

The 450 x 380 km Bengal Bay Crater in India - A possible secondary Crater of the P/T- Impact Event

see also Part 1 to 6 of my study : “Global Impact Events are the cause for Plate Tectonics and the formation of Continents and Oceans”

(→ Please find my other studies on vixra.org, archive.org , or soon on this website : www.permiantriassic.de)

by Harry K. Hahn / Germany - 8. July 2017

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Abstract :

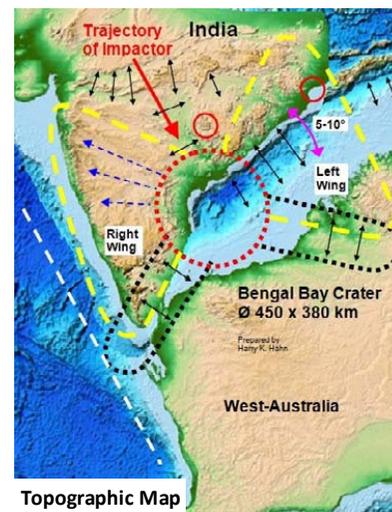
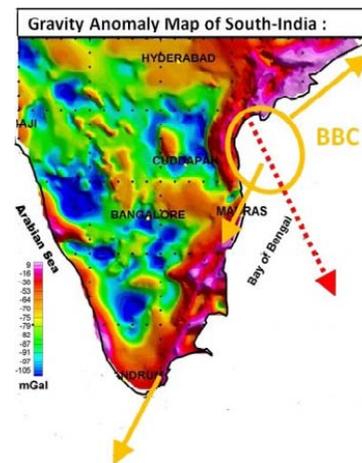
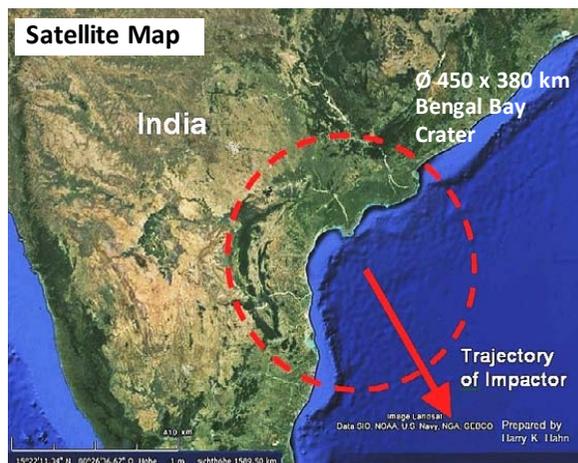
Bengal Bay at the center of India’s east coast was formed by an elliptical Impact Crater with the dimensions of $\approx 450 \times 380$ km. This is indicated by gravitational anomaly- and magnetic anomaly-maps and by satellite- and topographic-maps. The remaining NW-section of the identified Bengal Bay Impact Crater located on the Indian Plate, and the SE-section of the 400 x 350 km elliptical Port Headland Crater located on the ocean-floor in the NW of the Australian Plate probably belong to the same Impact Crater which caused a massive fracture in Earth’s crust and separated India from Australia ≈ 200 -250 million years ago.

The assumed trajectory of the $\varnothing 20$ to 40 km impactor, which produced this large Impact Crater, indicates that this crater in all probability is a large secondary crater which was caused by the Permian Triassic (PT) Impact Event in Siberia 253 million years ago.

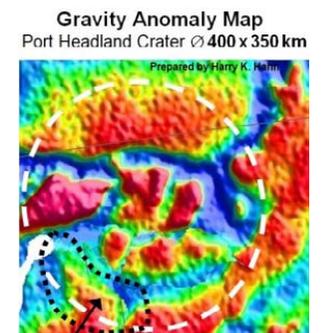
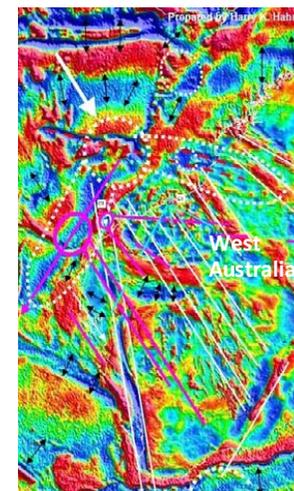
The impactor probably was a fragment of the asteroid or comet which caused the PT- Impact Crater. This is indicated by the iron-rich ejecta and ejecta rich in platinum-group elements that was ejected by the Bengal Bay- / Port Headland- Crater and which impacted on the Yilgarn Craton and Pilbara Craton in West-Australia, as traces on the gravity anomaly map indicate. Satellite images of India provide further evidence for this assumption. The linear western border of the Indian Plate was caused by the powerful Ejecta Ray R4 of the Permian Triassic Impact Event. Within this assumed Ejecta Ray R4 two more secondary craters of the PT-impact event are located. These are the two impact craters R4/8 with $\varnothing 120$ km, and the smaller Mumbai Crater with $\varnothing 25$ km (see images on page 5 & 6).

There is strong indication that the Iron-Ore Deposits around Sandur (India) were caused by ejecta material which was ejected by the Mumbai Impact Crater. And the impactor which formed the Mumbai Crater also seems to be a fragment of the original PT-impactor. This is indicated by the 30 km long “drop-shaped” mountain range near Sandur which contains the Sandur Iron-Ore Deposits, and by the orientation of this enormous drop-shaped ejecta-impact-structure.

The Indian Traps are either a direct result of the ejecta blanket that was caused by the Bengal Bay Impact and that probably covered an area $> 1,000,000$ km², or the Indian Traps may be the result of a catastrophic collapse of a giant shield-volcano which grew on top of the Bengal Bay Crater after the impact. The impact caused large fractures in Earth’s crust and initiated strong Expansion Tectonics in a large area. This can easily explain massive outflows of magma that may have caused the Indian Traps in the post impact era.



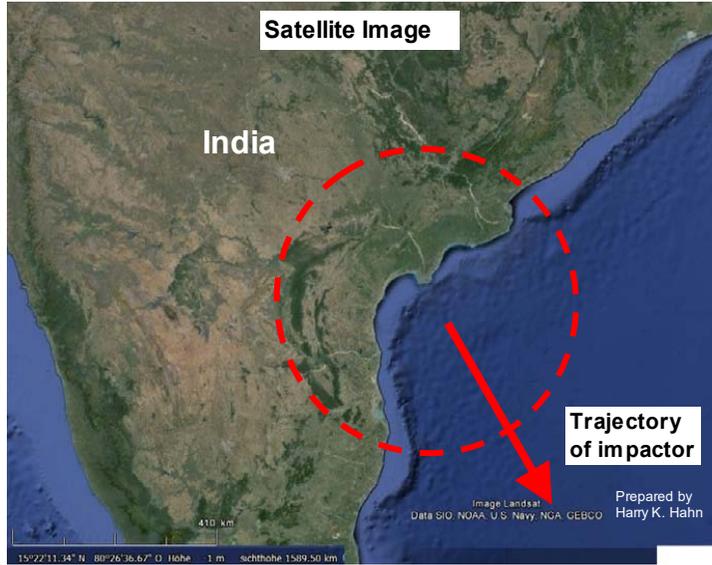
Gravity Anomaly Map (West-Australia)



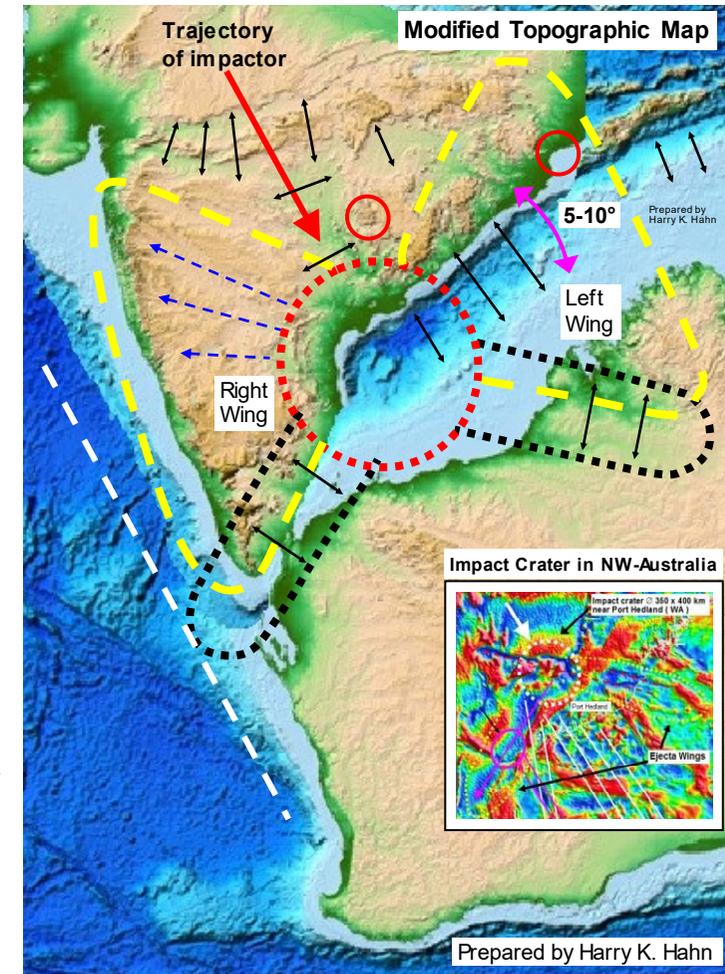
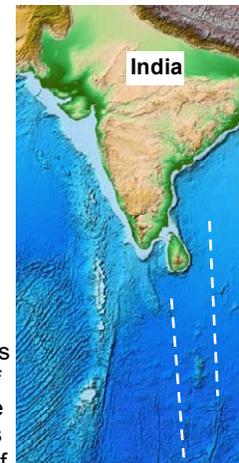
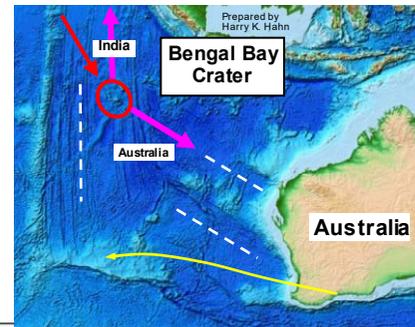
A large Impact Crater \varnothing 450 x 380 km which formed the Bengal Bay in India seems to be related to the PT-Impact Event.

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 2](#) 253 Ma ago. If we consider a rotation of India of 5-10° after the impact, and an orientation of India to Australia, before the impact, as shown below, then this impact in India maybe the same as the one in NW-Australia ! (see [page 4](#)). This means that India & Australia had a different position, when Pangea broke apart, as generally believed !

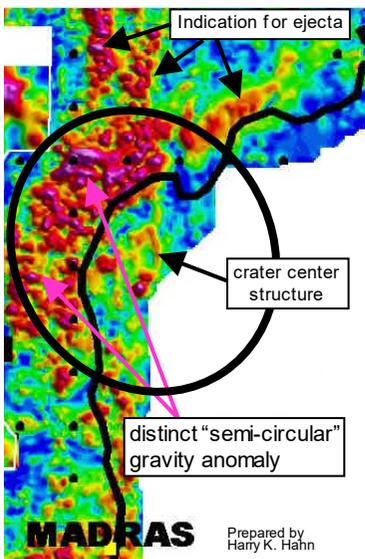
Elliptical crater \varnothing 450 x 380 km in India



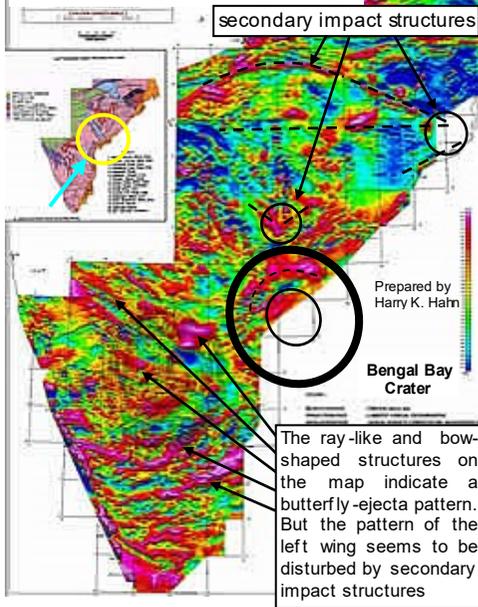
If this assumption is correct, then this large impact crater in India probably caused the break-off of India from Australia starting around 250 Ma ago (→ break-off of [Pangea](#)). Indication for this impact can be found on the topographic map, satellite image and on gravity- & magnetic anomaly maps 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](#)

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

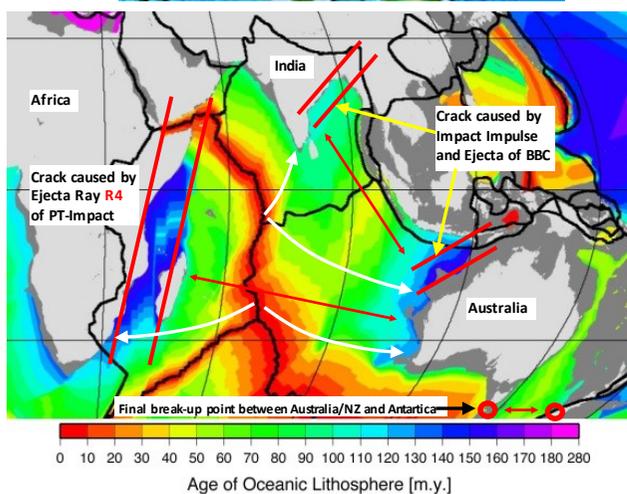
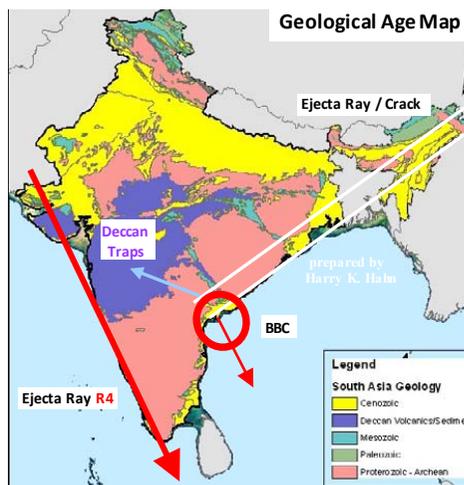
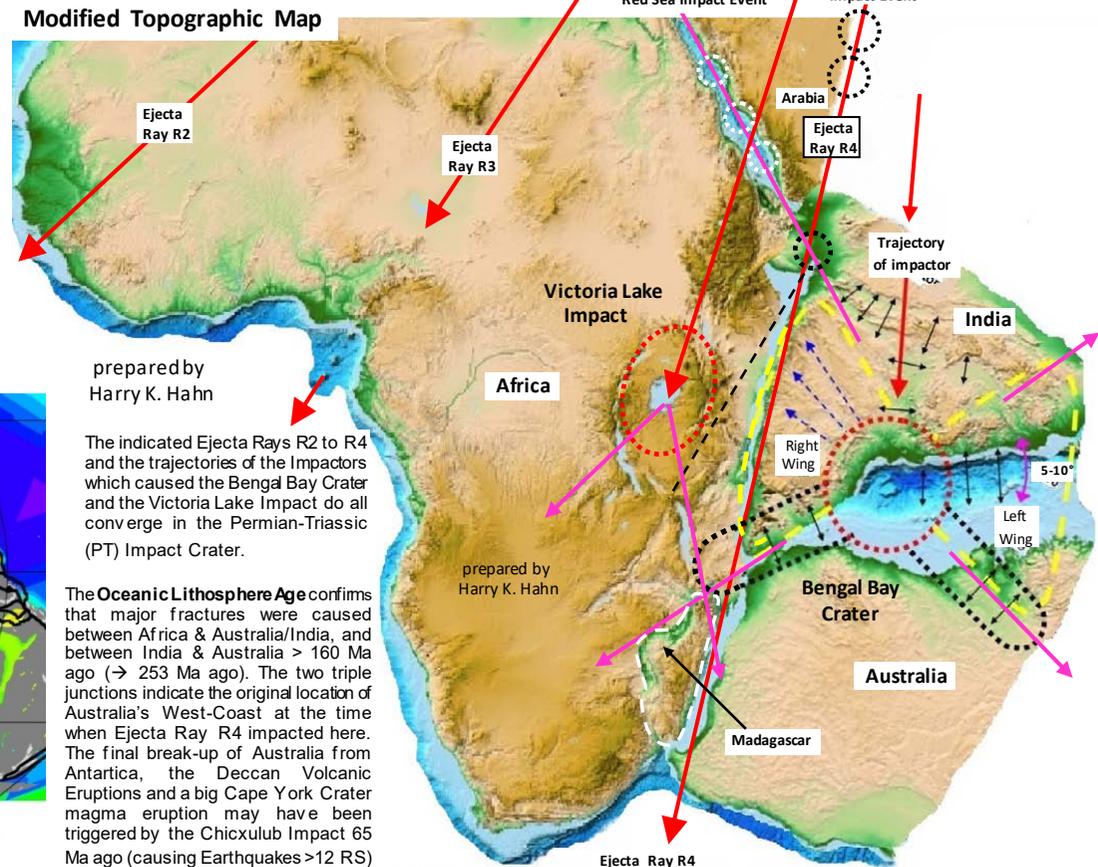
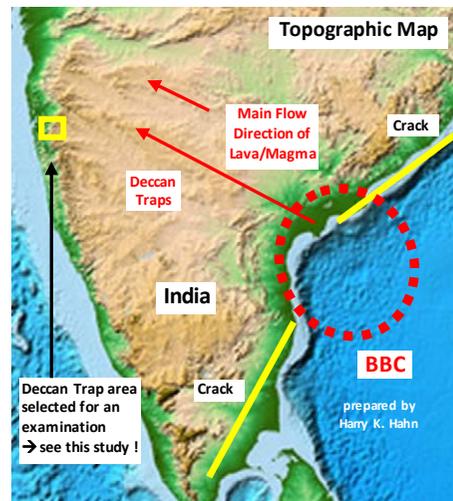
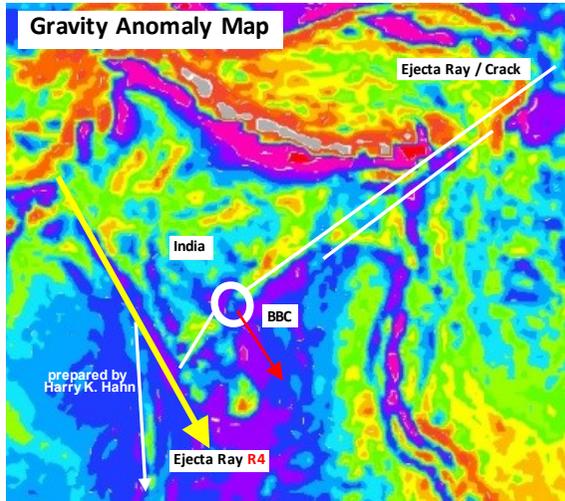
The impactor which caused the Permian-Triassic Impact Crater also produced a number of powerful Ejecta Rays and large Secondary Impactors which caused a global fracture pattern in Earth's crust, which then triggered the break-up of Pangea. The powerful Ejecta Ray R4 caused an immense crack in the Super-Continent 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.



prepared by Harry K. Hahn

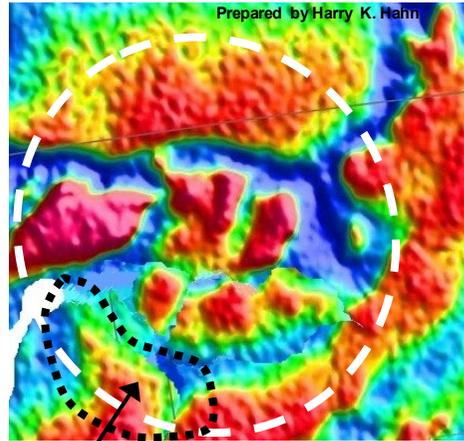
The indicated Ejecta Rays R2 to R4 and the trajectories of the Impactors which caused the Bengal Bay Crater and the Victoria Lake Impact do all converge in the Permian-Triassic (PT) Impact Crater.

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)

The Port Headland Crater with \varnothing 400 x 350 km in the NW of Australia may be identical to the Bengal Bay Crater in India

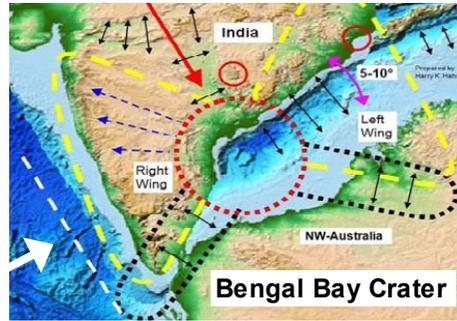
The gravity anomaly map of West-Australia shows evidence for another large impact crater near **Port Hedland** which has an elliptical shape. It's an oblique impact crater, which means that the impactor arrived in a shallow angle of probably $< 30^\circ$. The impactor probably had a diameter of approx.. 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 400x 350 km

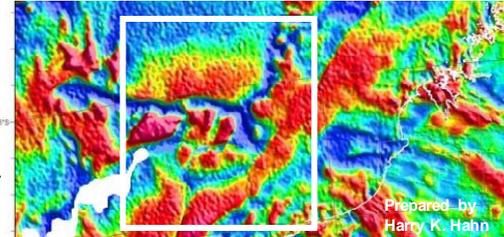
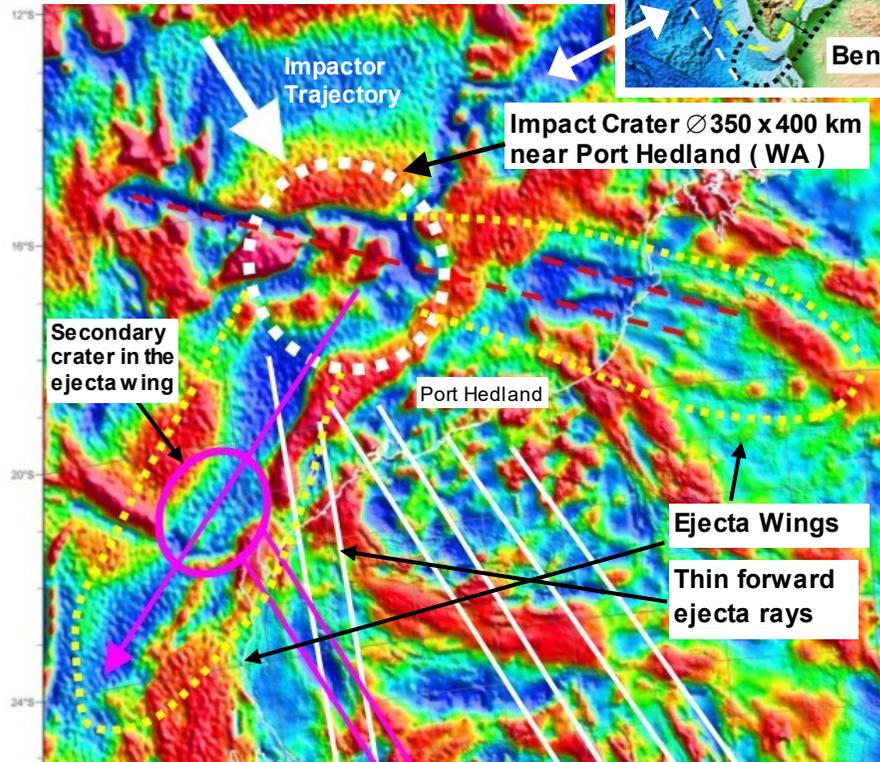


Because it was an **oblique impact** it produced a butterfly ejecta blanket. I have marked the two wings of the ejecta blanket with yellow dotted lines on the maps. Along the center lines of these ejecta wings big cracks in Earth's crust opened up. Here a majority of the ejecta mass impacted on the **surface**. 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.

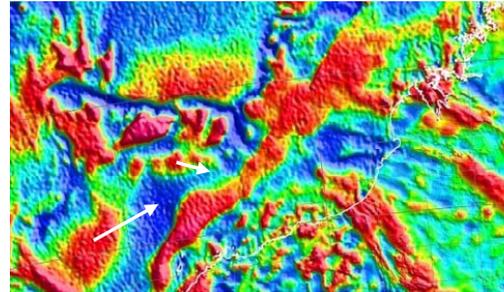
Please compare !
The BBC & the Port-Headland Crater



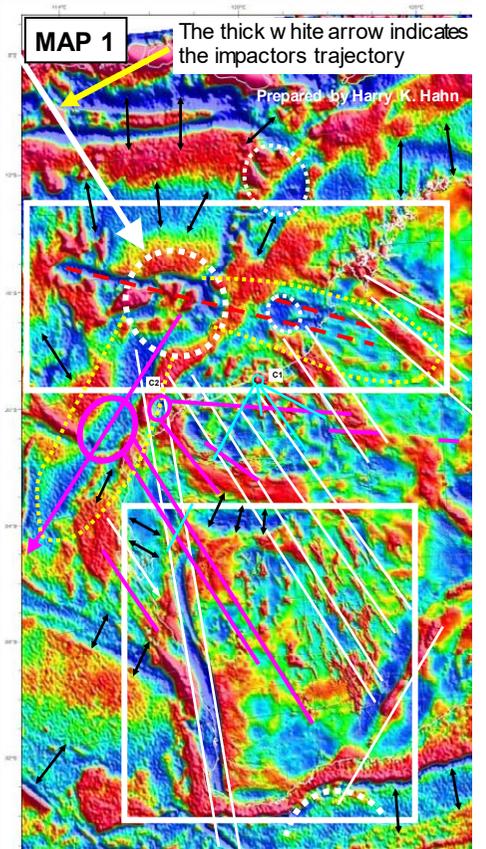
Note the precise crater-wall shape on the marked fragment !!



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



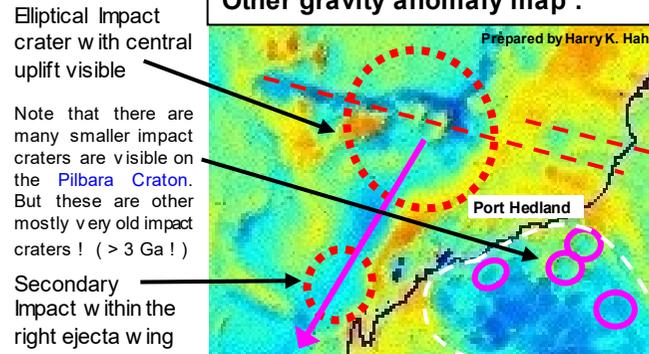
Here for comparison the original map



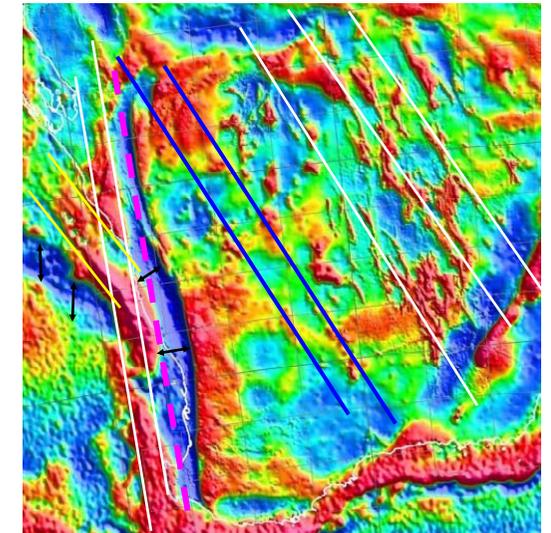
Prepared by Harry K. Hahn

GRAVITY ANOMALY MAP OF THE AUSTRALIAN REGION 3RD EDITION, 2008
Geoscience Australia
GPO Box 1378
Canberra, ACT 2601

Other gravity anomaly map :

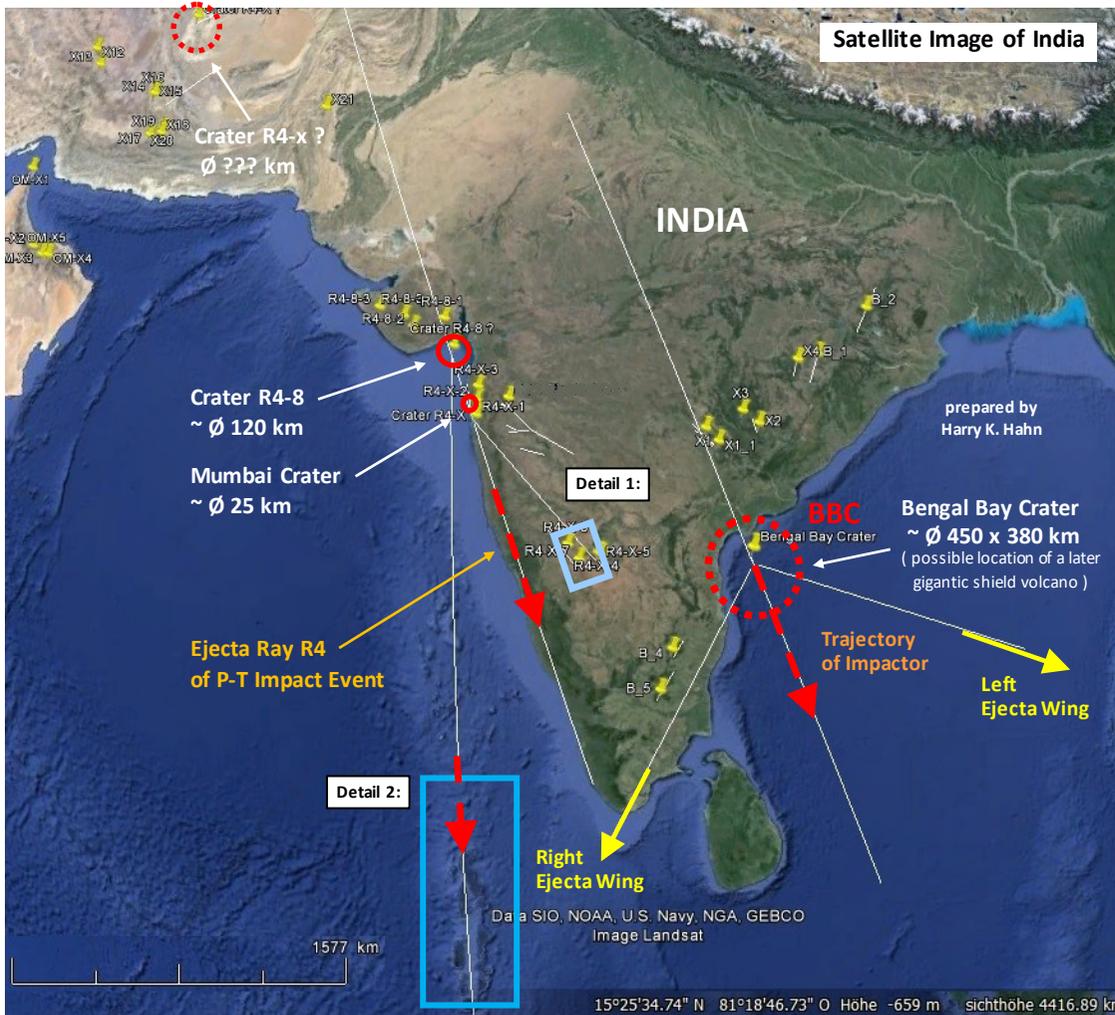


The left image shows that there is a smaller secondary elliptical structure within the right ejecta wing, from which further ejecta rays originate. The right image shows on the left side the strong ejecta rays which cut-off the Yilgarn Craton from Super-Continent **Pangea**.



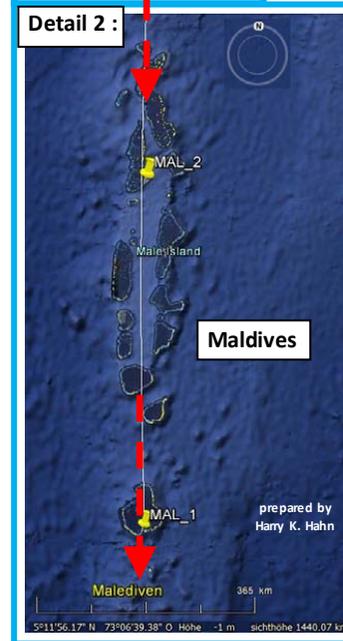
Two craters $\varnothing \sim 120$ km & $\varnothing \sim 25$ km on the west-side of the Indian Plate were caused by Ejecta Ray R4 from the PT-Impact

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 $\varnothing \sim 120$ km is located on the northern end of the linear western border of the Indian Plate. And the second crater with $\varnothing \sim 25$ 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 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.

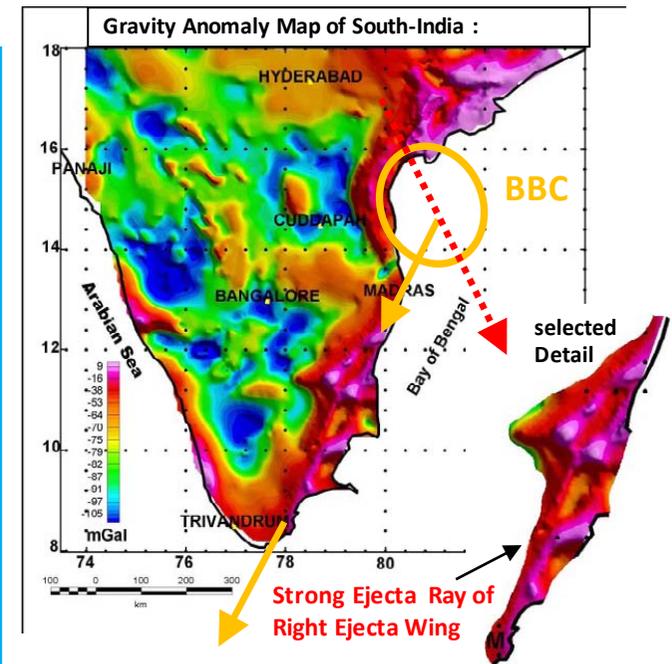


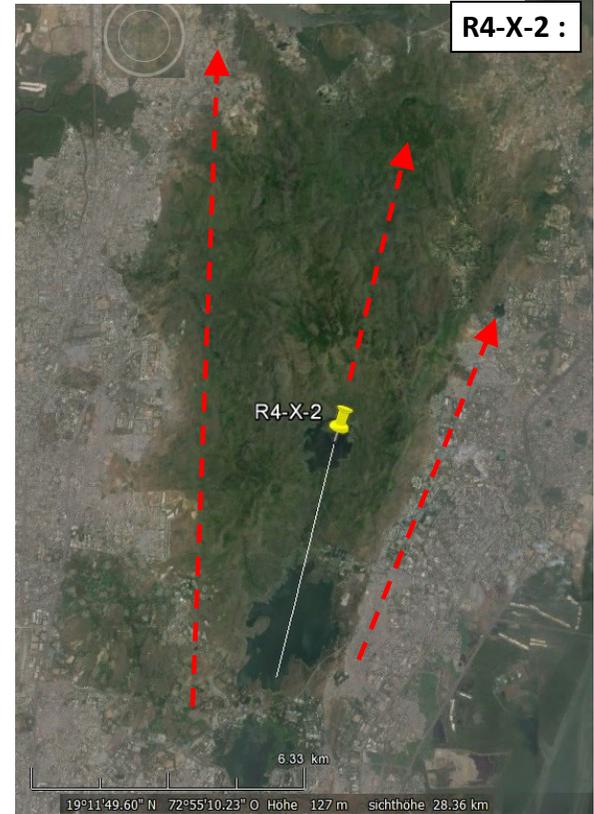
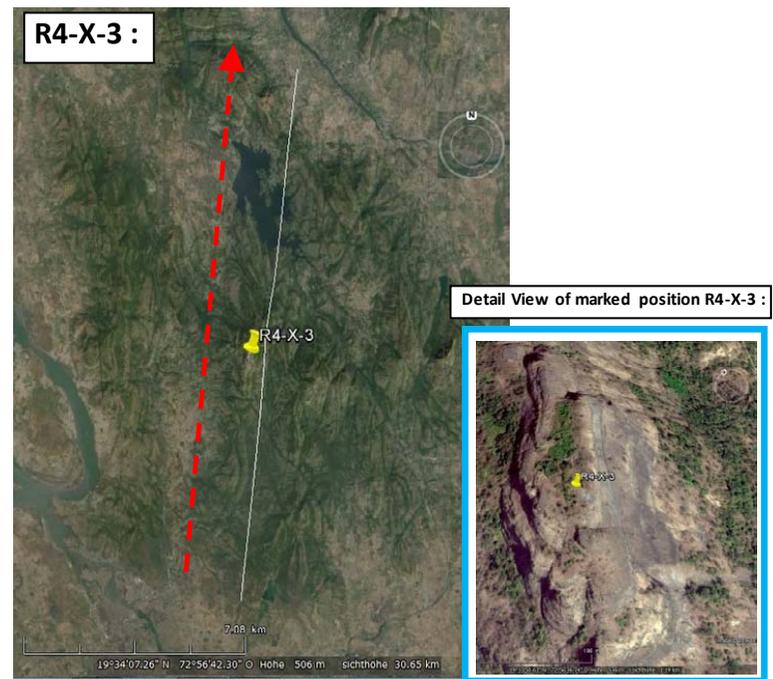
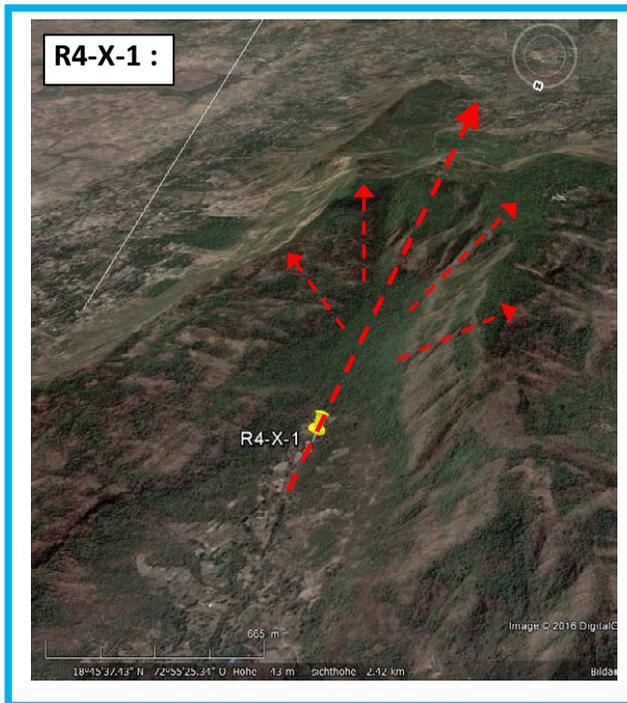
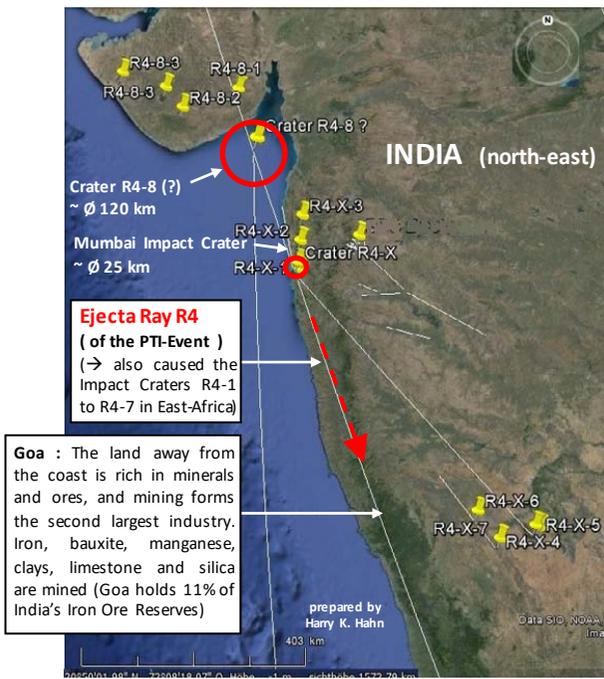
Detail 1: The Iron-Ore Deposits around Sandur in the Ballari District are ejecta material which is originating in the Mumbai Impact Crater

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)

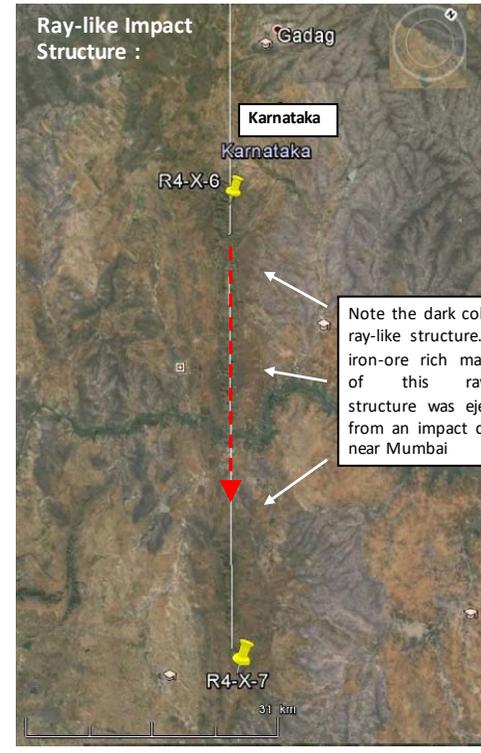
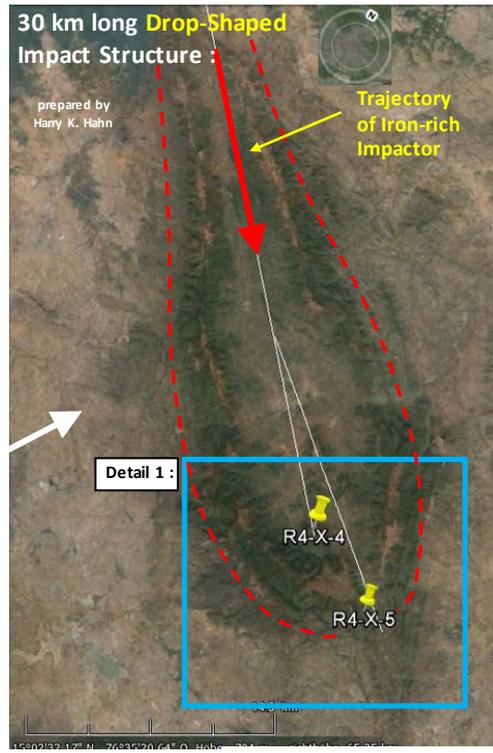
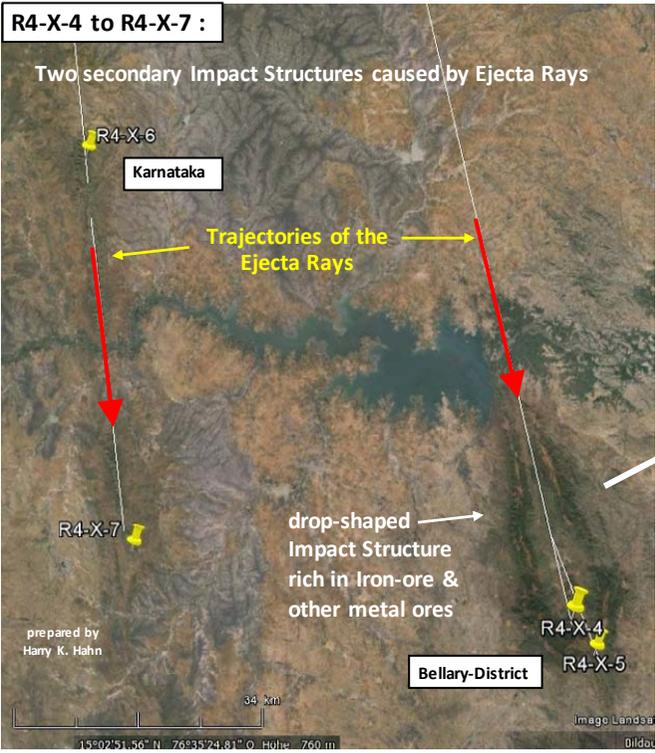


Gravity Anomaly Map of South-India: This map clearly indicates the ejecta ray which formed the south-east border of the Indian Plate. The purple- & red-colored linear structures indicate the ejecta ray (ejecta material) which caused a major crack between the Indian Plate and the Australian Plate 253 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).

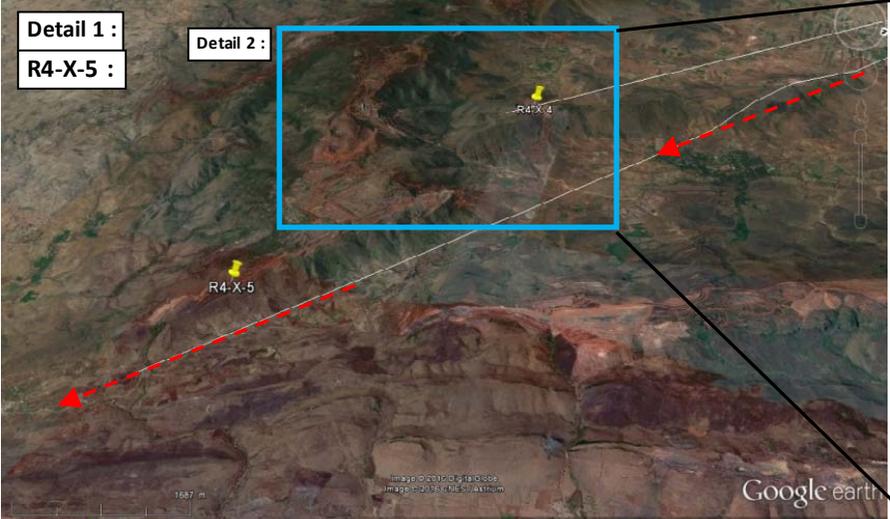




India's Iron-Ore-Reserves are the result of Secondary Impacts caused by ejecta from the Mumbai Crater and BBC & P-T Impact Crater in general



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**.

References :

Part 5 of my Study : [Global Impact Events are the cause for Plate Tectonics and the formation of Continents and Oceans_Part 5](#)

Part 1 : [The 1270 X 950 km Permian-Triassic Impact Crater Caused Earth's Plate Tectonics of the Last 250 Ma](#)

Part 2 : [The Permian-Triassic Impact Event caused Secondary-Craters and Impact Structures in Europe, Africa and Australia](#)

Part 3 : [The Permian-Triassic Impact Event caused Secondary-Craters and Impact Structures in India, South-America and Australia](#)

Part 4 : [The Permian-Triassic Impact Event and its Importance for the World Economy and for the Exploration- and Mining-Industry](#)

Tectonics :

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2. G.R. Foulger, D-M. Jurdy : **Plates, Plumes, and Planetary Processes** ; The Geological Society of America, Special Paper 430 ; Boulder Colorado 2007 ; ISBN: 978-0-8137-2430-0
3. P. Kearey, F.J. Vine : **Global Tectonics** , England 1996, Blackwell Science Ltd. , ISBN : 0-86542-924-3

Impact Cratering :

4. C. Koeberl, F. Martinez-Ruiz : **Impact Markers in the Stratigraphic Record** 2003 ; Springer Verlag ; ISBN : 3-540-00630-3
5. G. R. Osinski, E. Pierazzo : **Impact Cratering** ; USA 2013, Wiley-Blackwell Publication ; ISBN : 978-1-4051-9829-5
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6. W.U. Reimold, R.L. Gibson : **Meteorite Impact** ; Council for Geoscience, Germany 2009, Springer Verlag
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Interesting Online Documents & Websites :

- 1.) Introduction : **Impact Metamorphism** , by Dr. Ludovic Ferriere
→ <http://www.meteorimpactonearth.com/impactmeta.html>
- 2.) **Numerical modelling of basin-scale impact crater formation**; R.W.K. Potter
→ <http://www.lpi.usra.edu/lpi/potter/publications/RossThesis.pdf>, **see also:** [Orientale impact](#)
- 3.) **Cycles in fossil diversity** : R.A. Rohde, R.A. Muller, 2005, www.nature.com
→ <http://muller.lbl.gov/papers/Rohde-Muller-Nature.pdf> → see Introduction in my study
- 4.) **Asteroid/Comet Impact Craters and Mass Extinctions** , Michael Paine
→ <http://users.tpg.com.au/users/tps-seti/crater.html>
- 5.) **A Breakup of Pangaea and plate kinematics of the central Atlantic and Atlas regions**, A.Schettino, E.Turco → <http://gji.oxfordjournals.org/content/178/2/1078.full>