Chapter 22: Erosional Morphology in Northern California

Abstract

The Northern California Coastal Range from Eureka in the north down to San Francisco Bay is examined for evidence of significant erosion direction from flowing water. Pattern on the east side of that range suggest a onetime huge wave splashing event from west to east. A postulated source for that water is found in the Mendocino circular lineament located off shore in the Pacific Ocean. As this seems to be the last major erosional event in this area, it precludes a general flow off of the continents and subsequent deposit of continental shelf, which some Flood models advocate.

Introduction

Much of our model of erosion processes date back to Penck (1953), but are roots in the 19th century's thinking of W.M. Davis's erosion cycles and James Hutton's uniformity of processes when they attempted to loosen the bonds of Biblical time constraints (Orme 2007).

Both Davis, 1880s (Orme 2007), in talking about the erosional process, and B.W. Sparks (1960) in 1948 when describing geomorphology, list three aspects involved: structure + stage (span of time) + cycle (process) (Orme 2007). Most Creationist modelers accept both aspects 1 and 3, feeling that only the timing has to be changed to fit a Biblical perspective. After all, our understanding of the processes of erosion have been developing since the ancient Greeks. Aristotle recognized streams move material and deposit it as alluvium. Seneca recognized the power of streams to abrade valleys. Leonardo da Vinci believed that valleys were cut by their streams. But, what if all three assumption are based on inadequate evidence? Then Creationists need to take a harder look at the evidence no matter where it leads us (Barnhart 2011, 2012a, 2012b, 2014) and formulate our models with a due amount of skepticism for both the required timing, and involved processes (Chapter 1).

For this study I will be using images from Google Earth. One Flood Modeler recently derided me, "I believe the analysis of lineaments and fracture patterns is far more sophisticated than using Google maps." His view is not informed. A little explanation is needed.

When the military started regularly using cameras in planes during the Second World War, the few geologist who had access to those pictures started seeing geomorphic relationships they hardly expected (Gay 2012) and later, when the first satellite images were released to a few select universities a constant buzz erupted and a flurry of papers at conferences resulted (O'Driscall 1964, Norman et al 1977, O'Leary and Freedman 1978). The satellite images were soon known by the missions' names: Landsat and Copernicus. The most widely available source of these images today is Google Earth. Although it is ubiquitous for much simpler application, Google Earth is not simple. With the addition of the latest ocean bottom profiles from every ship reporting sonar readings to the National Oceanic and Atmospheric Administration, Google Earth's mapping of topography is global, comparing countless images pixel by pixel for the clearest picture and delivering the best and latest to the public. It is not a low technology process.

As part of the purpose of this paper is to demonstrate how to see linears, and Google Earth is available to everyone with a computer, I encourage every reader to use the provided latitude and longitude to go to the original images. Pan up and down, linears which apparently have no indication will often appear when observed from much closer or much further away, or at oblique angles. The veracity of linears increases as elements are found to repeat, have regularity, concentric or parallel expression, and are provided with a purpose (Chapter 2). This paper will seek to discern these principles in the landscape and start to understand the purpose through analyzing linears.

Method

Two models of the Flood (Oard 2013, 2017, Walker 1994) have been proposed that call for an erosion pattern of mass wasting on a continental scale in accordance with "the mountains rose and the valleys sank" (Psalm 104:8). They envision a large current off the continent, draining for a significant period of time during the Flood. Their association of mountains and valleys with continents and ocean basins would call for erosion patterns to exit the continent across its shores. This paper will look at one small section of topography to see if physical evidence will support this interpretation in northern California, and if not, what type of erosive flow is indicated?

Area B, Figure 22.1, is at the inner edge of California's Coastal Range where it meets the Central Valley. The cross section, A–A', shows the profile for 140 km (87 miles) where the elevation changes from 0.0-1.6 km. (0-1.0 miles). From this profile alone the topography might be interpreted as consistent with the waters flowing west into the Pacific Ocean off a flooded continent and producing the continental shelf deposits, but will detailed examination confirm this?

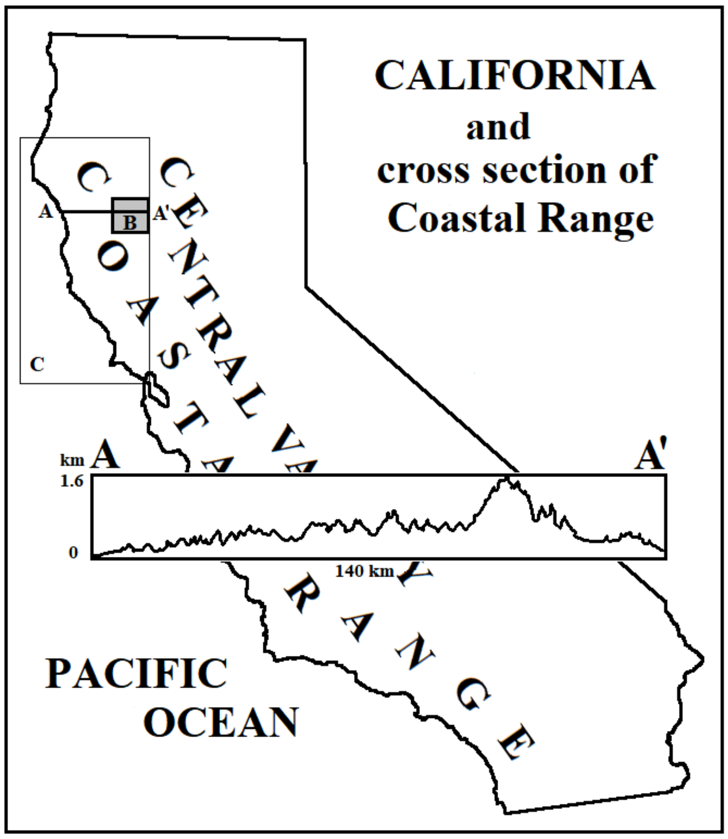

Figure 22.1: California with the relative position of the Coastal Range and Central Valley geomorphic provinces showing: area B, figure 2; area C, figure 7; and cross section A-A' through them to the Pacific Ocean. (Cross section produced with Elevation Profile in Google Earth Pro, 2018.)

Vertical View

Davis (Orme 2007) and Pensk (1953) present erosion of mountains as a process that starts with a relatively flat peneplane and through continental movement and other applied stresses, an area of topography is thrust into the air and slowly worn down through randomly applied forces. If those forces are random, why would topographic features lay in parallel linears?

Figure 22.2 extends from Lodoga in the south to Elk Creek and Black Butte Lake in the north. It is not hard to find linears in this area. Figure 22.2A shows six. Figure 22.2B shows by two examples that each expression of a linear does not stand alone. Multiple additional linears can be found parallel to one another. Although smaller linears are shown, viewing directly on Google Earth and panning up and down will illustrate numerous example that are both smaller and larger.

As each of these linears are topographically distinctive it is reasonable to assume erosion played a part in their visibility. Yet, why should erosion be in linears and not random? A first assumption, linears parallel to the coast line, north and south in this area, might come from the stress of accreting island arcs building the continent according to the model of Plate Tectonics. Linears "a" or "f" might be accounted for in this manner, but not "b-e" which are more east to west.

Might faults be responsible? Although we have provided no reason for the direction of faults, they should be considered. The major faults in the area are provided by Gutierrez et al (2010) in Figure 22.2D, and very few of them equate with these linear directions. This is not to rule out other linears that do trace the faults, but faults are not the exclusive cause behind these linears.

Figure 22.2C traces a 35 km (21.75 mile) wide circular lineament, constructed from arcuate linears, indicated by pairs of arrows, on all four cardinal sides. Only one possible fault can be associated on its eastern side. But, we see that linear "a's" expression is strong enough that the fault may have nothing to do with this circular lineament.

Since the coast line is due west of this location, could lineaments "b-e" be water channels from runoff? An often repeated linear is "c". In Figure 22.2B each of the five creeks can be seen to have a "c" linear flowing from it, but additional parallel linears are numerous, and they don't have creeks connected to them, nor even separate canyons for their headwaters. Besides, each of the creeks exit the hills and promptly turn north in the direction of linear "a" for a time before they continue their route east after merging with Grindstone Creek. It appears the creeks follow the linears rather than determine them. So, *the linears came first*.

Although the mountain peak on the cross section, Figure 22.1, is 1.6 km. (1.0 mile), other spots are 2.0 km (1.25miles) in elevation and some are lower. Some passes in the ridge may be no more than 1.0 km (0.62 miles) high. The mountain's lithology; marine sandstone, shale and conglomerates (Gutierrez et al 2010); and elevation change is similar to the Grand Canyon, but these canyon's walls are primarily evenly sloped with no erosional steps or incised thalweg for the creek. This is the rain shadow side of the mountains, and in its present situation, the creeks have not been here very long or in the time they have, flow has not significantly exceeded present flow. The present creek is vastly underfit (see Dendritic Pattern section below). In its present condition, it did not erode the canyon but only occupies it. This steep v-shaped largest canyon continues up to the crest, so no evidence of increased rainfall or glaciation in the Ice Age can be postulated to be involved.

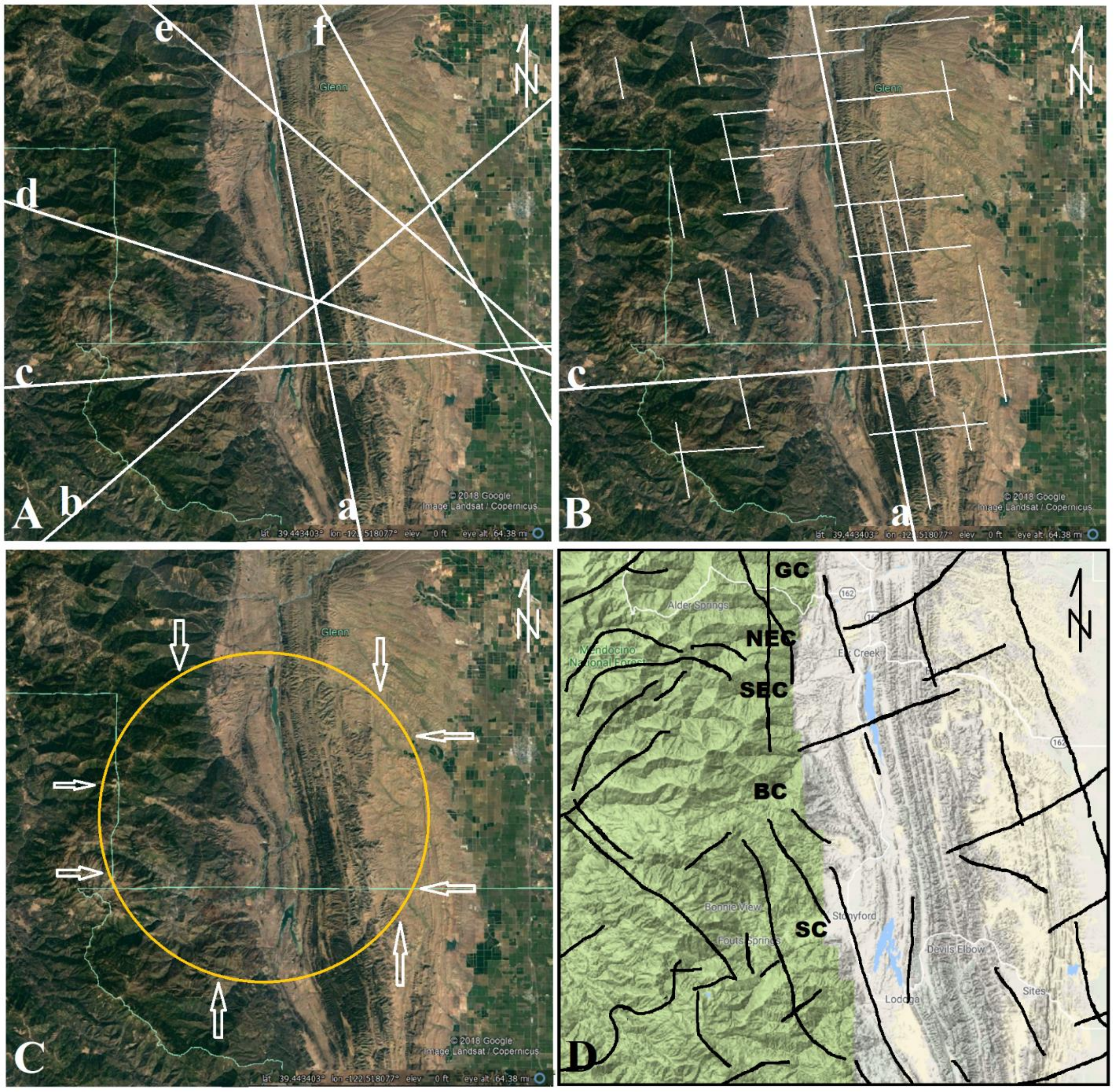

Figure 22.2: Google Earth image of the east side of the Coastal Range and Central Valley of California, USA from Lodoga in the south to Elk Creek and Black Butte Lake in the north. (Rectangle B in Figure 22.1.) (A) Six lineaments that are prominent in the area. (B) Additional parallel linears to “a” and “c”. (C) Circular lineament (CL) defined by sections of arcuate linears marked by pairs of arrows. (D) Major faults in the area and abbreviations for creeks: SC=Stoney Creek, BC=Briscoe Creek, SEC=South Fork Elk Creek, NEC=North Fork Elk Creek, and GC=Grindstone Creek. (39.443403°N, -122.508077°E, accessed 7/25/2018. Faults from Gutierrez et al 2010.)

Dendritic Pattern

The oblique view of Figure 22.4 shows an obvious dendritic pattern branching towards the viewer, originating in Grindstone Creek’s canyon. The eroded dendritic pattern exits the canyon at 1.75 km (1.0 miles) width and maintains it for about 6.0 km (3.75 miles) with a straight thalweg. This is wider than the Mississippi River at only 1.0 km (0.6 miles) in Baton Rouge where it nears it terminus in the Gulf of Mexico. The Mississippi drains the entire center of the continent and Grindstone Creek drains at most a 25 sq.km (15 sq. miles) area. The straight thalweg starts as a bulbous 2.0 km (1.25 mile) section and then continues for 4.0 km (2.5 miles) without significant narrowing before suddenly branching into the dendritic pattern. With Grindstone Creek for some few minutes carrying nearly twice the volume of the Mississippi River, the bulbous shape at the canyon’s exit suggest erosion from a hydraulic leap, commonly called a “rooster tail,” and the ensuing stilling pond prior to the 4.0 km (2.5 miles) of highly turbulent flow being pushed across the valley, traveling so fast it couldn’t spread-out.

This runoff did not originate in a normal catchment basin, even with increased rainfall from an Ice Age. In a modern setting, this type of flow could only originate in a dam breach with impounded waters. And then it would suggest a dam of some size to have a breach 1.75 km (1.0 miles) wide. Such a dam breach on a lake 25 km (15 miles) long would empty the lake in a matter of moments. But, instead of a deep basin the creek exits the top of a sloped mountain range, and the dendritic pattern does not simply disperse, showing it dropped its sediment like the standard delta.

A similar, but possibly slightly reduced flow not channeled into a narrow weir, can be traced from the mouth of Briscoe and Stoney Creeks to the south. Between the two dendritic patterns the scouring channels of a smaller flow (pink lines) and the still smaller flow bounces off the foot of the hills (green lines) moving to the thalweg of linear "a." The visibility of the pink and green linears are indication that their flow was still erosive and the yellow flow did not continue, so that diminishing velocity with sedimentation would mask this returned flow. The Central Valley is near level, and there is not a significant elevation difference to drive the flow back to the west and it is a much smaller volume than was carried east. A wave which reached across the mountains might account for this movement, with the primary water hitting the mountain side but some reaching to the valley and moving between the two flows exiting the mountains. This wave traveled over multiple mountain crest, the tallest probably in excess of 1.0 km. (0.6 miles), Figure 22.1, and had to travel at this elevation nearly 100 km (62 miles) to get a significant part of its volume to the east side of the crest. And some had to travel 150 km (93 miles) to reach the valley floor. A single directional, tsunami wave, of this size could not be accounted for with the present Earth's processes and current is the wrong direction to be produced by water evacuating a rising continent.

Circular lineaments

Figure 22.3B shows 5 circular lineaments that were not visible in the vertical view. At 10 to 20 km (6.2-12.4 miles) in diameter, impact craters would be a possibility, but they are not deep craters, and thus would not expect them to have identifying characteristics like shatter cones or Planar Deformation Features to verify an impact origin (Earth Impact Database 2016). I will tentatively identify them as "CL," circular lineaments, but the recognized uncertainty of their genesis does not lessen their occurrence. Lineaments showing repetition, having regularity, concentric or parallel expression, are not random and crying out for discernment of source.

The two at "b" may be a nested pair, and "d" could be a small center lineament for the large circle (in pink) originally shown in Figure 22.2C. This larger circle is masked by the topographic differences of the oblique view.

Figure 22.3C shows an overlapping nested pair of circular lineament. Nested pairs of CL make a strong argument for an impact crater and its annulus (Chapter 2).

Looking at the dendritic and circular patterns together, a logical question to ask is in what order they occurred? The yellow dendritic pattern to the north cuts through the circular patterns, while the large dendritic pattern to the south used circle "a" as a limit to the dendritic flow. This confirms the circles were there before the water flow that produced the dendritic pattern. Whether previous to the dendrites these circles were standing in a significant depth of water which would blunt the cratering of small impactors and temper erosion from the jetting flow off the mountain, it is hard to determine at this time.

Straight Lineaments

Even less distinct are the straight linears seen in Figures 22.2 and 22.3D. Small sections can be seen repeating across sections of foothills, but it is an underlying pattern which preceded both circles and dendrites, and yet in Figure 22.2, they show when the circles in the same area are not visible. Continued action of erosion and water did not erase linear patterns and may have accentuated them. This indicates that the cause of the straight linears are likely produced by a greater expression of energy than either the wave or circular lineaments.

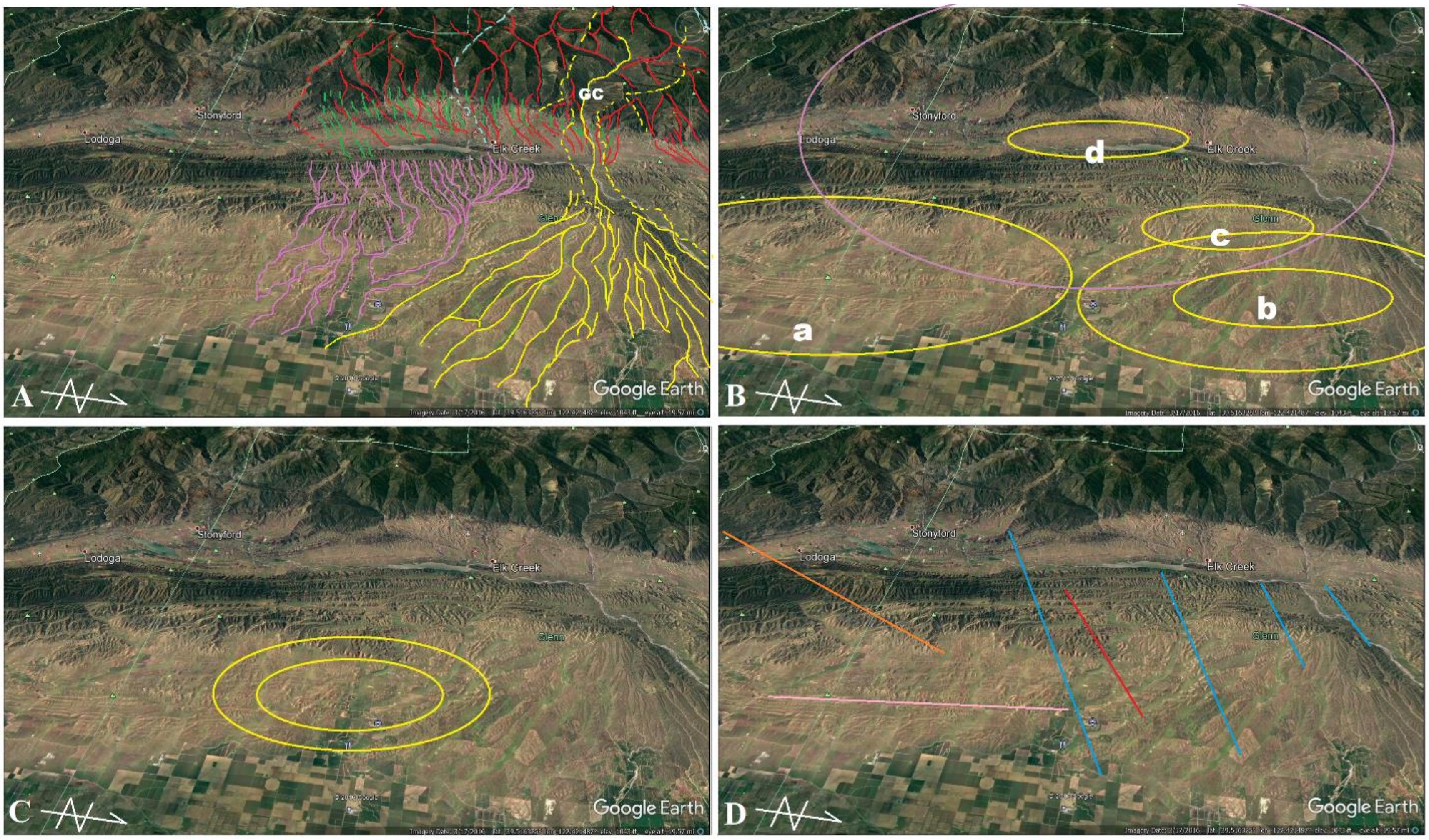

Figure 22.3: Google Earth oblique image with (A) dendritic pattern, (B) circular lineaments, (C) nested circular lineaments, and (D) multiple sets of straight linears. (3/17/2016. Google Earth 39.516325°N, -122.421487°E, accessed 5/1/2017.)

See the Context

Observing the erosional pattern in Figure 22.3A, what is its source in the mountains? Figure 22.4 shows Granite Creek, "GC," exiting its 1.75 km (1 mile) wide canyon into the bulbous, "C," and straight, "D," section. "A" is the original canyon width, over 4.0 km (2.5 miles), when "F" canyons were cut prior to the cutting of the bottleneck. This sequence accounts for less erosion from "F," visible in Figure 22.3. The 8+ km wide flow, above "A" forced by the weir, produced the enormous hydraulic leap.

Looking for the mountain's crest in Figure 22.4, circular lineament (CL) "J" does not contain the highest peaks, but it is the functional divide for water drainage. It was the landing axis for the wave that ultimately produced the dendritic pattern below. For the local "J-K" CL, "J" is elevated, associated with the pressure wave expression while "K" is depressed, formed by thalwegs, showing it is a release-wave valley (Chapter 1). The ridge at the east end of "B" may be another elevated arc to "J-K" CL, but the water eroded over it producing an 8-9 km (5 mile) gap as rushing water eroded the mostly straight canyons extending from "E" to "E." These are functionally wind and water gaps formed in the manner Oard (2014, 2017) suggest, but they were formed by water rushing *onto* the continent.

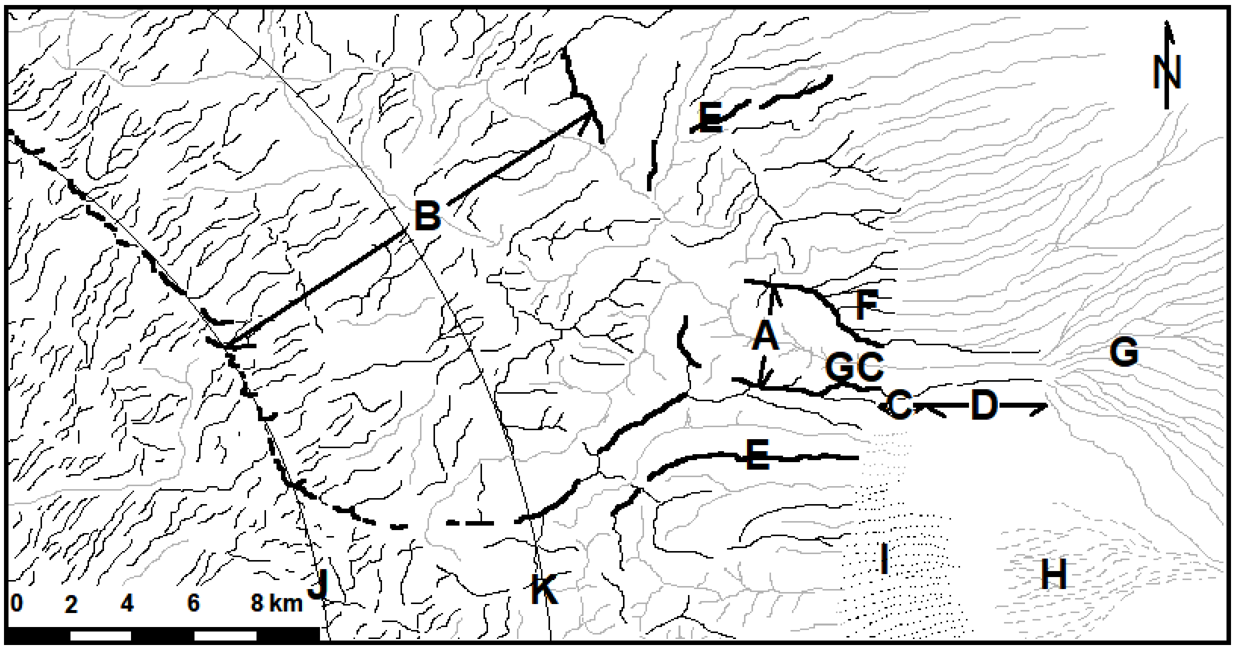

Figure 22.4: Tracing from Google Earth Terrane map. Black lines trace ridges, gray lines trace thalwegs. Heavy black lines indicate major divides directing water flow.

Figure 22.5 gives the context of Figures 22.2 and 22.4, emphasizing the difference in visibility that features produce as the view is panned in and out. CL “J” and “K” are extended to full circles and CL “D” shows the significant amount of obliteration they received as a result of the wave’s erosion. The effects of this erosional event extend from the Cascades, north of Eureka, to Marin County, northern peninsula of San Francisco Bay on the south. The only significant form between these extremes not eroded by the water is CL “C,” which I reason was produced later than the splash.

Lineament E is very significant because it extends the full length of the California coast. The actual width of the lineament is delineated by the arrows on each side. These produce a trough about 10 km wide This type of trough appears associated with many straight lineaments varying its width proportional to the size of the pressure wave and resultant expression of energy, assumed proportional to size of impactor. Lineament “E” has its centers in an amalgam of the Green River, Uinta, Washakie and Piceance Basins where Wyoming, Utah, and Colorado meet.

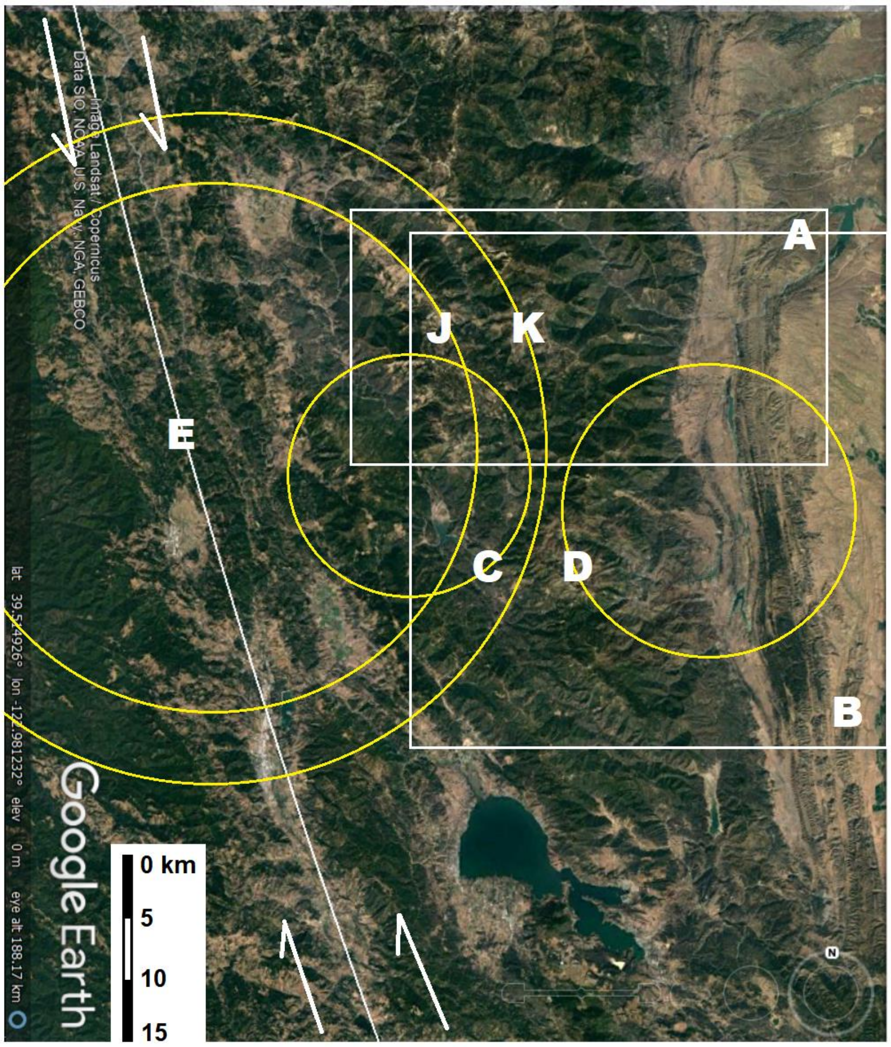

Figure 22.5: Google Earth image of Coastal Range of California from Clear Lake on the south to Paskenta on the North. (A) Area of Figure 22.4 sketch. (B) Area of Figure 2. (C) Circular linear (CL) "C." (D) Circular linear from Figure 22.2C. (E) Slightly curved linear that follows the entire coast of California. Arrows define the western and eastern sides of the linear. "J-K" Circular linear defined in Figure 22.4. (2018, 39.514926°N, -122.981232°E, accessed 8/14/2018.)

Locating the Mendocino CL

The splash/ "tsunami" wave that reaches from the mountain crest to the valley floor originated in the area of the Mendocino CL, Figure 22.6. Locating this CL provides a lesson in recognizing CLs in the landscape.

Global Gravity Anomaly (GGA) is a satellite derived measurement of the Earth's gravity signature prepared by Scripps Institute of Oceanography (2014) and viewed on Google Earth. Gravity is assumed to vary because of crustal thickness, elevation changes, rock lithology, and density (Sandwell et al 2014). Crustal thickness is ignored because it is assumed not to vary on the scale of image changes, or change in harmony with elevation (Bird et al 2005). Elevation is recognized to generally change in harmony with lithology and density (Bird et al 2005). As it is assumed, energy had to be put into the rock to change its elevation, lithology and density, GGA is a measure of the total energy input or work done on a point of the globe. Where GGA varies and topography or bathometry cannot be seen to vary in the same pattern, the changes are likely due to lithology and/or accompanying density.

Figure 22.6A shows few circular bathometry change in the area where I suspect the Mendocino CL to occur but GGA does. Is there a circular pattern among the changes? Recognizing that not only circular linears but multiple straight and curve linears have a cumulative effect on the GGA pattern, the three CLs are plotted in the area with a computer program by Maartin d' Hart calculating the ring of points equal distant from a center. The smallest ring is based on the gap in the gravity measurement to the west of center and the other two circles are related to shore lines and rock outcroppings on Landsat image, Figure 22.6A, as well as gravity mounds in Figure 22.6B.

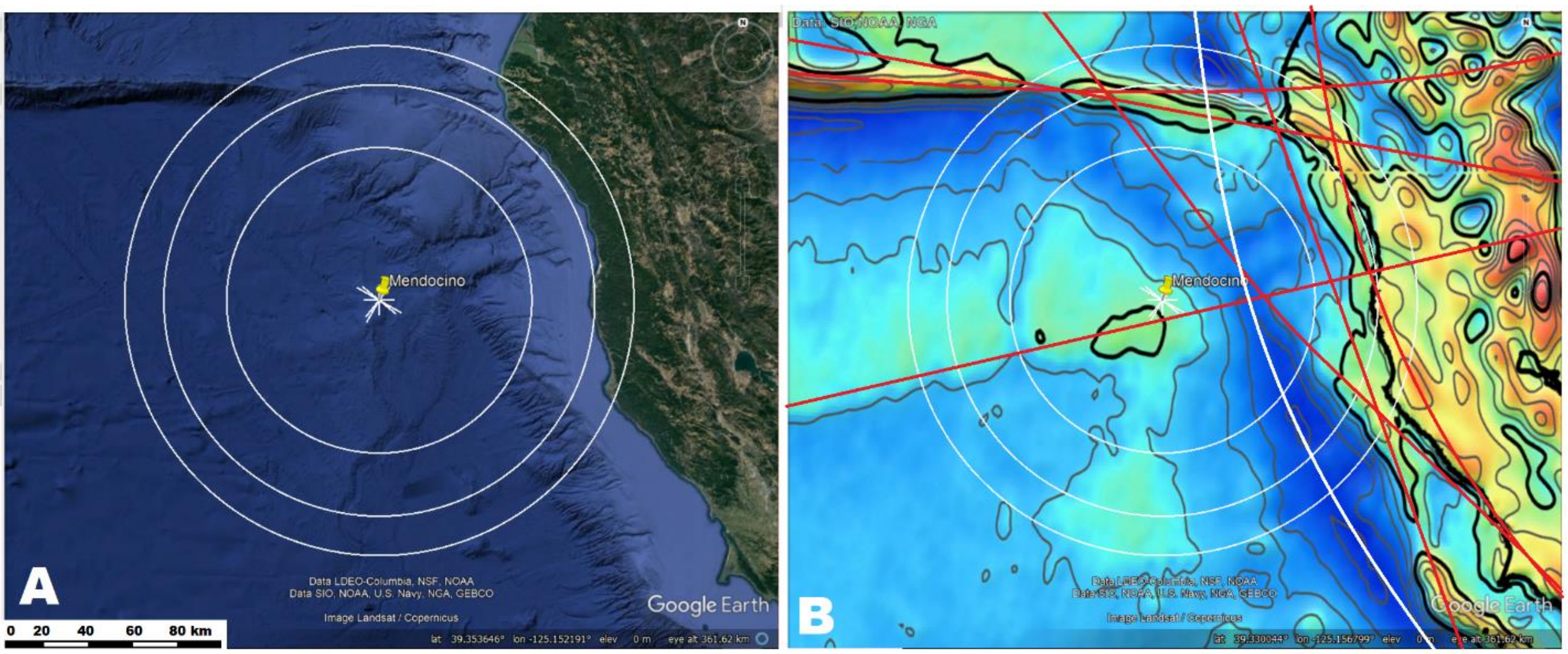

Figure 22.6: Google Earth and Global Gravity Anomaly images of Mendocino circular lineament. (B) Shows straight and slightly curved linears that have a significant cumulative effect on the energy expression of the CL. (2018, 39.399121N, -124.882543E, accessed 8/14/2018.)

San Francisco Bay to Eureka

Looking at Figure 22.7 many circular and straight lineaments can be mapped in the topography. Looking at the inner circle for the Trinity CL, it is a prominent valley for the majority of the south-west quarter inhabited by a fork of the Trinity River. That valley would be interpreted as a release-wave valley (Chapter 1). Where the Eel CL intersects it for about 20-25 km (12-15 miles) with its own release-wave valley, suggesting that they may have occurred in the same time frame so their pressure waves could react in a plastic manner and not one eroding the other. The "J-K" CL must have occurred after the Eel, because it eroded most evidence of the Eel CL within its circle except for a concentric high ridge just inside the smaller circle on the south south-western half, and the north north-eastern half of the "J-K" CL is much more pronounced. This shows that successive events leave their distinct marks in erosion and gravity patterns but do not completely erase the record of previous events.

Areas "A-E" show erosion in a roughly radial pattern to the Mendocino CL, modified as the rushing water preferentially eroded linears going approximately in the same direction the escaping water was fleeing. Area "F" is a triangle between the two linears which is a 75 km (47 mile), inverted v-shaped delta which eventually flowed into the upper reaches of San Francisco Bay. Such a long delta would require a significant pressure head above it. On its way, the erosion radially modified the southeastern half of the Russian CL's evidence on land.

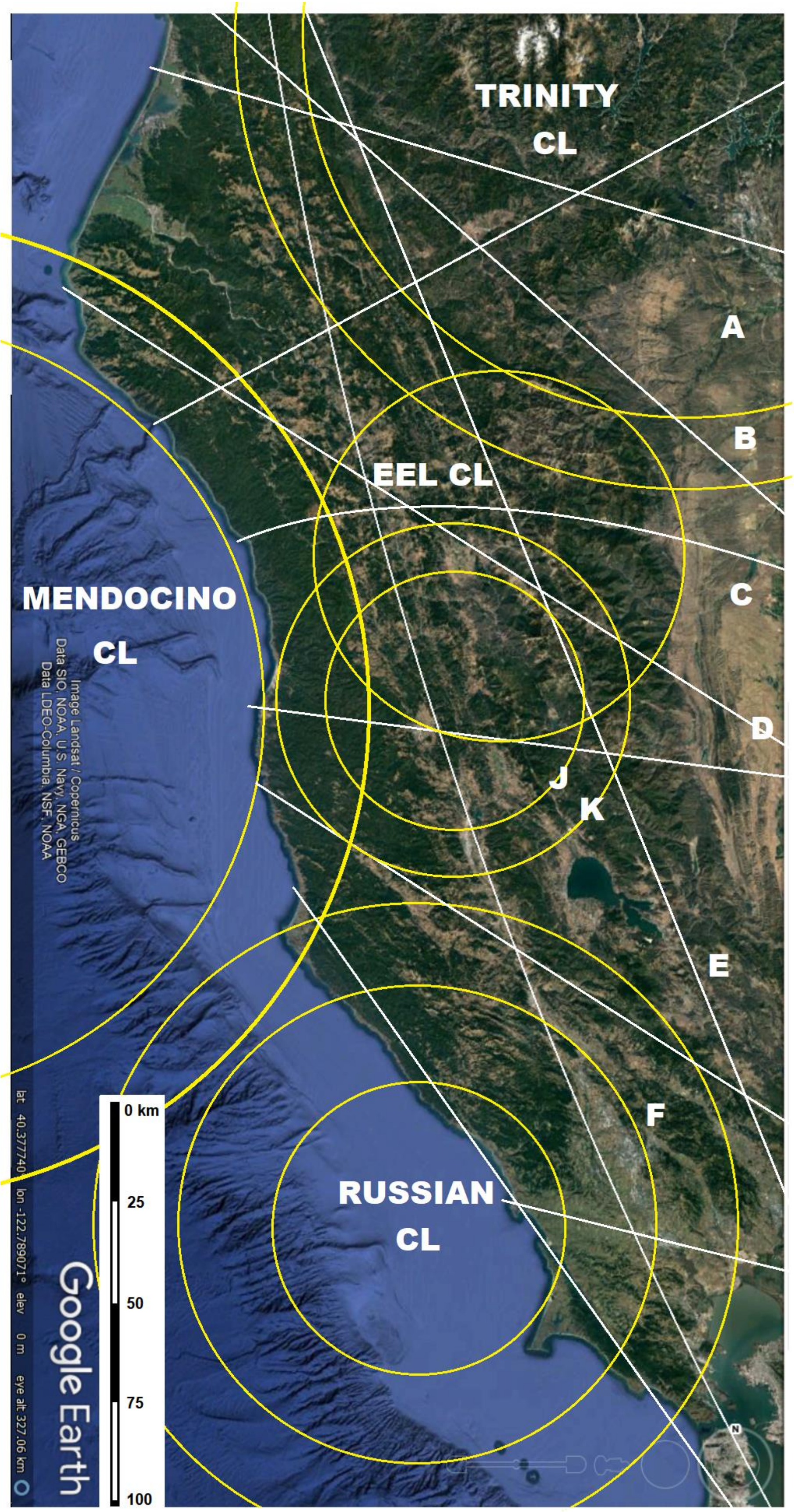

Figure 22.7: Google Earth image of California's Coastal Range from San Francisco to Eureka showing multiple circular lineaments (CL) and slightly curved to straight lineaments. (2018, 40.377740N, -122.789071E, accessed 8/14/2018.)

Conclusion

Uniformitarian thinking suggests erosional processes involve three aspects: structure + stage (span of time) + cycle (process), and these work together to produce random arrangements in the geomorphology. Using the Eureka to San Francisco Bay portion of California's Coastal Range, prominent patterns of repetitive linears in the topography show that these random processes of erosion were laid over an ordered structure of lineaments. These straight and circular linears, and their overlying dendritic pattern are left from an erosion event the magnitude of which is not occurring with present processes. Erosion patterns do show predominant water flow in this area was from west to east, and could not represent east to west flow from draining continents. Failure to support the structure-stage-cycle process suggests more caution needs to be exercised in adopting present physical processes to paleogeomorphology.

One possible cause for the circular and straight lineaments which precedes the erosion event would be impacts, with the straight lineaments produced at distant annulus by sheer forces to the circular lineaments. I postulate the large tsunami wave was generated by an impact off shore in the Pacific Ocean Basin. I have named the resultant structure, Mendocino Circular Lineament. Whether any impacts can be proven at this time, this analysis of water's erosional action offers a viable explanation of the evidence.

An alternating pattern of high and low ridges are produced by the high (pressure-wave) and low (release-wave) portions of the shock wave as mountains and valleys respectively. This would be an impact related interpretation of "the mountains rose and the valleys sank" (Psalm 104:8).

Erosion patterns from California, bordering the Pacific Coast of North American suggest a general flow off of the continent left no evidence, but instead, a pattern of high and low topography which was largely determined by the sequence and location of high and low linears, and a huge wave breaking from west to east. This tsunami of water I will interpret as the last major event in a chain of multiple events resulting from impacts.

Looking at partial linears singly will often leave the searcher questioning if they can see real lineaments or is their vision playing with their imagination to see linears and pattern that really do not exist? It is only with recognizing associations and interactions that repeated patterns can be recognized. Then evaluating erosion through these patterns that sequencing of events can be established and the validity of each linear be established.

How these erosive events would be modified with a significant layer of standing water covering the surface has not been explored in this paper, and would be a good topic for further research.

While remnant of erosion patterns do not reflect every event that happened in an area, it is reasonable to assume it does record the last major events, and the Coastal Range of Northern California does not record a mass erosional event going from east to west draining the continent into the Pacific Ocean. This calls into question that aspect of Flood Models and any assumption about the continental shelf being sediments from such a flow.

References

Barnhart, WR. 2011. Hurricane Katrina splay deposits: Hydrodynamic constraints on hyperconcentrated sedimentation and implications for the rock record. *Creation Research Society Quarterly*, 48(2):123-146.

Barnhart, WR. 2012a. A hydrodynamic interpretation of the Tapeats Sandstone: Part I: Basal Tapeats. *Creation Research Society Quarterly*. 48(4):288-311.

Barnhart, WR. 2012b. A hydrodynamic interpretation of the Tapeats Sandstone: Part II: Middle and Upper Tapeats. *Creation Research Society Quarterly*. 49(1):19-42.

Barnhart, WR. 2017. Cratering and the Earth: clues in lineaments. *Creation Research Society Quarterly*. 53(3):191-205.

Barnhart. WR. 2014. Anomalous Impressions in Tapeats Sandstone (Cambrian), Grand Canyon. *Creation Research Society Quarterly* 51(1):14-30.

Bird, D.E., K. Burke, S.A. Hall and J.F. Casey. 2005. Gulf of Mexico tectonic history: Hotspot tracks, crustal boundaries, and early salt distribution. *AAPG Bulletin* 89(3):311-328.

Earth Impact Database. 2016. http://www.passc.net/EarthImpactDatabase/, accessed 1/12/2016.

Gay, S.P. 2012. Joints, Linears, and Lineaments – The basement connection. *Search and Discovery Article #41083.* http://www.searchanddiscovery.com/pdfz/documents/2012/41083gay/ndx_gay.pdf.html Accessed 13 June 2016.

Gutierrez, C., W. Bryant, G. Saucedo, and C. Wills. 2010. *California geologic data map series map no. 2 – Geologic map of California*. California Geological Survey. Scale 1:750,000,

Norman, D.J., N. Price, and M. Chukwu-Ike, 1977. Astrons—the earth's oldest scars? *New Scientist* 73:689–692.

O´Leary, D.W. and J.D. Friedman. 1978. Towards a workable lineament symbology. *Proceedings of the Third International Conference on the New Basement Tectonics, Basement Tectonics Committee Publication #3*, pp. 29–31. Basement Tectonic Committee, Inc., Denver, CO.

O'Driscoll, E.S.T. 1964. Cross fold deformation by simple shear. *Economic Geology* 59(6):1061-1093.

Oard, M.J. 2013. *Earth's surface shaped by Genesis, Flood, Runoff*. http://michael.oards.net/GenesisFloodRunoff.htm, accessed 8/3/2018.

Oard, M.J. 2017. The Bighorn Basin, Wyoming—Monument to the Flood, Part 1: The Flooding Stage. *Creation Research Society Quarterly*. 53: 206-216.

Orme, A.R. 2007. The Rise and fall of the Davisian cycle of erosion: prelude, fugue, coda, and sequel, *Physical Geography* 28(6): 474-506.

Penck, W. 1953. *Morphological analysis of land forms*. Translated by. H. Czech and K.C. Boswell, St, Martins Press Inc. New York.

Sandwell, D. T., R. D. Müller, W. H. F. Smith, E. Garcia, and R. Francis. 2014. New global marine gravity model from CryoSat-2 and Jason-1 reveals buried tectonic structure, *Science*, 346 (6205):65-67.

Scripps. 2014. Global [Marine] Gravity Anomaly download. Scripps Institute of Oceanography. http://topex.ucsd.edu/grav_outreach/. Accessed 11/19/2014.

Sparks, B.W. 1960. *Geomorphology (Geographies for advanced study), First Edition*, Longman, London,

Walker, T. 1994. A Biblical Geologic Model – ICC paper. http://biblicalgeology.net/Model/A-biblical-geological-model-ICC-paper.html, accessed 8/3/2018.