

Impact-area of the Ejecta-Ray R4 from the PT-Impact Crater, located near Margaret River (Western Australia)

- Raman Spectra of selected Rock Samples - by Harry K. Hahn, 30.12.2021 -

Summary :

The visited area is located along the west-coast of SW-Australia near the town Margaret River. The Gravity Anomaly Map indicates that along this section of the coast the massive Ejecta-Ray R4 (caused by the Permian-Triassic Crater) impacted in a very short distance and formed this coast-line.

According to my Permian-Triassic Impact (PTI) Hypothesis this powerful Ejecta-Ray R4, which probably was caused by the leading-edge of the right ejecta-wing of the PTI, cut through Earth's crust and in that way it separated (cut-off) the Australian Plate and the Indian Plate, from the African Plate.

In the classic plate tectonics theory this would mean : Ejecta-Ray R4 was a (the) major cause of the break-up of Pangea ! After the PTI-Impact Event, the Australian Plate and the Indian Plate slowly drifted away from the African Plate in eastern- & north-eastern direction, as the ocean-floor-age map indicates

For a detailed description of the Permian-Triassic Impact (PTI) Hypothesis please read [Part 1 \(P1\)](#) of my hypothesis. And for a detailed description of the break-off of the Australian Plate and Indian Plate from the African Plate please read pages 14, 19-26 of [Part 3 \(P3\)](#) & 31, 33-34 of [Part 2 \(P2\)](#) of my hypothesis.

I have collected some rock-samples along the coast-line in the Margaret River area, which is located close to the original course of Eject-Ray R4. Therefore shock-metamorphic effects caused by Ejecta-Ray R4 should be present in rocks from this coastal-area, which are older than 250 myr. And indeed they are !

The Raman spectra of quartz from the sample sites 2, 4, 5 and 7-B collected along the coast in the Margaret River area provide first evidence for an impact (shock) event caused by Ejecta-Ray R4.

The shifts of the main Raman peaks, of analysed quartz from sample site 5, to the lower frequencies 463, 258/264, 126 cm^{-1} is a clear indication for an impact shock-event. Further indication comes from analysed quartz grains from the sample sites 2, 4 and 7-B which show shifts of main Raman-peaks to the lower frequencies 204, 125 cm^{-1} ; 261, 125 cm^{-1} and 260/267, 126 cm^{-1} and 263, 126 cm^{-1} .

(→ see explanation in [Appendix 1](#) at page [21](#) : Overview : The Raman bands (peaks) of shocked Quartz)

Further indication comes from Microscopic images of quartz from sample site 7-B (from Cape Leeuwin) which seems to indicate PDFs (planar deformation features) → see microscopic-Images on page 7 & 10

Microscopic images of analysed quartz grains from the sites 2, 4 and 5 may provide further proof for a shock event. (→ see microscopic-Images on the [pages : 3 to 11](#)).

All spectra were made with a **BRUKER Senterra-II Raman Microscope** (wavenumber precision $<0.1\text{cm}^{-1}$)

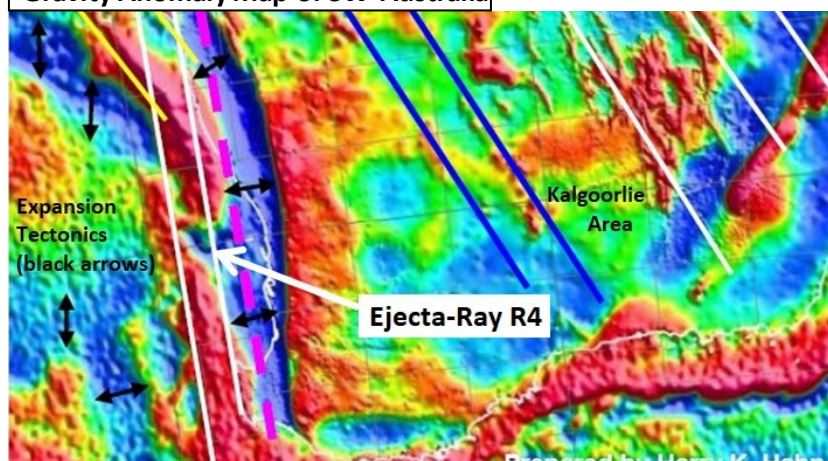
→ Images of the analysed rock samples and photos of the sample sites are in the Appendix at [page 16](#).

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

→ **References** : see [page 22](#) / and pages 14, 19-26 of [Part 3 \(P3\)](#) & 31, 33-34 of [Part 2 \(P2\)](#) of my hypothesis

Note : A shock pressure of 20 GPa exceeds every pressure caused by normal terrestrial metamorphism. The indicated shock pressures of $\approx 20\text{-}22$ GPa therefore in general point to an impact shock event.

Gravity Anomaly Map of SW-Australia



Quartz sample from site 7-B indicates PDFs

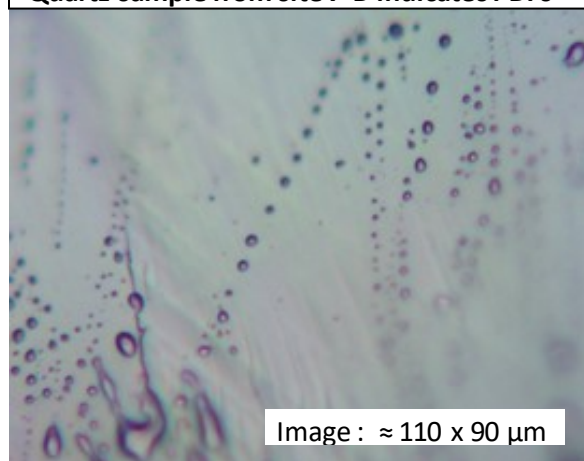
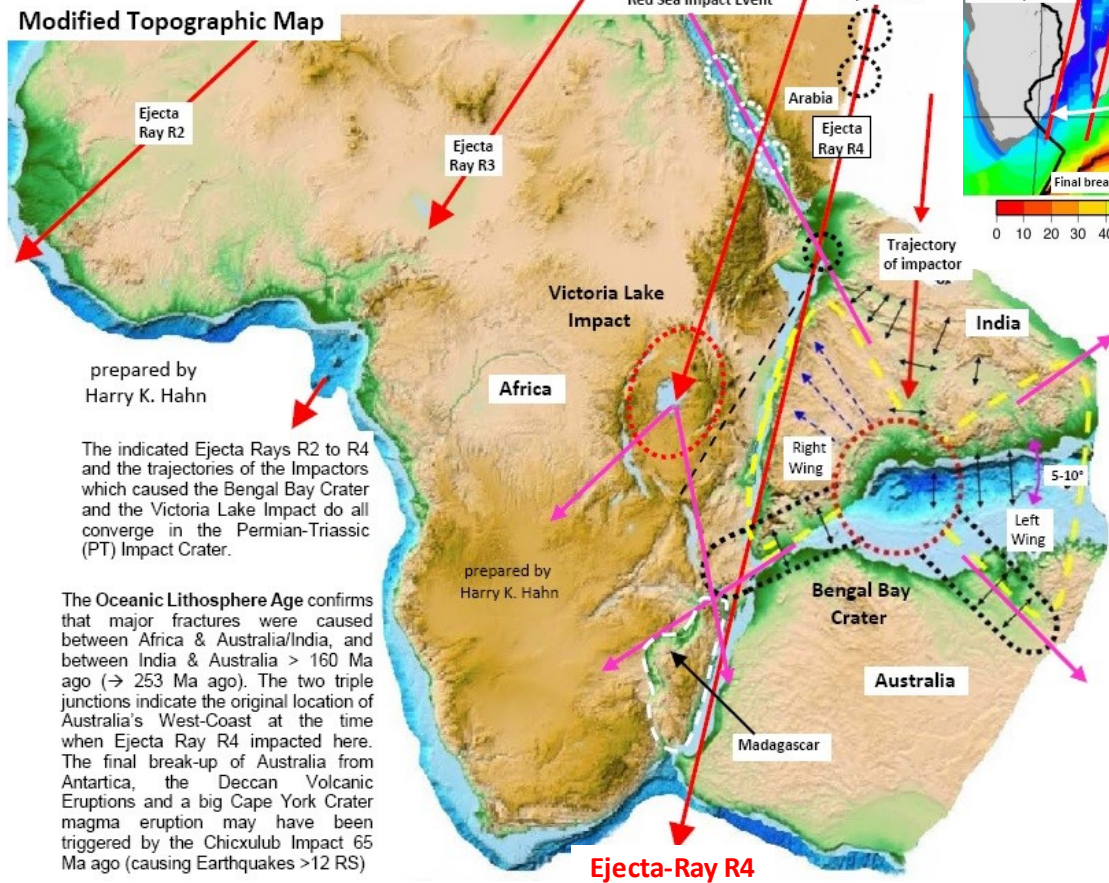
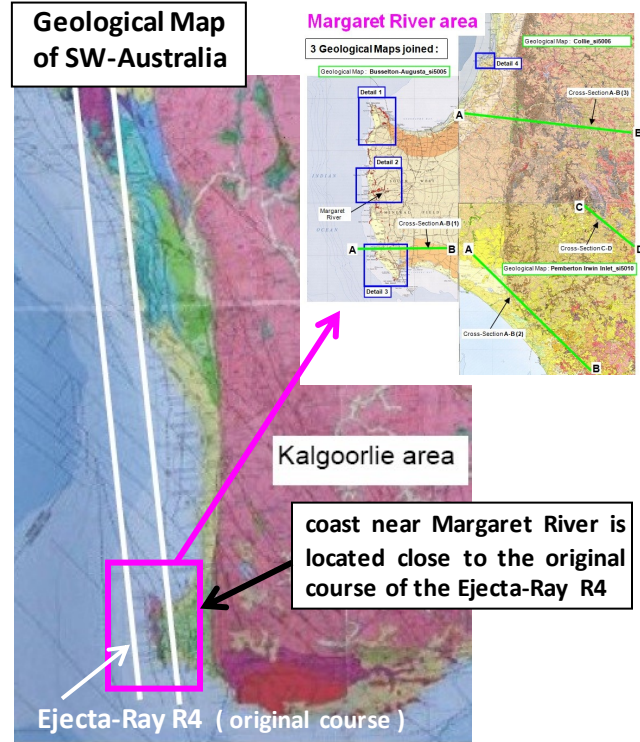
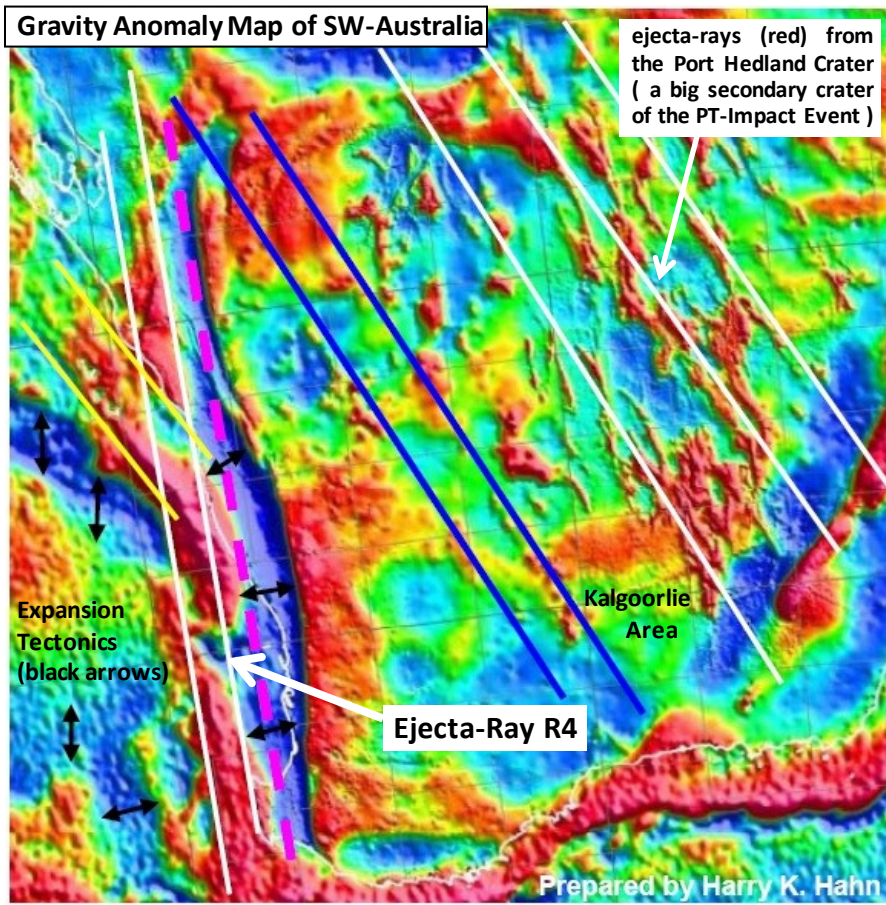


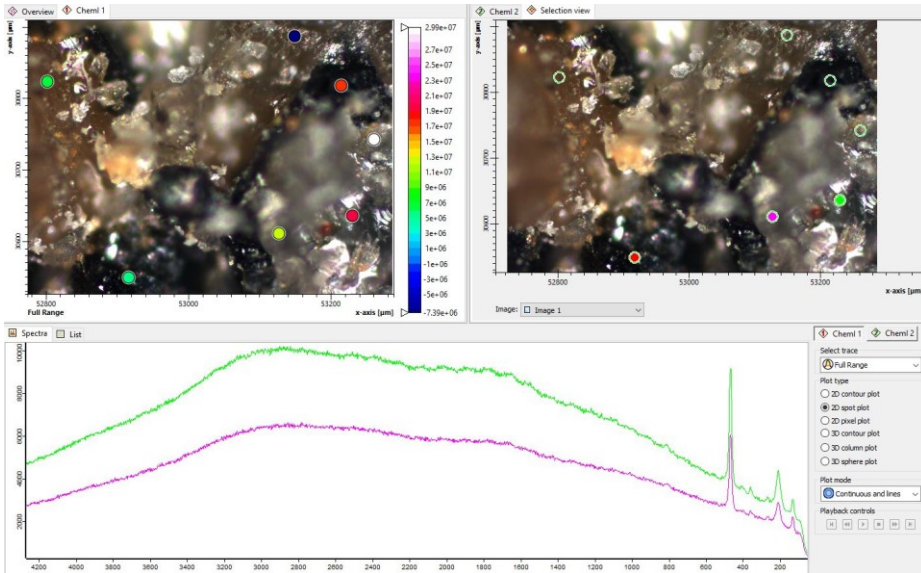
Image : $\approx 110 \times 90 \mu\text{m}$

The nearly linear outline of the west-coast of SW-Australia was formed by the impact of the powerful **Ejecta-Ray R4** that was caused by the Permian-Triassic Impact (PTI). → see my PTI-Hypothesis. The manipulated topographic map below shows how Africa, India and Australia were arranged (positioned) to each other at the time of the PTI. The original course of the linear **Ejecta-Ray R4** is indicated with two parallel white lines on the gravity anomaly map below. The linear (red) structures (positive anomalies) between these two lines probably were caused by magma outflow out of the crack after **R4** had cut through Earth's crust. The coast near Margaret River probably represents a remaining section of the impact-affected border-line close to the **Ejecta-Ray R4**, which is accessible on the surface.



The ocean-floor-age map will also provide proof for the arrangement of the African-Plate the Indian Plate and the Australian Plate before the impact of Ejecta-Ray R4 and it indicates the correct driftpaths of India & Australia after the Impact Event, as shown on the map above. My arrangement of the „tectonic plates“ and their drift-paths is different to the „classic theory“. But it explains the triple-junctions in the ocean-floor in a much more logical and correct way

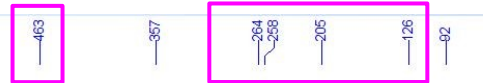
Sample Site 5: Stone 1_spectra 1 indicates: Quartz



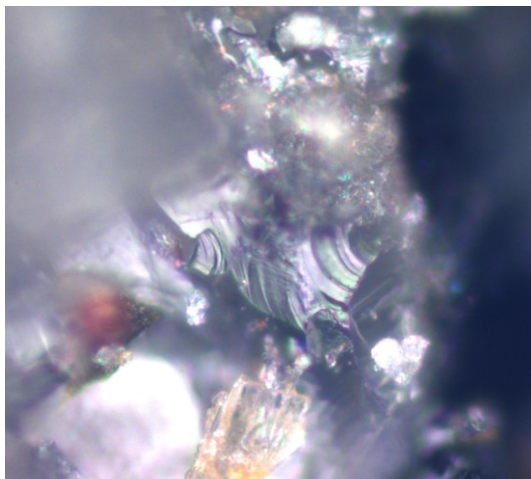
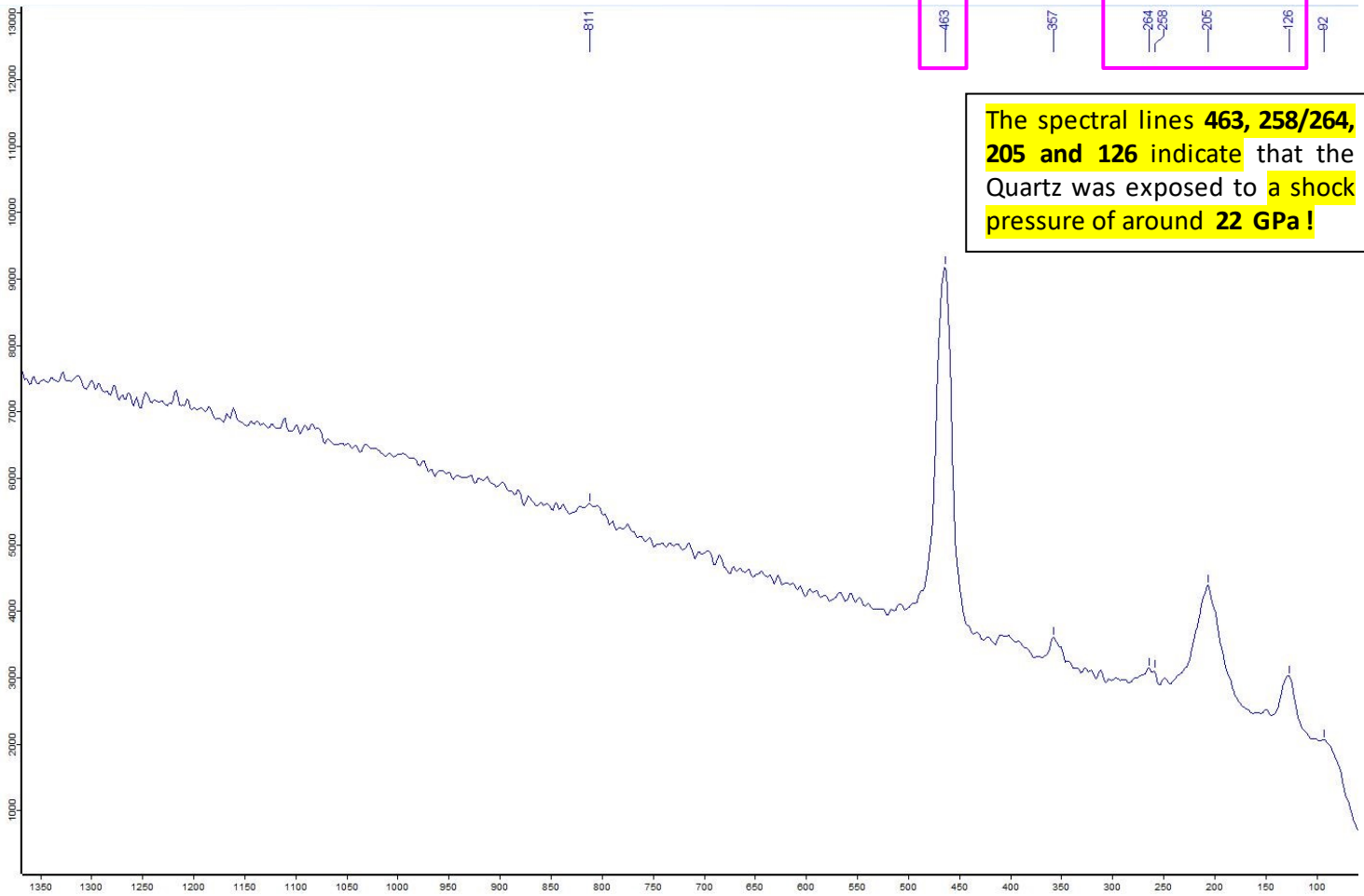
Sample :



463

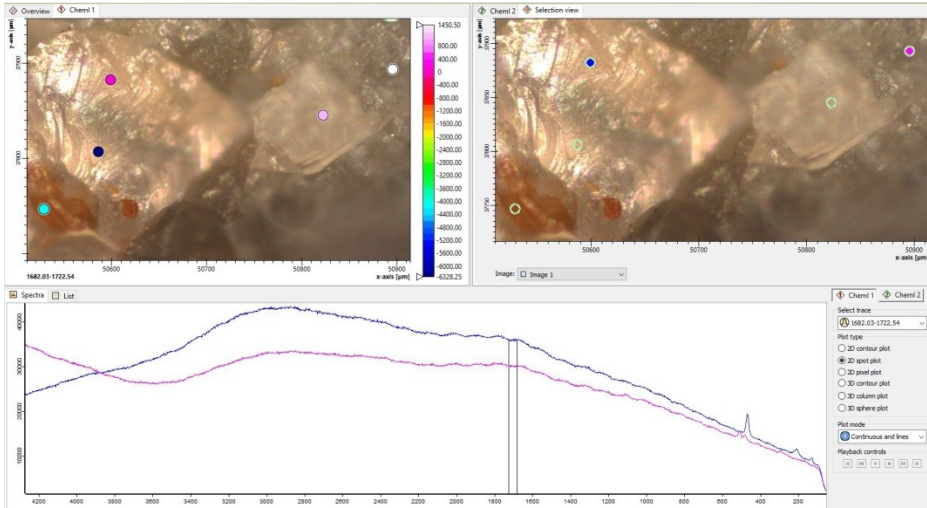


The spectral lines 463, 258/264, 205 and 126 indicate that the Quartz was exposed to a shock pressure of around 22 GPa !



Detail : Image size : ~ 200 x 150 μm

Sample Site 2: Stone 1_spectra 1 indicates: Quartz

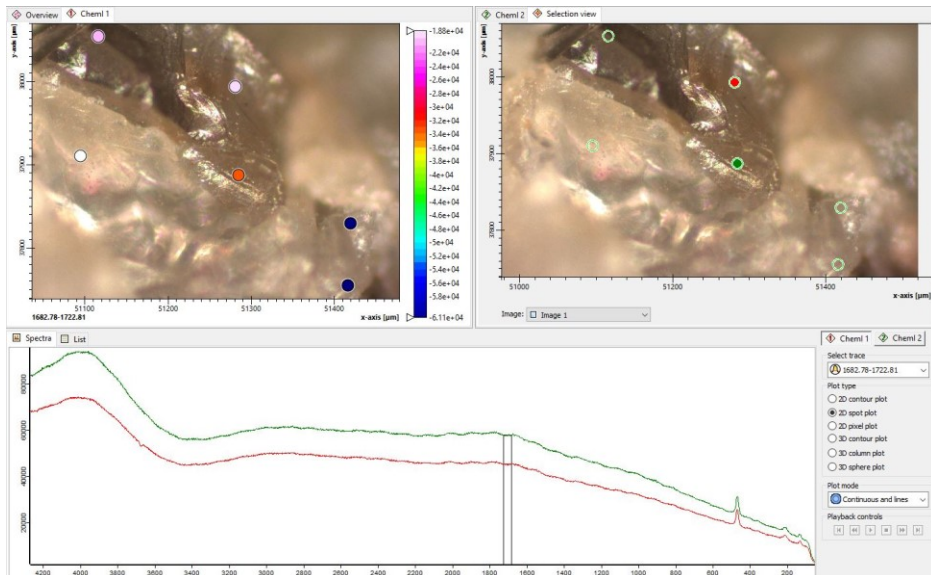


Sample :

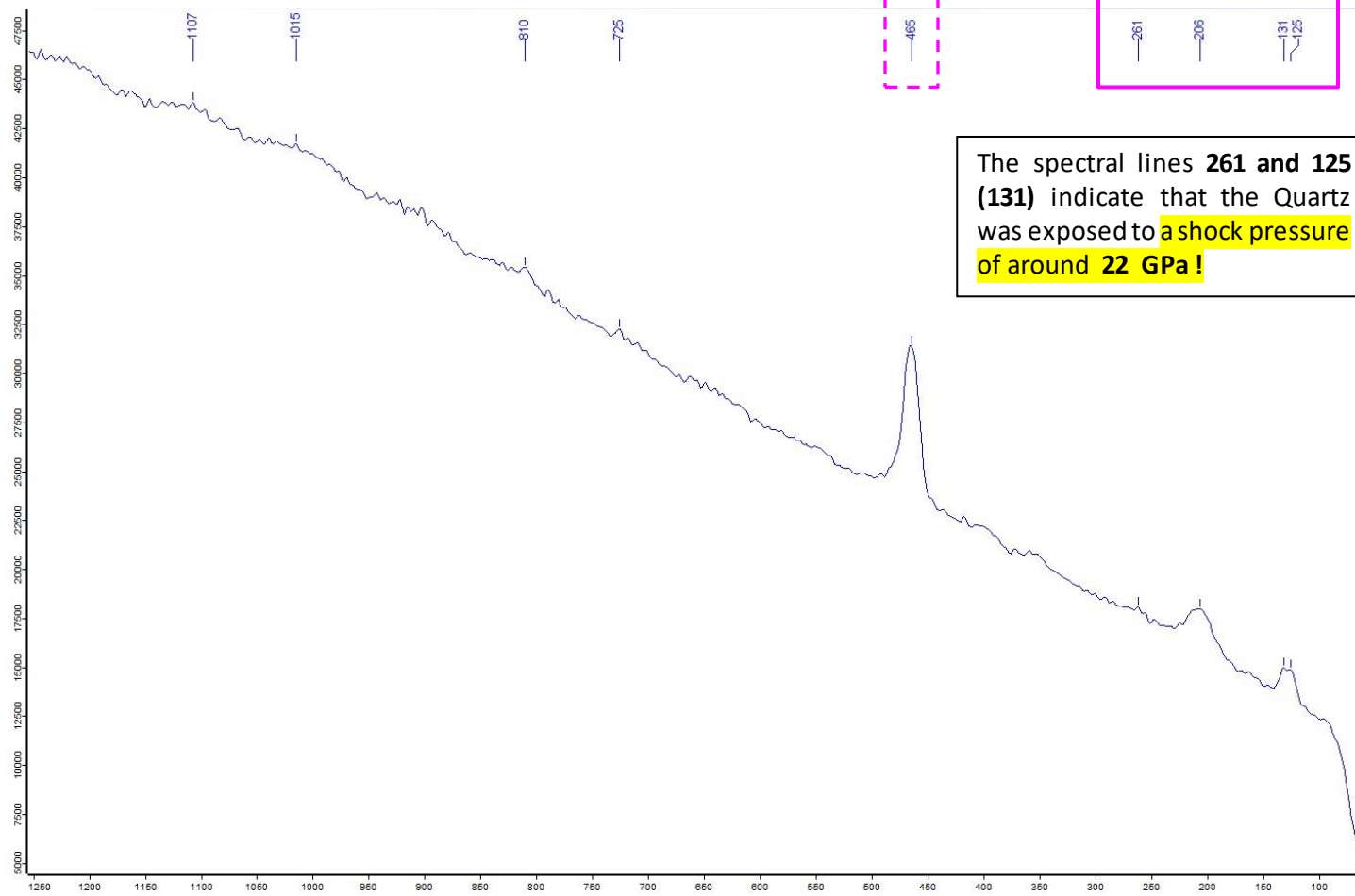


The spectral lines 204 and 125 indicate that the Quartz was exposed to a shock pressure of around 22 GPa !

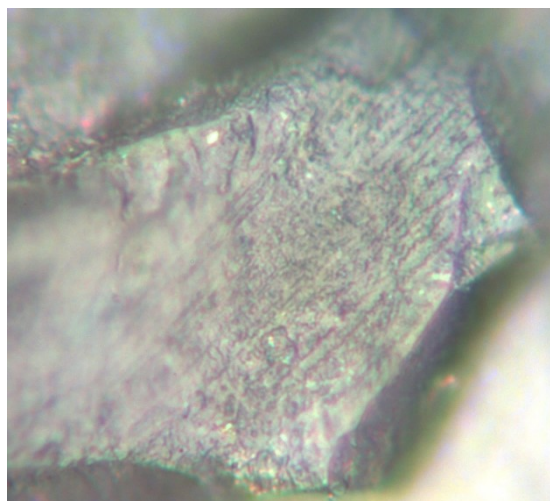
Sample Site 2: Stone 1_spectra 2 indicates: Quartz



Sample :



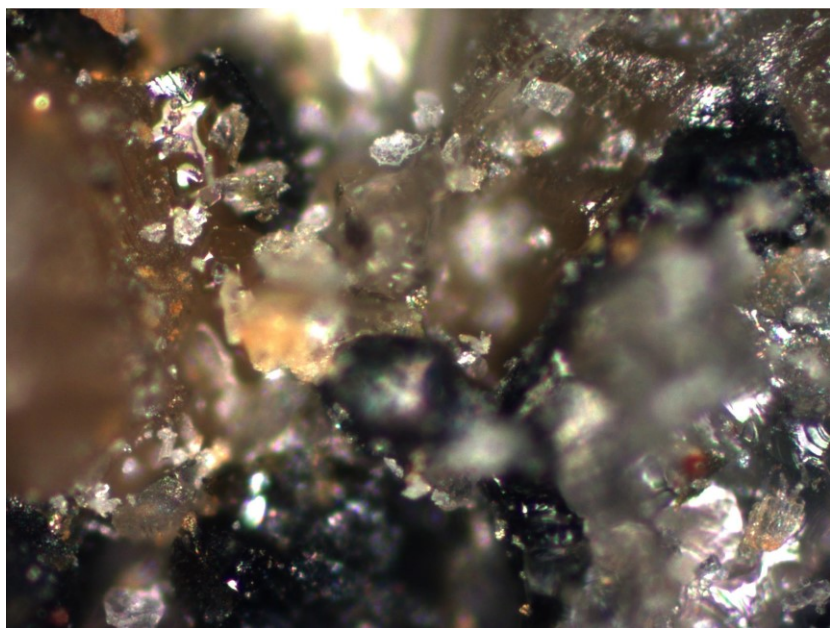
The spectral lines 261 and 125 (131) indicate that the Quartz was exposed to a shock pressure of around 22 GPa !



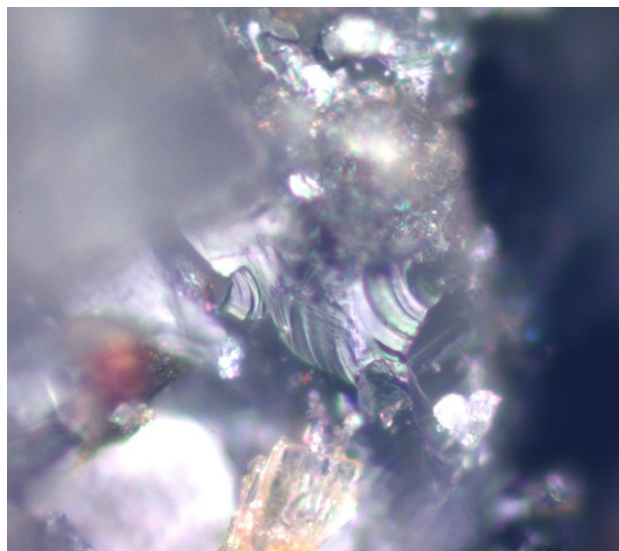
Detail : Image size : ~ 100 x 75 μm

Microscopic Images : Sample from Site 5 and 2 → original state (no preparation for analysis)

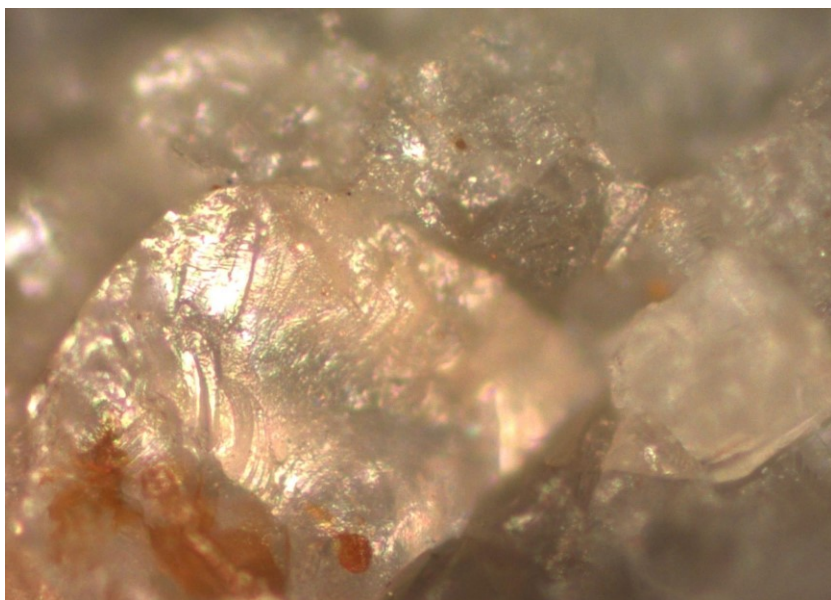
Sample Site 5 : Stone 1 : Quartz (Image ~ 500 x 400 μm)



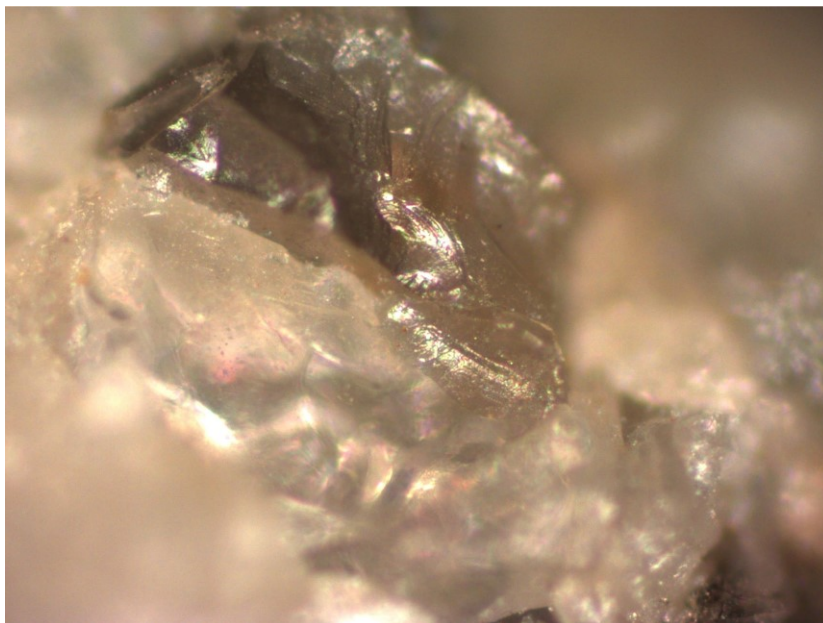
Detail : Image size : ~ 200 x 150 μm



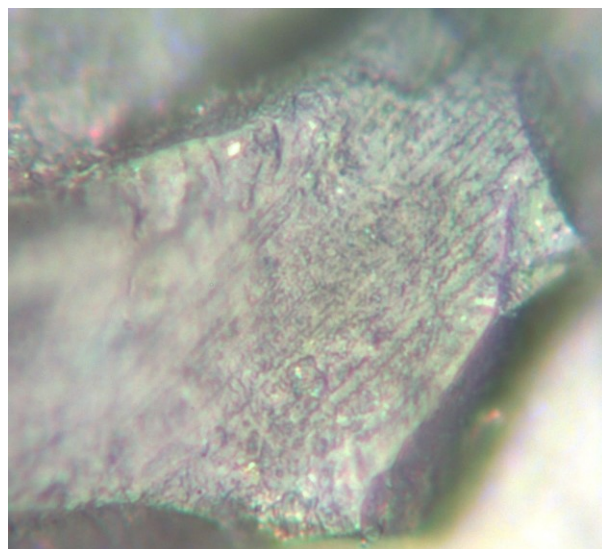
Sample Site 2 : Stone 1_Spec 1 : Quartz (Image ~ 400 x 300 μm)



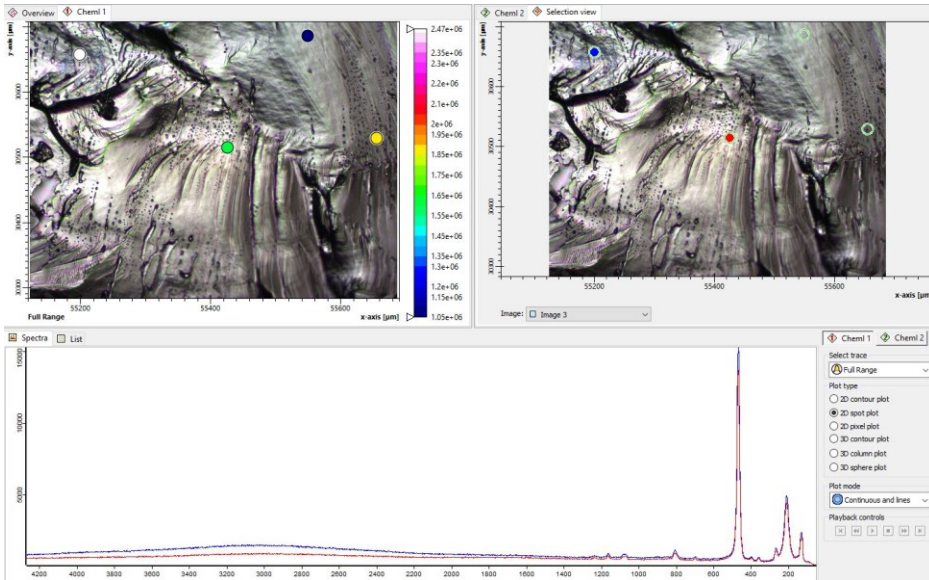
Sample Site 2 : Stone 1_Spec 2 : Quartz (Image: ~ 400 x 300 μm)



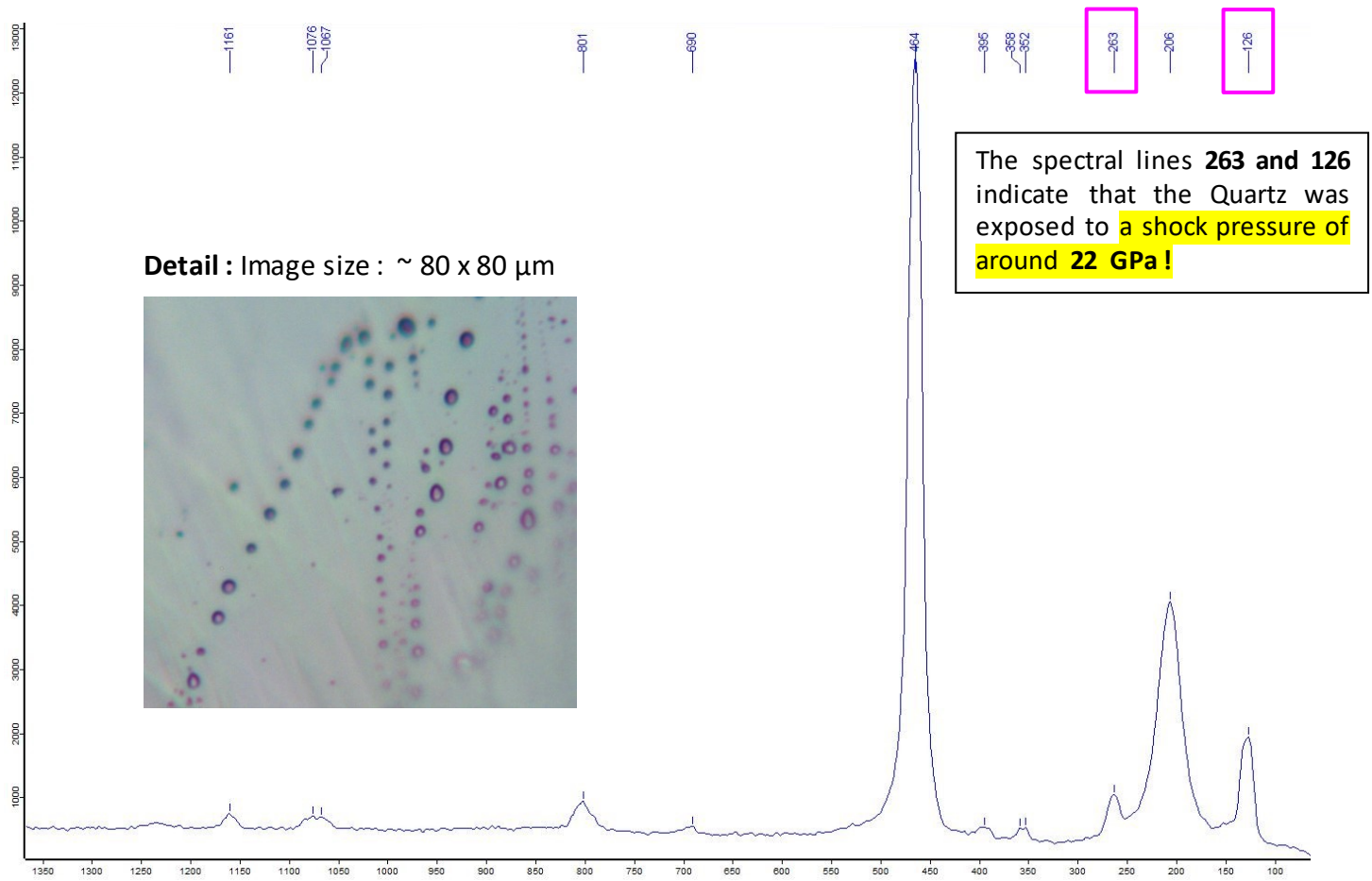
Detail : Image size : ~ 100 x 75 μm



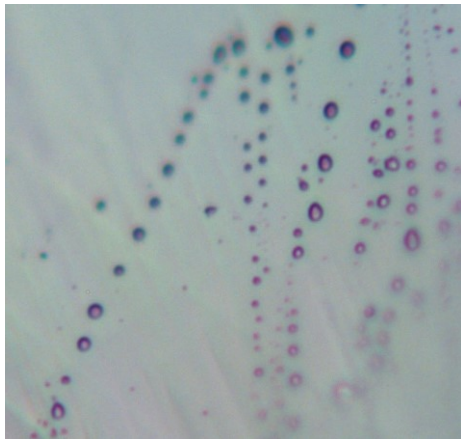
Sample Site **7-B** : Stone 1_spectra 1 indicates : **Quartz**



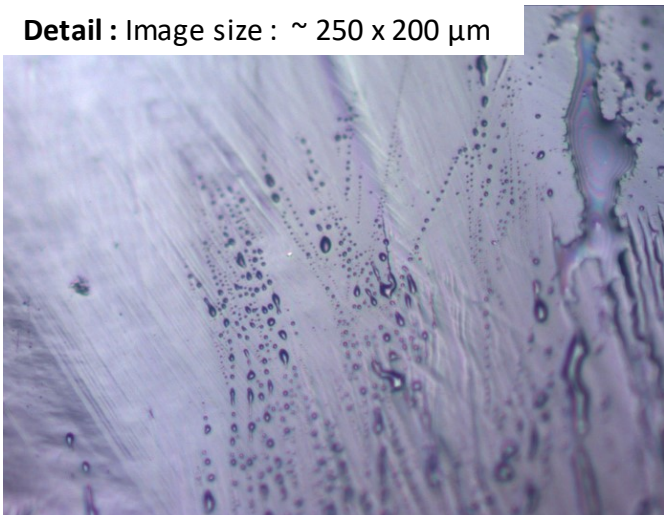
Sample :



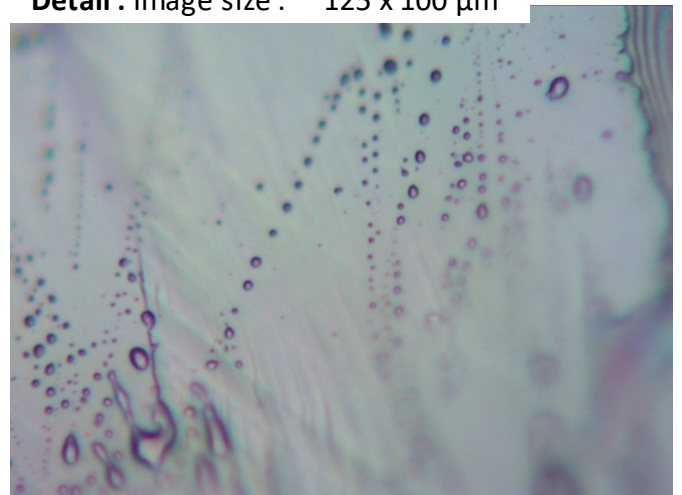
Detail : Image size : ~ 80 x 80 μm



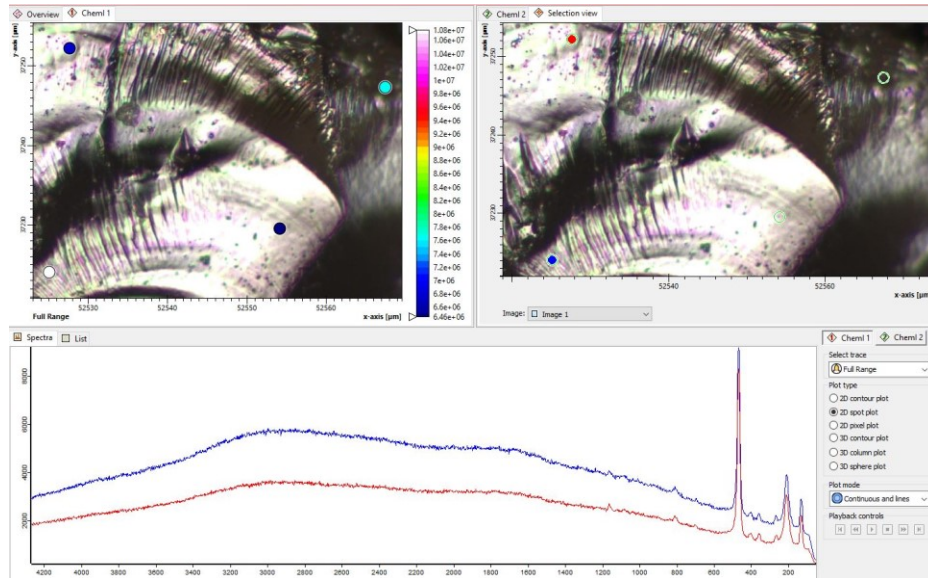
Detail : Image size : ~ 250 x 200 μm



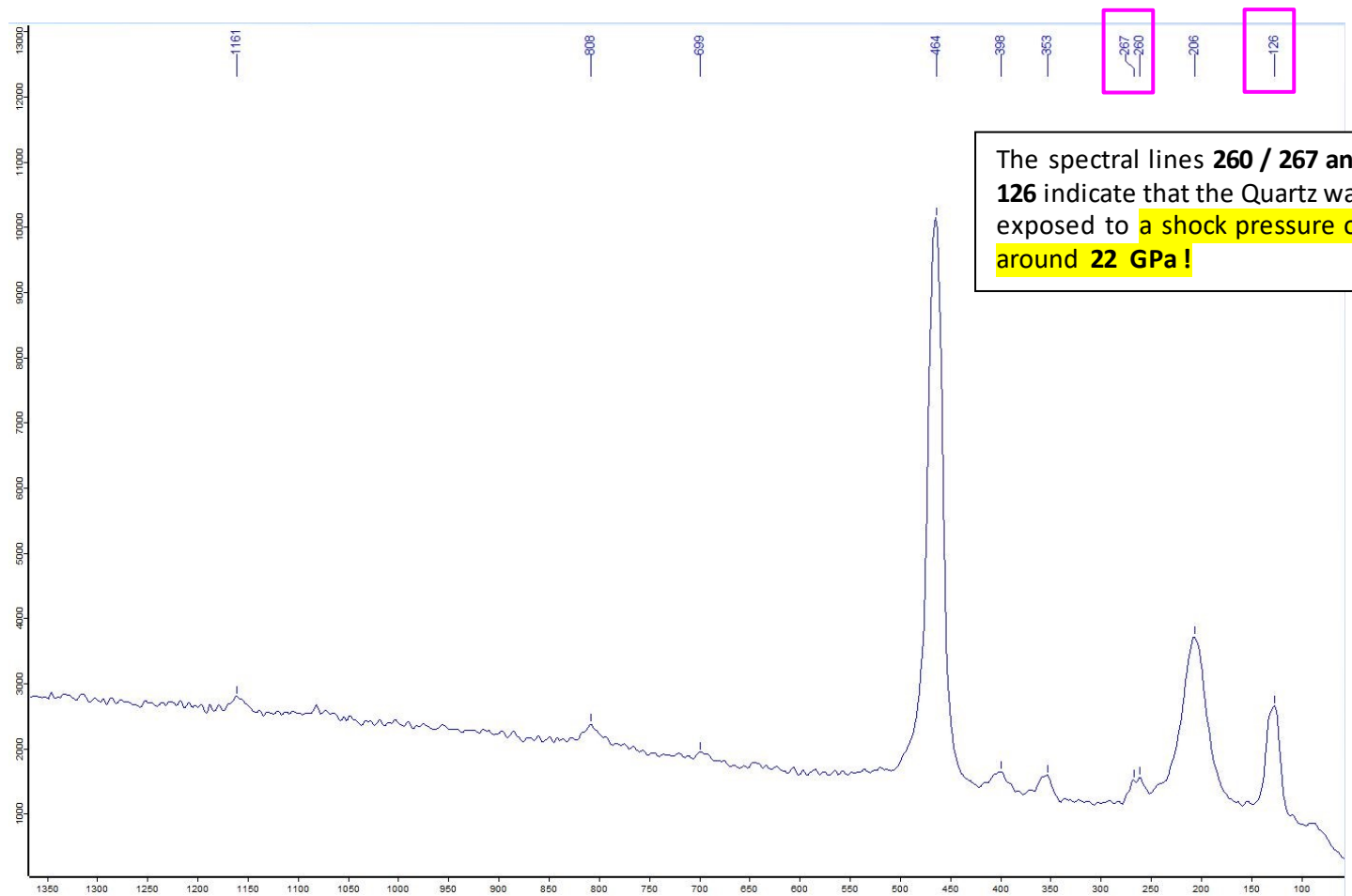
Detail : Image size : ~ 125 x 100 μm



Sample Site 4 : Stone 1_spectra 1 indicates: Quartz

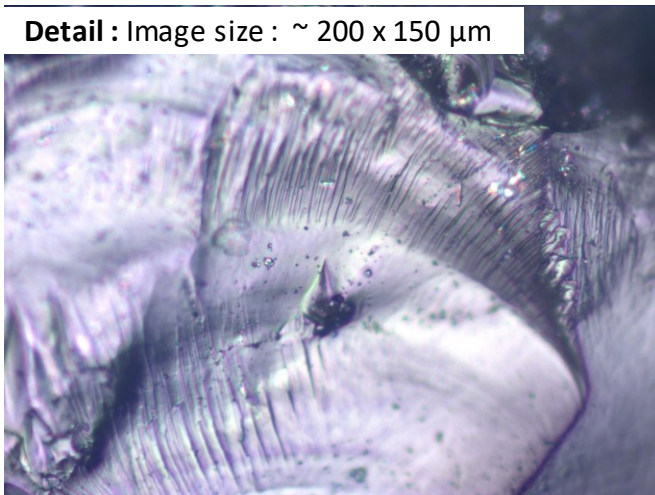


Sample :

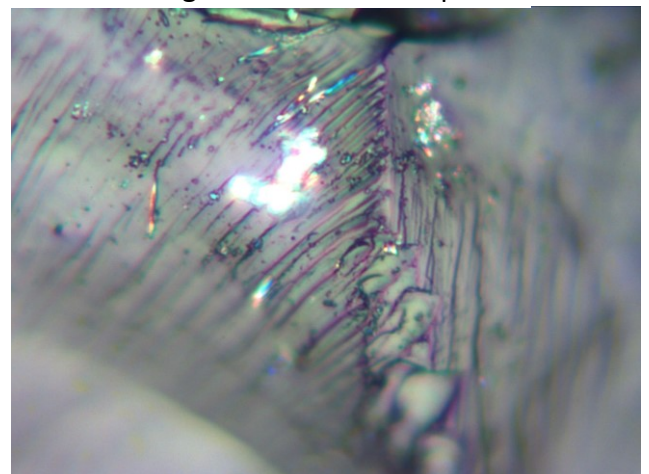


The spectral lines **260 / 267** and **126** indicate that the Quartz was exposed to a shock pressure of around **22 GPa** !

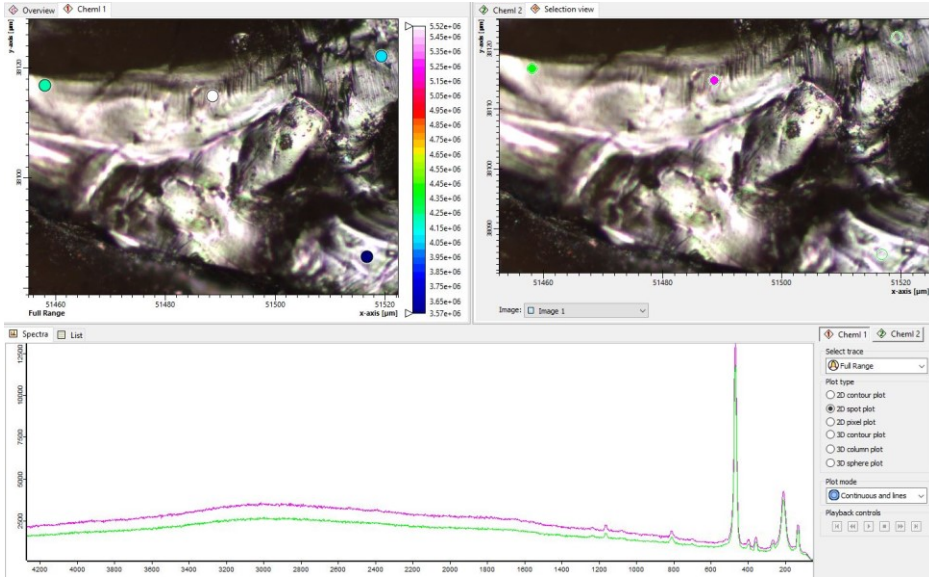
Detail : Image size : ~ 200 x 150 μm



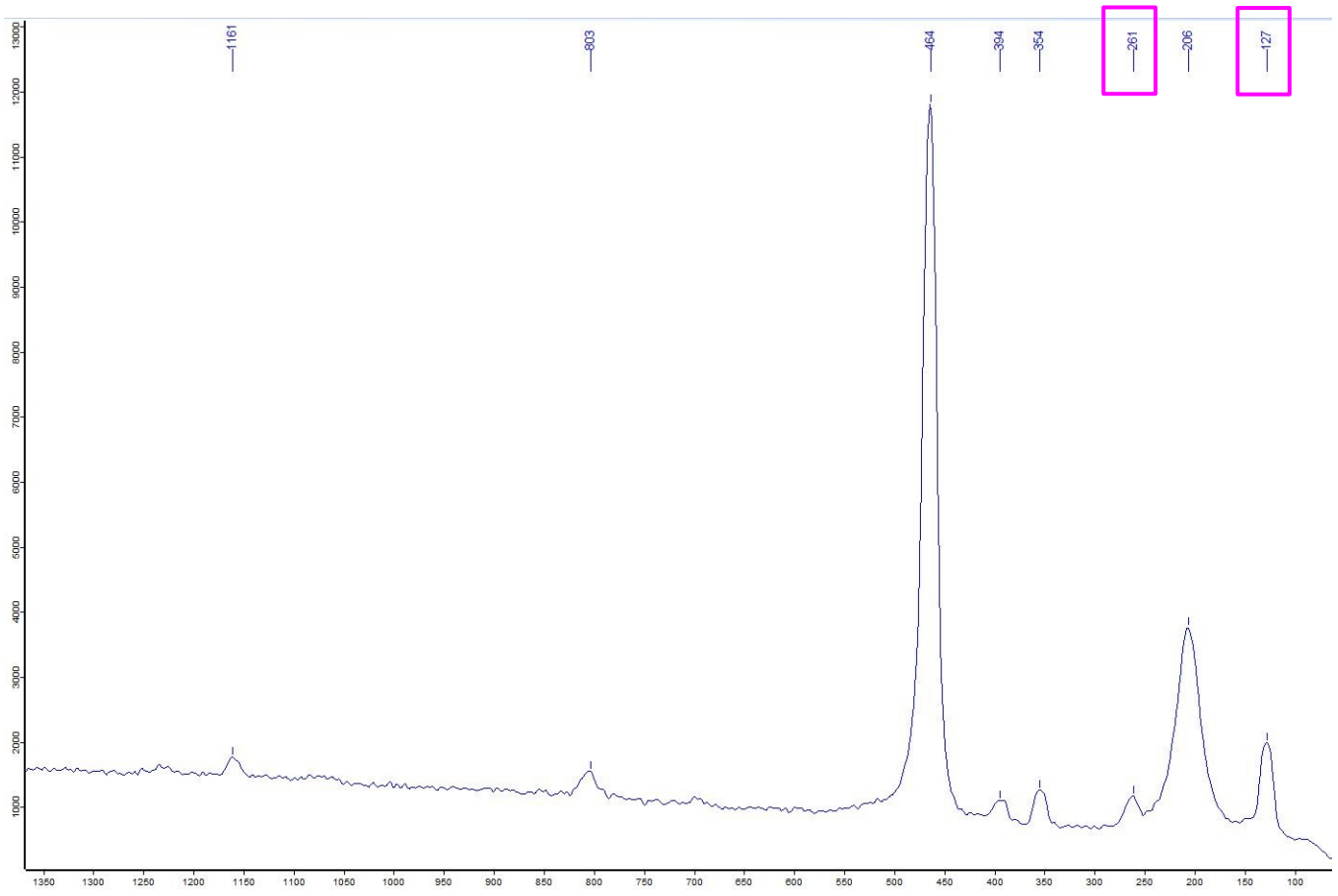
Detail : Image size : ~ 100 x 75 μm



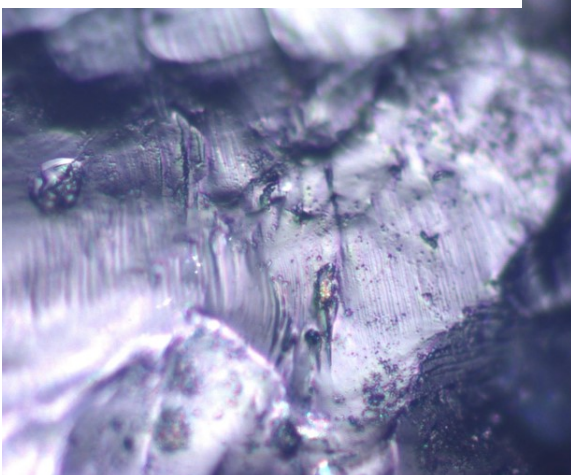
Sample Site 3: Stone 1_spectra 1 indicates: Quartz



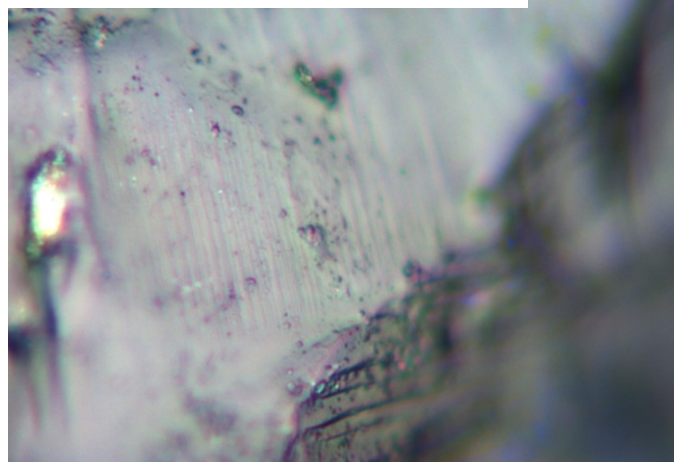
Sample :



Detail : Image size : ~ 150 x 150 μm

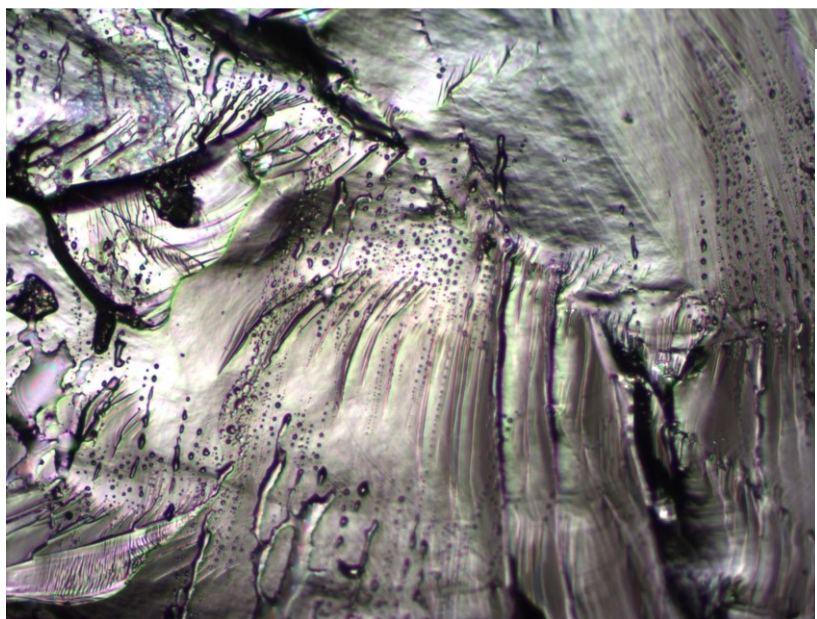


Detail : Image size : ~ 90 x 75 μm

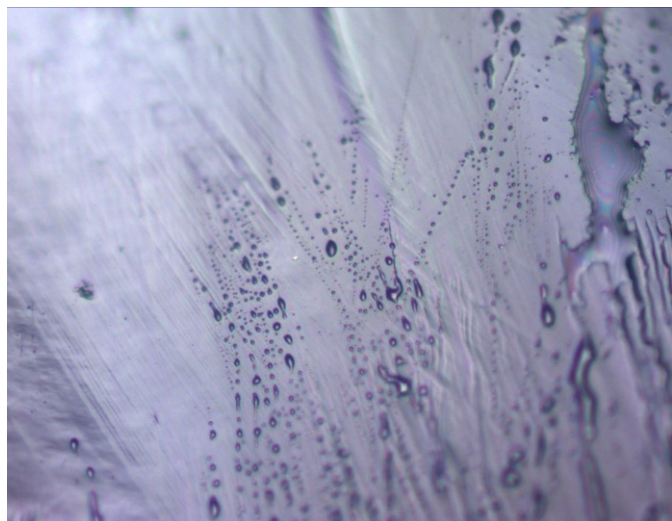


Microscopic Images : Sample from Site 7-B, 4 and 3 → original state (no preparation for analysis)

Sample Site 7-B : Stone 1 : Quartz (Image ~ 500 x 400 μm)



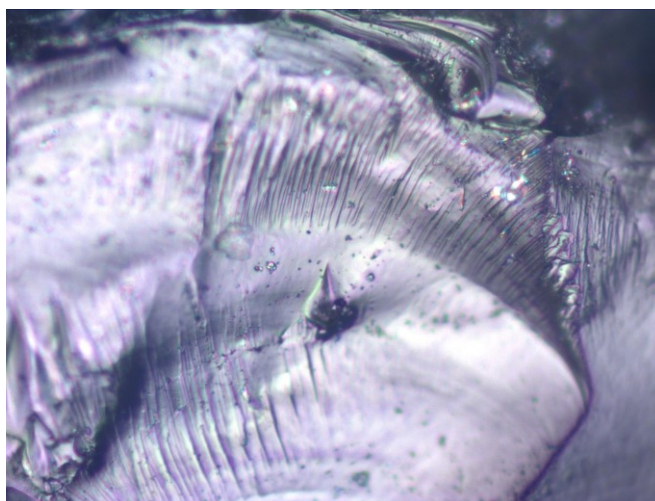
Detail : Image size : ~ 250 x 200 μm



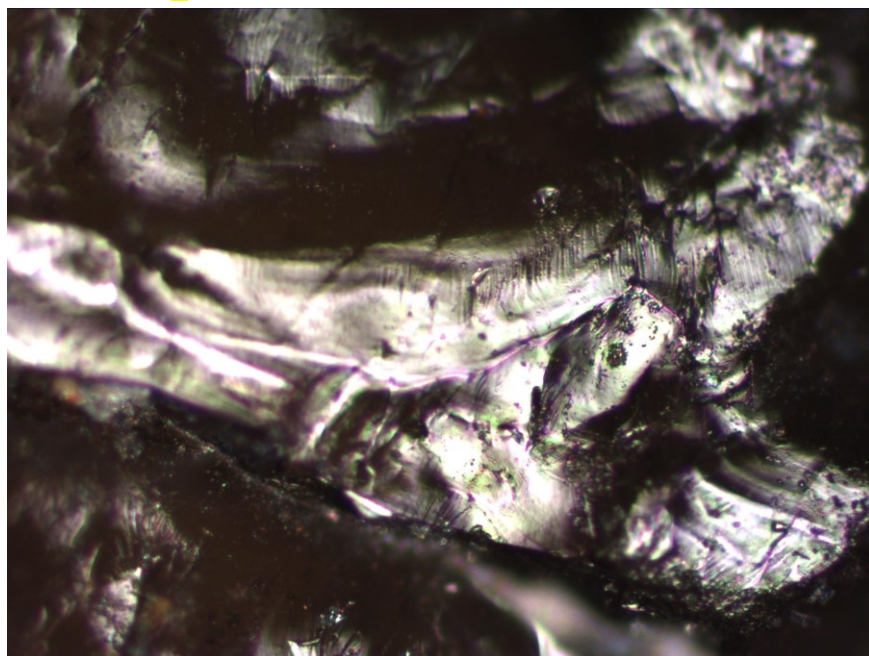
Sample Site 4 : Stone 1_Spec 1 : Quartz (Image ~ 300 x 250 μm)



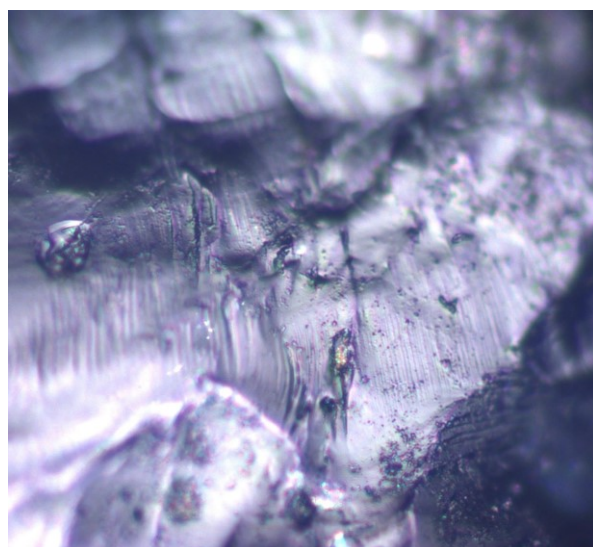
Detail : Image size : ~ 200 x 150 μm



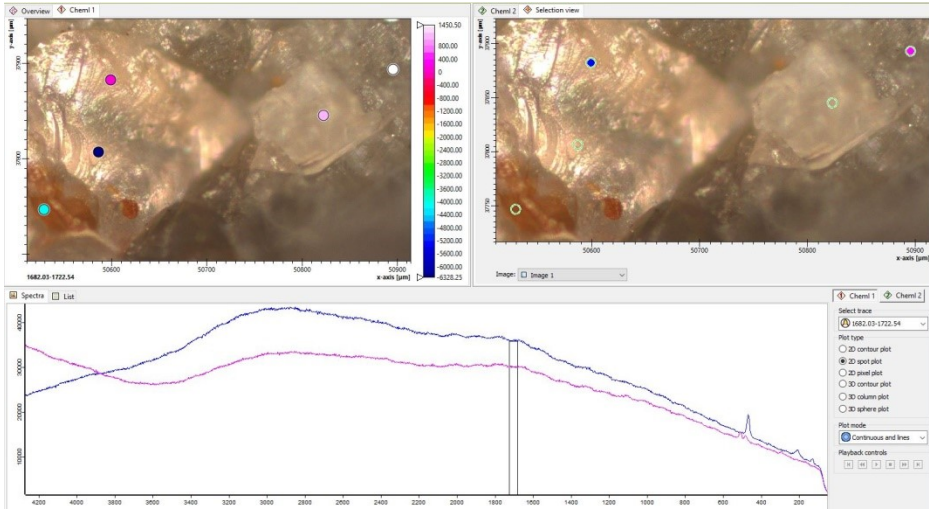
Sample Site 3 : Stone 1_Spec 2 : Quartz (Image: ~ 400 x 300 μm)



Detail : Image size : ~ 150 x 150 μm



Sample Site 2: Stone 2_spectra 1 indicates: Orthoclase, Labradorite



Sample :

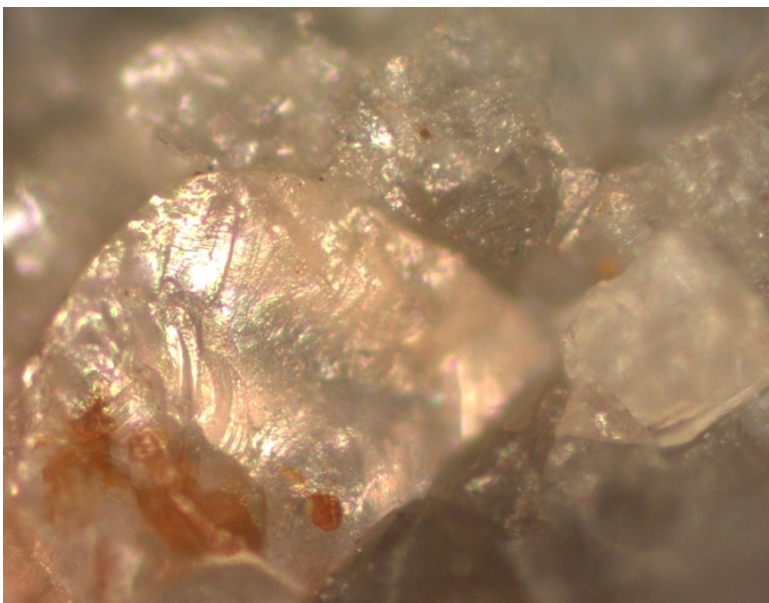
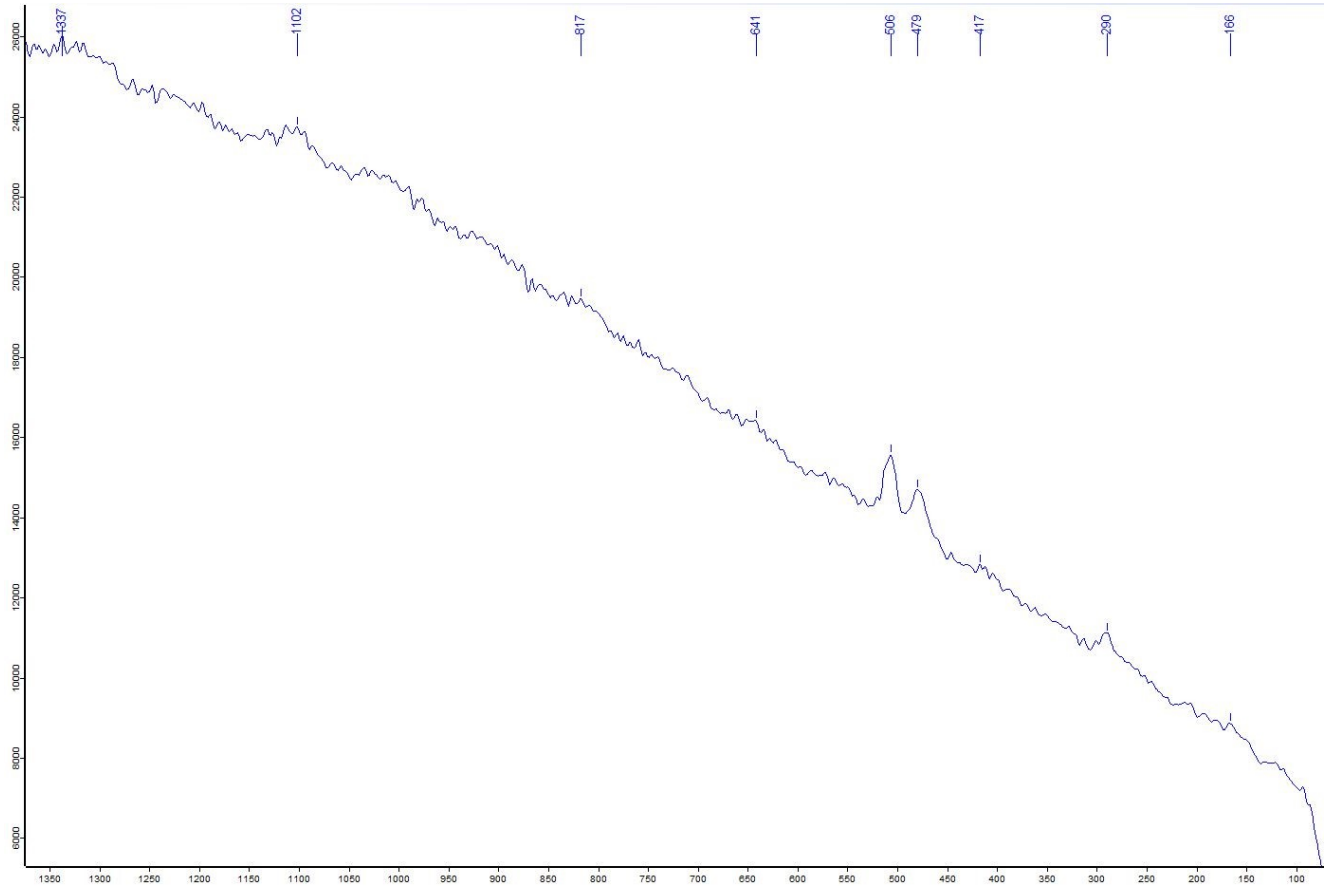
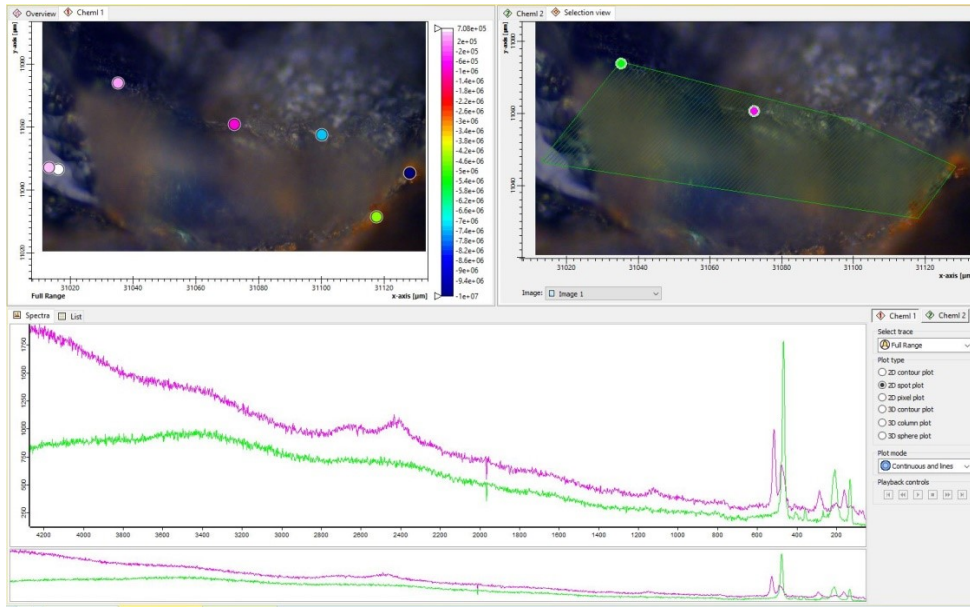


Image size : ~ 400 x 300 µm

Sample Site 3 : Stone 1_spectra 1 indicates : **Orthoclase**

(→ see RRUFF_CS results)

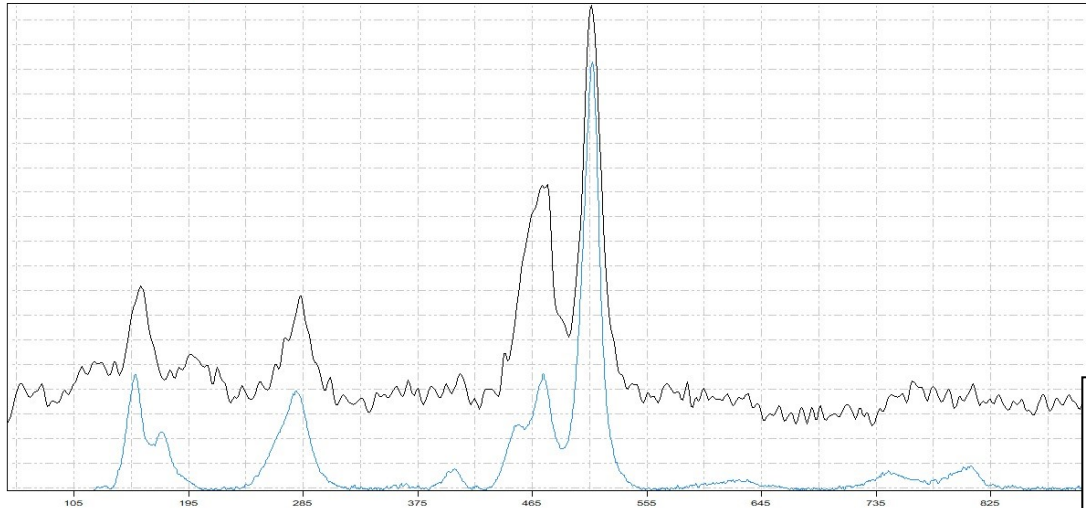


Sample :



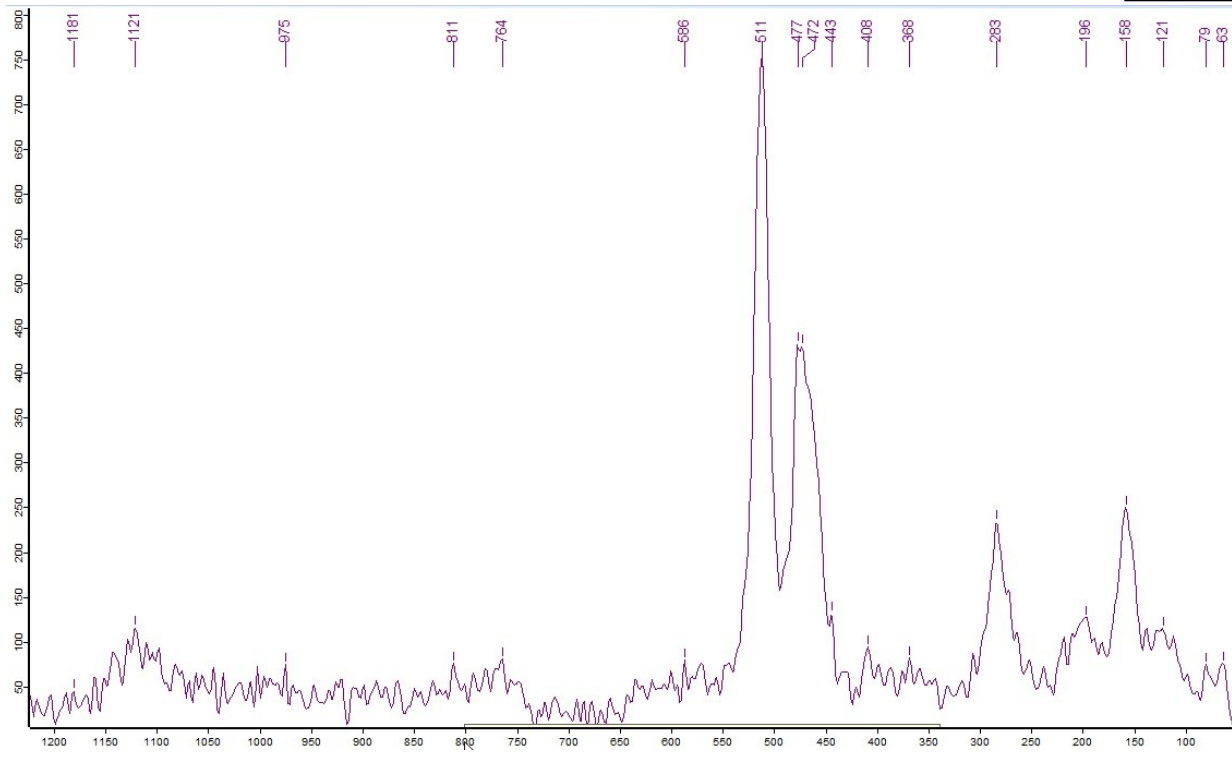
CrystalSleuth: EXTRACT_3-MARIV_stone1.0_000000.0

File Edit Mode Help



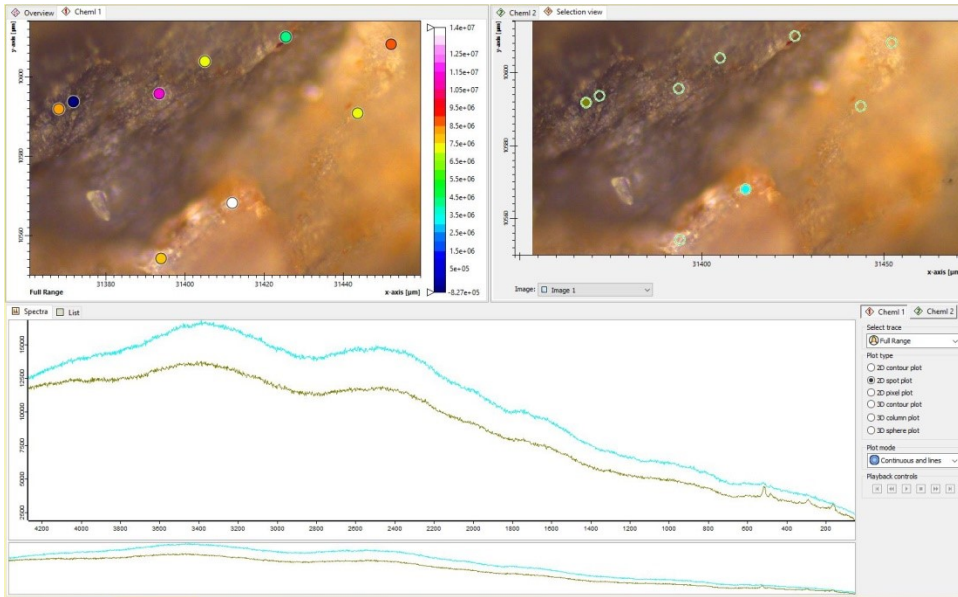
% Match:	Spectrum Name:	RRUFF ID:
90	<) Orthoclase (532nm)	R040055
90	Orthoclase (532nm)	R050185
89	Orthoclase (532nm)	R060077
88	Orthoclase (532nm)	R070001
88	Orthoclase (532nm)	R050367
87	Microcline (532nm)	R050054
87	Microcline (532nm)	R050193
87	Microcline (532nm)	R040154
86	Labradorite (532nm)	R050104
85	Microcline (532nm)	R050150
83	Oligoclase (532nm)	R070268
83	Anorthoclase (532nm)	R060054
82	Labradorite (532nm)	R060271

Note the similarity to Orthoclase from Madagascar !!
 → The African-Plate-area from which Australia was cut-off !



Sample Site 3 : Stone 2_spectra 1 indicates : **Orthoclase, Labradorite**

(→ see RRUFF_CS results)

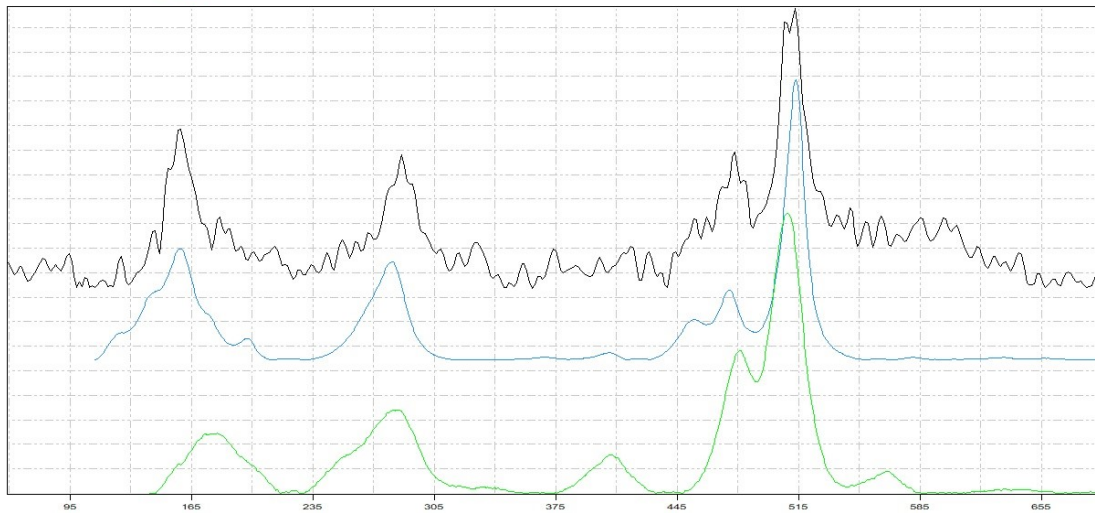


Sample :



CrystalSleuth: EXTRACT_3-MARIV_stone2.0_000008.0_NK_Y

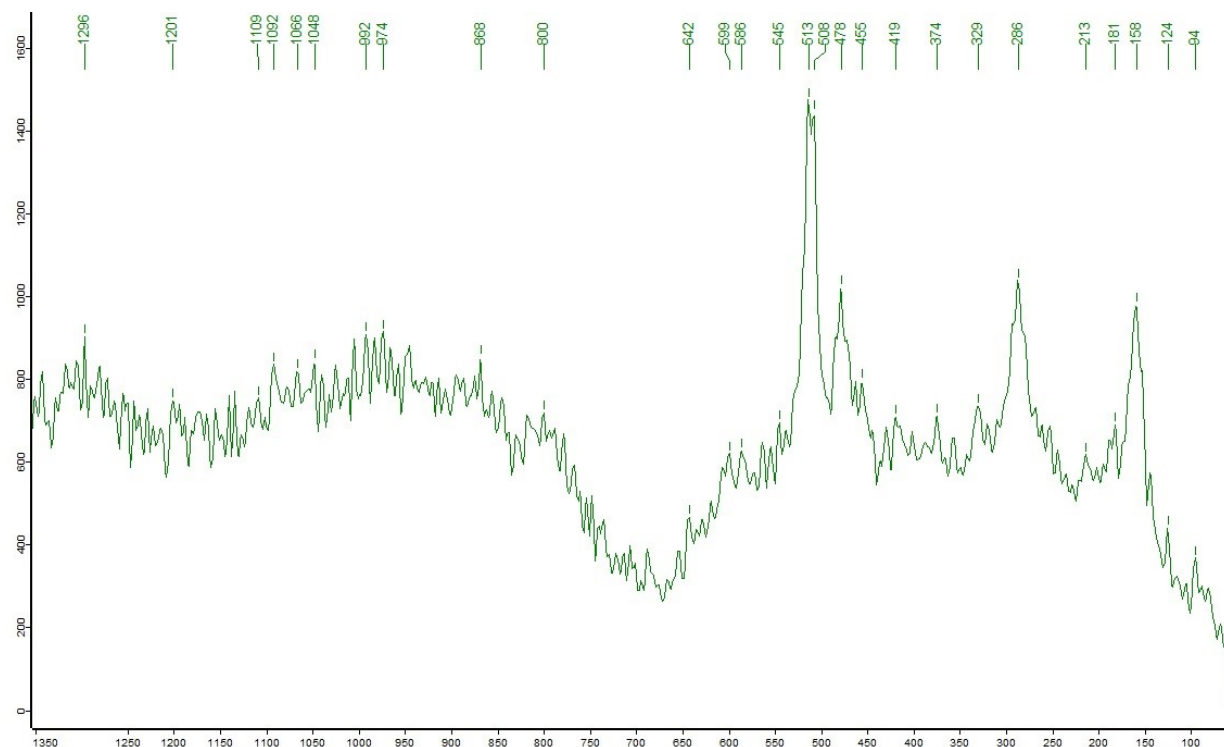
File Edit Mode Help



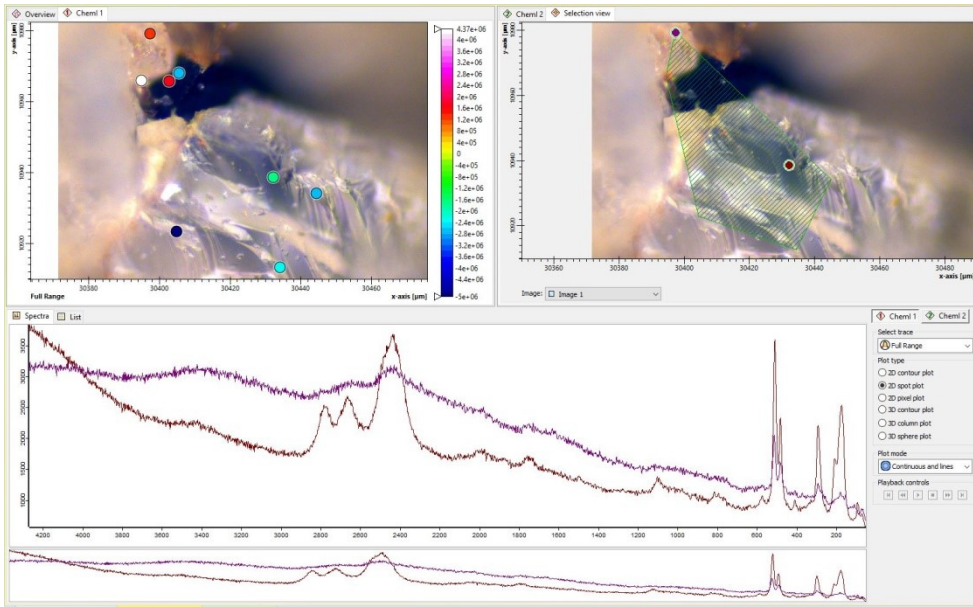
% Match:	Spectrum Name:	RRUFF ID:
87	Orthoclase (532nm)	R060077
86	Orthoclase (532nm)	R050367
86	Orthoclase (532nm)	R040055
86	-) Labradorite (532nm)	R050104
85	Anorthoclase (532nm)	R060054
85	Orthoclase (532nm)	R050185
85	Microcline (532nm)	R050054
83	Microcline (532nm)	R040154
83	Nickelalumite (532nm)	R060573
83	Hendersonite (532nm)	R070467
83	Meta-autunite (532nm)	R050612
83	Labradorite (532nm)	R060082
83	Albite (532nm)	R050407

R060077
Orthoclase
KAIS_3_O_8_pegmatite near Minh Tien, 15 km south of Luc Yen, Vietnam

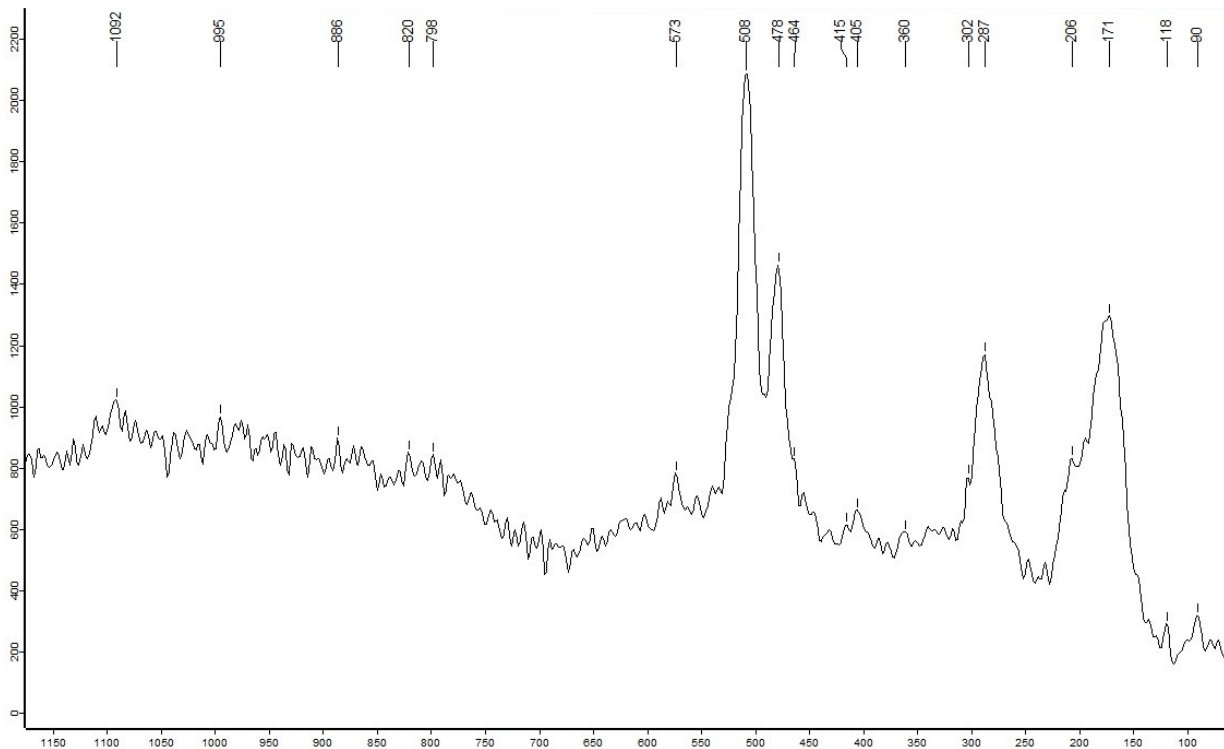
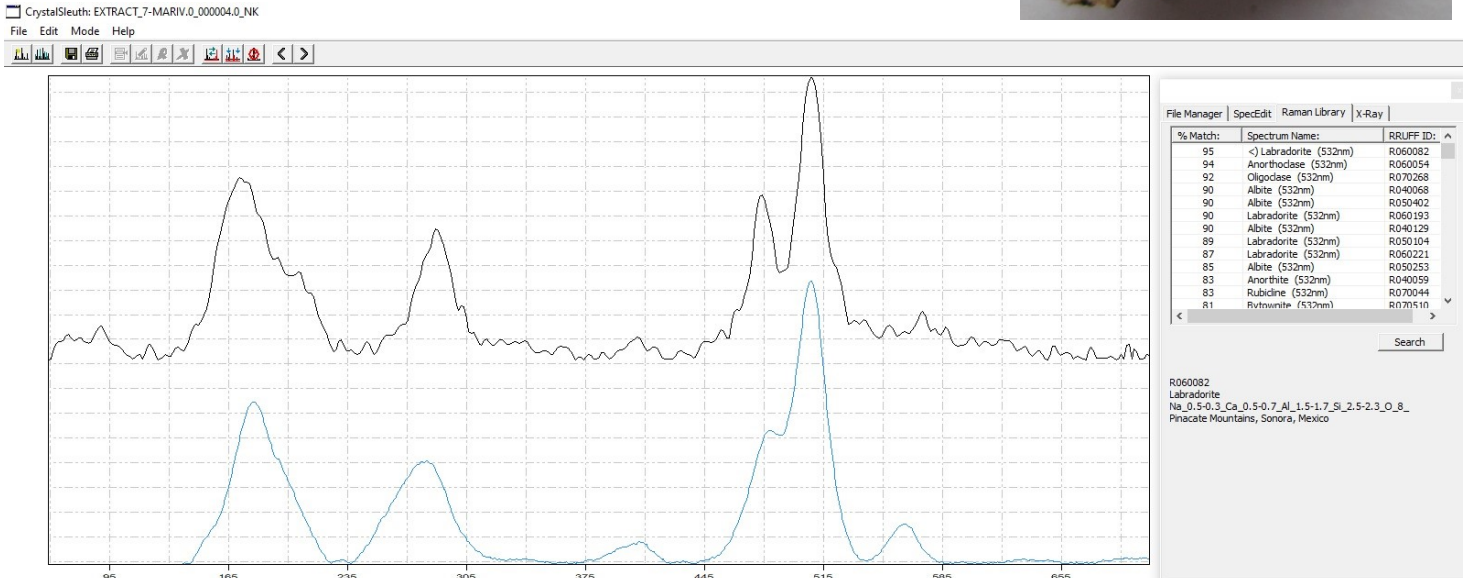
R050104
Labradorite
Na_{0.5}O-0.3Ca_{0.5}O-0.7Al_{1.5}-1.7Si_{2.5}-2.3O₈-unknown



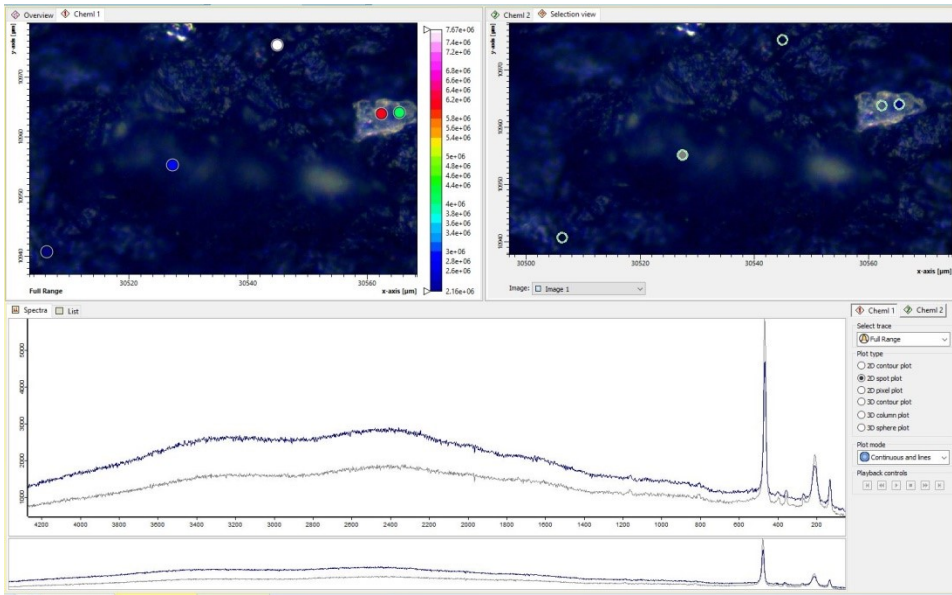
Sample Site **7-A** : Stone 1_spectra 1 indicates: **Labradorite** (→ see RRUFF_CS results)



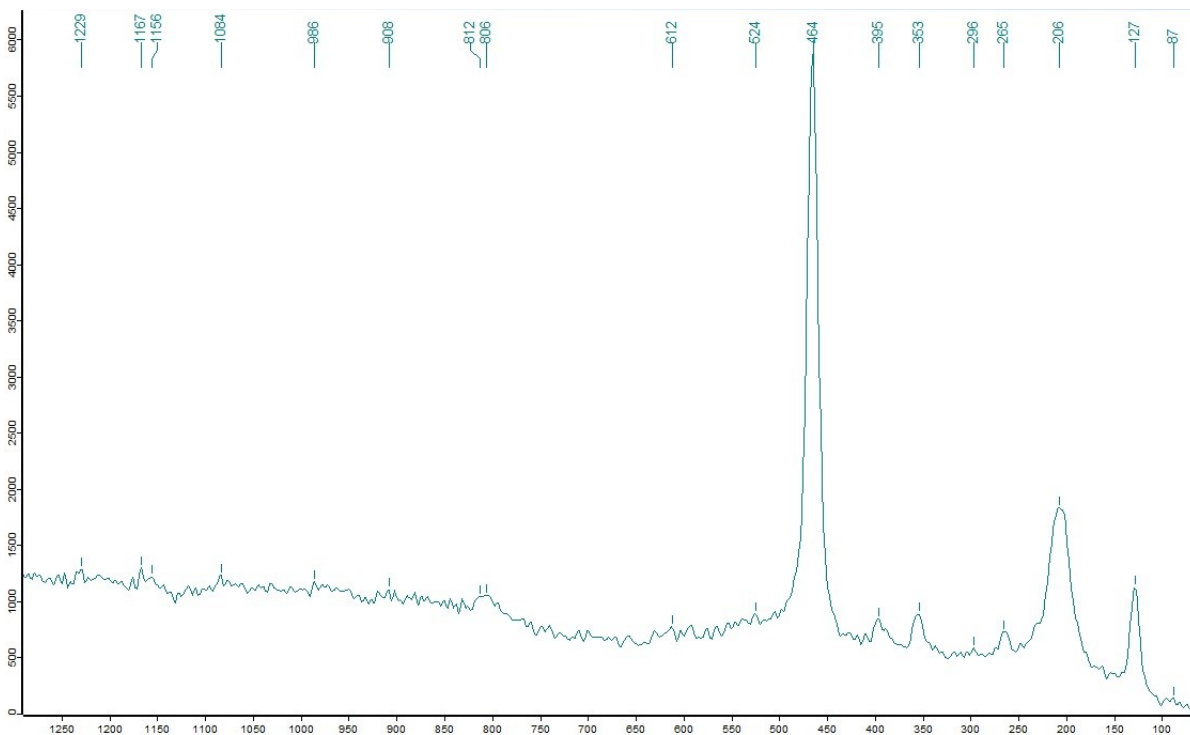
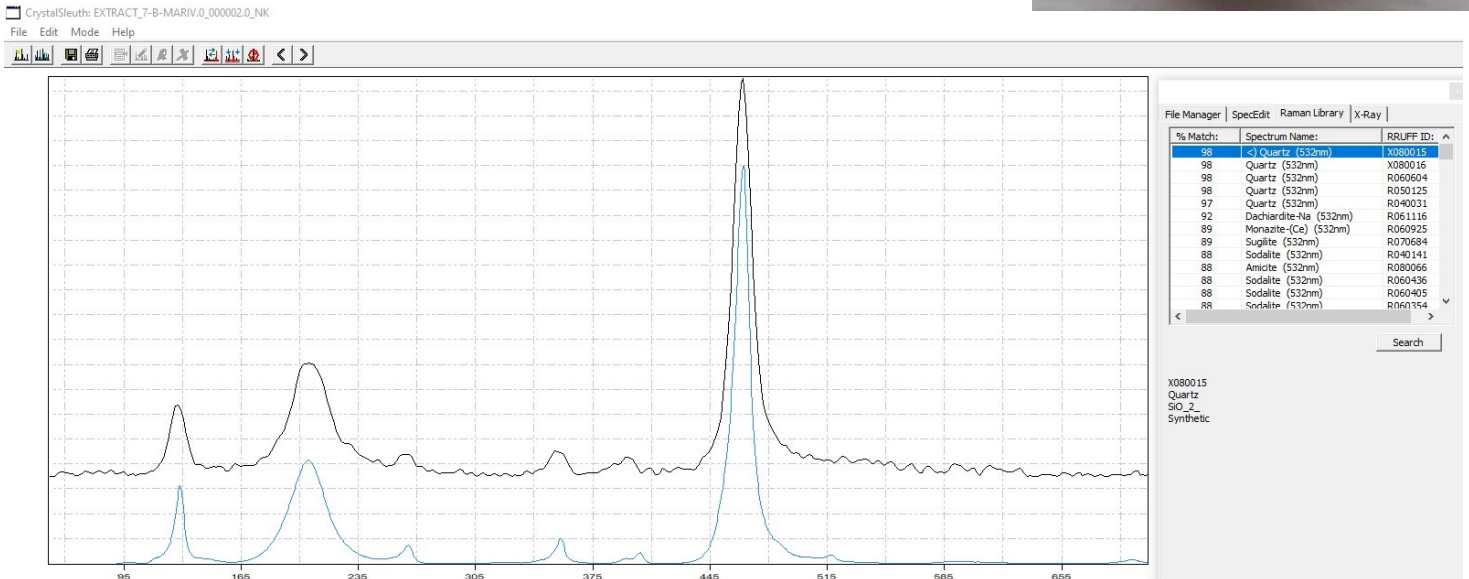
Sample :



Sample Site **7-B** : Stone 1_spectra 1 indicates: **Quartz** (→ see RRUFF_CS results)



Sample:



Appendix 1 : Photos of the rock samples from the analysed sample sites :

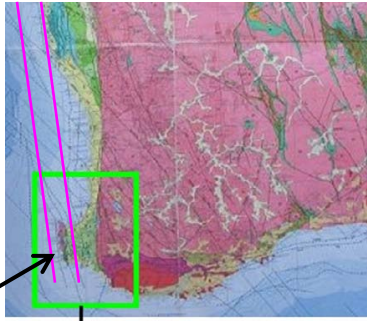
→ See next page !

Please note : Photos of all Sample Sites & Rock Samples are available on my website :

→ Samples from Margaret River Area or here : [Margaret River Area](#)

Geological Map of SW-Australia

Location where samples were collected :



Ejecta-Ray R4

Margaret River area

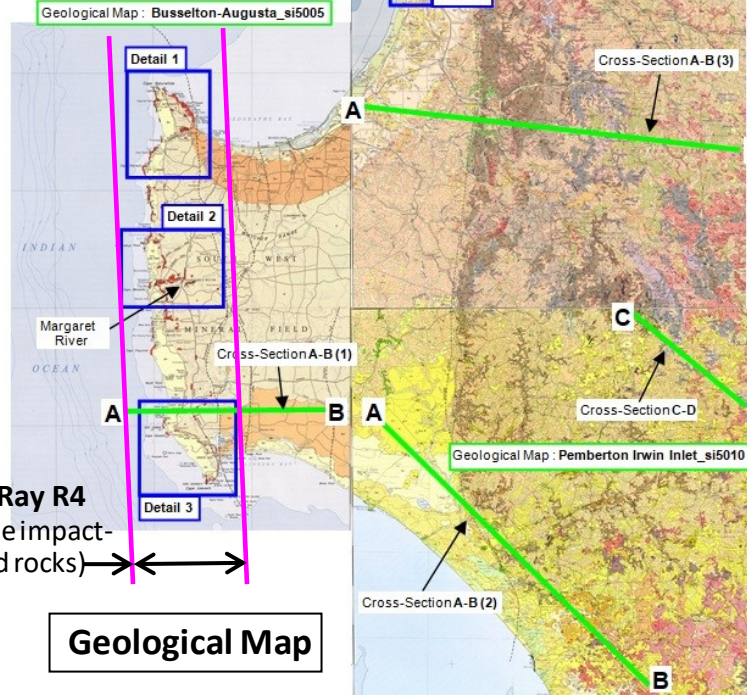
→ Geological Maps can be downloaded here :

<http://www.geoscience.gov.au/> → go to "Geology"

→ 1:250K Geological Maps and search for required map

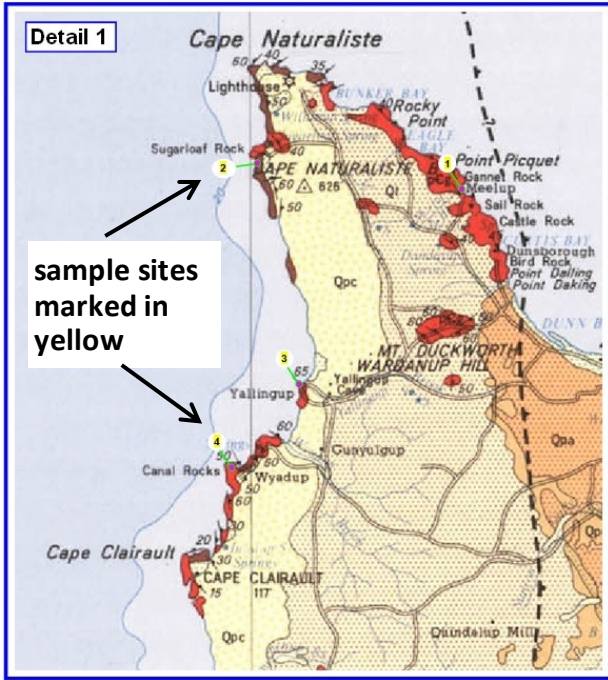
Margaret River area

3 Geological Maps joined :



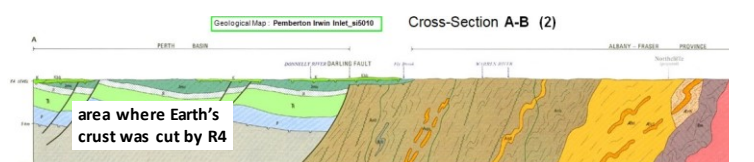
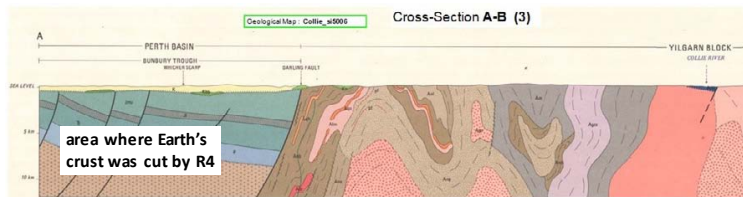
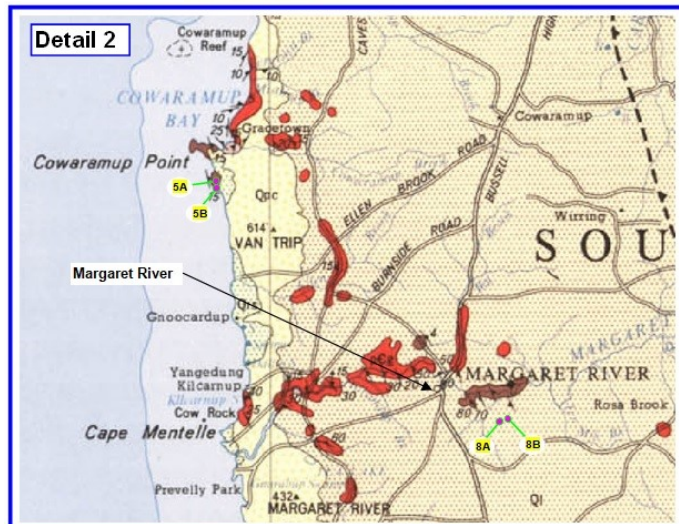
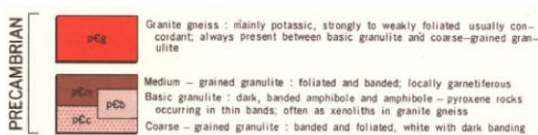
Ejecta-Ray R4 (possible impact-affected rocks)

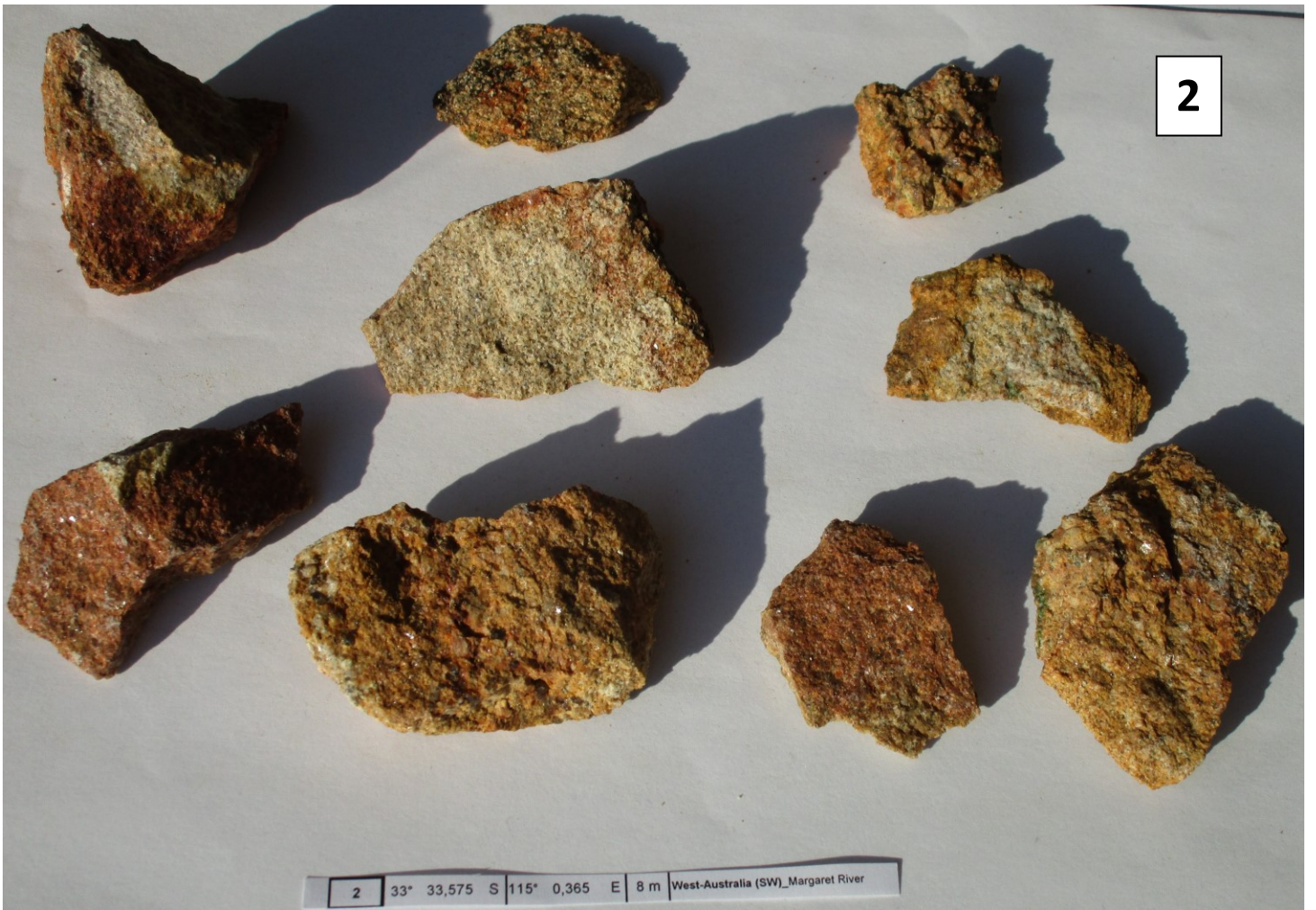
Geological Map



sample sites marked in yellow

Rock-types collected along the coast :





5

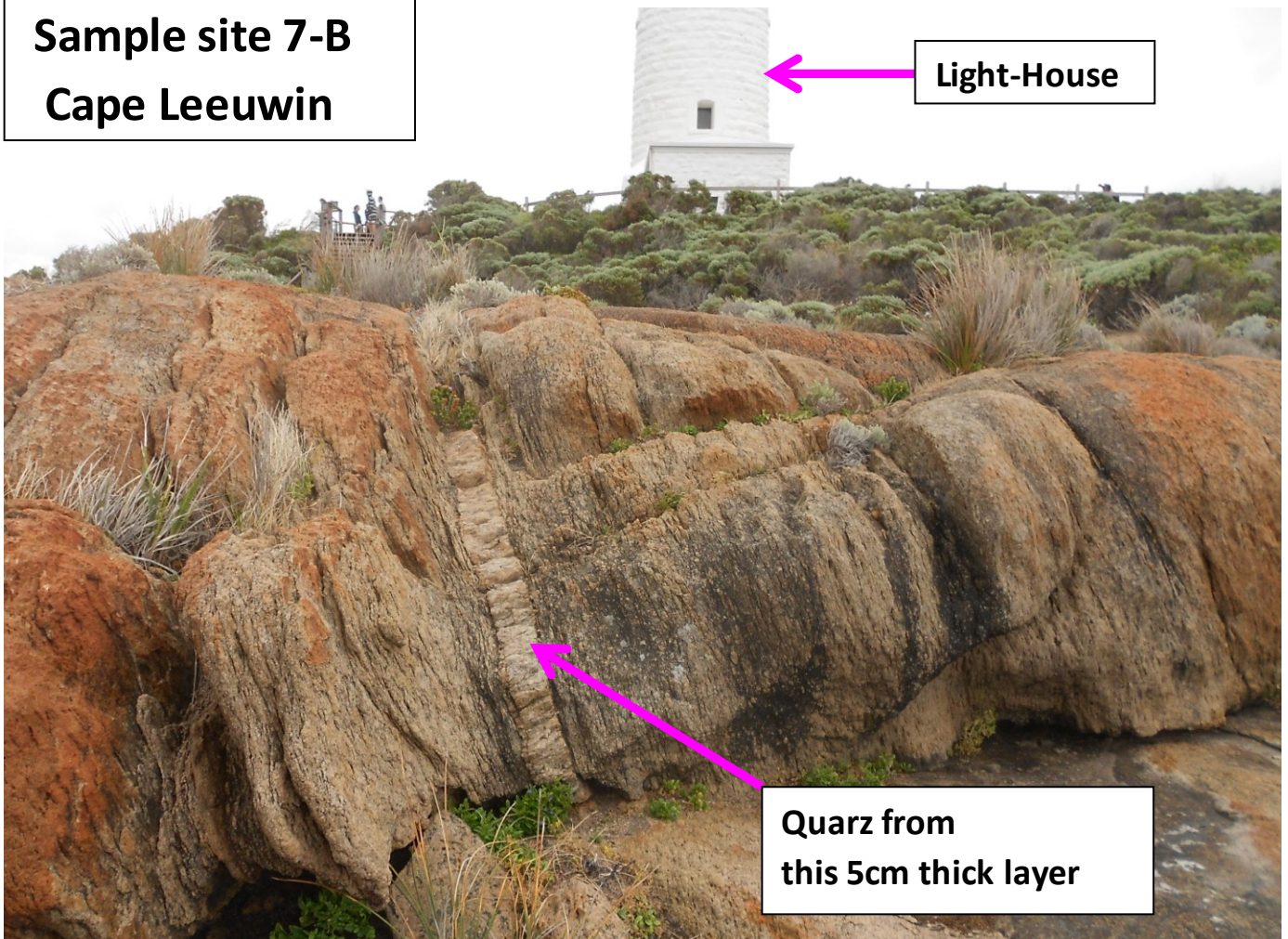


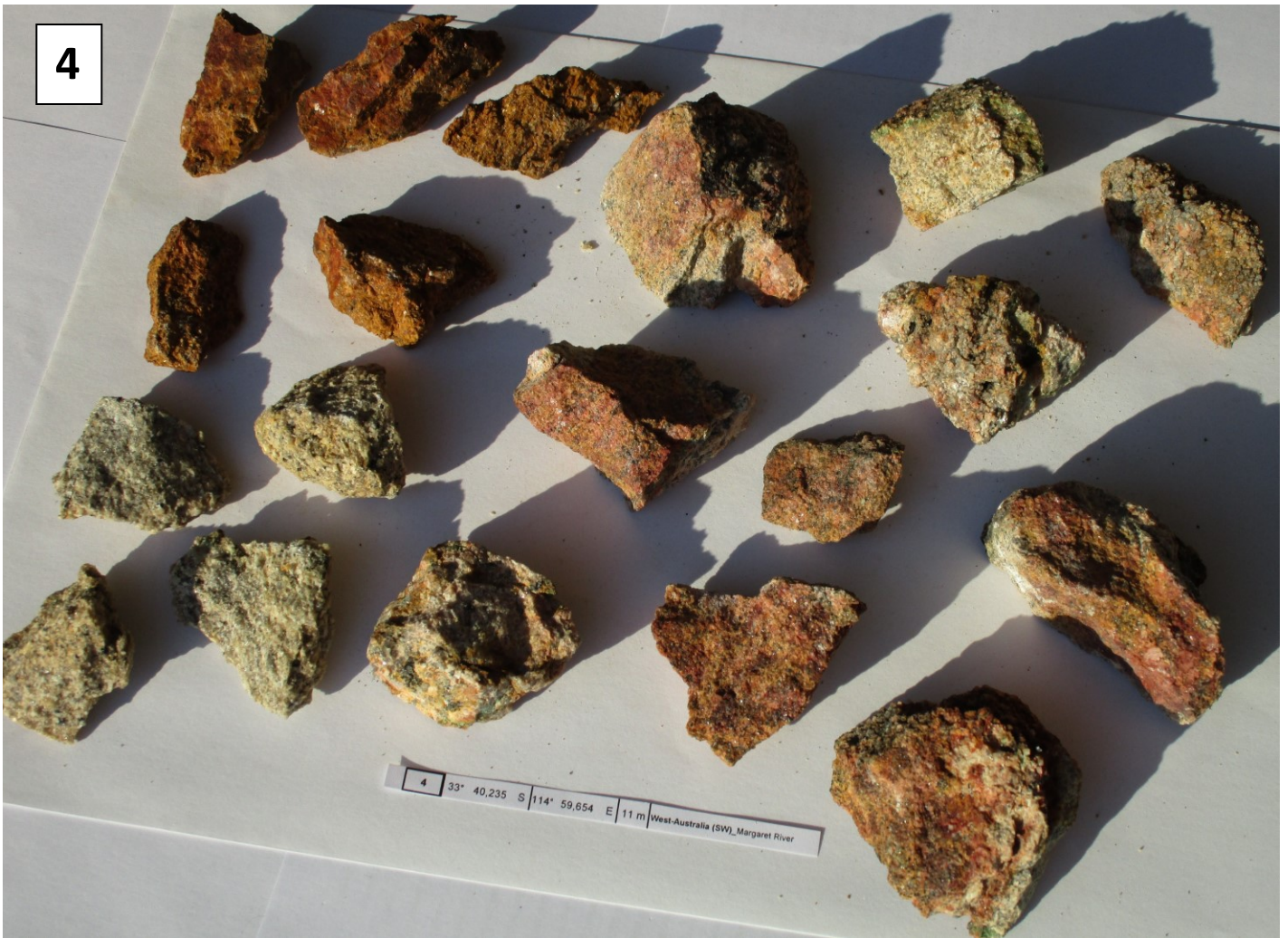
Sample site 5-B





**Sample site 7-B
Cape Leeuwin**





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

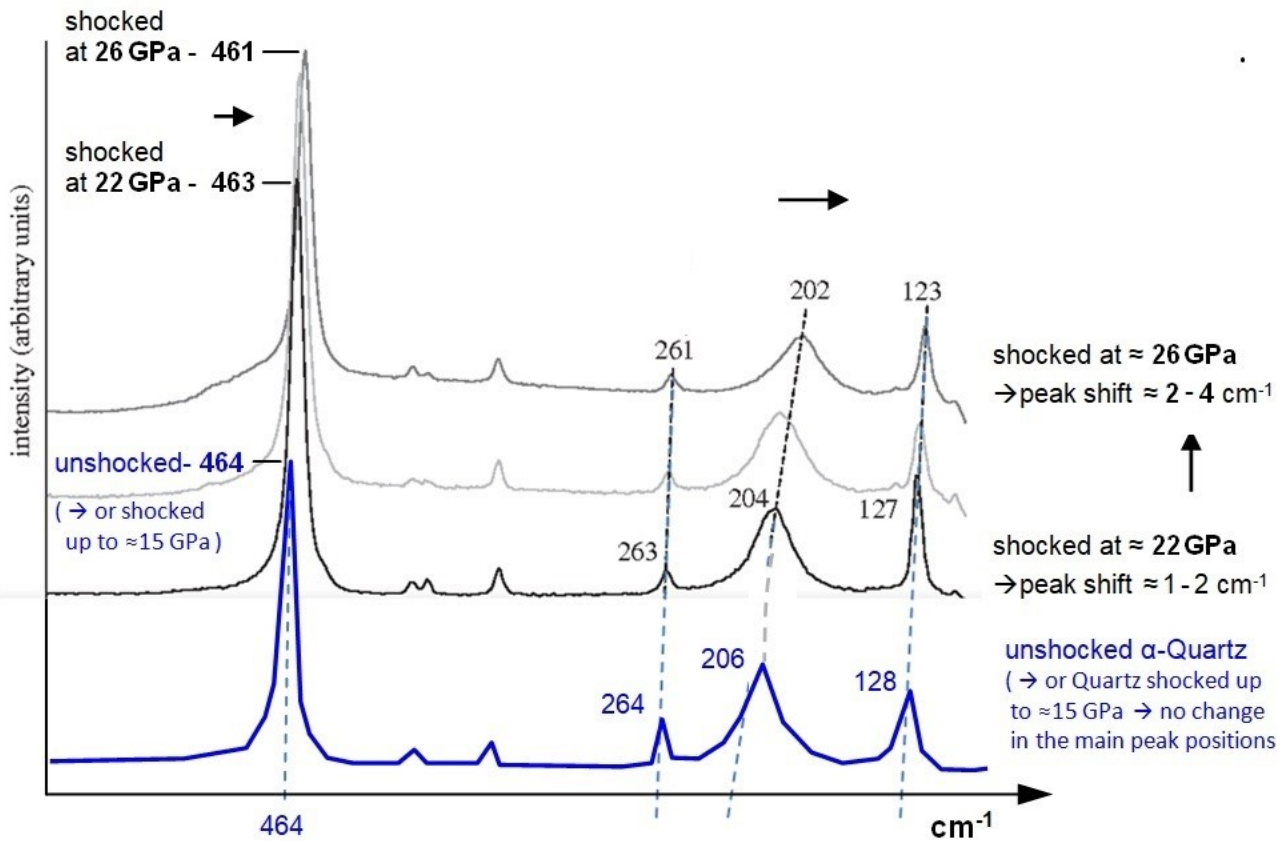
In order to verify a sample site as an impact site or impact structure, [shock-metamorphic effects](#) must be discovered in the rocks of the sample site. This can be done by different methods.

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.

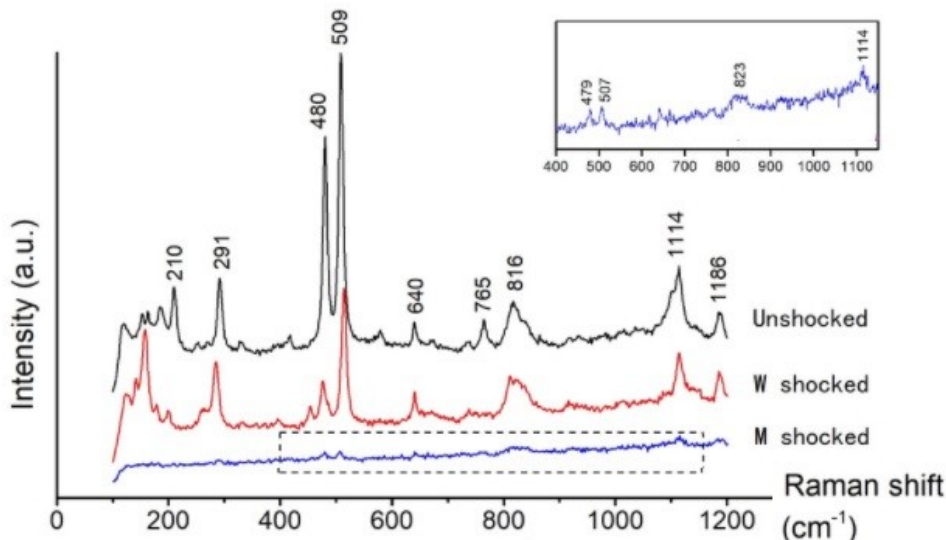
Mc Millan et al. (1992) and others have shown that the main RAMAN-peaks of Quartz shift towards lower frequencies if the Quartz was exposed the a shock-pressure > 15 GPa. → see diagram below

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 of Margaret River Area](#) or here: [Margaret River Area](#)

More info to the Impact-area of the Ejecta-Ray R4 of the PT-Impact in Part 2 & Part 3 of my hypothesis - by Harry K. Hahn
Please read pages 14, 19-26 of [Part 3 \(P3\)](#) & 31, 33-34 of [Part 2 \(P2\)](#) of my PTI-hypothesis → see also weblinks below!

Please also read my Raman-analyses to rock samples from the [Kalgoorlie area](#); [Southern-Cross area](#) & [Geraldton-area](#) !!
→ You can find these analyses either on www.vixra.org or on www.archive.org → under my author name : Harry K. Hahn

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

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