The Ø 20 x 15 km Tejeda Crater on Gran Canaria (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 20 x 15 km "Tejeda Impact Crater"** on Gran Canaria, 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 ellipitical impact craters indicated on this Gravity Anomaly map, as negative anomalies offshore of the Islands Fuerteventura, Teneriffa 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. (→ explanation on **pages 28** & **29** of my **PT Impact Hypothesis:** **Part 2** (or 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 (PTI) 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), which also has formed the **Bay of Lyon Crater** (or **BLC**) and **other impact structures in Spain** (or **L2**). Also read about **the Ø 13,5 x 10 km Ajuy Crater on Fuerteventura.**
On Gran Canaria one of the ejecta fragments of the PTI has formed an elliptical impact crater which is located nearly in the center of the island. But even if this secondary crater of the PTI is easy accessible, it will be difficult to provide proof for this impact crater, because of the relatively low impact pressure which only has caused weak shock-metamorphic effects and because the hotspot that was caused by the impact has erupted massive amounts of magma (lava) over the last ~250 Myrs and covered the original impact structures. To provide clear evidence for this impact crater it probably will be necessary to drill deep into the crater-wall of the Tejeda Crater and get drill-core samples from a few km depth.

In all rock samples which I have collected no quartz was found. Therefore it will be difficult to provide first proof for this secondary impact of the PTI, with this Raman spectroscopic analysis of some samples

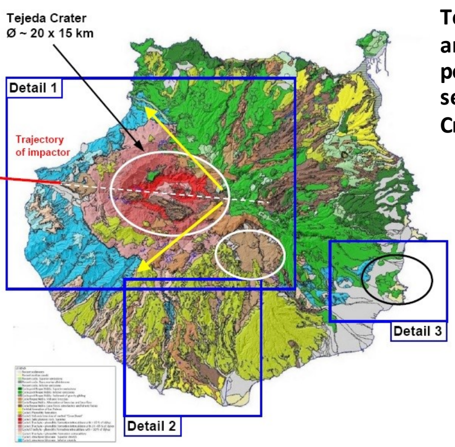
---

Some of the analysed feldspar-samples may show Raman-spectra which indicate (W)-weakly-shocked or (M)-moderately-shocked Feldspar. The Raman-spectra from the following sample sites No.: **15-A, 23, 28, 32 & 33** may indicate shocked feldspar-minerals. These Raman-spectra must be further analysed by experts with the experience to correctly assess such spectra. (→ explanation to Raman-spectra of shocked Feldspar : see at page **30** in the **Appendix 3**) Beside possible shocked feldspar minerals other minerals, e.g. a number of iron-bearer-minerals found on the island, may also indicate an impact event. Minerals found in the analyses : Albite, Anorthoclase, Augite, Corvusite, Coyoteite, Cronstedtite, Hollandite, Labradorite, Magnetite, Microcline, Oligoclase, Orthoclase, Tengerite, etc.

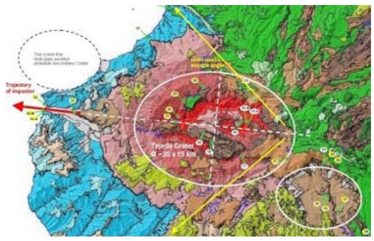
→ Images of the analysed rock samples and photos of the sample sites are in the Appendix at page **21**
→ A general summary to all analysed samples regarding my **PTI-hypothesis** (**P1**) → in **Part 6** (or: **P6**)

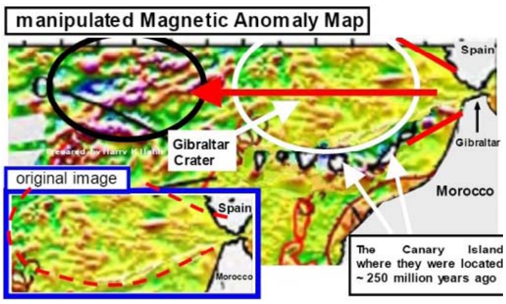
→ More images of all sample sites are available on www.permiantriassic.de or www.permiantriassic.at

Geological Map of Gran Canaria with the possible Tejeda Crater marked on the map

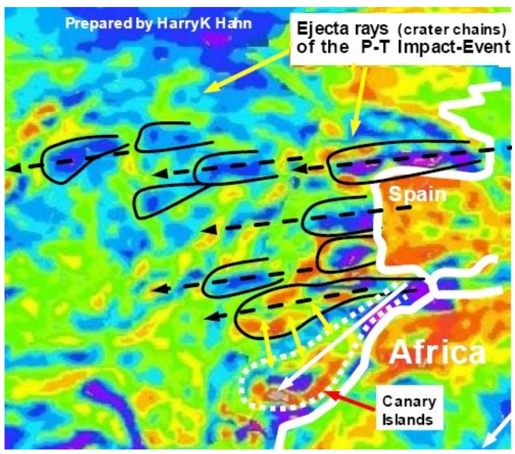


Detail of the Geological Map showing the Tejeda Crater and two more possible PTI-secondary Craters





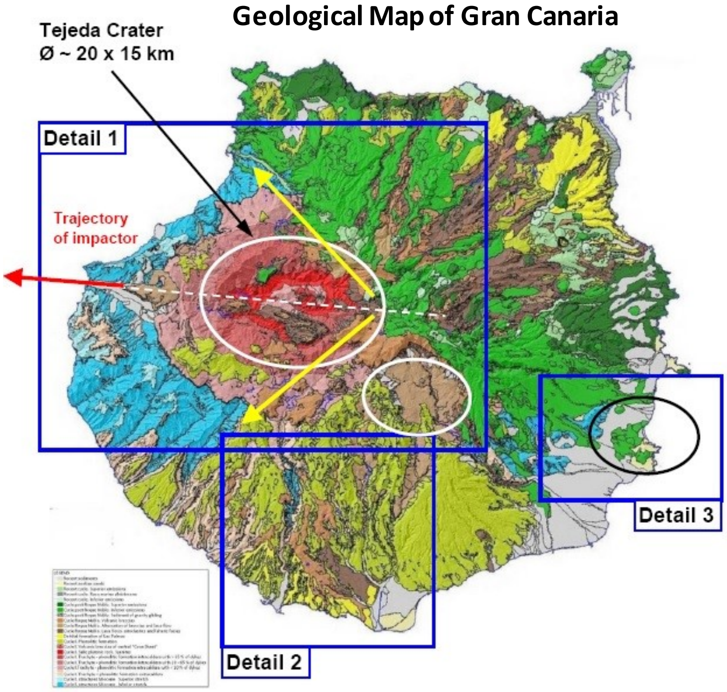
Gravity Anomaly Map of the Canarian-Island-area



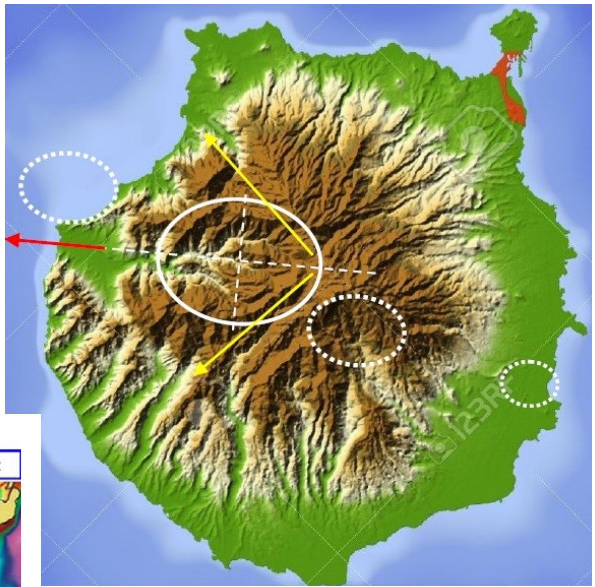
The Ø 20 x 15 km Tejeda Crater on Gran Canaria

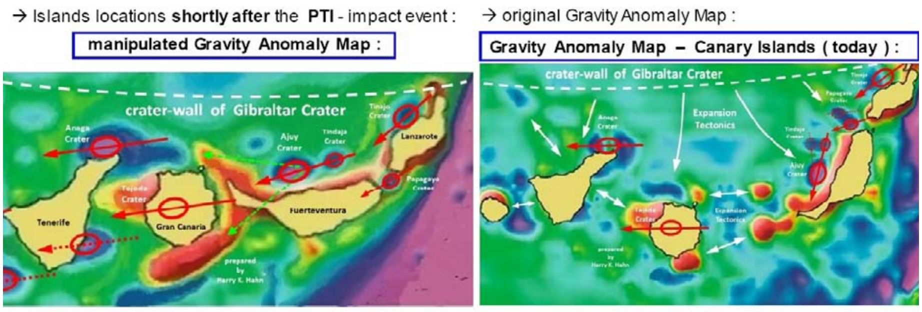
The geological map and the topographic map of the Island Gran Canaria indicate an Impact Event.
This is the **Ø 20 x 15 km** hypothetical **Tejeda Crater**, which is located nearly in the center of the Island. The village Tejeda is located inside this crater. The current believe that this precise elliptical crater-structure is the caldera of a large inactive volcano probably isn't correct !
I want to refer here to the other decribed elliptical impact craters on the Islands Tenerife and Fuerteventura, which in all probability were caused by ejecta–fragments from the Permian-Triassic-Impact (PTI). These elliptical crater-structures are all located offshore of these islands.
And the gravity anomaly map clearly indicates elliptical-shaped negative (blue) gravity anomalies (see map below)
But even if this probable secondary-crater of the PTI is easy accessible in the center of Gran Canaria, it will be difficult to provide proof for this impact crater, because of the relatively low impact pressure which only has caused weak shock-metamorphic effects and because the hotspot that was caused by this impact has erupted massive amounts of magma (lava) over the last ~250 Myrs and covered the original impact crater with thick layers of lava.
To provide clear evidence for the impact crater it probably will be necessary to get drill-core samples from deep inside the crater-walls of the Tejeda Crater.
The Raman-spectra of the analysed rock-samples may provide first indication for an impact event. Shocked feldspar may be present on the **sample sites 23, 28, 32, 33**

Geological Map of Gran Canaria



Topographic Map of Gran Canaria



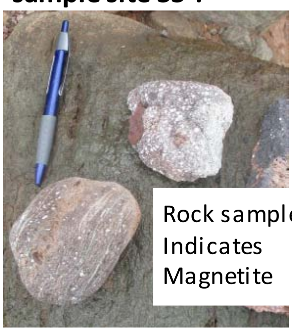


The Gravity Anomaly Map of the Canarian Islands indicates a large scale Impact Event

Different types of feldspar-breccia on **sample site 32**
(pebbles on the beach, west of the Tejeda Crater)

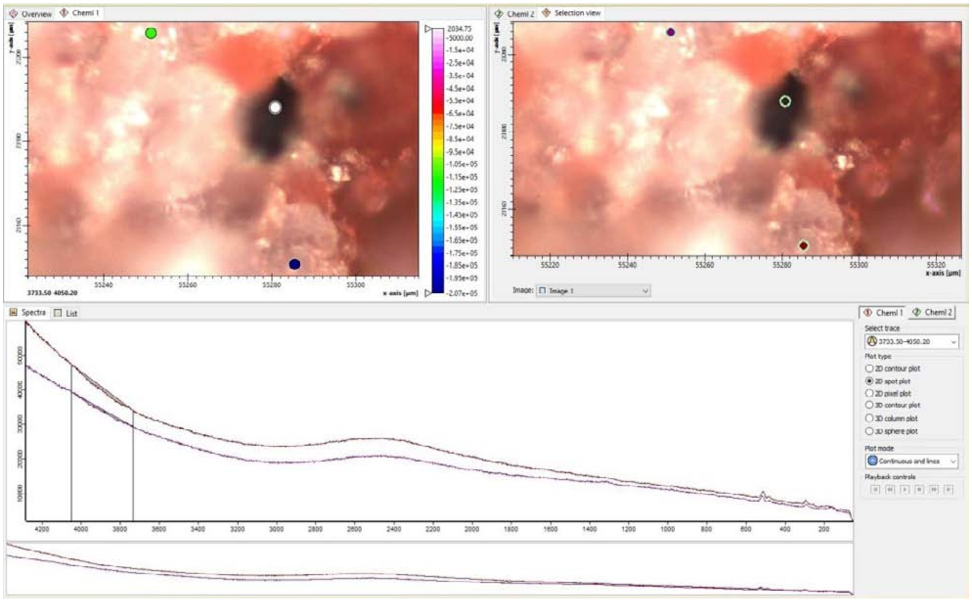
Rock of the crater-wall of the Tejeda Crater on **sample site 28 :**

Rock samples from the tip of the outflow-tongue from the Tejeda Crater on **sample site 33 :**

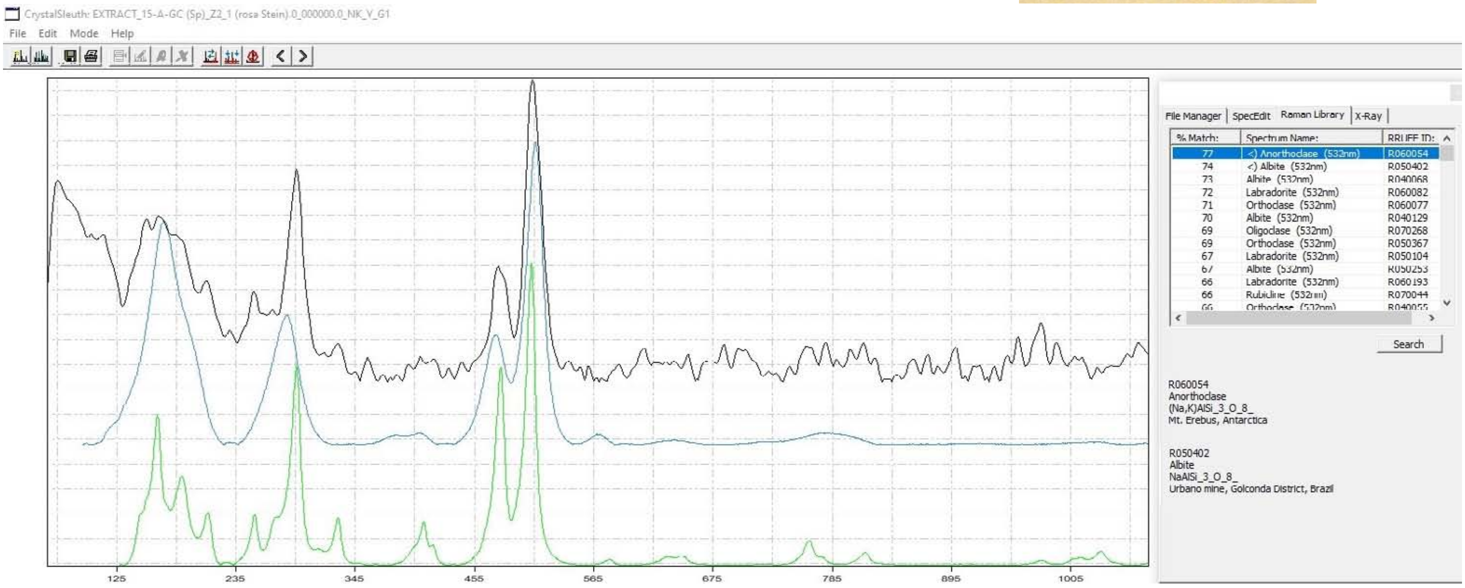


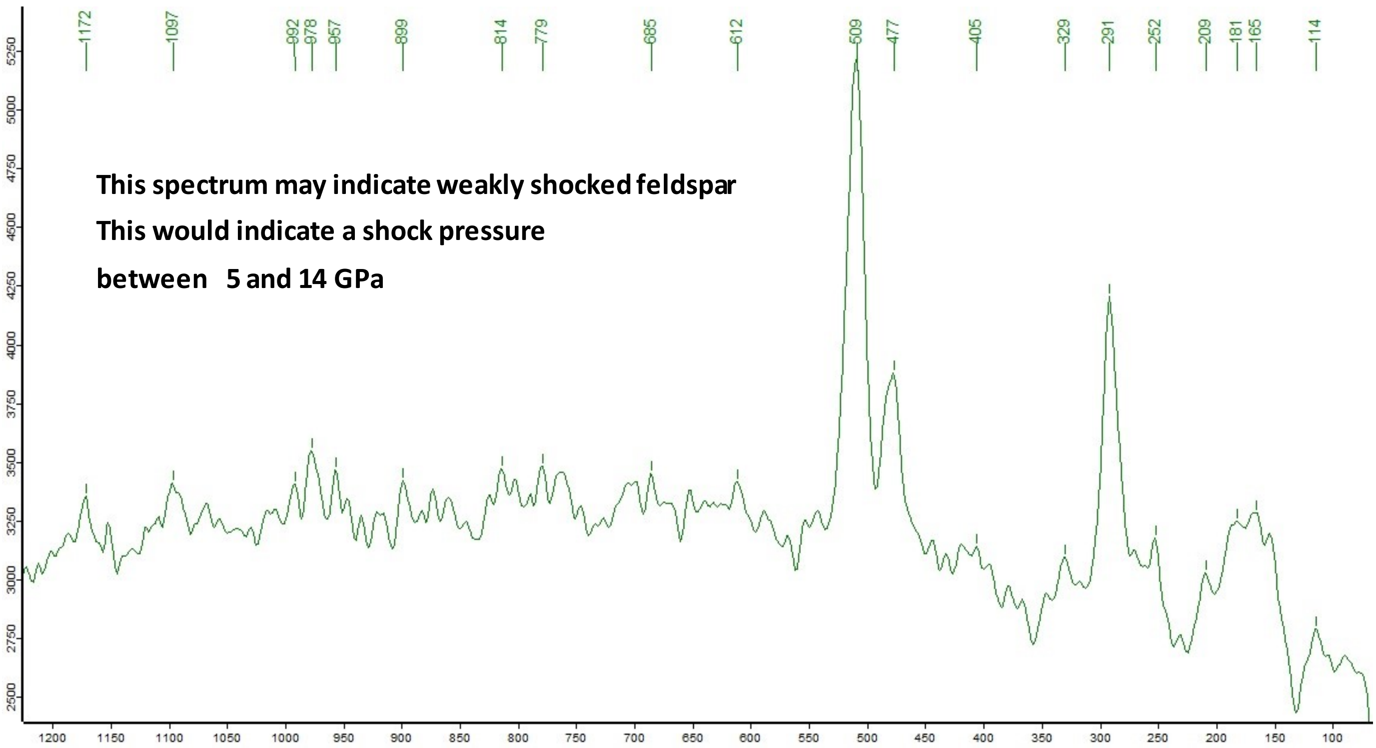
Rock sample Indicates Magnetite

Sample Site 15-A : Stone 1_spectra 1 indicates : Anorthoclase, Albite (→ see RRUFF_CS results)

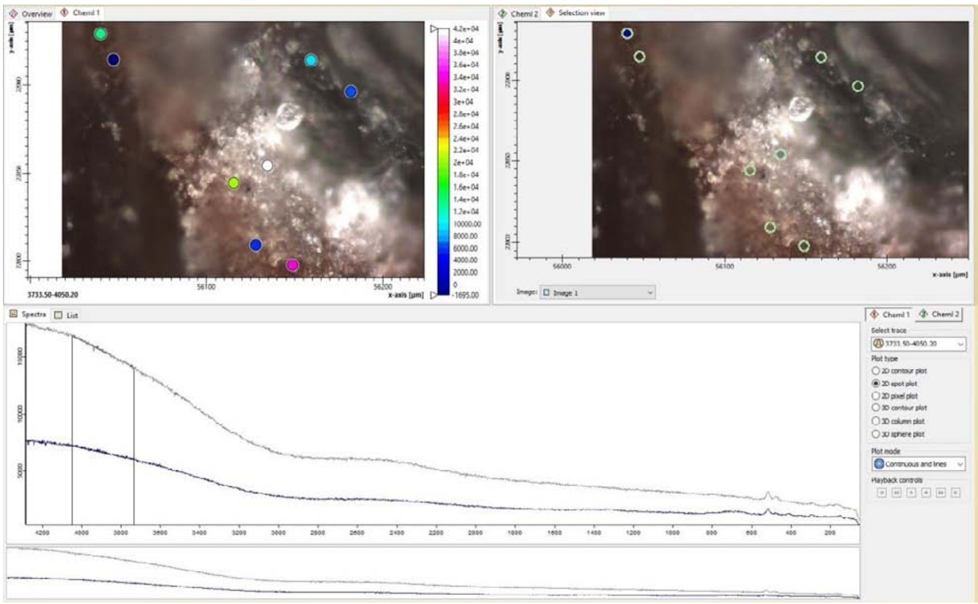


Sample :

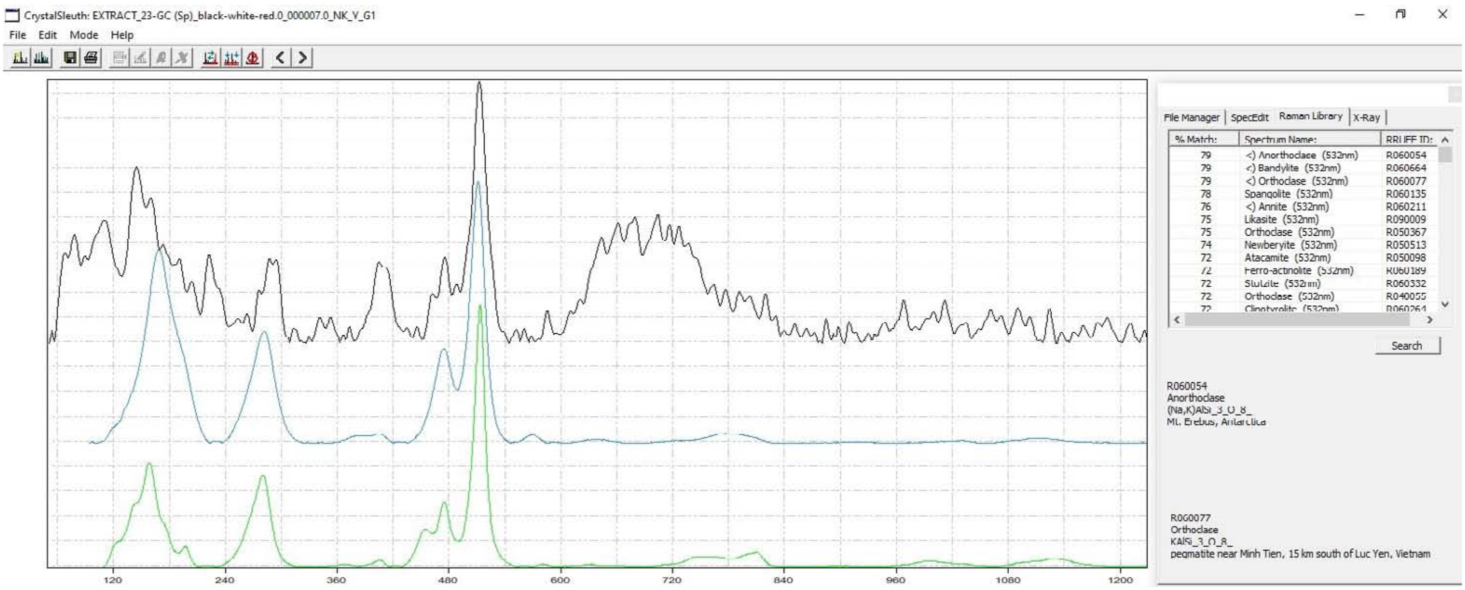


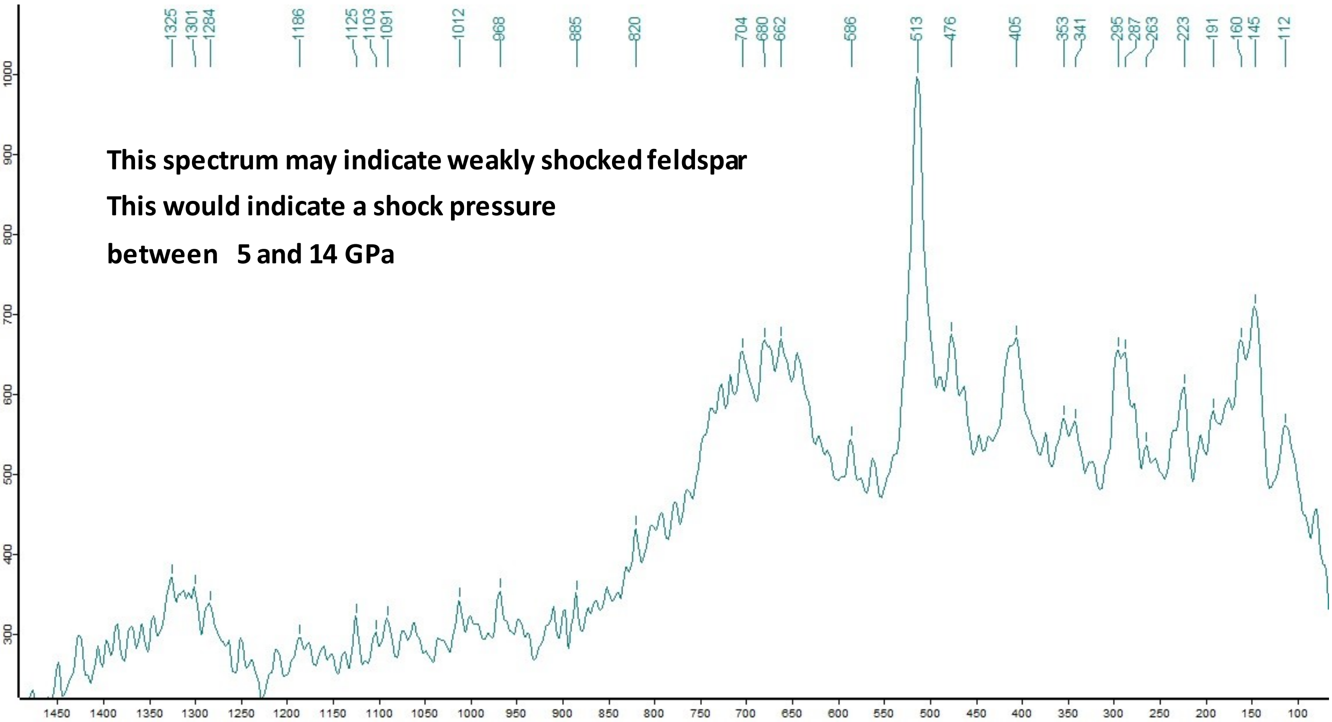


Sample Site 23 : Stone 1_spectra 1 indicates : Anorthoclase, Orthoclase (→ see RRUFF_CS results)



Sample :



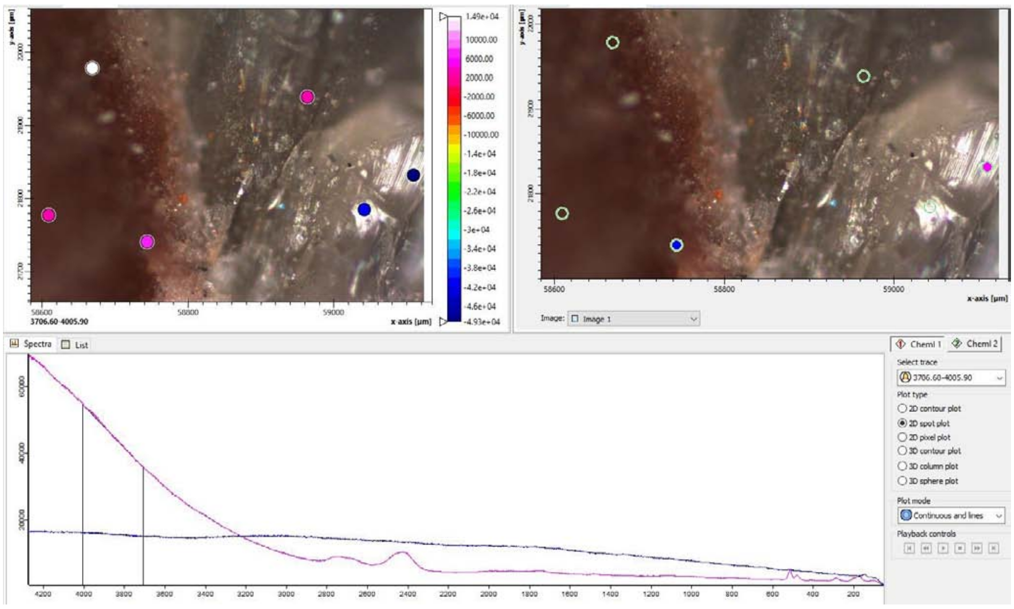


This spectrum may indicate weakly shocked feldspar

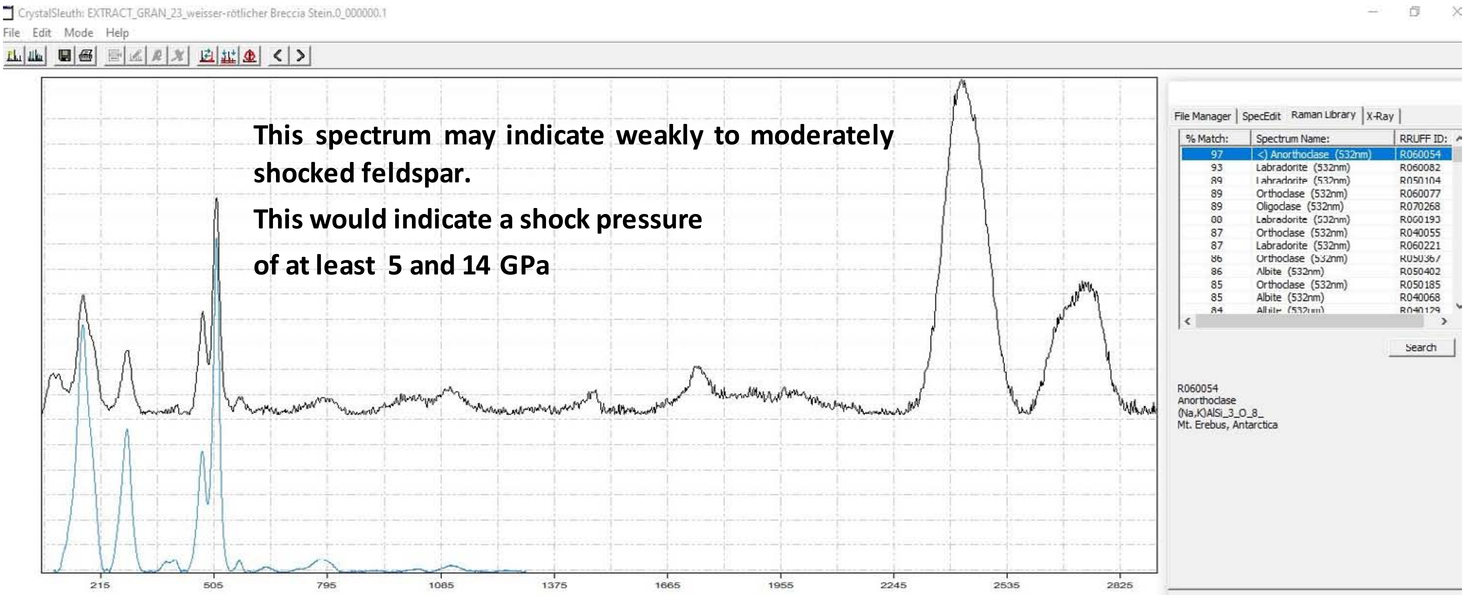
This would indicate a shock pressure

between 5 and 14 GPa

Sample Site 23 : Stone 2_spectra 1 indicates : Anorthoclase (→ see RRUFF_CS results)



Sample :



This spectrum may indicate weakly to moderately shocked feldspar.

This would indicate a shock pressure of at least 5 and 14 GPa

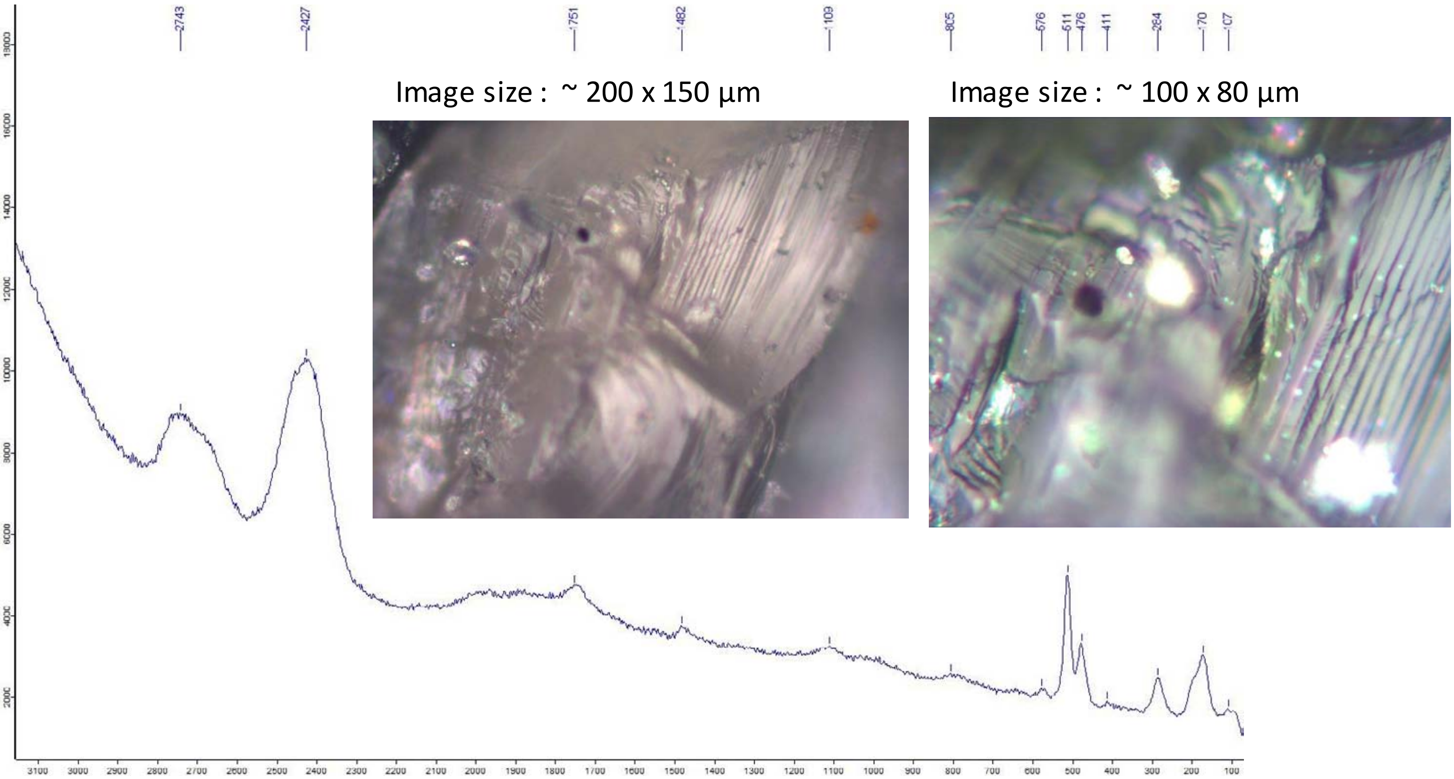
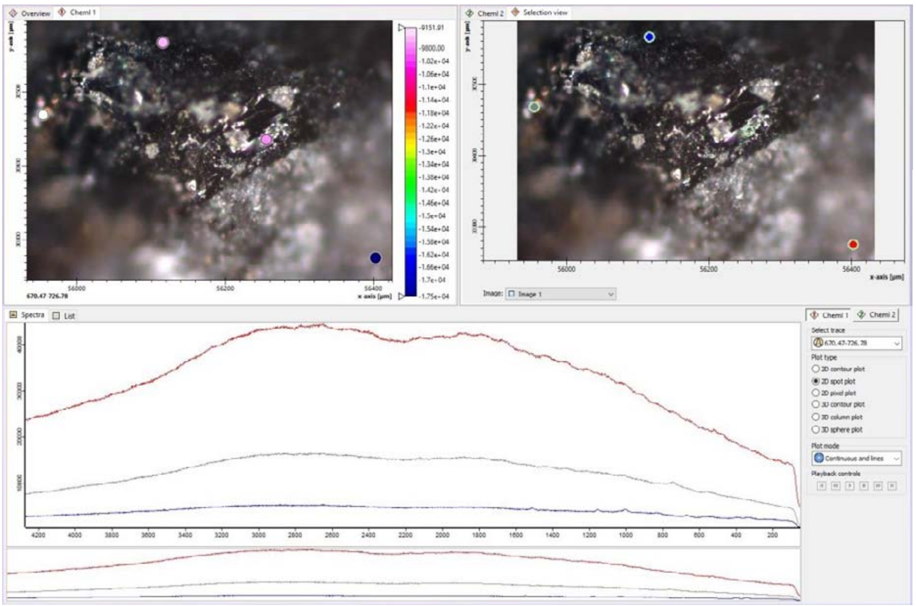


Image size : ~ 200 x 150 µm

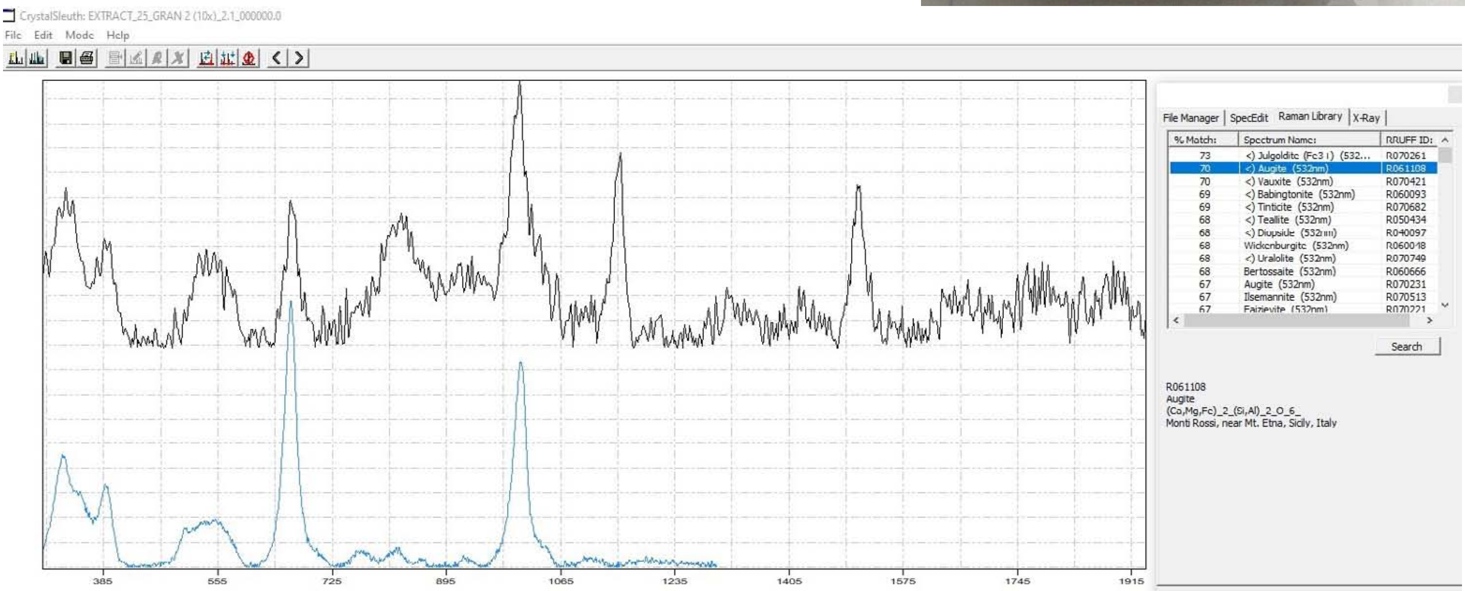
Image size : ~ 100 x 80 µm

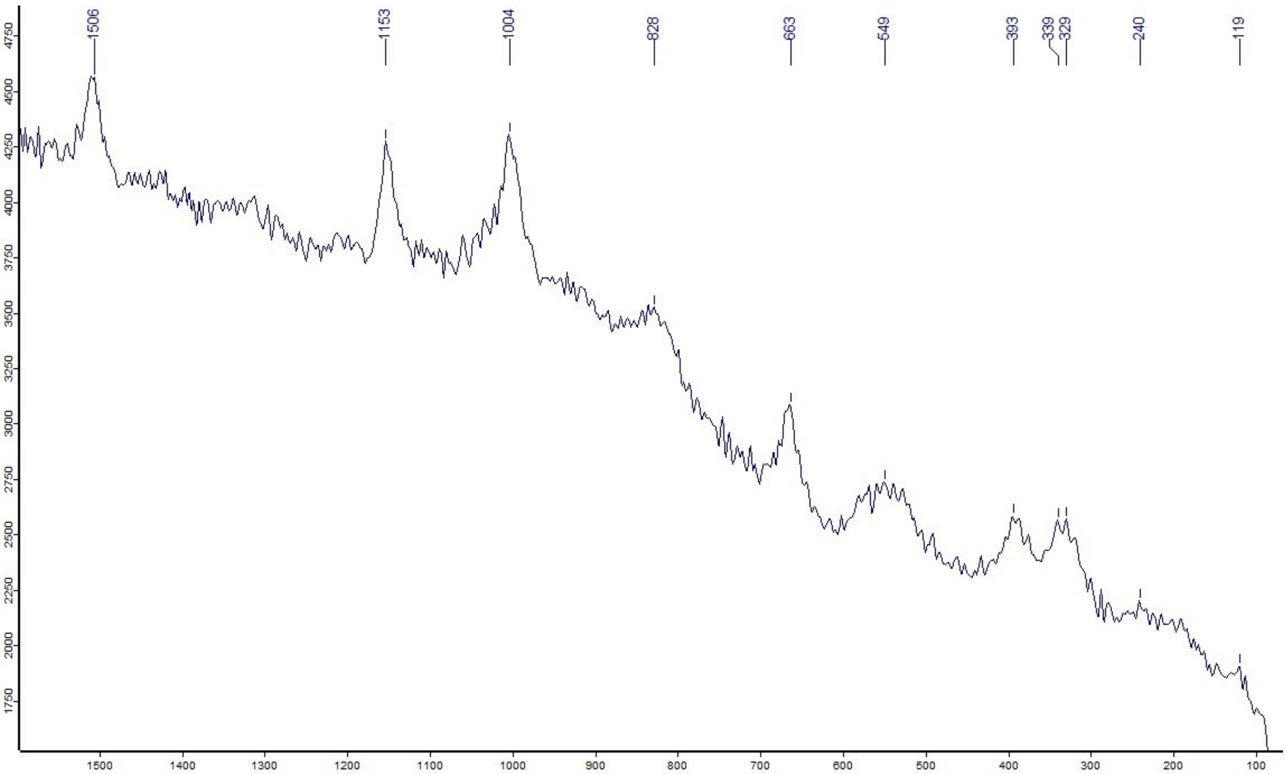
Sample Site 25 : Stone 1_spectra 1 (dark mineral inclusions) indicates : Augite (→ see RRUFF)

possible Iron-bearer mineral

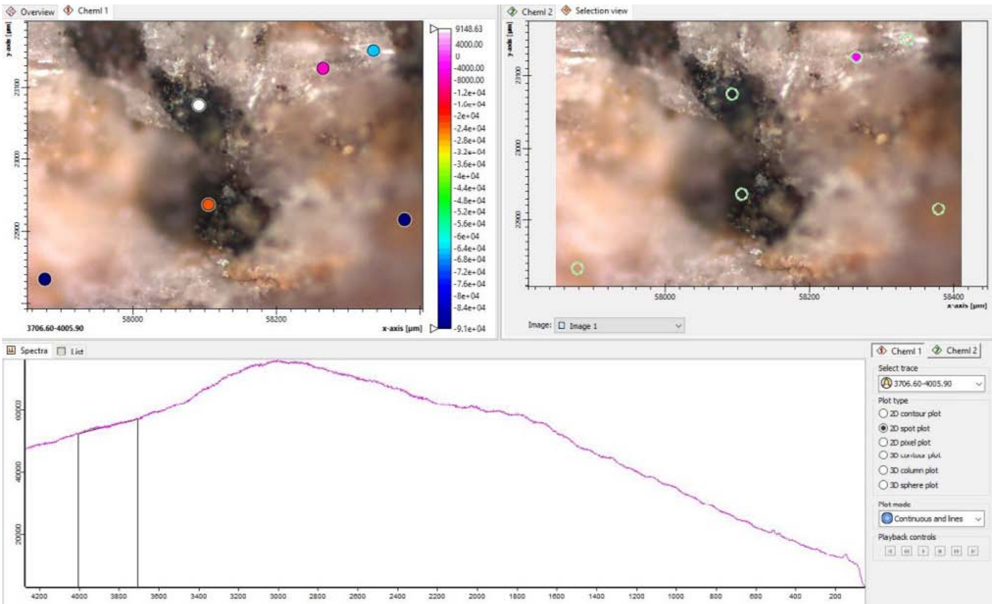


Sample :

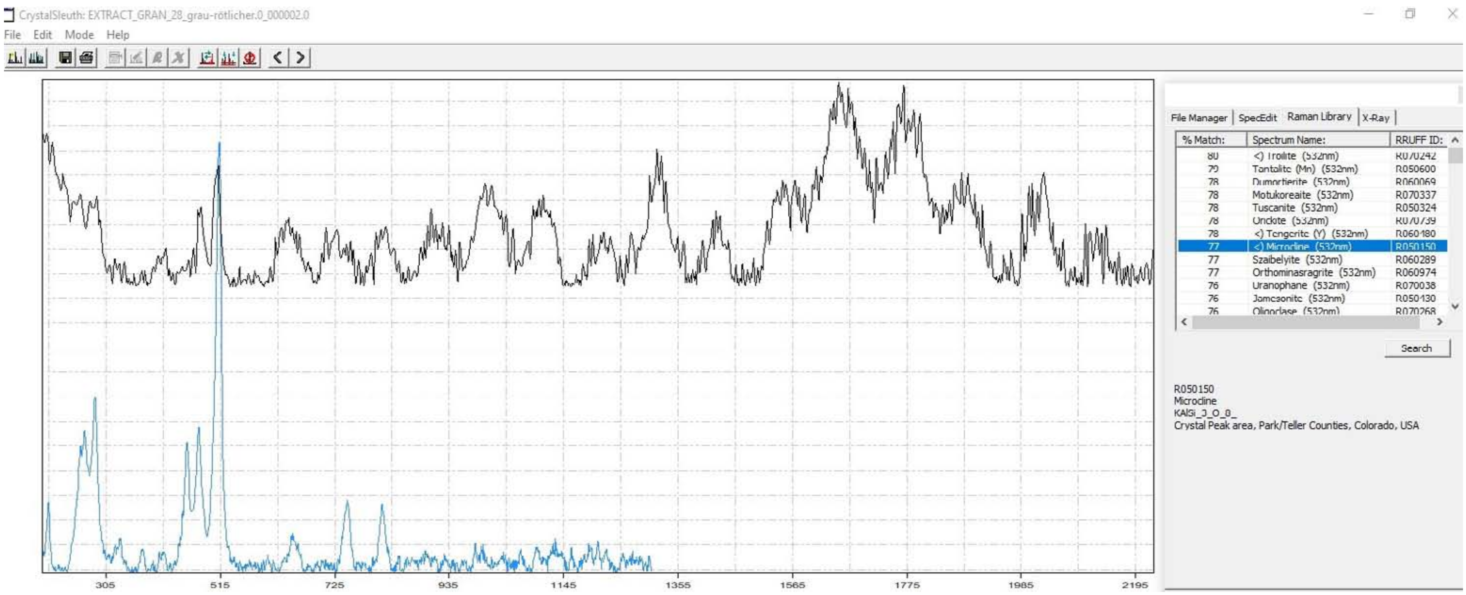


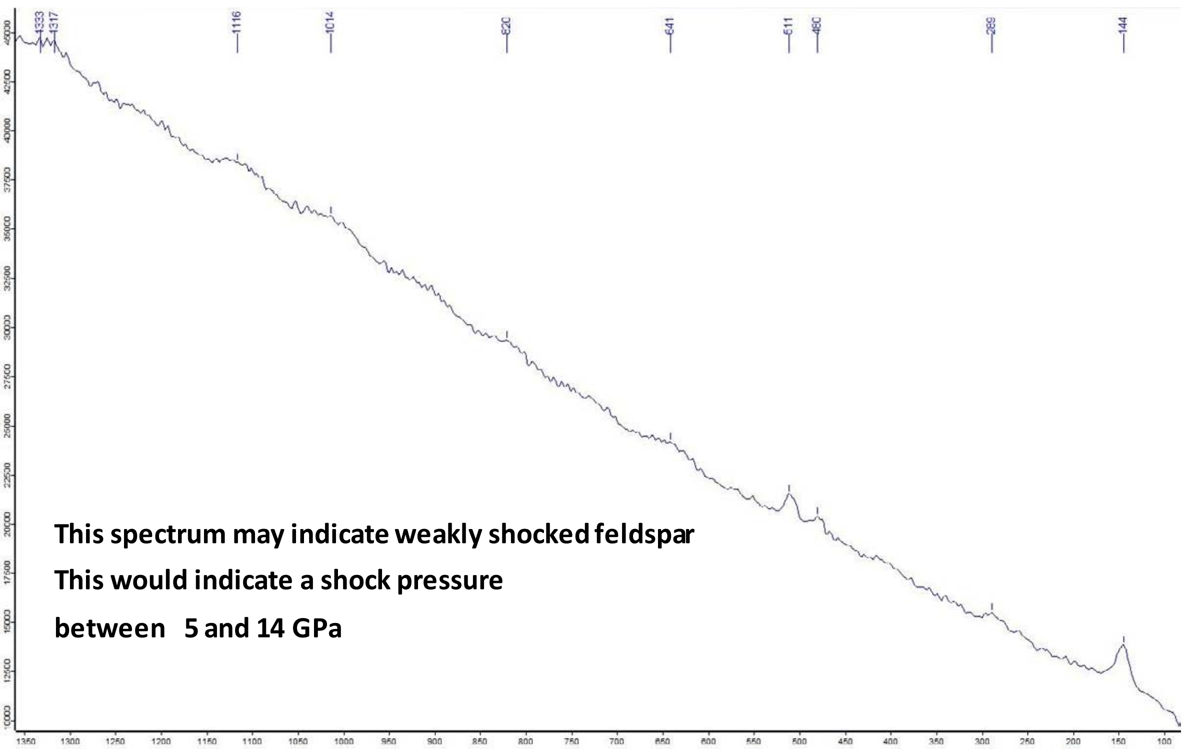


Sample Site 28 : Stone 1_spectra 1 indicates : Microcline (→ see RRUFF_CS results)



Sample :



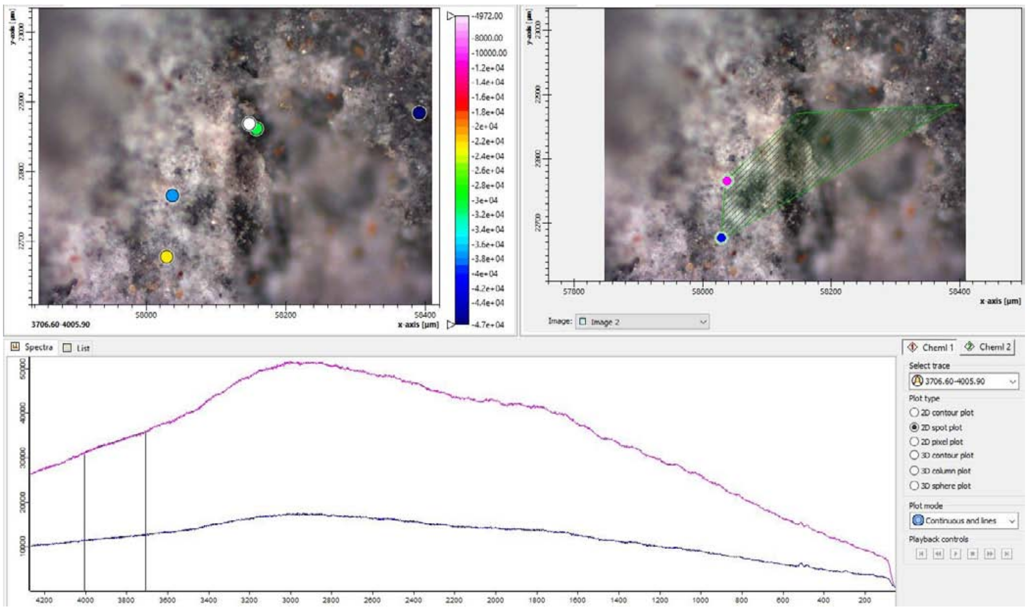


This spectrum may indicate weakly shocked feldspar

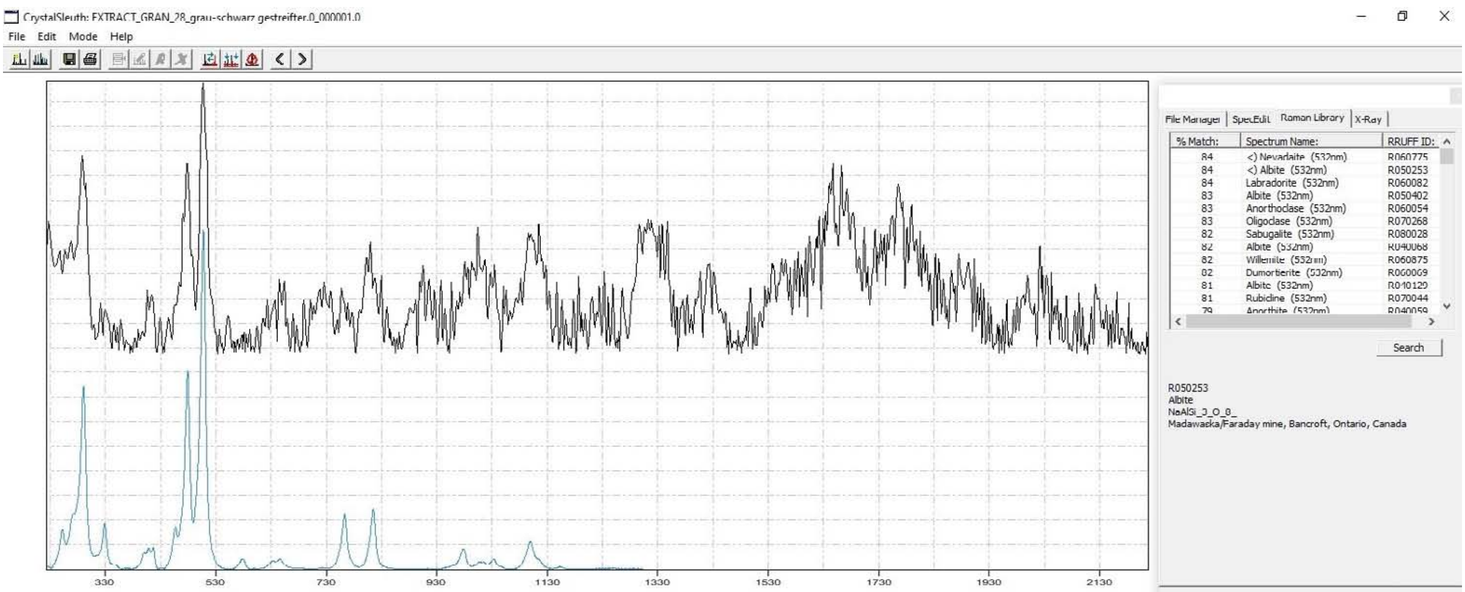
This would indicate a shock pressure

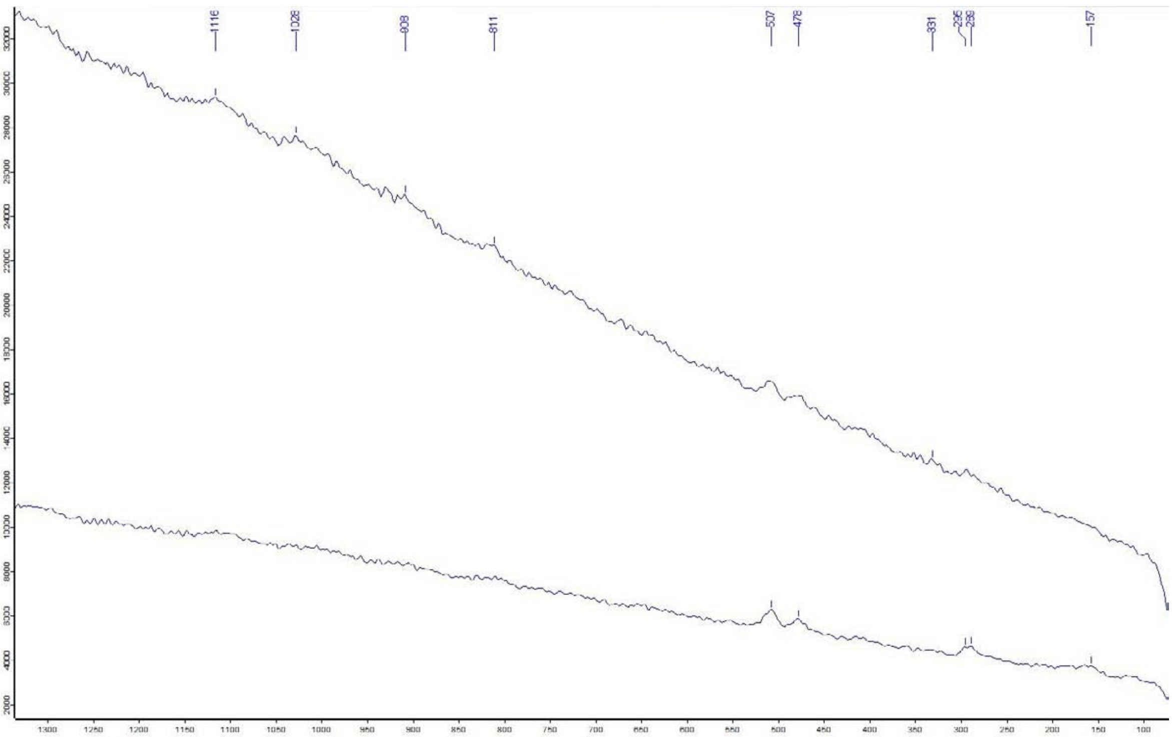
between 5 and 14 GPa

Sample Site 28 : Stone 2_spectra 1 indicates : Albite (→ see RRUFF_CS results)

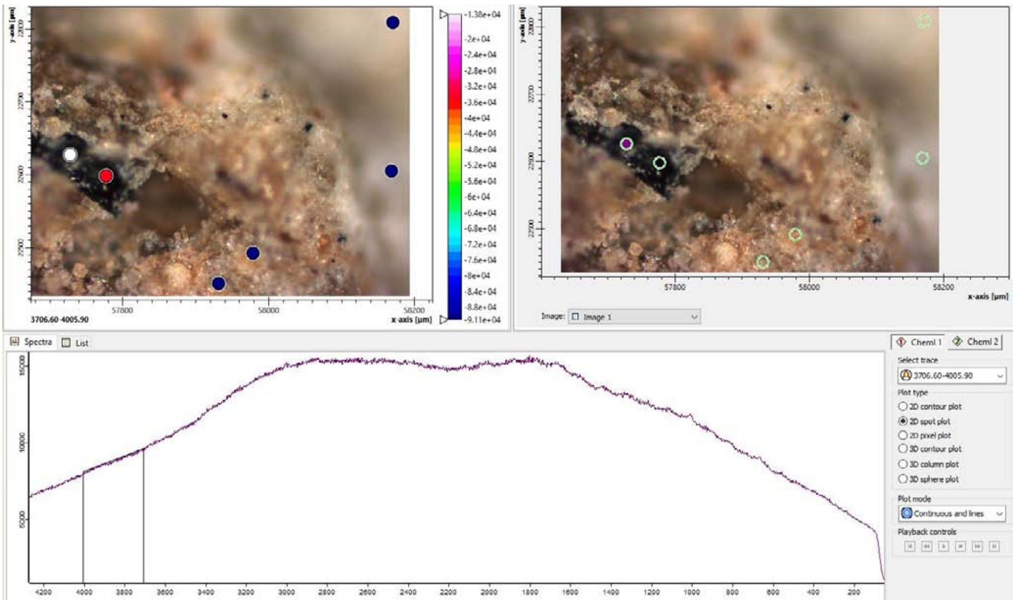


Sample :



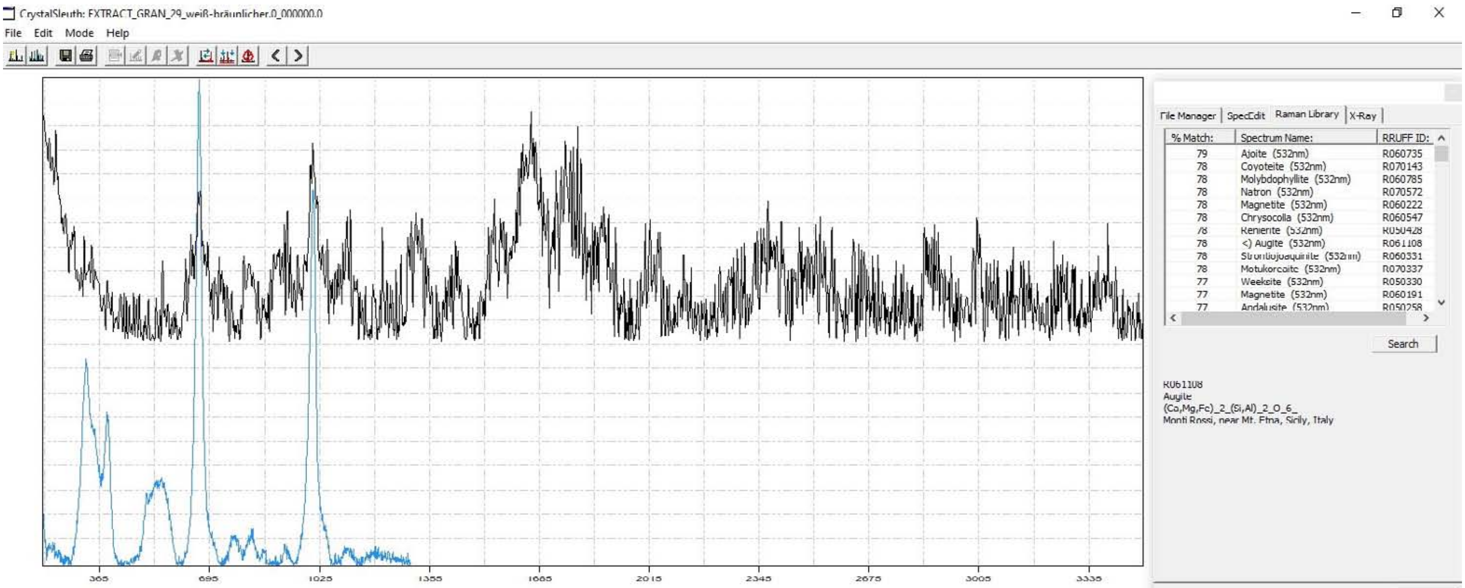


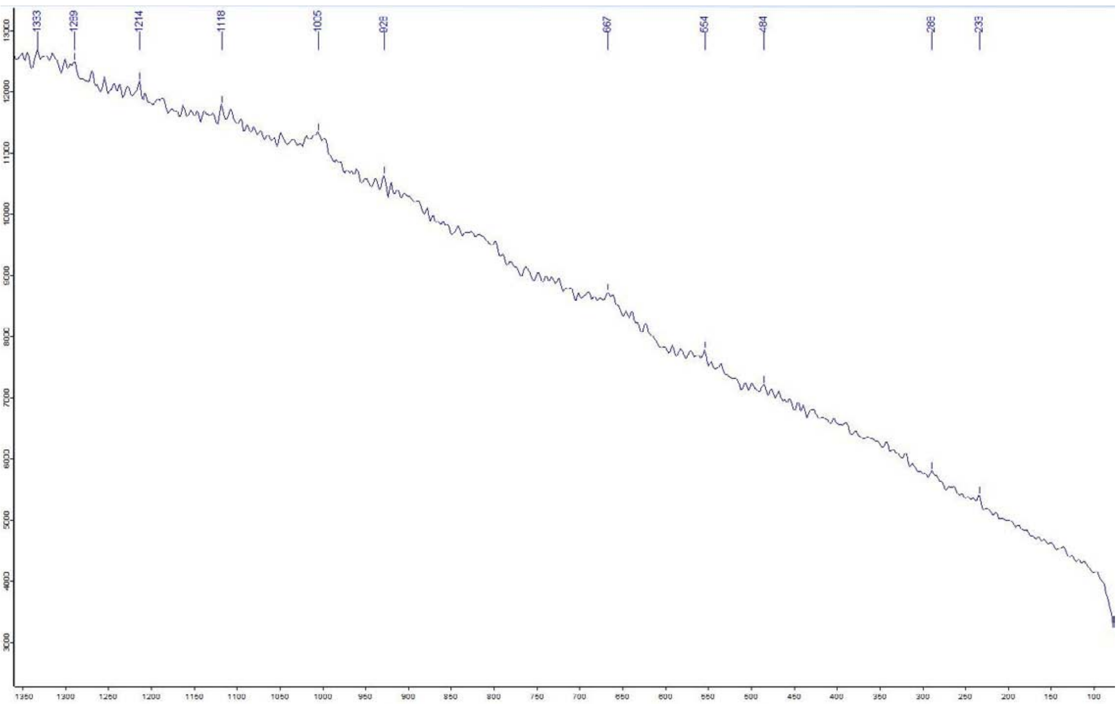
Sample Site 29 : Stone 1_spectra 1 indicates : Augite (→ see RRUFF_CS results)



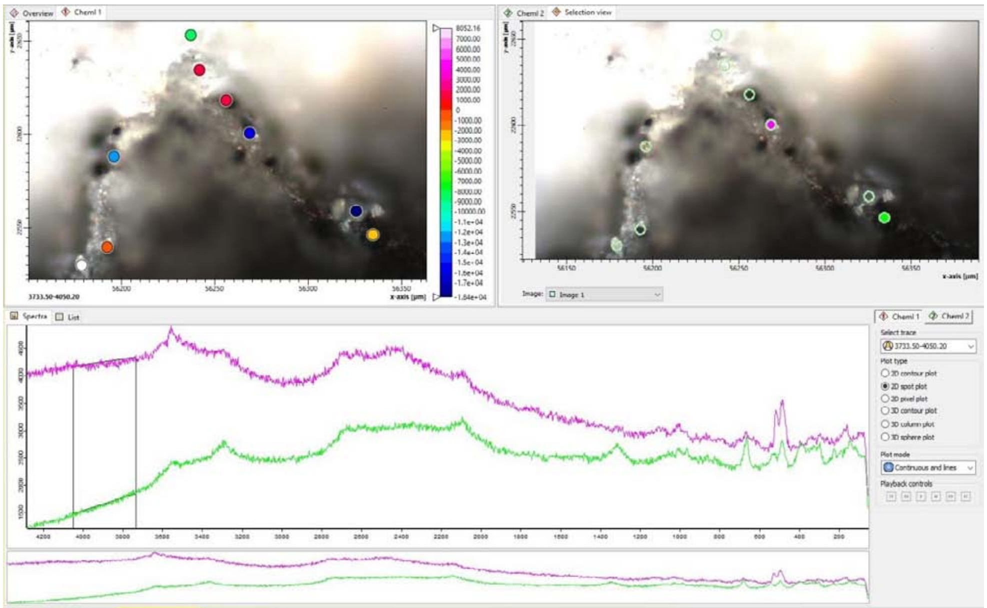
Possible Iron-bearer mineral

Sample :



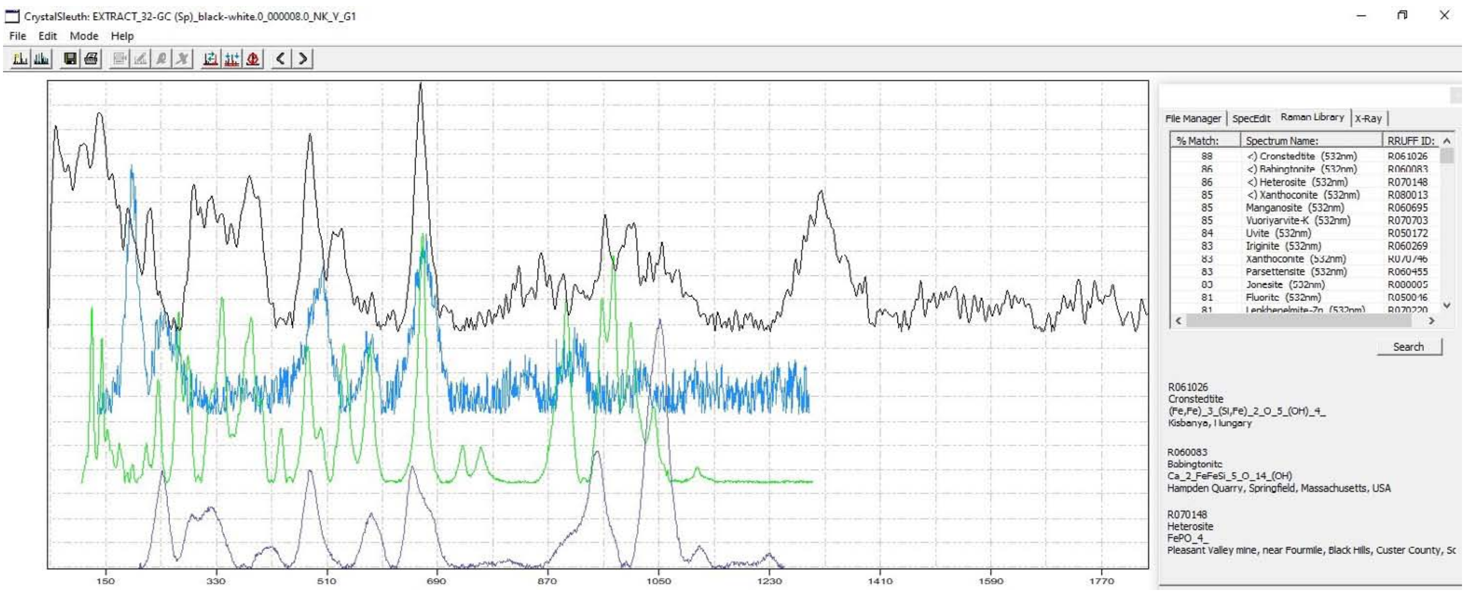


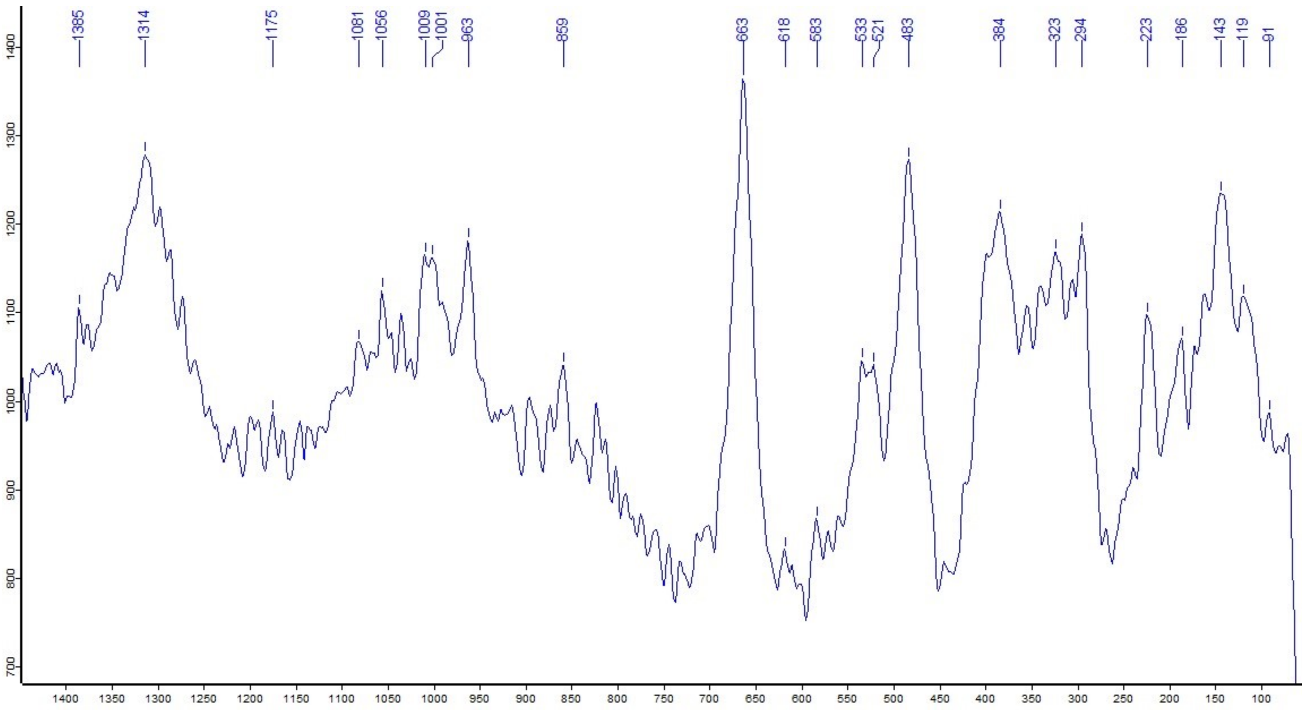
Sample Site 32 : Stone 1_spectra 1 indicates : Cronstedtite_Babingtonite_Heterosite (→ see RRUFF_CS)



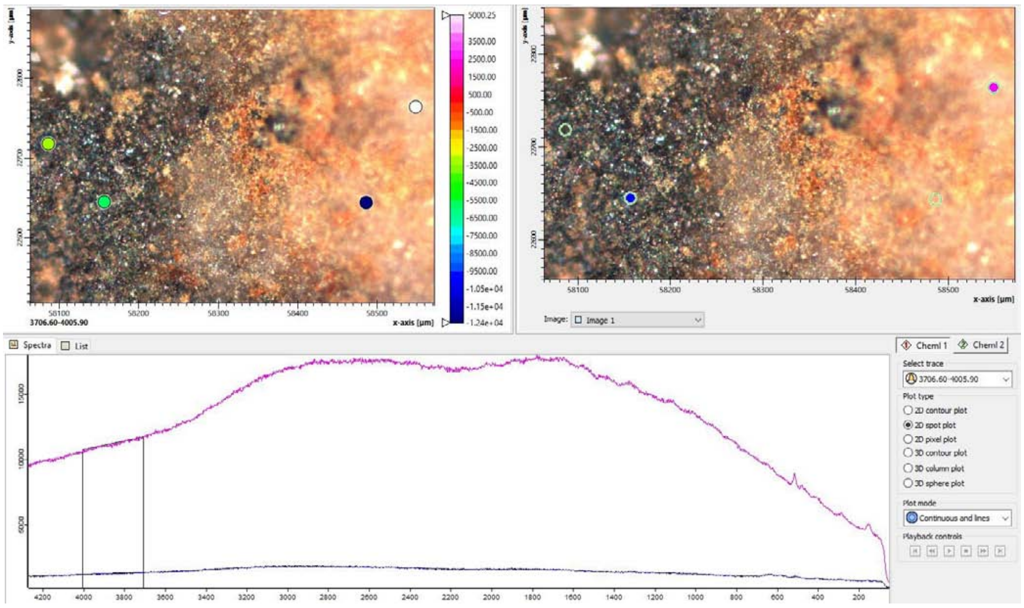
Note : → best matching minerals all iron-bearer minerals !

Sample :

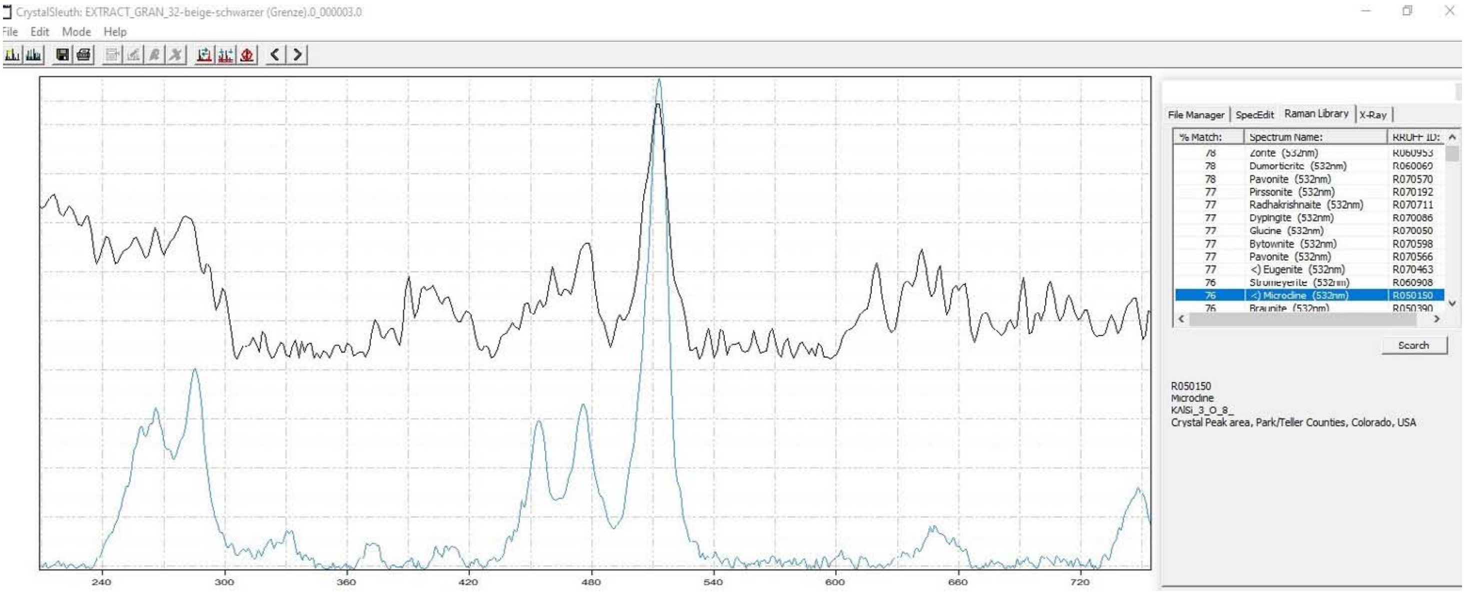


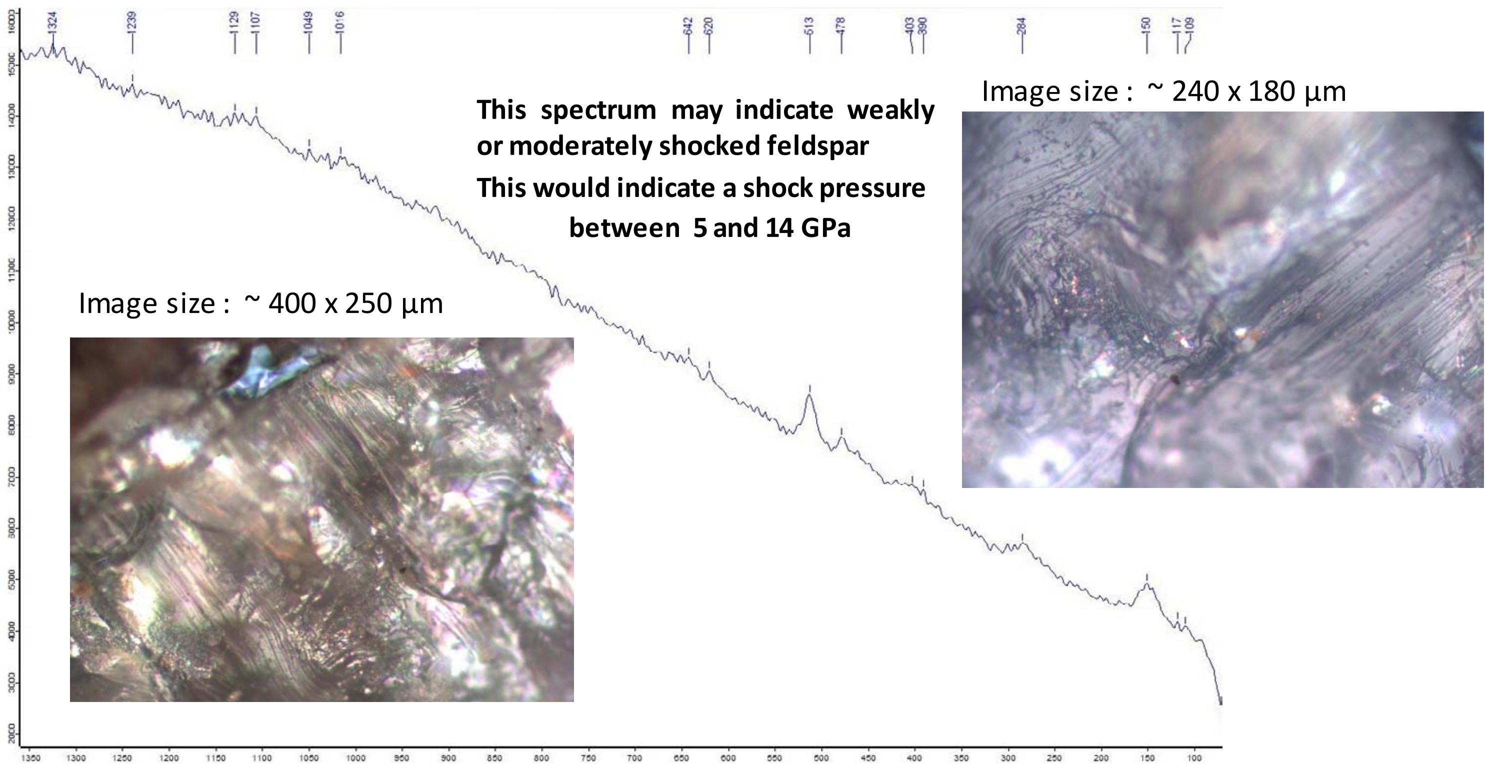


Sample Site 32 : Stone 2_spectra 1 indicates : Microcline (→ see RRUFF_CS results)



Sample :





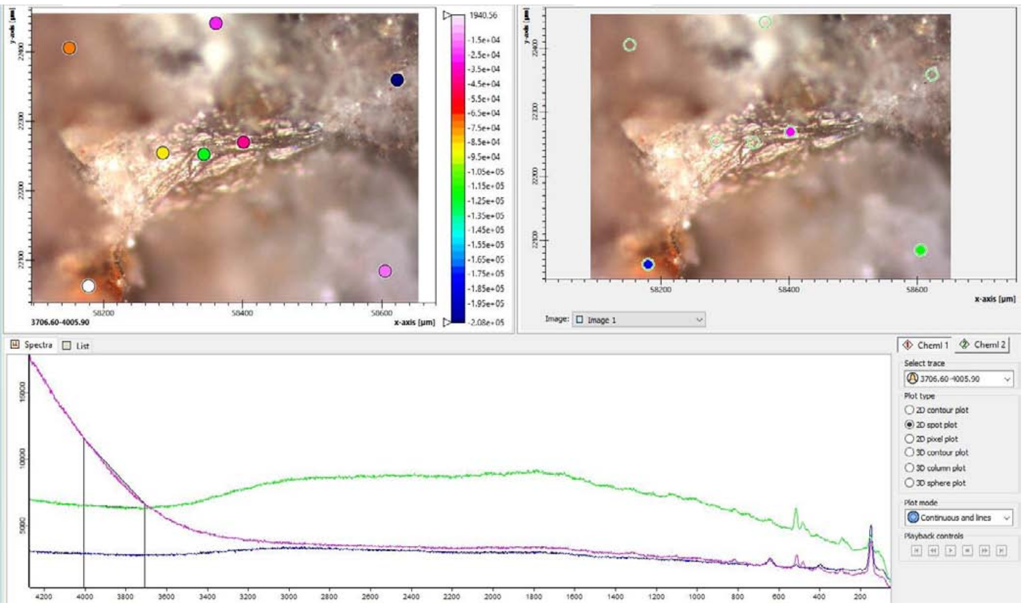
This spectrum may indicate weakly or moderately shocked feldspar

This would indicate a shock pressure between 5 and 14 GPa

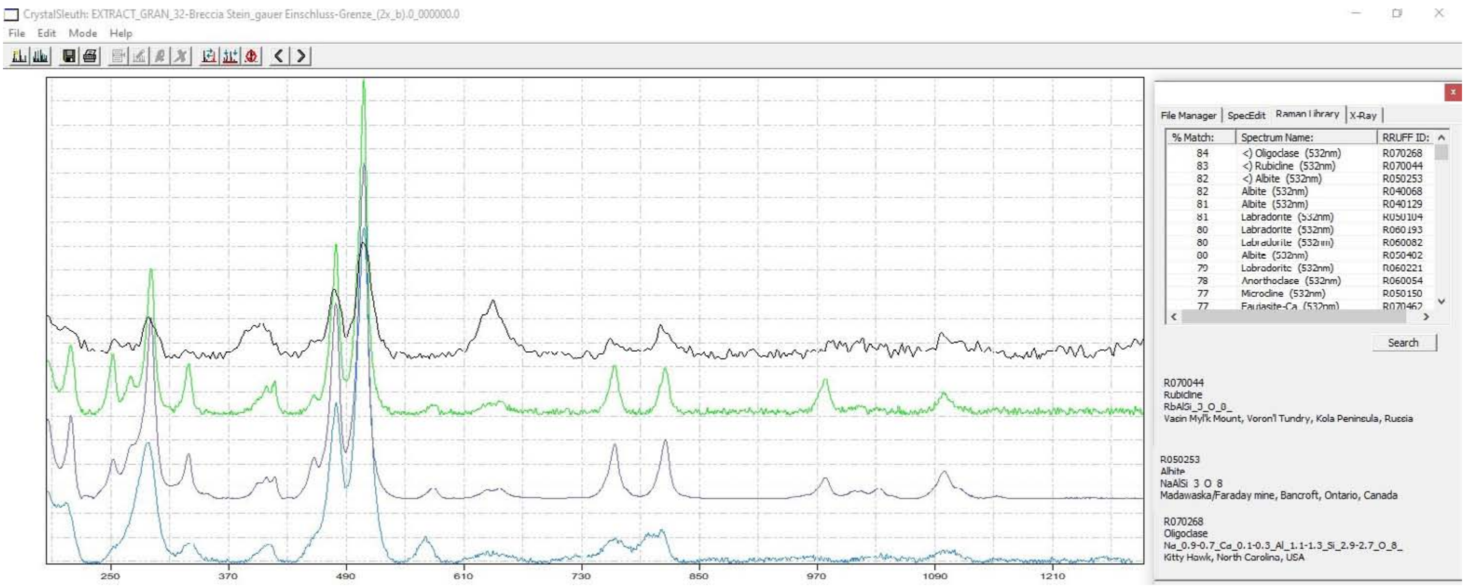
Image size : ~ 240 x 180 µm

Image size : ~ 400 x 250 µm

Sample Site 32 : Stone 3_spectra 1 indicates : Oligoclase, Rubicline, Albite (→ see RRUFF_CS results)



Sample :



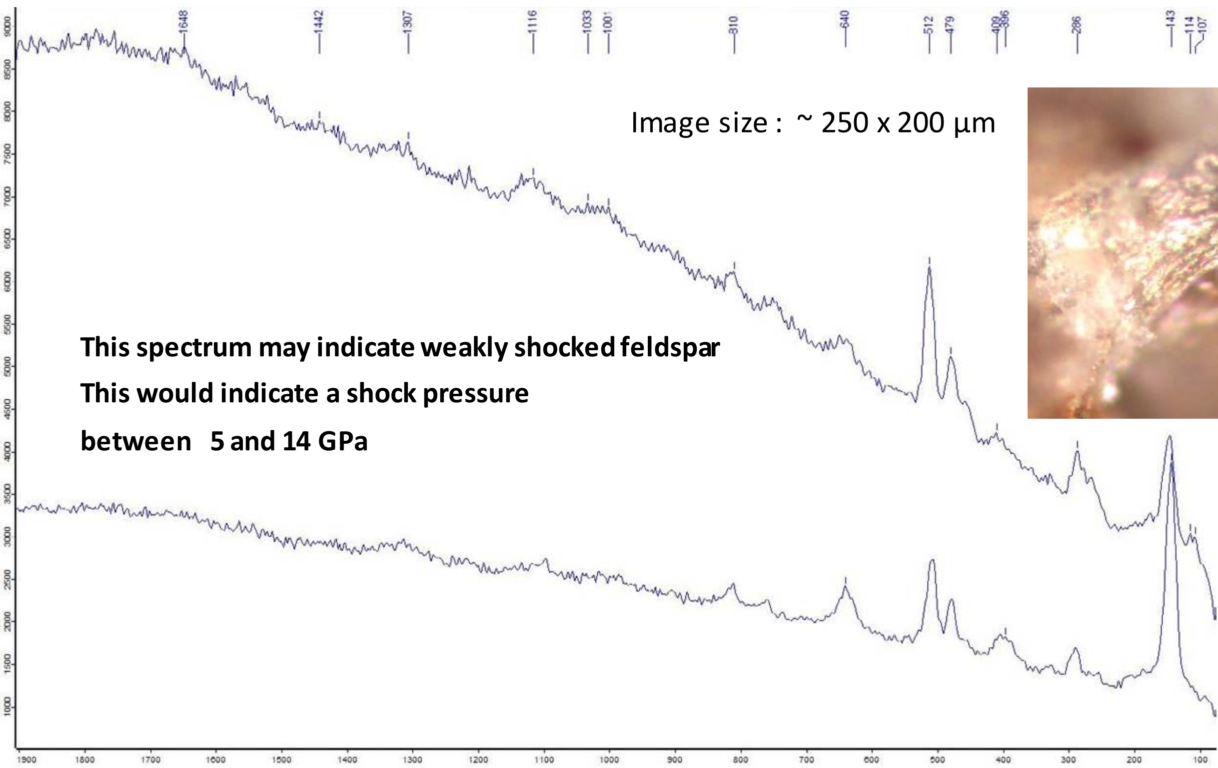
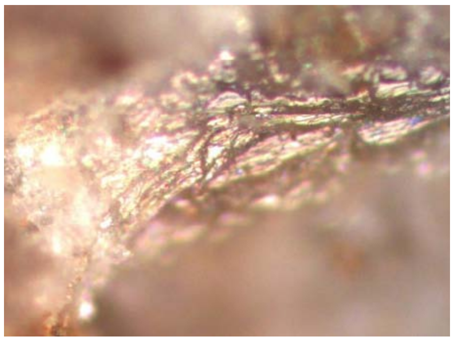


Image size : ~ 250 x 200 µm

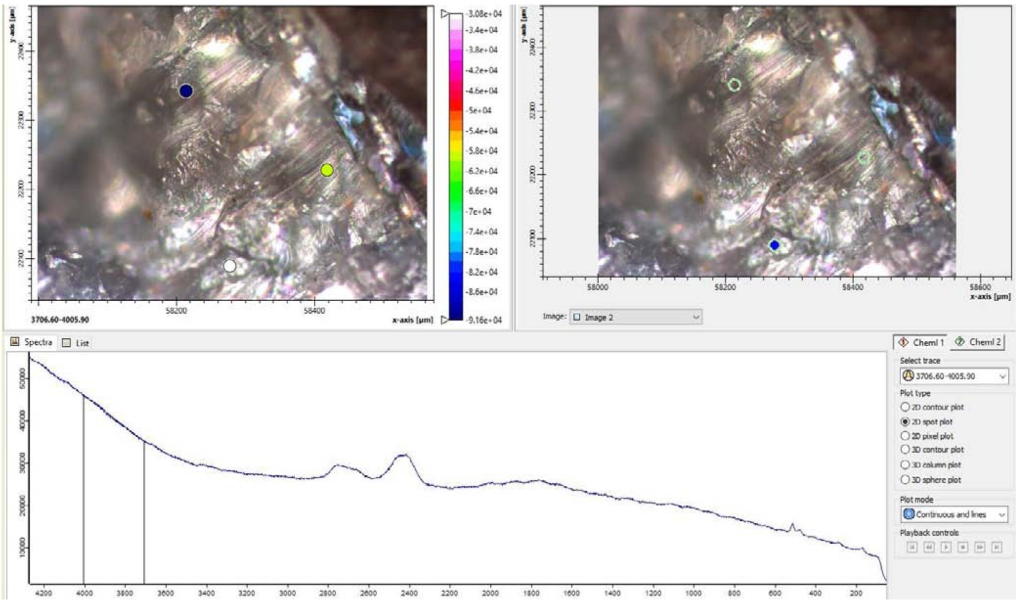


This spectrum may indicate weakly shocked feldspar

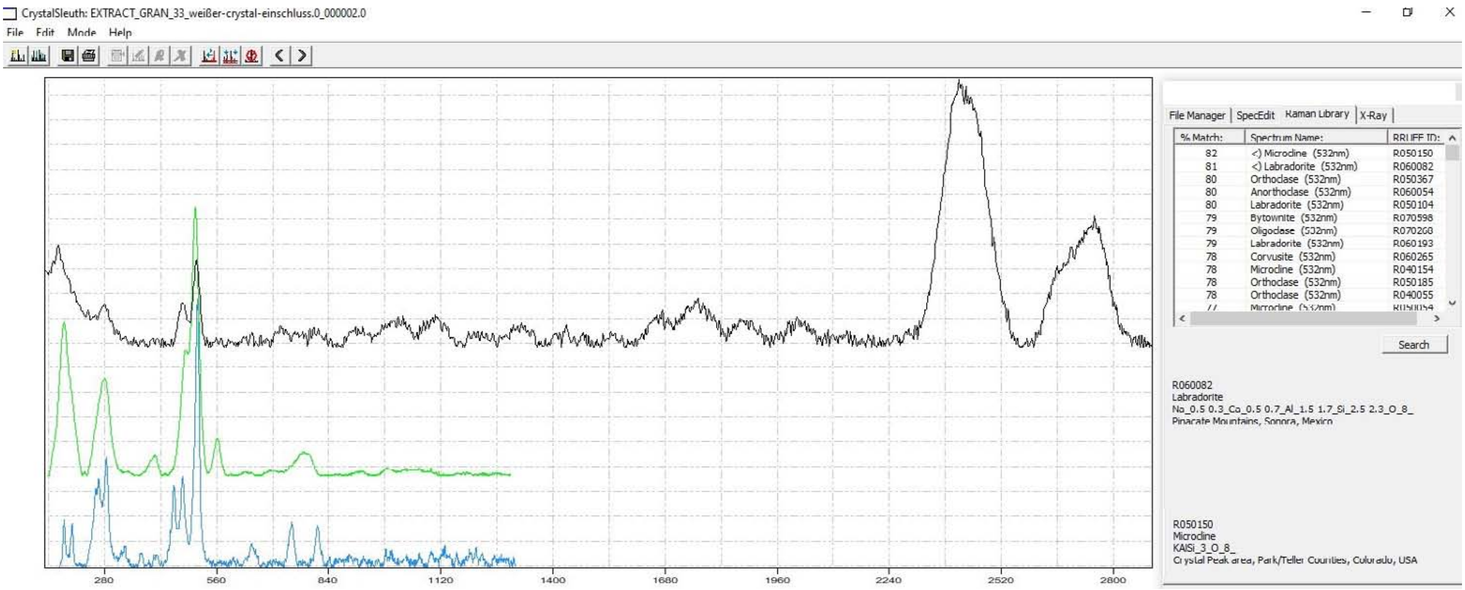
This would indicate a shock pressure

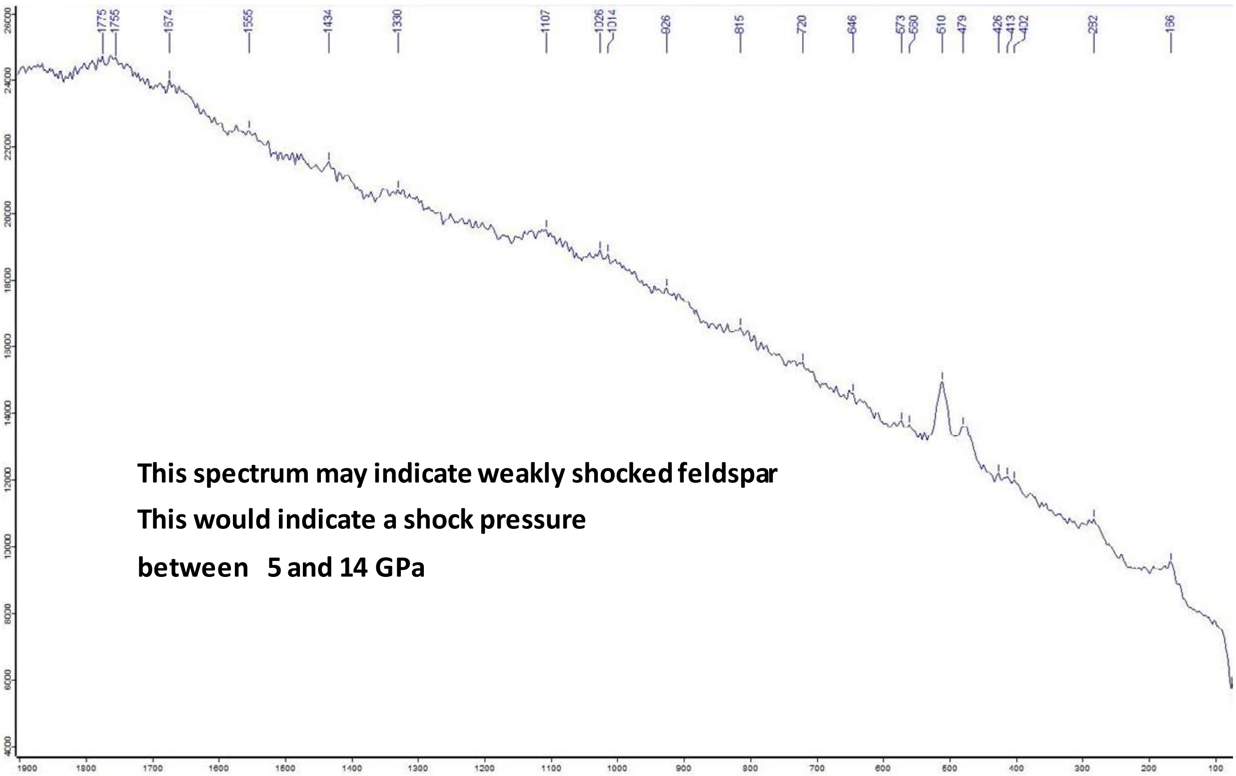
between 5 and 14 GPa

Sample Site 33 : Stone 1 (crystal inclusion)_spectra 1 indicates : Labradorite-Microcline (→ see RRUFF_CS)



Sample :



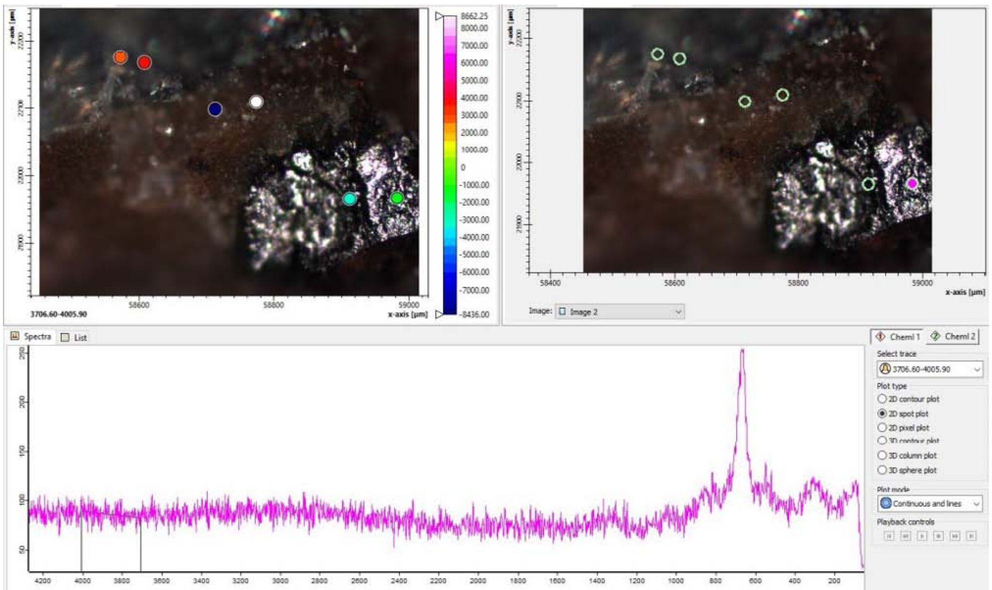


This spectrum may indicate weakly shocked feldspar

This would indicate a shock pressure

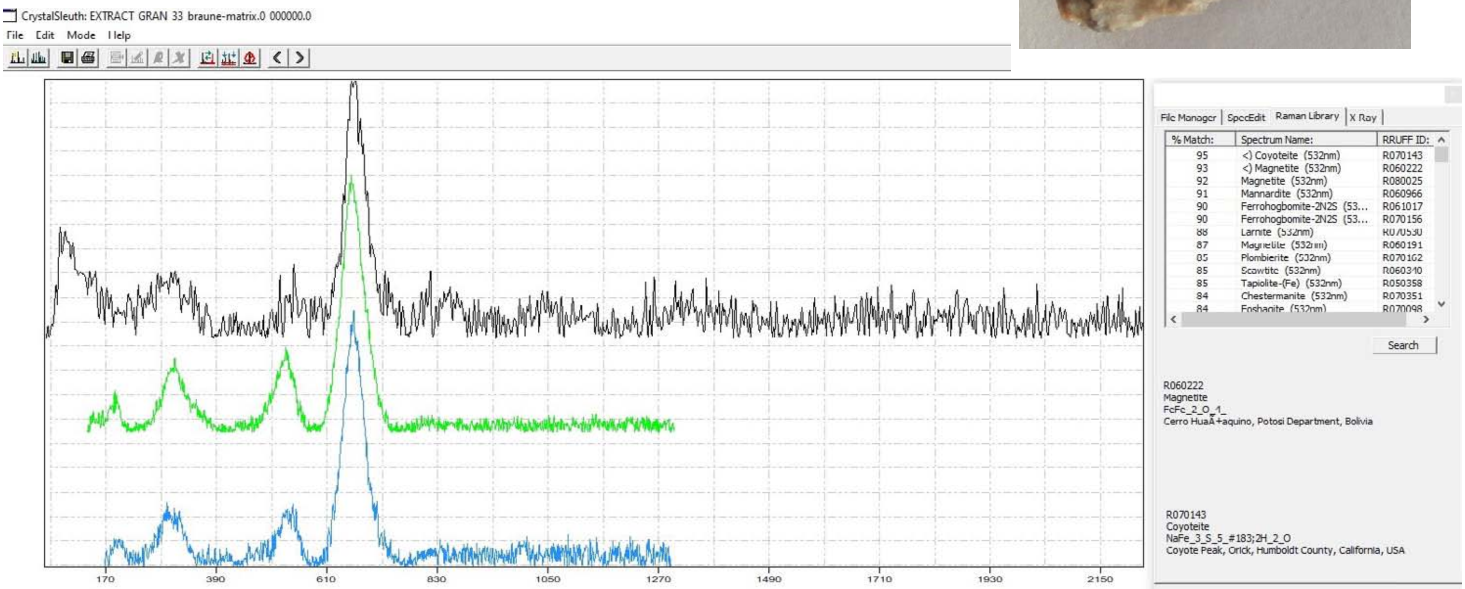
between 5 and 14 GPa

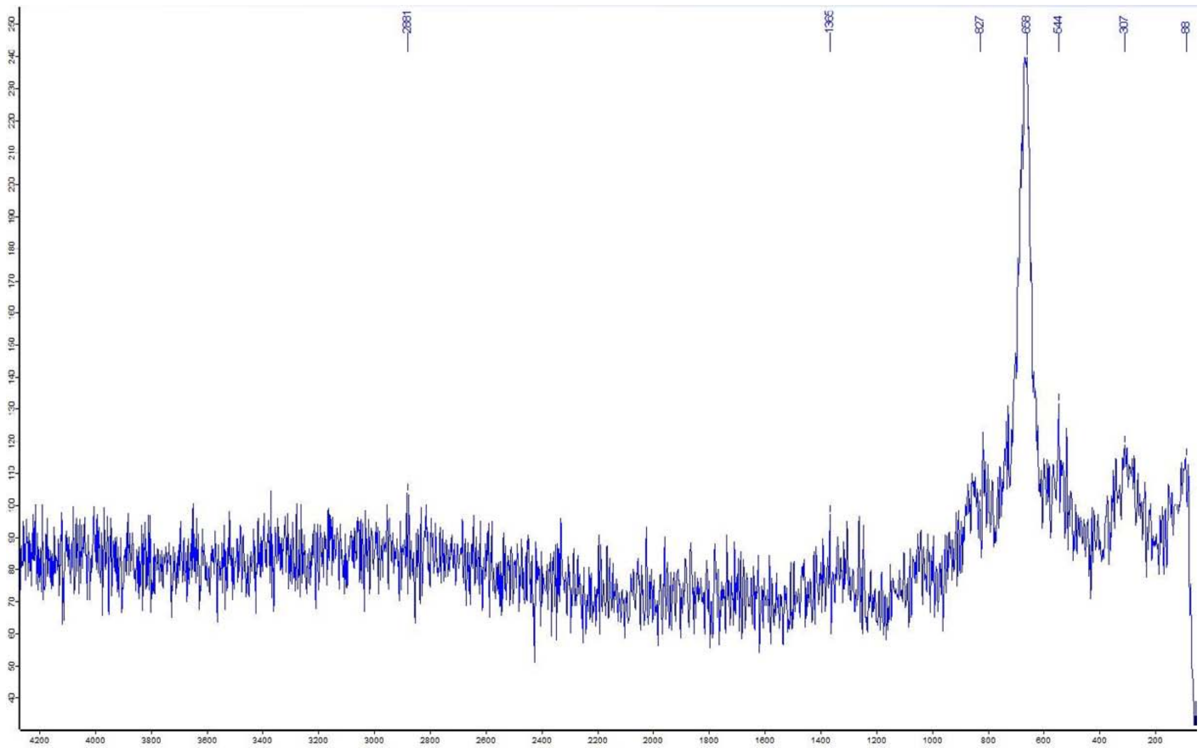
Sample Site 33 : Stone 1 (brown matrix material)_spectra 1 indicates : Magnetite, Coyoteite (RRUFF_CS)



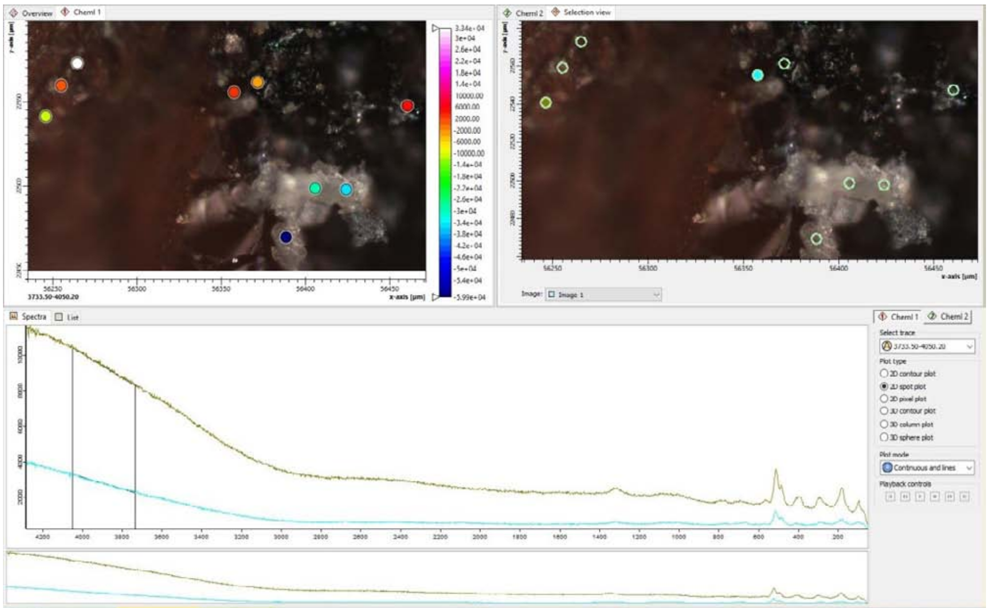
Note : The rock mainly consists of Magnetite !
(or Coyoteite)
→ iron-bearer minerals

Sample :

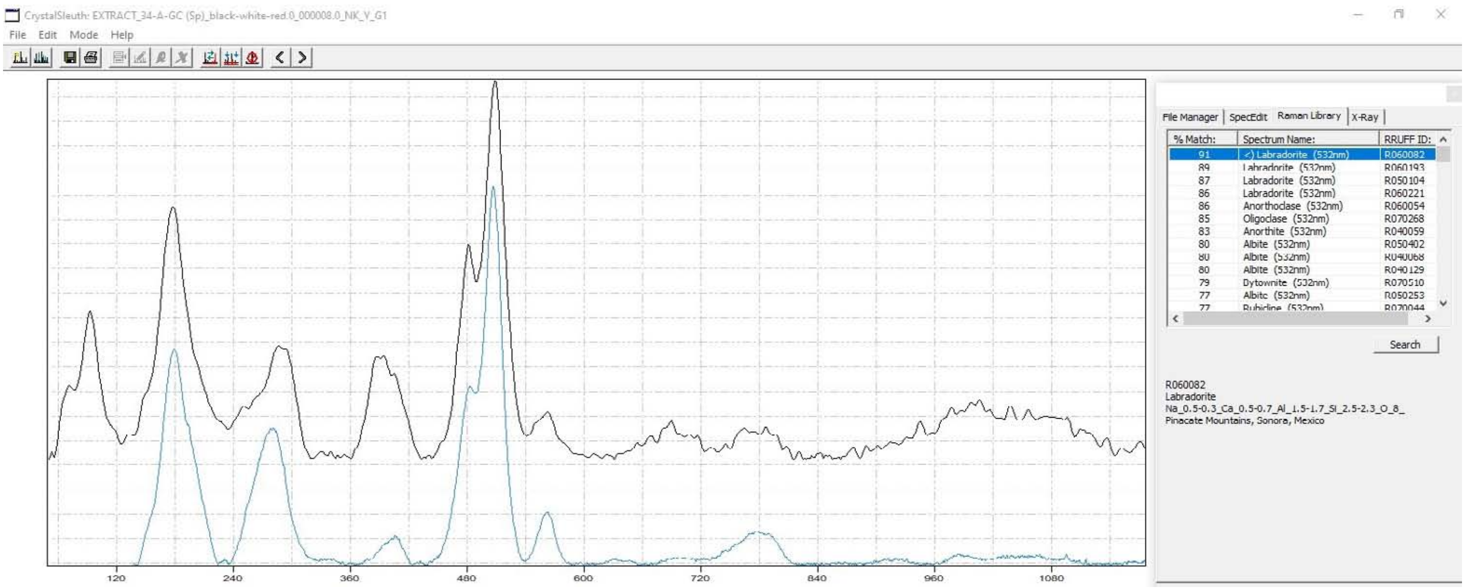


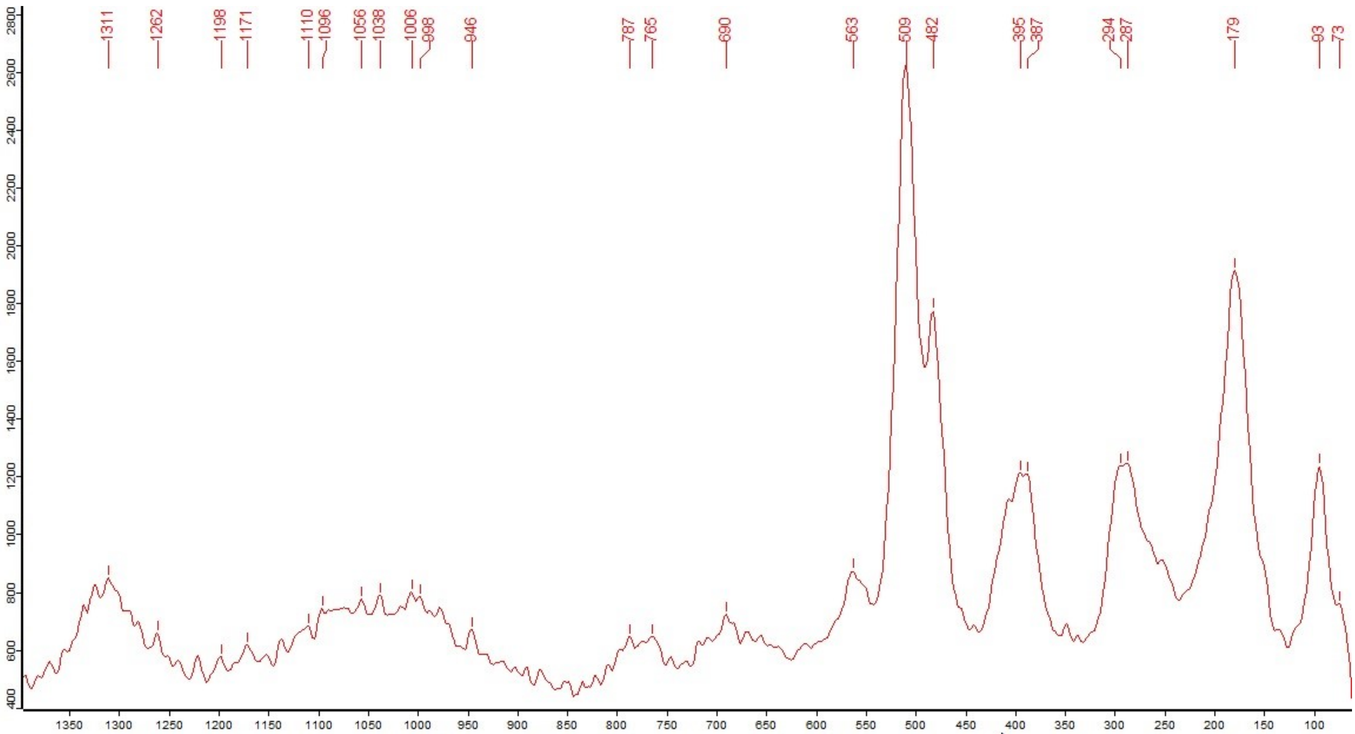


Sample Site 34-A : Stone 1_spectra 1 indicates : Labradorite (→ see RRUFF_CS)

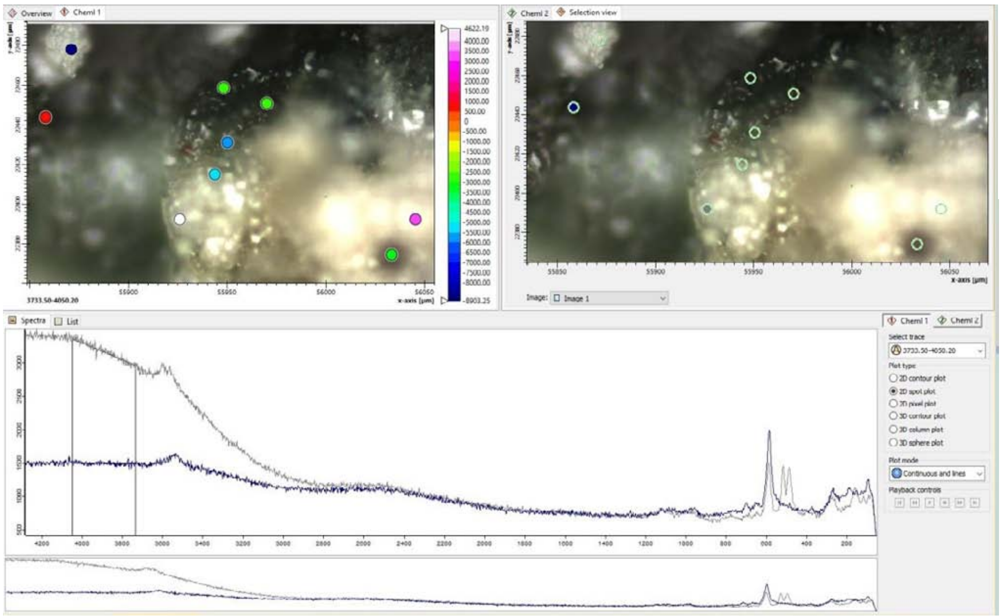


Sample :

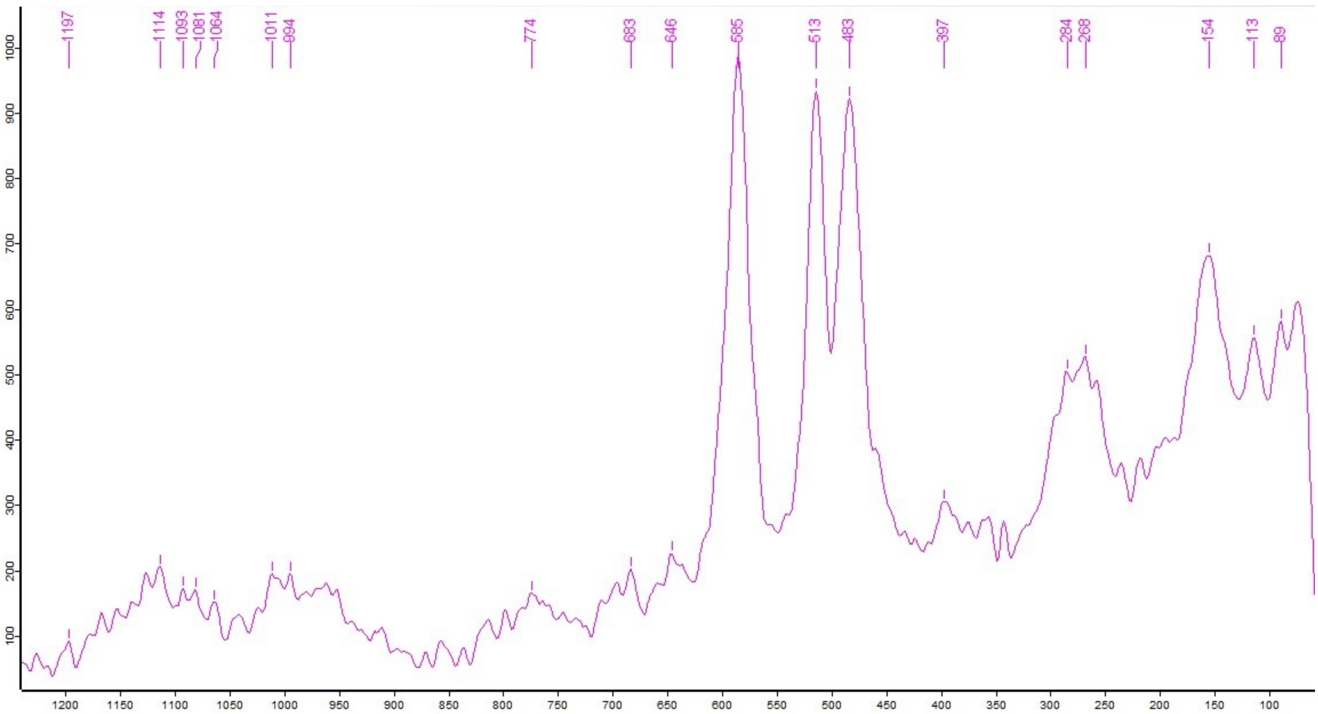




Sample Site 34-B : Stone 1_spectra 1 indicates : Hollandite, Labradorite, Tengerite-(Y) (→ see RRUFF_CS)

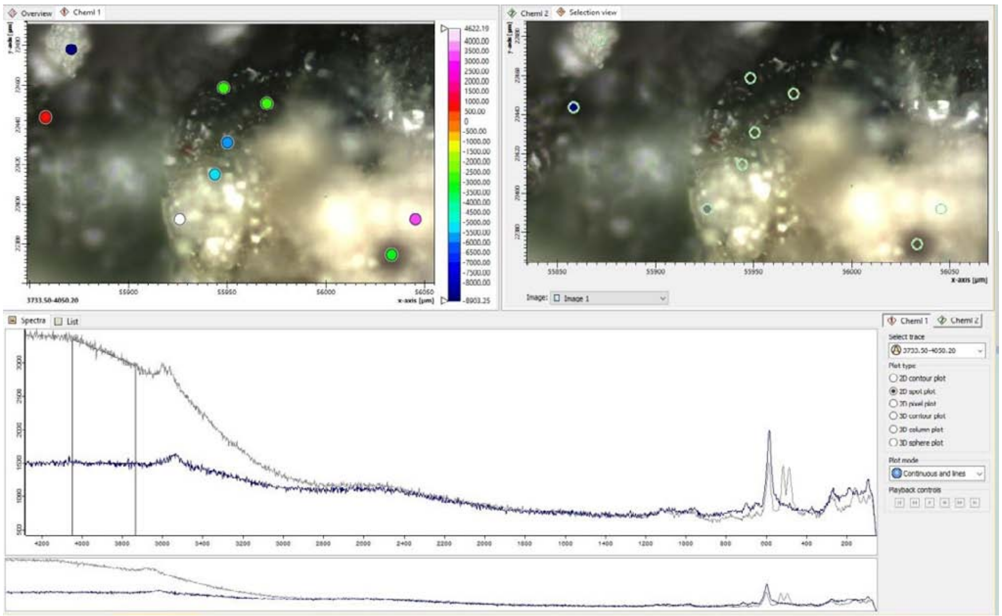


Sample :

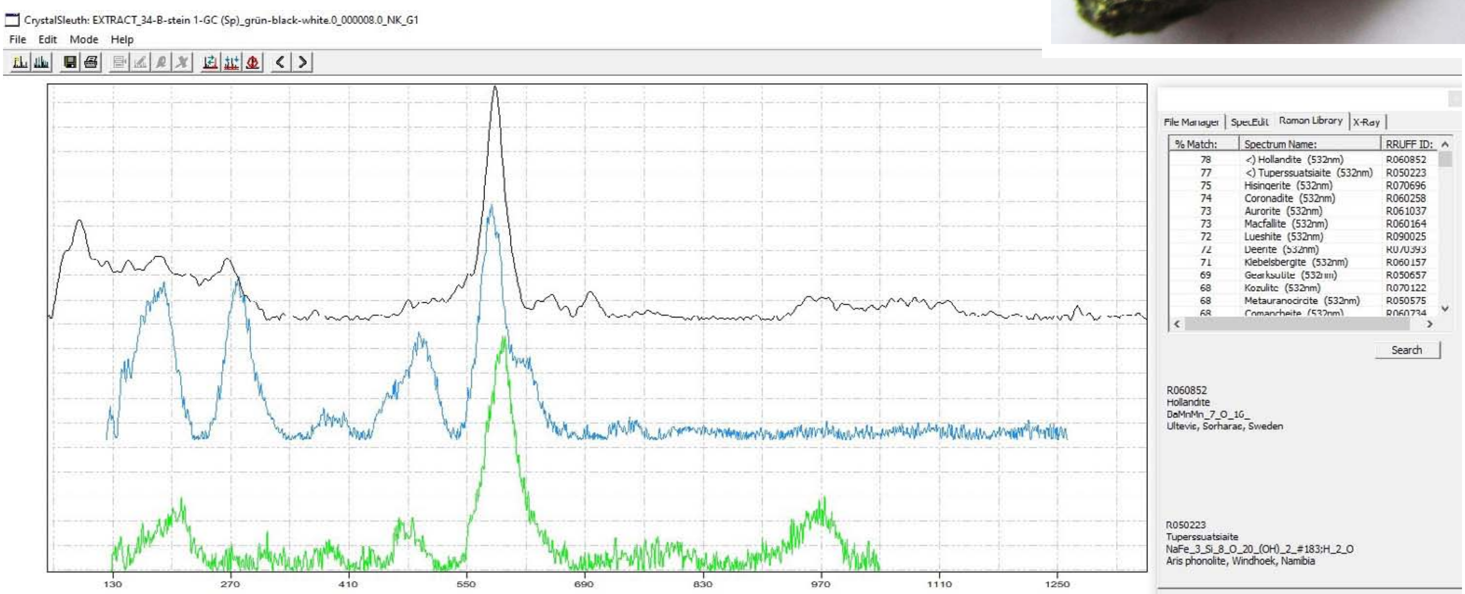


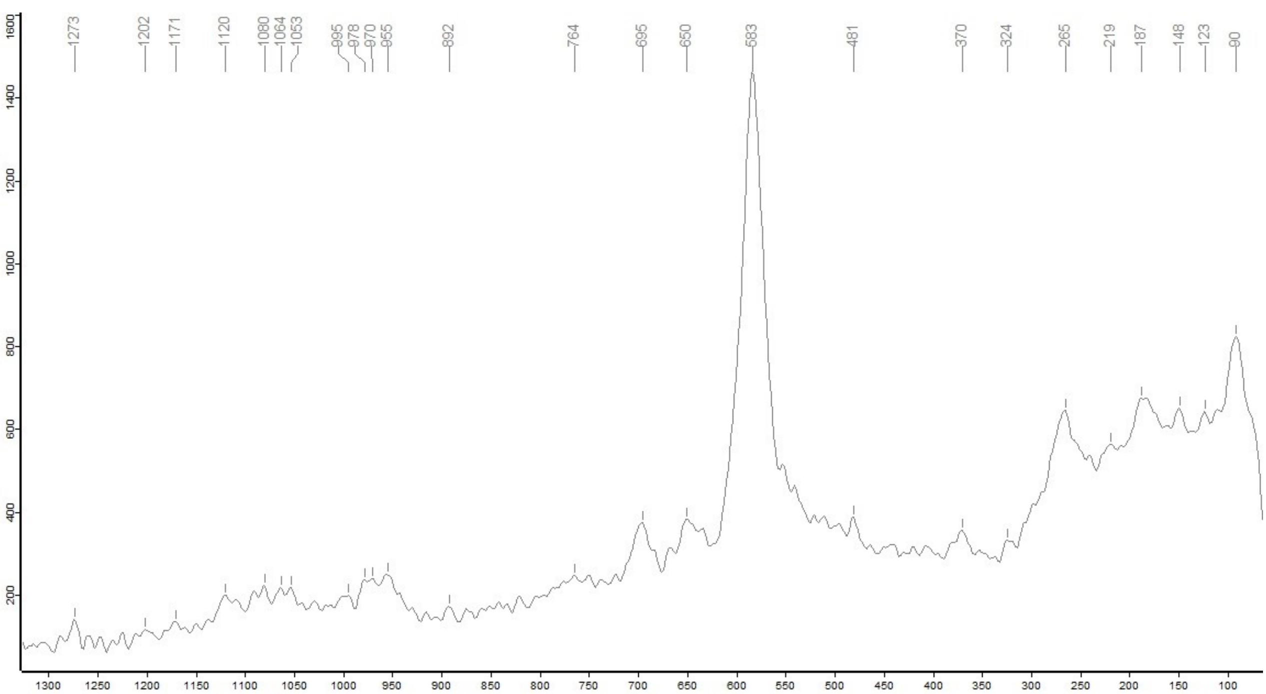
Sample Site 34-B : Stone 1_spectra 2 indicates : Hollandite,Tuperssuatsiaite (→ see RRUFF_CS)

Iron- or mangan bearer mineral

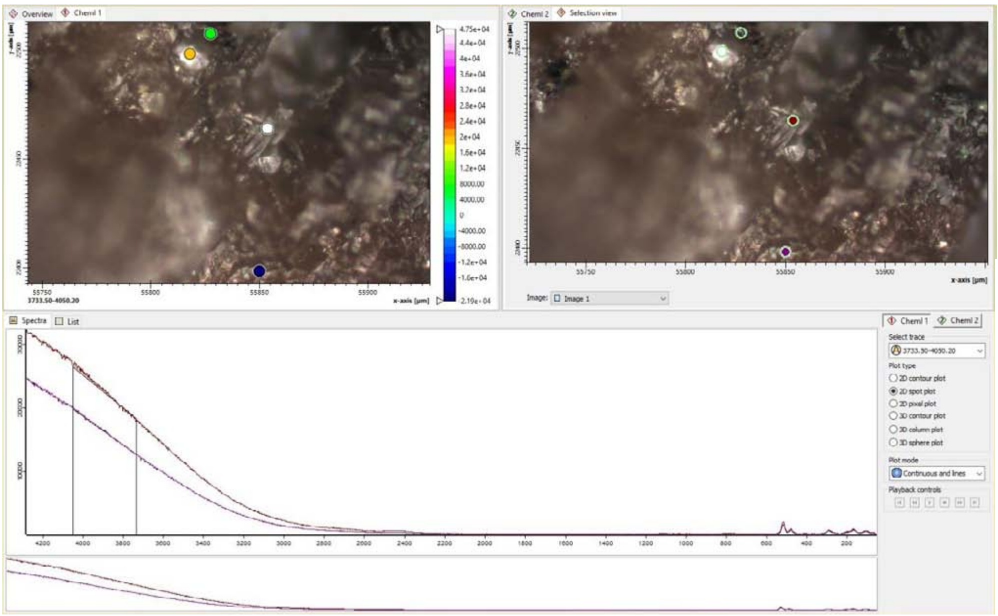


Sample :

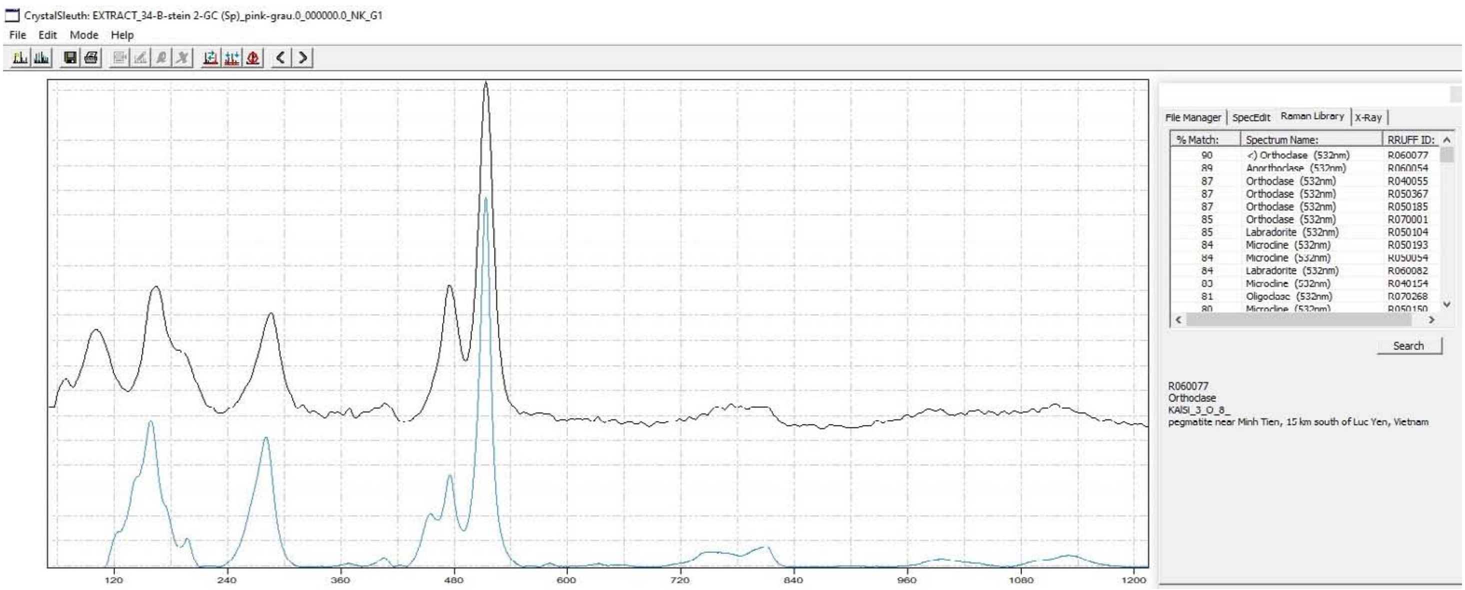


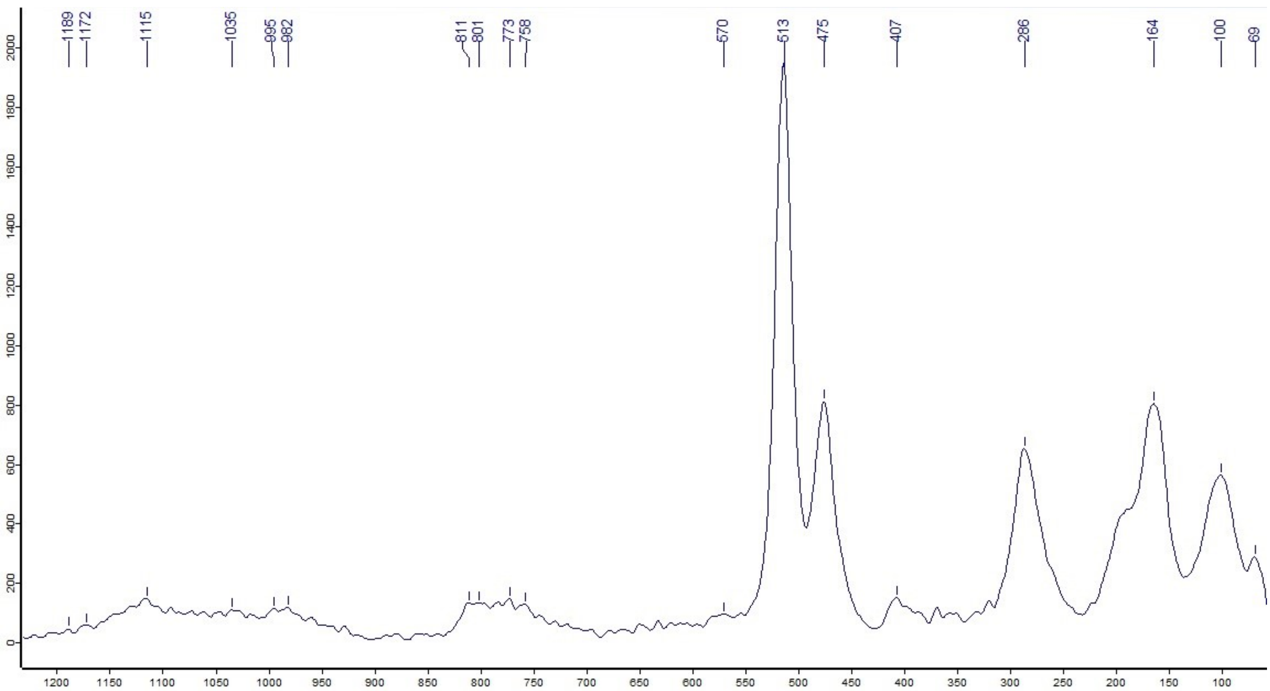


Sample Site 34-B : Stone 2_spectra 1 indicates : Orthoclase (→ see RRUFF_CS)

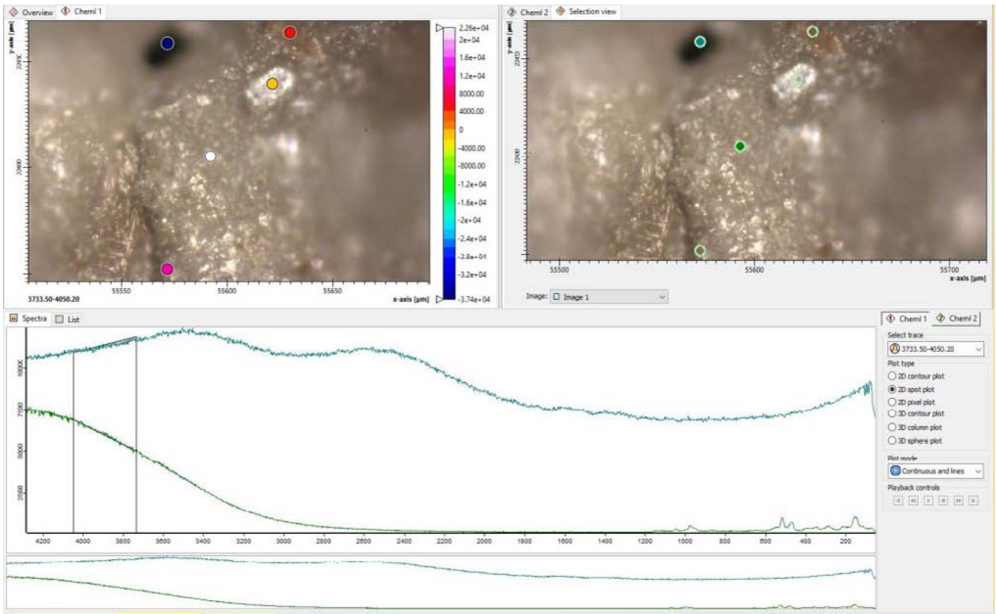


Sample :

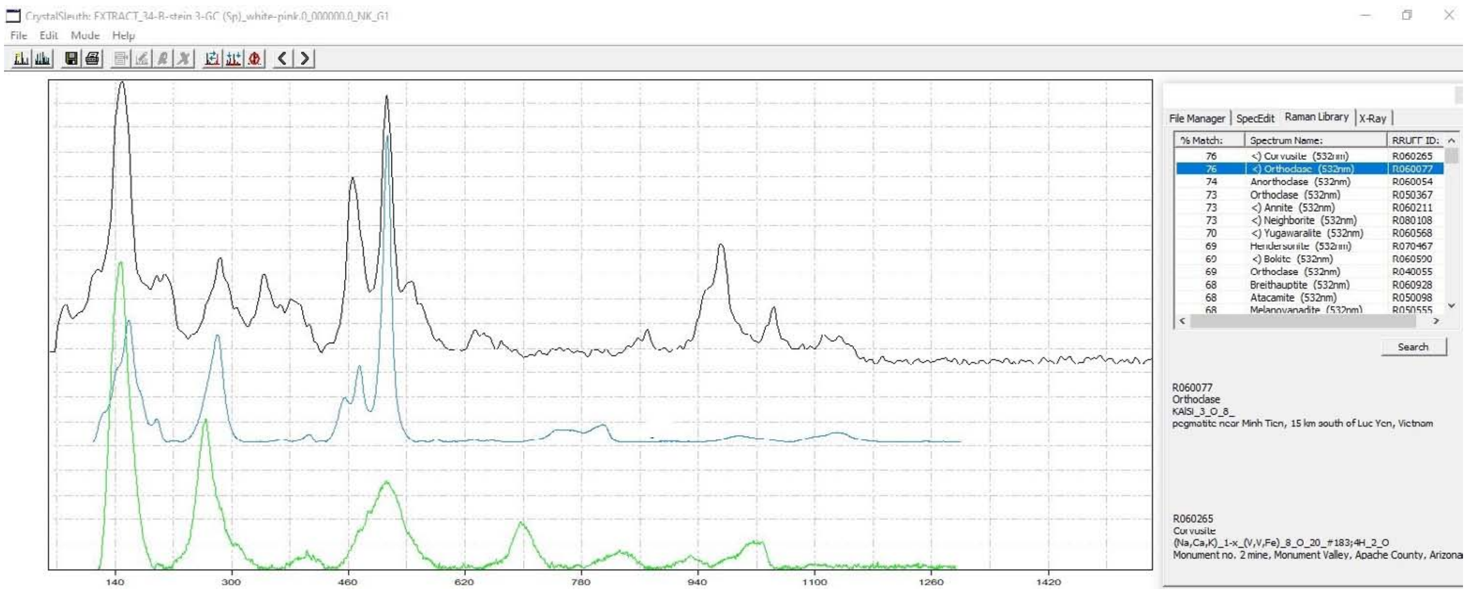


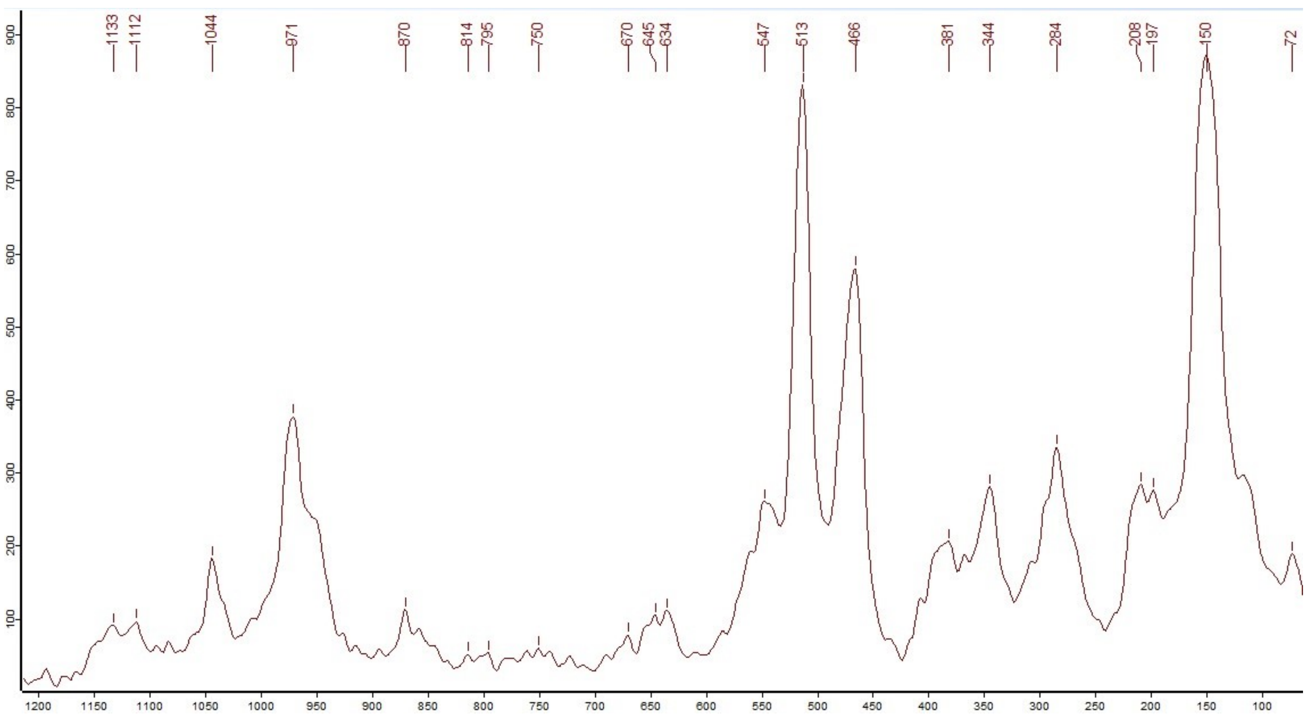


Sample Site 34-B : Stone 3_spectra 1 indicates : Orthoclase, Corvusite (→ see RRUFF_CS)

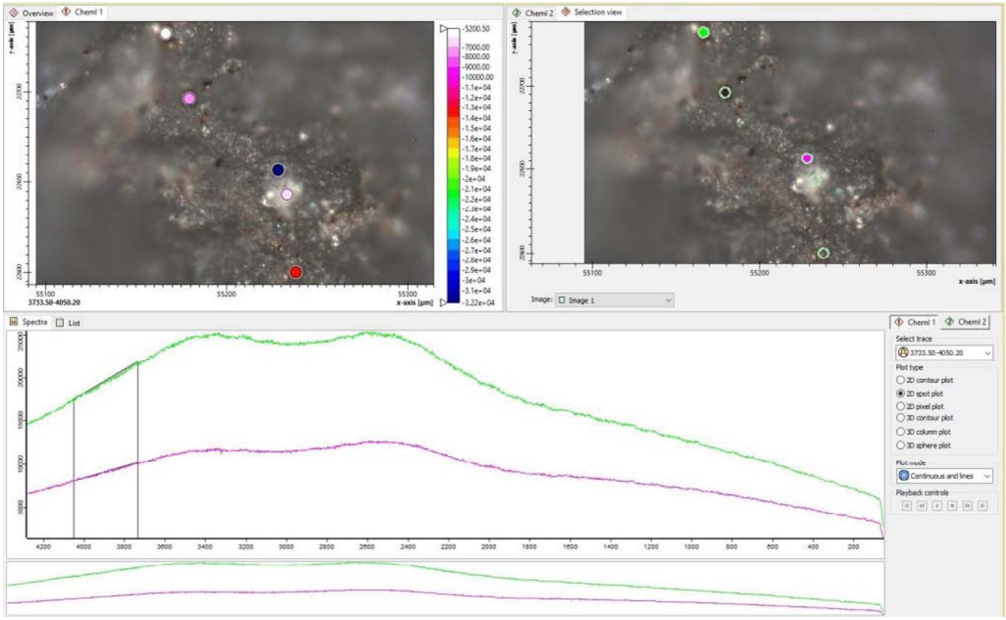


Sample :





Sample Site 36 : Stone 1_spectra 1 indicates : no usable result from this spectra



Sample :

Appendix 1 : Photos of the rock samples from the sites : 14, 20 & 25, 28, 29, 32, 33 & 34-B
→ See next page

Note : Photos of the Sites 14, 20 & 25, 28, 29, 32, 33 & 34-B and other sample sites are available on my website. → : Sample Sites "Tejeda 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 Magna 50 (1:50000)

Digital Geological-Map :

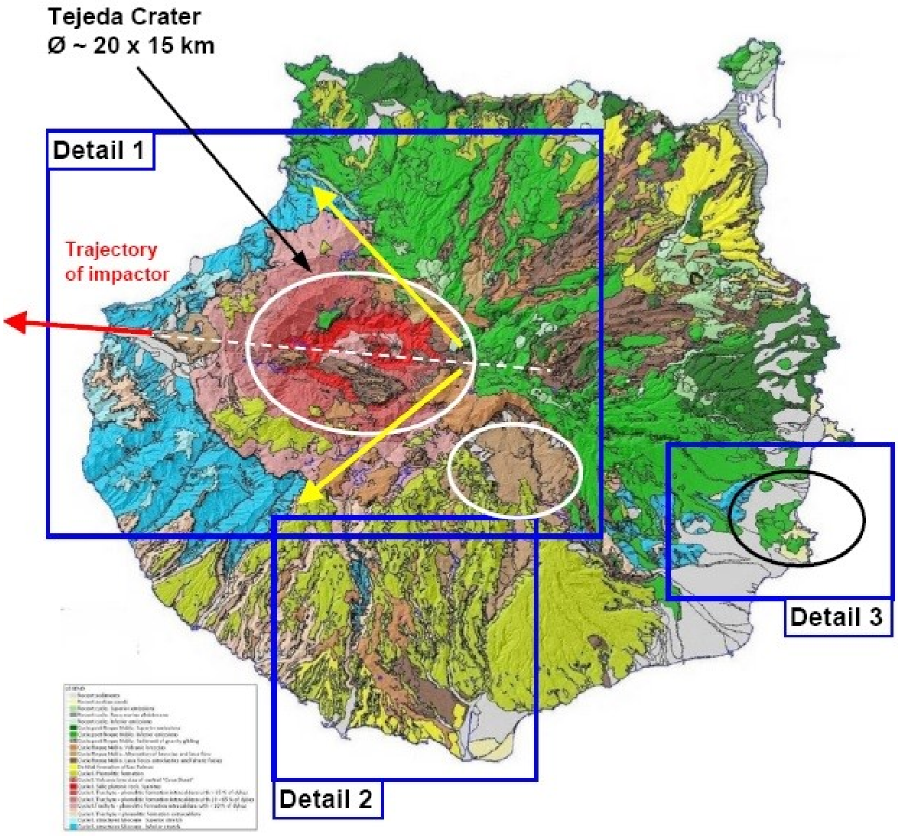
→ Gran Canaria (Hoja 1109)

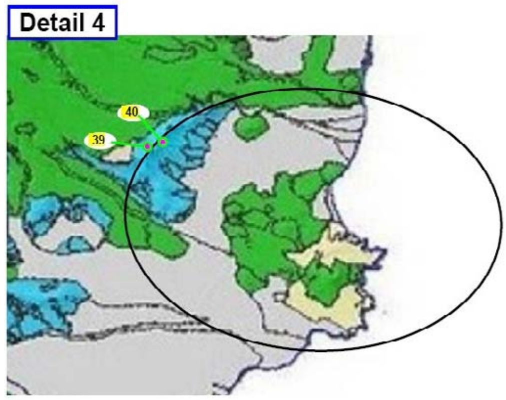
or

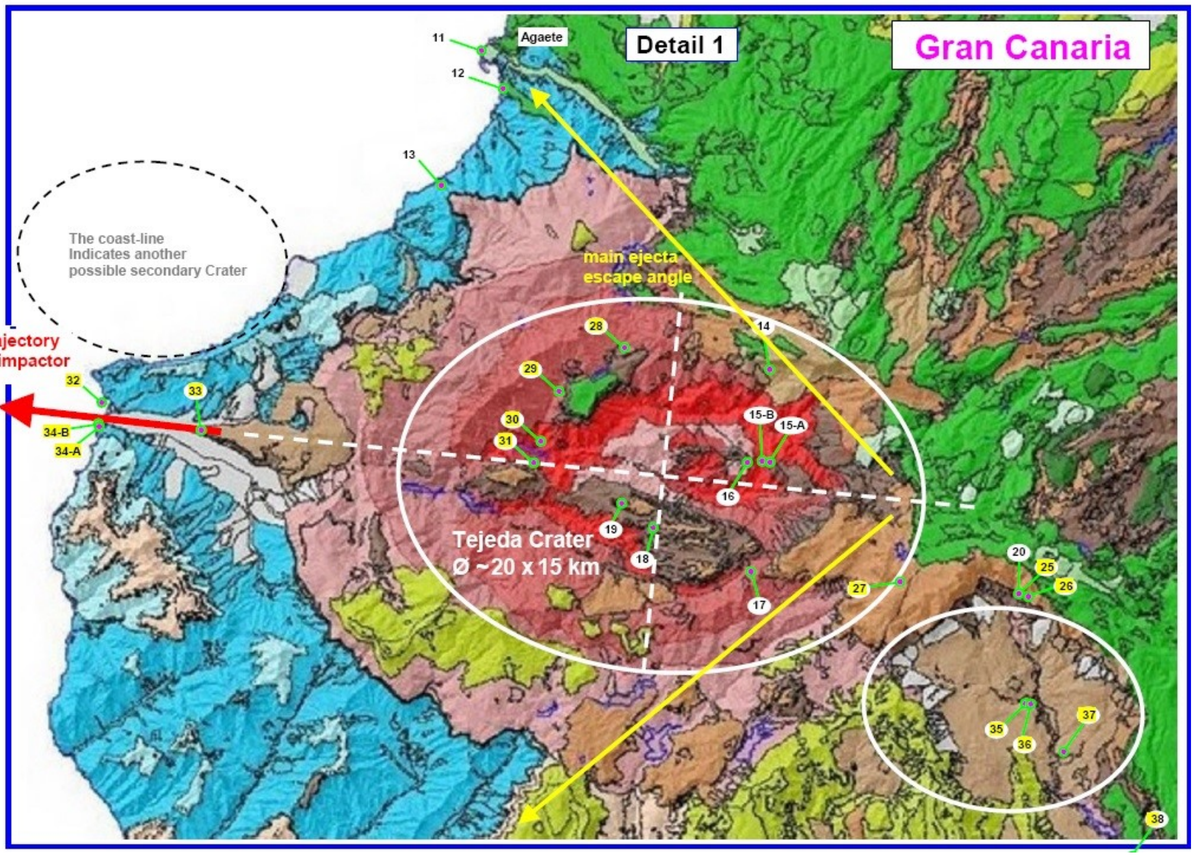
general entry to the maps :

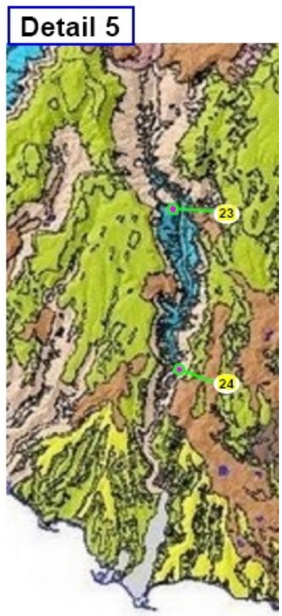
→ Magna 50 - GEO-Maps

→ zoom-in to Gran Canaria



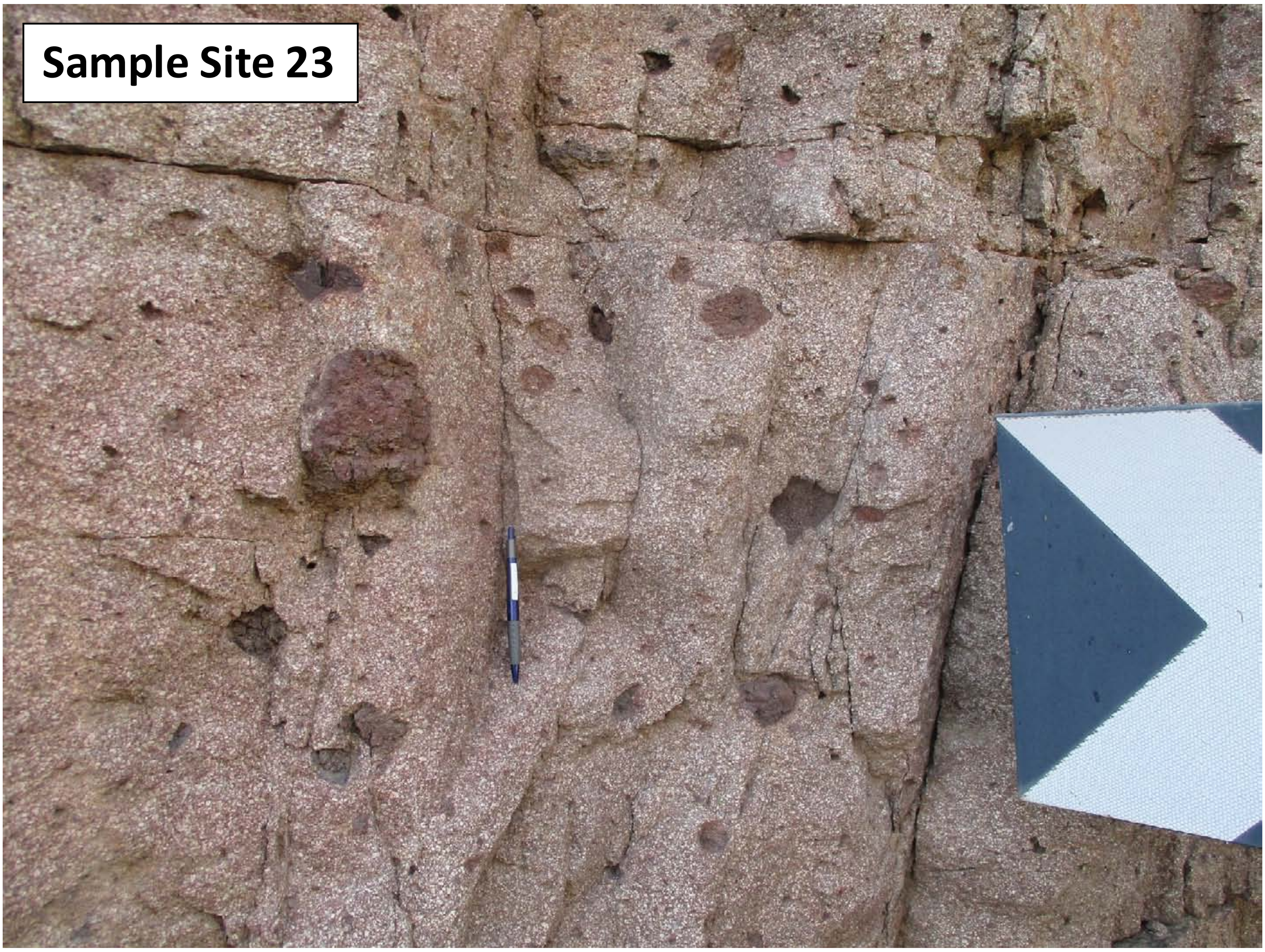




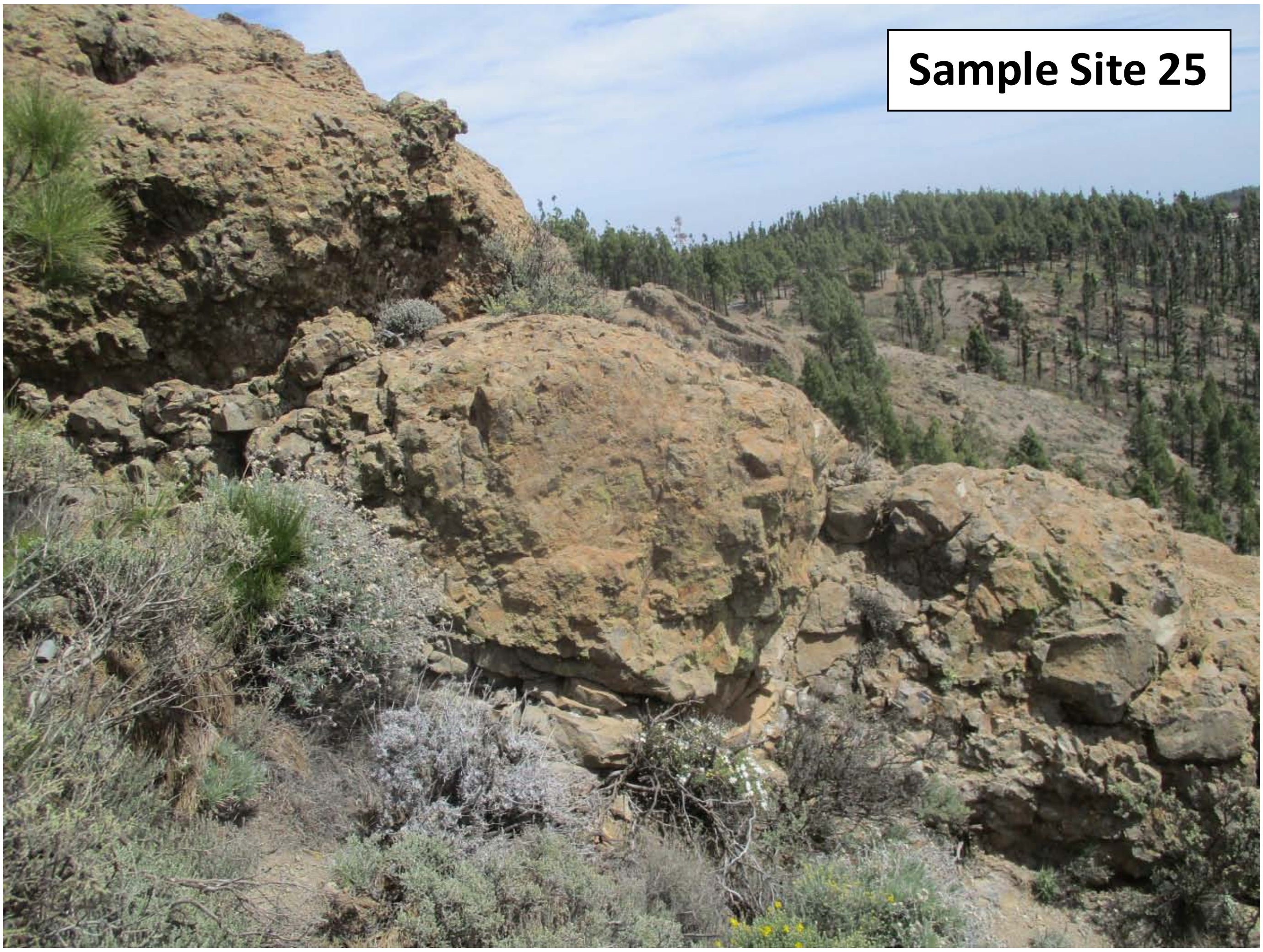



Sample Site 15-A

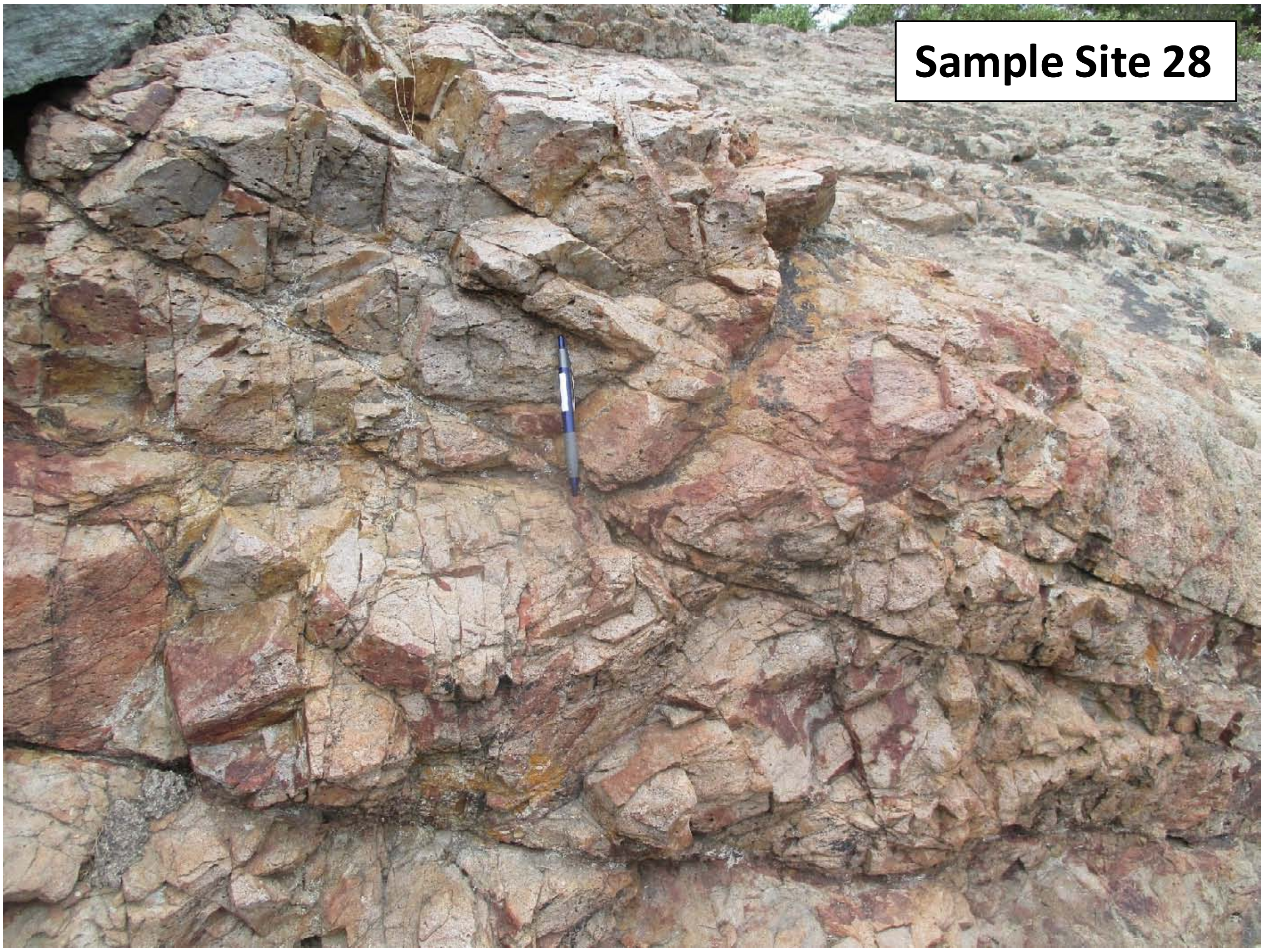

15-A
15-A 27° 59,450 N 15° 37,901 W 10 m Spain - Canary Islands


Sample Site 23


23
23
27° 52,624 N
15° 40,220 W
5 m
Canary Islands- 3 (Gran Canaria- 2)


Sample Site 25


25
25 | 27° 57,805 N | 15° 34,232 W | 12 m | Canary Islands - 3 (Gran Canaria - 2)


Sample Site 28


28
28 | 28° 1,468 N | 15° 40,544 W | 10 m | Canary Islands- 3 (Gran Canaria- 2)

Sample Site 29

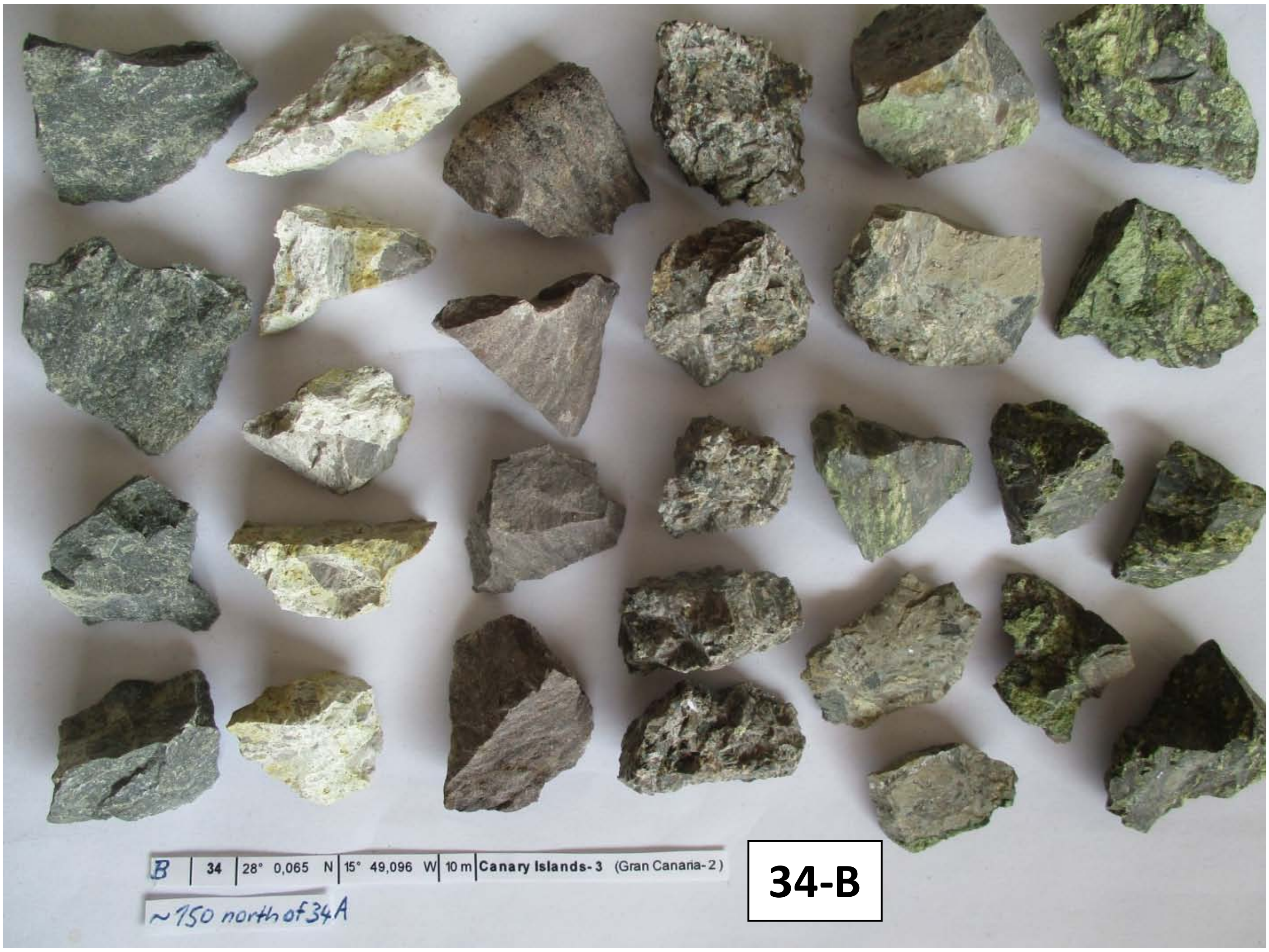

Sample Site 32


32
32
28° 0,344 N
15° 48,974 W
12 m
Canary Islands-3 (Gran Canaria-2)

Sample Site 33

33


Sample Site 34-B


B | 34 | 28° 0,065 N | 15° 49,096 W | 10 m | Canary Islands- 3 (Gran Canaria- 2)
~150 north of 34A
34-B

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

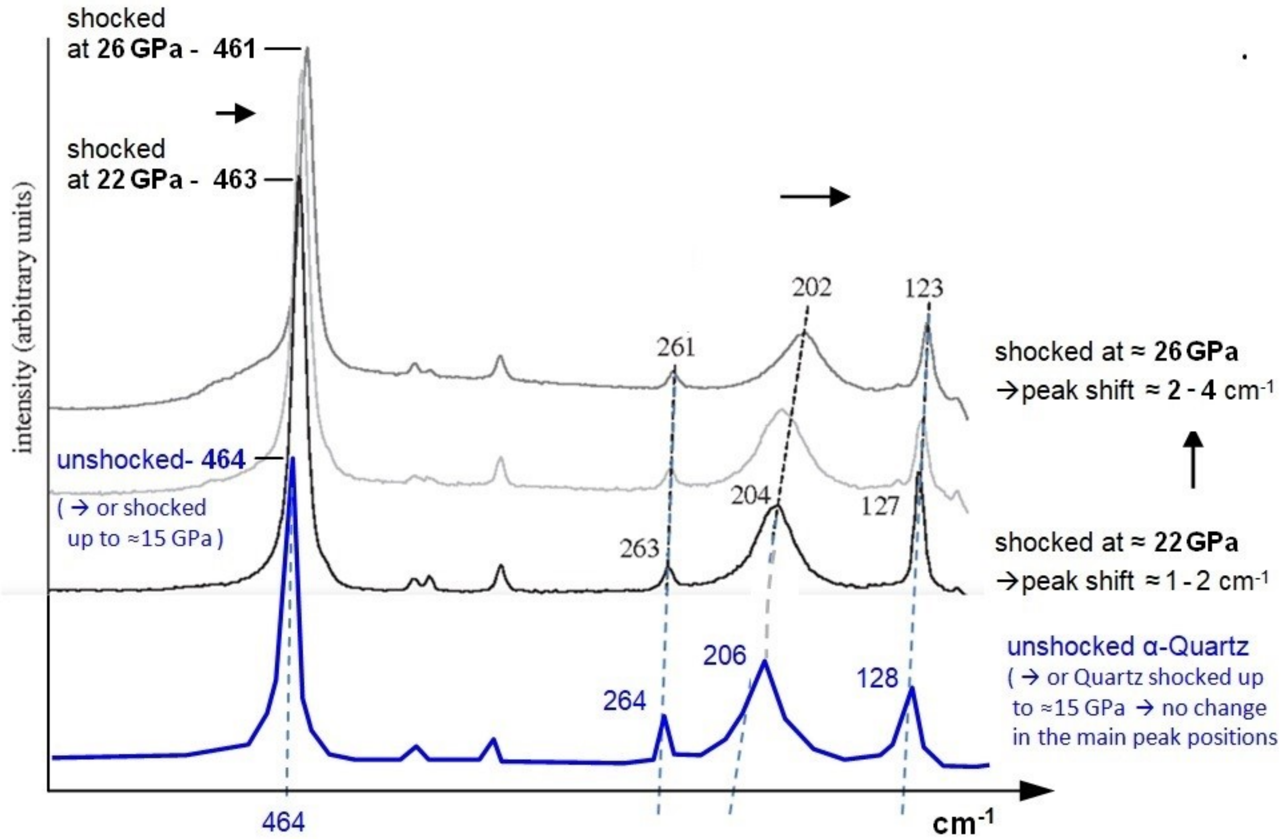
In order to verify a sample site as an impact site or impact structure, shock-metamorphic effects must be discovered in the rocks of the sample site. This can be done by different methods.

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.

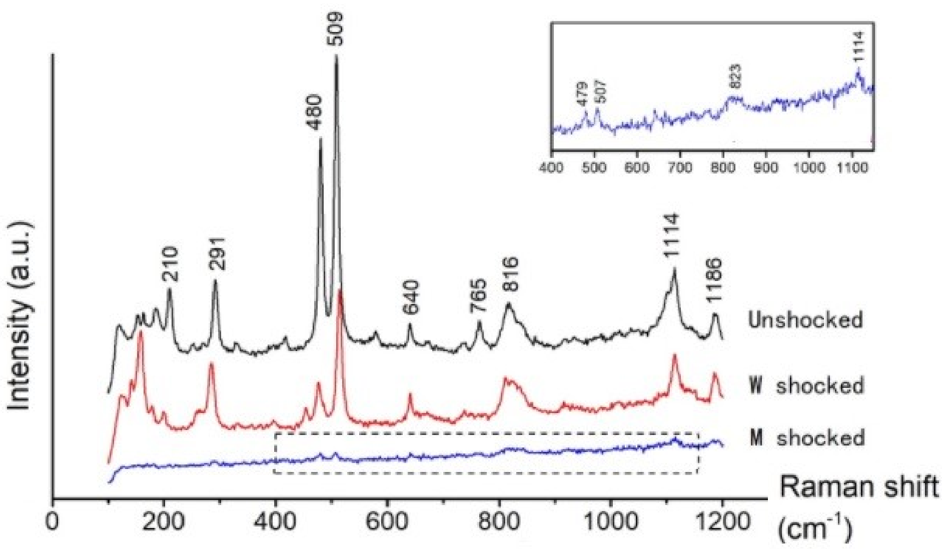
Mc Millan et al. (1992) and others have shown that the main RAMAN-peaks of Quartz shift towards lower frequencies if the Quartz was exposed the a shock-pressure > 15 GPa. → see diagram below

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 "Tejeda Crater" (or alternatively 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)

Impact Craters on Fuerteventura & Tenerife: Raman-anlaysis of rock-samples published soon on vixra.org & archive.org

Please also read : 1.) Scientific Studies to **Fuerteventura & Canarian Island's Geology** (→ links on page 2 !) - (→ or here)
2.) Scientific Studies to **Tenerife & the Canarian Island's Geology** (→ links 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

A Raman spectroscopic study of shocked single crystalline quartz - by P. McMillan, G. Wolf, Phillipe Lambert, 1992
https://asu.pure.elsevier.com/en/publications/a-raman-spectroscopic-study-of-shocked-single-crystalline-quartz
alternative : https://www.semanticscholar.org/paper/A-Raman-spectroscopic-study-of-shocked-single-McMillan-Wolf/cfaaf6eb3e46fbd2912fb91c7acf40e88e721132

Raman spectroscopy of natural silica in Chicxulub impactite, Mexico - by M. Ostroumov, E. Faulques, E. Lounejeva
https://www.academia.edu/8003100/Raman_spectroscopy_of_natural_silica_in_Chicxulub_impactite_Mexico
alternative : https://www.sciencedirect.com/science/article/pii/S1631071302017005

Shock-induced irreversible transition from α-quartz to CaCl2-like silica - Journal of Applied Physics: Vol 96, No 8
https://aip.scitation.org/doi/10.1063/1.1783609

Shock experiments on quartz targets pre-cooled to 77 K - J. Fritz, K. Wünnemann, W. U. Reimold, C. Meyer
https://www.researchgate.net/publication/234026075_Shock_experiments_on_quartz_targets_pre-cooled_to_77_K

A Raman spectroscopic study of a fulgurite – by E. A. Carter, M.D. Hargreaves, ...
https://www.researchgate.net/publication/44655699_Raman_Spectroscopic_Study_of_a_Fulgurite
alternative : https://royalsocietypublishing.org/doi/abs/10.1098/rsta.2010.0022

Shock-Related Deformation of Feldspars from the Tenoumer Impact Crater, Mauritania - by Steven J. Jaret
https://trace.tennessee.edu/cgi/viewcontent.cgi?article=1002&context=pursuit

A Study of Shock-Metamorphic Features of Feldspars from the Xiuyan Impact Crater - by Feng Yin, Dequi Dai
https://www.researchgate.net/publication/339672303_A_Study_of_Shock-Metamorphic_Features_of_Feldspars_from_the_Xiuyan_Impact_Crater

Shock effects in plagioclase feldspar from the Mistastin Lake impact structure, Canada – A. E. Pickersgill – 2015
https://onlinelibrary.wiley.com/doi/pdf/10.1111/maps.12495

Shock Effects in feldspar : an overview - by A. E. Pickersgill
https://www.hou.usra.edu/meetings/lmi2019/pdf/5086.pdf

ExoMars Raman Laser Spectrometer RLS, a tool for the potential recognition of wet target craters on Mars
https://www.researchgate.net/publication/348675414_ExoMars_Raman_Laser_Spectrometer_RLS_a_tool_for_the_potential_recognition_of_wet_target_craters_on_Mars