Massive Impacts on Earth

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Telegistics Inc.

A good scientific theory is one that

explains all known observations

and

predicts things not yet known or observed.

Plate Tectonics explains most observations and predicts most observed details to date.

But not everything we observe.

An improved theory, presented here, would include all present observed details, predict some new ones,

and explains some processes and formations that Plate Tectonics cannot.

The Comet Impact Challenge:

What I am about to present is commonly described as

"Inconceivable"

The Challenge:

Present to me why it is Inconceivable,
or why it is believable - ie how to test it or publish it.

The clearest presentation pro or con wins.

A Quick review of present knowledge on impacts:

There are ~ 200 known impact craters on Earth.
All are believed to be from Asteroids.

Most fit present criteria of being proven
with shock metamorphic evidence.

The largest is Vredefort Dome at 300 km diameter.
The best known is Chicxulub at 150 km diameter.

Chicxulub is the dinosaur killer and led to
one of the greatest extinction events in history.

Large Asteroids are few in number and
unlikely to ever leave the asteroid belt.

Most craters are over 3 billion years old.

Comets are rare, do not hit Earth, and
do not cause impact craters.

Allow me to present some new observations

which challenge some

of the present understanding.

My observations began with

a review of Egypt with Google Earth.

Egyptian Chronology:

The old kingdom - 2686 - 2181 BCE
- **centered in Memphis (Cairo)**
- **Building of the pyramids**

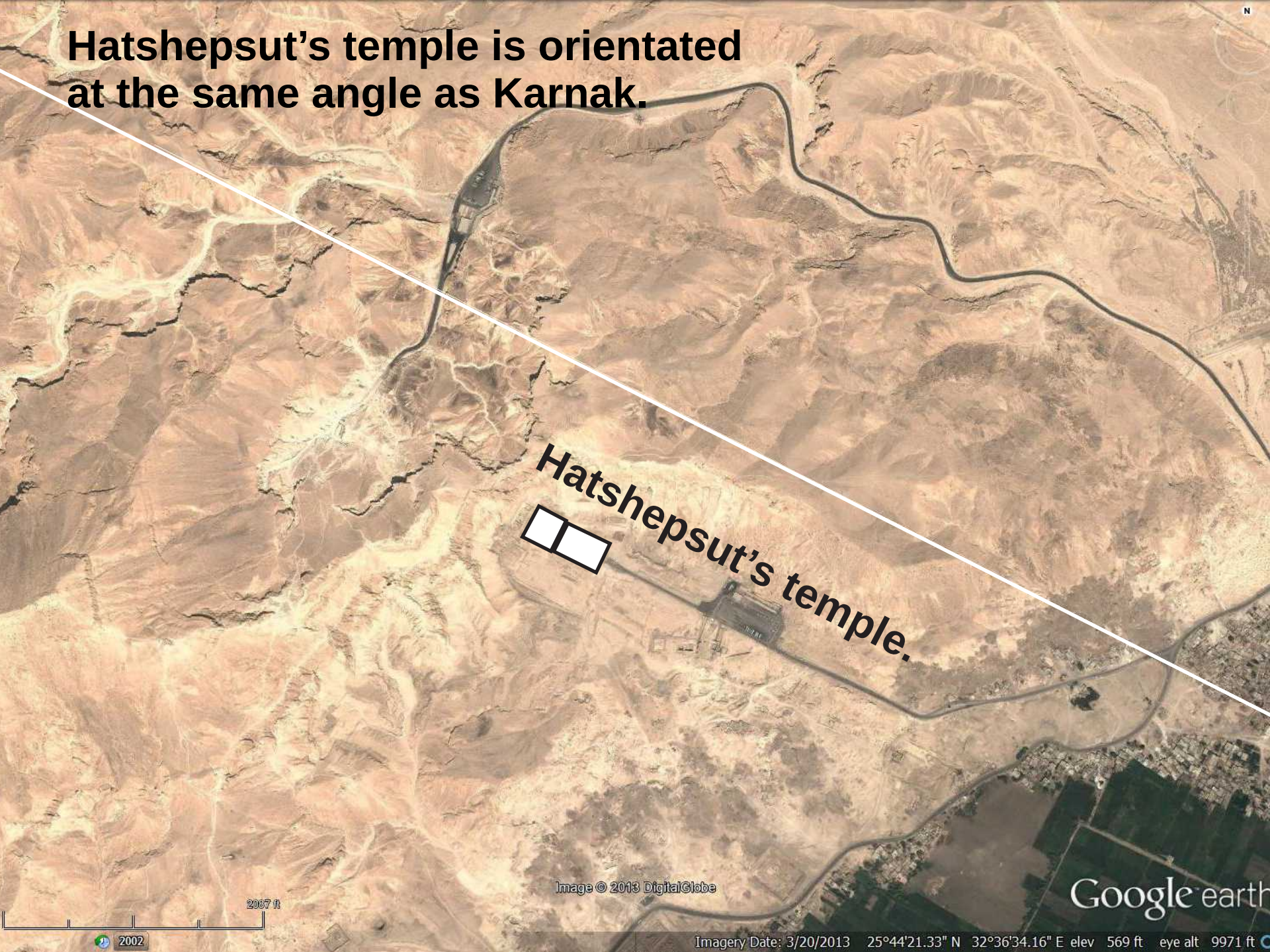
The Middle Kingdom - 2055 - 1650 BCE
- **centered in Thebes (Luxor)**
- **Not as well known**
- **Ended when Egypt was conquered by barbarians.**

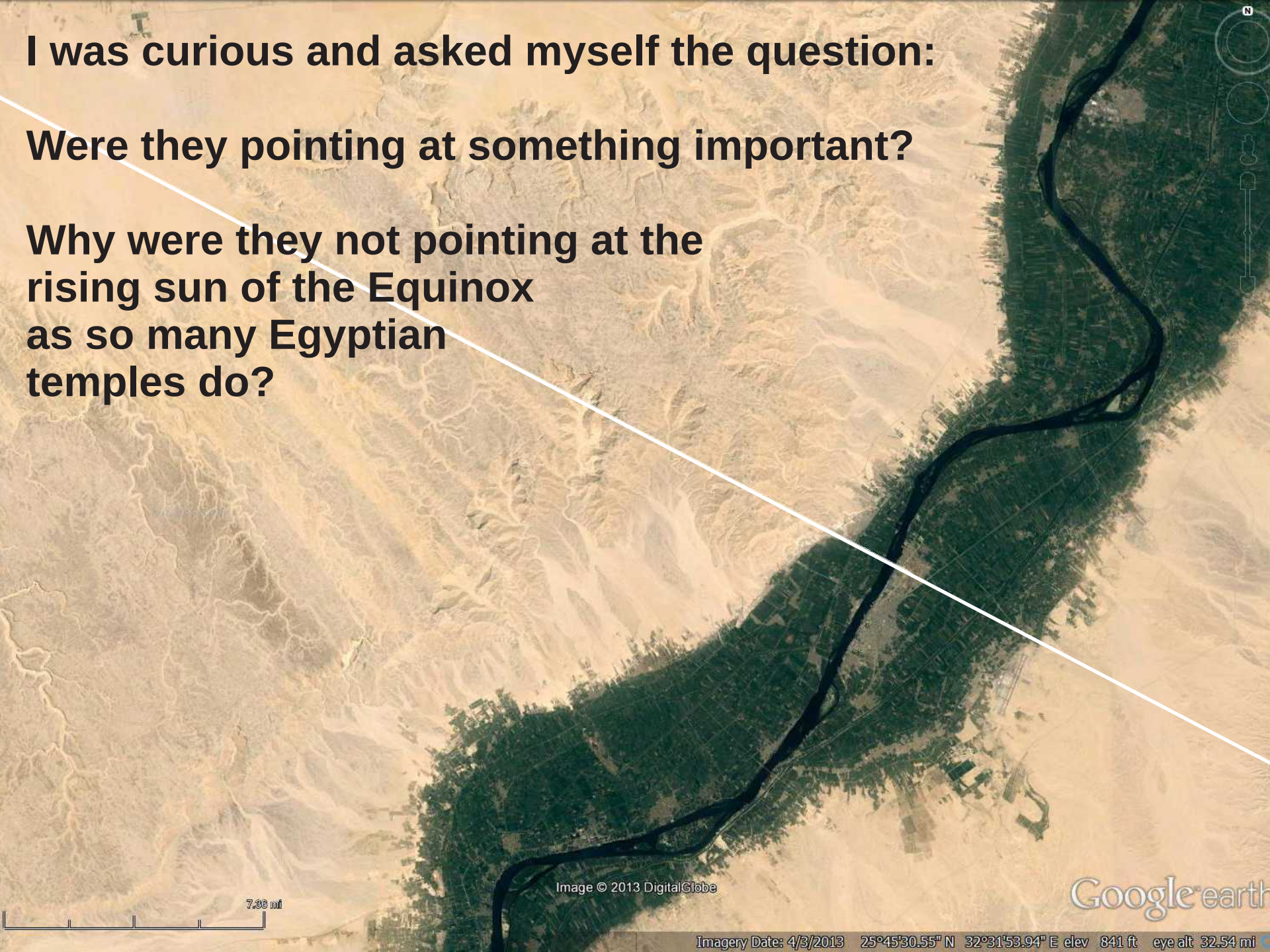
The New Kingdom - 1550 - 1069 BCE
- **The time we all are familiar with**
- **Ramses, Tutmose, Tutankhamun, ...**
- **When great statues and temples were built**

No temples or buildings in Luxor are older than 1550 BCE.


A few years ago, I was looking at Egypt with Google Earth, zooming in on Karnak and Hatshepsut's Temple.
I noticed something unusual.
Image © 2013 DigitalGlobe
Google earth
994 ft
2002
Imagery Date: 3/20/2013 25°43'12.98" N 32°39'10.87" E elev 266 ft eye alt 4770 ft


Most Egyptian temples were orientated East-West but Karnak is orientated at a different angle.
Image © 2013 DigitalGlobe
Google earth
994 ft
2002
Imagery Date: 3/20/2013 25°43'12.98" N 32°39'10.87" E elev 266 ft eye alt 4770 ft

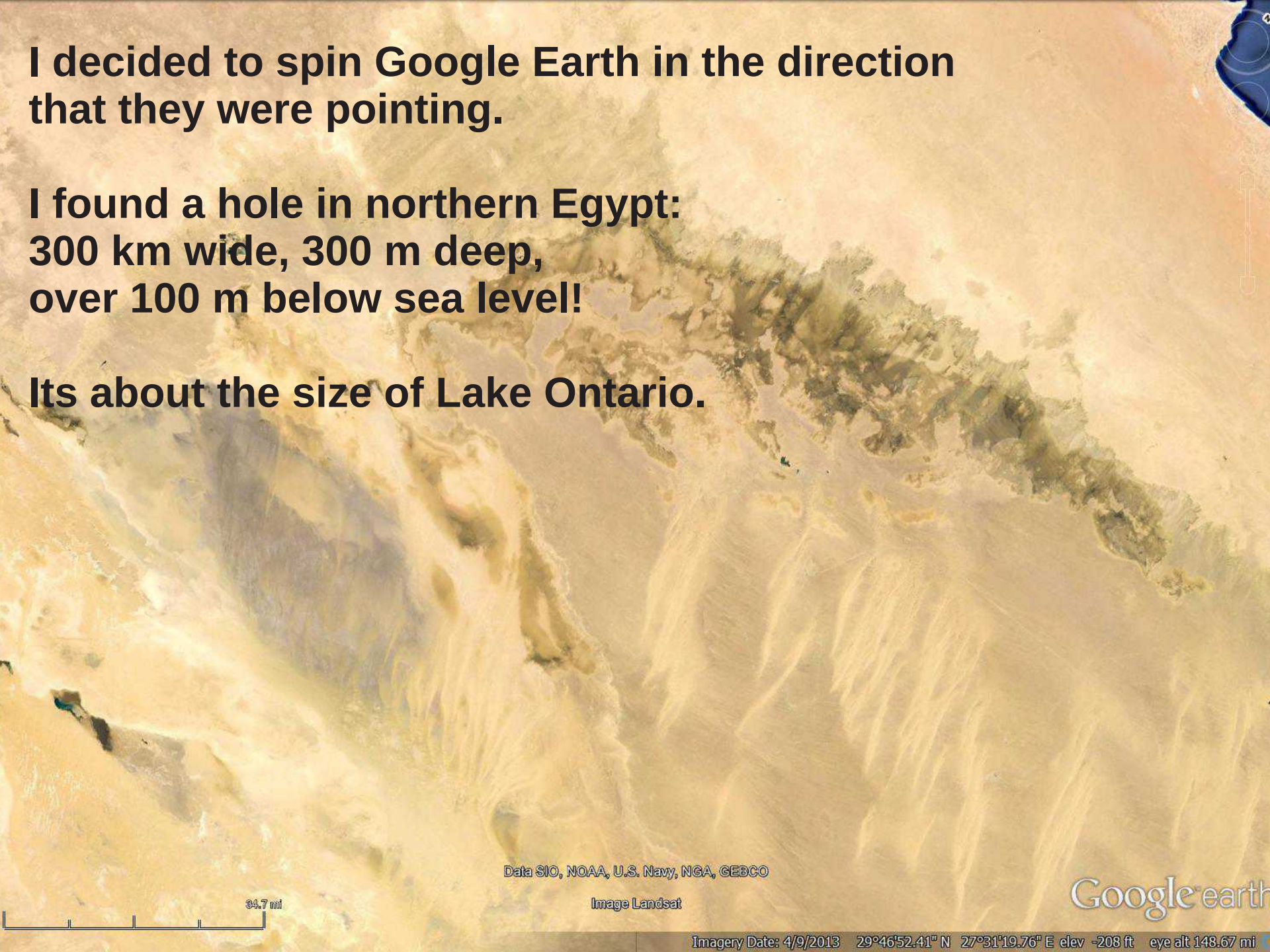

Hatshepsut's temple is orientated at the same angle as Karnak.
Hatshepsut's temple.
Image © 2013 DigitalGlobe
Google earth
2087 ft
2002
Imagery Date: 3/20/2013 25°44'21.33" N 32°36'34.16" E elev 569 ft eye alt 9971 ft


I was curious and asked myself the question:
Were they pointing at something important?
Why were they not pointing at the rising sun of the Equinox as so many Egyptian temples do?
Image © 2013 DigitalGlobe
7.38 mi
Google earth
Imagery Date: 4/3/2013 25°45'30.55" N 32°31'53.94" E elev 841 ft eye alt 32.54 mi

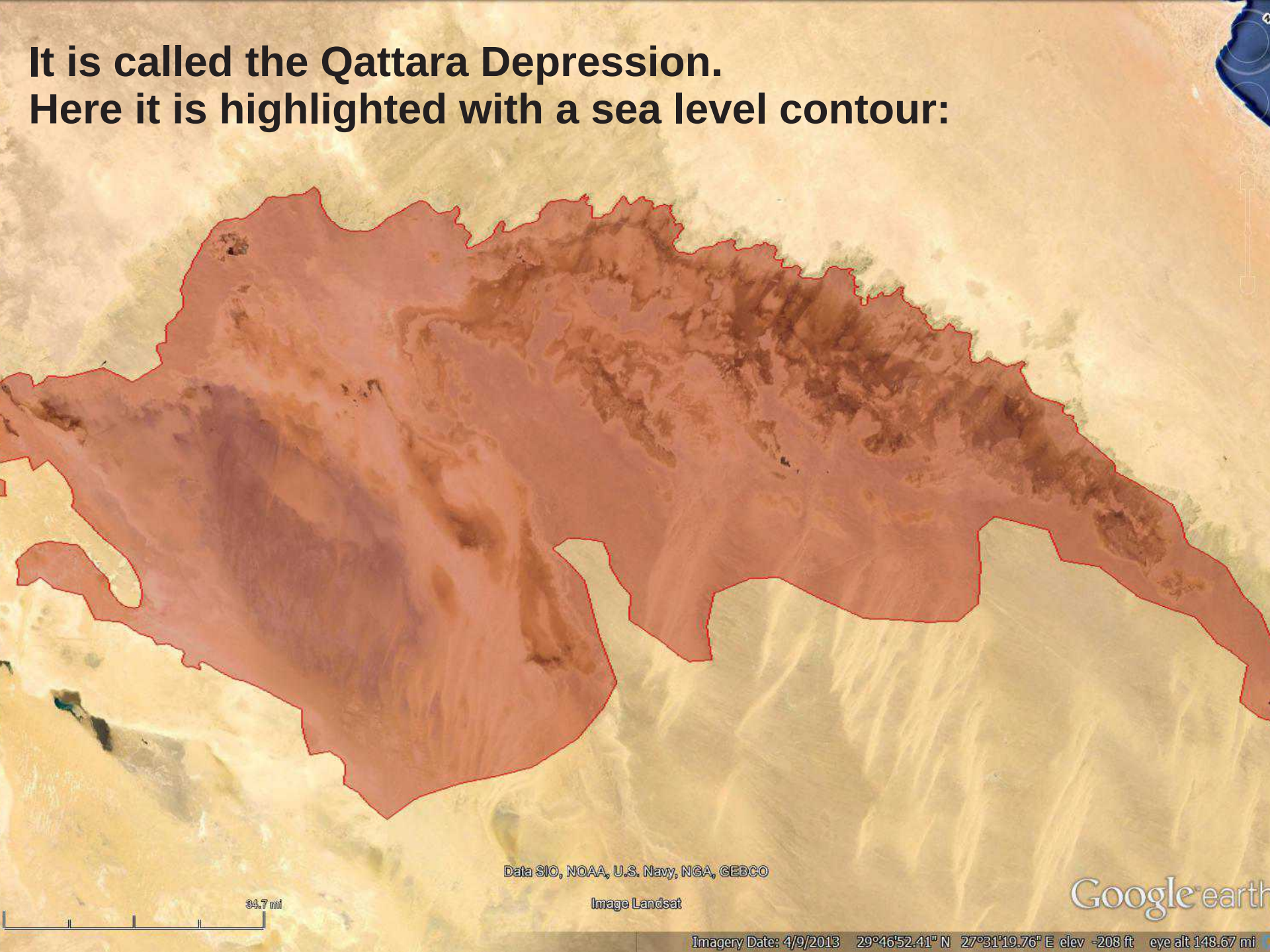
I decided to spin Google Earth in the direction that they were pointing.

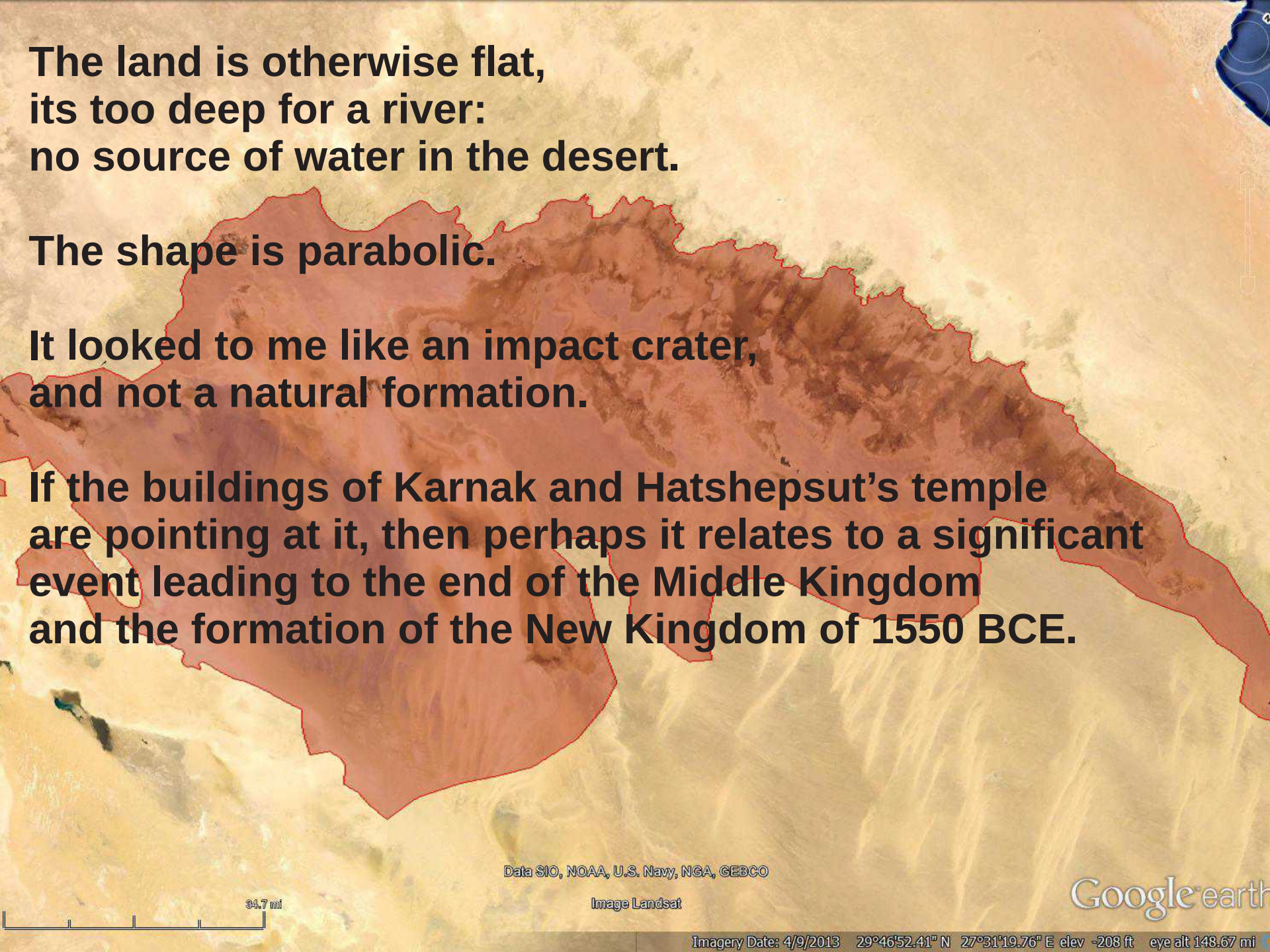
I found a hole in northern Egypt:
300 km wide, 300 m deep,
over 100 m below sea level!

Its about the size of Lake Ontario.



It is called the Qattara Depression.
Here it is highlighted with a sea level contour:




The land is otherwise flat,
its too deep for a river:
no source of water in the desert.
The shape is parabolic.
It looked to me like an impact crater,
and not a natural formation.
If the buildings of Karnak and Hatshepsut's temple
are pointing at it, then perhaps it relates to a significant
event leading to the end of the Middle Kingdom
and the formation of the New Kingdom of 1550 BCE.
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat
84.7 mi
Google earth
Imagery Date: 4/9/2013 29°46'52.41" N 27°31'19.76" E elev -208 ft eye alt 148.67 mi

What else would one find if it was an impact crater?

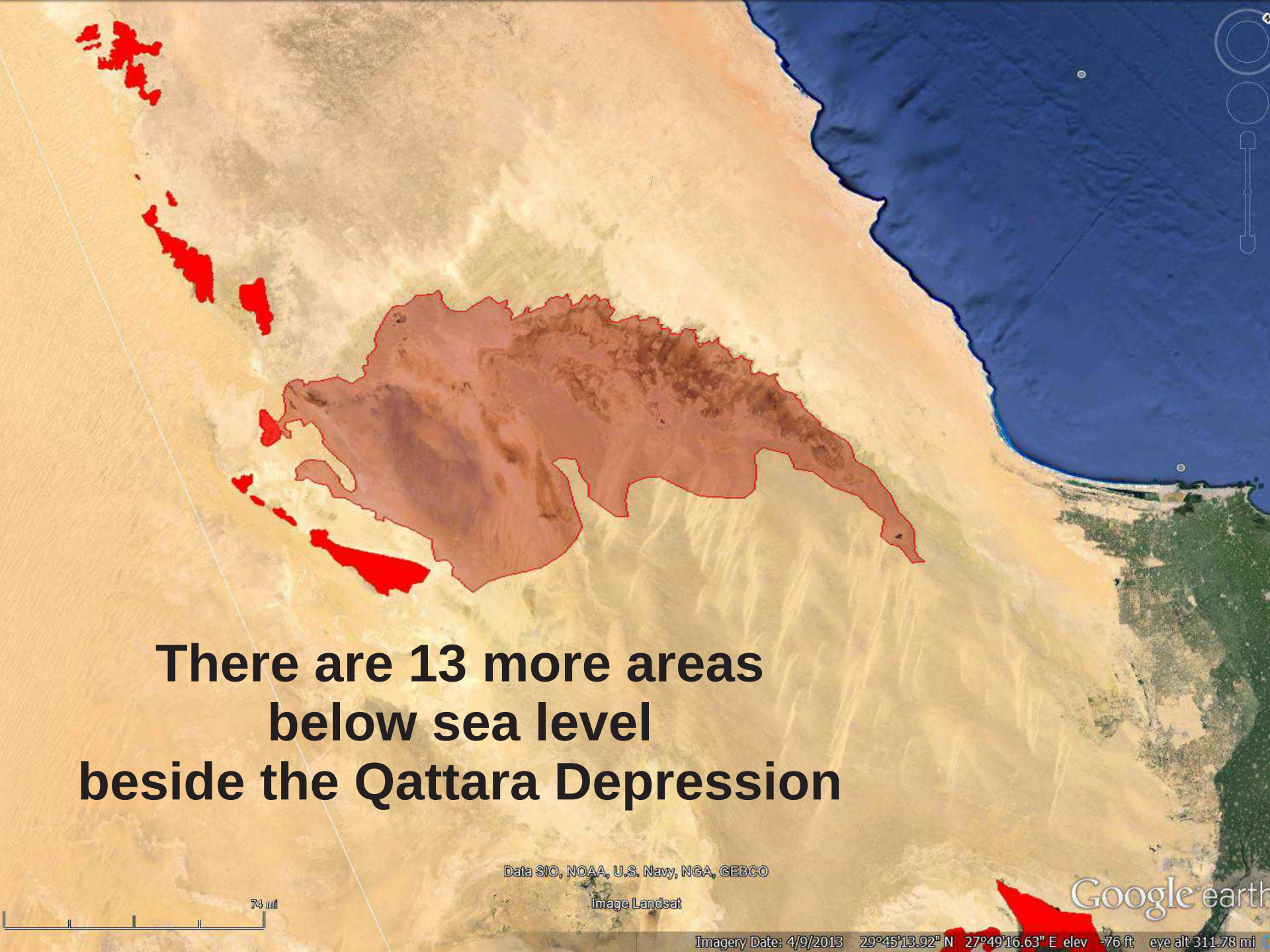
In general, a crater is 10-20 X the size of the object impacting. So a 300 km crater needed a 30 km object to form a 300 km wide hole.

An object that big would break apart as it approached Earth.

One would expect other, smaller holes nearby.

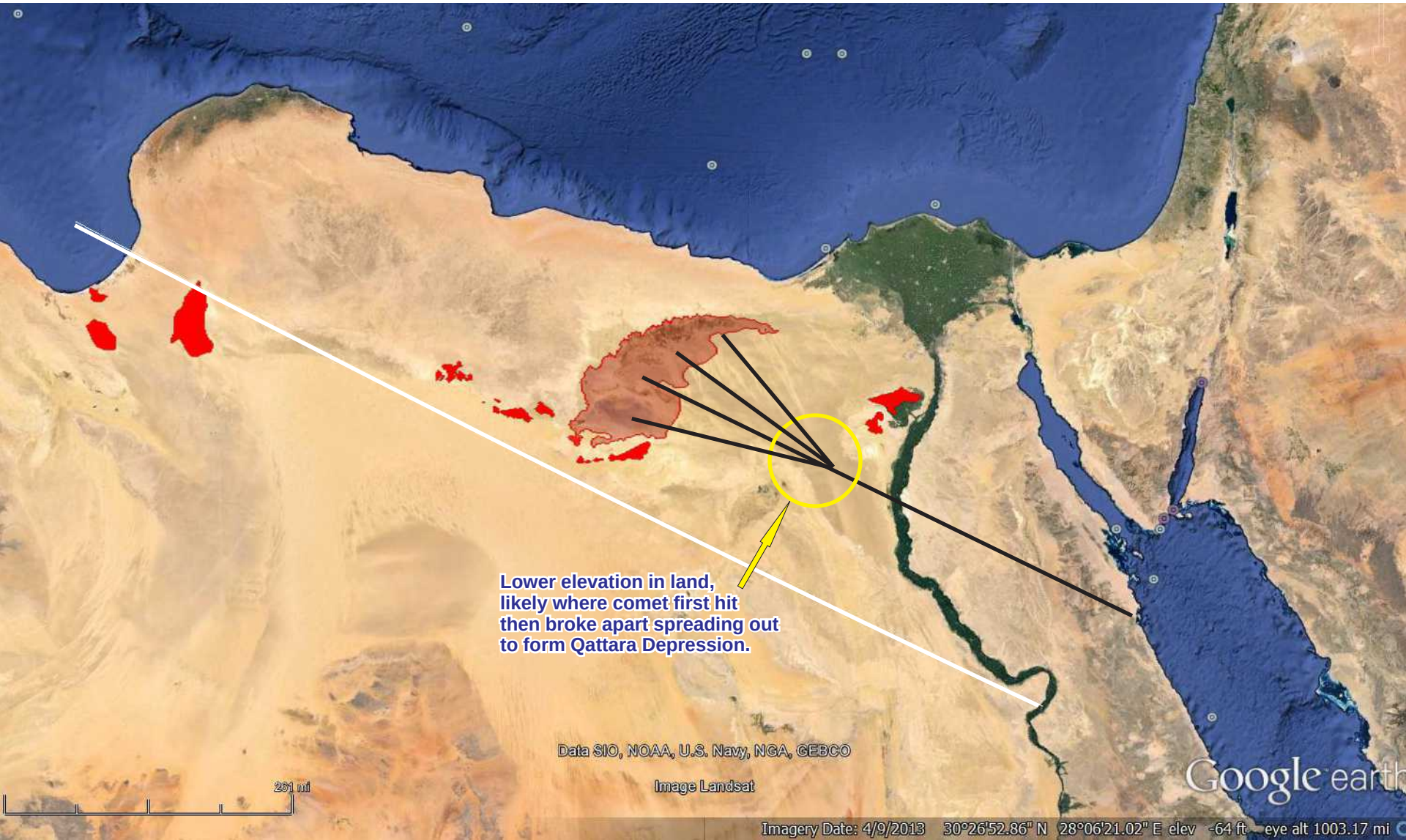
Were there any other below-sea-level holes in Northern Egypt?


YES
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat
74 mi
Google earth
Imagery Date: 4/9/2013 29°45'13.92" N 27°49'16.63" E elev -76 ft eye alt 311.78 mi

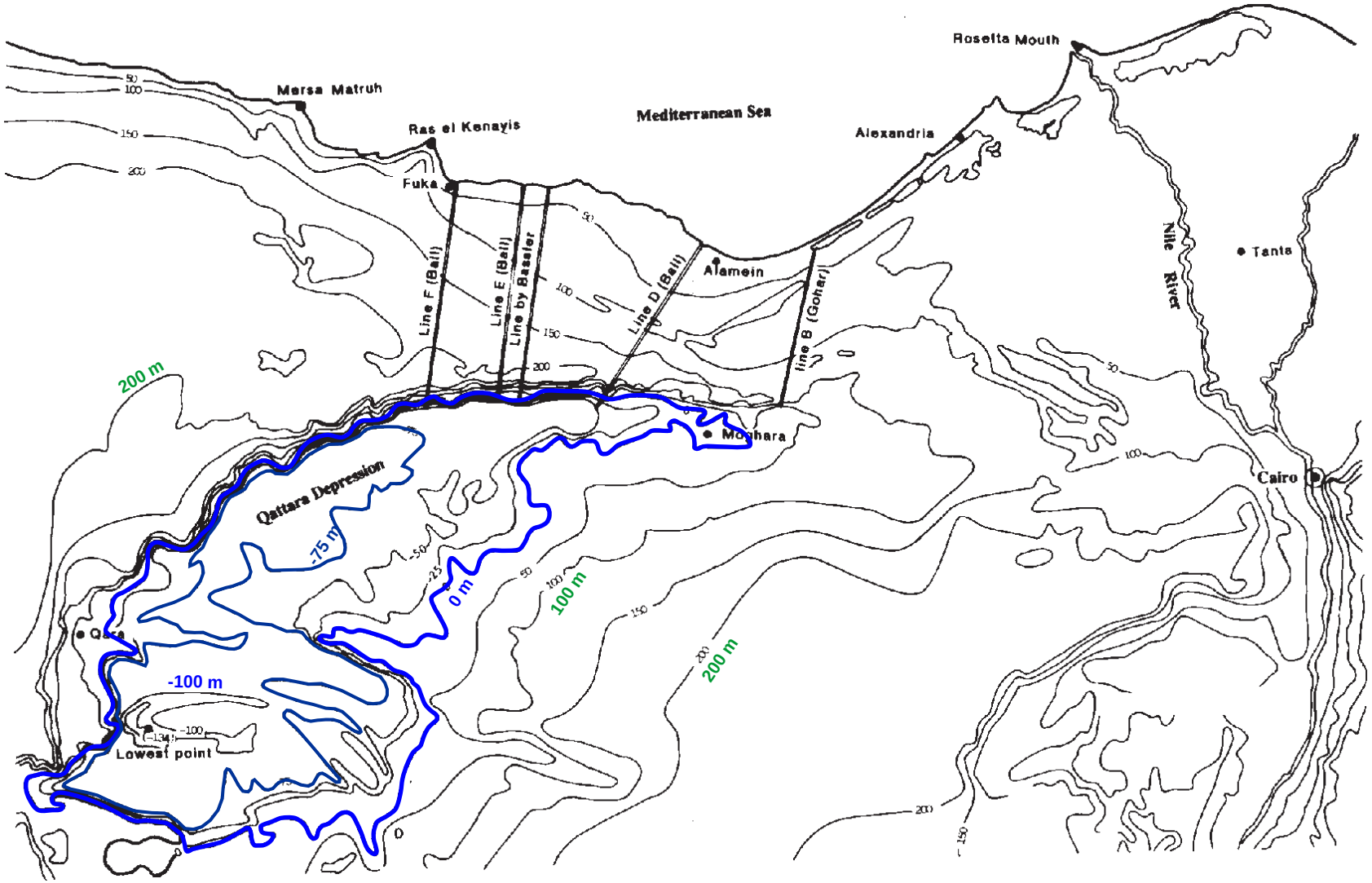

There are 13 more areas
below sea level
beside the Qattara Depression
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat
74 mi
Google earth
Imagery Date: 4/9/2013 29°45'13.92" N 27°49'16.63" E elev -76 ft eye alt 311.78 mi


And they trend along the same line
as Karnak and Hatshepsut's temple.
The line is approx. 23.4°
relative to the Equator
= the tilt of the Earth.
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat
281 mi
Google earth
Imagery Date: 4/9/2013 30°26'52.86" N 28°06'21.02" E elev -64 ft eye alt 1003.17 mi

**The Qattara Depression is beginning to fill in with desert wind blown sand,
At present, the edges are sharp, the deep parts a swamp. It seems recent.
The Geological Survey of Egypt explains it as due to wind erosion or a river bed.
A river can not erode below sea level. And the sand is filling not eroding.**



Is the Qattara Depression simply wind erosion of soft easily blown away materials?



The Qattara Depression is in horizontal layers of sediments:

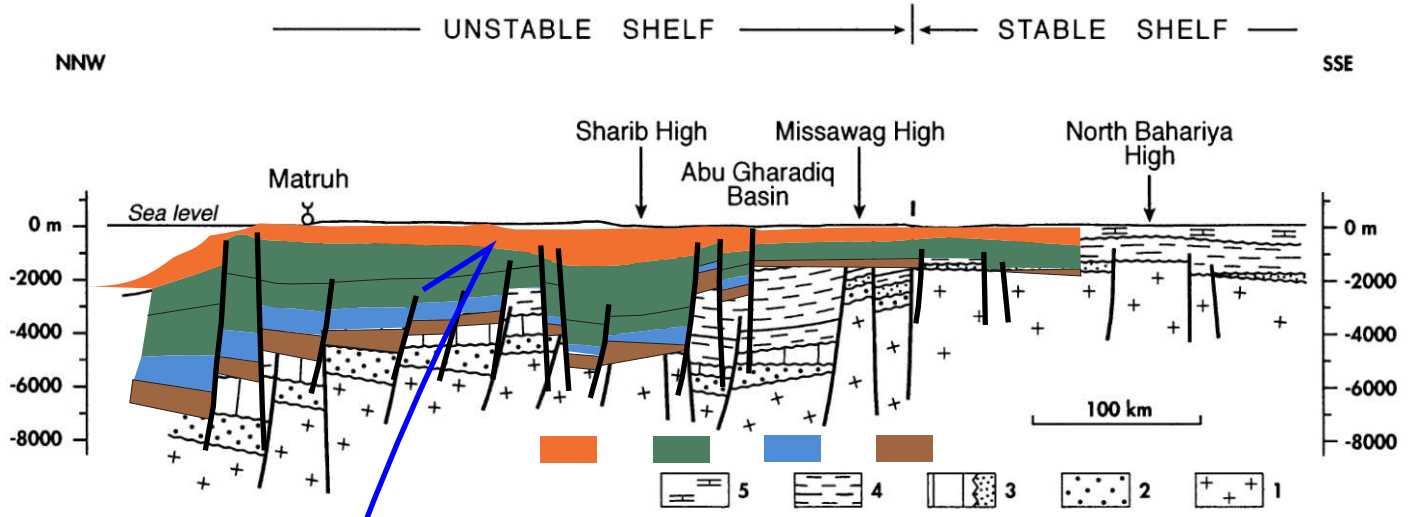
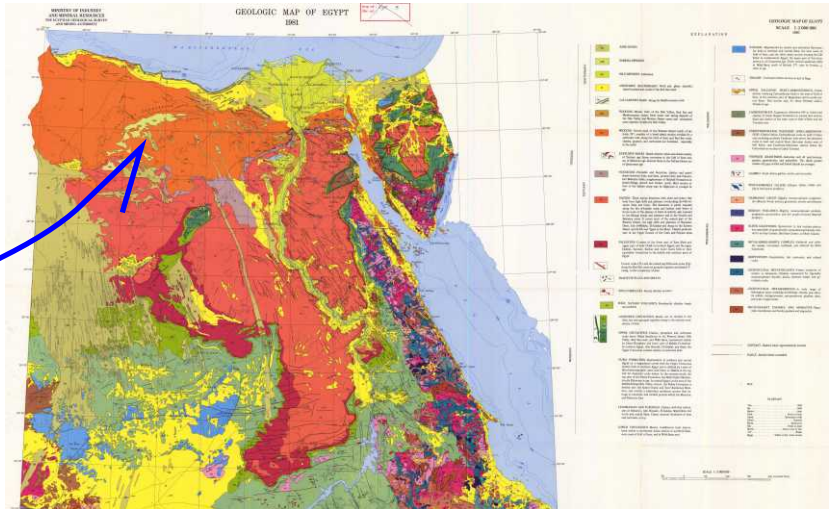
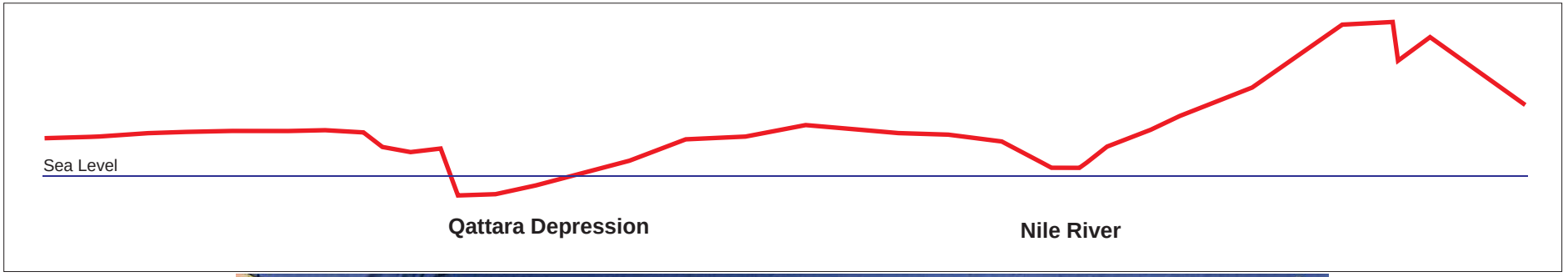


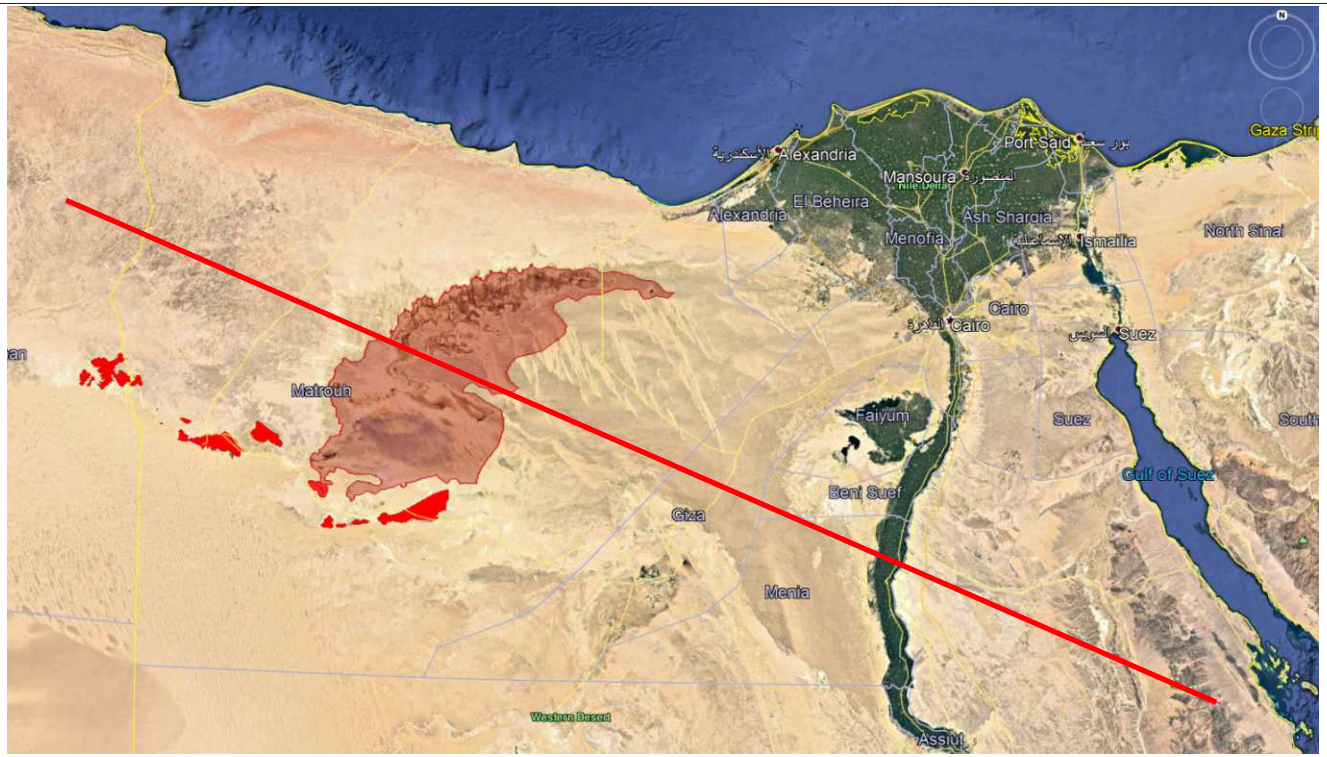
Fig. 11. Schematic geological cross-section along northwestern Egypt. Vertical exaggeration ×13. Location of section on Fig. 2. Legend: 1, PanAfrican basement; 2, Paleozoic; 3, Jurassic, mainly marine (vertical bars) or mainly continental (stippled), possibly including some Triassic near the present-day shoreline; 4, Cretaceous, the black line corresponds to the top Alamein dolomite (~top Aptian); 5, Cenozoic.

The Qattara Depression is in an area of a single rock type (Cenozoic Carbonates) of over 1 km depth.



The Qattara Depression topography is different than normal for river valleys or for wind erosion.

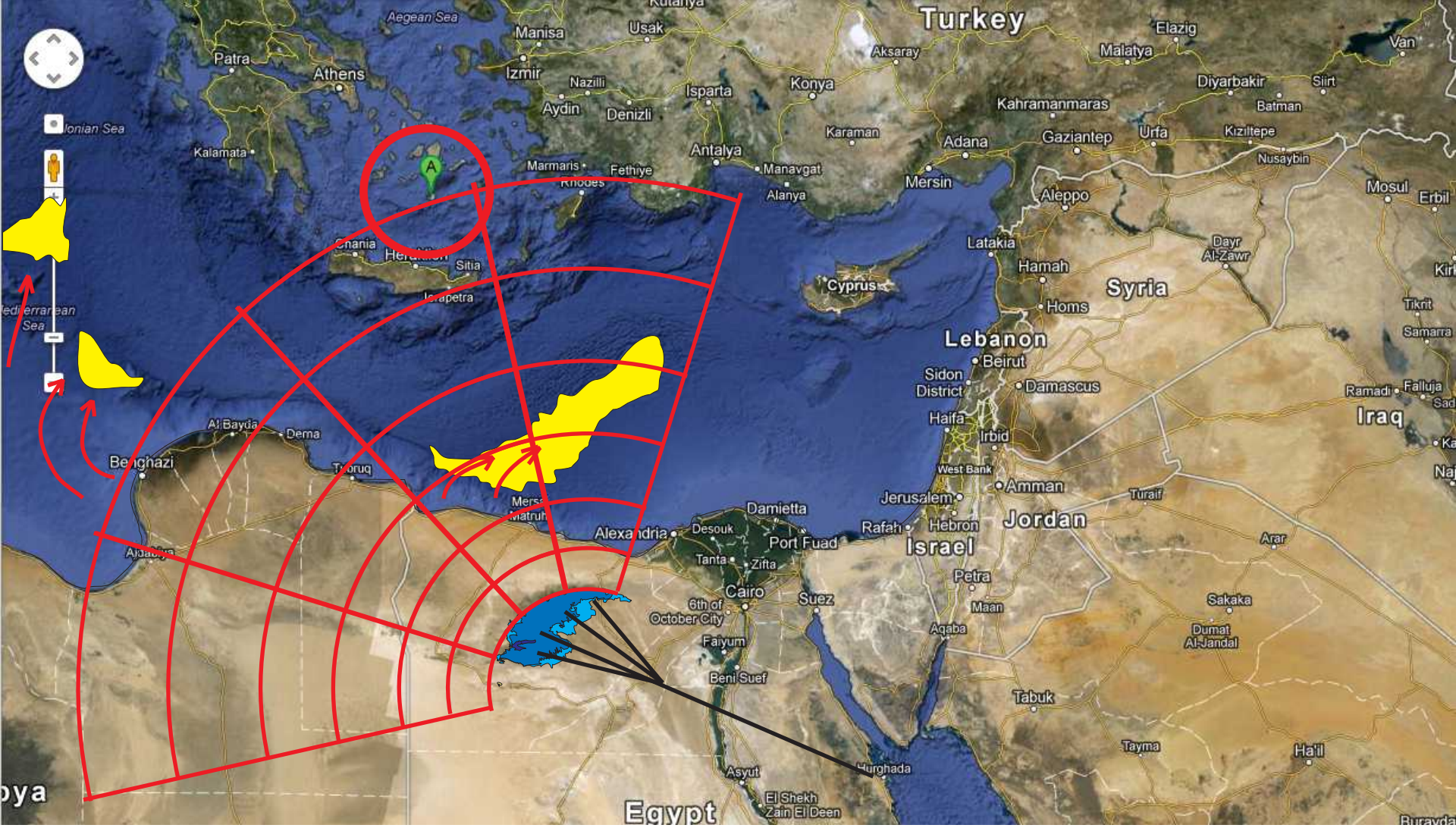




There are three massive mud slides, or Turbidites They are 20 - 40 meters thick, and represent over 65 cubic kilometers of sand and mud that filled the depths of the Mediterranean.

"Tsunamiites: Features and Implications" T.Shiki et al., Elsevier 2008, Chapter 13, Pg 198.


Thera (Santorini) Volcano
One of the largest explosions in history
About 1628 BC
Main Shock Wave.
Thera is in the middle
of the shock wave.
Aegean Sea
Turkey
Patra
Athens
Ionian Sea
Kalamata
Marmaris
Fethiye
Rhodes
Antalya
Manavgat
Alanya
Karaman
Adana
Mersin
Gaziantep
Urfa
Kahramanmaras
Diyarbakir
Batman
Siirt
Kiziltepe
Nusaybin
Elazig
Malatya
Aksaray
Van
Mosul
Erbil
Aleppo
Latakia
Hamah
Dayr Al-Zawr
Syria
Homs
Cyprus
Lebanon
Beirut
Sidon District
Damascus
Haifa
Irbid
West Bank
Amman
Jerusalem
Jordan
Israel
Rafah
Hebron
Iraq
Ramadi
Falluja
Tikrit
Samarra
Turaif
Arar
Petra
Maan
Aqaba
Sakaka
Dumat Al-Jandal
Tabuk
Tayma
Ha'il
Khaybar
Medina
Yanbu
Burayda
Unaizah
Damietta
Alexandria
Desouk
Port Fuad
Tanta
Zifta
Cairo
6th of October City
Suez
Faiyum
Beni Suef
Hurghada
Egypt
Asyut
El Shekh Zain El Deen
Qena
Gerga
Qoseer
Al Masid
Luxor
Al Kharga
Esna
Nagaa El-Shaikh
Al Madiq
Aswan
Elba National Park
Thuwal
Al Bayda
Tobruq
Benghazi
Mediterranean Sea



The shock wave from a Qattara impact could cause mud slides, and trigger the volcano, Thera.

It would fit with all other similar such massive mud slides being from meteorite-impact-related events.

Until recently, it has been assumed that the mud slides are due to the effects of the tsumani caused by the eruption of Thera, in 1628 BC.

Three recent reports say it could not have been caused by Thera:

"Outside the Aegean, the the tsunami impact was negligible."
"Impact of the Minoan tsunami of Santorini: Simulated scenarios in the eastern Mediterranean",PARESCHI et al.; Geophysical Research Letters, Vol. 33, L18607, doi:10.1029/2006GL027205, 2006

"The Thera ash was preceded by the tsunami." (The volcano would have spewed ash for a week or two before blowing up. After it blew up, there would be no more ash expelled. If the tsunami was due to the volcano, the ash should have come first, and the tsunami second.)
"Discovery of Minoan tsunami deposits",K. Minoura et al., Geology; January 2000; v. 28; no. 1; p. 59–62;

"The Mediterranean homogenites (mud slides) are the only examples of deep-sea Tsunamiites (Caused by a tsunami) known in sedimentology ... However, some meteorite-impact-related sediments from the geological past provide noteworthy examples of homogenite-like deep-sea beds ... most notably the ones from the K/T boundary deposits in the Caribbean."
"Tsunamiites: Features and Implications" T.Shiki et al., Elsevier 2008, Chapter 13, Pg 212.

Finding other holes in the same line leads one to think that:

If this is an impact,
and it happened in historical times,

then there must be much larger craters
and there must be many more than
the 200 presently accepted on Earth.

And 100 million years between impacts
is not realistic.

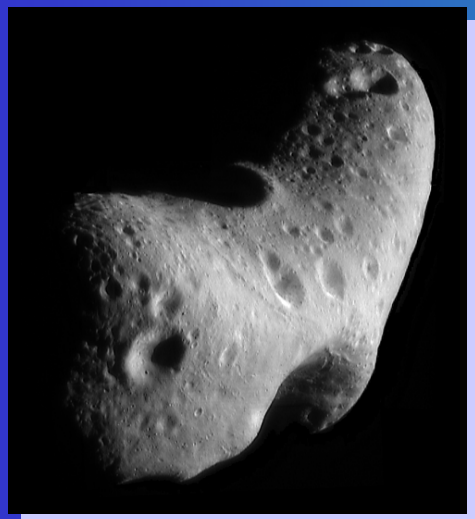
Present understanding is that the last massive impact was 65 million years ago:
Chicxulub Crater, 180 km wide, 900 m deep originally.

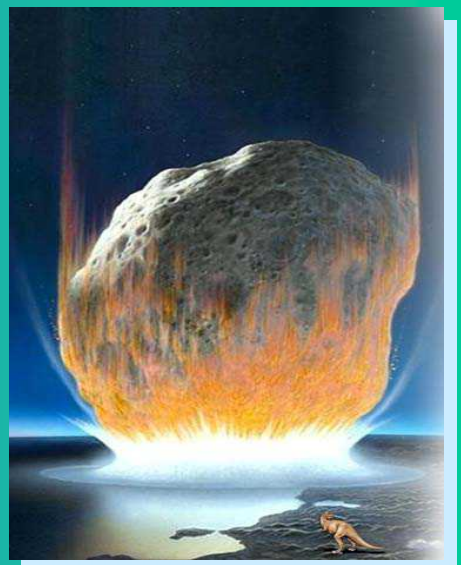
It is only 20 m deep today - its almost invisible.
It is believed to be the cause of the extinction of the dinosaurs.

NASA teaches that impacts are rare.
In 2006, David Morrison did a presentation on Cosmic Impacts.

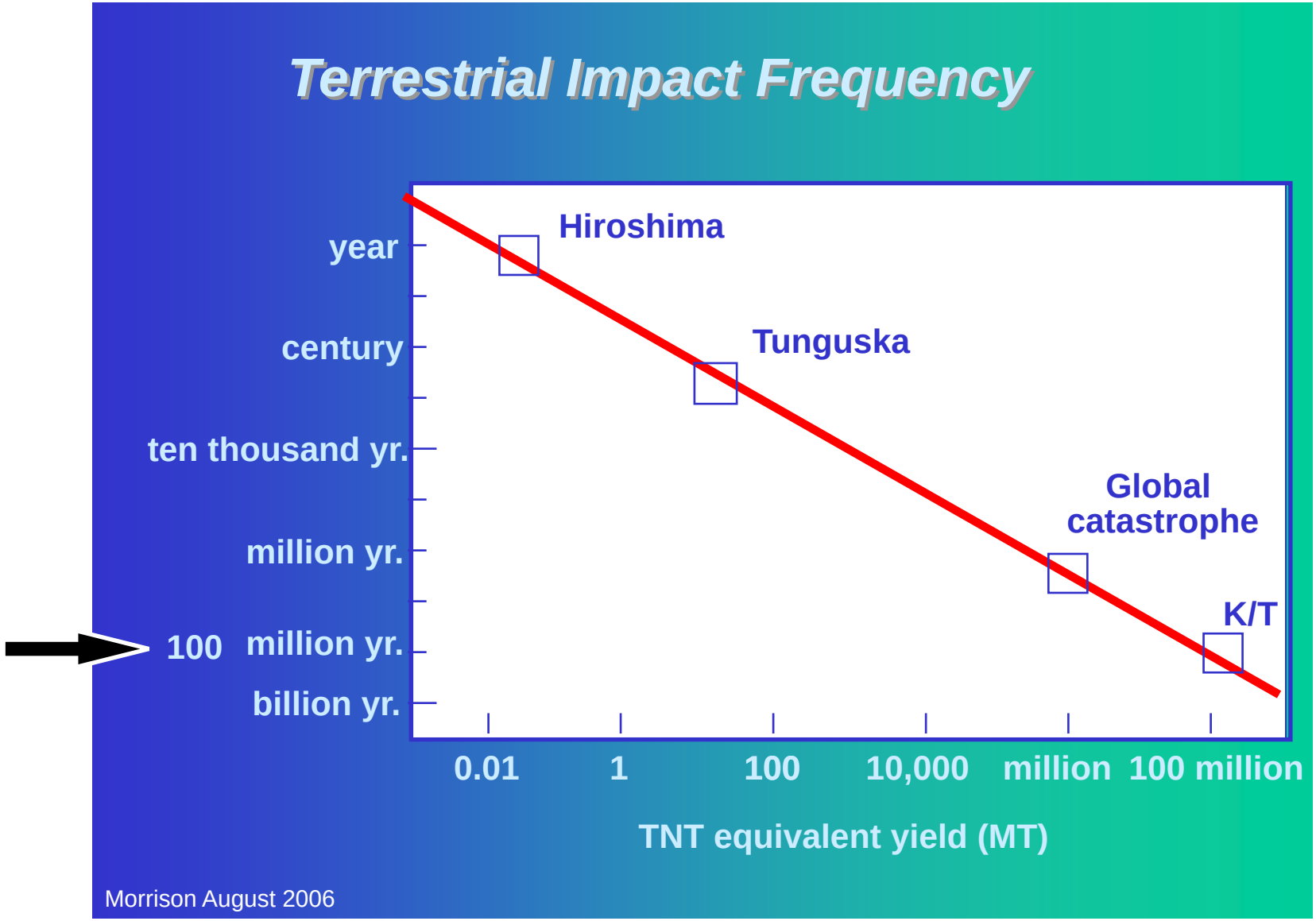
COSMIC IMPACTS AND EVOLUTION

David Morrison
NASA Astrobiology Institute
2006





Impacts causing 180 km diameter craters only happen once every 100 million years.



It includes this interesting slide:

Apophis: A Real Threat?

Near-Earth Asteroid Apophis is the best current example of a possible impactor. Initial orbits (December 26, 2004) suggested 2% impact chance on Friday, April 13, 2029.

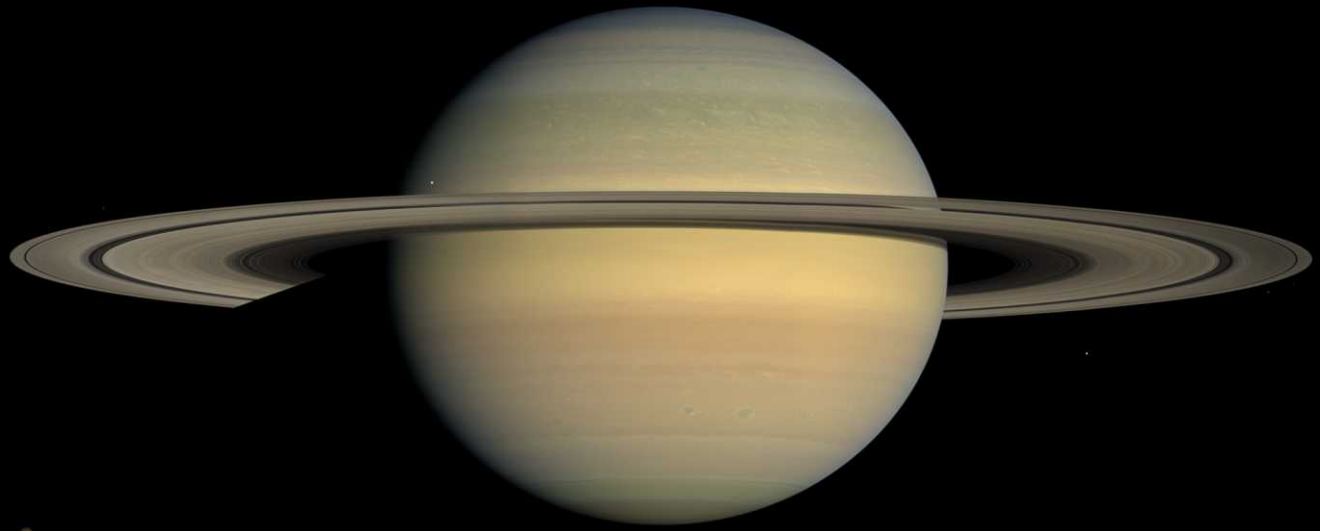
Current orbit still admits of a very small chance (less than one in 20,000) of impact on April 13, 2026.

Rusty Schweickart

The Red line is the path that Apophis is traveling in space.
It is traveling in the Ecliptic Plane, which is at 23.4^{o} relative to the equator.
This is the due to the tilt of the Earth relative to the Ecliptic.

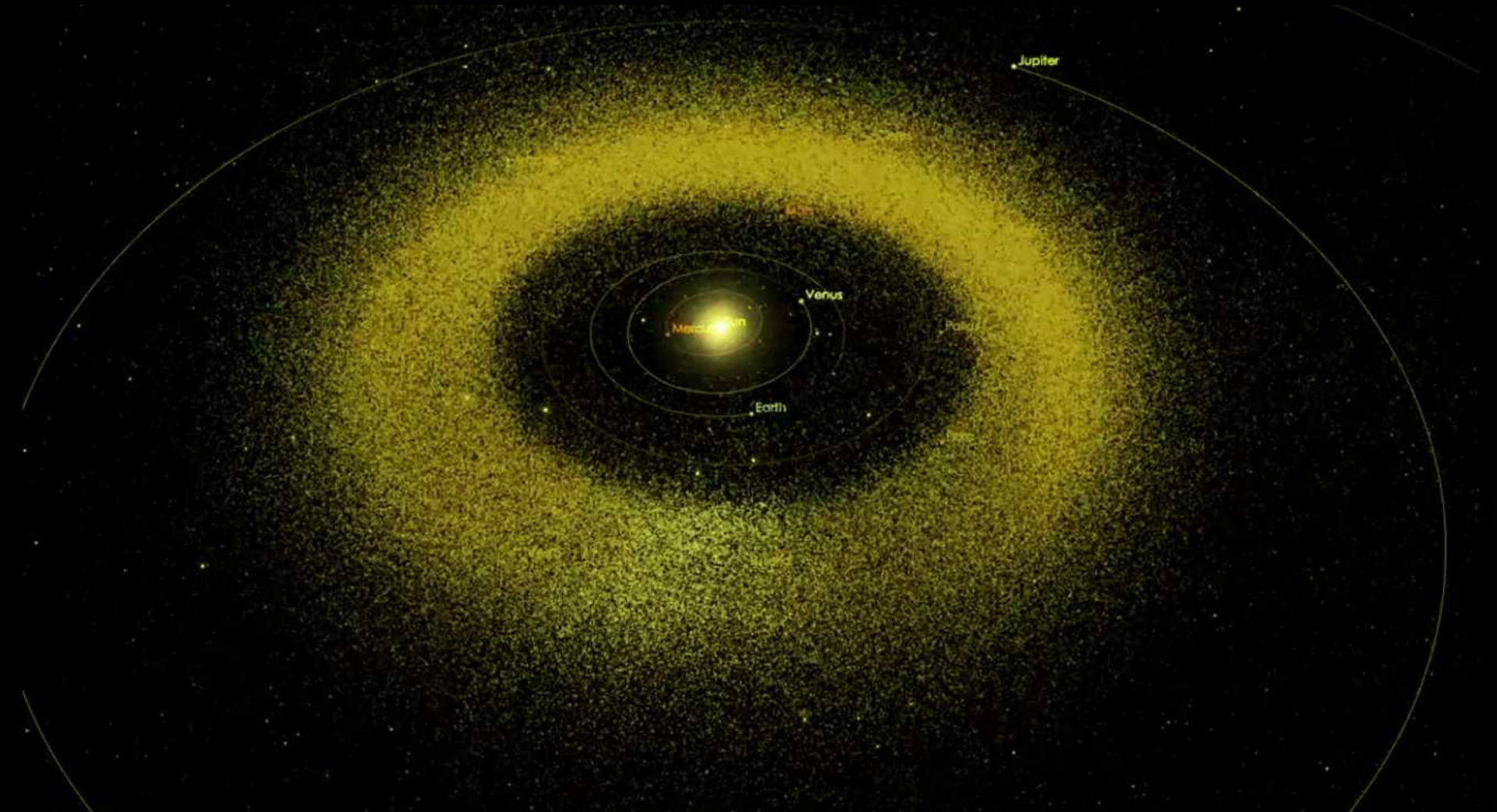
If Apophis hits in the middle it will be at a 42^{o} angle of impact.
If it hits at the ends, it will be a glancing impact or skip.
Past the ends of the red line, it misses.

As the rings of Saturn are in a thin plane, the planets, asteroids and many comets lie in a thin plane called the Ecliptic



Comets and Asteroids are mainly on the Ecliptic.
When time between impacts was calculated
Less than 10,000 asteroids were known.

Today more than 600,000 have been identified.



Short period comets are from the Kuiper Belt, outside of Neptune's orbit.

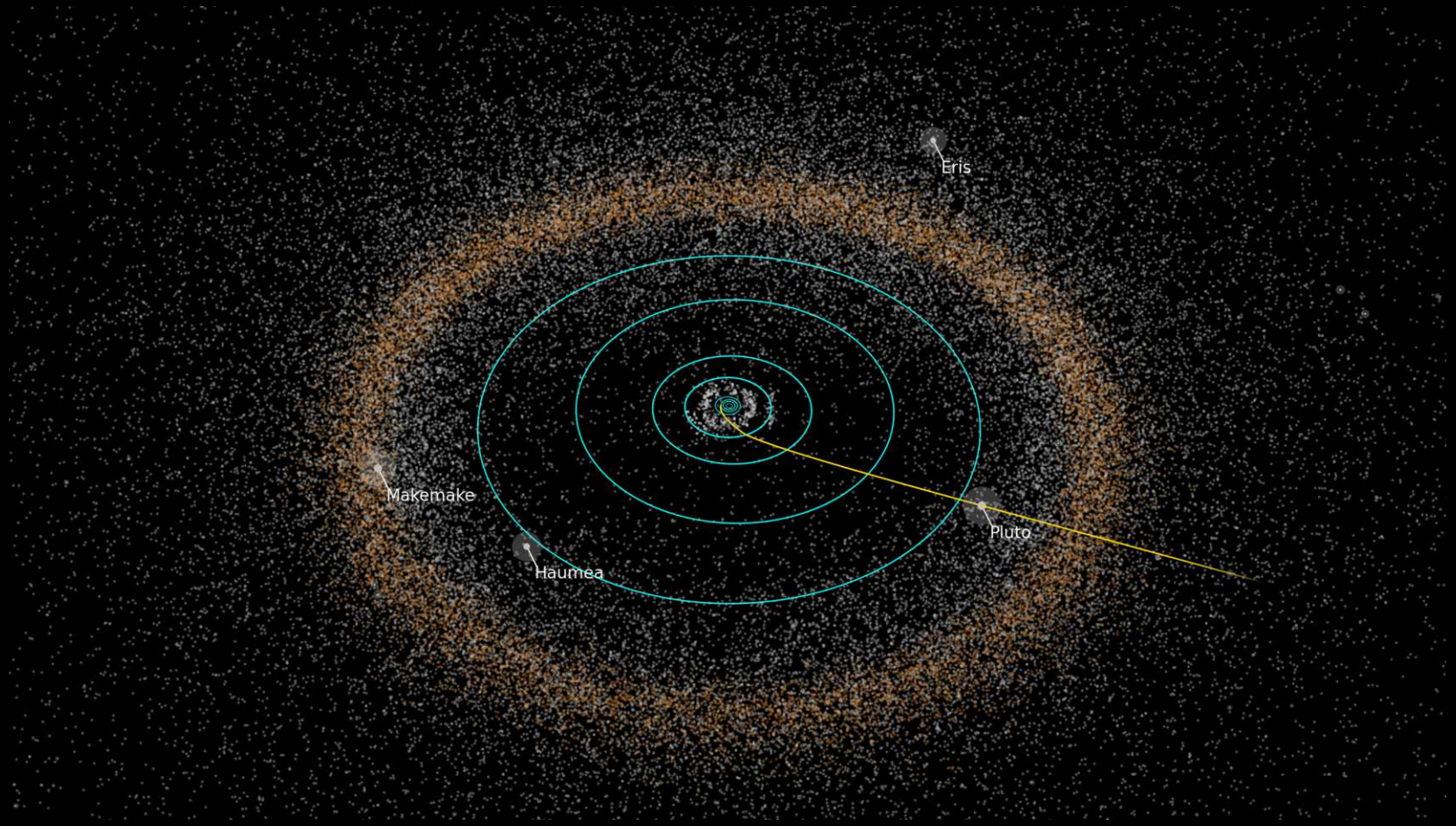
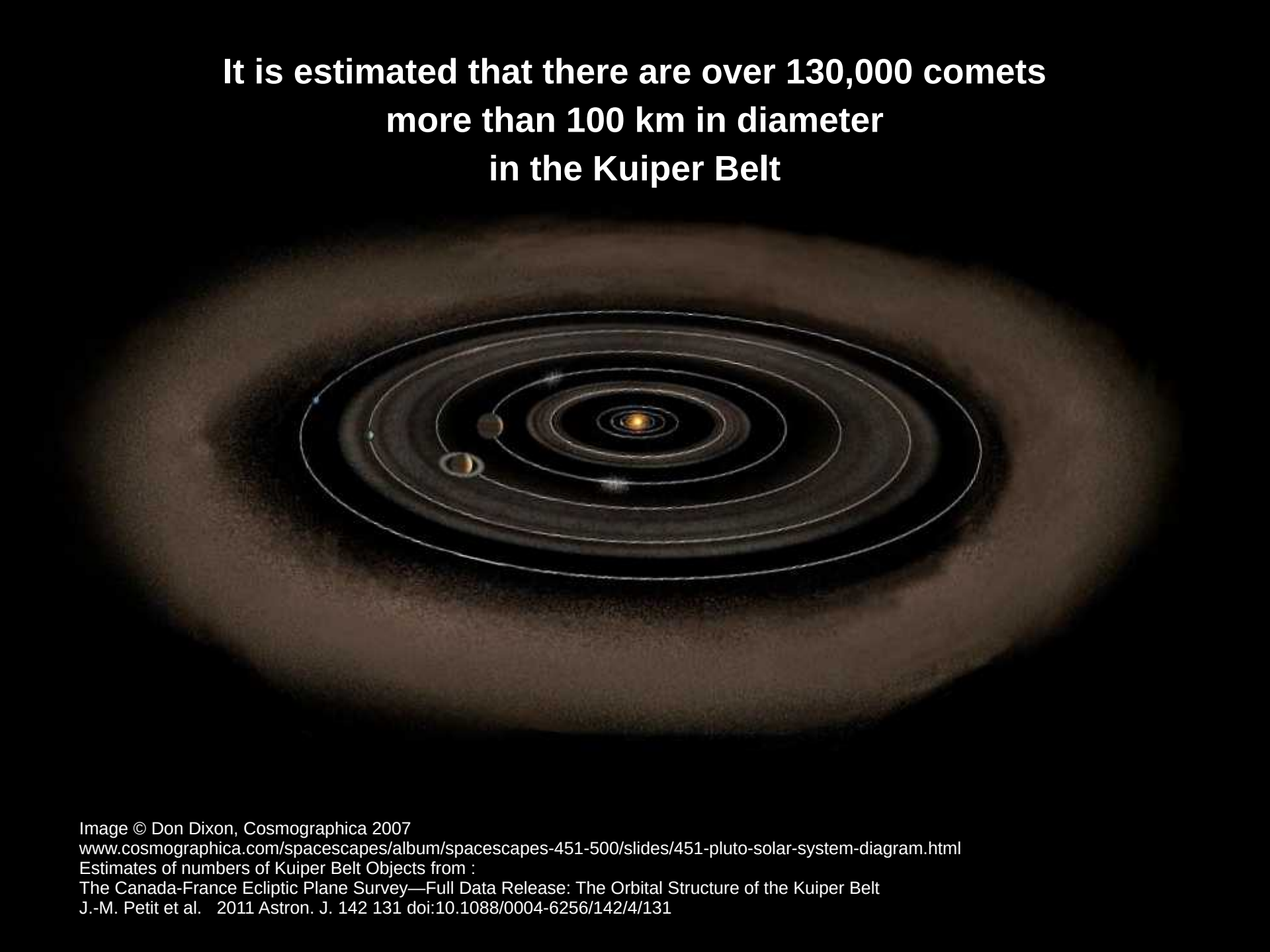


Image Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute/Alex Parker
www.jhuapl.edu/newscenter/pressreleases/2014/141015_2_image2.asp

It is estimated that there are over 130,000 comets more than 100 km in diameter in the Kuiper Belt



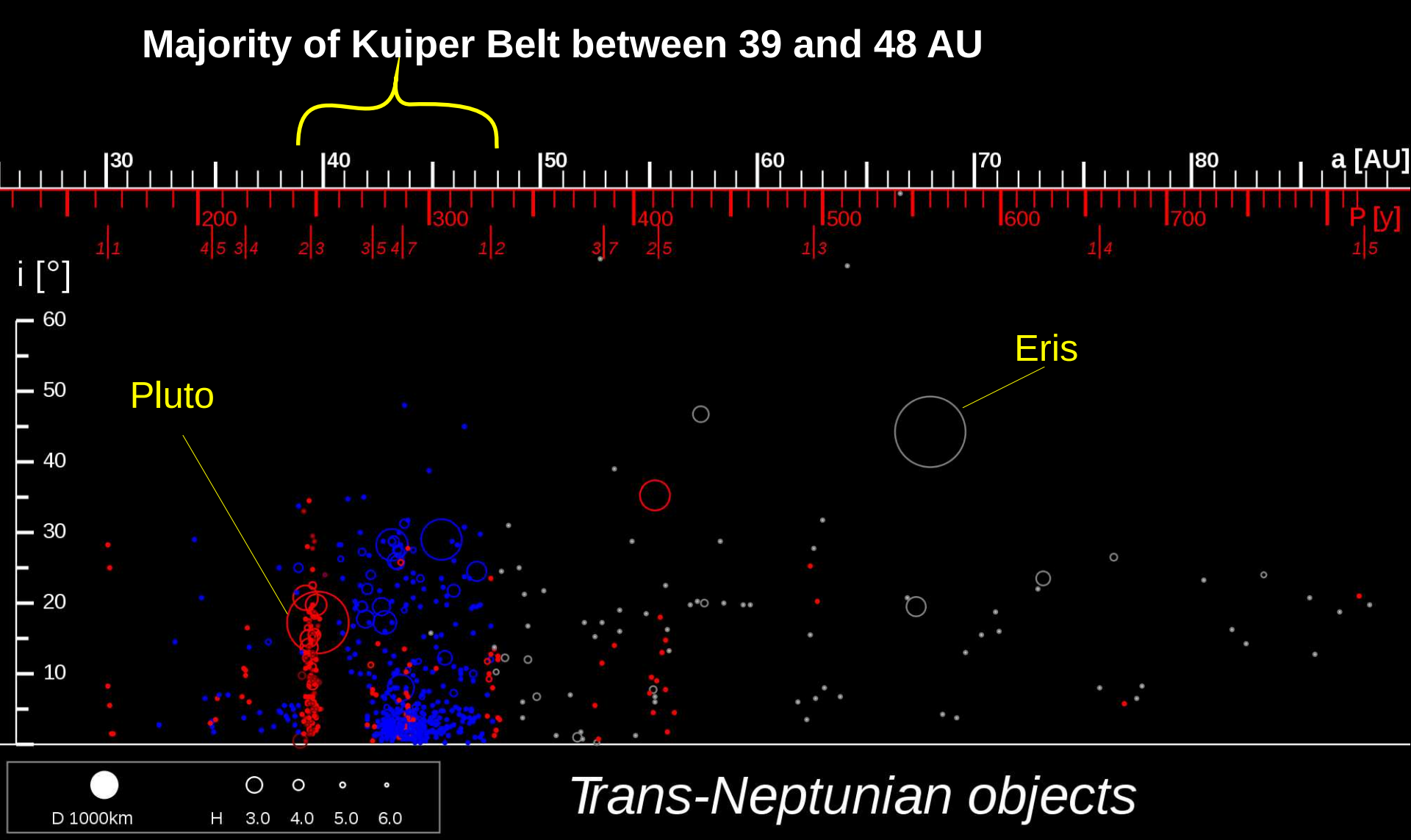
www.cosmographica.com/spacescapes/album/spacescapes-451-500/slides/451-pluto-solar-system-diagram.html
Estimates of numbers of Kuiper Belt Objects from :
The Canada-France Ecliptic Plane Survey—Full Data Release: The Orbital Structure of the Kuiper Belt
J.-M. Petit et al. 2011 Astron. J. 142 131 doi:10.1088/0004-6256/142/4/131

Present understanding of the Kuiper Belt objects

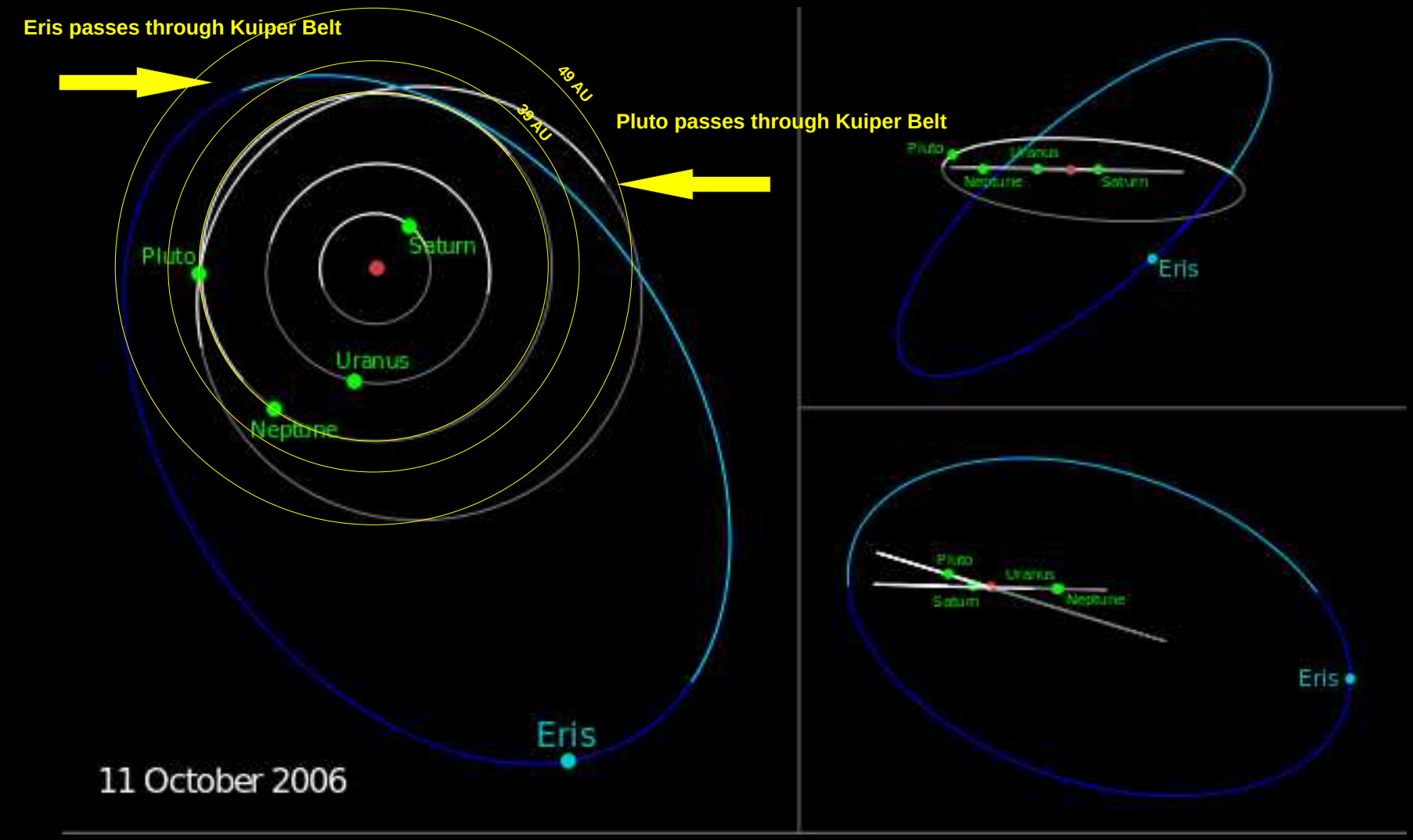
is that their orbits are very stable

and nothing will move

from the Kuiper Belt to earth crossing orbits.


Majority of Kuiper Belt between 39 and 48 AU
30
40
50
60
70
80
a [AU]
200
300
400
500
600
700
P [y]
1|1
4|5
3|4
2|3
3|5
4|7
1|2
3|7
2|5
1|3
1|4
1|5
i [°]
60
50
40
30
20
10
Pluto
Eris
D 1000km
H
3.0
4.0
5.0
6.0
Trans-Neptunian objects

Both Pluto and Eris pass through the Kuiper Belt each orbit.



Orbit of Eris

(136199 Eris)

Perihelion: 37.77 AU
Aphelion: 97.56 AU

Eccentricity: 0.44
Inclination: 44°

Orbital period: 557 years

A simple calculation of gravitation attraction shows that Pluto and Eris will pull in objects from 1,000,000 km in 1 year, or 3,000,000 km in 5 years.

A 5 year journey through the Kuiper Belt will significantly change orbits of any object within 1 to 3 million km.

Assuming only 1 million km radius effect, volume in 5 years travel at 4.7 km/sec:

Area = ¶ r^2 = 3.14*10^6*10^6 = 3.14 X 10^12 sq km

Length = 5 *365*24*3600 * 4.7 = 7.41 X 10^8 km

Volume = 2.33 X 10^21 cu km

Density of objects in Kuiper Belt:

(based on ~500X asteroid population from Petit et al, 2011)

assuming 1X10^9 objects of 0.5 km diameter or less

Kuiper Belt is mainly between 39 and 48 AU, about 6 AU thick

Area = 3.14*48*48 - 3.14*39*39 =

7234.56 - 4775.94 = 2458.62 sq AU

Thickness of 6, Volume = 14751.72 cu AU

1 cu AU = (1.496 x 10^8)^3 cu km

= 3.35 X 10^24 cu km

Volume of Kuiper Belt ~ 5 X 10^28 cu km

Swept Volume of Pluto/Eris =~ 2.33 X 10^21 cu km

= 1/(2.146 X 10^7) of objects in Kuiper Belt

but 1X10^9 objects approx 0.5 km diameter

So approx 50 objects effected each orbit.

Asteroid population distribution (Davis et al 2002)

Approximate number of asteroids (N) larger than a certain diameter (D)

D	0.1 km	0.3 km	0.5 km	1 km	3 km	5 km	10 km	30 km	50 km	100 km	200 km	300 km	500 km	900 km
N	25000000	4000000	2,000,000	750,000	200,000	90,000	10,000	1100	600	200	30	5	3	1

Largest asteroids

Kuiper Belt population distribution

(# Asteroids * 500 based on estimates of 130,000 or more of 100 km diameter)

Approximate number of asteroids (N) larger than a certain diameter (D)

D	0.5 km	3 km	10 km	30 km	100 km	300 km
N	1,000,000,000	100,000,000	5,000,000	500,000	100,000	2,500

50 Kuiper Belt objects of 0.5 km relates to:
5 objects of 3 km diameter
0.25 objects of 10 km diameter
0.025 objects of 30 km diameter
0.005 objects of 100 km diameter
0.000125 objects of 300 km diameter

A 300 km object will be significantly changed in orbit every 250/.000125 years = which is 2 million years.

D. R. Davis, D. D. Durda, F. Marzari, A. Campo Bagatin, and R. Gil-Hutton; 2002
"Collisional Evolution of Small-Body Populations" pages 545- 558,
"Asteroids III" Edited by William Bottke, Alberto Cellino, Paolo Paolicchi, and Richard P. Binzel

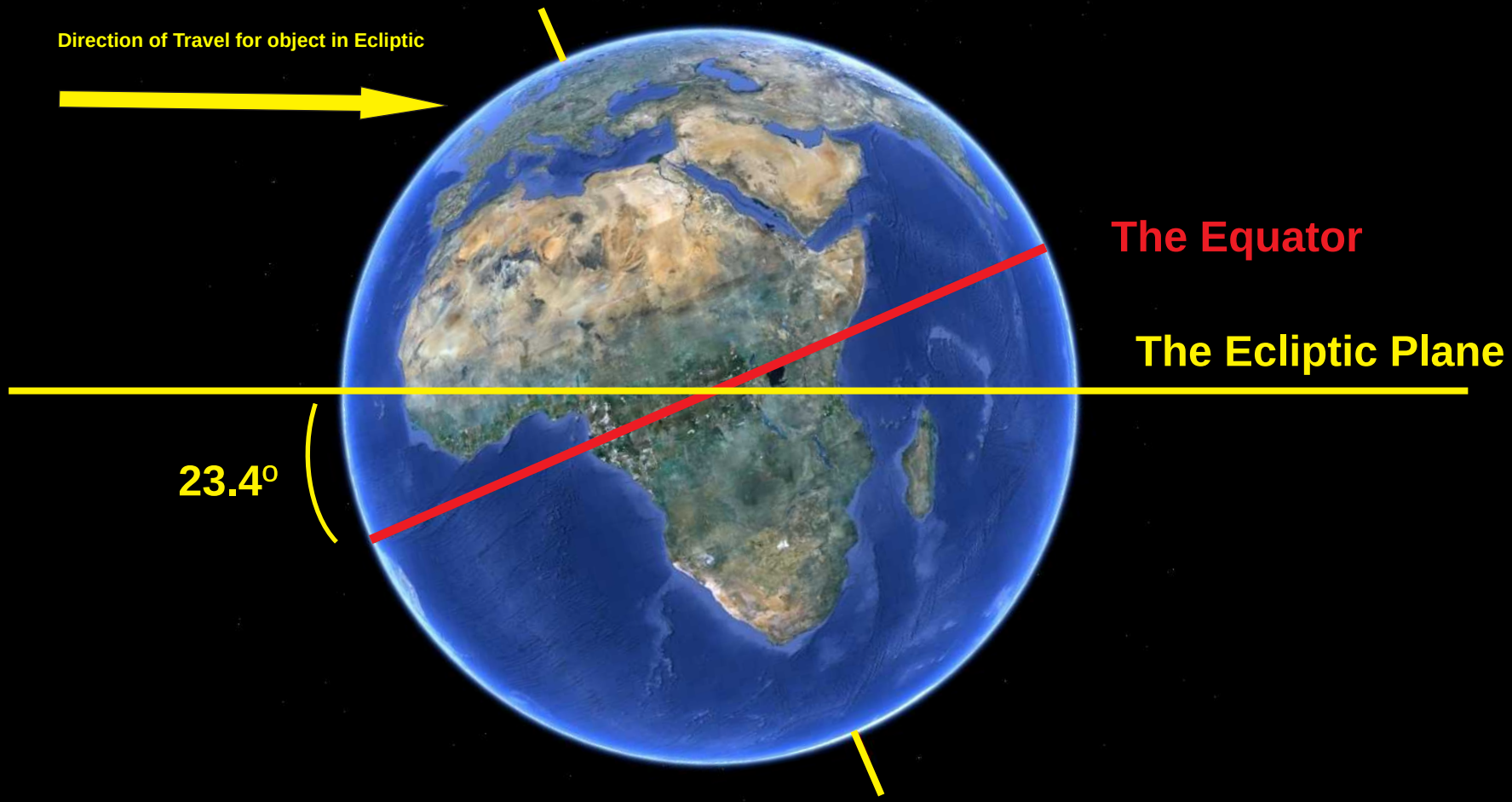
Note: Marcus 2011 proposes only 2 million objects over 5 km diameter in the Kuiper Belt. This is 1/22 of my estimate.
"IDENTIFYING COLLISIONAL FAMILIES IN THE KUIPER BELT", Robert A. Marcus, Darin Ragozzine, Ruth A. Murray-Clay, and Matthew J. Holman
 The Astrophysical Journal, Volume 733, Number 1

A 300 km object will be significantly changed in orbit every 2 million years.

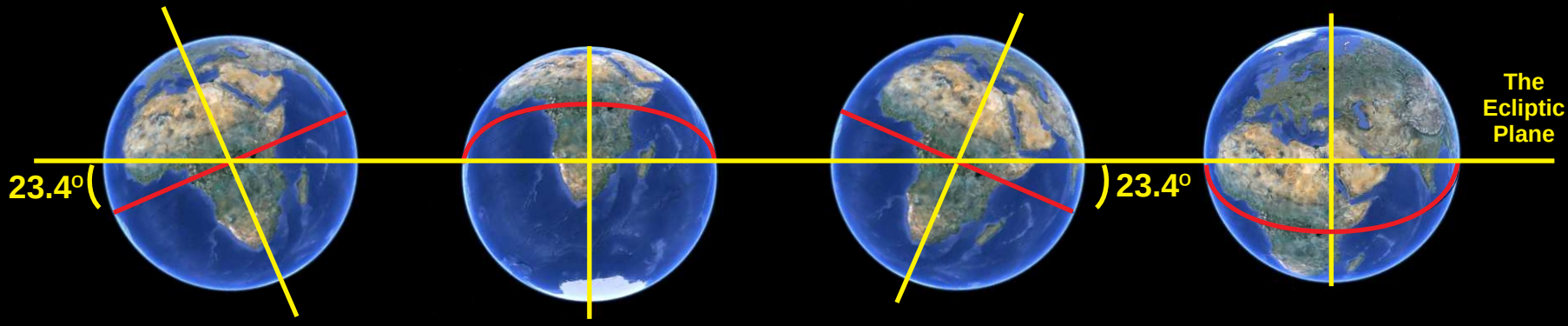
Assume only 1 in 50 hit Earth,
then we can expect to be hit
by a 300 km comet every 100 million years
and by a 30 km comet every 5,000 years.

Our present estimates of impact frequency are too low.
We should expect to find recent impacts of 30 km+ comets.

The Earth is tilted 23.4^{o} relative to the Ecliptic



An impact from an object traveling in the Ecliptic can hit the Earth at any angle between 0º and 23.4º relative to the Equator, depending on when and where it hits.



Ecliptic 23.4º clockwise
relative to the Equator

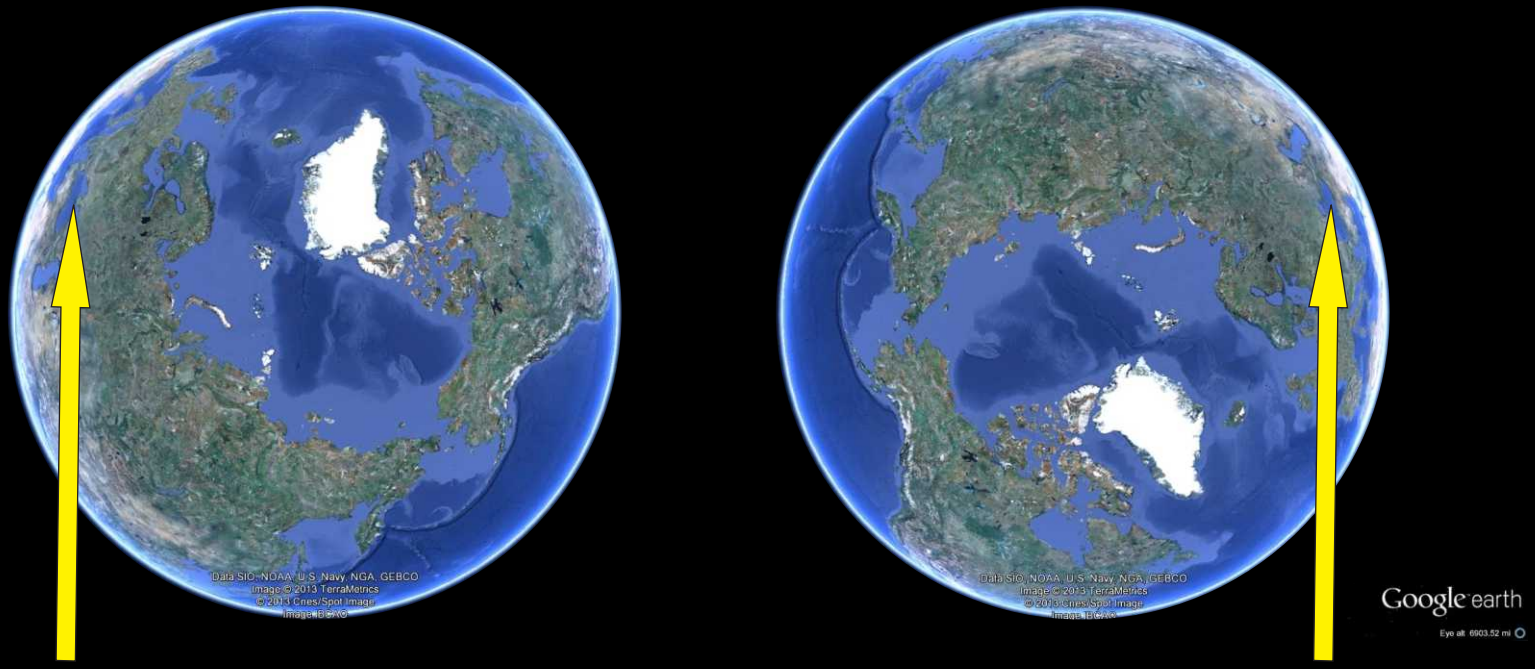
Ecliptic 0º
relative to the Equator

Ecliptic 23.4º counter clockwise
relative to the Equator

Ecliptic 0º
relative to the Equator

23.4º is not the only angle of travel possible, but it is a unique angle that can only relate to an impact, and not to tectonic processes.

A comet traveling in the Ecliptic can hit at either 23.4º Clockwise or 23.4º Counter-clockwise depending on which side of the Earth it hits.



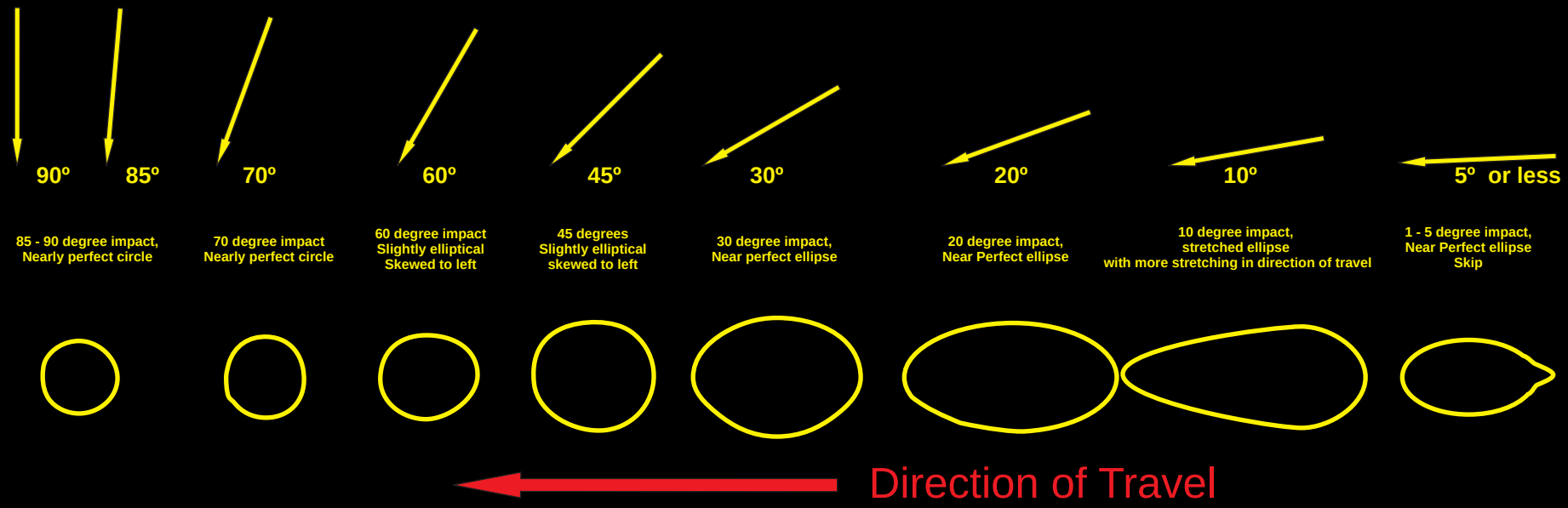
Impact at 23.4º tilted Counter-clockwise

Impact at 23.4º tilted Clockwise

Angle of Impact effect on crater shapes:

(Note that the Direction of Travel is the same for all of these impacts.)

Results of pellet rifle shots into moist, soft clay. March 29, 2011



Circular Craters
From 90º to 40º

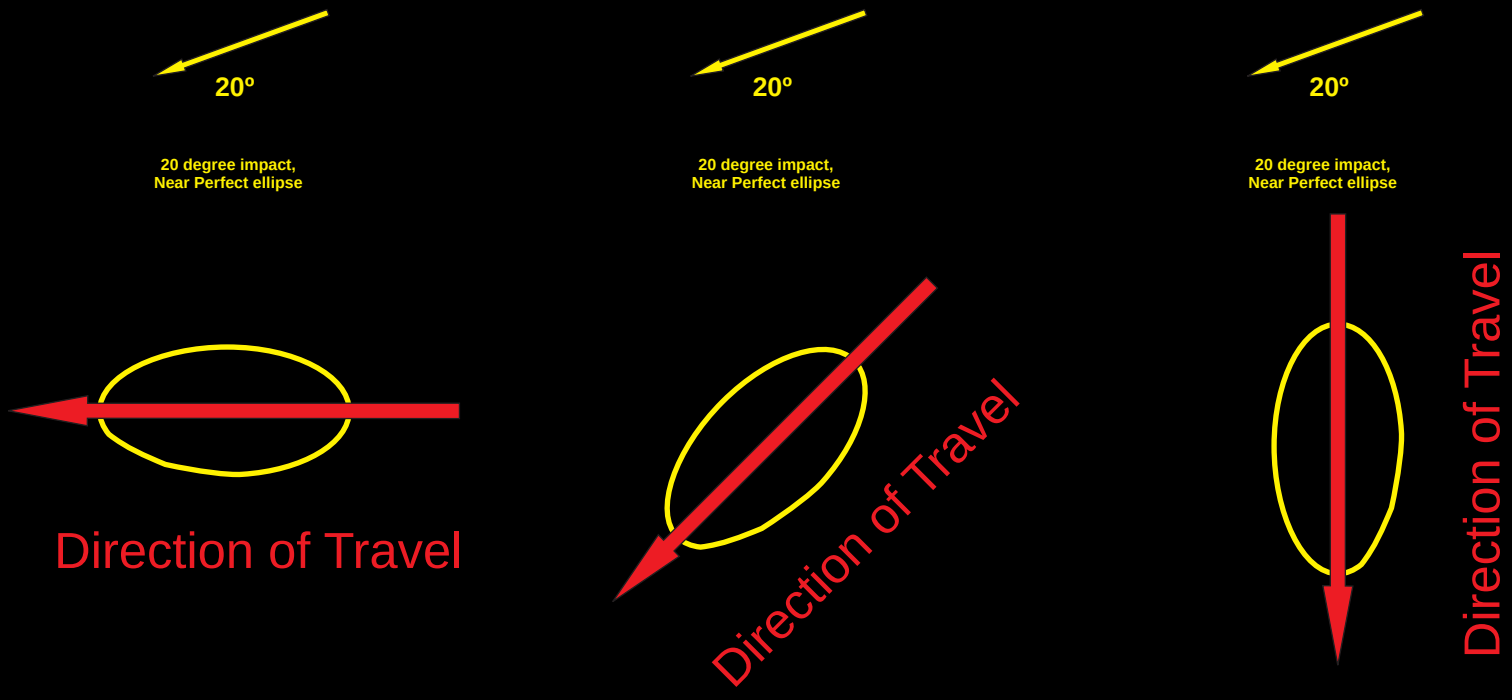
Ellipsoidal Craters
From 40º to 20º

SKIPS
may be irregular
or ellipsoidal
10º to 0º

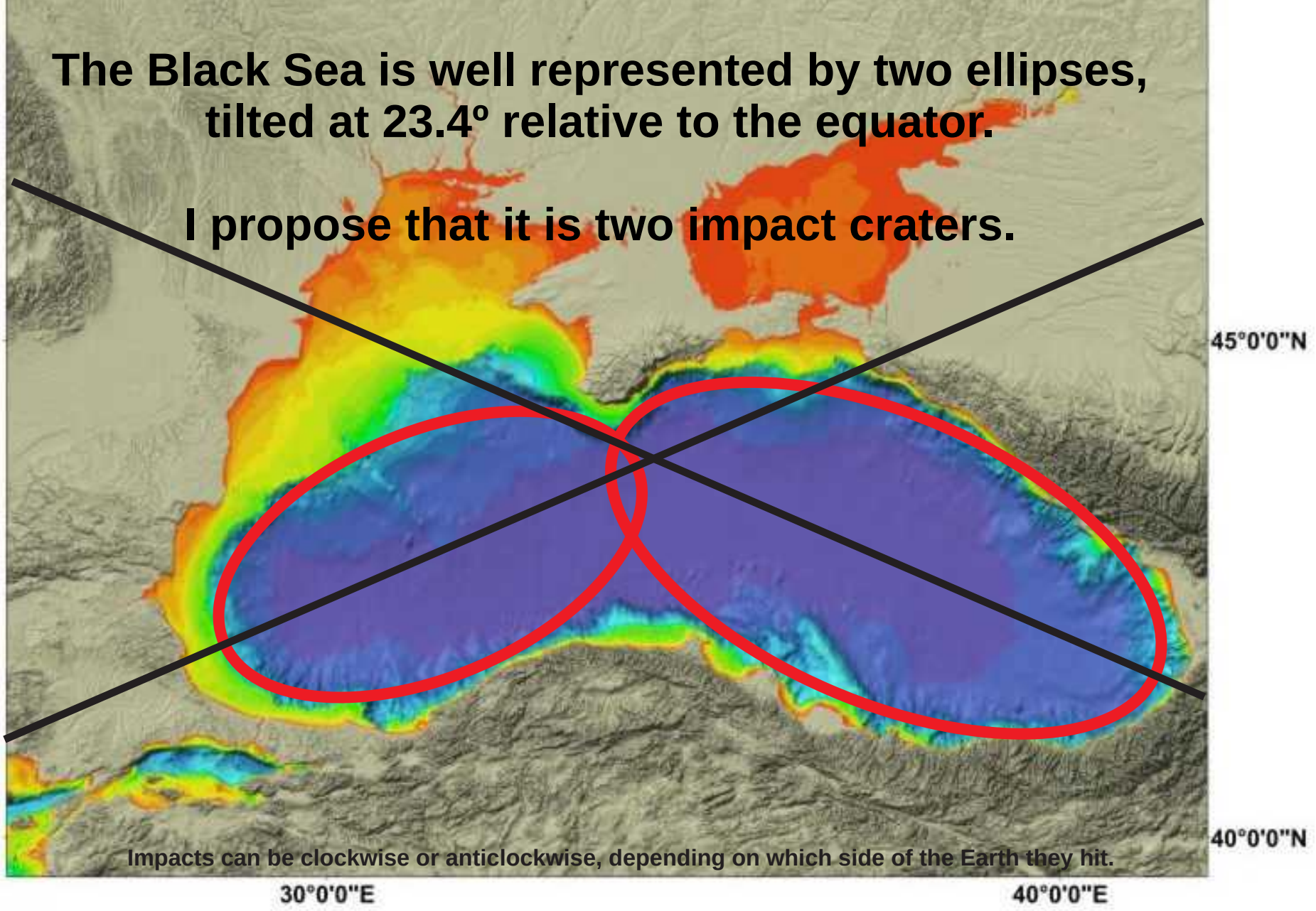
Direction of Travel effect on ellipsoidal craters:

(Note that the Angle of Impact is the same for all of these impacts.)

Results of pellet rifle shots into moist, soft clay. March 29, 2011



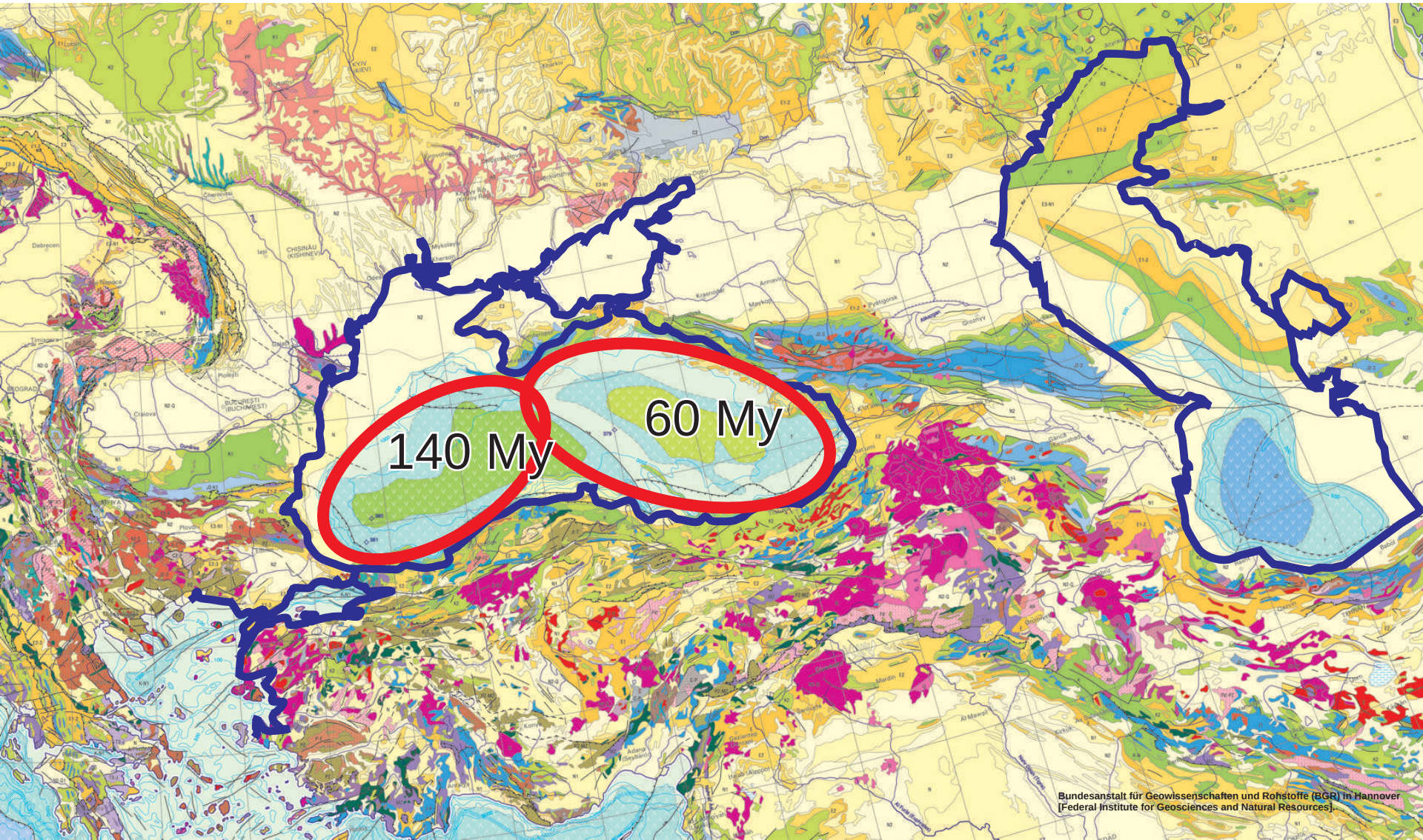
Note that the red line showing Apophis' path from David Morrison's presentation passes through the center of the Black Sea.



Depths of Black Sea indicated by color. Red is shallow, Purple deepest. Max depth 2,200 meters.

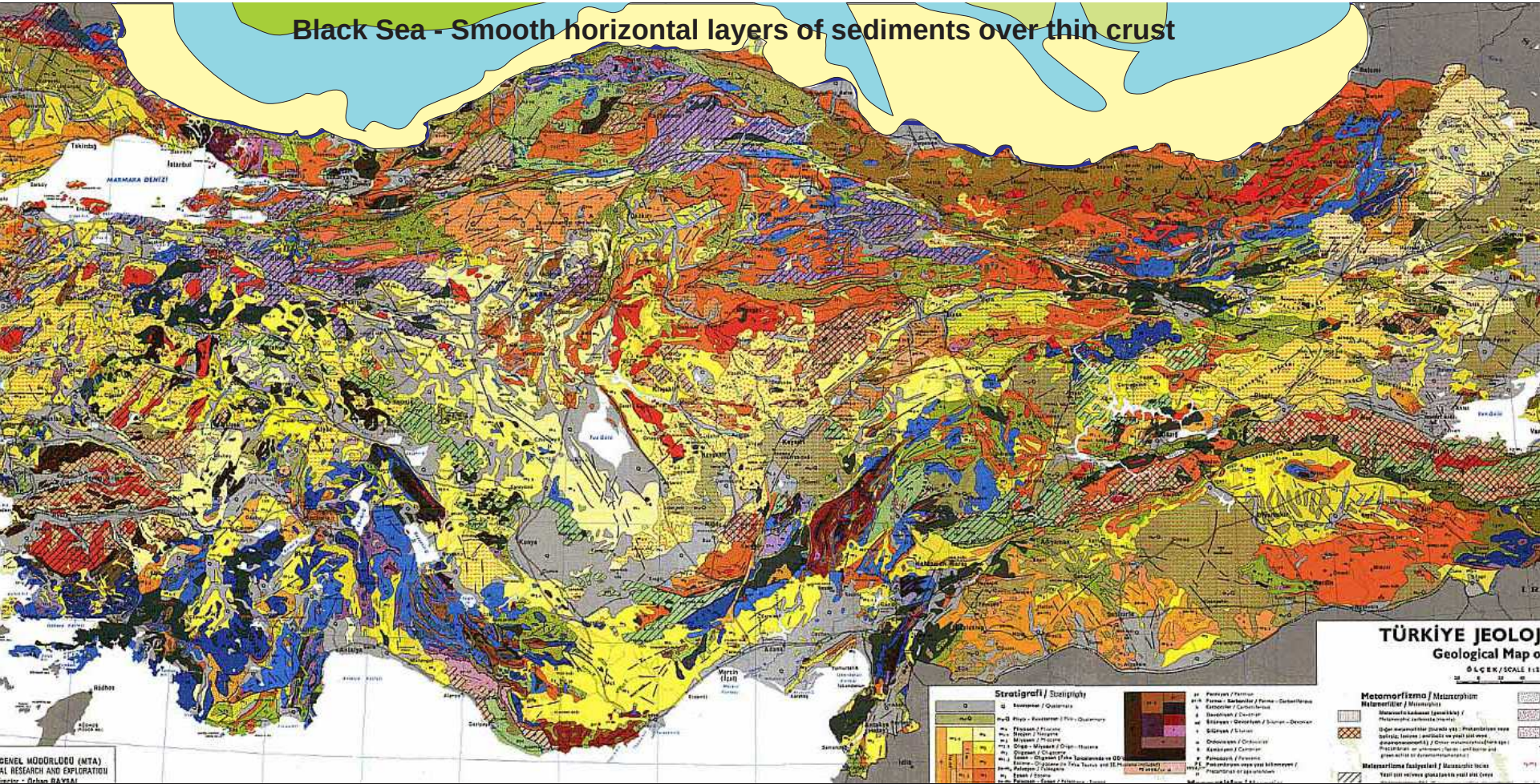
Image from GEBCO: http://www.gebco.net/data_and_products/gridded_bathymetry_data/gebco_08_update_history/version_20100927/

The Black Sea and Caspian sea are listed as oceanic crust.
The west side of the Black Sea is Cretaceous, the east side, Paleocene.
It is recognized that the two halves are different.

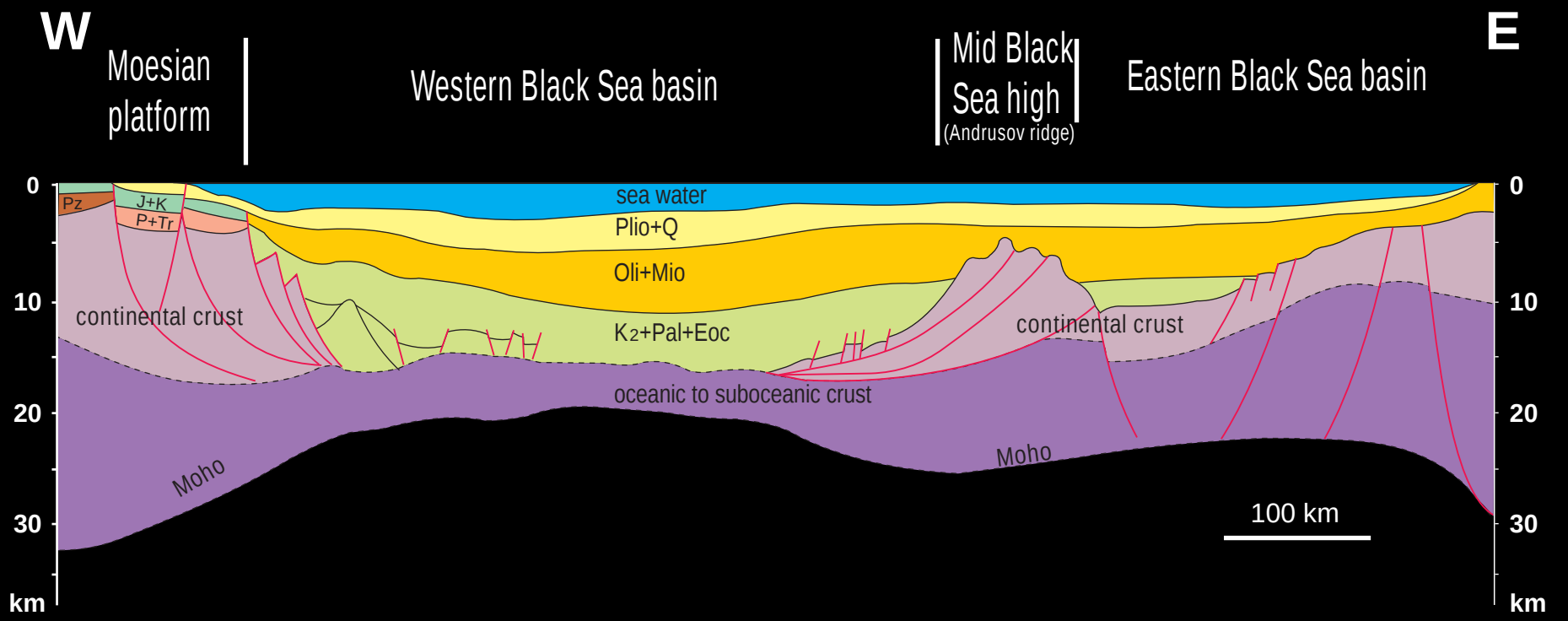


**The geological map of Turkey shows massive disruption in the land to the south.
This is explained by mountain building due to Arabia moving north,
and colliding with Turkey.**

**The 20-40 km layer of continental crust is severely warped,
and the thin 5 km layer of oceanic crust under the Black Sea is intact,
not effected by the northward movement of the land to the south.**



Geological Cross Section of the Black Sea



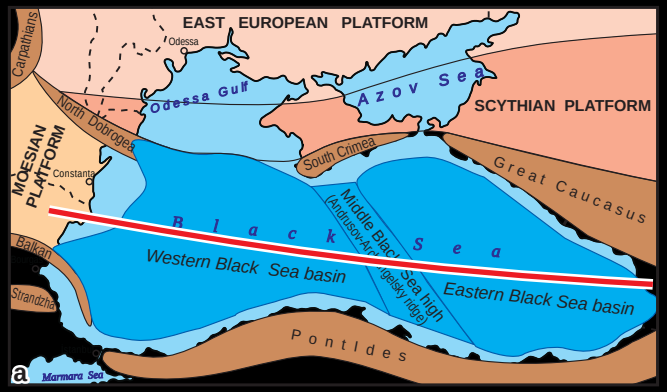
Note the thick broken continental crust to the west and east.

Note the thin crust under the Black Sea

Note the smooth, horizontal layers of sediment in the Black Sea.

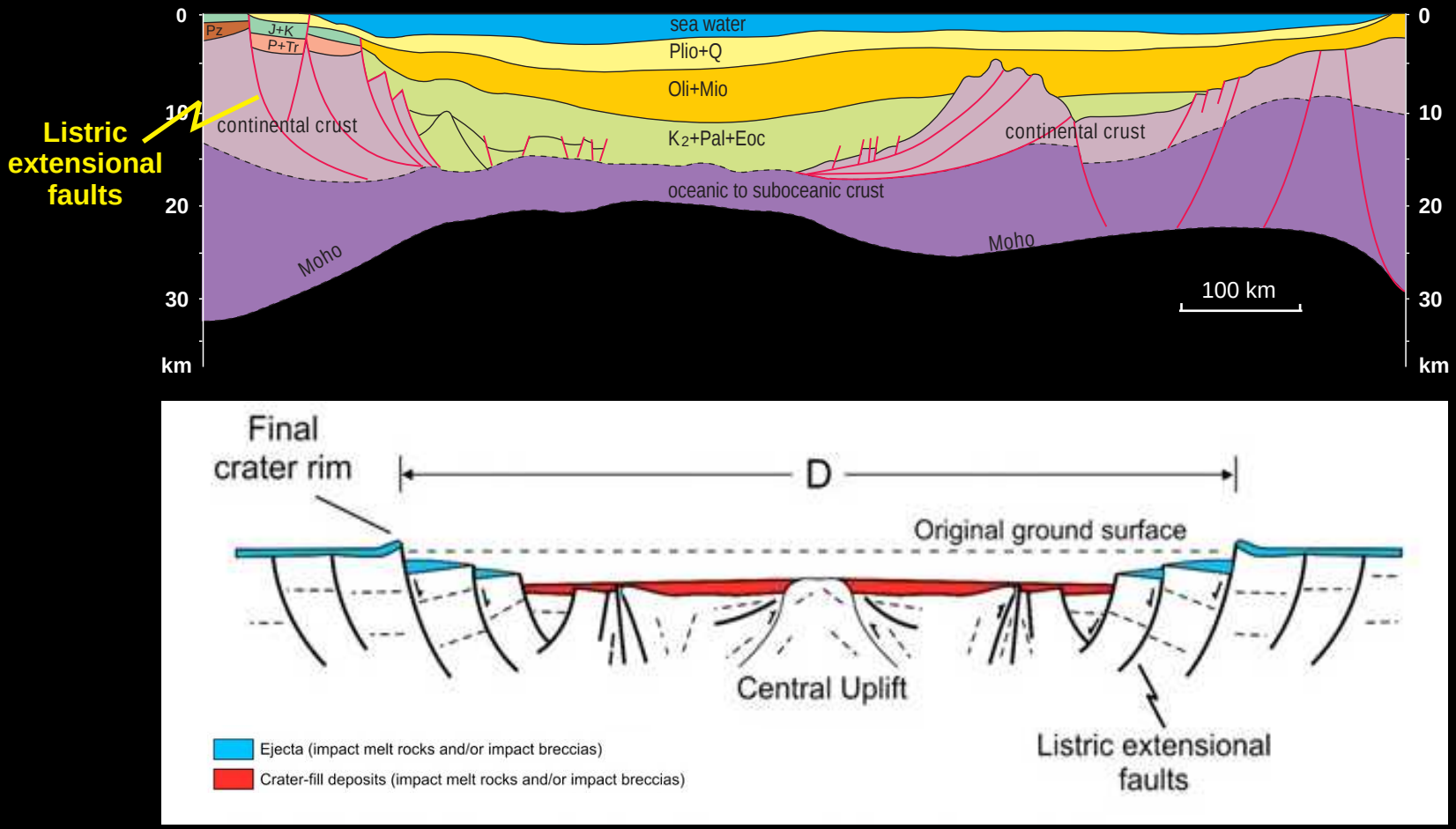
Note the depth of the sediments is 16 km deep.

Cross Section Location Map



Georgi Georgiev, "Geology and Hydrocarbon Systems in the Western Black Sea", Turkish Journal of Earth Sciences (Turkish J. Earth Sci.), Vol. 21, 2012, pp. 723–754.

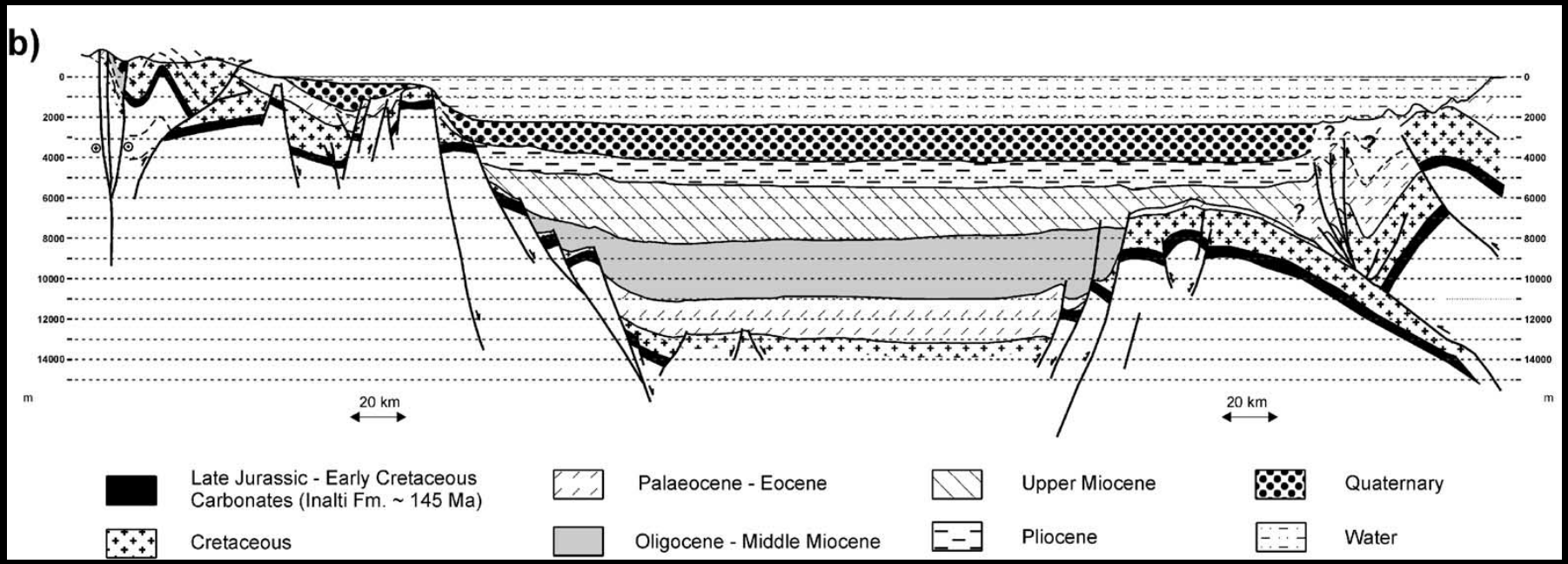
A comparison of the Black Sea cross section with a standard complex crater cross section



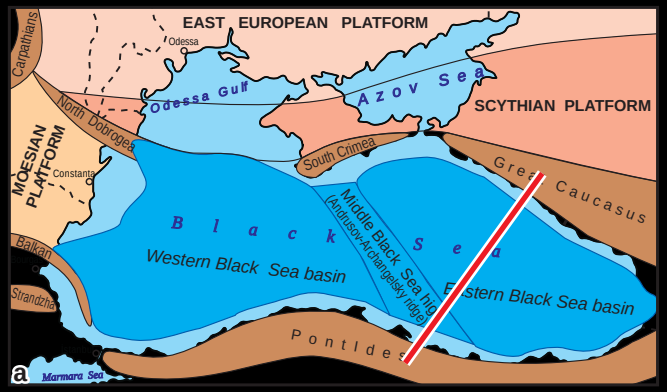
Gordon R. Osinski, Livio L. Tornabene, Richard A.F. Grieve, Impact ejecta emplacement on terrestrial planets
Earth and Planetary Science Letters 310 (2011) 167–181
Modified from Melosh, H.J., 1989: Impact Cratering: A Geologic Process. Oxford University Press, New York.

Geological Cross Section of the Black Sea

North - South Section



Cross Section Location Map



D.J. Meredith, S.S. Egan
"The geological and geodynamic evolution of the eastern Black Sea basin: insights from 2-D and 3-D tectonic modelling"
Tectonophysics 350 (2002) 157– 179

According to NOAA:

The average depth of the oceans: **3,700 meters**

The deepest part of the oceans: **6,000 meters**
(not including trenches)

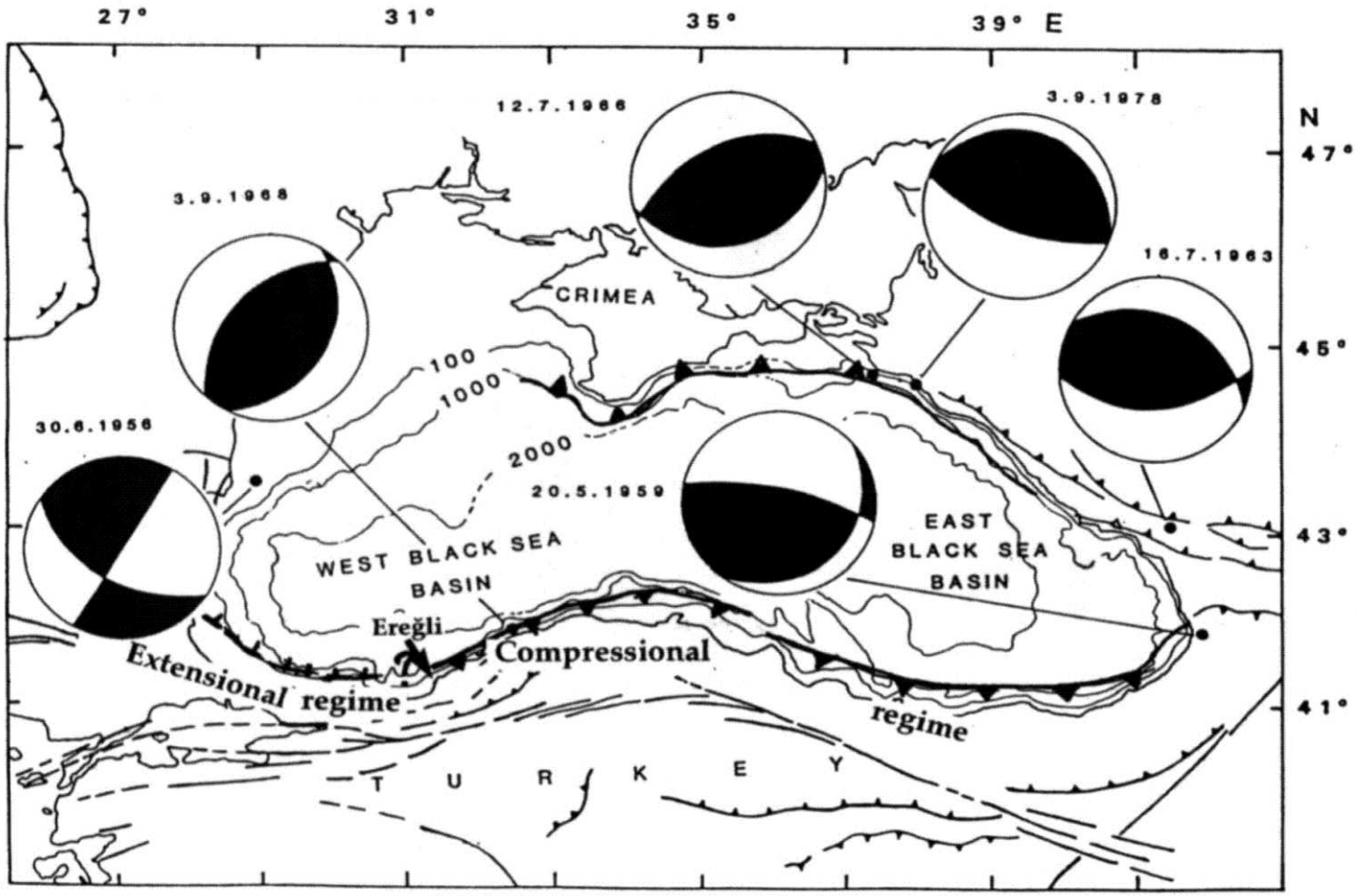
The maximum depth (Mariana Trench): **10,803 meters**

The Black Sea: **16,000 meters**
(before it was filled with sediments)

The age of the sediments is estimated to be up to 150 million years, based on seismic mapping. The actual ages are unknown as they are deeper than can be drilled.

https://www.ngdc.noaa.gov/mgg/global/etopo1_ocean_volumes.html

The edges of the thin oceanic crust of the Black Sea are causing compression in the thick continental crust around it, while not being disturbed in the process:
There are few earthquakes, and it is filled with horizontal sediments.



Tari et al, "Active tectonics of the Black Sea with GPS"
Earth Planets Space, 52, 747–751, 2000

The USGS map of earthquakes in Turkey shows that earthquakes are rare in the Black Sea, and very abundant everywhere else.

The defining feature of plate tectonics is that as the crust moves, earthquakes happen. One can identify tectonic features by the earthquake patterns.

No earthquakes implies that the Black Sea is not a tectonic feature.

USGS - Seismicity of Turkey, 1990 - 2006

NASA JPL have measured tectonic plate motions with GPS

Jet Propulsion Laboratory
California Institute of Technology

JPL HOME EARTH SOLAR SYSTEM STARS & GALAXIES SCIENCE & TECHNOLOGY
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search

GPS Time Series

The Global Positioning System (GPS) is a constellation of 30 satellites which is used for navigation and precise geodetic position measurements. Data from over 2000 receivers have been analyzed at the Jet Propulsion Laboratory, California Institute of Technology under contract with the National Aeronautics and Space Administration. JPL's GIPSY software is used to produce these time series and other useful data products. Horizontal velocities, mostly due to motion of the Earth's tectonic plates, are represented on the map by lines extending from each site. Click on a dot or name to see detailed time series for a particular site. Additional information may be obtained from mbh@jpl.nasa.gov.

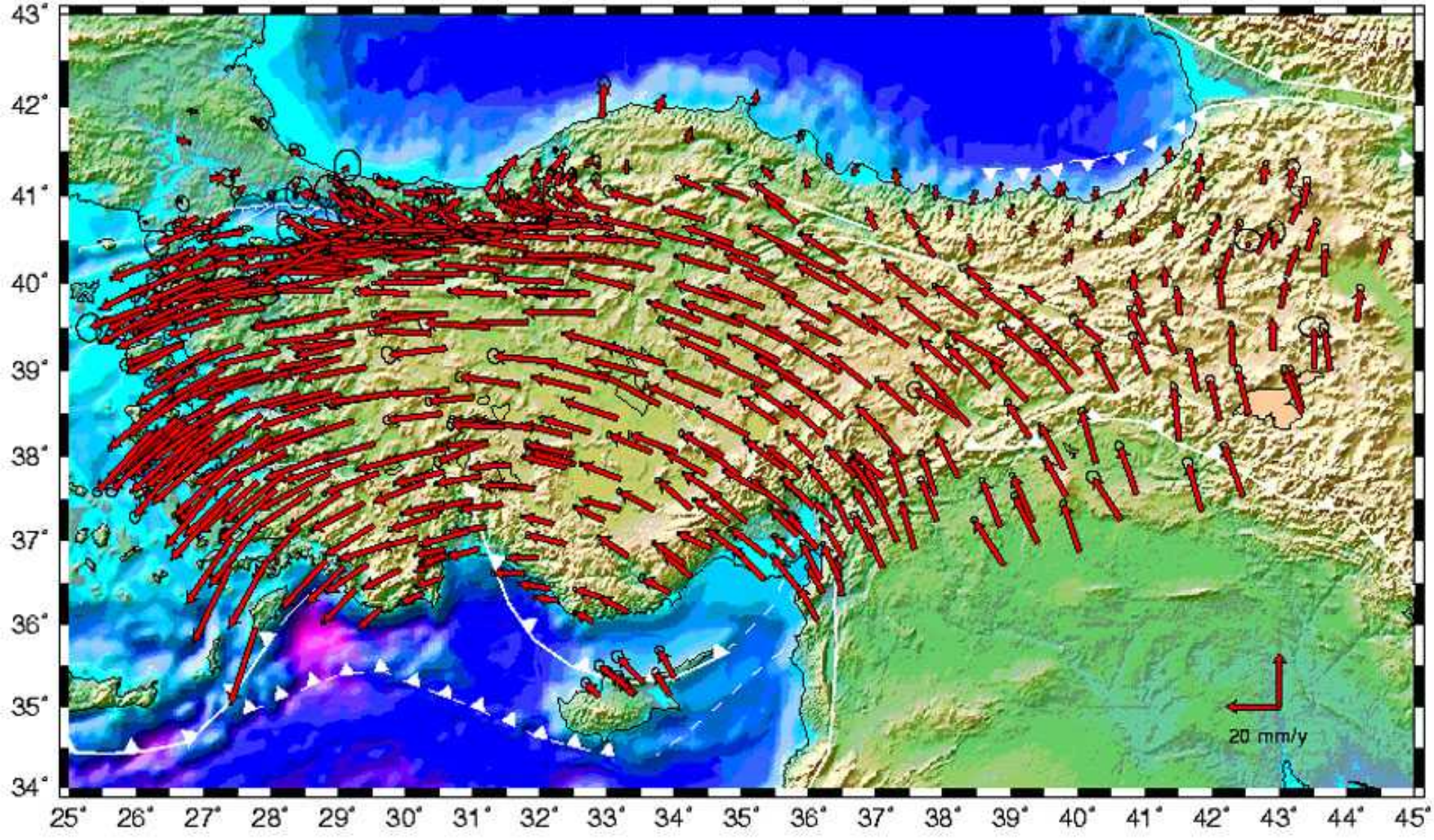
Geodetic Positions and Velocities || Cartesian Positions and Velocities
Break Estimates || Seasonal Estimates
FTP Time Series || FTP Residuals
Methods

AB01	AB02	AB04	AB06	AB07	AB08	AB09	AB11	AB13	AB14	AB15	AB17	AB18	AB21	AB22	AB25	AB27
AB28	AB33	AB35	AB36	AB37	AB39	AB41	AB42	AB43	AB44	AB45	AB46	AB48	AB49	AB50	AB51	ABEB
ABMF	ABPO	ABVI	AC02	AC03	AC06	AC07	AC08	AC09	AC10	AC11	AC12	AC13	AC14	AC15	AC17	AC18
AC19	AC20	AC21	AC23	AC24	AC25	AC26	AC27	AC28	AC31	AC32	AC34	AC35	AC36	AC37	AC38	AC39

sideshow.jpl.nasa.gov/post/series.html

They show Africa and the Middle East moving north east:

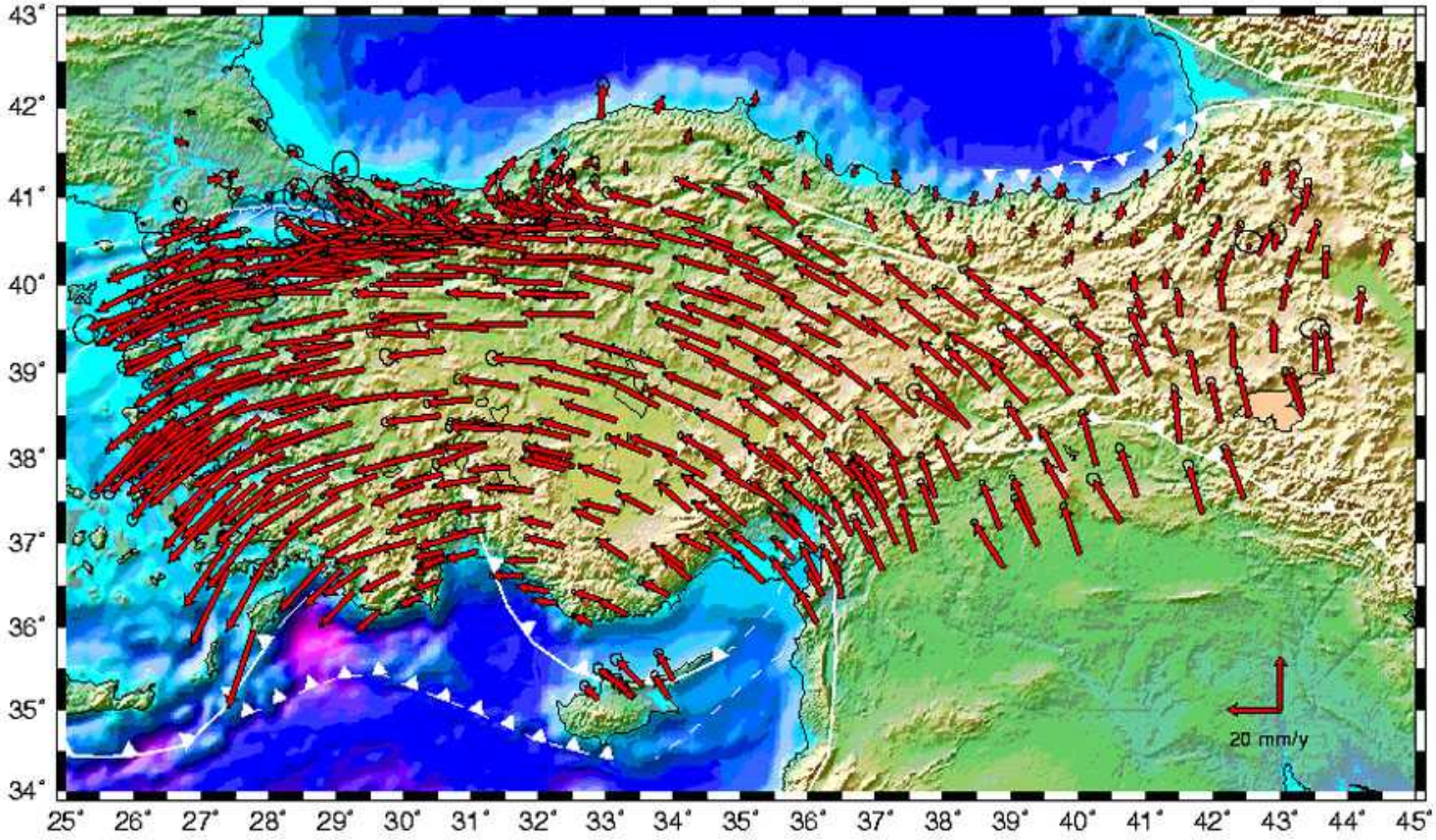
The Turkish Geological Survey's detailed surface GPS measurements show a different pattern:



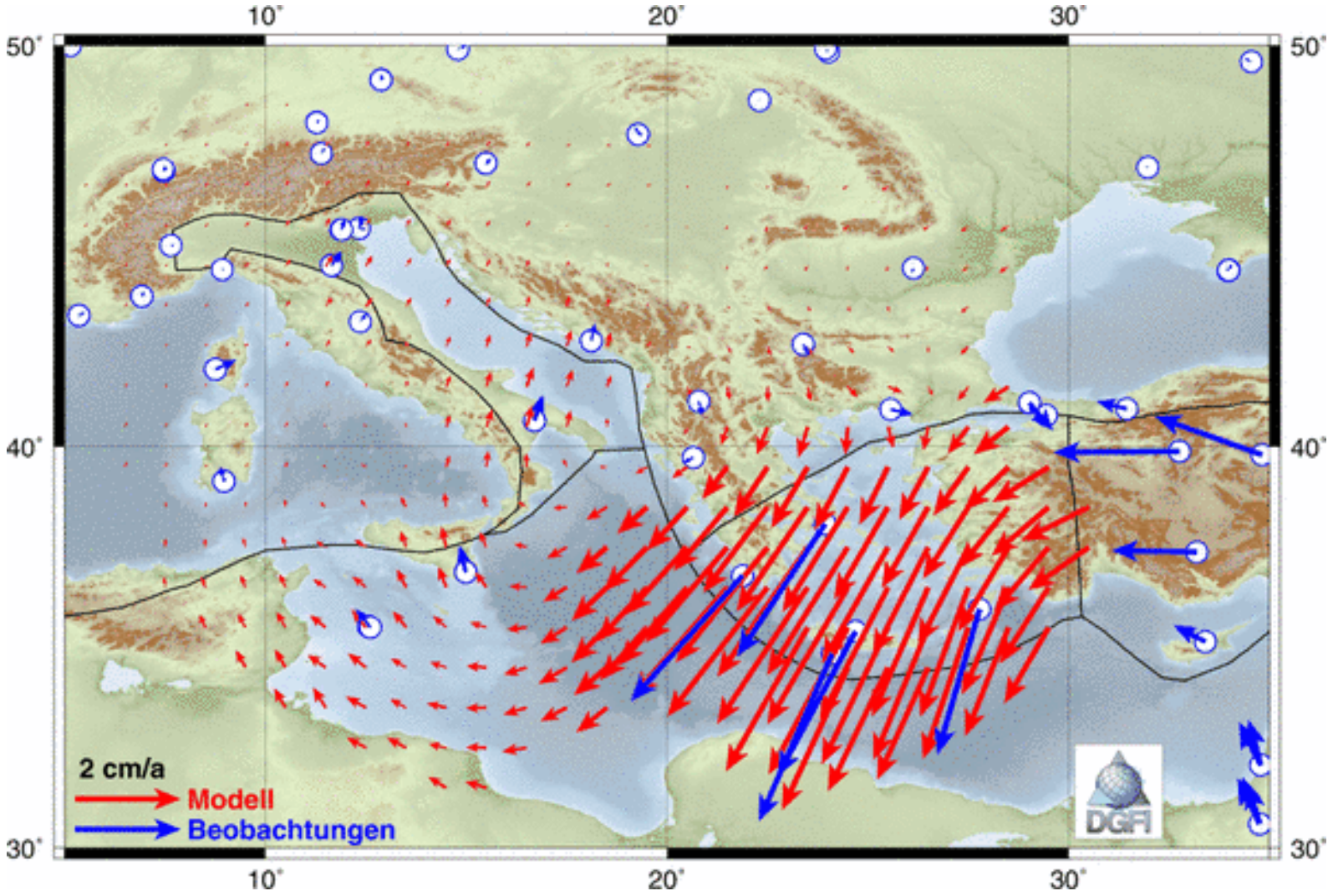
Horizontal velocity field of Turkey and surrounding regions in a Eurasia-fixed frame.
TURKISH NATIONAL FUNDAMENTAL GPS NETWORK www.hgk.msb.gov.tr/english/tutga.php

While the mantle is moving northeastwards,
The crust is being diverted around the Black Sea,
similar to a rapidly moving river flowing around a large rock.

Something has diverted the continental mass.



**This diversion continues into the Mediterranean Sea,
Stopping at the north coast of Africa,
and at the Tyrrhenian Sea**



Deutsches Geodätisches Forschungsinstitut www.dgfi.badw.de/index.php?id=252

"*The present-day tectonics of the Black Sea has been a puzzle.*"

"*The origin of the Black Sea has been long studied and is complicated in detail*"

"*There is a speculation that the lithosphere of the Black Sea and Caspian Seas form a resistant "backstop" diverting the impinging Anatolian plate to the west and "funneling" the continental lithosphere of eastern Turkey and the Caucasus around the eastern side of the Black Sea (McClusky et al., 2000).*"

Tari et al, "Active tectonics of the Black Sea with GPS"
Earth Planets Space, 52, 747–751, 2000

The Black Sea and Caspian basins "are remnants of a much greater marginal sea formed during three separate episodes during the Mesozoic: in the Middle Jurassic, Upper Jurassic and Late Cretaceous."

L.P. Zonenshain, X. Le Pichon, "Deep Basins of the Black Sea and Caspian Sea as Remnants of Mesozoic Back-Arc Basins" Tecronophysics, 123 (1986) 181-211

"***Subsidence analysis of the eastern Black Sea basin suggests that the stratigraphy of this deep, extensional basin can be explained by a predominantly pure-shear stretching history. ... The timing of opening of the eastern Black Sea, which occupied a back-arc position during the closure of the Tethys Ocean, has also been a subject of intense debate; competing theories called for basin opening during the Jurassic, Cretaceous or Paleocene/Eocene.***"

Donna J. Shillington, Nicky White, Timothy A. Minshull, Glyn R.H. Edwards, Stephen M. Jones, Rosemary A. Edwards, Caroline L. Scott
"Cenozoic evolution of the eastern Black Sea: A test of depth-dependent stretching models"
Earth and Planetary Science Letters 265 (2008) 360–378

"***Seismic data show that the eastern Black Sea has evolved via a sequence of interrelated tectonic events that began with early Tertiary rifting followed by several phases of compression, mainly confined to the edges of the basin. ... It is also suggested that extension of a 40–45 km thick pre-rift crust is required to generate the observed magnitude of total subsidence.***"

D.J. Meredith, S.S. Egan
The geological and geodynamic evolution of the eastern Black Sea basin: insights from 2-D and 3-D tectonic modelling
Tectonophysics 350 (2002) 157– 179

Problems with the Plate Tectonic understanding

The Black Sea is commonly described as a rapidly sinking depression that filled in as it moved down. How a depression formed is not understood, but there are many other depression on Earth, so it is not unusual in that aspect (they may also be impacts).

If it was a tectonic depression, then the surface would have moved down with it, yet there are no remnants of surface rock types in the Black Sea other than as sedimentary fills. So the original surface is missing.

If it was moving down, it would still have earthquakes associated with its downward motion - and the edges would be moving into the center. Instead the edges are pushing outwards, and there is no evidence of downward or any other motion in the Black Sea.

The other Tectonic suggestion is that it is a remnant of a previous ocean plate. But no ocean plates are 16 km deep, and the northward motion of Arabia would not be diverted around oceanic crust.
So it simply does not fit a tectonic explanation.

Summary of defining features leading to impact theory

1: 23.4º major axis of elliptical shaped depression.

2: Only a very thin ocean crust in the Black Sea depression.

3: The Black Sea is an excessively deep depression - much deeper than the deepest part of the ocean.

4: Deep sediments in nearly horizontal layers fill the depression.

5: Few earthquakes occur in the Black Sea depression, but there are many earthquakes around it right up to its edge.

6: Geology of depression dramatically different than surrounding areas.

7: The Black Sea is apparently pushing the Turkish crust away.

8: Plate Tectonics can not explain the feature's shape or presence.

A low angle impact would explain all of the above.

The orientation of Plate Tectonic events are determined by the relative motions of the continents.

There is no tectonic force that can recognize the tilt of the Earth.

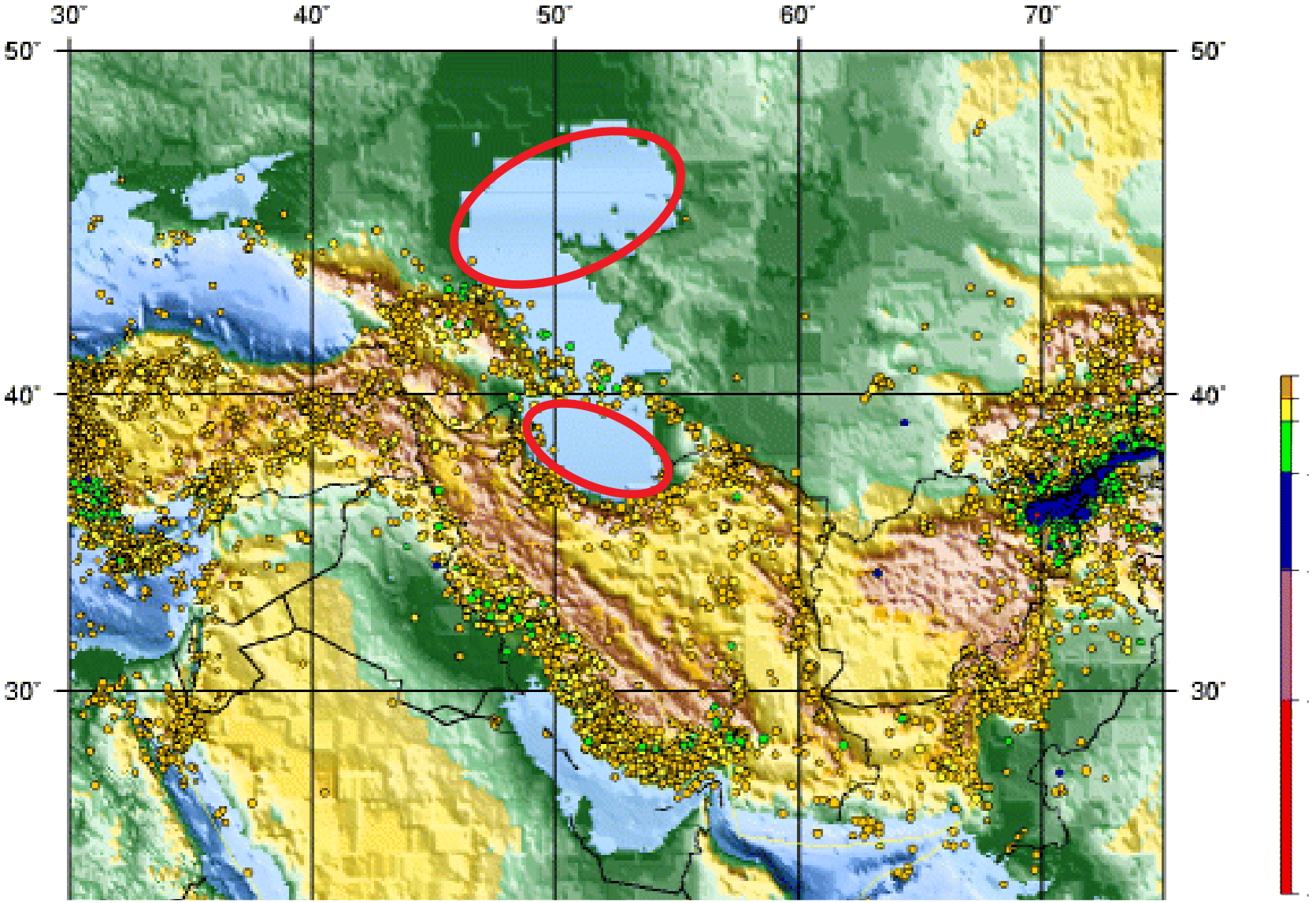
If only one feature is orientated at 23.4º, it is random luck.

If many features are orientated at 23.4º,
it is due to the tilt of the Earth,
and impacts from objects traveling on the Ecliptic.

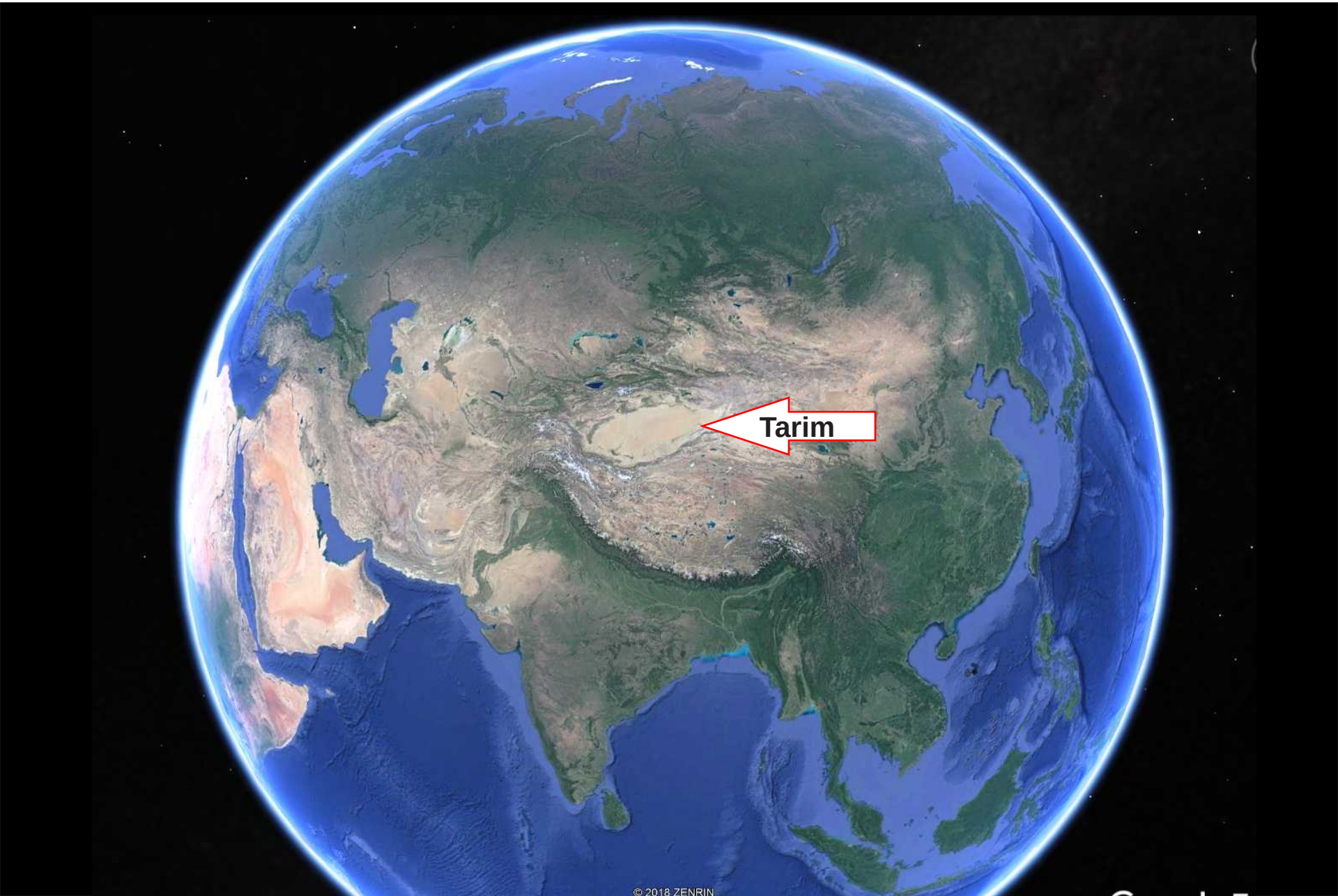
There are many depressions that are orientated at 23.4º

Note that the red line passes through the center of the Caspian Sea's south buldge.

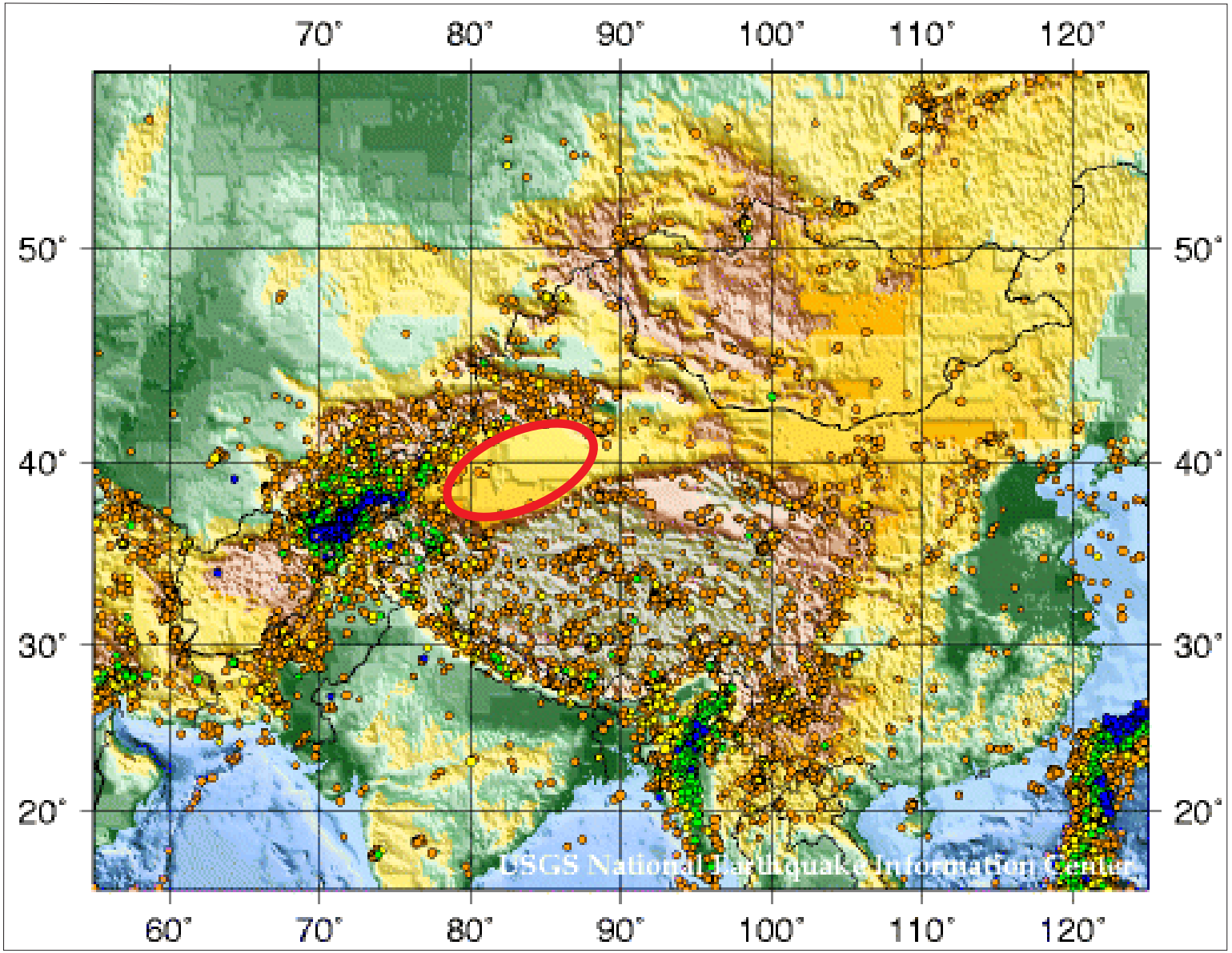
Everything about the Black Sea applies to the Caspian Sea.



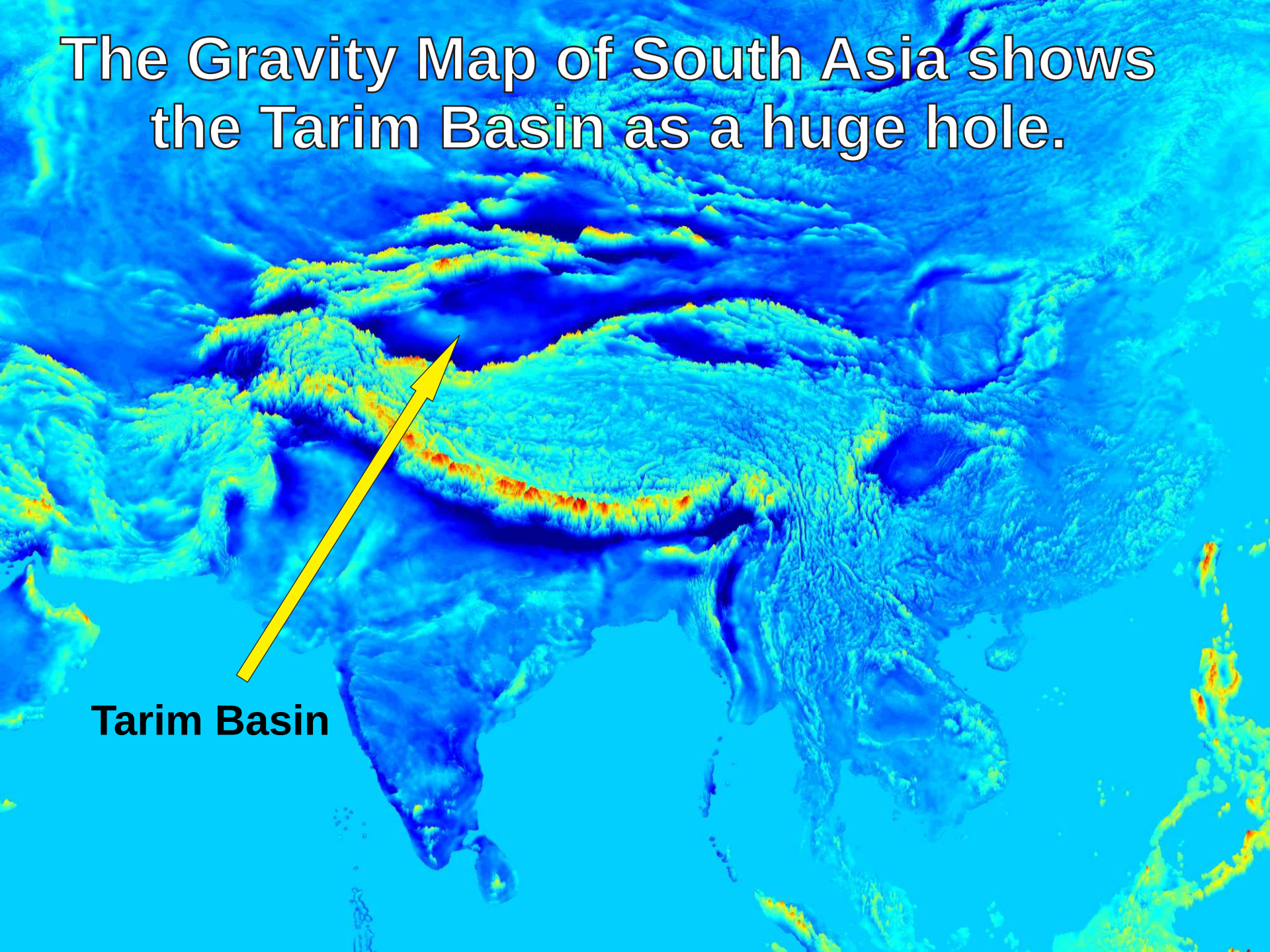
The Tarim Basin is a 900 km long ellipse tilted at 23.4º



The Tarim Basin has virtually no earthquakes.



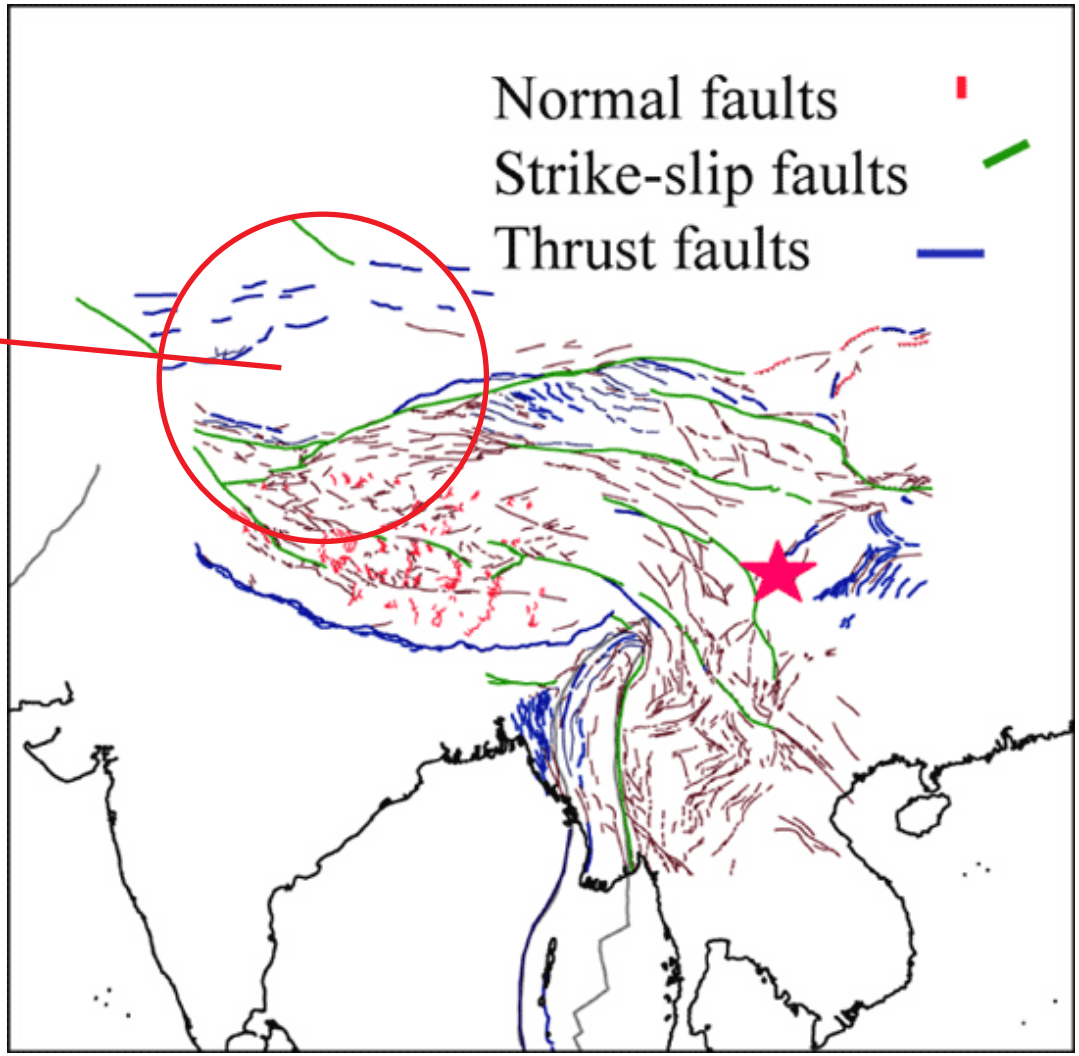
USGS - Seismicity of Asia, 1990 - 2000


The Gravity Map of South Asia shows the Tarim Basin as a huge hole.
Tarim Basin

The Tarim Basin has no Faults in it,

The surrounding Himalayan Mountains have many fault zones.

Tarim Basin
Fault Free Zone



Caltech Tectonics Observatory
www.tectonics.caltech.edu/outreach/highlights/2008MayChinaEQ/

Tarim Basin GPS measurements are similar to those around the Black Sea - The Himalayan Mountains are being diverted around the thin crusted Tarim Basin

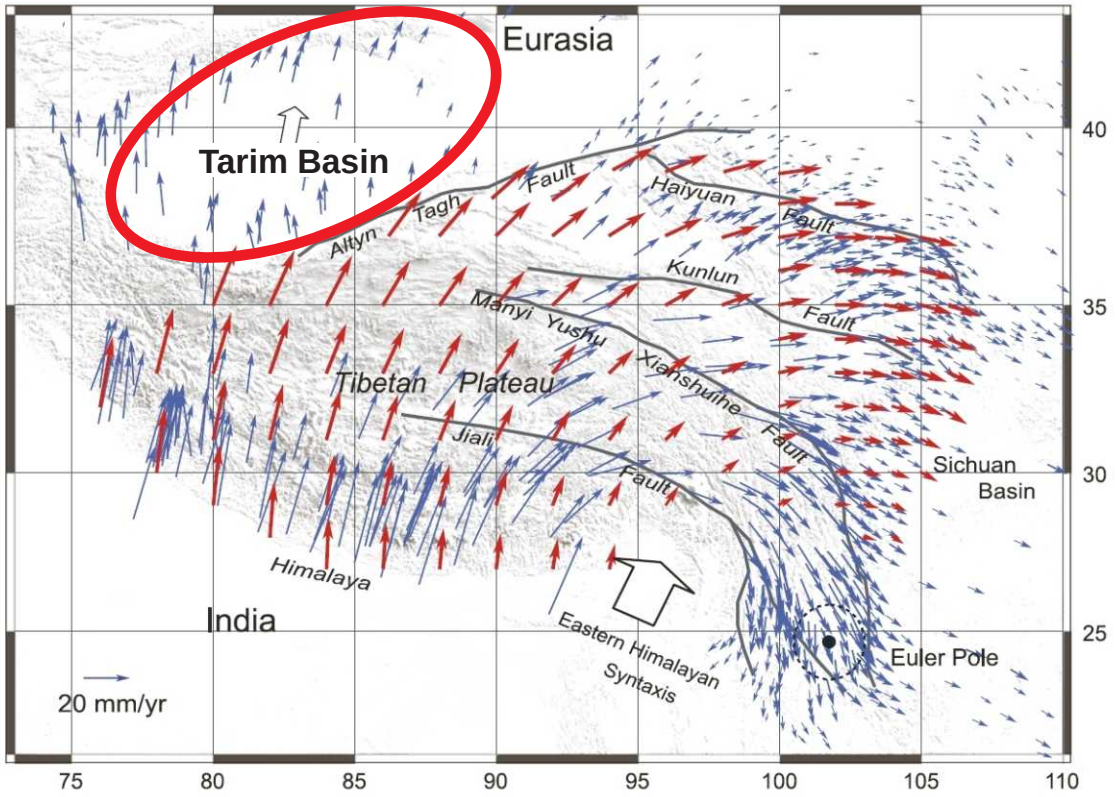
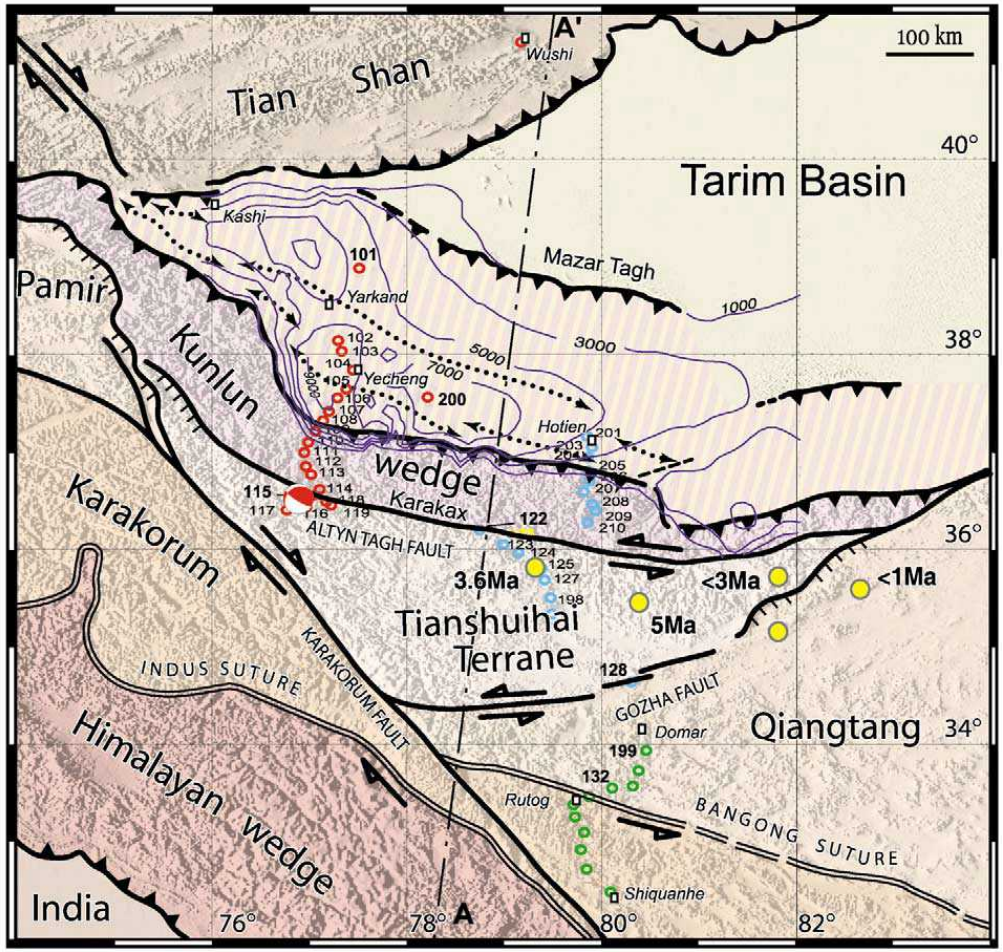


Figure 2. Map showing the observed GPS velocity field (blue arrows) around the Tibetan Plateau relative to the stable Eurasia and the calculated rigid rotation velocity field (red arrows) with the Euler vector of the plateau. The Euler pole is located near the southeast corner of the plateau with an ellipse of 95% confidence. The thick black solid lines indicate principal active faults.

Weijun Gan, Peizhen Zhang, Zheng-Kang Shen, Zhijun Niu, Min Wang, Yongge Wan, Demin Zhou, and Jia Cheng
"Present-day crustal motion within the Tibetan Plateau inferred from GPS measurements"
Journal of Geophysical Research, Vol. 112, B08416, 2007

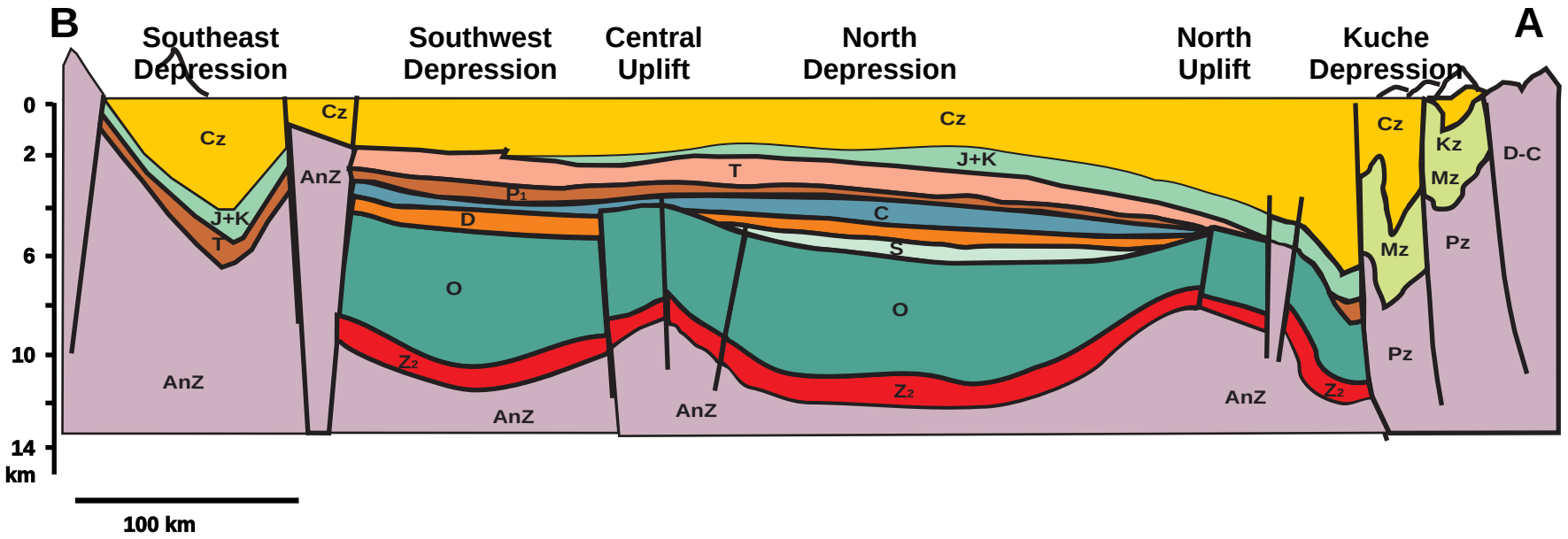
The edges of the thin oceanic crust of the Tarim Basin are causing compression in the thick continental crust around it, with only a little effect of tectonic activity in the Tarim in the process: There are few earthquakes, and it is filled with horizontal sediments.

Main geological domains of western Tibet orogen



G. Wittlinger, J. Vergne, P. Tapponnier, V. Farra, G. Poupinet, M. Jiang, H .Sud, G. Herquel, A. Paul
"Teleseismic imaging of subducting lithosphere and Moho ofsets beneath western Tibet"
Earth and Planetary Science Letters 221 (2004) Pg. 117 - 130

Geological Cross Section of Tarim Basin

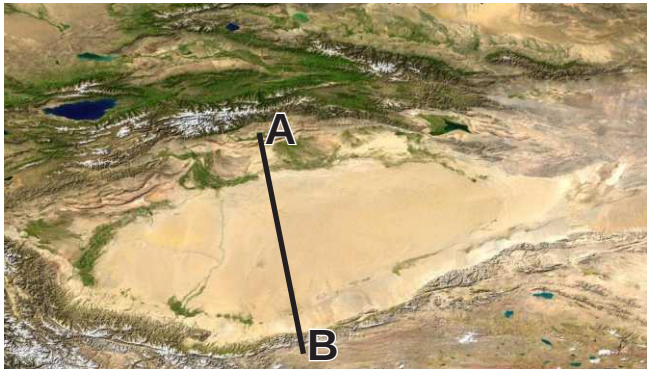


Note the thick broken continental crust to the south and north

Note the smooth, horizontal layers of sediment in the Tarim Basin - the same as in the Black Sea, but with more tectonic compression.

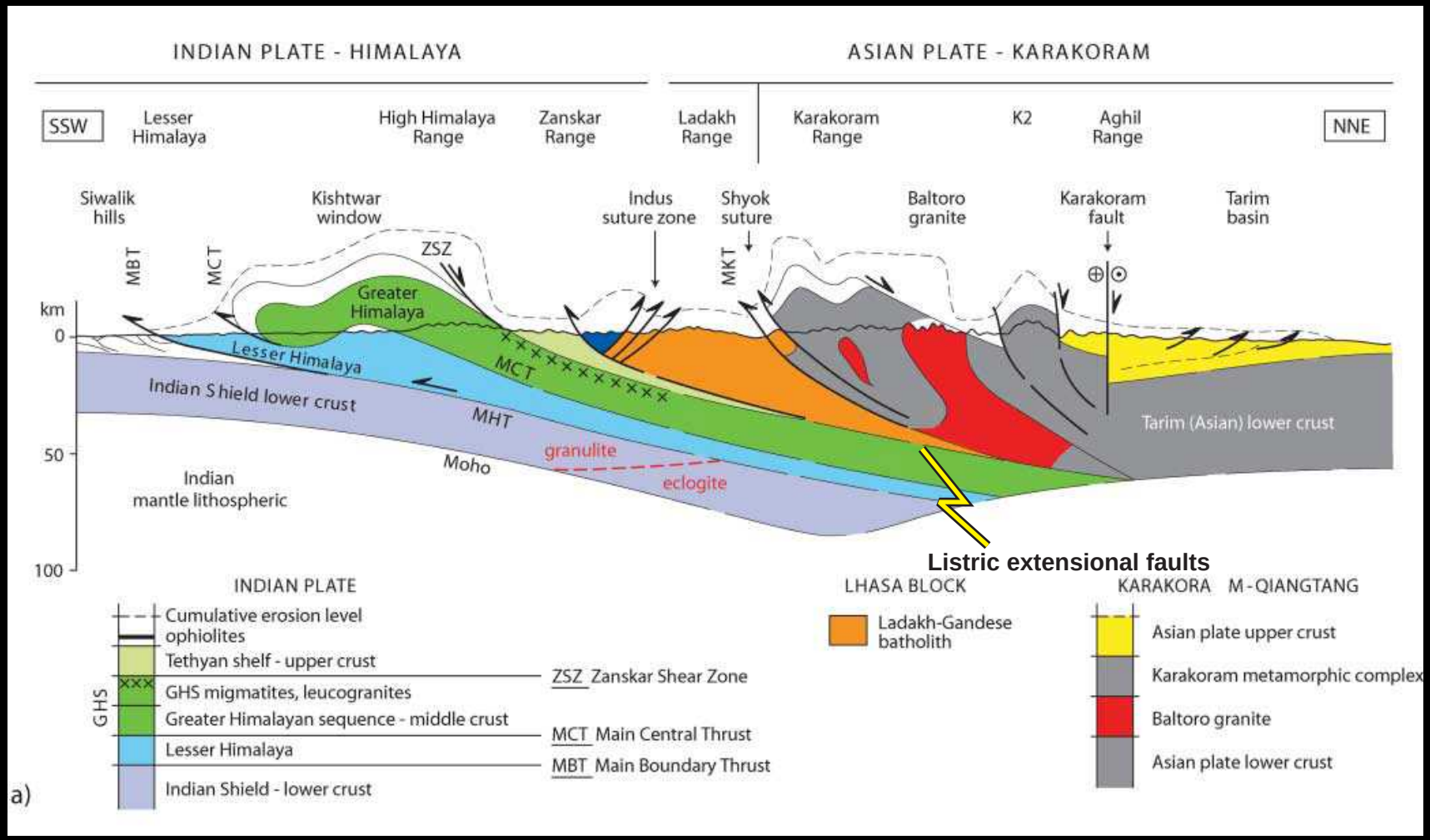
Note the depth of the sediments is 13 km deep.

Cross Section Location Map



Tongwei Zhang, Quanyou Liu, Jinxing Dai and Yongchun Tang
"Natural Gas Geochemistry in Tarim Basin, China and Its Application to Gas Filling History"
Power, Environmental & Energy Research Center, Caltech
Research Institute of Petroleum Exploration and Development, PetroChina, Beijing 100083,China

Geological Cross Section of Tarim Basin and south Himalayas
Note Tarim Basin has pushed the crust to the south.



The Crust is much thinner under Tarim (40 km vs 80-90 km)

M. P. Searle, J. R. Elliott, R. J. Phillips & S.L. Chung
"Crustal–lithospheric structure and continental extrusion of Tibet"
Journal of the Geological Society, London, Vol. 168, 2011, pp. 633–672.

Tarim Basin is considered to be a continental extension that began about 280 Ma.

Tarim has extensive layers of Basalt and Diabase.

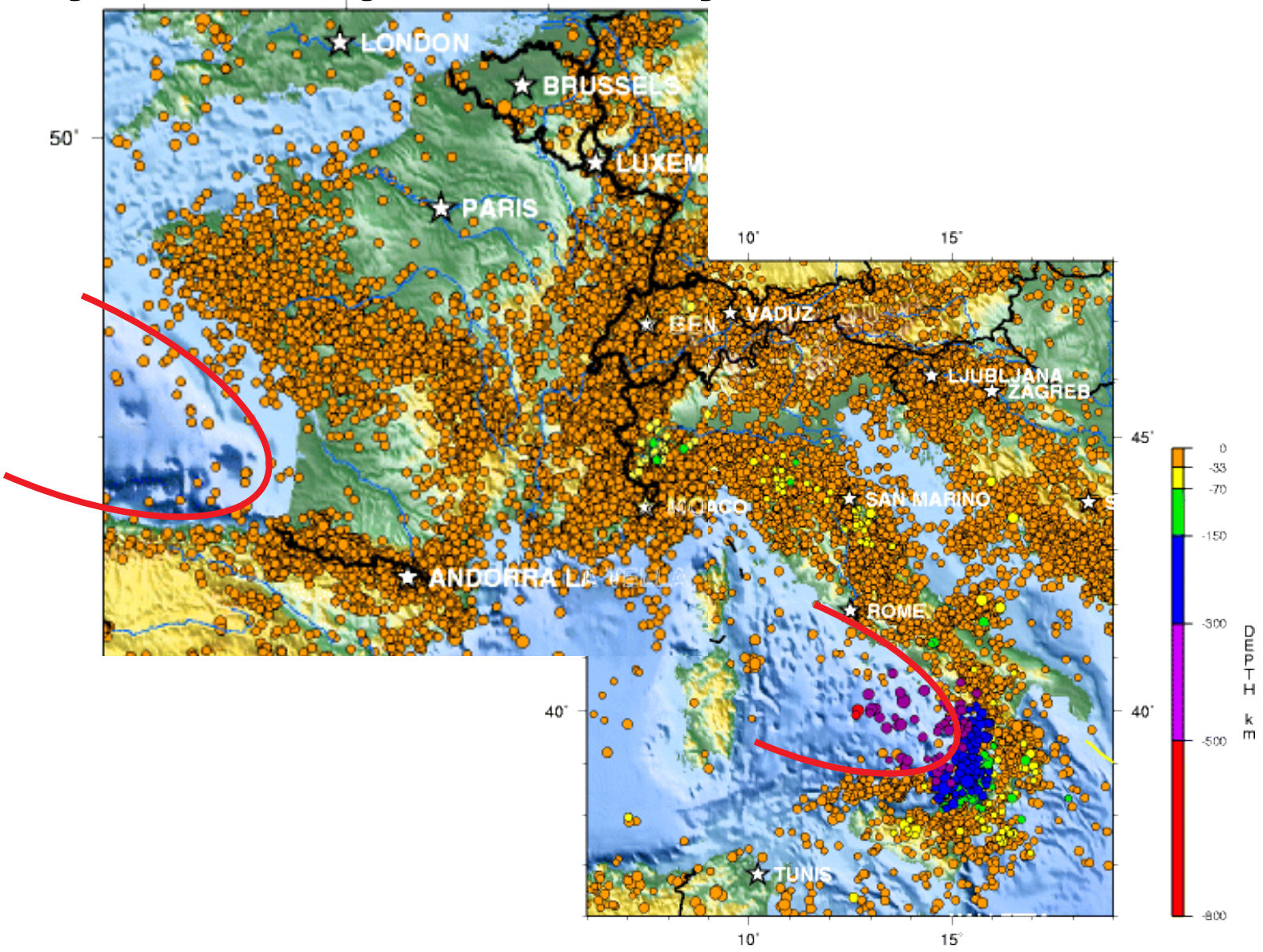
It is associated with an Extinction Event and the Siberian Traps.

"The large scale Permian magmatism in the Tarim basin is linked with mantle plume activity and mass extinction, as the ascending magma interacted with continental crust. An important unsolved question is the link between the Tarim Permian ca. 280 Ma magmatism and other Permian mafic magmatic events in surrounding regions, such as the 250 Ma Siberian traps, and the 258 Ma Emeishan large igneous province in SW China."

An impact origin would explain the formation of the Tarim basin better than Plate Tectonics.

Shufeng Yang, Zilong Li, Hanlin Chen, Chuanwan Dong, Xing Yu, Chengzao Jia, Guoqi Wei
"Permian large volume basalts in Tarim basin"
Large Igneous Provinces Commission, International Association of Volcanology and Chemistry of the Earth's Interior

The Bay of Biscay and The Tyrrhenian Sea:



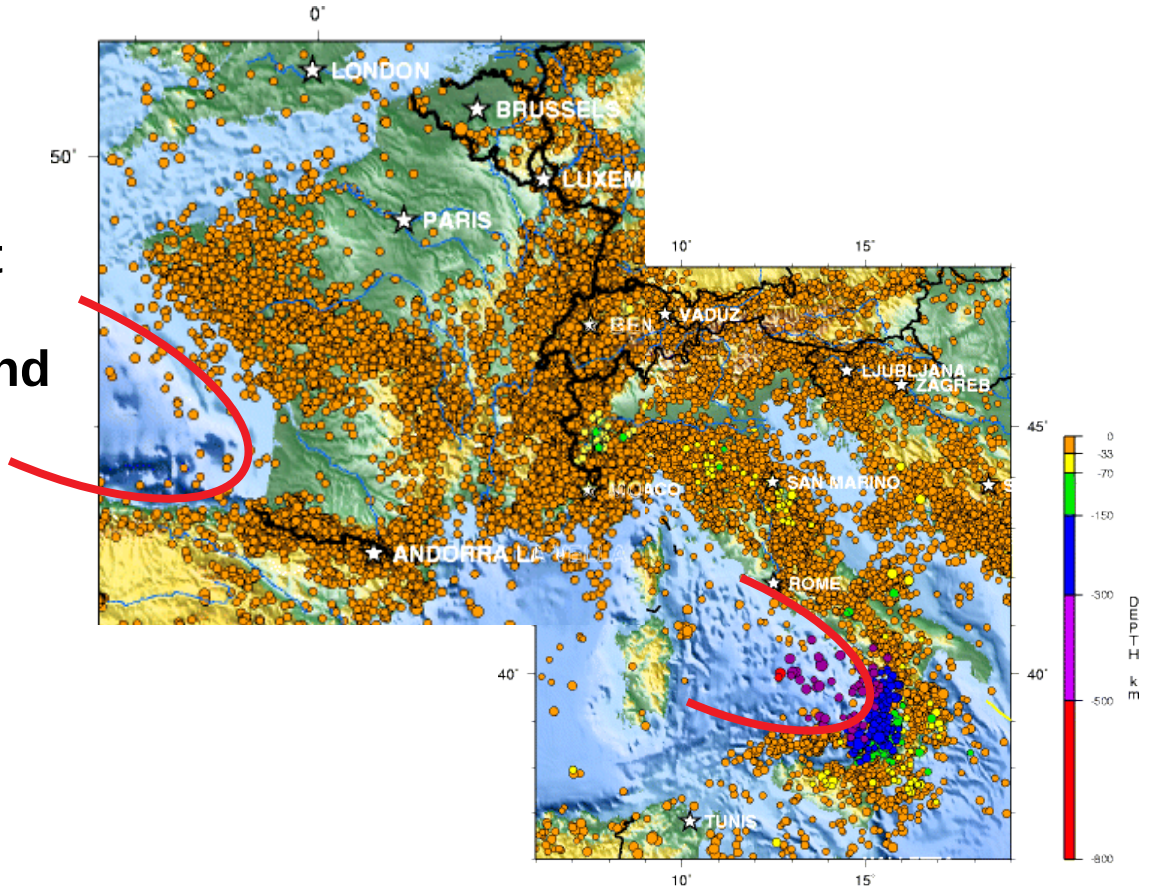
USGS - Seismicity of France and Italy, 1990 - 2000

The Bay of Biscay has no earthquakes,
The Tyrrhenian Sea has some very deep earthquakes
but none in the crust.

The geology around them is dramatically different.
Volcanoes and mountains compared to thin ocean crustal areas.

A parabola at 23.4º
fits them both very well.

An impact that hits the edge of continental crust will leave a parabolic crater in the continent, and a flat area in the ocean instead of elliptical.



USGS - Seismicity of France and Italy, 1990 - 2000

The map of the moho depth of the Mediterranean shows that the Bay of Biscay and Tyrrhenian Sea have thin crusts

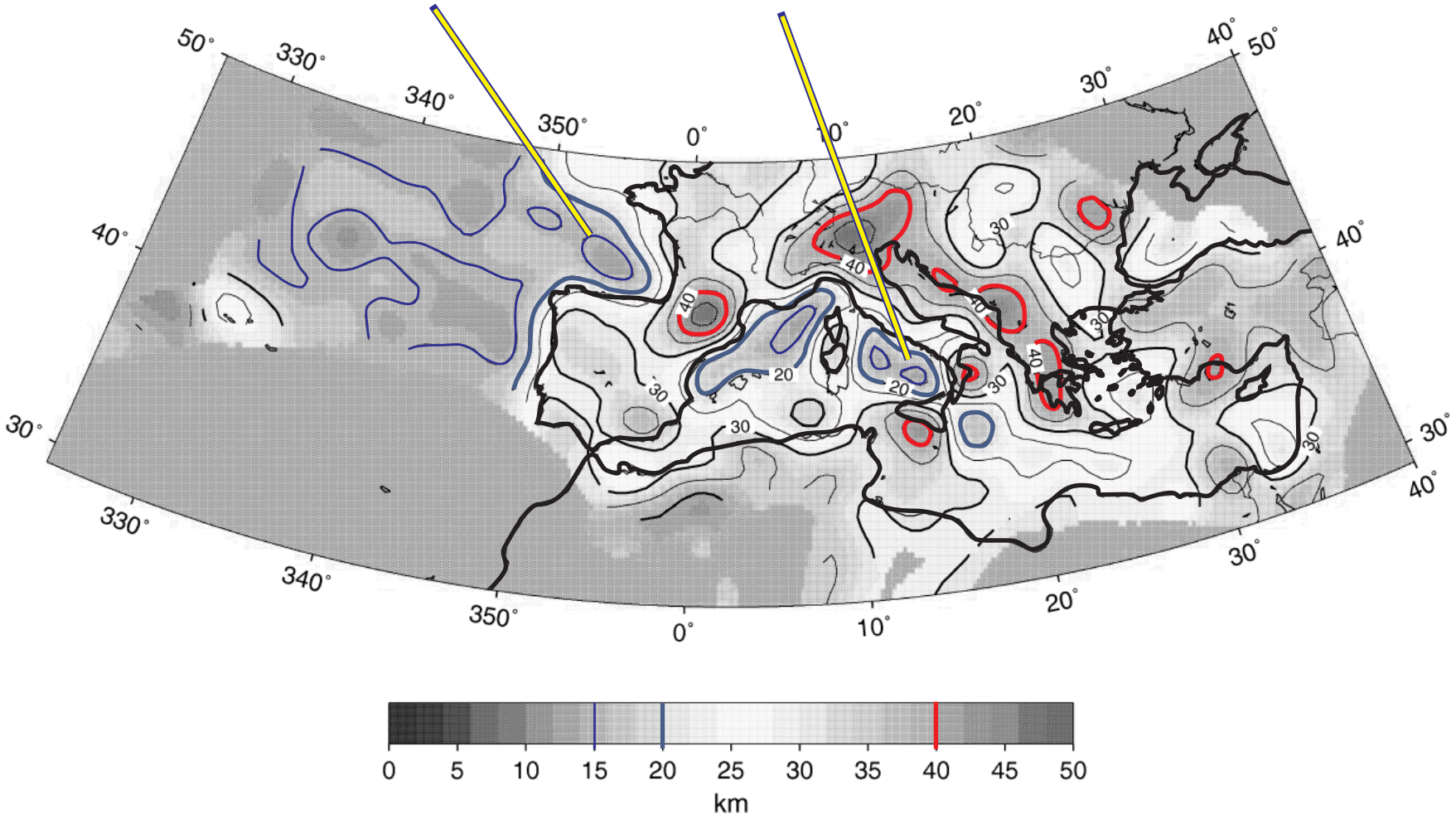
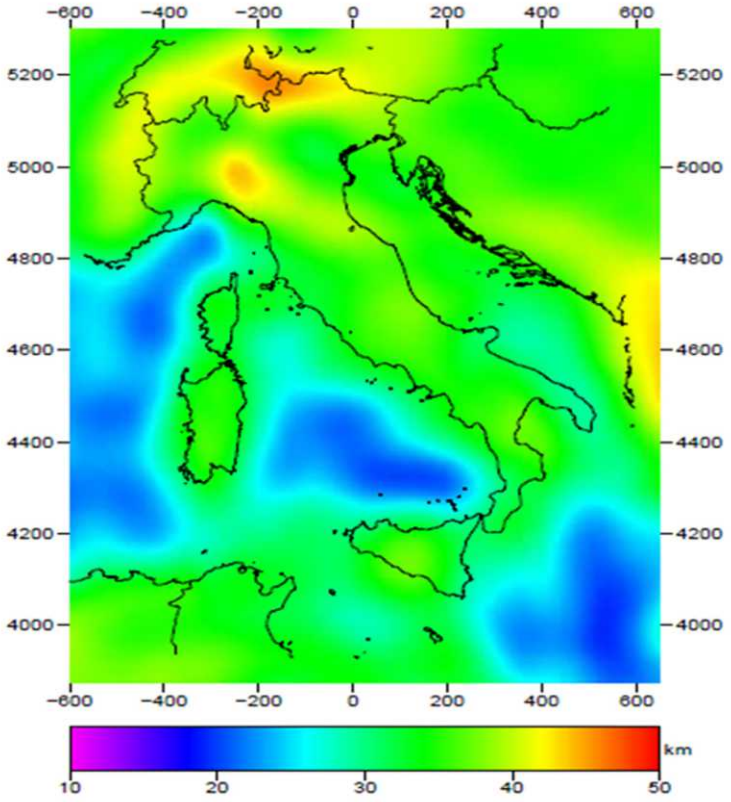
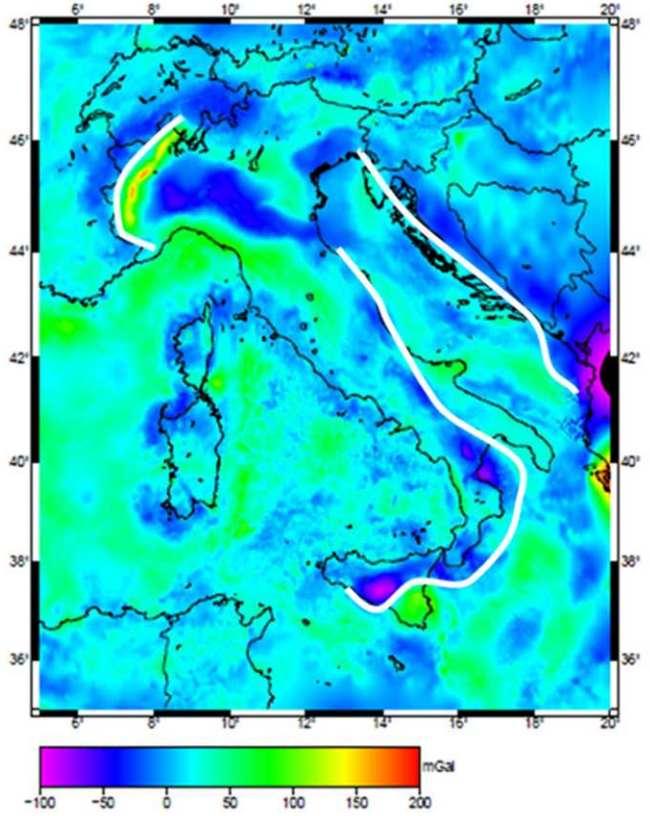


Figure 5. Map of Moho depth (EAM02) obtained in the 3-D inversion.

Federica Marone, Mark der Meijde, Suzan van der Lee and Domenico Giardini
"Joint inversion of local, regional and teleseismic data for crustal thickness in the Eurasis-Africa plate boundary region."
Geophys. J. Int. (2003) 154, 499-514

Mohorovičić discontinuity of Italy based on data from the GOCE satellite.



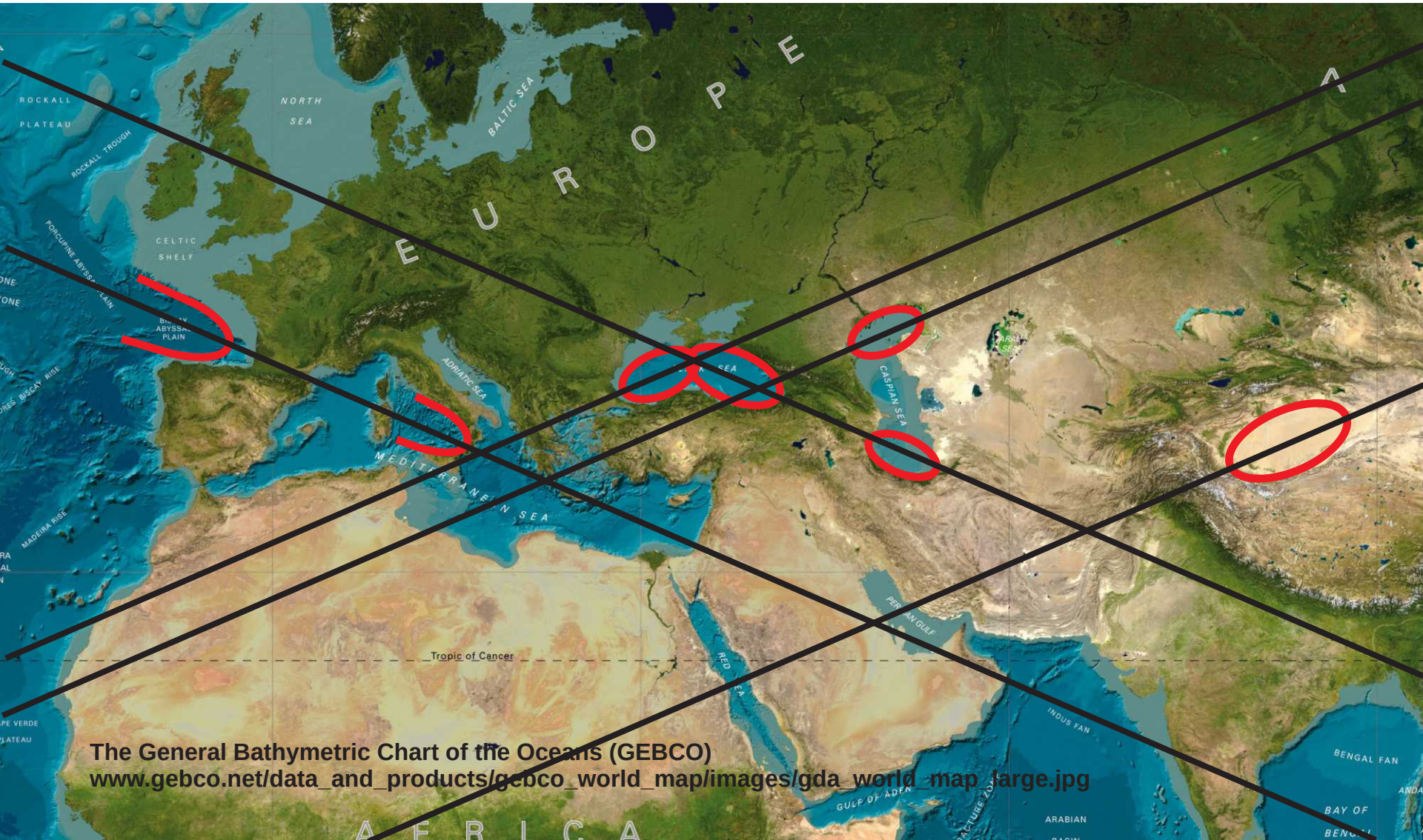


European Space Agency: Moho and gravity of Italy
Released 09/03/2012 10:47 am

www.esa.int/Our_Activities/Observing_the_Earth/GOCE/Mapping_the_Moho_with_GOCE
and
http://spaceinimages.esa.int/Images/2012/03/Moho_and_gravity

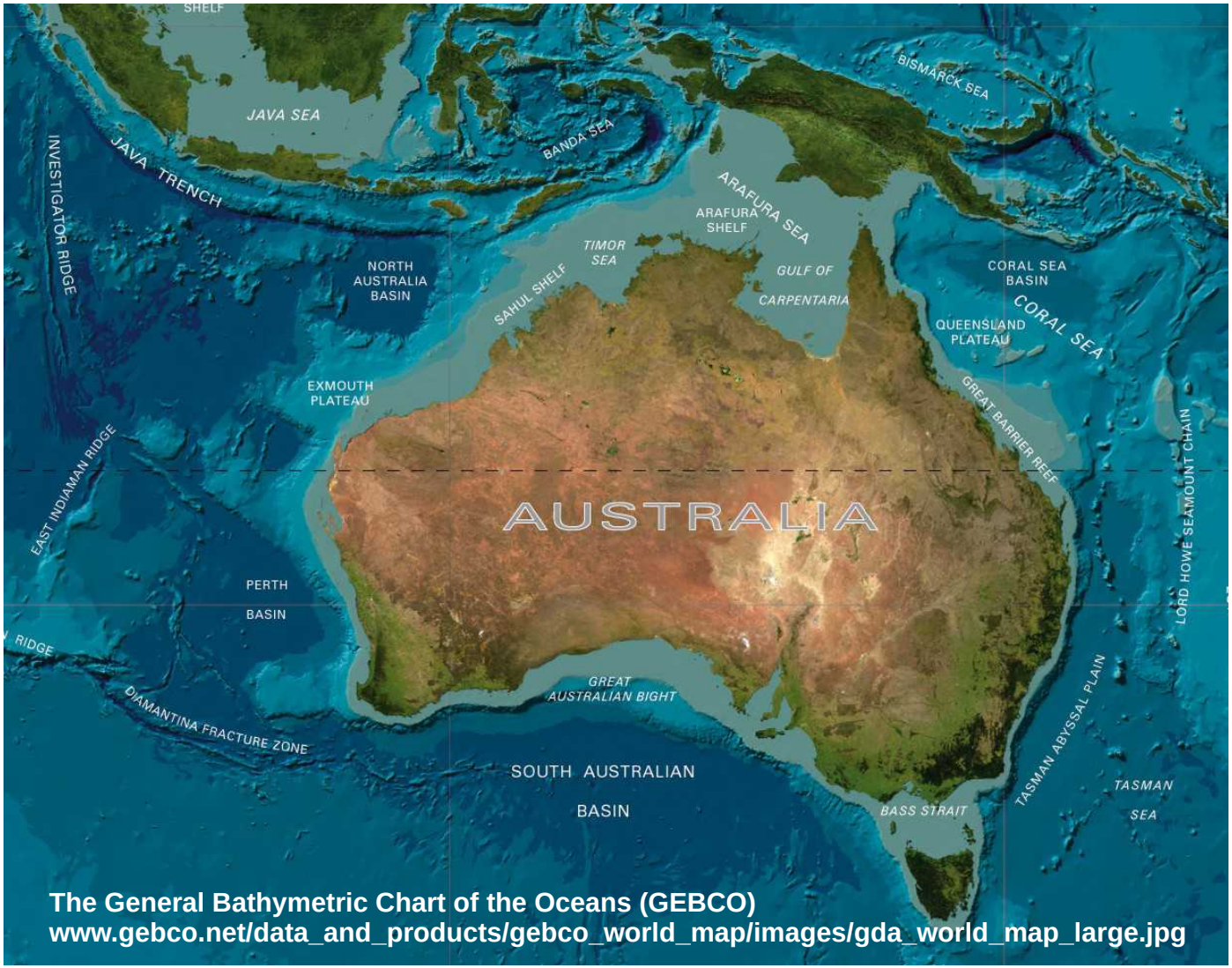
Ploted on a map of Earth showing ocean features you can easily see the 23.4º features.

Ploted on a map of Earth showing ocean features you can easily see the 23.4º features.



The General Bathymetric Chart of the Oceans (GEBCO)
www.gebco.net/data_and_products/gebco_world_map/images/gda_world_map_large.jpg

There are others in Australia with 23.4º features.



The General Bathymetric Chart of the Oceans (GEBCO)
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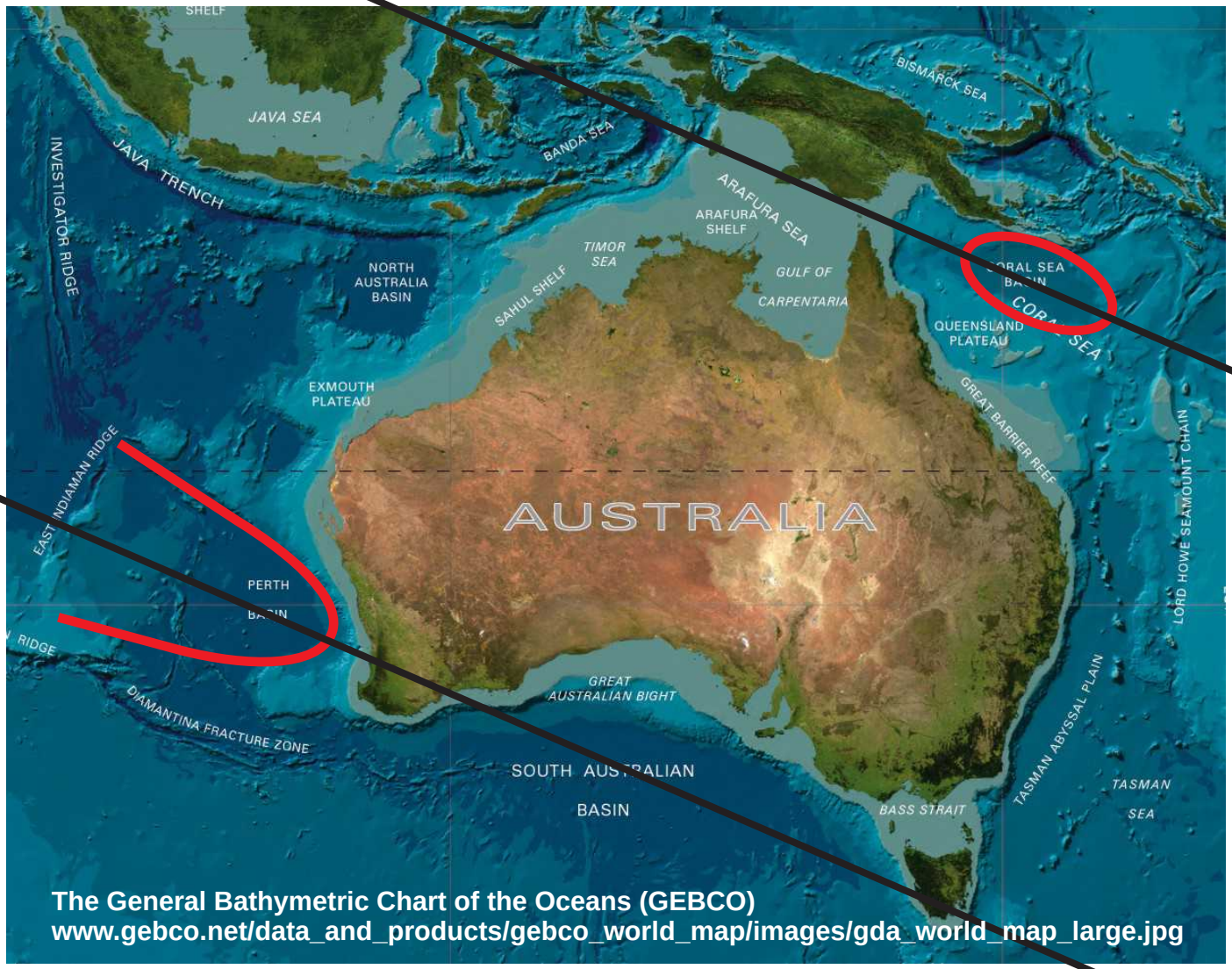
There are others in Australia with 23.4º features.



The General Bathymetric Chart of the Oceans (GEBCO)
www.gebco.net/data_and_products/gebco_world_map/images/gda_world_map_large.jpg

And in North America with 23.4º features.

The General Bathymetric Chart of the Oceans (GEBCO)
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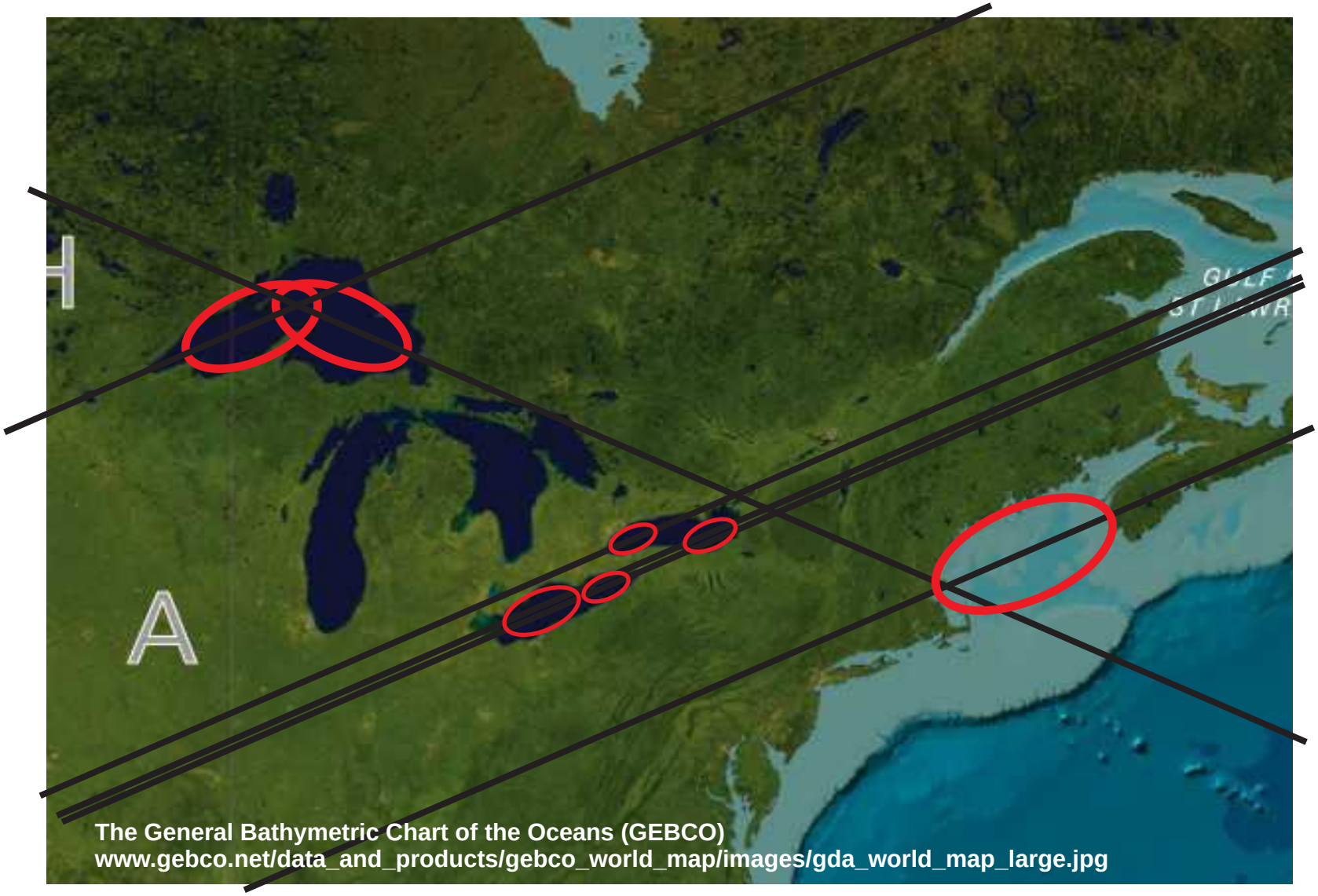
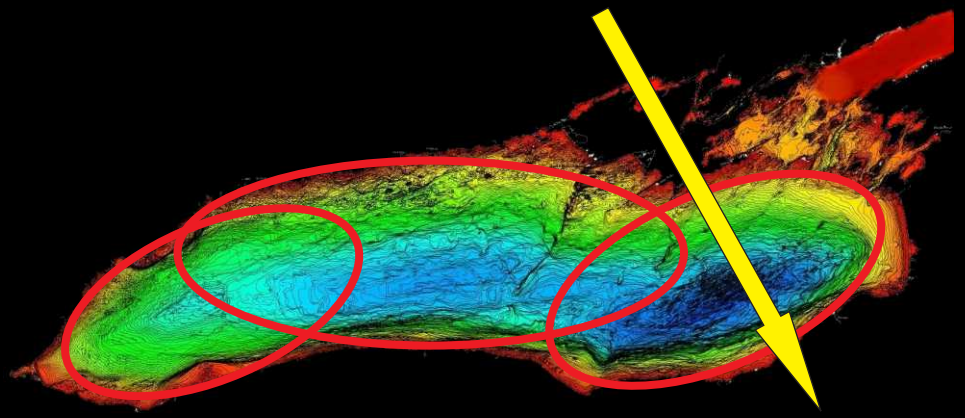
And in North America with 23.4º features.

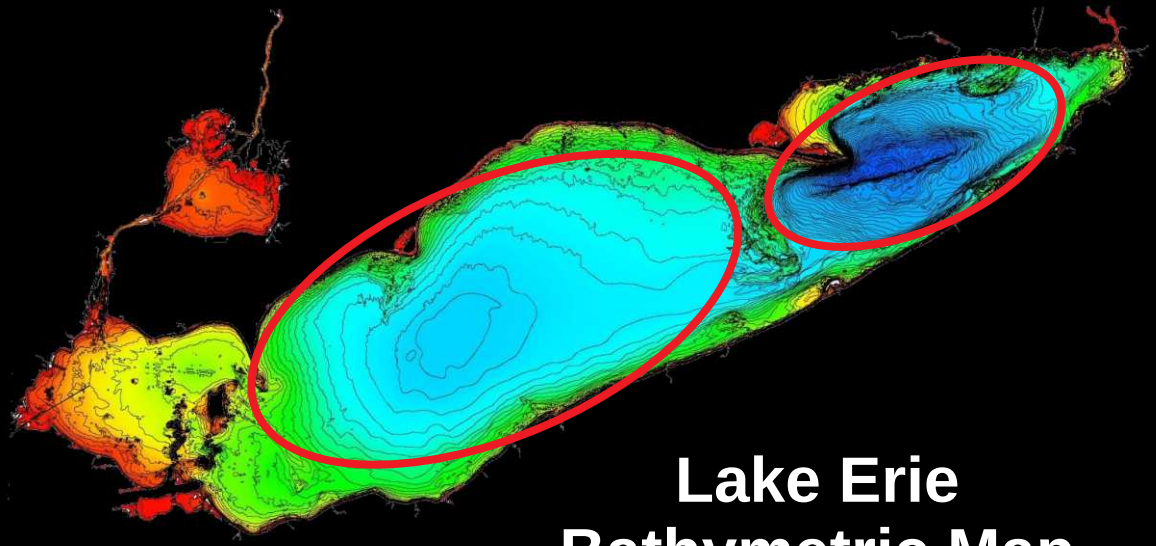


The General Bathymetric Chart of the Oceans (GEBCO)
www.gebco.net/data_and_products/gebco_world_map/images/gda_world_map_large.jpg

The Great Lakes are distorted by glaciers, but the 23.4º features are prominent.



Lake Ontario Bathymetric Map



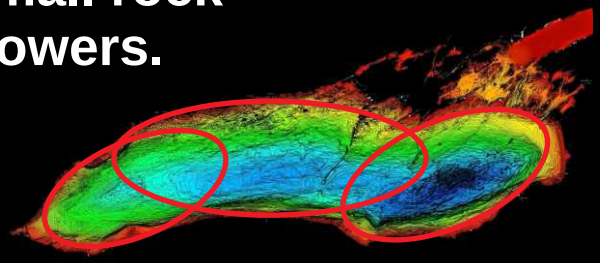
Lake Erie Bathymetric Map

Lakes Erie and Ontario are too shallow for a explosive or penetration impact: they would fit very low angle impacts that skipped.

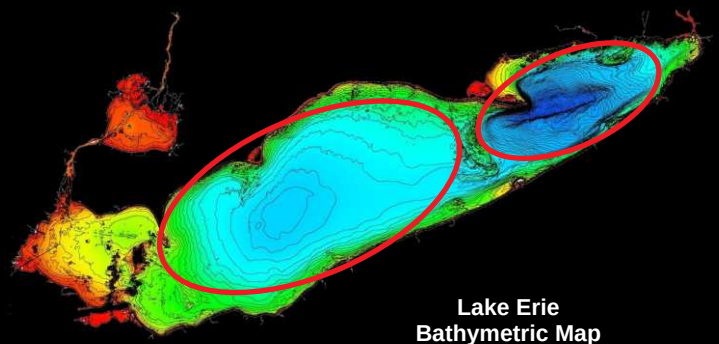
As skips, a lot of the ejecta would have been tossed at speeds near the speed of the impacting body: 30 - 70 km/sec.

The ejecta speed is well past escape velocity.

Such skips would create clouds of dust and small rock that would come back each year as meteor showers.



Lake Ontario
Bathymetric Map



Lake Erie
Bathymetric Map

The test of a good theory is its ability to predict that which is not otherwise predictable.

This theory predicts impacts are larger and more common than previously recognized.

Can a 23.4º feature be found that explains something that seems impossible and is presently a mystery?

The Hoba Meteorite, Namibia.

The largest meteorite in the world @ 66 tonne
It was found resting on the surface of the land.

It is estimated to have fallen in the last 80,000 years
based on the radiometric dating of 59Ni, a spallation product nuclide.

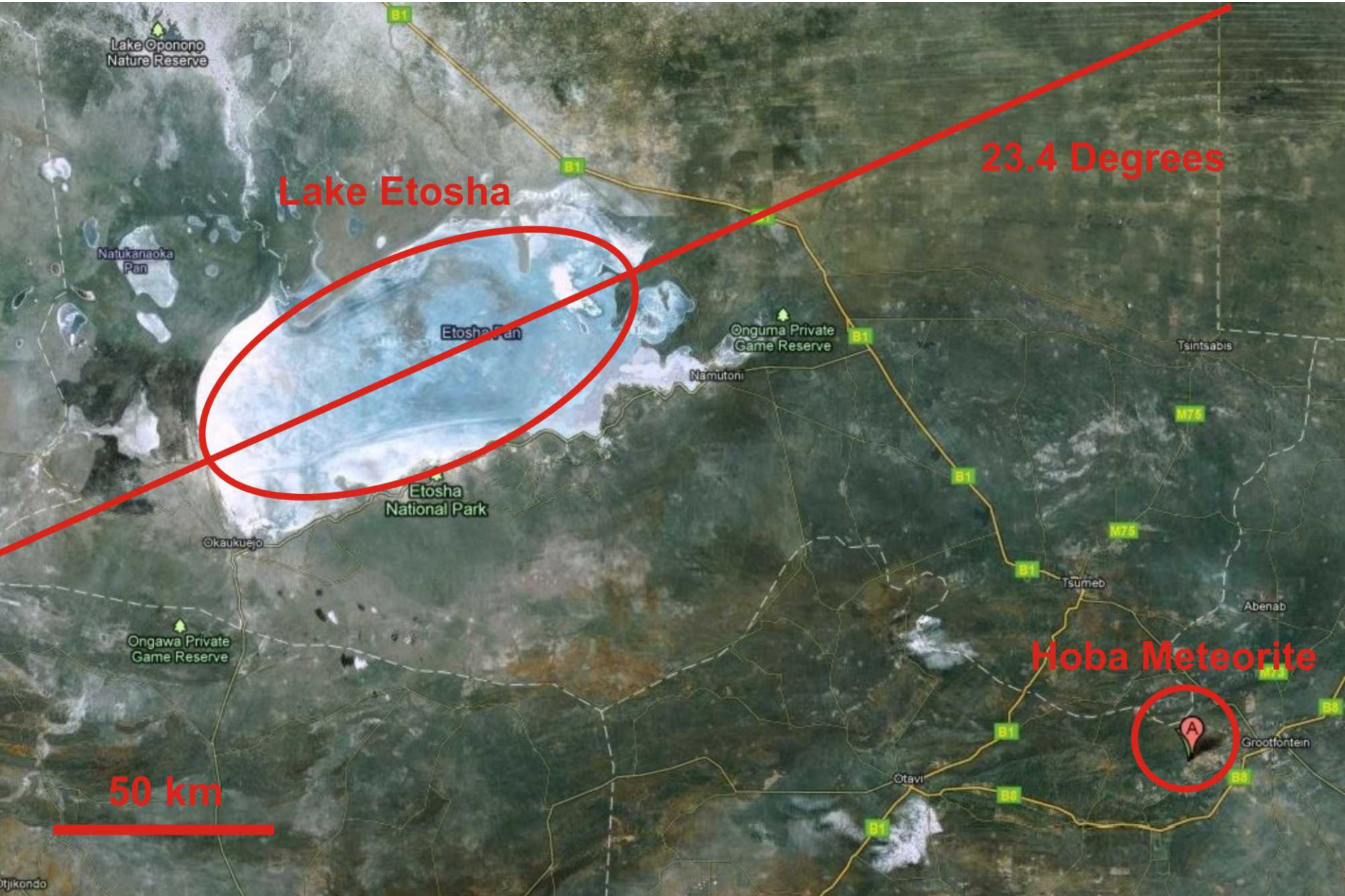
According to the Earth Impact Effects Program, if it fell at the lowest possible impact speed of a meteoroid @ 11 km/s, it would have formed a crater of 80 - 100 meters diameter, and be buried 30 meters deep.

At present it is postulated that it somehow skipped on the atmosphere and slowed down, and landed gently.

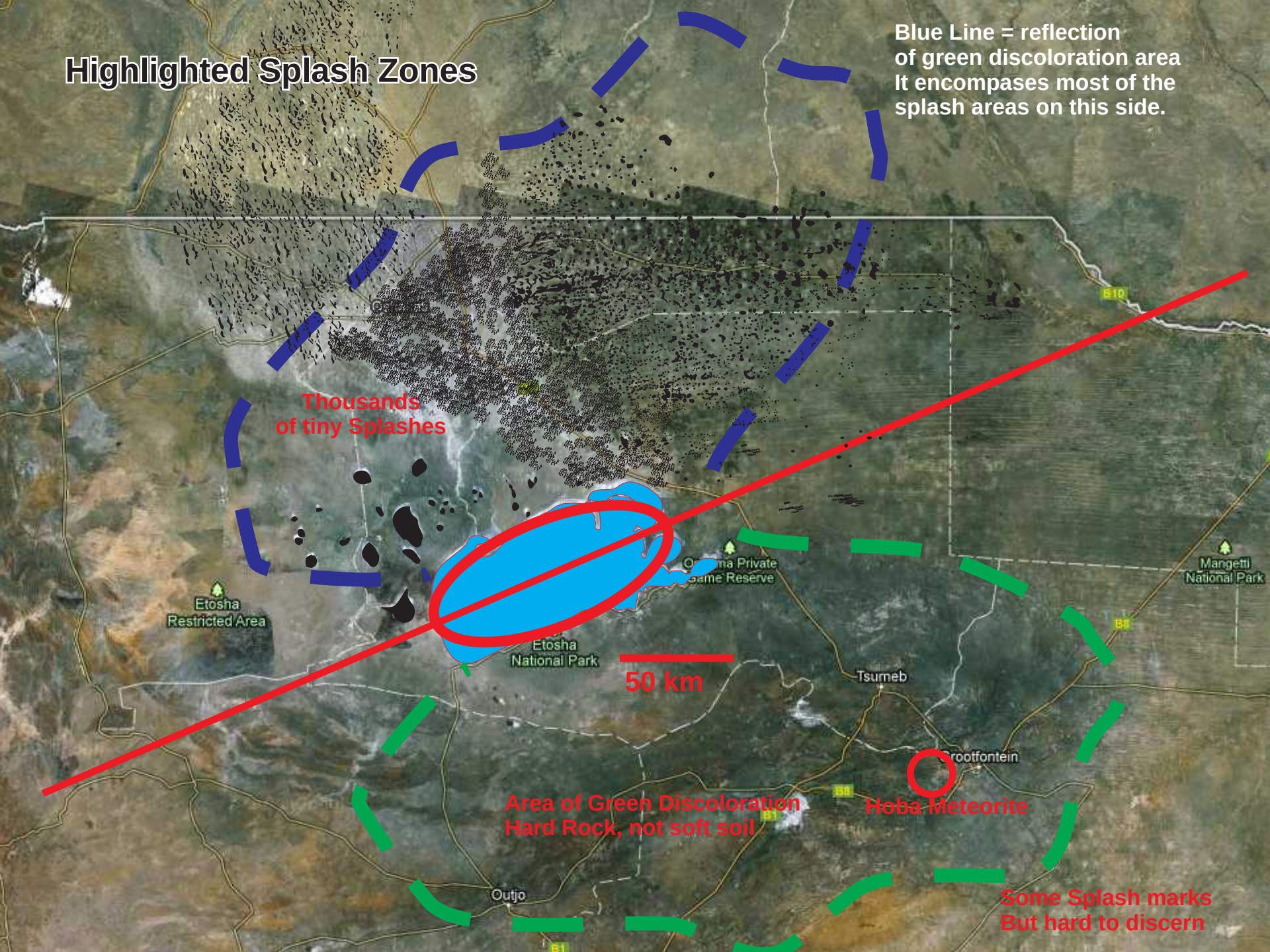
Since that is not possible, it must be a piece of a larger meteor or comet and broke off during a splash impact.

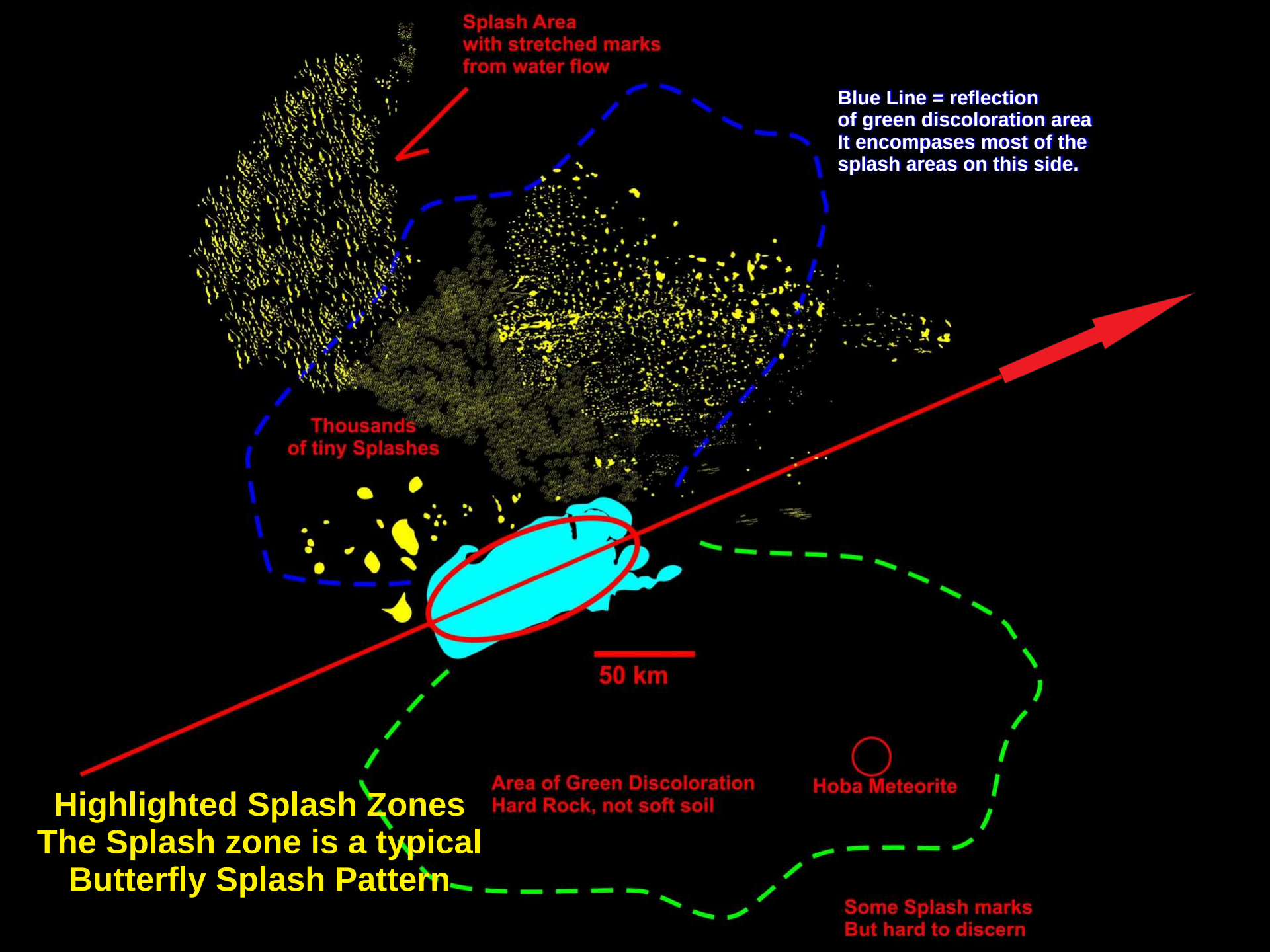
The splash crater should be near. It would be convenient if it was at 23.4º

Etosha Pan (or lake) is 150 km from the Hoba meteor




The area around Etosha is a huge splash pattern.
The white blotches and spots are depressions in the land.
Mainly used for farming at present.
The south area is hard rock and
has no depressions, but it is darker
colored than the rest of the land,
and the darker coloration
is in a matching pattern
to the splash depressions
to the north.
Oshakati
B1
B10
Etosha Pan
Onguma Private
Game Reserve
Mangetti
National Park
Etosha
Restricted Area
Etosha
National Park
Tsumeb
B8
Grootfontein
Outjo


Highlighted Splash Zones
Blue Line = reflection
of green discoloration area
It encompasses most of the
splash areas on this side.
Thousands
of tiny Splashes
Etosha
Restricted Area
Etosha
National Park
50 km
Tsumeb
Mangetti
National Park
Area of Green Discoloration
Hard Rock, not soft soil
Hoba Meteorite
Outjo
Some Splash marks
But hard to discern


Splash Area
with stretched marks
from water flow
Blue Line = reflection
of green discoloration area
It encompasses most of the
splash areas on this side.
Thousands
of tiny Splashes
50 km
Area of Green Discoloration
Hard Rock, not soft soil
Hoba Meteorite
Some Splash marks
But hard to discern
Highlighted Splash Zones
The Splash zone is a typical
Butterfly Splash Pattern


The area to the north is a huge splash pattern
With depressions now used for farming.
Images from Google Map.
Onehova
Onauwanga
Omundaungilo
Opepela
Onandjaba
Eeshowa
Oshuli
Oushini
Okambabwena
C45
Onamundidi
Omvil
Oshikunde
Onangolo
Ohauyave
Omulonga
Onamudime
Oininive
Ombug
Onhunda
Oneshiyo
Oshombwa
Oshilambwili
Eshosho
Oshifitu
Otyaityava
Oluno
Most of the depressions
have a bump or hole
in the center
Farm House
with fence around
the property.

The depressions are shallow holes - bowl shaped.

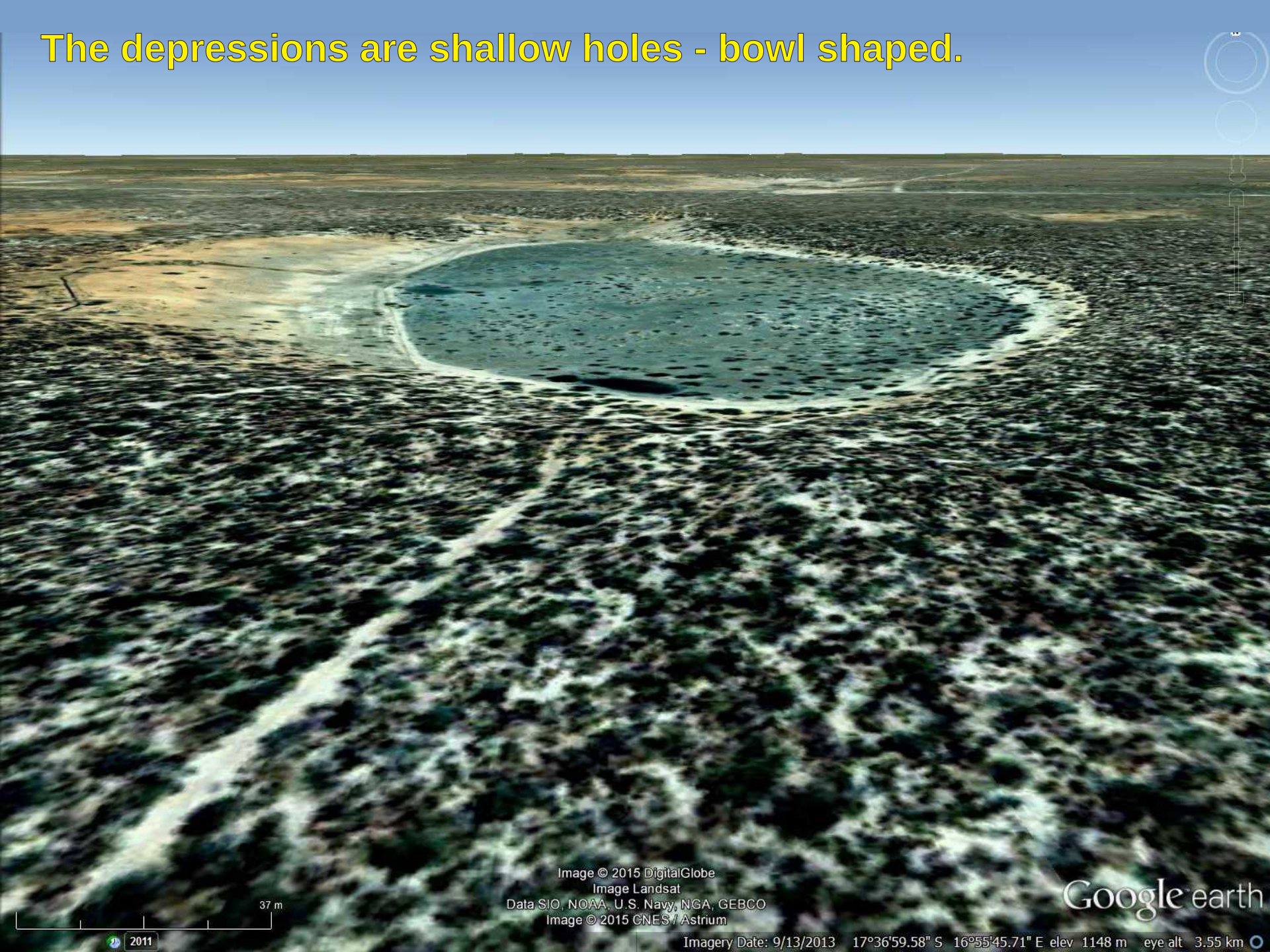



Image Landsat
79 km
Google earth
Imagery Date: 4/9/2013 18°03'27.82" S 16°48'43.93" E elev 1127 m eye alt 357.69 km


N
Image Landsat
99 km
Google earth
Imagery Date: 4/9/2013 18°04'58.96" S 16°40'52.43" E elev 1125 m eye alt 178.22 km


24.3 km
Image Landsat
Google earth
Imagery Date: 4/9/2013 18°04'25.56" S 16°37'46.12" E elev 1122 m eye alt 112.58 km

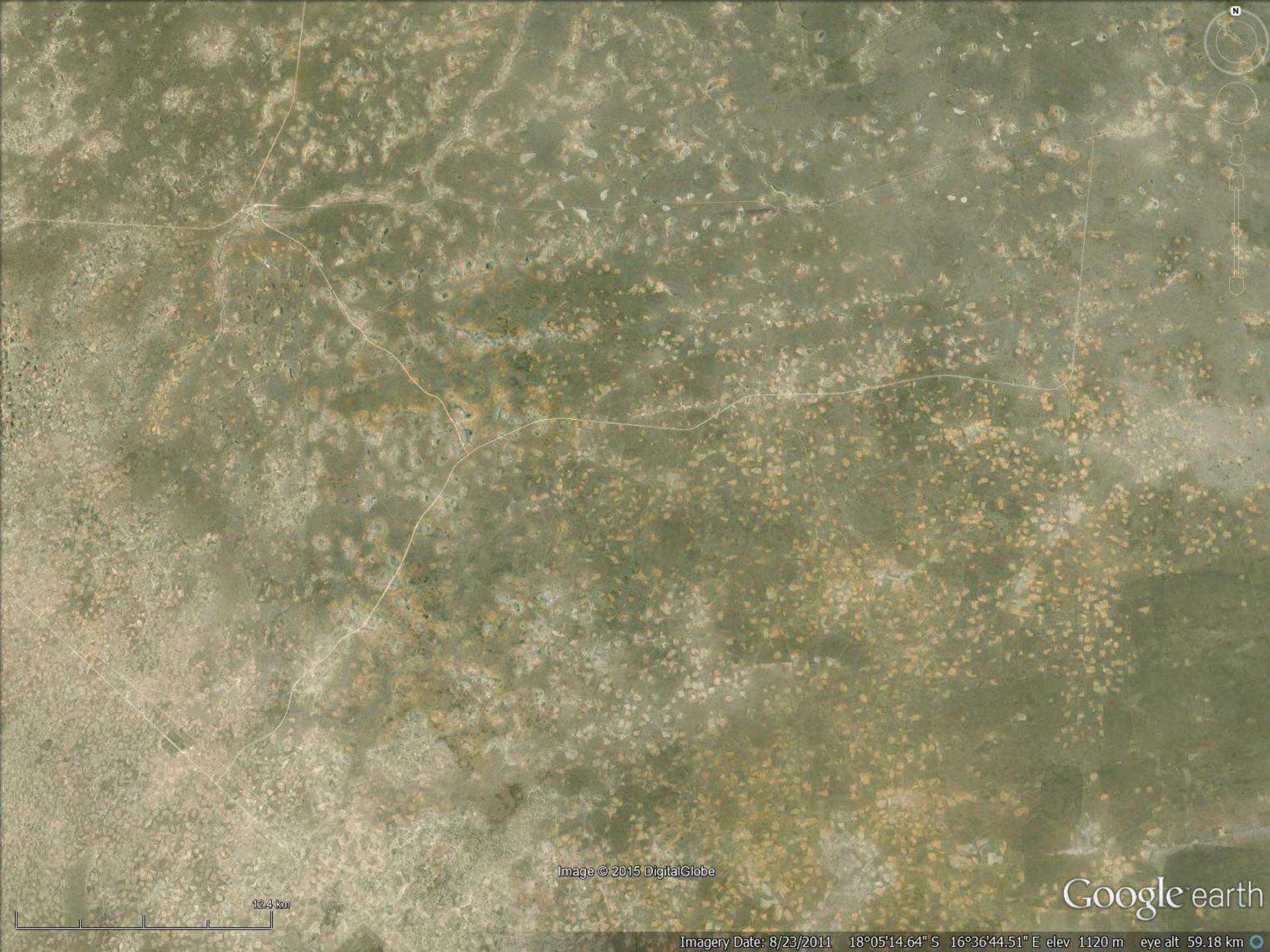


Image © 2015 DigitalGlobe
12.4 km
Google earth
Imagery Date: 8/23/2011 18°05'14.64" S 16°36'44.51" E elev 1120 m eye alt 59.18 km

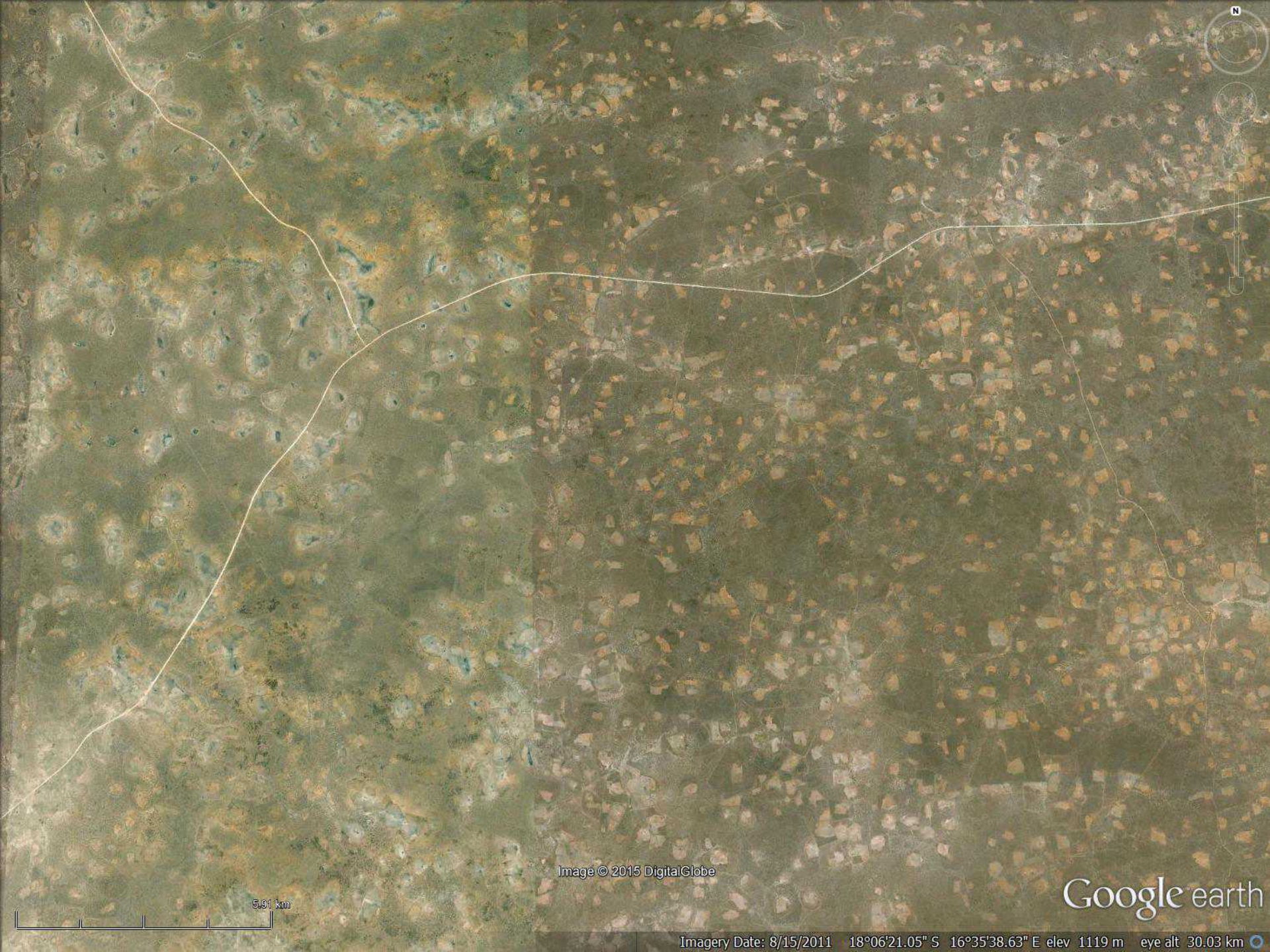


Image © 2015 DigitalGlobe
5.91 km
Google earth
Imagery Date: 8/15/2011 18°06'21.05" S 16°35'38.63" E elev 1119 m eye alt 30.03 km

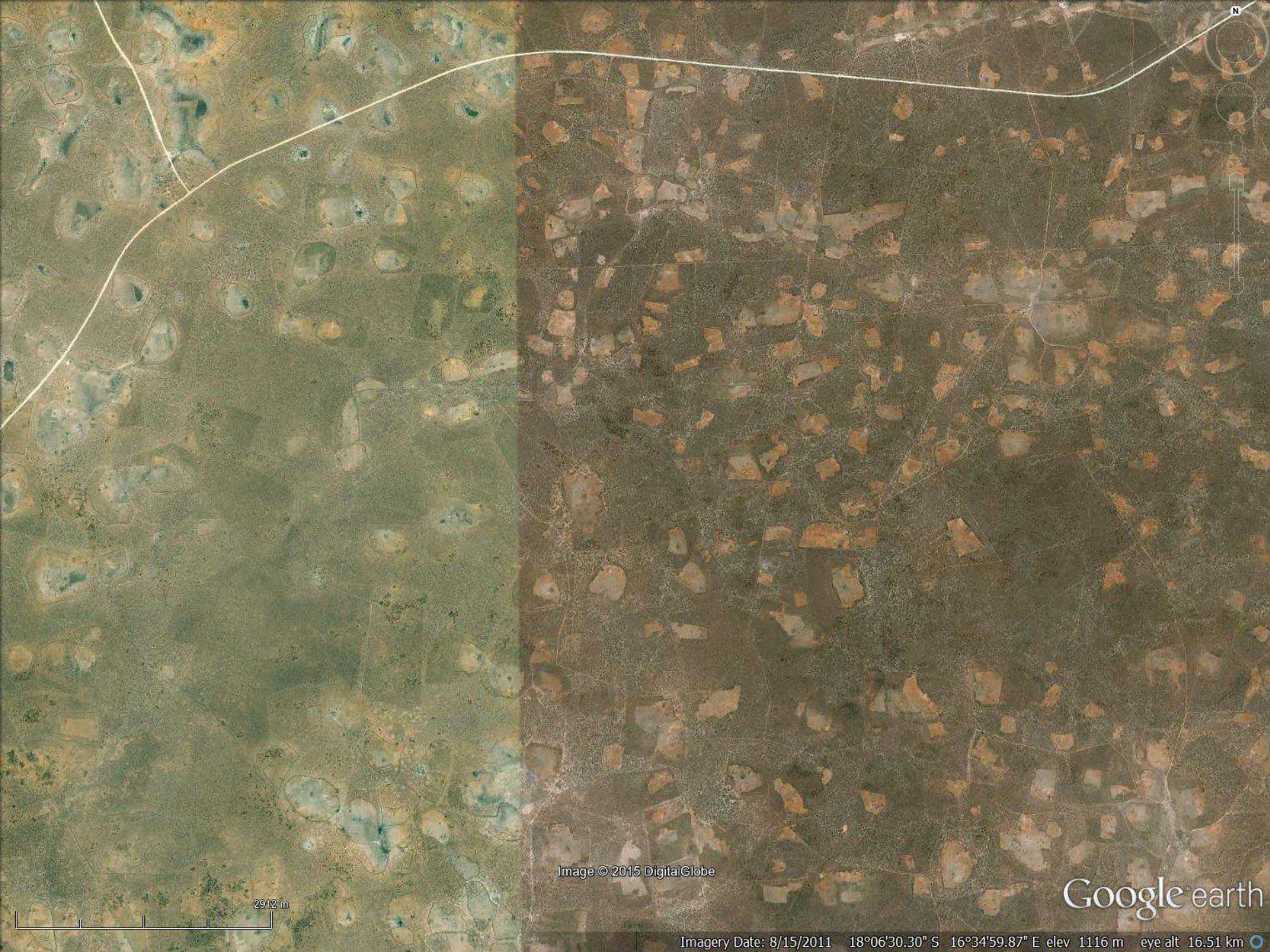

N
Image © 2015 DigitalGlobe
2912 m
Google earth
Imagery Date: 8/15/2011 18°06'30.30" S 16°34'59.87" E elev 1116 m eye alt 16.51 km


Image © 2015 DigitalGlobe
1417 m
2003
Google earth
Imagery Date: 8/15/2011 18°06'34.79" S 16°34'51.47" E elev 1118 m eye alt 9.76 km


Image © 2015 DigitalGlobe
Google earth
726 m
2003
Imagery Date: 8/15/2011 18°06'32.96" S 16°34'46.29" E elev 1116 m eye alt 6.73 km


Image © 2015 DigitalGlobe
Google earth
431 m
2003
Imagery Date: 8/15/2011 18°06'39.48" S 16°34'42.79" E elev 1114 m eye alt 5.35 km


Image © 2015 DigitalGlobe
242 m
2003
Google earth
Imagery Date: 8/15/2011 18°06'41.63" S 16°34'40.73" E elev 1114 m eye alt 4.41 km


Image © 2015 DigitalGlobe
Google earth
162 m
2003
Imagery Date: 8/15/2011 18°06'45.29" S 16°34'40.11" E elev 1114 m eye alt 3.99 km


Image © 2015 DigitalGlobe
Image Landsat
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
98 m
2007
Google earth
Imagery Date: 4/9/2013 18°06'54.34" S 16°34'38.27" E elev 1115 m eye alt 3.68 km

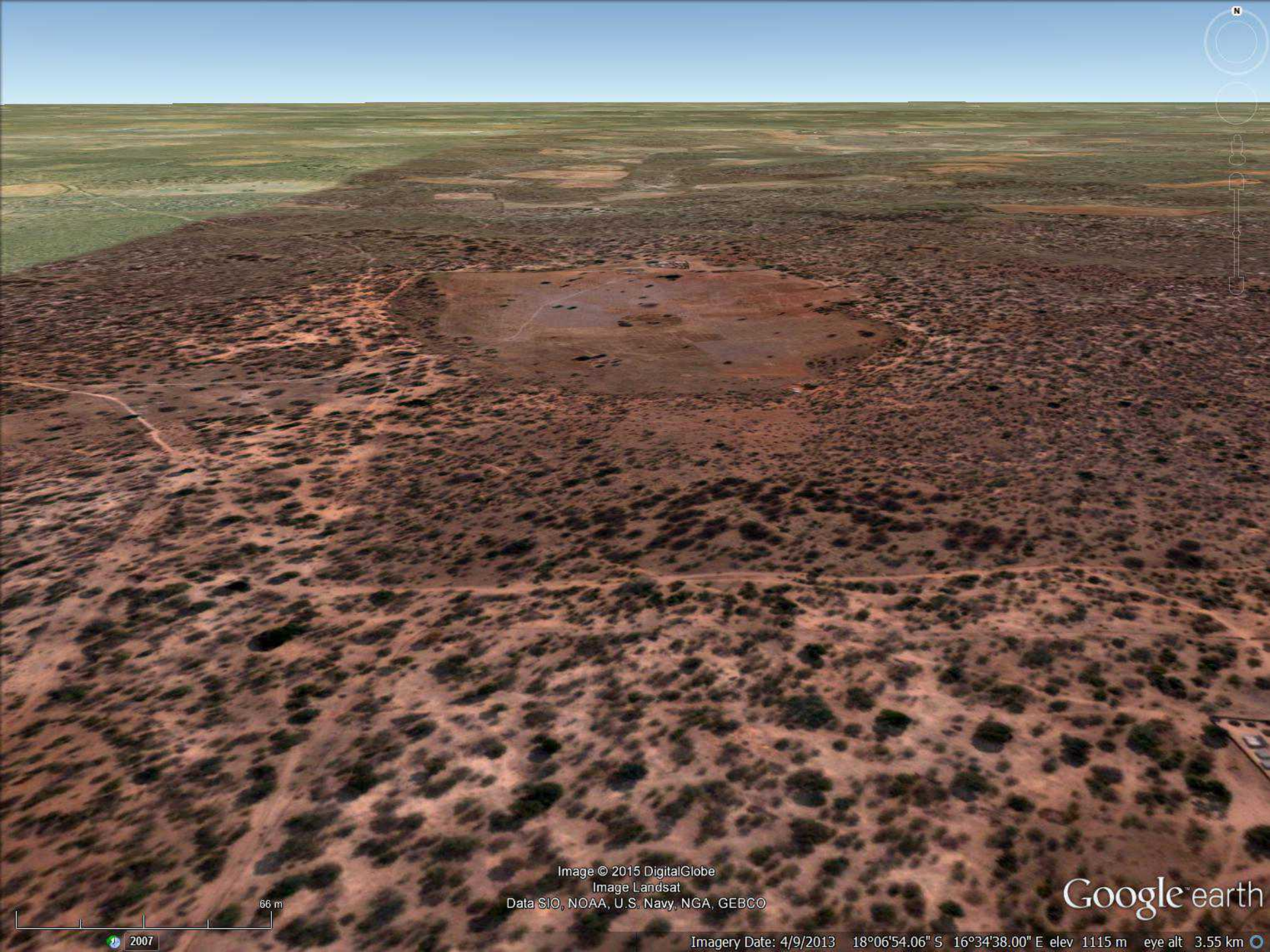


Image © 2015 DigitalGlobe
Image Landsat
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
66 m
2007
Google earth
Imagery Date: 4/9/2013 18°06'54.06" S 16°34'38.00" E elev 1115 m eye alt 3.55 km

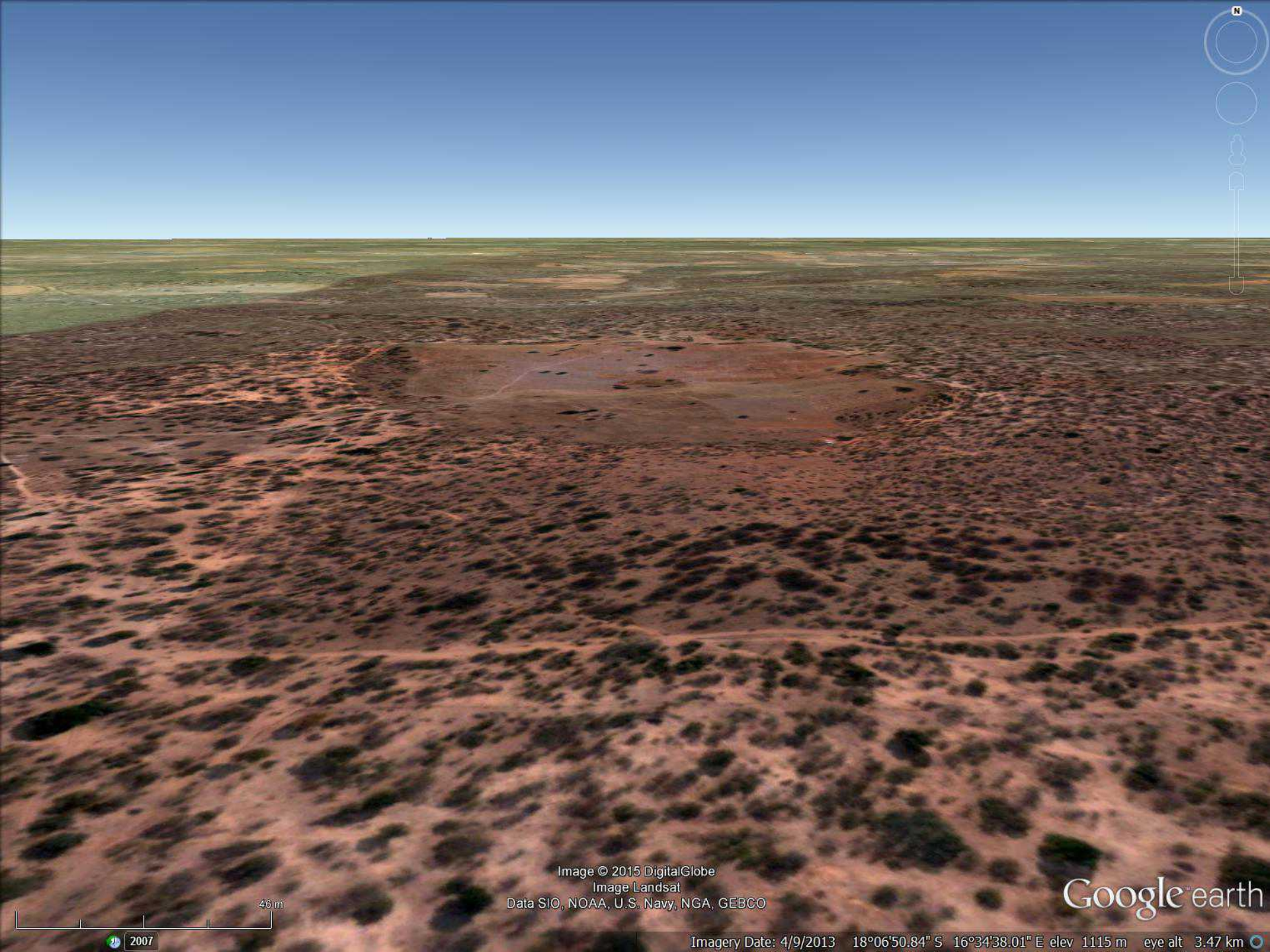
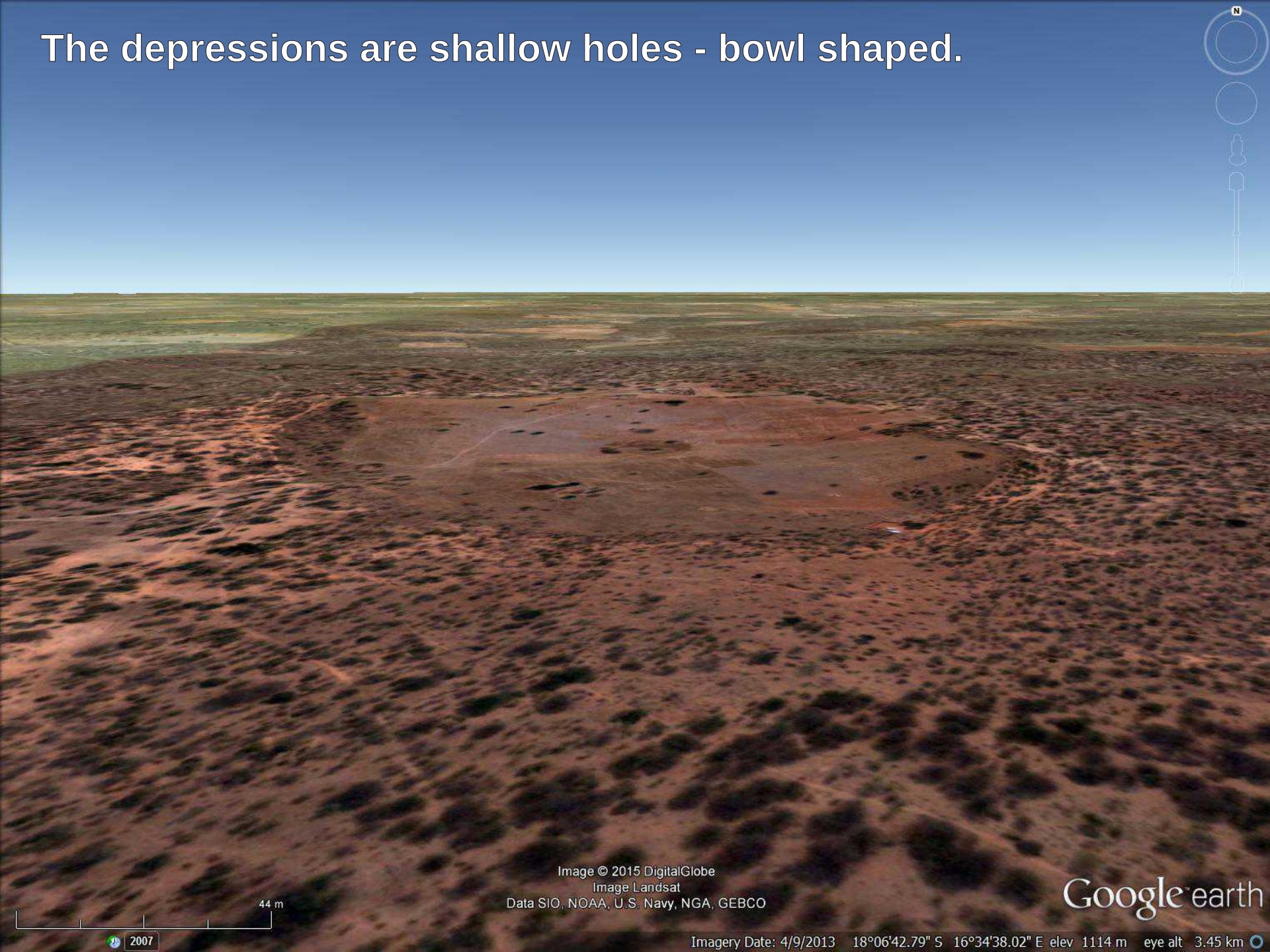


Image © 2015 DigitalGlobe
Image Landsat
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
46 m
2007
Google earth
Imagery Date: 4/9/2013 18°06'50.84" S 16°34'38.01" E elev 1115 m eye alt 3.47 km

The depressions are shallow holes - bowl shaped.



Theory said that the Hoba meteor should be from a larger impactor that broke up as it splashed on Earth nearby, tossing the Hoba fragment sideways.

Etosha Pan is 150 km away from Hoba and it is surrounded by a huge splash pattern.

Remember that Hoba is dated to 80,000 years ago or less. And it is a tiny fragment of a much larger object.

We have identified a potential crater 150 km X 50 km that is < 80,000 years old, but was so small of an impact, that it is not noticed in the historical or geological records.

"When you have eliminated the impossible,

whatever remains,

however improbable,

must be the truth."

Sherlock Holmes
The Sign of the Four, ch. 6 (1890)

If these 23.4º features are not logically Tectonic in origin, then it is logical to assume that they are are impacts.

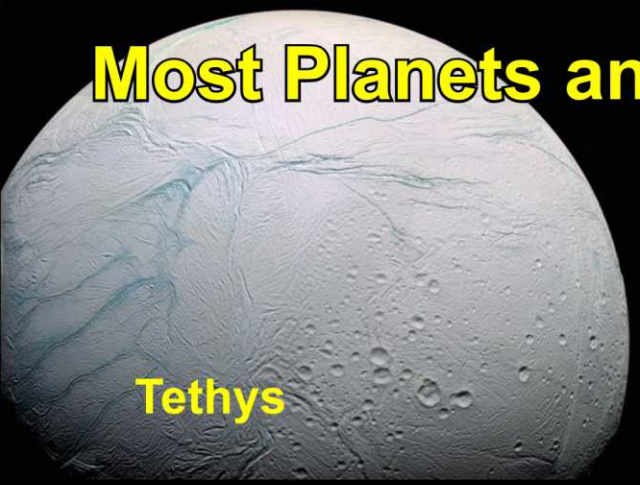
The test of a good theory is its ability to predict that which is not otherwise predictable:

Elliptical Craters should be less common than circular ones

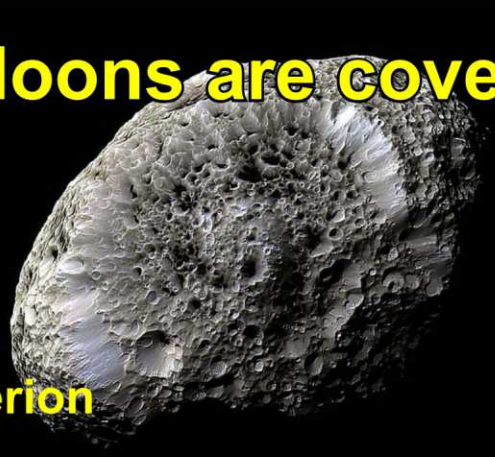
So the next Prediction is that

There should be some very large circular impact craters.

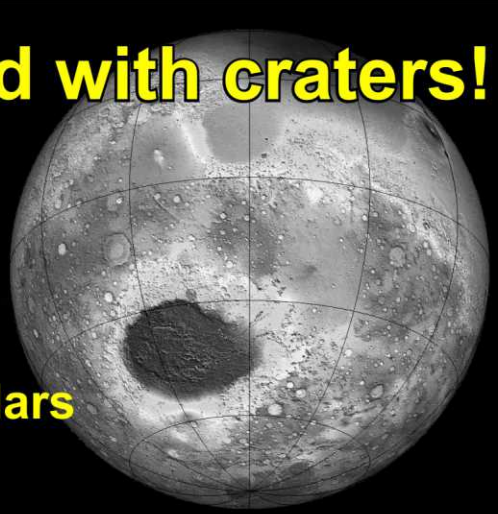
Most Planets and Moons are covered with craters!



Tethys



Hyperion

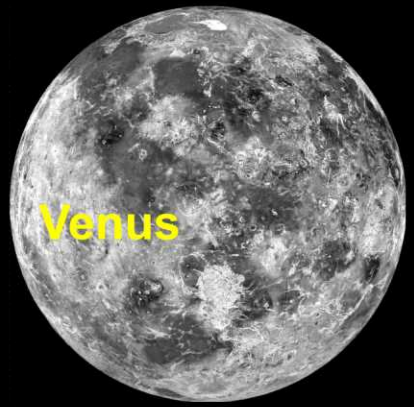


Mars

Celestia

Earth's Moon
Farside

Earth's Moon
Nearside

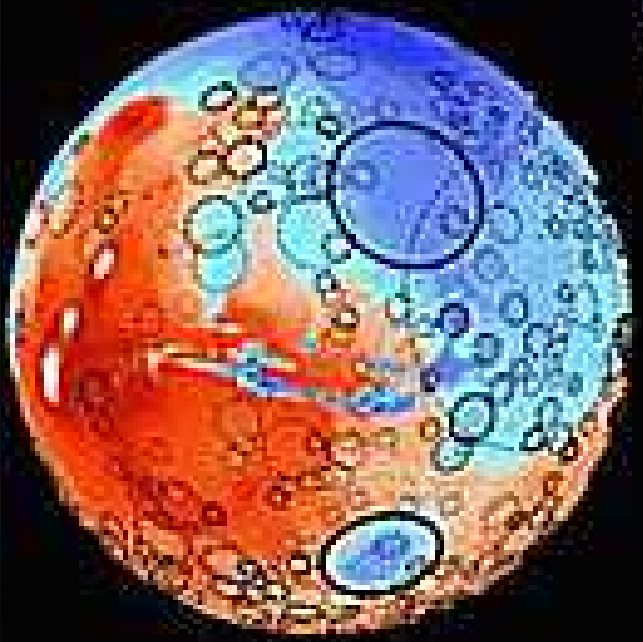


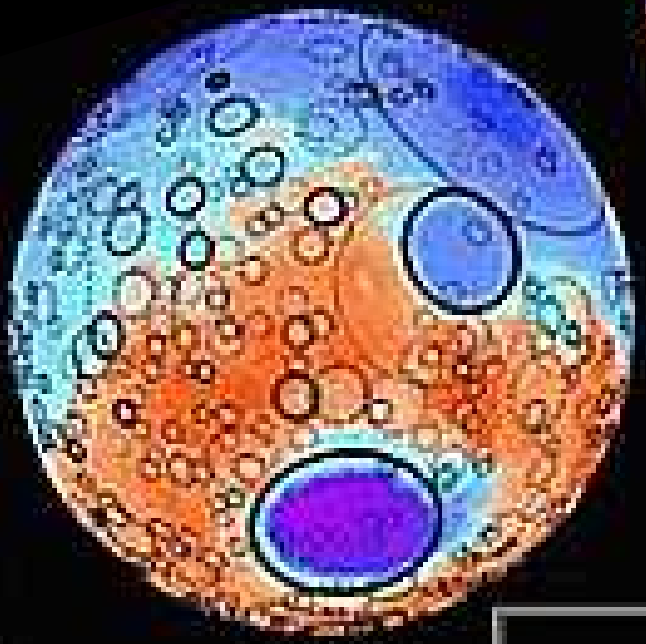
Venus

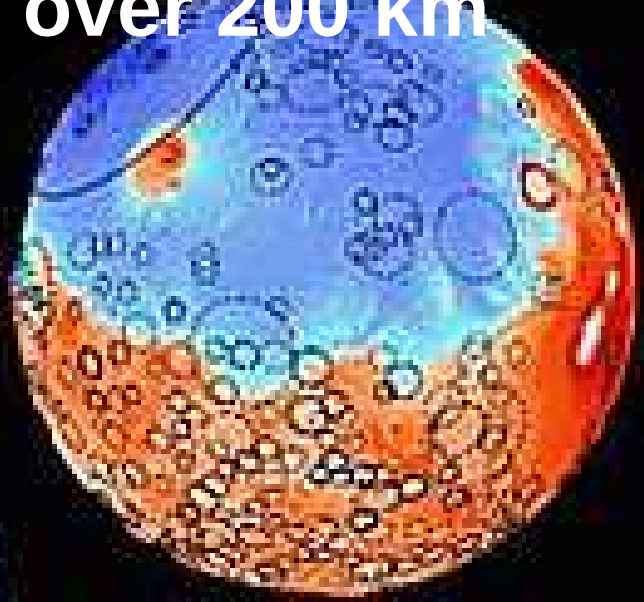
Mercury

Callisto

Mars has hundreds of craters over 200 km







	VIS	BUR	TOT
Highlands	62	359	421
Lowlands	5	101	106
Planet*	67	493	560

*Includes features in Greater Tharsis

Graphic courtesy Herb Frey

Why would Earth be the exception?

It should have hundreds of large craters also.

Following is the largest I have noted,

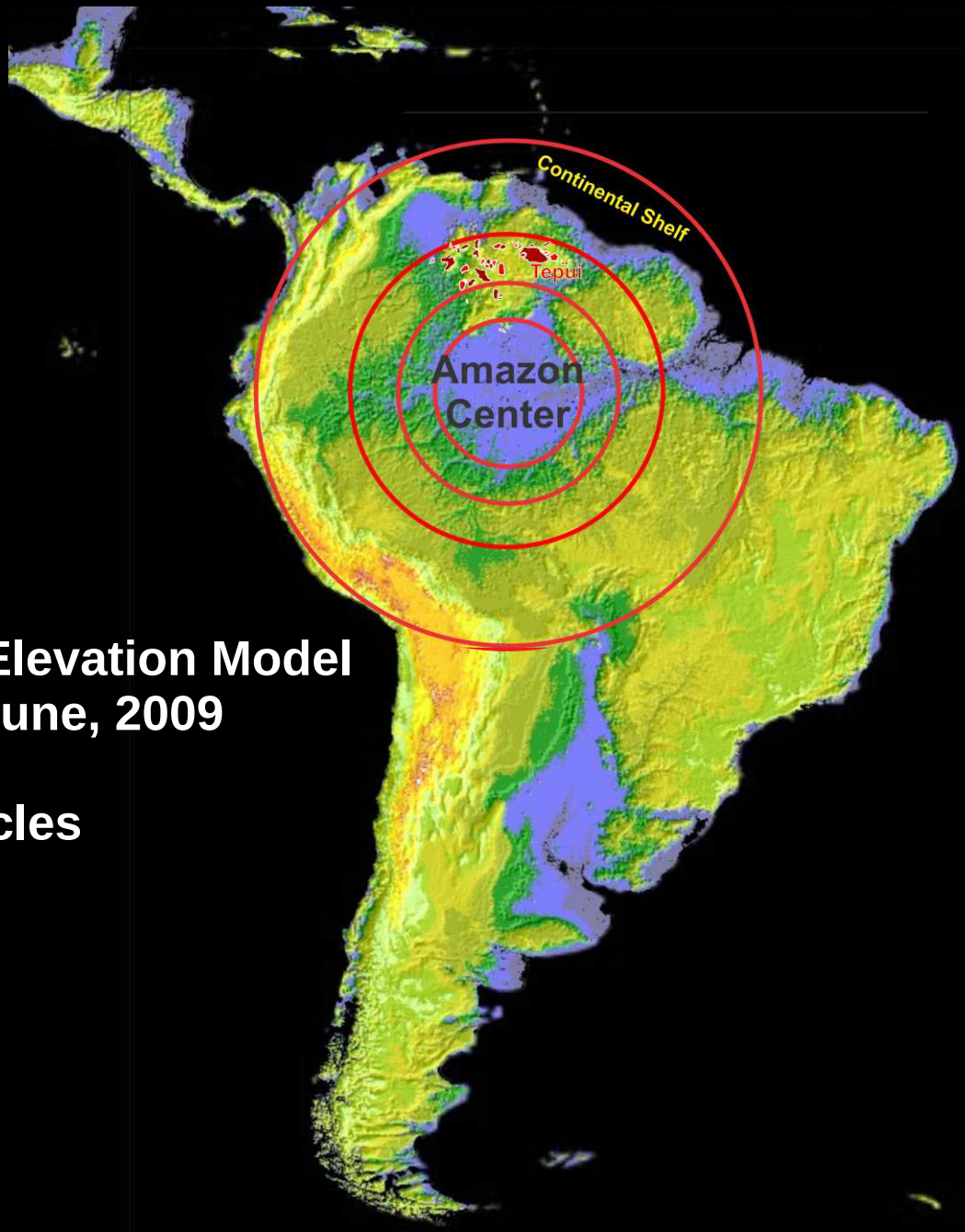
But there are other potential large craters.

South America has a perfectly circular north west coast.

NASA's Global Digital Elevation Model (GDEM) was released June, 2009

It shows a series of circles in the Amazon Basin.

South America has a perfectly circular north west coast.



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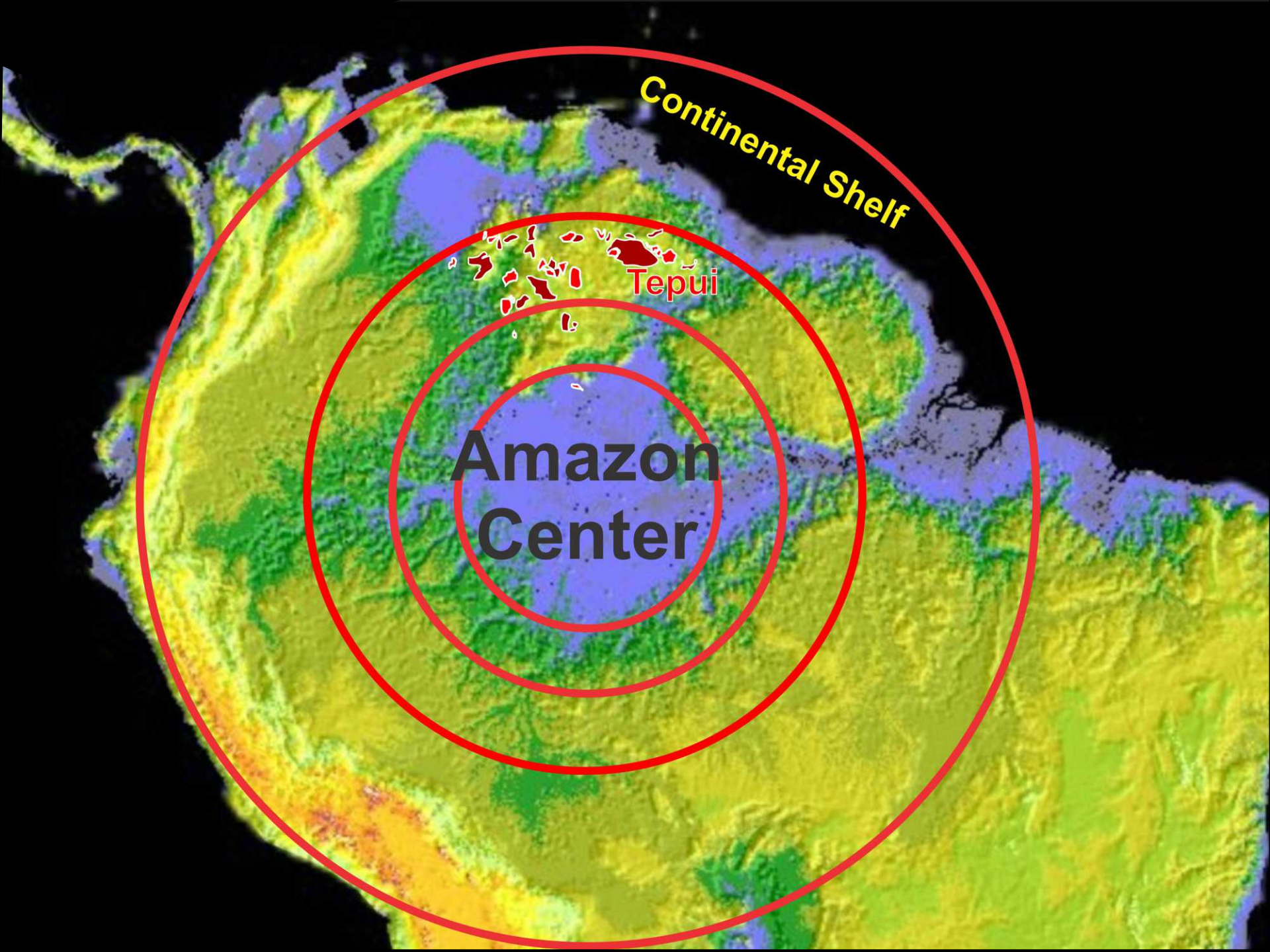
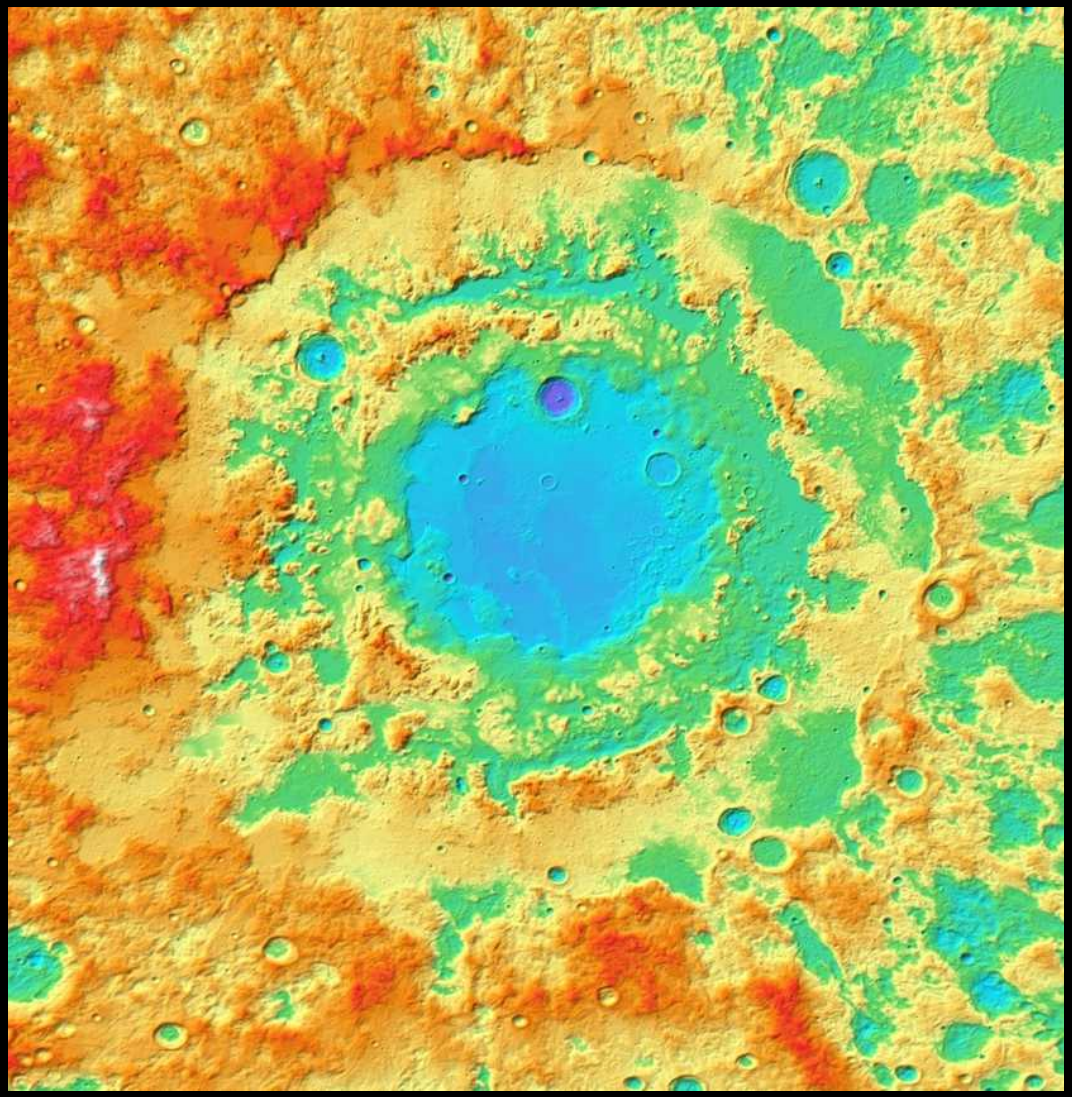
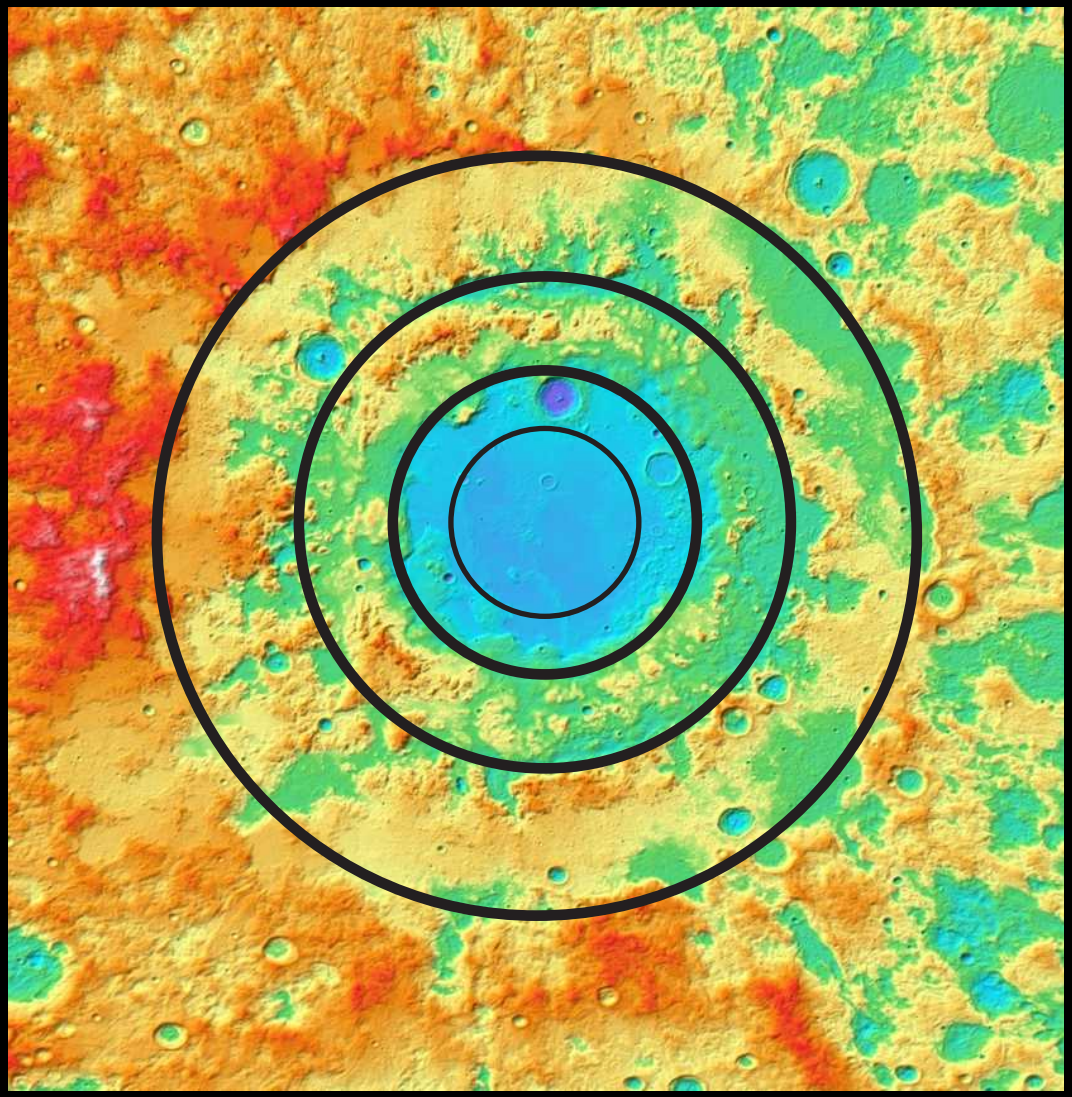

Continental Shelf
Tepui
Amazon
Center

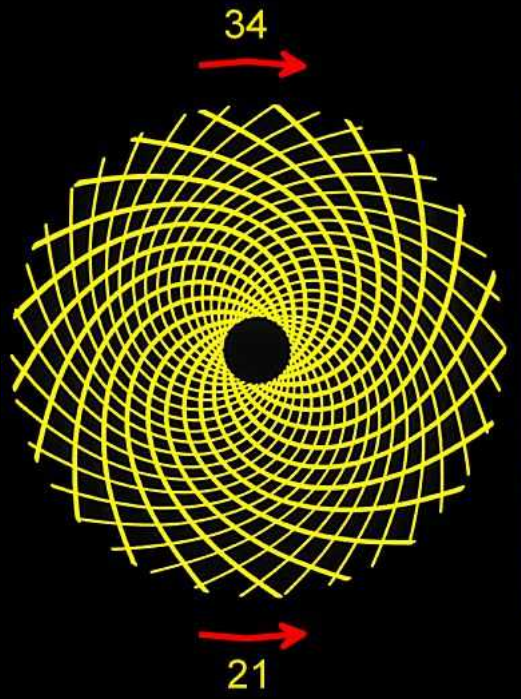
The Orientale Crater on the Moon has many similarities

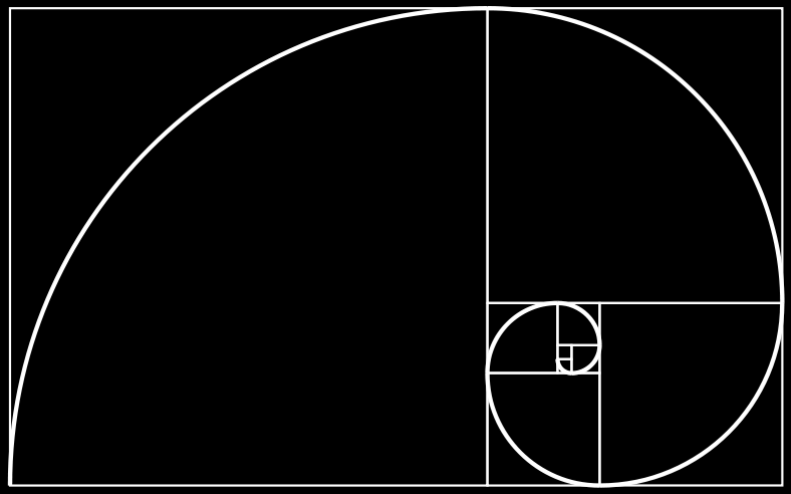


The rings of Orientale are in the same ratios as the Amazon.

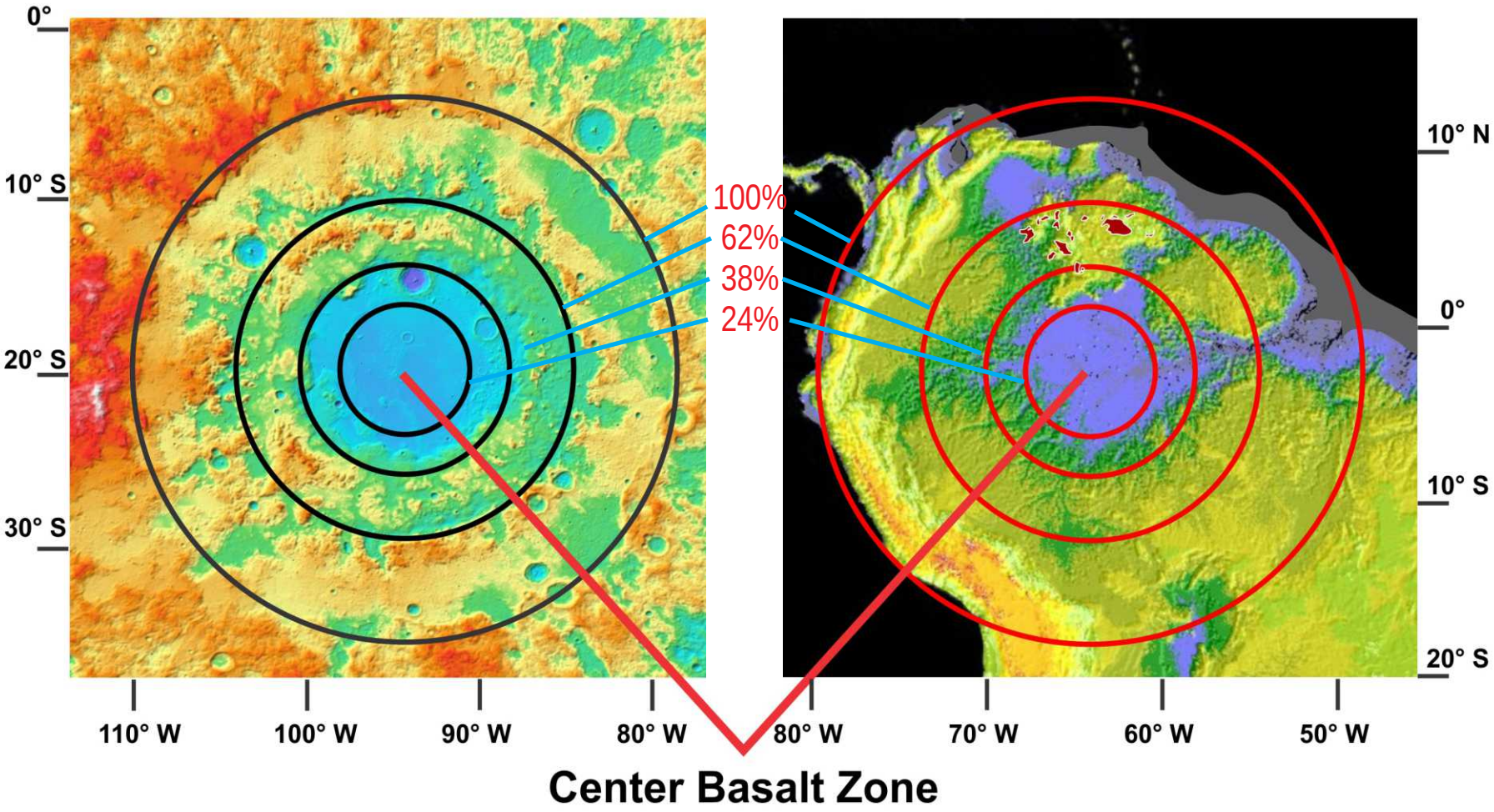


The Golden Ratio or Fibonacci Sequence is common in Nature:

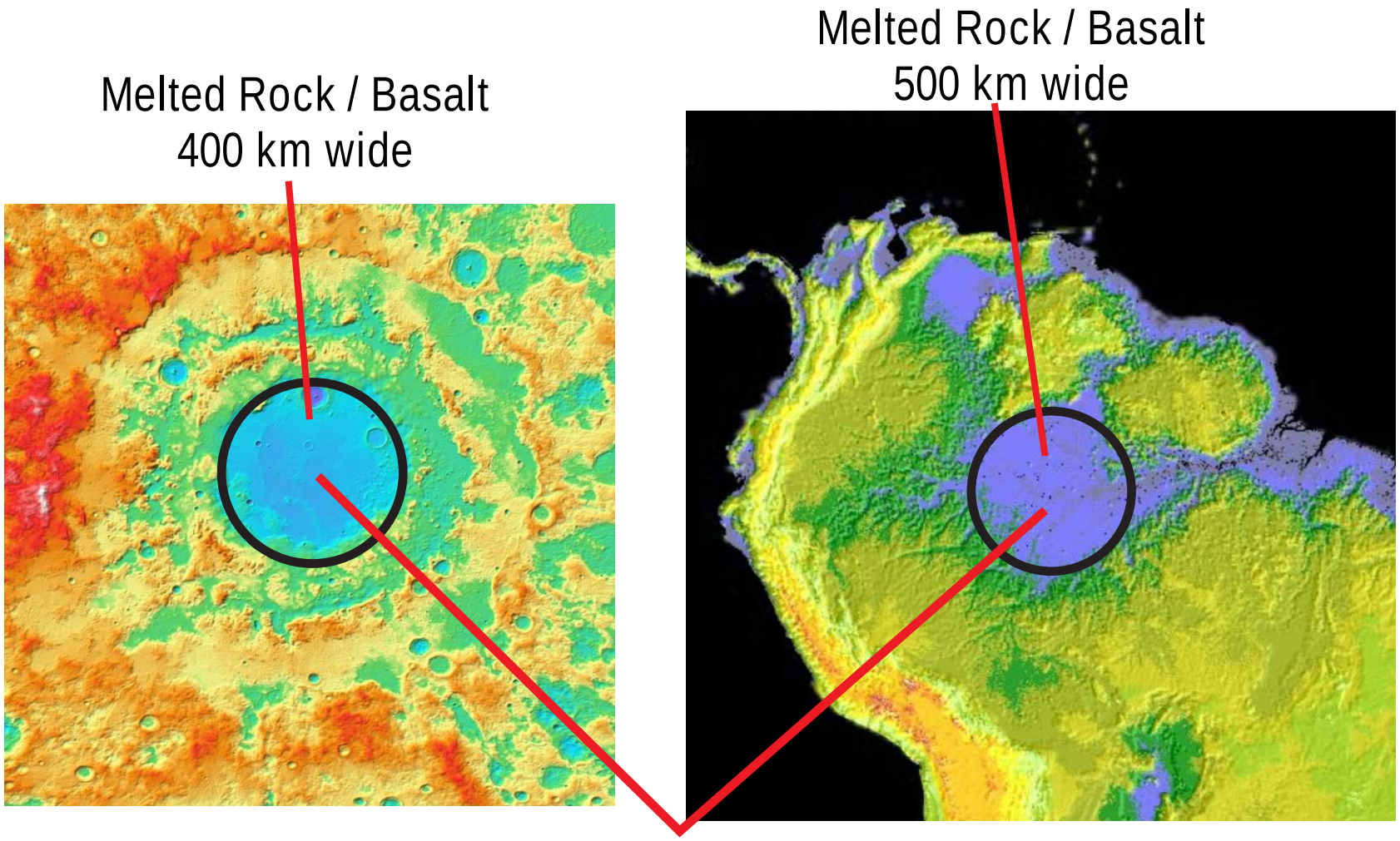




The rings of Orientale and Amazon both follow the golden ratio: 0.618



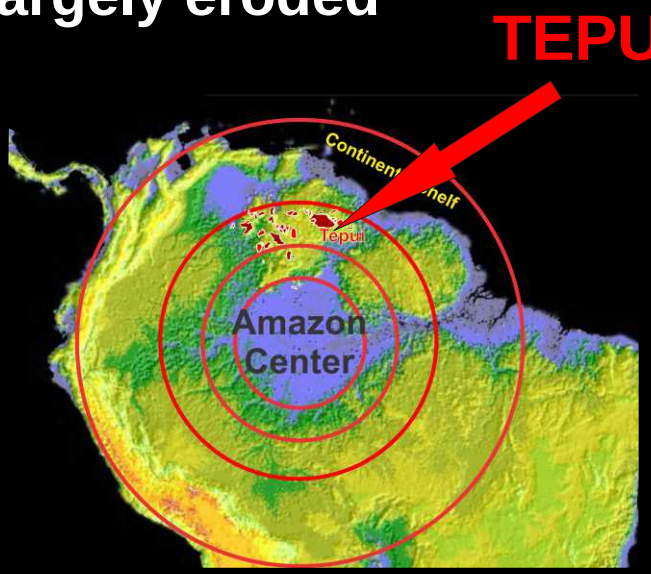
Both have the central area filled with a basalt layer.

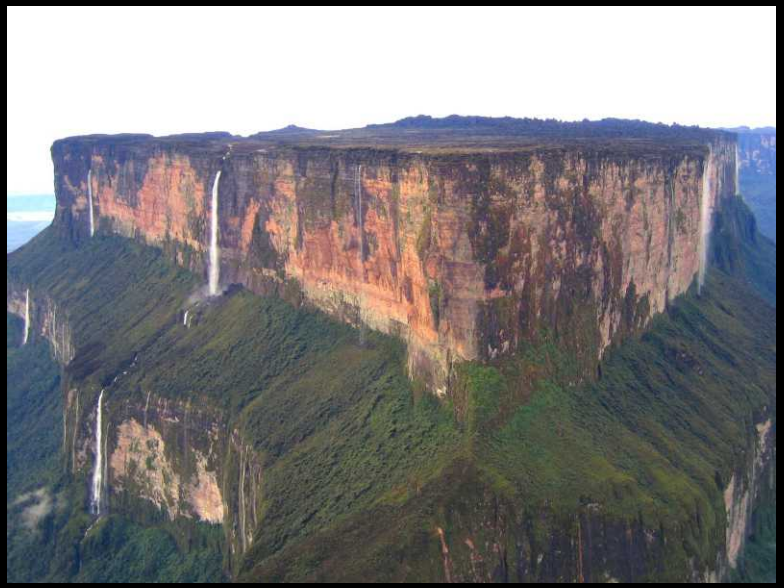


Highlands of the north east have been largely eroded leaving table top plateau or “Tepui”

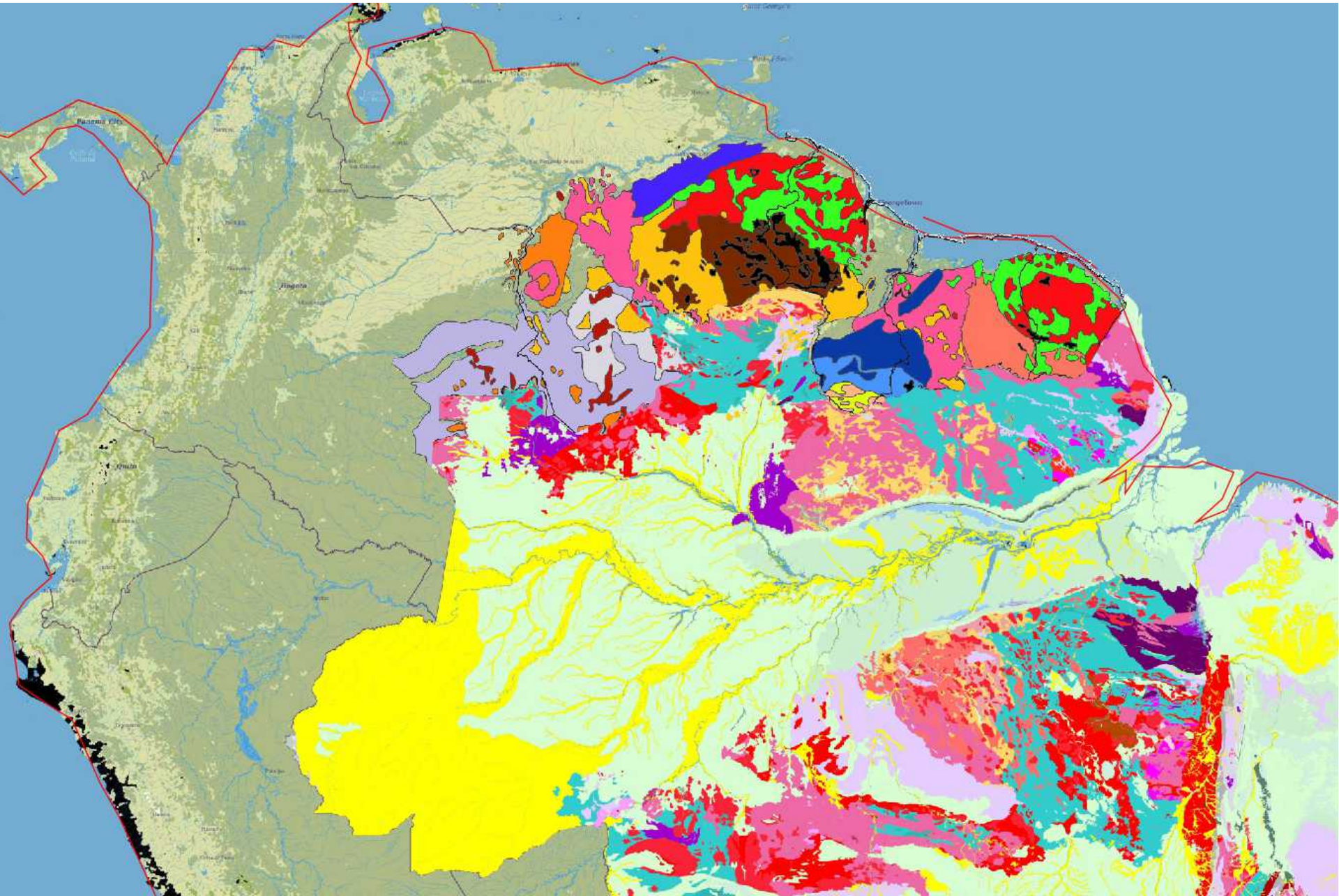
These are located in a ring, matching the third ring of Orientale.

They range from 1,000 - 3,000 m high.

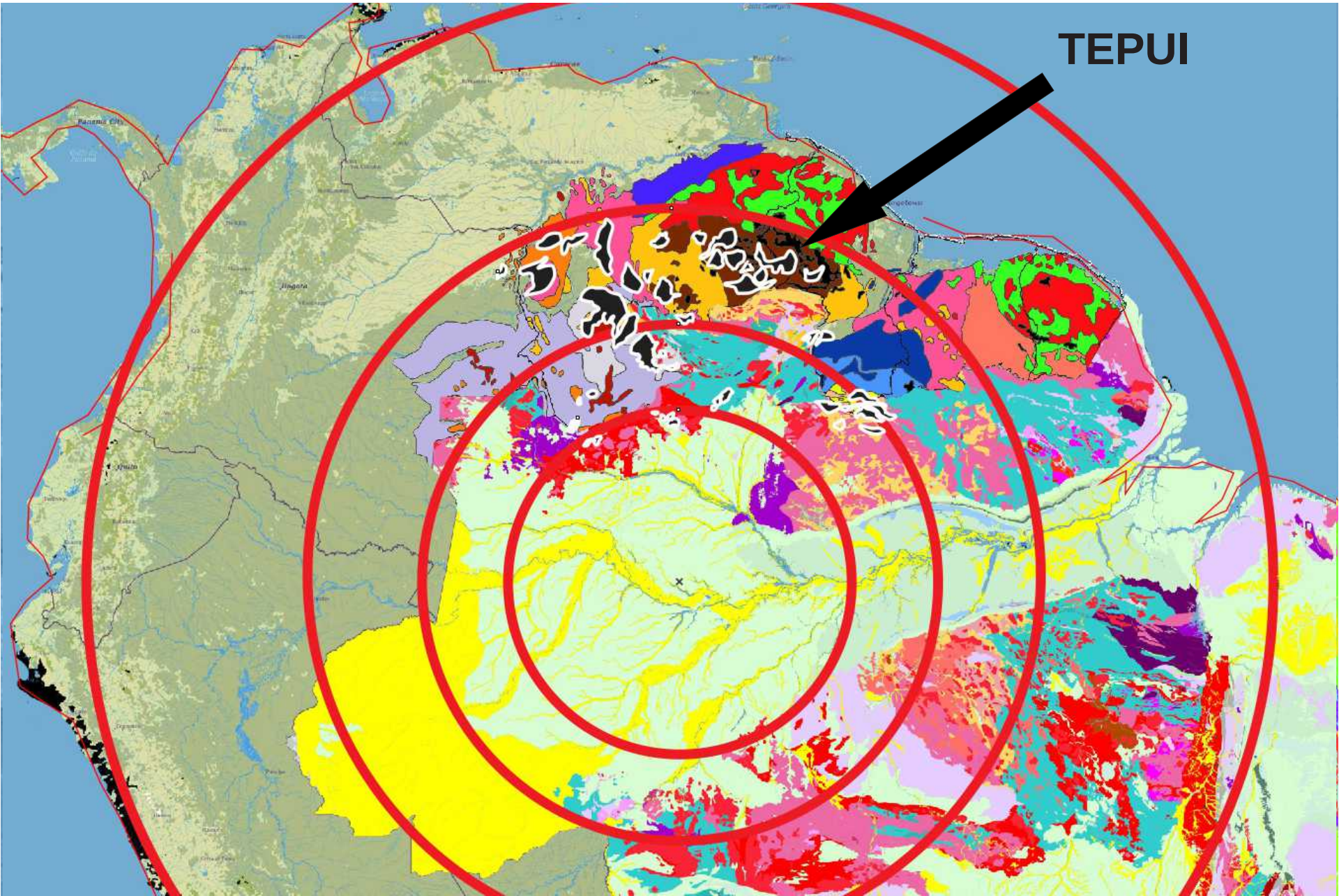




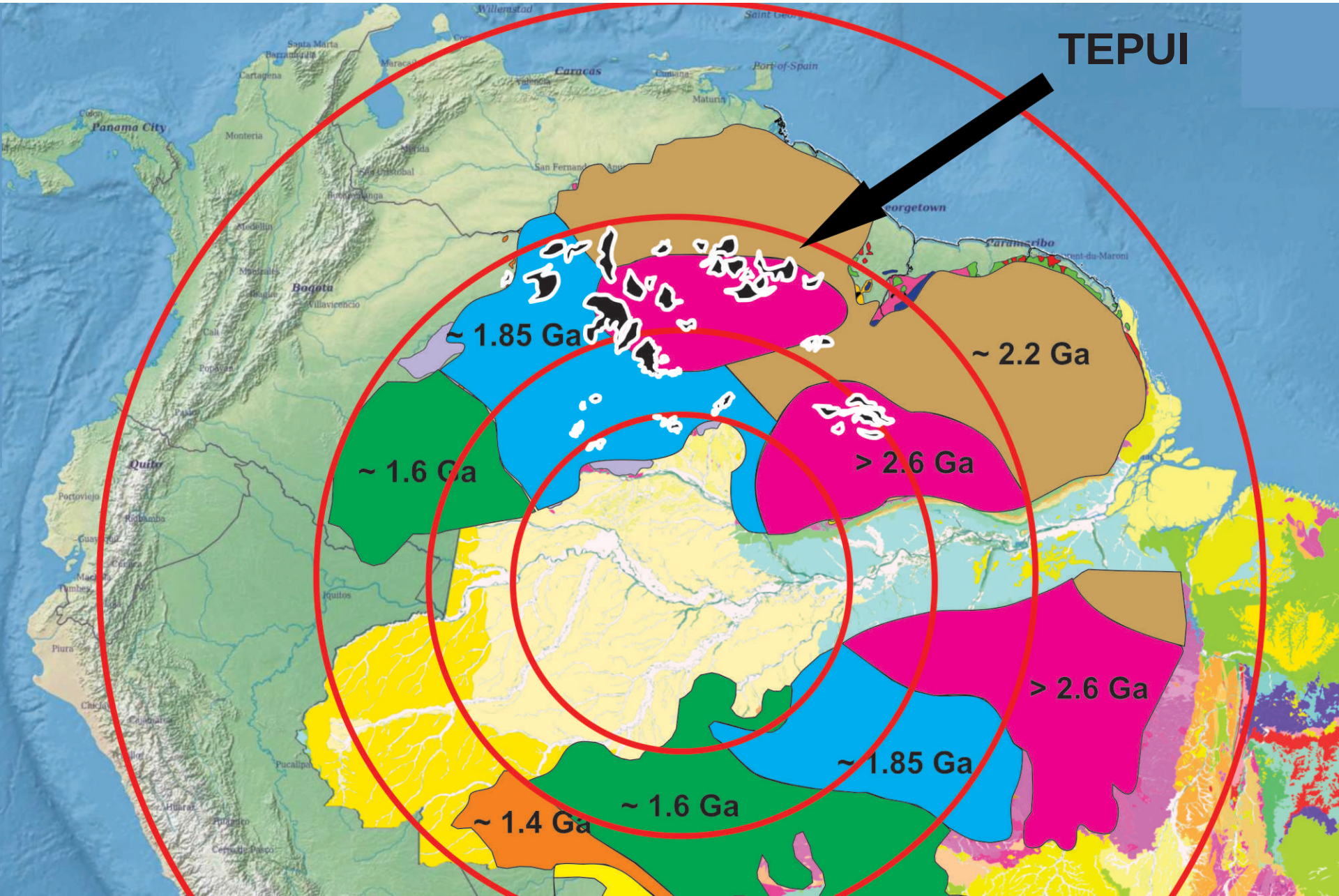
The geological map of Brazil and Venezuela



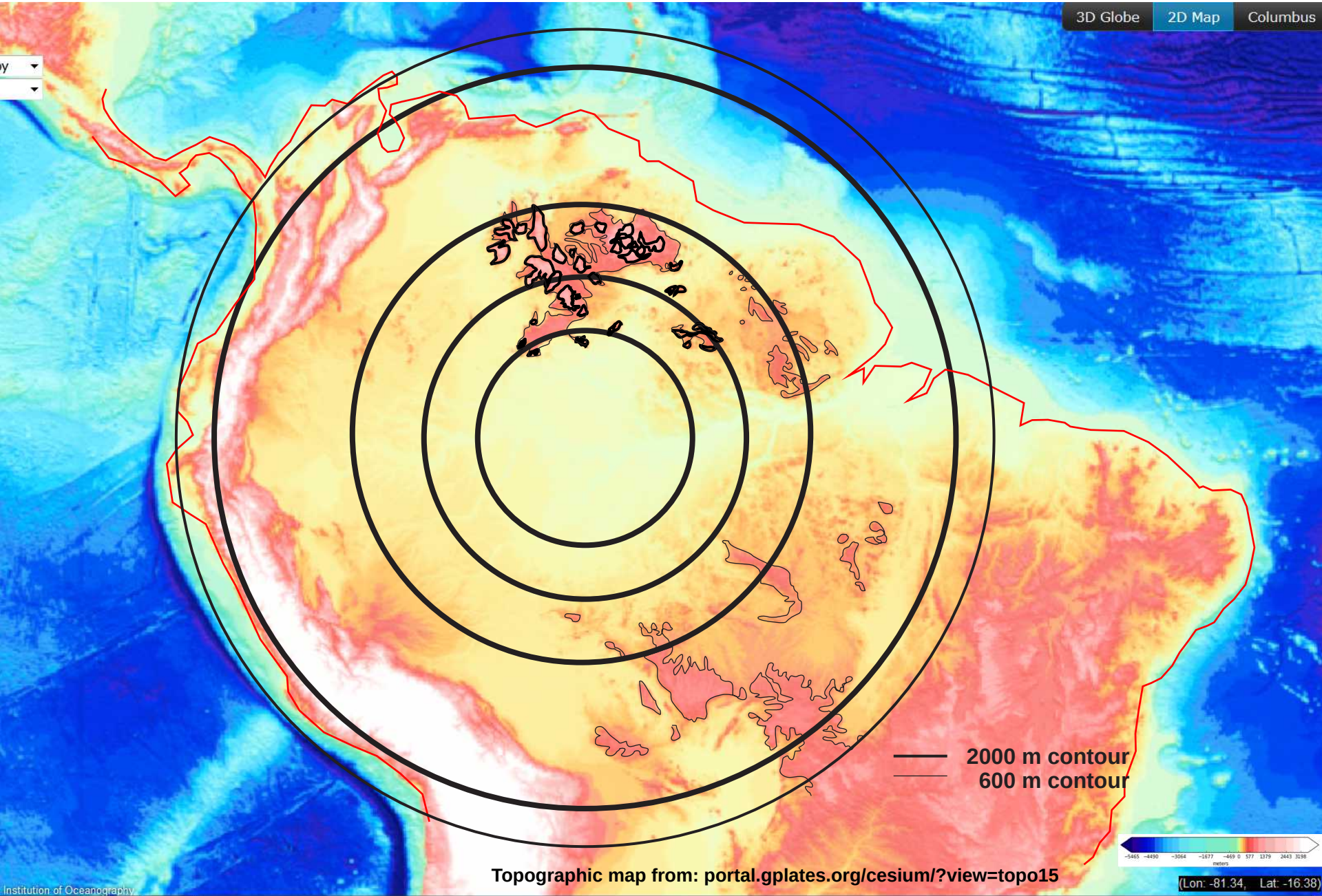
The geological map of Brazil and Venezuela shows that the Tepui are dispersed over many rock types



The geological map of Brazil and Venezuela shows that the Tepui are dispersed over many rock types and many ages



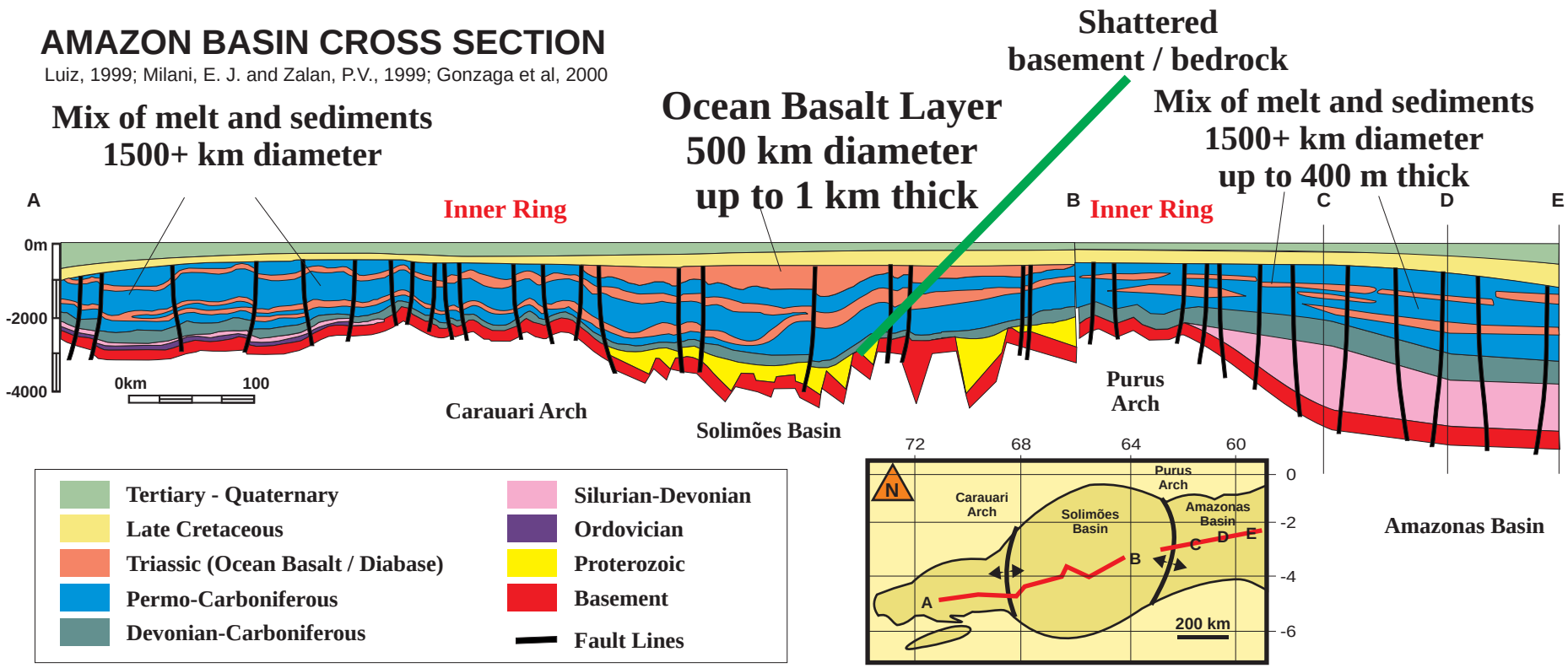
If the outer ring matches the continental shelf on the west side instead of the coast, then it also fits the mountains in the south.



The Amazon Basin has a 1 km thick layer of recent sediments on top.

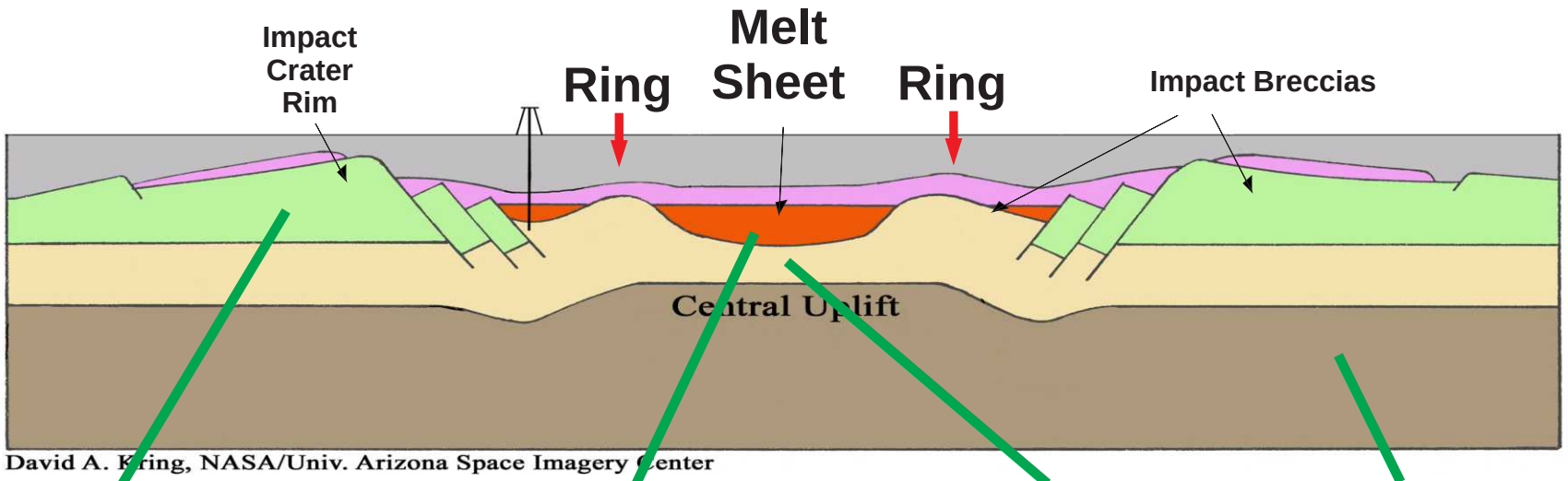
Under the recent (Mesozoic to present) sediments
The center area is covered with a 500 km diameter layer of basalt.
The older sediments are fractured and mixed with melted rock layers.
The central section of precambrian basement rocks is shattered.

Ideally the cross section should extend to the mantle, but it is based on oil wells and there is no detailed information available at greater depths.



LUIZ CARLOS MARCHI, Petrobras, THE LEADING EDGE, JULY 1999, Pg. 825

Comparison of Chicxulub crater and Amazon Basin

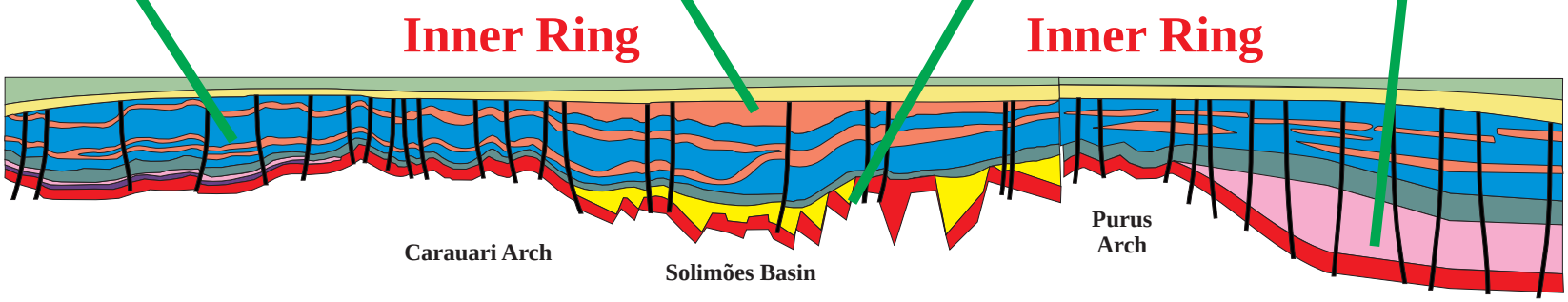


Mix of melt and sediments

Basalt Layer

Shattered basement / bedrock

Faulted Bedrock



Geological Cross Section of Chicxulub

Kring, David A. NASA/University of Arizona Space Imagery Center. 2008-02-15.
URL:http://www.lpl.arizona.edu/SIC/news/Chicxulub_drilling_hires.jpg
www.lpi.usra.edu/science/kring/epo_web/news/images/Chicxulub_drilling_hires.jpg

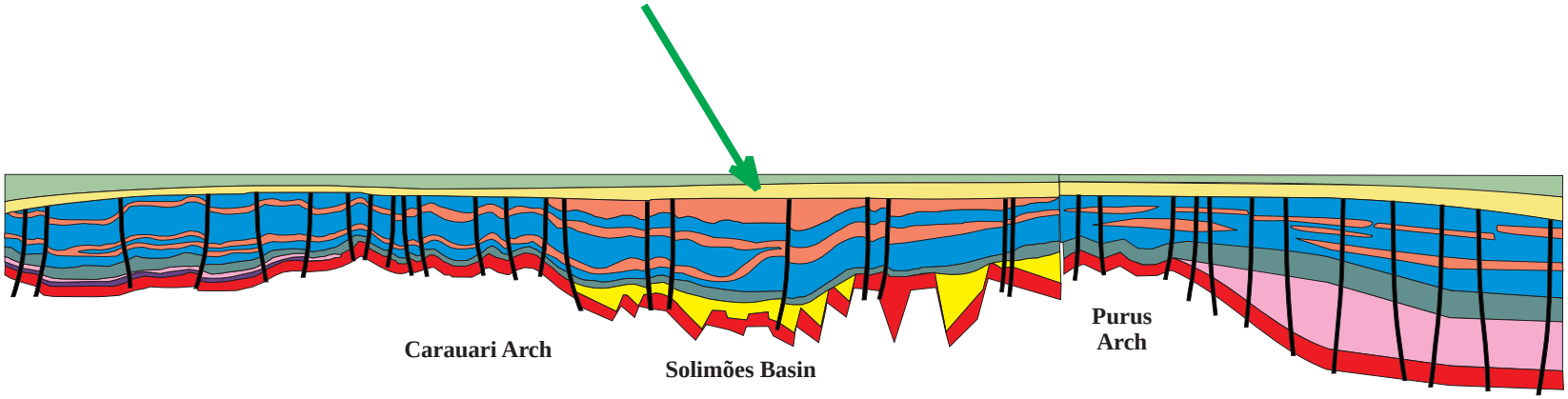
In general, there are no fossils in the first layer of sediments. (Mendes et al., 2012)

The only dinosaur fossil is one tooth found in one out of thousands of drill cores. It is why the layer is typically listed as upper cretaceous.

To have sediments deposited in the Amazon without fossils is unimaginable now.

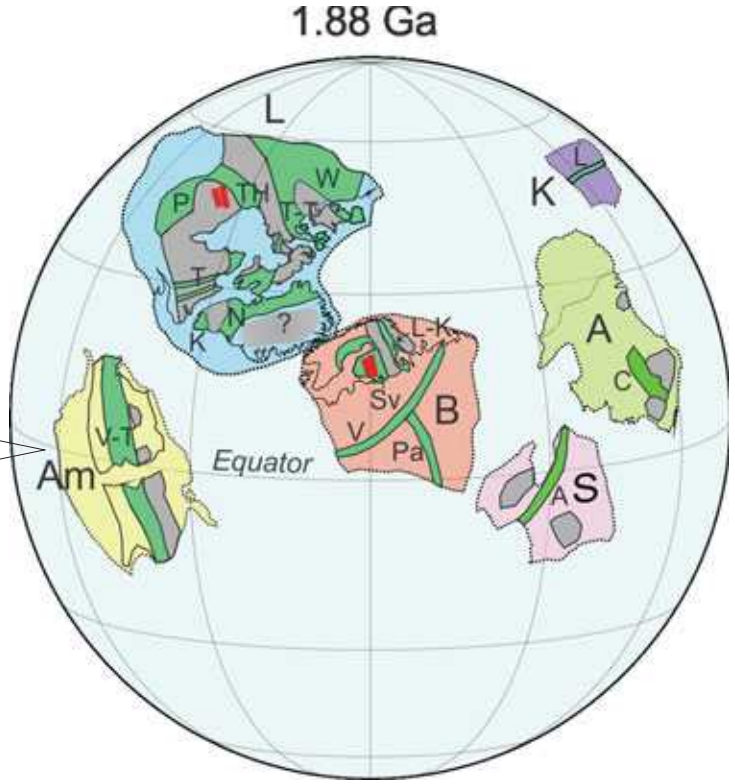
For millions of years, the Amazon Basin had virtually no life in it.

Fossil Free Sediment layer about 500 m thick



Mendes, Anderson Conceição; Werner Truckenbrod, Afonso César Rodrigues Nogueira, 2012,
"Análise faciológica da Formação Alter do Chão (Cretáceo, Bacia do Amazonas), próximo à cidade de Óbidos, Pará, Brasil"
Revista Brasileira de Geociências, volume 42 (1), 2012

Paleo reconstructions of the continents show the Amazon Craton as unchanged in 2+ Ga



Amazonia presented the same shape as today

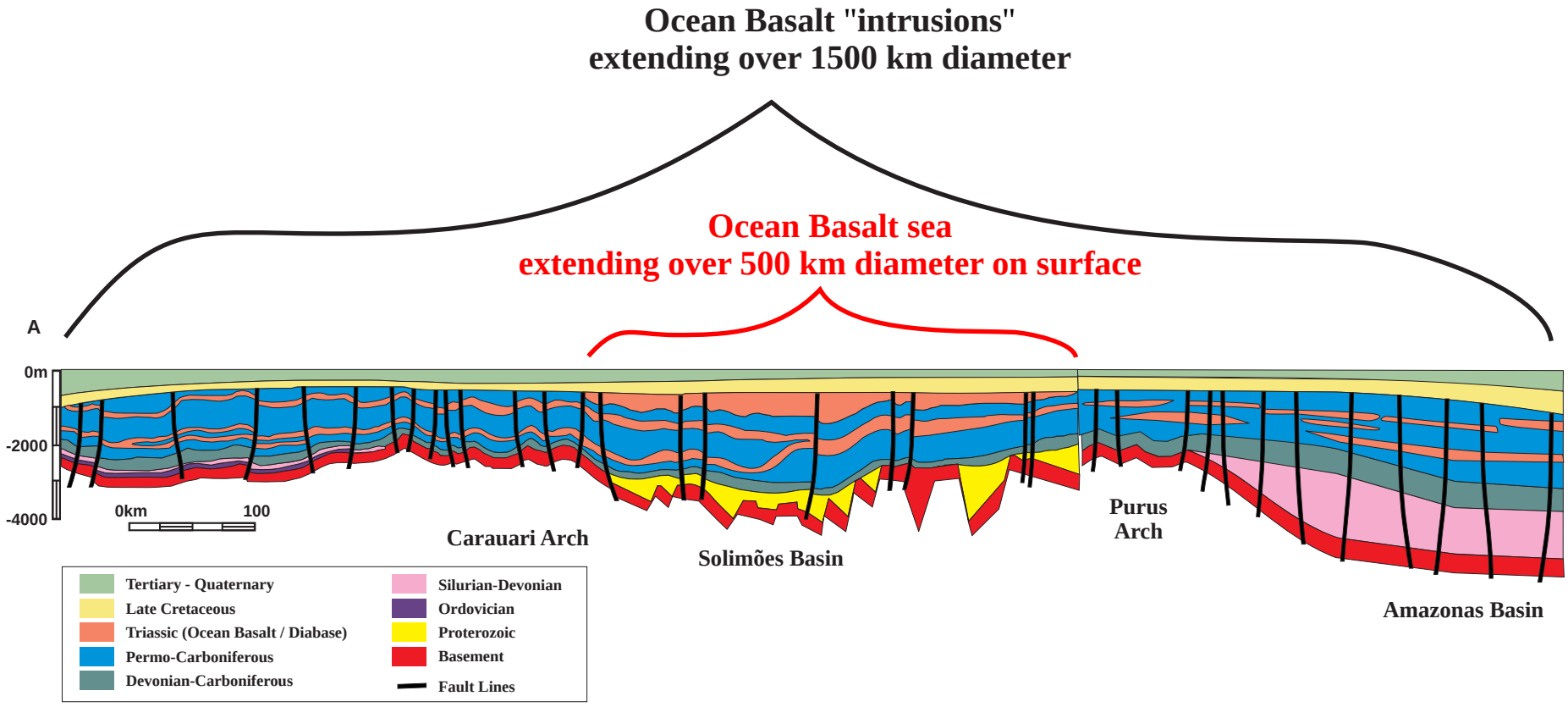
The Amazon Craton is extremely stable.

Image from: S. Mertanen and L.J. Pesonen, 2012, "Paleo-Mesoproterozoic Assemblages of Continents: Paleomagnetic Evidence for Near Equatorial Supercontinents" Chapter 2 of I. Haapala (ed.), "From the Earth's Core to Outer Space, Lecture Notes in Earth System Sciences 137", Springer-Verlag Berlin Heidelberg 2012, DOI 10.1007/978-3-642-25550-2_2,

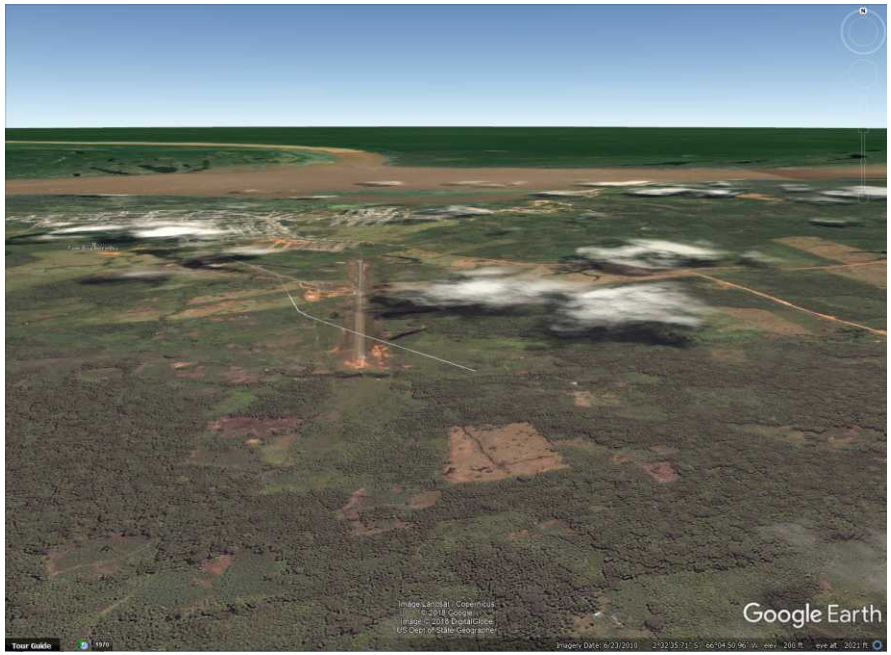
Also see:

Manoel Souza D'Agrella-Filho, Franklin Bispo-Santos, Ricardo Ivan Ferreira Trindade, Paul Yves Jean Antonio, "Paleomagnetismo do Cráton Amazônico e sua participação em paleocontinentes" ("Paleomagnetism of the Amazonian Craton and its role in paleocontinents")
Brazilian Journal of Geology, 46(2): 275-299, June 2016
DOI: 10.1590/2317-4889201620160055

There is no possible Plate Tectonic explanation of the vast intrusions and basalt sea in the center of a stable craton.
An impact origin would require a flat basalt sea.

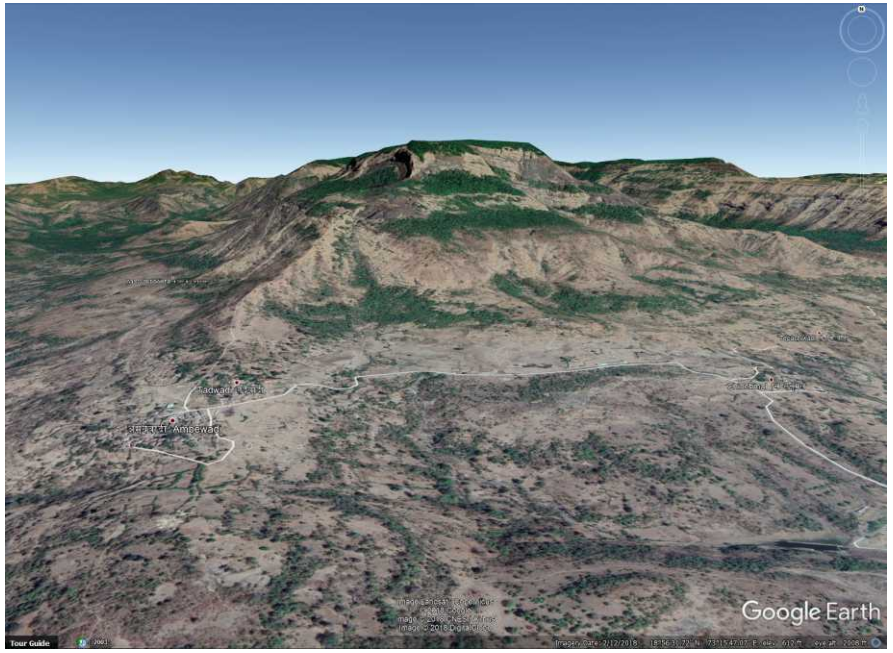


The consideration that the Central Amazon basalt sea was flattened by erosion does not fit with the Deccan Traps which remain as high mountains after 65 million years. Same rock type, same age.



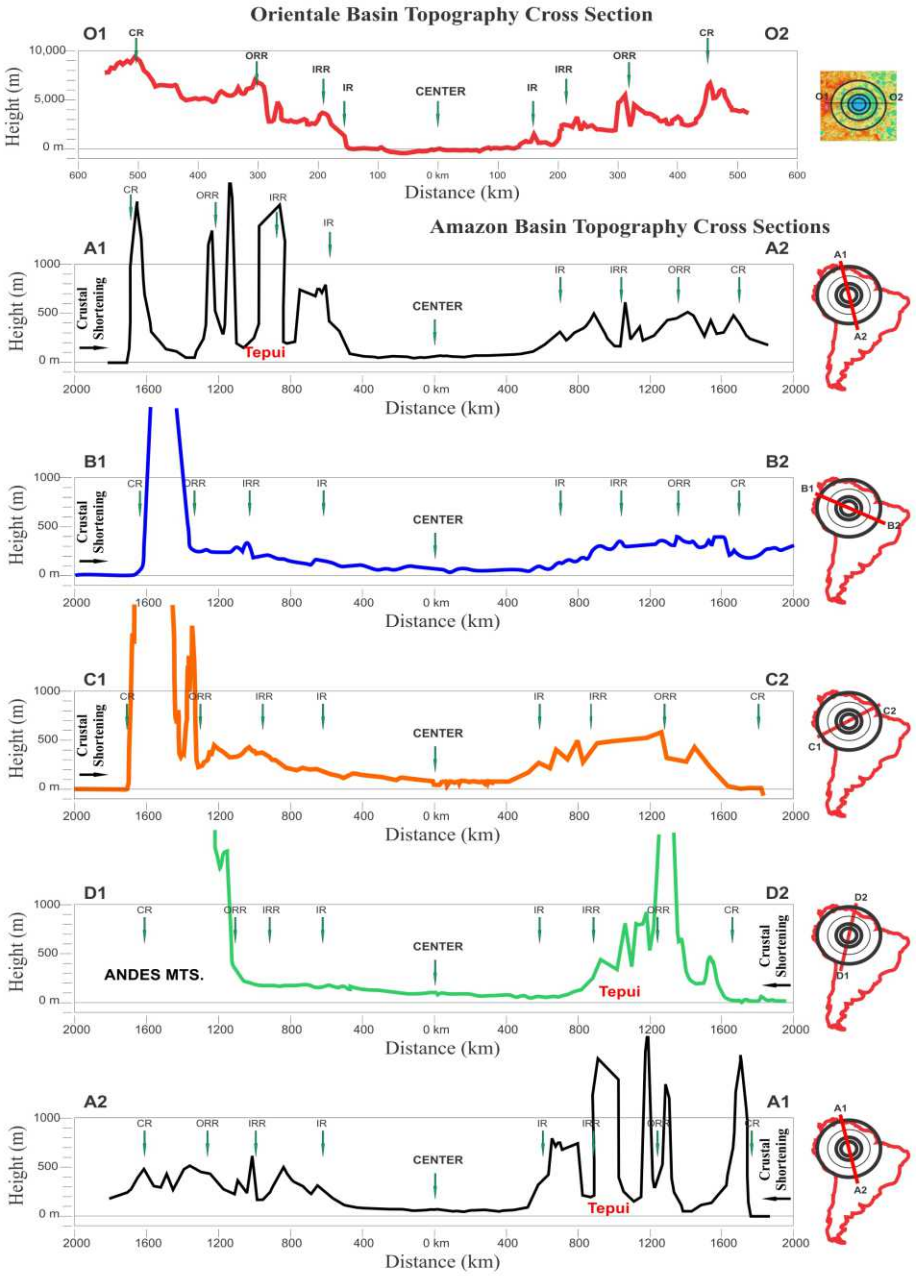
The Central Basalt Sea in the Amazon Basin
10 m elevation after 65 million years

Images from Google Earth, at 2000 ft elevation



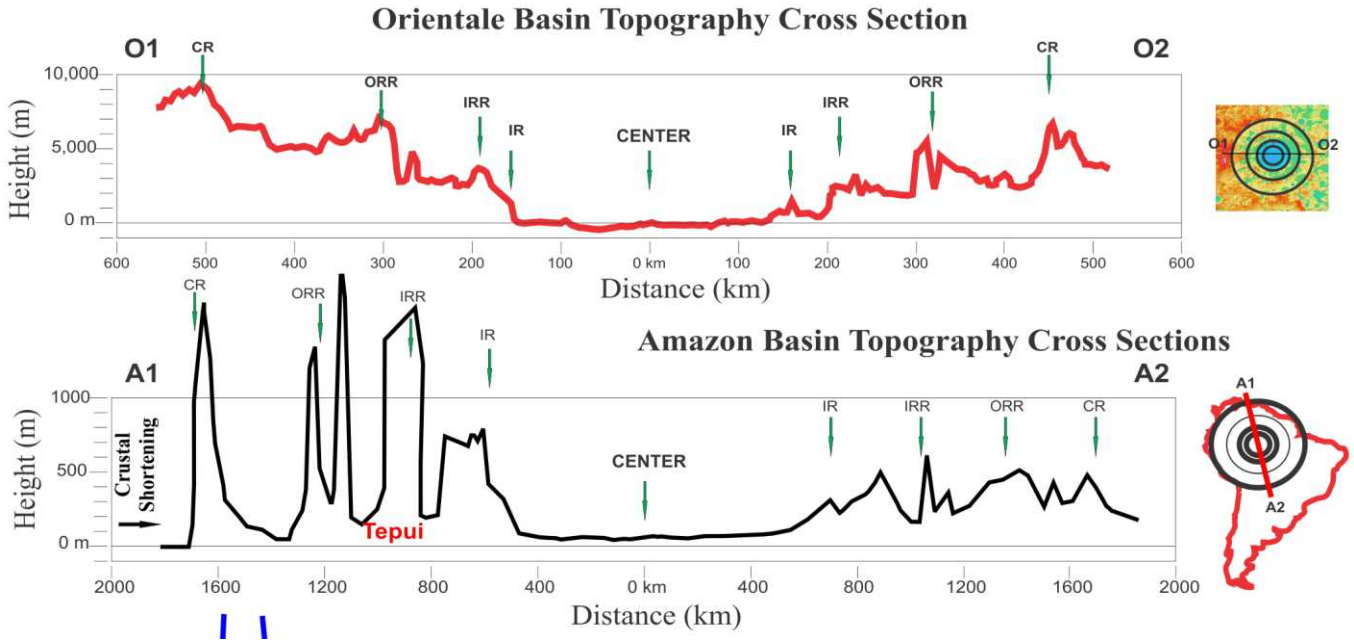
The Deccan Traps
at Matheran in Maharashtra, India
1,000+ m elevation after 65 million years

Comparison of Topography Orientale Basin & Amazon Basin



Comparison of Topography of Orientale Basin & Amazon Basin: The same pattern for both, except that the Amazon is much flatter, as expected with a comet impact into softer hotter mantle for the Amazon vs an asteroid impact into the harder, colder Lunar surface for Orientale.

Also, the Amazon is buried under 1 km of sediments, and has lost 2-3 km of relief due to erosion and been compressed about 400 km on the west coast. The vertical exaggeration for the Amazon is 10X greater to help see the relief. The west coast is stretched 400 km to account for the compression.

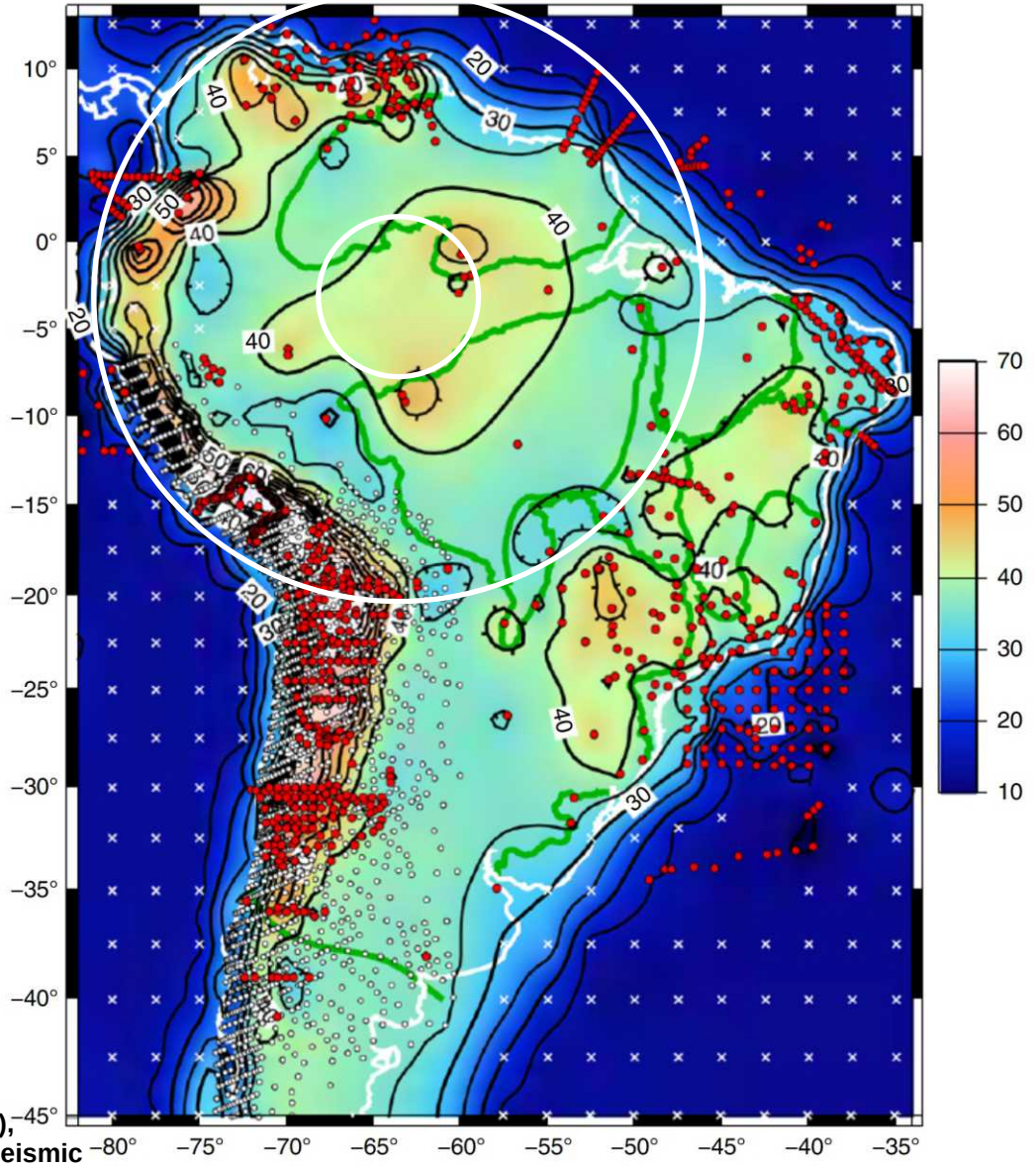


Thickness of the crust based on seismics

The center of the Amazon has a ring in the crust thickness, not related to the geology.

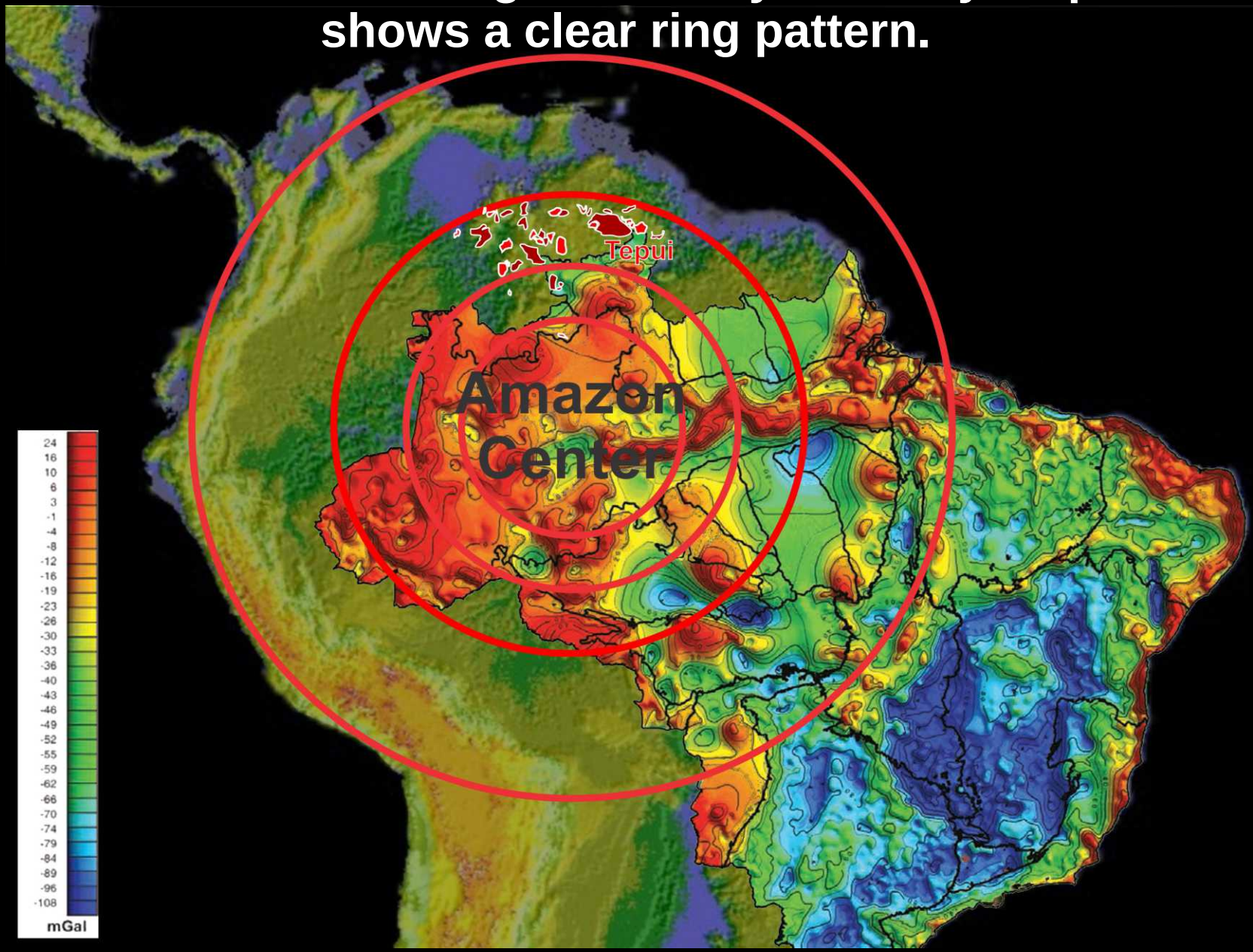
Also it is notable that the ancient cratons are relatively flat whereas most ancient cratons are mountainous.

(Cratons of 1-2.5 Ga are outlined in green)



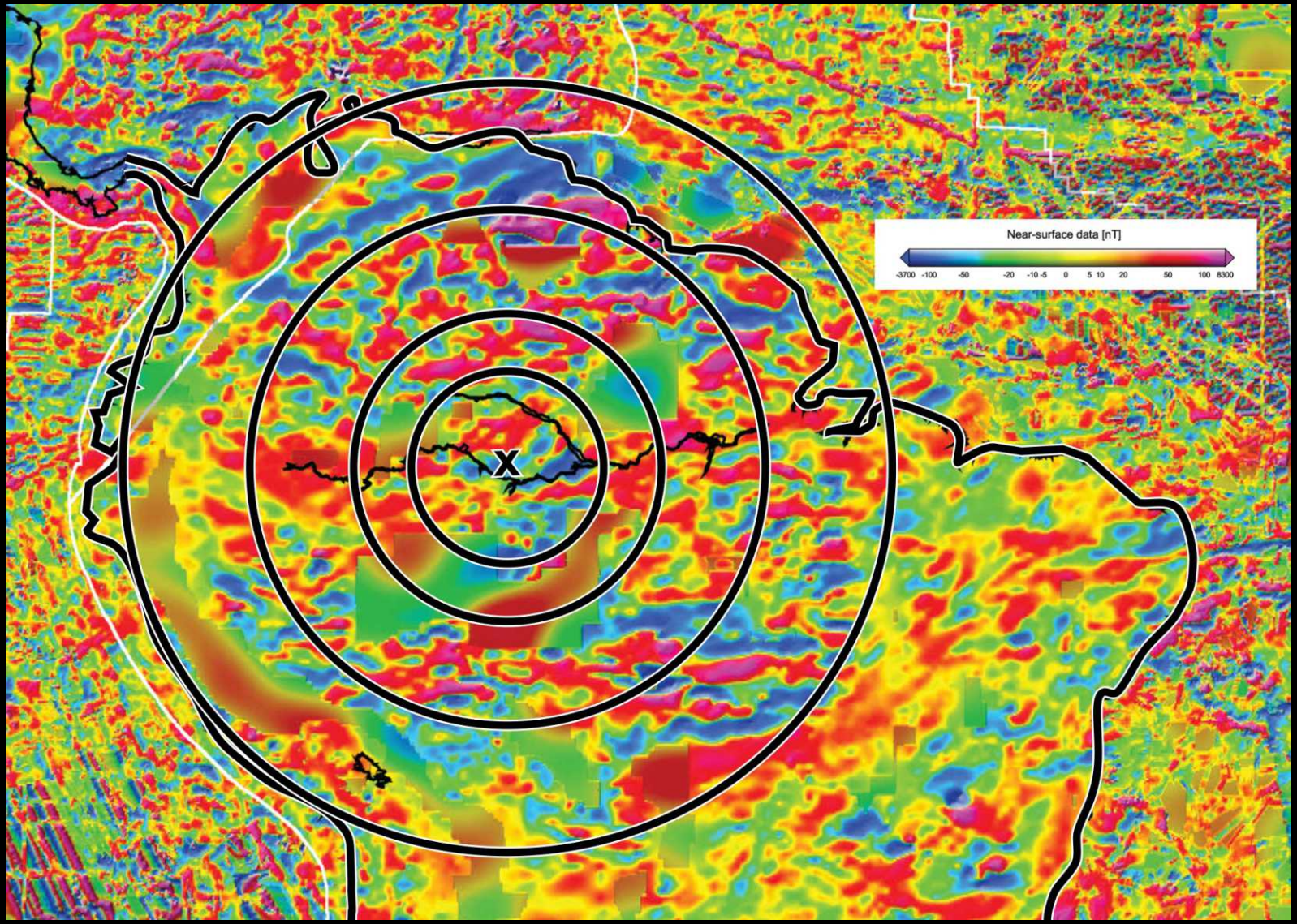
Assumpção, M., M. Feng, A. Tassara, J. Julià, J., (2013), "Models of crustal thickness for South America from seismic refraction, receiver functions and surface wave tomography", Tectonophysics 609 (2013) pp. 82-96

The Brazil Bouguer Gravity anomaly map shows a clear ring pattern.



Anomalias Bouguer do territrio brasileiro, from: "Geology, Tectonics and Mineral Resources of Brazil" pg 349

The World Magnetic Anomaly Map Shows a clear circular pattern.



Magnetic Anomaly Map of the World, 2007; CGMW & Geological Survey of Finland

There are no earthquakes in the Amazon Basin.

No earthquakes tells us that there is no tectonic activity.

No tectonic activity leaves the "intrusion" of the central basalt sea unexplained.

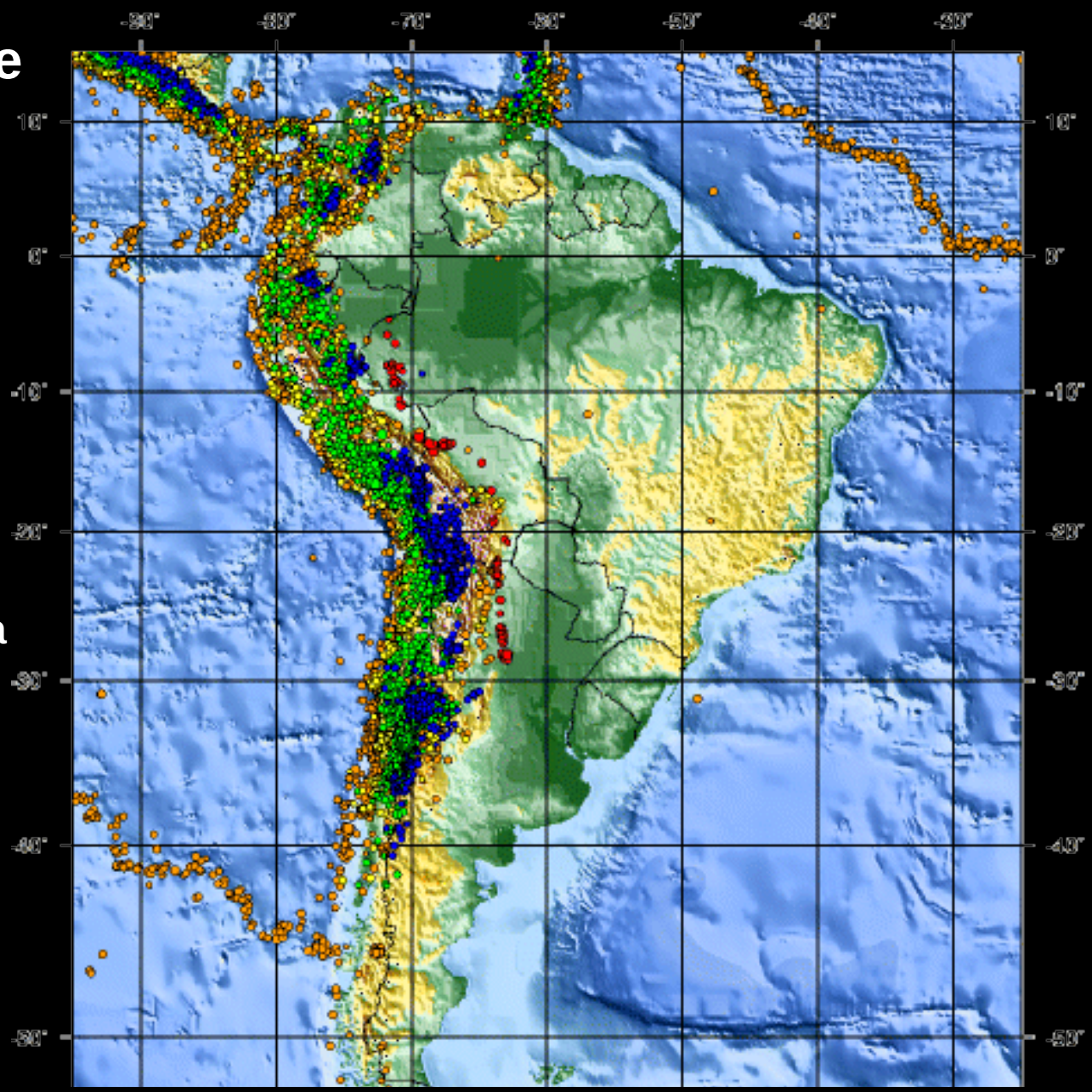
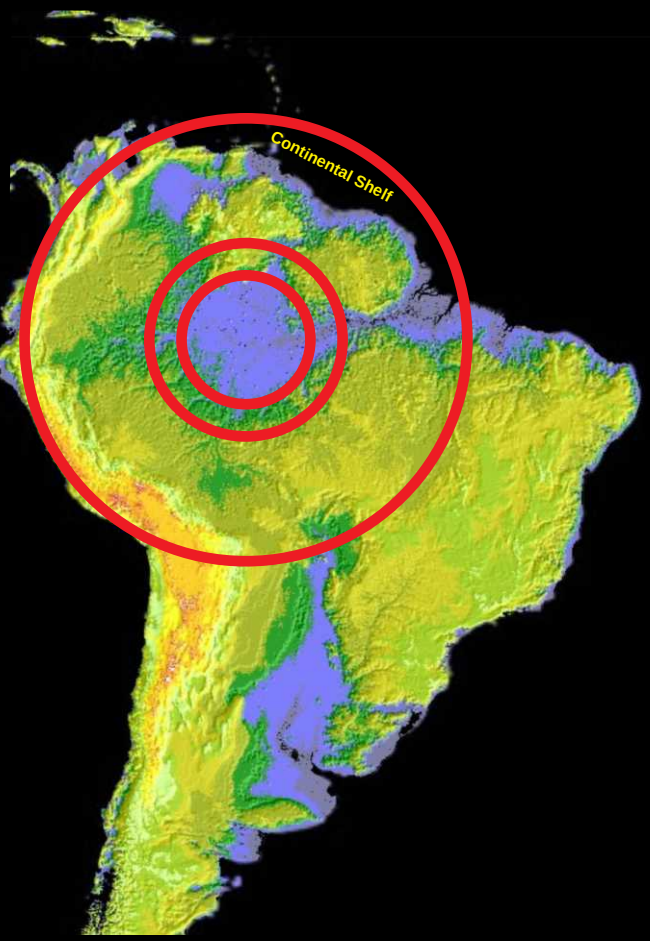


Plate Tectonics says nothing about the circular pattern:
Reconstructions of past continents
assume that the Amazon Basin was the same
500 million years ago, as now.

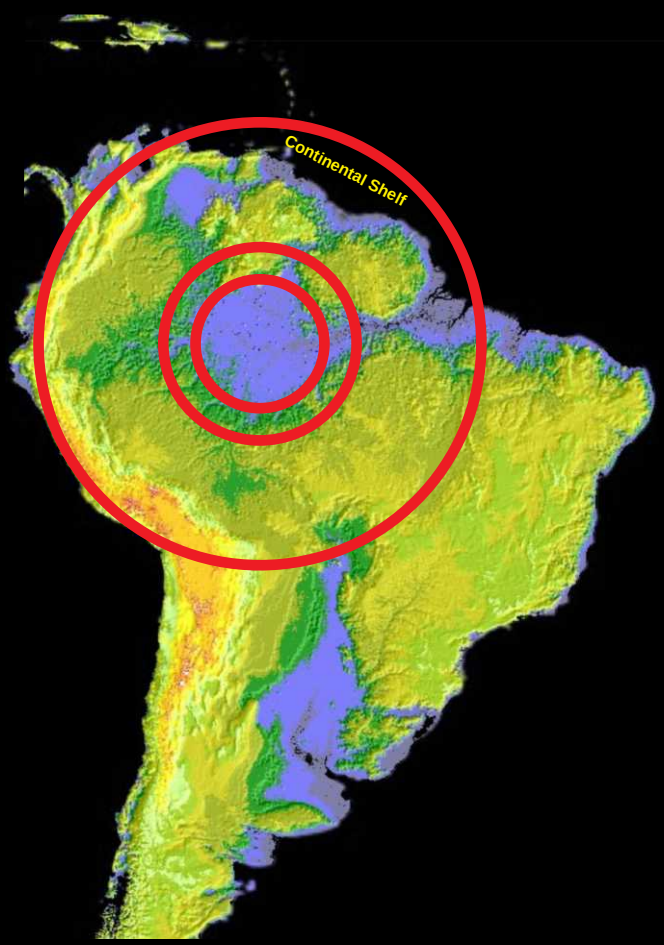
There is no logical tectonic reason
for the massive intrusions
and basalt melt layer
in the center of the Amazon,

or for the circular shape.



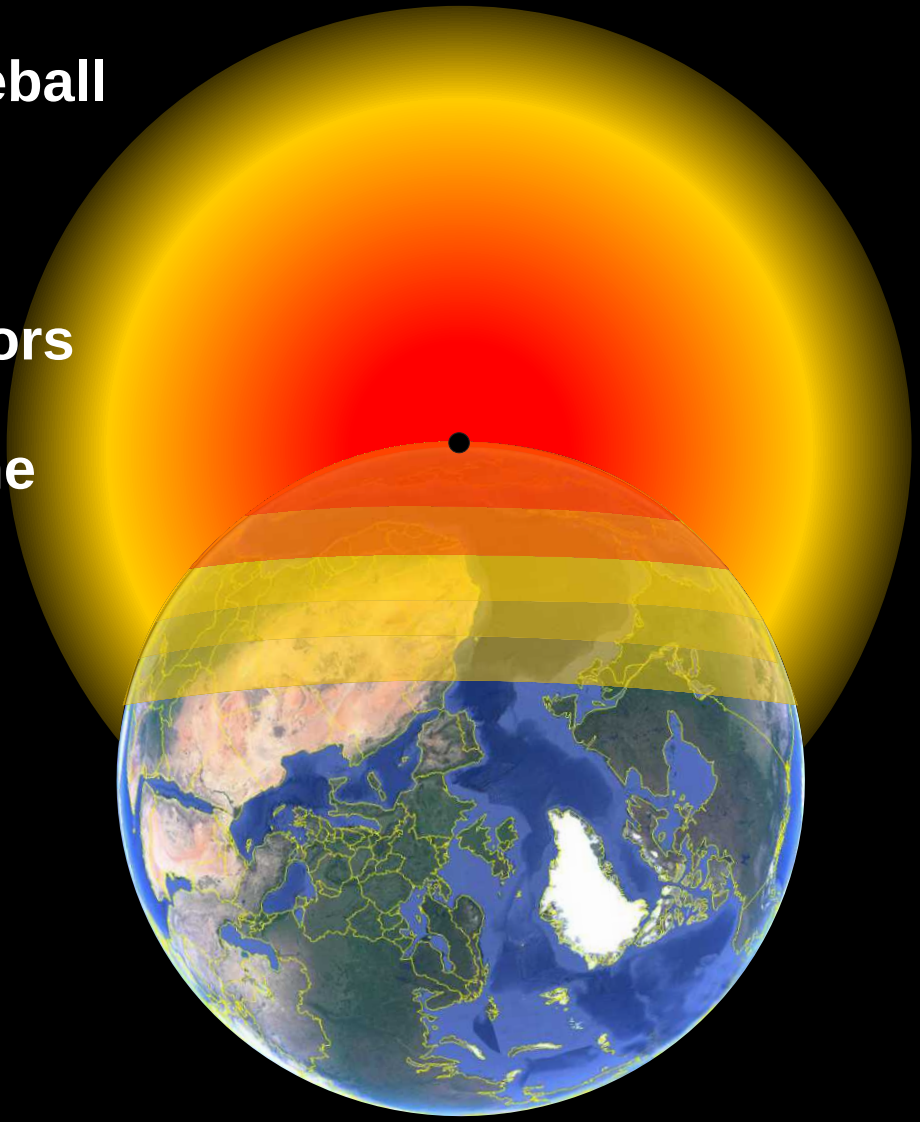
An Impact explains all of the features of the Amazon Basin

The best fit to the 3500 km crater is an impact by a comet.
380 km diameter, density 0.8,
Speed 72 km/sec
(Earth Impact Effects Program Calculation)



An impact of this size
would have produced a fireball
that would have covered
1/2 of the planet.

Considering the many factors
about to be presented,
the best fit for the age of the
Amazon Impact is 65 my.



AMAZON:
380 km Comet, 70 km/sec
A Planet
Devastation event

1/3 to 1/2 of the planet
boiled or burned

Fallout, Heat and
shock waves would
kill almost all large animals
in the remainder of the planet

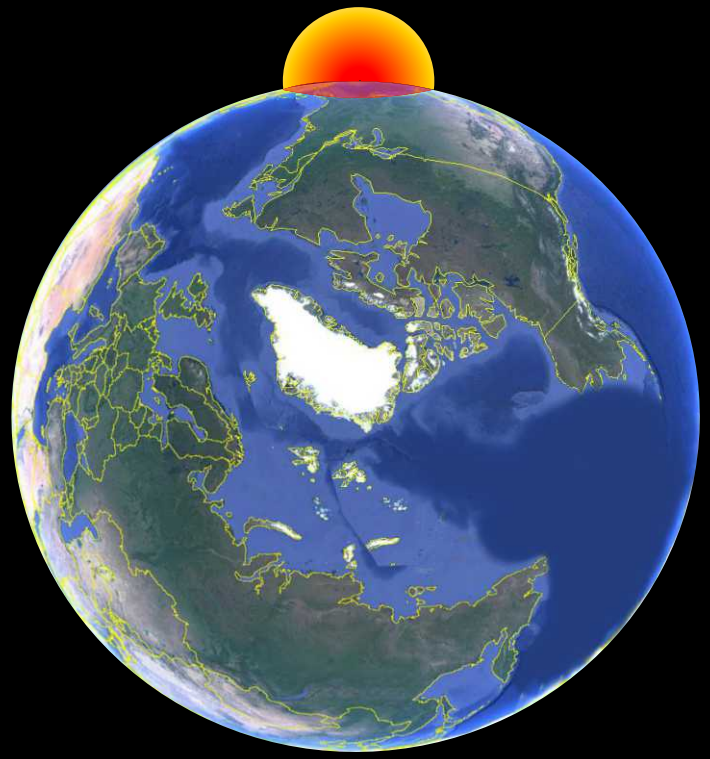
An Extinction Event would clearly result.

In comparison,
Chicxulub would have a tiny fireball.

Is there any serious doubt
that Chicxulub
is the dinosaur killer?

CHICXULUB:
12 km Asteroid, 20 km/sec
A Small
local event

1.2% of the planet
boiled or burned



There are many articles discussing Chicxulub that consider it as a potential factor, but not the cause.

"Global climate change driven by soot at the K-Pg boundary as the cause of the mass extinction"
Kunio Kaiho1, Naga Oshima2, Kouji Adachi2, Yukimasa Adachi2, Takuya Mizukami1, Megumu Fujibayashi3 & Ryosuke Saito1, Nature Scientific Reports, July 2016

"Triggering of the largest Deccan eruptions by the Chicxulub impact" - The Traps contributed significantly to the Cretaceous-Paleogene extinction. Mark A. Richards, Walter Alvarez, Stephen Self, Leif Karlstrom, Paul R. Renne, Michael Manga, Courtney J. Sprain, Jan Smit, Loÿc Vanderkluysen, and Sally A. Gibson, GSA Bulletin 2015

"Deccan volcanism, the Chicxulub impact, and the end-Cretaceous mass extinction: Coincidence? Cause and effect?" - Extinctions are due to climate warming and cooling, sea-level changes, erosion, weathering, ocean acidification, high-stress environments with opportunistic species blooms. G. Keller, GSA Special Papers 2014, v. 505, p. 57-89

"Large igneous provinces and mass extinctions: An update" - Vast quantities of volcanic gas (CO_2 and SO_2) is the trigger for a truly major biotic catastrophe. Warming and marine anoxia feature in many extinction scenarios, indicating that the ability of a large igneous province to induce these proximal killers (from CO_2 emissions and thermogenic greenhouse gases) is the single most important factor governing its lethality.
David P.G. Bond & Paul B. Wignall, GSA Special Paper 505, 2014

"Cretaceous Extinctions: Multiple Causes" - impact, marine regression, volcanic activity, and changes in global and regional climatic patterns. J. David Archobald et al., Science Letters, Vol 328, May 21, 2010

"New evidence concerning the age and biotic effects of the Chicxulub impact in NE Mexico" - Chicxulub was 300,000 years before the extinction
Gerta Keller, Thierry Adatte, Alfonso Pardo Juez, Jose G. Lopez-Oliva, DOI: 10.1144/0016-76492008-116, July 2009

Impacts, volcanism and mass extinction: random coincidence or cause and effect?" - biotic stress was due to a lethal combination of tectonically induced hydrothermal and volcanic processes, leading to eutrophication in the oceans, global warming, sea-level transgression and ocean anoxia. It must be concluded that major magmatic events and their long-term environmental consequences are major contributors, though not the sole causes of mass extinctions. Sudden mass extinctions, such as at the K/T boundary, may require the coincidence of major volcanism and a very large Impact. G. Keller, 2004, Australian Journal of Earth Sciences (2005) 52, (725 – 757)

Models of Chicxulub ejecta formation and transport from the impact event suggest that basement material, which is the source for shocked quartz and zircon grains, is ejected at velocities <3km/s and would be unable to reach distal locations (Artemieva and Morgan, 2008)

A consideration on the likely world wide boundary layer that would be formed by an impact producing the Amazon:

One of the reasons that Chicxulub is convincingly attributed with the K/Pg boundary layer is the calculation that the size of the impacting asteroid should have been about 10 km in diameter, based on the thickness of the boundary layer and the amount of iridium in the boundary layer (Alvarez, 1980). Therefore it seems reasonable to assume that a 380 km diameter comet should leave a much larger boundary layer.

Alvarez used the factor from the Krakatoa eruption (22%) as the amount of asteroid material that would stay in the atmosphere.

When a comet hits at 72 km/sec, the vast majority of the comet material will either be buried deep into the Earth or ejected at speeds in excess of the escape velocity, and be lost to space (Jeffers et al, 2001).

Instead of 22% of the comet remaining in the atmosphere after the impact, very little would remain. ("Virtually None" - Jeffers et al, 2001)

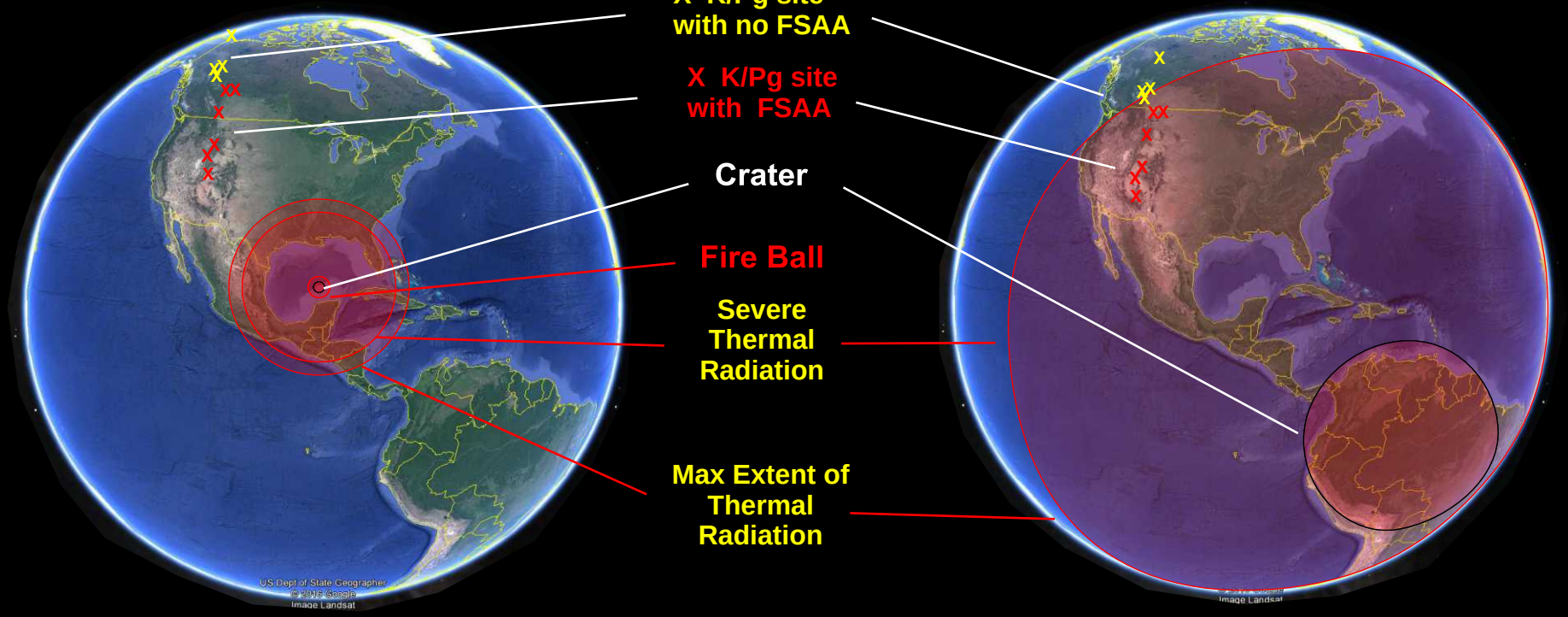
The K/Pg boundary layer thickness would fit a 380 km comet impact.

Jeffers, S. V., S. P. Manley, D. J. Asher, (2001), "Near-Earth object velocity distributions and consequences for the Chicxulub impactor", Mon. Not. R. Astron. Soc., 327, 126–132 (2001), doi: 10.1046/j.1365-8711.2001.04747.x

Some other concerns about Chicxulub:
1. The Fern Spore Anomaly requires a fireball over 3500 km in diameter

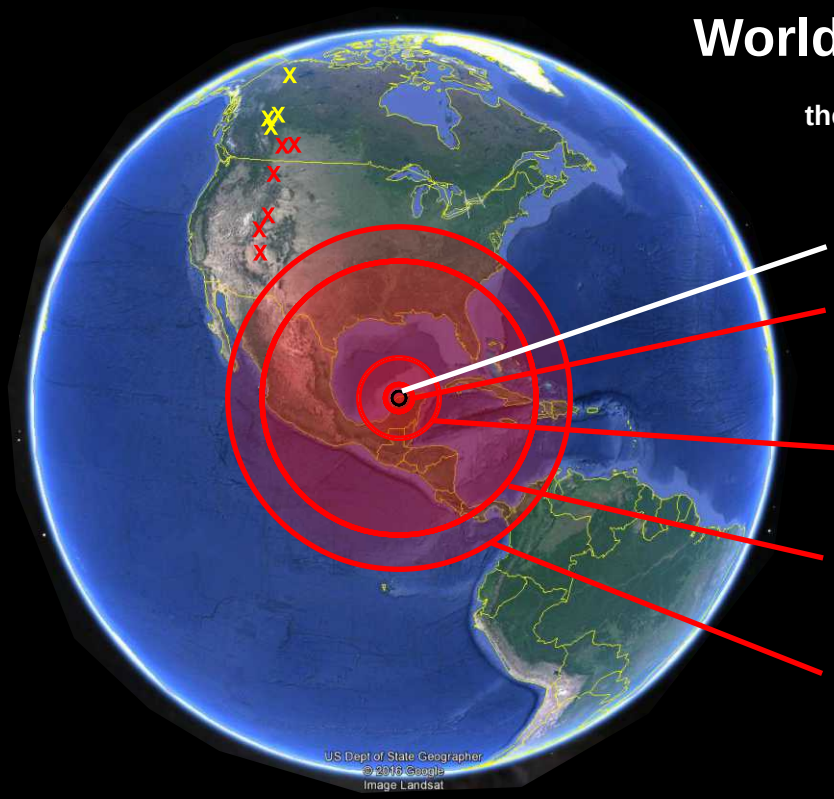
Chicxulub is too small to have caused the Fern Spore Anomaly
(Red Circle in Image shows the extent of the fireball from "Earth Impacts Effects Program")

The Amazon is precisely the right size to have caused the Fern Spore Anomaly



Southern North America has a "Fern Spore Abundance Anomaly" assumed to be related to widespread burning of forests from heat from the impact and ejecta. (Fleming and Nichols, 1990)

2. The K/Pg boundary layer is too thick



Chicxulub is too small to have formed the World Wide Bioundary Layer

The red circles in the image show the resultant ejecta layers calculated by the Earth Impacts Effects Program

Crater

Fire Ball

50 cm ejecta layer
1000 km diameter

10 cm ejecta layer
3400 km diameter

5 cm ejecta layer
4250 km diameter

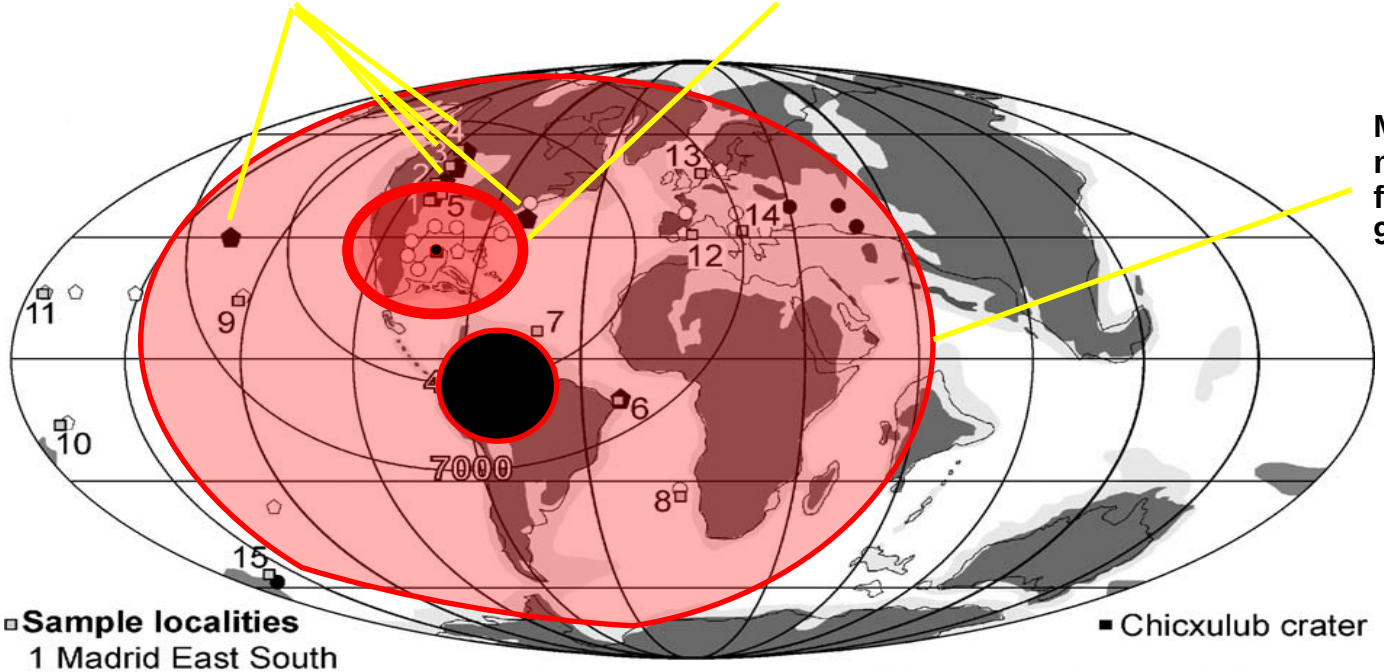
The K/Pg Boundary Layer is ~10 cm in Italy, Spain.
Chicxulub's max extent of 10 cm layer is 3400 km diameter

3. The size of world-wide shocked crystals are too large they require a higher speed, larger impact.

Shocked Quartz over 300 microns Impossible for Chicxulub, expected with Amazon

Maximum extent of 200+ micron mean size particles from Chicxulub Impact: 2000 km radius

Maximum extent of 200+ micron mean size particles from Amazon Impact: 9000 km radius



Sample localities

- 1 Madrid East South
- 2 Berwind Canyon
- 3 Rock Creek East
- 4 Wood Mountain Creek
- 5 Clear Creek East
- 6 Poty Quarry
- 7 ODP 207-1258A
- 8 ODP 208-1262/7
- 9 LL44-GPC3
- 10 ODP 130-803D
- 11 ODP 198-1209
- 12 Agost & Caravaca
- 13 Stevns Klint
- 14 Petriccio & Furlo
- 15 Woodside Creek

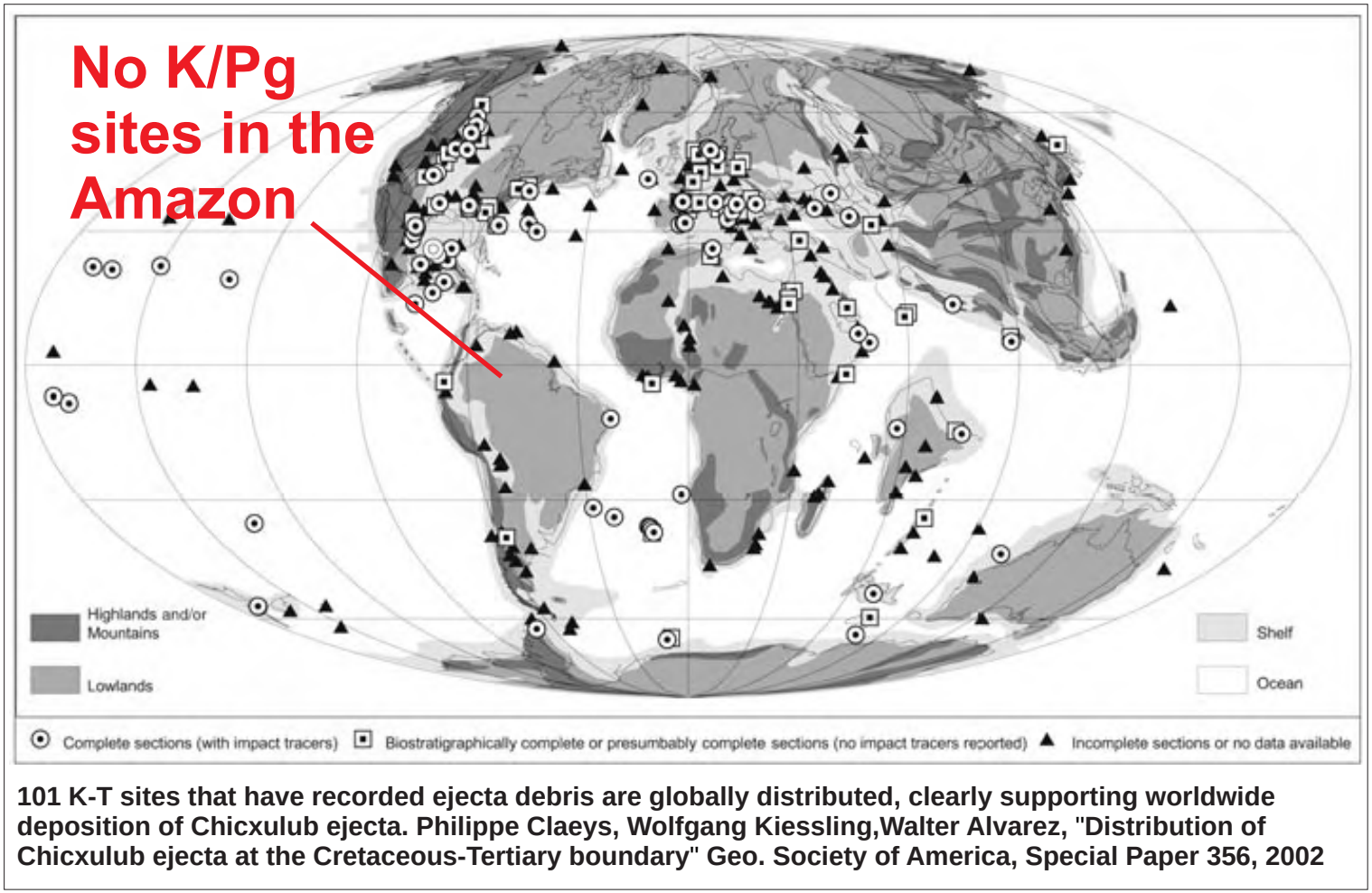
▪ Chicxulub crater

○ not constrained ● < 150 ⬠ 150-300 ⬟ > 300

Maximum size shocked quartz (μm), from Claeys et al. [48]

Claeys, P., Kiessling, W., Alvarez, W., 2002, "Distribution of Chicxulub ejecta at the Cretaceous-Tertiary boundary" Geological Society of America, Special Paper 356, 2002.

4. The Missing K/Pg boundary Layer.

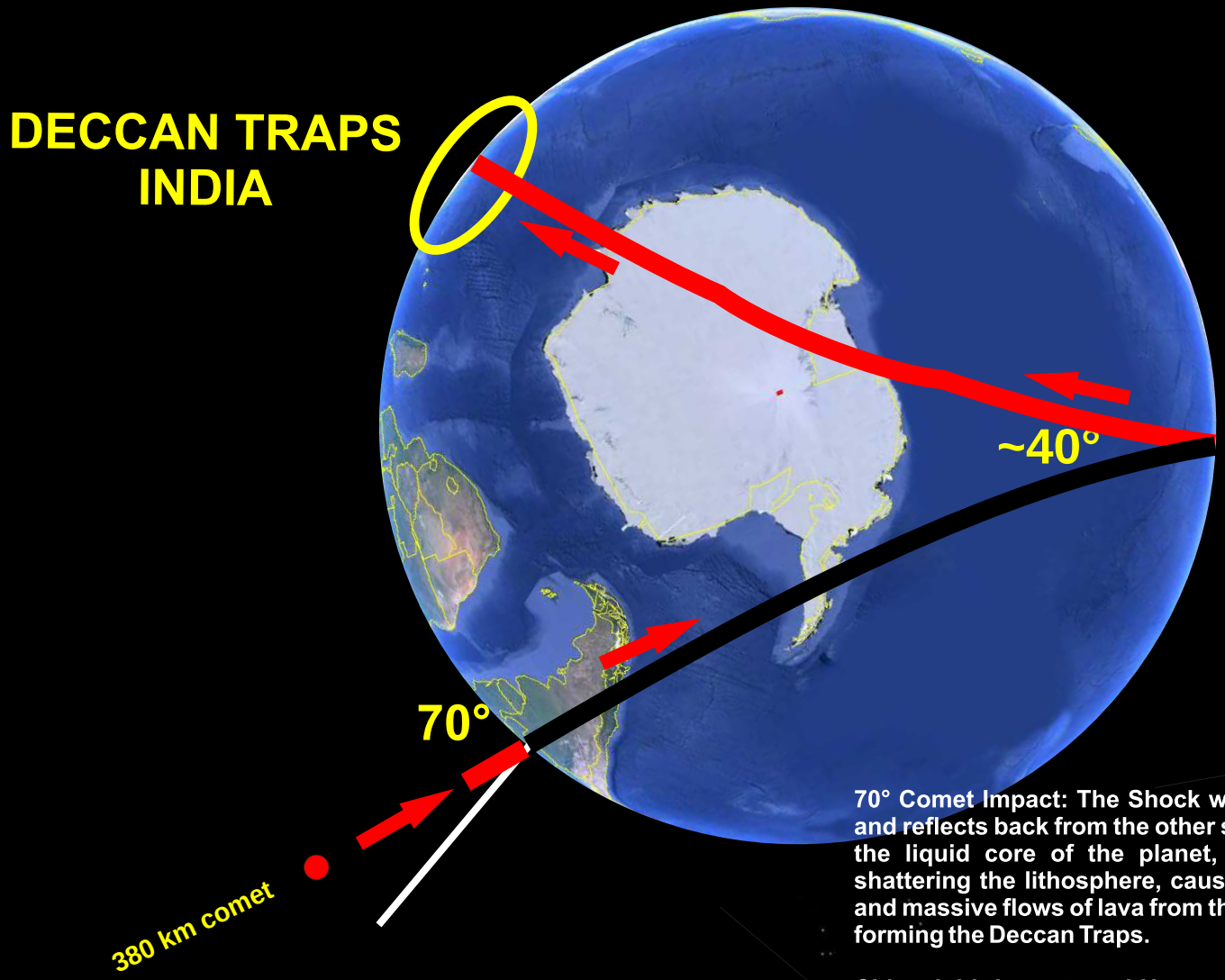


101 K-T sites that have recorded ejecta debris are globally distributed, clearly supporting worldwide deposition of Chicxulub ejecta. Philippe Claeys, Wolfgang Kiessling,Walter Alvarez, "Distribution of Chicxulub ejecta at the Cretaceous-Tertiary boundary" Geo. Society of America, Special Paper 356, 2002

Chicxulub HAS a K/Pg boundary layer

The Amazon does NOT have a K/Pg boundary layer

5. The Deccan Traps could not be caused by Chicxulub, but could be a direct result of the Amazon Impact.



70° Comet Impact: The Shock wave travels through Earth and reflects back from the other side. It is partly focused by the liquid core of the planet, hitting India, lifting and shattering the lithosphere, causing massive earthquakes. and massive flows of lava from the mantle onto the surface, forming the Deccan Traps.

Chicxulub's impact would have minimal effect on India.

The Amazon Basin as an impact

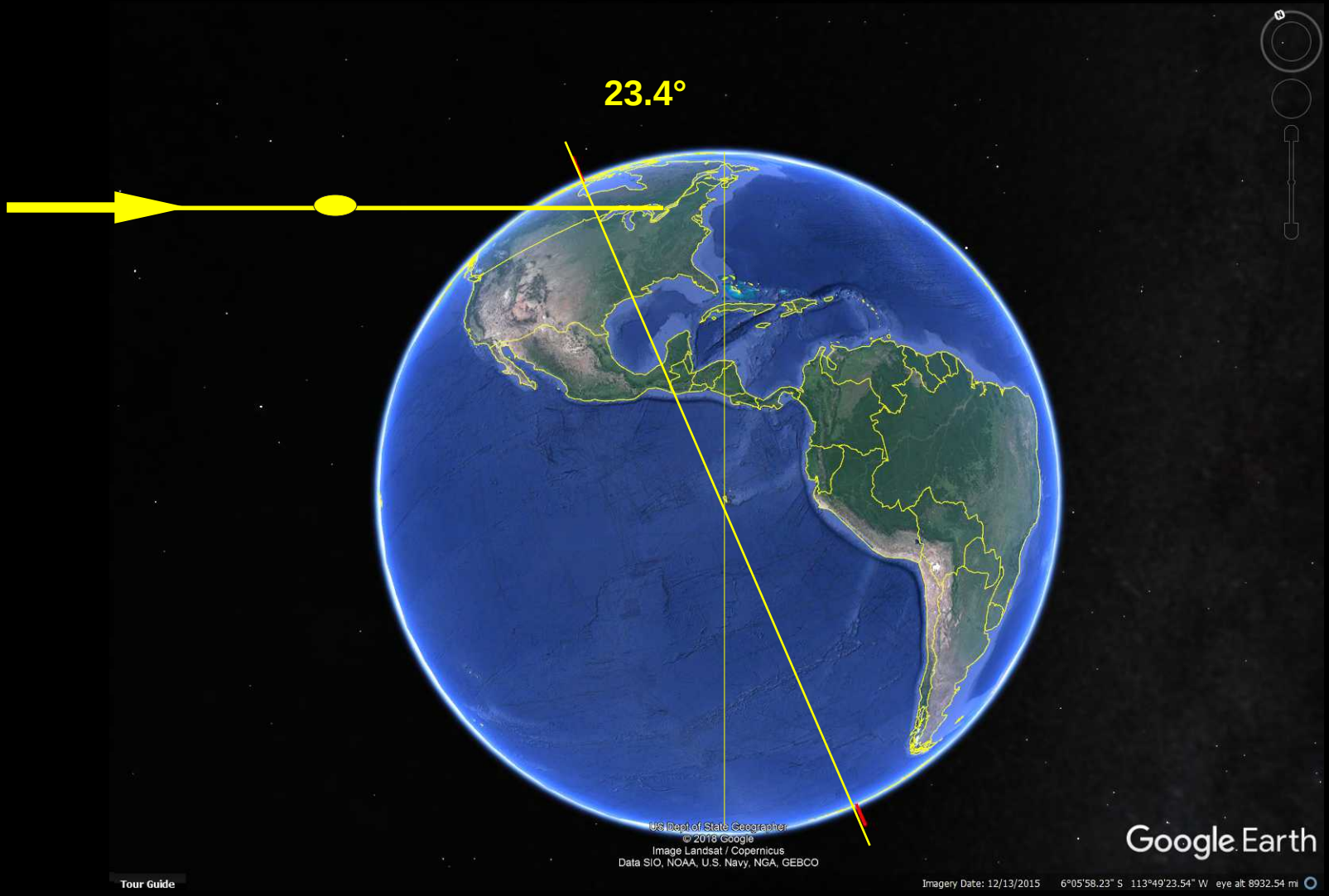
fits the evidence for the K/Pg boundary layer

better than Chicxulub

Can this view of many comet impacts

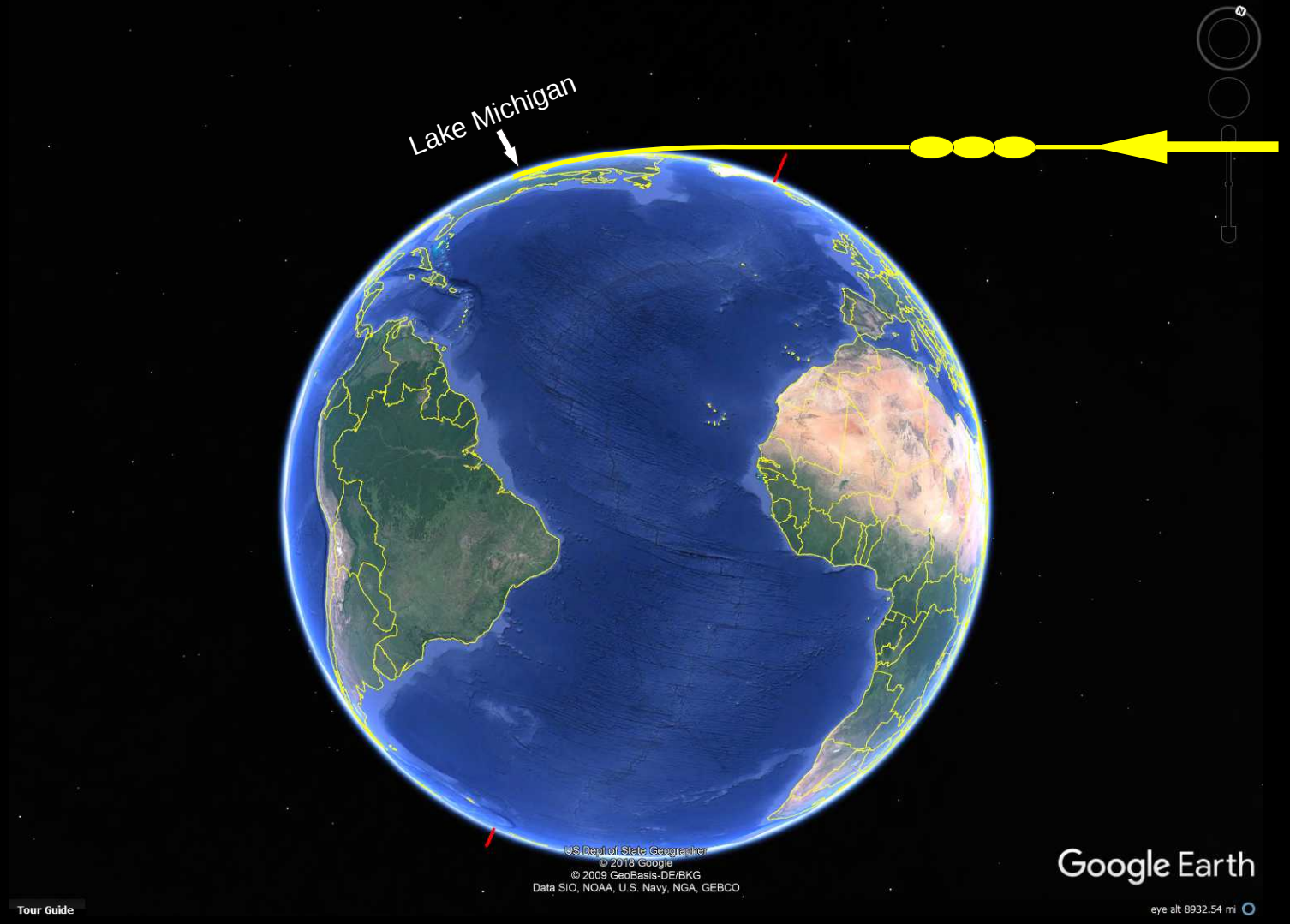
enable us to predict something else?

John Burgener theory of the end of the ice age:
A large comet broke into 7 + pieces
1 hit Earth forming the Middle of Lake Ontario

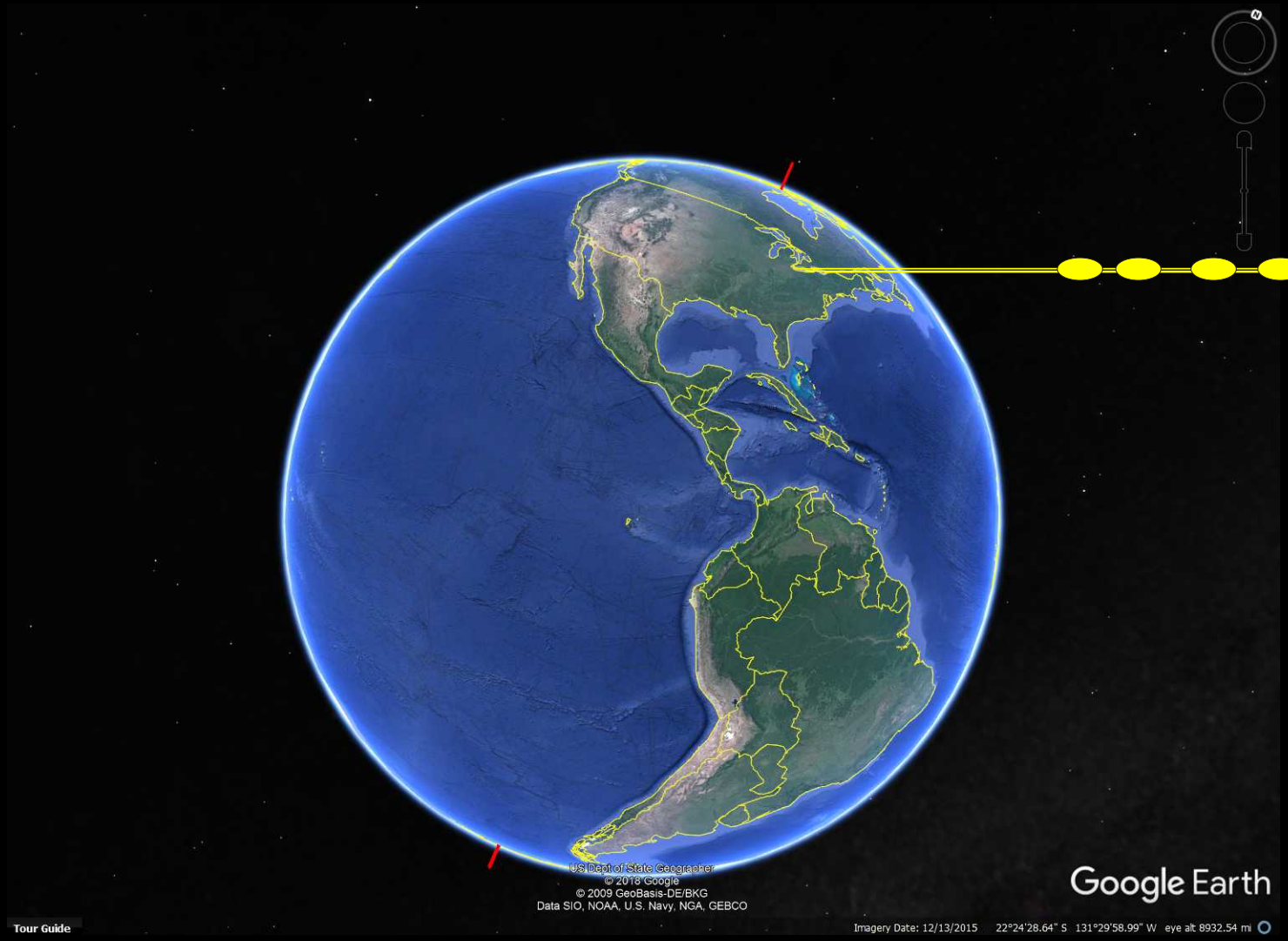


John Burgener theory of the end of the ice age:

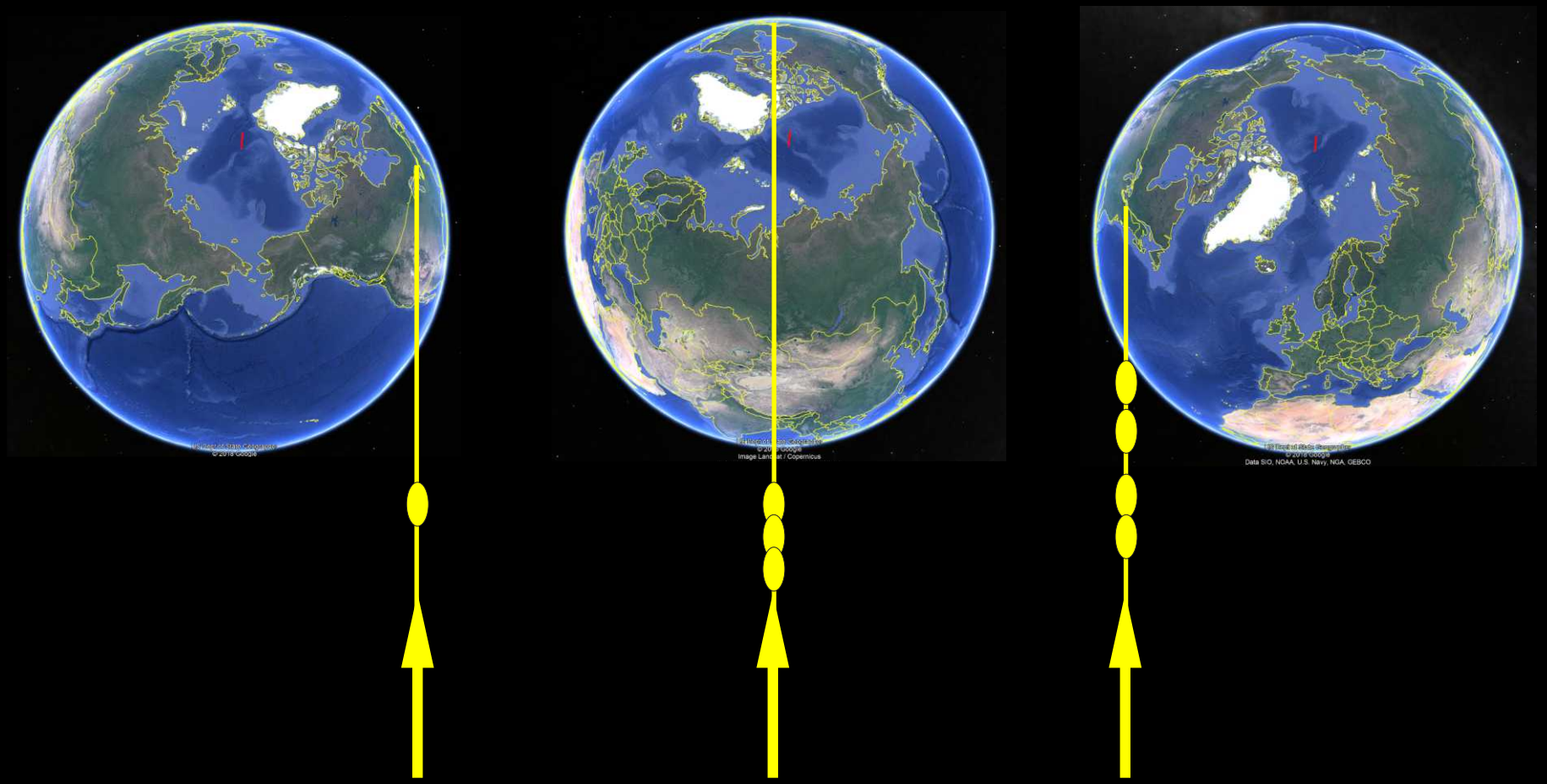
6 hours later 2+ hit Earth forming Lake Michigan



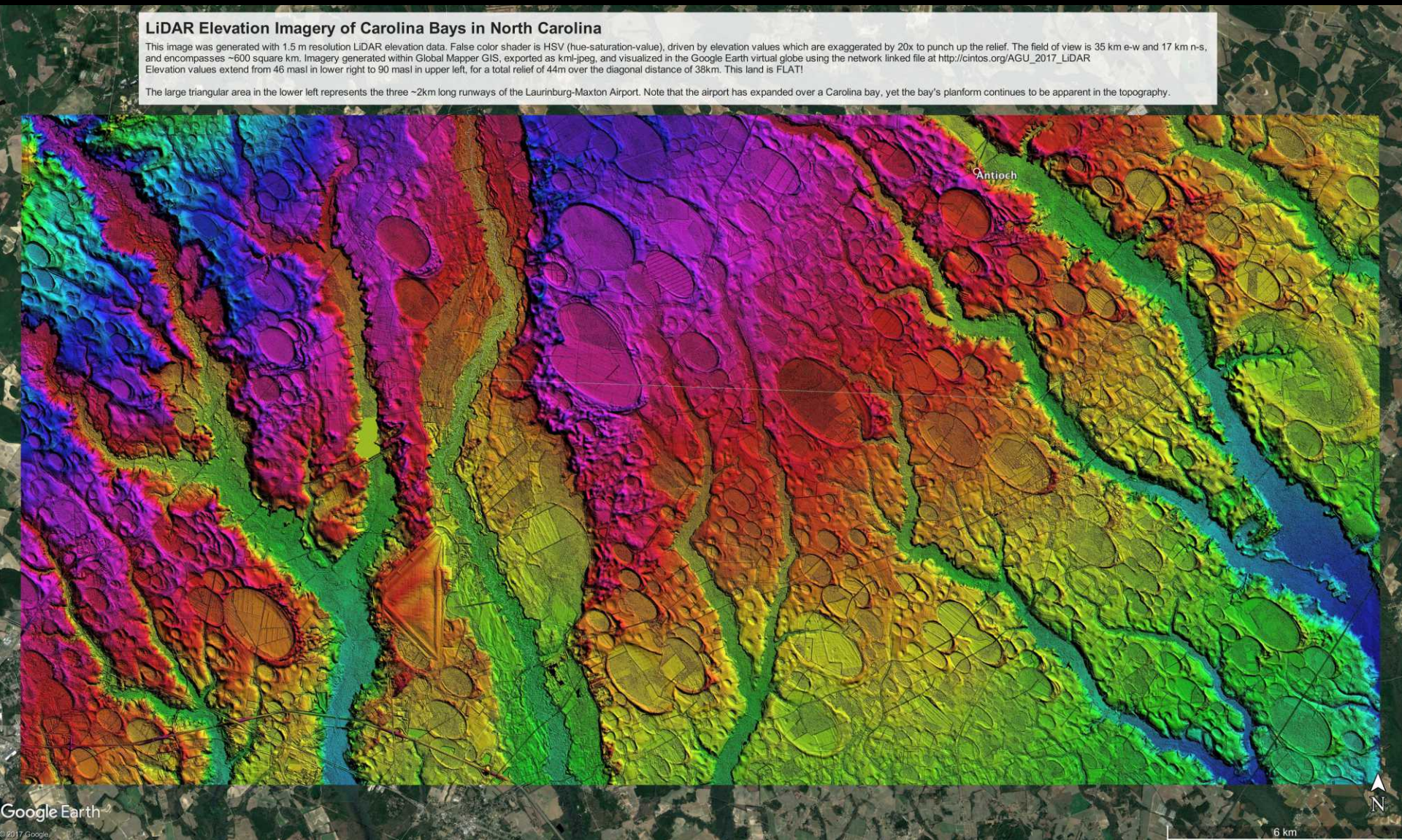
John Burgener theory of the end of the ice age:
6 more hours later 4 hit Earth
forming Lake Ontario and Lake Erie



The view from above over 12 hours



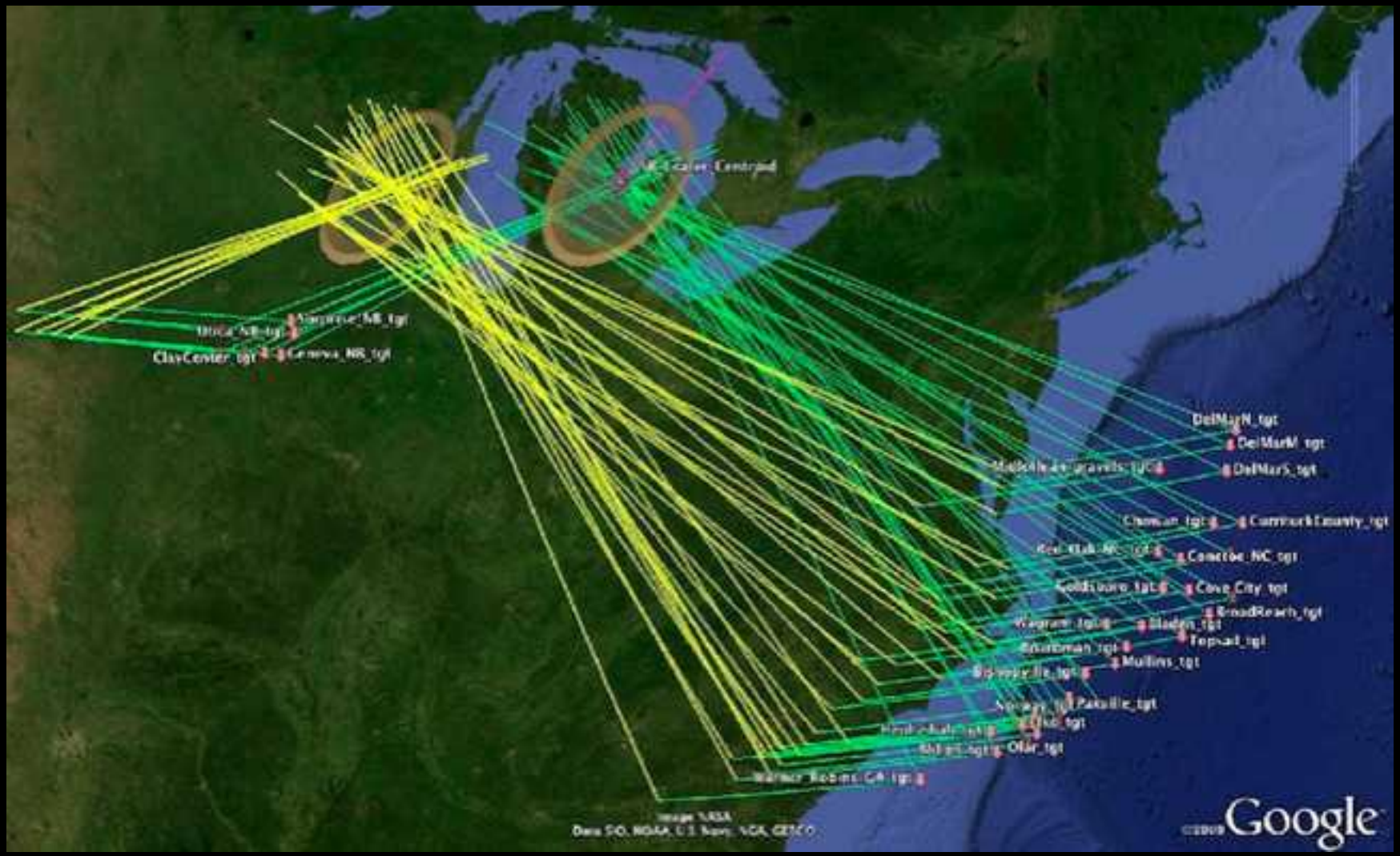
The Carolina Bays are small oval depressions all along the East coast of USA



Several Authors have tried to trace the origins of the Carolina Bays.

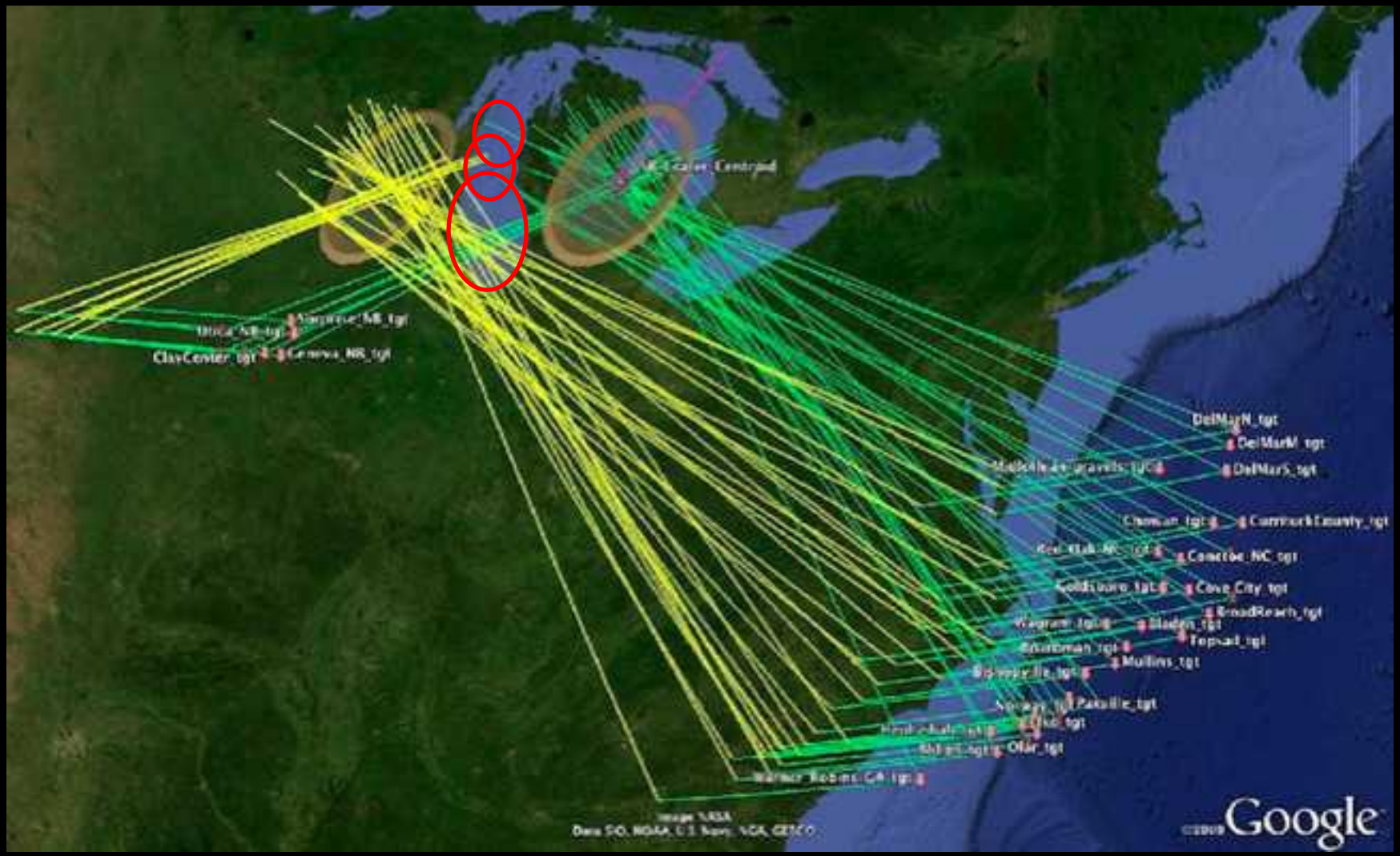
For Instance: "Correlating the Orientation of Carolina bays to a Cosmic Impact"

cintos.org/SaginawManifold/Introduction/index.html



My alternative is that an impact forming Lake Michigan is the source:

All of the lines lead to Lake Michigan



Summing Up:

Ellipses orientated at 23.4° are unique features best explained by impacts.

Ellipses from low angle impacts are common and not always at 23.4°.

The Hoba Meteorite is part of a larger impact event.

Lakes Erie, Ontario and Michigan may be recent impact events.

Some very large circular features can be better explained as craters than as tectonic features.

The Amazon Basin fits as a impact crater and as the source of the K/Pg boundary layer.

Recent impacts have occurred in historical times and disrupted civilization.

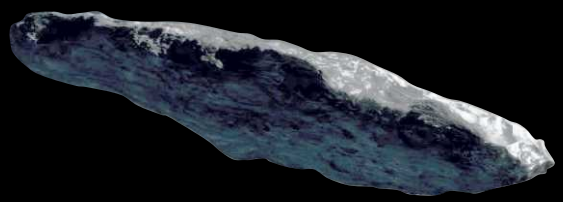
Differences between Comet and Asteroid impacts:

Asteroids are typically less than 10 km diameter
They explode on contact with Earth's surface
They are well represented by simulations of explosions on the surface of Earth
They impact at 11.2 - 25 km/sec
They are usually of high density - typically 3000 - 8000 kg/m^3
They are commonly spherical or close to spherical
Most of the ejecta will be expelled at below escape velocity

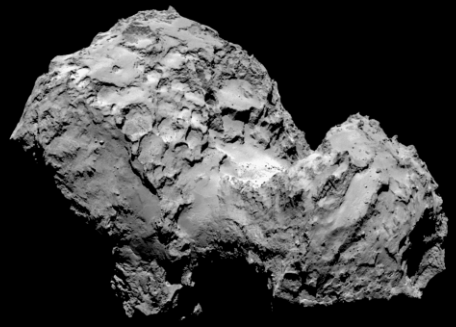
Comets are typically more than 10 km diameter
They penetrate Earth's surface at least their own diameter
They are poorly represented by explosions at Earth's surface
They impact at 40 - 70 km/sec
They are often of lower density - typically 500 - 1000 kg/m^3
They are usually NOT spherical
- long objects produce dramatically different craters than spheres
Most of the ejecta will be jetted into space at above escape velocity

Comets are typically not spherical

Most hydrocode simulations assume spherical impactors.

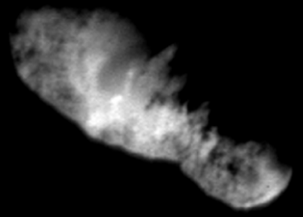


Oumuamua



Chury

Hailey



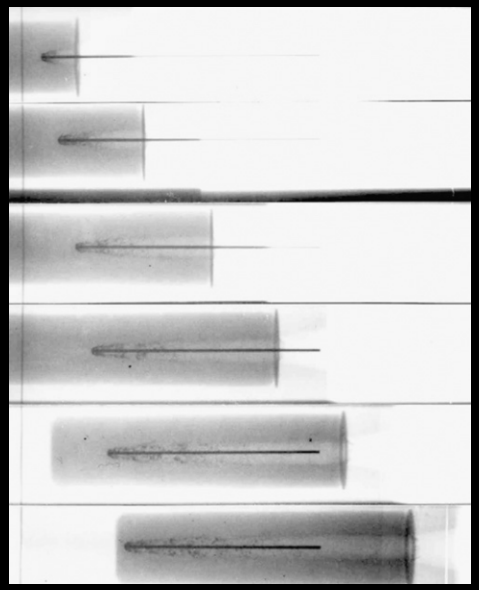
Borrelly

Hartley 2

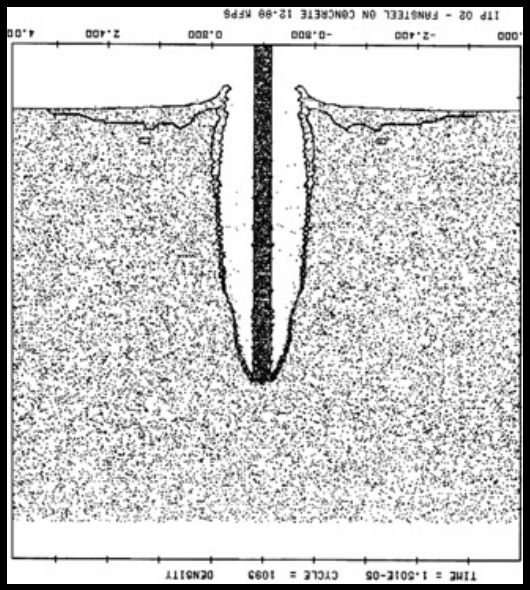
Asteroid 2014 JO25

Itokawa

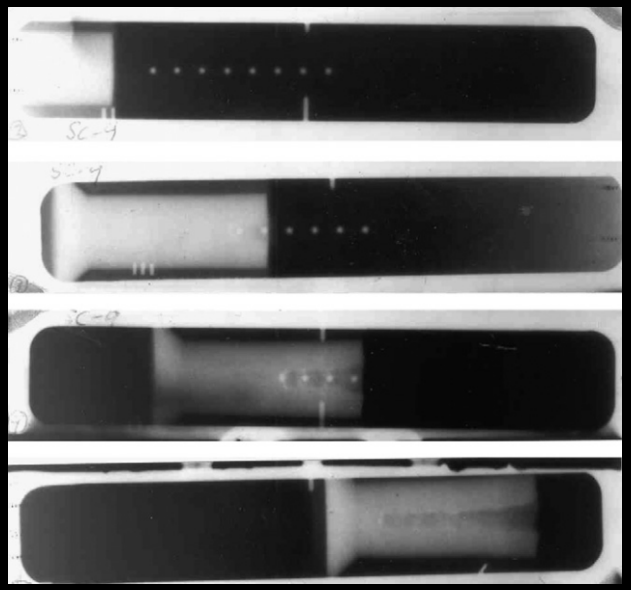
Penetration studies of long rods and series of impactors show deep craters with little shock beyond a few diameters of the impactors.



X-ray of tungsten rod penetrating concrete.



Computer simulation of tungsten rod penetrating concrete.



X-ray of 8 spheres penetrating concrete.

Final crater from 8 spheres penetrating concrete.

Dennis L. Orphal, "Explosions and impacts"
International Journal of Impact Engineering 33 (2006) 496–545

Penetration craters:

Well studied for military applications. Bullets are designed to penetrate, not explode on contact. Nails are fastened to concrete by explosive "hammer guns". Arrows usually penetrate rather than shattering on impact.

What is different?

Penetration craters range from 4X to about the same diameter as the object penetrating, with sizes occuring depending on speed, shape and materials. There may or may not be a rim. Ejecta is sent backwards at about the same speed as the object penetrating. High speed comet impactors will have most of the ejecta sent into orbit, not spread over the land. The main shock wave travels FORWARD not sideways.

I suggest that for elongated high speed comet impacts, the shock metamorphic features will be in limited zones and much less present than in asteroid impacts. In many cases shock features are not likely to be found.

Projects of interest:

Hydrocode studies of low angle impacts by high speed, low density objects

Hydrocode studies of non-spherical objects impacting at high speeds

Hydrocode studies of very large comet impacts - what should the crater caused by a 400 km object at 70 km/sec look like?

Studies of what is expected in shock metamorphic evidence for a comet crater

The Hoba Meteorite is part of a larger impact event - studies of the high resolution magnetic survey of Namibia should find more pieces

Study of the boundary layer expected from a high speed comet impact - how much remains vs how much it sent to space at above escape velocity?

Study of probability of Kuiper Belt objects being sent into Earth crossing orbits

Trips:
1: Go to south Amazonia to seek shock metamorphic evidence
2: Go to Namibia to seek additional Hoba Meteorite pieces
3: Go to the Black Sea to find shock metamorphic evidence

This presentation is available on the web:

www.craters.ca

Along with 2 posters presented at AGU 2016 and 2017

and two draft articles on the Amazon as a crater and on the 23.4° ellipsoidal features on Earth

For questions and comments please email me at:

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