

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 (elliptical) 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)

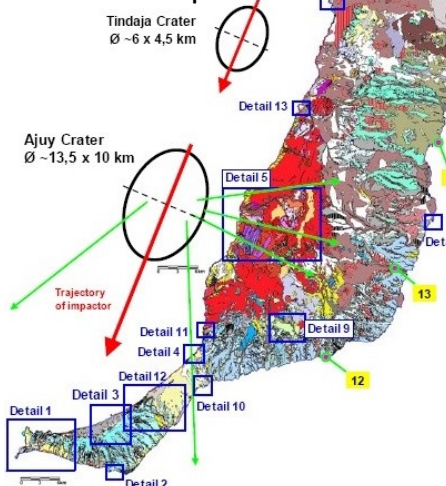
Beside possible shocked feldspar minerals other minerals found on the island may also indicate an impact event. On sample site 35-A, a small rock island on the south-west coast of Fuerteventure, which probably represents ejecta material of the Ajuy Crater, the mineral Uranpyrochlore was found. And on 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

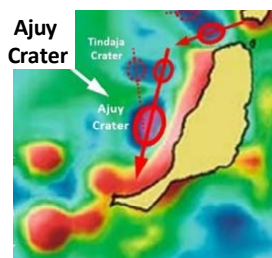
Geological Map of Fuerteventura with the possible Ajuy Crater marked on the map



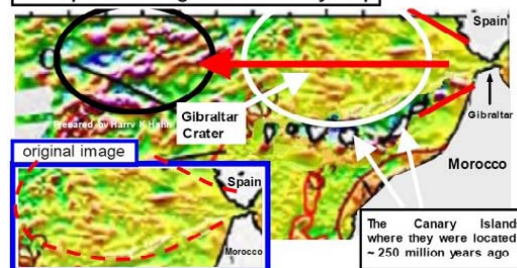
Gravity Anomaly Map of Fuerteventura :

with the possible two impact Craters marked on the map. (indicated by blue & purple color)

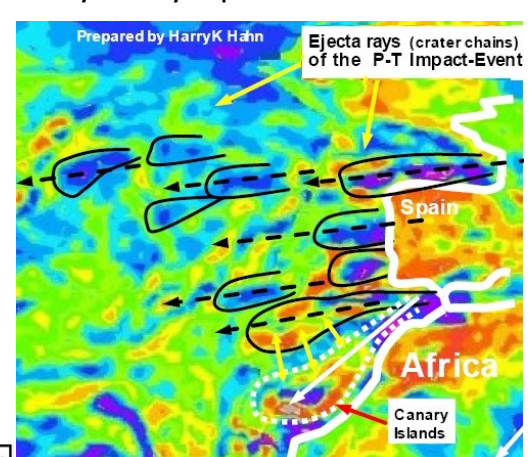
→ negative anomalies



manipulated Magnetic Anomaly Map



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.

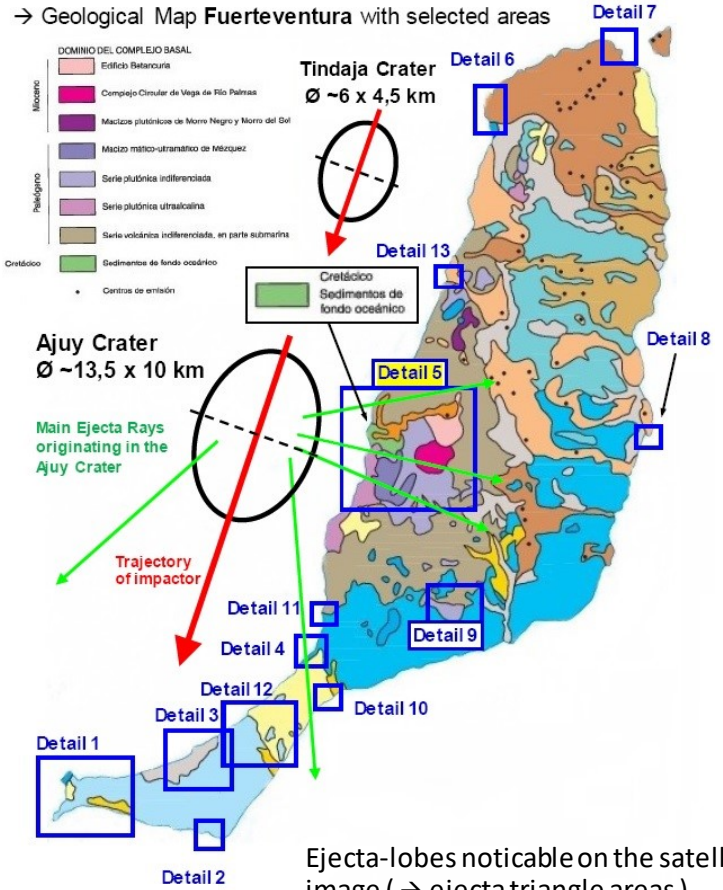
On the canary island "Fuerteventura" old oceanic sediments with an age of >100 Ma can be found as fragments embedded in magmatic material near the village Ajuy, on the west-coast of Fuerteventura.

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.

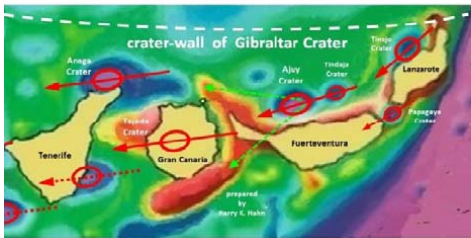
Evidence of shock-metamorphic effects in minerals and specific minerals to confirm an impact event should be present on the sample sites located in the “ejecta triangle areas”, on the sample sites 35-A (a small rock island) and on sample site 21-A, where impact-breccia seems to be present

Fuerteventura

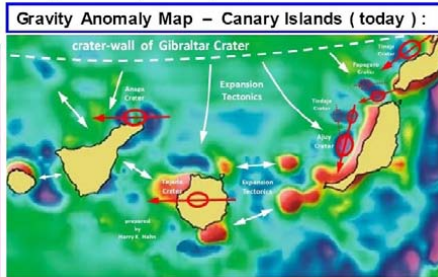


Ejecta-lobes noticeable on the satellite image (→ ejecta triangle areas)

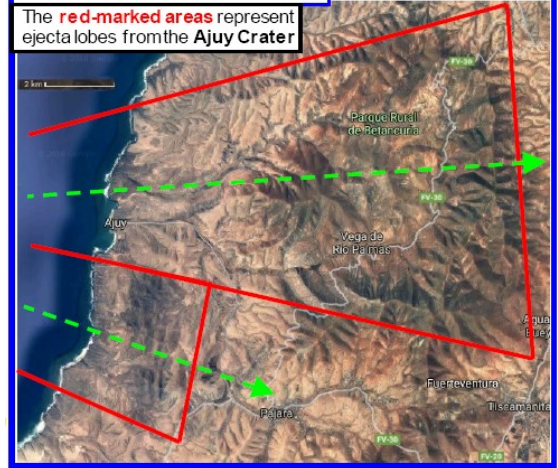
→ Islands locations shortly after the PTI - impact event : **manipulated Gravity Anomaly Map :**



→ original Gravity Anomaly Map :



Detail 5 – Satellite Image



Detail 3A → Sample Site 35 A



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

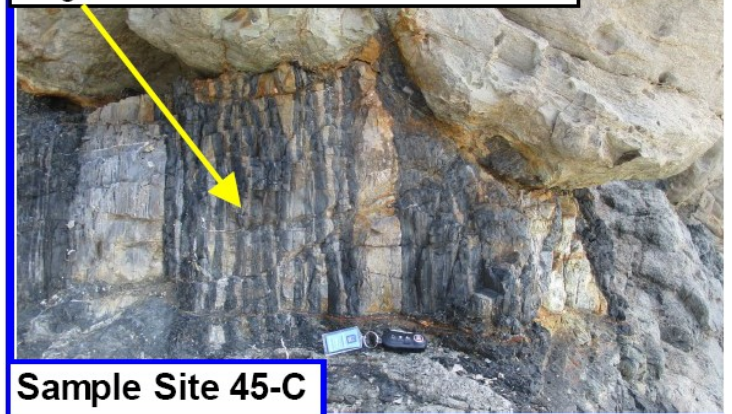
On site **21-A** impact breccia seems to be present.

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

Sample Site 21-A – Dyke Breccia (Impact Breccia)

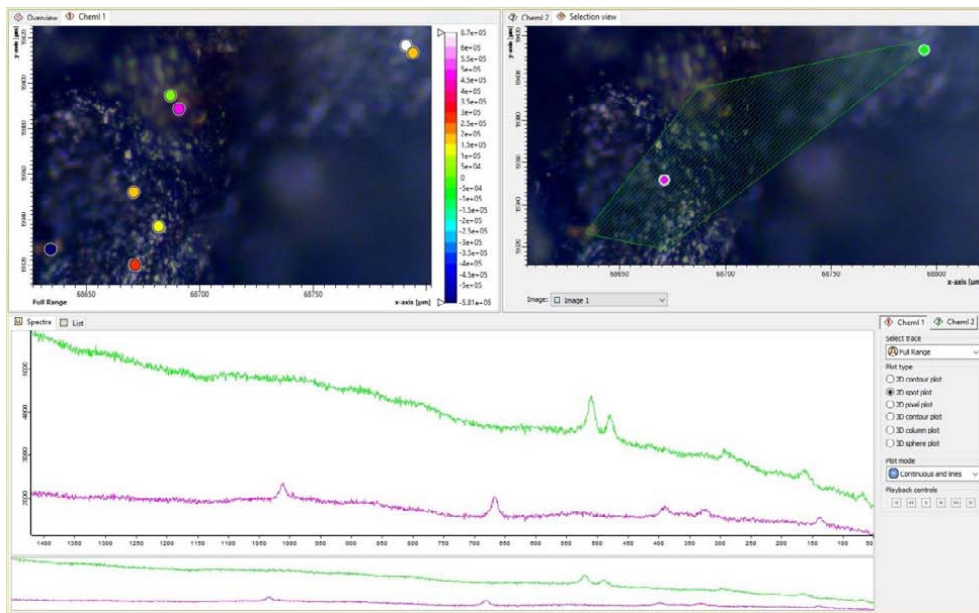


fragment of old Mesozoic Oceanic Crust

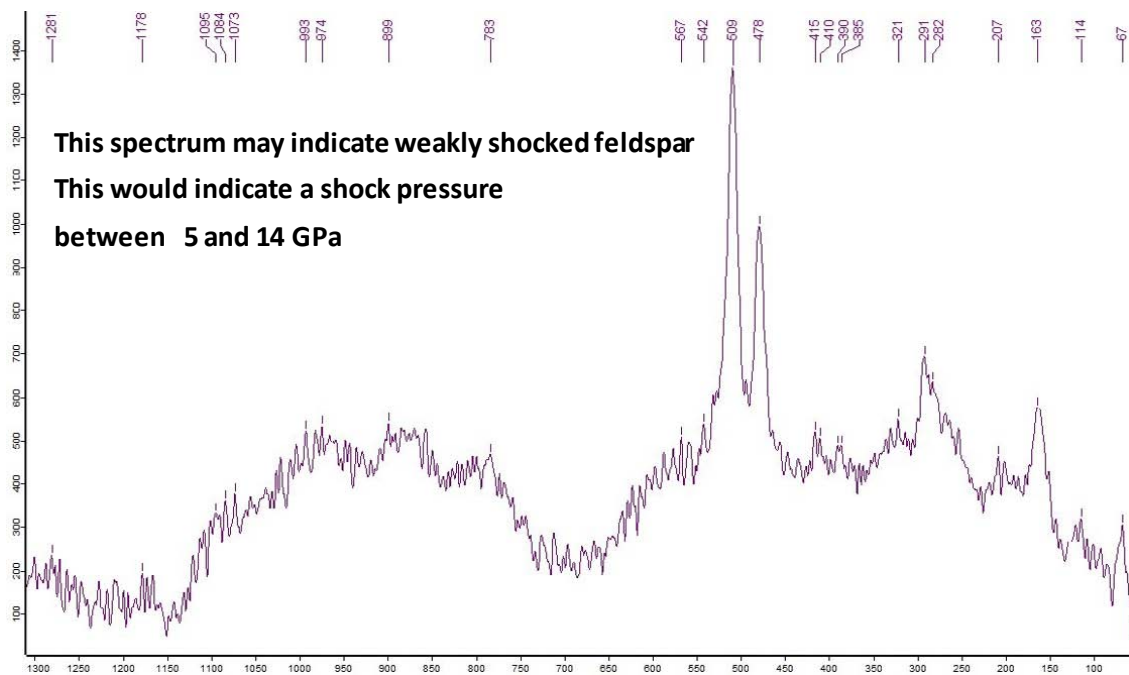
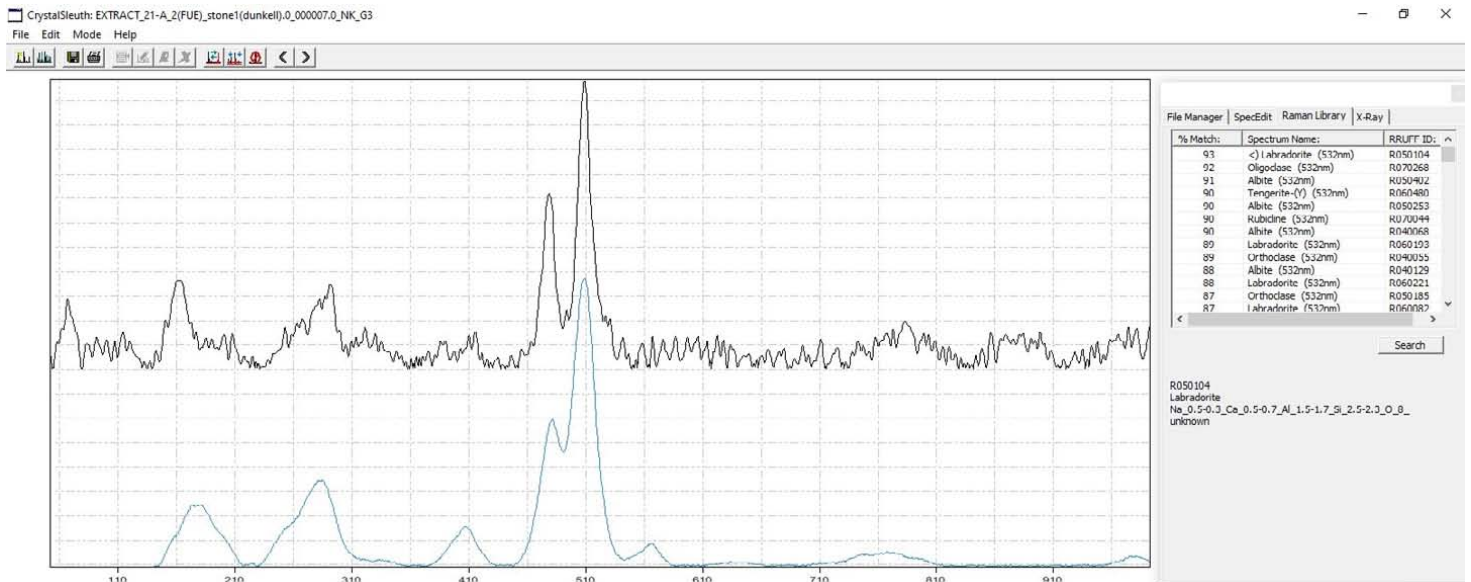


Sample Site 45-C

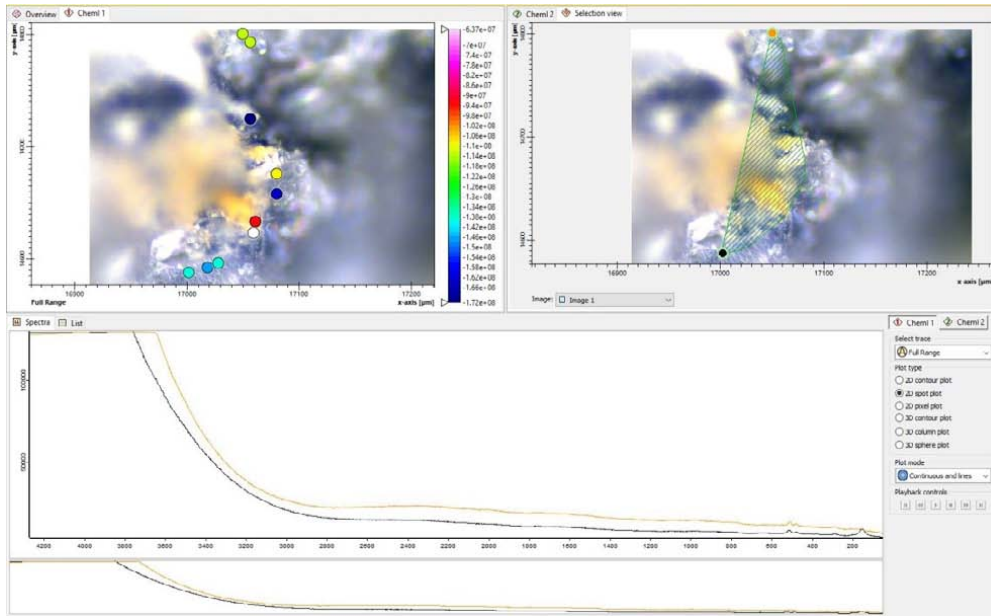
Sample Site **21-A** : Stone 1_spectra 1 (dark mineral) indicates : **Labradorite** (→ see RRUFF_CS results)



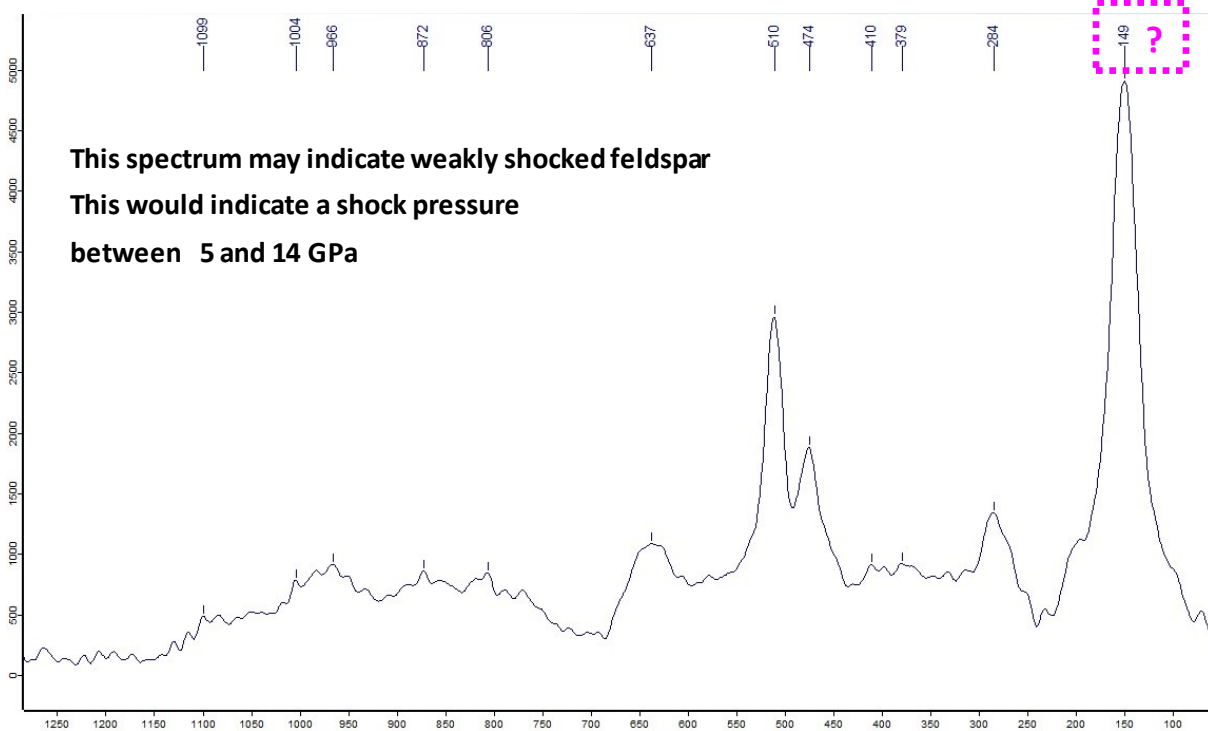
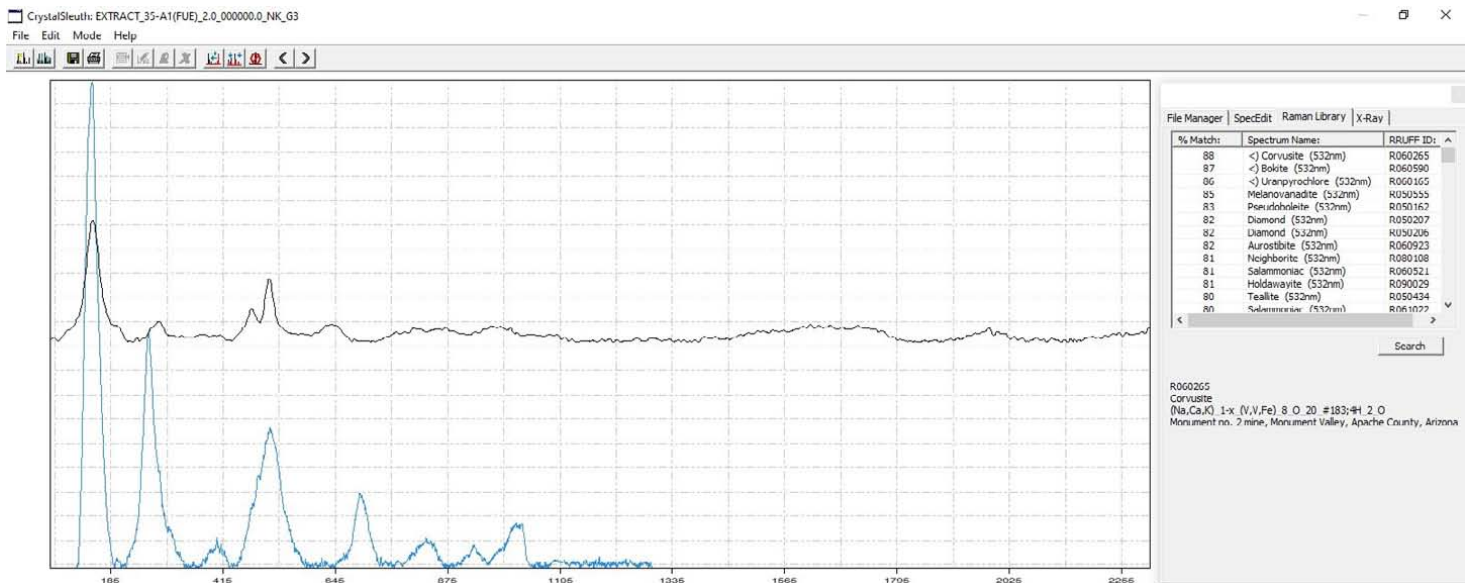
Sample :



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



Sample :



This spectrum may indicate weakly shocked feldspar
This would indicate a shock pressure
between 5 and 14 GPa

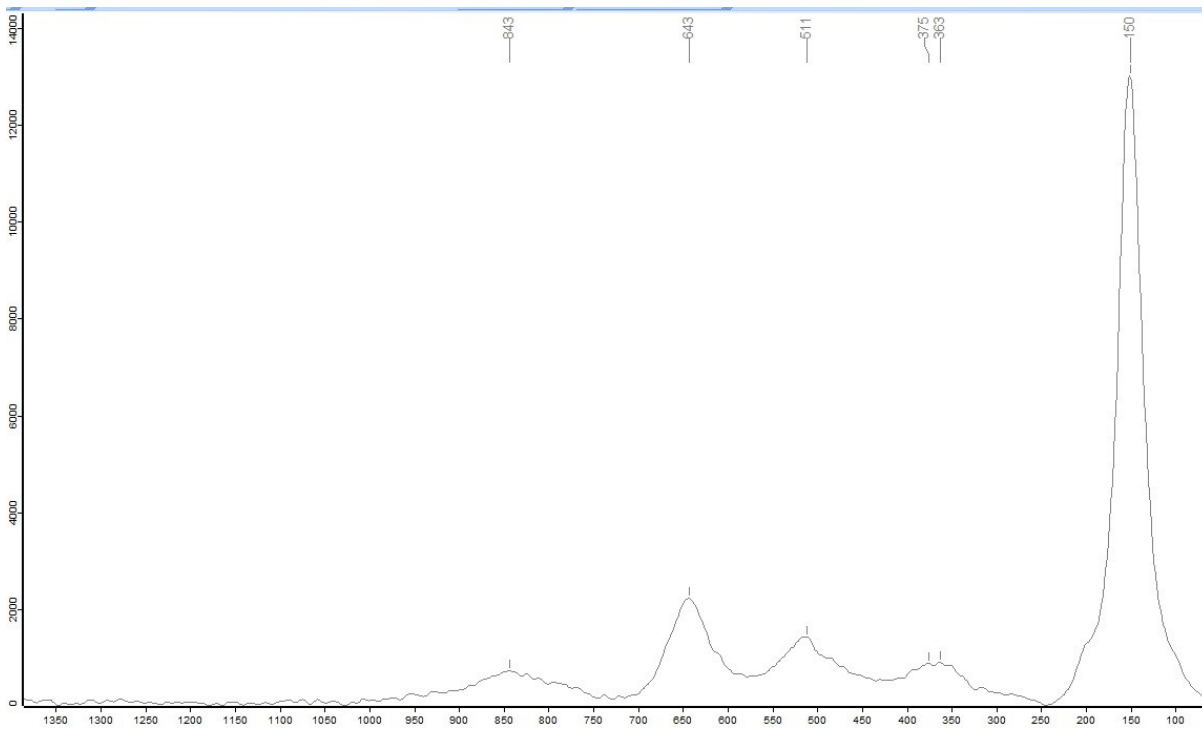
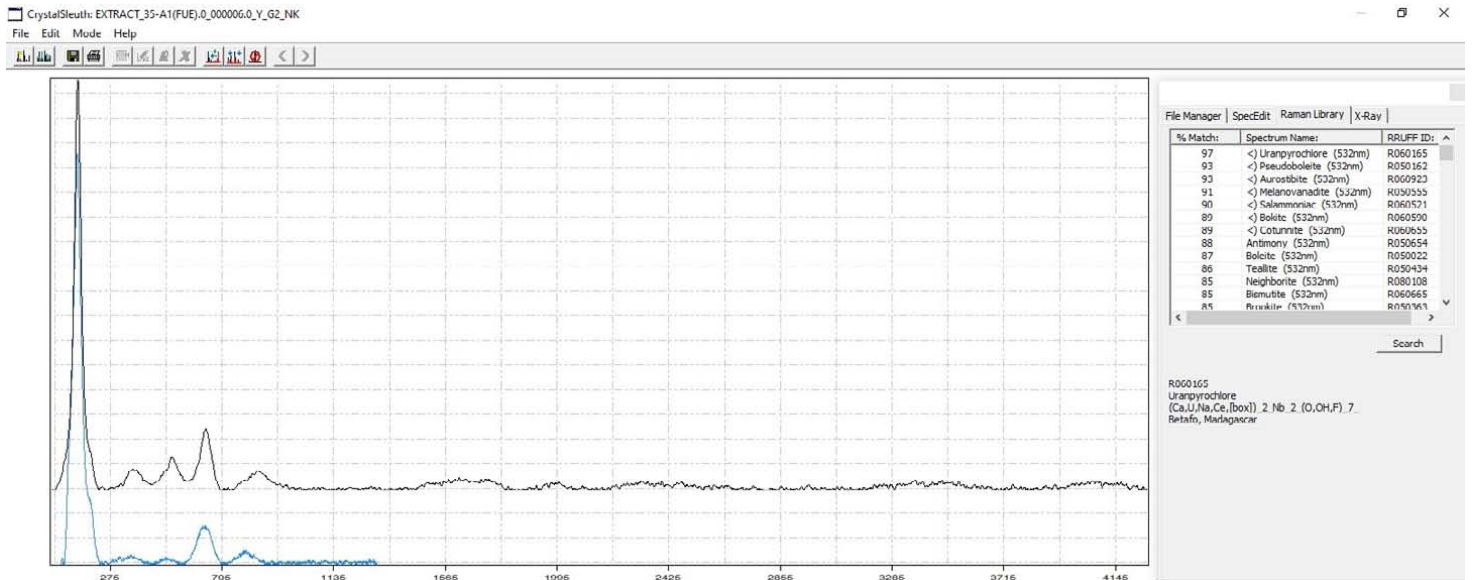
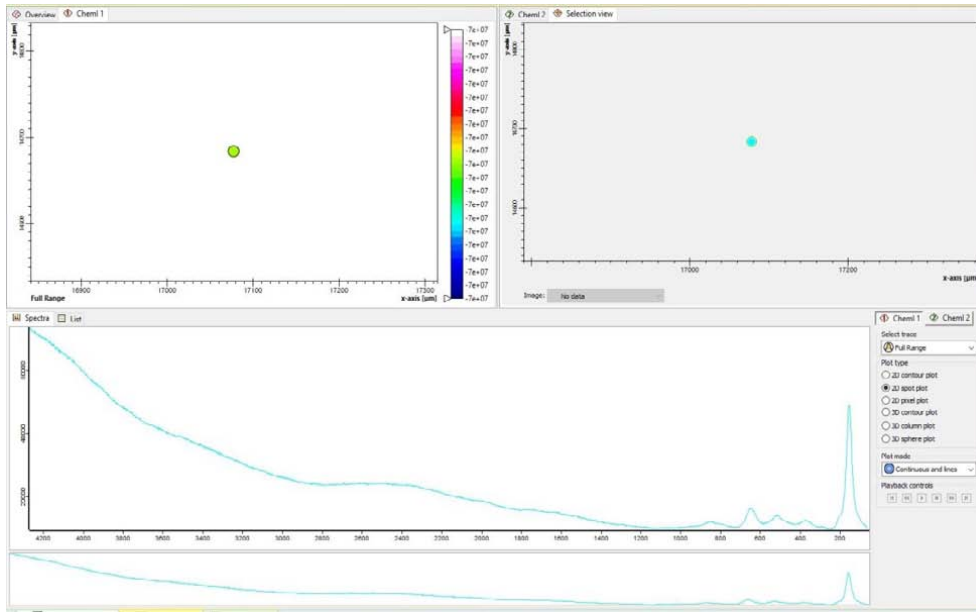
Sample Site **35-A** : Stone 1_spectra 2 indicates : **Uranpyrochlore** (→ see RRUFF_CS search)

Note : mineral contains **Uranium** !

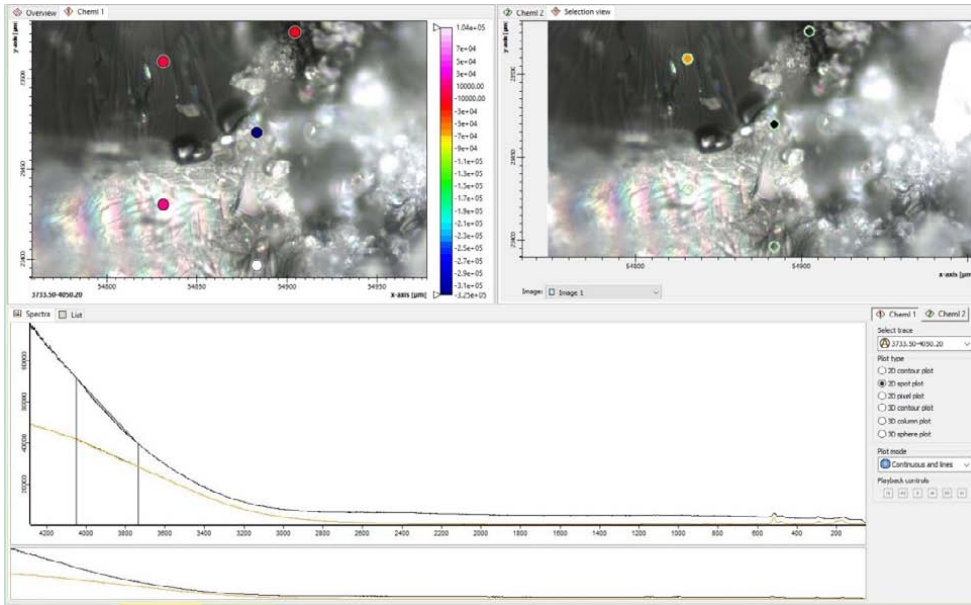
Mineral is similar to a rare earth mineral found in Madagascar

(→ Ejecta Ray R4 !)

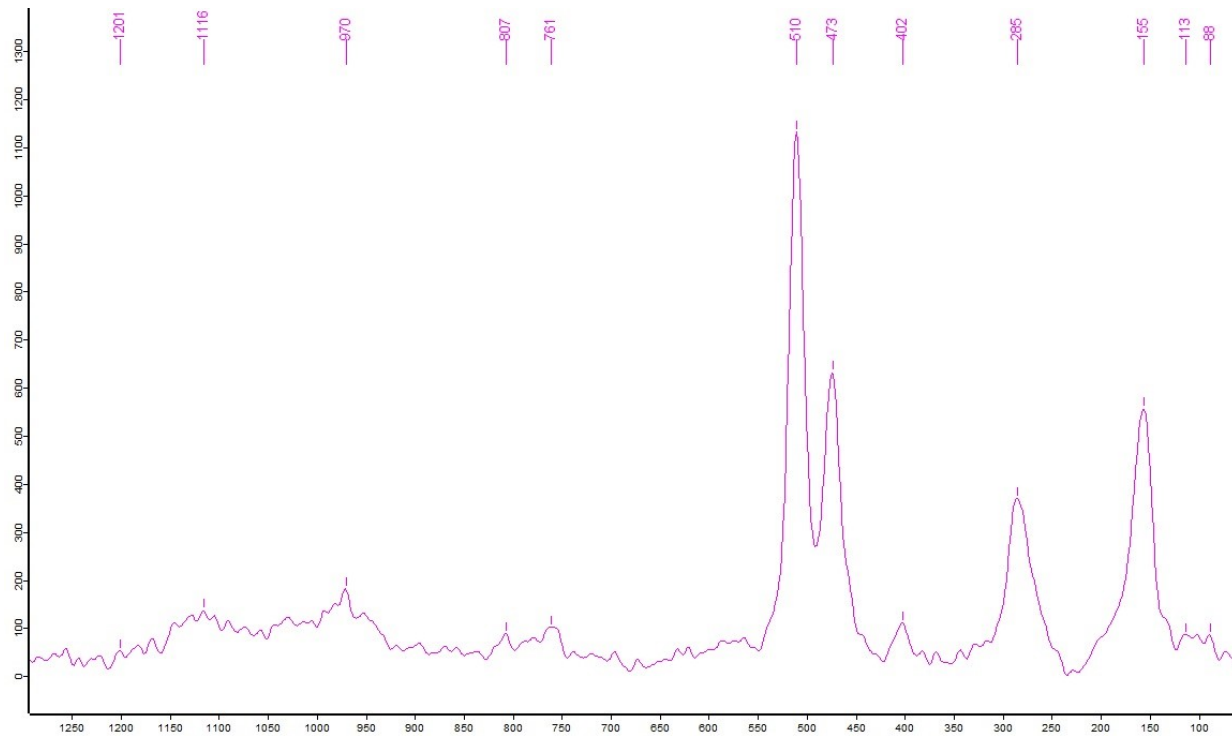
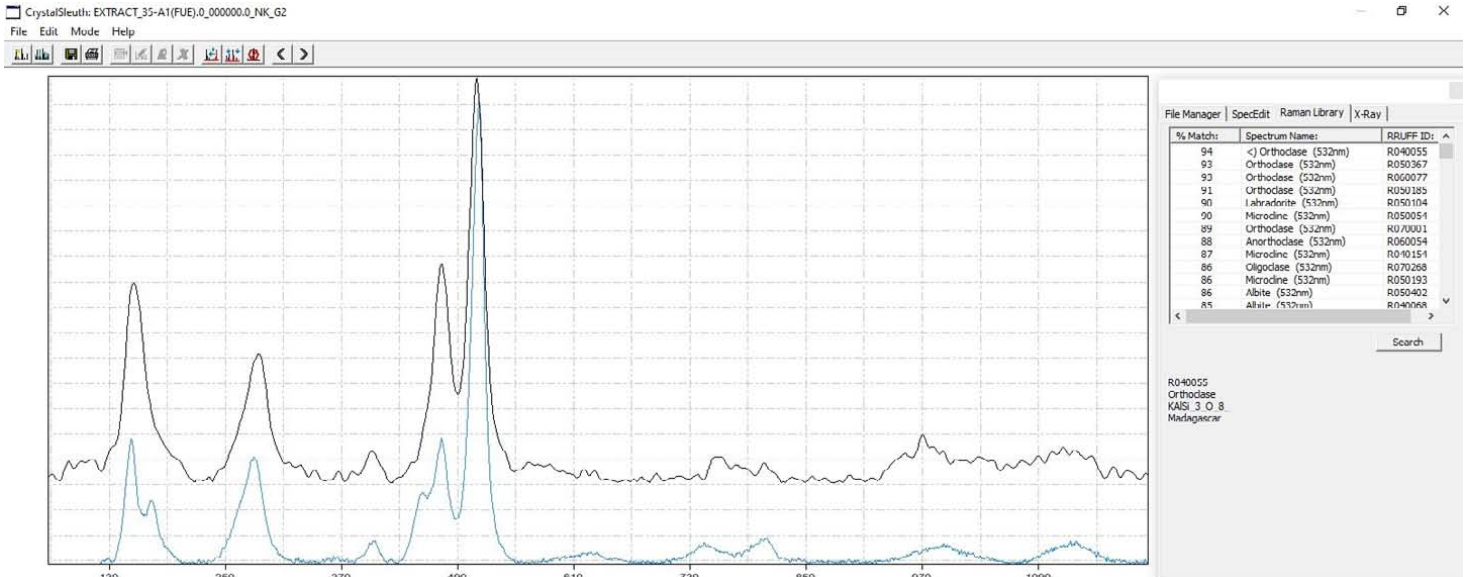
Sample :



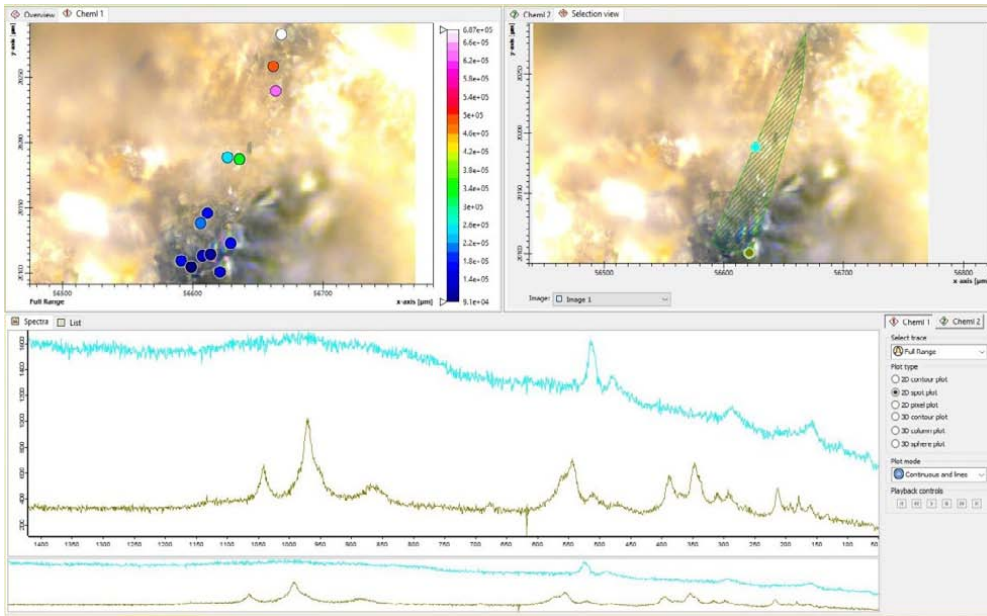
Sample Site **35-A** : Stone 1_spectra 1 indicates : **Orthoclase, Labradorite** (→ see RRUFF_CS)



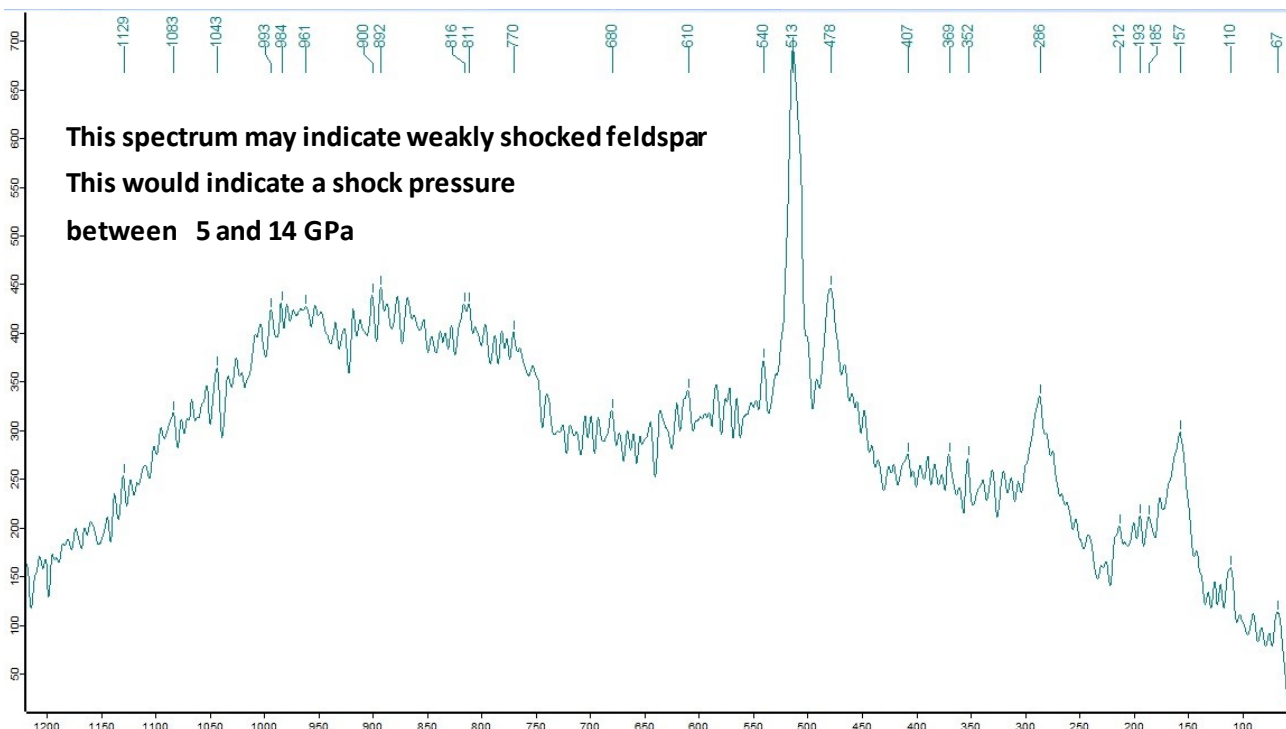
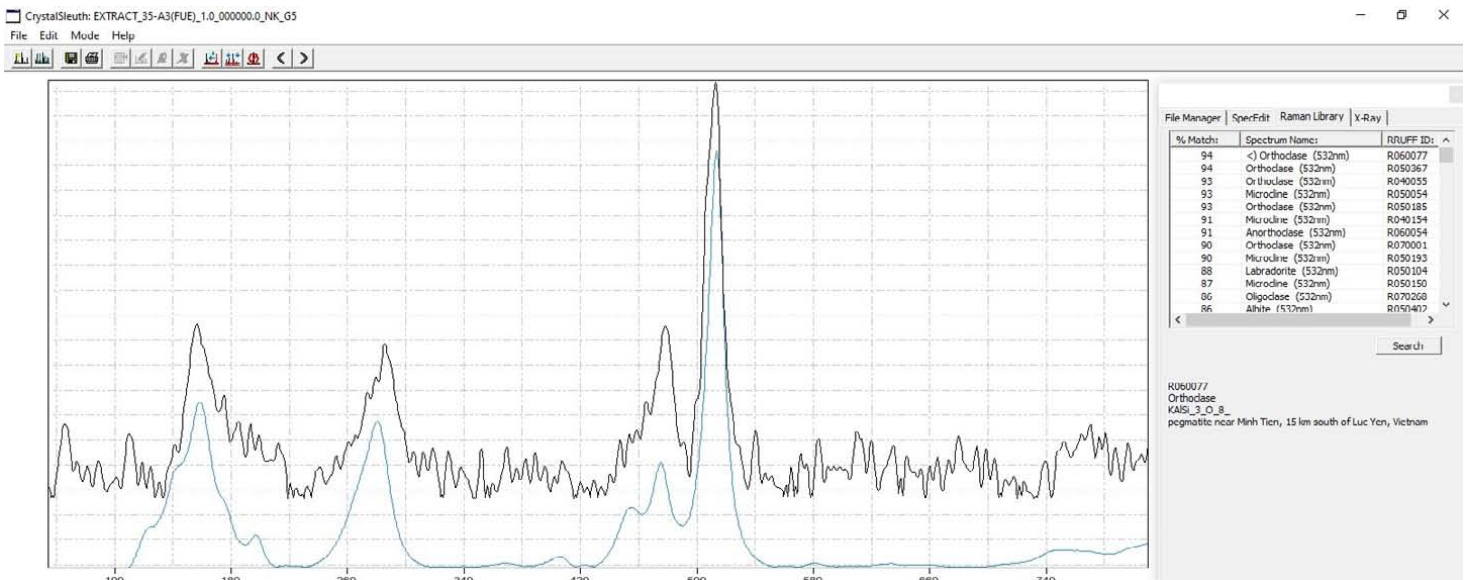
Sample :



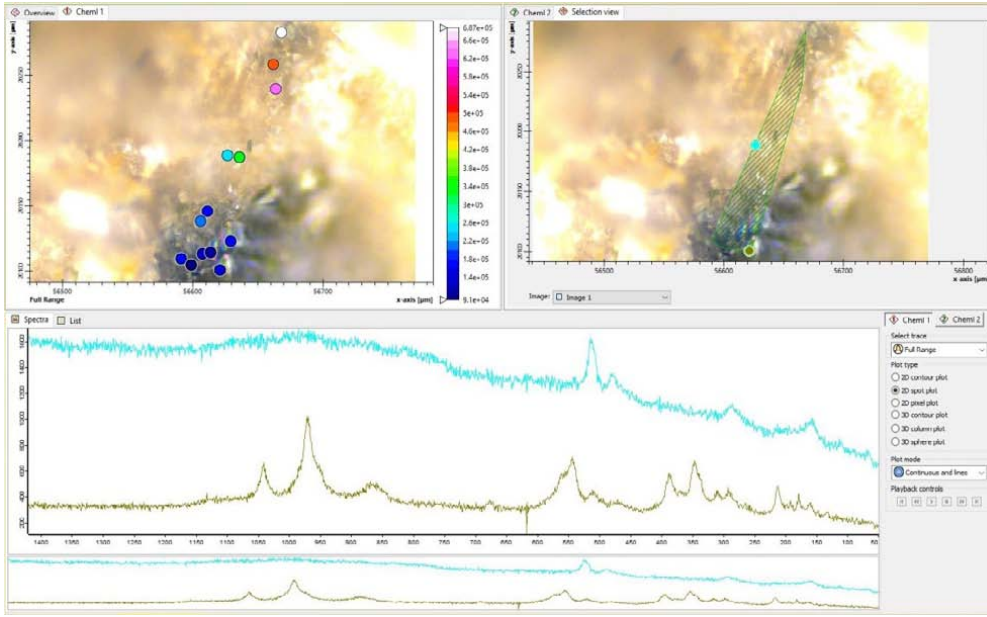
Sample Site **35-A** : Stone 2_spectra 1 indicates : **Orthoclase** (→ see RRUFF_CS search)



Sample :



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



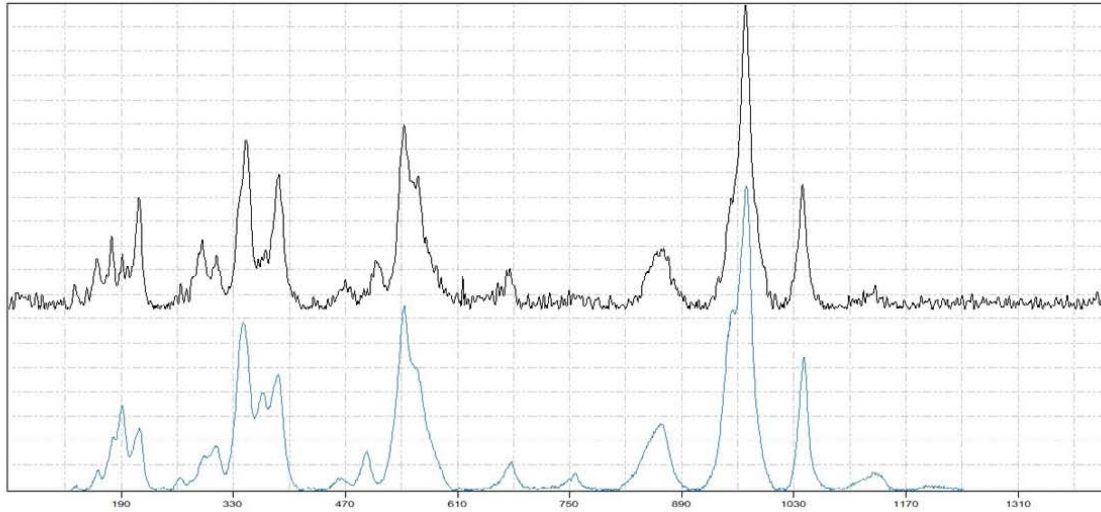
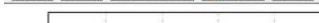
Note : **Aegirine** is an Iron-bearer mineral

Sample :



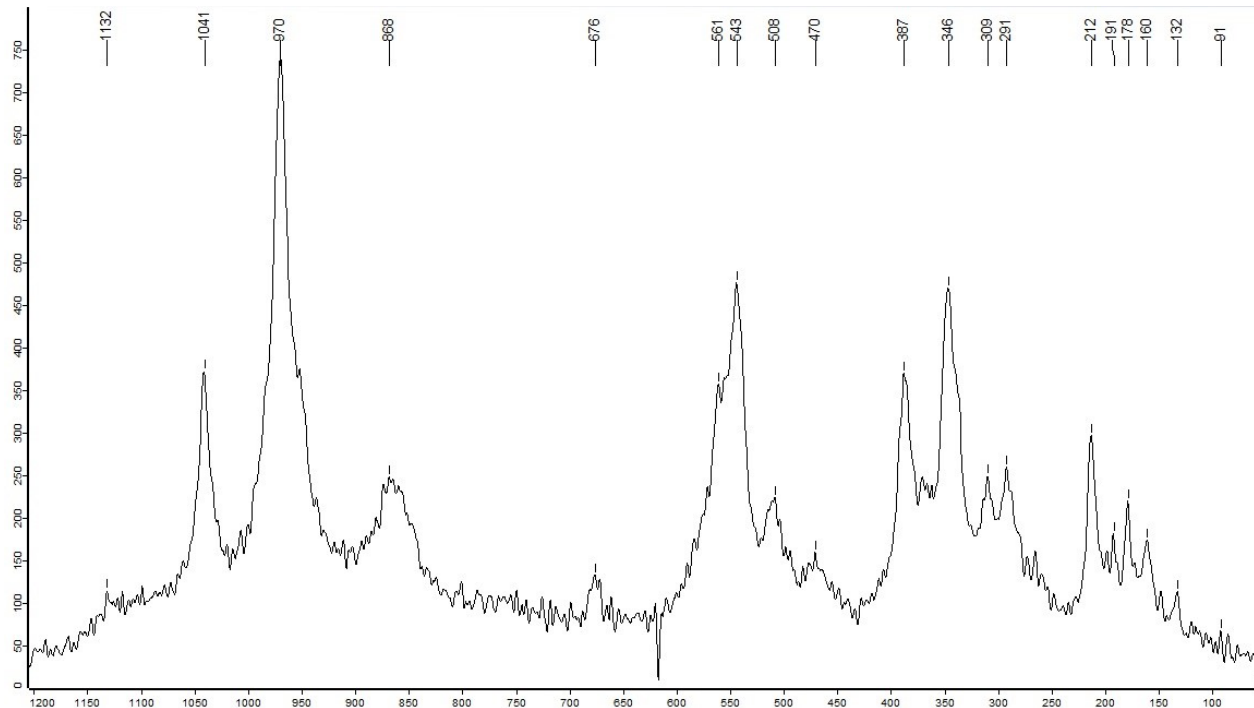
CrystalSleuth: EXTRACT_35-A3(FUE)_1_0_000012_0_Y_G2_NK

File Edit Mode Help

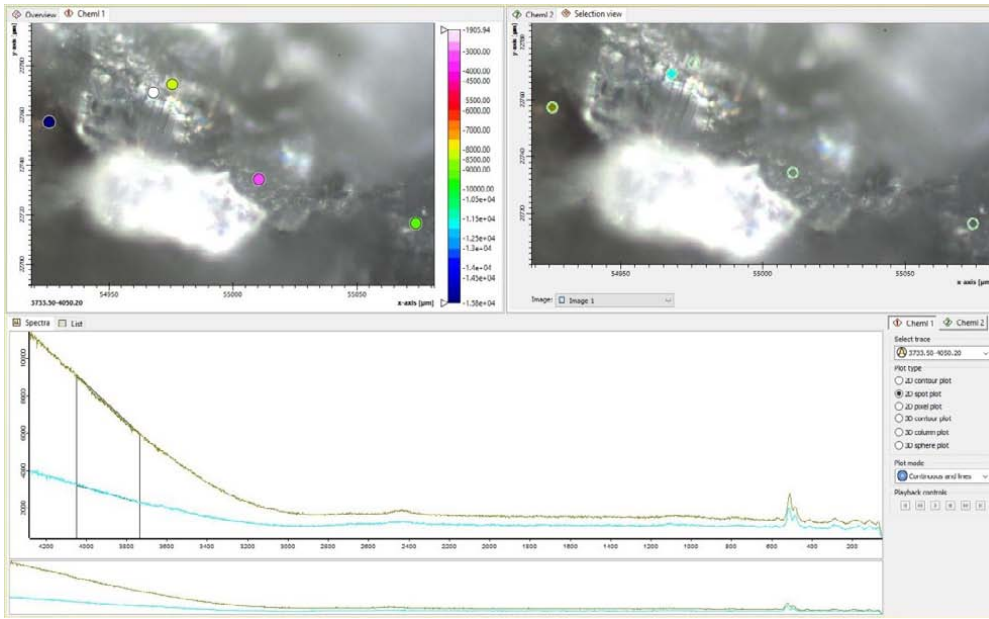


% Match	Spectrum Name	RRUFF ID
96	<J> Aegirine (532nm)	R040054
95	Aegirine (532nm)	R070125
93	Aegirine (532nm)	R050074
83	Caryophite (532nm)	R070181
83	Aegirine (532nm)	R061093
80	Magnesianiebeckite (532nm)	R070002
78	Riebeckite (532nm)	R060028
75	Fluoro-ferroalekete (532nm)	R070468
74	Natroleymynte (532nm)	R060958
74	Riebeckite (532nm)	R050082
72	Kovdorokite (532nm)	R050505
72	Jalpaikite-(Fe³⁺) (532nm)	R070351
71	Kovdorokite (532nm)	R061979

R040054
Aegirine
NoFCS_2_0_5
Mont-Saint-Hilaire, Rouville County, Quebec, Canada



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

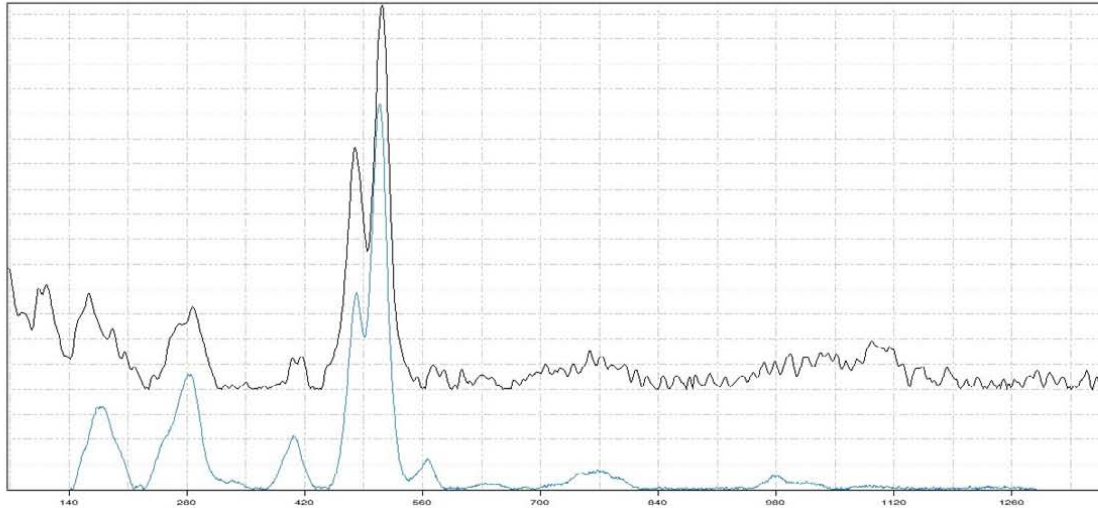


Sample :



CrystalSleuth: EXTRACT_38-FUE (Sp)-Z1_zebra rock (white stuff)_0_000000_0_NK_G1

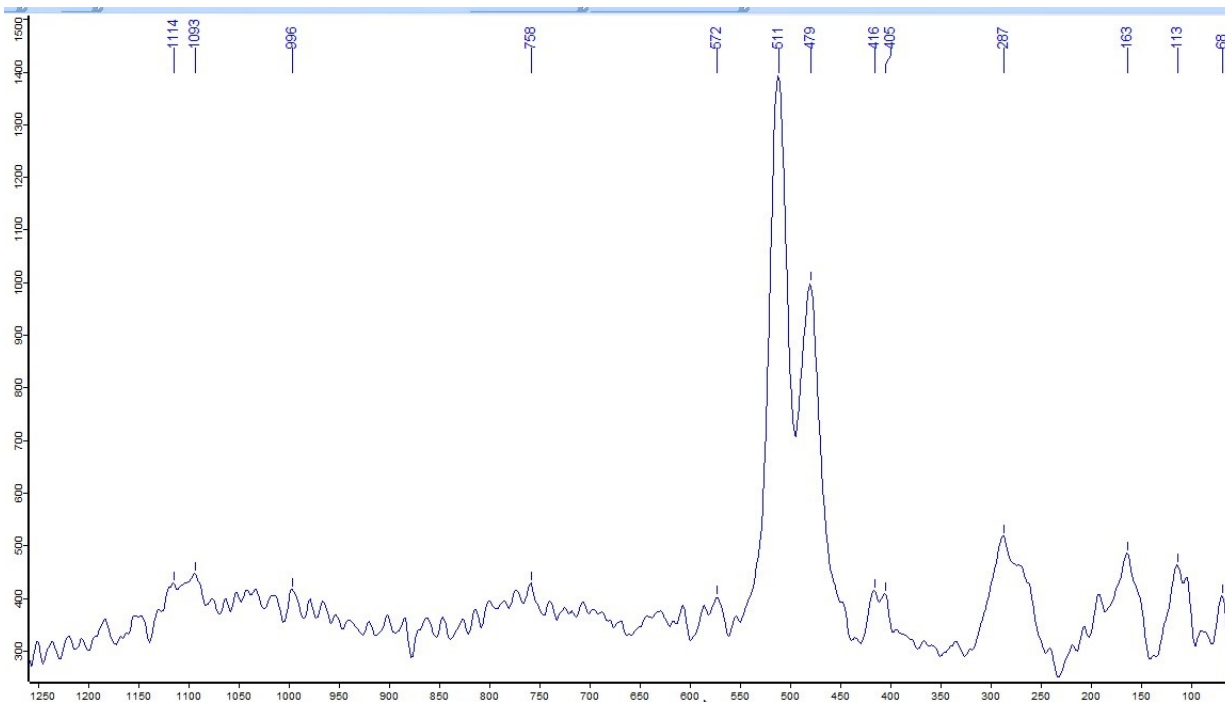
File Edit Mode Help



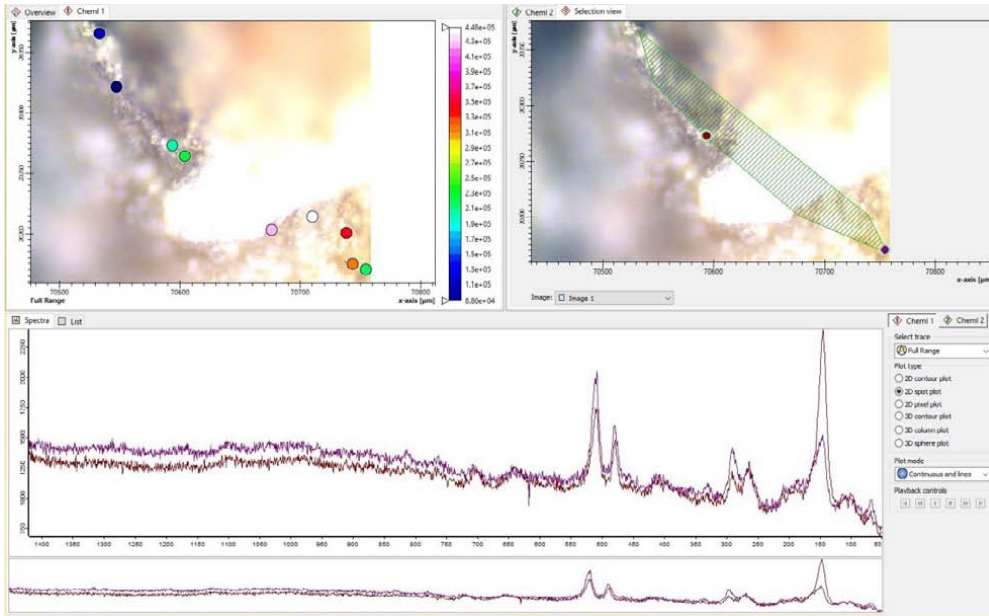
% Match	Spectrum Name	RRUFF ID:
90	< Labradorite (532nm)	R050104
88	Labradorite (532nm)	R060221
87	Orthoclase (532nm)	R040055
86	Labradorite (>52nm)	R060193
86	Oligoclase (532nm)	R070268
86	Orthoclase (532nm)	R070001
85	Orthoclase (532nm)	R050185
84	Labradorite (532nm)	R060082
84	Orthoclase (532nm)	R060077
84	Stronalite (532nm)	R060919
84	Orthoclase (532nm)	R050367
83	Perite (532nm)	R060766
81	Microline (532nm)	R050184

Search

R050104
Labradorite
Na 0.5-0.3 Ca 0.5-0.7 Al 1.5-1.7 Si 2.5-2.3 O 8
unknown

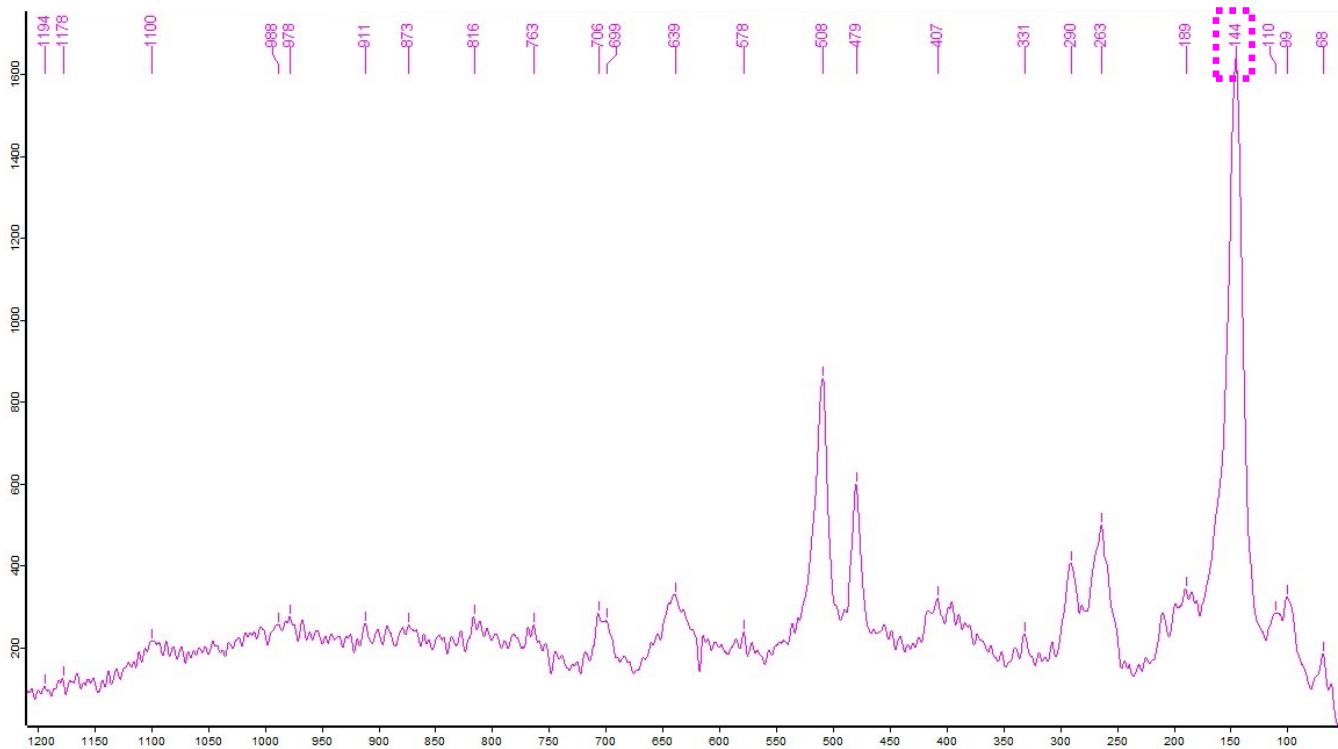
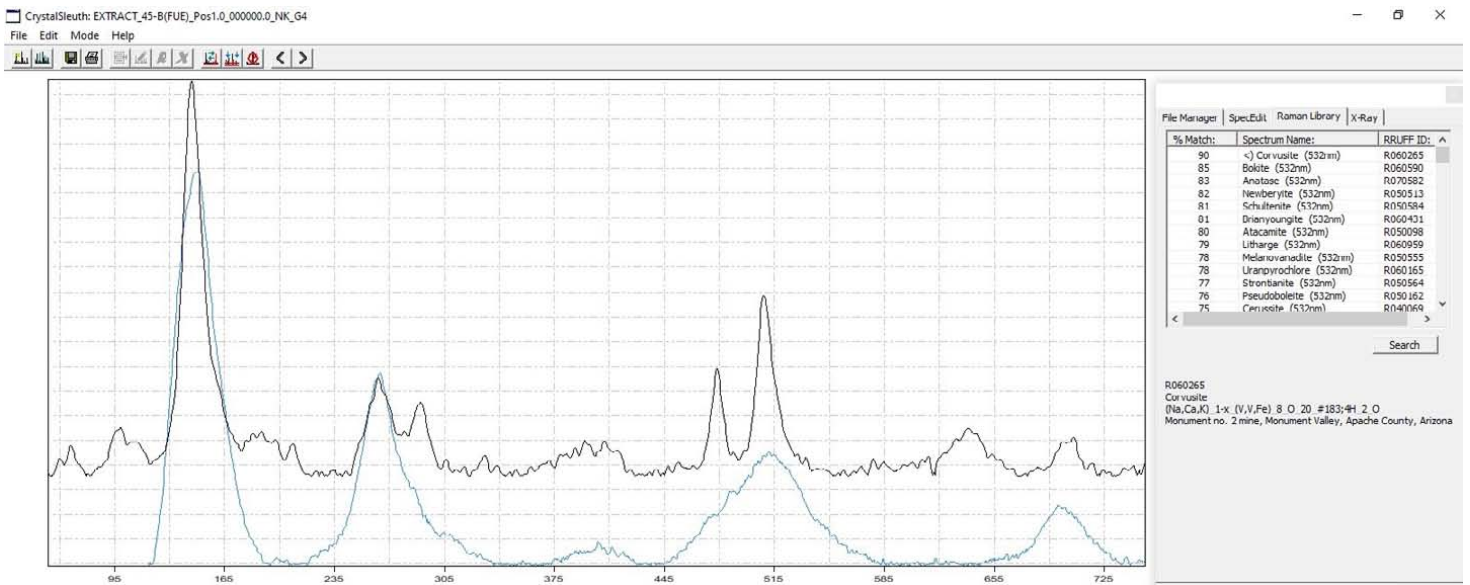


Sample Site **45-B**: Stone 1_spectra 1 indicates: **Corvusite** (+ Orthoclase, Labradorite?) (→ RRUFF_search)

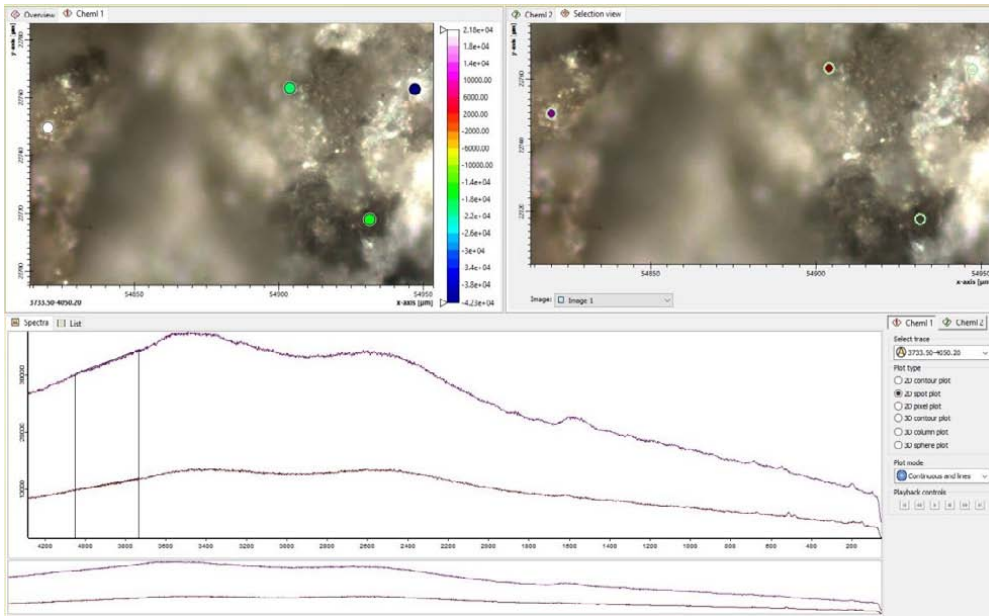


Note: **Corvusite** is an Iron-bearer mineral

Sample:

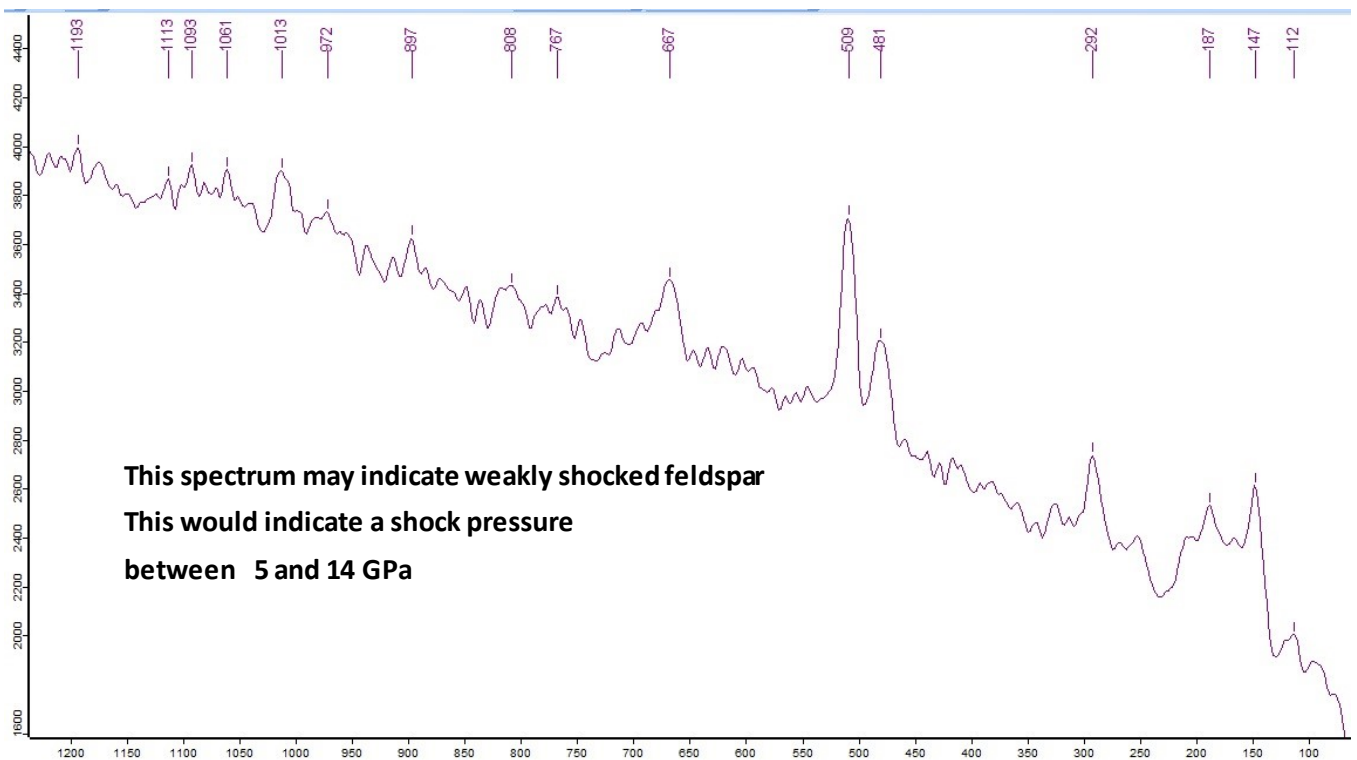
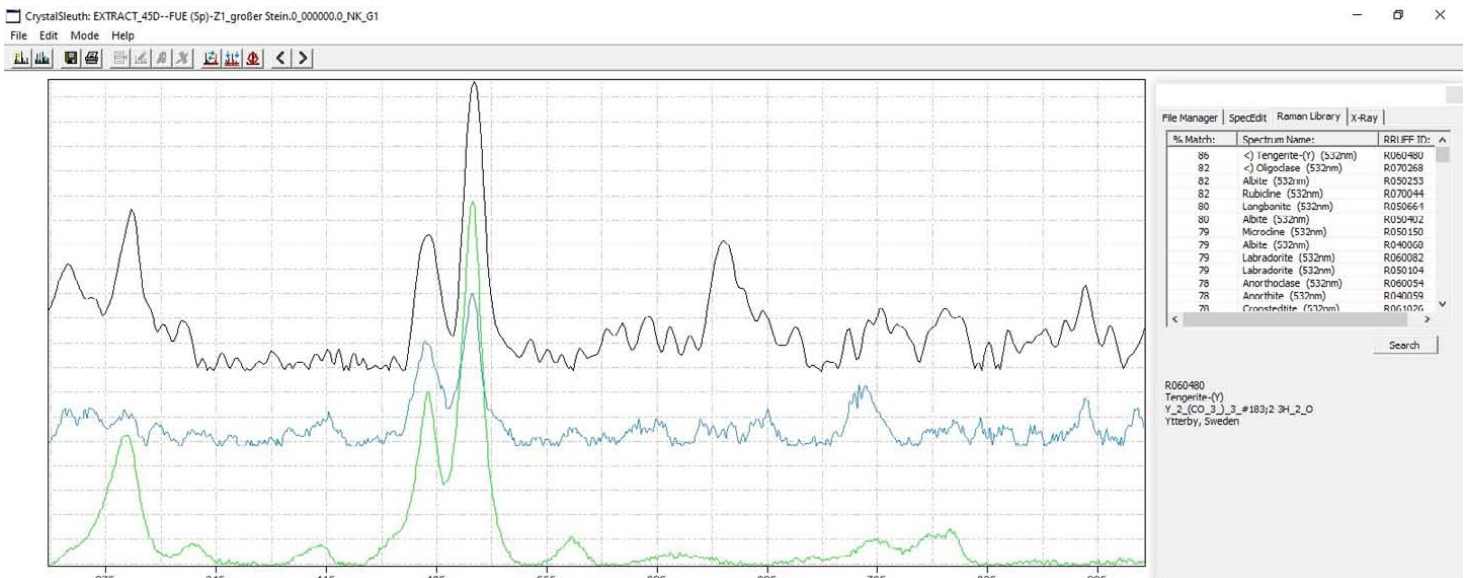


Sample Site **45-D**: Stone 1_spectra 1 indicates: **Oligoclase, Tengerite-Y** (→ see RRUFF_CS search)



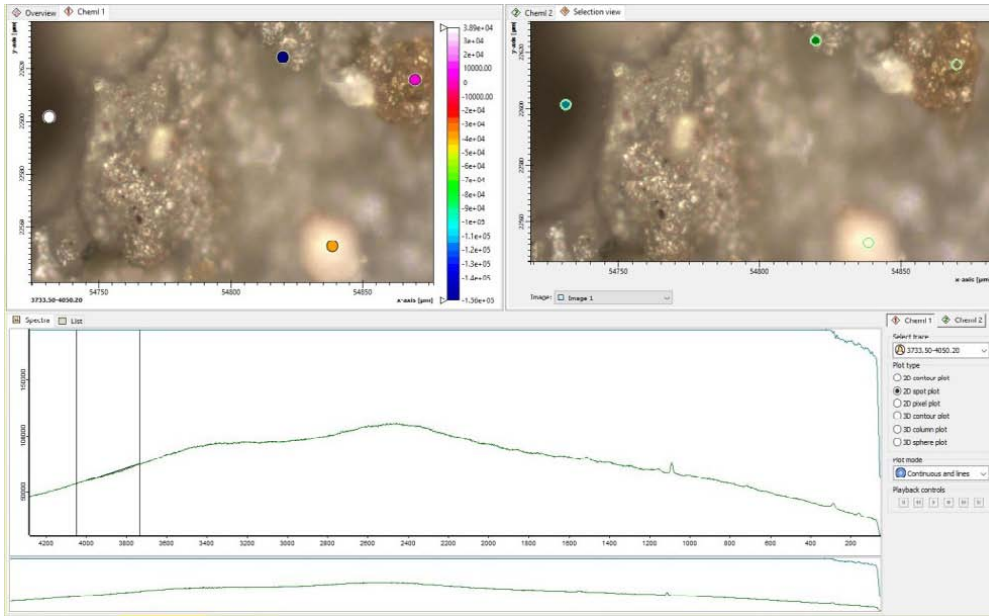
Sample from **old ocean sediments** which are > 100 million years old!

Sample :



This spectrum may indicate weakly shocked feldspar
This would indicate a shock pressure
between 5 and 14 GPa

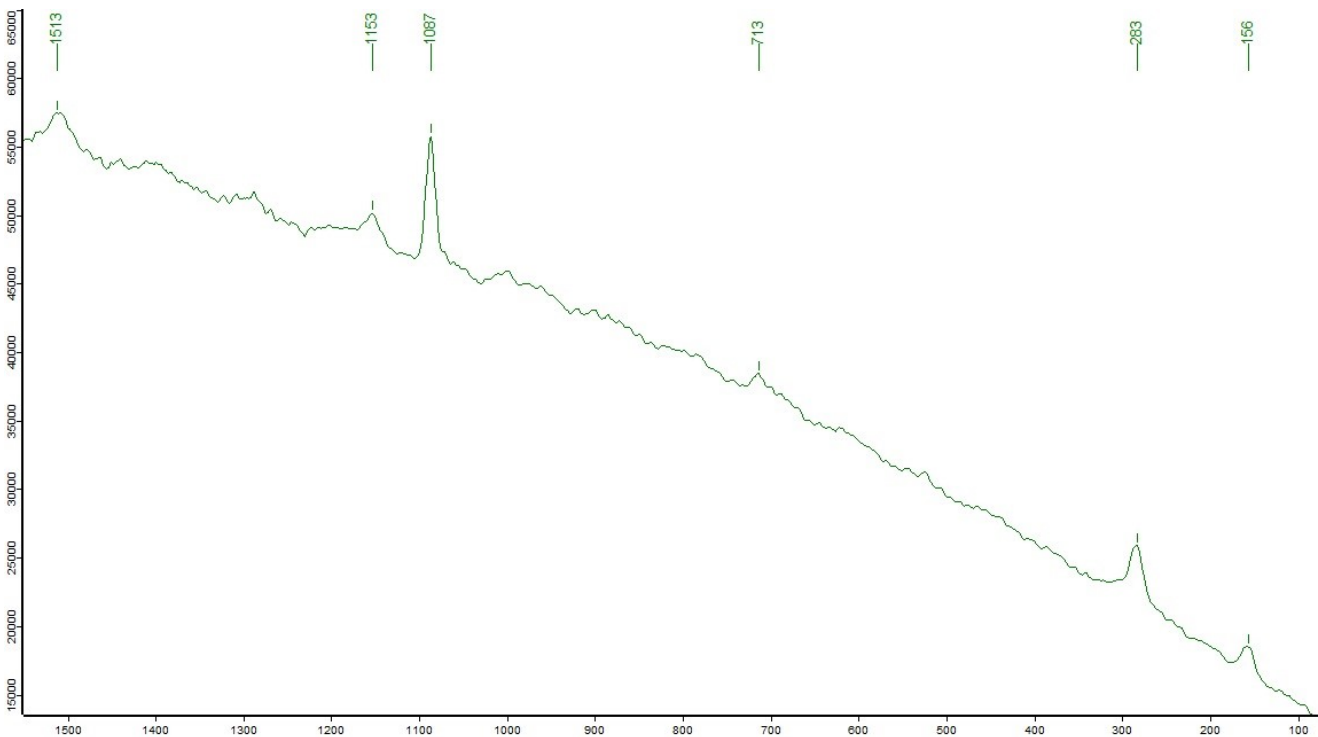
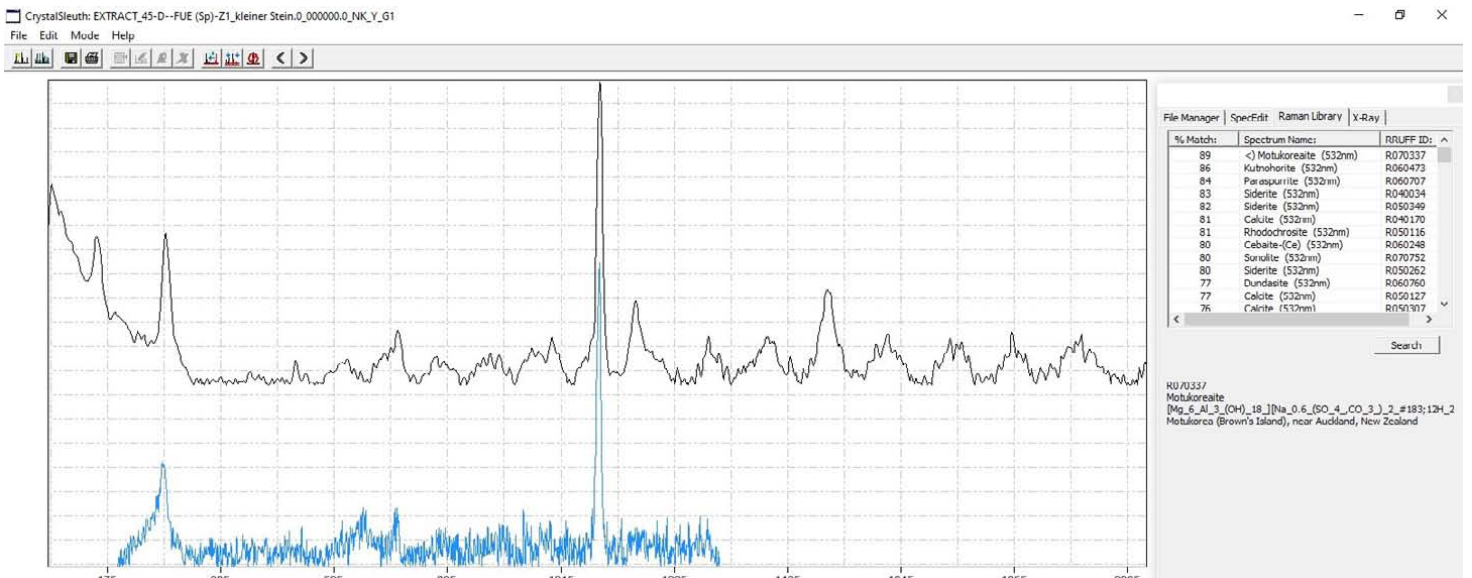
Sample Site **45-D**: Stone 2_spectra 2 indicates: **Motukoreaita** (→ see RRUFF_CS search)



Note:

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

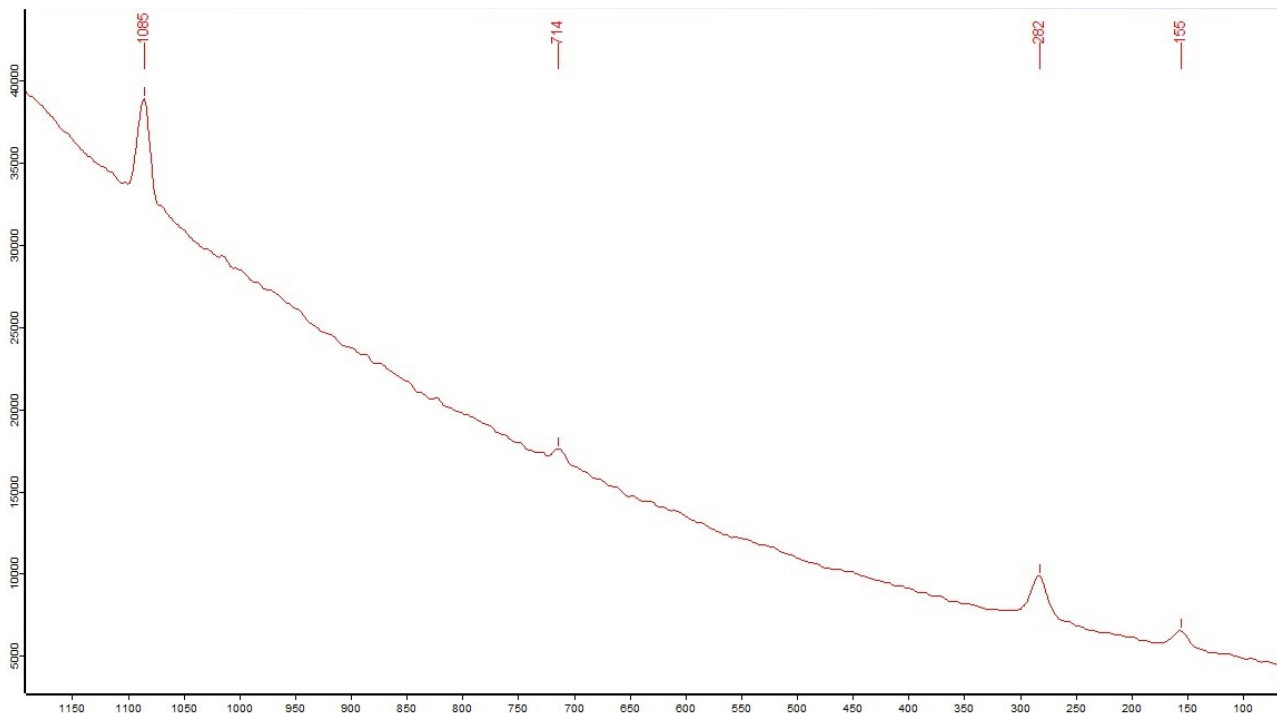
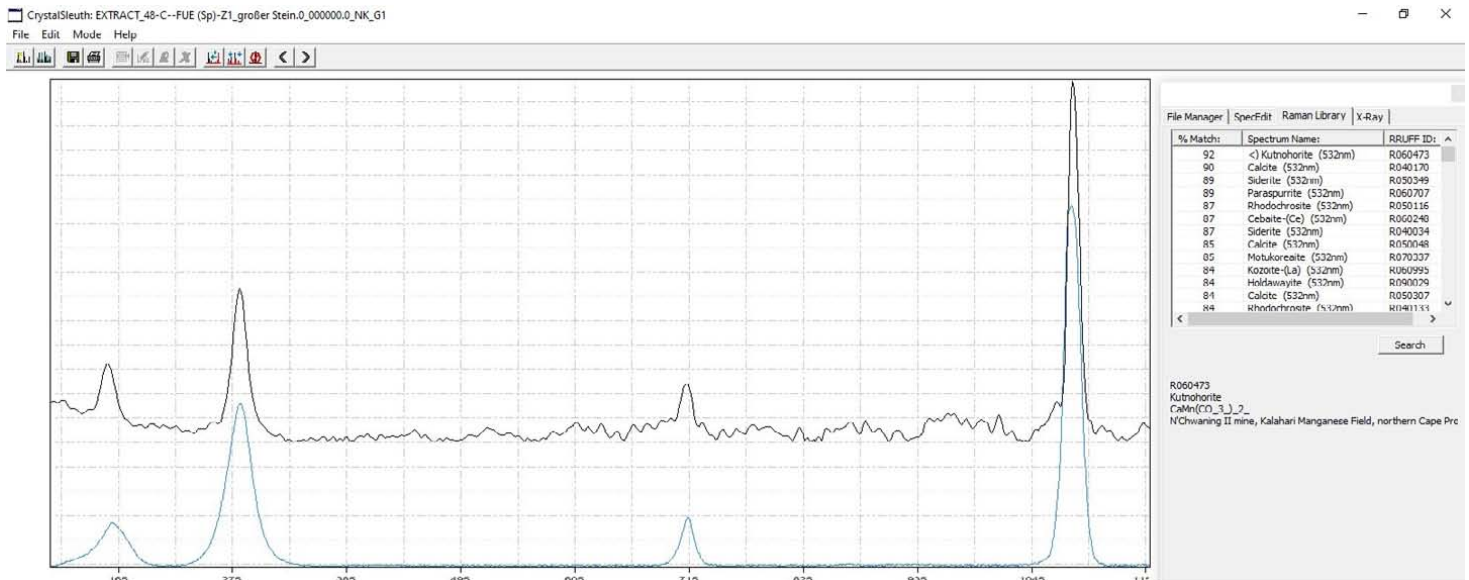
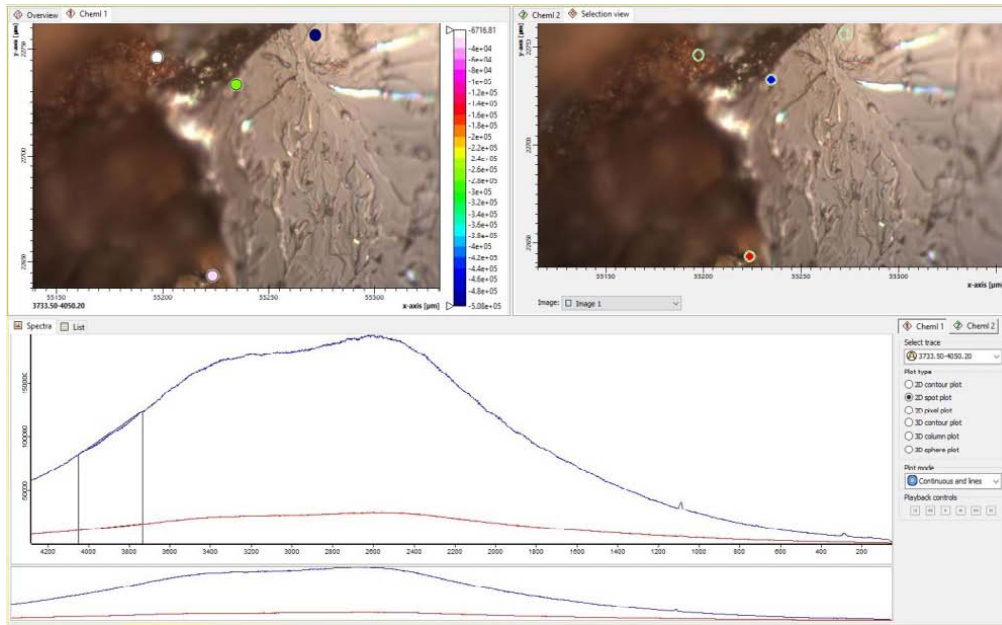
Sample:



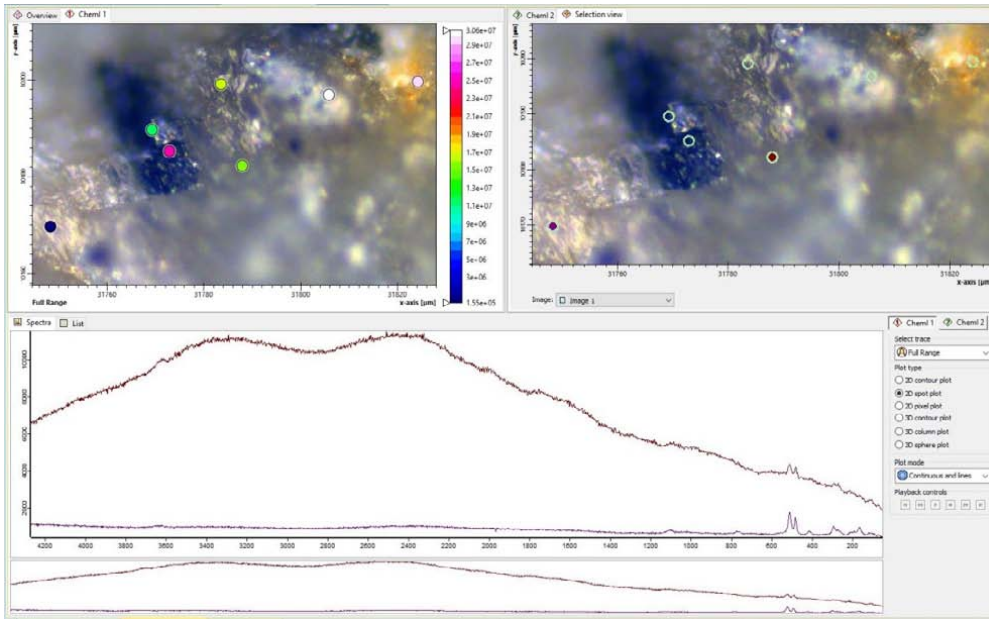
Sample Site **48-C** : Stone 1_spectra 1 indicates: **Kutnohorite, Calcite** (→ see RRUFF_CS search)

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

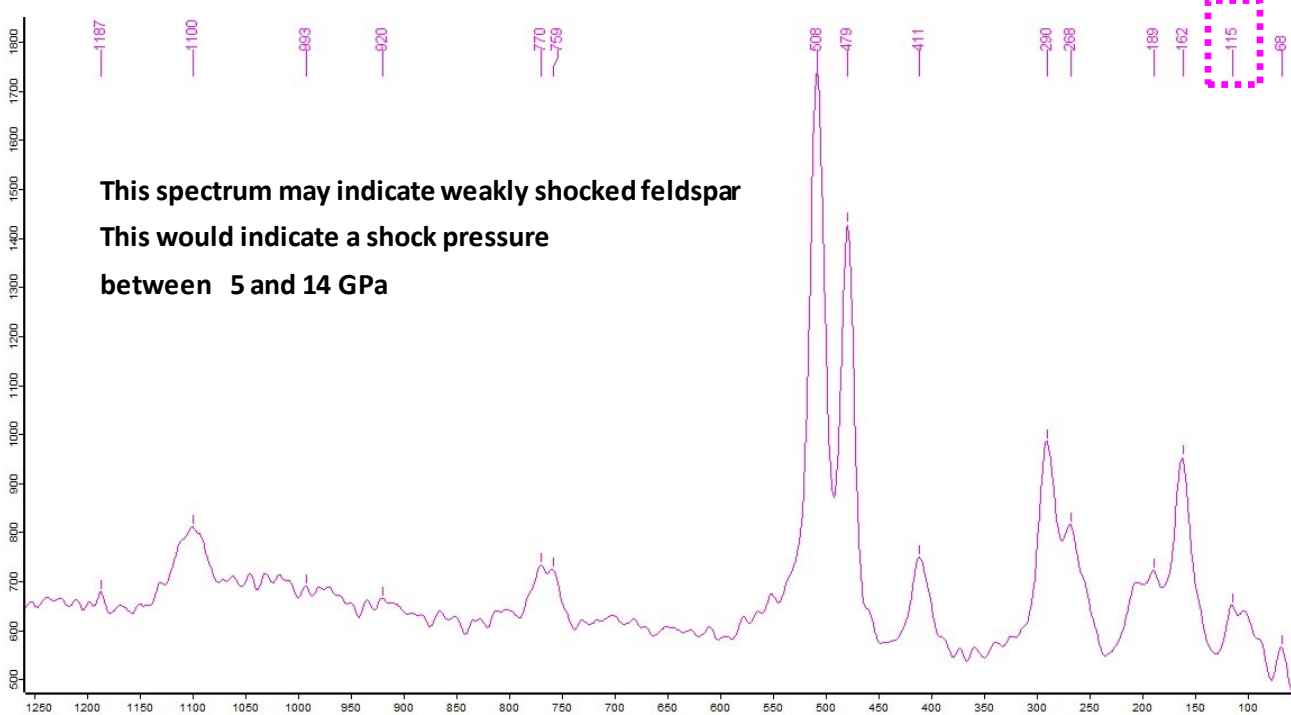
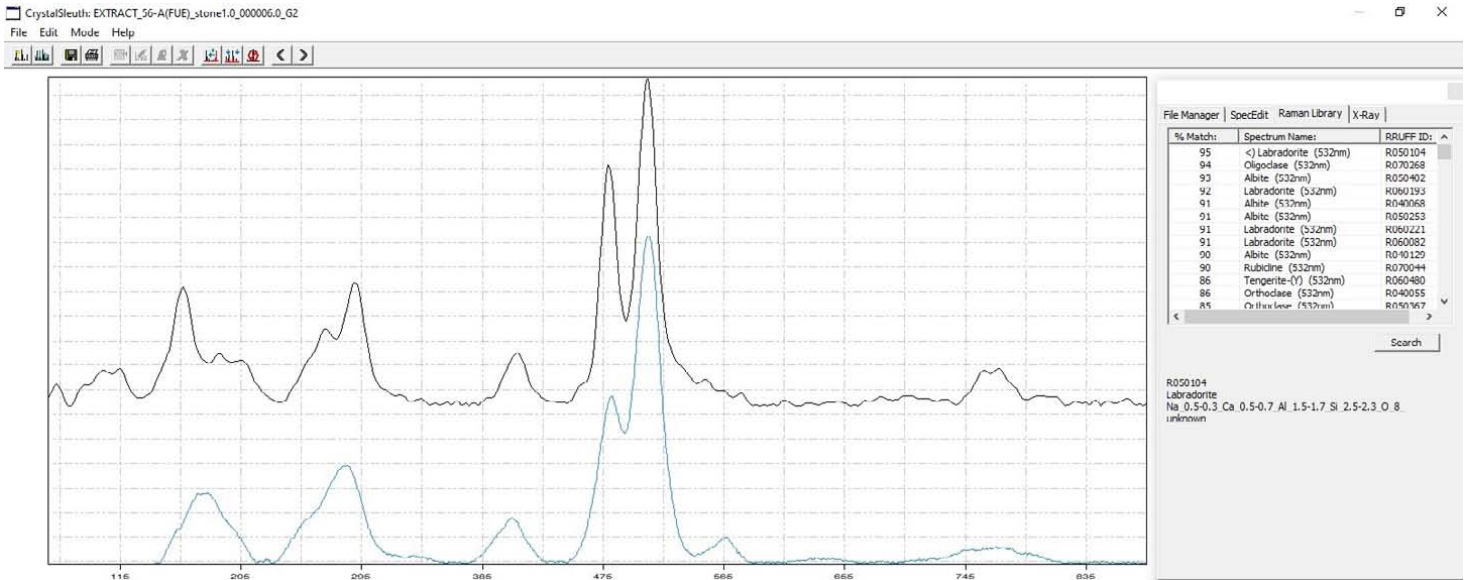
Sample :



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

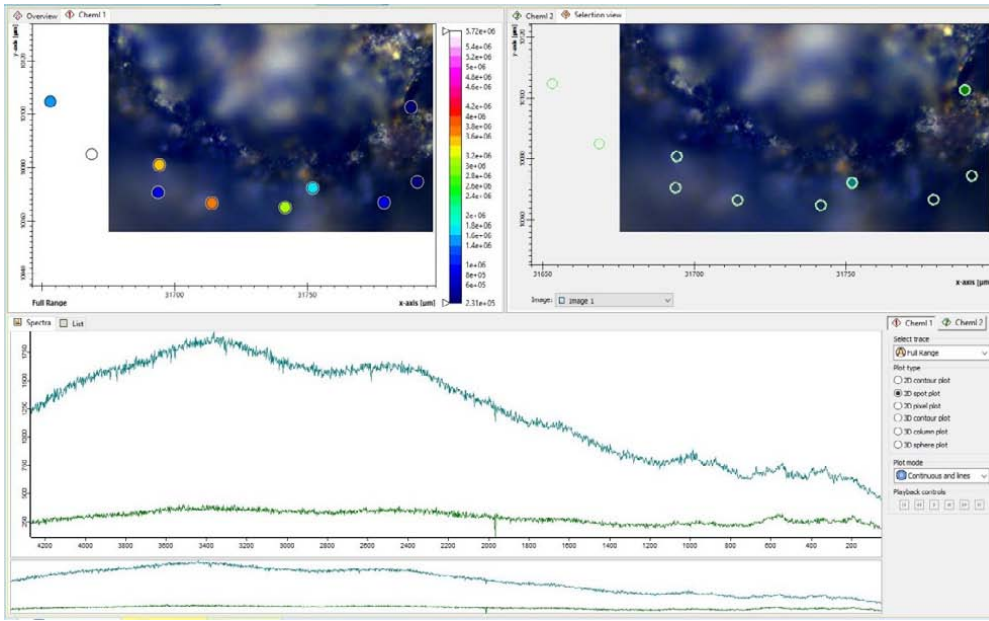


Sample :

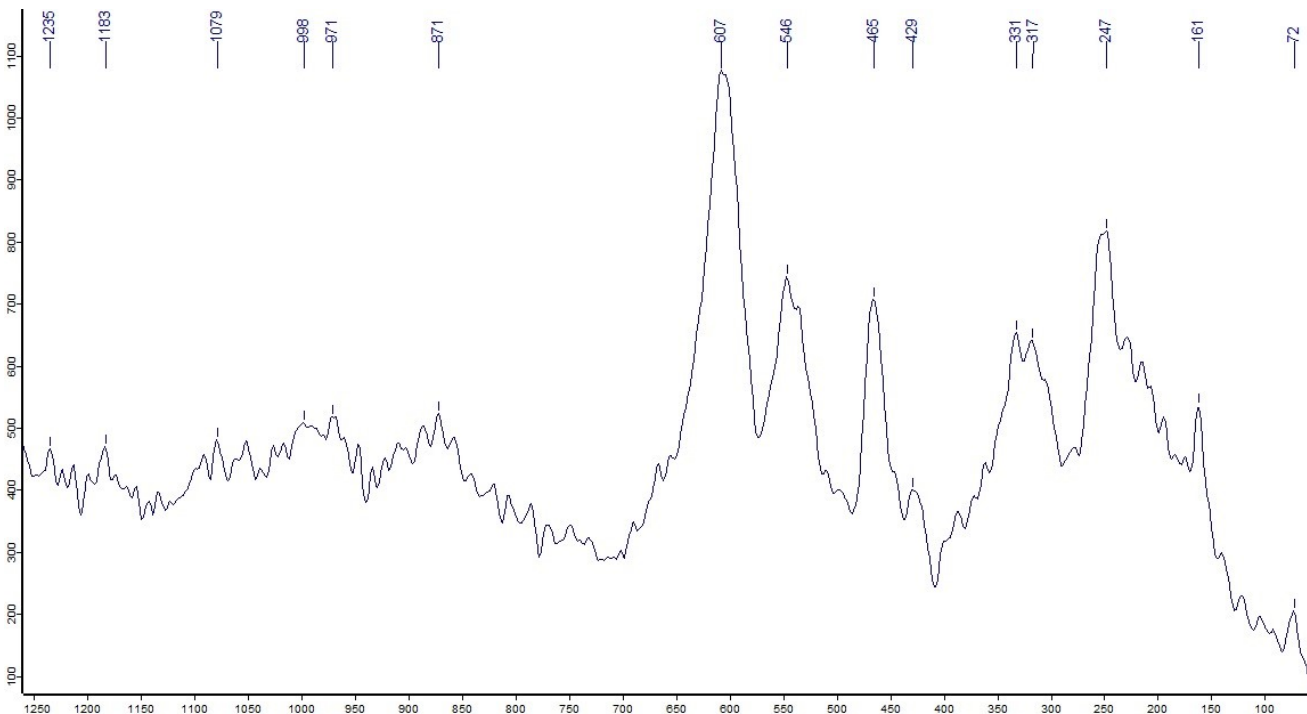
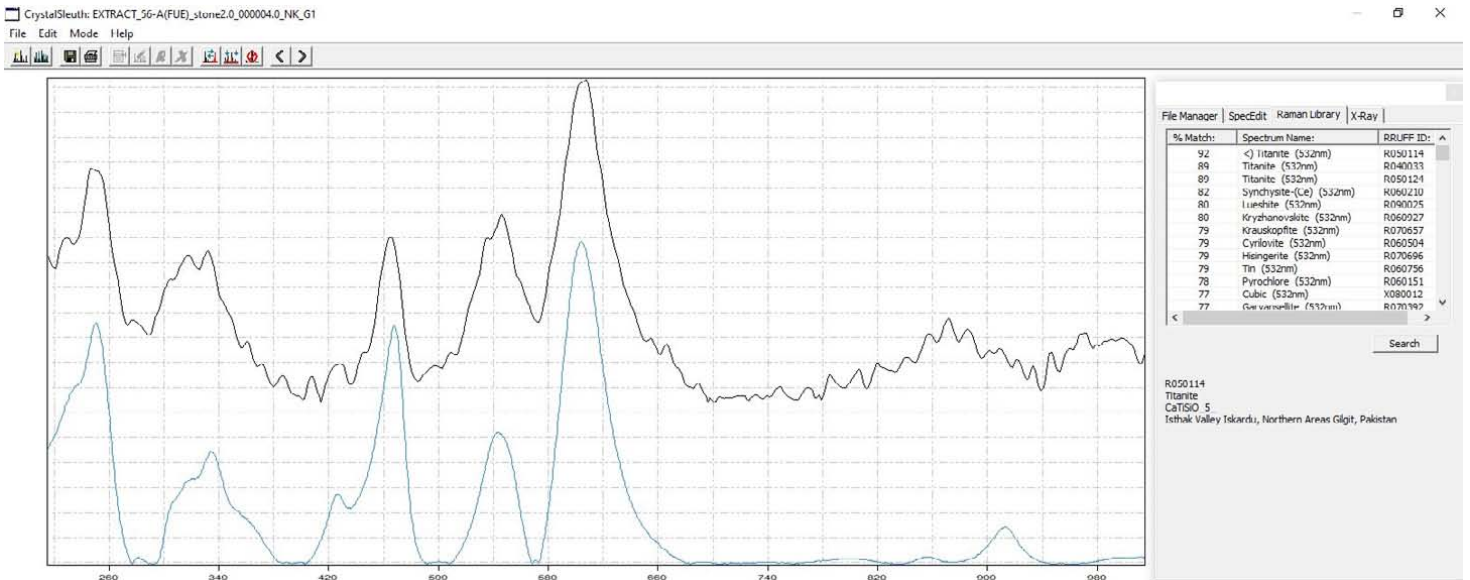


**This spectrum may indicate weakly shocked feldspar
 This would indicate a shock pressure
 between 5 and 14 GPa**

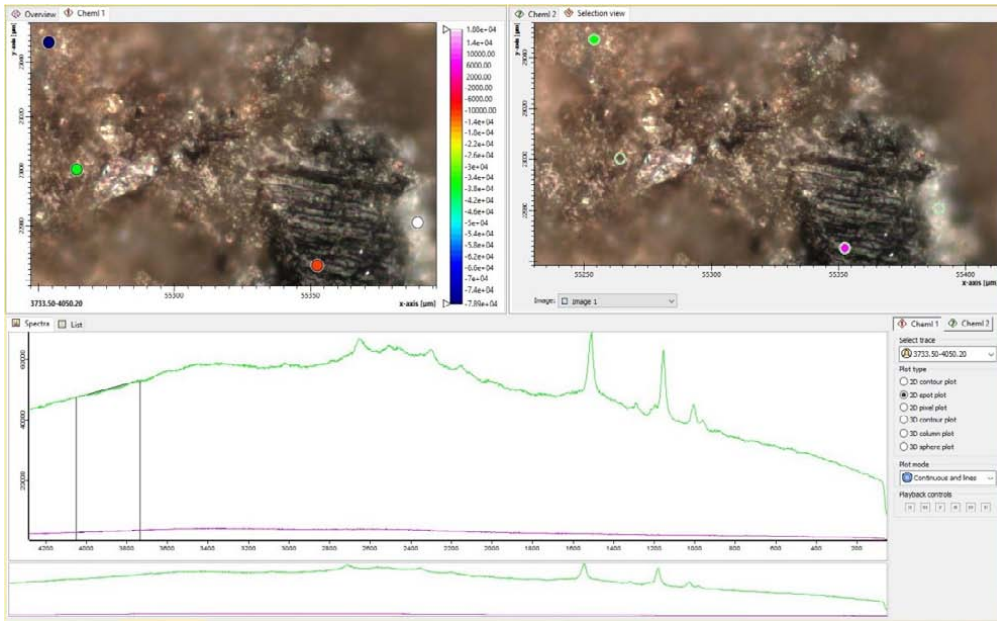
Sample Site **56-A** : Stone 2_spectra 1 indicates : **Titanite** (→ see RRUFF_CS search)



Sample :



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

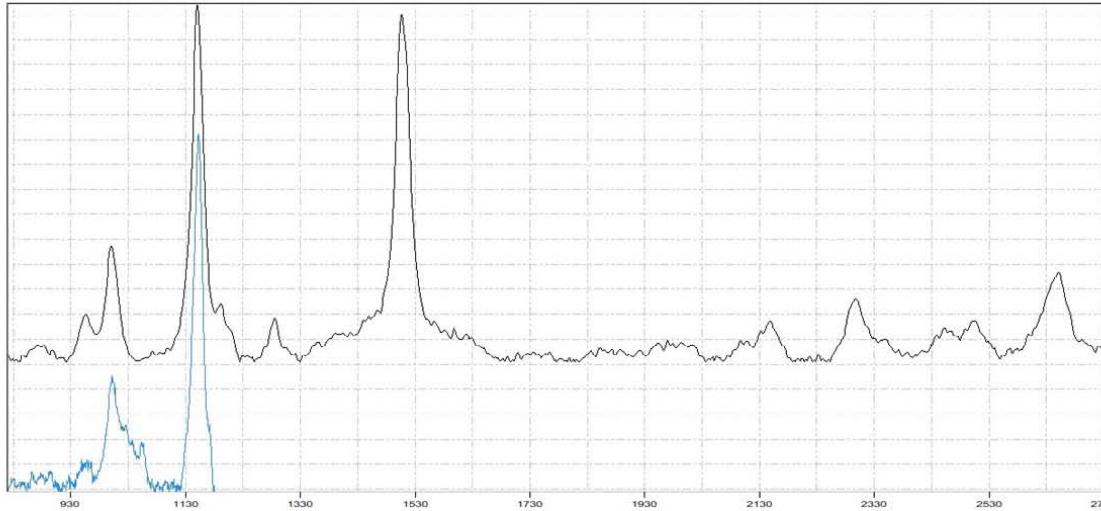


Sample :



CrystalSleuth: EXTRACT_56-C--FUE (Sp)-Z1.0_000003.0_NK_G1

File Edit Mode Help

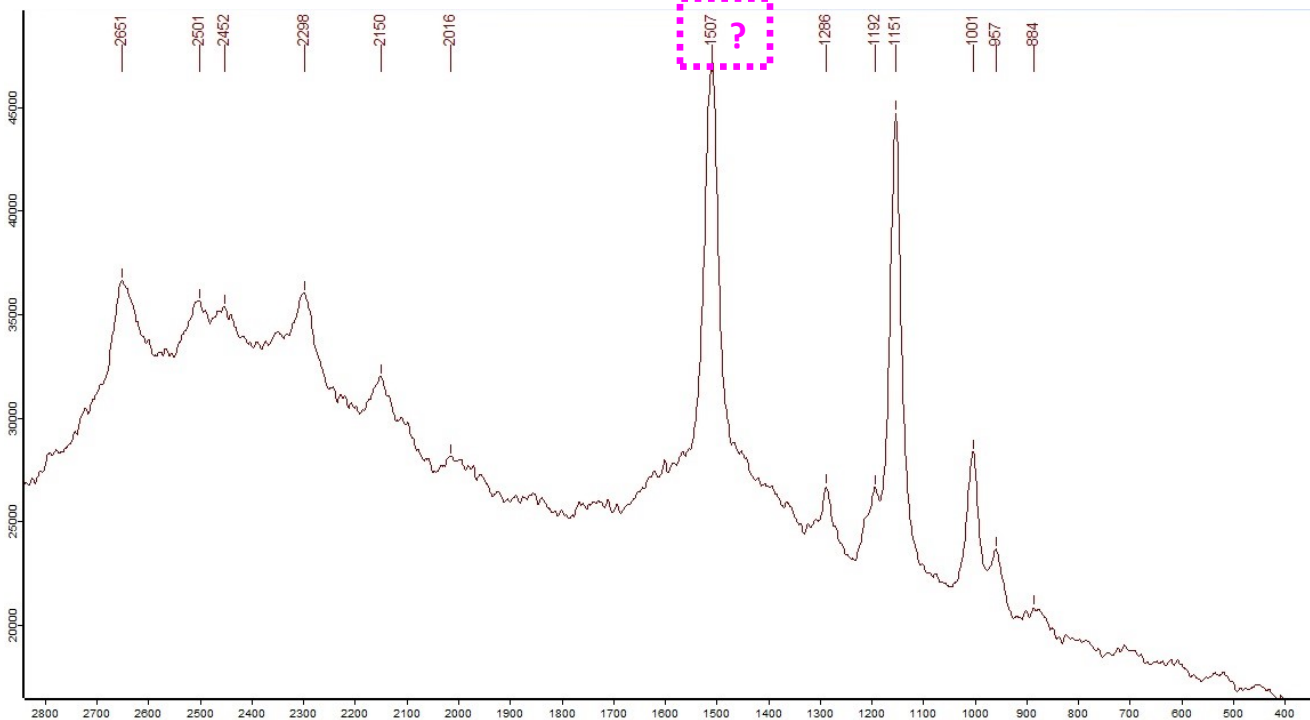


File Manager SpecEdit Raman Library X-Ray

% Match	Spectrum Name	RRUFF ID
62	< > Reyerte (532nm)	R060749
53	Thorarite (532nm)	R060849
53	Reckingerite (532nm)	R060096
51	Zincite (532nm)	R060027
51	Abeleonite (532nm)	R070007
51	Heulandite-Sr (532nm)	R070272
50	Clinoptilolite-Ca (532nm)	R061098
50	Clinoptilolite-Na (532nm)	R061099
49	Barrerite (532nm)	R050135
49	Heulandite-Ca (532nm)	R050017
49	Dachiardite-Ca (532nm)	R061097
48	Epistilbite (532nm)	R061105
48	Stellerite (532nm)	R070155

Search

R060749
 Reyerte
Na_2Ca_14Al_2Si_22O_58(OH)_8#183;6H_2O
 Drynoch, Island of Skye, Scotland

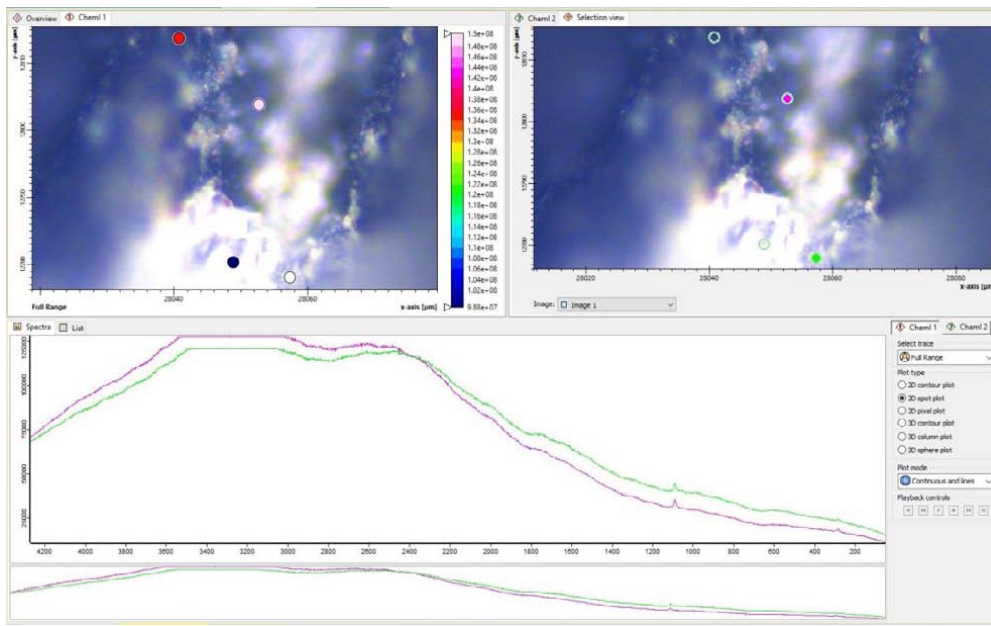


Sample Site **58-A** : Stone 2_spectra 1 indicates : **Sonolite, Motukoreaite** (→ see RRUFF_CS search)

Note :

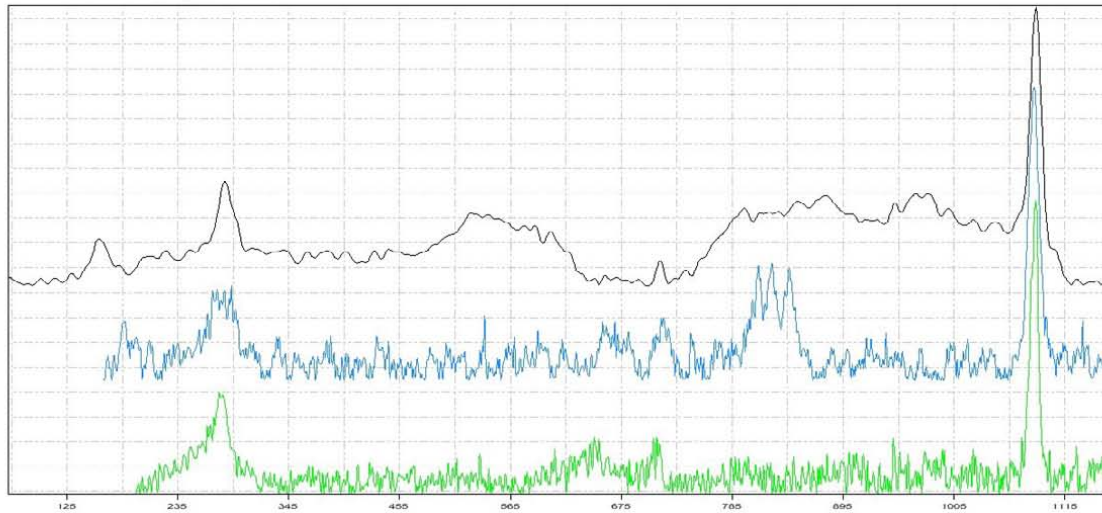
Motukoreaite is metamorphosed (> 100 million year old) ocean sediment, which was metamorphosed below 150 Grad into Motukoreaite !

Sample :



CrystalSeuth: EXTRACT_58-A(FUE)_stone2_1_000000_0_NK_G2

File Edit Mode Help

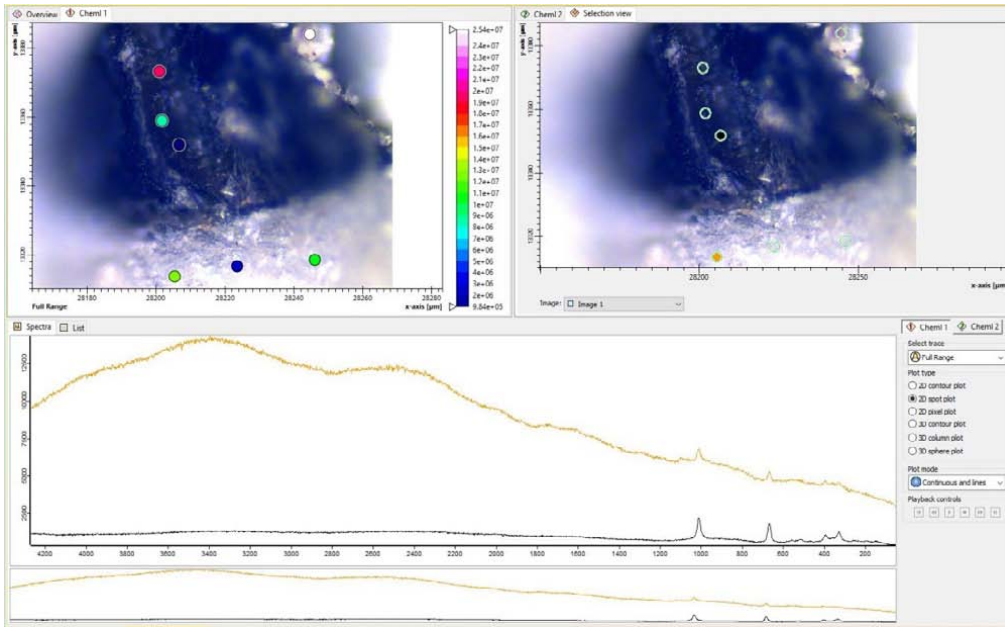


% Match	Spectrum Name	RRUFF ID
79	◁ Sonolite (532nm)	R070752
76	◁ Motukoreaite (532nm)	R070337
73	Chlorite (532nm)	R050416
73	Znucalite (532nm)	R070483
71	Digenite (532nm)	R060840
71	Wickenburgite (532nm)	R000040
71	Gratonite (532nm)	R060956
71	Yuksporite (532nm)	R060518
70	Szabalyite (532nm)	R070490
70	Ixolite (532nm)	R070495
70	Aryalite (532nm)	R070413
70	Imberite (532nm)	R080014
69	Ferrocite (532nm)	R010171

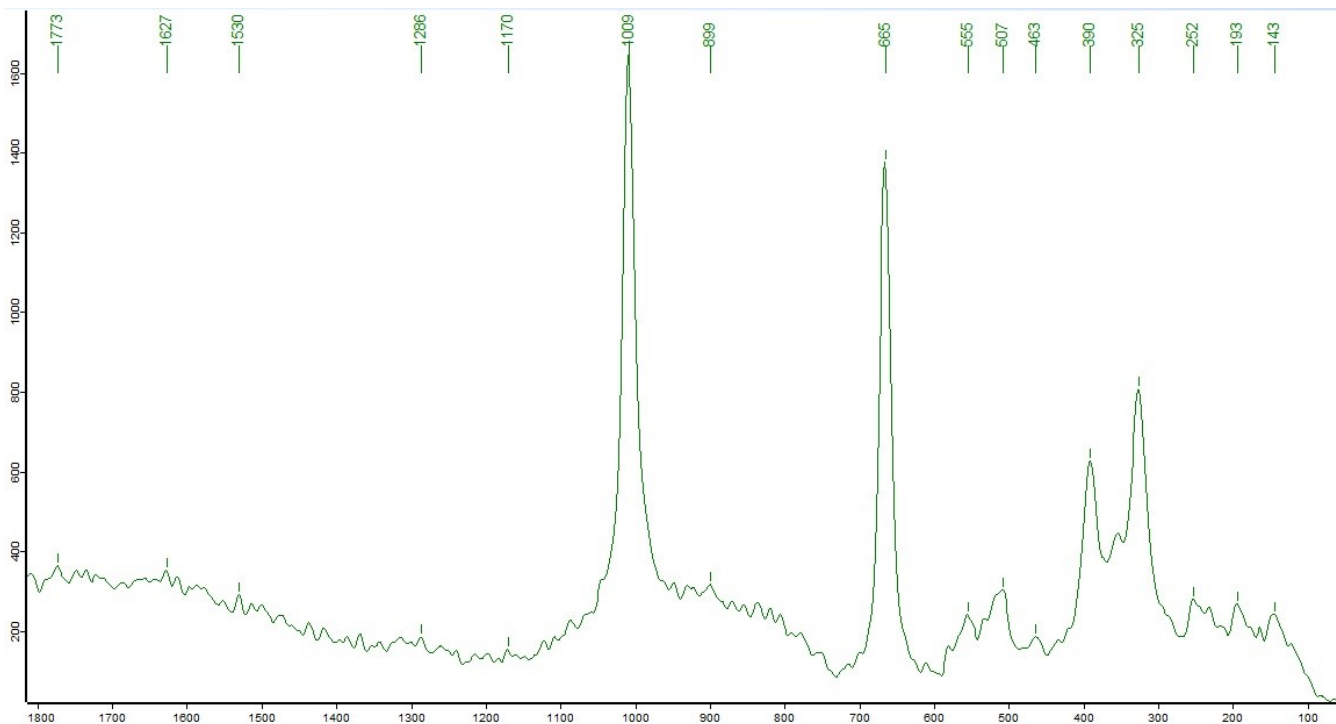
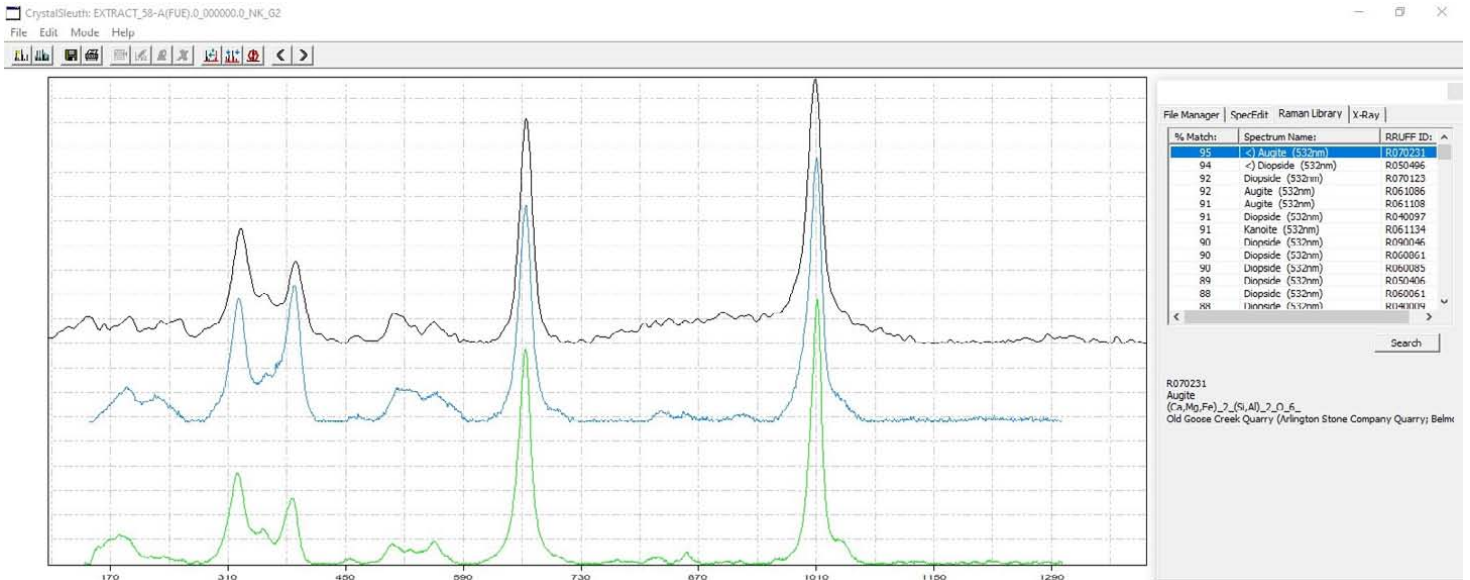
R070752
Sonolite
Mn₉(SiO₄)₄(OH)₂
Fuji mine, Wakasa, Fukui Prefecture, Chubu Region, Honshu Island



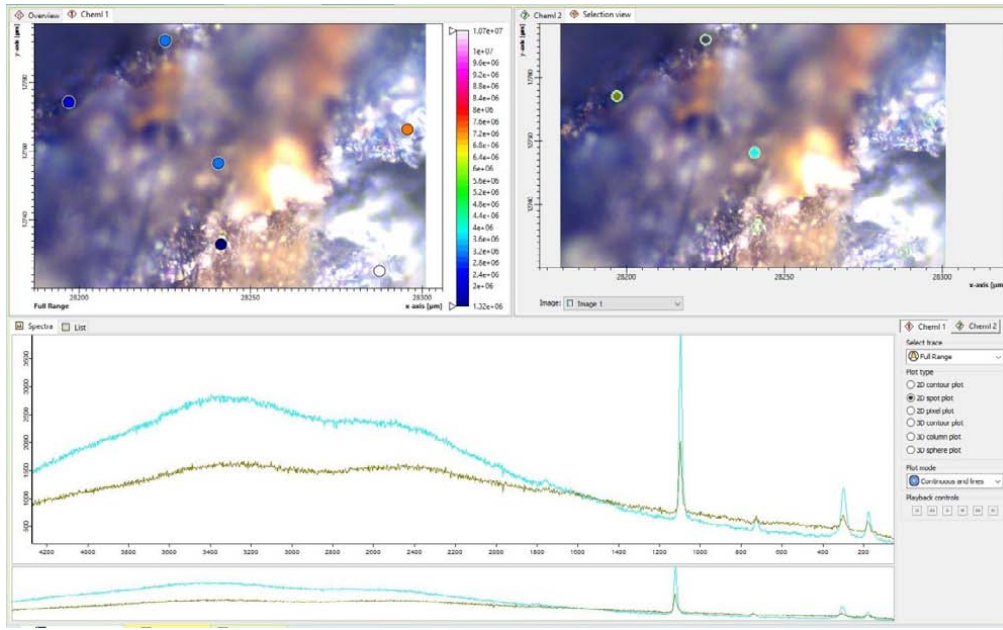
Sample Site **58-A** : Stone 1_spectra 1 indicates : **Augite, Diopside** (→ see RRUFF_CS search)



Sample :



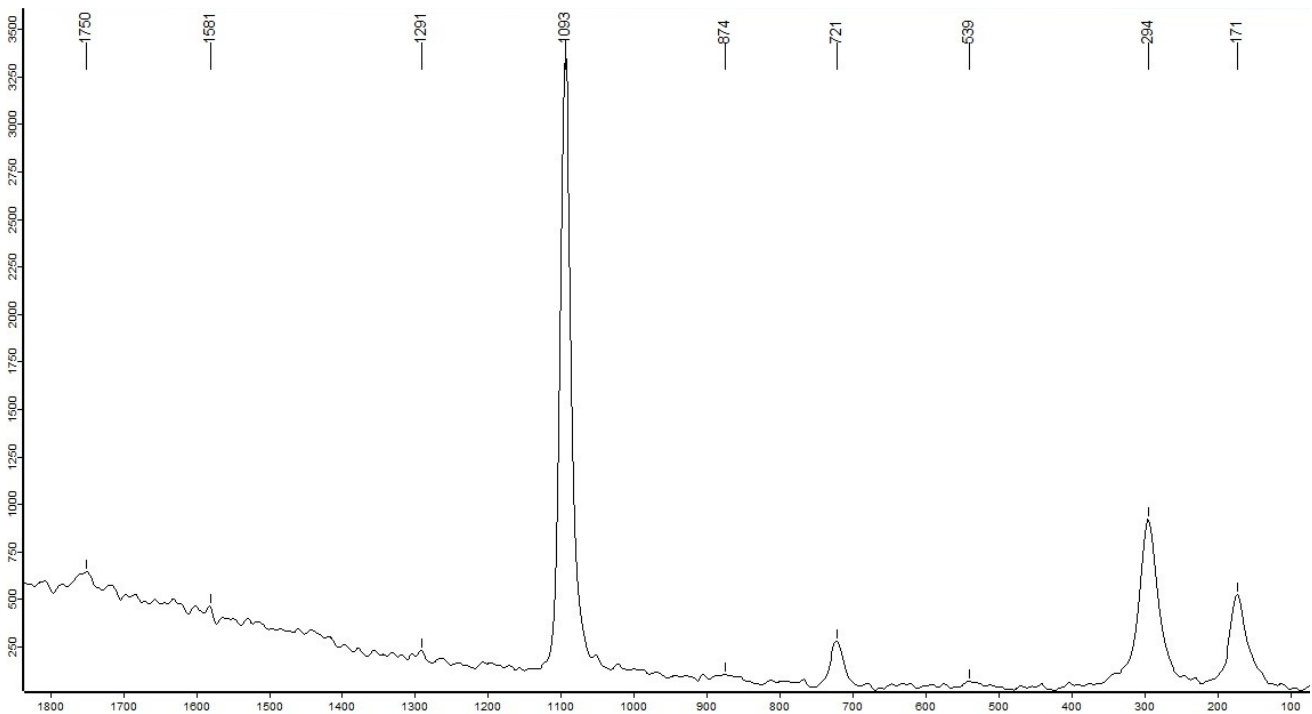
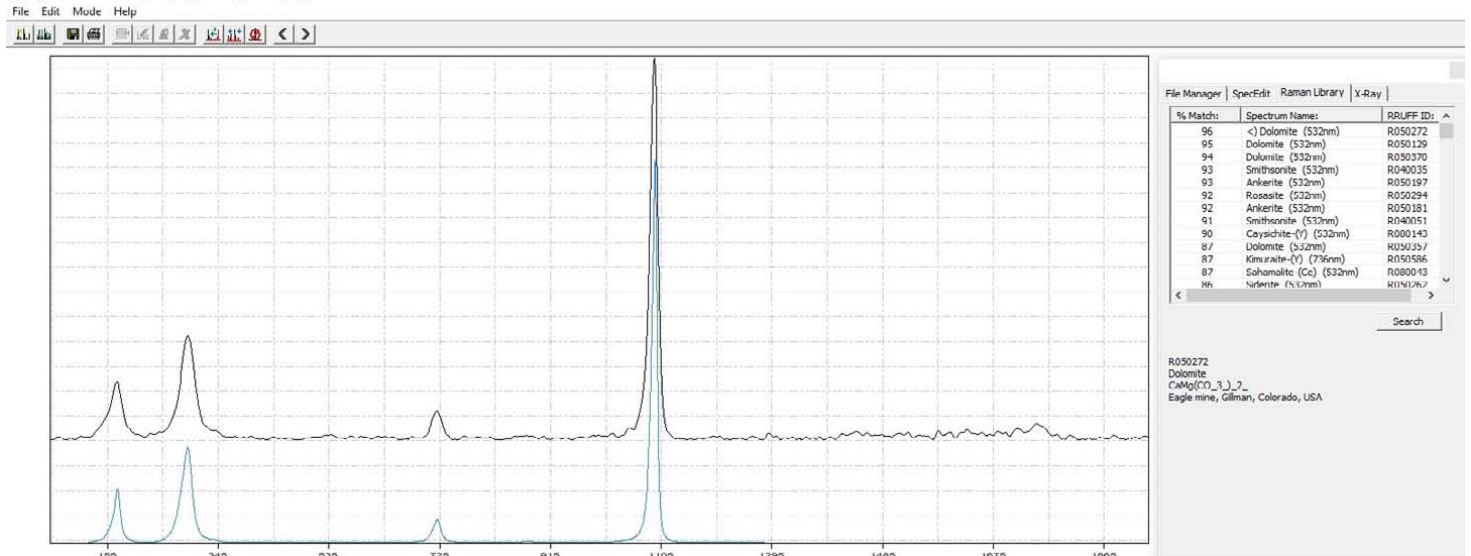
Sample Site **58-C** : Stone 1_spectra 1 indicates: **Dolomite** (→ see RRUFF_CS search)



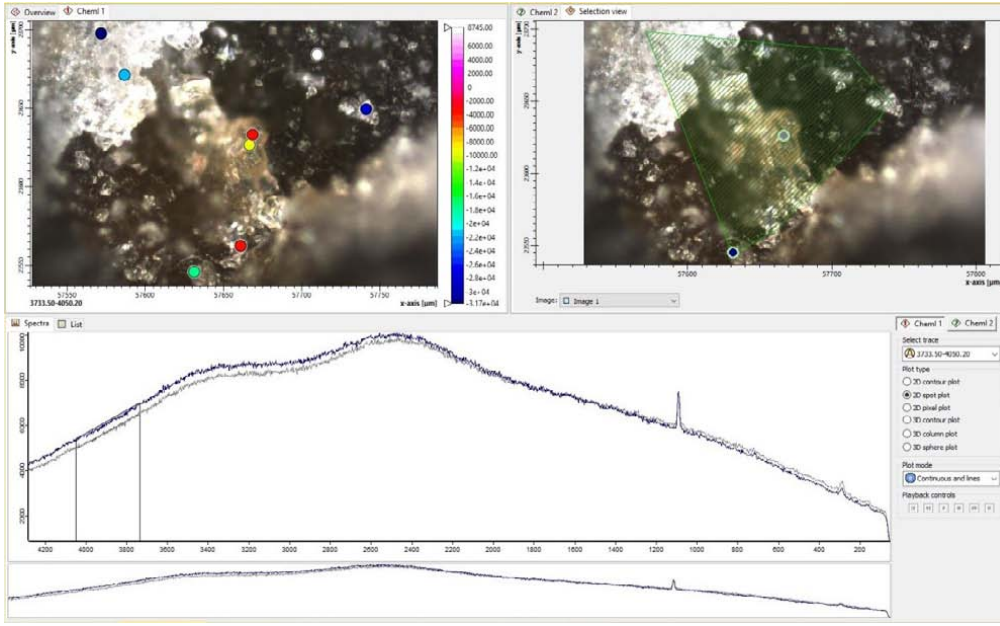
Sample :



CrystalSleuth: EXTRACT_58-C(FUE)_stone1_0_000000_0_NK_G3

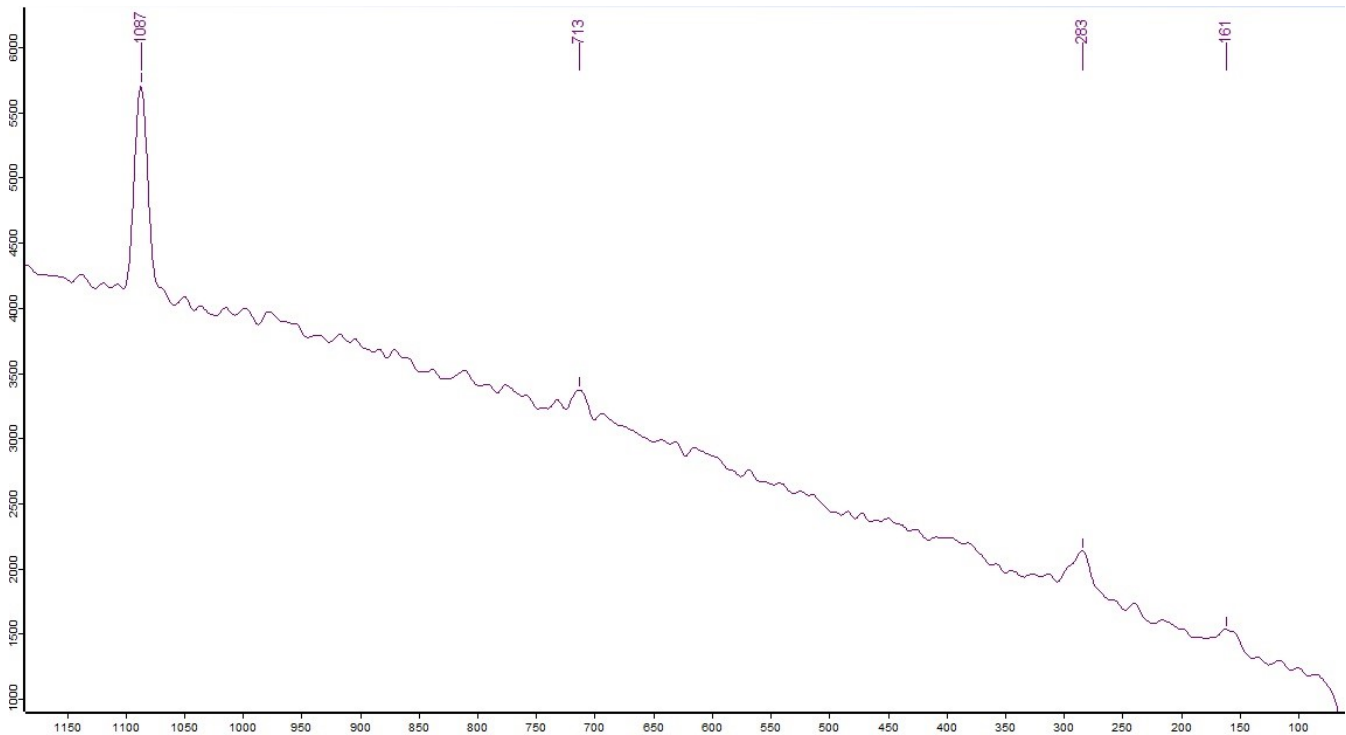
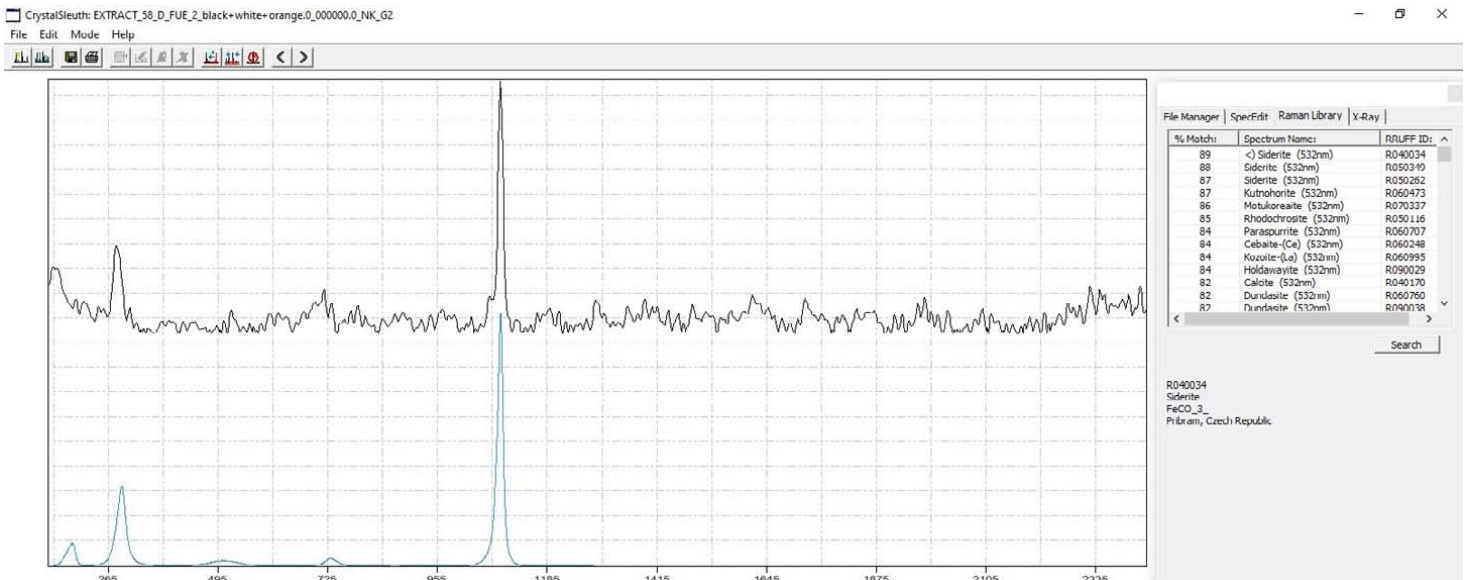


Sample Site **58-D** : Stone 1_spectra 1 indicates : **Siderite** (→ see RRUFF_CS search)



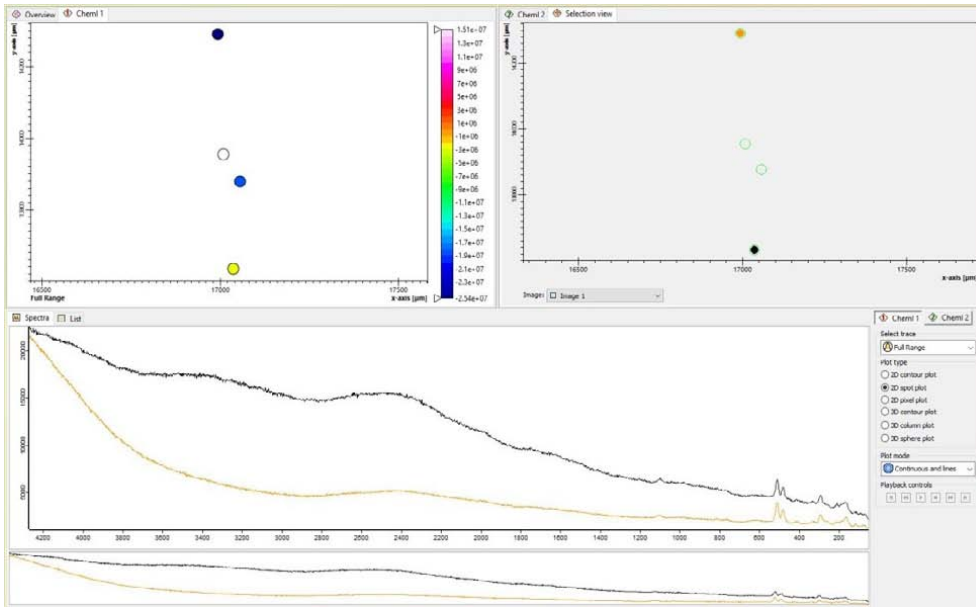
Note : **Iron-bearer mineral**

Sample :



Sample Site **21-A** : Stone 01_spectra 1 indicates: **Albite, Oligoclase**

(→ see RRUFF_CS results)

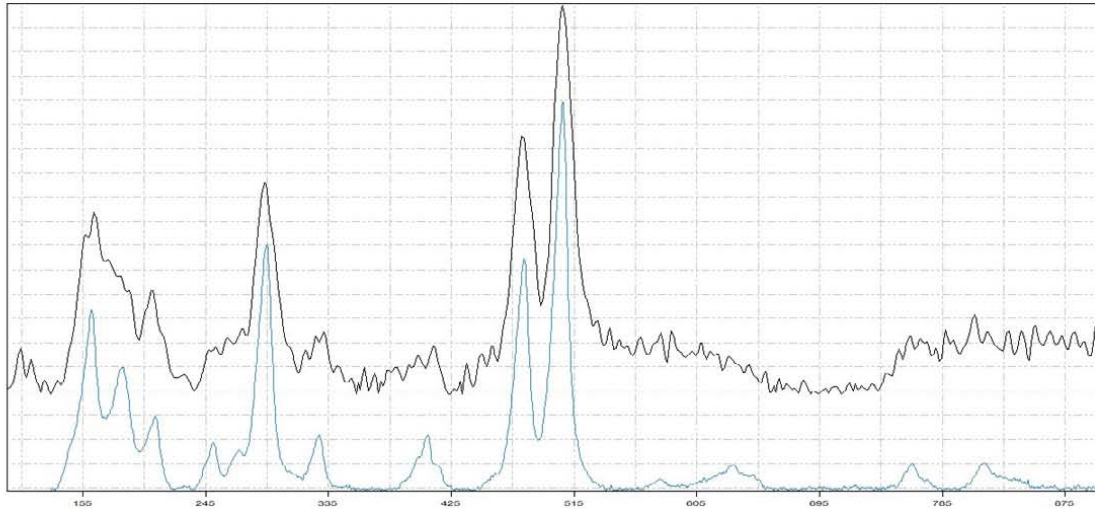
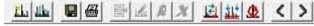


Sample :



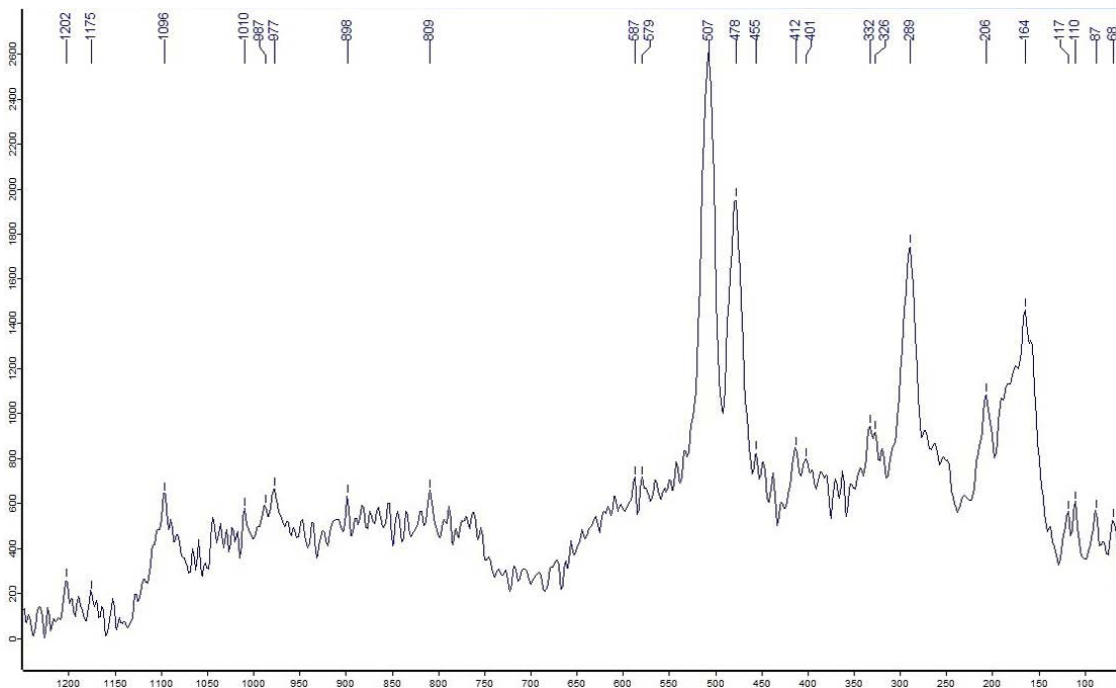
CrystalSleuth: EXTRACT_21-A(FUE)_1.0_000000.0_NK

File Edit Mode Help

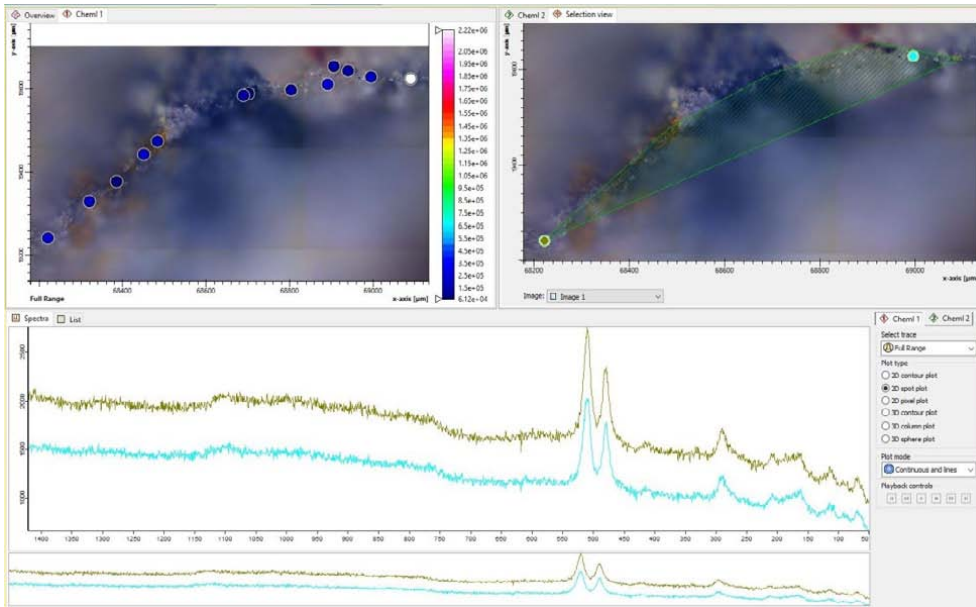


% Match:	Spectrum Name:	RRUFF ID:
91	< Albite (532nm)	R040068
91	Oligoclase (532nm)	R070268
91	Albite (532nm)	R050402
90	Albite (532nm)	R040129
89	Labradorite (532nm)	R060082
88	Labradorite (532nm)	R050104
87	Labradorite (532nm)	R060193
87	Albite (532nm)	R050253
86	Rubidite (532nm)	KU/U0944
86	Labradorite (532nm)	R060721
86	Anorthodese (532nm)	R060054
82	Tengerte-(Y) (532nm)	R060480
82	Psilodotite (532nm)	R061014

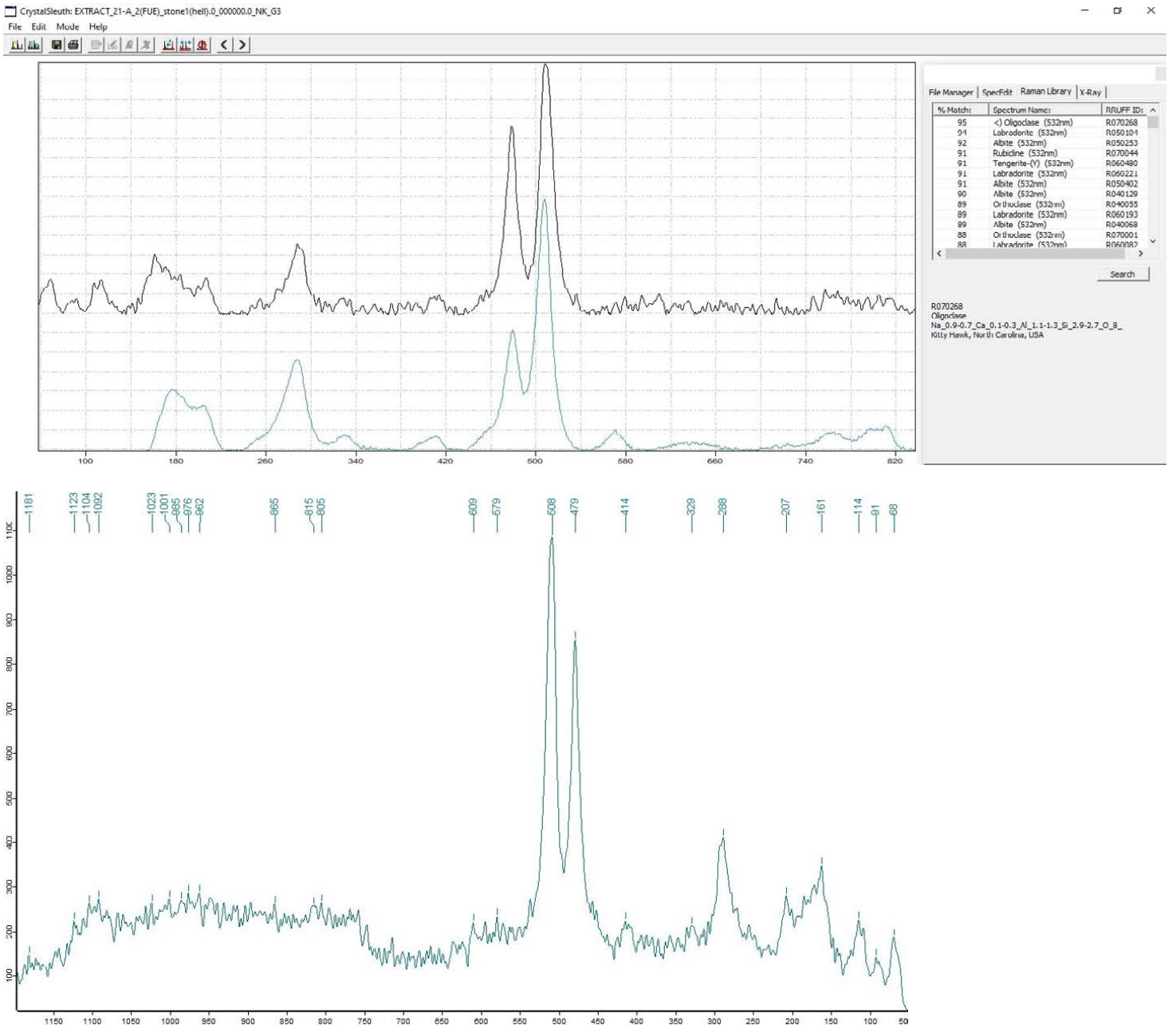
R040068
 Albite
 NaAlSi₃O₈
 Hording Pognabite, Dixon, New Mexico, USA



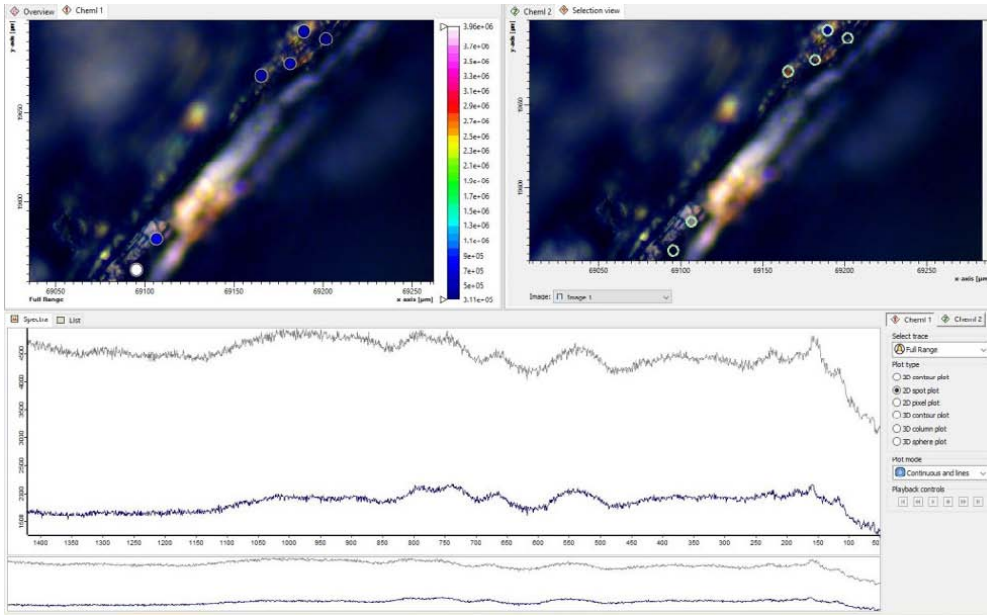
Sample Site **21-A** : Stone 1_spectra 2 (white mineral) indicates : **Oligoclase Labradorite** (→ see RRUFF_CS)



Sample :



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

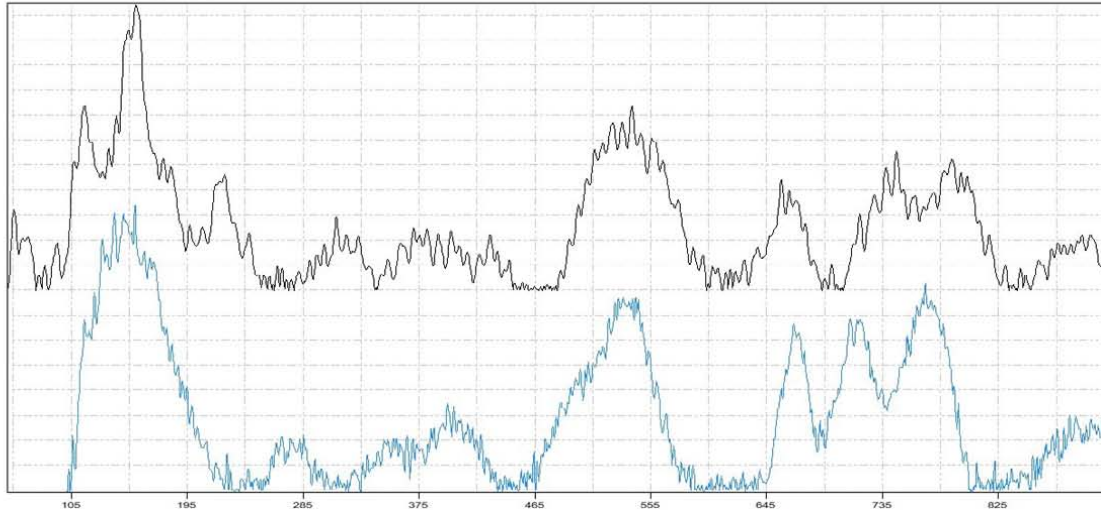


Sample :



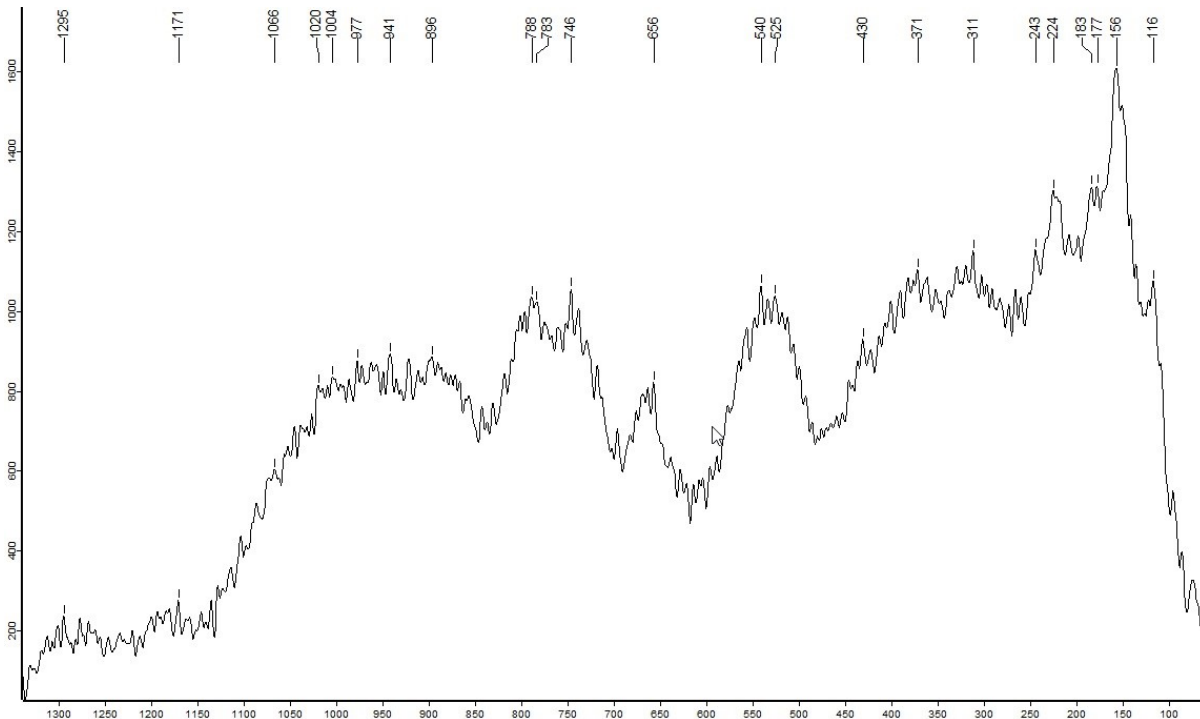
CrystalSleuth: EXTRACT_21-A_2(FUE)_stone2(dunkell)_0_000000_0_NK_G4

File Edit Mode Help

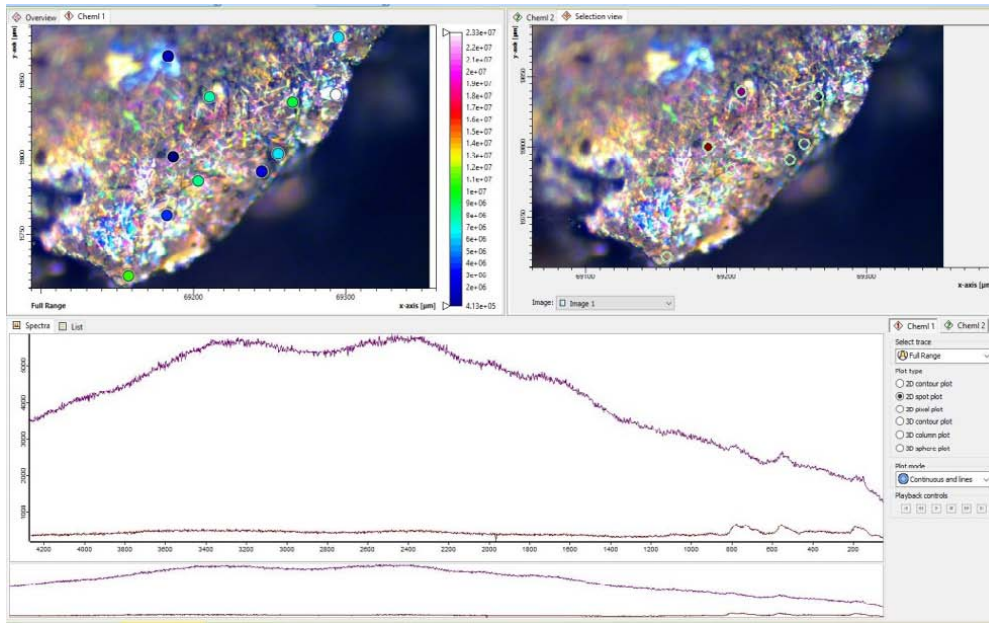


% Match:	Spectrum Name:	RRUFF ID:
91	-) Annite (532nm)	R060211
90	Uranopyrochlore (532nm)	R060165
90	Cotunnite (532nm)	R060655
90	Neiborite (532nm)	R080108
89	Diamond (532nm)	R050207
88	Hönlamoyite (532nm)	R090029
88	Tugayavallite (532nm)	R060568
88	Cerussite (532nm)	R050023
88	Liebigite (781nm)	R050662
88	Diamond (532nm)	R050206
87	Cerussite (532nm)	R060017
87	Rieschite (532nm)	R060665
87	(nikkita-1) (532nm)	R061007

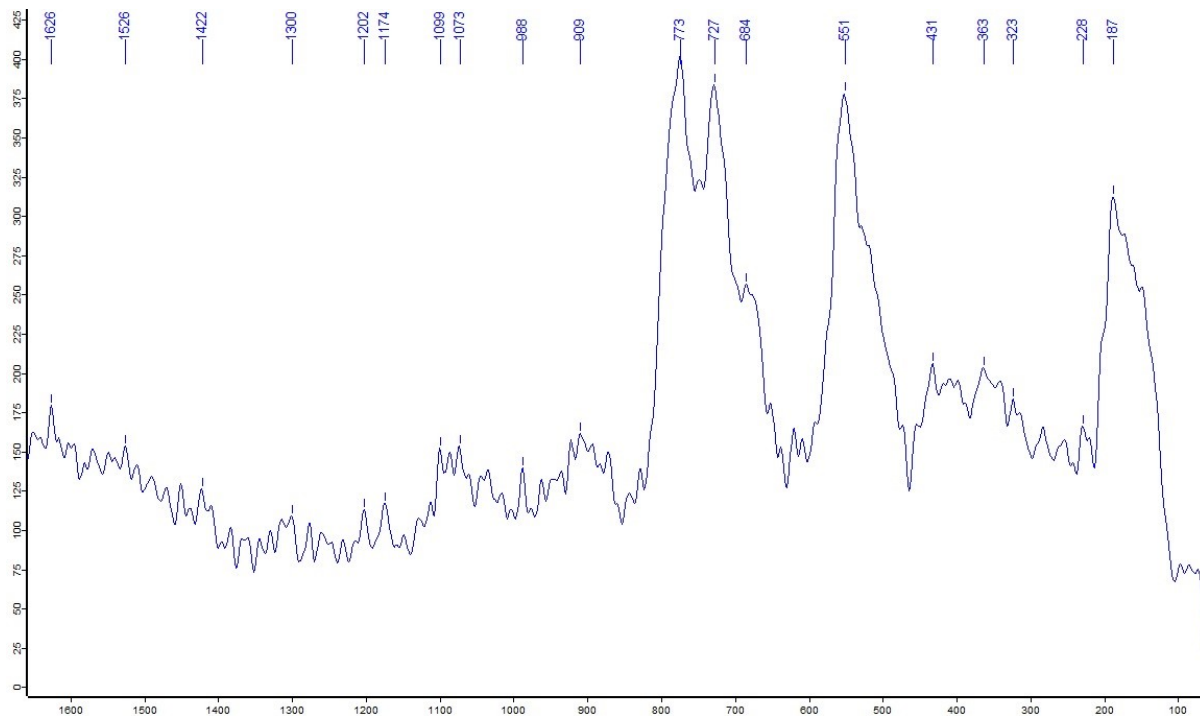
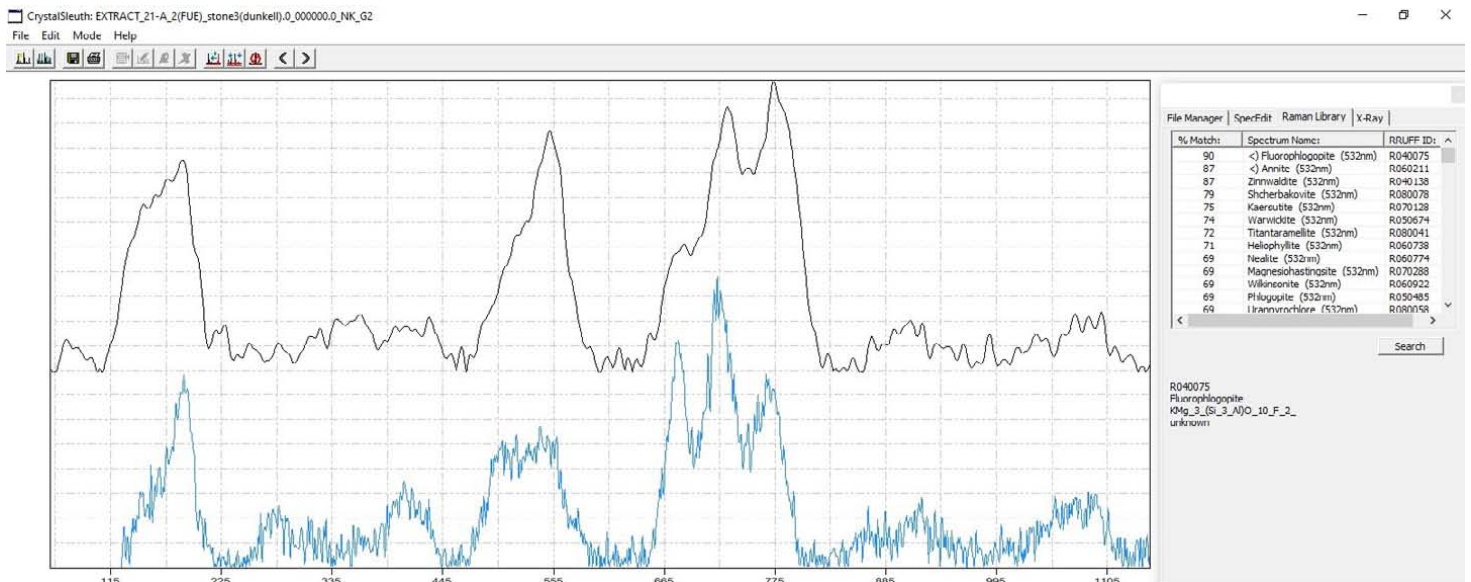
R060211
Annite
#Fe_3(Si_3AlO_10(OH)_2
Mont Saint-Hilaire, Rouville County, Quebec, Canada



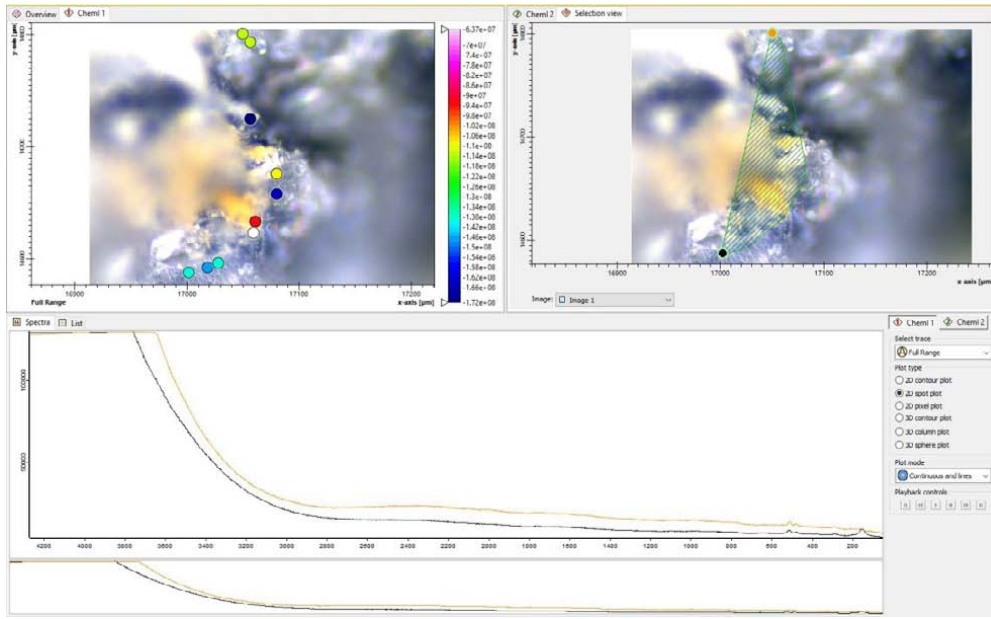
Sample Site **21-A** : Stone 3_spectra 1 (dark mineral) indicates : **Fluorophlogopite** (→ see RRUFF_CS)



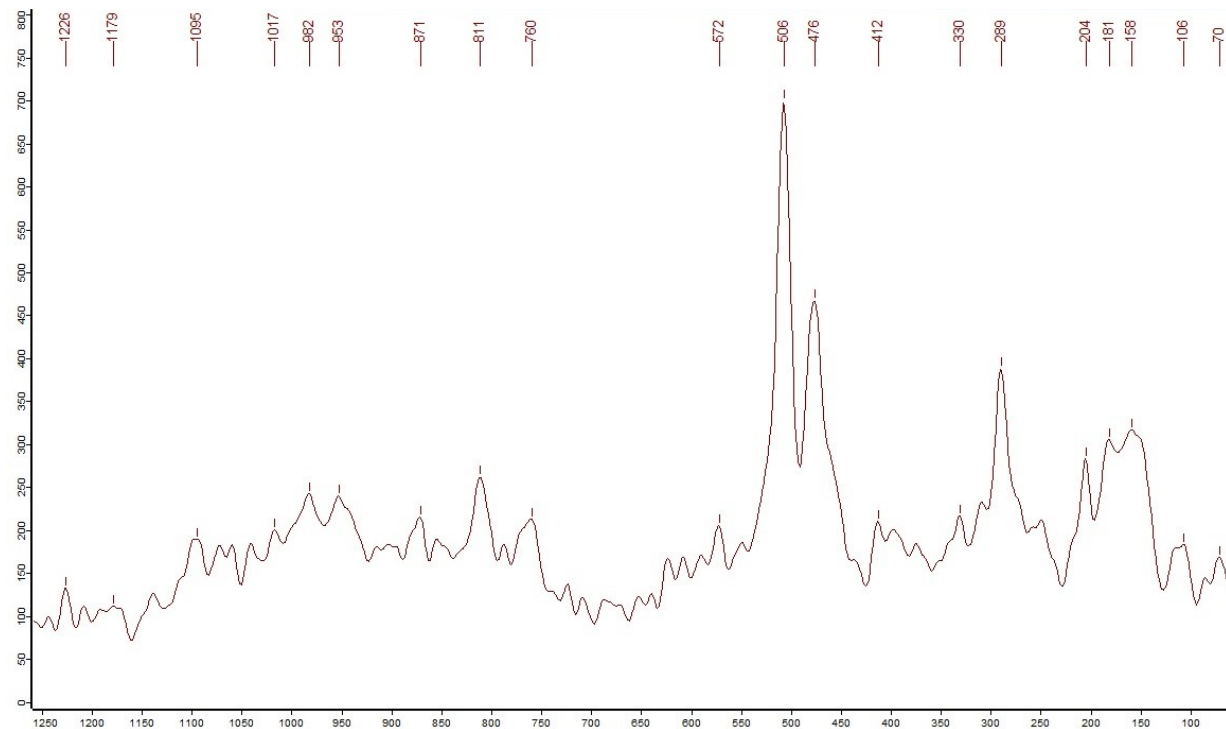
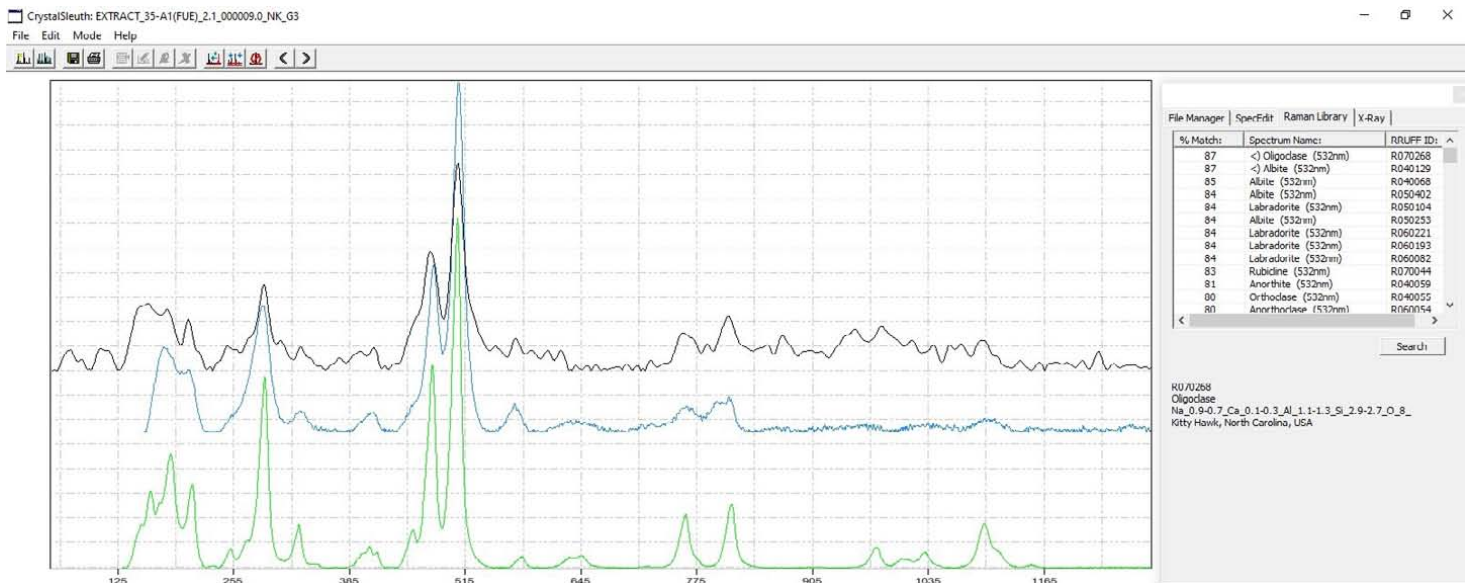
Sample :



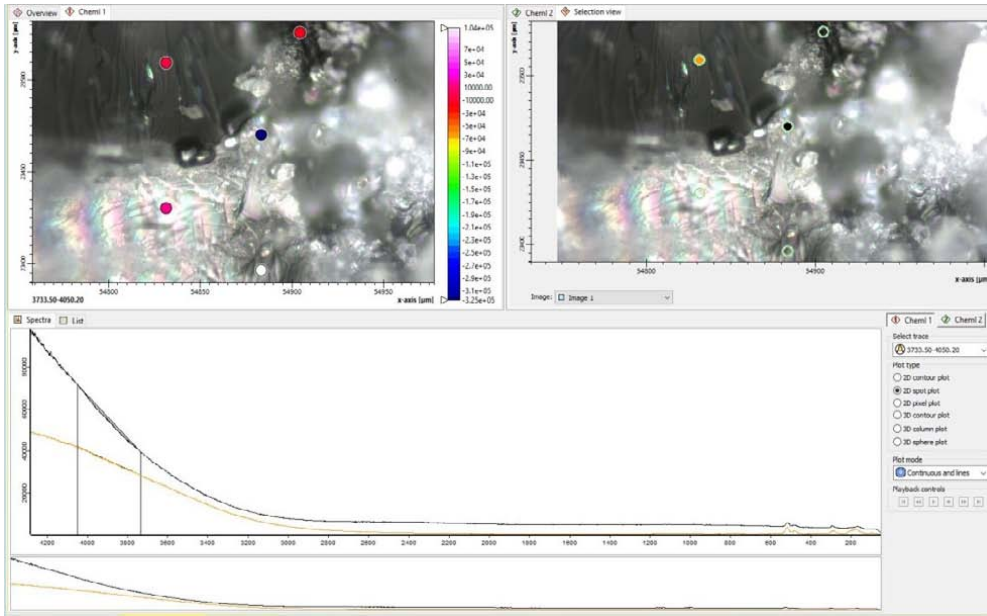
Sample Site **35-A** : Stone 1_spectra 4 indicates : **Oligoclase, Albite** (→ see RRUFF_CS search)



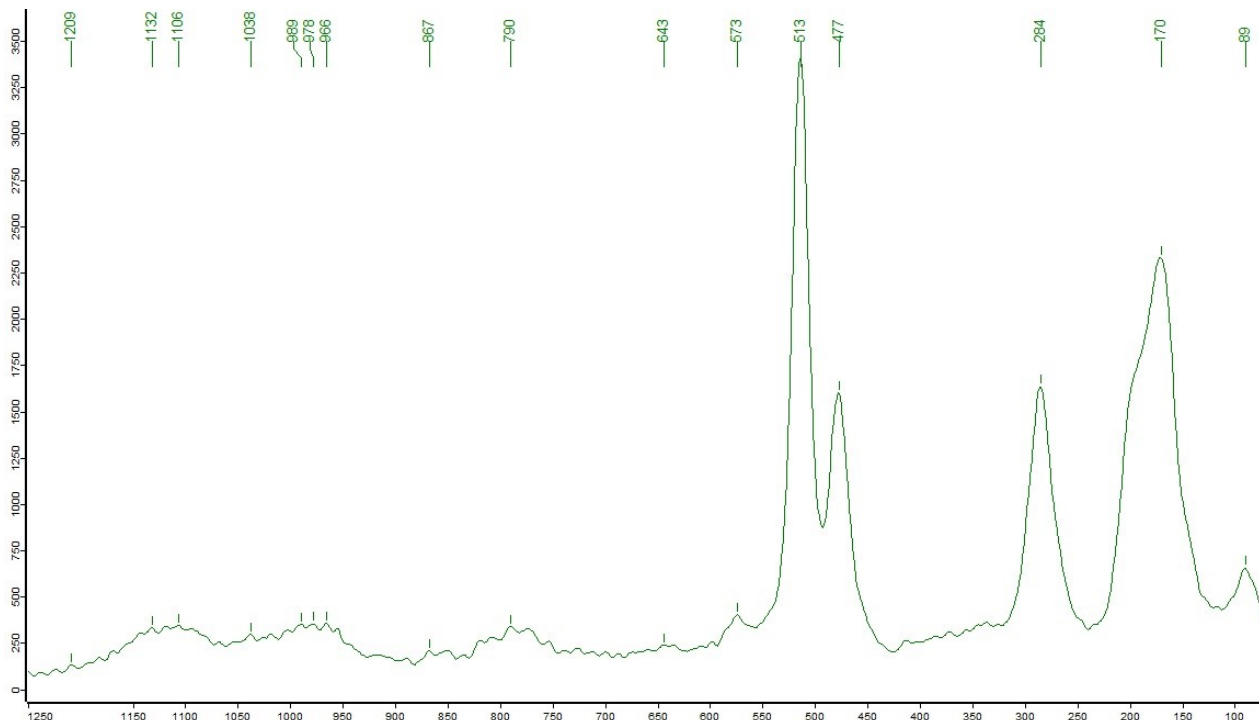
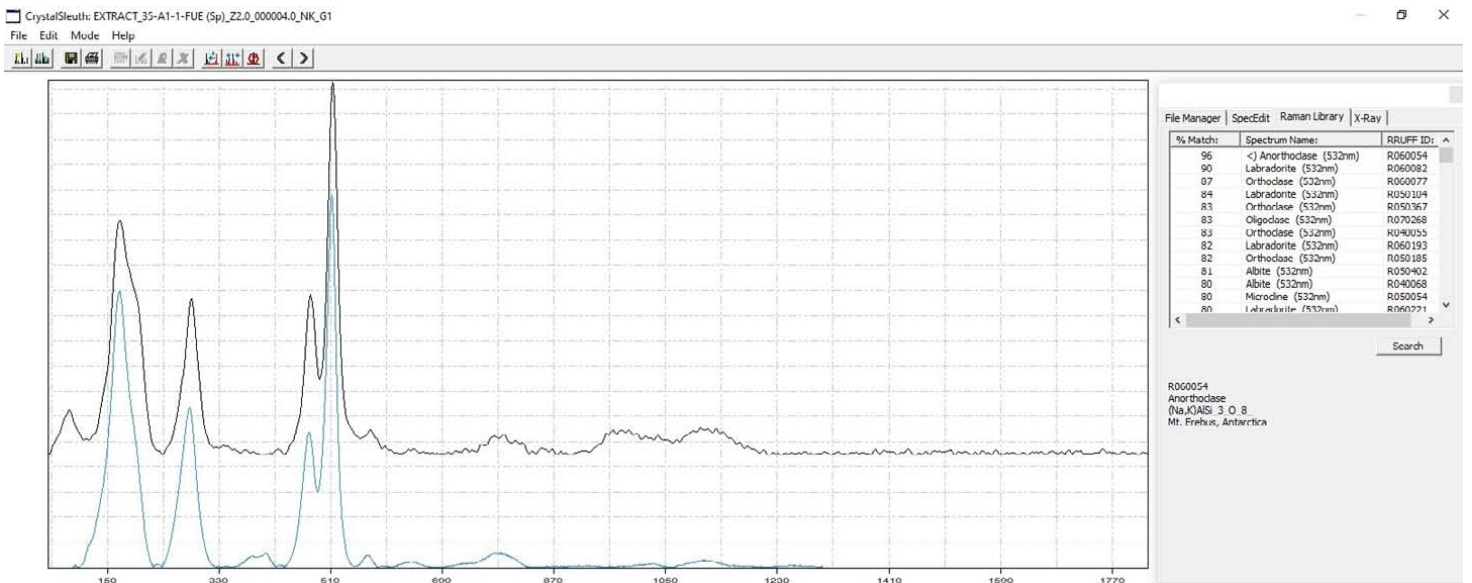
Sample :



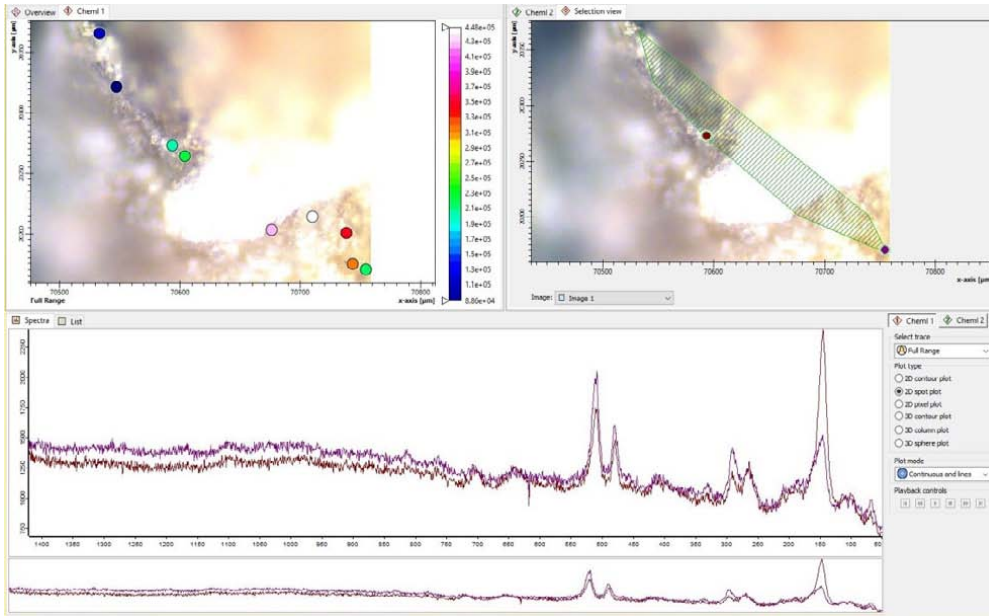
Sample Site **35-A** : Stone 1_spectra 5 indicates : **Anorthoclase, Labradorite** (→ see RRUFF_CS search)



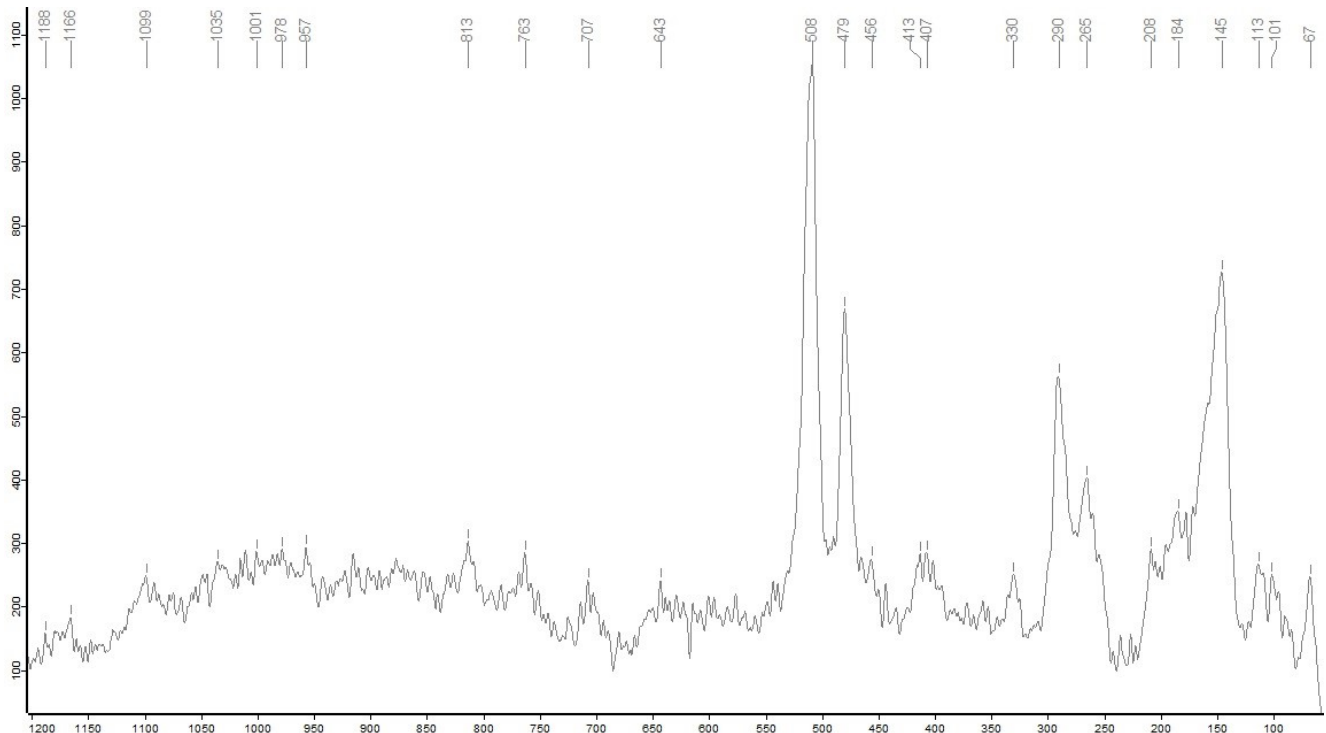
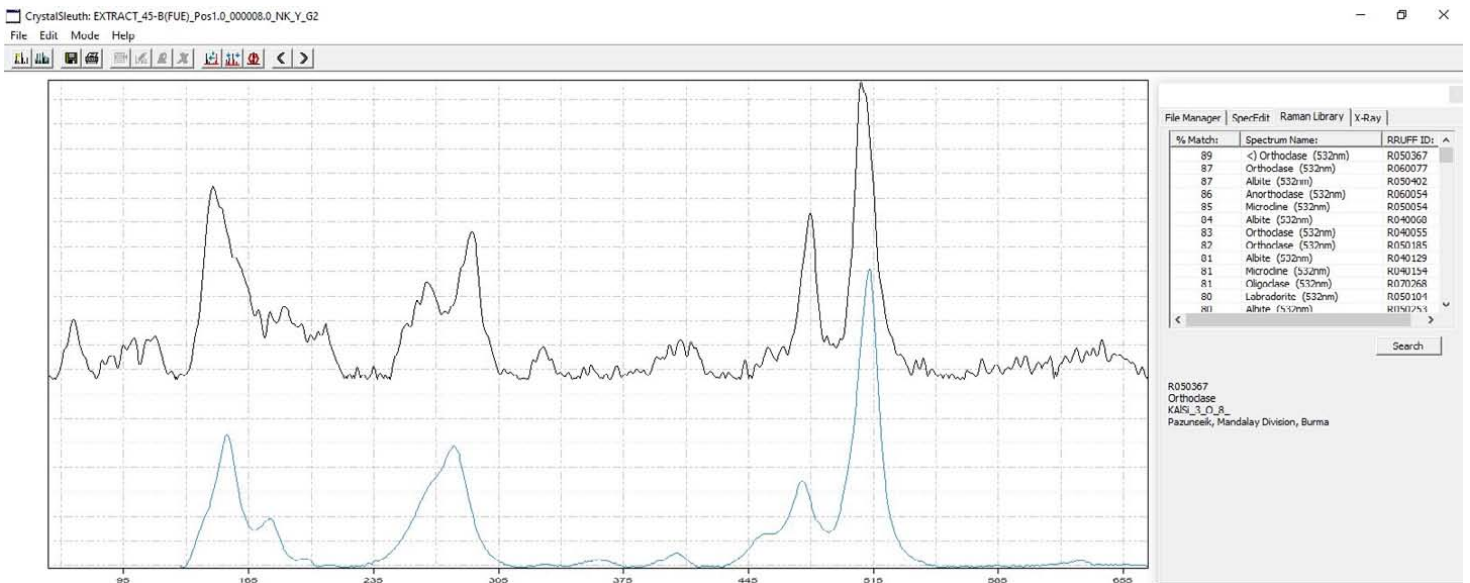
Sample :



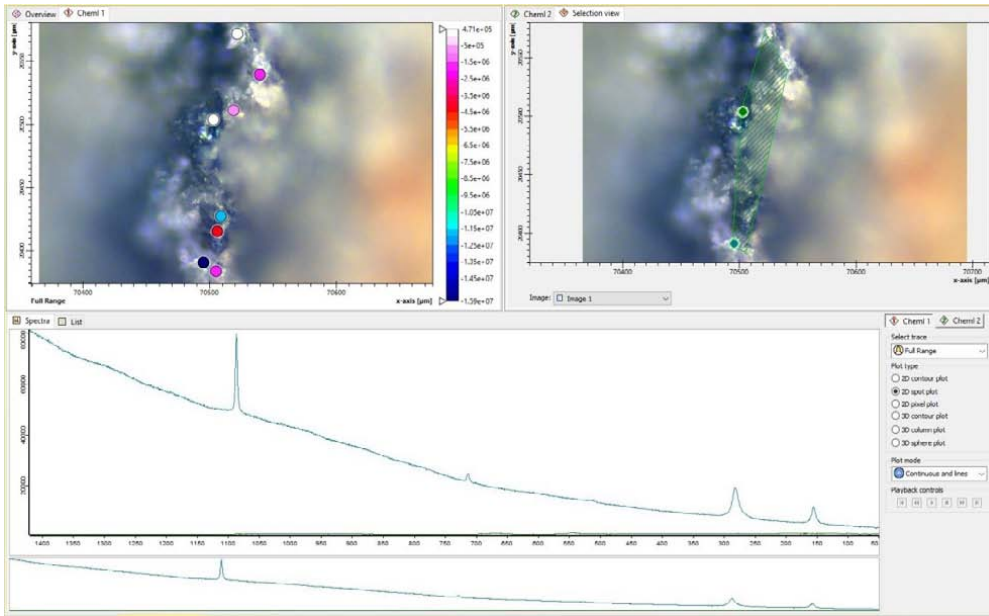
Sample Site **45-B** : Stone 1_spectra 2 indicates : **Orthoclase** (→ see RRUFF_CS search)



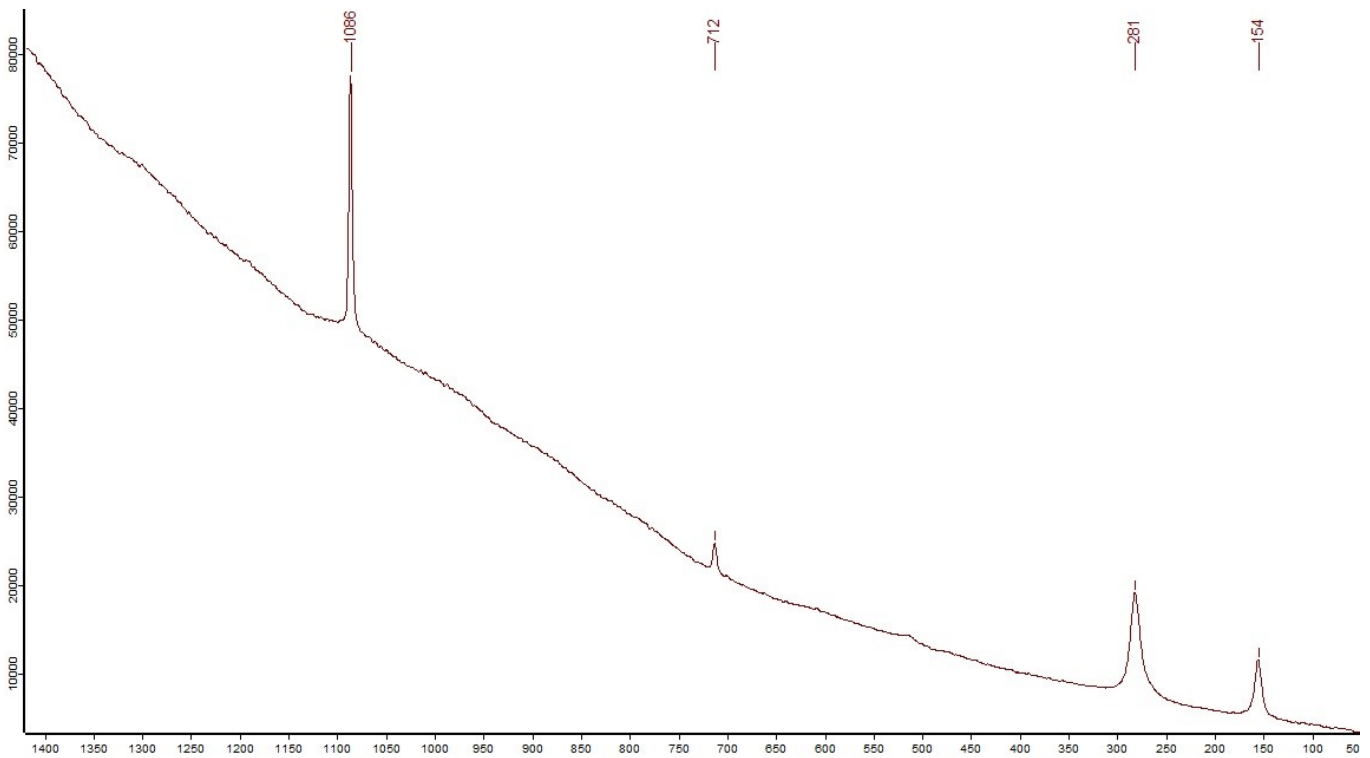
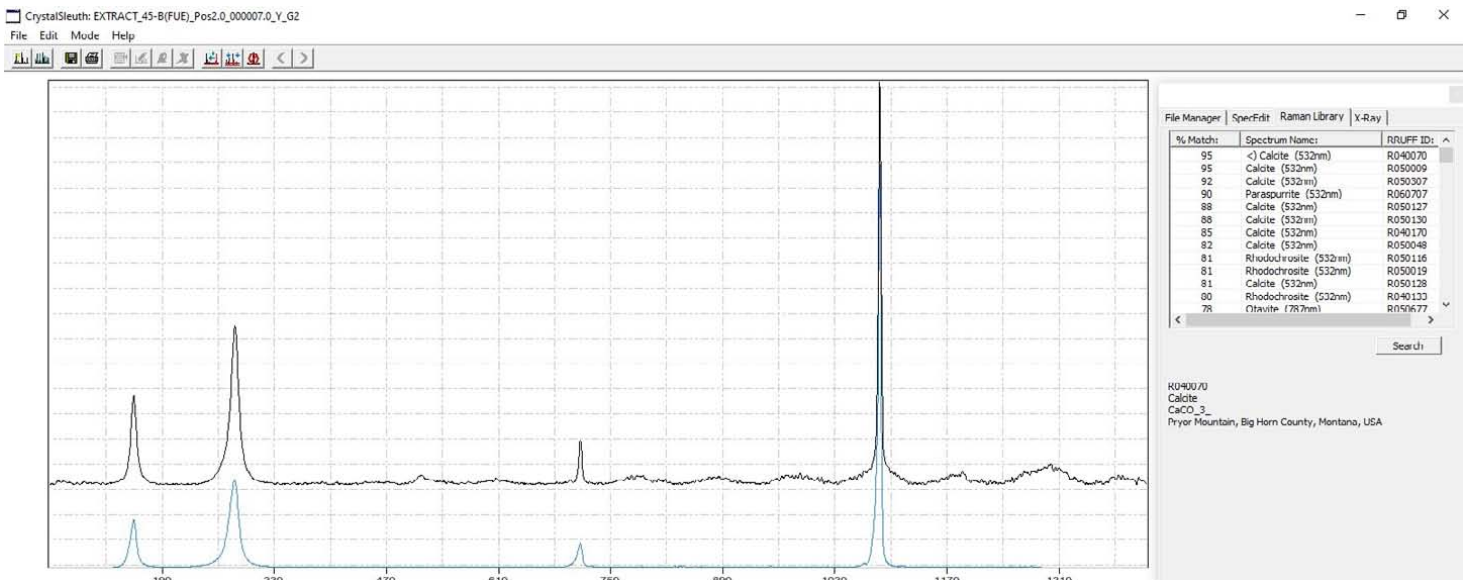
Sample :



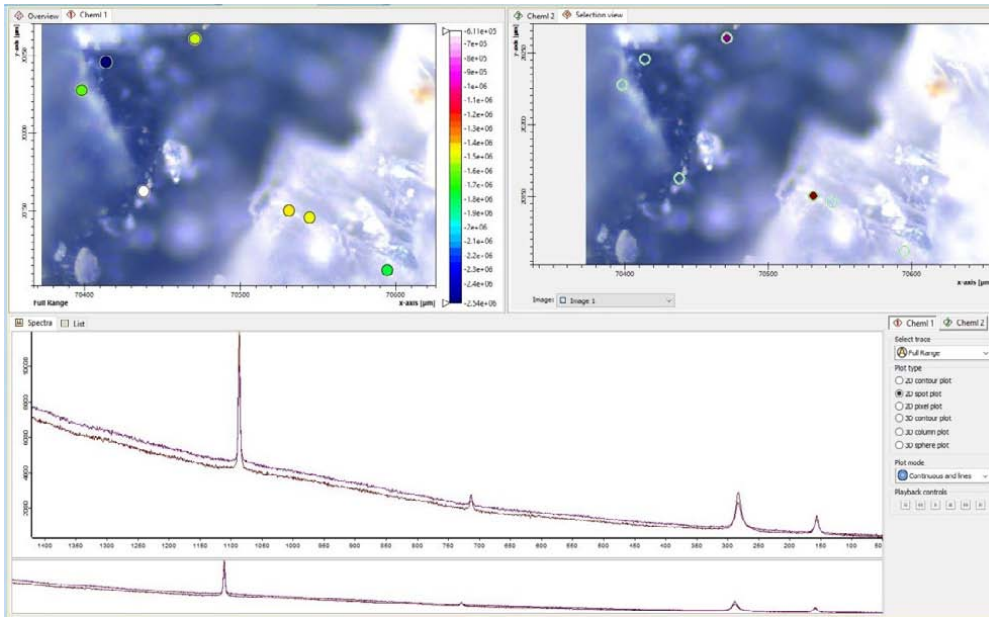
Sample Site **45-B** : Stone 1_spectra 3 indicates : **Calcite** (→ see RRUFF_CS search)



Sample :

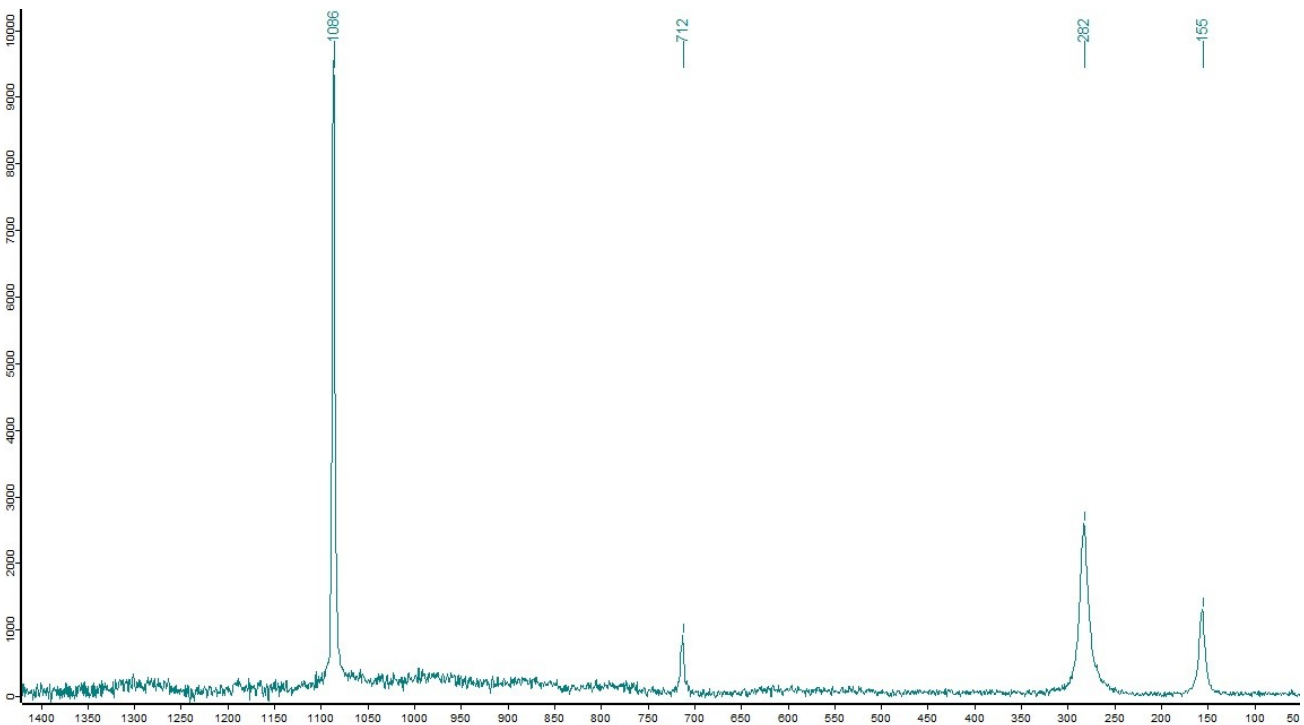
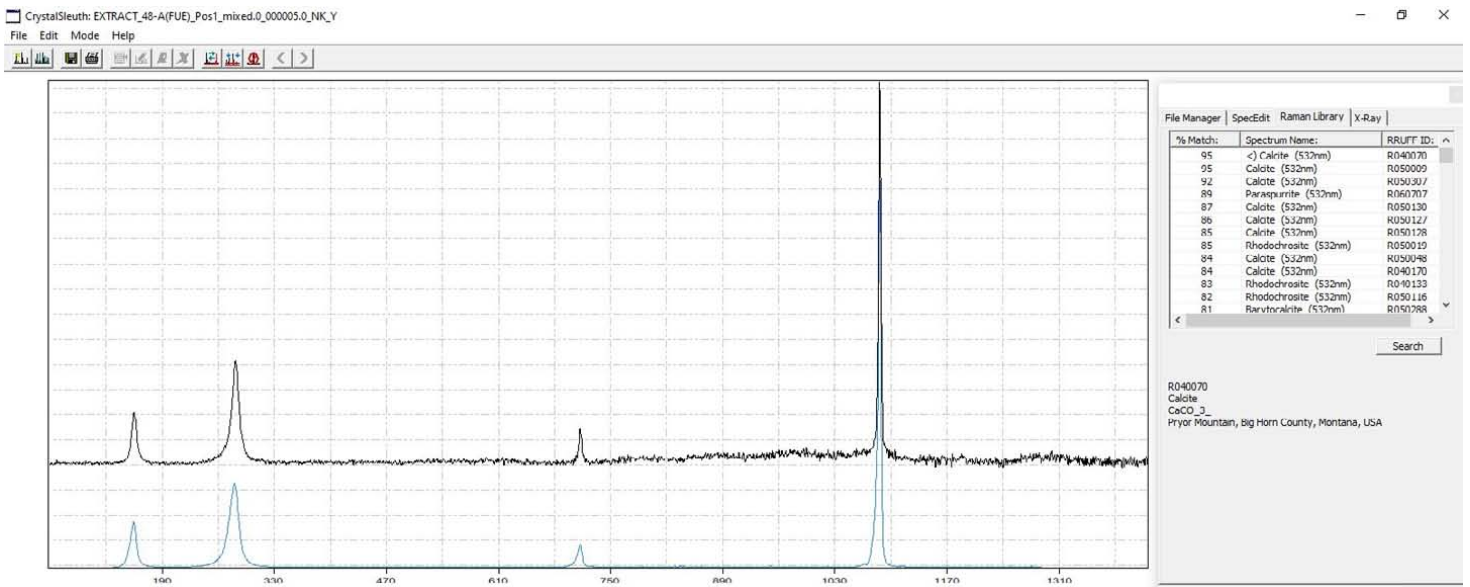


Sample Site **48-A** : Stone 1_spectra 1 indicates : **Calcite** (→ see RRUFF_CS search)

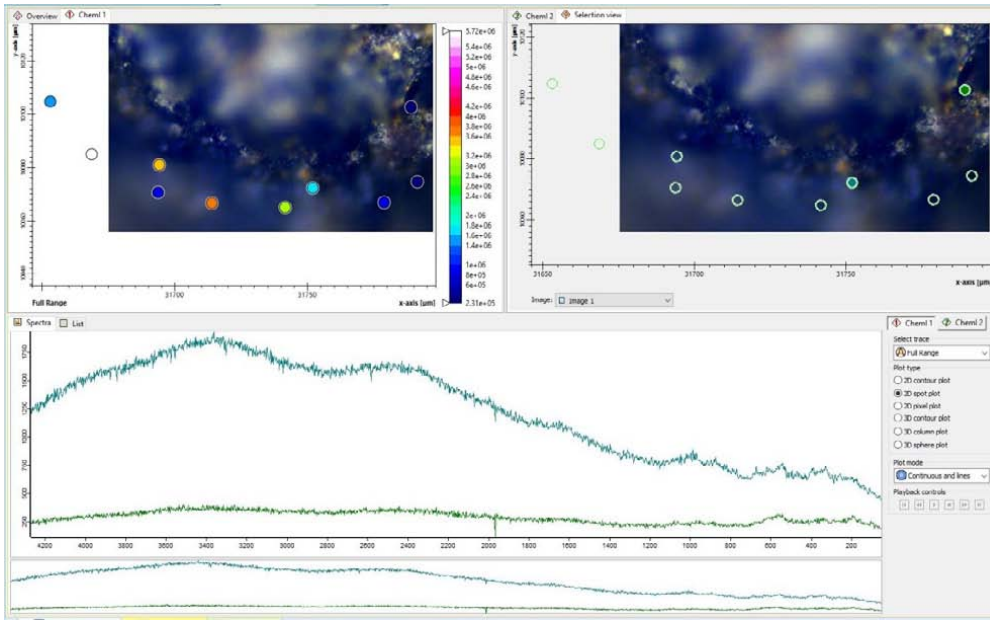


Sample Site : Ajuy Beach

Sample :



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

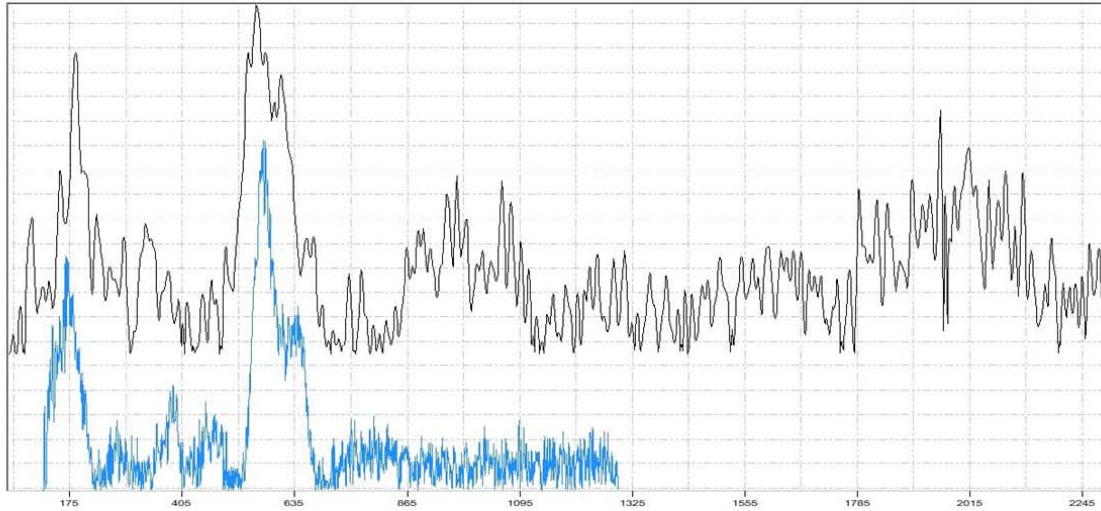


Sample :



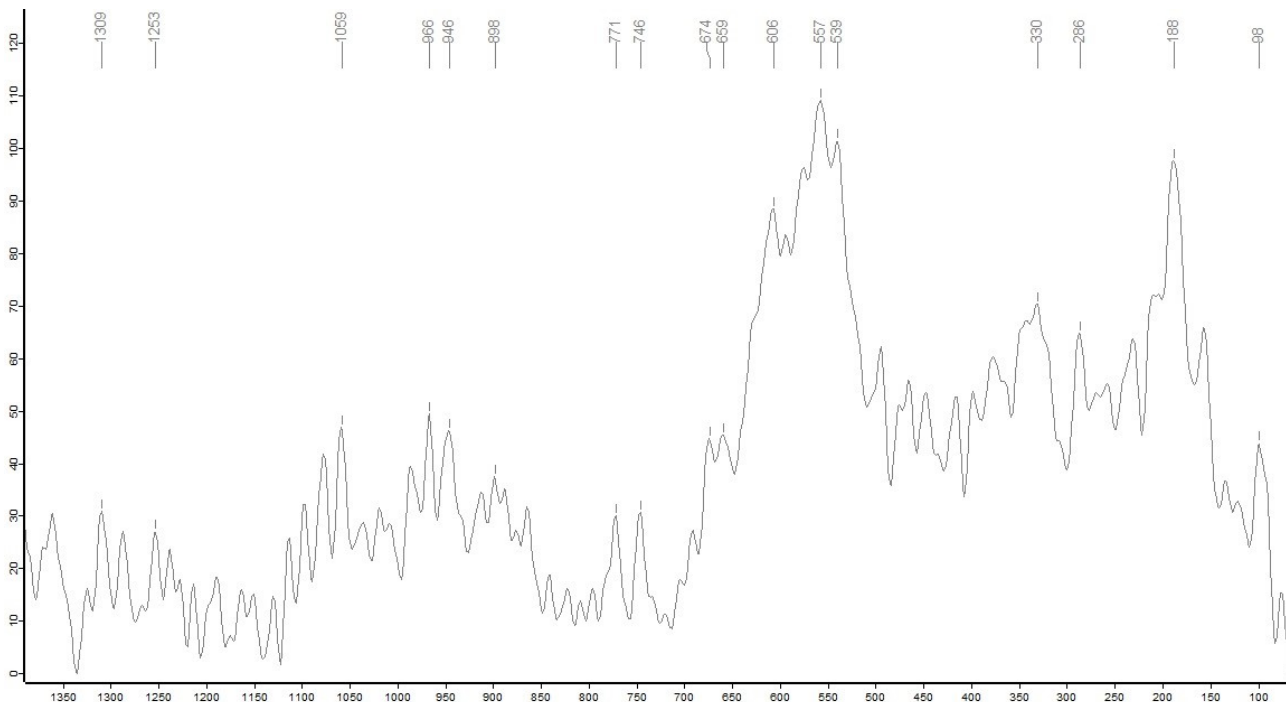
CrystalSleuth: EXTRACT_56-A(FUE)_stone2.0_000000.0_NK_G2

File Edit Mode Help

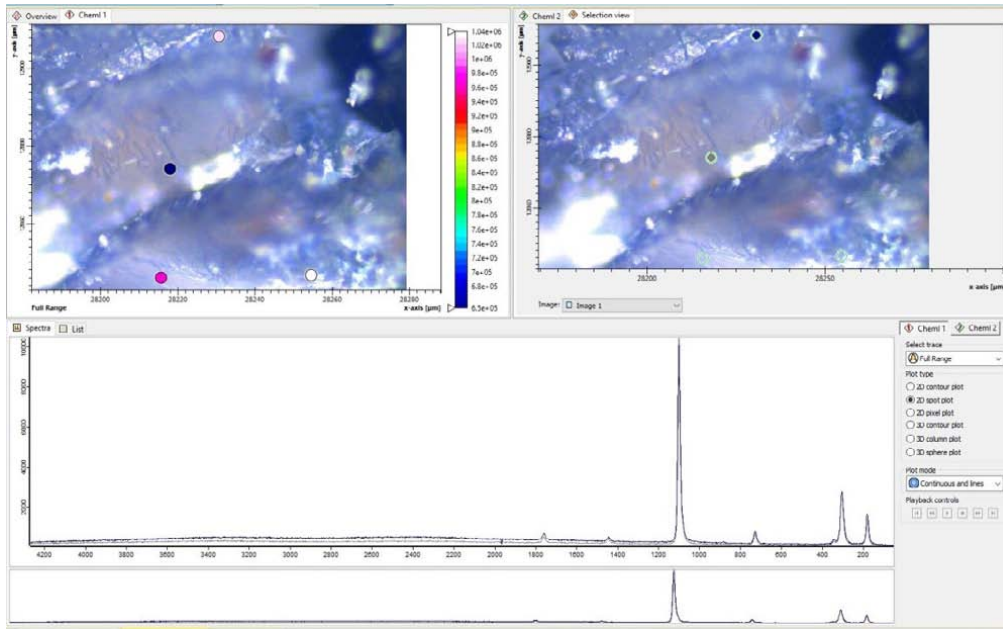


% Match	Spectrum Name	RRUFF ID
86	< Coronadite (532nm)	R060258
84	Lueshite (532nm)	R090025
82	Pyrochlore (532nm)	R060151
81	Aurorite (532nm)	R061037
80	Metauranocroite (532nm)	R070721
80	Prussite (782nm)	R050668
80	Garyanselite (532nm)	R070392
80	Metauranocroite (532nm)	R050575
79	Resevite (532nm)	R070678
79	Hisingite (532nm)	R070696
78	Macfallite (532nm)	R060164
78	Mozzerite (532nm)	R070205
78	Duvernite (532nm)	R070193

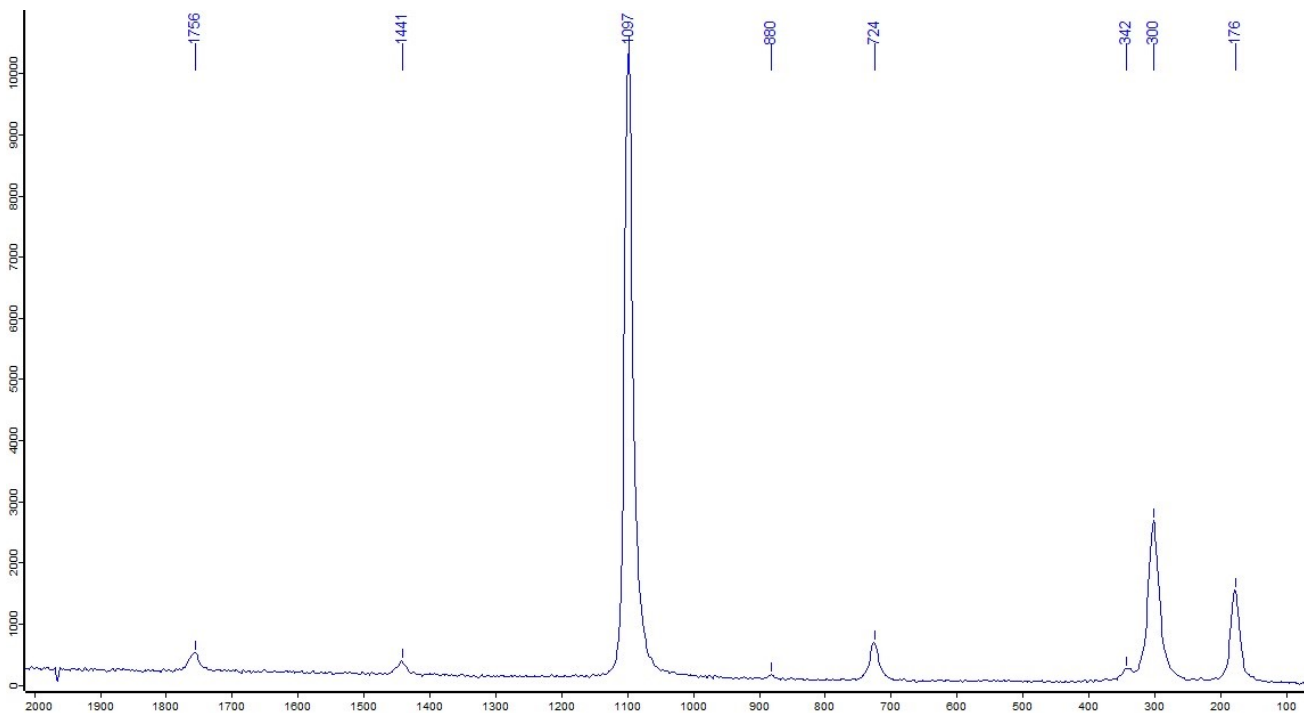
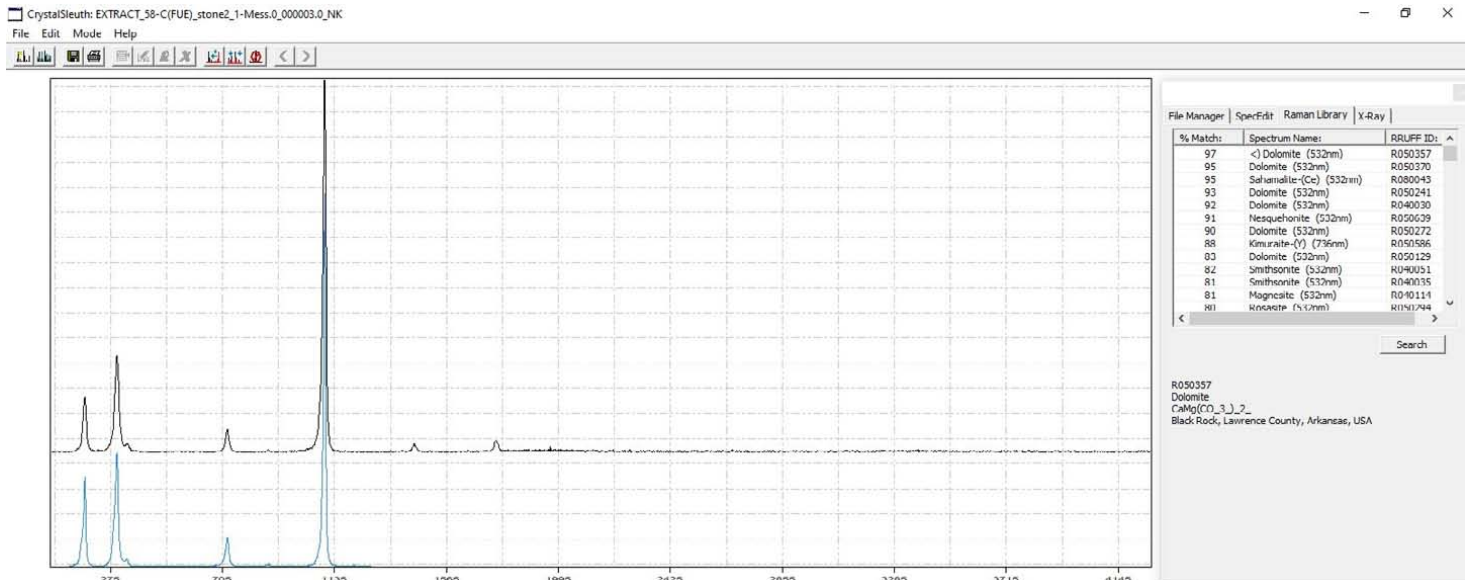
R060258
 Coronadite
 PbMn₂Mn₆O₁₆
 Taumbc mine, Taumb, Otavi District, Oshana, Namibia



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

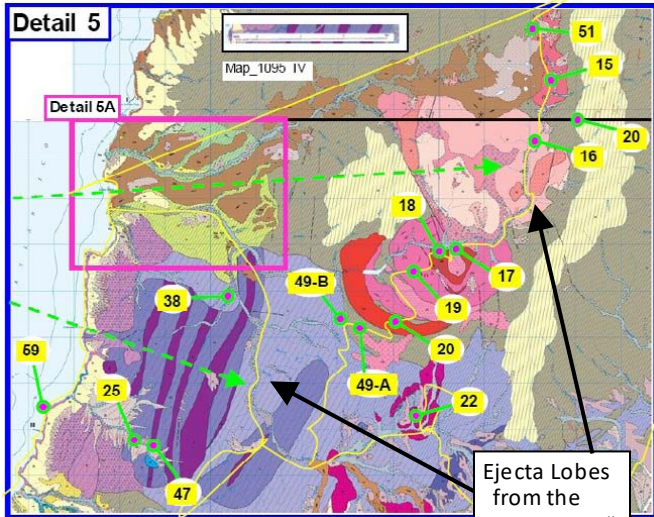
Note : Photos of the Sites 35-A, 45-A, 45-B, 45-C, 48-C, 56-A, 56-B & 21-A and other sample sites are available on my website. → : **Sample Sites "Ajuy Crater"** (or here) together with geological maps and a GPS-Data List of the sample sites.

Geological maps of selected sample areas :

→ Weblink to the Digital Geological-Map (IGME) :

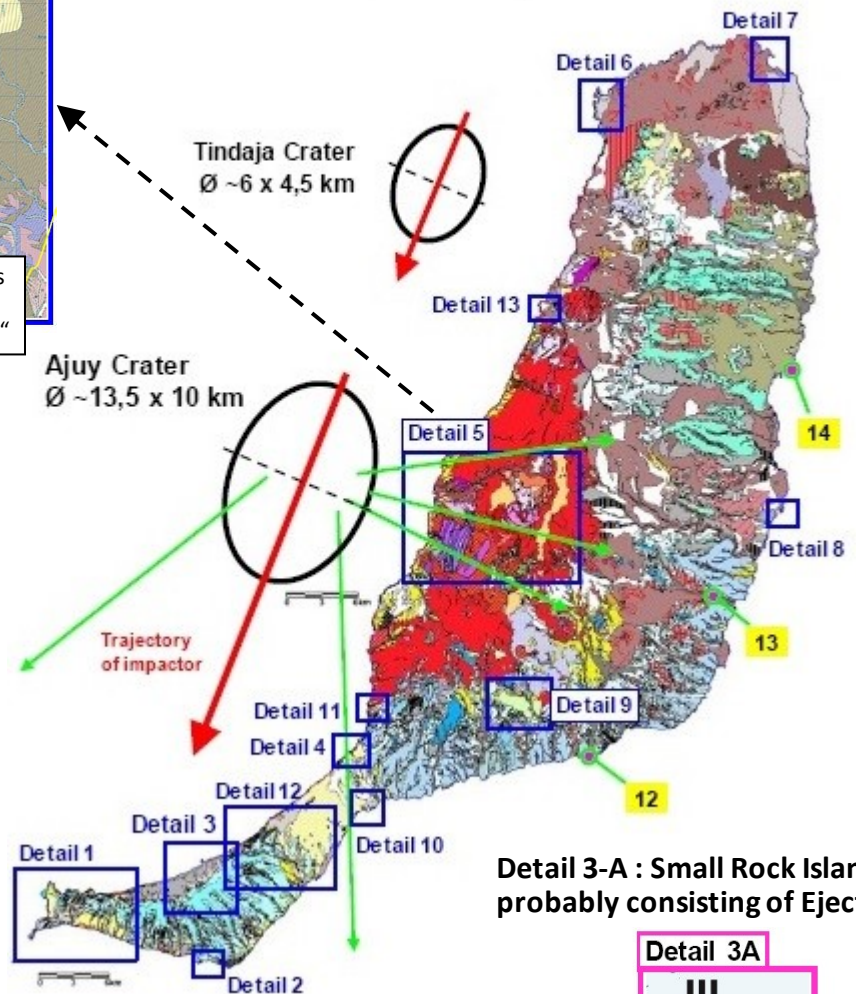
<http://info.igme.es/visorweb/> → **Fuerteventura**

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

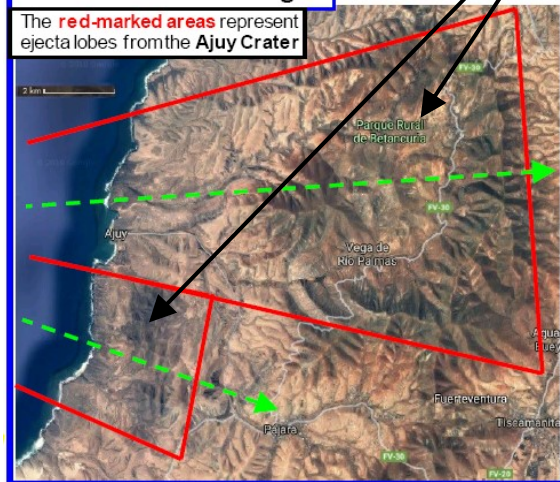


Fuerteventura

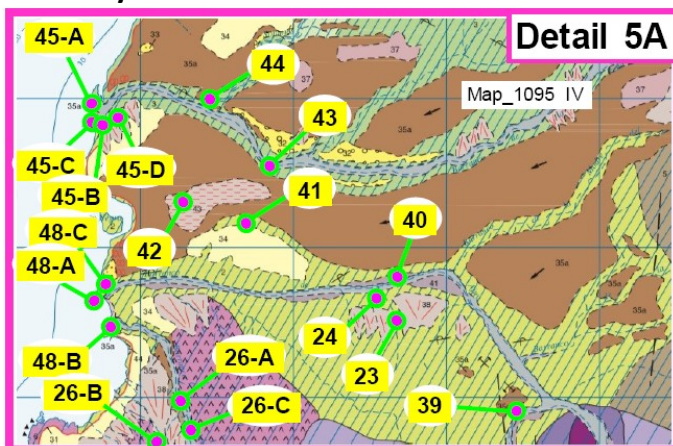
→ Geological Map 1 : 50000 of Fuerteventura with selected Sample site areas



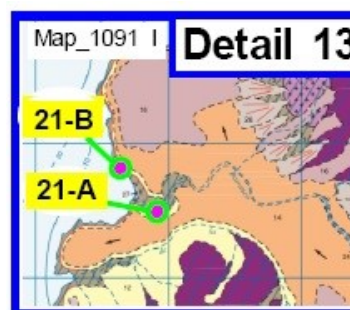
Detail 5 – Satellite Image



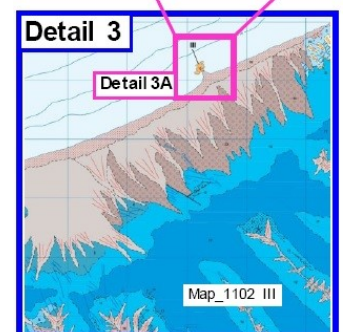
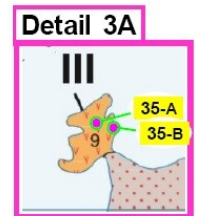
Detail 5-A : Ejecta-Impact-area with fragments of > 100 Myr old oceanic sediments visible in the rocks



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



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



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

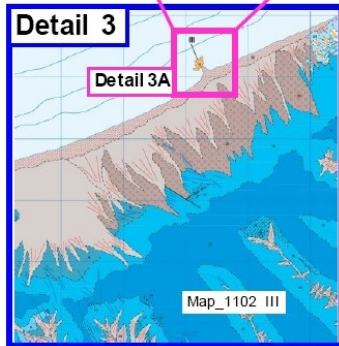
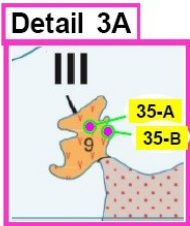


21-A



Sample Site 35-A

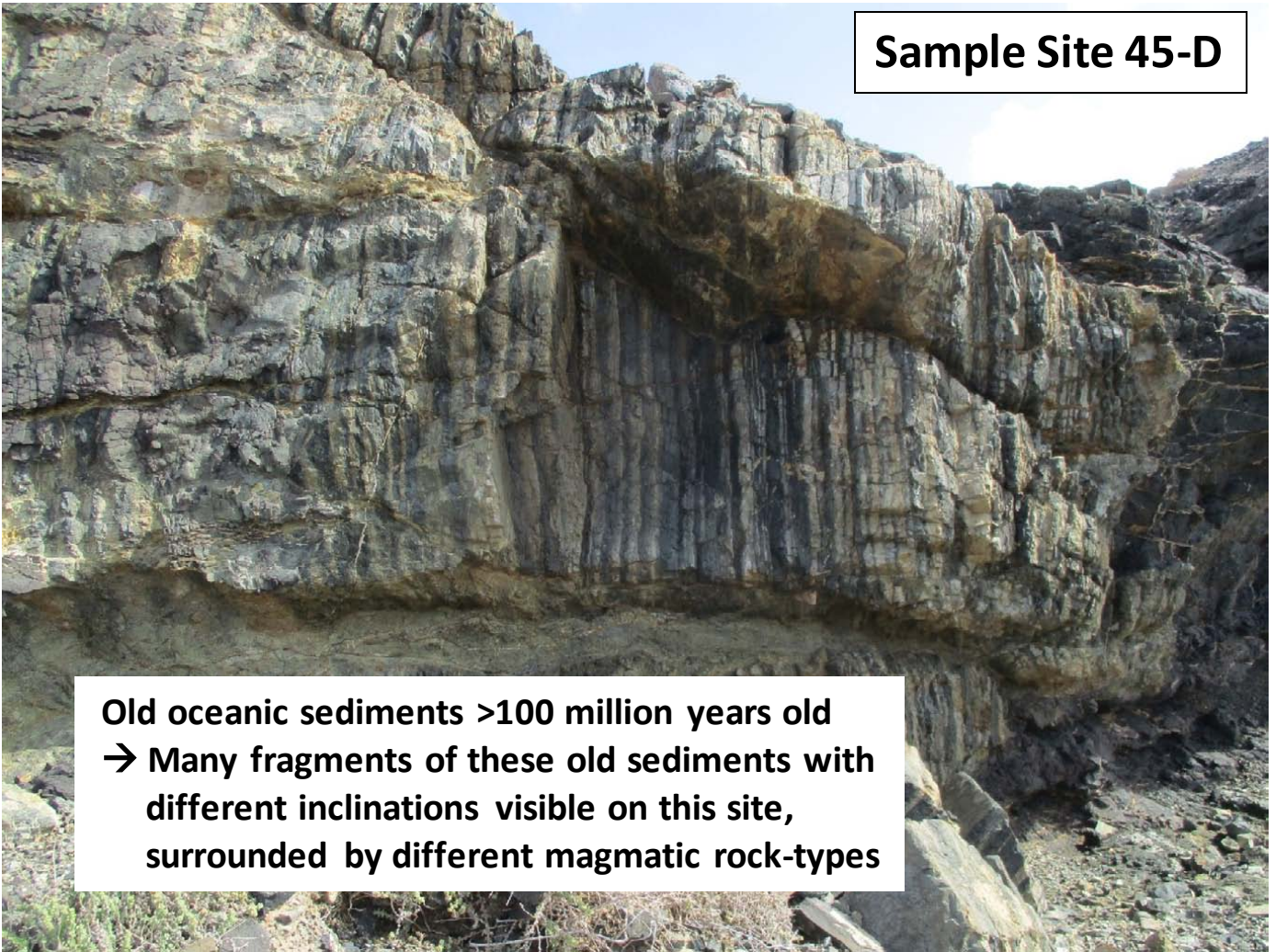
Note the ejecta-like structure of the rocks



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 12m 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

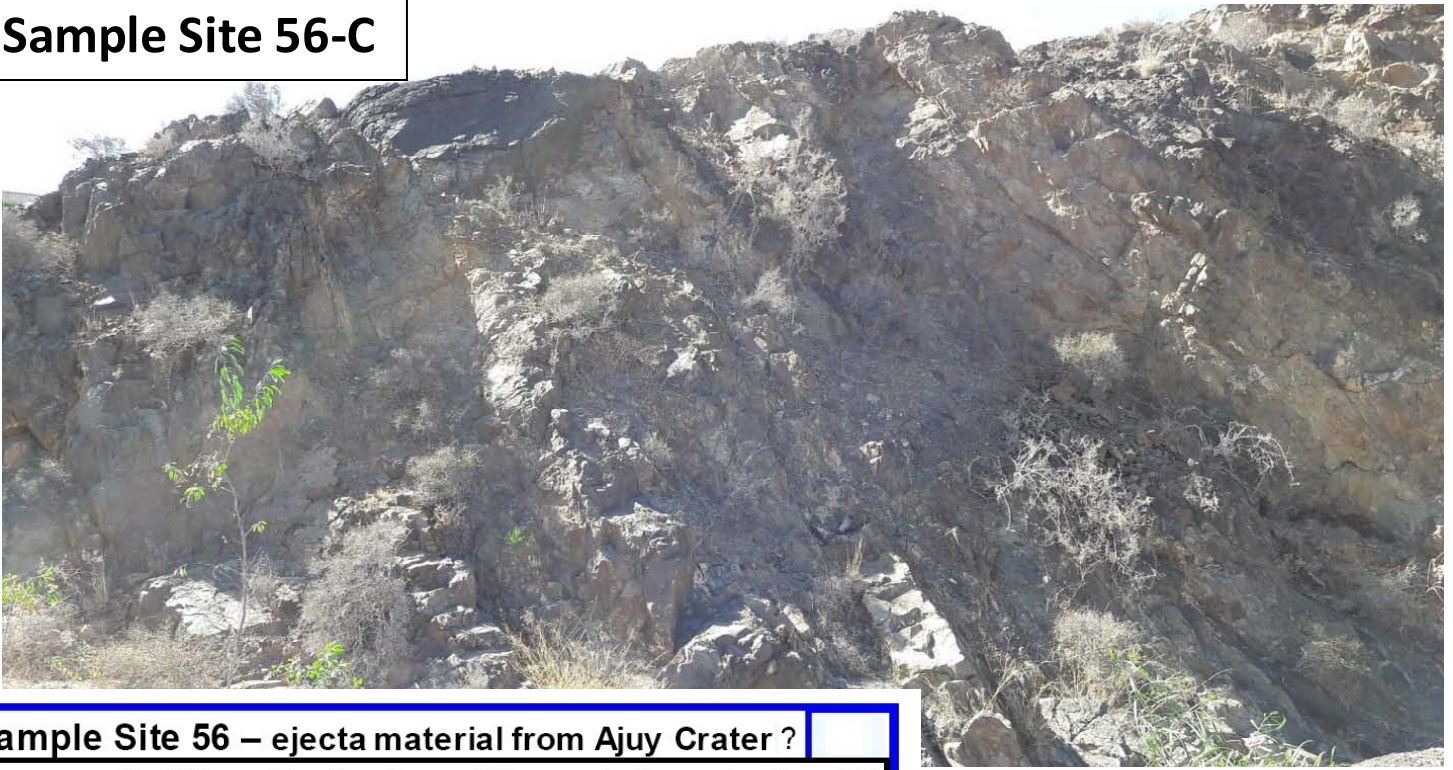
Geological info sign on Ajuy beach

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.



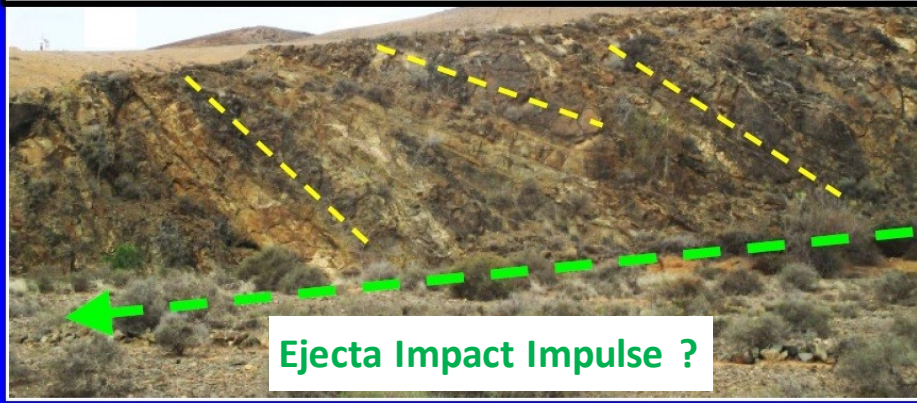
48-C

Sample Site 56-C



Sample Site 56 – ejecta material from Ajuy Crater ?

Layers with different inclinations (Mesozoic Oceanic Crust ?)
→ probably caused by ejecta impact impulse from the **Ajuy Crater**



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

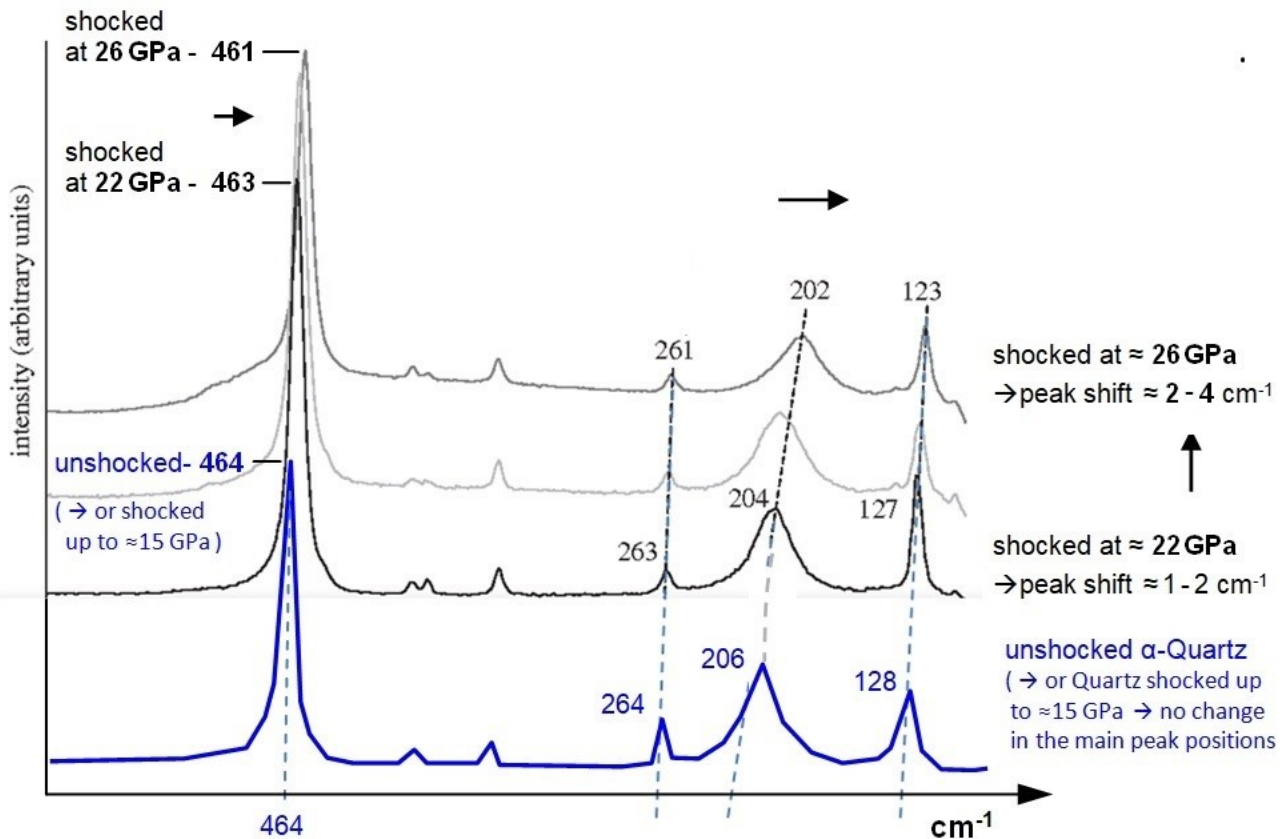
In order to verify a sample site as an impact site or impact structure, [shock-metamorphic effects](#) must be discovered in the rocks of the sample site. This can be done by different methods.

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.

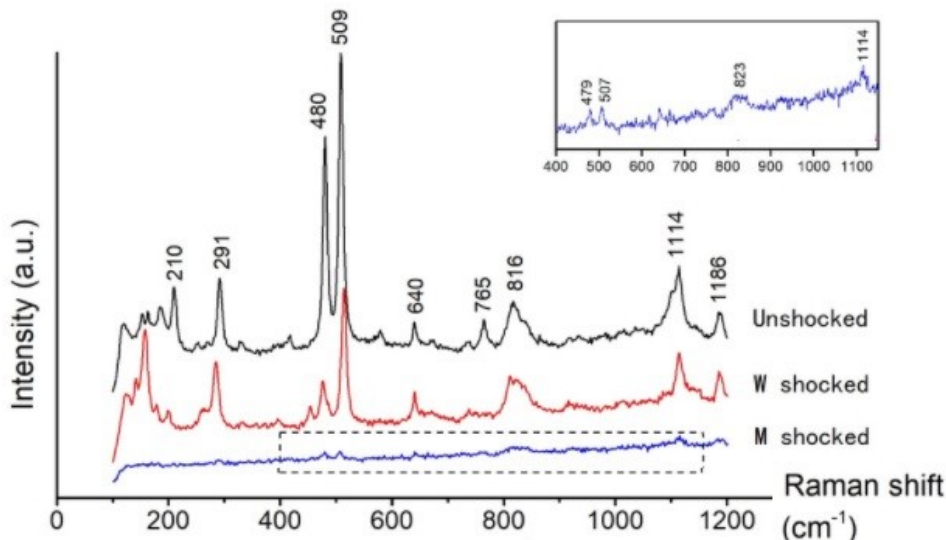
Mc Millan et al. (1992) and others have shown that the main RAMAN-peaks of Quartz shift towards lower frequencies if the Quartz was exposed the a shock-pressure > 15 GPa. → see diagram below

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-anlysis 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

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