

The Permian-Triassic Impact Event caused Secondary-Craters & -Impact Structures in India, South-America & Australia

Part3 of my study: “Global Impact Events are the cause for Plate Tectonics and the formation of Continents and Oceans” - see also: Part1 & 2, and Part4 to 6

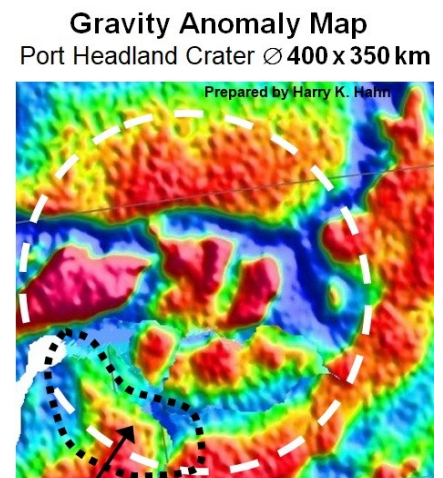
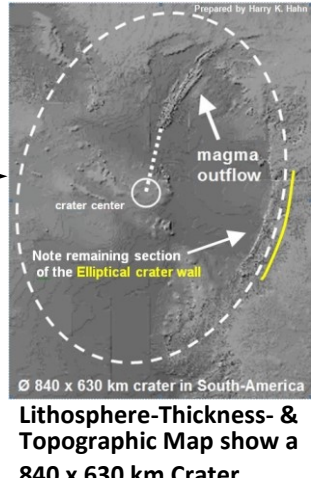
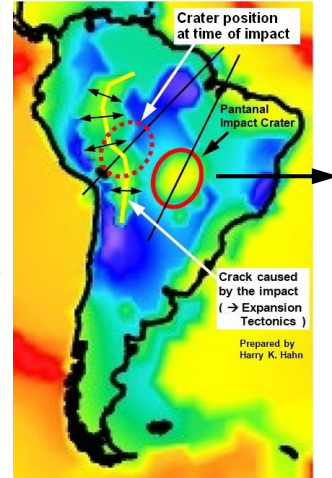
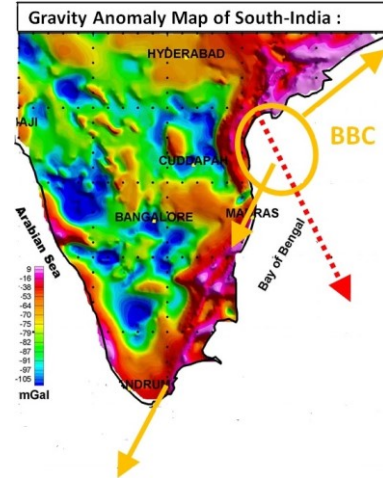
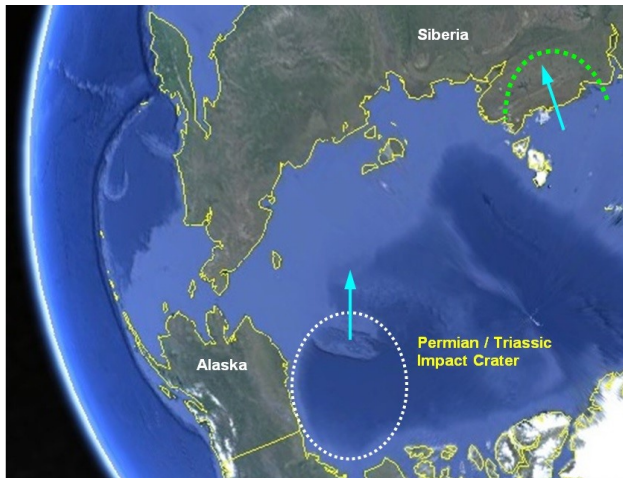
by Harry K. Hahn / Germany - 8. July 2017 - (→ see Documentation here : www.permiantriassic.de → will be active in March 2021)

Abstract : Note: Document not allowed for commercial use ! (→my studies are also on : archive.org)

I will first give an overview of the Permian Triassic (PT) Impact Event on the first pages, before I describe the Secondary-Craters and -Impact Structures of the PT-Impact. The section which describes the assumed secondary craters and impact structures in India, South-America & Australia that were caused by the PT-Impact Event starts at page 14.

The impactor which caused the **1270 x 950 km** elliptical PT-Impact Crater, an asteroid or comet in the diameter range of probably 60 to 200 km, collided with our planet at a very shallow angle. Because of this very shallow impact angle of probably less than 8° and the estimated low impact velocity of around 8 km/s, large amounts of material was excavated from Earth’s crust during the impact. This excavated crust material, together with large fragments of the impactor, is the ejecta material that caused many large secondary craters & impact structures on Earth. The ejecta material probably had a velocity of less than 8 km/s at impact. The large secondary- impact craters and –structures found in India, South-America and Australia were caused by Ejecta Material that was produced during the Permian Triassic (PT)-Impact Event.

A large fragment of the PT-Impactor, or of the ejected material, caused the **450 x 380 km** Bengal Bay Crater (BBC) near the east-coast of India. The gravity anomaly map of India indicates the remaining NW-section of the crater-wall of this Crater, as well as a linear ejecta ray structure which formed the SE-coast of India. There are also other secondary impact structures of the PT-Impact Event visible on satellite maps of India. For example the 30 km drop-shaped impact structure that produced the Iron-Ore Deposits in Sandur. The **400 x 350 km** Port Headland Crater near the NW-coast of Western Australia, clearly visible on the gravity anomaly map, may be identical to the Bengal Bay Crater in India and it may represent mainly the original SE-section of the BBC. This crater produced ejecta rays, rich in platinum group elements and gold, which impacted on the Yilgarn Craton. Two more large Craters with $\varnothing > 300$ km were found off the south-coast of West-Australia. And many secondary impact structures were found along the NE-coast of Australia which in all probability were caused by the Cape York crater-chain (see Part 2). An exceptional large **840 x 630 km** elliptical Crater, probably caused by the PT-Event, was found in South-America. This Crater formed the Pantanal plain and it probably is responsible for the Central Atlantic Magmatic Province (CAMP) around the Triassic/Jurassic boundary.



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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. I even went to the 16th Symposium for “Tectonics” TSK2016 in Bonn in March 2016 and distributed copies of my study about the PT-Impact. But the only answer I got so far (KIT) was: My discoveries aren’t explainable with the current state of geophysics

Geological evidence for the Permian-Triassic (PT) - Impact Crater :

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 I want to prove 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.

I have collected many Rock samples in order to prove my hypothesis : **Images of this rock samples can be found on the following websites :**

www.permiantriassic.de (or www.permiantriassic.at) → **This website should be active in March 2021** (please try it in the next months from time to time)

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 will provide further indication and evidence for the Permian-Triassic (PT) Impact Crater and its effects, which I describe in my study !

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 succeeded 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 Siberian 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 occurring during Permian-Triassic times (→ and may be the result of a large impact event ! → comment from H.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.

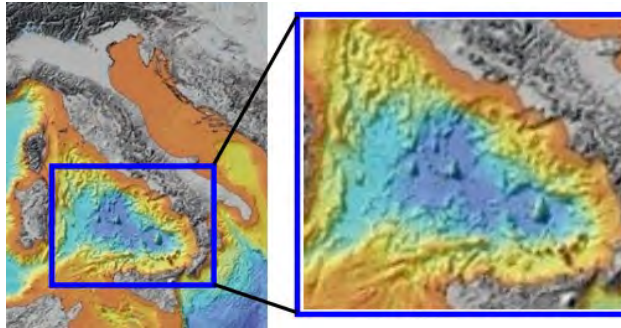
Summary

There is evidence for an elliptical impact crater with the enormous dimensions of **1270 x 950 km** in the Beaufort Sea near the north-coast of Alaska. This impact crater seems to be responsible for the Permian-Triassic boundary, which has caused the most severe mass extinction in Earth's history, ~253 million years ago. This Permian-Triassic (PT)-impact crater was formed by an oblique impact. That means that the impactor collided with our planet at a very shallow angle of probably less than 8°.



The impactor, an asteroid or a carbon-rich comet with a diameter of 60 to 150 km, impacted in the Beaufort Sea close to the north-pole and caused a gigantic butterfly-shaped ejecta blanket with two large ejecta wings which covered the majority of the northern hemisphere. Within the boundaries of this ejecta blanket many large secondary impact craters were formed by the ejecta, with crater diameters of up to 450 km. In Europe (in the Mediterranean area) at least 8, but probably up to 20 such large secondary craters were formed by the impacting ejecta, which was thrown out of the PT-impact crater. These impact craters and the resulting large-scale magma (lithospheric) flow is responsible for the tectonic development of

Europe during the last ~253 Ma. Two of these secondary craters (Ø160 & Ø220 km), which formed the Tyrrhenian Sea north of Sicily (Italy) and which are still noticeable on topographic- & geological maps (see below), should provide the evidence to confirm the described impact scenario



The main impulse of the PT-impact, together with the impulses and secondary craters, produced by the ejecta material, caused a global fracture pattern on Earth's crust, which was the trigger for the break-up of Pangea and a global expansion tectonic process. This expansion tectonic process caused the dichotomy on Earth → the formation of continents and ocean basins. And it is responsible for the transport of large amounts of volatiles from Earth's mantle to Earth's surface. Earth's diameter increased from an estimated diameter of 6500-7500 km ~253 million years ago to a diameter of 12756 km today, with an average expansion rate of ~20mm/year. The expansion of Earth was caused by abrupt decompression of Earth's mantle, which led to the large-scale expansion of volatiles, especially H₂O (water), in Earth's mantle. Through the sudden decompression of Earth's mantle, caused by the extensive fracturing of Earth's crust, the solubility of H₂O and other volatiles in the mantle material decreased below the volatile concentration. That's

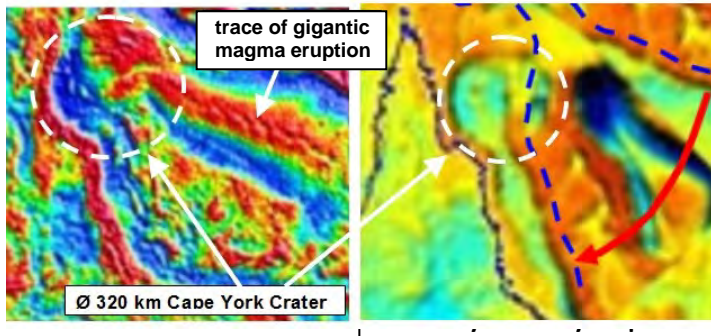
why Earth's mantle became super-saturated with H₂O and other volatiles (e.g. CO₂ & SO₂), which then started to exsolve and form gas-bubbles in the mantle material. These gas-bubbles continued to grow, and they were responsible for the transport of magma and volatiles (especially H₂O) to Earth's surface, through the overpressure which they caused in the mantle material. The ocean basins, which represent new surface area of our planet and which formed between the old crust fragments (the continents), continuously filled up with water (H₂O) over the last 253 Ma. This (hot) water was, and still is, transported from Earth's mantle to Earth's surface through the fractures caused by the PT-impact, mainly the Mid-Ocean Ridges, were the new surface areas of our planet Earth (the ocean floors) are continuously created

In the same way as the water was transported to the surface of our planet Earth, and in the same way the expansion tectonic process was initiated on Earth it happened on other planets and moons of our Solar System. There is evidence for other powerful global impact events which occurred on the planets Venus, Mars and Pluto, on Jupiter's moon Ganymede, on Saturn's moons Enceladus & Iapetus, on Pluto's moon Charon and on our moon. These global impact events, which are described in more detail in another part of this study probably all took place within the last 300 million years!

But back to the Perm-Triassic (PT)-Impact! :
The main impulse of the Perm-Triassic (PT)-impact on Earth initially caused a break-off of the Angara Craton from the Russian Craton and it caused a strong acceleration of the Angara Craton towards South, where China and Australia were located at that time. The following powerful southward movement of the Angara Craton then caused the HP and UHP orogens in China, through the

extreme compression which it produced in the crust fragments caught between the North China Craton & the Angara Craton. This dynamic process led to the formation of the Altaid magmatic fronts.

In the NE & NW of Australia, off the coast, two exceptional large craters with ~ 350-400 km diameter can be identified, which both seem to be secondary craters caused by ejecta from the PT-impact event. Here especially the Cape York impact crater located off the NE-coast of Australia must be mentioned, because it strongly influenced the tectonic development of the Pacific Plate through a number of gigantic magma eruptions.



The stratigraphic record of the NE-coast of Australia (e.g. "Moreton Geology") indicates the probable connection of the Cape York crater, and its secondary impact structures, with the PT-impact event. At least eight (8) gigantic magma eruptions can be assigned to the Cape York Crater, which took place within the last ~200 million years. The fifth eruption of this series of magma eruptions, which was very powerful, not only left clear visible traces on the Pacific Plate. The magma front of this eruption also moved a small cratonic block (the Colorado Plateau) deep into the north-american continent. This has caused the formation of the Rocky Mountains and the Basin & Range Province. Further, a second magma front resulting from this eruption strongly influenced the

geology of Antarctica, and it separated Antarctica from Australia & South-America. This eruption No.5 may have been triggered by extreme earthquakes, of magnitude >12 (on the Richter Scale), which were caused by the Chicxulub Impact Event ~65 Ma ago, and could therefore be partly responsible for the extinction of the dinosaurs.

The magma eruption No.6 of the Cape York crater left further distinct traces on the Pacific plate and it strongly influenced the geology of Mexico and of the Gulf of Mexico, when the magma front crossed this area. This magma front was also responsible for the formation of the Appalachians, which were created by a crust-fragment that was relocated (bended) towards the East by the magma front.

The 7th magma eruption of the Cape York Crater again left clear traces on the Pacific Plate. It strongly influenced the geology of Middle America when its magma front impacted there.

The magma eruptions No.6 & 7 may have been triggered by strong impact-related earthquakes too (→ probably caused by the 62 Ma Impact-Cycle).

A key map for the further analysis of these magma eruptions is the NOAA ocean floor map, which shows the topography of the Pacific Plate in fine detail. This map shows all the fine traces which will lead to the confirmation of these magma eruptions, and it will help to understand the dynamic geological processes caused by these magma eruptions, e.g. the separation of New Guinea & New Zealand from Australia, and the separation of Japan from New Guinea, the formation of Indonesia, French Polynesia etc.

Another key map is a global ocean-floor-age map (e.g. from Google). This map clearly shows the 1200-1600 km wide ocean-floor stripes (between 60°N and 30°S latitude) along which the magma fronts moved mainly from west to east. In the eastern half of the Pacific Plate these stripes are clearly visible because of the strong east-ward

shift of their ocean-floor ages on the map, which was caused by an eastward acceleration of these stripes, resulting from the massive eastward directed magma outflows. The distinct bend in the Hawaiian-Emperor-Chain (starting at 43 Ma) is, at least partly, a result of the faster east-ward motion of 2 or 3 of these ocean-floor stripes over the Hawaiian hotspot, because these ocean-floor stripes were accelerated (& stretched) in eastward direction by the magma eruptions (-outflows).

Along the NE coast of Australia there are many other secondary impact structures noticeable, which all were caused by the Cape York impact.

Other possible secondary impact craters, caused by the PT-impact event, were found in India, in Arabia and in South-America.

Here the 450 x 380 km elliptical crater identified in India, which formed the Bay of Bengal, seems to be related (identical) to the large secondary crater off the NW-coast of Australia with the estimated dimension of 400 x 350 km, that is responsible for the ejection of large amounts of ejecta, rich in Platinum Group elements, in a ray-like pattern over the Yilgarn Craton.

A large elliptical crater with the dimensions of 840 x 630 km, found in South-America, which can be identified on topographic maps and on satellite images, may also be related to the PT-impact event.

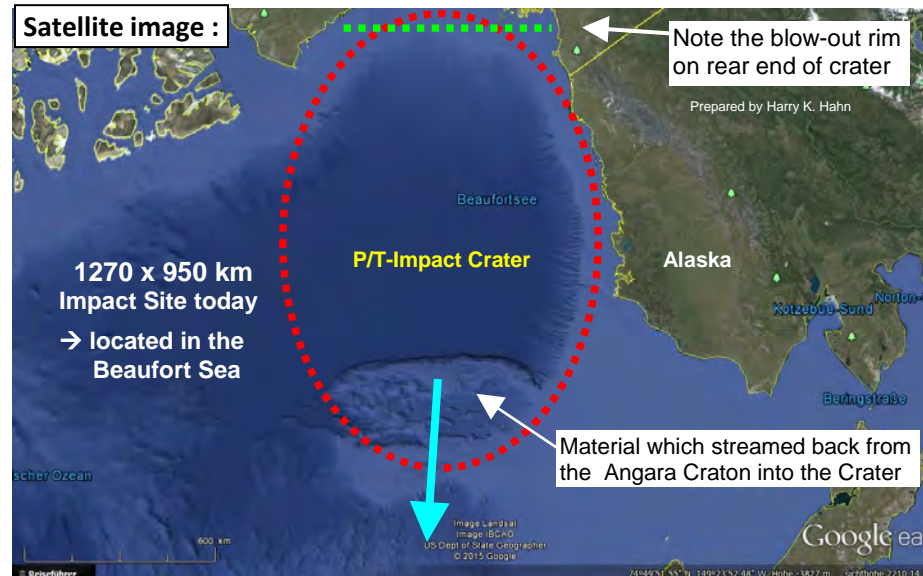
Another largescale impact event in Africa, which must be mentioned here, are four chains of impact craters (probably > 10 craters per chain), with craters in the Ø150 to Ø250 km range, which represent ejecta rays which cross the whole continent in different angle direction !

These impact craters are also secondary craters, which were caused by ejecta originating in the PT-Impact Crater !

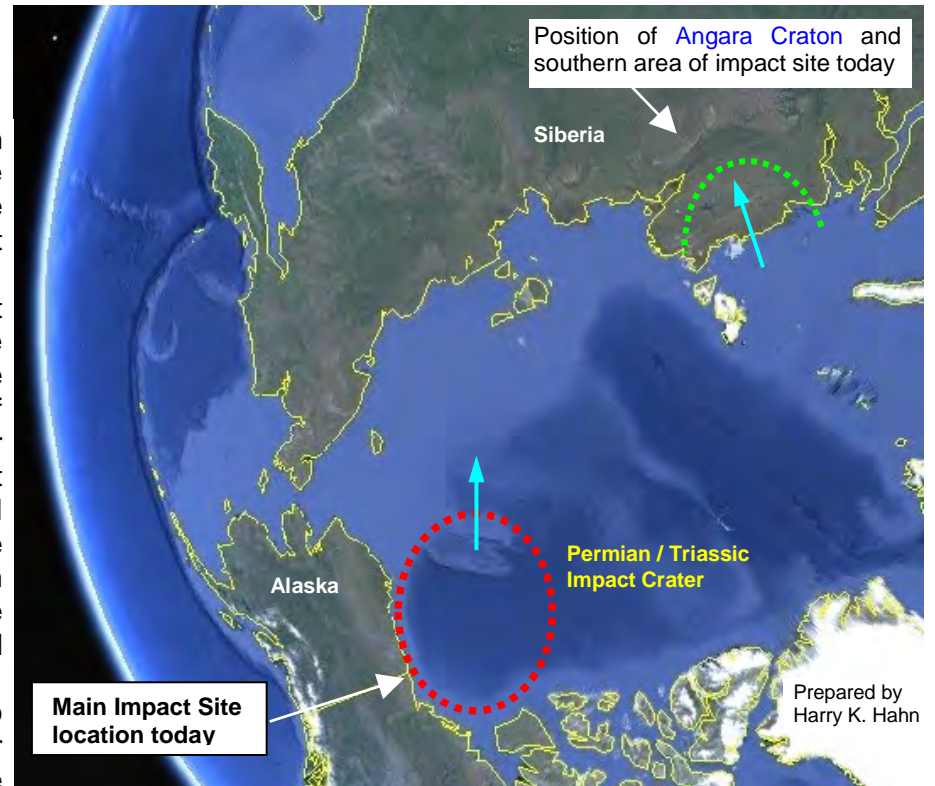
253 Million years ago a big Asteroid or Comet collided with Earth and caused a 1270 x 950 km elliptical Impact Crater

The asteroid or comet had a diameter in the range of ≥ 60 to 200 km, and it caused the most severe impact event and mass extinction known in Earth history. → This caused the **Permian-Triassic boundary₁**, which is associated with the most extensive **mass extinction** of marine species and terrestrial vertebrates & plants. And it caused the largest eruption of “continental” **flood lavas**, the **Siberian Traps**.

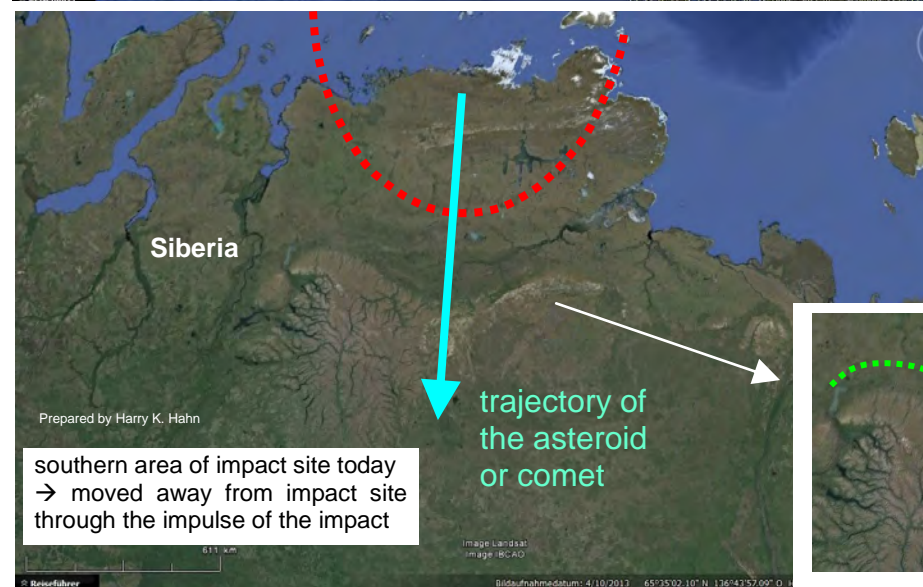
The following images and explanations describe the impact event and its effects on our planet Earth during the ~ 253 million years from this event. As everyone can imagine, this powerful impact event completely reshaped our Earth's appearance !



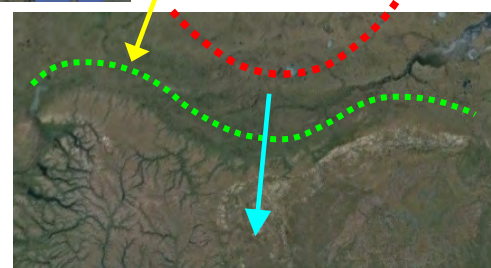
The two images on the left show the remains of the impact site as it appears today. The main impact site is located in the Beaufort Sea close to the coast of Alaska. Another part of the impact crater which moved away from the impact site through the impulse of the impacting asteroid is located in **Siberia**. By moving the two locations together the impact scene becomes evident.



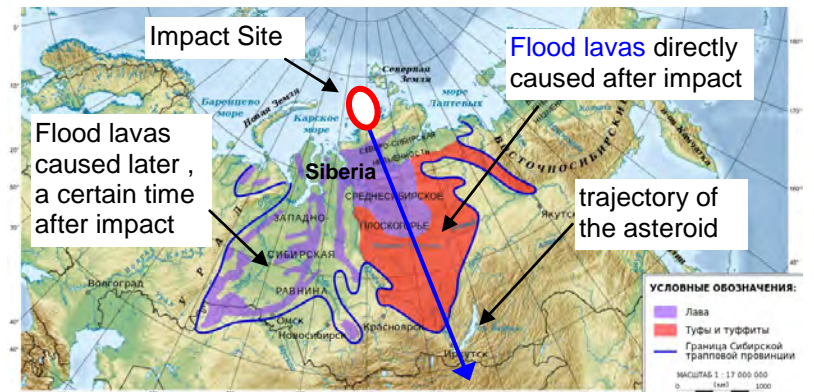
→ Here 3 informative movies about the P/T-Event : [PT_Movie 1](#) ; [PT_Movie 2](#) ; [PT_Movie 3](#)



Note the **bow-shape** of the northern edge of the flood-lava formation → similar to bow-waves produced by ships !



The flood lavas caused by the impact : The Siberian Traps

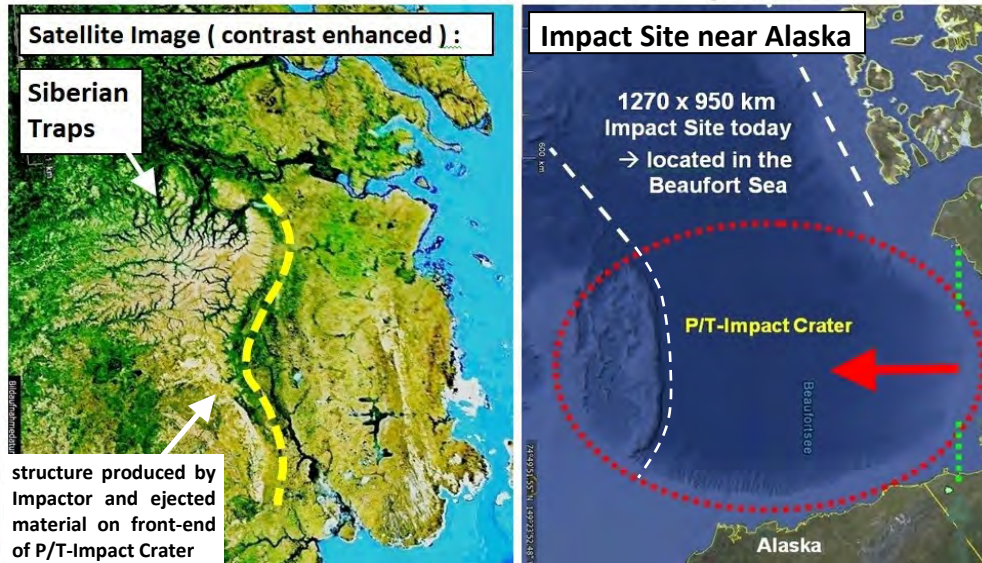


To the crater formation of the Ø 1270 x 950 km P/T-Impact Crater

There is close correlation between the topography of the real P/T-impact crater and the topography of a simulated elliptical impact crater with similar properties (ellipticity, impact angle, impact velocity, target surface etc.). The PT- impactor probably had an impact velocity of around 8 km/sec. And the impact angle probably was in the range of around 5 to 7 degrees.

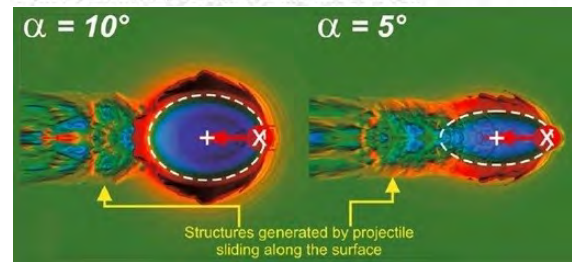
Therefore the PT-impact was a “low-velocity impact” of a large asteroid or comet in the diameter range of 60 to 200 km, at a very shallow angle. During impact the lower part of the impactor was decelerated by shearing along the surface, while the fragmented upper part of the impactor continued its motion nearly unaffected. The fragmented upper part of the impactor, together with a very large volume of partly molten excavated rock material was ejected in a very large butterfly-shaped ejecta blanket. This ejecta blanket which included many large secondary impactors (→ fragments of the P/T-impactor + ejecta), produced a number of secondary crater chains with crater diameters of 100-250 km, and a number of very large secondary craters with diameters of >300 km (e.g. Bengal Bay Crater, Cape York Crater, Pantanal Crater, etc.). There is strong indication that these impact crater chains are responsible for the major fractures in Earth’s crust, which led to the break-up of Pangea. (→ e.g. the **crater chains R1 to R4** → see Part 2 of Study)

The real structure of the Permian Triassic Impact crater area

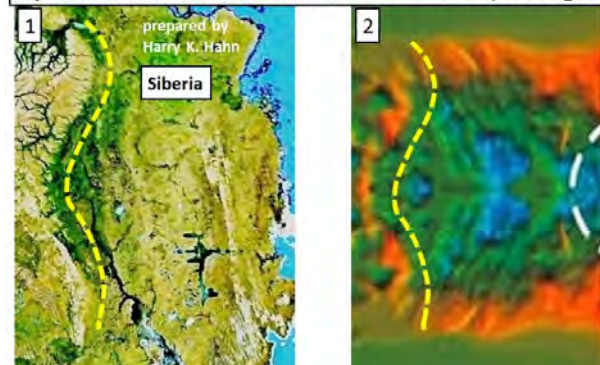


structure produced by impactor and ejected material on front-end of P/T-Impact Crater

Figure 2. Influence of the impact angle on crater shape. Impact of a 5 km sized projectile at 8 km/s and low impact angles α (friction coefficient $f=0.3$; no cohesion). The dashed white line marks the inner boundary of the crater cavity just before the onset of crater modification (measured at the preimpact surface). The cross (X) indicates the contact point of the projectile with the target, the “+” marks the geometric center of the crater. The secondary structures close to the left crater rim are the result of the projectile motion along the target surface (friction) and indicate a very oblique impact angle. The color contours denote the elevation where green represents the initial level of the target, blue represents topography below, and red above the target level.

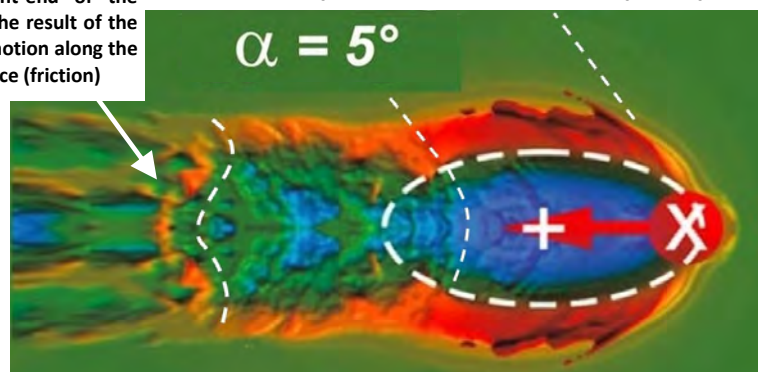


Compare → impact structures on front-end of crater :
 1.) Reality : Satellite image Siberia (contrast enhanced)
 2.) Simulation : front-end structure at ~ 5 - 7° impact angle



The secondary structures at the front-end of the crater are the result of the projectile motion along the target surface (friction)

Simulated Impact Structure of a 5° oblique Impact :



Early reflections of shock and rarefaction waves in the projectile prevent plastic deformation in the upper part of the body. The strong pressure gradient in the projectile suggests fragmentation of the projectile would likely occur.

In this case, the lower part of the projectile is decelerated by shearing along the surface while the upper part continues its motion nearly unaffected.

The transition from circular to elliptical impact craters

Dirk Elbeshausen,¹ Kai Wünnemann,¹ and Gareth S. Collins²

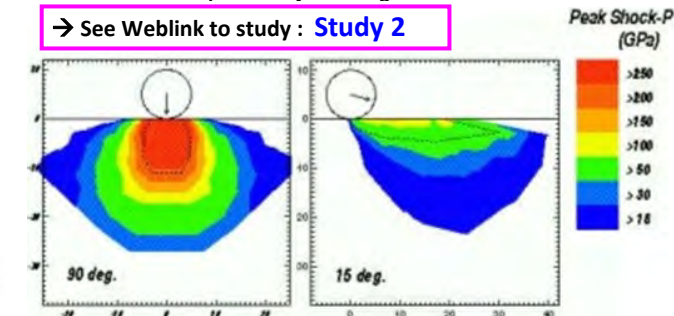
2. Model Setup → Weblink to Study : Study 1

[5] To investigate crater formation for shallow-angle impacts, we have carried out a series of 3-D simulations with the hydrocode iSALE-3D [Elbeshausen and Wünnemann, 2011; Elbeshausen et al., 2009]. This code uses finite difference and finite volume techniques on a Cartesian staggered mesh. It follows an Implicit Continuous-fluid Eulerian and Arbitrary Lagrangian-Eulerian (ICE+d ALE) approach, as described in Harlow and Amsden [1971] and Hirt et al. [1974], to solve the Navier-Stokes equations in a compressible manner. Hence, the kinematic description of motion can be either Lagrangian (where the mesh deforms according to the nodal velocities) or Eulerian (where mesh is fixed in space) or a mixture of both. Due to large deformations and shearing of matter that occur in particular during oblique impacts, the Eulerian approach is more appropriate for the given study [e.g., Collins et al., 2013]. The Eulerian kinematic description requires the reconstruction of interfaces between matter and the free surface (or different types of materials which was not considered in this study as target and projectile were assumed to consist of the same material) to enable a precise calculation of material flows. For the interface reconstruction, it is beneficial to use an adaptive approach coupled with a volume-of-fluid technique [Benson, 2002; Hirt and Nichols, 1981; Gueyffier et al., 1999] as described in Elbeshausen and Wünnemann [2011]. The code has been successfully validated against laboratory experiments and benchmarked against other numerical impact models [e.g., Davison et al., 2011; Pierazzo et al., 2008].

[6] In all simulations, we assume terrestrial gravity conditions ($g=9.81 \text{ m/s}^2$) and resolve the projectile by 16–24 cells per projectile radius. We varied the impact angle α in a range between 90° (vertical impact) and 5° . The primary focus of this study was on low impact angles ($\alpha < 30^\circ$), since we expected the transition from circular to elliptical craters in this range. We used impact velocities of $U=8 \text{ km/s}$, 12 km/s ,

The diagrams below show that the maximum shock pressure is drastically reduced in an oblique impact at 15° impact angle compared to the vertical impact case. The reduction in volume of melt is $\geq 90\%$ for a 15° impact ! (This estimate does not include possible melting due to shear heating). That means the PT-Impact has ejected large volumes of unmelted rock !

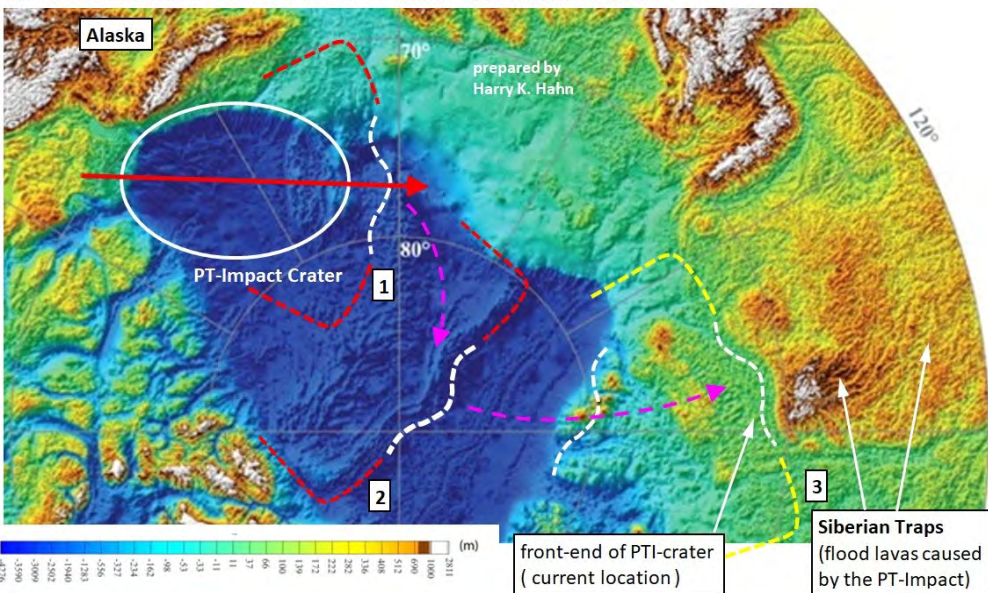
→ See Weblink to study : Study 2



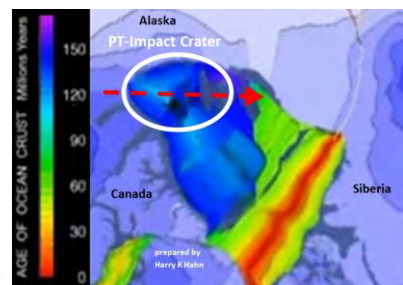
Large-scale structures caused by the PT – Impact , visible on different Maps

Polar-Projection of PT-Impact Area – Topographic Map

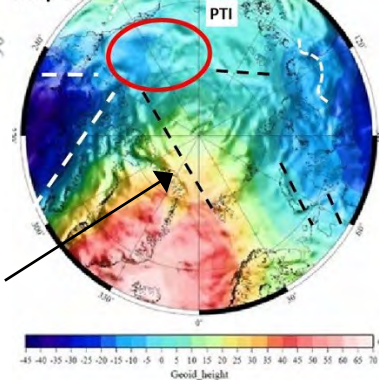
→ the motion of the front-end of the PTI-crater over time is indicated



Ocean-Floor Age Map of PT-Impact Area

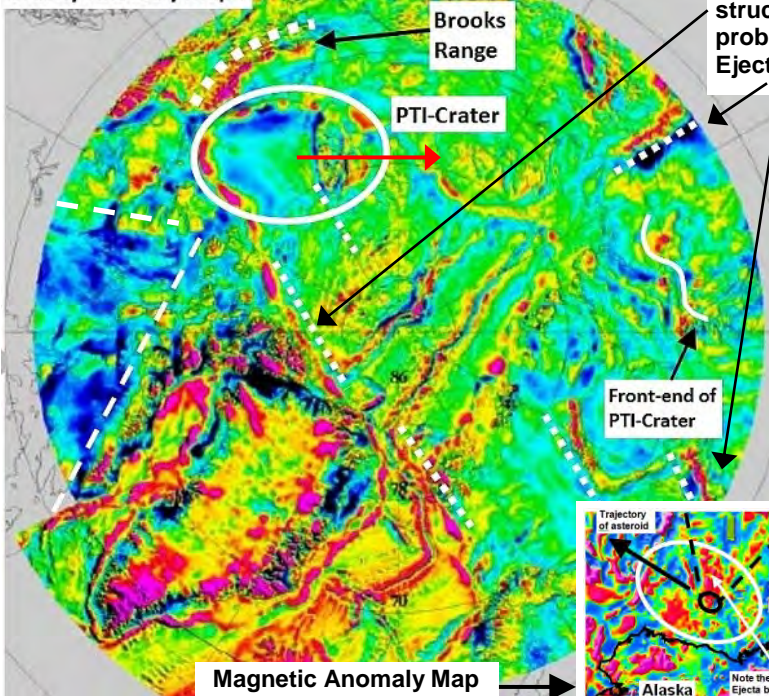


Geoid Map :



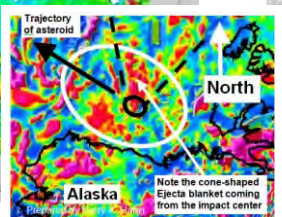
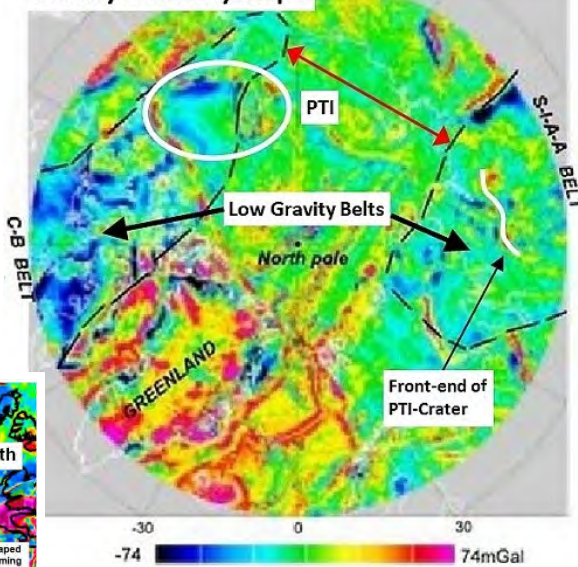
Gravity Anomaly- and Geoid Maps also indicate the PT- Impact

Gravity Anomaly Map :



Note the indicated linear structures on the maps, probably caused by large Ejecta-rays & -blankets

Gravity Anomaly Map :



There is an interesting example of an elliptical Crater on Mars with the dimensions of 10 x 7.5 km, which in all probability was caused by a small Mars-orbiting moonlet whose orbit tidally decayed, because it came too close to the martian atmosphere. It probably impacted in a very shallow angle $\leq 5^\circ$ (see trajectory-d at the image below) with a relative slow velocity of less than 5 km/s .

The impactor which caused the P/T-Impact Crater on Earth probably also was a small moonlet, which was caught by Earth's gravity and was orbiting around Earth, before its orbit tidally decayed in Earth's atmosphere, and it finally impacted at a shallow angle of $\leq 7^\circ$ with an impact velocity of probably less than 8 km/s. This would explain the elliptical Crater, the visible ejecta-ray structures the Siberian Traps and the triggered Expansion Tectonics.

On the origin of a double, oblique impact on Mars

J.E. Chappelow^{a,b,*}, R.R. Herrick^b

A double, oblique impact feature north of Olympus Mons provides a unique opportunity to investigate the event that formed it. The sizes of the craters, their ellipticity, shapes of ejecta blankets, separation from each other, and positions relative to each other, all give us information about the event. Coupling this information with an existing model of meteoritic flight through an atmosphere allows us to test several possible scenarios for the event (object type and origin, pre-entry trajectory, atmospheric trajectory, prevailing atmospheric density). We find it highly improbable that the impactor was simply an extramartian asteroid or comet. We also find that it is unlikely to have been a double-asteroid or a tidally fractured one, but is more likely to have been a Mars-orbiting moonlet whose orbit tidally decayed, and that denser atmospheric conditions than today's may have prevailed when it impacted.

→ Study : [Weblink1](#), [Weblink2](#)

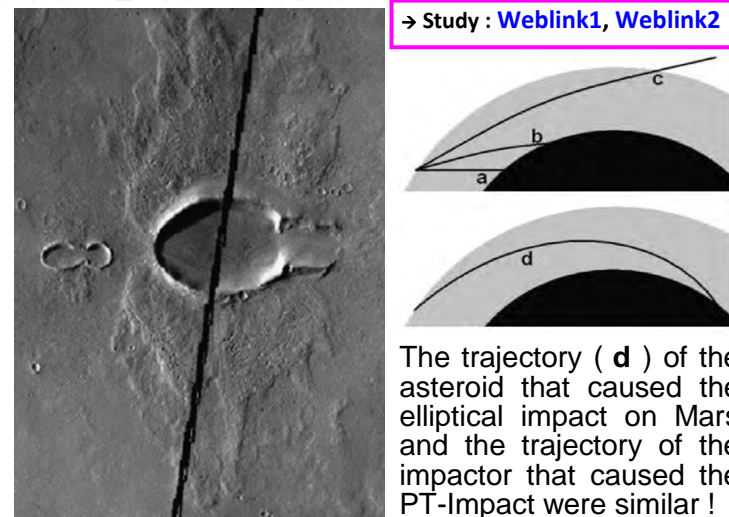


Fig. 1. A large (7.5 × 10.0 km) elliptical crater with a smaller elliptical crater (2.0 × 3.0 km) lying 12.5 km directly uprange (to the left). 'Butterfly'-pattern ejecta occur around both craters. (Mosaic of THEMIS daytime IR images.) North is up.

Fig. 2. Atmospheric flight trajectories for asteroids (top) and a moonlet (bottom) in the martian atmosphere, as discussed in the text. Both are radially exaggerated.

To the evolution of the PT – Impact Event, and the effects of the impact on Earth's crust

The PT₃-Impact was an **oblique impact**. This means the impactor, a large asteroid or a comet, with ~ 60 to 200 km diameter, impacted on our planet in a very shallow angle. The impact angle was probably < 8°. Therefore the impact, which took place close to the north-pole, produced a large butterfly-shaped ejecta blanket, originating at the impact site and spreading over the majority of Earth's surface area. →

→ The butterfly-shaped outline of the **ejecta blanket** (marked in red) is shown on the map in FIG. 1

The tectonic map on the left (FIG 3), a polar projection shows the present situation. The two maps on the right side show the situation directly at the time of the PT-Impact, and at ~ 150 Ma after the PT-impact.

Because of the immense size of the impactor, the ejecta blanket which resulted from the impact, covered nearly Earth's complete surface, and it produced very large secondary impacts. Most of these secondary impacts were distributed within this butterfly-shaped ejecta pattern, and many secondary impact craters formed along distinct ejecta rays (e.g. ejecta rays R1 to R4), which have their starting point at the PT-Impact Crater.

TECTONIC MAP OF THE NORTHERN HEMISPHERE

Don L. Anderson, Dave T. Sandwell, and Paul Wessel

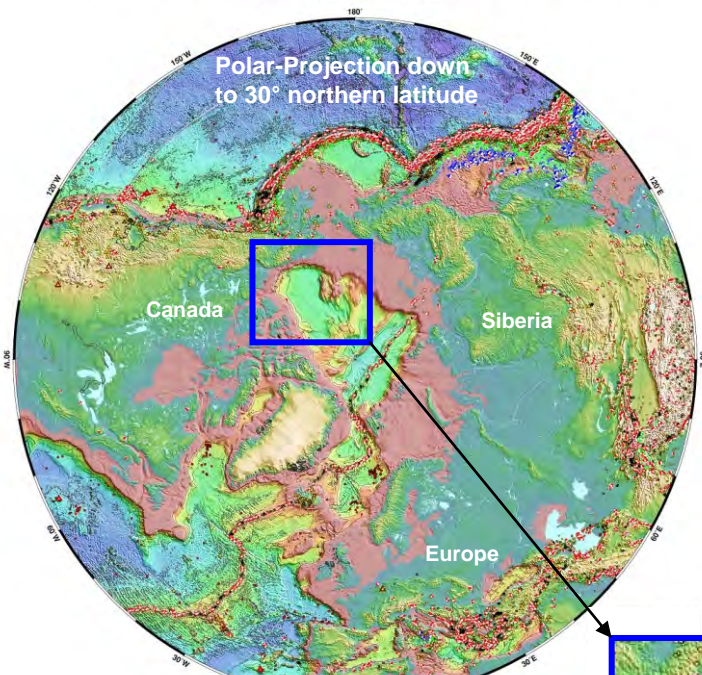
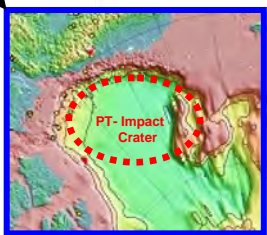


Fig 3 : Present Situation



Detail of Impact Site

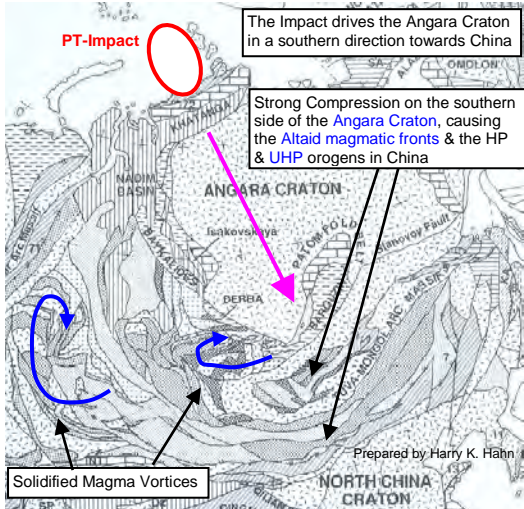


Figure 21.6. Paleotectonic map of Asia showing the primary orogenic-collage components mentioned in the text. Precambrian consolidated

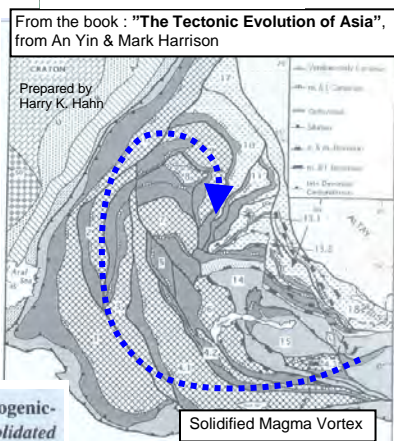


Fig 1 : A Polar-Projection centred on the PT-Impact Site (→ center point corresponds approx. to the North-Pole too). The map shows Earth's complete surface area and the positions of Earth's continents as they probably were located at the time of impact.

The area which was most effected by the PT-Impact is located within the butterfly-shaped ejecta blanket (red) Most secondary impacts (marked in pink & orange) and ejecta rays are also located within this area.

Fig 2 : A Polar-Projection of the North-Pole area down to approx. 30° northern latitude , showing the scene at a time between the PT-Impact and today. All following considerations in this study are based on a smaller Earth before the impact and on strong **Expansion Tectonics** after the impact, because all maps used for the analysis indicate Expansion Tectonics !!

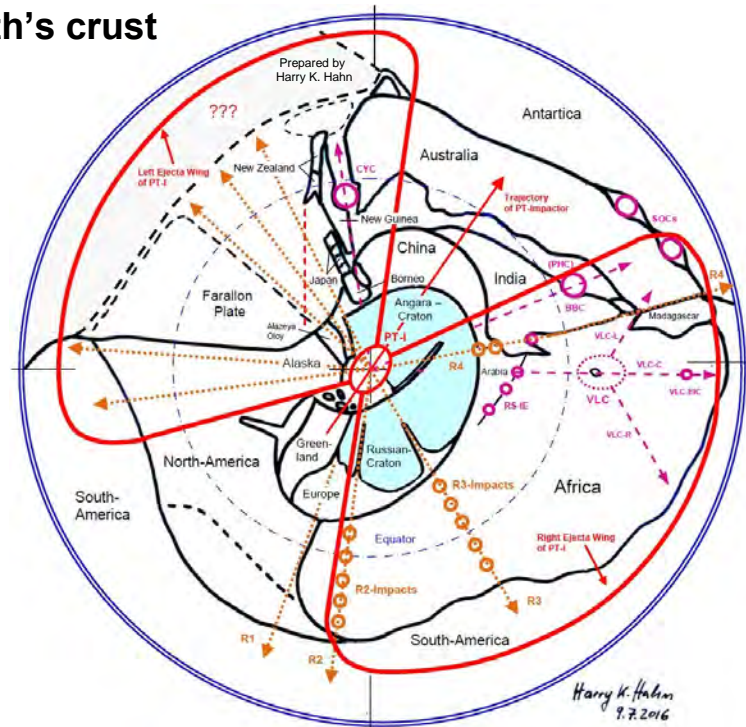


Fig 1 : Polar-Projection of Earth's complete surface area at the time of Impact centred on the PT-Impact Crater. Earth diameter : ~6500-7500 km

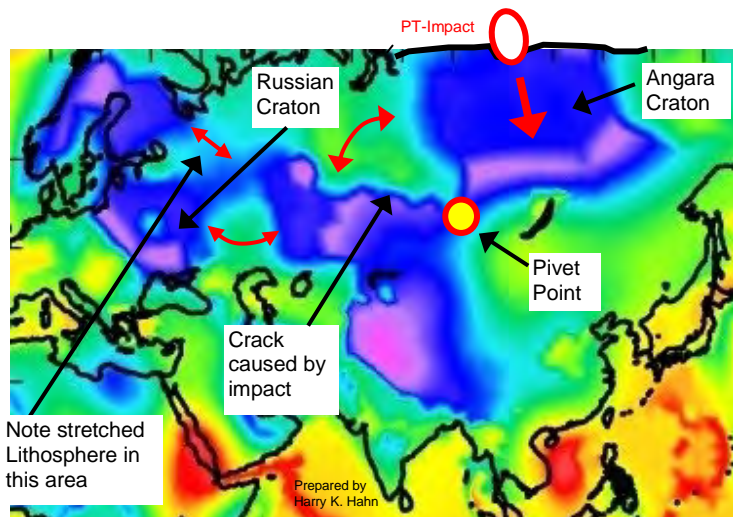


Fig 2 : Polar-Projection down to 30° N ~100 Ma ago, Ø Earth : ~ 10000 km

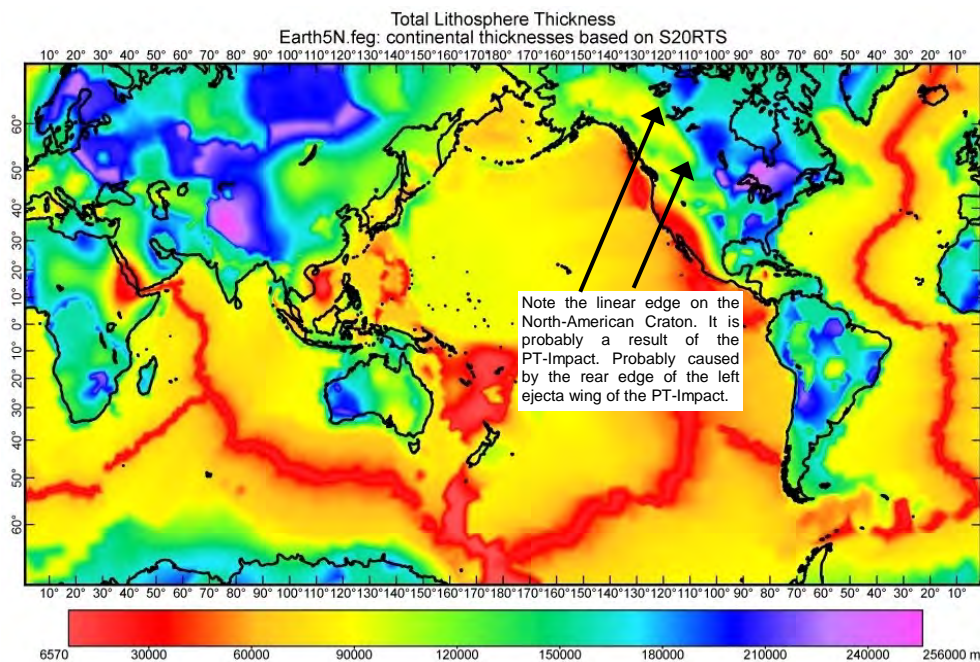
The tectonic evolution after the PT – Impact Event

Prepared by Harry K. Hahn

As already mentioned on the previous page, all the following considerations are based on a smaller Earth with ~Ø 6500-7500 km before the impact, and on strong **Expansion Tectonics** after the impact. Because all maps used for the analysis indicate that the **PT₂-Impact** triggered strong Expansion tectonics on Earth which is probably still going on today. (→ There is certainly much more expansion than subduction going on today !)



Model of total lithosphere thickness. A composite of continental thicknesses scaled from vertical-S-wave upper-mantle travel-time-anomalies and an age-dependent model in the ocean basins. See following Weblink : http://peterbird.name/publications/2008_torque_balances/012_total_lithosphere-Earth5N.jpg



An important key-map for the analysis :

On the lefthand side a composite of continental thicknesses scaled from **vertical-S-wave** upper-mantle travel-time-anomalies combined with an age-dependent model of ocean basins is shown.

The map shows that there was originally a complete Eurasian Craton. However this large Eurasian Craton was hit by the asteroid ~253 Ma ago and broke apart through the immense shear- & bending stress which was induced into the Craton by the Impact Impulse.

The physical description of the impact event :

The **PT₃-Impact** event can roughly be divided into three phases which I will describe in the following :

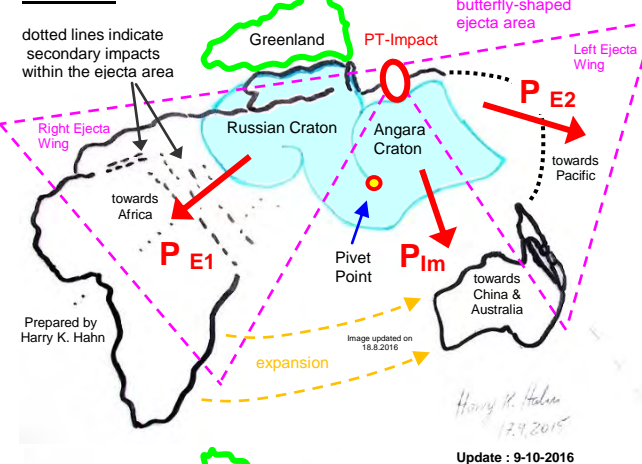
Phase 1 : The impact produced three main **impulses** which were induced into the surrounding Lithosphere. The impulse **P_{IM}** from the Impactor itself and the two Ejecta-Impulses **P_{E1}** and **P_{E2}** which all accelerated different areas of Earth's crust (lithosphere). The following formula can be applied :

$$P_{Total} = P_{IM} + P_{E1} + P_{E2}$$

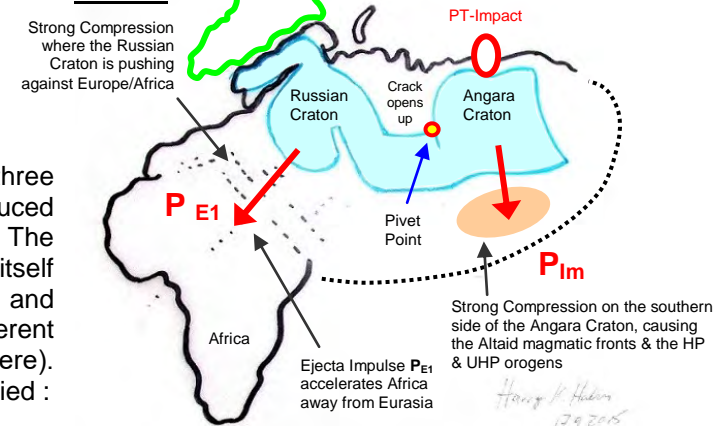
Phase 2 : The accelerated sections of Earth's Crust (e.g. the Angara & Russian Cratons, which rotated around a common pivot point) then later produced immense compression stress further away, where they collided with other thick crust areas.

Phase 3 : The further tectonics is more complex , because of complex interaction between different areas of Earth's crust. The begin of phase 3 is roughly described in the image on the right-hand side.

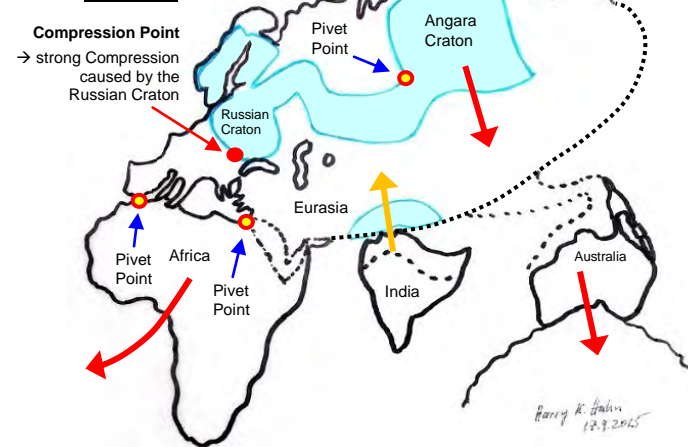
Phase 1 :



Phase 2 :

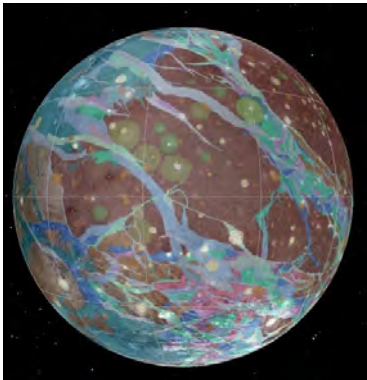


Phase 3 :



Overview and probable cause of Expansion Tectonics : A global impact event combined with a mantle super-saturated in volatiles

High concentrations of volatiles in the mantle of certain planets & moons may be the driving force for their rapid expansion , after a global impact event has caused extensive fractures in their crust. → The global impact event and the fractures in the crust are the trigger, which initiate the expansion of the planet or moon by abrupt decompression of the mantle. Then the **volatiles** in their **mantle** e.g. **CO₂, H₂, SO₂, H₂S** etc. → **but especially H₂O**, which may be in a super-saturated state, cause the rapid expansion of the mantle, and the formation of ice-crusts, oceans & atmospheres on their surfaces → as seen on **Earth, Mars, Ganymede, Enceladus & Pluto** etc. (→ see this study !)

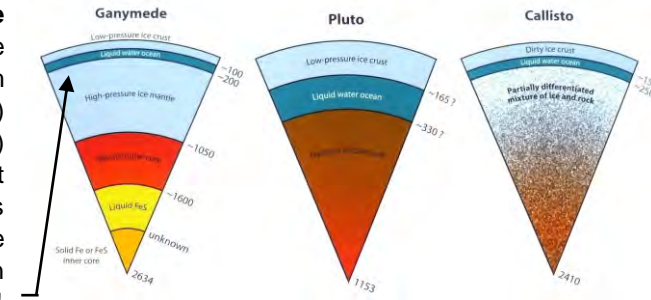


Jupiter moon Ganymede is definitely one of the most obvious examples of global expansion tectonics. **It is easy noticeable that the (old) brown colored areas represent fragments of a sphere which drifted away from each other !** The fragments of these shattered (older & smaller) sphere seem to get pulled apart from each other by an expanding sphere (→ the expanding mantle) underneath. The cause of the fractures in the old (brown-colored) crust and the trigger of the expansion tectonics was a global impact event ! (see chapter 6 in this study !) And the substance which is driving the obvious expansion of the moon must be **H₂O** ! Because the mantle of Ganymede pretty much only consists of water in different aggregate states ! → See diagram on the righthand side !

Ganymede - Global Geologic Map

The expansion only slightly increased the moon's moment of inertia !

Figure 3.15 Idealized interiors of selected icy bodies (depths in kilometres). Comparatively minor differences in history, composition, and location have produced a wide range of internal structures and geological processes in the larger satellites and dwarf planets. (Various sources.)

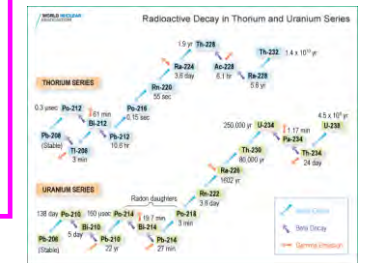


Inner structure of Ganymede, Pluto & Callisto

Table 2.5 : Average Chemical Composition in % of Continental and Oceanic Crust

	Continental Crust			Oceanic Crust
	Upper	Middle	Total	
SiO ₂	66.3	63.5	53.4	50.5
TiO ₂	0.64	0.69	0.82	1.6
Al ₂ O ₃	15.4	15.0	16.9	15.3
FeO	5.04	6.02	8.57	6.71
MgO	2.48	3.59	7.24	7.58
MnO	0.10	0.10	0.10	0.19
CaO	3.59	5.25	9.59	11.3
Na ₂ O	3.27	3.39	2.65	2.68
K ₂ O	2.80	2.30	0.61	1.81
P ₂ O ₅	0.15	0.15	0.10	0.2

Composition of Earth's mantle in weight percent		
Element	Amount	Compound
O	44.5	
Mg	22.8	SiO ₂
Si	21.5	MgO
Fe	5.8	FeO
Ca	2.3	Al ₂ O ₃
Al	2.2	CaO



Important indicators which support the Expansion Tectonics Hypothesis (→ see description below) :

- 1) Earth's mantle contains **0,5 – 2 wt% H₂O** . But because the mass of water (H₂O) in the mantle is poorly constraint, the real value could be much higher !
- 2) A comparison of Earth's **mantle** with the mantle of other planetary bodies with high concentrations of H₂O on their surfaces (see diagram), indicates that the **wt% of H₂O in Earth's mantle** maybe considerably under-estimated !
- 3) Different analyses indicate that Earth's radius is expanding with 4 to 15 mm/y This means Earths diameter increased by **2000-7500 km** in the last **250 Ma** !
- 4) The 12 km "**Kola super-deep Borehole**" showed that **at depths >7 km the rock is extremely fractured** and **saturated with H₂O & Hydrogen** from deeper sources !
- 5) The **H₂O** in Earth's mantle is **super-critical** & behaves like a gas (Study1, <http://>)
- 6) **Helium-3** and **Tritium** detected on Mauna Loa / Hawaii indicate the production of **Hydrogen-3 (Tritium)** by **ternary fission** in **Earths core**. See : <https://books.google>

Other interesting information: [Study1](#), [Study2](#), [Study3](#), [Study4](#), [Study5](#), [Study6](#), [Study8](#), [Study9](#)

Hypothesis : → Process for the expansion of the mantle which is causing expansion tectonics :

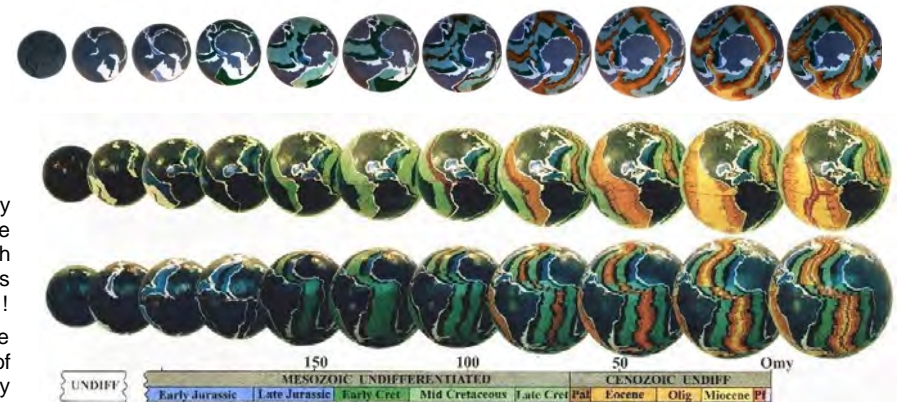
- 1.) First we consider a crust of a planet or moon which is stable (→ undamaged by big impacts) for a long time period (> 200 Ma). Underneath this stable crust, which is acting like the wall of a pressure vessel, **volatiles** accumulate within the **mantle** material over a long time. These volatiles are produced by different processes inside the mantle. At the beginning the mantle material of the planet or moon contains these volatile components in a dissolved state. However pressure and temperature in the mantle increase over time, because more and more volatiles accumulate within the mantle material, and because **radioactive decay** is constantly adding heat. The solubilities of the volatiles depend on pressure, temperature and the composition of the mantle material. When solubility decreases below volatile concentration, the volatiles will exsolve and start to form small gas bubbles in the mantle material
- 2.) At this point the mantle material is super-saturated with these volatiles. And with further increasing pressure within the mantle material, finally the point will be reached where the pressure in the mantle exceeds the pressure caused by the **lithostatic load** (weight) of the crust. This is the point when tensile stress will start to build up inside the crust material of the planet or moon, which allows the pressure within the mantle to increase even further ! (→ like in a pressure vessel). This build-up of stress in the crust can go so far, that the crust is close to fracturing through tensile stress ! In this state the crust will be very vulnerable to impact events !! The **extremely fractured rock** found **at depths >7 km** maybe proof of this !! (Note that Earth's mantle contains at least 0,5 - 2 % H₂O !)
- 3.) If one or more large impactors are hitting the crust of the planet or moon in this state, the fracturing of the crust will be particularly extensive because it was already close to fracturing through increased tensile stress. And as soon as the crust is fractured by the impact(s) the mantle material will start to expand rapidly. Because volatile solubility in the mantle material (**magma**) decreases through the rapid pressure drop in the mantle, caused by the fracturing of the crust, more and more gas will exsolve !! And the mantle expands faster and faster because of growing gas-bubbles within the mantle material. Heat from the impact event is contributing to this process !
- 4.) A self-accelerating process is initiated which only stops when a new equilibrium is reached between the decreased pressure in the mantle and the pressure produced by the new (thinner) overlying crust, which is caused mainly by gravity and not by the constraint of a closed spherical shell (a pressure vessel wall) anymore. Because of the grown gas-bubbles the mantle-density dropped considerably

Expansion Tectonic Earth models :

From **James Maxlow** & other geologists and geo-physicists which support this Theory :

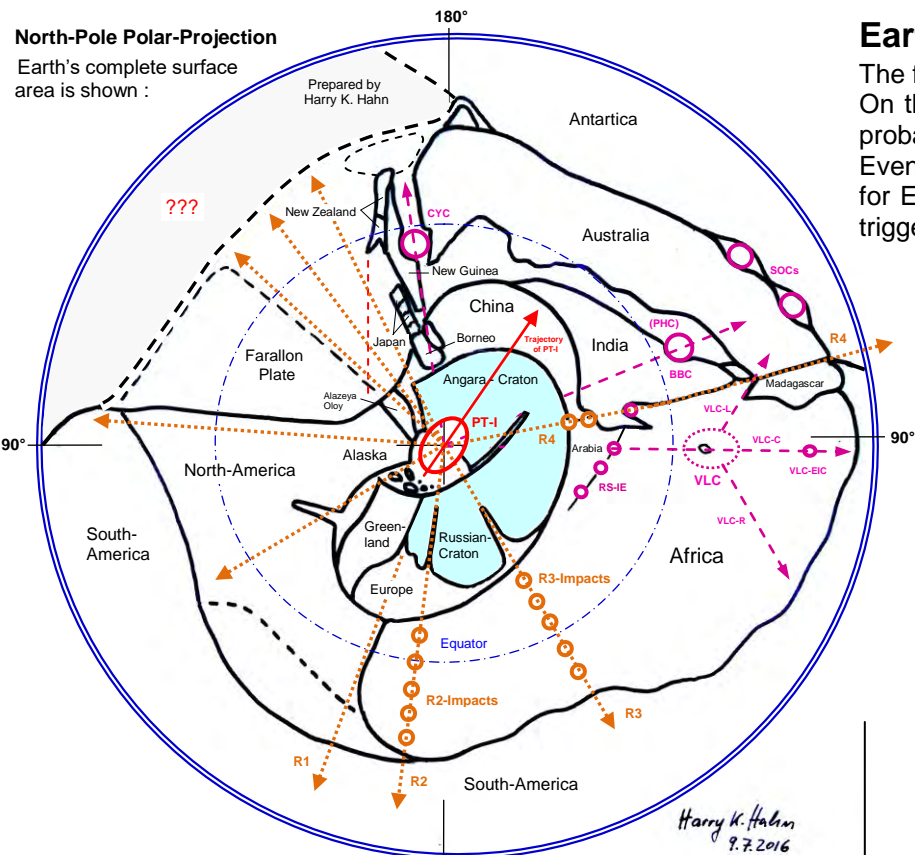
Web-Links : [L1](#), [L2+L3](#), [L4](#), [L5](#), [L6](#), [L7+L8](#), [L9](#), [L10](#)

Isotope	Heat release [W/kg isotope]	Half-life [years]	Mean mantle concentration [kg isotope/kg mantle]	Heat release [W/kg mantle]
²³⁸ U	9.46 × 10 ⁻¹¹	4.47 × 10 ⁹	30.8 × 10 ⁻¹⁰	2.91 × 10 ⁻¹⁰
²³⁵ U	5.69 × 10 ⁻¹¹	7.04 × 10 ⁸	0.22 × 10 ⁻¹⁰	1.25 × 10 ⁻¹⁰
²³² Th	2.64 × 10 ⁻¹¹	1.40 × 10 ¹⁰	124 × 10 ⁻¹⁰	3.27 × 10 ⁻¹⁰
⁴⁰ K	2.92 × 10 ⁻¹¹	1.25 × 10 ¹⁰	36.9 × 10 ⁻¹⁰	1.08 × 10 ⁻¹⁰



North-Pole Polar-Projection

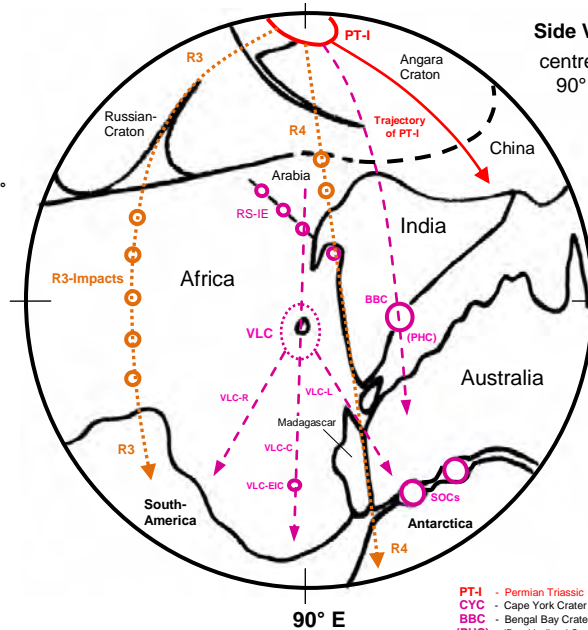
Earth's complete surface area is shown :



Earth at the time of the PT-impact Event

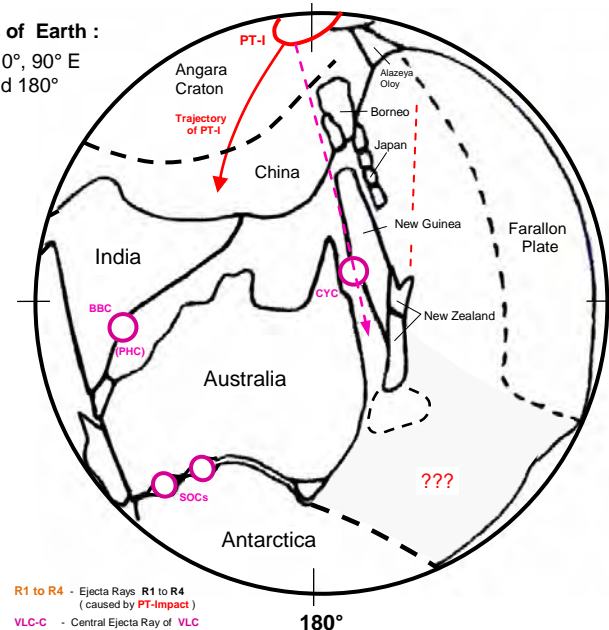
Prepared by Harry K. Hahn

The following maps show how our planet Earth probably looked at the time of the Permian-Triassic (PT)-Impact. On these maps, the arrangement of Earth's continents at PTI-time is based on impact structures which in all probability were caused by the PT-impact Event (especially the CYC-, the BBC/PHC- and the VLC-impact Event & the Ejecta Rays (crater chains) R1-R4 were used as a reference). And an [Expansion Tectonics](#) model for Earth was used as base for these maps. The PT-impact Event caused the shown fracture pattern, which triggered an expansion tectonics process on Earth. → Earth's Ø at the time of the PT-impact : ~ 6500-7500 km



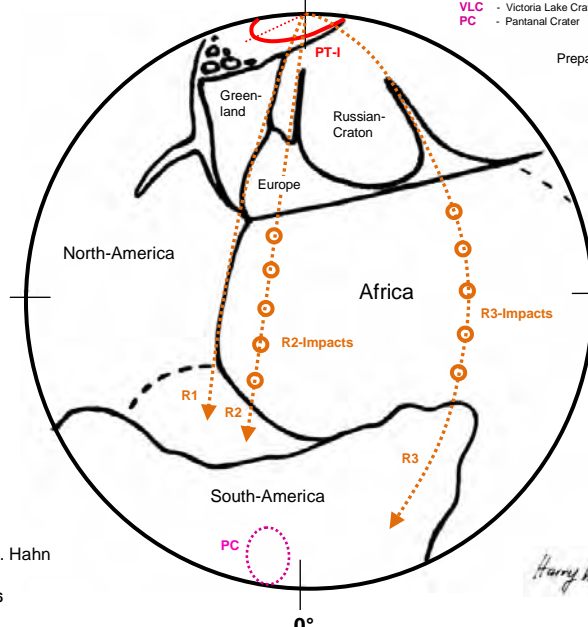
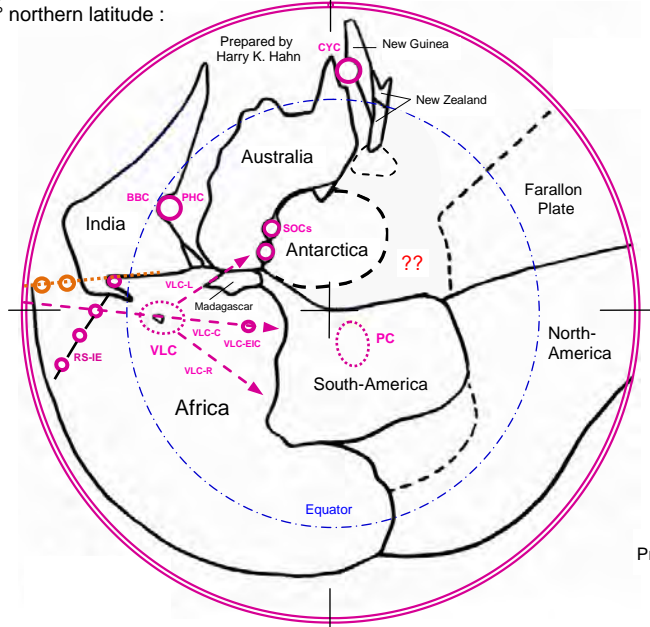
Side Views of Earth :

centred on 0°, 90° E
90° W and 180°

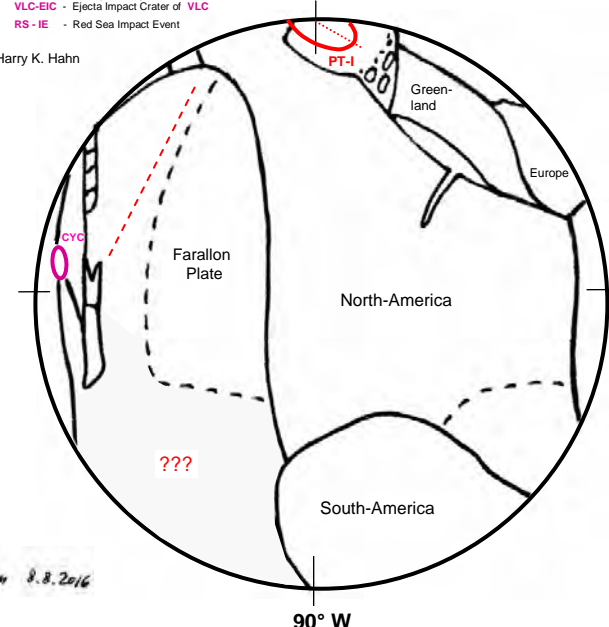


- PT-I - Permian Triassic Impact
- CYC - Cape York Crater
- BBC - Bengal Bay Crater
- (PHC) - (Port Hedland Crater)
- SOCs - Southern Ocean Craters
- VLC - Victoria Lake Crater
- PC - Pantanal Crater
- R1 to R4 - Ejecta Rays R1 to R4 (caused by PT-impact)
- VLC-C - Central Ejecta Ray of VLC
- VLC-R - Right Ejecta Ray
- VLC-L - Left Ejecta Ray
- VLC-EIC - Ejecta Impact Crater of VLC
- RS-IE - Red Sea Impact Event

Polar-Projection of South-Pole area up to ~ 45° northern latitude :



Prepared by Harry K. Hahn



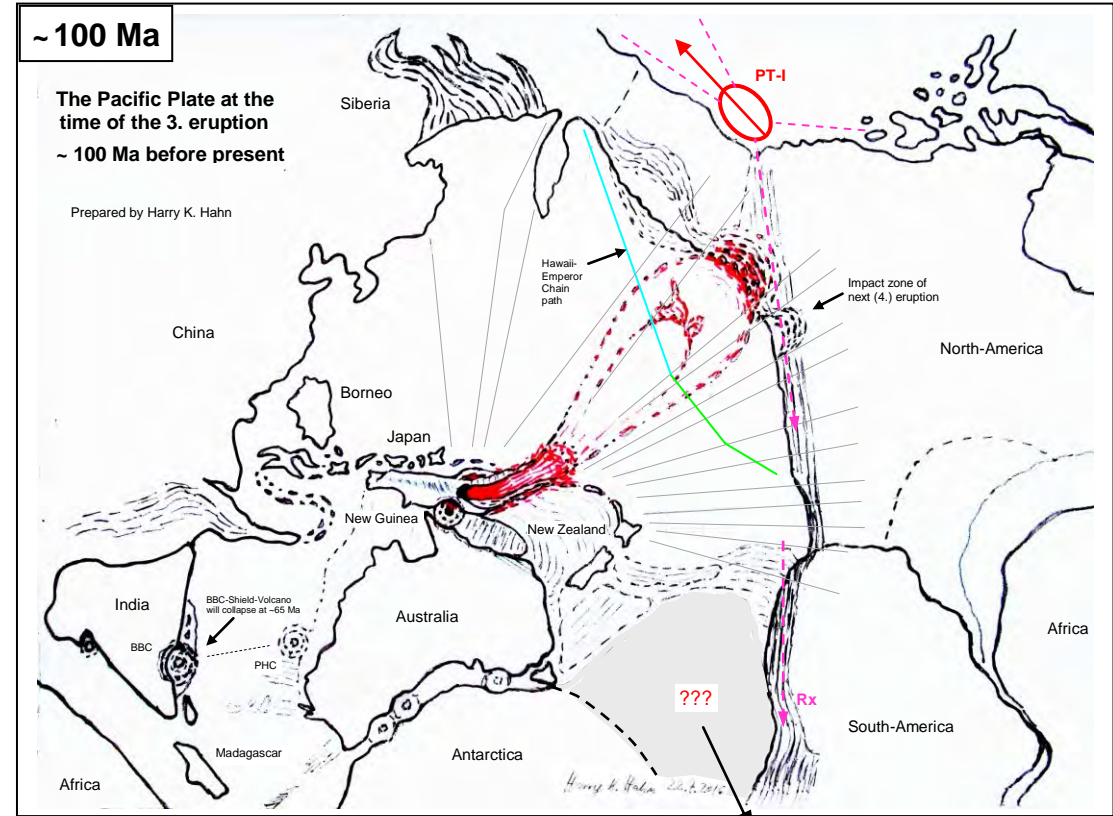
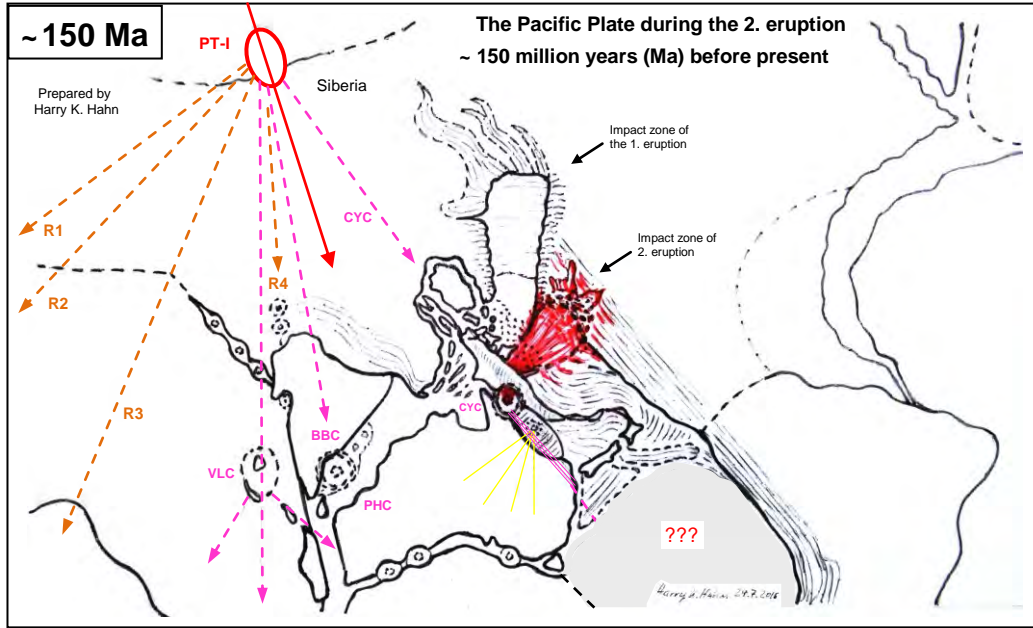
Prepared by Harry K. Hahn

Update : 9-10-2016

Harry K. Hahn 9.8.2016

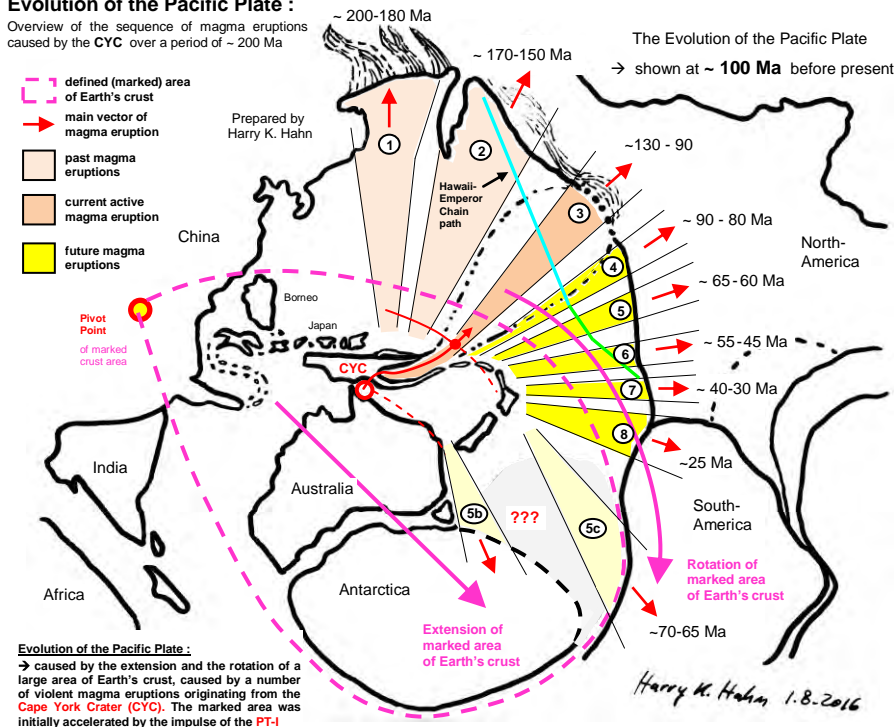
The evolution of the Pacific Plate & Pacific Ocean, in the aftermath of the PT-Impact Event, caused partly by the Cape York Crater :

The Impact impulse of the **PT-Impact Event** caused an acceleration of Australia & Antarctica towards SE. Together with many fractures in Earth's crust, caused by very large secondary impacts (e.g. by BBC, CYC & VLC), and together with powerful temporary magma eruptions of the Cape York Crater, the dynamic process of this evolution began.



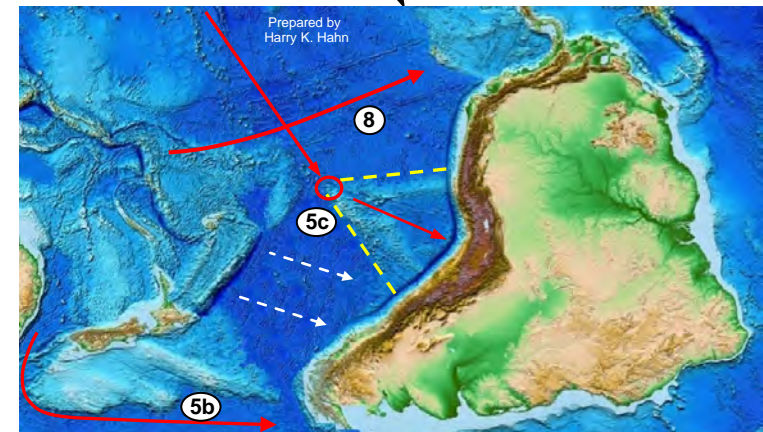
Evolution of the Pacific Plate :

Overview of the sequence of magma eruptions caused by the CYC over a period of ~ 200 Ma



To the Evolution of the Pacific Plate

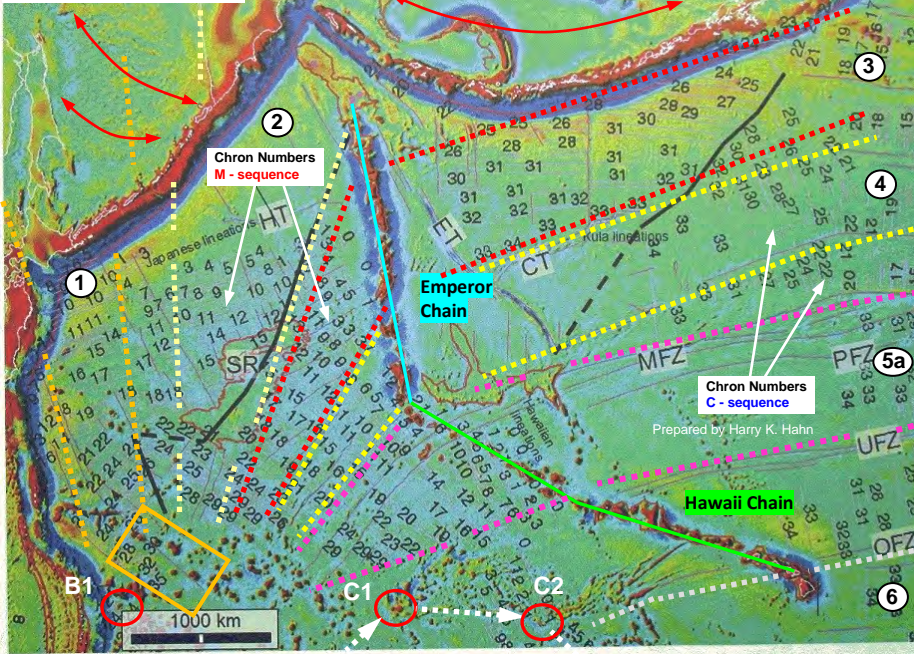
The Pacific Plate (→ new ocean floor !) was caused by an **Expansion Tectonics** process. This expansion tectonics process was triggered by the Permian-Triassic Impact Event (PT-I), and by a number of very large magma eruptions coming from a big secondary crater, caused by the PT-I event. This impact crater is the Cape York Crater (CYC) located just east of the Cape York Peninsula in the NE of Australia. This 300-350 km diameter crater must have been caused by a particular large and dense secondary impactor, because it penetrated deep into Earth's mantle and formed a channel which connected to the Pacific-LLSVP (caused by ejecta of the PTI), which produced at least 8 but maybe up to 10 extremely large magma eruptions over the last 200 Ma, which initially erupted in a north- and north-eastward direction, and later mainly in an eastward direction. The Impact Impulse of the PT-I together with the described magma eruptions of the CYC caused the expansion and rotation of a large area of Earth's crust (→ Australia, Antarctica, New-Guinea, Indonesia, Japan etc.). The eruption which happened around 65-60 Ma ago (→ which may have been triggered by the **Chicxulub Impact**) was a particular violent eruption. This eruption seems to have initiated the final separation of Asia, Australia, Antarctica & South-America. The expansion tectonics process accelerated fast at this time, which was caused by a faster expanding Earth-Mantle.



Evolution of the Pacific Plate :
→ caused by the extension and the rotation of a large area of Earth's crust, caused by a number of violent magma eruptions originating from the Cape York Crater (CYC). The marked area was initially accelerated by the impulse of the PT-I

Key-Maps for the further analysis of the Pacific Plate :

Gravity Anomaly Map



Free air gravity map of northern Pacific (Sandwell 2005). Identified magnetic lineations in the north Pacific, labeled with Chron-Numbers. The heavy black lines track triple junctions, dashed where inferred. The Japanese and Hawaiian lineations of the M-Sequence are mostly west of Hawaii-Emperor chain; they are numbered with the M-prefix. Thin magenta lines represent fracture zones: HT-Hokkaido Trough; SR-Shatsky Ridge; ET-Emperor Trough; CT-Chinook Trough; MFZ-Mendocino fracture zone; PFZ-Pioneer fracture zone; UFZ-Murray fracture zone;

The Gravity Anomaly Map above, shows the NW-Pacific Plate with Chron Numbers of magnetic lineations (→ see Table !).

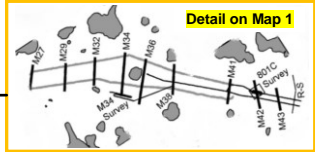
The paths of different Magma Eruption Fronts (No. 1 - 8) from the Cape York Crater (CYC), over a period of ~200 Ma (≥ 8 eruptions), are indicated by different colored lines on the shown maps.

The lines indicate the approximate paths (directions) of the different magma fronts relative to their source areas, and relative to their final locations on the continental plates (→ final locations = collision zones with the continental plate, starting points = CYC magma chamber at time of event) Between the different magma eruptions of the CYC there were quiet time periods (breaks) of ~ 20 to 50 Ma. Each of these magma eruptions left distinct marks = evidence (→ LIP'S, volcanic areas, cracks etc.) on the Pacific Plate. See further explanations on the following pages !

See Study :

Origin of the Pacific Jurassic quiet zone :

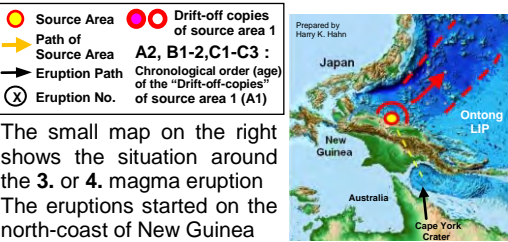
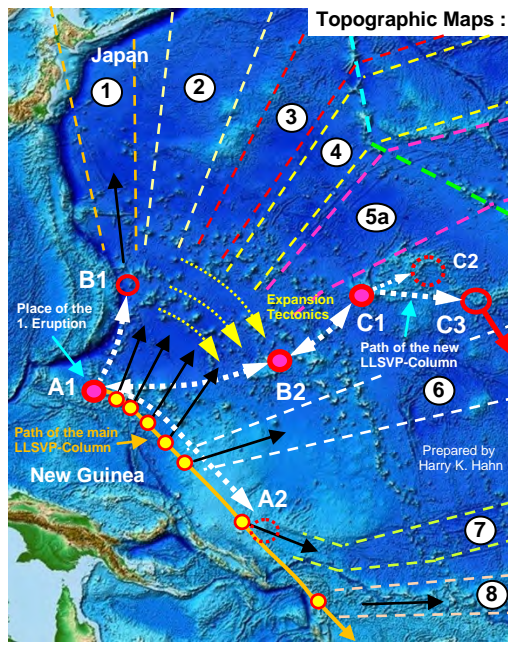
Magnetic Lineations M 35 - M 44



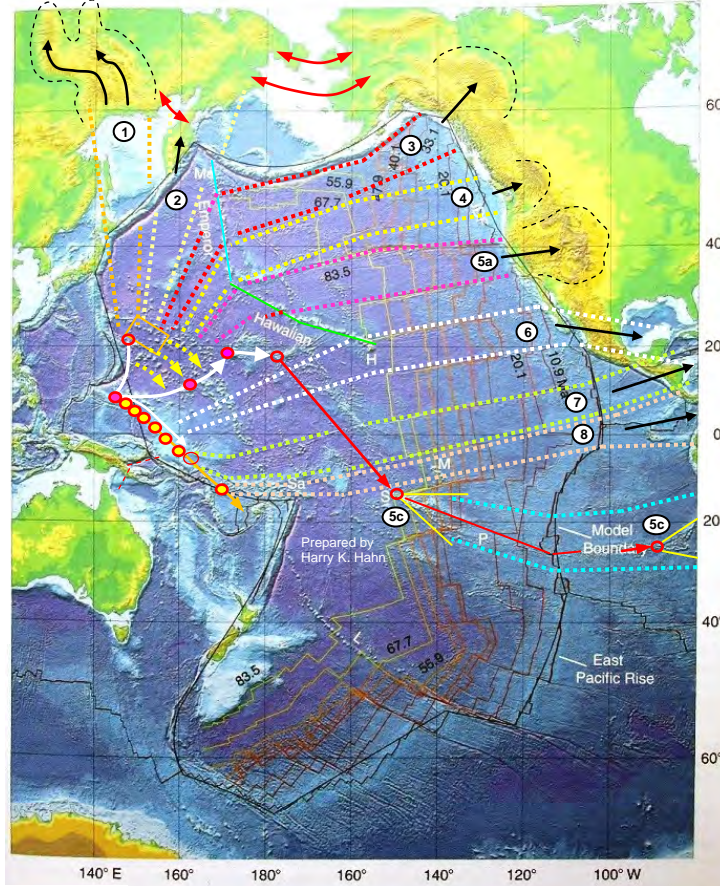
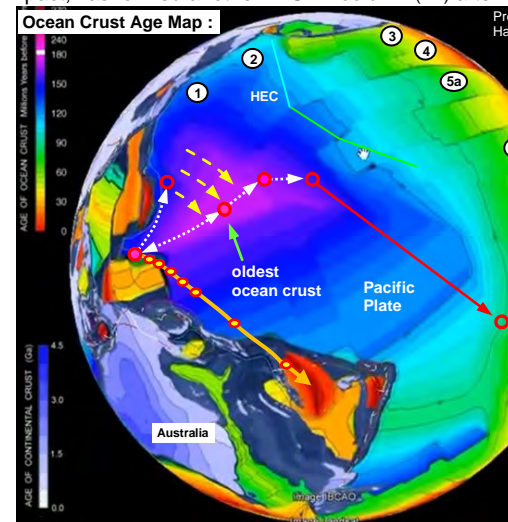
Chron Numbers of Magnetic Lineations in North-Pacific

West of Hawaii-Emperor Chain		East of Hawaii-Emperor Chain	
M-sequence	Age (Ma)	C-sequence	Age (Ma)
M 0	118	C 4	20
M 1	122	C 6	23
M 3	125	C 8	27
M 5	128	C 10	30
M 10	130	C 12	33
M 14	138	C 14	36
M 16	142	C 16	39
M 18	145	C 18	42
M 20	147	C 20	46
M 22	150	C 22	52
M 25	155	C 24	56
M 29	158	C 26	61
M 33	160	C 28	66
M 35	163	C 31	70
M 38	165	C 32	72
M 44	170	C 33-C34	74-84

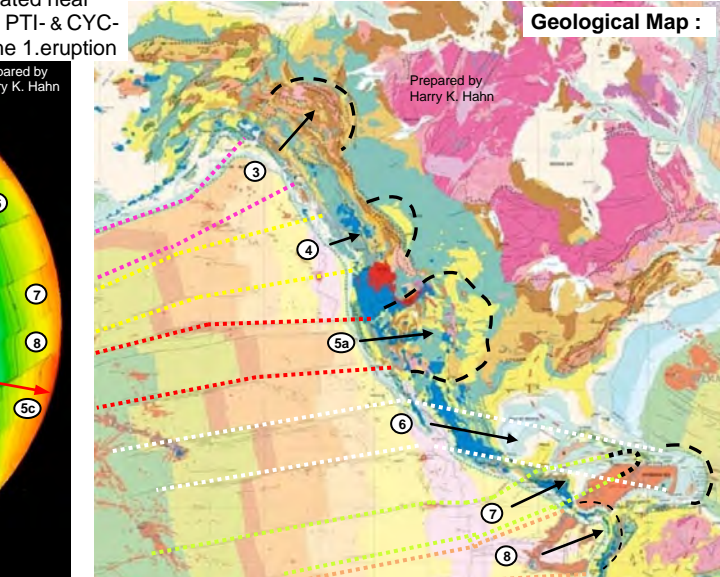
Topographic Maps :



The small map on the right shows the situation around the 3. or 4. magma eruption. The eruptions started on the north-coast of New Guinea. The larger map above shows the path of the source of the magma eruptions (yellow dots on orange arrow). Today it is located near the Fiji-islands. The source, a LLSVP resulting from the PTI- & CYC-Impact, has formed another LLSVP-column (B2) after the 1. eruption.



The maps on the right show the paths of all magma eruptions



Geological Map :

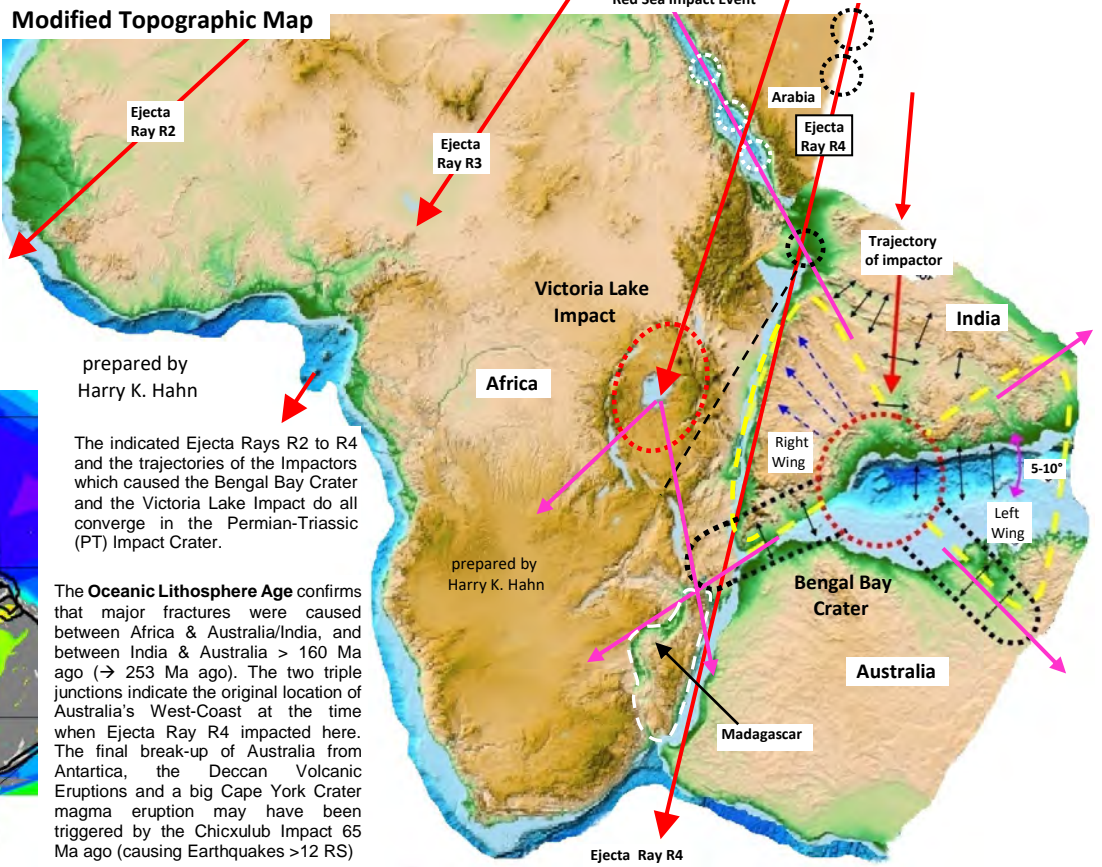
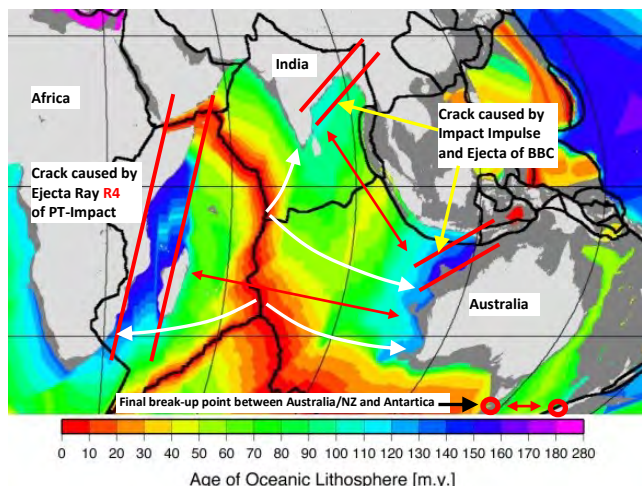
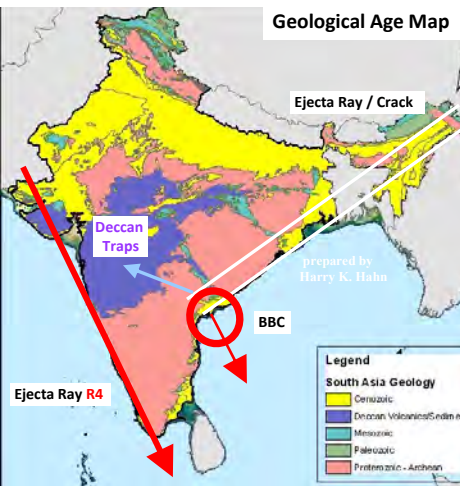
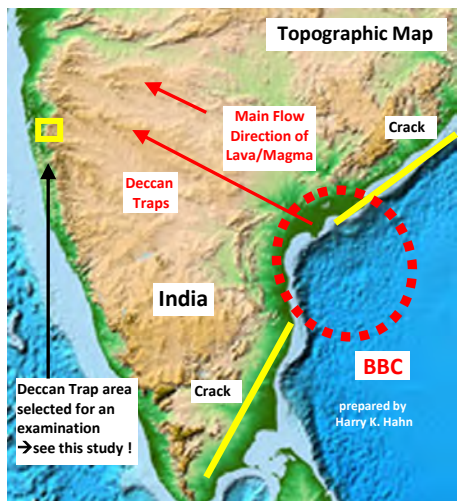
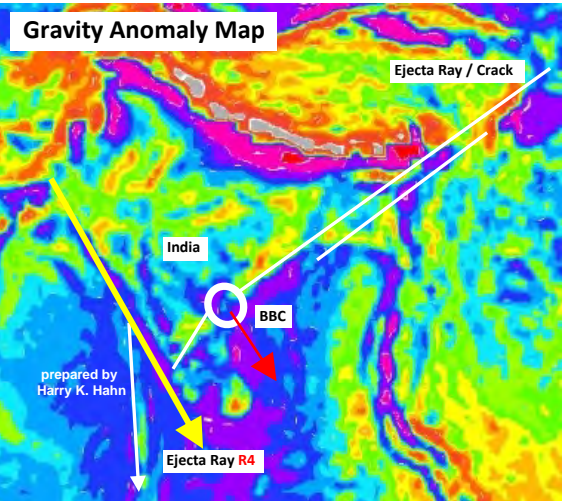
The separation of India from Africa was initiated by a powerful Ejecta Ray (R4) from the PT-Impact Event ~253 Ma ago

The impactor which caused the Permian-Triassic Impact Crater also produced a number of powerful Ejecta Rays and large Secondary Impactors which caused a global fracture pattern in Earth's crust, which then triggered the break-up of Pangea. The powerful Ejecta Ray R4 caused an immense crack in the Super-Continent Pangea which defined the eastern border of the African Plate on one side and the western border of the Indian Plate and the Australian Plate on the other side. Another large crack in Pangea's crust was caused by the Bengal Bay Impact which defined India's western border & Australia's NW border and started their separation

Gravity Anomaly Maps provide evidence that the Indian Plate was formed by Ejecta Rays
 The Gravity Anomaly Map of India shows clear evidence of the described Ejecta Ray R4. The precise straight purple-colored signature, which indicates the western border of the Indian Plate, provides a first proof that indeed a powerful ejecta ray has separated India from Africa. And there is further evidence for another powerful ejecta ray which started at the center of the BBC and which formed the NE-border of the Indian Plate. Together with the main impact impulse of the BBC the crack caused by this ejecta ray is responsible for the separation of India from Australia. The ocean age map and the major fracture zones in the ocean floor also confirm this scenario. The age of the Deccan Traps (65.7 to 64.9 Ma ago) contradicts this scenario. But it seems that the Deccan flood basalts were caused by a much later violent magma eruption from the crack area caused by the BBC. This Magma eruption and the final break-up of Australia from Antarctica may have been triggered by the Chicxulub Impact.

A strong Ejecta Ray (R4) and a large Secondary Impactor caused by the P-T Impact Event led to the break-up of India from Africa & Australia (Begin of break-up process : ~ 253 Ma ago) :

This modified Topographic Map shows a probable scenario of the arrangement of these continental plates shortly after the Permian-Triassic (PT) Impact Event. South-America which was still connected to the west-side of Africa, and Antarctica which was still connected to South-Australia and South-Africa at the time of the PT-Impact, are not shown ! Note that the Atlantic Ocean & Southern Ocean, which are partly visible on this map, did not exist at the time of the PT-Impact ! This map shall only demonstrate how Africa, India, Australia and Arabia were arranged to each other, and how this land area of the Super Continent Pangea broke apart, caused by the powerful Ejecta Rays and Secondary Impactors which were ejected from the PT-Impact Crater. Especially the Ejecta Ray R4 which produced a major crack and the powerful Secondary Impactor which produced the Bengal Bay Crater (BBC) are responsible for the break-up of this land area of Pangea. The edges of the ejecta blanket and strong ejecta rays of the BBC caused further cracks in Earth's crust (e.g. between India & Australia, and in the Red Sea) which led to the break-up of this area.



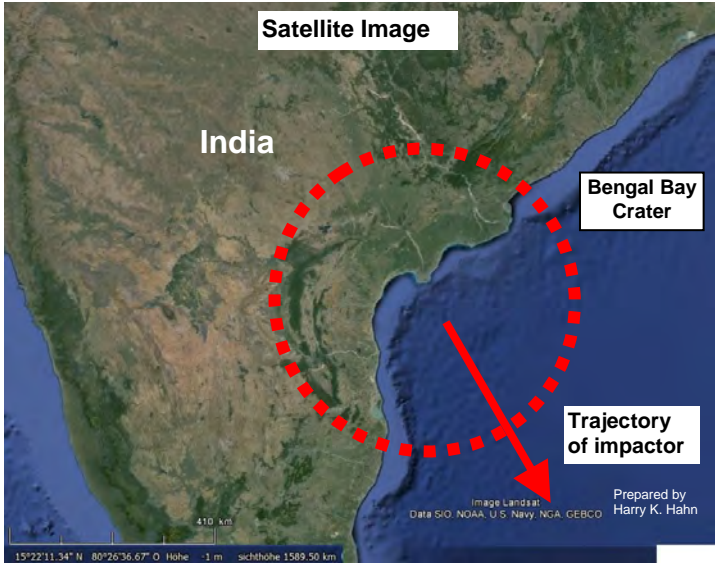
The indicated Ejecta Rays R2 to R4 and the trajectories of the Impactors which caused the Bengal Bay Crater and the Victoria Lake Impact do all converge in the Permian-Triassic (PT) Impact Crater.

The Oceanic Lithosphere Age confirms that major fractures were caused between Africa & Australia/India, and between India & Australia > 160 Ma ago (→ 253 Ma ago). The two triple junctions indicate the original location of Australia's West-Coast at the time when Ejecta Ray R4 impacted here. The final break-up of Australia from Antarctica, the Deccan Volcanic Eruptions and a big Cape York Crater magma eruption may have been triggered by the Chicxulub Impact 65 Ma ago (causing Earthquakes >12 RS)

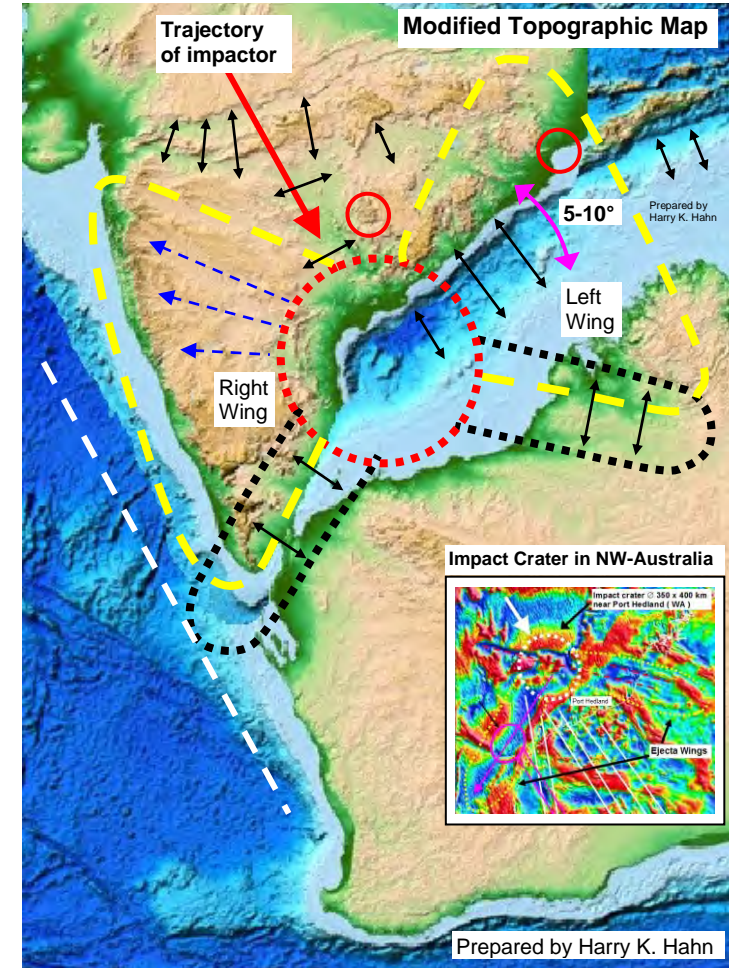
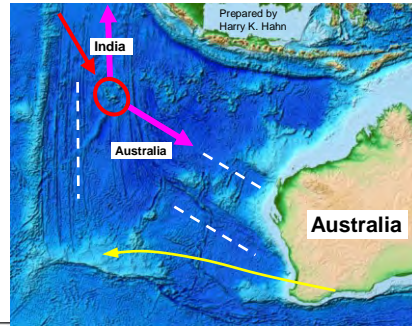
A slightly elliptical impact crater in India with \varnothing 450 x 380 km seems to be related to the PT-Impact Event.

This large elliptical crater is located at the center of India's east coast in the Bengal Bay. The assumed trajectory of the \varnothing 20 to 40 km impactor which produced this large Crater indicates that this crater may be a large secondary crater of the **PT-Impact Event** 253 Ma ago. If we consider a rotation of India of 5-10° after the impact, and an arrangement of India to Australia, before the impact, as shown below, then this impact in India maybe the same impact as the one in NW-Australia ! This would mean that India & Australia had a slightly different arrangement to each other as generally believed !!

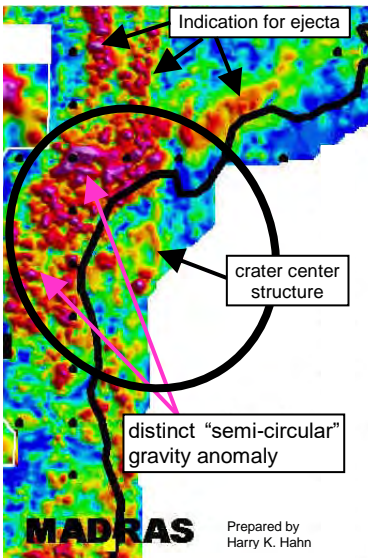
Elliptical crater \varnothing 450 x 380 km in India



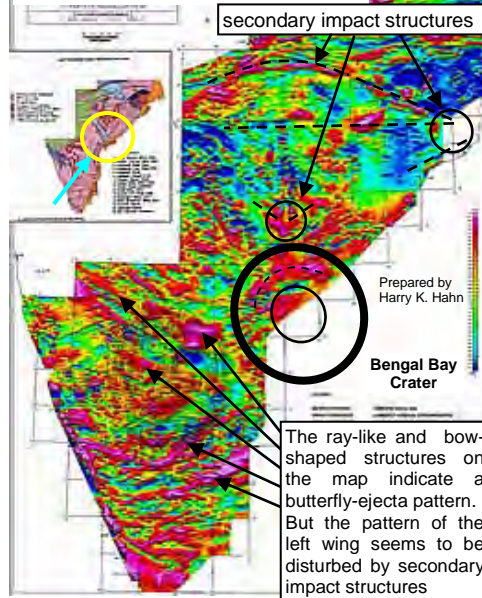
If this assumption is correct, then this large impact crater in India probably caused the break-off of India from Australia starting around 250 Ma ago (→ break-off of **Pangea**). Indication for this impact can be found on the topographic map, satellite image and on gravity- & magnetic anomaly maps of India. Because of the noticeable magnetic anomaly traces in the assumed ejecta pattern the impactor must have contained considerable amounts of iron. Because it was an **oblique impact**, the impactor produced a butterfly-shaped ejecta pattern (→ indicated in yellow on the map below). Here the ejecta structure is quite good noticeable within the right wing of the butterfly-ejecta pattern (→ indicated by the blue arrows). Therefore in all probability the Indian **Traps** are the result of an enormous ejecta blanket covering an area > 1,000,000 km² ! The Impact Crater initiated strong **Expansion Tectonics** (black arrows) → Compare with crater in NW-Australia



Gravity Anomaly Map



Magnetic Anomaly Map



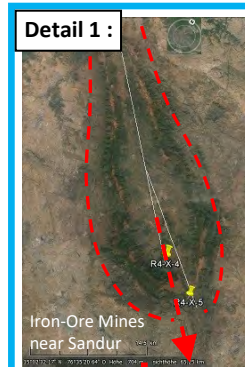
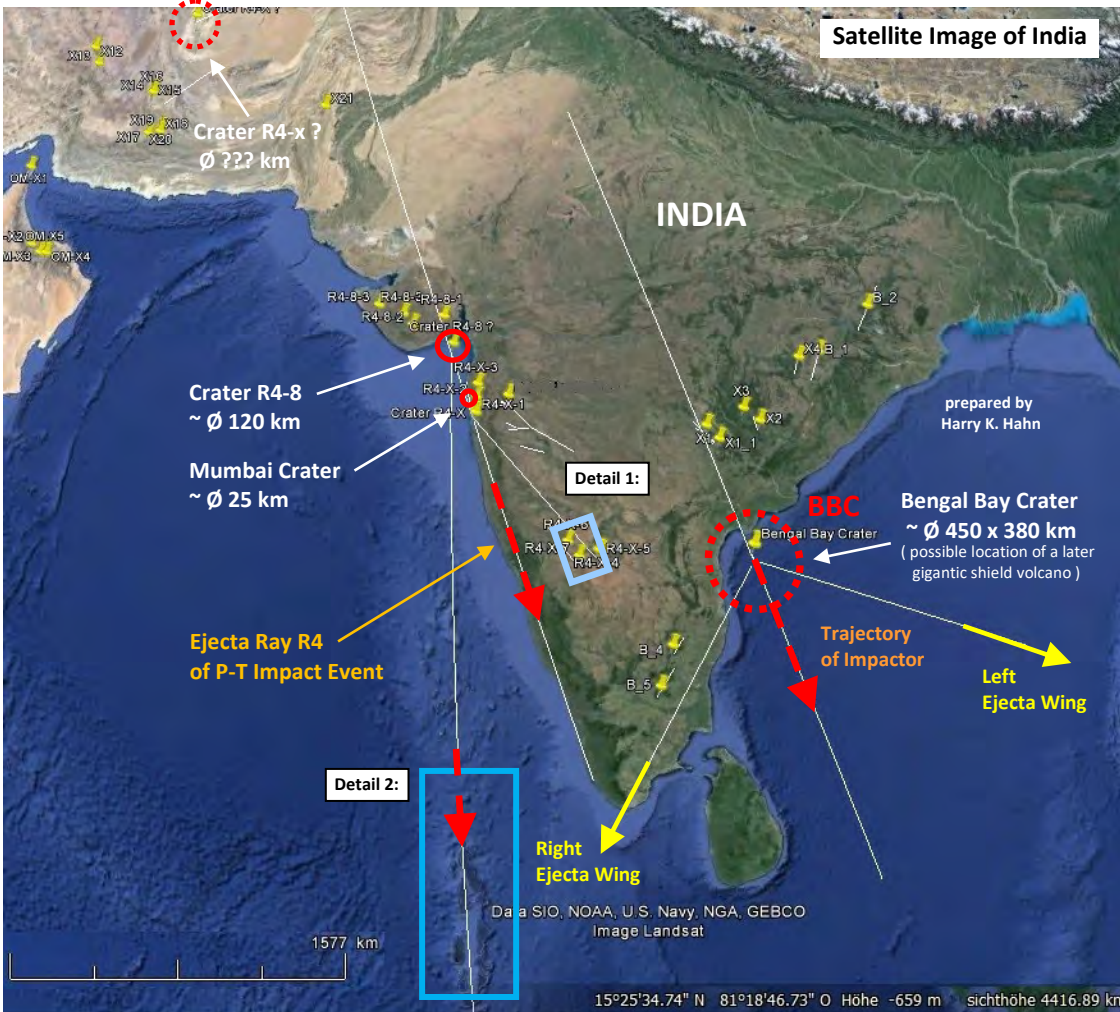
The ocean floor map shows traces of the movement of India and Australia after the Impact Event. These traces indicate a fast movement of India directly towards North (plus an anti-clockwise rotation by 5-10°), probably caused by the ejecta impulse, and a movement towards SE by Australia.

The **gravity anomaly** map and the magnetic anomaly map give indication for a large impact crater and for an extensive ejecta pattern. However only half of the whole crater structure is visible because the other half is located on the ocean floor → or in all probability in NW-Australia !!

The fact that the center of the crater lies precisely on the coast (or in a bay) is a strong indicator that this crater may have caused the break-off of India from **Pangea**

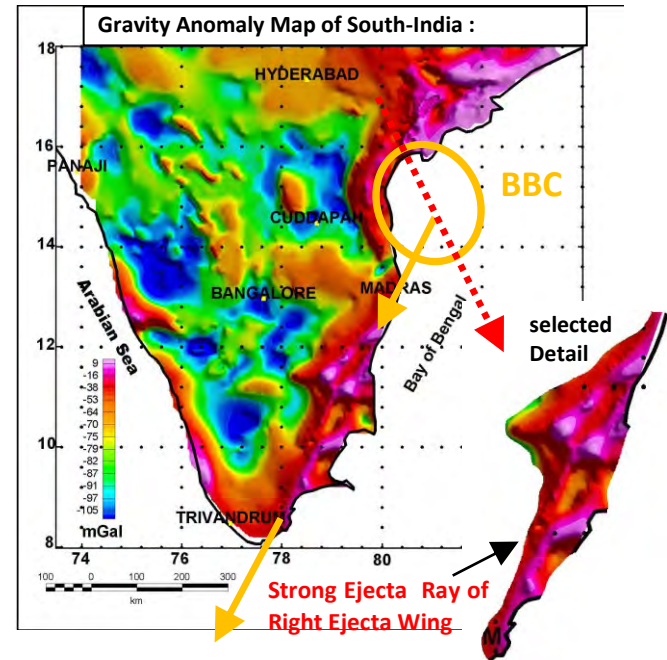
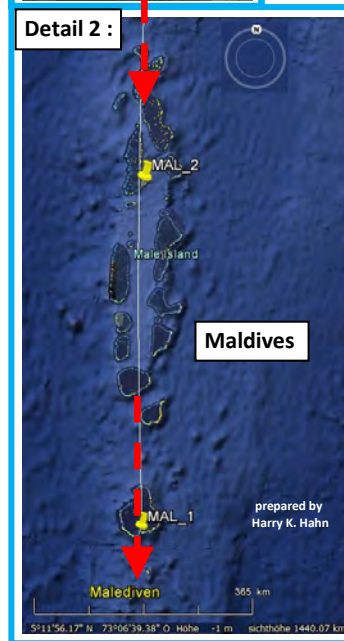
Two craters Ø ~120 km & Ø ~25 km on the west-side of the Indian Plate were caused by Ejecta Ray R4 from the PT-Impact

The western border of the Indian Plate was formed by Ejecta Ray R4 of the PT-Impact Event. Secondary Impact Structures along this western border of the Indian Plate indicate the location of two craters which lie on the track of Ejecta Ray R4. The first crater (R4-8) with Ø ~120 km is located on the northern end of the linear western border of the Indian Plate. And the second crater with Ø ~25 km ("Mumbai Crater") is located around 240 km south of crater R4-8 , directly on the west-coast of India near Mumbai. There is strong indication that the Iron-Ore Deposits around Sandur are ejecta material which is originating in the Mumbai Impact Crater. This is indicated by the orientation and the drop-shape of this Iron-Ore Deposits (Range). → see detailed images of this and other secondary impact structures on the following pages of this document. The Maldives, a linear island-chain was formed by either ejecta from Crater R4-8 or by Ejecta Ray R4 itself. This is not clear yet. The ejecta ray which formed the Maldives may have drifted away from the Indian Plate later, because of ocean spreading activity. Another possible impact crater R4-x was probably also located on the track of Ejecta Ray R4 initially, before it moved west-ward through a gigantic mantle flow (in the Pakistan-/ Iran-area) which was caused when the African Plate separated from the Eurasian Plate after the impact of the ejecta from the PT-Impact Event. A share of the impulse of the Bengal Bay Impact certainly was responsible for the north-ward acceleration of the Indian Plate, which caused the Himalaya when India collided with the Eurasian-Plate. The Deccan Traps probably were caused by a much later violent magma eruption coming from the crack area caused by the BBC. Maybe these flood basalts came from a gigantic shield volcano which collapsed because of earthquakes (>12 RS) triggered by the Chicxulub Impact , 65 Ma ago.

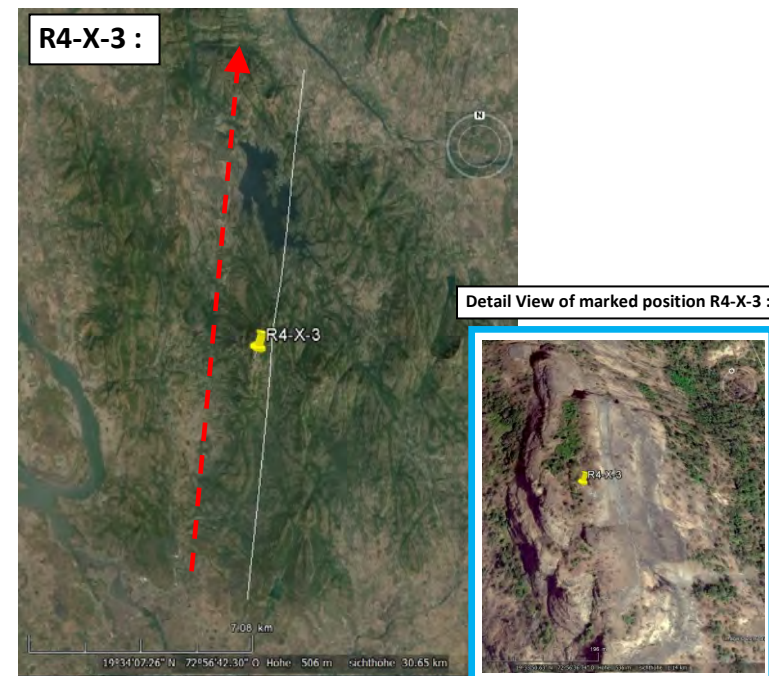
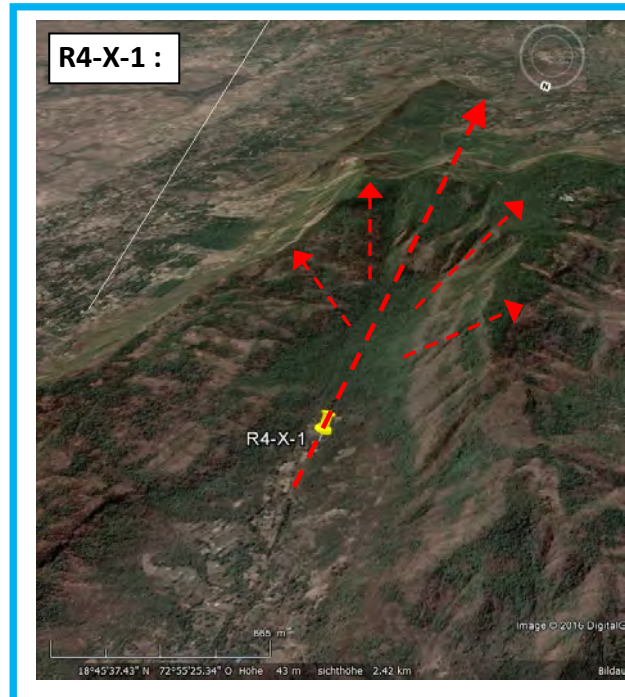
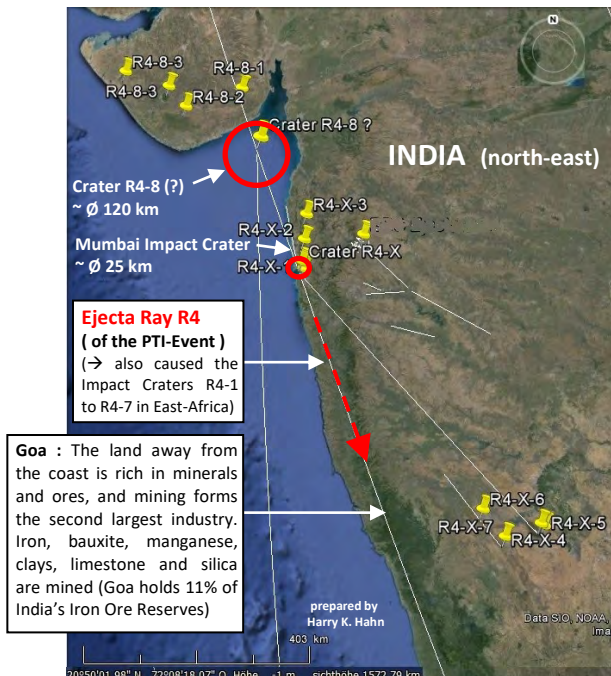


Detail 1 : The Iron-Ore Deposits around Sandur in the Ballari District are ejecta material which is originating in the Mumbai Impact Crater

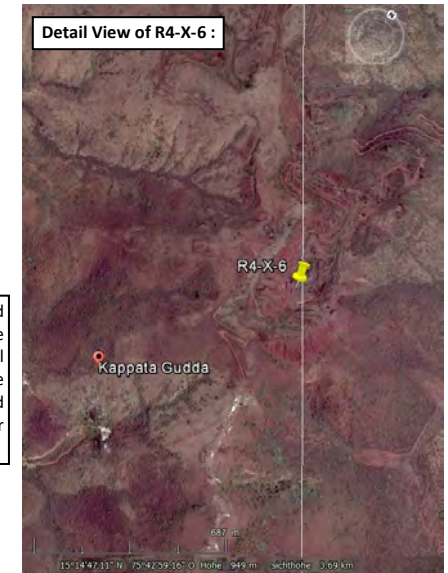
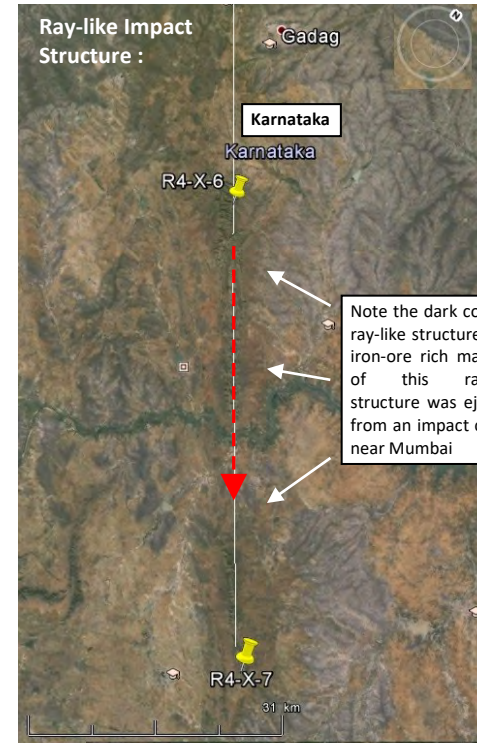
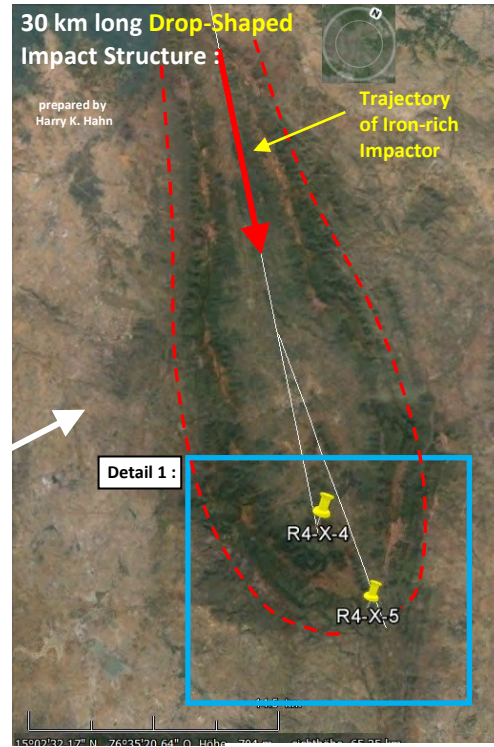
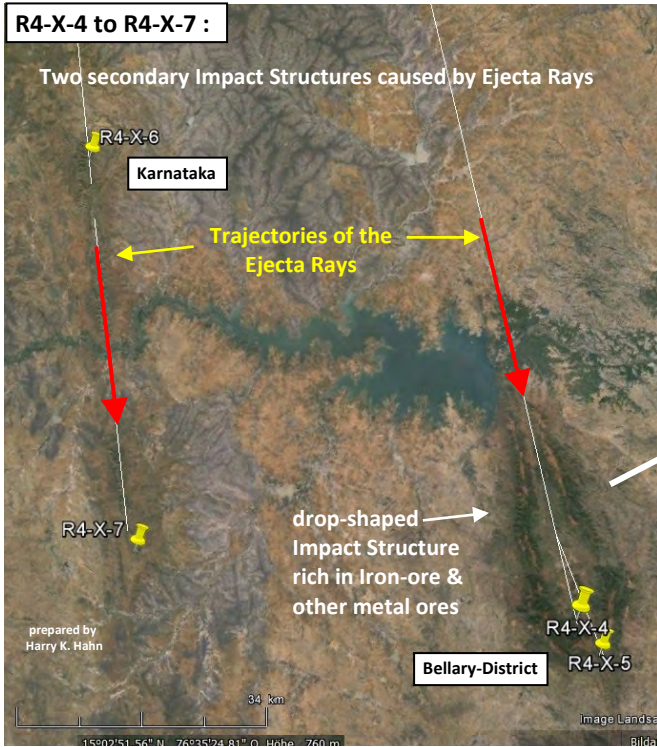
Detail 2 : The Maldives are the result of a strong ejecta ray from Crater R4-8 or a result of Ejecta Ray R4 itself. This ejecta material may also be rich in Iron-ore & other Metal-Ore. (magnetic anomalies on Maldives)



Gravity Anomaly Map of South-India : This map clearly indicates the ejecta ray which formed the south-east border of the Indian Plate. The purple- & red-colored linear structures indicate the ejecta ray (ejecta material) which caused a major crack between the Indian Plate and the Australian Plate 253 Ma ago, which then eventually led to the separation of these two Plates (together with the other much longer crack along the NE-border of the Indian Plate.



India's Iron-Ore-Reserves are the result of Secondary Impacts caused by ejecta from the Mumbai Crater and BBC & P-T Impact Crater in general

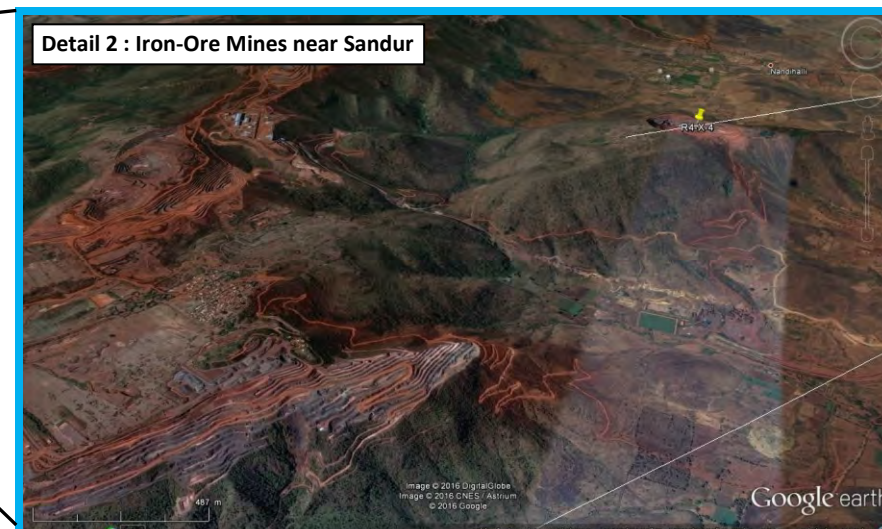
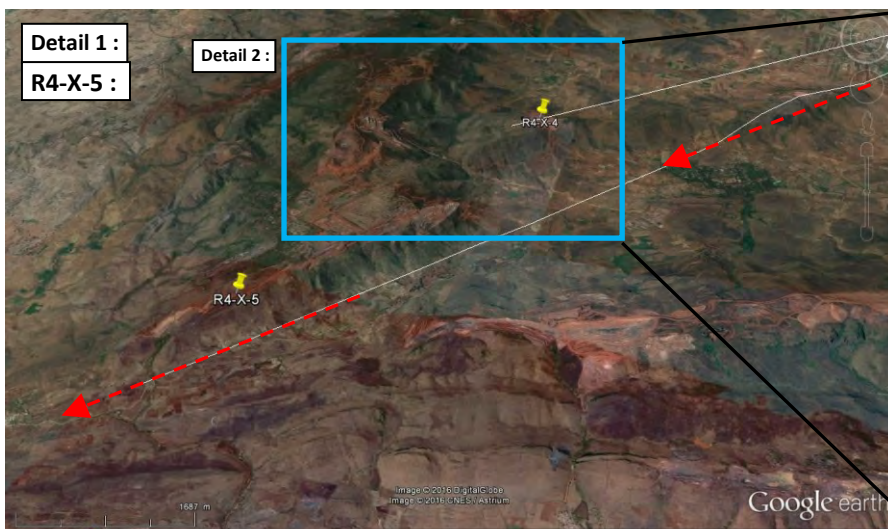


There is clear indication that the Iron-Ore Deposits near Sandur in the Ballari District are ejecta material which is originating in the Mumbai Impact

The drop-shape of the mountain range around Sandur (→ iron-ore deposits) its exact orientation and the visible ejecta ray near Gadag lead to the bay near Mumbai

This leads to the logical conclusion that the bay of Mumbai must be caused by an Impact Crater, which was formed by an iron-rich impactor probably originating from the PT-impact Event.

(this can be concluded from the probable trajectory of the Impactor which caused the Mumbai Impact Crater)

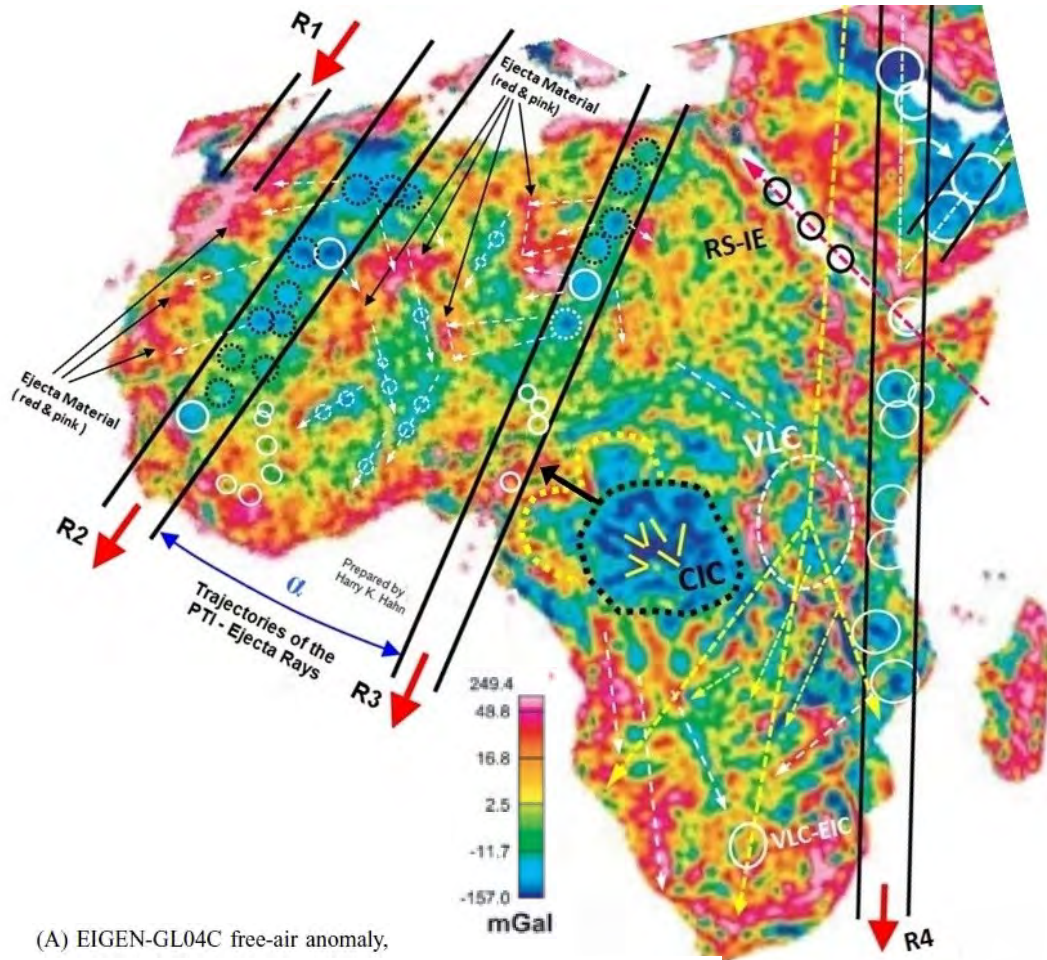


Ballari District is rich in mineral resources. It contains 25% of India's Iron ore reserves. It has both metallic and non-metallic minerals. The metallic minerals include iron ore, manganese ore, redoxide, gold, copper and lead. The non-metallic minerals include andalusite, asbestos, corundum, clay, dolomite, limestone, limekankan, moulding sand, quartz, soap stone, granite and red ochre.

Three powerful Ejecta Ray caused by the Permian Triassic Impact Event are indicated by negative gravity anomalies on the Map

Gravity Anomaly Map of Africa showing the PT-Ejecta Rays R1-R4 :

- ➔ Ejecta Rays R1 to R4 of the Permian Triassic impact (PTI) are marked on the map. (➔ smaller crater chains are also indicated)
- ➔ Impact Craters appear as negative anomalies (blue or green areas)
- ➔ The 1200x850 km Congo Impact Crater (CIC) also shown on the map



(A) EIGEN-GL04C free-air anomaly,

A crustal thickness map of Africa derived from a global gravity field model using Euler deconvolution

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²Department of Geosciences, Pennsylvania State University, University Park, PA 16802, USA

³School of Geosciences, The University of the Witwatersrand, Johannesburg, South Africa

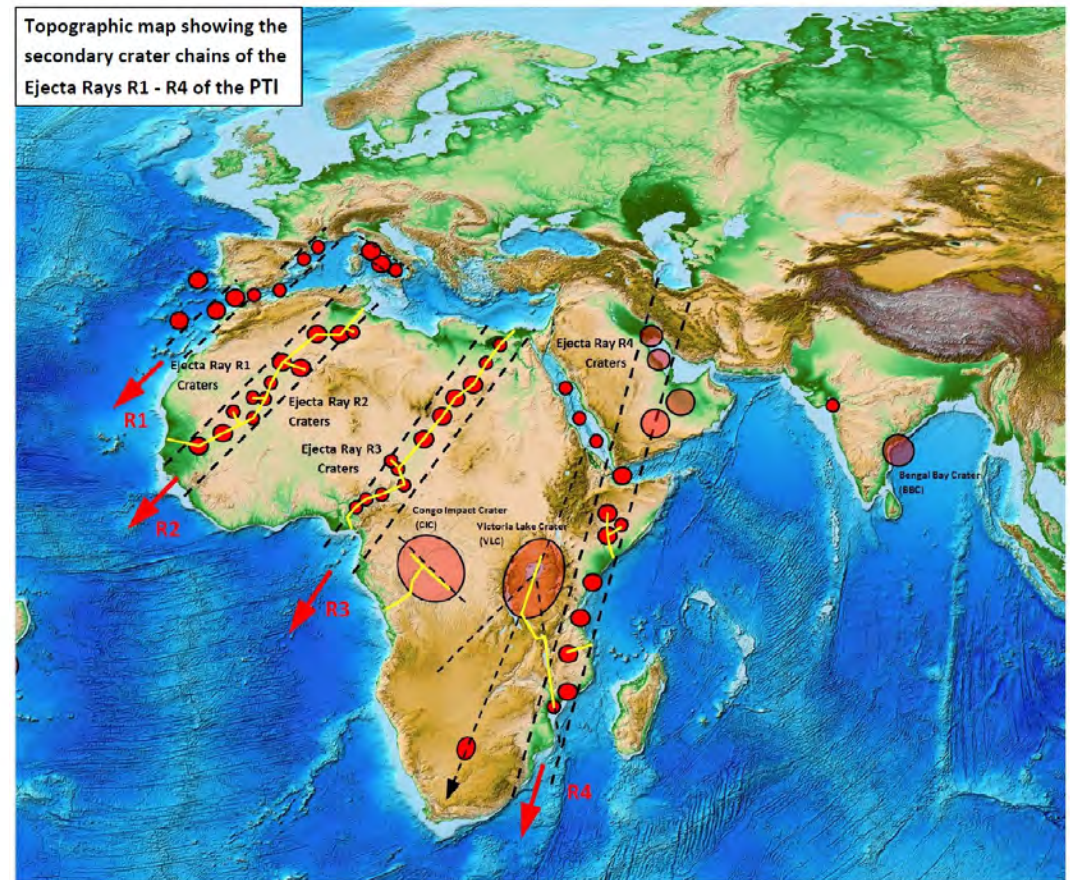
3 METHODOLOGY

As our main interest is the depth of the crust-mantle boundary, the gravity data are first subjected to a high-pass filter using a 1000-km cut-off wavelength to remove deep mantle sources (Obenson 1974;

Block et al. 2009, Fig. 1B). Undesired tapering effects are minimized by expanding the grid up to 20 per cent of the total grid area. We then calculate the X, Y, Z derivatives of the filtered gravity anomaly on a 0.25° grid (Figs 1C, D and E) and use them as input to the 3-D Euler equation.

Topographic Map of Africa indicating the crater chains R1 to R4 :

- ➔ The Chains of impact craters (R1 to R4) shown on the topographic map (➔ marked in red) in all probability represent oil- & gas-rich areas.
- ➔ The Impact Crater areas can easily be connected by an oil-pipeline (Pipelines marked in yellow)
- ➔ The Congo Impact Crater (CIC) and the Victoria Lake Impact Crater (VLC) probably also represent oil- & gas-rich areas.



In the oil-exploration industry it is common knowledge that large oil-fields can be expected in an area effected by a big impact crater. Because a large impact not only produces the required structural traps (by impact induced fracturing and brecciation of the rock under the crater, which results in very effective porosity & permeability of the fractured rock), but also the palaeo-environment for the deposition of post-impact shales that provides the oil & gas.

There are geological examples available, like the Ames Crater (\varnothing 14 km) in Oklahoma / USA, or the worldclass Cantarell Oil-field, which is located near the \varnothing 180 km Chicxulub Crater in Mexico, which clearly indicate the close connection of impact craters & oil- & gas-fields

A powerful Ejecta Ray from the Victoria-Lake Impact Event (~Ø 1550x1100 km) started the separation of Madagascar from Africa

The separation of Madagascar from the African Plate was initiated by secondary impact events which were caused by the Permian-Triassic (PT) Impact ~253 Ma ago. Especially the secondary impact which caused the “Victoria Lake Crater“ (VLC) contributed to this separation of Madagascar from Africa. This powerful Impact Event, which was an oblique impact, and which occurred in the Victoria Lake area, produced two strong “ejecta wings” or ejecta rays (VLC-R & VLC-L) and a “Central Ejecta Ray” (VLC-C) which caused the Iron-Ore Deposits in South-Africa (→EIC). From the location and shape of the secondary impact structures caused by the Victoria Lake Impact (→ yellow pins on satellite map → see following pages !), the orientation of the two ejecta wings and the trajectory of the main impactor can be reconstructed. This provides strong evidence that the VLC was caused by the PT-Impact. (→ similar to the Bengal Bay Crater). In all probability the impact impulse of ejecta ray VLC-L (L=left), which runs from the VLC over Malawi Lake (→ a result of the impact of VLC-L) towards the original position of Madagascar, caused fractures (→ on the western border of the Madagascar-Fragment) which are responsible for the break-off of Madagascar from the African Plate. This happened at the same time when Ejecta Ray R4 caused a major fracture between Africa and Australia/India (→ see modified map below) Gravity Anomaly- & Topographic- Structures provide further evidence for this scenario. And Gravity Anomaly- & Magnetic-Anomaly Structures also confirm the VLC-Impact Scenario.

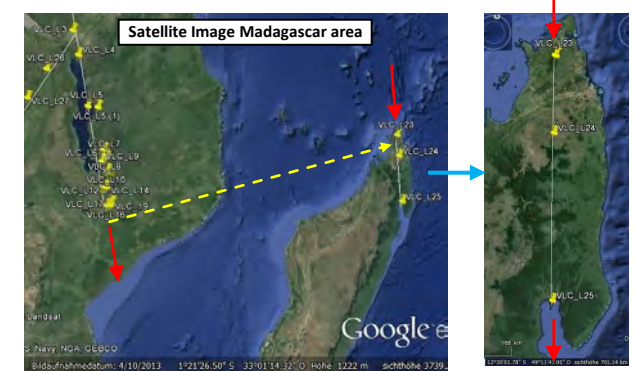
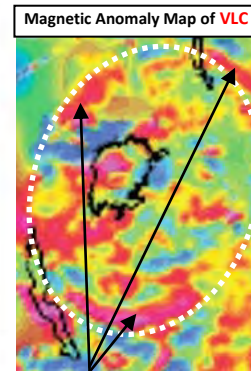
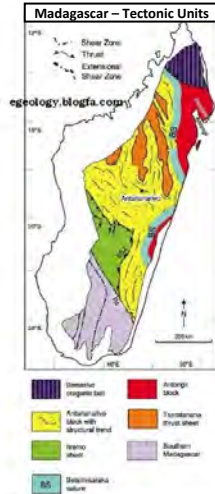
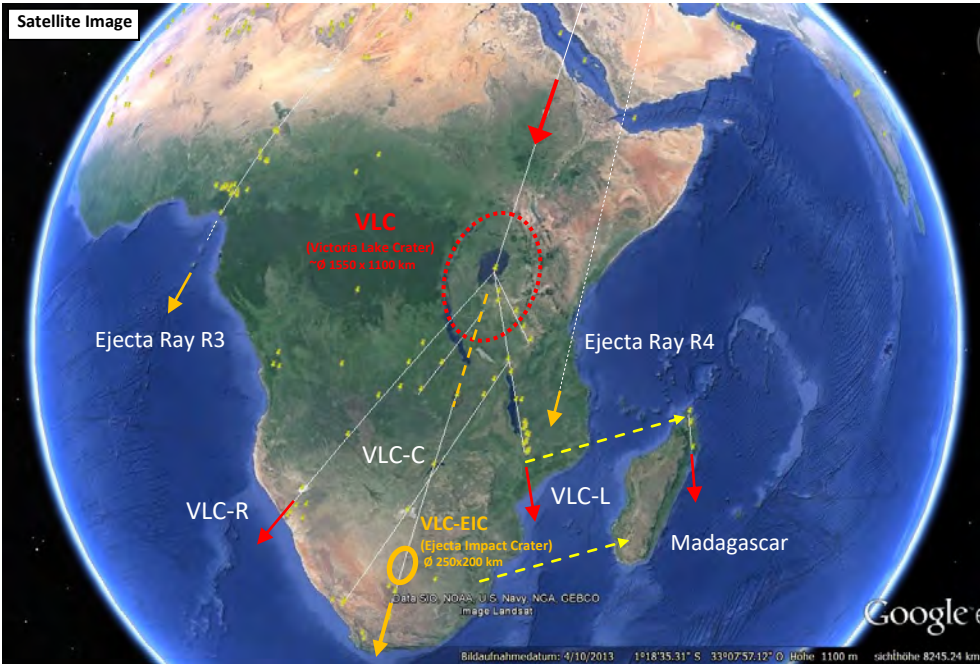
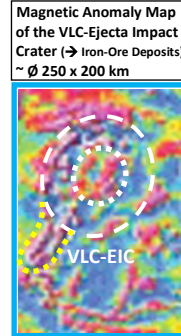
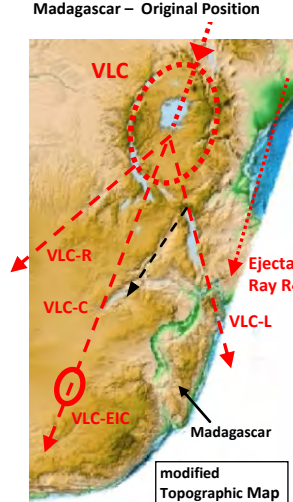
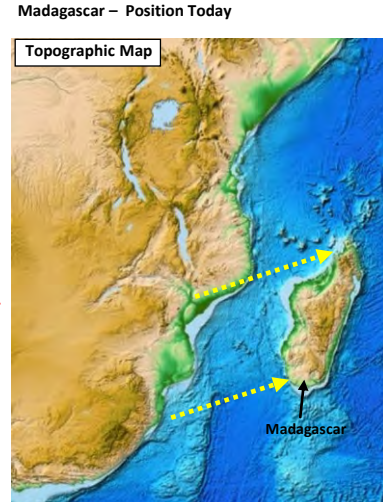
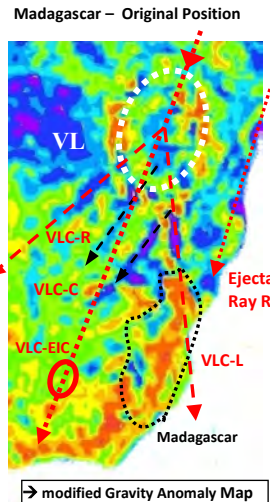
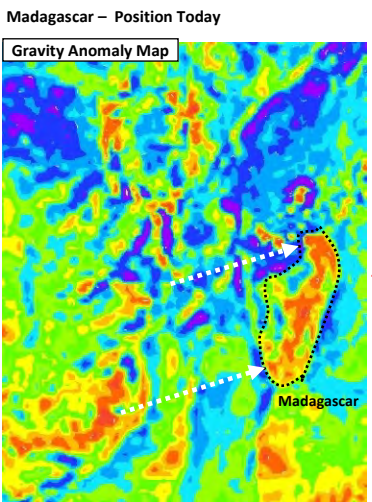
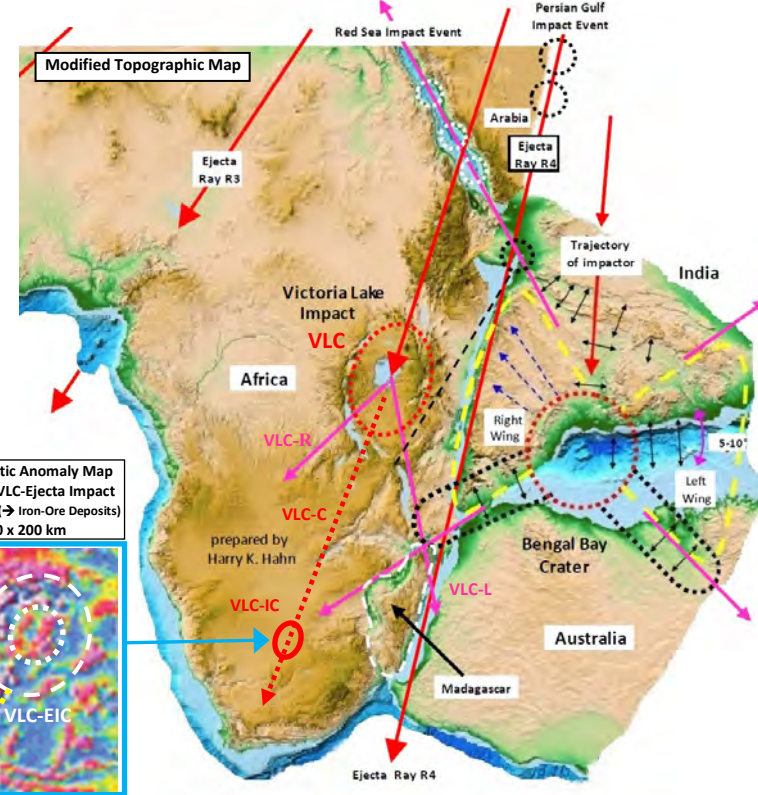


Figure 6. A simplified geological map showing the main tectonic units of the Proterozoic basement in Madagascar. The Mozambique Belt, East African Rift, and various Shear Zones are shown. Reproduced with permission from Collins and Stanley (2002).

The modified Topographic Map on the righthand side shows how Africa, India and Australia were positioned to each other, and how this land area of Pangea broke apart, caused by the powerful Ejecta Rays and Secondary Impactors from the PT-Impact Event.



prepared by Harry K. Hahn

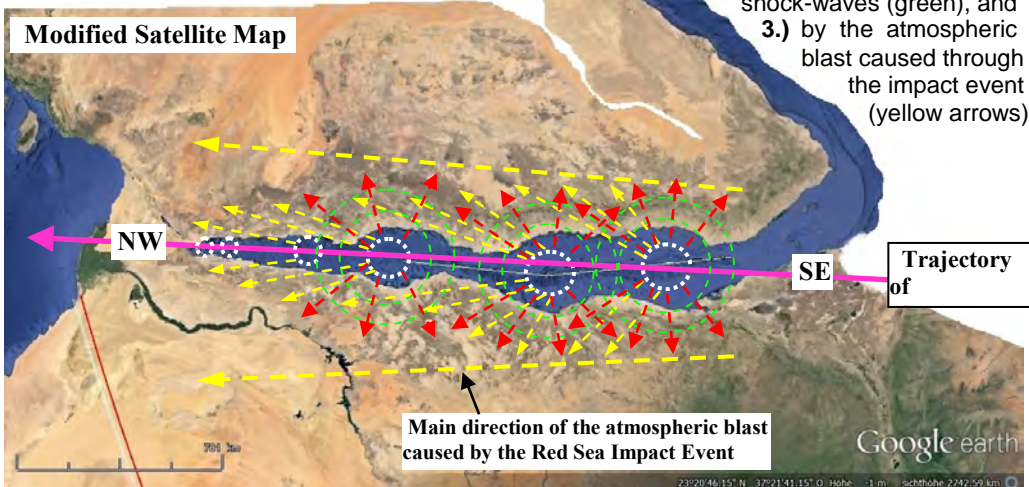
The Red Sea "Rift-Area" was caused by an Impact Crater Chain, which was formed by ≥ 3 craters with \varnothing 100 to 150 km

The satellite map and the gravity anomaly map of Africa indicates that the true (initial) cause of the Red Sea Rift-Area was an Impact Event, which in all probability is connected to the **PT-Impact Event** 253 Ma ago. There are many secondary impact structures visible on the satellite map, along the coast-area east & west of the Red Sea, which indicate that the impactors had a trajectory from the SE to the NW. This means that probably not the PT-Impact itself produced the impactors, but more likely a large secondary impact of the PT-Impact. A probable scenario is shown on the map below. I believe that the Bengal Bay Crater, which in all probability separated India from Australia, has produced these impactors. It seems that the impactors came from the rear edge of the Right Ejecta Wing of the Bengal Bay Impact Event. \rightarrow I will show some of the secondary impact structures of the Red Sea Rift-area in the document which describes this impact event in more detail.



The Red Sea Impact Event occurred from SE to NW

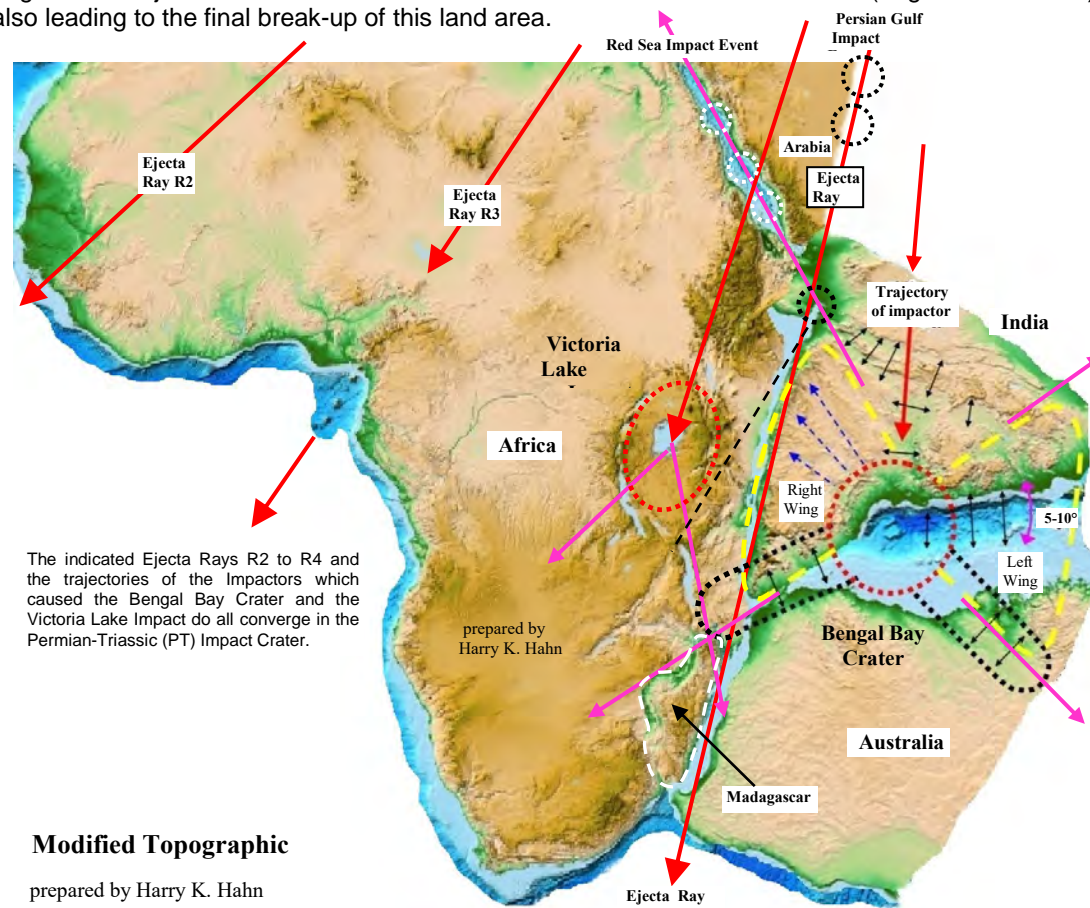
Especially the traces of the atmospheric blast, caused by the Impact Crater Chain, indicate that the impactors came from SE. The modified satellite map shows the impact area a certain time after the impact event



The secondary impact structures were formed by three effects :

- 1.) by the ejecta from the craters (red arrows);
- 2.) by seismic shock-waves (green), and
- 3.) by the atmospheric blast caused through the impact event (yellow arrows)

This modified Topographic Map shows a probable scenario of the arrangement of some continental plates shortly after the Permian-Triassic (PT) Impact Event. South-America which was still connected to the west-side of Africa, and Antarctica which was still connected to South-Australia and South-Africa at the time of the PT-Impact, are not shown. And note that the Atlantic Ocean & Southern Ocean, partly visible on this map, did not exist at the time of the PT-Impact ! This map shall only demonstrate how Africa, India, Australia and Arabia were arranged to each other, and how this land area of the Super Continent Pangea broke apart, caused by the powerful Ejecta Rays and Secondary Impactors which were ejected from the PT-Impact Crater. Especially the Ejecta Ray R4 which produced a major crack and the powerful Secondary Impactor which produced the Bengal Bay Crater (BBC) are responsible for the break-up of this land area. The edges of the ejecta blanket of the BBC caused further cracks in Earth's crust (e.g. the Red Sea) also leading to the final break-up of this land area.



The indicated Ejecta Rays R2 to R4 and the trajectories of the Impactors which caused the Bengal Bay Crater and the Victoria Lake Impact do all converge in the Permian-Triassic (PT) Impact Crater.

Modified Topographic

prepared by Harry K. Hahn

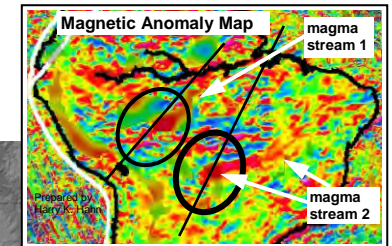
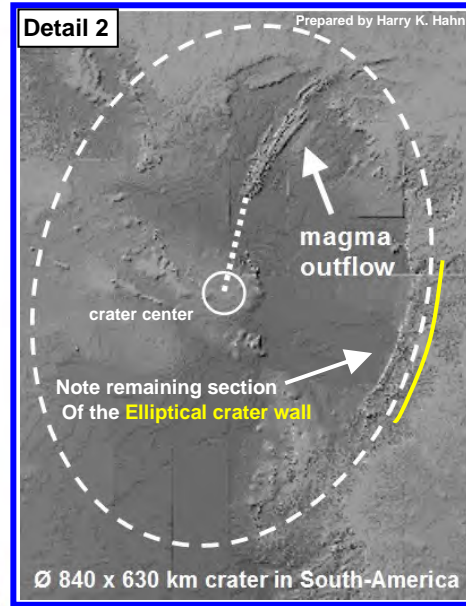
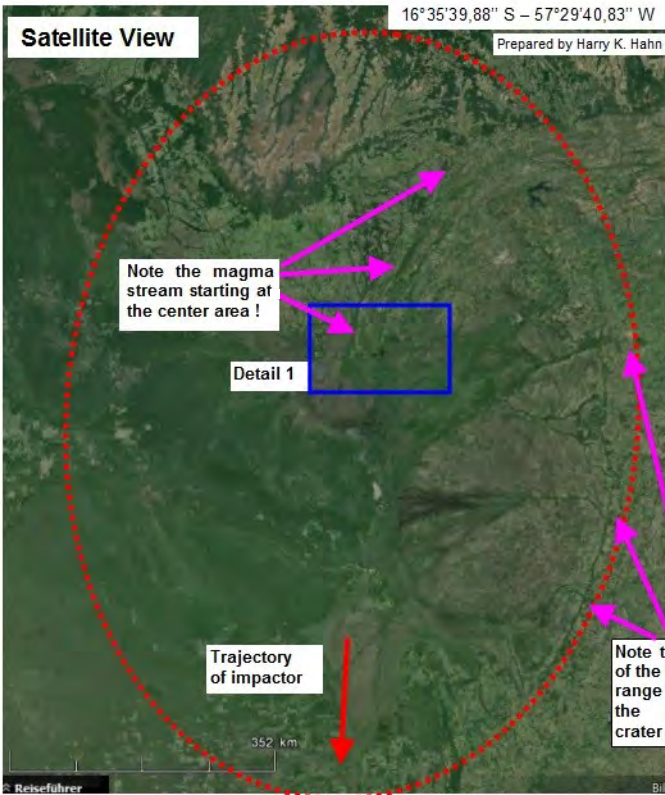
In South-America a large \varnothing 840 x 630 km Crater exists, which may be connected to the PT- Impact Event 253 Ma ago

The orientation of this elliptical impact crater indicates that it may be a result of the PT-Impact too ! The special feature on this crater is a solidified magma stream which came straight out of its center ! This magma stream is 30 km wide and it surely had serious longterm effects on the climate ! But it is also possible that this massive Impact happened later, e.g. at the Triassic/Jurassic boundary because it may have caused the CAMP- Event The impact crater, which has formed the plane Pantanal area, has also caused an enormous crack in the lithosphere, which has triggered extensive

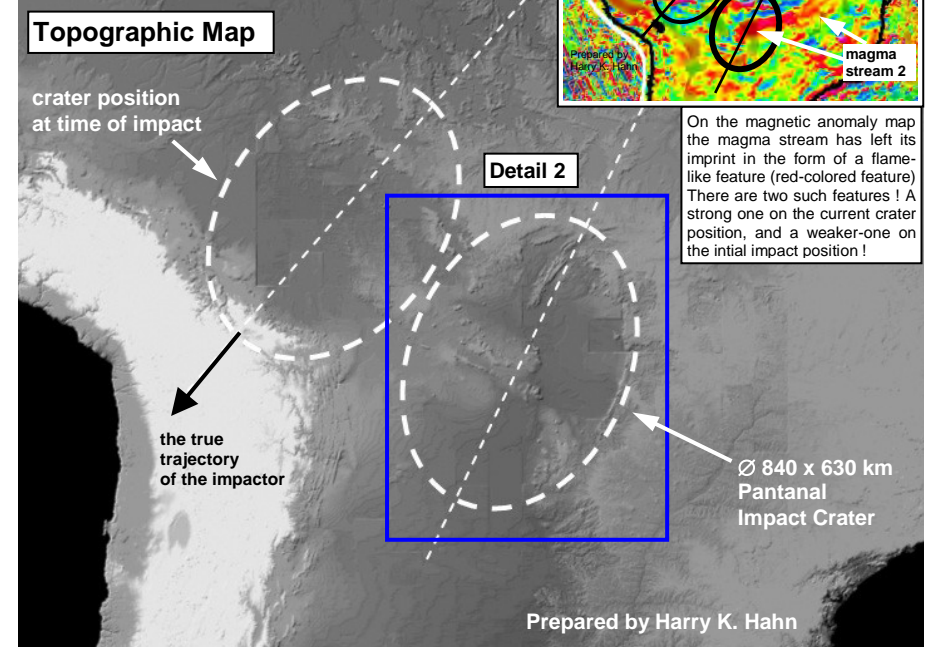
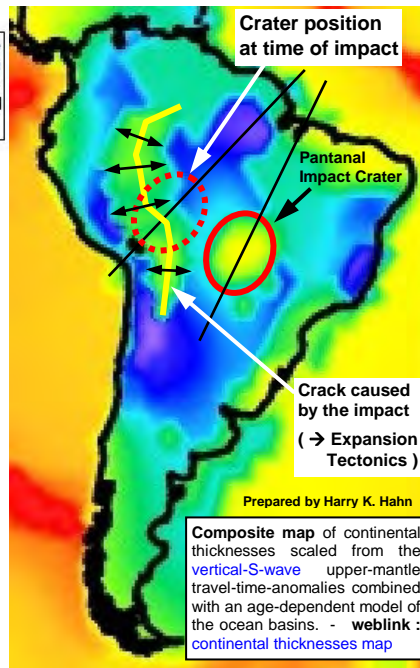
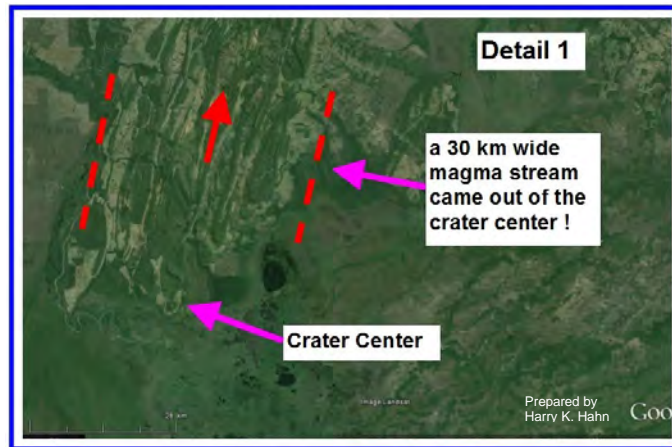
Expansion Tectonics along the Andes in the East of South-America

There are different maps which show clear evidence for this impact crater. The topographic map and the satellite map show the remains of the elliptical crater wall and of the magma stream, which flew out of the crater center. The topographic- and the magnetic anomaly map indicate that the crater position was located around 600 km towards the north-west at the time of impact. There are a number of features on the maps which clearly indicate this fact ! The continental (lithosphere)-thickness map shows a "crack", or a "stretching" of the lithosphere over a length of around 1500 km. This crack in the lithosphere runs along the eastern border of the Andes, from Bolivia through Brasilia and up to Colombia ! It is obvious that this enormous crater has caused a fracture though the north of the continent, and it led to Expansion Tectonics and maybe the CAMP- Event, which produced > 1,000,000 km² of new surface area !!

This \varnothing 840 x 630 km elliptical crater caused a > 600 km shift of the north-eastern part of the continent towards south-east. And it probably produced large areas with a great potential for large oil- & gas-fields (around the crater center)



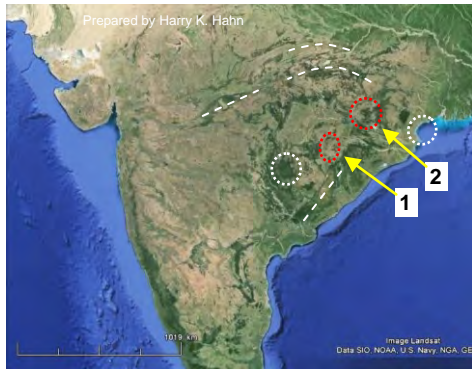
On the magnetic anomaly map the magma stream has left its imprint in the form of a flame-like feature (red-colored feature) There are two such features ! A strong one on the current crater position, and a weaker-one on the initial impact position !



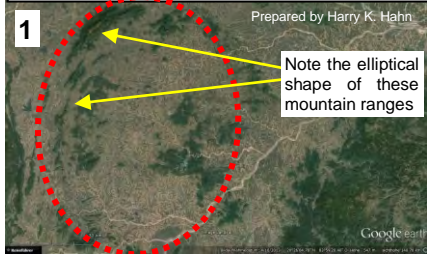
Other possible Impact Structures in India & South-America which probably were caused by the PT – Impact Event :

There are other impact structures on Earth which are indicated by topographic features and visible on satellite images (e.g. in Google Earth). I want to show here a few possible impact structures, which are a bit more difficult to interpret. There are some further structures visible in India which seem to be secondary impact structures caused by the Bengal Bay Crater. And there are also further impact structures visible in South-America which seem to be connected to the **PT-Impact**

Other impact structures in India

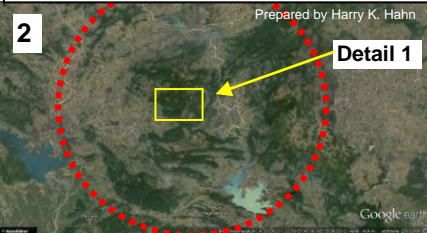


20°26'04.78" N – 83°59'20.40" E



elliptical structure with \varnothing 90x65 km

21°59'57.45" N – 85°35'58.53"



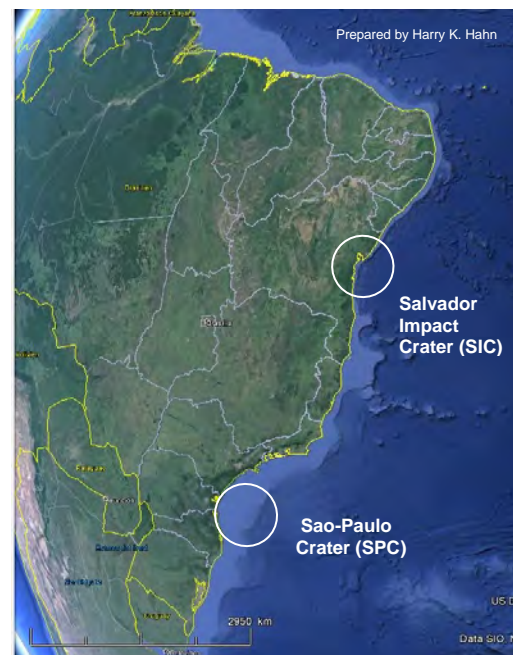
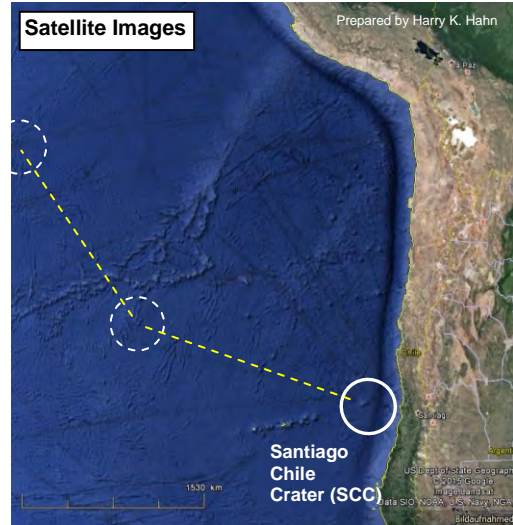
circular structure with $\sim \varnothing$ 100 km

Detail 1



Further impact structures in South-America :

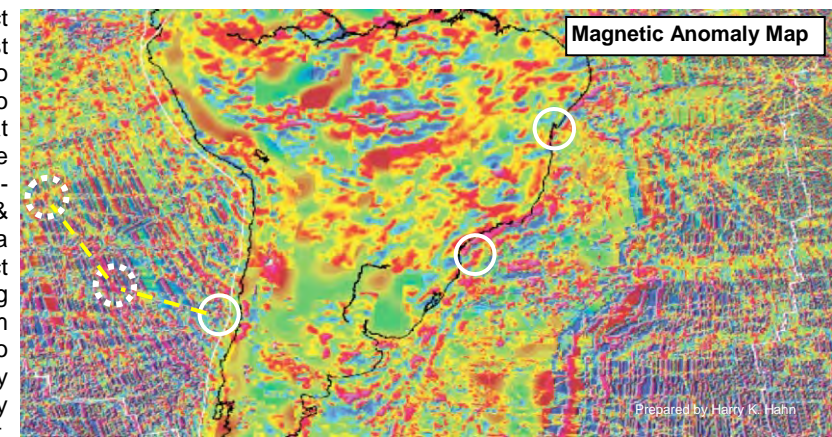
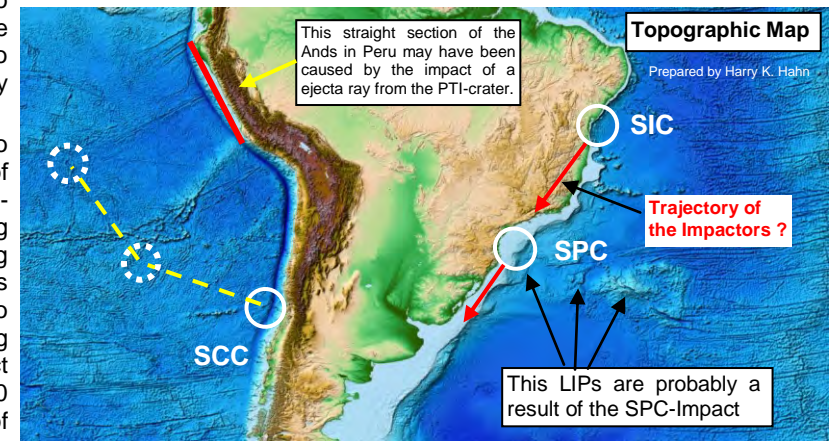
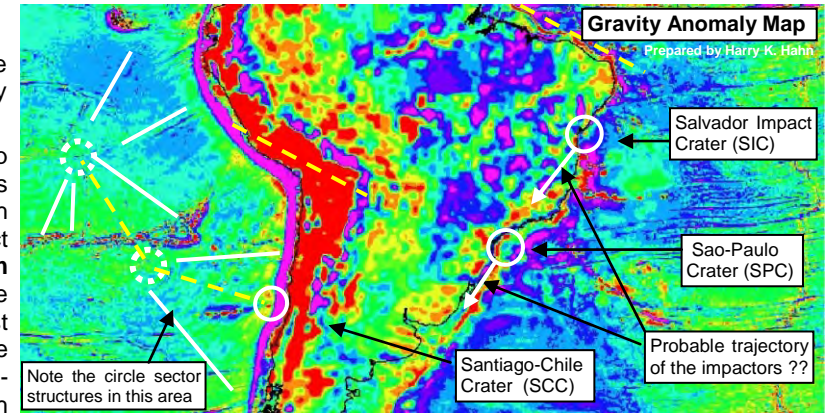
There are two possible impact craters located in two bay-areas on the East-Coast of South-America and one crater on the West-Coast which may also be a secondary crater caused by the **PT-Impact Event** ~ 253 Ma ago.



The Gravity Anomaly Map of South-America shows finer structures which indicate two further impact craters in the **300-600 km** diameter range on the East-Coast, and at least one impact-crater or -zone just west of the West-Coast of Chile, which seems to be connected to two structures on the ocean floor (→ the two structures are indicated by white dotted circles).

These structures seem to be traces of two "stops" of this crater (?) or impact-zone in the past, during the ocean floor spreading . Possibly these structures show traces of two magma outbreaks coming from this crater or impact zone, within the last 100 Ma, similar to the traces of Cape York Crater.

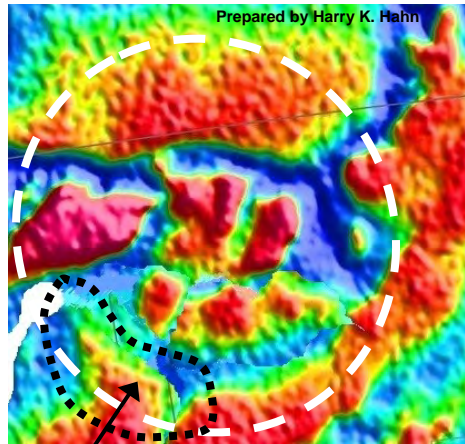
The two assumed impact craters on the east coast of South-America, close to Salvador and Sao Paulo (Curitiba) seem to be (at least partly) responsible for the shape of the east-coast of South-America & the breakup of Gondwana. The Salvador Impact Crater (SIC) may belong to the Ejecta-Ray R3 from the PTI. The Sao Paulo Crater could be caused by ejecta from the PTI or by ejecta from the VI C event



Oblique Impact Crater with \varnothing 400 x 350 km in the North-West of Western Australia. Expected age : ~ 253 Ma.

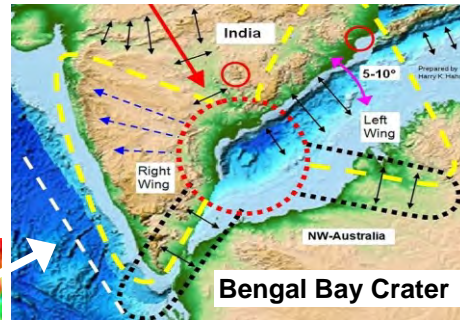
The gravity anomaly map of West-Australia shows evidence for another large impact crater near **Port Hedland** which has an elliptical shape. It's an oblique impact crater, which means that the impactor arrived in a shallow angle of probably $< 30^\circ$. The impactor probably had a diameter of approx.. 20 to 50 km and it probably was a fragment of the main impactor, which caused the mass extinction at the **Permian-Triassic boundary** 253 million years ago. This impact crater may be identical to the Bengal Bay Crater (BBC) in India and it may represent the SE-section of the BBC !

Elliptical Impact Crater \varnothing 400x350 km

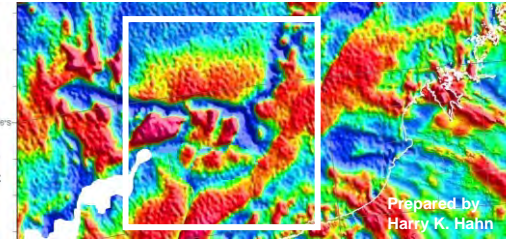
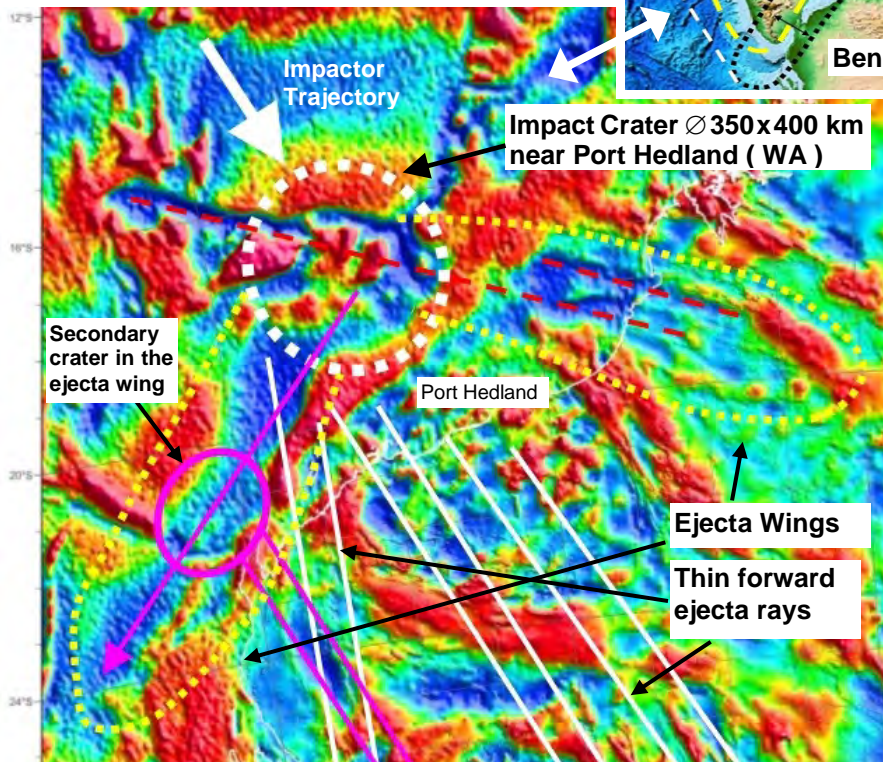


Because it was an **oblique impact** it produced a butterfly ejecta blanket. I have marked the two wings of the ejecta blanket with yellow dotted lines on the maps. Along the center lines of these ejecta wings big cracks in Earth's crust opened up. Here a majority of the ejecta mass impacted on the **surface**. **But there were also some thin forward ejecta rays thrown out of this Crater** They are marked with white lines. But there were also some thin forward ejecta rays thrown out of this impact crater. They are marked with white & purple lines on the gravity anomaly map. A few strong rays of these ejecta rays cut-off Australia from **Pangea**. One of the main mining sites for the Platinum-Group Elements (in Kalgoorlie) is located where some of these Ejecta Rays impacted on the Yilgarn Craton.

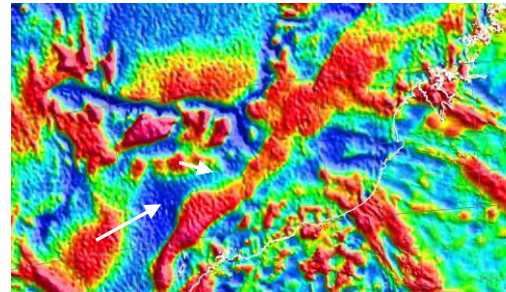
Please compare !
The BBC & the Port-Headland Crater



Note the precise crater-wall shape on the marked fragment !!



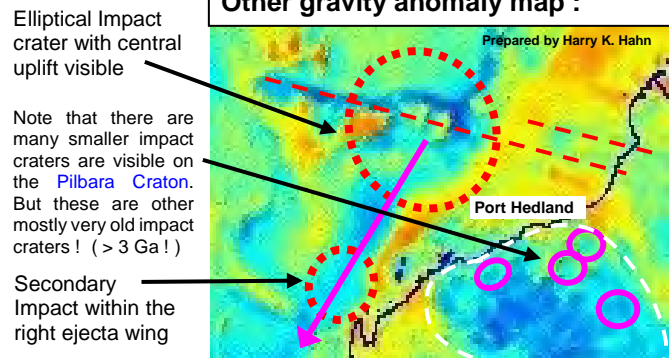
This image is manipulated and shows the crater roughly in it's original state



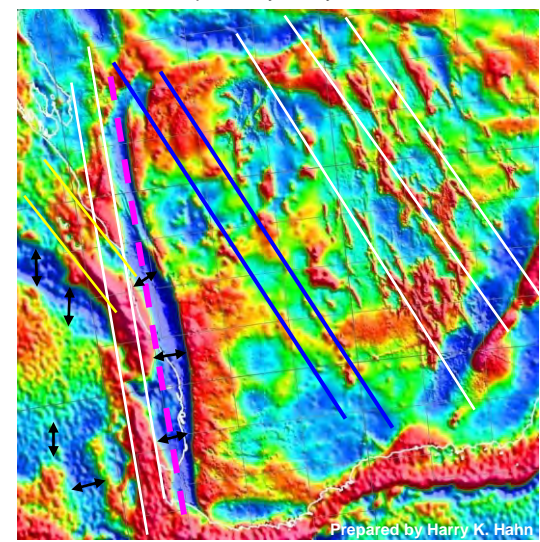
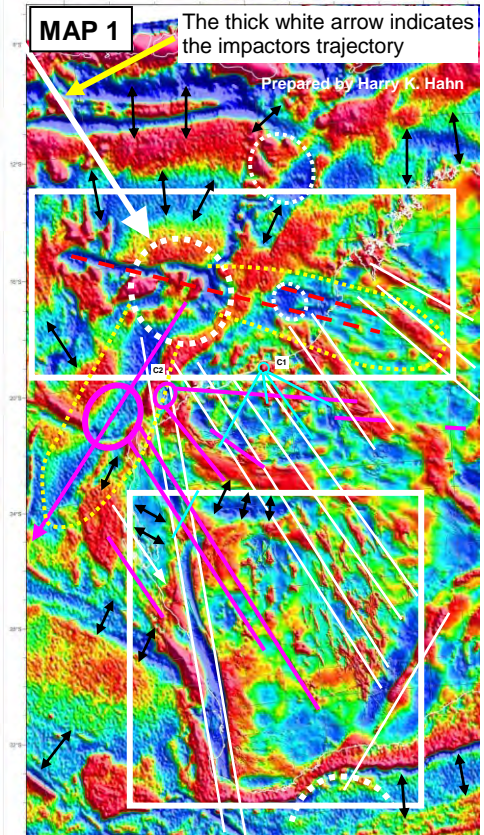
Here for comparison the original map

GRAVITY ANOMALY MAP OF THE AUSTRALIAN REGION 3RD EDITION, 2008
Geoscience Australia
GPO Box 378
Canberra, ACT 2601

Other gravity anomaly map :

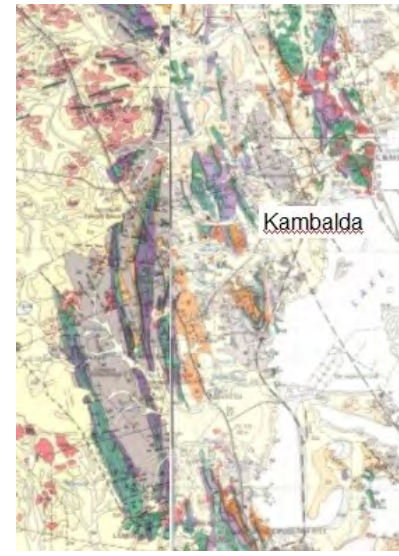
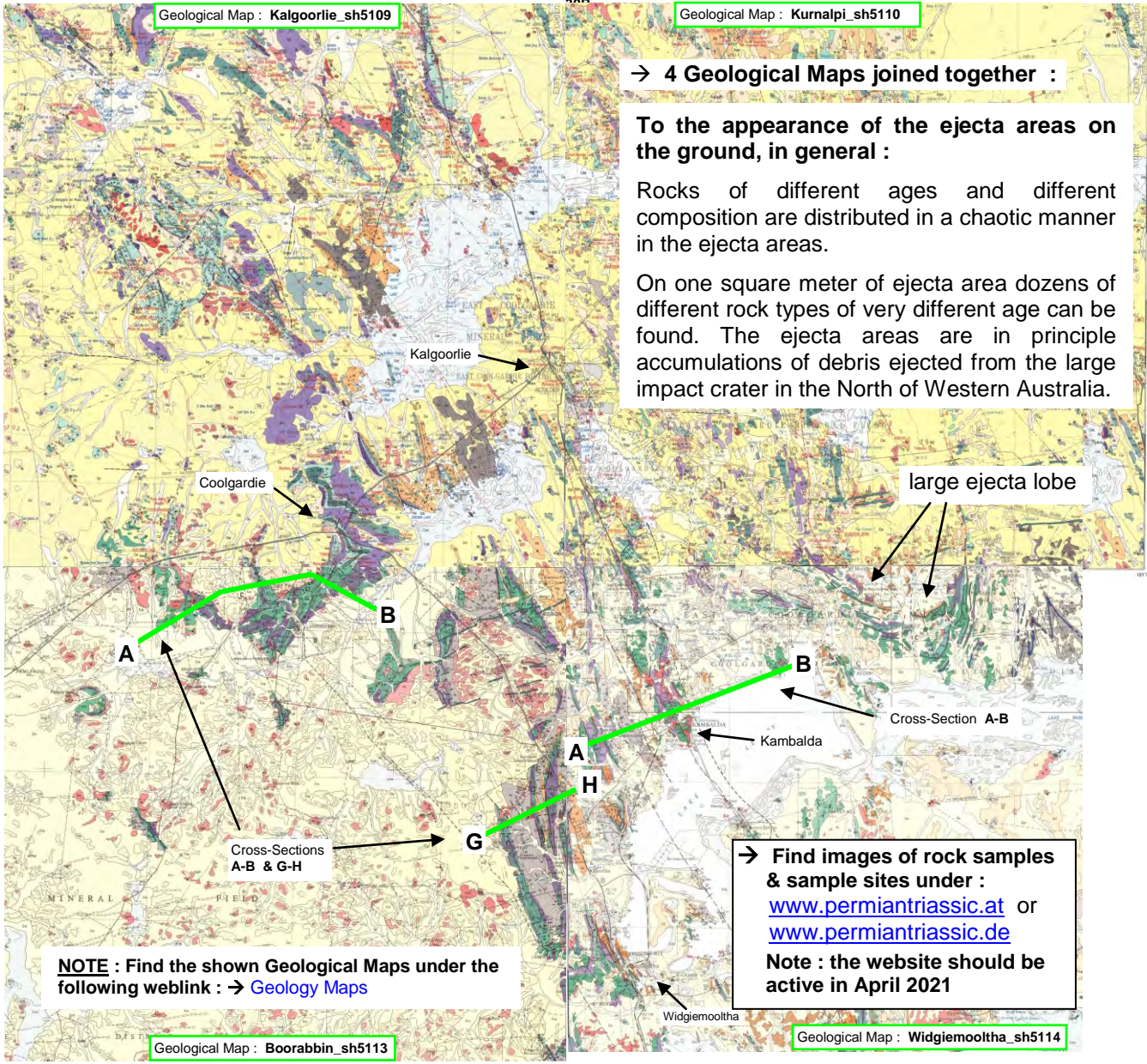


The left image shows that there is a smaller secondary elliptical structure within the right ejecta wing, from which further ejecta rays originate. The right image shows on the left side the strong ejecta rays which cut-off the Yilgarn Craton from Super-Continent **Pangea**.

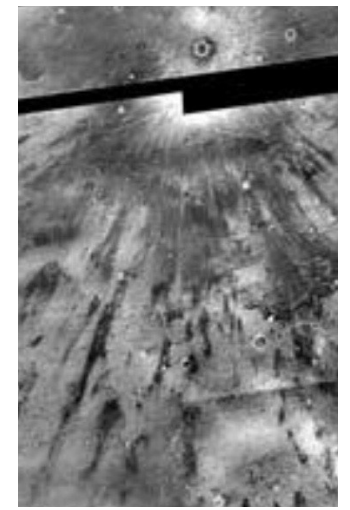


To the appearance of the ejecta rays from the large Impact Crater in the NW, on the geological maps : Prepared by Harry K. Hahn

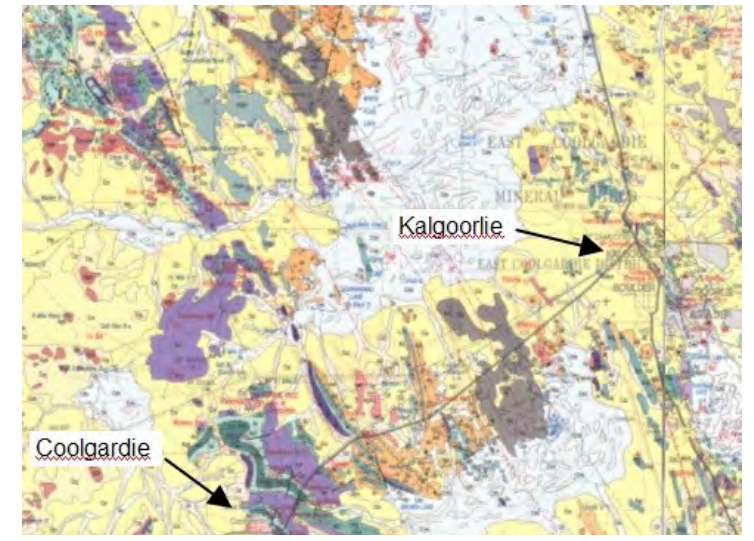
The following image shows the area around Kalgoorlie, where a considerable share of the forward ejecta material impacted on the **Yilgarn Craton**. The geological map indicates that that the stripe-shaped (linear) formations and the lobe-shaped formations with high probability are ejecta lobes and ejecta rays which originate from the large impact crater in the NW of Western Australia. And it is no coincidence that many Mines for **Platinum Group Elements** are located in close proximity to these ray-shaped and lobe-shaped geological formations.. One of the biggest **Gold Mines** of the world is located in **Kalgoorlie**, close to one of this ejecta rays.



Ejecta lobes near Kambalda



Graterri Crater on Mars :
 Compare the shape of the Ejecta-Lobes and -Rays !!

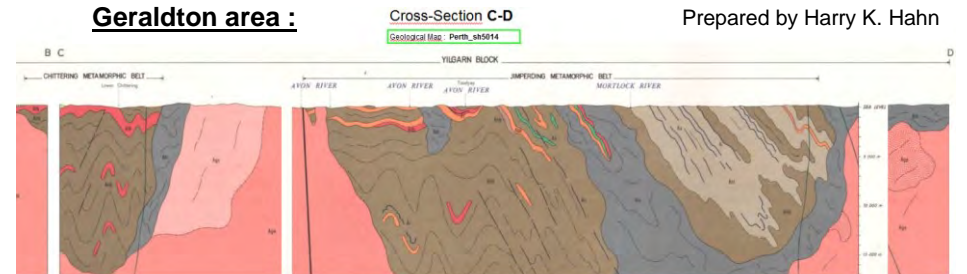
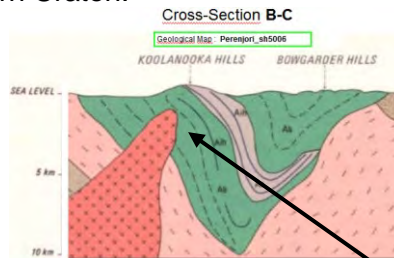
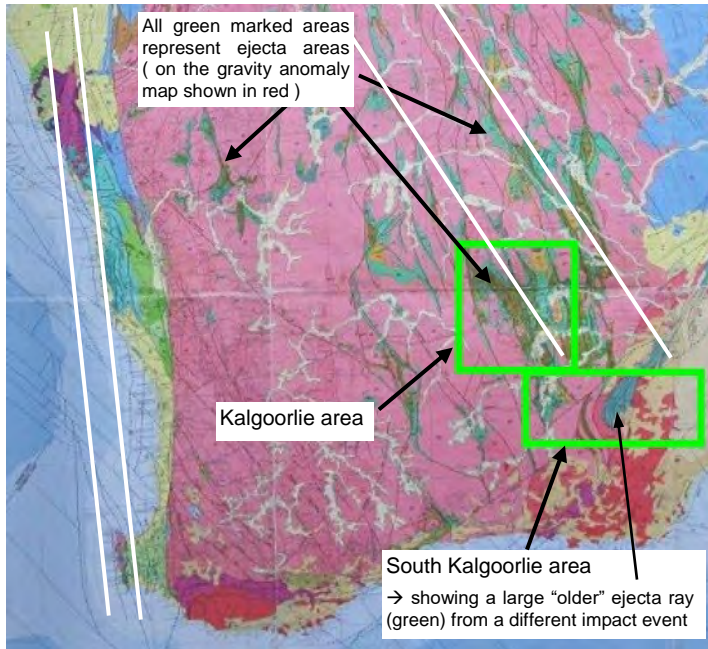


Ejecta lobes & rays near Kalgoorlie & Coolgardie

How the massive ejecta rays, originating from the large impact crater in the NW, appear underground :

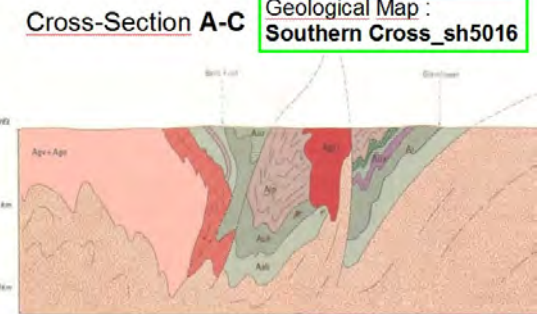
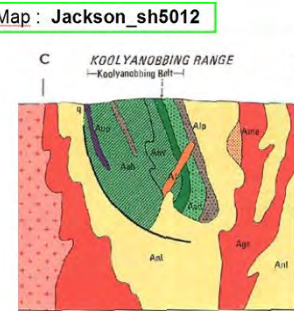
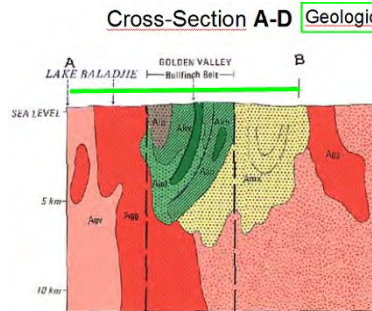
The ejecta rays visible on the gravity anomaly map of Australia, which were ejected from of the large crater north of the North-West Coast of Western Australia, were examined in many geological surveys. Here they show up in the geological cross sections on the maps, as parabola-shaped rock formations (intrusions) in the base rock of the **Yilgarn Craton**. These ejecta rays cut into the rock around **5 to 15 km deep**.

A strong ray along the west coast even cut-off the Yilgarn Craton.



Southern Cross area :

Note how this ejecta ray (green layers) got deformed by the red marked rock formation

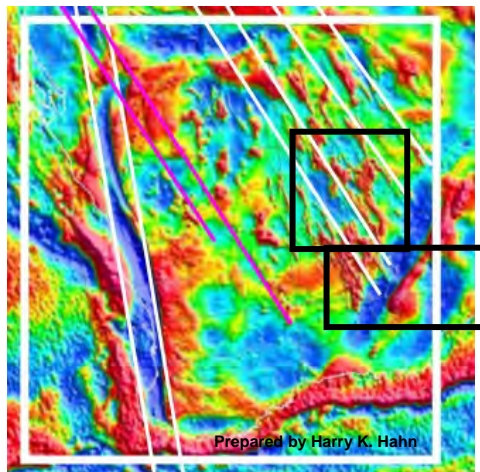


↓ Geological Map of Western Australia

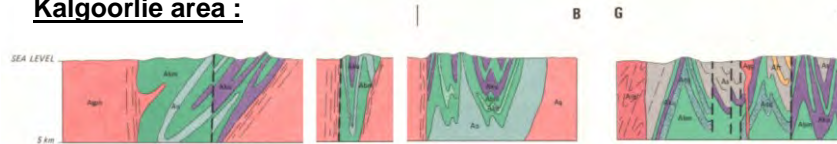
Cross-Sections from : Geological Map : Boorabbin_sh5113

Cross-Section from : Geological Map : Widgimooltha_sh5114

Compare with Gravity Anomaly Map :

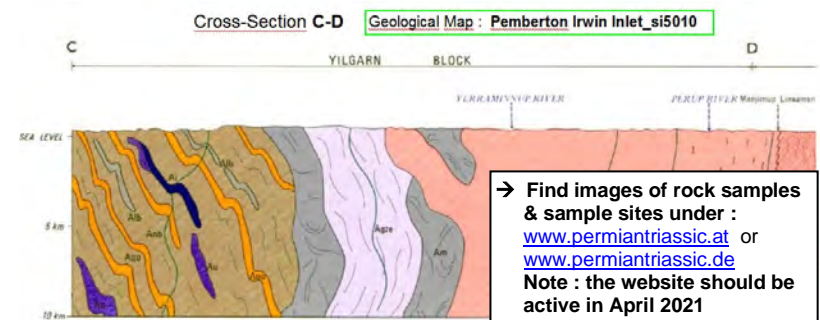
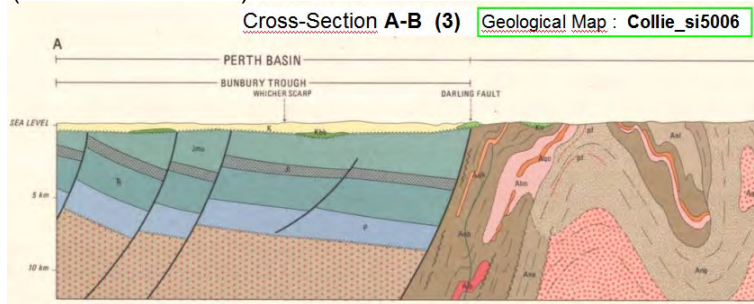


Kalgoorlie area :



Margaret River area : (SW corner of WA)

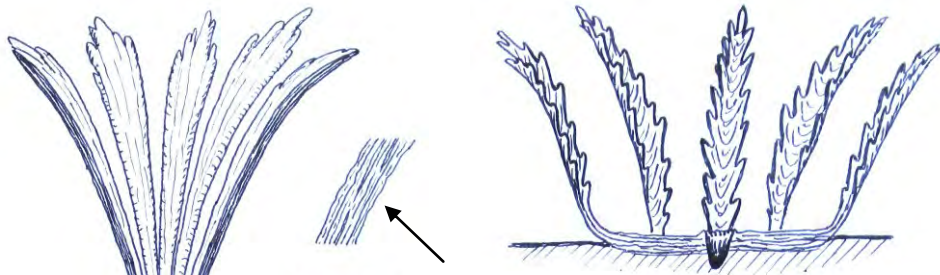
NOTE : Find the shown Geological Maps under the following weblink : → [Geology Maps](#)



→ Find images of rock samples & sample sites under : www.permiantriassic.at or www.permiantriassic.de
Note : the website should be active in April 2021

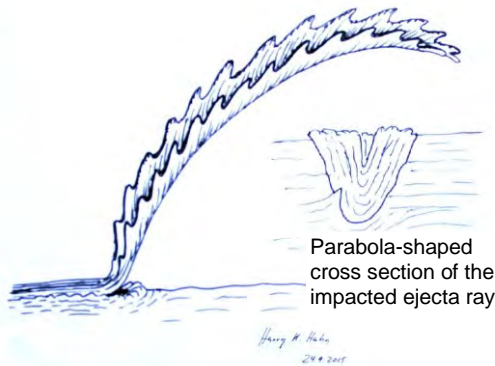
Parabola shaped geol. intrusions caused by ejecta rays

The following images shall demonstrate how ejecta rays have formed the deep parabola shaped intrusions (rock formations). Especially ejecta material which contains ductile material like iron, will form laminar sheet-like ejecta lobes, with many laminar layers, which includes other material too. On a planet with a dense atmosphere, like on Earth, these laminar sheet-like ejecta lobes will then take on the form of an U-shaped lobe before impacting on the ground, because of the strong airflow on the outside of the ejecta lobe. When impacting on the ground this ductile ejecta lobes will form the parabola shaped intrusions as described on the previous pages.



Ejecta lobes directly after impact

a certain time after impact



Parabola-shaped cross section of the impacted ejecta ray

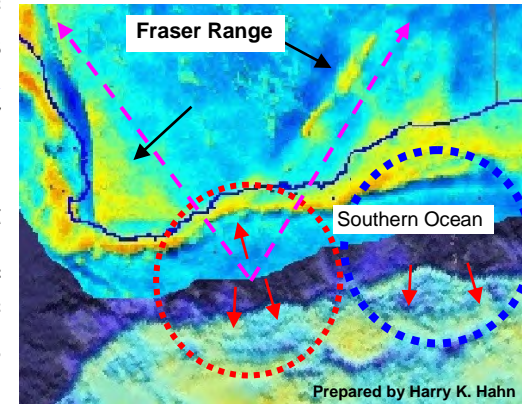
Example of a sample site in WA which shows the described laminar iron-bearing rock which was ejected from the big impact crater in the North. It is from the Southern Cross area; Location : 30°47,882 S : 118°59,477 E . It seems that the whole linear mountain range is made of this laminar ejecta lobe which is orientated vertically. See Cross Section A-B Southern Cross area → (Golden Valley)



because of aero-dynamic reasons the lobe takes on an U-shaped cross-section

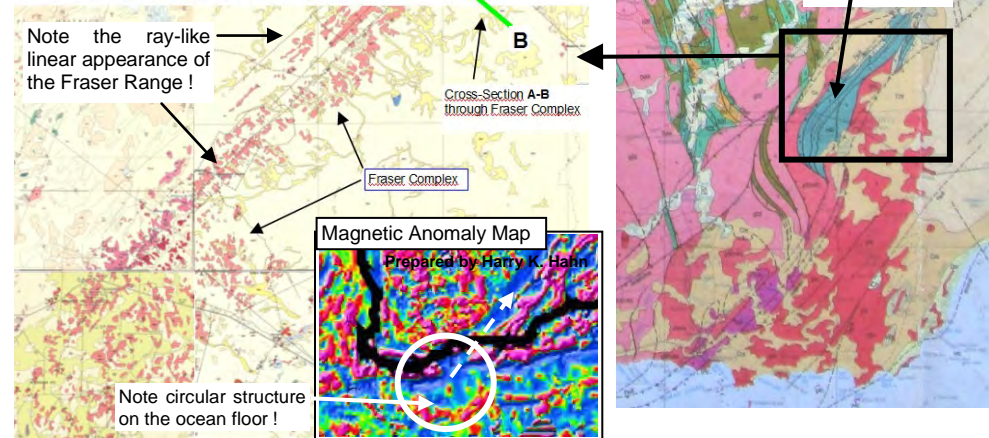
Evidence of another ejecta ray structure south of Kalgoorlie This ejecta ray structure is also at least 253 Ma , or older :

The geological map of the area south of Kalgoorlie already indicates a suspicious linear geological structure, the **FRASER RANGE**. Rock samples from the center line of the mountain range show large amounts of mineral glass (**diaplectic glass**) which is a strong indicator for an impact origin. Further indication gives a map combination of a gravity anomaly map of Australia and a topographic map of Antarctica, arranged to each other so as they were ~200 Ma ago (at Pangea time). The image indicates a **420 km crater** from which the large ejecta ray (the Fraser range) seems to be ejected from. A



Note the ring structures, the strong ejecta ray and the cone shaped gravity anomaly which has its apex in the center of the red marked impact crater. And there is obviously another crater!

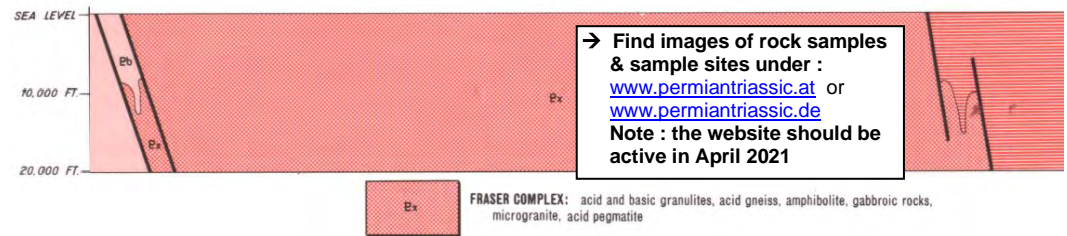
→ 4 Geological Maps joined together



Cross-Section from : **Geological Map : Zanthus_sh5115**

SECTION A - B

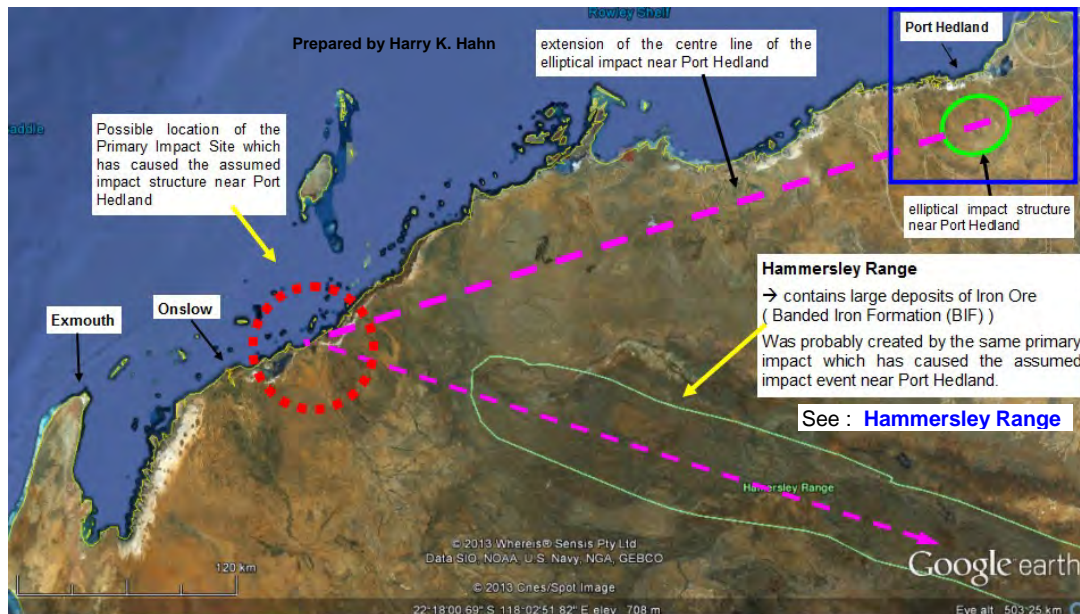
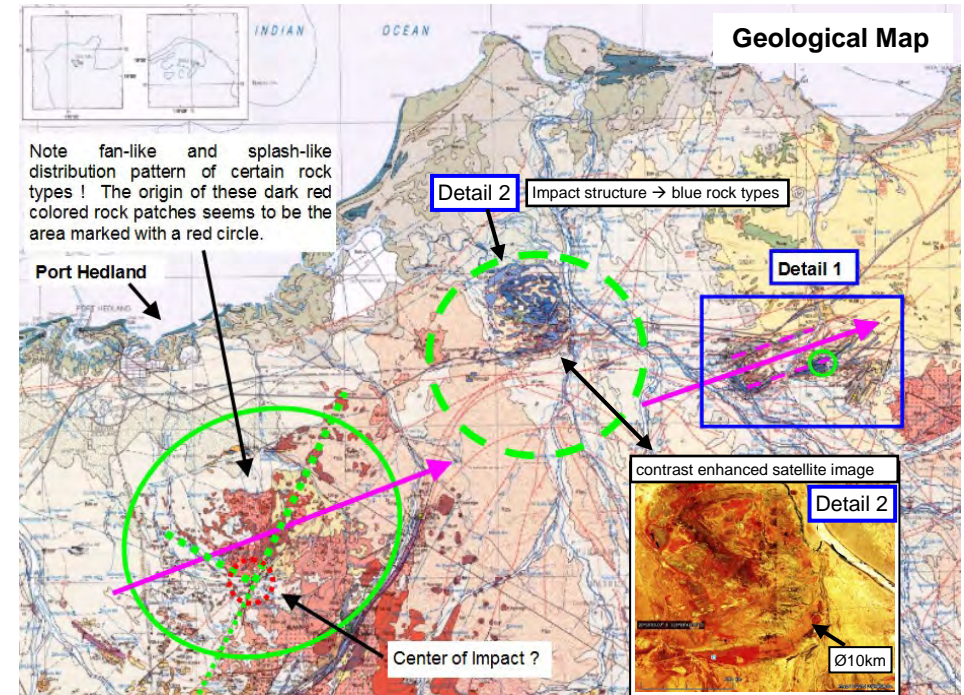
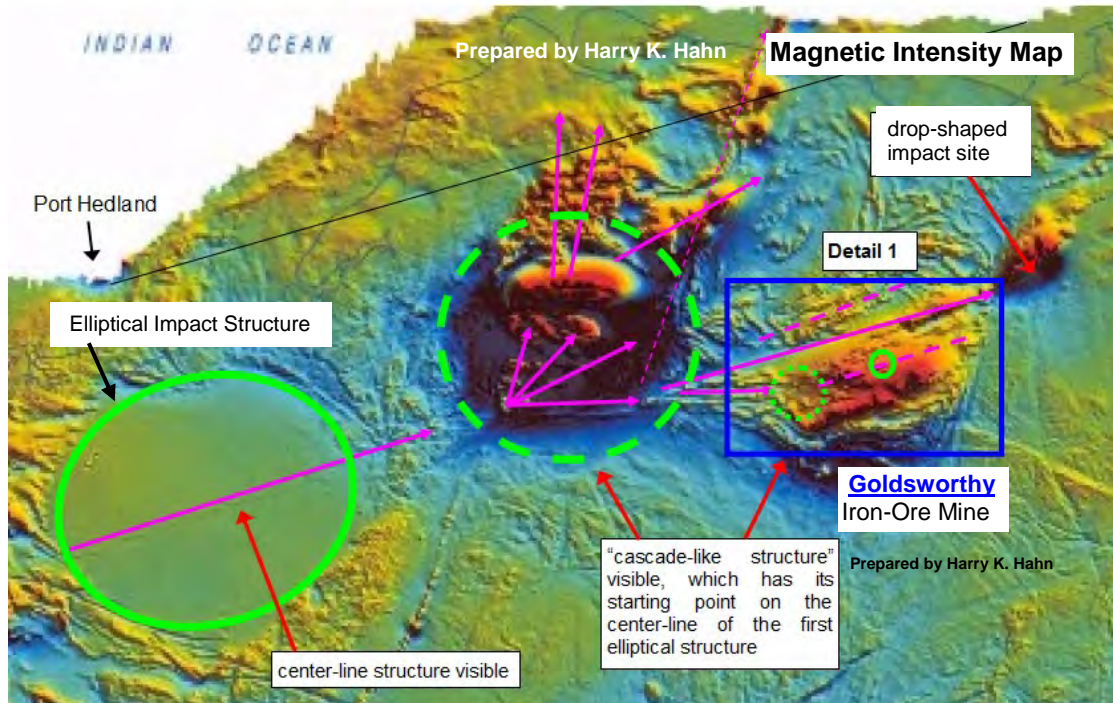
Prepared by Harry K. Hahn



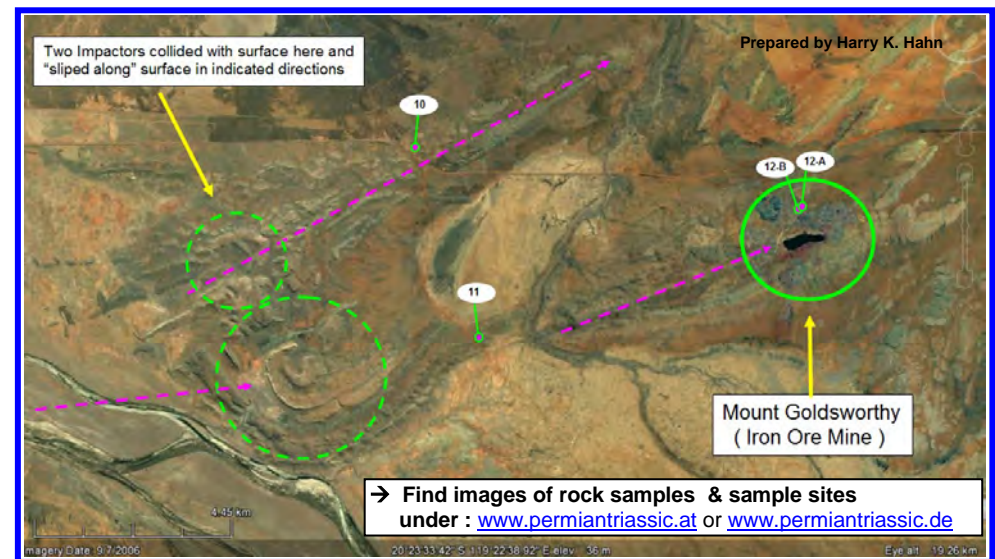
→ Find images of rock samples & sample sites under : www.permiantrassic.at or www.permiantrassic.de Note : the website should be active in April 2021

A complex secondary Impact Structure (> Ø 30 km Crater) near Port Hedland in the Pilbara Region (in NW of West-Australia)

The satellite image, the magnetic intensity map and the geological map indicate a complex impact structure near **Port Headland** (in West-Australia), which probably was formed by secondary impactors (ejecta material) which were ejected by a large secondary Crater of the PT – Impact Event that probably impacted near Onslow, a town on the NW-coast. This impact structure, which probably also caused the Iron-ore rich Hammersley Range, must be ~ 253 Million years old.



Detail 1 : Satellite View with marked position of impactor sites & Iron Ore Mine



Other secondary impact structures in the NE of Australia, probably caused by the Cape York- (PT) Impact Event

The following maps show where other secondary impact structures are located, near the NE-coast of Australia. Most of the identified impact structures which are probably a result of the Cape York impact event, have an elliptical shape and their impact direction can be read out of the topography of the impact structure. The impact structures are probably a result of ejecta material coming from the Cape York Crater Chain. (→ see next page !)

Prepared by Harry K. Hahn



1 20° 25' 00.00" S - 148° 06' 00.00" E



2 24° 52' 00.00" S - 151° 25' 00.00" E



3 19° 28' 00.00" S - 147° 00' 00.00" E



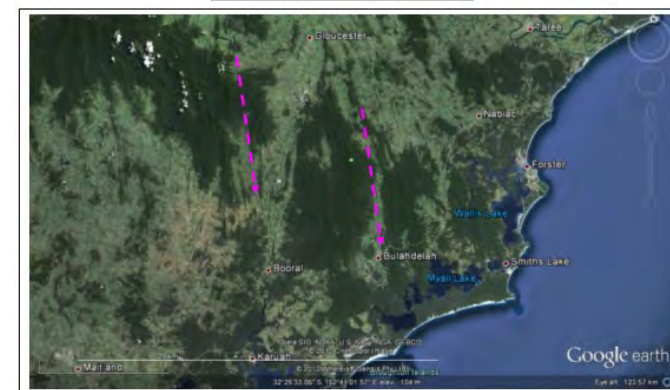
4 17° 20' 00.00" S - 145° 00' 00.00" E



5 20° 12' 00.00" S - 147° 09' 00.00" E



6 32° 15' 00.00" S - 152° 10' 00.00" E



7 15° 45' 00.00" S - 145° 18' 00.00" E



8 24° 40' 00.00" S - 151° 00' 00.00" E

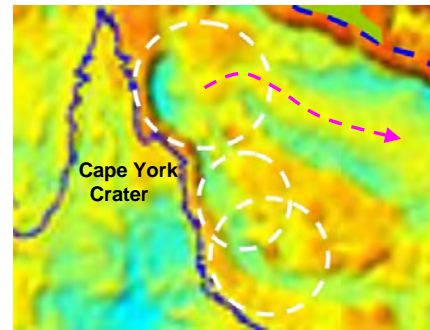


Detail A & B :

Gravity Anomaly Map :

Secondary Impact Structures No.: 9 –12 :

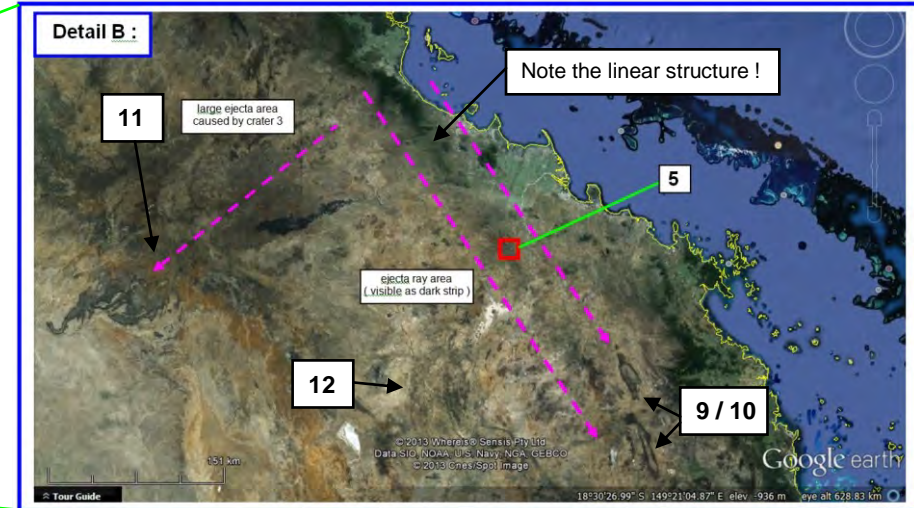
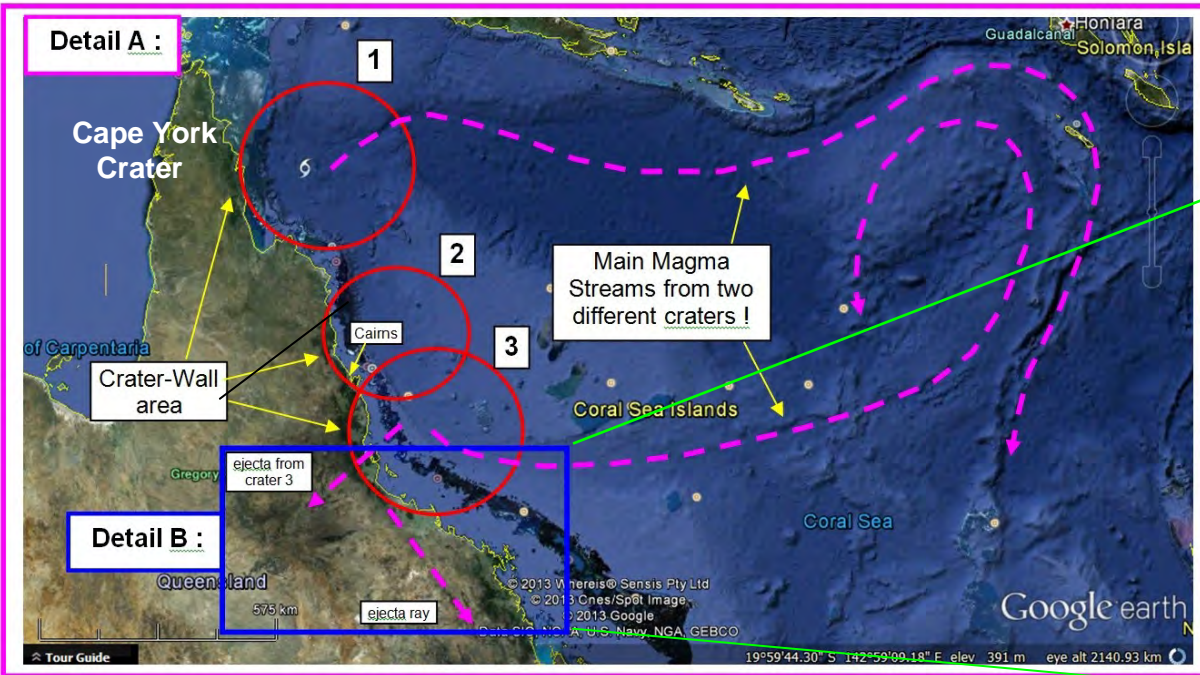
Detail A : shows the probable positions of three impact craters which may be responsible for the Cape York impact event offshore of the NE-coast of Australia, and magma stream structures probably caused by eruptions caused by Crater 1. **Detail B** shows some secondary impact structures caused by the Craters 1 to 3.



9a & 9b

9a : 21° 06' 00.00" S - 148° 05' 00.00" E

9b : 21° 45' 00.00" S - 148° 16' 00.00" E



10

21° 28' 00.00" S - 148° 19' 00.00" E



11

20° 00' 00.00" S - 144° 40' 00.00" E



12

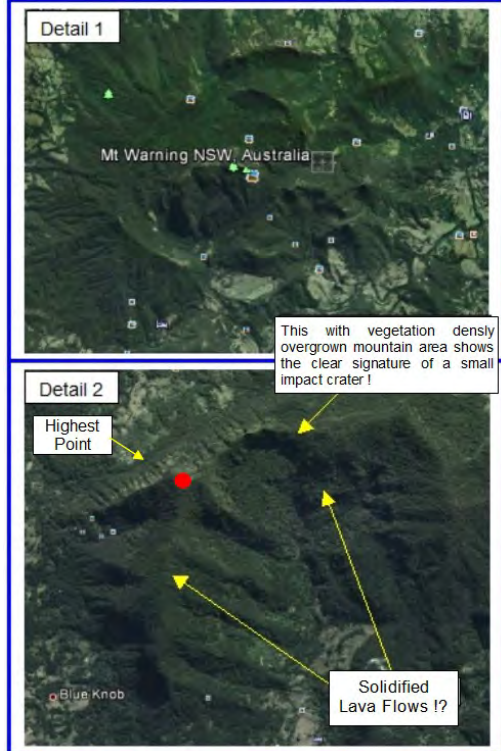
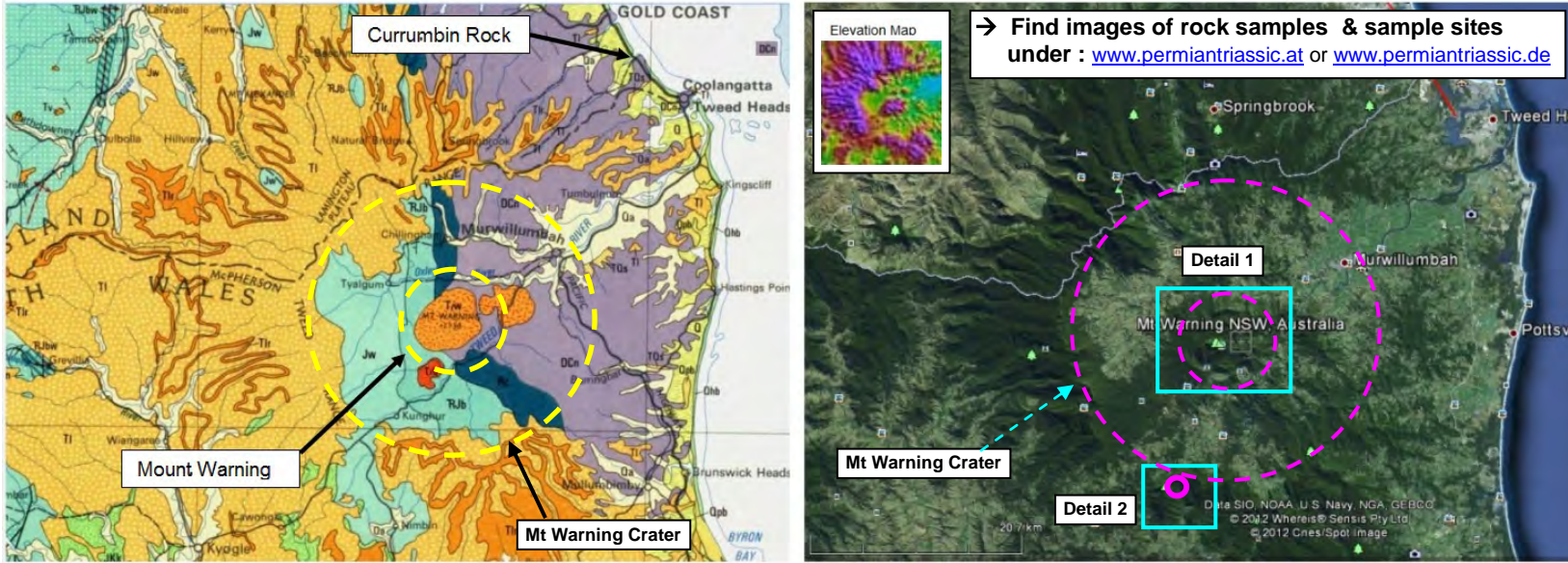
21° 25' 00.00" S - 146° 26' 00.00" E



10 Secondary Impact crater with \varnothing 30 km south of Brisbane / on East Coast of Australia

Prepared by Harry K. Hahn

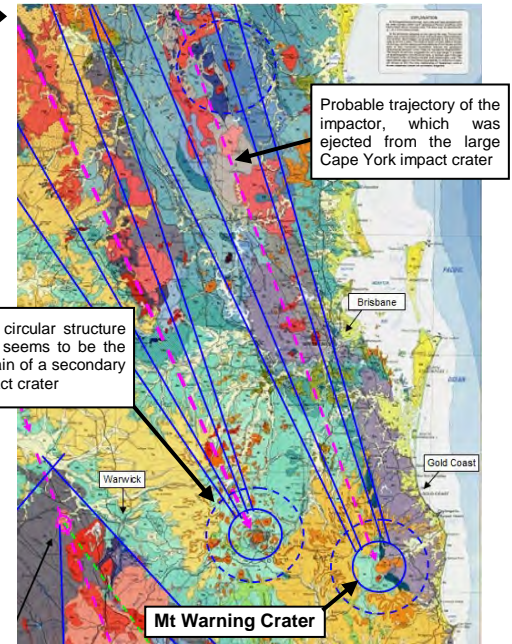
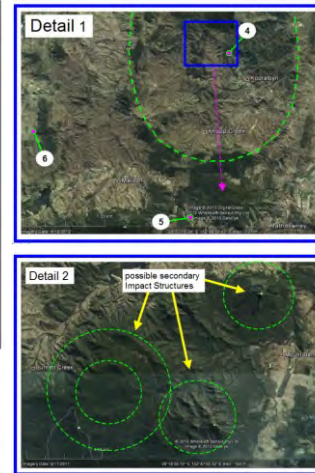
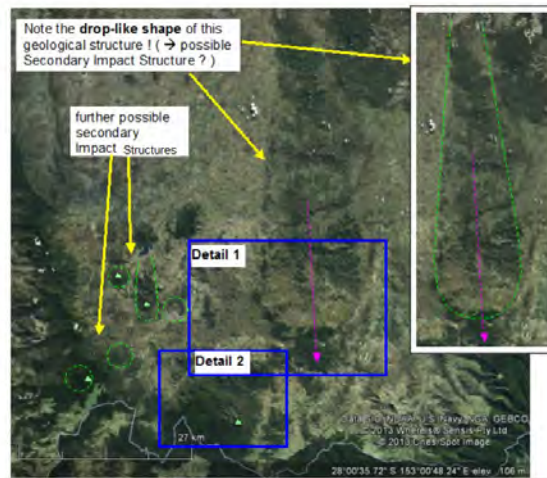
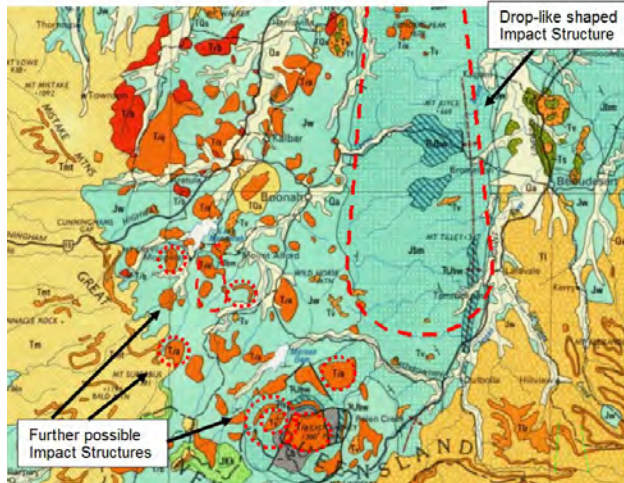
Mount Warning is probably the result of a large **secondary impact** caused by the Cape York impact event, and is not the rest of an eroded shield-volcano as currently believed! Therefore the age of the Mt Warning crater should be ~ 253 Ma. The chaotic looking central area of the Mt Warning crater is probably the result of a central uplift where volcanic activity was going on inside (similar to a volcano). When the volcanic activity ended, this central uplift collapsed into a chaotic structure.



Further secondary impact structures north-west of Mt. Warning :

Map : **Moreton Geology** : [Geology Maps](#) → type in : **WARWICK**

North-West of Mount Warning there are further structures which also seem to be secondary impact structures which are caused by the Cape York impact event. These impact structures probably also formed 253 Ma ago, at the **P-Tr boundary**

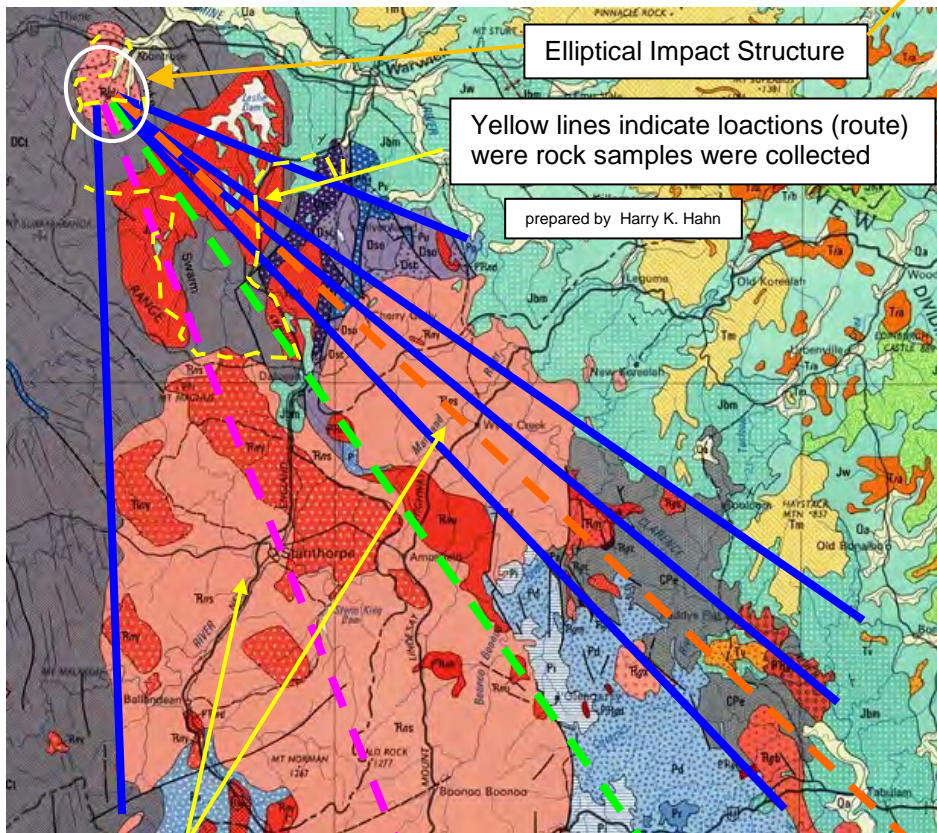


Oblique (elliptical) Impact Structure 8 x 7 km, near Warwick / Queensland → probably caused by ejecta from Cape York Crater

There is a precise **Elliptical crater structure** noticeable on the **Magnetic Intensity Map**. This structure is located around 30 km west of Warwick (QLD). This **elliptical ring structure** is not completely closed, which is an indication that the impactor arrived in a shallow angle. The orientation of the elliptical ring structure corresponds with the orientation of the (assumed) ejecta blanket. The age of the oblique impact is probably **253 Ma**.

(see explanation for the estimated age in Part 2 of my study → Cape York Crater)
 The geological map of the surrounding area shows a very striking distribution of certain rock types along sectors, which are limited by „rays“, which all seem to come from the same starting point. And it seems that all rays have their starting point within the elliptical impact structure! Only the rays which limit the sector of the grey colored rock type (see next page !) seem to have their starting point shifted a bit towards the direction where the impactor came from. It seems that the pink & red colored rock types, and also the grey colored rock type, were scattered during the impact towards the south-east, in a cone-shaped pattern.

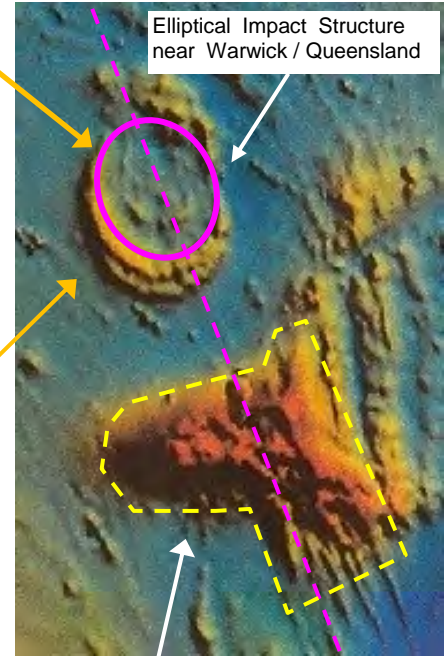
„Ejecta Blanket“ & Geological Map of the surrounding area of the Impact Structure



Ejecta blanket of the elliptical impact structure

main impact direction

→ Find images of rock samples & sample sites under : www.permiantriassic.de (this website should be active in **April 2021**)



magnetic signature of ejected material

main impact direction



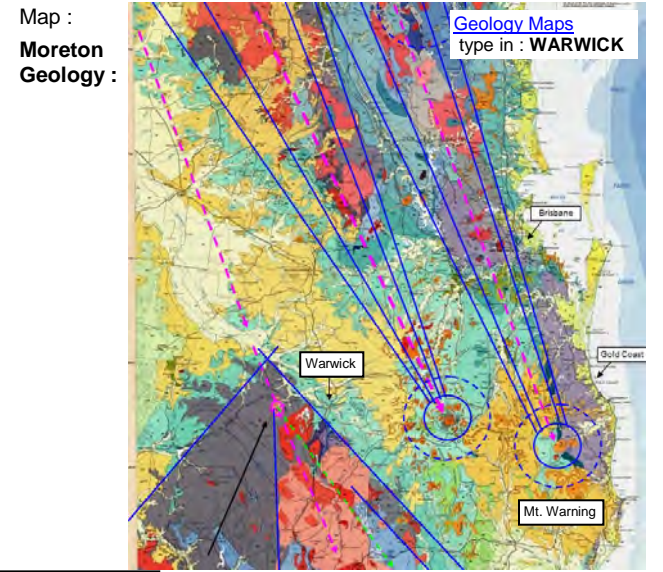
Rest of the elliptical ring wall of the impact crater (orange)
 → corresponds with ring structure shown on Magnetic Intensity Map.

“Blow-Out” area

Satellite Image

The image below shows the geological map of the wider surrounding area of the assumed Impact Event near the city „Warwick“. Beside the cone-shaped distribution of the different rock types south of the elliptical Impact Structure near Warwick, there is also a striking stripe-like (or ray-like) distribution visible of similar colored rock types, parallel to the suggested “main impact direction“. Here the main impact direction corresponds to the direction of the pink arrow in the first image on the previous page. And at the end of the two visible “stripe-like (or ray-like) “ejecta blankets” there are circular geological structures noticeable.

With high probability these circular geological structures are also the remains of secondary craters, which were caused by material ejected from the primary (Cape York) impact crater further north ! I now want to name one of these circular structures a bit closer. This geological structure is named “Mount Warring”



Map :

Moreton Geology :

I have marked the form of the assumed impact structure (as shown on Magnetic Intensity Map) in this satellite image.

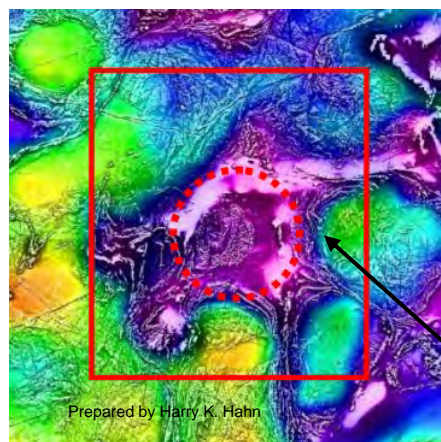
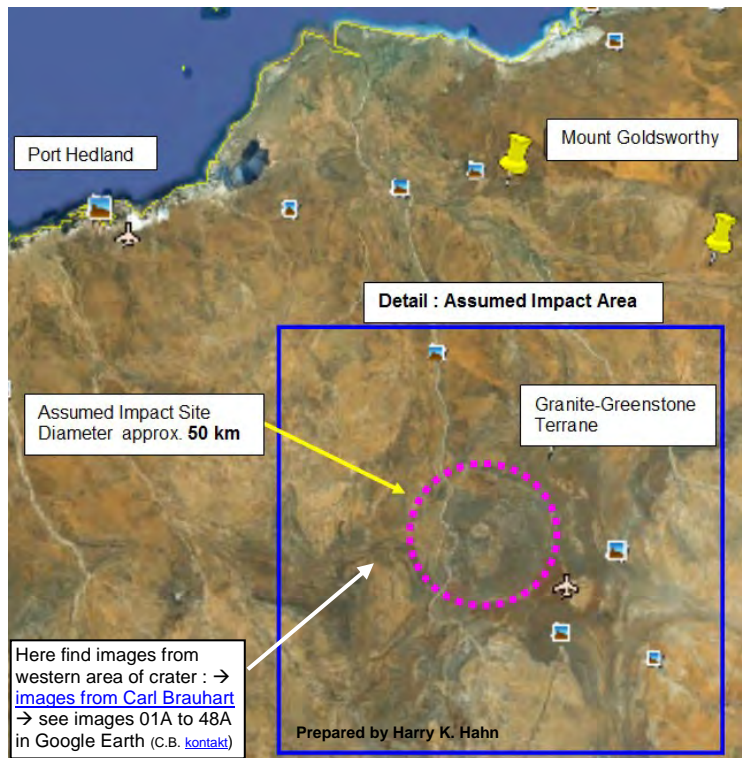
Dimensions of the small elliptical impact structure approx. : **8 x 7 km**.

The age is probably 253 million years. (PT-I)

The scattered rock types give indication that this small secondary impact structure, together with the Cape York Crater is connected to the largest mass extinction in Earth's history, at the **Permian-Triassic boundary**

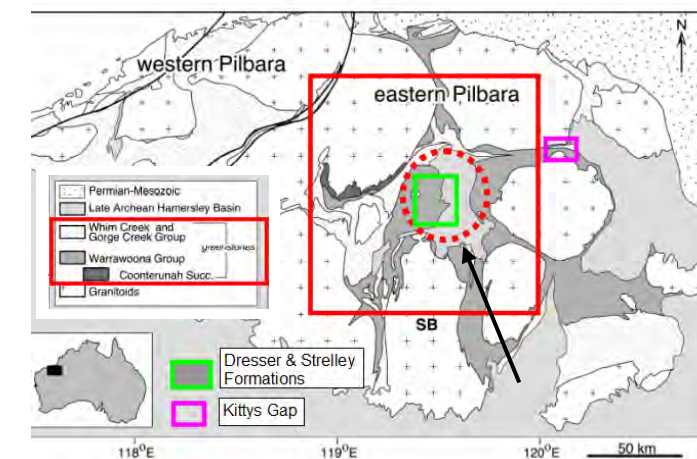
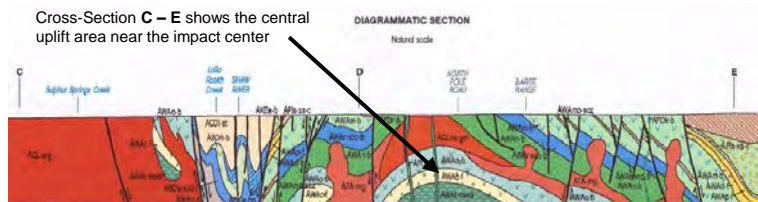
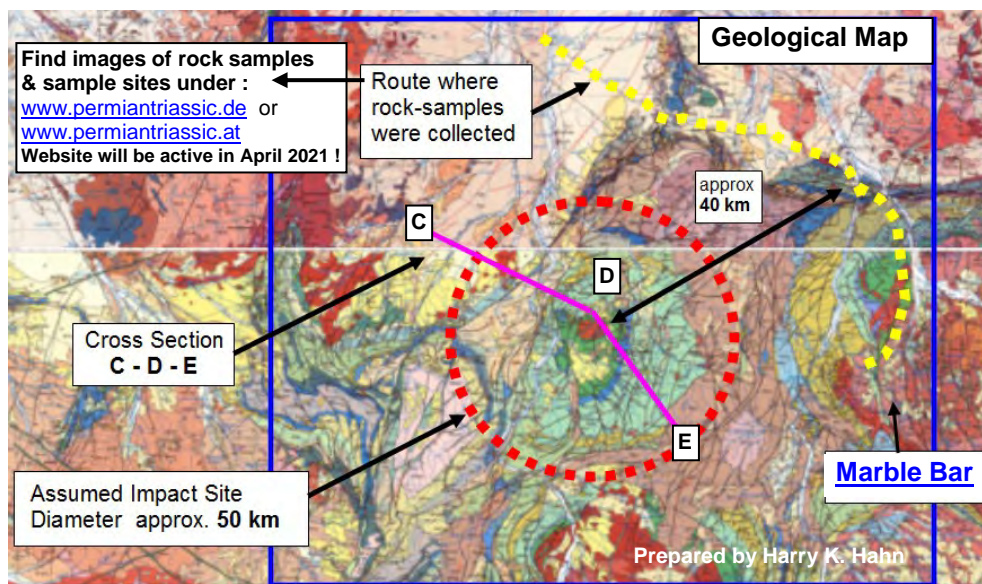
A primary Impact Crater \varnothing 50 km (Age > 3 Ga !) in the Pilbara Region near Marble Bar / Western Australia

This Impact Crater probably is connected to the **BGB 3.26 - 3.24 Ga Impact Event** in South-Africa. Even if this impact crater isn't connected to the PT-Impact Event I want to mention it here ! The satellite view, the geological- and magnetic-intensity -map indicate a very old \varnothing 50 km impact structure near Marble Bar / Western Australia. These impact structure probably was formed by a comet-fragment which impacted on the indicated position approx. **3,25 Ga** ago. This impact which may be connected to the **BGB impact structure** in South-Africa, **maybe responsible for the development of the first life-forms on Earth ~ 3,25 Ga ago !**



Combined magnetic intensity (first vertical derivative) and gravity image of the Eastern Pilbara Granite-Greenstone Terrain (R.Blewett, National Geoscience Mapping Accord, AGSO-Geoscience Australia). The image shows the distinct ovoid outline of the granitoid complexes, surrounded by greenstone belts

\varnothing 50 km impact structure



The Geologist Andrew Y. Glikson pointed out, that there seems to be a clear correlation between the **BGB 3.26 - 3.24 Ga impact event** in South-Africa and stratigraphic units of the same age in the **Pilbara Craton** (→ the assumed impact event described in this document) **Therefore I want to propose the following hypothesis :**

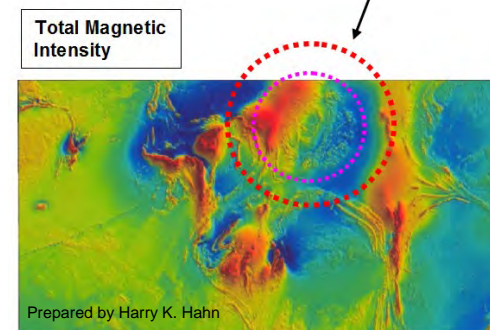
Both impact events, the **BGB impact structure** and this impact event in the Pilbaras occurred at the same time! These impacts were caused by the same impactor, which probably was a **Comet**, maybe coming from the **Oort Cloud**, which broke apart when it reached the Roche Limit (approx. 10000 to 30000 km above Earth's surface).

The fragments of the comet then formed the BGB structure and the described Pilbara impact structure.

The later development of the **oldest known Stromatolites**, found very close to the two impact sites, was a direct result of these two impacts and the organic material which arrived together with the impacting comet fragments

The oldest 3.25 Ga **Stromatolites** are found in the **Hooggenoeg Formation** (Buck Ridge) / South Africa and in the **Dresser Formation** / West Australia, **less than 30 km** away from each of the the two impact sites ! There is also strong indication that the **Pilbara Craton** and the **BGB** formed the first **Supercontinent Vaalbara ~ 3.25 Ga ago**.

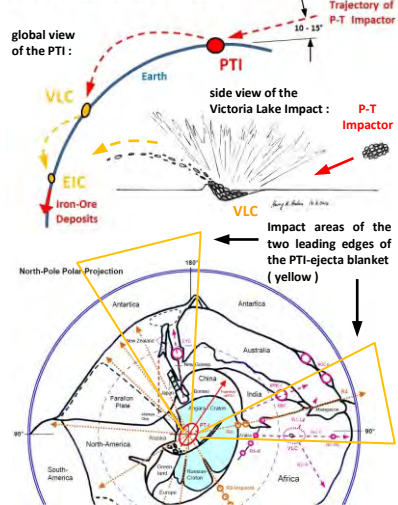
Note **circular pattern** with inner ring structure and uplift area in assumed impact (crater) zone



The African - LLSVP, and the Pacific - LLSVP which is responsible for the magma eruptions, were caused by the PT- I:

There is strong indication that the **Permian-Triassic Impact (PT-I)** and the ejecta rays which were caused by this enormous impact are responsible for the formation of the two main **LLSVPs** (**Large low-shear-velocity provinces**) inside Earth's mantle. These two large structures, which are characterized by slow (seismic) shear wave velocities and which consist of much hotter material (~4000°K) than the surrounding mantle material (~2000°K), extend laterally and vertically for thousands of kilometers from the core-mantle boundary. In all probability the remains of large secondary impactors and the powerful ejecta of the leading edges of the two ejecta-wings of the PT-I descended deep into Earth's Mantle and caused the **LLSVP's** as a result.

Impact Scenario of Victoria Lake Crater (VLC) & Ejecta Impact Crater (EIC):



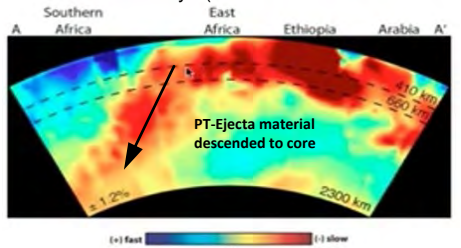
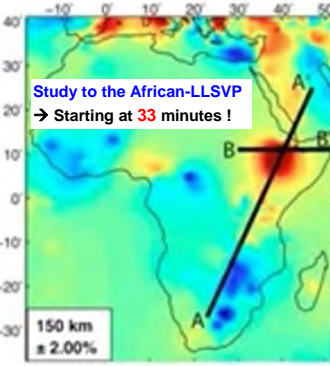
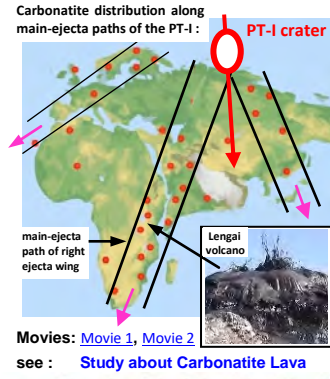
The diagram on the left shows the shallow (oblique) impact of the PT-Impactor which probably had a diameter of around ~60 to 200 km. It also shows a side view of the **Victoria Lake Impact** (crater) (→**VLC**) which was caused by a large secondary impactor ejected from the PTI-crater. Part of the ejecta from the VLC was ejected forward in impact direction where it formed another secondary crater, the EIC. The rest (the majority) of the VLC-ejecta was again ejected in a butterfly-ejecta-pattern. Traces of "forward-ejecta", which always seems to be dense & ductile metal-bearing material, are also visible near the CYC- and PHC (BBC)-craters.

The majority of the ejecta from the PTI-crater was ejected in the form of a gigantic butterfly-shaped ejecta blanket. Where the leading edges of the two ejecta wings of this butterfly-ejecta blanket impacted on Earth's crust (in the yellow marked areas) extensive fractures (new continent borders) were formed. The north-polar-projection of Earth, shown on the left shows Earth at P/T boundary time

A large part of the ejected material and a number of big secondary impactors impacted in these two yellow marked areas. → see also larger map in the chapter: "Earth at the time of the PT-Impact Event"

The world map on the left shows the distribution of **Carbonatites** in Africa & Eurasia. I have rearranged the position & orientation of Africa, Europe and India so as they were just after the PT-Impact 253 Ma ago (→ original map, Le Bas 1987). It is clearly visible that the **carbonatites are mainly located along the paths where the leading edges of the ejecta wings of the PTI impacted!!** This is especially clear for the impact path of the leading edge of the right ejecta wing along the east-coast of Africa (→ ejecta ray R4 & VLC-ray).

Because the **Carbonatites** are probably derived from Earth's lower mantle, we can conclude that the shock-wave of the PTI-impact, or PTI-ejecta descending into the mantle, brought carbonatites from the lower mantle to the surface, or the carbonatites were brought-in by the impactor itself! Lengai Volcano in Tanzania still erupts Carbonatite-Lava today! (→ from the African LLSVP!)



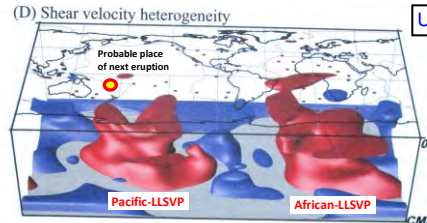
The two images on the bottom left side show a section view of the **African-LLSVP**. The section view A – A' runs from the Arabian Peninsula through the **African Rift Valley** and the **Victoria Lake (VLC)** area towards South-Africa. The section view runs essentially along the same path where the leading edge of the right ejecta wing of the PTI impacted. It is clearly visible that the main structure of the African **LLSVP** is orientated along the same path as the impacting right leading edge of the PTI-ejecta. (→ LLSVP = red, orange & yellow area in the section view A – A'). The images are from a study of Andy Nyblade which used **African-Array Data**.

He claims that evidences indicate that the African LLSVP is a thermochemical **whole-mantle-structure** without a separation in the 410-660 km region. The same principles applies for the **Pacific LLSVP**. The two maps on the top right side show that especially the **ULVZ** at the **core mantle boundary (CMB)** within the Pacific LLSVP is mainly orientated along the path where the leading edge of the left ejecta wing of the PTI impacted. Because this ULVZ has a distinct chemical signature there is a high probability that the **ULVZ** is a direct result of ejecta of the PTI which descended to the CMB in this area.

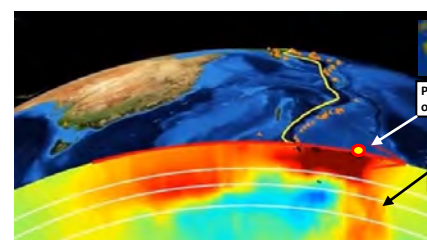
Note: it seems that the Cape York Impact produced a permanent channel in the mantle which connects the Pacific-LLSVP/ULVZ with the surface. Through this channel in the mantle ≥8 violent magma eruptions occurred over the last ~200 Ma causing a number of big **LIP's** on the Pacific Plate (e.g. the **Ontong LIP**).

Warning: There is a high probability that another such violent magma eruption will occur!! My study indicates that the next magma eruption will take place near the **Fiji-islands** → see image on the right which shows the path of the source (outflow channel positions = yellow dots) of the magma eruptions. It seems the Pacific LLSVP is due for an eruption soon! The solid upward pointing column at the top-end of the LLSVP, near the **Fiji's** may indicate the coming eruption (& **mass extinction!**). The vertical expansion rate of this column must be measured!!!

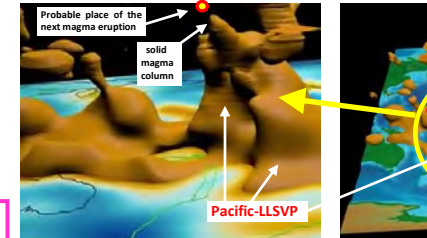
Note: All volcanos of the **Pacific Fire Ring** and all other volcanos on Earth can be explained by the Permian-Triassic Impact! They are all located in the (fractured) crust areas which were directly caused by the ejecta of the PT-I!! The magma (molten mantle material) which causes these volcanos, in all probability is **exclusively** a result of the impact of ejecta & secondary impactors from the PTI!!! Therefore a revised model for **Earth's mantle** is required, which must consider a much higher share of **volatiles**, e.g. H₂O & CO₂ within the mantle material



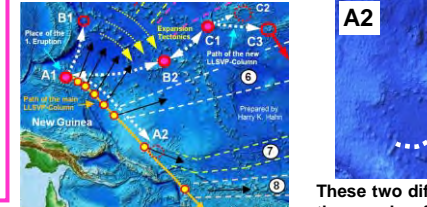
A 3-D view of the Pacific- & African LLSVP and the probable location of the next eruption



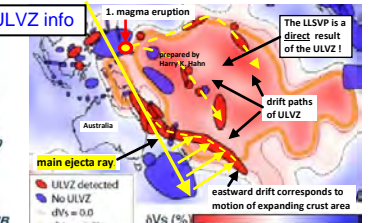
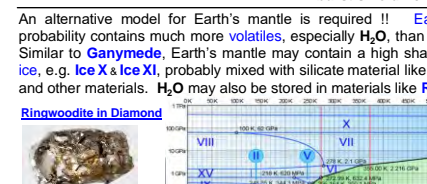
3D-Model No. 1 of Pacific LLSVP → see: 3D-Animation 1
3D-Model No. 2 of Pacific LLSVP → see: 3D-Animation 2



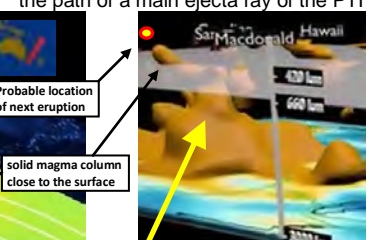
3D-view of Pacific-LLSVP with the possible location of next eruption



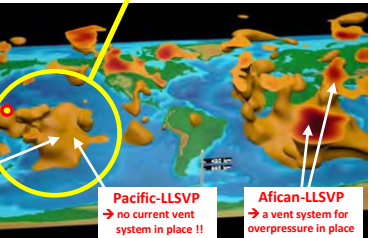
Path of the magma eruption source (→ yellow dots). A2, B1&B2, C1-C3 represent drift-off-copies & remains of the first magma-eruption-zone A1



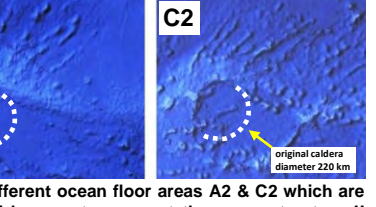
The Pacific-ULVZ is orientated along the path of a main ejecta ray of the PTI



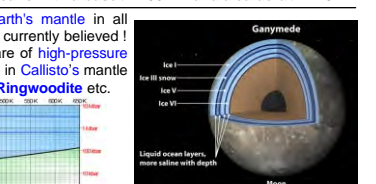
3D-Model No. 1 of Pacific LLSVP → see: 3D-Animation 1
3D-Model No. 2 of Pacific LLSVP → see: 3D-Animation 2



This 3-D Animation shows the African-LLSVP has a large vent system for overpressure in place, but the Pacific-LLSVP doesn't!



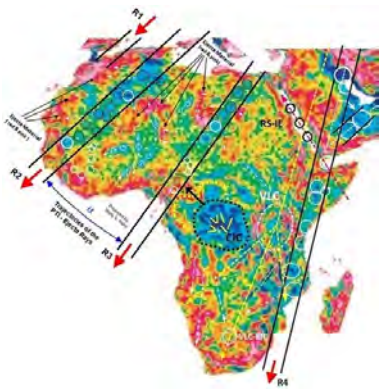
These two different ocean floor areas A2 & C2 which are thousands of km apart represent the same structure!! These "drift-off-copies" are an image of the first magma eruption which took place on position A1! These nearly identical structures, from two different crust layers (?), probably show the remains of a burst shield-volcano with a base ø 450 km and a caldera ø 220 km.



Ringwoodite in Diamond

Epilogue

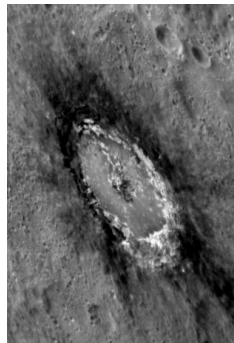
All the new impact craters discovered during this study should lead to new oil- & gas-fields with more than 600 billion barrels of oil-reserves, and with more than 300 trillion cubic feet of gas-reserves ! (→ at a ~50 % success rate)



Especially the crater chains R1 to R4 and the CIC which are located on or near the African Continent, will contain a large share of these impact related oil- & gas-reserves. Because at least $50 \geq \varnothing 150\text{km}$ craters are located within the crater-chains R1-4 & the CIC

The expected reserves in this areas alone should exceed 400 billion barrel oil & 200 trillion ft^3 of gas. Additionally large reserves of metal-ores should be located in the ejecta areas of these impact craters.

I now want to mention an interesting discovery on Mercury. The image on the right shows the $\varnothing 80 \text{ km}$ Basho Crater on Mercury. The low-reflectance material (black) which is surrounding the crater is a form of carbon called graphite.



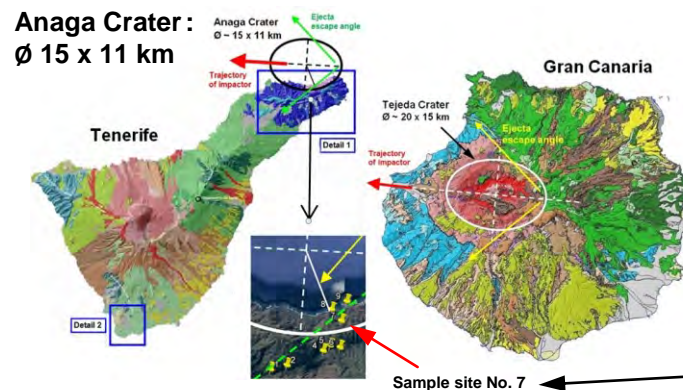
The scientists believe it was excavated by the impact from the planet's original, ancient crust which lies deeper.

It is thought that Mercury was once covered by a crust composed of graphite, when much of the planet Mercury was still molten.

An alternative explanation would be that the carbon was brought-in by the impactor itself, for example if the impactor was a carbon-rich comet. This would be my first guess when I look at this image. However an origin from within Mercury (from Mercury's mantle) is also possible.

I mention this discovery for the following reasons :

- 1.) In all probability the PT-impactor was a carbon-rich comet with a diameter of $\geq 50\text{km}$.
- 2.) Lengai Volcano located in Tanzania within the strong ejecta ray R4 is erupting Carbonatite Lava, Carbonatites are formed essentially of carbonate. Because the distribution of carbonate rocks in Europe seems to be closely related to the impact event in Europe, caused by PTI-ejecta, it must be considered that the carbonate which formed the carbonatite lava originates from the PT-impact.
- 3.) The 12 km "Kola super-deep borehole" showed that at a depth $> 7 \text{ km}$ the rock in Earth's crust is saturated with Hydrogen (H_2) and H_2O which originates from deeper sources in the mantle ! Therefore we must take into consideration the possibility that certain amounts of the hydrocarbon reserves found close to impact structures could be a result of the thermochemical processes which are going on during & after the impact event ! (→ especially the gas reserves (CH_4 , C_2H_6 etc.))



The first diagram below is from the following study : "Infrared, Raman, and cathodoluminescence studies of impact glasses" from Arnold Gucsik, Prof. Koeberl & others. It shows Raman-Spectra of three types of known impact glass samples.

The Raman spectrum of the sample **No. 7** which I collected in the Anaga Range on Tenerife Island shows very similar spectra like two of the known impact (diaplectic) glass samples (see diagrams). This provides the **first scientific evidence** that the oblique impact crater $\varnothing 15 \times 11 \text{ km}$, which I assume on Tenerife (→ see image below) is a fact !

This impact crater, together with a nearly identical crater on Gran Canaria (→ same orientation and similar size !) provides the first scientific proof for secondary craters, caused by the described global impact event at the Permian-Triassic boundary !!

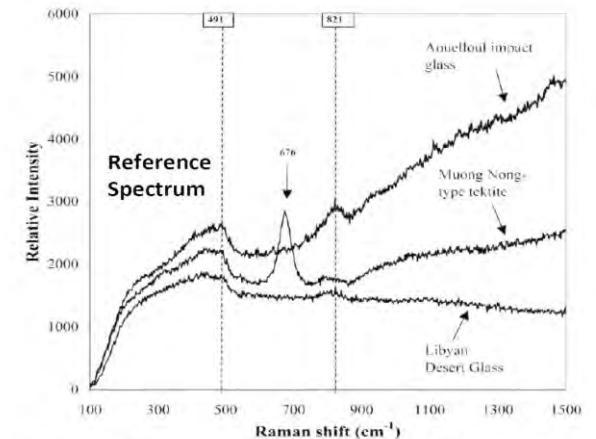
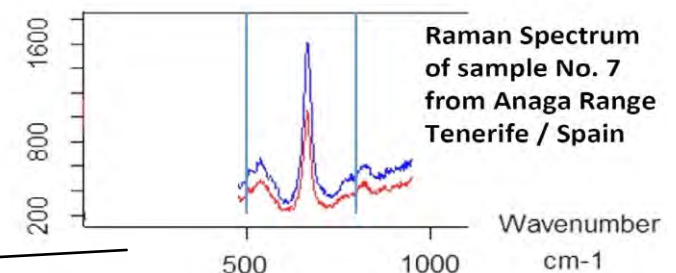
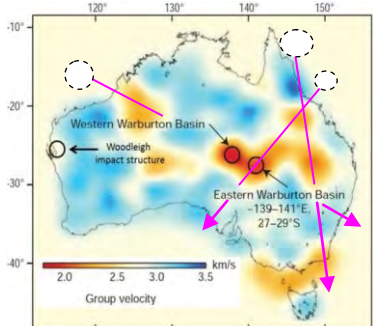


Fig. 8. Raman spectra of Anoufou impact glass (a), Muong Nong-type tektite (b), and Libyan desert glass (c) generally exhibit two broad bands at 491 and 821 cm^{-1} and relatively high background fluorescence, which indicate a high degree of amorphization. These broad bands might be due to diaplectic glass. The numbers denote peak positions in cm^{-1} .



There are still many other large-scale impact structures on Earth which need to be properly analysed, in order to figure out the correct tectonic model for Earth before & after the PT-Impact Event → e.g. the East- & West-Warburton Impact Basins.



→ see image on the left !
 There are two craters which formed the East- & West Warburton Basins approx. 300-360 Ma ago (estimated diameter Ø 100-200km each)
Weblinks :
[News Article 1](#) , [News Article 2](#)
[East-Warburton Basin](#)
[Eromanga Basin](#)
[\(Woodleigh Crater\)](#)

However this work must be carried out by experienced planetary scientists & geologists now, together with the analysis of all planets and moons
 Because we need to know the root causes of all global impact events which took place in our Solar System and we need to find all impact structures !!

After reading this study about global impact events
What practical measures should be taken ??

- 1.) The first and most important measure must be the continuation of the research work, regarding global impact events and their causes & effects, which was started with this study here !
 Scientists from many different disciplines must take on the challenge to find further evidence for the global impact structures described in this study
- 2.) Rock samples from all new impact craters and impact structures described in this study (Part 1-4) should be collected and analyzed.
- 3.) After the confirmation of the P/T-impact crater and related secondary impact structures a new

analysis & simulation of the tectonic processes in Earth's past, in the last 253 Ma, must be done !

4.) Then the cause of the expansion tectonic process, which obviously was triggered by the P/T-impact, must be found. And because there are other planets & moons in our solar system where expansion tectonic processes were triggered by a global impact event, a teamwork of scientists from different disciplines is required.
 To find the driving physical / chemical process for the mantle expansion visible on different planets and moons, a close collaboration of planetary scientists, geophysicists, geologists, chemists and physicists (especially with expertise in fission research and high-pressure / high-temperature material research) is required.

5.) A more precise and more detailed computer analysis of the collisions (pericenter events) of the Sagittarius Dwarf Galaxy with our galaxy must be done. In all probability debris- (mass) streams resulting from these collisions are the cause of periods of violent global impact events in our solar system ! That's why it is important to find out the exact composition, extension & the effects of the debris streams, caused by these collisions, on our solar system !!! The starting point of this analysis should be the study from Mr Chris Purcell
Important ! : Especially the effects and the position of the leading tidal tail of the **Sgr-DG** in the past (-300Ma) & in the future must be studied !!

6.) Because the distribution of metal-ores and energy resources, like crude oil or natural gas in Earth's crust, is mainly caused and defined by large (global) impact events, knowledge of the precise location and size of all impact craters on Earth is crucial for future explorations of ore deposits, and especially for the exploration and discovery of new large oil- and gas-deposits !!
 Good knowledge of all large impact structures on Earth will make a big difference in future

explorations, in order to find these important energy- and ore- deposits for mankind !!

Especially the correlation of big impact craters with the formation and the development of large oil-fields & gas-fields must be precisely analysed !! It seems that in particular the impact-related tectonic motion of crust fragments and magma streams, which were created during large impact events, are an important condition for the development of large oil- and gas deposits !!
 This correlation must be studied & analysed !

Having seen and analyzed the Permian-Triassic Impact and the global destruction which it caused :

THE FOLLOWING WARNING MUST BE GIVEN :

We must consider different worst case scenarios in regards to one or more impactors (asteroids or comets) which are on a collision course with our planet Earth !!! And we must find solutions, and build and install suitable defence technology in space, in order to deflect the impactors of all assumed worst case scenarios away from Earth !!!

Possible Worst Case Scenarios to consider !! :

- 1.) Accumulations of **Asteroids** and/or **Comets** with a density like in the **Asteroid Belt** are approaching from deep space and they are on a collision course with Earth, having velocities up to 100 km/s !!
- 2.) Up to 10 Asteroids in the diameter range of Ø 10–40 km with velocities of 20-100 km/s are on a collision course with Earth and all are arriving at the same time !! Pre-Warning Time < 18 months !!!
- 3.) A large **Asteroid** with Ø 200 km and a velocity of 100 km/s is approaching from deep space (from outside the solar system !!) and is on a collision course with Earth. Pre-Warning Time < 2 years !!!

As long as we don't exactly know what astrophysical processes have caused the global impact events within the last 300 million years, described in this study, we must take sufficient precautions !! in this violent and merciless universe !!

Because if we don't do so !!, Mankind and most other species on Earth could go extinct within a very short time !!, just like the Dinosaurs !!!

There are already some ideas and plans for the realization of technology to deflect small asteroids.

But every idea or plan which I have seen so far regarding the deflection of an asteroid or comet is far away from being able to cope with one of the described worst case scenarios !!!

If we are very lucky we could survive Worst Case Scenario 1.) But only if all asteroids or comets > Ø 10 – 20 km would miss our planet Earth !!!

Because we are not able to deflect such large impactors yet !!! We just don't have the required defense capability and technology to do that !!!

I have made an own assessment, and I found a few suitable defense strategies which are able to cope with large impactors, up to Ø 200 km !!

However these strategies only work if the required technology is installed in space (in defined locations in our solar system !) and if we are ready (well trained !!) to use this technology. And it would only be possible to cope with high-velocity Asteroids or Comets (with velocities >30-40 km/s) if the technology is installed with maximum rocket performance which is possible and if it would be installed on many locations in our solar system !!!

It would probably take at least 20 years to design, build and install such a defense system and it would probably cost ≥ US\$ 100 billion !

However if all members of the UNO cooperate in the effort to build such a defense system for our planet Earth, then it shouldn't be a problem to

finance it !!! And it also shouldn't be a problem to convince the UNO members to invest in such a defense system for our planet Earth !!

Because this is really the only possible insurance against a global impact event and the extinction of mankind and the total destruction of our world !!

And we shouldn't wait until the devil comes around the corner! Fast and smart action is required !

How such a defense system for our planet Earth could look like is described in my following study :

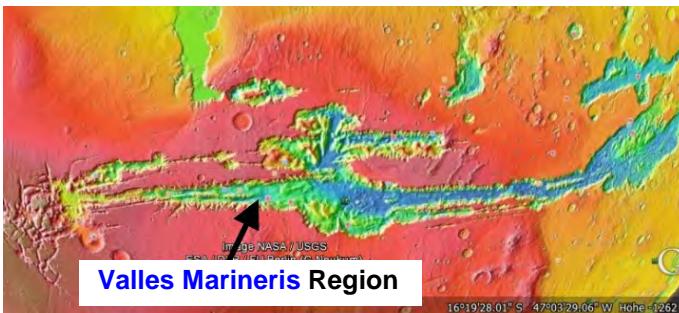
→ see Weblink : **["To the deflection of asteroids in the diameter range of 5 to 200 Km"](#)**

The interested readers should also have a look at the following Wikipedia page :

→ **[Asteroid Impact Avoidance Strategies](#)**

The strategies and the technology described in my above mentioned study : **["To the deflection of asteroids in the diameter range of 5 to 200 Km"](#)** can also be used for doing **Terra-Forming** on Mars and on other planets & moons

With the described asteroid deflection strategies it would be possible to carry out controlled impacts of asteroids in the 10-20 km diameter range on Mars and on other planets & moons !!



The Valles Marineris is a deep 2400 km long Canyon on Mars probably caused by a crack in the crust of Mars. **Note** : Mars' ocean water came out of the mantle here !

An action plan for Terra-Forming on Mars :

In order to create an additional "Second Earth" for Mankind we should perform Terraforming on Mars as quick as possible before the settlement starts !!

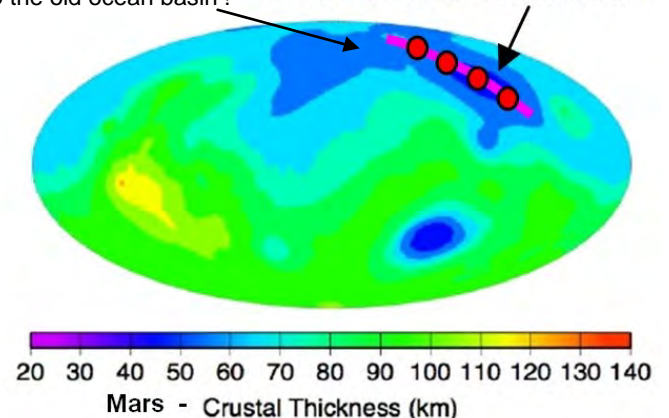
With a controlled impact series of probably 3 to 4 impactors in the Ø 10-20 km range a large crack in the crust of Mars could easily be produced.

In order to achieve this crack with the smallest possible impactor diameter & energy expense, the optimum area for the intended crack would be the thinnest crust area of Mars. This is in the center area of the northern lowland (→ the former ocean floor on Mars) Here the crust is only 40 km thick!

A large crack in this area should cause large amounts of volatiles (e.g. H_2O) to rise up to the surface, similar as it happened in **Valles Marineris**. This would quickly produce a small ocean near the crack and a thicker atmosphere, which would improve the living-conditions on Mars considerably!

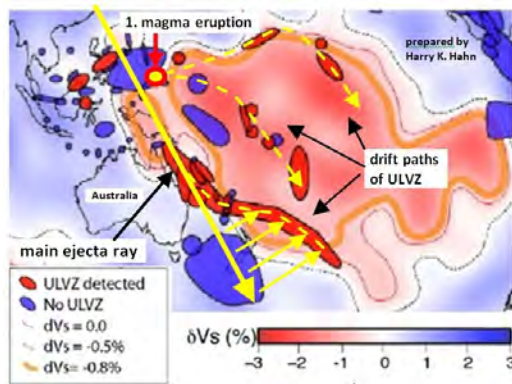
Such a **Terra-Forming** project should first be tested on another planet or moon which is located further away from Earth, and which is not a primary target for human settlements. It could be tested for example on Jupiter's moon **Ganymede**.

From this crack large amounts of salt-water from Mars' mantle can fill up the old ocean basin ! Ø 10-20 km impactors produce a crater chain which causes a crack



To the new discoveries :

An essential new discovery in comparison to the first edition of my study is the fact that the Pacific Plate and the expansion tectonics process which has formed it, is the result of ≥ 8 gigantic magma eruptions in the west pacific region over the last 200 Ma. These magma eruptions were caused by the Pacific-LLSVP-(ULVZ), which in all probability is a direct result of impacting ejecta of the PTI !



Further new discoveries are the Victoria Lake Impact event, the Canary Islands Impact event, the localization of the “Bay of Lyon” Crater, the correct position & orientation of the Indian Plate, Madagascar and South-America at the time of the PTI-event and some other new interdependencies. (See new pages, changes & additions in my study)

Regarding the described magma eruptions in the West Pacific the following **Warning** must be given :

With high probability another magma eruption will take place in the west pacific region ! In all probability it will occur in proximity to the Fiji Islands. When it will happen is difficult to say ! Therefore the mantle area below the Fiji region must be examined with seismic tomography in more detail, e.g. the vertical velocity of the magma flow under the Fiji region must be measured !

Note that a new mass extinction, caused by another gigantic magma eruption of the Pacific-LLSVP, can begin at any time ! Within a short

time period such a largescale magma eruption could kill up to 60% of all species on Earth ! Like the other eruptions in the past it will cause an oceanic anoxic event (like the OAE-1a & OAE-2 etc.) which will release vast amounts of CO_2 , H_2S etc. into the oceans and will kill up to 60% of all marine species. Largescale explosive volcanism with vast amounts of CO_2 released will be a result too (eg Ajupa Island)

It could begin in a few years, or it may not happen in the next million years. But in all probability it will happen sometime within the next ~ 5 million years ! A solid column at the top end of the Pacific LLSVP near Fiji, which is located close to the surface, may be an indication of the next due magma eruption !

And there seems to be a connection between these magma eruption events in the west pacific region and the 62 Ma bio-diversity cycle on Earth (\rightarrow Extinction-cycle with two half periods of 31 Ma)

\rightarrow See Part 5 of my Study !

In all probability some of these violent magma eruptions were triggered by extreme earthquakes, e.g. caused by impact events, like the Chicxulub-Impact in Mexico. Like a punch which triggers an eruption of the contents of a heated Coke-bottle, the shock waves of an extreme earthquake may finally trigger a magma eruption from the Pacific-LLSVP (\rightarrow caused by a sudden pressure spike) ! But to make it clear : We are looking at two different periodic cycles here !

The periodic magma eruptions of the Pacific-LLSVP are caused by thermochemical processes which are going on inside the LLSVP & ULVZ. There seem to be longterm thermochemical processes at work with cycle lengths of 10 - 30 Ma (million years). (\rightarrow the cycle length seems to decrease over time)

Please note : It may also be the case that a large amount of superheated mantle-water streams out of the Mid-Ocean-Range-crevices before a magma eruption starts, causing in this way climate change and sea-level rise !! see weblink to : [News Article](#)

The 62 Myr Bio-Diversity Cycle (or 62 Ma Extinction-cycle !) is caused by a precise periodic astronomical event going on for at least 500 Ma ! In all probability it is caused by the periodic crossing of the galactic plane by our solar system every 31 Ma. Every second crossing of the galactic plane seems to be particularly dangerous, because it has produced a worldwide mass extinction every time for the last 8 (62 Ma)-cycles ! 6 of this 8 crossings caused a mass extinction each time, killing ≥ 70 % of all marine species on Earth ! Because our solar system moves along a spiral path around the galactic center, at every second crossing our solar system crosses the same ring area of the galactic plane, which in all probability is densely packed with debris resulting from collisions of our Galaxy with the Sagittarius Dwarf Galaxy (Sgr-DG).

And to point this out : Our solar-system is currently crossing the galactic plane in this obviously dangerous ring-area ! We know that the last worldwide extinction took place 65 Ma ago !

Therefore the next worldwide extinction event seems to be overdue and can happen at any time ! Maybe we just haven't passed the debris-layer yet !

By the way : This assumed debris-ring (or debris accumulation) may be the cause of the Oort Cloud (\rightarrow the source area of comets !) around our solar system, and the densely packed debris ring(s) in the galactic plane (similar to Saturns ring) may offer an alternative to explain the Dark Matter problem !

Looking at the other global impact events which I have discovered on the planets Venus, Mars & Pluto, and on the moons Ganymede & Charon, which all indicate orbit inclinations $\geq 40^\circ$ for the original orbit of the impactors (comets or asteroids), then it certainly must be taken into consideration that the impactors came from outside our solar system !! \rightarrow either from the Oort Cloud, or from the assumed debris ring (layer) in the galactic plane !

Because these global impact events probably all occurred within the last ~250 Ma, we must expect large impactors which are coming with high velocity from deep space !!

As long as we don't exactly know the physical process which has caused the global impact events within the last 300 million years, described in this study, we must take sufficient precautions !!

Because we are not able to deflect such large impactors yet ! We just don't have the required defence capability and technology to do that !

Therefore an asteroid- & comet deflection system must be built which protects our planet!

I have made an own assessment, and I found a few suitable defence strategies which are able to cope with large impactors, up to Ø 200 km !!

How such a defence system for our planet Earth could look like is described in my following study :

See : → ["To the deflection of asteroids in the diameter range of 5 to 200 Km"](#)

It will probably take at least 20 years to design, build and install such a defence system and it would probably cost ≥ US\$ 100 billion ! But it is our responsibility to build such a system !

It is also our task & responsibility to settle on our neighbour planet Mars as soon as possible, and to establish an independent civilisation on Mars, which doesn't need support from Earth to survive !

This is the only way to make sure that our advanced technological civilisation will survive in the case of a global impact event on Earth, caused by a large impactor coming from deep space, or in the case of another gigantic magma eruption caused by the Pacific LLSVP.

We may be able to build a defence system against a large impact on Earth. However it's not possible to build a defence system against a gigantic magma eruption coming from Earth's mantle !!

That's why the development of nuclear drives for spacecrafts must be accelerated. We need much more payload capacity ! Instead of just being able to lift 10 tons into orbit, we need payload capacities of thousands of tons to really make progress in establishing settlements on Mars and on other planets and moons. If we shift our focus to the development of nuclear driven spacecraft we can achieve this within a few decades !

Please note that 10 kg enriched Uranium contain as much energy as thousands of tons of rocket fuel !! We already have enough fuel (enriched uranium) to build hundreds of spaceships with payload capacities ≥ 1000 tons !! The weapons industry worldwide must be redirected to build such large spaceships, and the space-technology which we need for the colonization of Mars, instead of ever-increasing the weapons-piles on Earth !! We must shift our focus !!!

The G20 & UNO must now set a new framework, so that "resource wars" can't happen anymore !!

Therefore I suggest an **action plan** & a number of global regulations which have the following goals :

- 1.) To secure and explore the required **resources** for mankind far in advance before they are needed
- 2.) To define which resources should be extracted first and which ones should be put on hold, in order to minimize the environmental impact of the mining industry, in particular regarding very sensitive natural environments.
- 3.) Altogether there should be a longterm planning for a secure and environmental friendly resource exploitation worldwide.

Speculation on commodity markets must be restricted by setting bandwidths for trading. Commodity prices must be forced into defined bandwidths to provide stability for world's economy.

And a worldwide analysis of all available resources & reserves must be carried out under control of the UNO & G20. A precise projection of the resource needs for the next 30 years must be done, and a 30 Year plan for food-, water-, energy- and mineral resources supply for mankind must be set up. Because the next 30 years will be the most challenging time in human history, with maximum resource consumption !

4.) Mining industries which are critical for the resource supply for mankind should be under observation and protection of the UNO & UNSC. (for example the crude oil exploration industry)

5.) More food and energy reserves (oil & gas) must be kept in stock during the coming very low sun-spot-cycle minima, in which cold Winters and shortened harvest seasons must be expected !!

see following links : [link_1](#) , [link_2](#) , [link_3](#) , [link_4](#)

6.) The population growth in the fastest growing countries must be reduced as quickly as possible with the financial help from the G20 & UNO.

And much more irrigated farmland is required !!

Top-Down Approach is required to reduce resource consumption worldwide ! First it must be defined how much resources can be used over the next 30 years. Then all key-industries must get limits for the use of resources, which they shouldn't exceed !

We need to refocus ! We must start many international projects where all members of the UNO & G20 work together to achieve a better and saver life for all people, a healthy environment and in general a good and positive vision for mankind ! One of these positive visions must be a constant settlement of mankind on Mars, realized by the G20 and the UNO !

And we must protect the remaining Rainforests and clean up our World's Rivers from plastics !!

The Author : Harry K. Hahn - 8.7.2017

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Interesting Online Documents & Websites :

Note : If weblinks don't work, then type-in or copy the shown web-address directly in your internet browser, or search with titel & author !

Images of **Rock-samples & Sample sites** of some of the described impact structures can be found on these websites : www.permiantriassic.at or www.permiantriassic.de

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→ <http://www.isale-code.de/redmine/projects/isale/wiki/Media>
(Especially watch the 3. animation !! clic on the third image !)
- 2.) **The Sagittarius Impact as an Architect of Spirality and Outer Rings in the Milky Way**
→ <https://www.youtube.com/watch?v=pig-ugRehNM&feature=youtu.be>
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