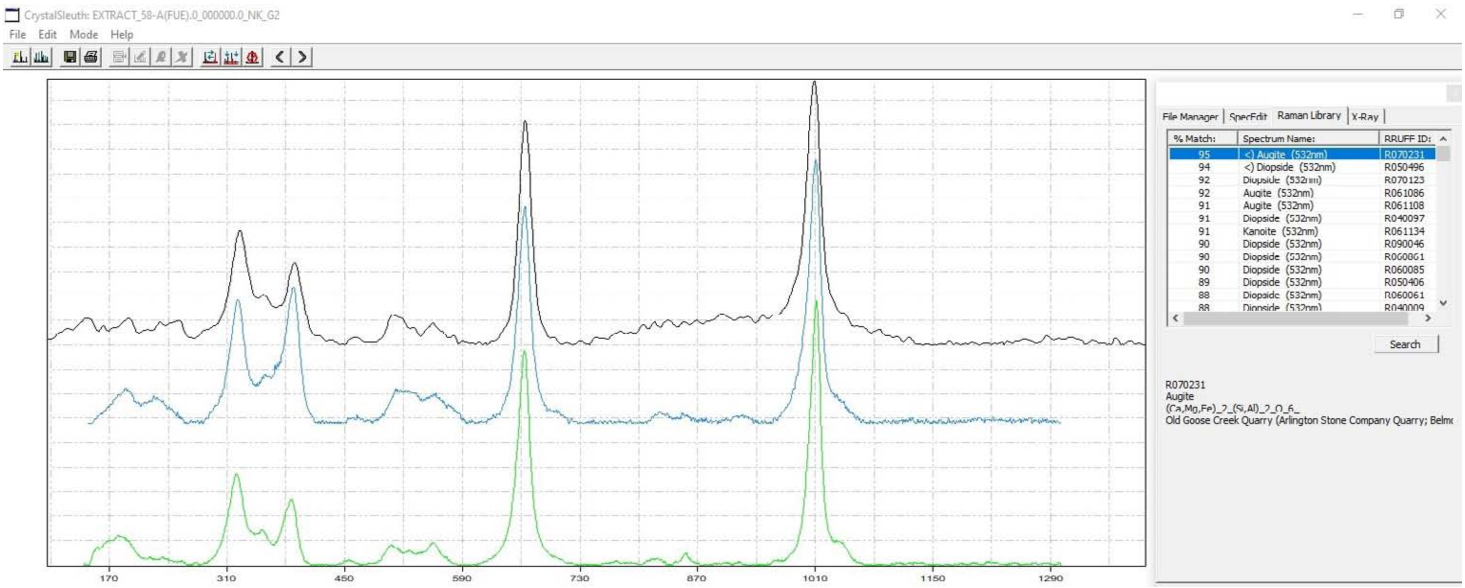
Sample :

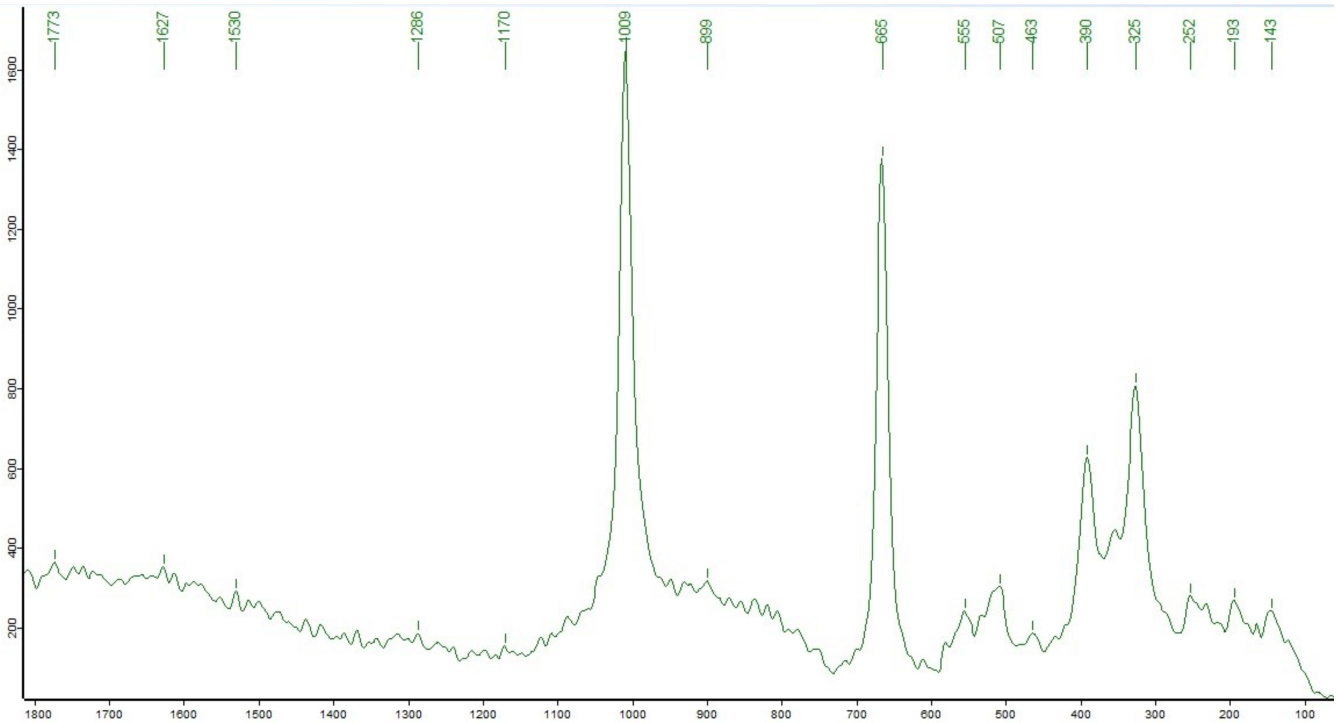


Sample Site 58-A : Stone 1_spectra 1 indicates : Augite, Diopside (→ see RRUFF_CS search)

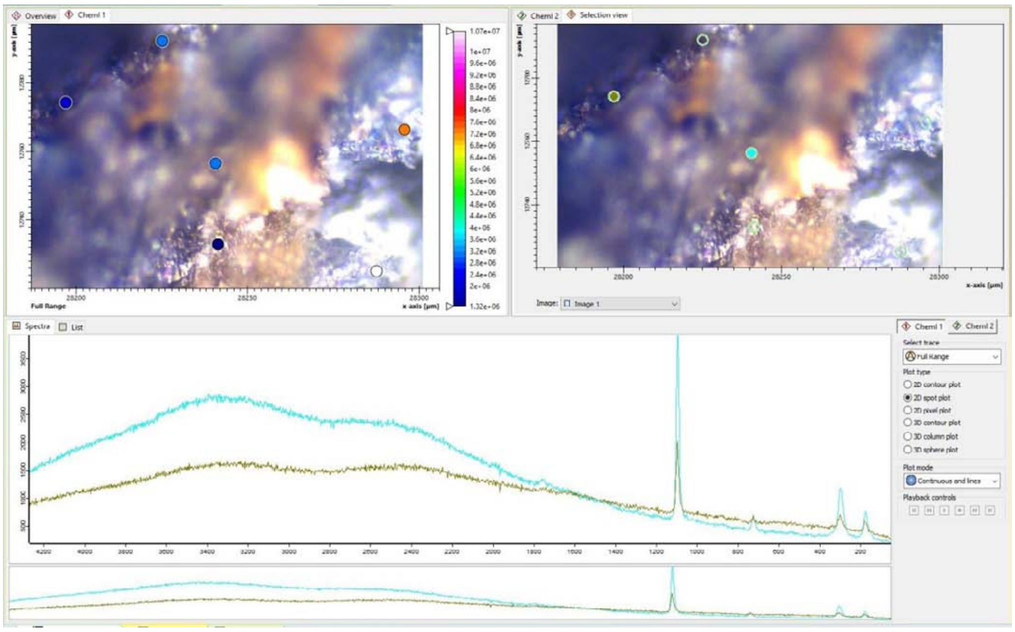


Sample :

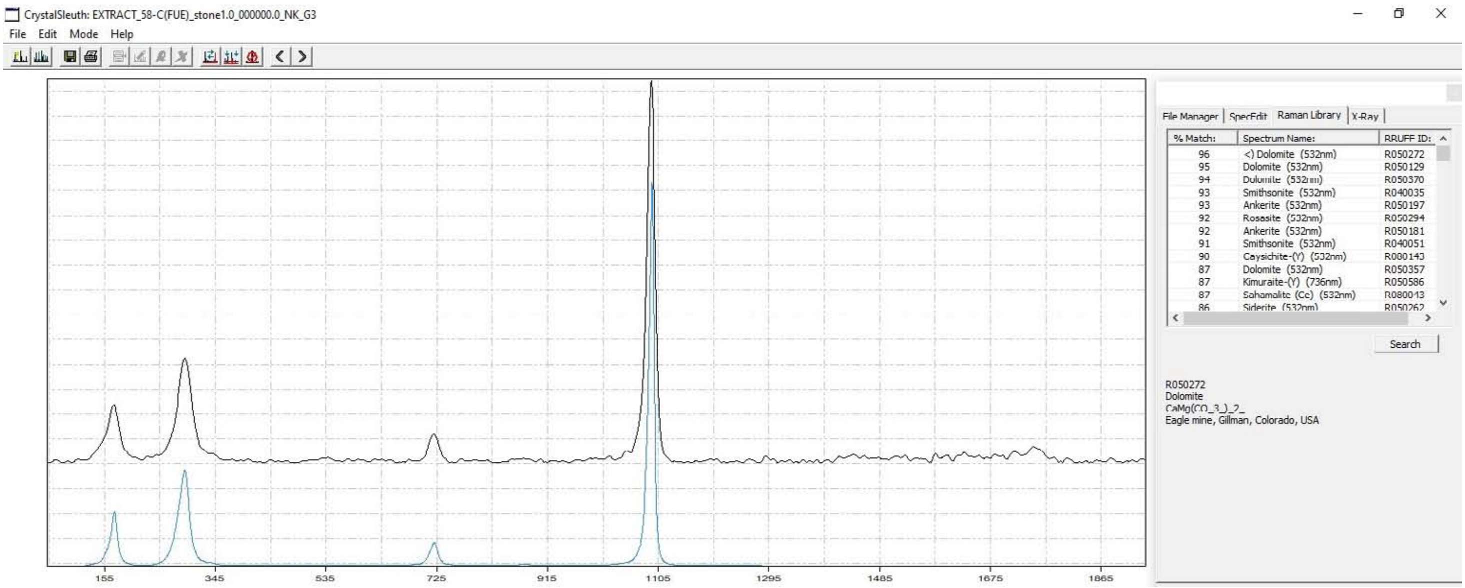


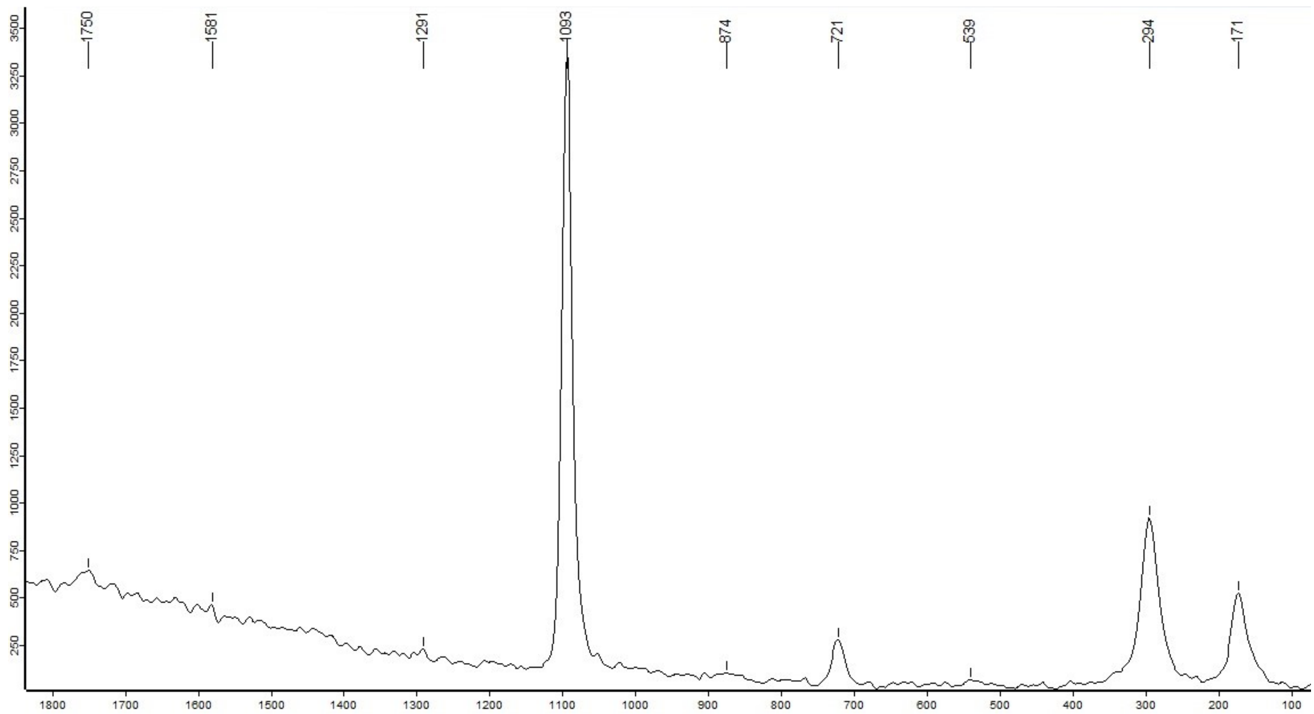


Sample Site 58-C : Stone 1_spectra 1 indicates : Dolomite (→ see RRUFF_CS search)

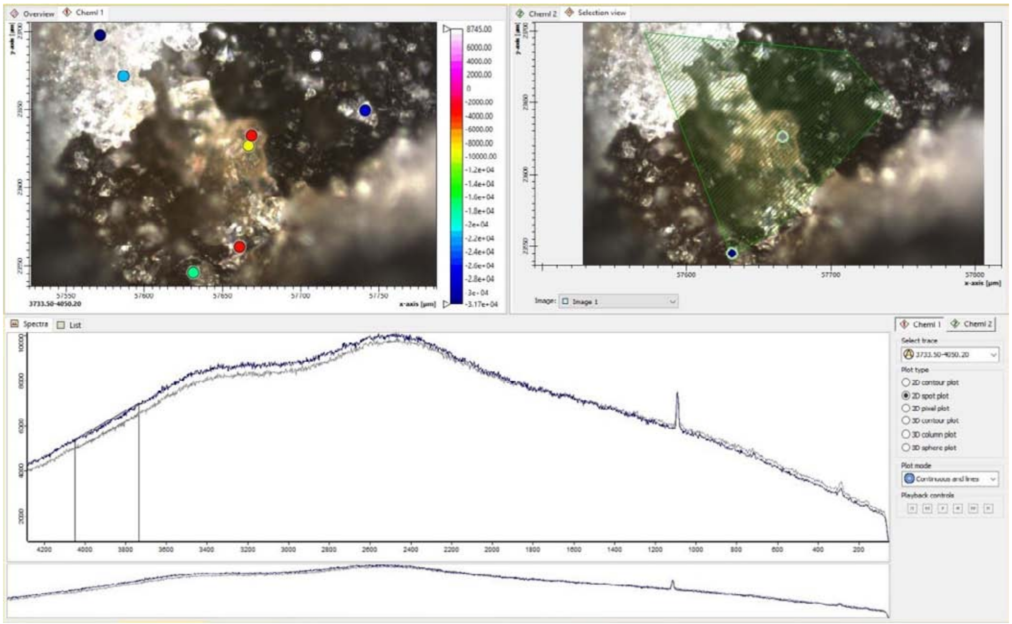


Sample :



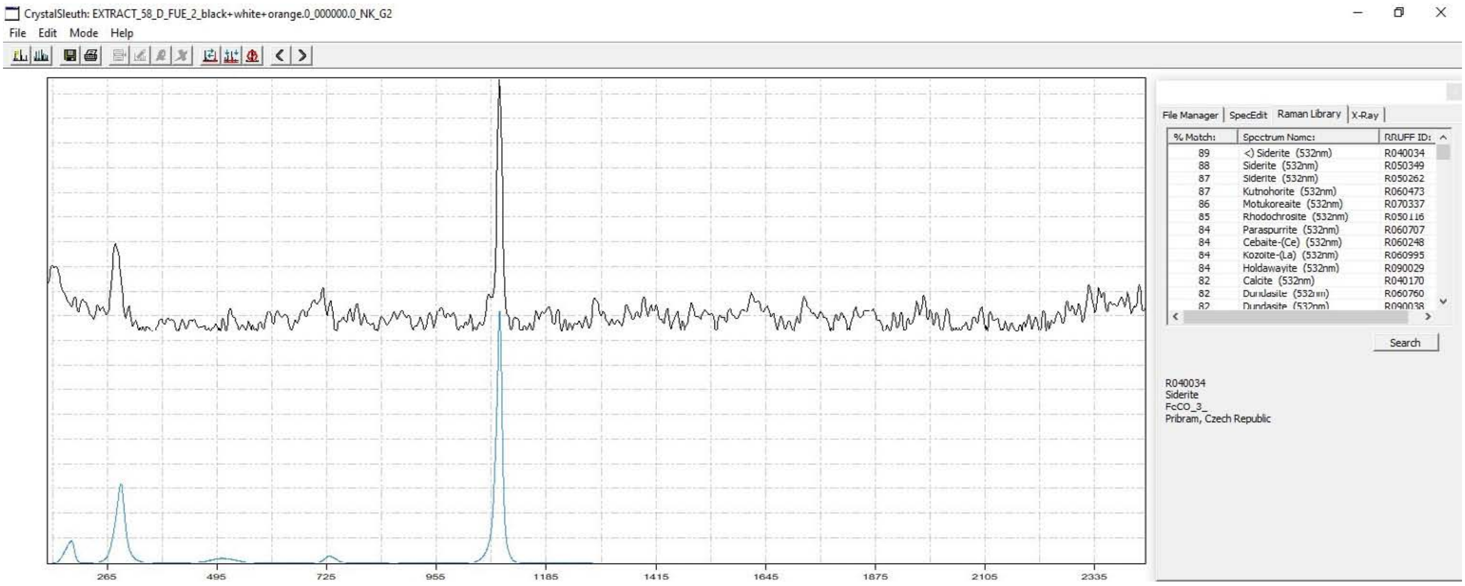


Sample Site 58-D : Stone 1_spectra 1 indicates : Siderite (→ see RRUFF_CS search)

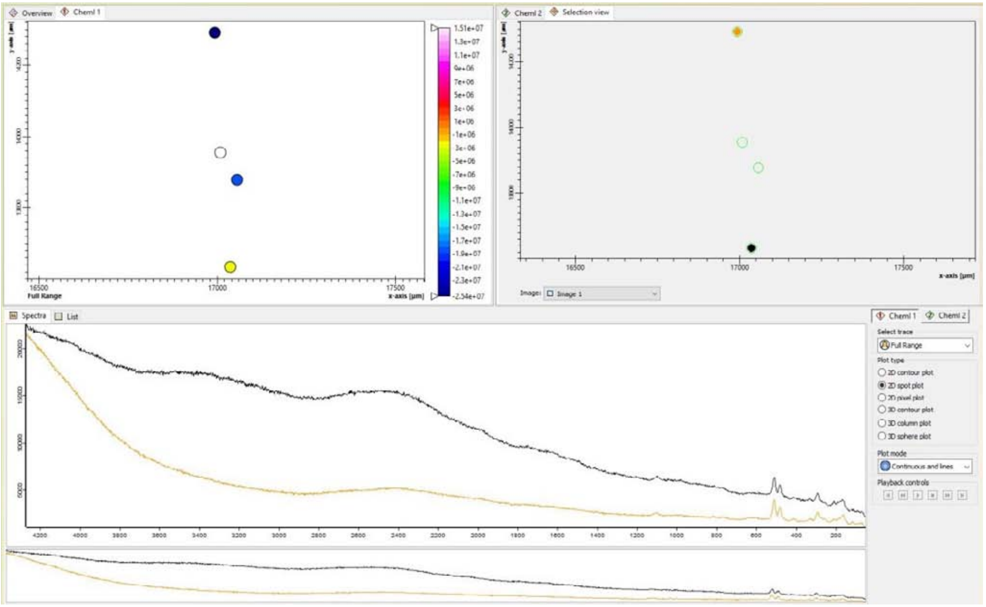


Note : Iron-bearer mineral

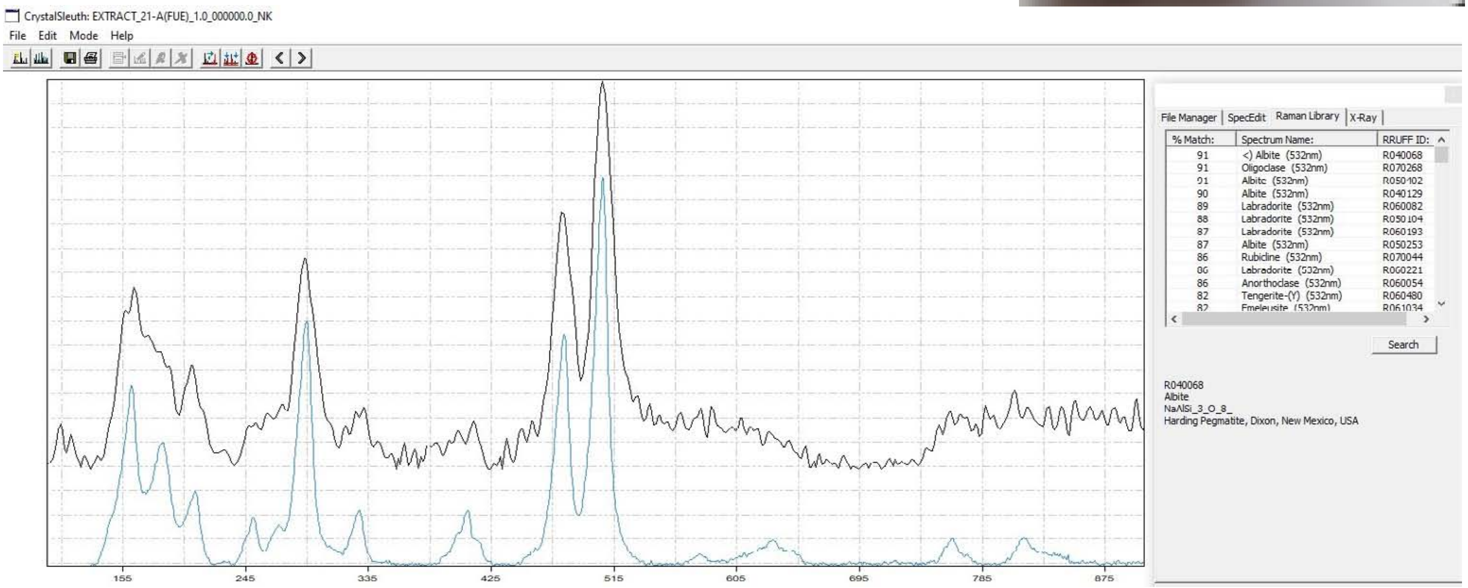
Sample :

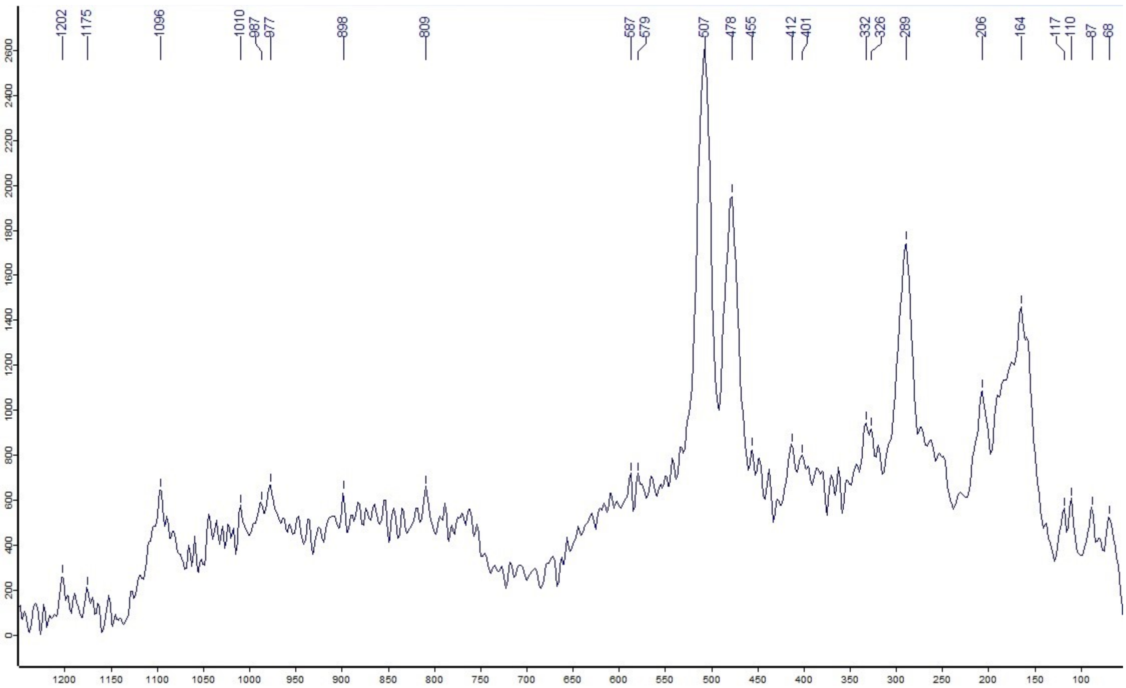


Sample Site 21-A : Stone 01_spectra 1 indicates : Albite, Oligoclase (→ see RRUFF_CS results)

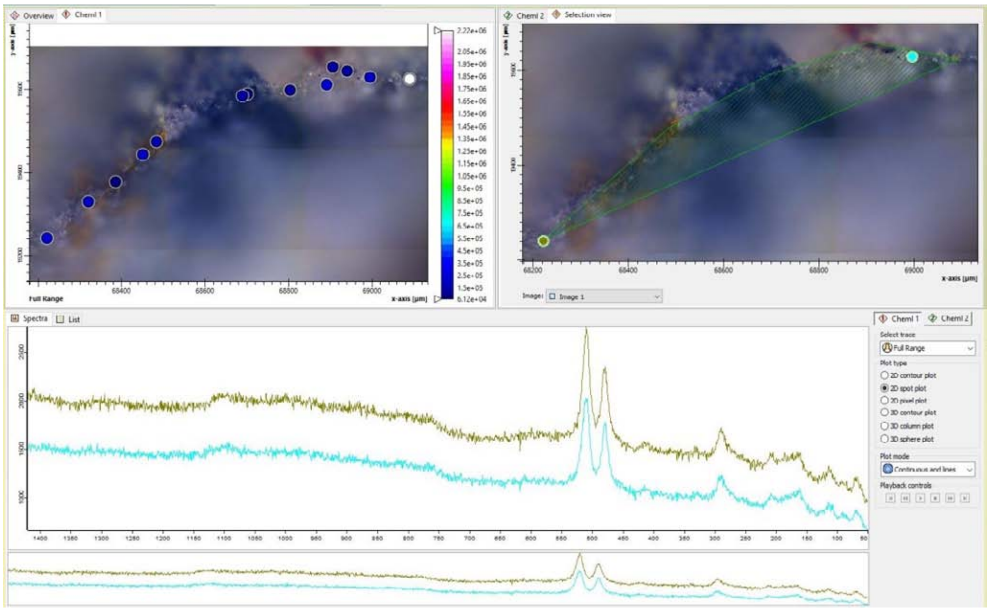


Sample :

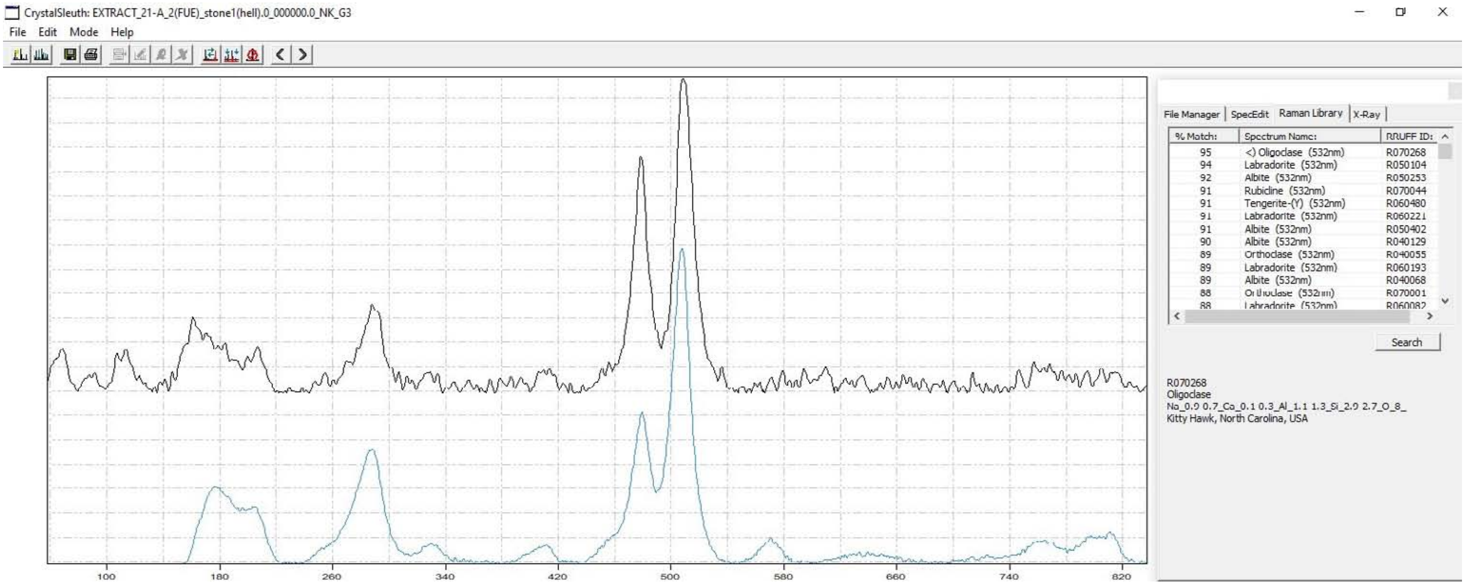


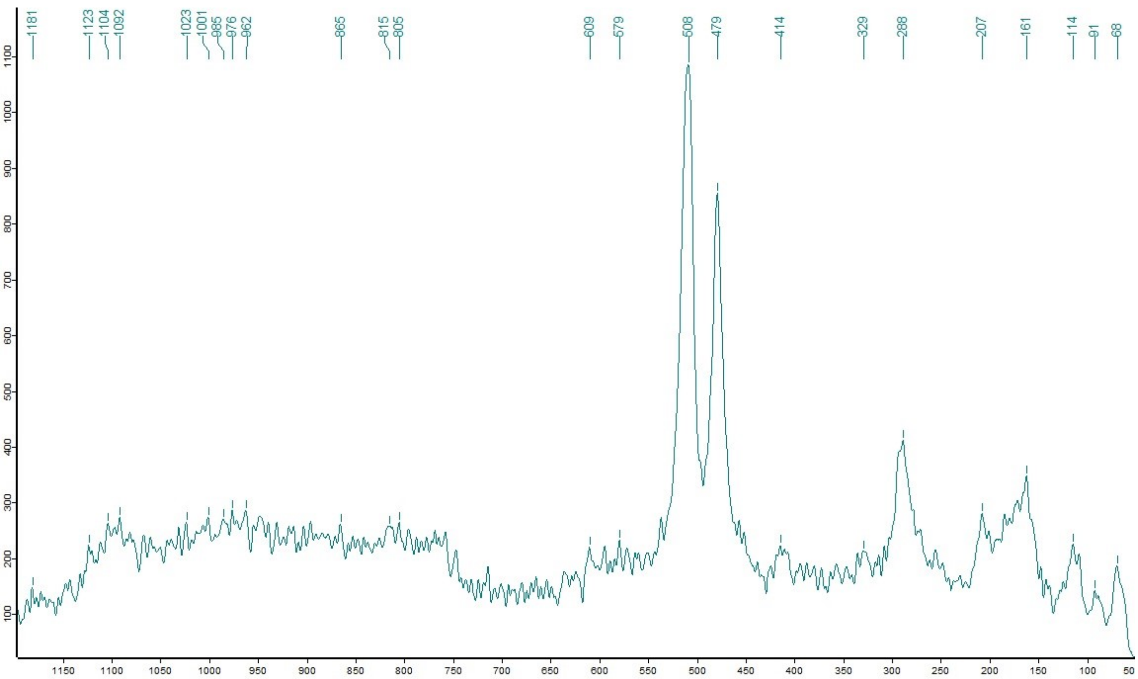


Sample Site 21-A : Stone 1_spectra 2 (white mineral) indicates : Oligoclase Labradorite (→ see RRUFF_CS)

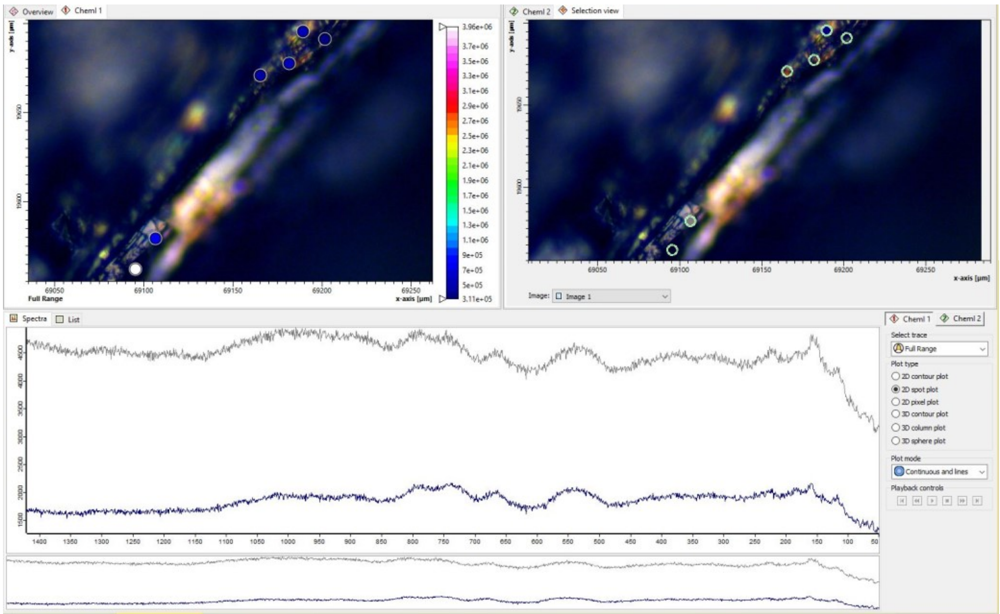


Sample :

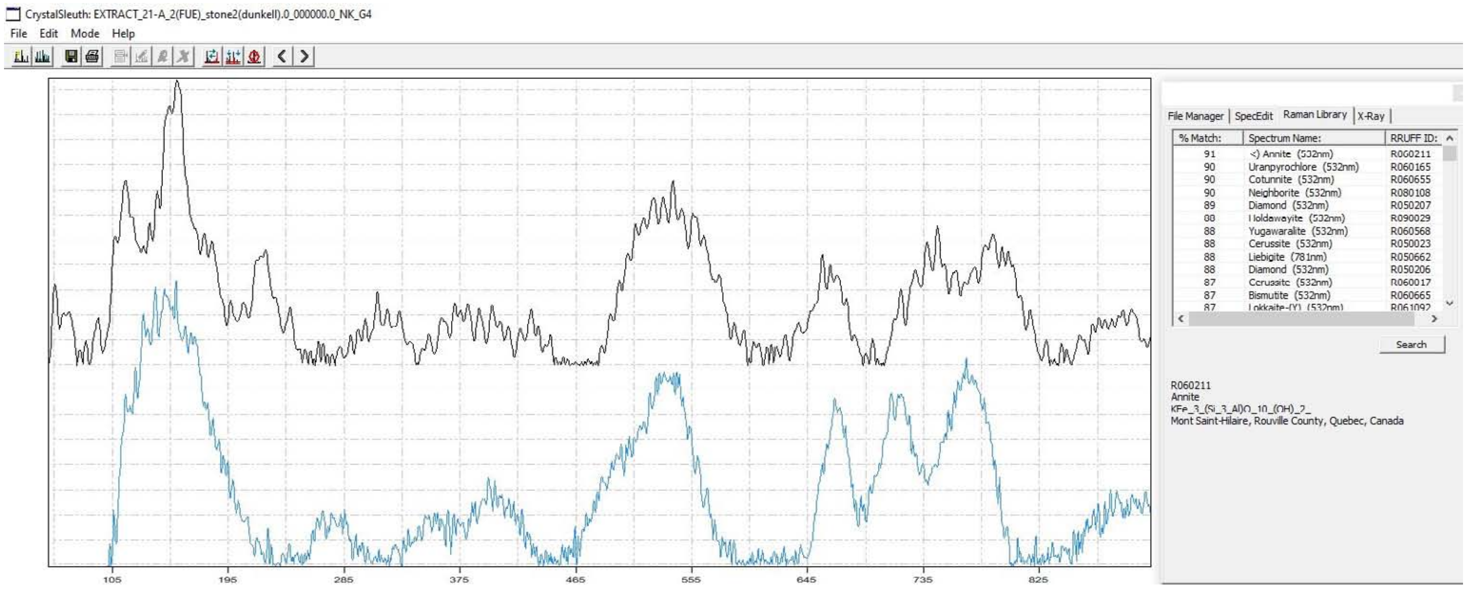


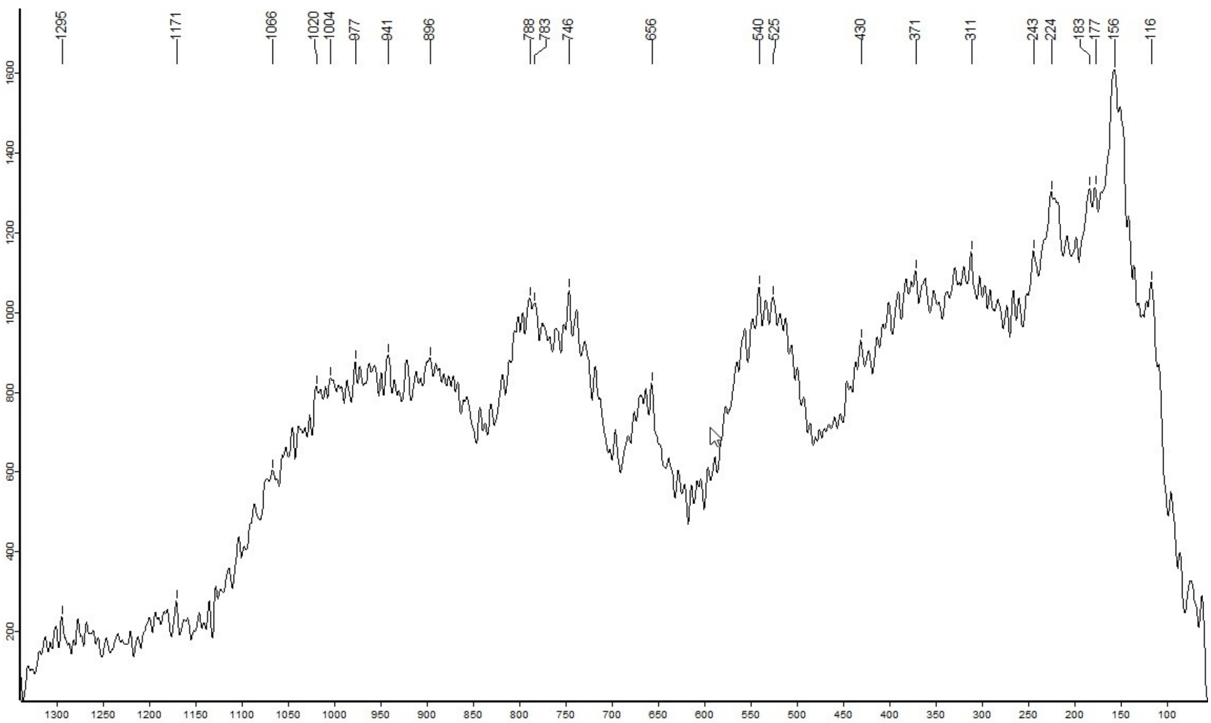


Sample Site 21-A : Stone 2_spectra 1 (dark mineral) indicates : Annite (→ see RRUFF_CS)

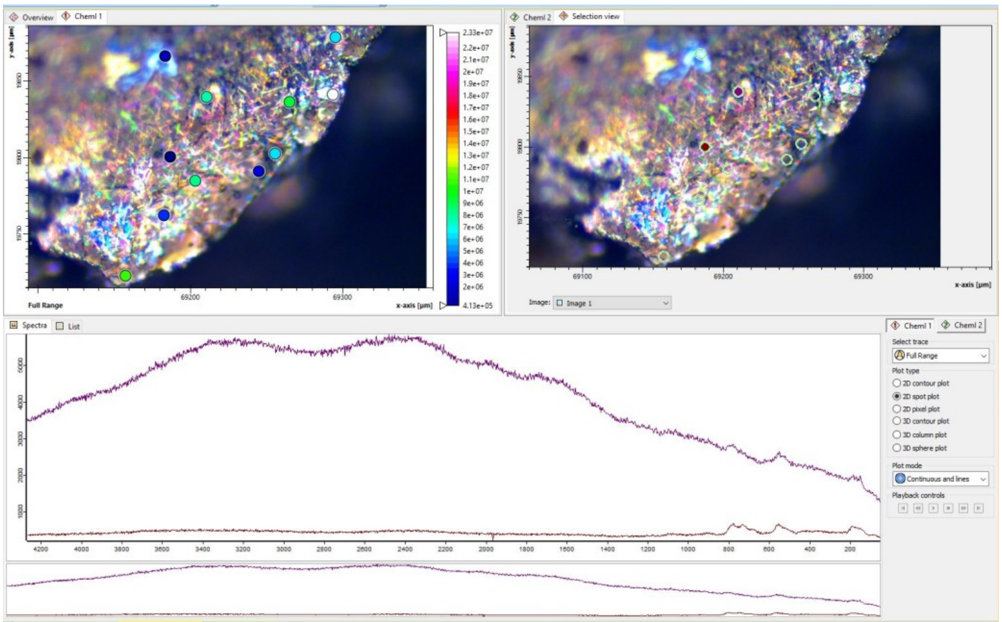


Sample :

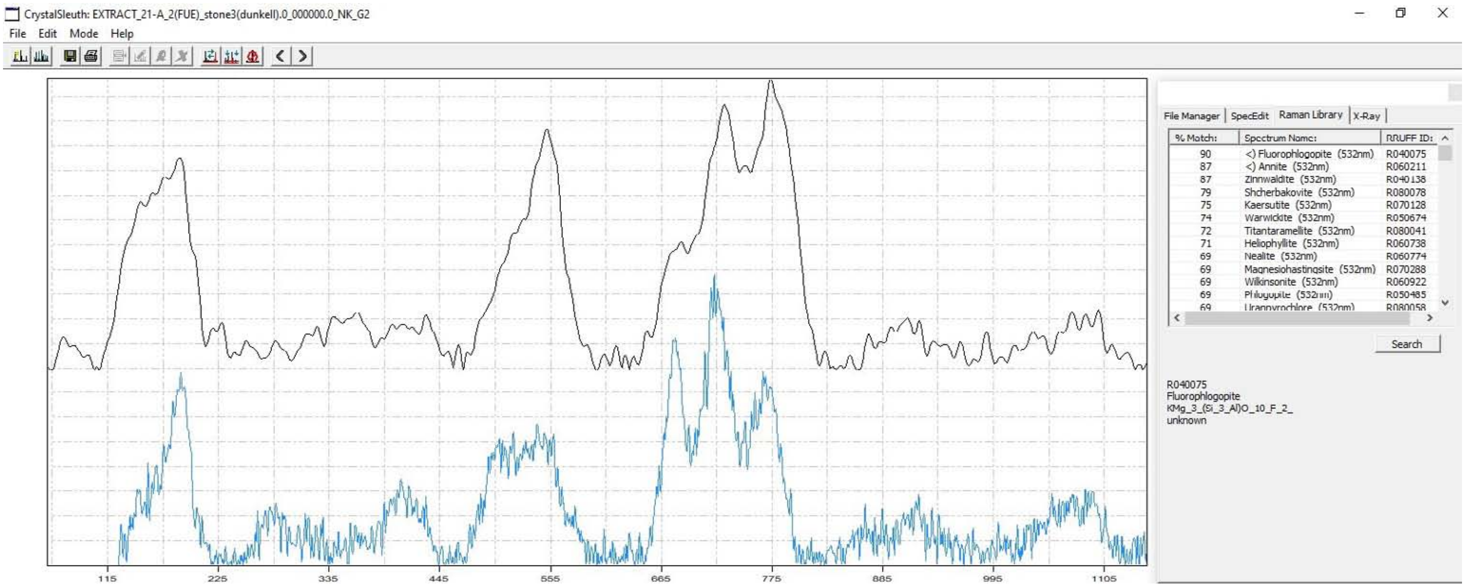


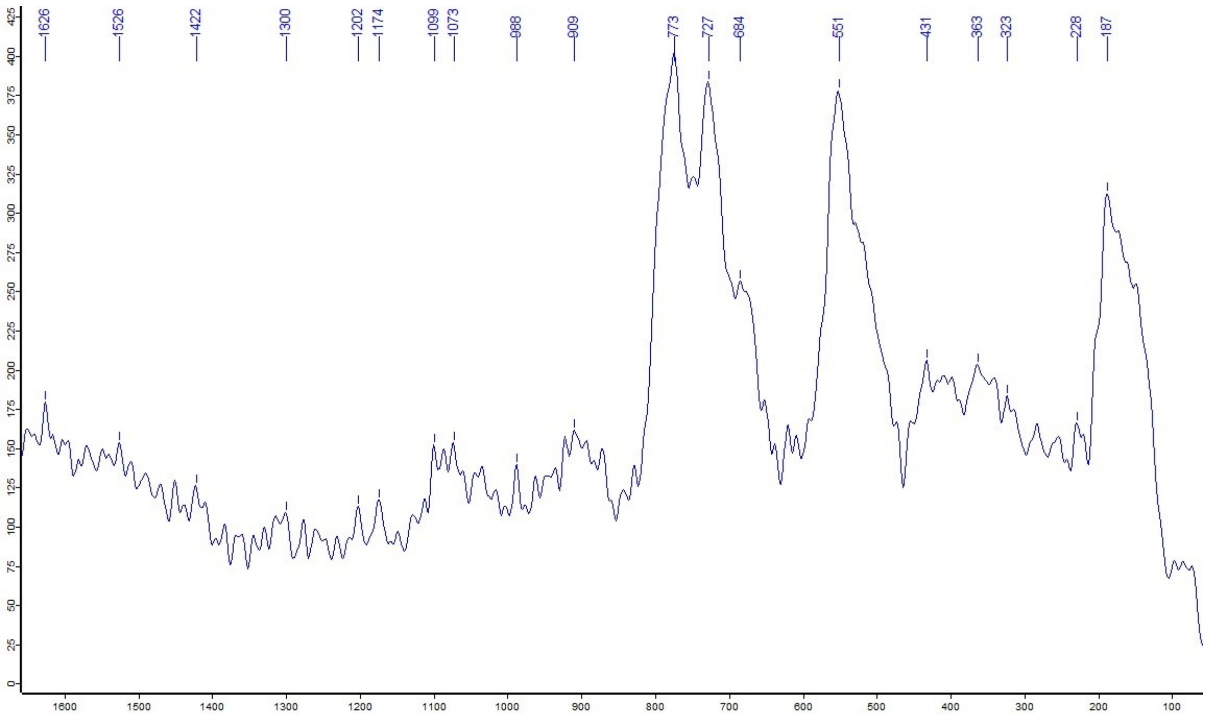


Sample Site 21-A : Stone 3_spectra 1 (dark mineral) indicates : Fluorophlogopite (→ see RRUFF_CS)

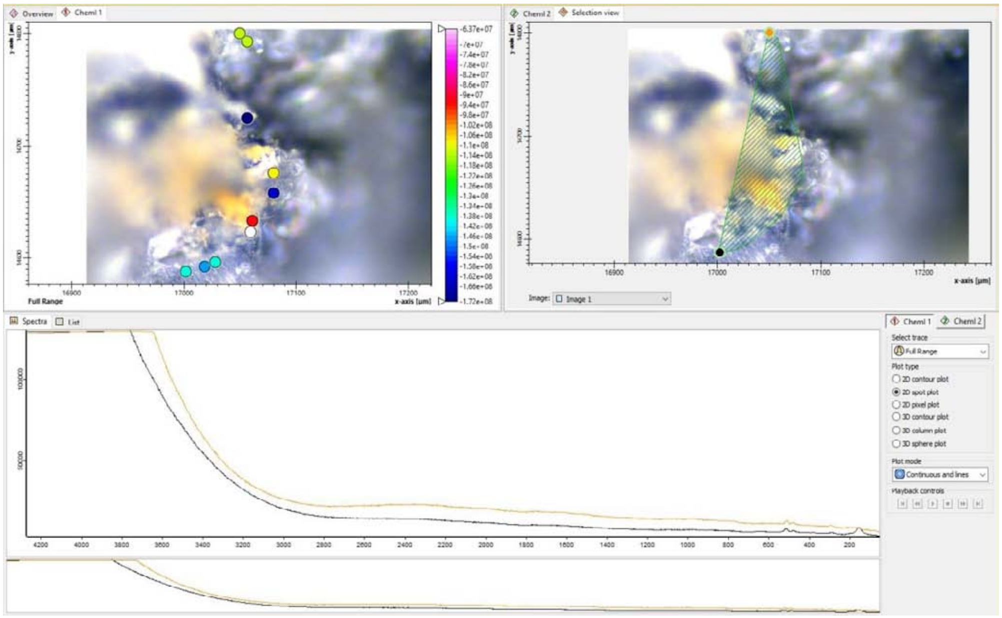


Sample :

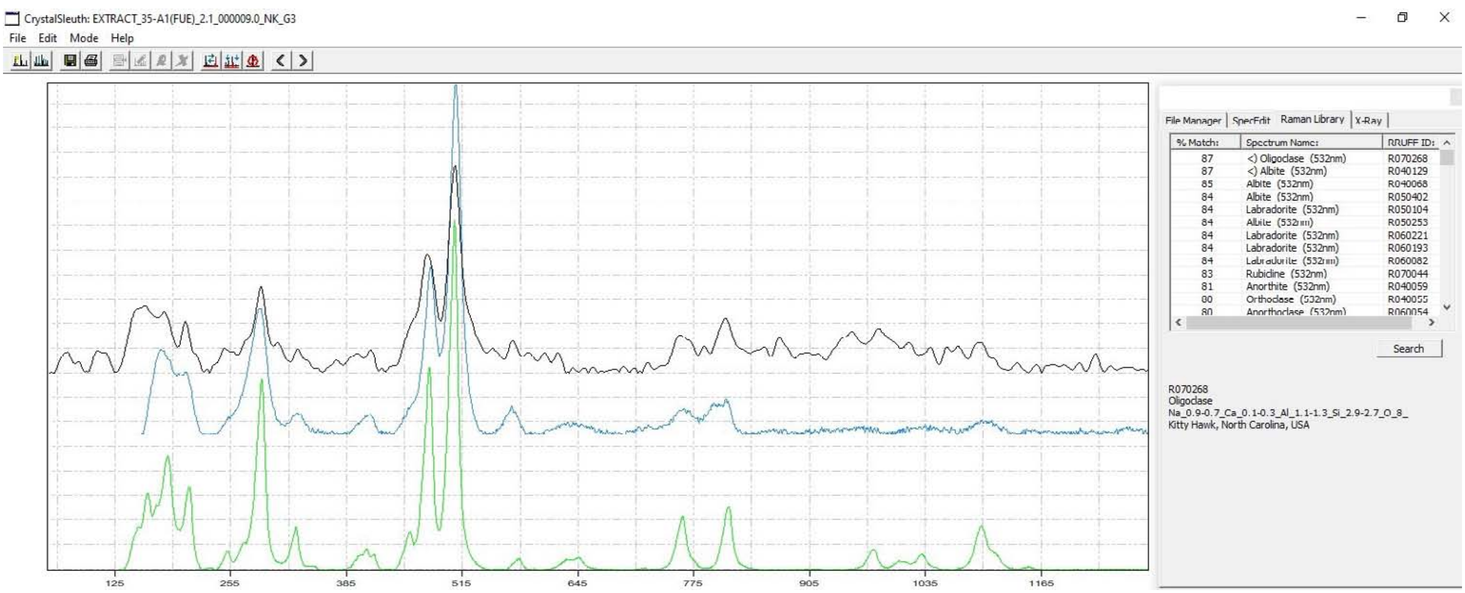


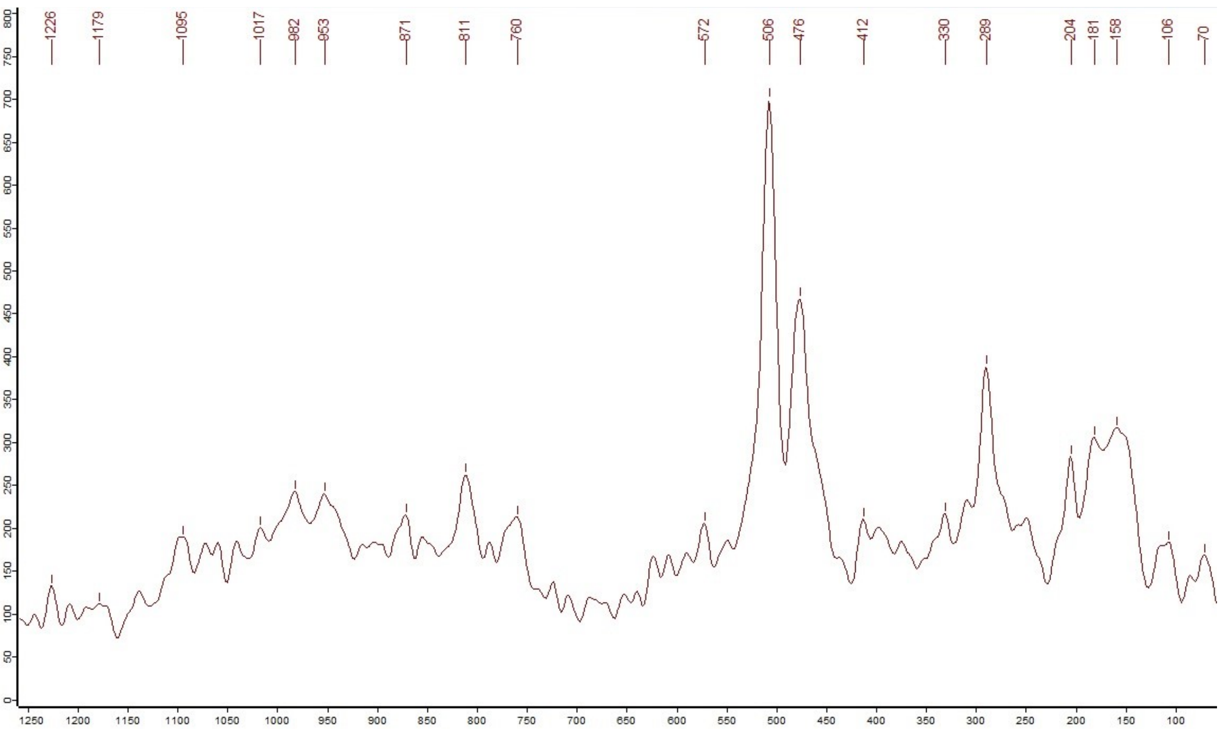


Sample Site 35-A : Stone 1_spectra 4 indicates : Oligoclase, Albite (→ see RRUFF_CS search)

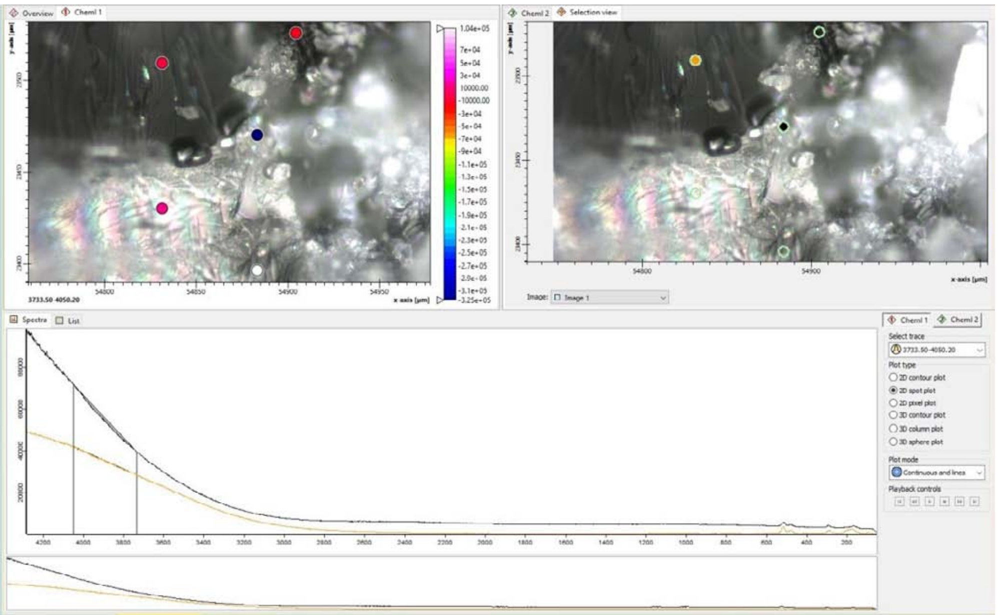


Sample :

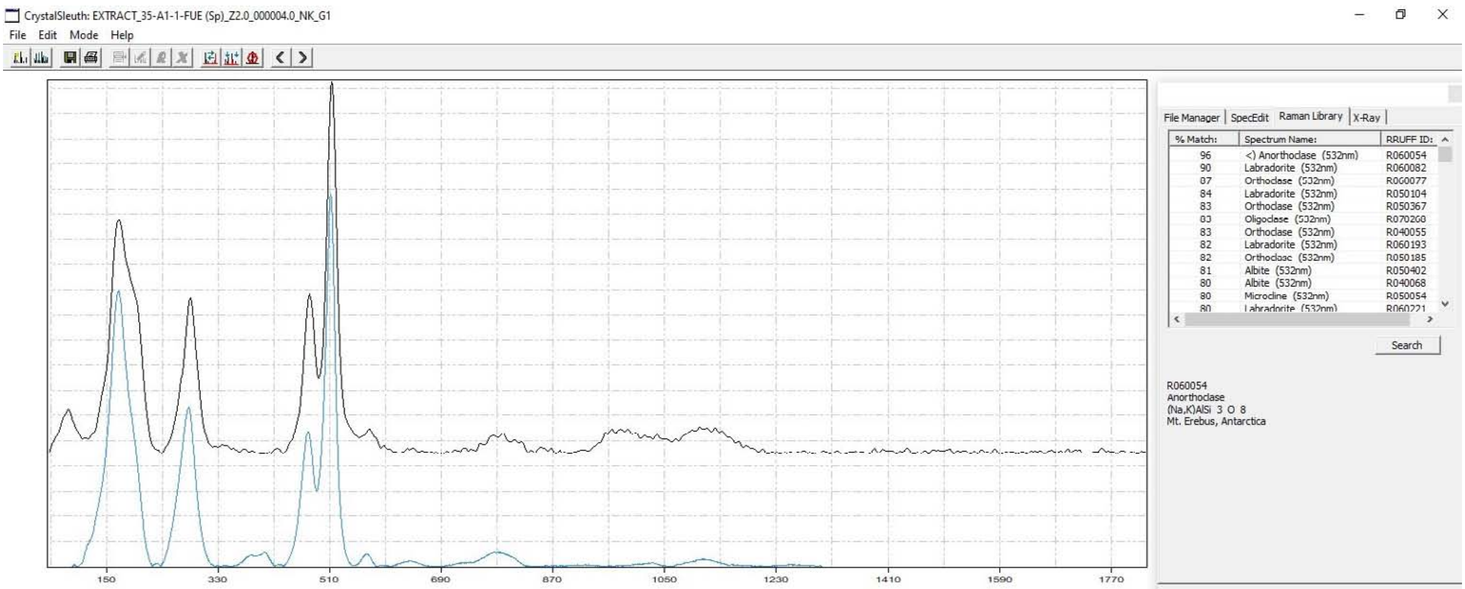


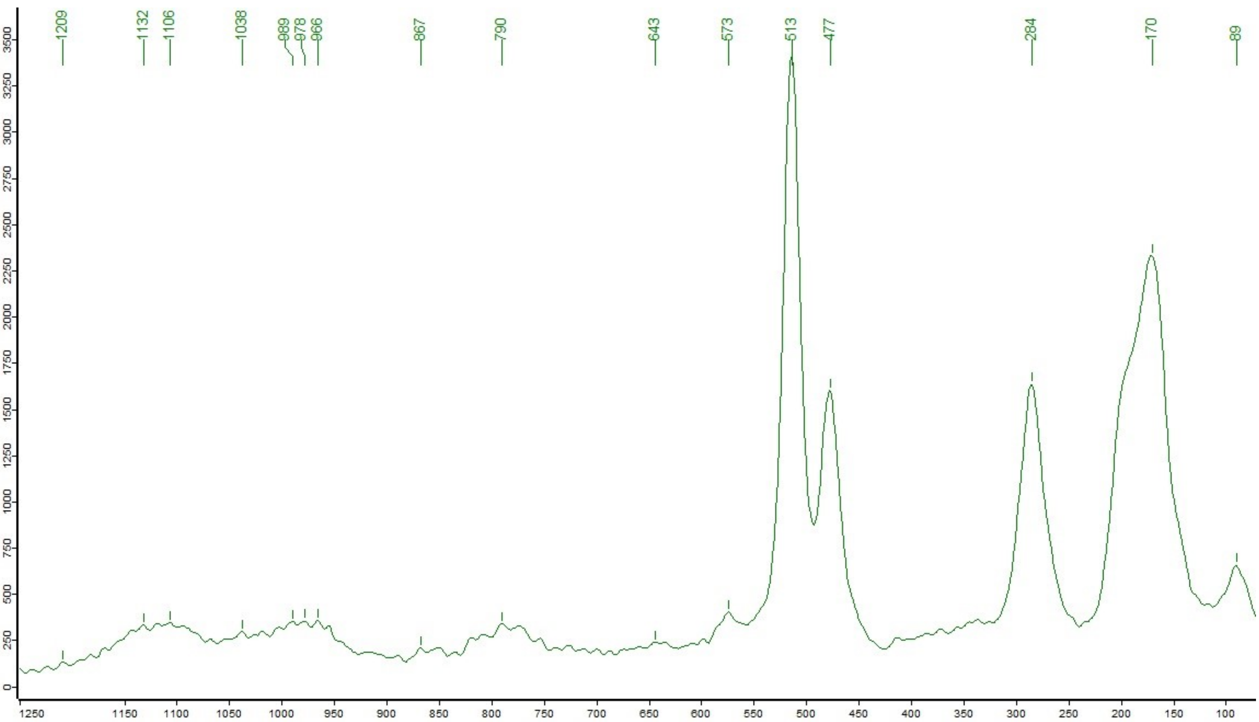


Sample Site 35-A : Stone 1_spectra 5 indicates : Anorthoclase, Labradorite (→ see RRUFF_CS search)

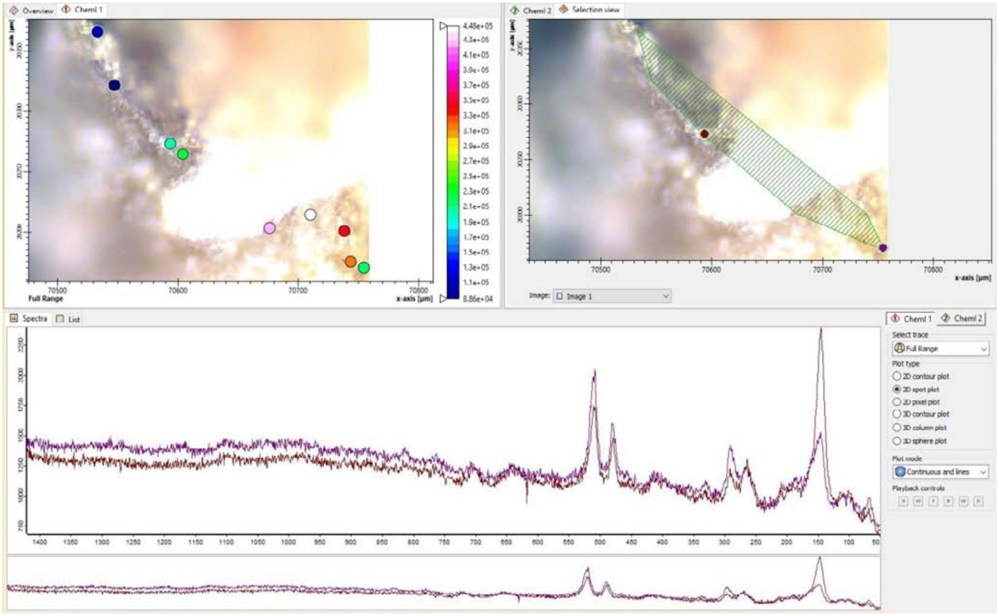


Sample :

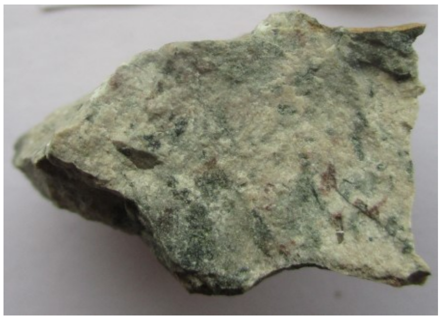


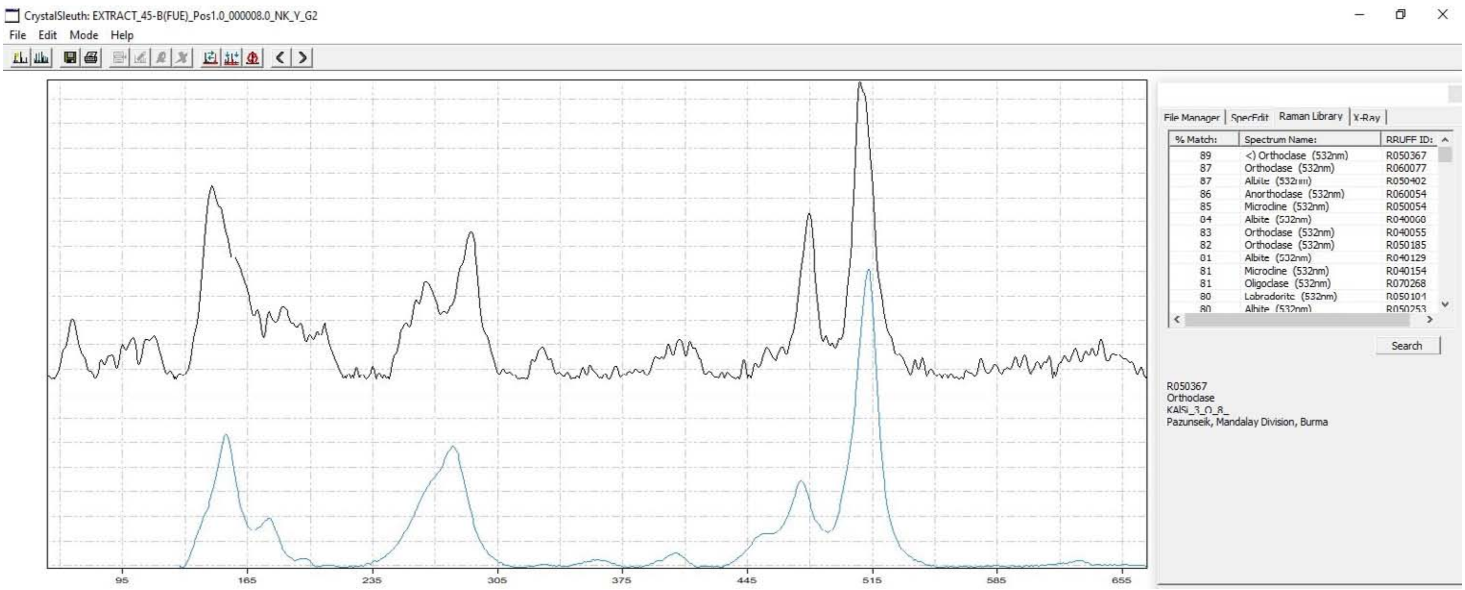


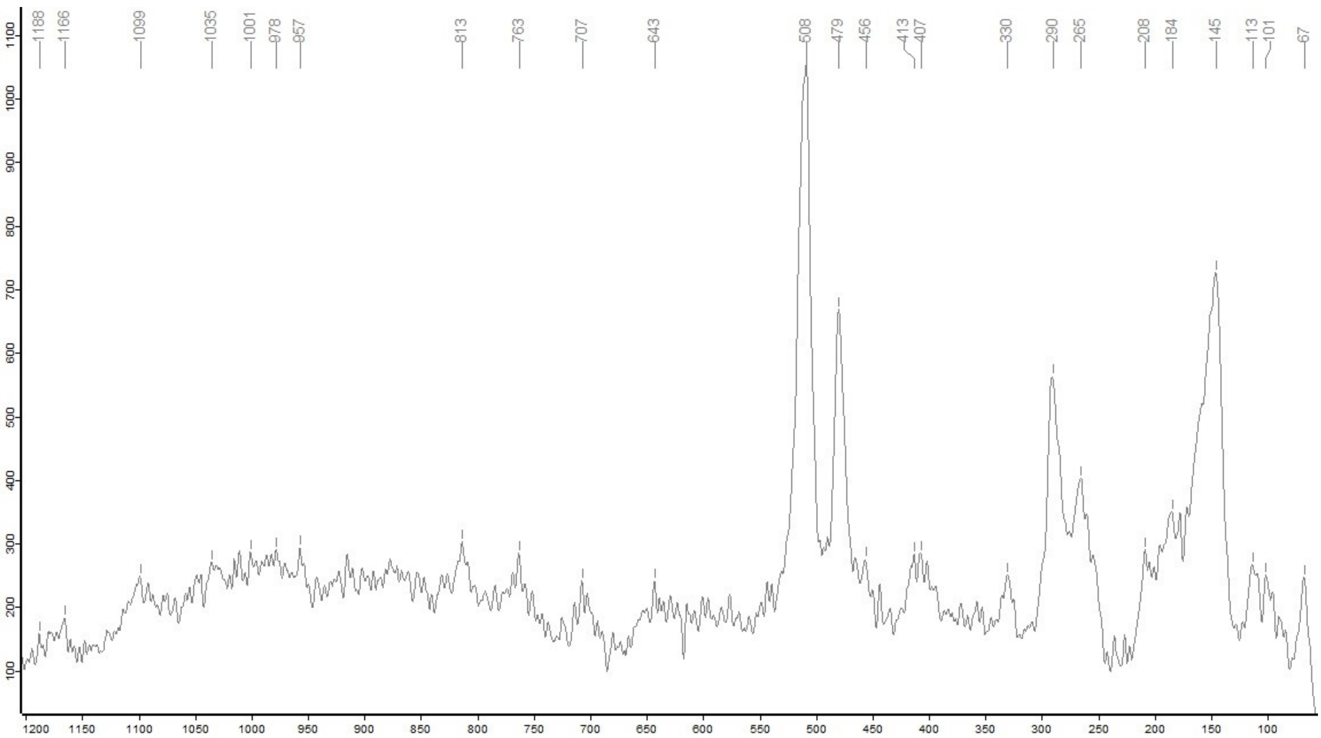
Sample Site 45-B : Stone 1_spectra 2 indicates : Orthoclase (→ see RRUFF_CS search)



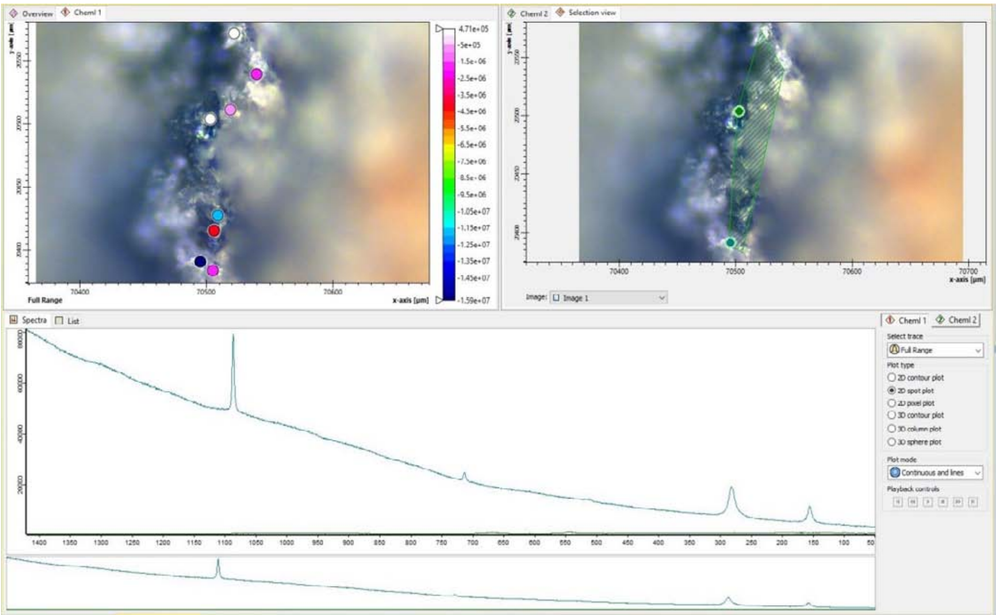
Sample :



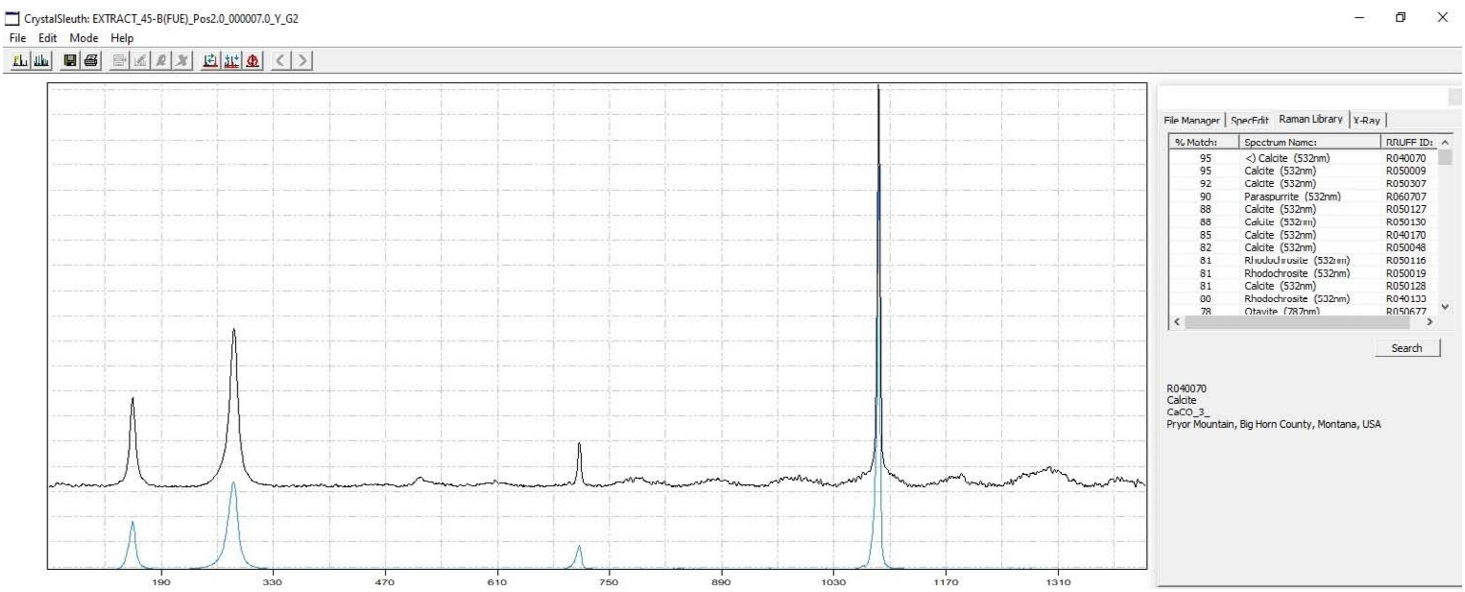


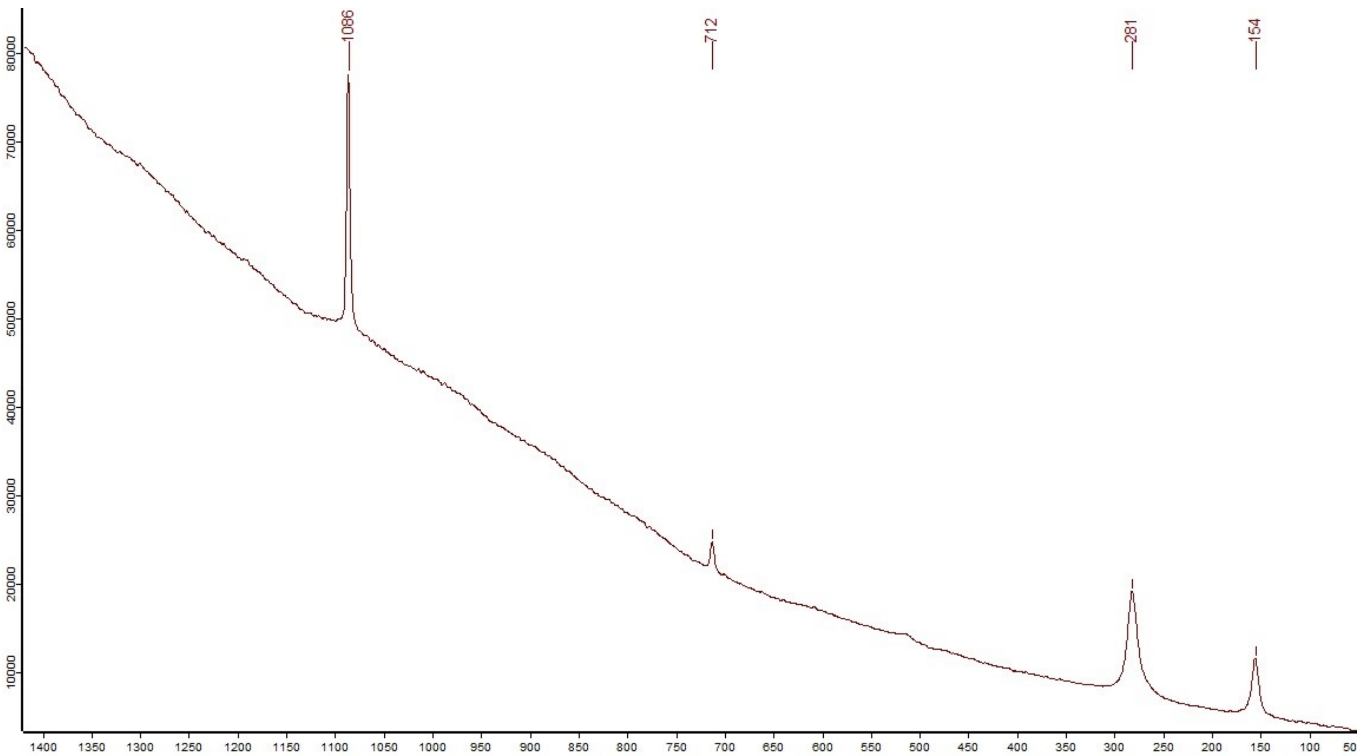


Sample Site 45-B : Stone 1_spectra 3 indicates : Calcite (→ see RRUFF_CS search)

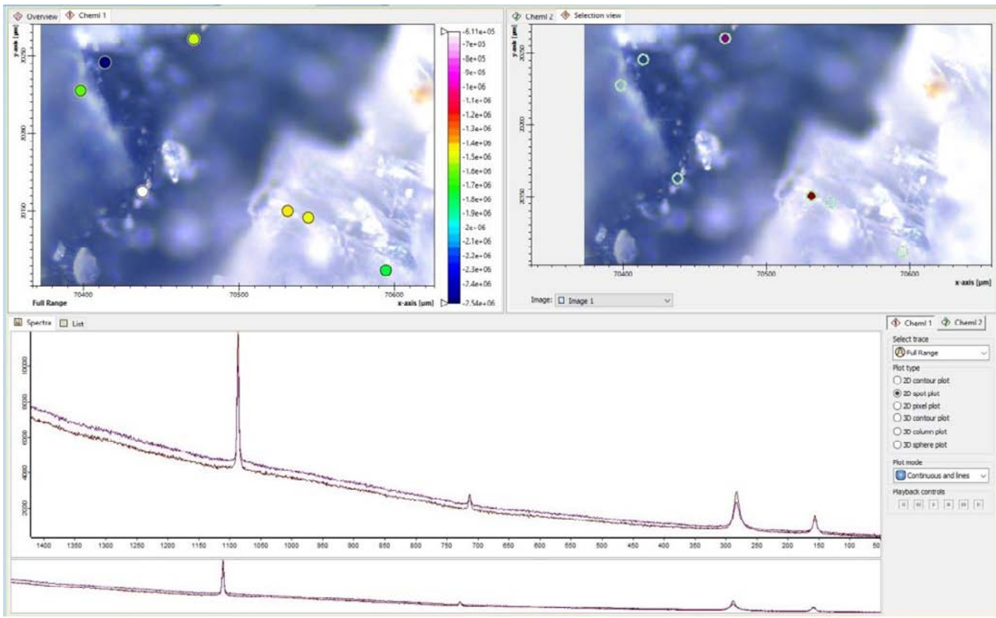


Sample :



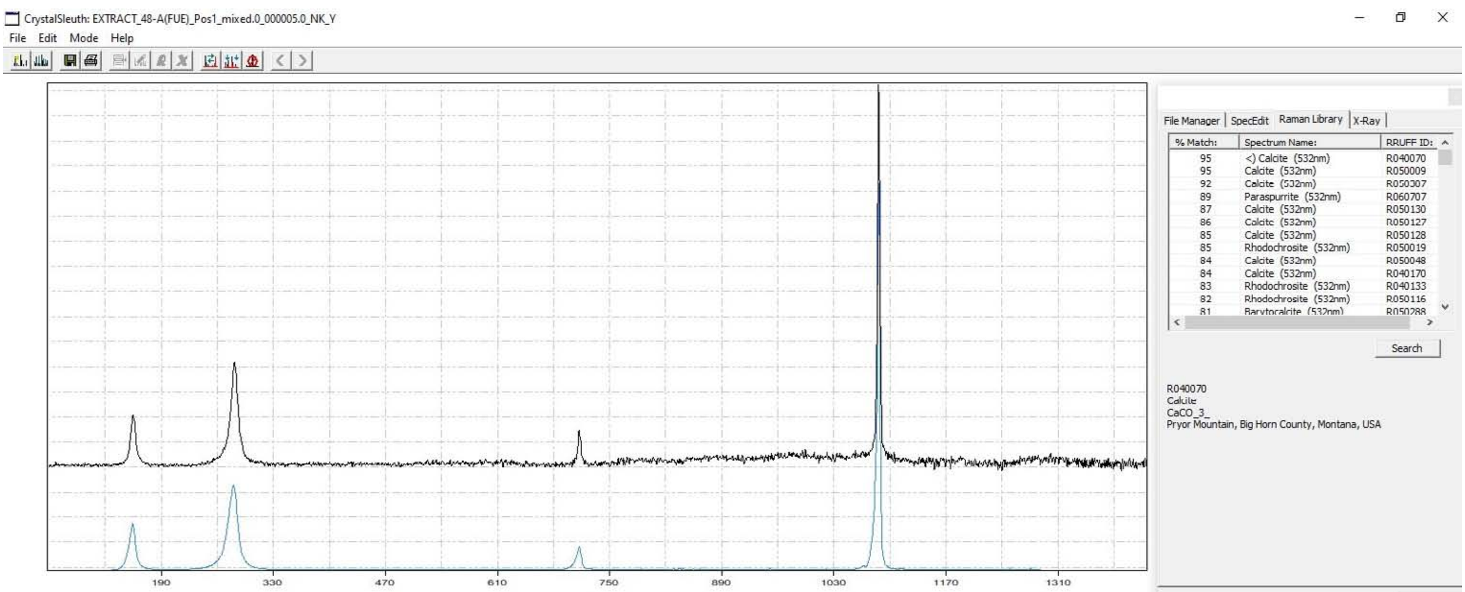


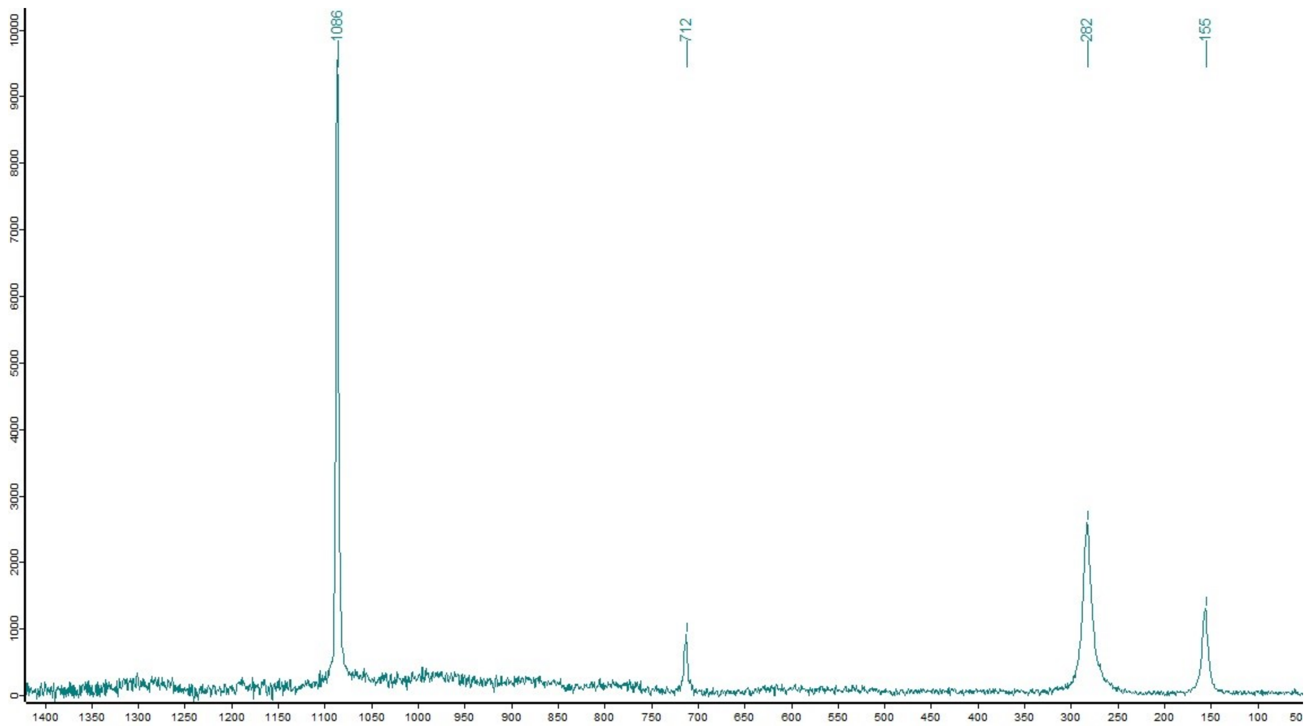
Sample Site 48-A : Stone 1_spectra 1 indicates : Calcite (→ see RRUFF_CS search)



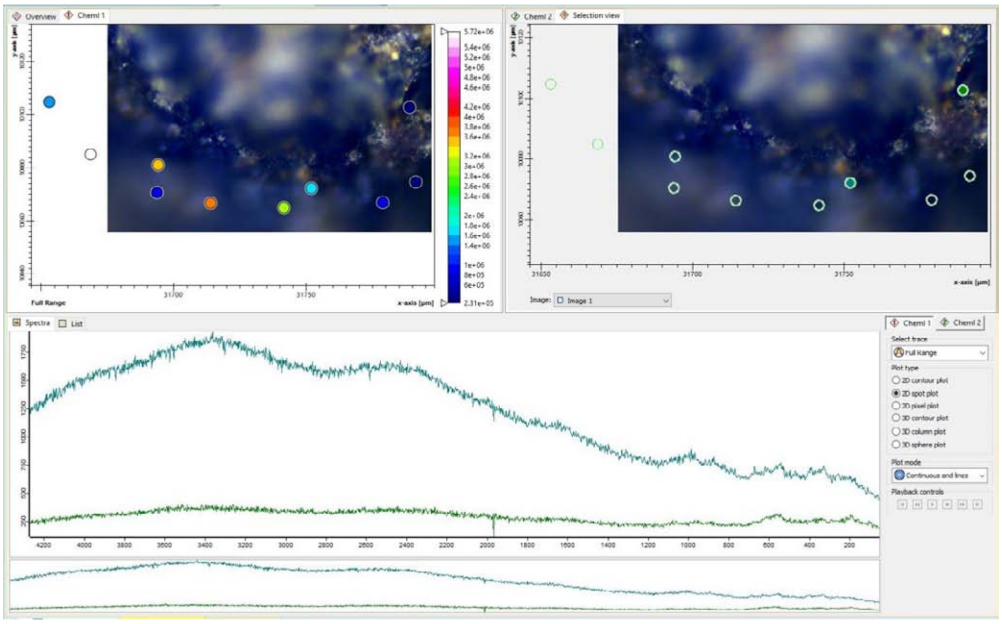
Sample Site : Ajuy Beach

Sample :

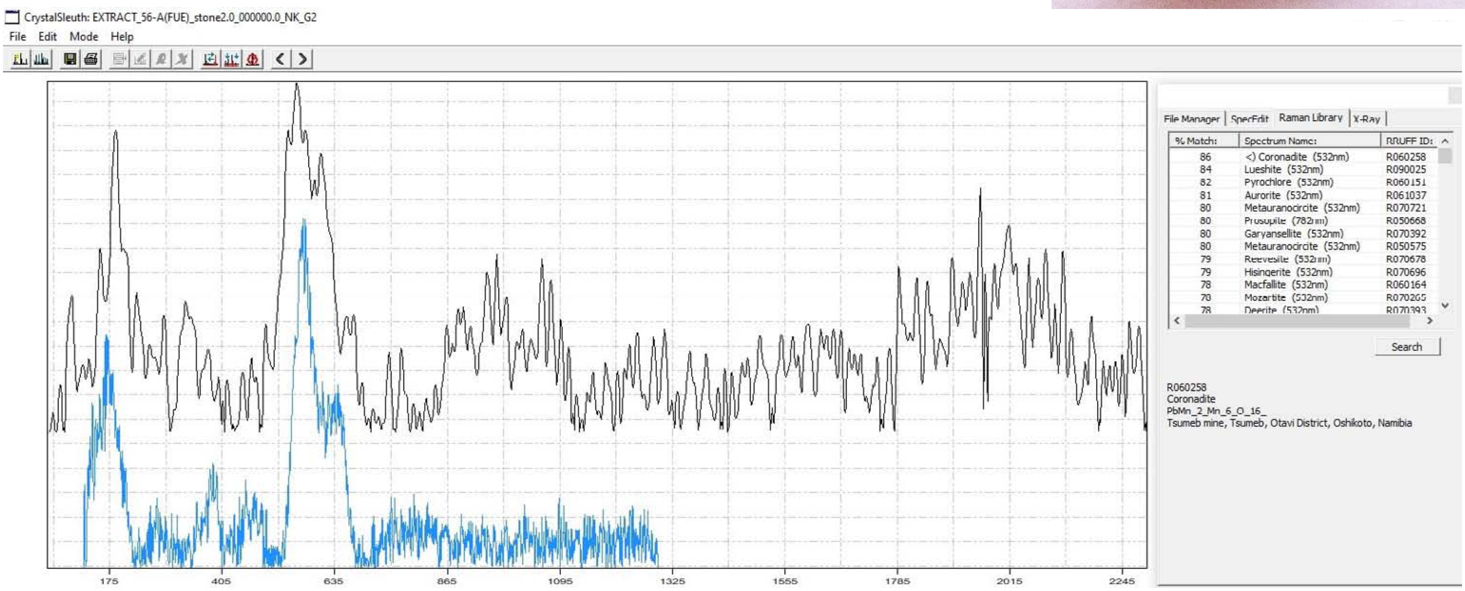


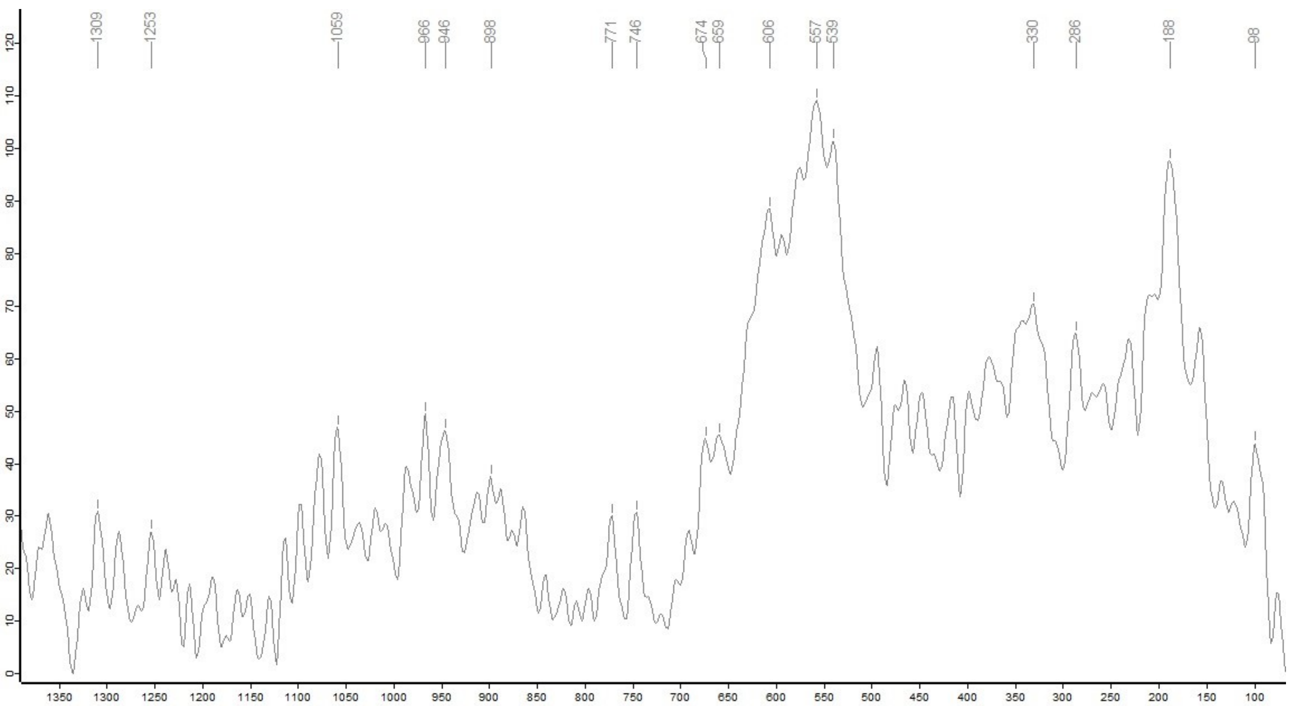


Sample Site 56-A : Stone 2_spectra 2 indicates : Coronadite (→ see RRUFF_CS search)

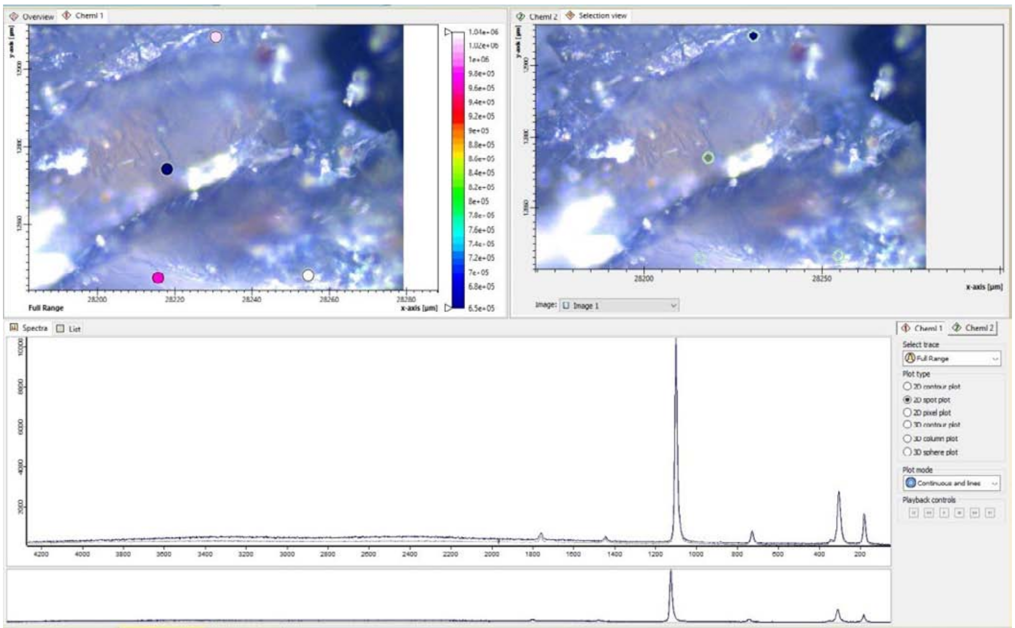


Sample :

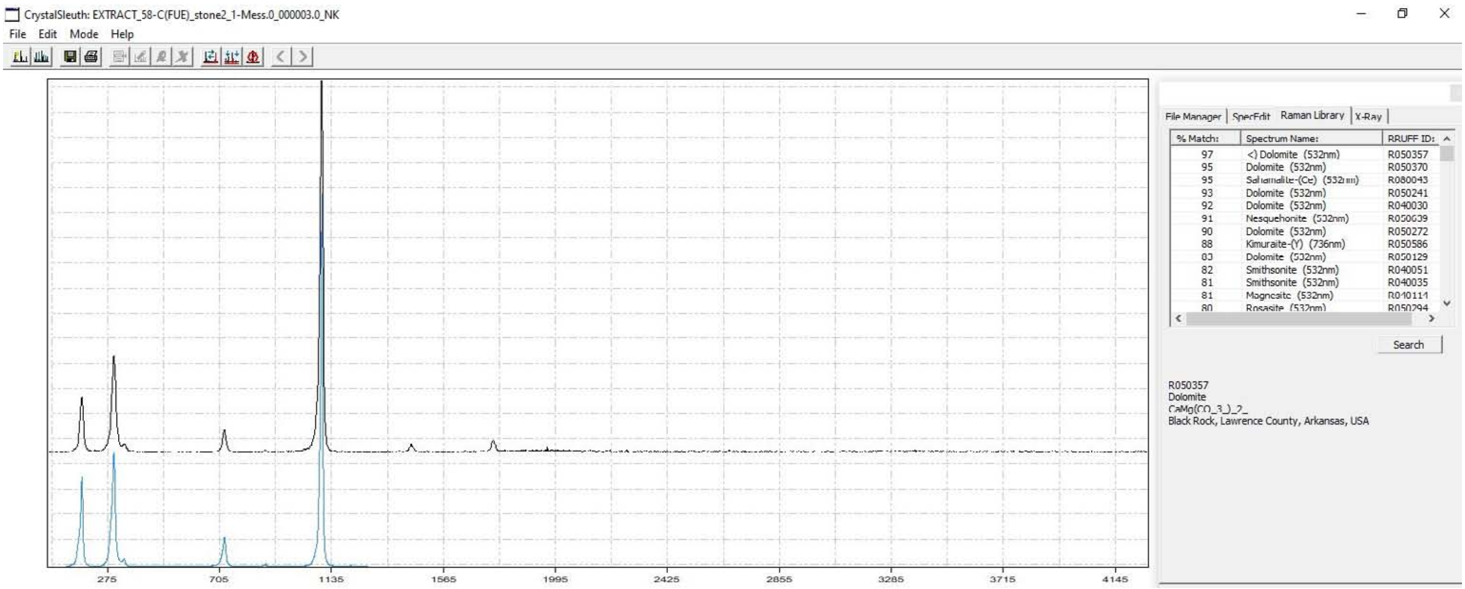


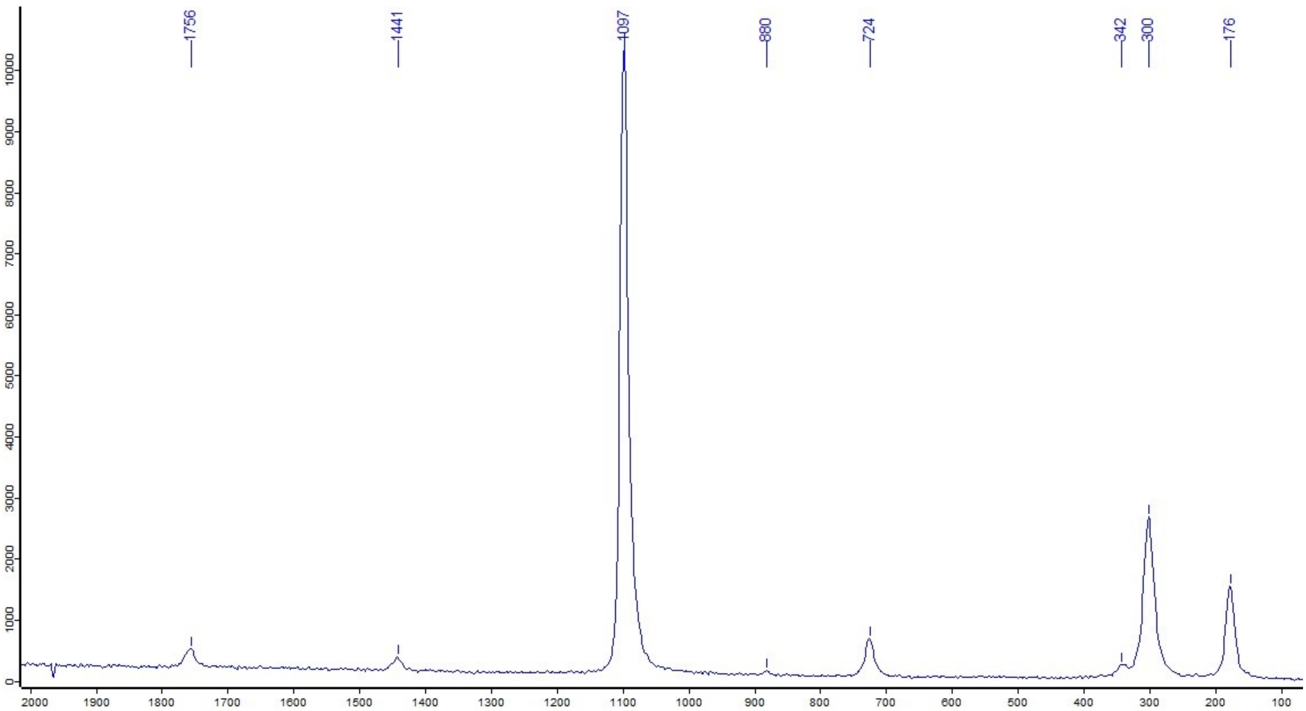


Sample Site 58-C : Stone 2_spectra 1 indicates : Dolomite (→ see RRUFF_CS search)



Sample :





Appendix 1 : **Photos of the rock samples from the sites : 21-A, 35-A, 45-D, 48-C, 56-C**

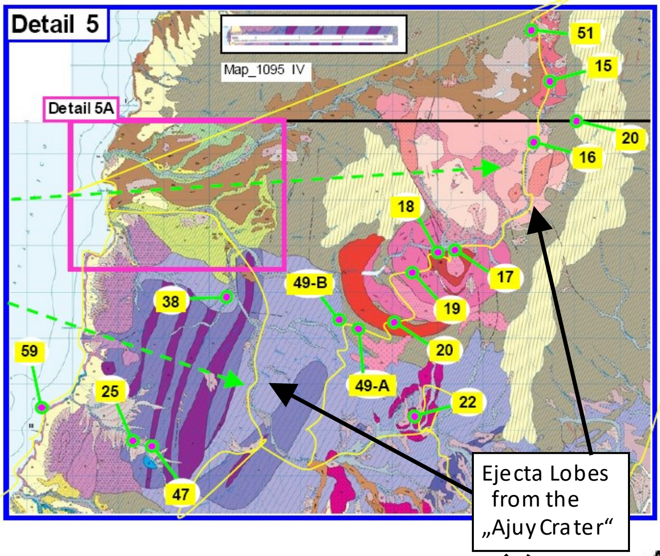
→ See next page

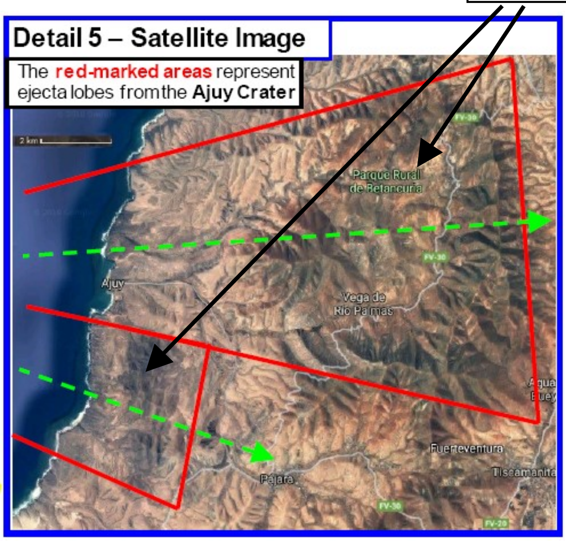
Note : **Photos of the Sites 35-A, 45-A, 45-B, 45-C, 48-C, 56-A, 56-B & 21-A and other sample sites are available on my website. → : Sample Sites "Ajuy Crater" (or here) together with geological maps and a GPS-Data List of the sample sites.**

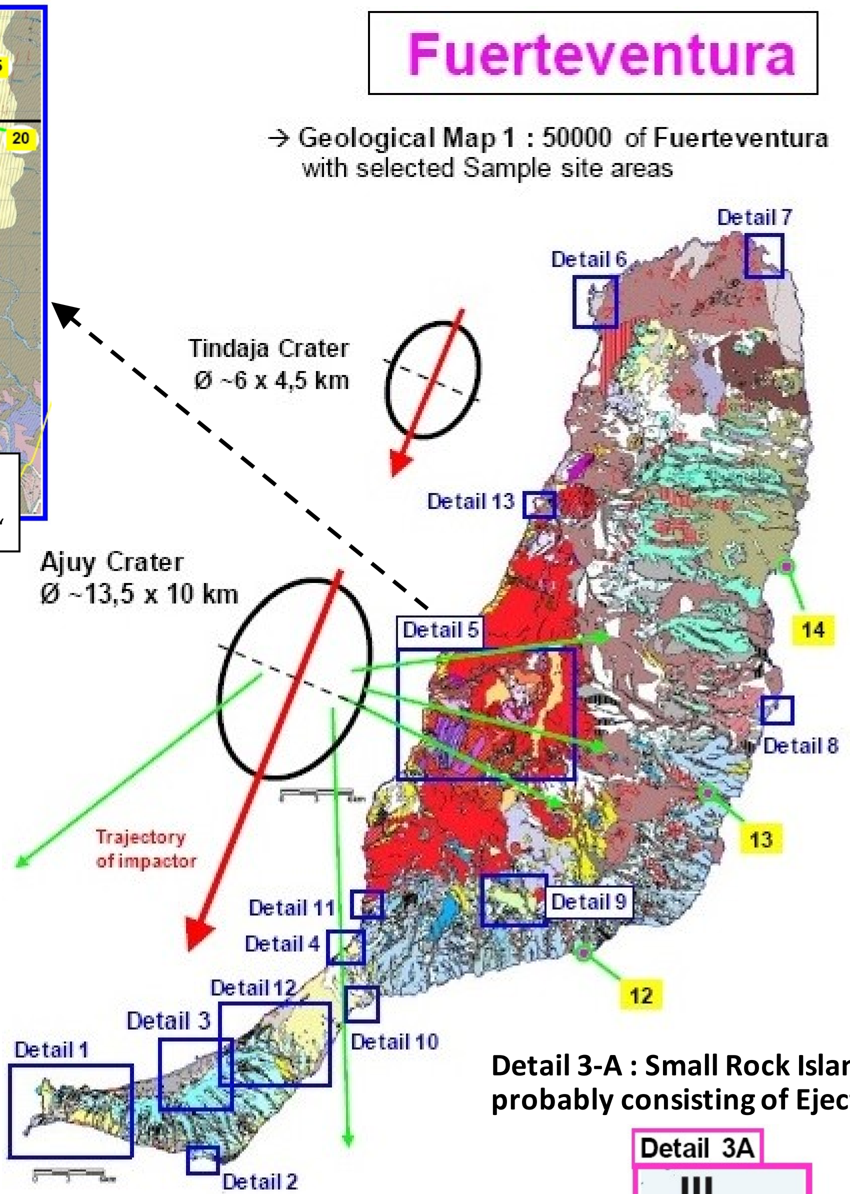
Geological maps of selected sample areas :

→ Weblink to the Digital Geological-Map (IGME) : http://info.igme.es/visorweb/ → Fuerteventura

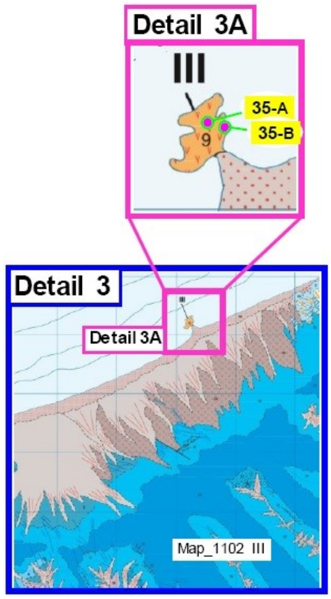
Detail 5 : Ejecta-Impact-areas of the Ajuy Crater



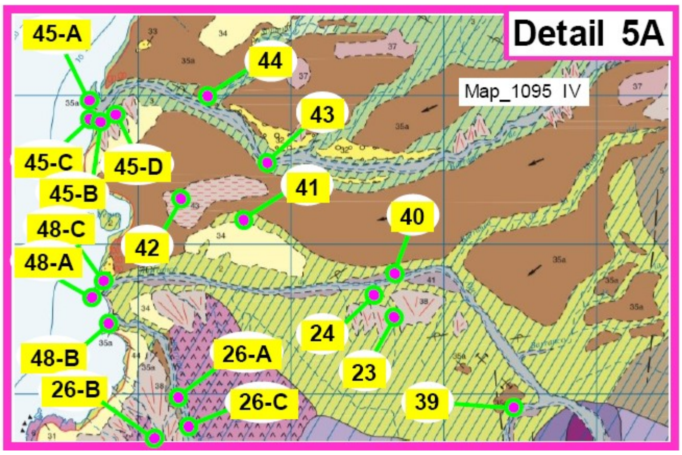




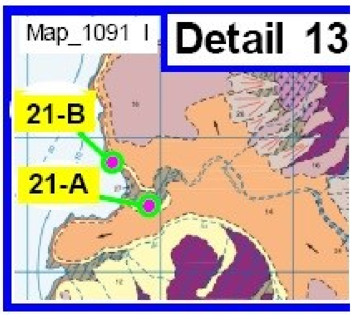
Detail 3-A : Small Rock Island probably consisting of Ejecta



Detail 5-A : Ejecta-Impact-area with fragments of > 100 Myr old oceanic sediments visible in the rocks



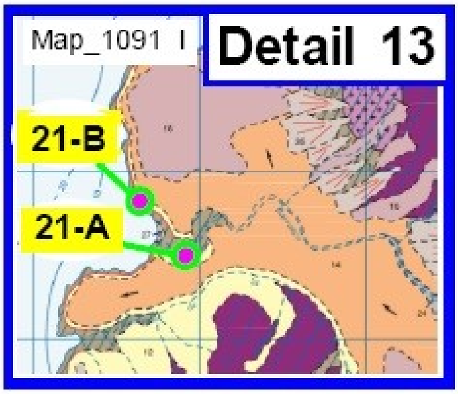
Detail 13 : Dyke Breccia (Impact Breccia?) with large inclusions



Sample Site 21-A

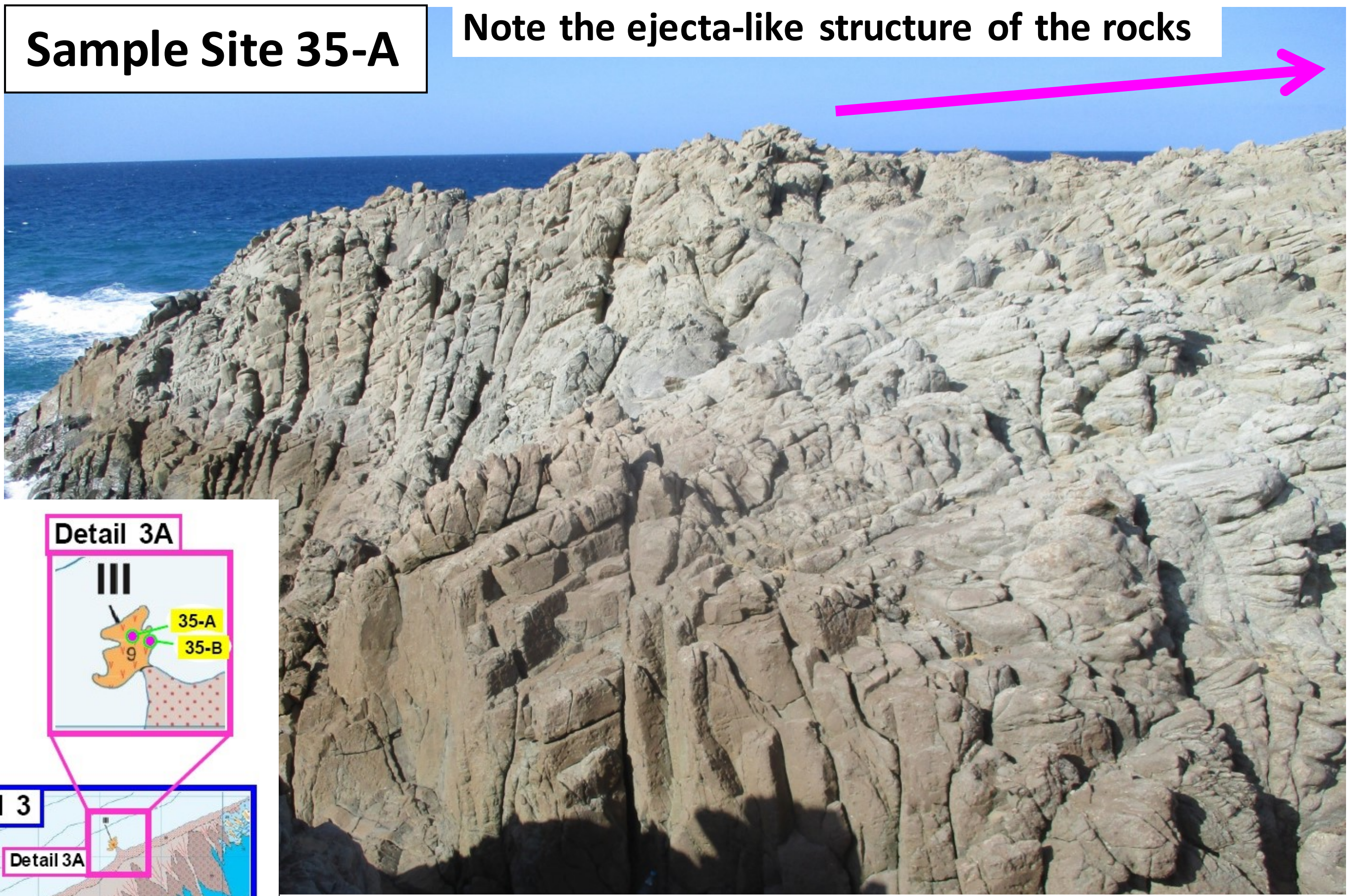
Dyke-Breccia with large inclusions (Impact Breccia ?)

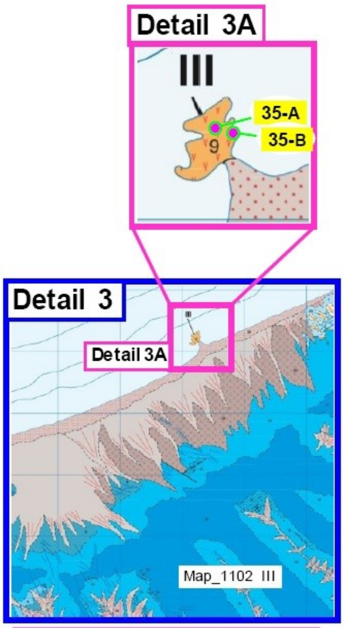
Found in the base rock of a creek on the west-coast of Fuerteventura



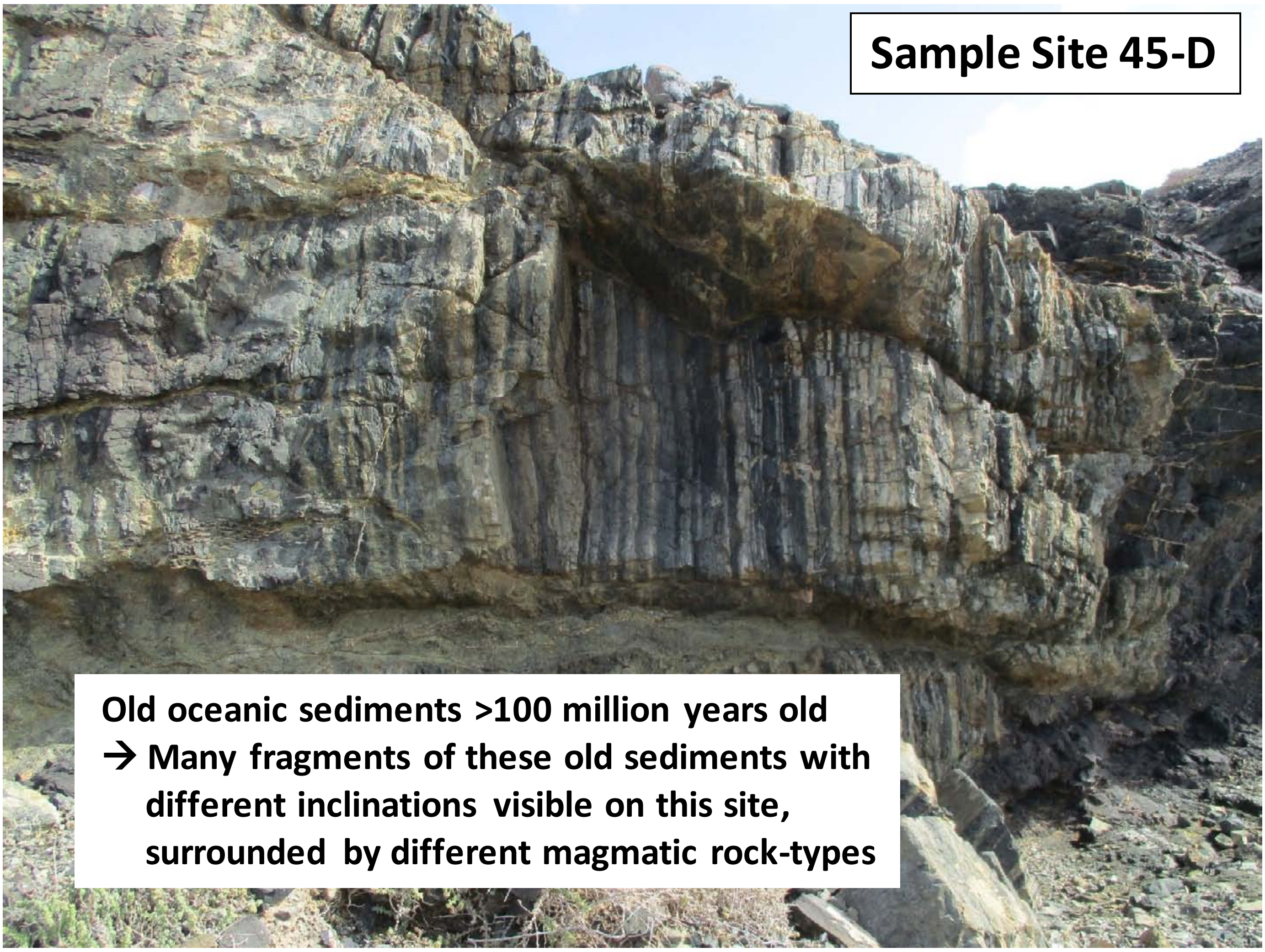
21-A

Sample Site 35-A





The small rock-island just a few meters offshore of the west-coast-beach on the southern tip of Fuerteventura probably represents Ejecta-Material from the Ø15x11km Ajuy Crater ! The rocks contain the mineral Uranpyrochlore, which may be an indicator-mineral for an impact event.

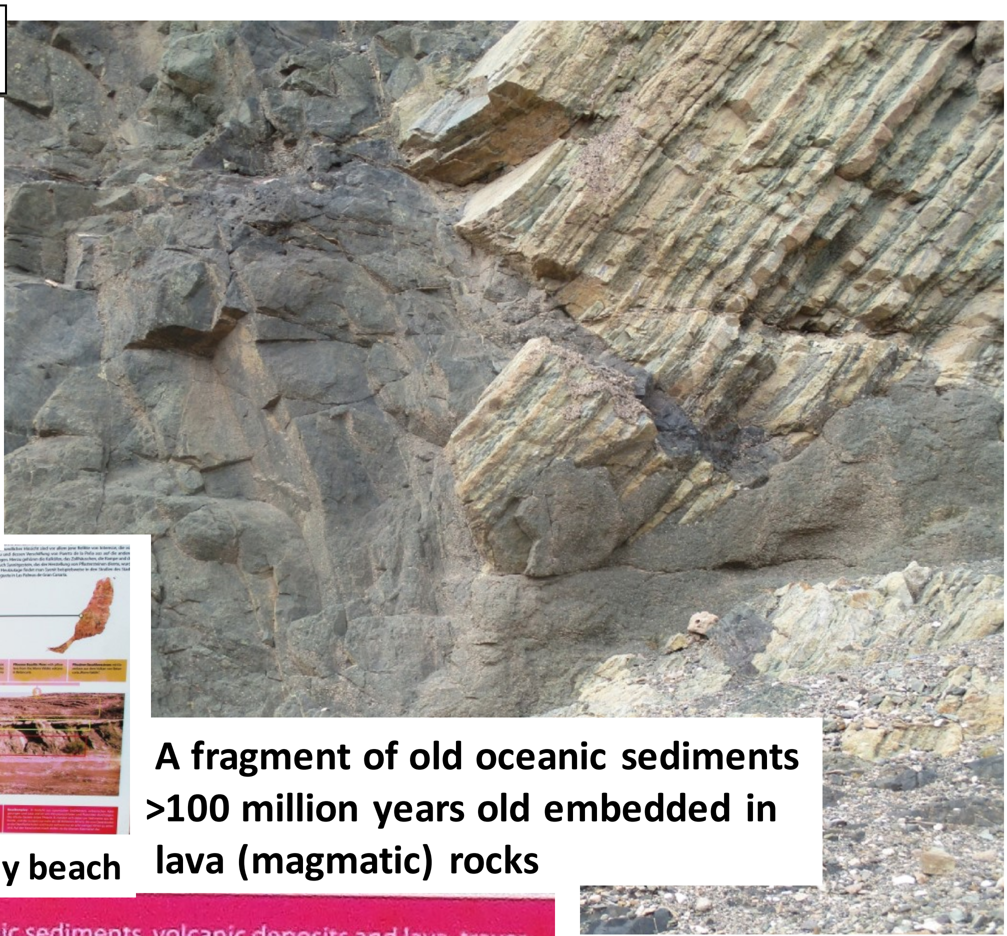

Sample Site 45-D
Old oceanic sediments >100 million years old
→ Many fragments of these old sediments with different inclinations visible on this site, surrounded by different magmatic rock-types


45-D
45-D 28° 24,714 N 14° 9,337 W 12 m Canary Islands-2 (Fuerteventura)

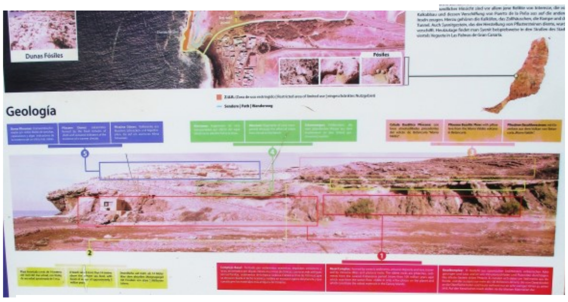
Sample Site 48-C

The rocks on the beach near the "Ajuy" village on the west-coast of Fuerteventura contain fragments of very old oceanic sediments.

The oldest rocks on the Canarian Islands !



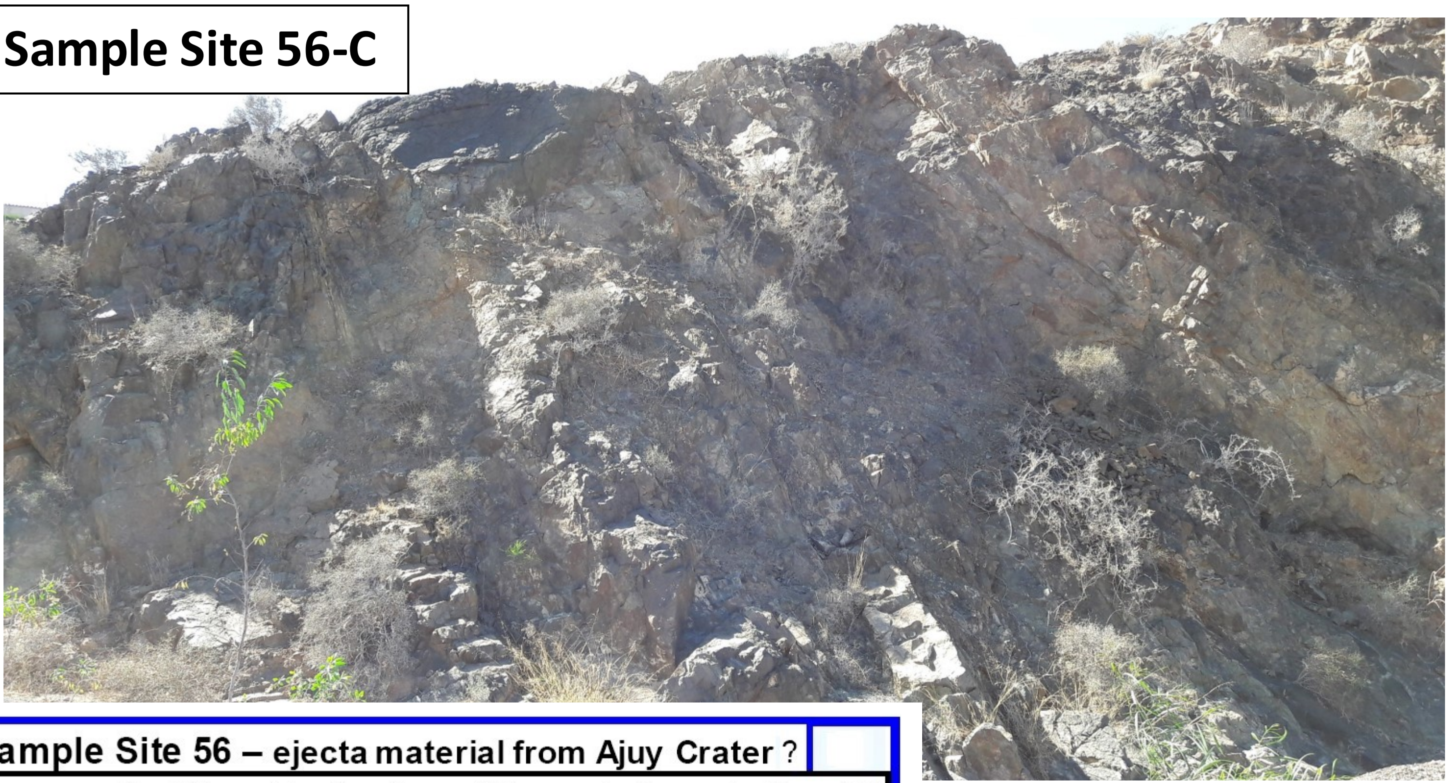
A fragment of old oceanic sediments >100 million years old embedded in lava (magmatic) rocks

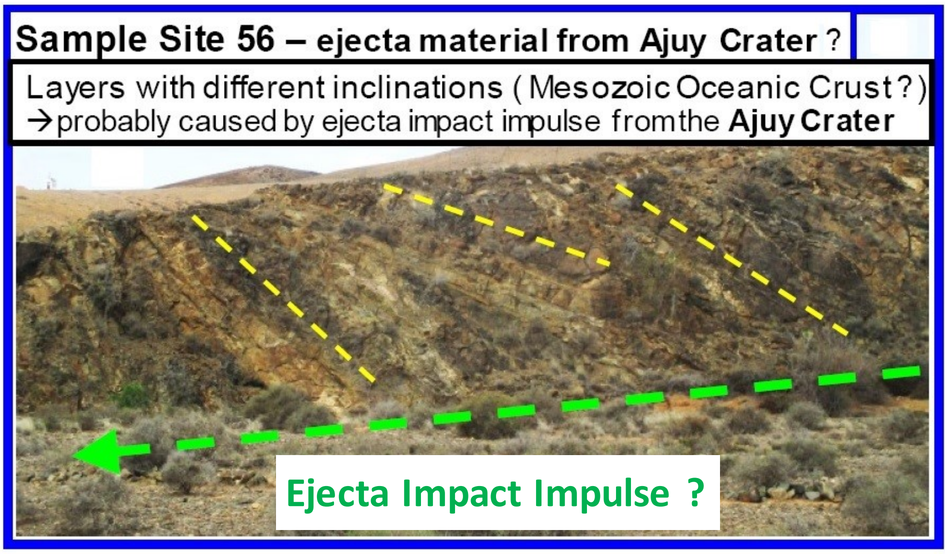


Geological info sign on Ajuy beach

Basal Complex: formed by oceanic sediments, volcanic deposits and lava, traversed by intrusive dikes and plutonic rocks. The oldest rocks are phtanites, sediments from the Jurassic-Cretaceous period (more than 100 million years ago) which rose from the ocean floor, visible in only a few places on the planet and which constitute the oldest materials in the Canary Islands.

Sample Site 56-C





There are different rock layers with slightly different inclinations towards the west-coast of Fuerteventura (towards the Ajuy Crater) visible on this site. Probably a direct cause of the impact impulse. Old crust layers may be present on this site !

56-C

Appendix 2 : A short overview : The Raman bands (peaks) of Quartz shocked with 22-26 GPa

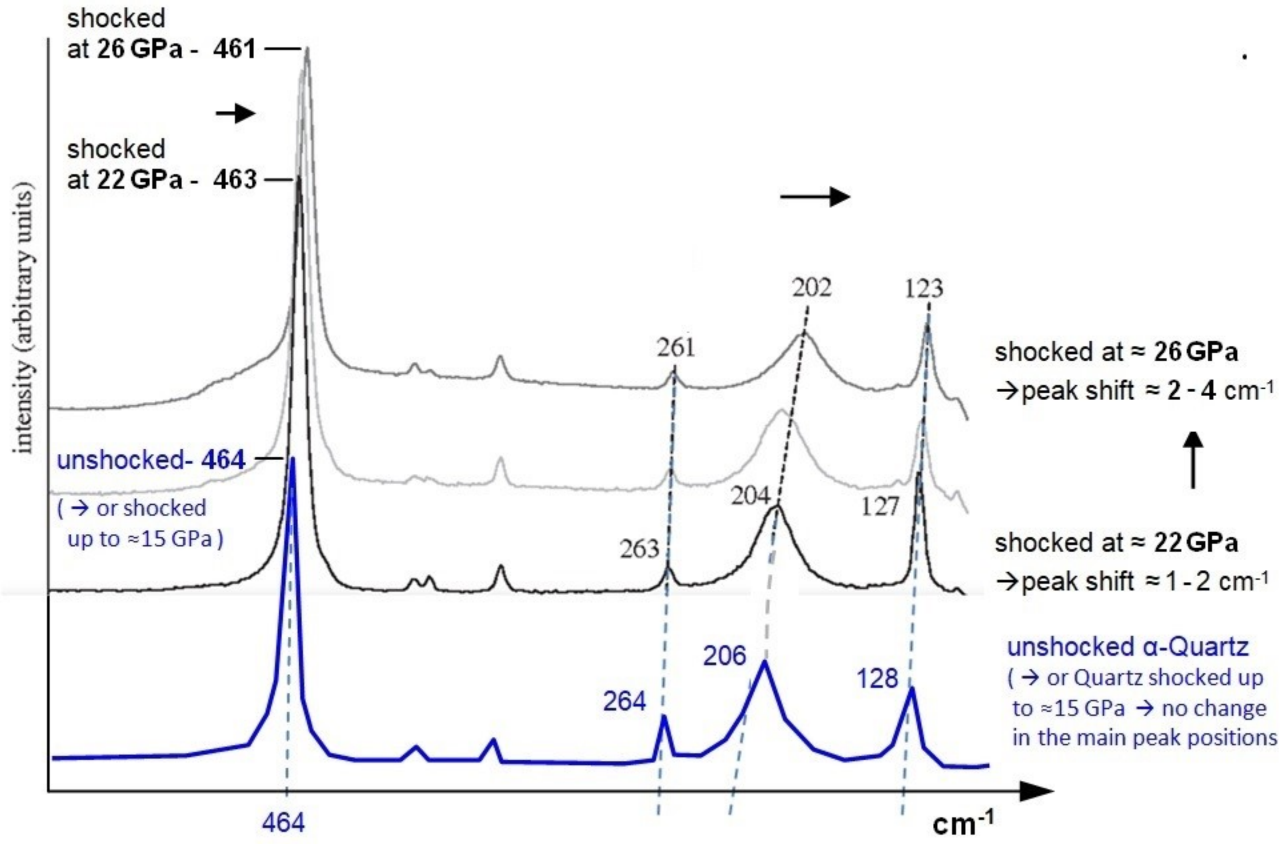
In order to verify a sample site as an impact site or impact structure, shock-metamorphic effects must be discovered in the rocks of the sample site. This can be done by different methods.

For example with the help of PDFs (planar deformation features) which are visible in the quartz with the help of a microscope. However this requires careful preparation of the samples and expertise.

Another, easier method, is the use of a RAMAN microscope. Micro-RAMAN Spectroscopy on quartz grains in the samples can provide the first evidence for a shock event, that was caused by an impact.

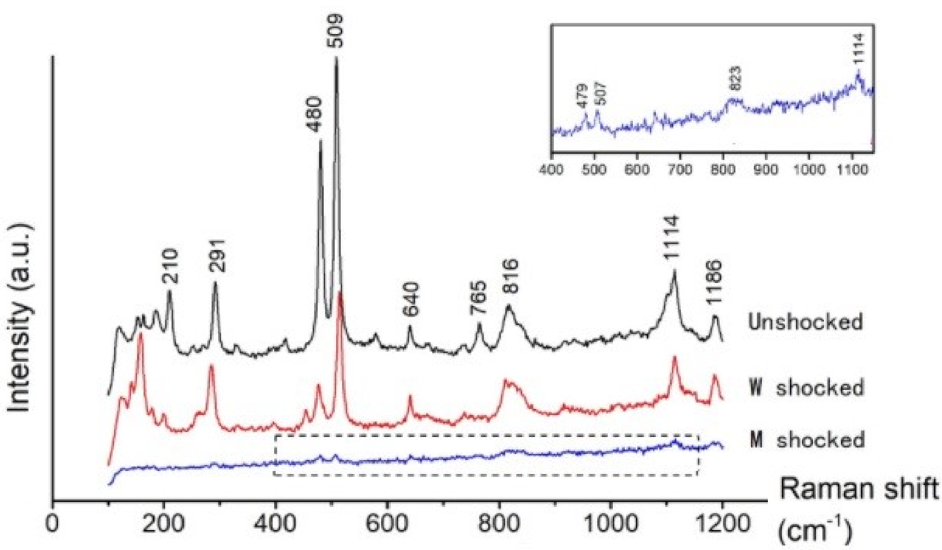
Mc Millan et al. (1992) and others have shown that the main RAMAN-peaks of Quartz shift towards lower frequencies if the Quartz was exposed the a shock-pressure > 15 GPa. → see diagram below

The shift of the main quartz RAMAN-peaks can be used to identify quartz that was shocked by an impact



Quartz shocked with **22 GPa** and **26 GPA** shows shifts of the main RAMAN-peaks of 1 - 4 cm^{-1} to lower frequencies

Appendix 3 : Raman spectra of (W) weakly-shocked & (M) moderately-shocked Alkali-Feldspar



Weakly shocked alkali feldspar mainly developed irregular fractures and undulatory extinction. Note that the Raman-lines 210 and 765 are missing in the w-shocked feldspar, and an additional line at ≈ 150 appears.

The shock pressure for the w-shocked feldspar was estimated to be between 5 and 14 GPa

References :

Photos of all Sample Sites & Rock Samples are available on : Sample Sites "Ajuy Crater" (or **here**)

The following Impact-Craters & -structures belong to the same large-scale secondary impact event caused by the PTI :

The 130 x 110 km Bay-of-Lyon Impact Crater (France)_Raman spectra of selected Rock Samples (or here)

A 30 km Impact Structure and a 1.6 x 1.2 km Elliptical Crater in Southern Spain_Raman Spectra of Rock Samples (or here)

The Ø 20 x 15 km Tejeda Crater on Tenerife : Raman-anlaysis of rock-samples published soon on vixra.org & archive.org

Please also read : Scientific Studies to the **Geology of** Fuerteventura & **the Canarian Islands** (→ on page 2 !) - (→ or here)

The Permian-Triassic (PT) Impact hypothesis - by Harry K. Hahn - 8. July 2017 :

Part 1 : The 1270 X 950 km Permian-Triassic Impact Crater caused Earth's Plate Tectonics of the Last 250 Ma

Part 2 : The Permian-Triassic Impact Event caused Secondary-Craters and Impact Structures in Europe, Africa & Australia

Part 3 : The PT-Impact Event caused Secondary-Craters and Impact Structures in India, South-America & Australia

Part 4 : The PT-Impact Event and its Importance for the World Economy and for the Exploration - and Mining-Industry

Part 5 : Global Impact Events are the cause for Plate Tectonics and the formation of Continents and Oceans (Part 5)

Part 6 : Mineralogical - and Geological Evidence for the Permian-Triassic Impact Event

Alternative weblinks for my Study **Parts 1 - 6 with slightly higher resolution** : Part 1, Part 2, Part 3, Part 4, Part 5, Part 6

Parts 1 – 6 of my PTI-hypothesis are also available on my website : **www.permiantriassic.de** or **www.permiantriassic.at**

Shock-metamorphic effects in rocks and minerals - https://www.lpi.usra.edu/publications/books/CB-954/chapter4.pdf

Shock metamorphism of planetary silicate rocks and sediments: Proposal for an updated classification system
Stöffler - 2018 - Meteoritics & Planetary Science – Wiley: https://onlinelibrary.wiley.com/doi/epdf/10.1111/maps.12912

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