# Chapter 15A: Multi-provincial: The Ipojuca crater's contribution



**Abstract**

If major geophysical features of the North American continent share enough geomorphic characteristics, it is reasonable to suggest they also share a connection in their origin event. The Great Appalachian Valley, the thalweg of the Mississippi embayment, and the path of the western branch of the Mid-Continental Rift are all mega-regional structures that share such physical characteristics. They are found to be concentric to Ipojuca center in the Atlantic Ocean and share a constant form the author referred to as a release-wave valley, and are at a similar spacing that could relate to wave length. These characteristic suggest an energy-wave connection that is typical for astral-impacts.

**Key words:** Release-wave valley, Great Appalachian Valley, Mississippi Embayment, Mid-Continental Rift

### Rings from Yucatan to Nova Scotia

When we look at a specific section of the crust and see multiple circular lineaments, we can see how multiple craters interacted with each other in a given province or continent. When we look at the CGRS (Chapters 3-7) of other craters we can see how their energy signature interacted at much greater distance in small circle relationships that appear as straight or slightly arced lineaments which can sometimes be mapped globally. As their effects reach out over half a globe away, CGRS are multi-provincial.

Two of the CGRS centers recurring in North America are the Jarvis 1 center from the South Pacific, and the Ipojuca center from the west Atlantic, Figure 15.1, which is covered in this chapter.

### Ipojuca Cratering Center

The Ipojuca center shows a small circle relationship to circular lineaments in the U.S.A. and North American continent. A small circle defines a set of points that are equal distance from the center, and without the differences in lithospheric heat caused by previous craters, the shock-wave from the impact would reach all points on the small circle at the same time with the same amount of energy signature expression. Idealized small circle relationships are shown with the white concentric linears on these maps.


**Figure 15.1.** Ipojuca center and its small-circle relationship to linears in Central and North America.

The Ipojuca center is located at -8.7475°N Latitude, -34.4210°E Longitude and named after the town at the Port of Serrambi, State of Perambuco, Brasil. It has very little topographic indication near its center as it was an early and significant astral-impact, but Figure 15.2 shows its gravity indications.

In gravity it shows with the symmetrical deflections of the major linears (“transverse faults”) within its center, indicated by black arrows in Figure 15.2B. The OCR and Open-rings were set at two major interruptions of the linears, like in the Bermuda crater. A prominent energy signature show up at both of those rings, indicated with the red and blue circles for high and low gravity rings respectively. The smaller A, B, and C rings show the most topographic indications on the continent.

The OCR-ring was set for the interaction with Africa. Since a foundational crater for Africa would have arrived later and determined the coastline, this maybe the 2-ring, and the OCR-ring is just off shore where the more prominent disturbance in the linear pattern is indicated in Figure 15.2B.

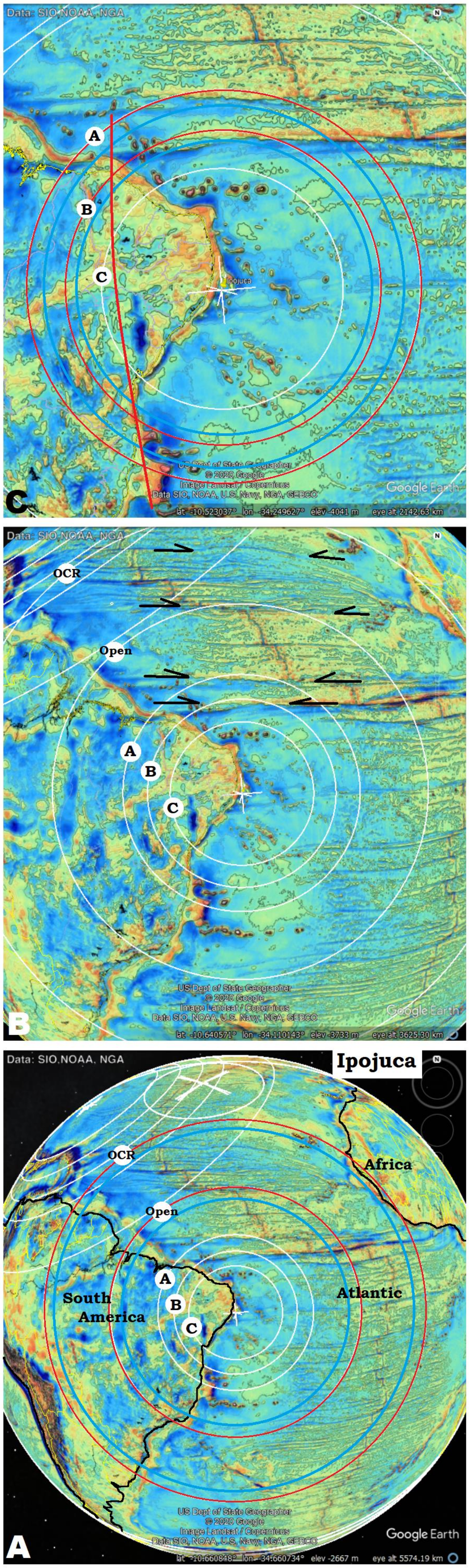



**Figure 15.2:** The evidence for the Ipojuca crater visible in its circular structure. (A) Its orientation and energy signature shows where it intersects the South American continent. (B) The inner rings that helped to locate the center, and the linear deflection in the north edges that mark prominent rings. (C) Inner rings showing the energy signature for two of them. Red line shows a CGRS from another source captured as a mascon, defining the extent of the Open-ring.

Figure 15.3, Lineament 1, from the Ipojuca center has little correlations with gravitational highs in image B along the North American central coastal. A small amount of gravitational high shows along the coast of Virginia and across Florida, but there is significant correlation with ridges of Nova Scotia and Newfoundland in the Canadian east. Additionally, in the south, on the Yucatan Peninsula, in Belize and Guatemala it corresponds to the Maya Mountains. The gravity high extends up the southeastern coast of the peninsula, even off shore onto the Yucatan continental shelf platform. Gravity highs in the south east coast were reinforced by the Serranilla Ring which formed the mountain arc of Cuba.

Linears 2a and b define the western edge of the Yucatan Peninsula, but the energy signature from the Maka Luta center formed the northwest edge of the Yucatan Shelf. The northeast edge of the shelf is defined by an energy signature from the Bermuda center (Chapter 14). The Chicxulub Crater shows no affect at this resolution because of its very small size.

The black and white line traces the remaining Release-wave Valley from these three pairs of CRGS, and the location of the later Great Lakes crater shows its truncation of the Mississippi's thalweg and its contribution to both the Great Appalachian Valley and the Mid Continental Rift.

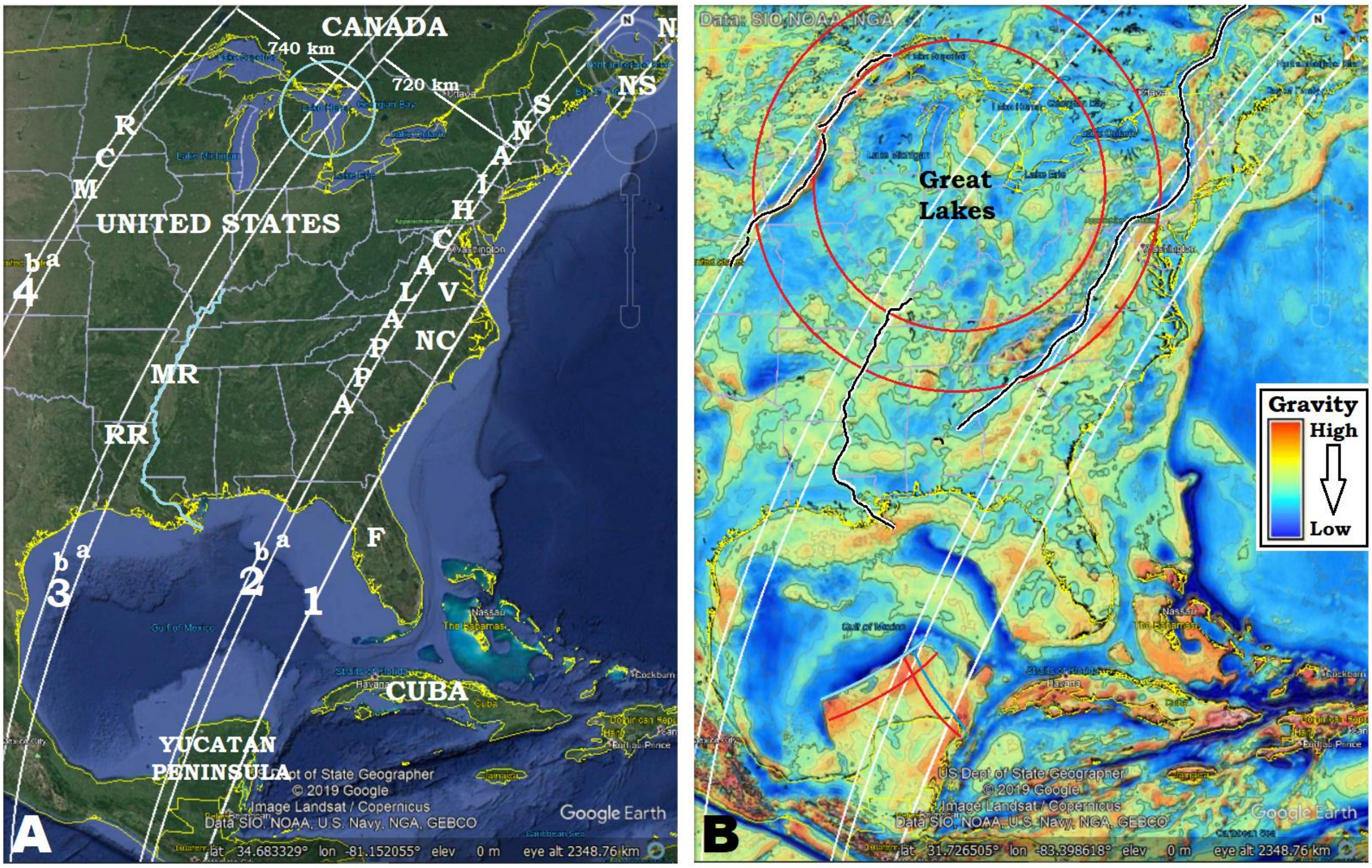



Figure 15.3. Some of the CGRS to the Ipojuca center. A) Landsat image from Google Earth. F= Florida, MCR= Mid-Continental Rift, MR= Mississippi River. N= Newfoundland, NS= Nova Scotia, RR= Realfoot Rift, V= Virginia. B) Global Gravity Anomaly overlay map on Google Earth for the same area. Paths of Release-wave Valleys traced in black and white (Image credit: All Gravity maps form Global Gravity Anomaly overlaid on Google Earth, Scripps 2014).

**Great Appalachian Valley**

Figure 15.3B shows the line of the Appalachian Mountains generally follow lines 2a and b. Comparing with Figure 15.4, a high gravity line generally follows line 2b to the northwest and a gravity low follows between the lines until it bifurcates at the north end and splits into an eastern portion which continues with the lines, and the western portion moves over to the Saint Lawrence Seaway. While the seaway follows concentric to Line 2 north of the joining, a significant blue line, gravity low, follows southwest through Lake Ontario and Lake Erie. This low gravity path likely was produced with the later Great Lakes crater and provided draining to the north via the Saint Lawrence Seaway, and to the south by the Mississippi Embayment.

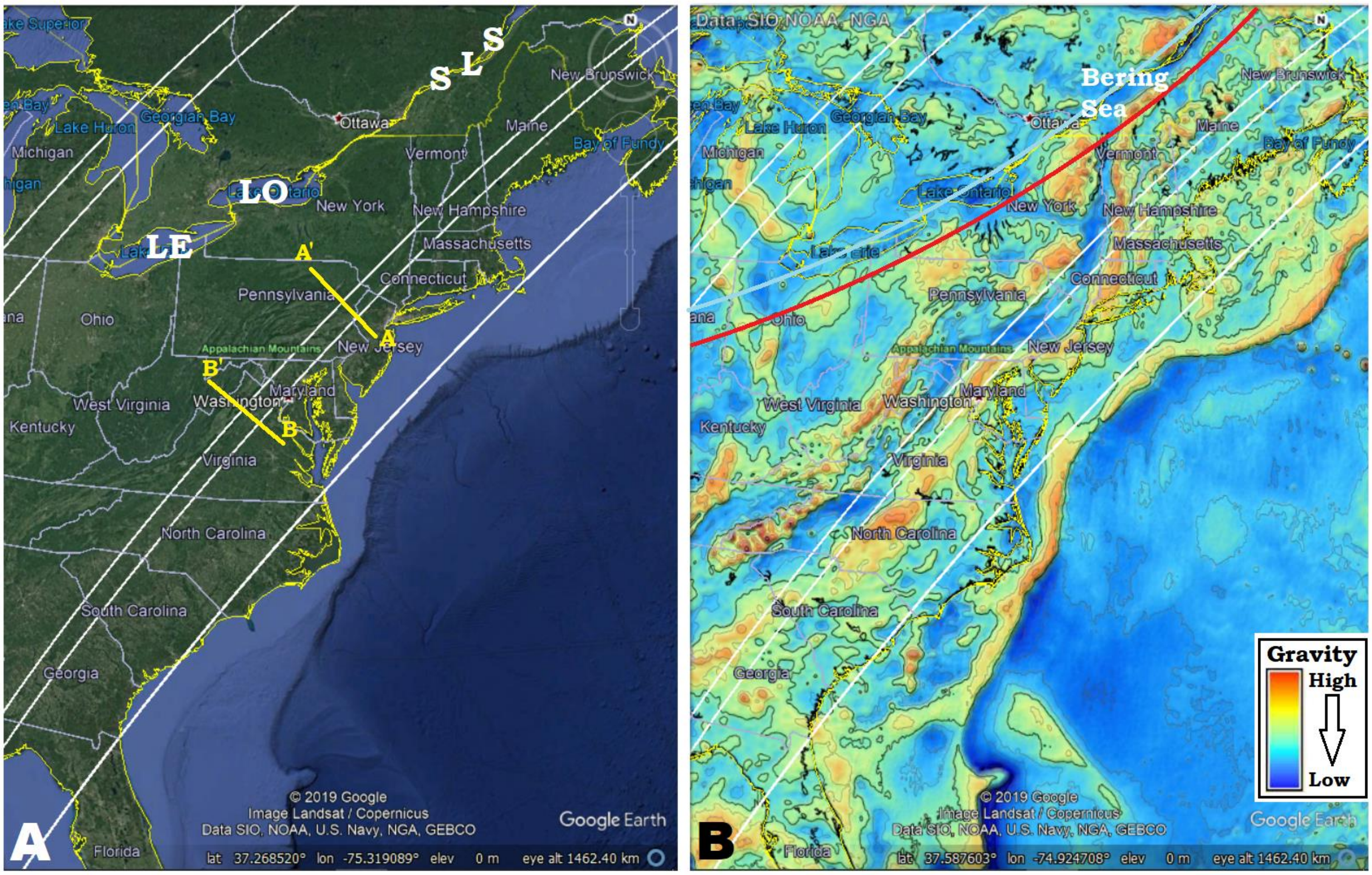
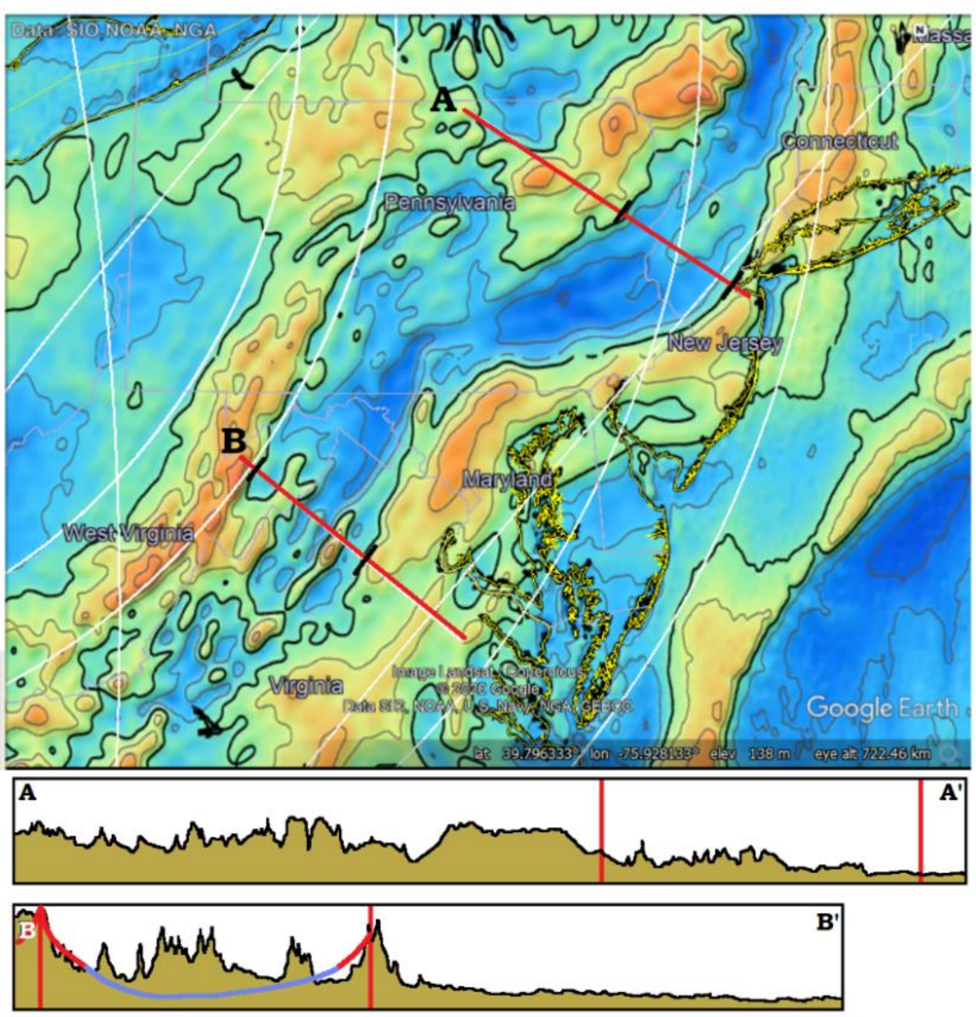


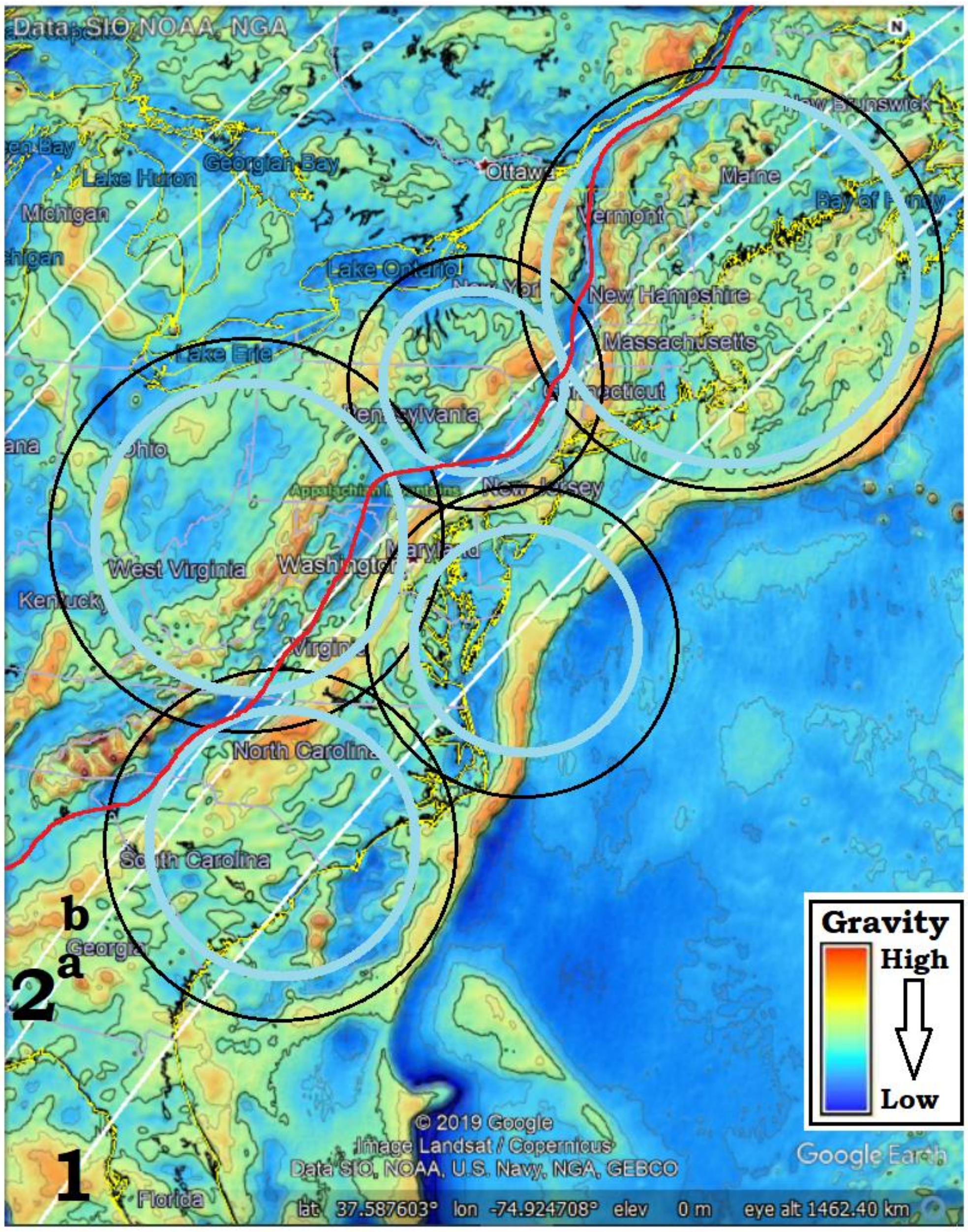

Figure 15.4: A) Landsat image from Google Earth for the eastern United States. LE= Lake Erie. LO= Lake Ontario, SLS= Saint Lawrence Seaway. B) Global Gravity Anomaly showing the energy signature contributed by the Bering Sea crater forming the linear from Lake Erie to the Saint Lawrence Seaway, connected by a CGRS, Figure 15.3, from Great Lakes crater (Scripps 2014).




Looking at two sections across the Great Appalachian Valley shows the general conformity of Section B to the cross section for the shock and release-wave presented in Figure 1.3. If the assumption is made for the Earth as it seems evident on the Moon, all mountains and valleys are a result of cratering or the CGRS from cratering centers, then all peaks on these sections are related to additional impacts. Numerous peaks overlying what is believed to be the original ridge and valley form.

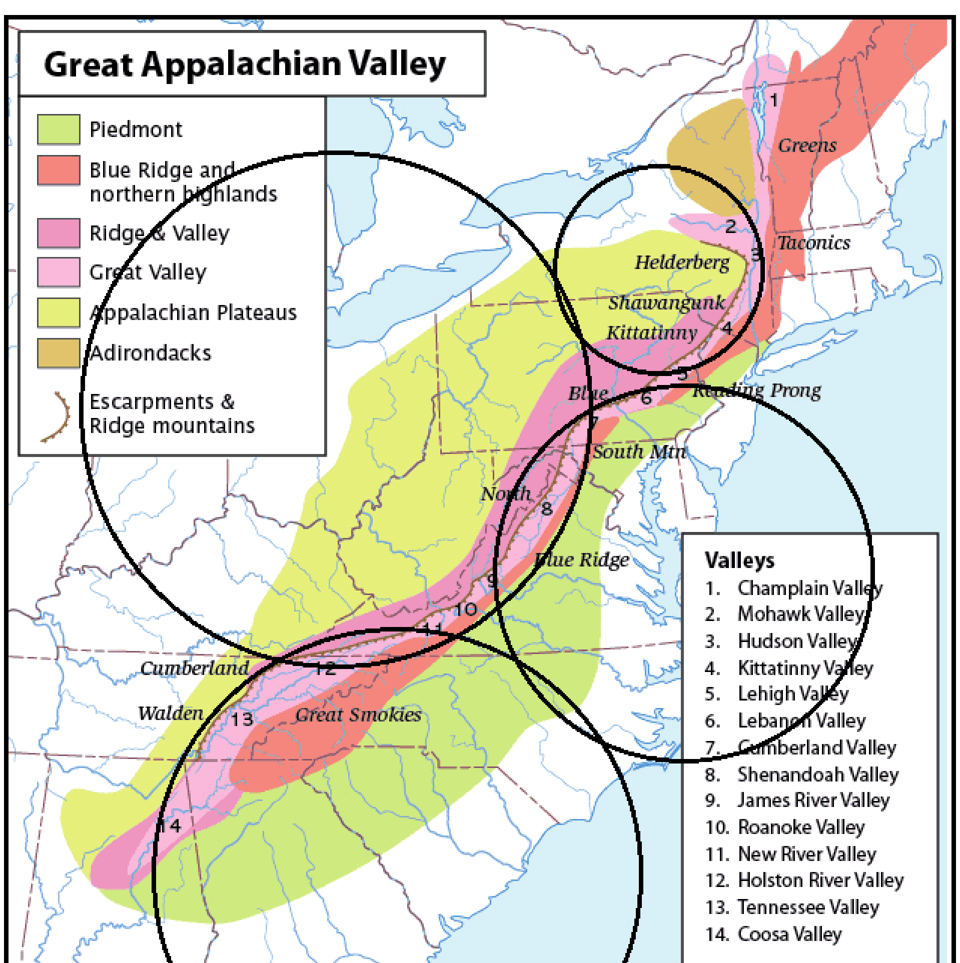
It also shows that gravity does not always follow topography. There is a distinct high gravity ridge bordering the continental shelf which has no equivalent structure in the topography.

**Figure 15.5:** Detail of where the two sections cross the Great Appalachian Valley in gravity. Section B shows the energy signature of a crate overlaid. (Scripps 2014, sections redrawn from Google Earth).




A little experimentation with perfect circles laid over the image produces Figure 15.6. The most northern circle even includes parts of the path in that circle from Line 2 to the Saint Lawrence Seaway. The rest of the circles have the low gravity arc generally laying just inside a high gravity arc defined by the circle. This suggest the low gravity arcs are part of the release-wave valleys inside the shock wave highs. This is seen in the energy signature's shock-release wave pairs, Figure 15.6. The energy of multiple sets of shock-release waves interact like overlapping ripples in a pond. If we assume the original wave between Lines 2a and b was a release valley, the additional centers produced release-waves rings that added their negative energy signature. When these are combined with the low energy at this point produced by the Ipojuca center this caused the cumulative gravity low and topographic low seen in the Great Appalachian Valley, and the numerous up-thrust ridges within it.

**Figure 15.6:** Global gravity Anomaly overlay for Google Earth showing the path of lines 2a and b have the gravity pattern corresponds to circular lineaments drawn as perfect circles on the high gravity readings. Only some of the most obvious rings have been drawn. Additional smaller and larger rings can be seen.




While this pattern of overlapping circular lineaments is seen on the gravity map, it is also pronounced enough to be seen on the generalized map of the area, Figure 15.7.

**Figure 15.7:** Map of the Great Appalachian Valley showing its relationship to some of the circles seen on Global Gravity Anomaly map. (Image modified from Perhelion for Wikimedia, May 12, 2010, CC.)

**Shear-wave Splitting (SKS)**

Shear-wave splitting ("SKS" from the Greek "ký́ma" = wave) refers to the quality of seismic anisotropic of the lithology, including crust and mantle. With much greater quantity and accuracy of reported seismic data, it was recognized that shear-wave had preferred paths through the rock layers where they would travel faster, and those preferred paths were attributable to changes in crystal orientation and cracks. (SKS is much used in petroleum drilling predicting the fracturing of the substrate.) But, there is a general confusion because the general path lines do not consistently conform to assumed plate motion, surface geology, magnetic or gravity lines (Long et al 2016).

Walpole et al (2014) tries to station-average all SKS reading and suggest that was the direction of asthenosphere melting and movement under the crust of the continent, but their results do not conform to any projected motion of plate tectonics either. They end up with a spiral movement in the US west, around Nevada, and another around the mid-continent. The western spiral may represent heavy influence of the combined effect of the Alvord, Blowout Mountain and Mormon Basin crater centers producing a host of concentric fractures to their centers. The mid-continent spiral may similarly relate to the Maka Luta center.

Long et al (2016) plotted SKS, their Figure 4c, in the southern half of the Appalachians and the points midway up the northern Appalachians do show a consistency of direction, and they labels it with an orange line, which is consistent with my Figure 15.3, CGRS 2a and b from the Ipojuca center. Long et al determine that SKS *cannot follow directly from the assumptions of plate motion* except in very isolated instances, I find their expressions in the lithosphere and asthenosphere may follow a consistent pattern with the larger, earlier, and deeper CGRS found in the asthenosphere, and the smaller, later, and shallower CGRS found in the upper lithosphere.

**Mississippi Embayment and Reelfoot Seismic Zone**

Nyamwandha and Powell (2016) suggested the SKS are tracks related to chemical alteration from ascending hot fluids from subducting plates that still trigger seismic activity in the Reelfoot Seismic Zone.

A mantle plume suggested by Liu et al 2017 connected with the Ozark uplift or hot fluid upwelling from the Bermuda Hotspot's passing. The Pascola Arch related to Tull center and Cottonwood Grove-Blytheville Arch is connected Hornsby center.

Not only do rings from the Ipojuca center define the Great Appalachian Valley but Line 3a, Figure 15.2 defines the Mississippi River which sits over the thalweg of the original Mississippi Embayment from the Gulf of Mexico. This embayment has a long history of study as it is the site of the Reelfoot Fracture Zone, often referred to as an early or failed rift.

The Reelfoot Seismic Zone is the most seismically active region east of the Rocky Mountains, where earthquakes occur in distinct bands (Dunn et al 2013) a significant change in fault trends and high pore pressure. SKS can readily be associated with their cratering centers, Figure 15.8, which provides much more recognition of geologic shear source.

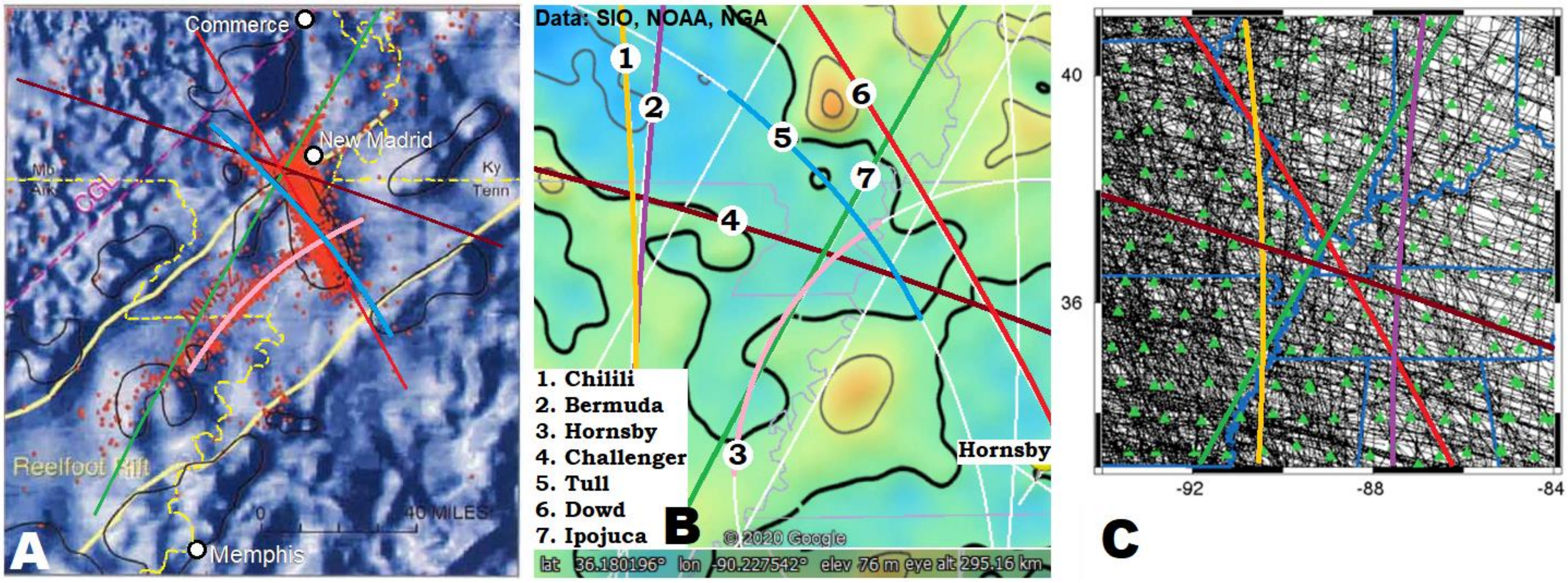
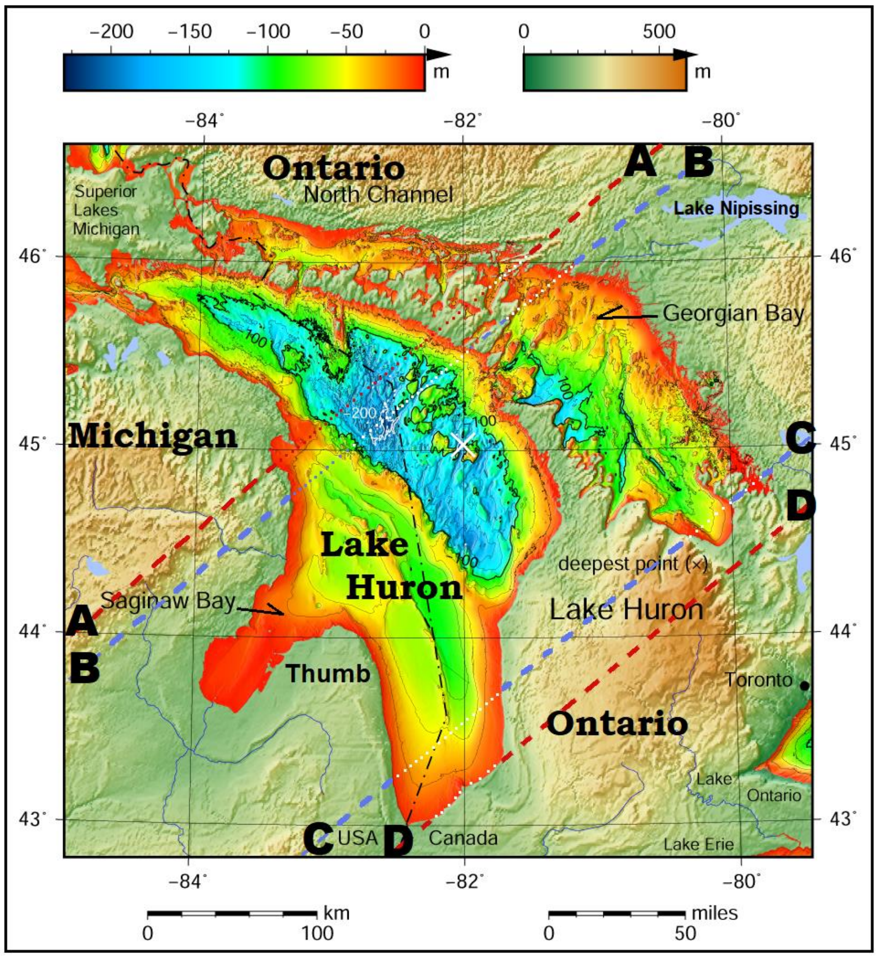



Figure 15.8: Reelfoot Fracture Zone and some of the contributing CGRS's. (A) Shaded relief map of the New Madrid Seismic zone (NMSZ), showing the relatively smooth area of the so called "Reelfoot Rift". Commerce Geophysical Lineament (CGL) indicated by dotted line in pink. Recorded seismic epicenters shown in red. (B) Google Earth with Global Gravity Anomaly overlay showing plotted paths of CGRS from identified centers. (C) Shear-wave Split paths for the same area, and some of the shock release-wave directions from mapped CGRS centers that corresponds with SKS. Most common are the Ipojuca and Challenger centers. (Image credit: A. CC from Erdbeben Wikimedia, 9/10/2005. B. Scripps 2014. C. Figure 2, Pollitz and Mooney, 2014.)

Moving north along CGRS 3a and b, Figure 15.3B, shows the Great Lake crater, arriving after the Ipojuca CGRS, distorted both the Great Appalachian Valley on the east and the Mid Continental Rift on the west, while it totally obliterated the upper Mississippi embayment. Or, did it?

When looking at a crater, we may immediately think it blasted a hole that big. Chapters 8, 12 and 13 suggested an impact did not simply blast a bowl out of or into the surface. Instead, once the lithosphere was heated, later impacts only contributed their energy signature to the pattern, like later pebbles adding ripples to a lake. Figure 15.4B maps the arc of the Bering Sea CGRS's energy signature that crosses it. Carefully looking at Figure 15.3A, lying inside the CGRS lines is Saginaw Bay which forms the indent between the "fingers and thumb" of Michigan's "mitten". Figure 15.9 is a view of that detail. Linear A and D are the ridges of CGRS 3a and b, Figure 15.3, enclosing the trough, Linears B and C, of the CGRS. Linear A is the highest ridge, so it represents the shock-wave that led the wave pair and the trough of the release valley followed it forming Saginaw Bay and the low lands around it (Figure 1.3). The deepest portion of Lake Huron and Georgian Bay, as well as Lake Nipissing also lie in that release valley.




**The Mandate of Knowledge**

Either the occurrence of linears conforming to concentric rings of "cratering" centers are a marvelous coincidence or they have geologic importance. Either this importance relates to their origin in impacts or the reader needs to provide some other reasonable hypothesis. Previously they were ignored because no one knew what to do with the information, but now that you the reader have this knowledge, you must make a decision what you are going to do with it.

Figure 15.9: Lake Huron detail showing topography and bathymetry. Lines A and D define the ridges and Lines B and C define the release valley of the Ipojuca CGRS. (CC using Global Mapping Tools, 5/8/2015, Wikimedia.)

**Sabine Block**

As the Mississippi River flowed down its thalweg, above the crystalline basement draining the central continent after the Maka Luta and eventual Great Lake cratering events, loaded with sediments and detritus, about the Arkansas-Louisiana state line it passed the still attached Sabine Block. The Sabine Uplift is a ~130 km x 100 km chunk of crystalline basement lifted into the oil-drilling strata. This is only the center surface of a block of crystalline basement extending north and south for nearly 800 km, east and west for about 200 km, and 40 km down to the Moho (Mickus and Keller 1992). The Sabine Uplift centers under the yellow "X" in Figure 15.10. The Sabine block, eventually broken off by the Gulf of Mexico crater, was the southern end of the Mississippi thalweg, while the Saginaw and Georgian Bays with Lake Nipissing around Lake Huron formed the northern terminus.

With this history, the east side of the Sabine Block, Figure 15.12, shows a familiar shape. "B" is the up-thrust of a shock-wave, while "C" is the following trough of the release valley. Or "C" may only represent a shelf on the side of the ridge, and the bottom of the trough is lower, further east. The group of 3 normal faults circles at "D" make a case for the shock-ridge descending into the release-trough, and the faults were produced by the adiabatic contraction following the expression of this CGRS (Figure 12.17H). Because these faults extend up through the "Early" sediments, this suggest all of those sediments were immediate fallback and wash-in from these original cratering event. The quantity of sediments resting against the eastern side of the Sabine Block is significantly greater than those to the west of the block. This shows it acted as a deflector for sediments washing down the Mississippi thalweg into the Gulf which must have also been forming in this same timeframe.

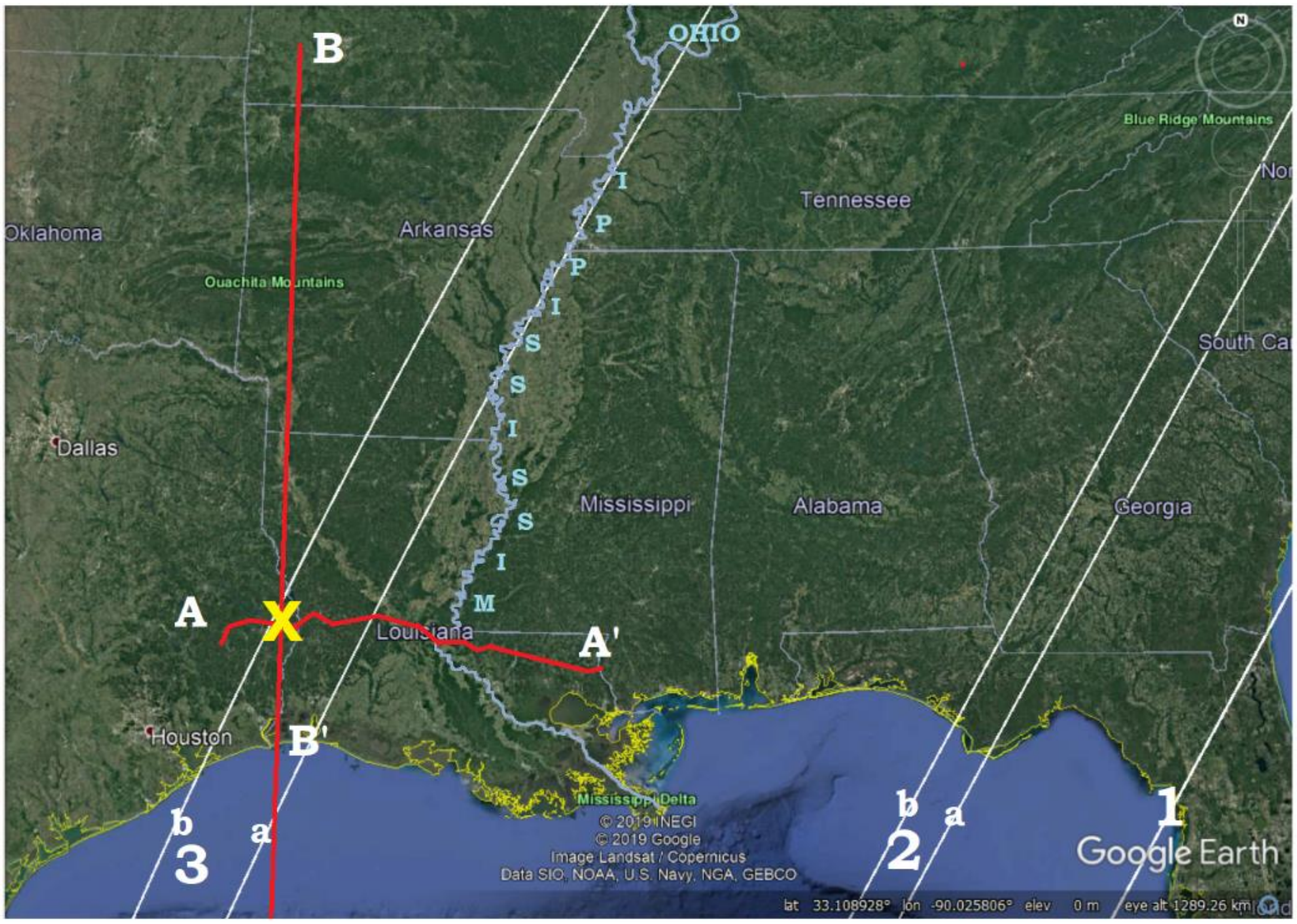



**Figure 15.10:** Google Earth image of the South-Central United States showing the path of the Mississippi River from its junction with the Ohio River and its path to the Gulf of Mexico. The Sabine block is nearest the surface at the yellow “X,” and extends from the Arkansas-Louisiana border well into the Gulf. Red lines locate the two sections.

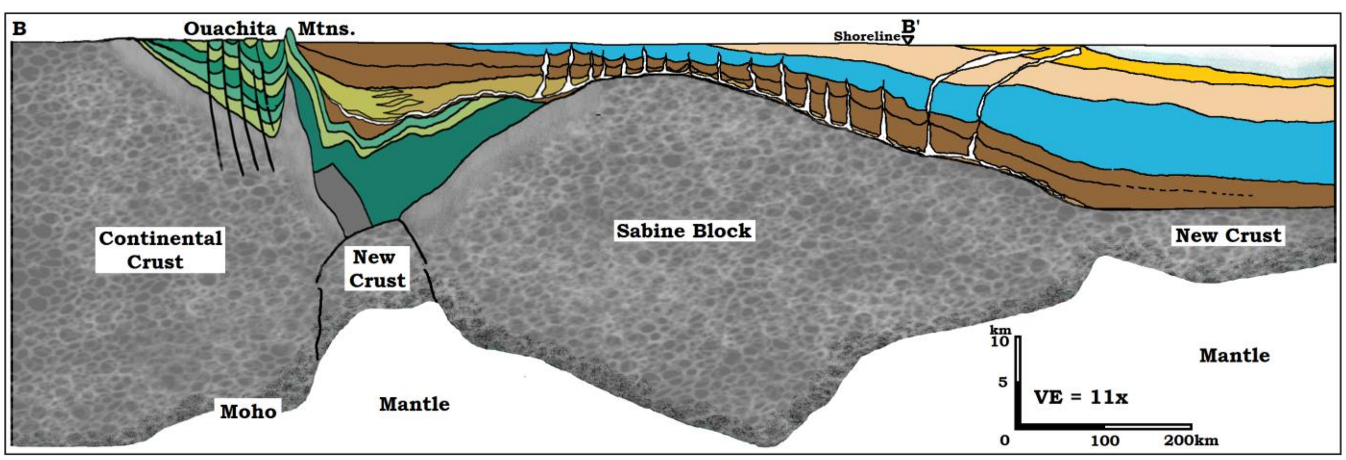



**Figure 15.11:** North-South section B-B’ through the Sabine Block (Redrawn from Mickus and Keller1992.)

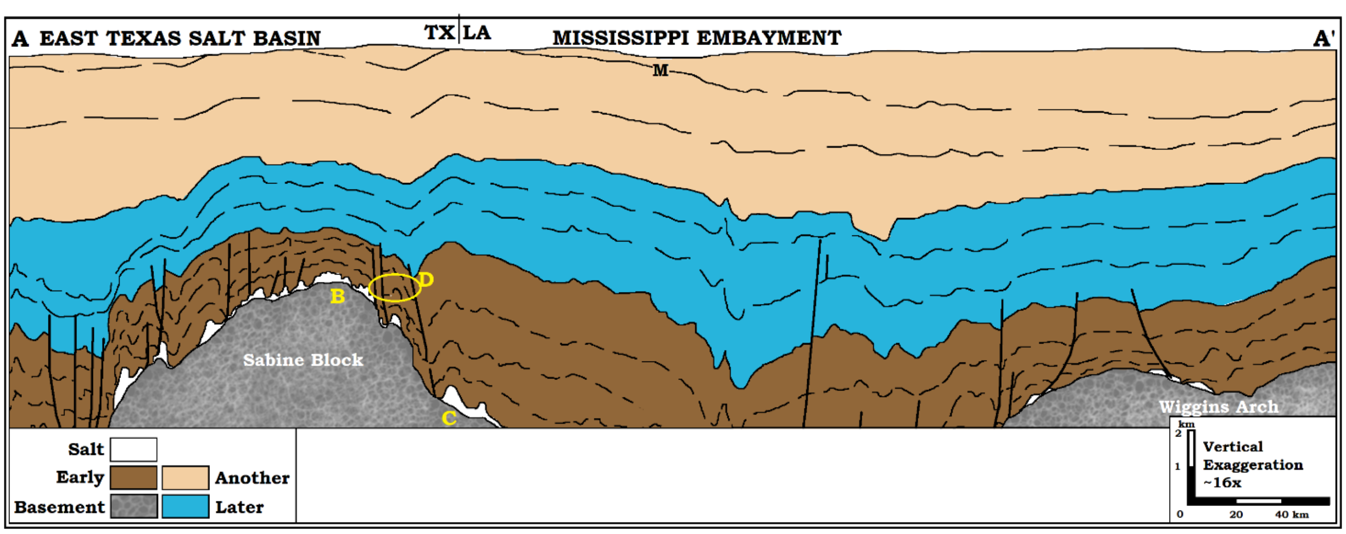



**Figure 15.12:** West-East section A-A’ across the Sabine Block and the path of the Mississippi River. (Redrawn from ION 2015), Early= Jurassic sediments, Later = Cretaceous sediments, and Another= Cenozoic sediments designation in the literature.

**Mississippi Delta: Sediment Pile on East of Sabine Block**

The Mississippi River is seen to conform to Line 3a the entire length of Arkansas, but then it deflects east along eastern Louisiana and is again deflected even further and further east before it finally enters the gulf. Therefore, the Mississippi delta is all of the area due south of the Louisiana-Texas border east to the Mississippi-Alabama border.

Comparing Line 3a to the Figure 15.12, throughout the "Early" sedimentation the drainage was straight across the east side of the Sabine Block. It appears to have remained there through the "Later" sediment. (The small peak under the Texas Louisiana border is a result of salt movement.) As the deposition continued it was building up faster under the words "Mississippi Embayment" showing the majority of the sediment depositing was arriving from that channel, until it reached the black line nearest the top marked M. That is considered the sedimentary break between Oligocene and Miocene. Snedden et al (2012) using this change in sediment patterns from well logs to limit the migration of the Mississippi Delta to the east, starting in the Early Miocene and continues strong to the early Pliocene.

Figure 15.12 shows three additional ghost-rings abutting the present channel of lower Mississippi River. Either the source for these rings did not arrive until the Early Miocene or all of the sediments below them arrived very quickly. Because of the lumpy texture to the Early and Later sediments against the east side of the Sabine Block, it appears the sediments arrived very rapidly. This is the same type of displacement of a cratering ring as seen in Mare Nectaris, Piccolomini crater, and Mare Orientale (Chapter 8, Figures 8.8-14).

It supports the model of cratering as a heat signature which may produce a bowl shaped hole if the substrate is ambient temperature, but when the lithosphere's temperature becomes elevated. Ghost craters may move the topography, like displacing water in a pond with ripples, and that displacement is often the major evidence of the ripples presence. Each successive crater is not a blasted hole that destroys any energy signature in its way, but as a ripple in the water, simply adds its own energy signature to the pattern already present. The distortion of the Appalachian Valley and the Mississippi thalweg are two examples of such distortions on earth.

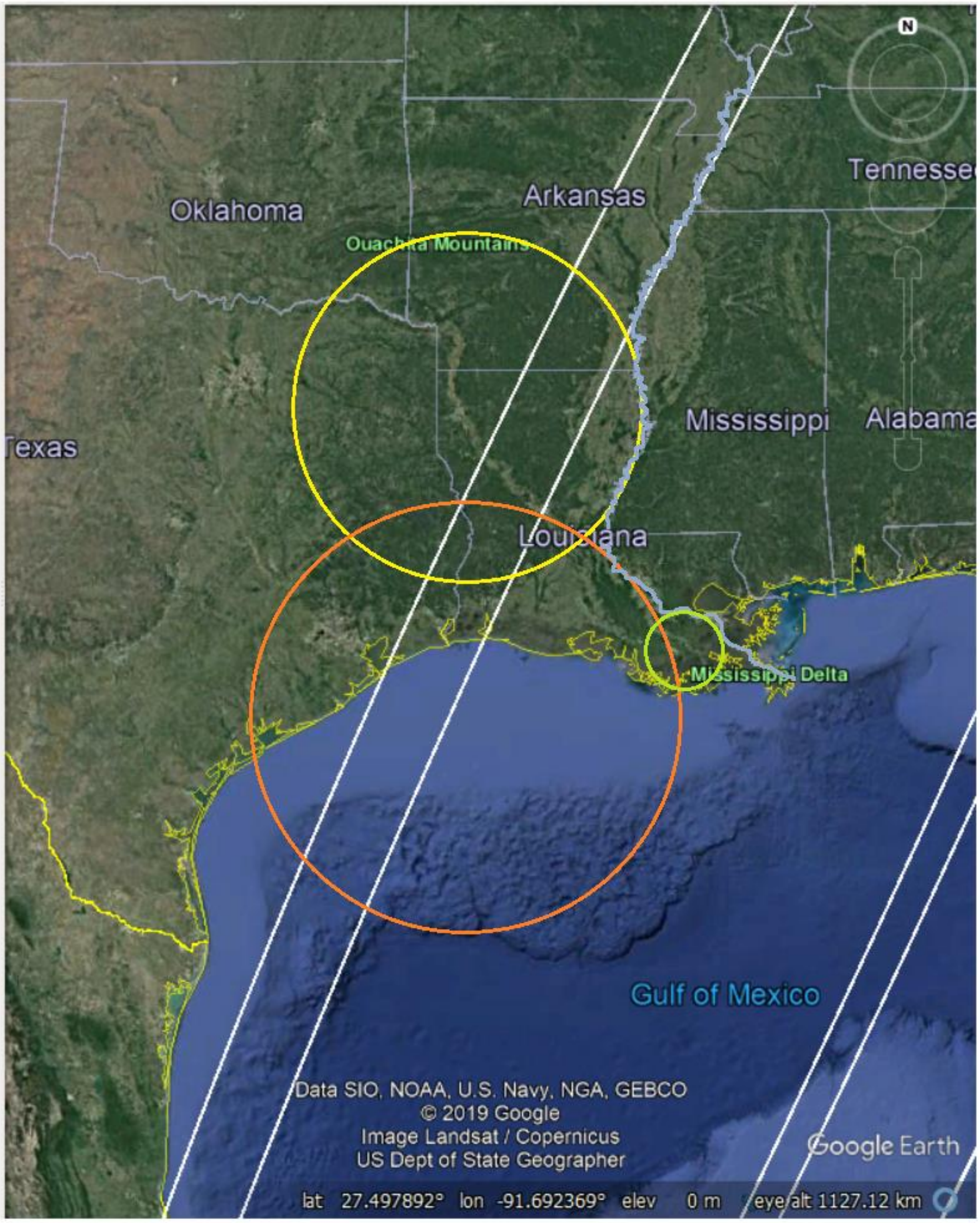



**Figure 15.12:** Google Earth image of the Mississippi Rivers path into the Gulf of Mexico, and the deviation to the south end of that channel.

**Mid-Continental Rift**

The Mid-Continental Rift is a trough of high density volcanics inserted into the North American (Maka Luta crater bowl) structure. Secular (Chichester et al 2018, Stein et al 2016, Stein et al 2011, Woelk and Hinze 1995) and Creationist (Reed 2000) authors have puzzled over its structure and location. They have generally come to the conclusion that it is a failed rift that tried to split the North American land mass. But, Stein et al (2018) suggest alternatively, it may be part of the Grenville Orogeny or a large igneous province.

The system consist of two (Reed 2000) or three (Stein 2018) arms. The west arm which is discussed here and northern and eastern arms, Figure 15.13B. Some of the northern branch is mapped as a CGRS of the Irminger center in the Irminger Sea, (Line A in Figure 15.13A) heavily contributed to by the Great Lakes and Michigan craters, Figure 15.13B. Chapter 10B, Figures 10.29-32, established the Mid Continental Rift is the result of interactions between the Tatanka, Maka Luta, Ipojuca, and MCR craters

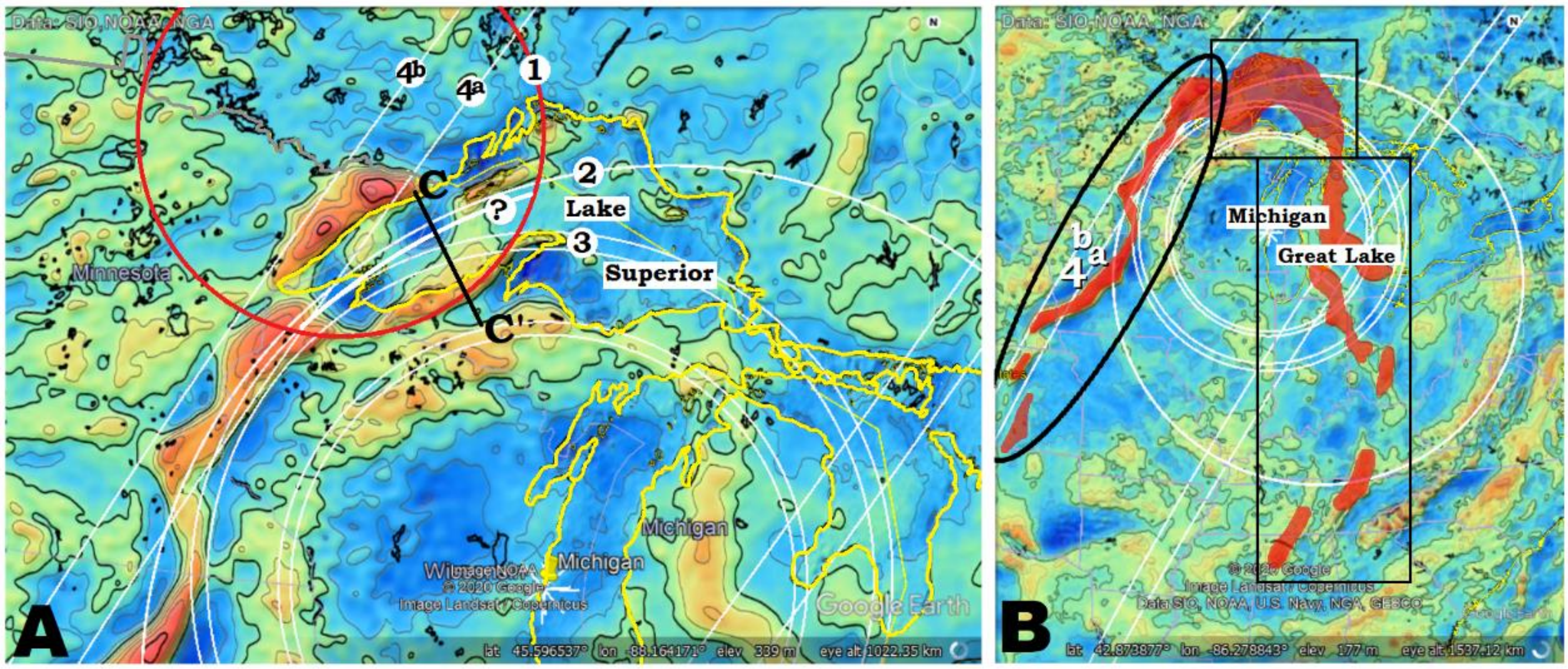



**Figure 15.13:** (A) Detail of the overlap between the Keweenaw crater-1, and Great Lakes crater-2, and Michigan crater-3. 4a and 4b are CGRS from the Ipojuca center defining the west arm of the MCR. The ?-linear is the location of the Douglas (Ojibwa) fault. (B) The MCR as shown by Stein et al (2017) showing the west arm (oval), north arm (top rectangle) and east arm (east rectangle). Stein et al added lower half of east arm to support their association with Grenville orogeny.

Stein et al (2018) imaged the MCR (Figure 15.14) using GLIMPCE (Great Lakes International Multidisciplinary Program on Crustal Evolution) data. But it is evident from Figure 15.13B that it primarily was not part of the MCR formed by the Ipojuca center. Instead, what they are considering is from much smaller, and later craters. While the Great Lakes crater warped the placement of the Ipojuca center produced Appalachian and the MCR, the Great Lake crater was later, and the Keweenaw crater was still later.

While at first the MCR appears to be a graben of a horst-graben system, Figure 15.14, they are all reverse faults, and a result of compression, not extension. Stein et al (2018) correctly identify it as “two steeply dipping faults that flatten and converge at depth, forming a bowl-shaped depression” (page 408), or two half-grabens (Stein et al 2016). The Portage Lake Volcanics that are limited to its general area, are laid over older volcanics that are more extensive and connect to deposits on Lake Superior’s northwest shore. I will assume these are some of the volcanics from the older western arm.

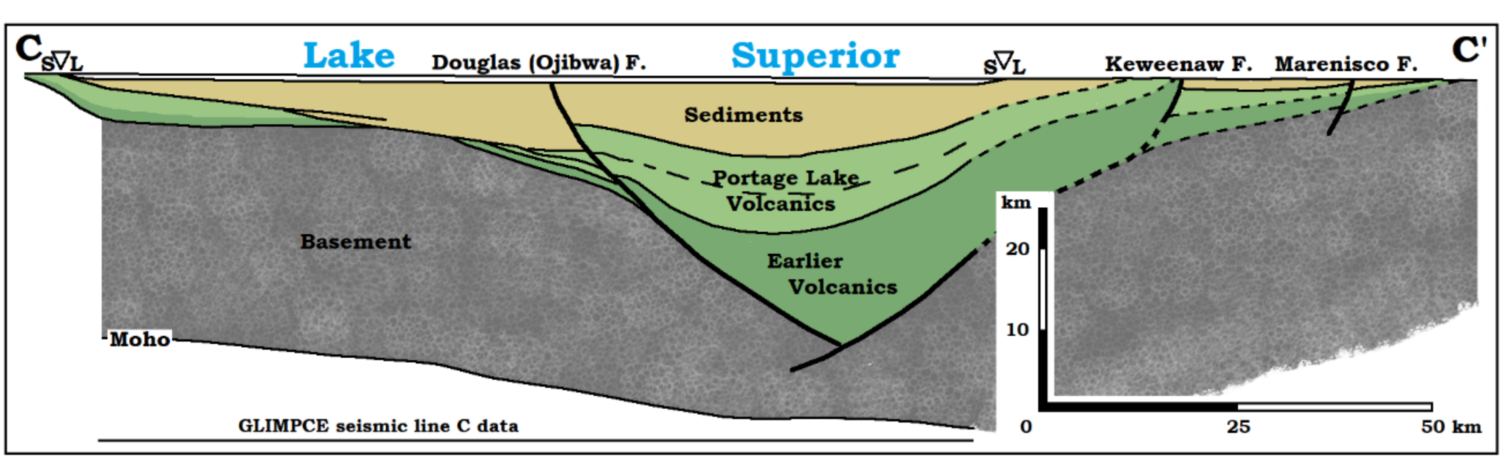



**Figure 15.14:** Seismic section under Lake Superior. From shoreline (SL) to shoreline. GLIMPSE data only available for northwestern two-thirds. (After Stein et al 2018.)

While I propose the western arm connected with the Ipojuca cratering center is the oldest structure and predates the MCR crater, Figures 15.15 and 15.16, the expression of the MCR occurred only with the MCR crater. The origin of the Douglas (Ojibwa) fault and Keweenaw fault are much more recent. As the Keweenaw fault cuts the Douglas (Ojibwa) fault it is younger, and would agree with the general decreasing size of impactors.

Line A, CGRS from the Irminger center, does not cut the high density ridge of the MCR although it probably contributed to its segmentation, so the Irminger CGRS is earlier than the MCR crater. The blue circle of the MCR largely defines a darker blue, low gravity area consistent with the thinned crust inside the Open-ring on the larger moon craters (Thaisen et al 2011), and then the high density fill of the Mid-Continental rift would directly correspond to a moon Mascon (Melosh et al 2013), high density mass concentration, occurring in this location, Chapter 9. The overlap with the Open-ring of the Maka Luta crater (Figure 14.11) contributed to the higher energy/hotter substrate causing the volcanics.

Additional circles can be seen all around the Mid-Continental Rift in Figure 15.15A. Ghost craters that relocated the gravity signature in the manner of distortions in moon crater rims (Chapter 8, Figures 8.8-14) are shown in red, and those that just add to the confusion, but are most visible in the gravity changes, are shown in black.

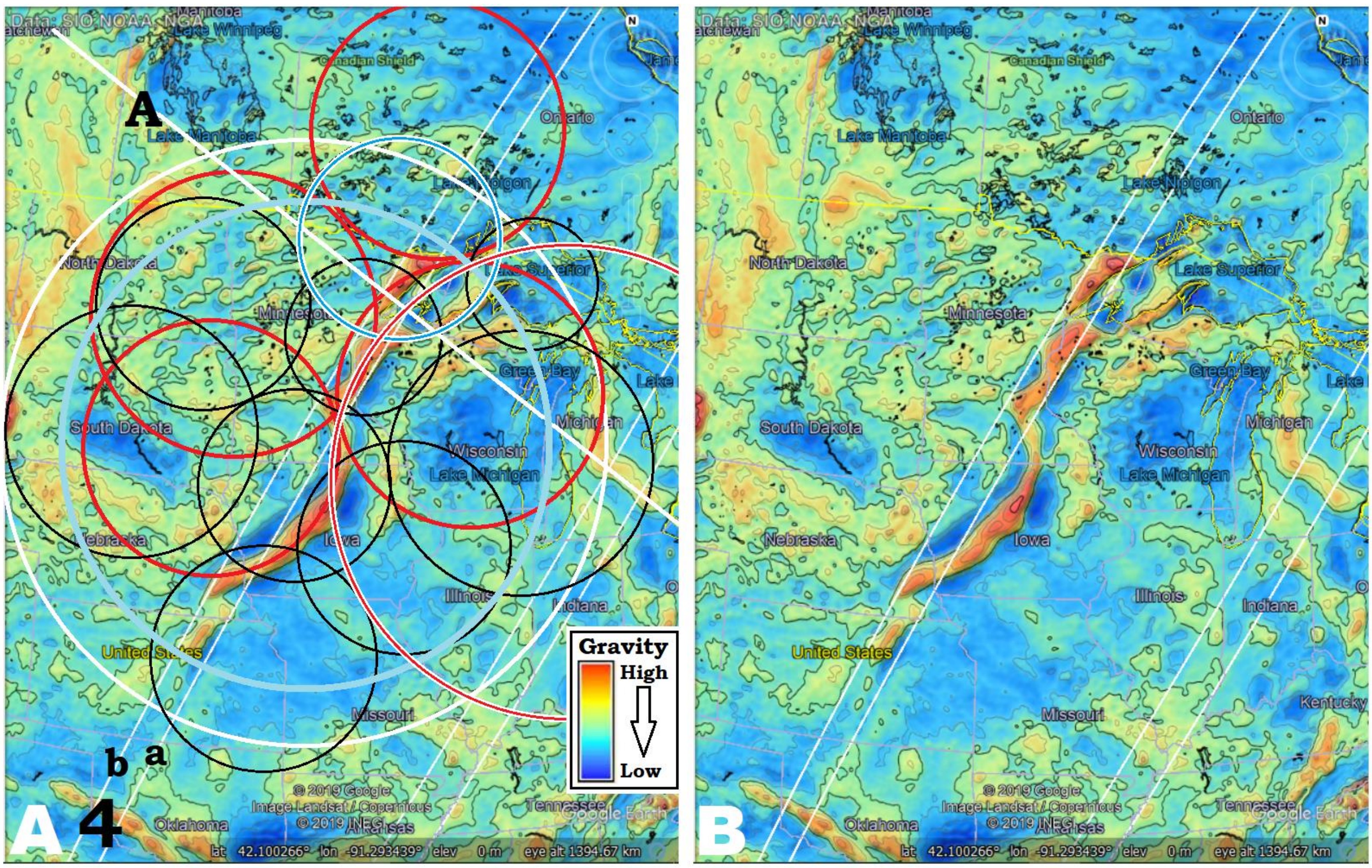



**Figure 15.15:** Global Gravity Anomaly overlay for Google Earth image of the Mid-Continental Rift showing some of the possible ghost craters distorting it. Line A is a ring of the Irminger center in the Irminger Sea, North Atlantic. Keweenaw crater shown as blue on white and Great Lakes crater shown as red on white. Same image in (B) Using the circles in A, can the reader locate the clues the author used to see the rings in the right image? Doing so may help you understand the principals involved. (Images: Scripps 2014)

Continuing across North America there are three additional places the Ipojuca CGRS show their energy signature. Linear 5a and b in Colorado, Figure 15.16, shows it contributes to the sudden rise of the Front Range with the Maka Luta ring. And, west of that its shock-wave contributed to the rise of Lulu, Howard, Bowen, and Gravel mountains, and the release-wave to the Colorado River Valley that runs to the east of them. In Utah, Linear 6 release-wave contributes to Highway 72 valley from Wellington to Fremont, Utah, and the shock-wave to the Hilgard-Fish Lake Mountains to its west. A second energy signature in Utah is further to the west in the Sevier River Valley and the Table Mountains west of it.

One last place the Ipojuca center contribute to the topography is on the west coast of Oregon and Washington. Linear 7a in this area is referred to as the Coastal Range, like in California, as if they were a single line of mountains, but, they are not. Linear 7b is called the Western Cascades. These two ridges also come with valleys in between. From the north, Puget Trough in Washington, and Willamette and Umpqua valleys in Oregon. The continuity of that low gravity valley is much more evident in the blue of the gravity map than it shows in topographic and vegetative cover.

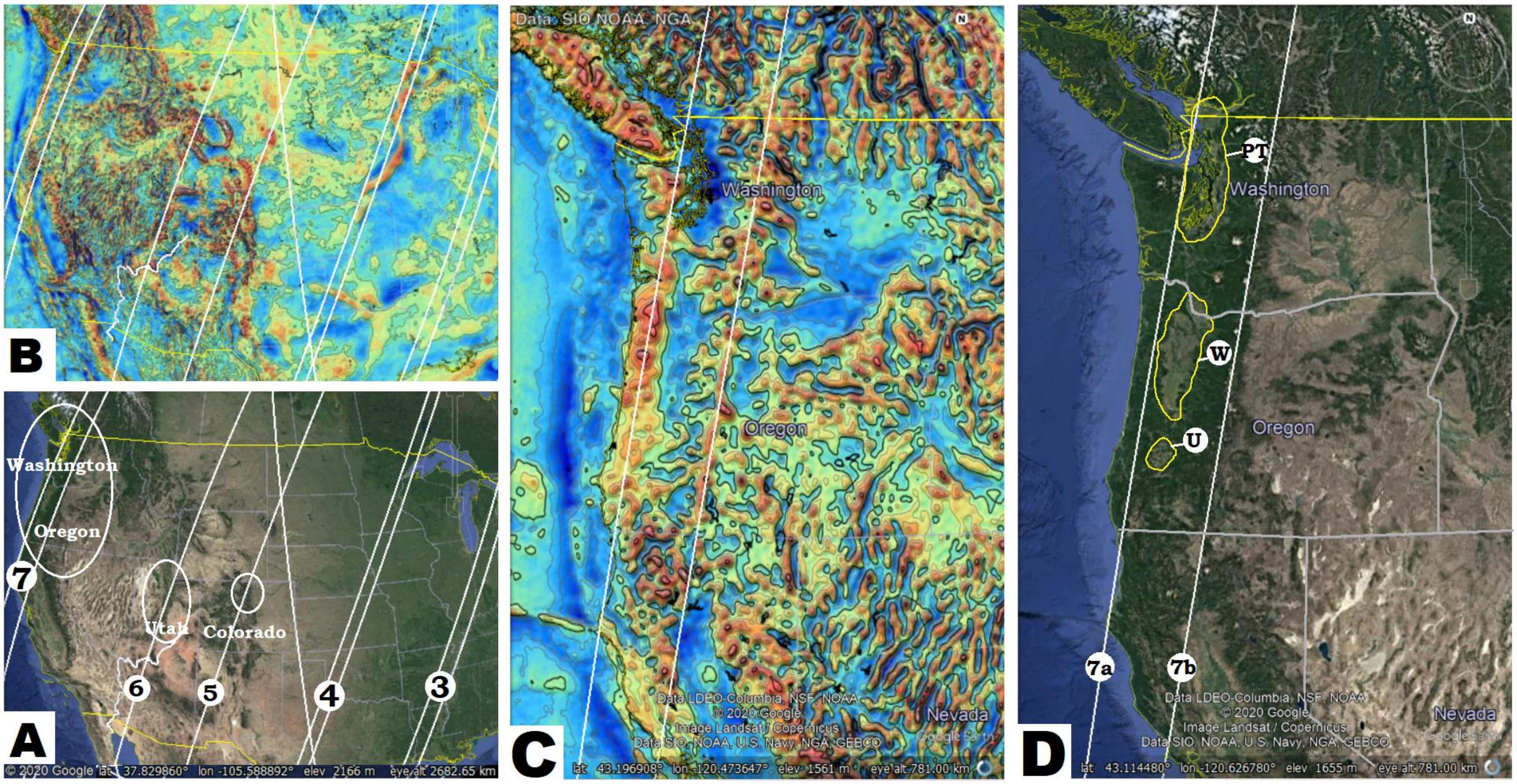



**Figure 15.16:** (A) The western portion of the U.S. showing CGRS from the Ipojuca center. (B) Same area in Global Gravity Anomaly. (C) Global Gravity Anomaly Map showing CGRS 7a and 7b from the Ipojuca center forming the western continental border in Oregon and Washington. (B) Google Map of the same area. ((B and C) Scripps 2014)

**Discussion and Conclusions**

Release-wave Valleys are the most prominent feature of Ghost craters when the substrate has become too hot/energized for the shock wave to raise a distinct ridge-ring. This will be seen again and again. Linears 2a and 2b define the Great Appalachian Valley. Linear 3a defines the thalweg of the Mississippi Embayment, which would also originally have been a valley like Saginaw Bay. Linears 4a and b defines the Mid-Continental Rift, filled with volcanics. Linear 5 defines a portion of the Colorado River Valley. Linear 6 defines a portion of the Sevier River Valley. And, Linears 7a and b define the west coast of Oregon and Washington with valleys in between. All of these lines are concentric and trace back to a single center, it is reasonable to assume that center was the origin of the shear force that produced each of these lines.

The occurrence of these lines at similar interval, 720-740 km (448-460 miles)(Figure 15.2), suggest a regular wave length, another indication a wave is involved. Chapter 1 defined valleys such as these which are associated within a ring of gravity highs would be expressions of shock-release waves and be the expected response of an impact. Either we have to suggest the concentric occurrence of extended lines of these gravity lows are a huge coincidence or some single cause has to be behind these multi-provincial expression of cratering.

The Northern Grenville Orogeny, as used in Plate Tectonics encompasses much of the East Coast of North America. It takes its name from Grenville, Ontario, just east of the Saint Lawrence Seaway, in the Canadian reaches of the Appalachian Mountains. The Grenville Province is thought to typify the geological processes involved in Plate Tectonics. This is an area I have shown the geomorphology to be governed by the Ipojuca center. As Jamieson says, “The single most important test of a geodynamic model is its ability to integrate diverse and independent observations in a self-consistent manner” (Jamieson et al 2013). If the Northern Grenville Orogeny model does not include the Mississippi River and Mid-Continental Rift, then it is inadequate to explain the observations. If both the Southern and Northern Grenville Orogeny are inadequate to explain the geophysical evidence in their individual areas, then Plate Tectonics and the concept of Continental Drift should be called into question. The Ipojuca center is shown to include the Basin and Range’s parallel “folding” of alternating high ridges and low valleys extending to the west coast of North America. Plate Tectonics fails to connect these to the Grenville Orogeny. If an impact model does explain all of this geophysical evidence, then it needs to be considered.

Chapters 3-5 extensively covered the Pacific Fracture Zones and the CGRS relationship to the Pacific center in the Kara Sea. The form that is left in the substrate of the Pacific floor is the energy signature of a shock-release wave (Figures 3.3. 3.4, and 3.5) repeatedly extended around the globe. The Ipojuca CGRS that are visible across North America are also multi-provincial cratering structures, and form the underlying pattern of energy with many overlaying energy signatures adding their unique touches. We find the Creator's handy work in the details all across the North American continent.

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