Mineralogical- and Geological Evidence for the Permian-Triassic Impact Event

Part 6 of my study : "**Global Impact Events are the cause for Plate Tectonics and the formation of Continents and Oceans**" - see also : **Part 1** to **Part 5** of my study

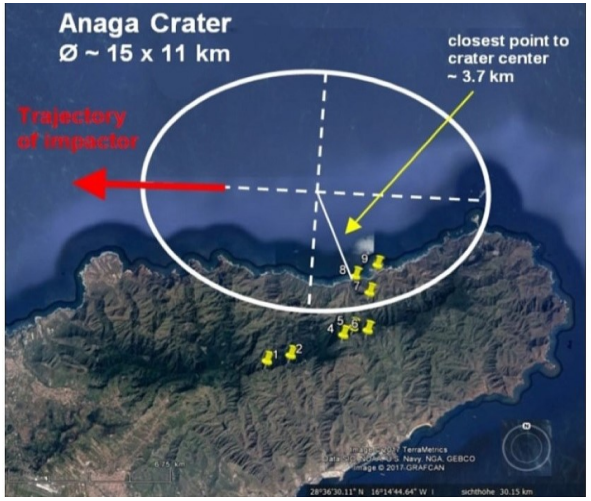
by Harry K. Hahn / Germany - **20. March 2021** - (→ see Documentation here : www.permiantriassic.de → will be active in April 2021)

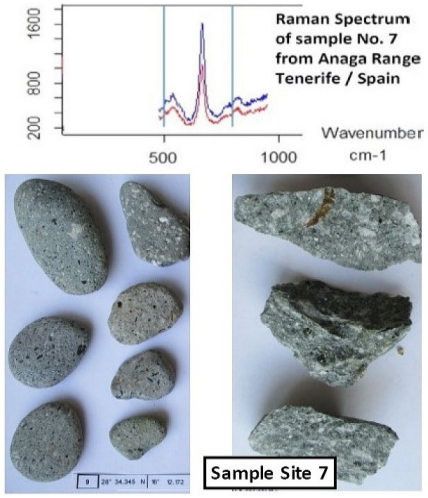
Abstract :

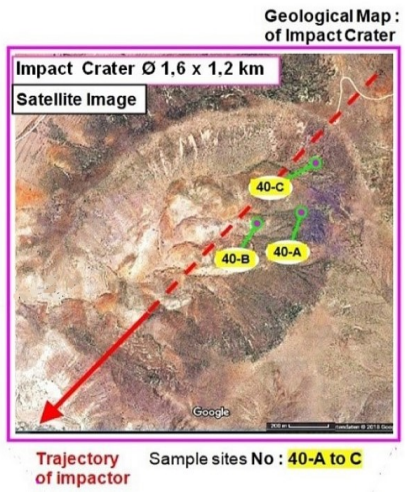
With this part of my study I want to present mineralogical evidence for my Permian Triassic Impact Hypothesis. I will do this with the help of rock samples and with the description of selected sample sites, where I have found impact breccia and impact-effected rock. In this provisional edition of Part 6, I present rock samples and evidence from five selected Secondary Craters of the PT-Impact which I have discovered, and where I believe Impact Breccia and impact-effected rock is present on certain sample sites. I have discovered other secondary craters which I will describe in an upgraded edition in a few weeks, together with a more detailed analysis of selected rock samples.

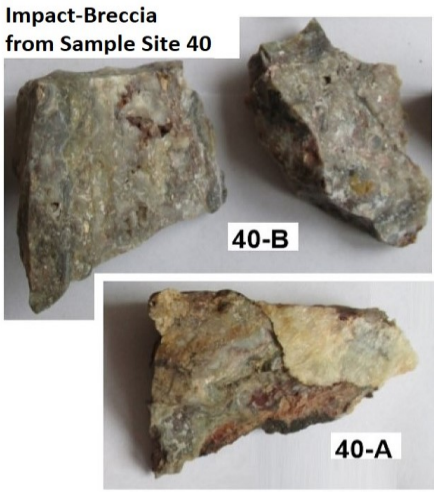
You can find images of all collected Rock Samples and of the visited Sample Sites on the following website : www.permiantriassic.de (alternative : www.permiantriassic.at)
The detailed description of the Permian Triassic (PT)-Impact Event, which formed the **Ø 1270 x 950 km PT-Impact Crater** in the Arctic Sea, and which produced hundreds of secondary-craters and –impact structures worldwide, can be found in **Part 1** of my study. In the **Parts 1 to 4** of my study I have described my Permian Triassic Impact Hypothesis mainly with the help of structural evidence, especially with the help of secondary impact-craters and –structures, found on topographic maps & satellite images, and on gravity-anomaly- & magnetic-anomaly maps. But in order to really proof and confirm my hypothesis there is geological-, geophysical- and mineralogical evidence required !

Because I have just started to analyze the most interesting rock samples of the many hundreds of samples, which I have collected over the last eight years, I can only present visual assessed mineralogical evidence at the moment, in order to proof the described Impact Craters. Please note that the Craters which I described in the Parts 1 to 4 of my hypothesis (study) are all still unknown to the geological society ! The reason for that is simple ! These craters are all "**Secondary Craters of the PT-Impact Event**" ! which were caused by ejecta material from the Permian Triassic Impact Crater in the Artic Sea. These mostly elliptical secondary craters were formed by impactors (→ejecta from the PT-Crater), which had low impact velocities of < 8 km/s, and which impacted in shallow angles of < 10° , and therefore only caused a low impact pressure of < 5 GPa in most of the ejecta material and impact-effected rock. This makes it difficult to find impact markers like impact-breccia, impact-glass, PDFs in minerals etc. ! To find impact markers for the PT-Impact Crater and for other big secondary craters please read this : **Recommended sites to proof the PT-Crater & other Secondary Craters** (alternative : **L2**)









Mid of 2012 I informed ~ 10 geologists and impact researchers (e.g. Prof. C. Koeberl, Prof. T. Kenkmann and Prof. U. Reimold) about the discovered 300 km diameter Cape-York Crater and other possible impact structures on Australia's East coast. In 2015 & 2017 I informed the above mentioned + geologists & the head office of the UNI Karlsruhe (KIT) about the discovered PT-Impact Crater. The only answer I got so far (KIT) was: My discoveries aren't explainable with the current state of geophysics

Indication and evidence for the Permian-Triassic (PT) - Impact Event coming from existing studies

A number of scientists specialized in impact research already proposed, that the Siberian Traps, the largest eruption of continental flood lavas on Earth, may be better explained by a large Impact than by a conventional mantle plume. Unfortunately the scientists haven't found the impact crater yet !

With my study (Parts 1 to 6) I want to proof that **Global Impact Events* are the primary cause for Plate-Tectonics** (and Expansion-Tectonics) on Earth and on other planets and moons of our solar system, and that such a Global Impact Event caused the formation of Continents and Oceans on Earth !

The hard evidence for the correctness of my hypothesis, will be the confirmation of the **Permian-Triassic (PT) Impact Crater** described in my study.

In the following I want to show now some extracts from a book written by the well-known impact researcher Prof. Dr. Christian Koeberl.
These extracts from the book show the existing indication and evidence for a Permian-Triassic (PT) Impact Crater. But no information is given for its location.

The title of the book : "Impact Markers in the Stratigraphic Record" – Authors : C. Koeberl & F. Martinez-Ruiz (ISBN : 3-540-00630-3)

Here the extracts from the book :

Page 29 : Siderophile element anomalies (e.g. enhanced Ir contents) were found at some P-Tr boundary locations (e.g., Holser et al. 1989). And recent research succeded in demonstrating the P-Tr boundary event was a much shorter event than thought. At Meishan, China, a negative excursion in the carbon isotopic composition had a duration of less than about 160,000 years and suggested that it could be the result of the impact of an icy carbon-rich comet.

Page 29 : Kaiho et al. (2001) reported sulfur isotope and chemical data for samples from the Meishan (China) Permian-Triassic (P-Tr) boundary section. They interpreted S-isotope data, as well as the occurrence of Fe- and Ni-rich particles, as evidence for a large-scale impact event that penetrated the Earth's mantle and formed a crater approximately **1000 km** in diameter.

A number of scientists pointed out that the Sibirian Traps cannot be the result of a mantle plume
(e.g. Czamanske et al. 1998, Sharma 1997, Elkins-Tanton and Hager 2000)

Page 109 : An impact event is also supported by evidence from extraterrestrial noble gases in fullerenes found in P-Tr boundary beds in China, Japan, Hungary.

Page 109 : Because there is a similar duality of signals between likely volcanic and impact sources at the P-Tr boundary, similar to the K-T boundary, the hypothesis of Impact Researchers should be tested, which claims that the Siberian Traps could have been caused by decompression melting at the impact site. And that impact volcanism can uniquely explain the dual signals in the geological record.

Page 110 : An indicative model of Impact Researchers shows that it is possible for the volume of decompressed mantle beneath a large ~ 200 km sized crater to greatly exceed the excavated volume of the impact crater itself, primarily due to reduction of lithostatic load. Under suitable conditions of geothermal gradient, this would lead to near instantaneous melting with volumes of the order of 10^6 km^3 , similar to the characteristic volumes of LIP's.

Page 110 : And the induced large-scale vertical and horizontal thermal gradients are expected to have a long-term effect on secondary mantle flow.

Page 111 : Decompression melting may contribute more melt than conventional shock melting.

Page 111 : We propose that the Siberian Traps, which are accessible and currently under considerable scrutiny, may be better explained by a large impact than by a conventional mantle plume. The closure of a former ocean between Siberia and Mongolia, as well as amalgamation with north and south China blocks may also have been occuring during Permian-Triassic times. (→ These events were the result of the P/T-Impact Event !! → comment from Harry.K.Hahn)

Page 97 : Decompression melting must be seriously considered whenever an impact is sufficiently large to cause the transient crater depth to excavate a substantial fraction of the local crustal thickness, and thereby cause a sudden drop in lithostatic pressure beneath the crater.

→ Geological- & Mineralogical Evidence (rock samples) from five possible Secondary Craters of the PT -Impact Event

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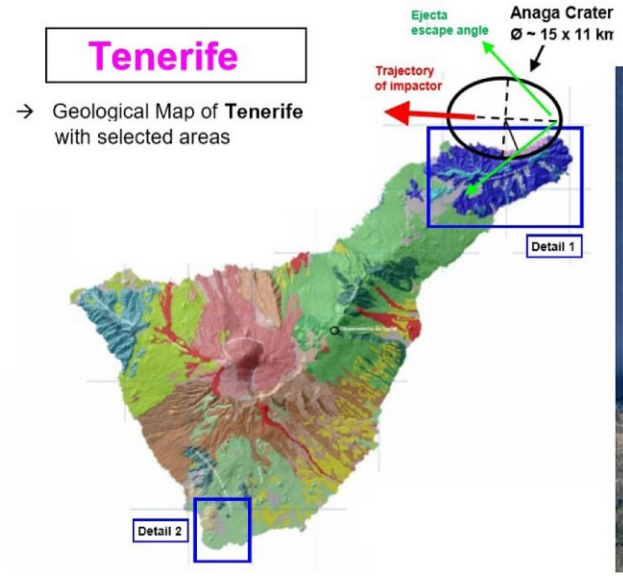
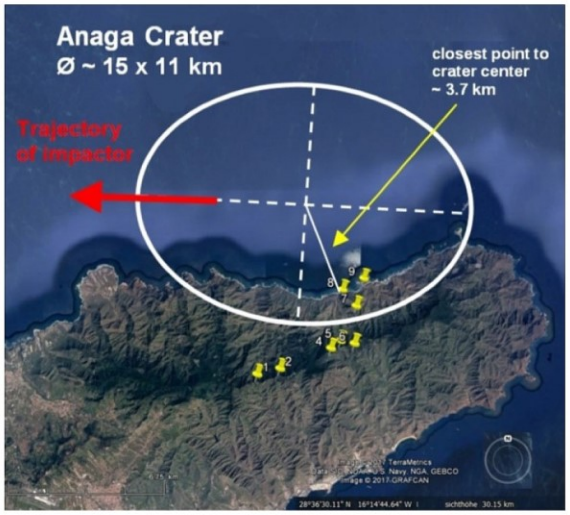
1.) The Ø 15 x 11 km "Anaga Crater" on Tenerife (Canary Islands) :

Mineralogical evidence for this Impact : Suevite & Impact Breccias found on the sample sites 7 and 9 :
Photos of the Sample Sites and Rock Samples are available here : ► **Rock-Samples - Tenerife 1 (& GC 1)** (No. 7 & 9)

A Raman-spectrum taken from the **black-glass inclusions** in the Suevite shows strong similarities to a spectrum of Muong-Nong-type Tektites (impact-glass) from China. I found the Suevite and Impact Breccia on two locations which are close to the estimated center of the impact crater.
The distance to the estimated crater center is around 4 km from these two locations (sample sites 7 & 9).

Strong indication for an impact event also comes from the fracture pattern in the Anaga Range, which shows an area effected by compression stress and an area effected by tensile stress, separated by a curved rift zone.





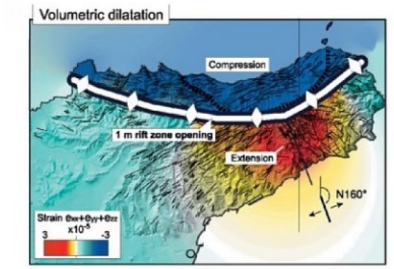
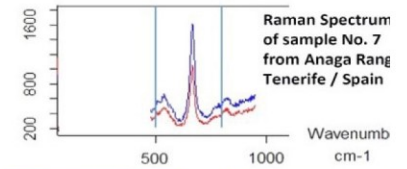


Fig. 7 Dislocation models calculated at a horizontal plane. A segmented rift zone was defined with an outline similar to the middle rift episode on Anaga. A curved tensile fault simulates the curved rift zone, uniform dislocation is 1 m. (A) Surface displacement vectors show that movement focused on the northern flank that is encircled by the rift zone. Dike intrusion along such a curved rift zone will thus promote flank creep. (B) Volumetric dilatation caused by 1-m horizontal widening of a curved rift zone. Dislocation models were calculated for a horizontal plane at 2 km depth, i.e. approximately at sea level. Positive strain (*red color*) matches the region where the third rift arm oriented NNW–SSE (160°) developed on Anaga. Negative volumetric dilatation is found elsewhere, strongest in the northern sector. Virtually complete absence of the NNW–SSE dike trend in the northern sector is due to the compressive field to the north of the curved rift



The Anaga Range on Tenerife belongs to the old basaltic shield of Tenerife, which is the oldest rock on Tenerife. Even if in the scientific literature the most rock on the Canary Islands is considered to be only a few million years old, I am sure that the base structure under the old basaltic shields is much older ! The oceanic ground where the canary Islands are located on is definitely > 150 Ma old.
On another canary island "Fuerteventura" very old oceanic sediments with an age probably > 200 Ma can be found near the village Ajuy as fragments embedded in what I believe is ejecta from a PTI-Secondary crater, west of Fuerteventura. (see documentation to the "Ajuy Crater" on Fuerteventura)

On sample site 7 on Tenerife the geological map shows an area consisting of batholith material (intrusive igneous rock) which I consider to be at least partly ejecta material of the assumed Anaga Crater, which cooled down in a similar way like batholith material. And on sample site 9 (beach) many different kinds of impact breccia can be found in the form of large and small pebbles, which were formed by the strong waves on this north-facing coast.

2.) The Ø 1.6 x 1.2 km elliptical Impact Crater in Southern-Spain (≈ 35 km east of Almeria) :

Mineralogical evidence for the Impact : Impact Breccia found on the sample sites 40-A and 40-B

Photos of the Sample Sites and Rock Samples are available here : ► Rock Samples - Spain_3 (→ No. 40-A & 40-B)

Other interesting Sample Sites with possible Impact Breccia & impact-effected rocks are available here : Rock Samples - Spain_1 & 2

Near the center of this elliptical Impact Crater Impact-Breccia crops out of the ground. This certainly isn't a volcanic structure !
This is a perfect "oblique impact crater" , but unknown to the geological society !

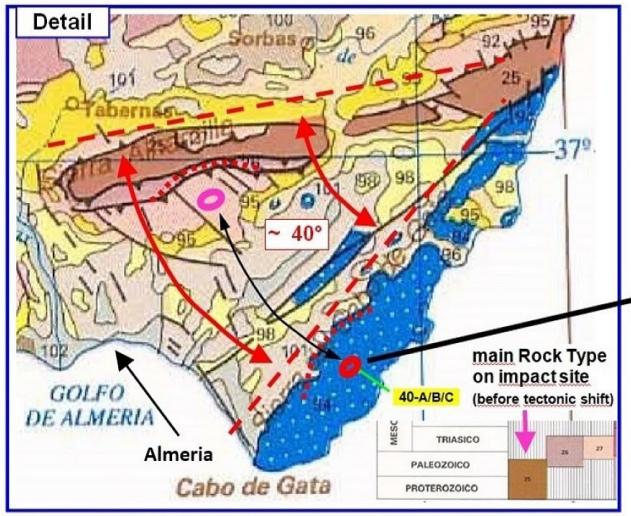
This crater is very interesting because it has the potential to proof the large-scale impact-scenario in Southern-Spain, which in all probability was caused by the PT-Impact Event, and it has the potential to proof the tectonic shift and rotation of a large area consisting of Proterozoic Rock (> 250 Ma old) which in all probability was caused by the tectonic motion of the African Plate that was triggered by the impacting ejecta from the PT-Crater.

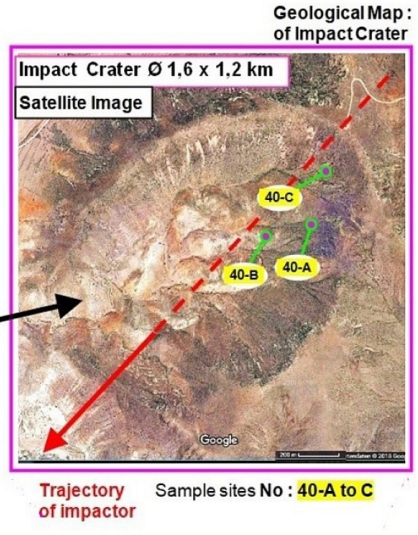
Please note that the crater originally impacted in the "brown-colored" rock-type 25, which is Proterozoic Rock !

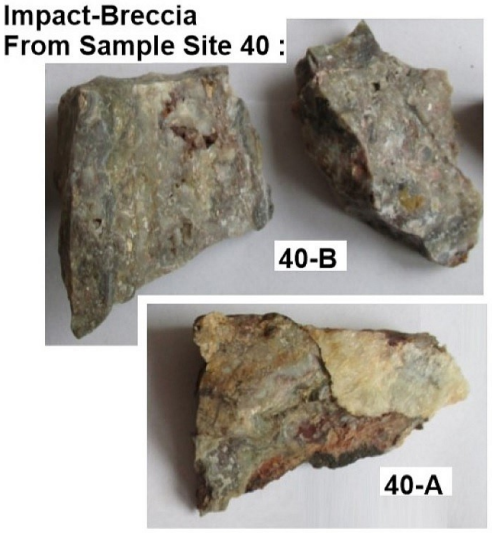
This is indicated by the curved cutout (or dent) visible in the brown rock-type (see image below), which represents a linear 300 - 400 m high mountain range. I have drawn-in a small pink-colored ellipse on the position where I believe the crater was originally located in reference to the mountain range.

This mountain range consisting of rock-type 25 in all probability is the remaining section of an ejecta ray from the PT-Crater, and the small elliptical crater was caused by a larger fragment from the ejecta of the PT-Crater. The blue-colored rock type is much younger and was formed by the volcanic activity which was triggered by the impact event..

The orientation, ellipticity and shape of the impact crater, which is perfectly orientated in line with the mountain range, provide precise information about the trajectory, impact angle and velocity of the ejecta from the PT-Crater that impacted here. Therefore this secondary-crater of the PT-Impact Event should be an important study object in order to bring light in the large-scale impact scenario caused by the PTI which took place in Europe ≈ 253 Ma ago







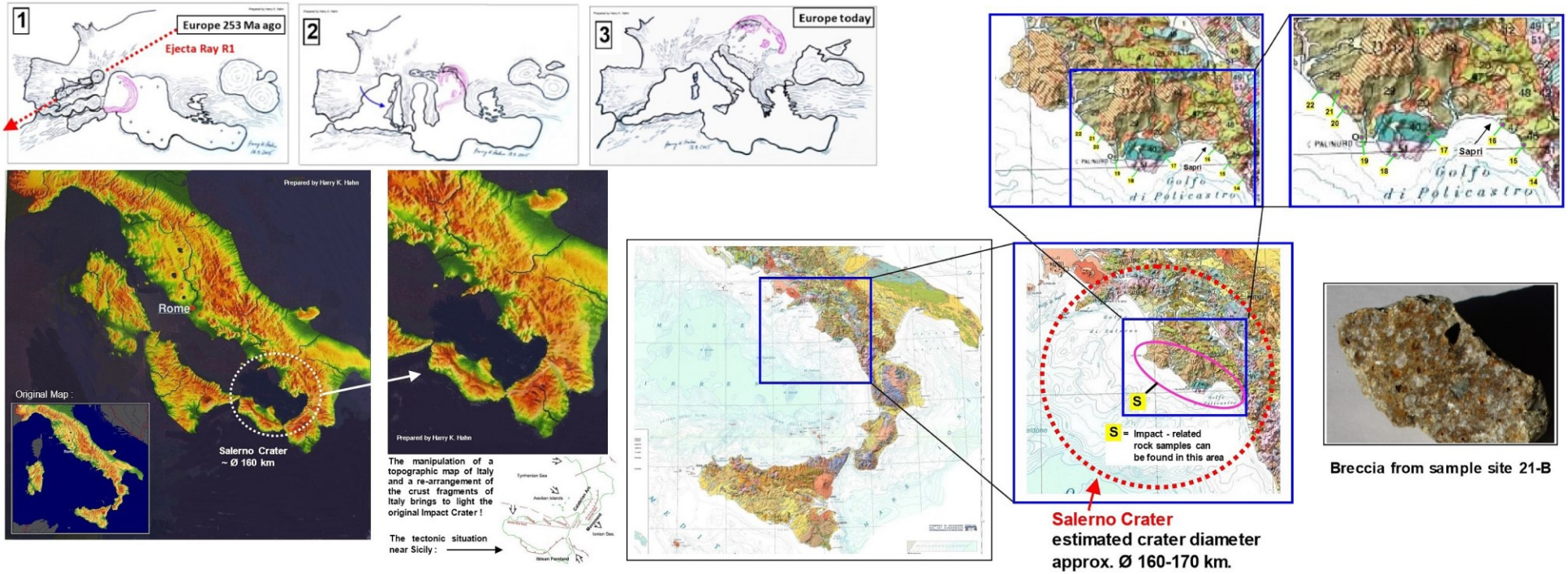
3.) The ≈ Ø 160 km "Salerno Crater" in Italy :

Mineralogical evidence for the Impact : Impact Breccia found on sample site 21-B :
Photos of the Sample Sites and Rock Samples are available here : ► Rock Samples - Italy (Sapri Area) (No. 21 (2))
And there are other potential Sample Sites with ejecta material & impact breccia : ► see rock samples & sites No. : 18 , 20 , 22

The Ø 160 km "Salerno Crater is part of a secondary crater chain which in all probability was caused by ejecta of the PT-Impact Crater.
This secondary crater chain probably consisted of at least four major secondary craters.
Only the last crater of this chain is still noticeable on the topographic map of Italy, if the crust-fragments are moved to the original positions which they had at the time of the PT-Impact (see image below). The "Salerno Crater" is good recognizable on this manipulated topographic map of Italy !
The motion of the crust fragments, over time, which originally formed the outline of the secondary crater chain, is shown in the image sequence 1 to 3.

The impact pressure of the ejecta from the PT-Impact Crater was quite low. Probably considerably less than 5 GPa in most of the crater area.
Shock-metamorphed rock (Impact Breccia) therefore only formed very close to the center of the crater.

The impact breccia found on sample site 21-B is located at a position which originally was only 20 km away from the center of the Salerno Crater.



4.) The ≈ Ø 130 x 110 km "Bay of Lyon Crater" in France :

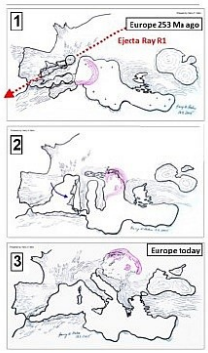
Mineralogical evidence for the Impact : Impact Breccia found on sample site 27-B

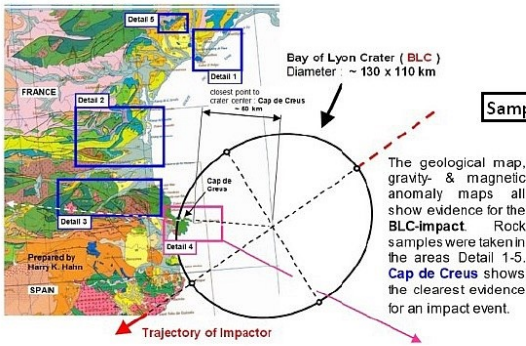
Photos of the Sample Sites and Rock Samples are available here : ► Rock-Samples from France (south-west) (No. 27-B3 (1-4))
Other potential Sample Sites with ejecta material & Impact Breccia : ► see rock samples and -sites No. : 12, 13, 17, 18, 24 , 25

The Ø 130 x 110 km Bay of Lyon Crater is also a member of the same secondary crater chain which formed the outline of Italy. It was the first crater at the northern end of this secondary crater chain, and it represents approximatelly the pivet-point, around which the Italian Mainland and the Yugoslavian Block, rotated after the PT-Impact Event (see image sequence 1-3). It seems that the “Bay of Lyon Secondary Crater” was a quite powerful Impact.

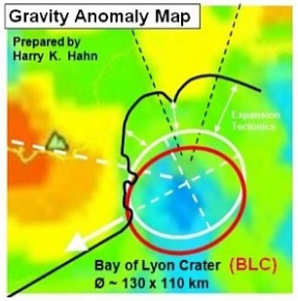
The crater is noticeable on a gravity anomaly map and the crater-center has left a strong signature on the magnetic anomaly map too, which indicates that the impactor (the ejecta fragment) probably consisted of a considerable amount of iron.

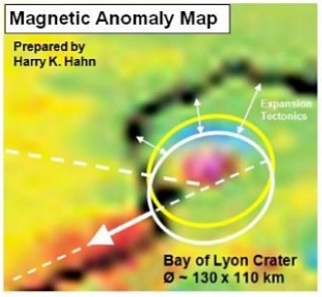
The closest point on land in reference to the assumed crater center of the "Bay of Lyon Crater" is **Cabo de Creus** in Spain. Here sample location **27-B** is located. This sample site shows a large area which obviously consists of rock that was partly melted and strongly deformed. In all probability all the rock on this site is partly melted ejecta from the Bay of Lyon Crater and from the PT-Impact Crater, which cooled down and solidified here.
Cabo de Creus may represent a small remaining section of the original crater-wall of the "Bay of Lyon Crater".

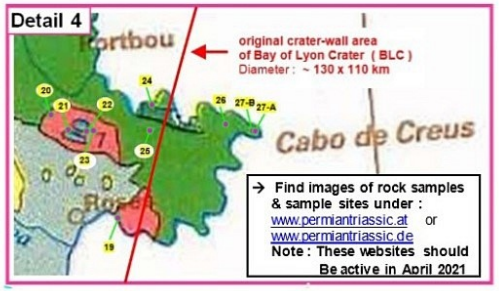




The geological map, gravity- & magnetic anomaly maps all show evidence for the **BLC-impact**. Rock samples were taken in the areas Detail 1-5. **Cap de Creus** shows the clearest evidence for an impact event.







The above shown **Cap de Creus** is the closest point to the center of impact of the **Bay of Lyon Crater (BLC)**. Distance to the crater center **~ 50 km**

It seems that **Cap de Creus** is a remain of the original crater-wall of the Bay of Lyon Crater ! Therefore it should be a primary research area for the scientific analysis of this Impact Event.

5.) The ≈ Ø 320 km "Cape York Crater" in North-East Australia :

Mineralogical evidence for the Impact : Impact Breccia & Suevite found on sample site 23 (1.trip) and on sites 49-A to 49-C (2.trip)
Photos of the Sample Sites and Rock Samples are available here : ► Rock Samples - Cape York 1 & 2

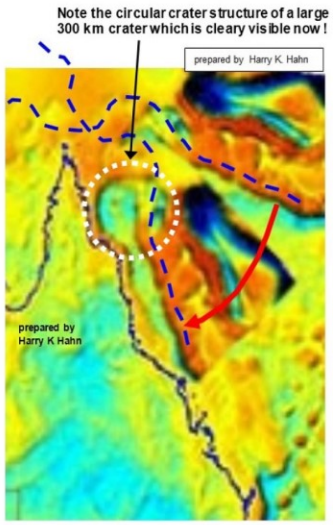
► see Cape York 1 : site No. 23 (VP 1) and ► Cape York 2 : sites No. 49-A to 49-C

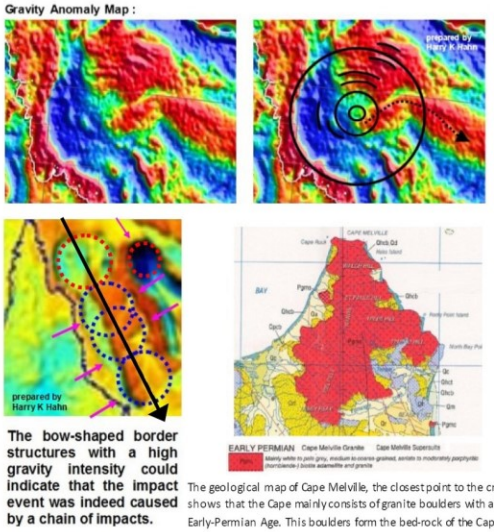
Other potential Sites with Impact Breccia : ► see Cape York 1 : rock samples and -sites No. : 16, 17, 22-A & 22-B (from 1.trip)
and ► see Cape York 2 : rock samples and -sites No. : 48-B , 50, 56, 57, 58 (from 2.trip)

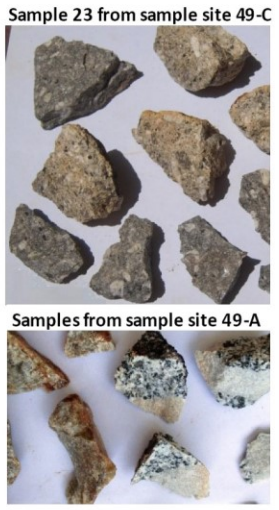
The Ø 320 km "Cape York Crater" in NE-Australia is located on the ocean floor. The closest point on land in relation to the crater center is **Cape Melville** which probably represents a small section of the original outer crater-wall and which is only reachable on a difficult 4W-track or with a boat (probably the better option !). I haven't been on this place. I tried to get there, but it was to difficult to do the track with a rented car ! But the satellite image of Cape Melville shows hills of **large grey boulders of up to Ø 20 m**. I strongly believe that these boulders represent the original ejecta material that was ejected from the Cape York Crater during the PT-Impact Event. These grey boulders consist of **Cape-Melville-Granite with an Early-Permian Age**.

The "Black Mountains" 20 km south of Cooktown, which is ≈ 150 km south of Cape Melville, in all probability also represent such Ejecta-Boulder-Hills which were formed during the Cape-York Impact. They are much easier accessible over the main highway. And there are many other sites along Australia's NE-coast were ejecta-boulder-hills exist which were caused by the assumed CYC-chain, and which are mostly covered by vegetation, for example the CY-sample sites : **16, 17, 48B, 49A-C, 56-58, 63 & 64** which also seem to be formed by ejecta material (impact breccia).

The boulders of the **"Black Mountains"** consist of **Trevethan Granodiorite with a given age of 259 +/- 1 Ma**, which is very **close to the PT-boundary age of ≈ 253 Ma**. That's why I strongly believe that this Trevethan Granodiorite and the Cape-Melville-Granite were formed at the same time, which was the time of the PT-Impact Event, precisely at the PT-boundary ! This would be strong evidence for my hypothesis that the Cape-York-Impact Event was caused by large & powerful ejecta fragments from the PT-Impact Crater, which formed a gigantic secondary crater chain along the NE-coast of Australia. Many other secondary impact structures along the east-coast of Australia are further indication for this large-scale Impact Event.







Please note : **Images of Rock-Samples & Sample Sites of the described five possible Secondary Craters of the PT-Impact Event** and other possible secondary-craters and -structures are available on the following websites : → www.permiantriassic.at or www.permiantriassic.de
(Note : these websites are still under construction)

References :

Here the weblinks to the Parts 1 to 5 of my study : → They are available on **vixra.org** and on **archive.org**

Weblinks to my studies on → vixra.org :	**Weblinks to my studies on → archive.org**
Part 1 : https://vixra.org/abs/2012.0210	Study-Part 1
Part 2 : https://vixra.org/abs/2101.0052	Study-Part 2
Part 3 : https://vixra.org/abs/2101.0096	Study-Part 3
Part 4 : https://vixra.org/abs/2101.0067	Study-Part 4
Part 5 : https://vixra.org/abs/2101.0127	Study-Part 5

References to studies about Impact Cratering :

1. C. Koeberl, F. Martinez-Ruiz : **Impact Markers in the Stratigraphic Record** 2003 ; Springer Verlag ; ISBN : 3-540-00630-3
2. W.U. Reimold, R.L. Gibson : **Meteorite Impact** ; Council for Geoscience, Germany 2009, Springer Verlag
3. R.L. Gibson, W.U. Reimold : **Large Meteorite Impacts and Planetary Evolution IV**
   The Geological Society of America, Special Paper 465 Boulder Colorado 2010 ; ISBN: 978-0-8137-2465-2
4. Introduction : **Impact Metamorphism** , by Dr. Ludovic Ferriere
   → http://www.meteorimpactonearth.com/impactmeta.html
5. R.W.K. Potter : **Numerical modelling of basin-scale impact crater formation**
   → http://www.lpi.usra.edu/lpi/potter/publications/RossThesis.pdf, **see also**: Orientale impact
6. **Crater Formation on the Moon**
   Animations to explain the Crater Formation on the Moon

Lectures :

1. **Lecture about the Permian-Triassic Extinction Event :**
   Permian-Triassic Mayhem: Earth's Largest Mass Extinction - YouTube