# The Ø 30 km Mt Warning Impact Crater & 1.5 km Impact Crater ( East-Australia )

## - RAMAN Spectra of selected Rock Samples - by Harry K. Hahn , 30.6.2021 -


## Summary :

Raman spectra of quartz from the sample sites **8-B2, 8-B3** and **15-B** and **15-C** provide evidence for an impact scenario in the Mt Warning area in East-Australia. The Ø 30 km crater-shaped Mt Warning area and a smaller ≈ Ø 1.5 km circular crater structure, which is located directly near the crater-rim of the Mt Warning Crater, seem to belong to a large-scale impact event caused by the Ø 320 km Cape York Crater in NE-Australia → see : **The 320 km Cape York Crater** (link2) **&** **Evidence for the Cape York Crater** (link4)

The possible Ø320 km Cape York Crater belongs to a Secondary Impact Crater Chain along the NE-coast of Australia which was caused by ejecta from the Ø 1270 x 950 km Permian Triassic Crater in the Arctic Sea

According to the current geological theory Mount Warning is a strongly erroded shield volcano.

Refering to my Permian-Triassic Impact Hypothesis Mt Warning is the result of an impact of a big ejecta fragment from the Cape York Crater or from the PT-Impact Crater, which caused this Ø30 km secondary crater that fractured Earth's crust and resulted in the growth of a large shield volcano above the crater

→ see my Permian Triassic Impact Hypothesis : **Part 1** (**P1**), **Part 2** (**P2**) & **Part 5** (**P5**) → **Mars Impacts !**

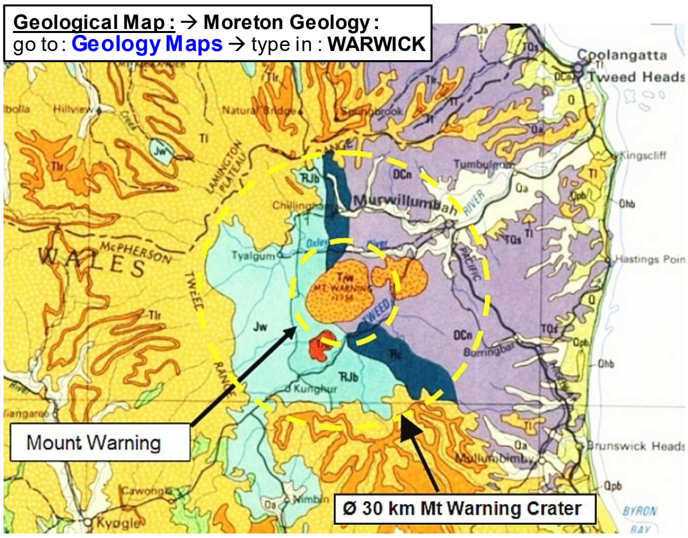
The Raman spectra of quartz from sample site **8-B2,** on the foot of the crater-wall on the outside of the smaller Ø 1.5 km circular crater structure, provides **first evidence for an impact event !** ( see Appendix )

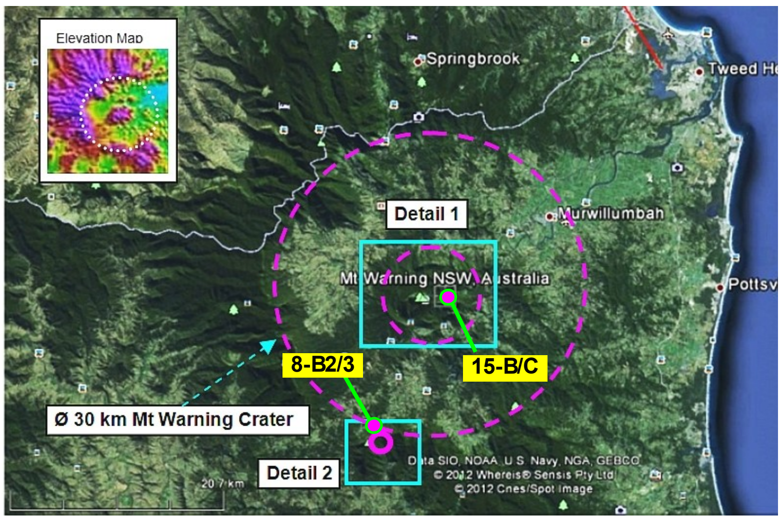
The shifts of the main Raman bands ( peaks ) to the lower frequencies **463, 260, 205** and **127 cm$^{-1}$** which are visible in the Raman Spectra of the quartz-sample, clearly indicate that the quartz from this site was exposed to a **shock pressure of around 20 - 22 GPa**. ( → see explanation in the Appendix at **page 17** ).
The spectra were made with a **BRUKER Senterra-II Raman Microscope** (wavenumber precision <0.1cm$^{-1}$)

Further evidence comes from the quartz inclusions of rock sample **8-B3** from the same location.
The shifts of the main Raman bands ( peaks ) to the lower frequencies **263** and **205 cm$^{-1}$** indicate the same **shock pressure of around 20 - 22 GPa**. The spectra of the rock samples from site **15-B** and **15-C,** the central mountain in the Mt Warning Crater, all indicate magmatic rocks which seems to confirm the fomation of a volcano in the crater-center, in contrast to real impact-(wall)-structures on the crater-rim

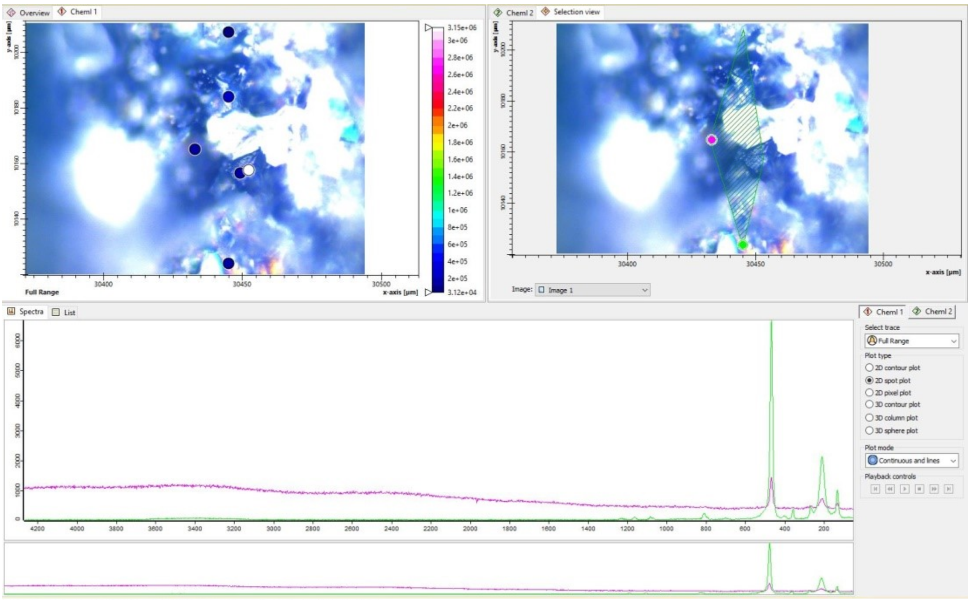
→ Images of the analysed rock samples and photos of the sample sites are in the Appendix at **page 12**.
→ More images of all sample sites are available on www.permiantriassic.de or www.permiantriassic.at
→ **General Summary** of my Analysis : see **Part 6** (**P6**) of my **PTI-hypothesis** (**P1**) / References : **page 18**

**Note :** A shock pressure of 20 GPa exceeds every pressure caused by normal terrestrial metamorphism. Therefore the quartz was clearly shocked by an impact event. The indicated shock pressure of ≥20 GPa is lower than the shock pressure that occured in other large impact craters on Earth, which can reach 100 GPa. This indicates that the Mt Warning Crater probably was caused by an oblique impact, and the impactor which formed the crater ( Ejecta of the CYC- or PT-Crater ) impacted with low velocity <8 km/s.

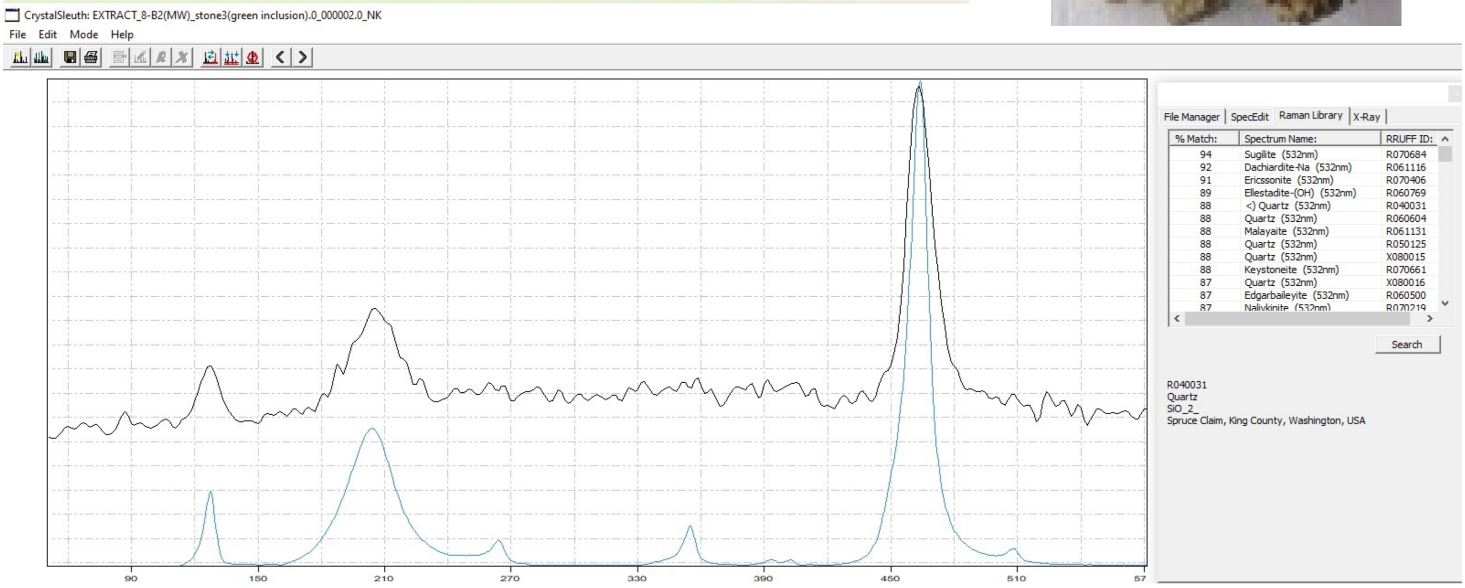



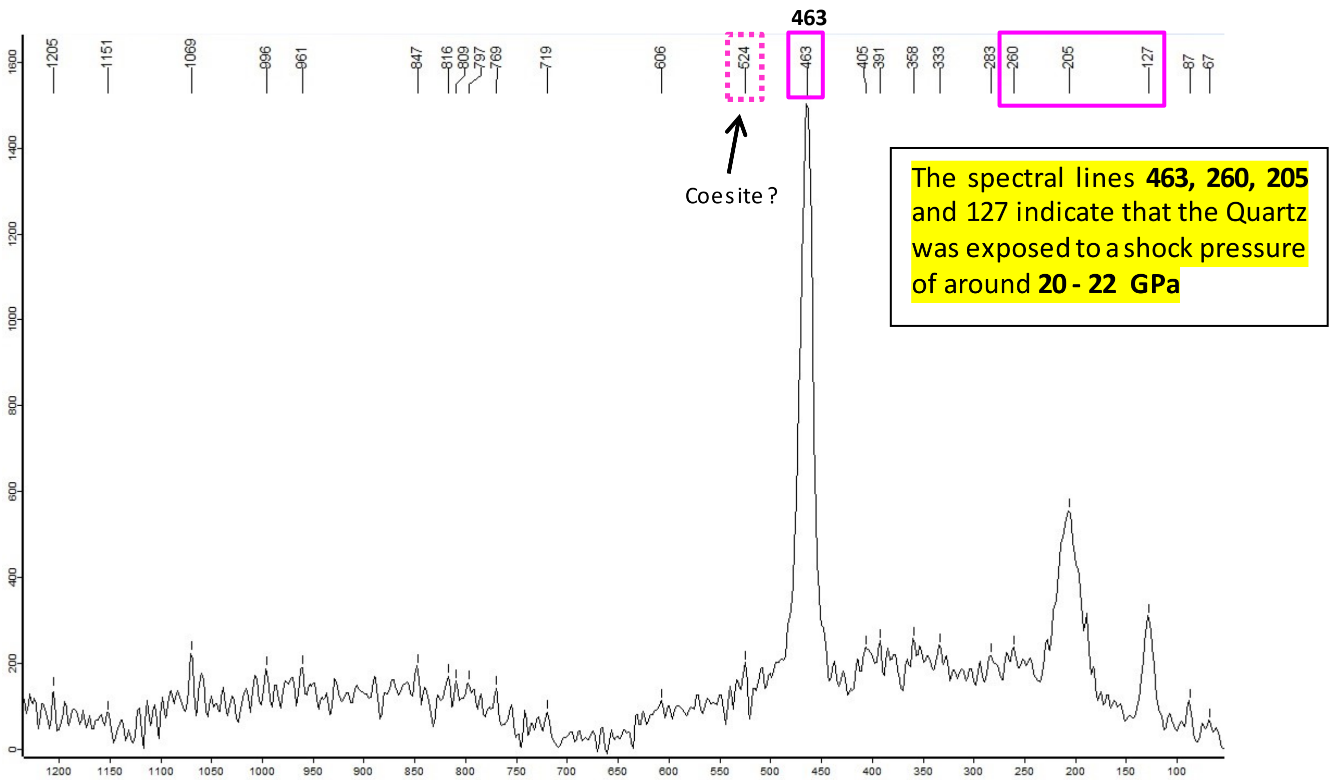
**Sample Site 8-B2 : Stone 3_spectra 2 ( Green mineral inclusions ) indicates : Quartz (→ RRUFF_CS results )**



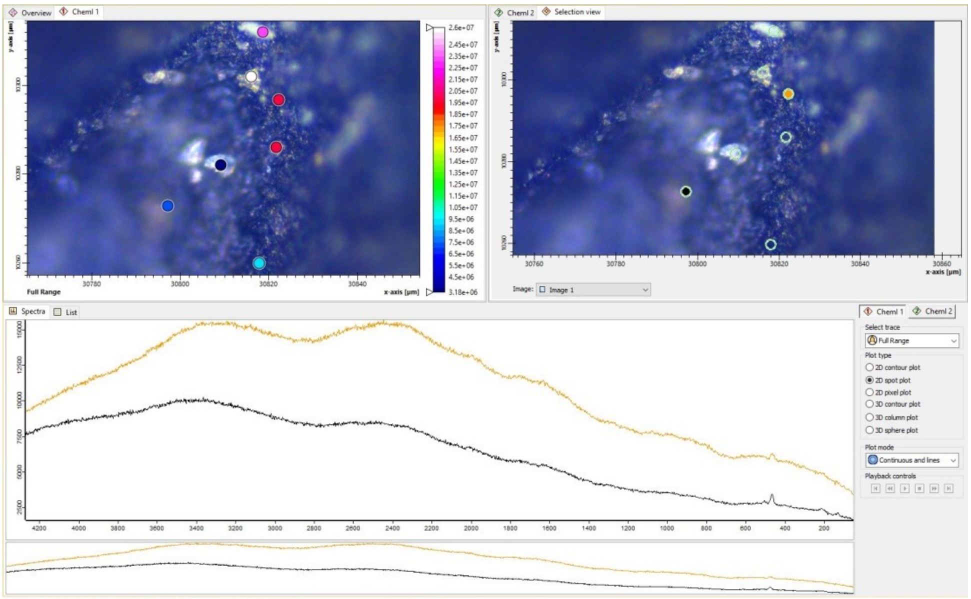
**Sample :**



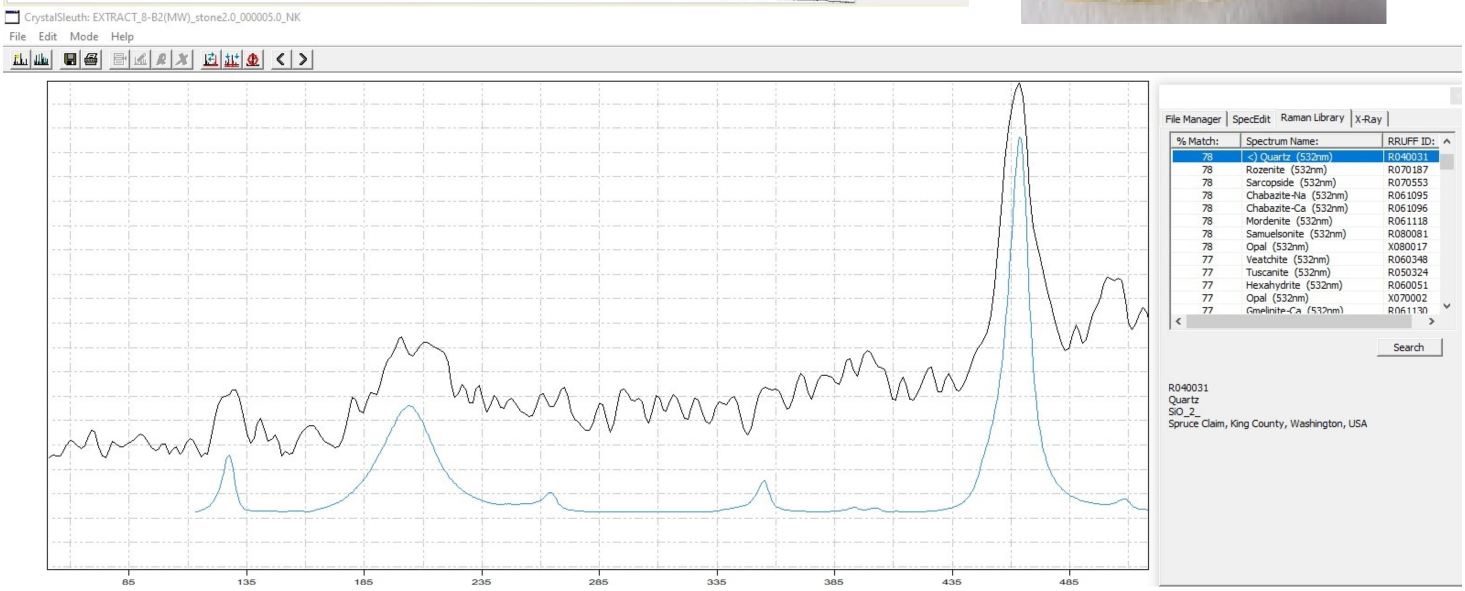

**Indication for a shock event are the shifts of the marked Quartz spectral lines towards 463, 260, 205 and 127**



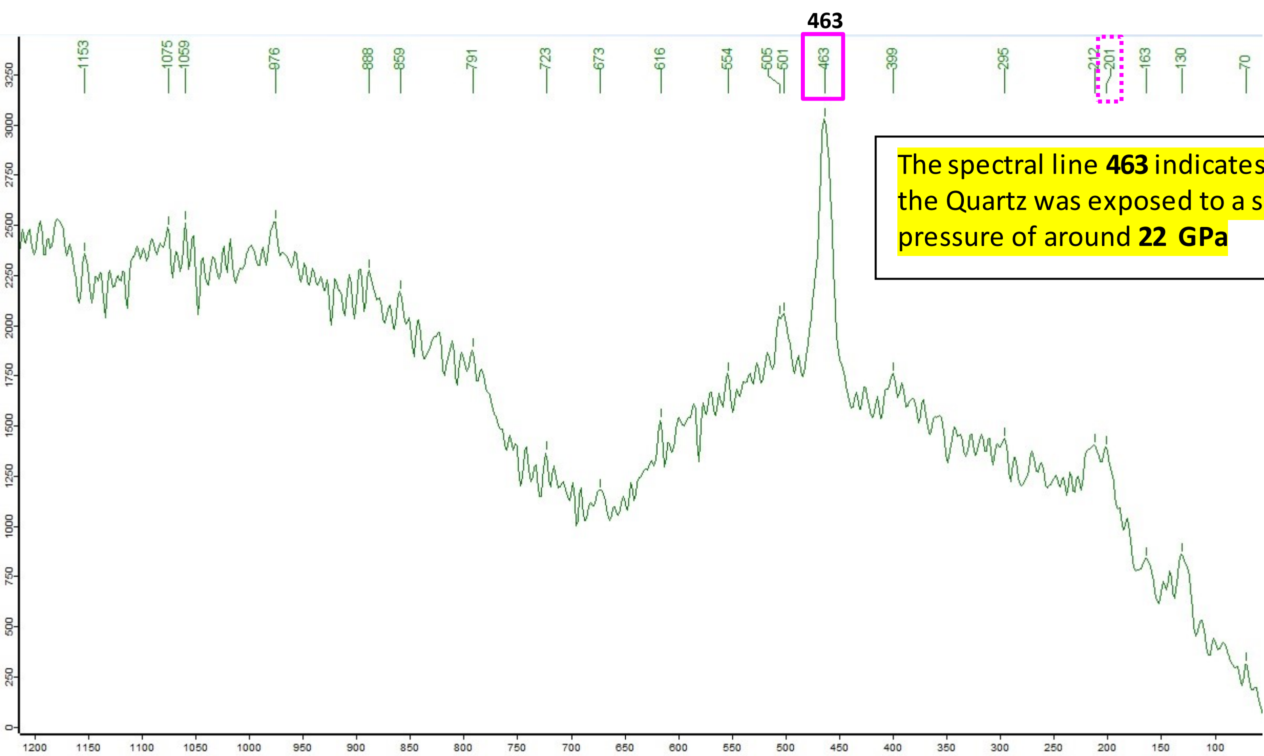
**Sample Site 8-B2 : Stone 2_spectra 1 indicates : Quartz.** (→ see RRUFF_CS results )



**Sample :**

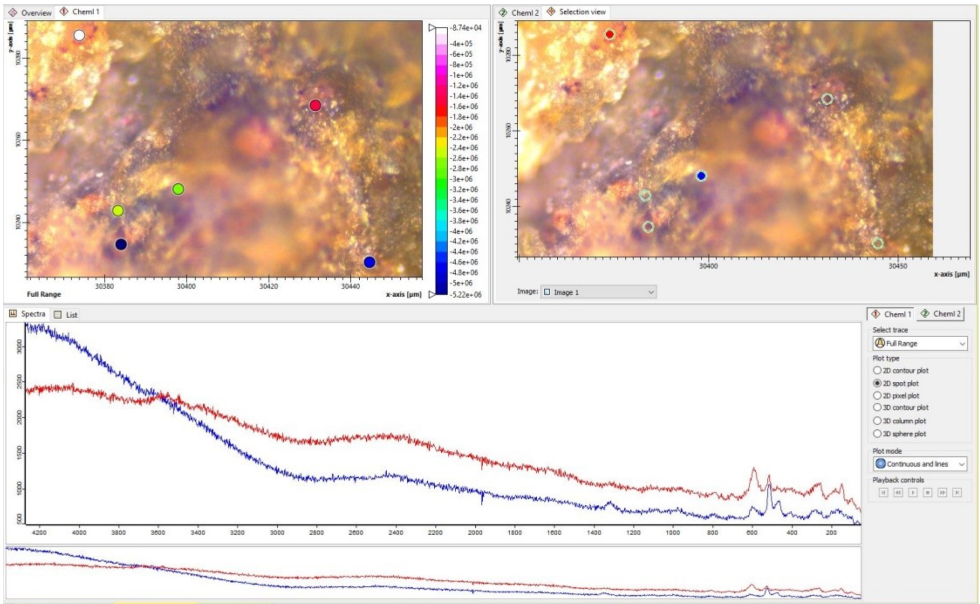



**Indication for a shock event is the shift of the marked main Quartz spectral line towards 463**




The spectral line **463** indicates that the Quartz was exposed to a shock pressure of around **22 GPa**

**Sample Site 8-B2 : Stone 3_spectra 1 ( brown mineral ) indicates : Anorthoclase , Orthoclase (→ RRUFF_CS)**



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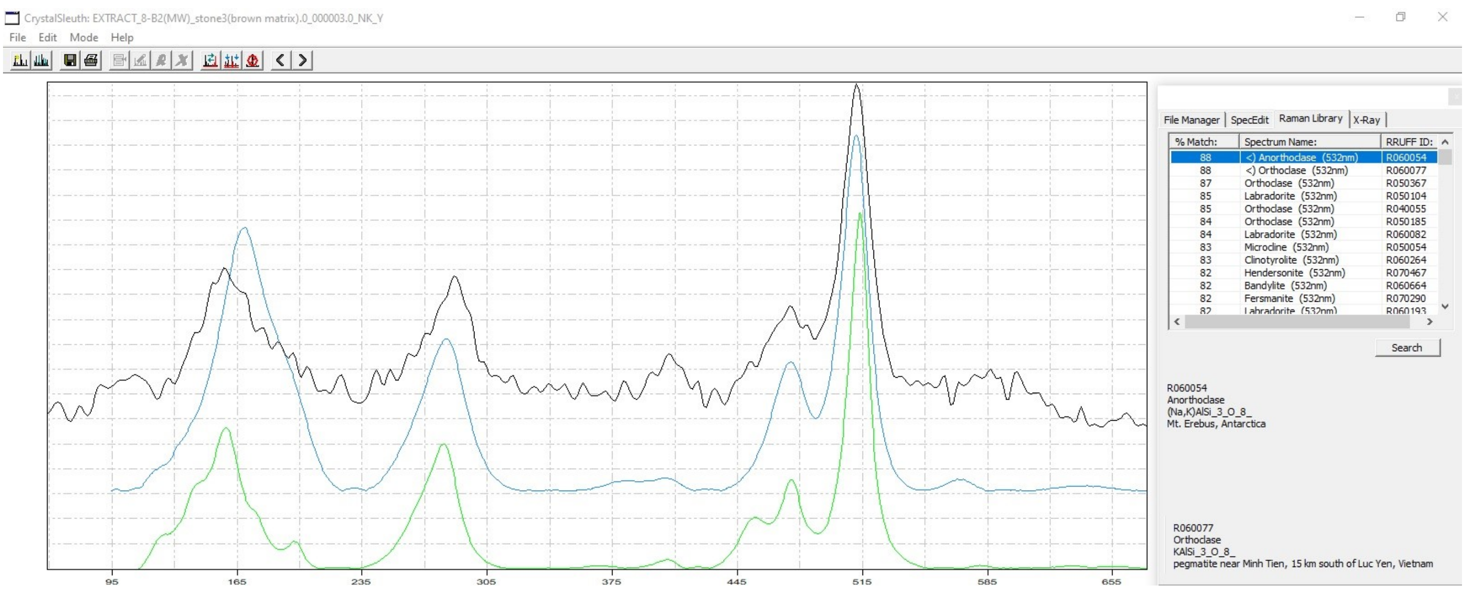
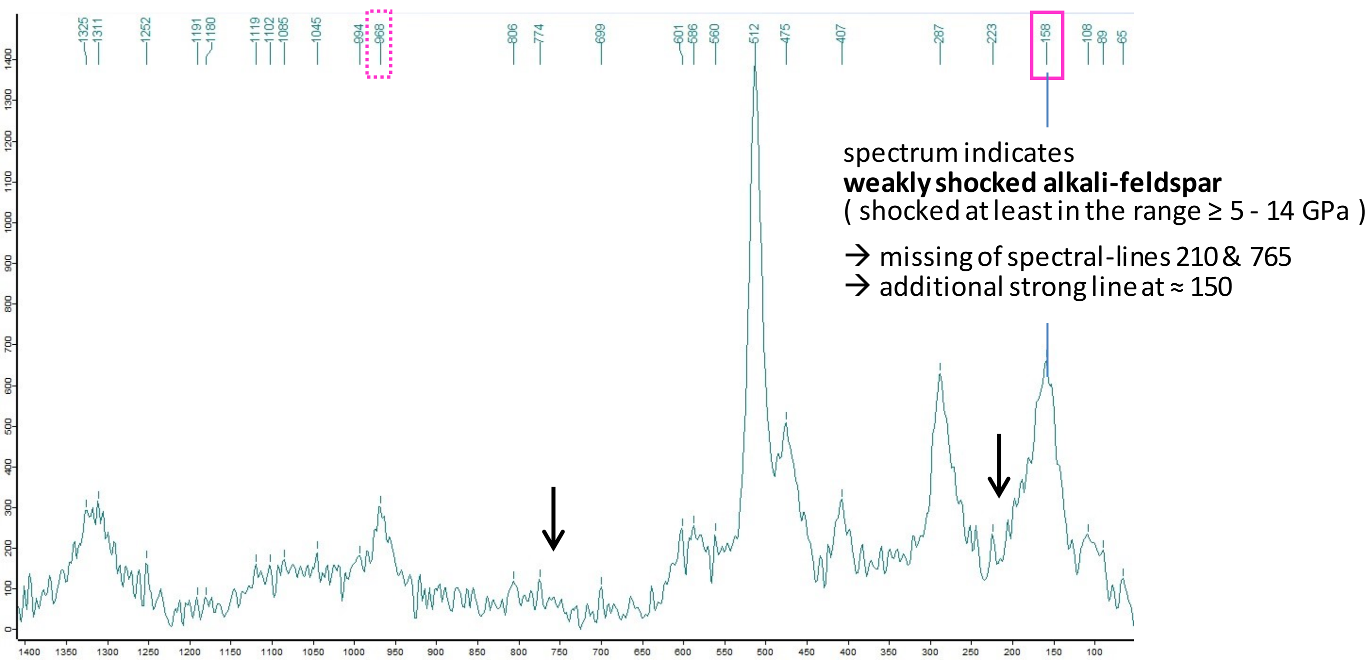
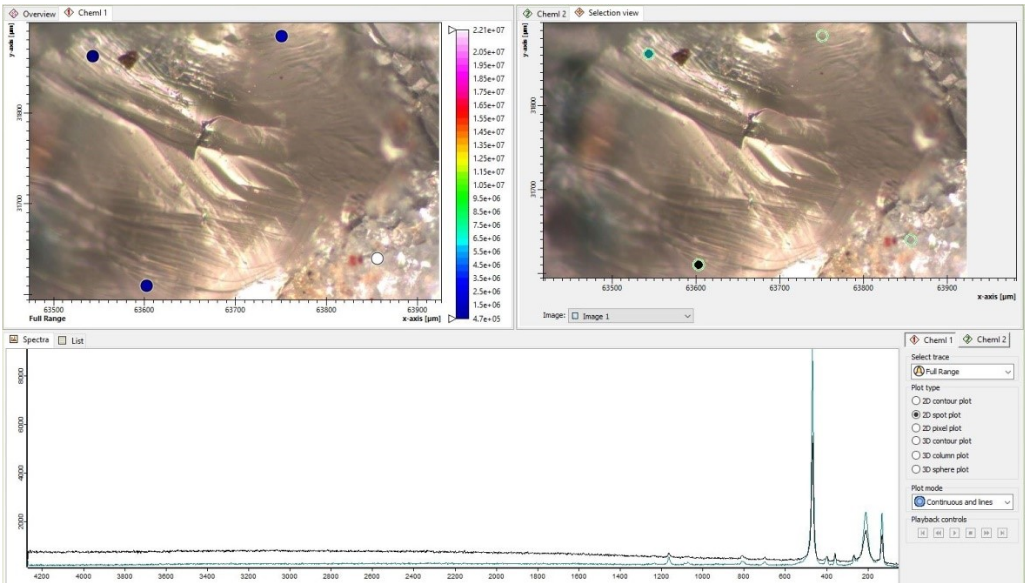
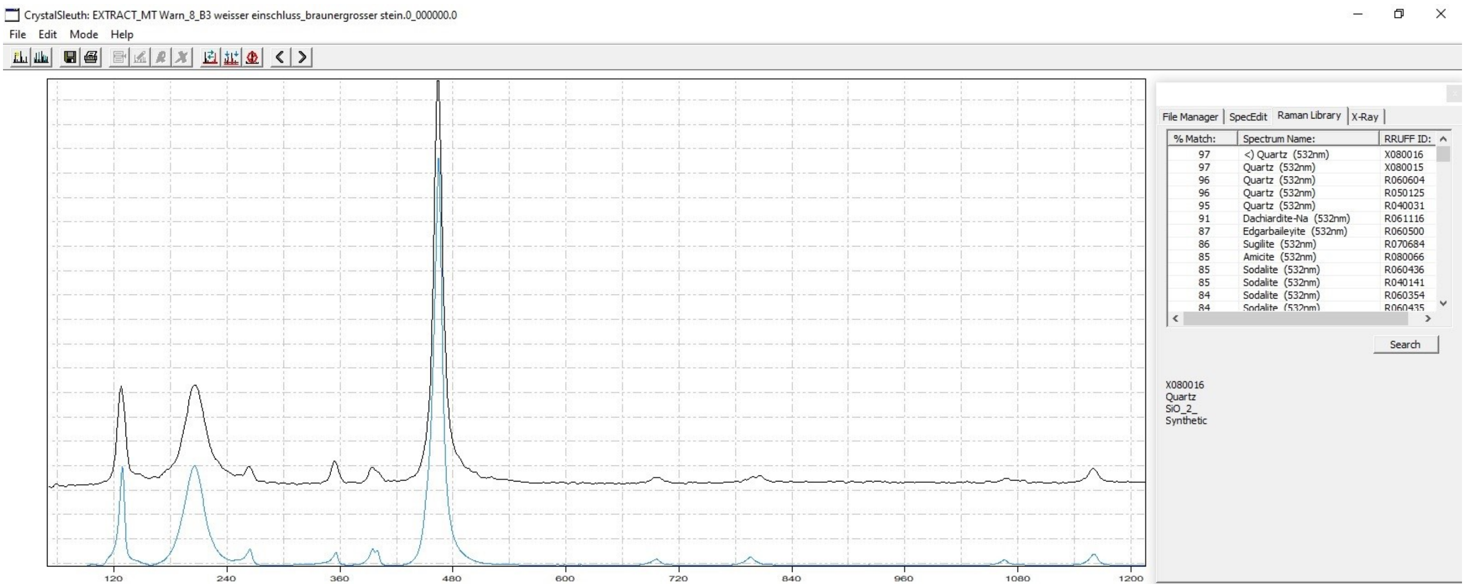


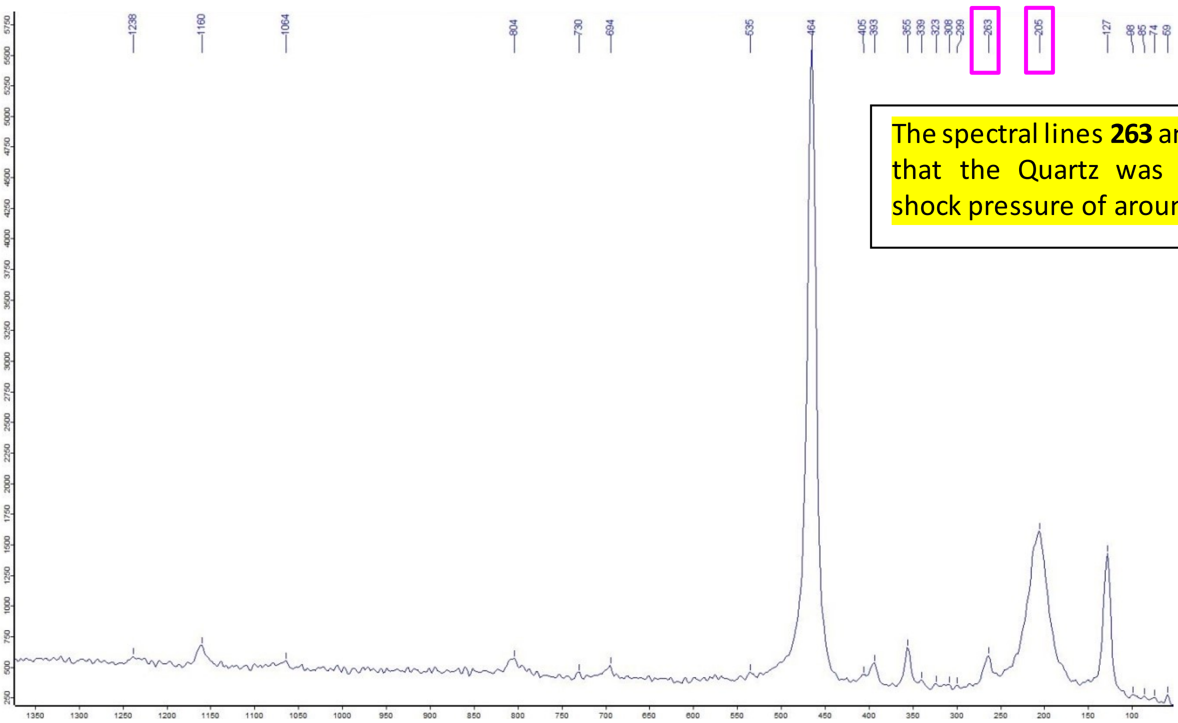
**Sample Site 8-B3 : Stone 1_spectra 1 ( white mineral inclusions ) indicates : Quartz (→ see RRUFF_CS results)**




**Sample :**



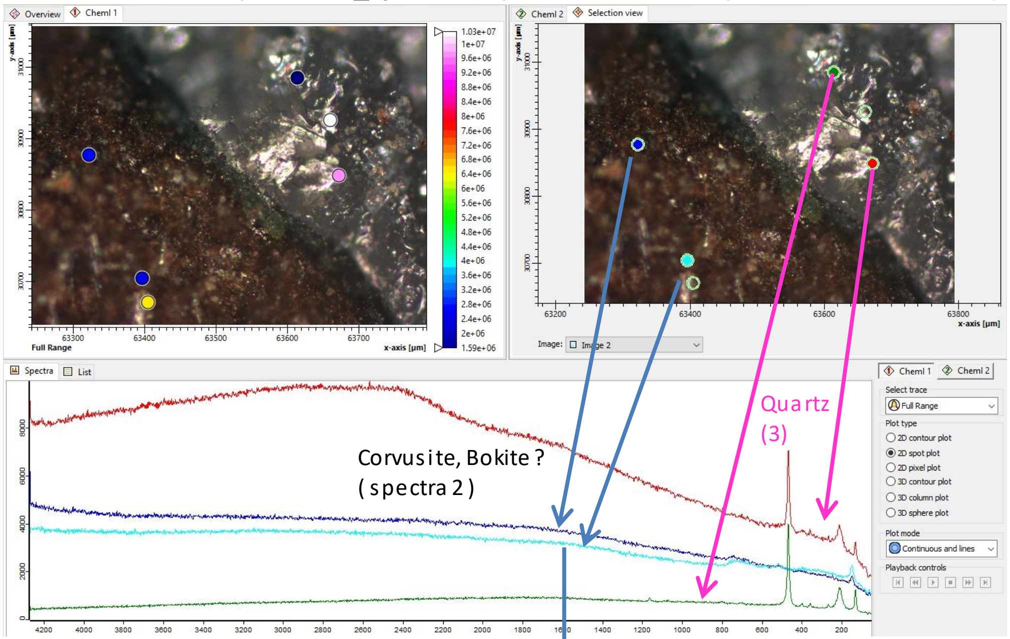

**Indication for a shock event are the shifts of the marked Quartz spectral lines towards 263 and 205**



The spectral lines **263** and **205** indicate that the Quartz was exposed to a shock pressure of around **22 GPa**

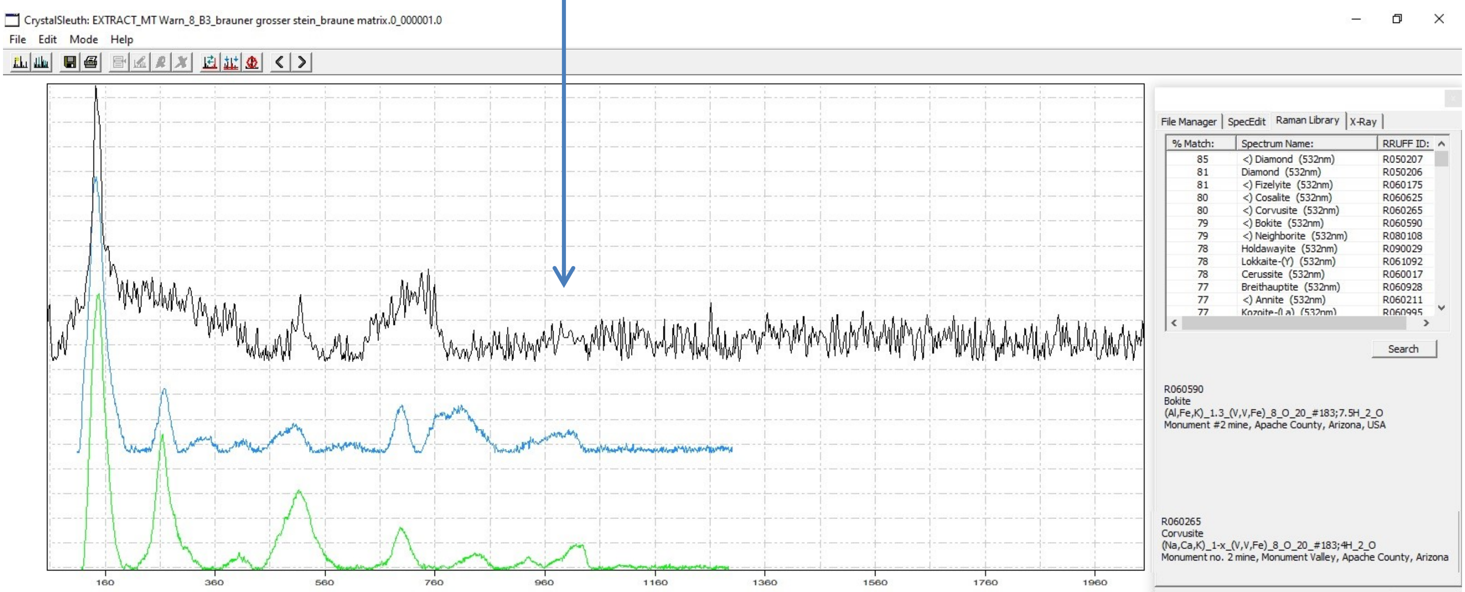
**Sample Site 8-B3 : Stone 1_spectra 2 ( brown matrix ) indicates : Corvusite, Bokite** (→ see RRUFF_CS results)

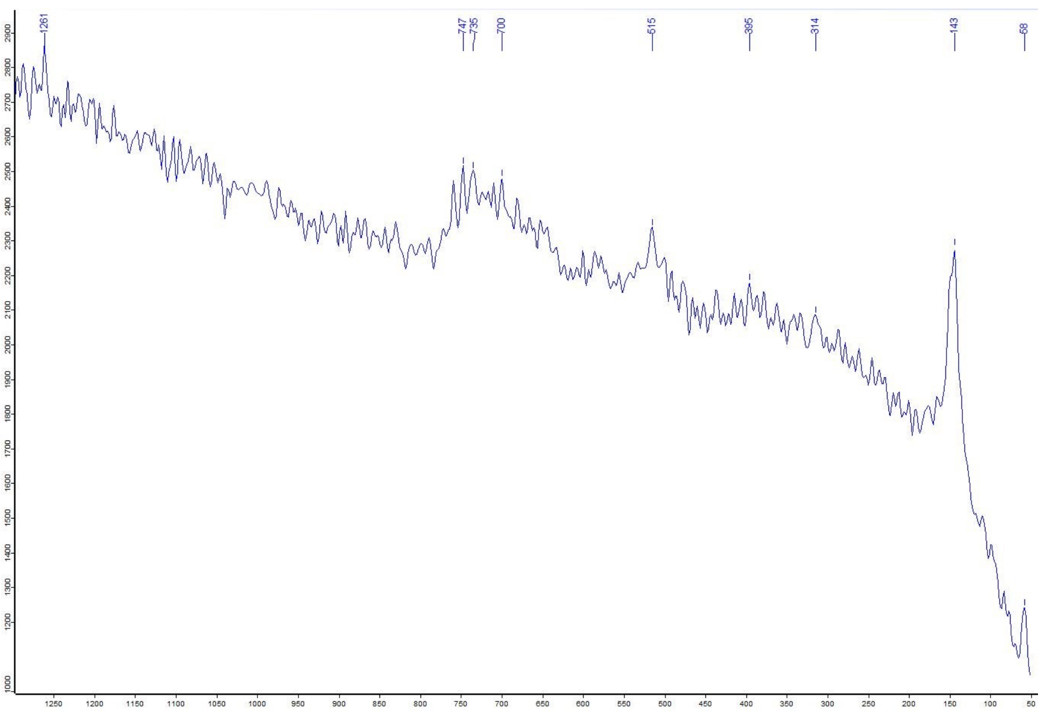
**( Stone 1_spectra 3 ( white inclusion ) indicates : Quartz )**




The image on the left shows the border-area between the brown matrix and one Quartz-inclusion

**Sample :**

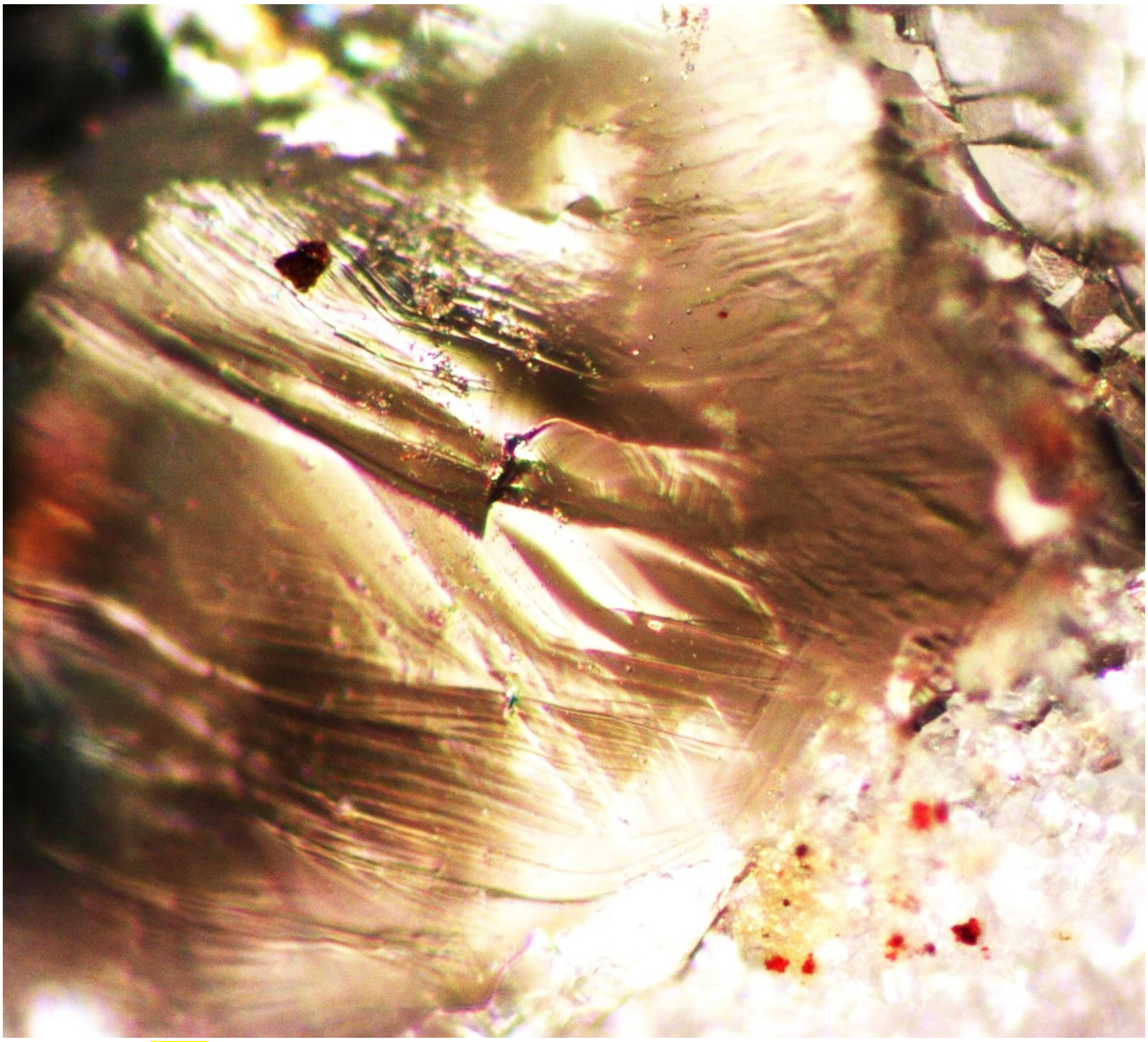


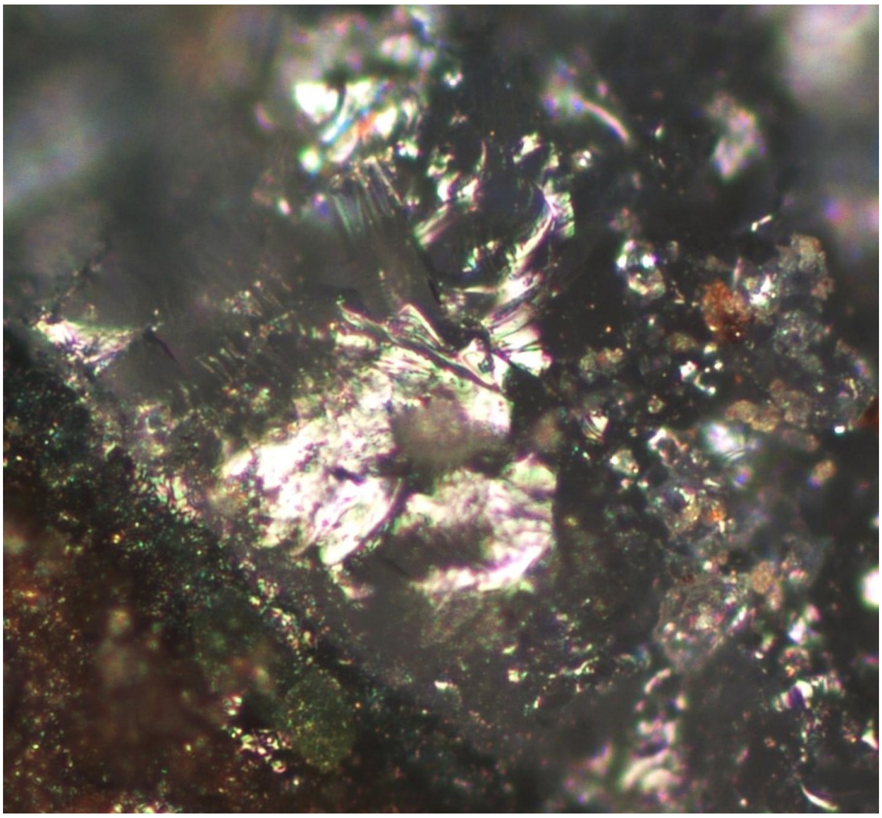
Microscopic Images : Sample from Site 8-B3 → original state ( no preparation for analysis )

Sample Site 8-B3 : Stone 1_spectra 1 (white mineral) indicates : Quartz - Image size : ~ 250 x 250 µm

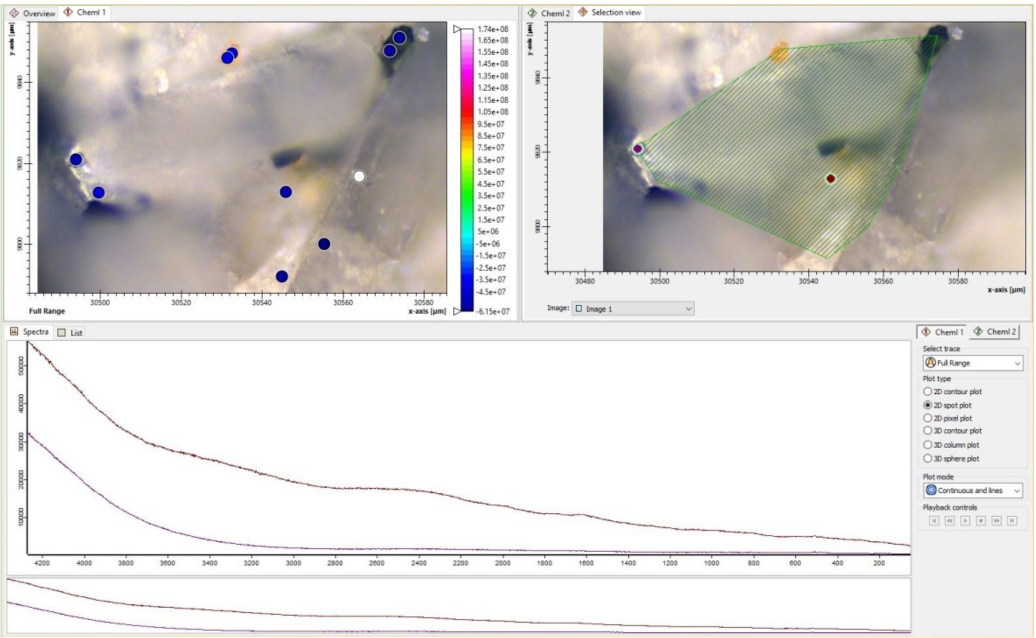
Note the fracture pattern visible in the quartz sample !



Sample Site 8-B3 : Stone 1_spectra 1 (white mineral) indicates : Quartz - Image size : ~ 200 x 200 µm



**Sample Site 15-B : Stone 1_spectra 1 indicates : Microcline , Albite** (→ RRUFF_CS results )



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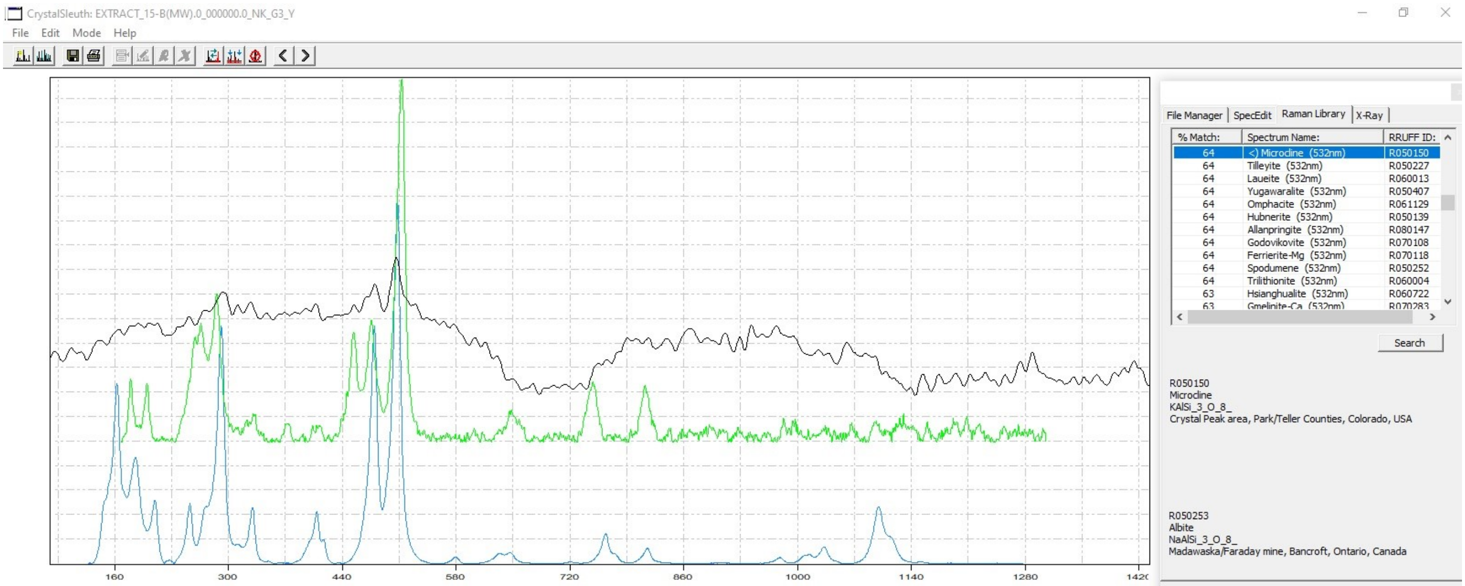
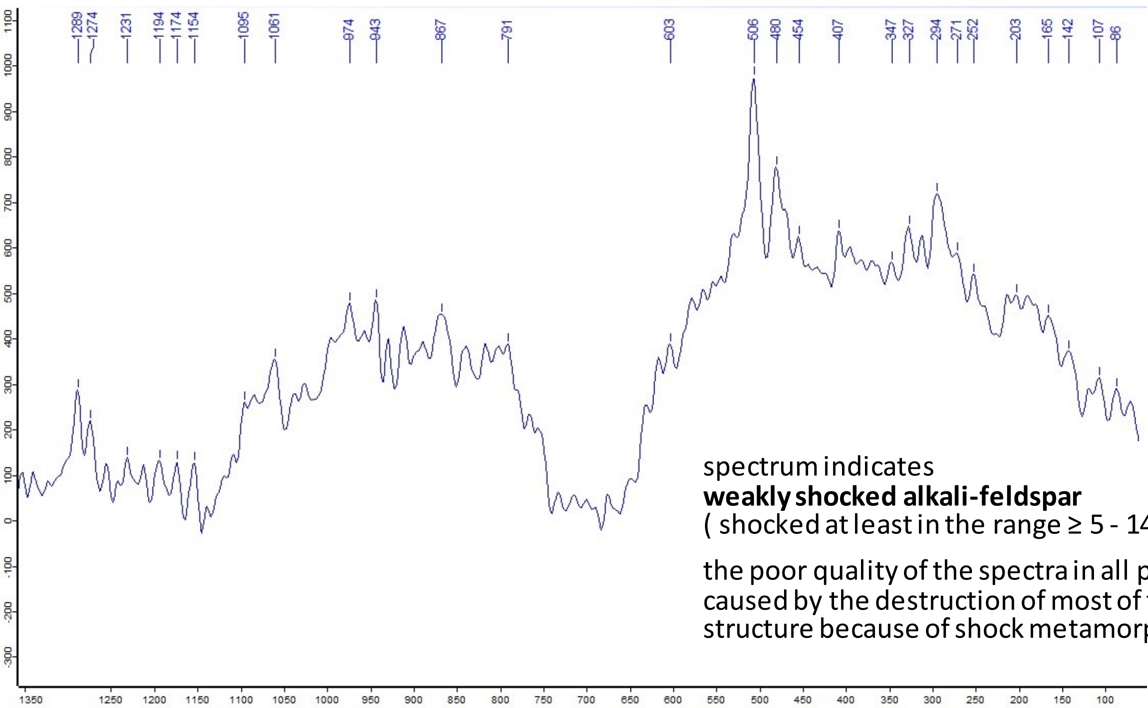
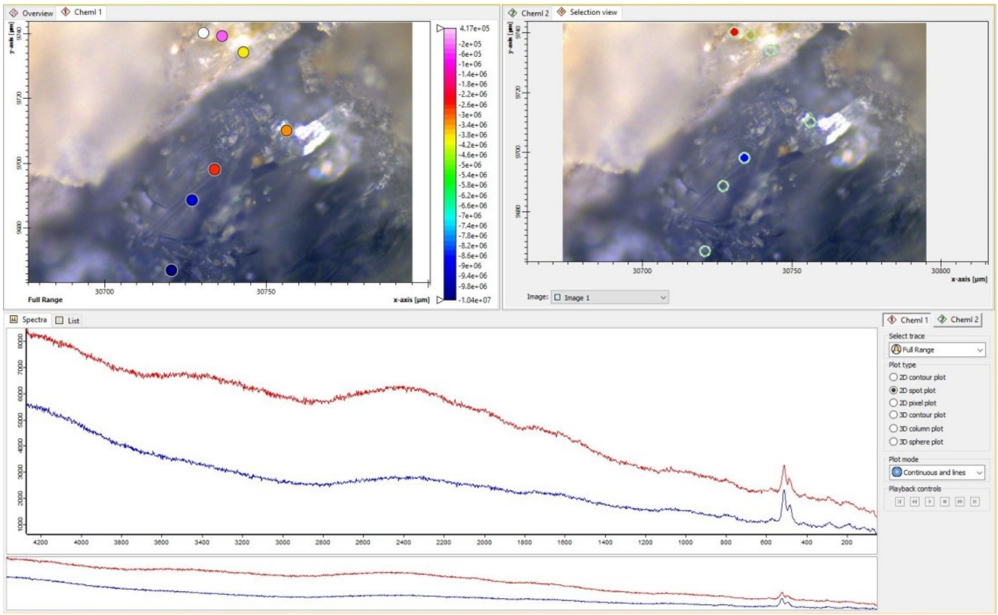


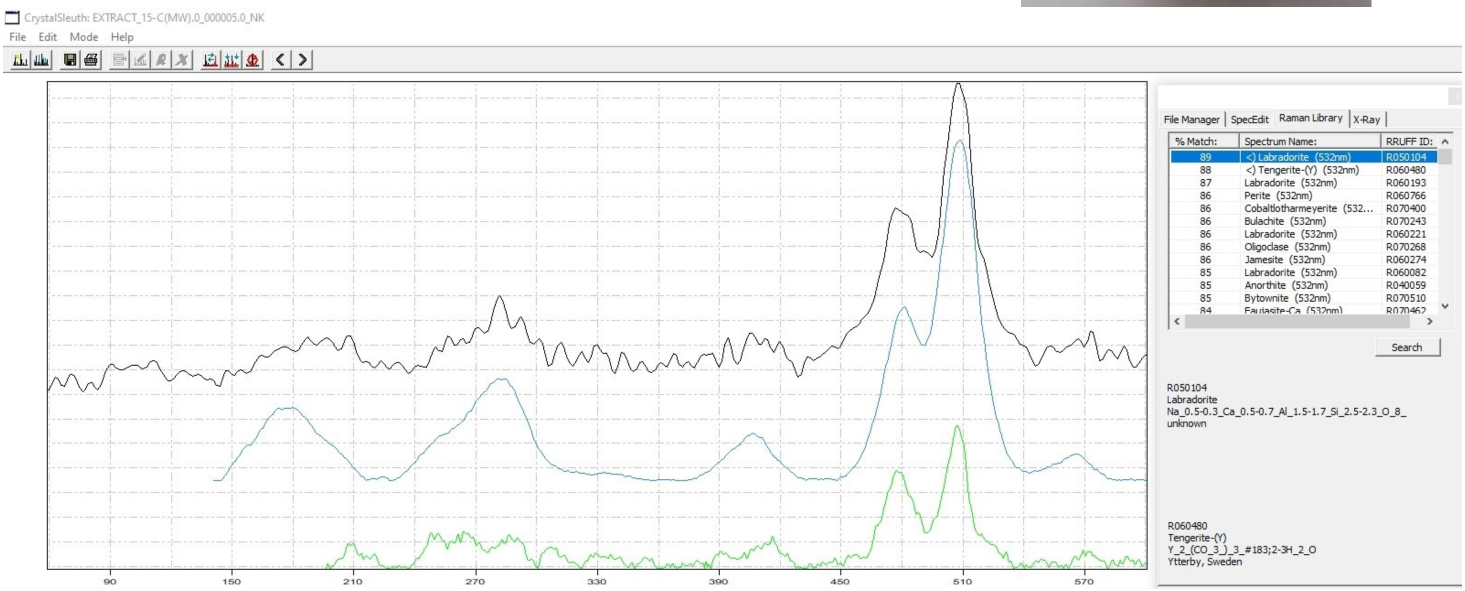

spectrum indicates
**weakly shocked alkali-feldspar**
( shocked at least in the range ≥ 5 - 14 GPa )

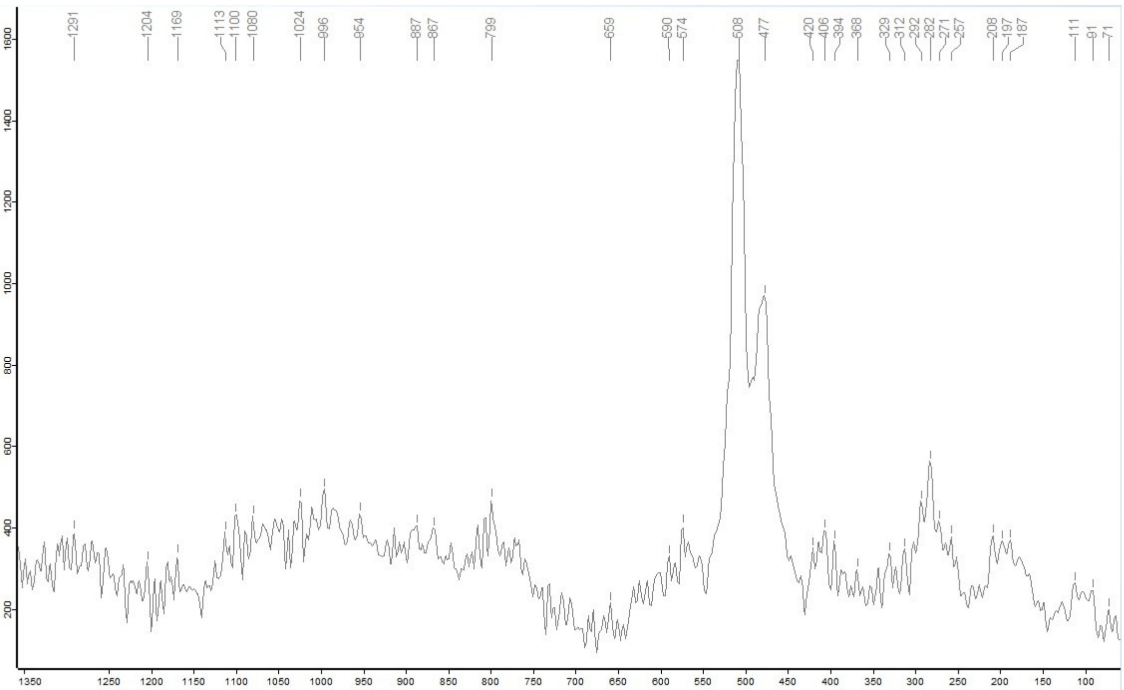
the poor quality of the spectra in all probability is caused by the destruction of most of the crystalline structure because of shock metamorphism

**Sample Site 15-C : Stone 1_spectra 1 indicates : Labradorite , Tengerite-Y** (→ RRUFF_CS results )

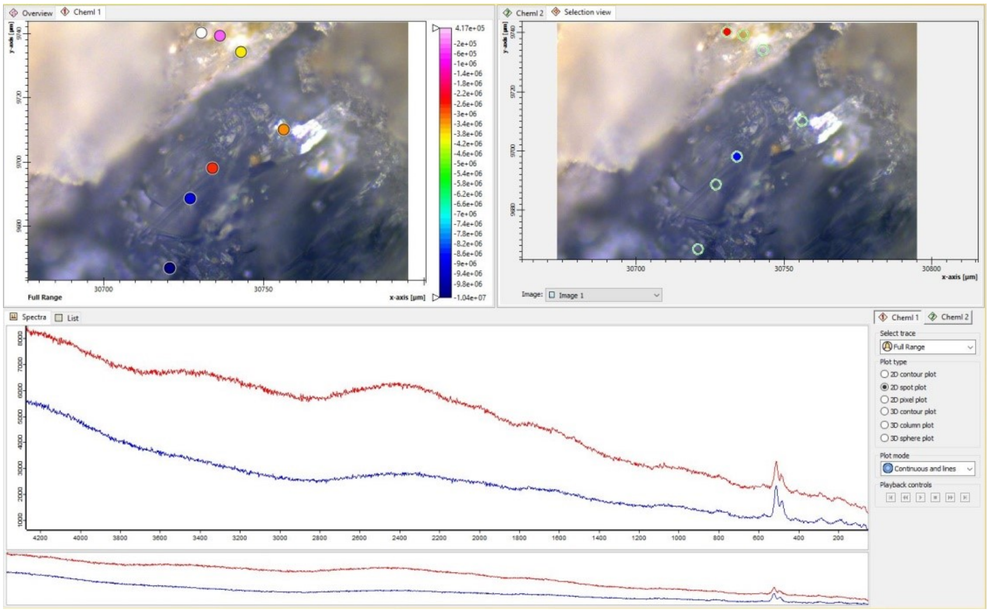


**Sample :**

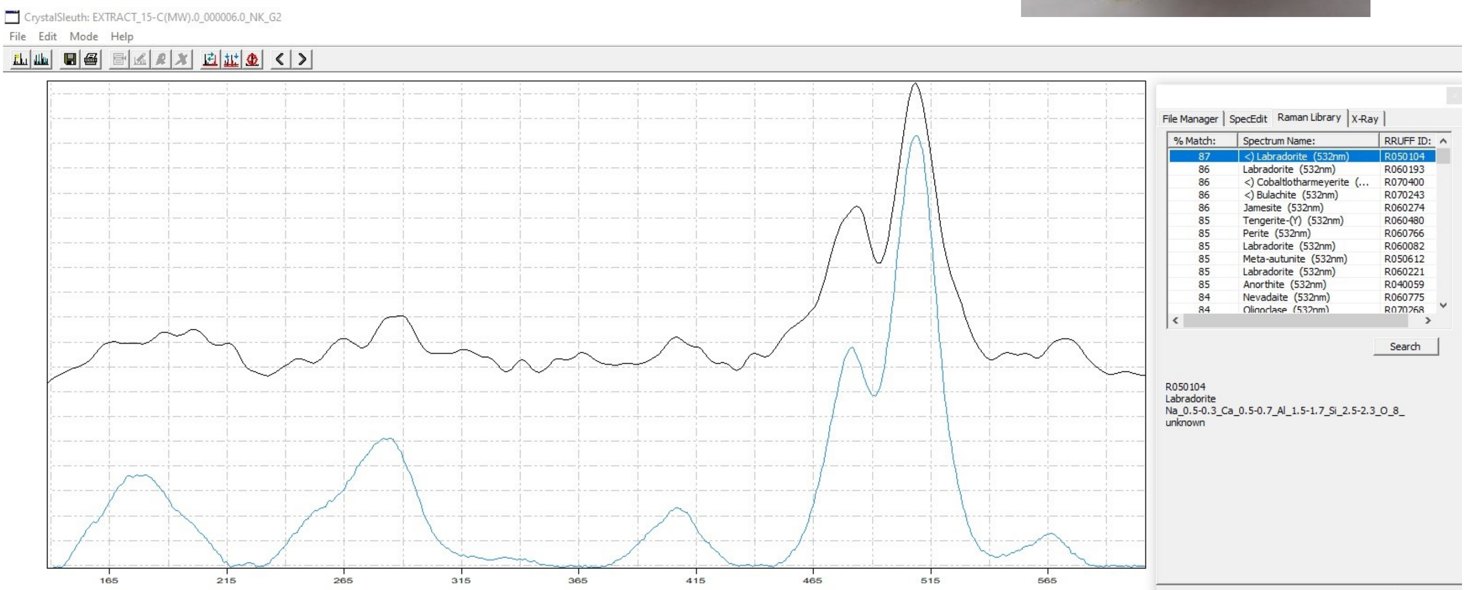


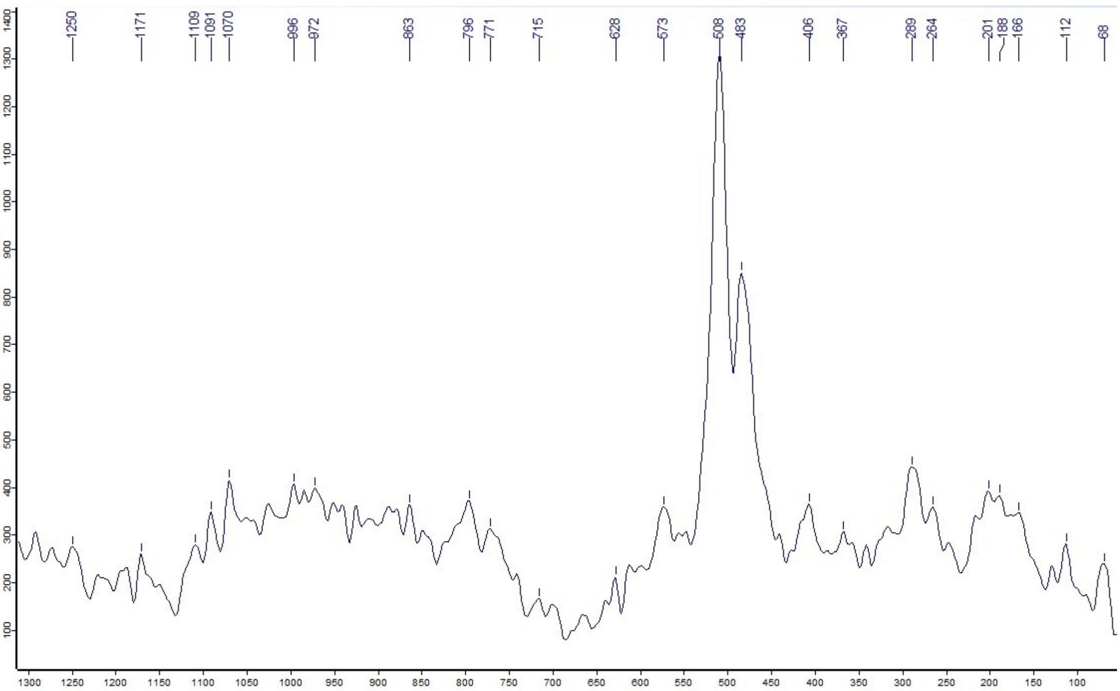



**Sample Site 15-C : Stone 1_spectra 2 indicates : Labradorite** (→ RRUFF_CS results )



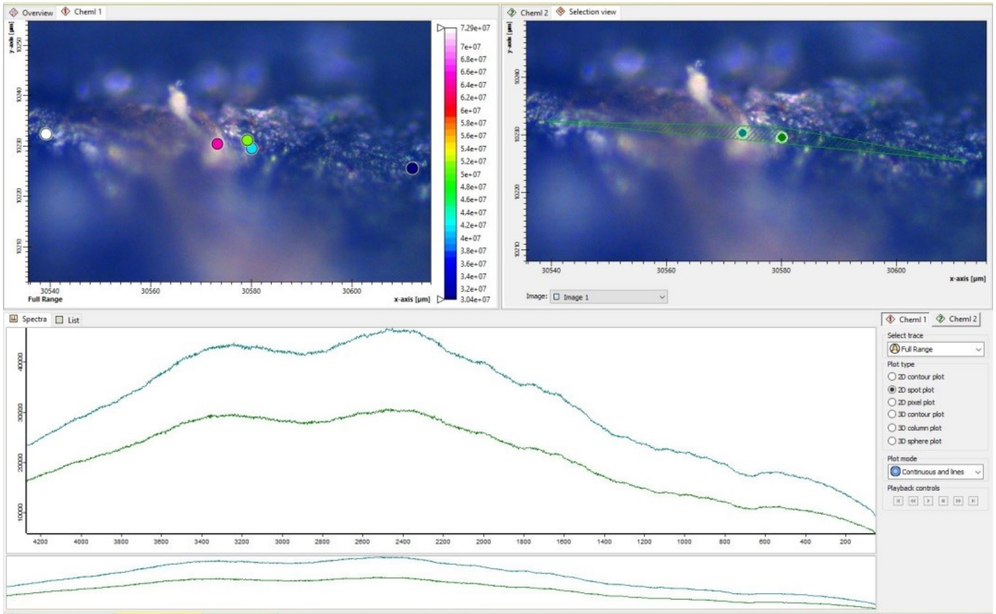
**Sample :**



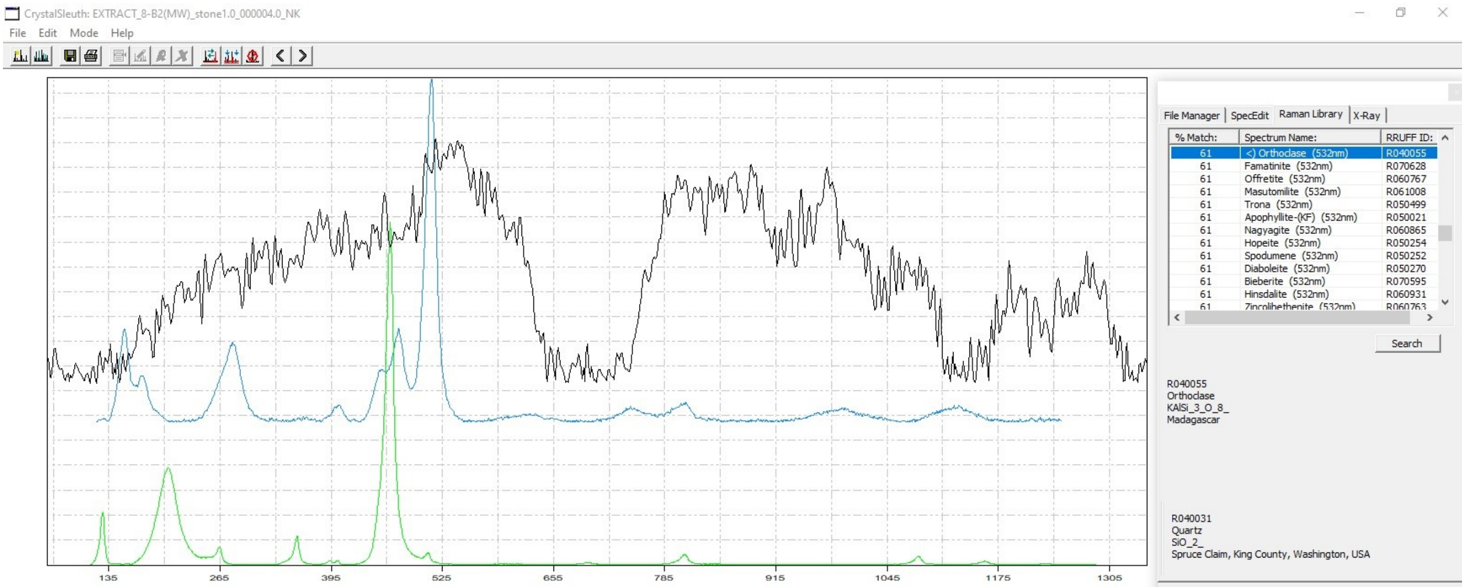
**Sample Site 8-B2 : Stone 1_spectra 1 (green Mineral ) indicates :** ( Orthoclase ? Quarz ? )

Spectra of poor quality contains to less information ! Therefore the result is only guesswork in this case.



**Sample :**

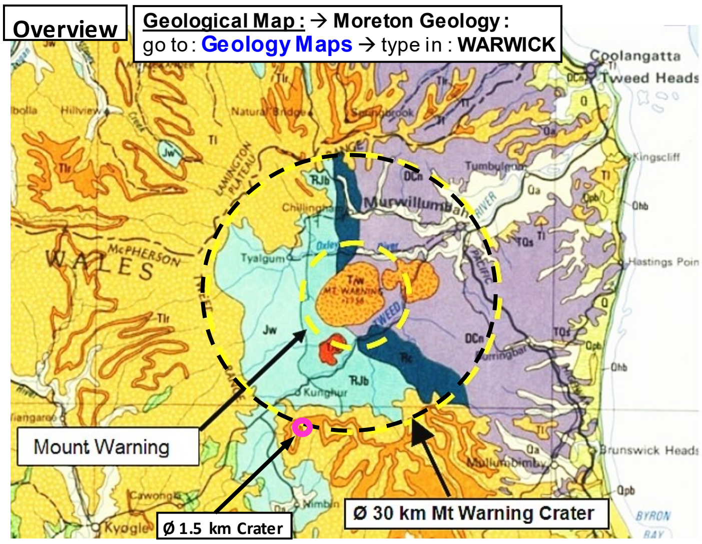
**Note the green color**

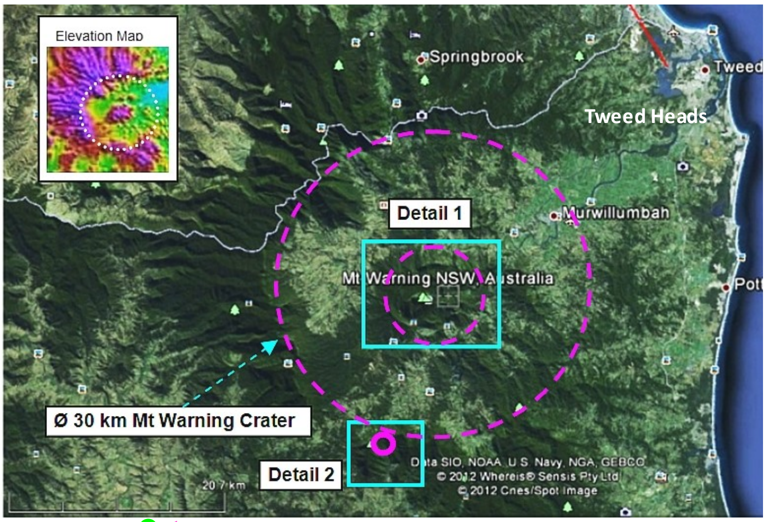


## Appendix 1 : Photos of the rock samples from sample sites : 8-B2/-B3 and 15-A to 15-C

→ See next page !

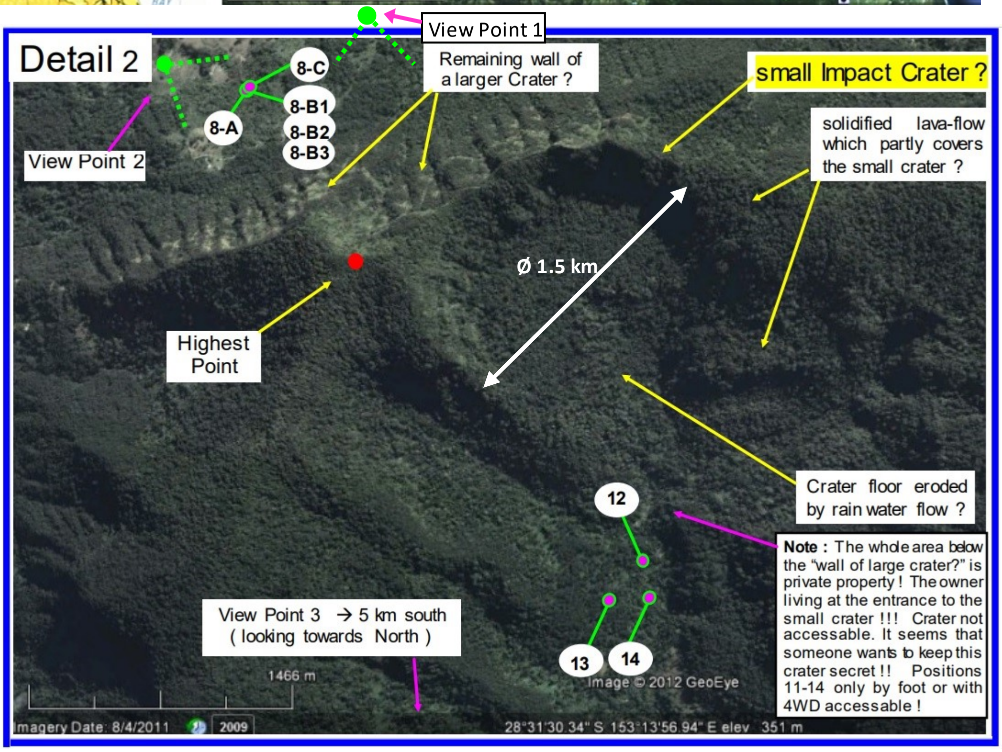
**Please note :** Photos of Sample Sites 8-B2 /-B3 and 15-B & 15-C and other sample sites are also available here → weblink : Sample Sites "Mt Warning Crater"

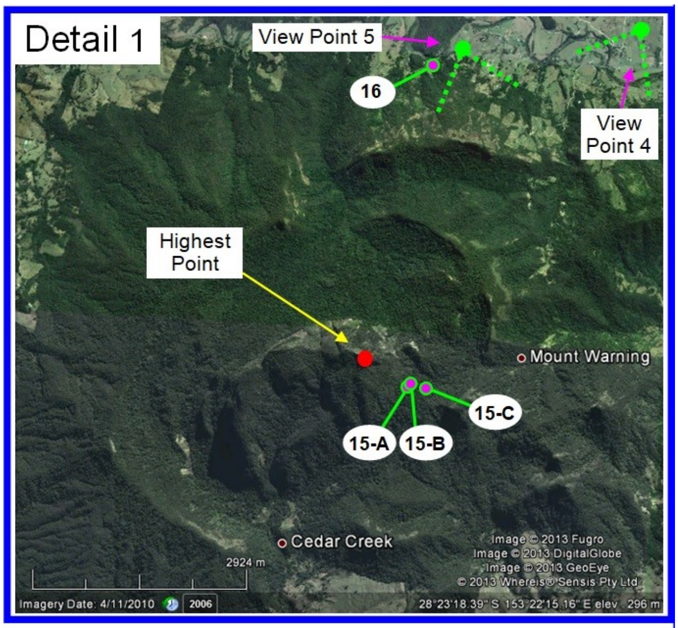



**Mount Warning** is probably the result of a large **secondary impact** caused by the Cape York Impact Event, and is not the rest of an erroded shield-volcano as currently believed ! Therefore the age of the Mt Warning crater may be ~253 Ma

The chaotic looking central area of the Mt Warning crater (Detail 1) is probably the result of a shield volcano which grew on top of the Mt Warning impact crater after the Impact Event.
When the volcanic activity ended, this shield volcano heavily eroded and collapsed into the visible chaotic structure. ( Detail 1 ) consisting of magmatic material. Only the original Crater-wall of the Mt Warning crater is left from the original earlier impact event.




### To the samples 8-B2/3 and 15-B/C :

The samples 8-B2 and 8-B3 were collected on the foot of a remaining section of the Ø 30 km Mt Warning crater.

This location lies close to the smaller Ø 1,5 km Crater, a bit below the level where the small crater is located.
( → see image above )

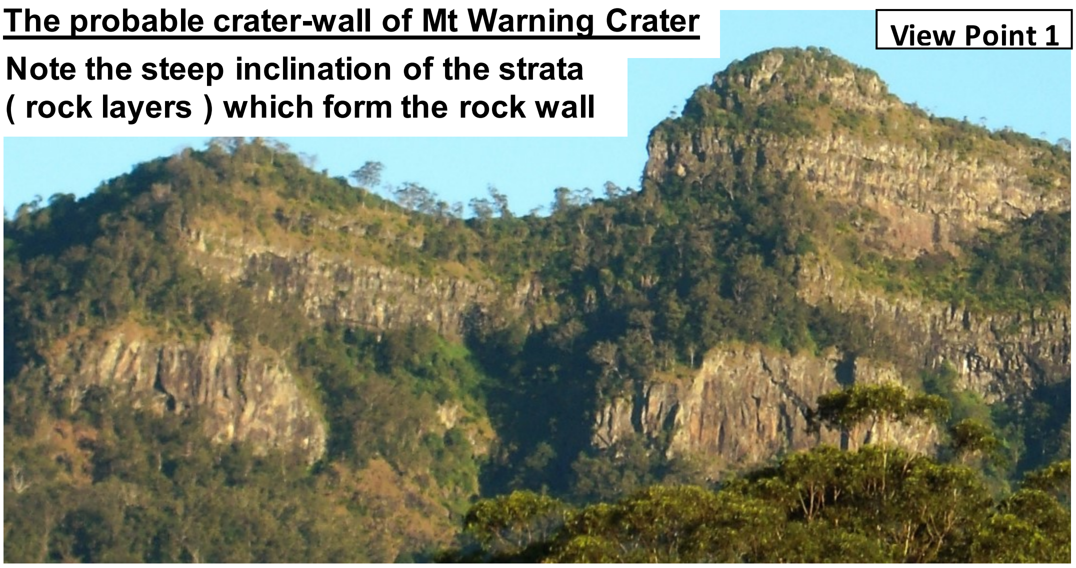
The samples 15-B & 15-C were collected on Mount Warning itself, which is the former top of the shield volcano ( or top of the central uplift ? ). It lies much deeper today because the shield volcano ( which grew on top of the impact crater ) eroded heavily and only left behind the former top of the volcano ( or central uplift ).

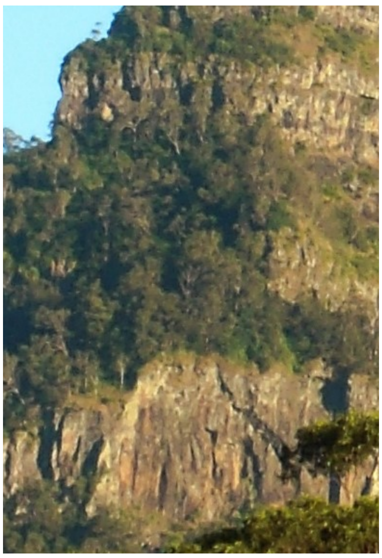
→ **Please find all images of all sample sites on my**


**Note** : permission may be required to do a geological expedition to the sites 8-B2/B3, located on private pasture land


**The probable crater-wall of Mt Warning Crater**

**Note the steep inclination of the strata ( rock layers ) which form the rock wall**

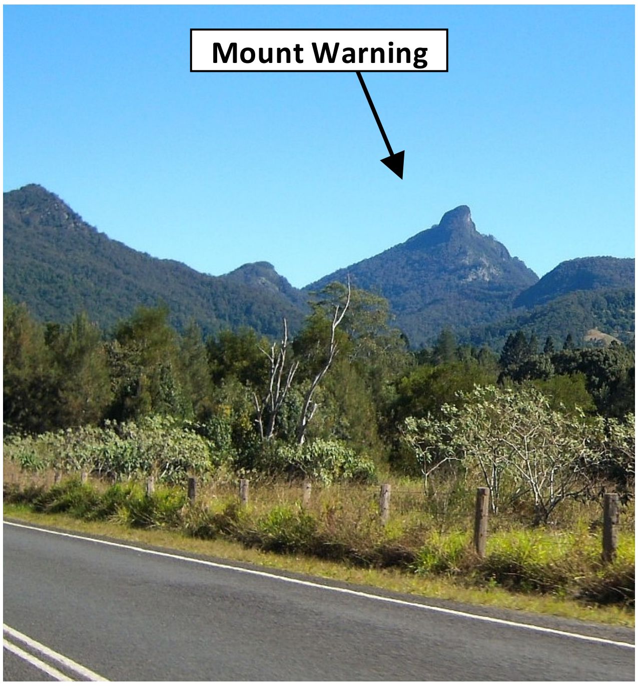


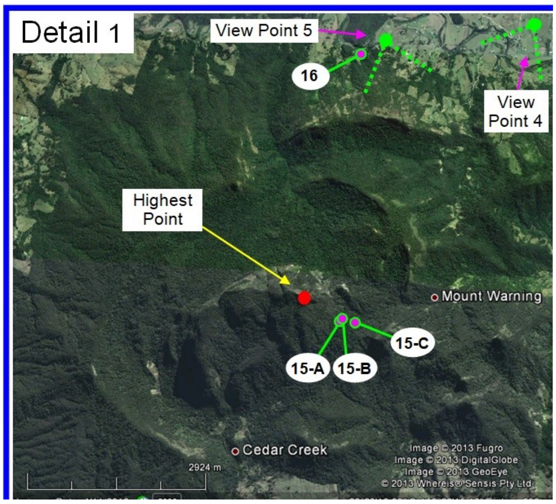




**Note** : permission may be required to do a geological expedition to the sites 8-B2/B3, located on private pasture land


**Note** : The sample sites 15-A to 15-C are accesible over a walking track ( hiking trail ). It's around a 1 hour uphill walk.


15-A
15-A 28° 24.072 S 153° 16.639 E 30 m Mt Warning


Mount Warning


Detail 1
View Point 5
16
View Point 4
Highest Point
Mount Warning
15-C
15-A
15-B
Cedar Creek
2924 m
Image © 2013 Fugro
Image © 2013 DigitalGlobe
Image © 2013 GeoEye
© 2013 Whereis® Sensis Pty Ltd


8-B3
8-B3 28° 30.972 S 153° 12.483 E 9 m Mt Warning

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

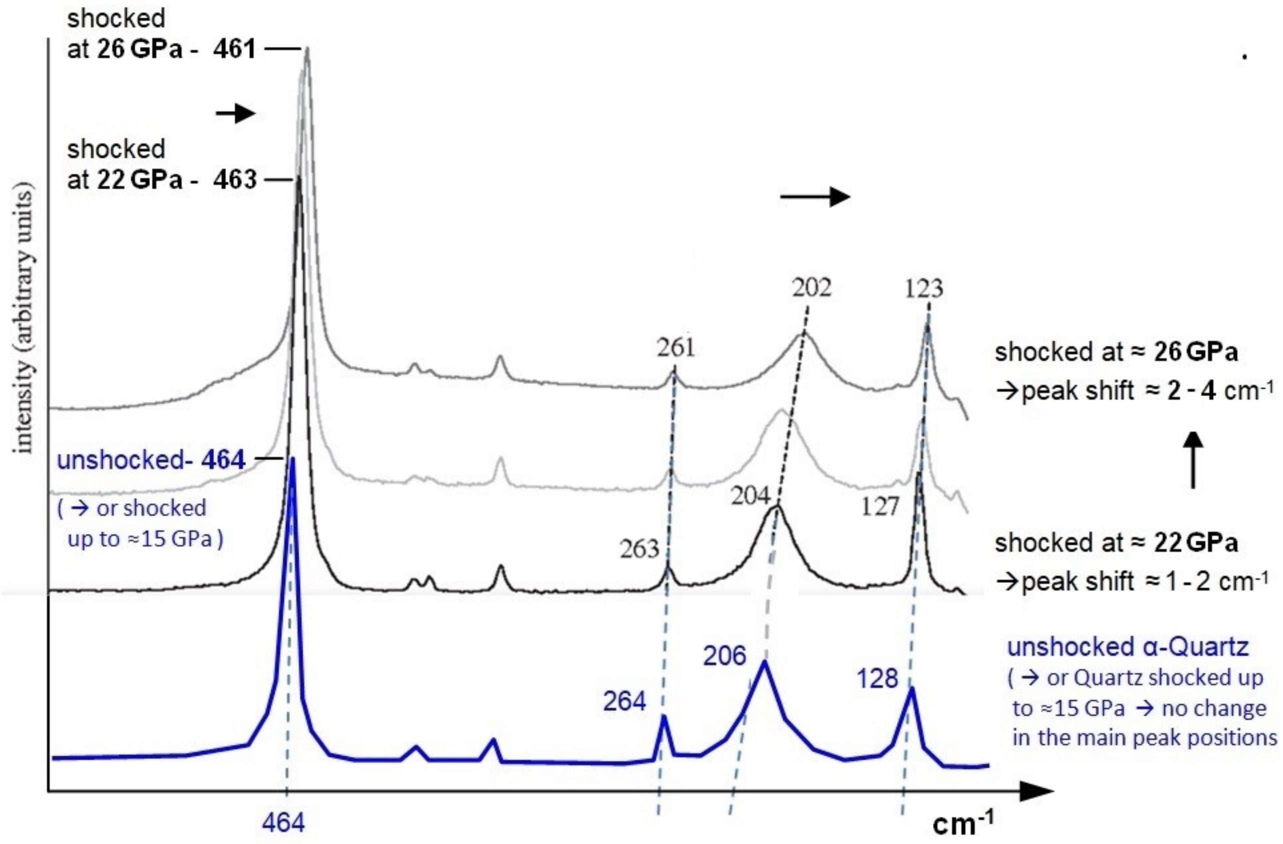
In order to verify a sample site as an impact site or impact structure, shock-metamorphic effects must be discovered in the rocks of the sample site. This can be done by different methods.

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.

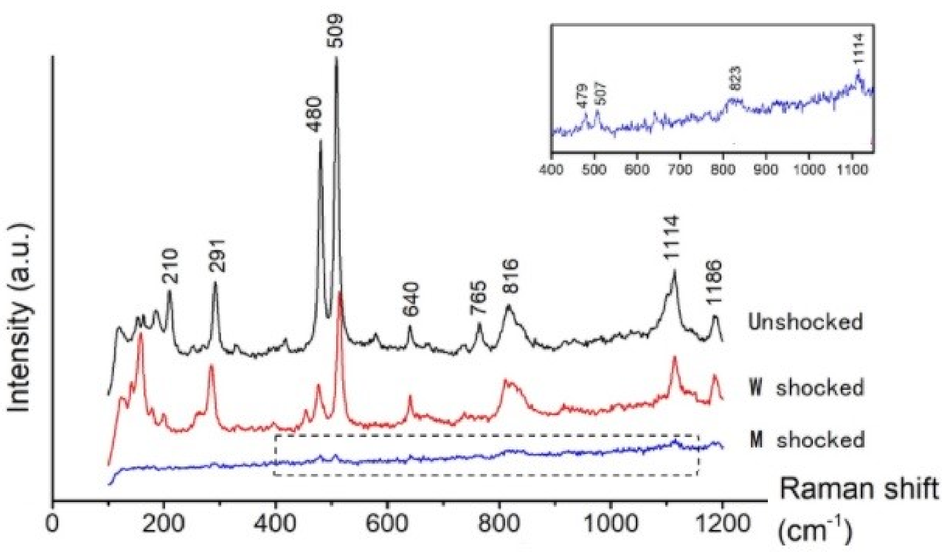
Mc Millan et al. (1992) and others have shown that the main RAMAN-peaks of Quartz shift towards lower frequencies if the Quartz was exposed the a shock-pressure > 15 GPa. → see diagram below

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 :** Samples "Mt Warning Crater" ( or : "Mt Warning Crater" )


**The 320 km Cape York Impact Crater and the Cape York Crater Chain in North-East Australia** - by Harry K. Hahn
https://vixra.org/abs/2101.0136 alternative : https://archive.org/details/the-320-km-cape-york-impact-crater-in-ne-australia

**RAMAN spectra of quartz samples from the Cape York impact area :** Evidence for the Cape York Crater ( or here : link4 )

**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**
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