

## Responses to comments made about Joe Rogan Podcast

An open letter to a critic on the matter of chevrons, megatsunamis and bolide impacts.

Recently I did a podcast with Joe Rogan. In our wide ranging discussion we covered a lot of material. As pleased as I was by the positive response of many in the listeners, I also appreciate and welcome criticism and open minded debate. I do not pretend to have the final truth on anything, I only know that it is fair to question everything and to go where the evidence leads us, in the assumption **that** science, ultimately, is a search for truth. I am convinced that even in the world of science dogmas and entrenched viewpoints can at times prevail over facts and evidence inconsistent with established beliefs. It is important to constantly be challenging dominant paradigms to keep science moving forward and to approach ever closer to an understanding of reality. I repeat, I do not claim to have the final word on any of the issues discussed on this or any other podcast in which I have participated. I engage in the pursuit of science for the love of learning and out of an irrepressible curiosity about the world we inhabit. No one, at least up to this point, has paid me to engage in this pursuit. I fund my own way and have done so for going on four decades. In reading through the many posted comments in response to the podcast it became apparent that the majority of comments critical of something I said are conspicuous for the absence of any actual learning or knowledge about the subject being commented upon. Quite a few of the negative comments were simply trash talking by fools who couldn't make a coherent counterfactual argument if their life depended on it. A few of the critical comments contradict this trend and actually represent some learning or at least some rational thought regarding many of the issues I raised during a three hour wide ranging discussion, and for these I am appreciative.

I am addressing this response to one issue raised regarding remarks about possible mega-tsunami deposits that I brought up during the podcast. It is my impression after investing a fair amount of time researching this phenomenon that it warrants serious consideration, especially in light of what we have witnessed during the past decade, two tsunami induced mega-disasters in Japan and the Indian Ocean. Several comments were particularly dismissive, so I am setting down this small exposition, without malice, to demonstrate that the remarks made on The Joe Rogan Experience were preceded by a substantial amount of background research and thought. While the following remarks pertain to this one issue specifically, they are also relevant to the general attitude evinced in many of the other comments critical of something I said that are obviously being made by individuals whose preconceived opinions were incompatible with the information I presented and their objections were nothing more than a knee jerk emotional response rather than a reasoned critique with some actual thought behind it.

Here is a comment posted by someone who took issue with my remarks about the possible mega-tsunami deposits in Madagascar. I choose this posting to respond to for two reasons. First of all it allows me the opportunity to elaborate in more detail regarding this important question of the reality of mega-tsunamis, not only to our past but to our future, and the posting also displays one of the most common of logical fallacies in critical thinking, the "appeal to authority." Disregarding the obvious attitude of cynicism, this is what Mary Kay Dunn had to say:

"I shared a link where *real scientists* discredited the mega-tsunami hypothesis (about the chevrons) that this dude espoused, but the conspiracy minded Rogan fans seem to think we can't ever know any truth no matter what evidence is shown to us because all of the world's scientists are bought off by one of two political sides."

First of all let's dispose of the appeal to authority canard. I have no doubt that Joanne Bourgeois, whose work is the subject of the linked article, is a "real scientist." In fact, I have a great deal of admiration for her work and have read a number of her papers, including her 2009 paper in *Geology* taking issue with the mega-tsunami hypothesis of Dallas Abbot and others. The statement is made by the Ms Dunn that "real scientists" have discredited the mega-tsunami hypothesis. My first thought is this: How easy it has become these days to simply link to a website presenting one side of a scientific debate and then presumptuously assume that the matter is settled. Then follows an egregiously over generalized statement about Joe Rogan "fans." Certainly it is true that some of the world's scientists are bought off by one of two political sides, a blatant case in point being many of the scientists employed by the IPCC. However, it should be emphasized that there are many scientists who retain their independence and credibility, and it is probably true that some Joe Rogan fans believe in conspiracies of one sort or another but it has become apparent to me that many of them are willing to look without prejudice at the facts, and I would say this goes for Joe himself. Let it also be stated that as far as conspiracies go, there are definitely real ones. History itself is basically a history of conspiracies. Anyone who thinks that those who covet power do not conspire to retain and expand that power, or that they would not subordinate science to that end, is suffering from excessive naivety, however, all this is a total *non sequitur* anyway in reference to the subject at hand.

So, as to the question of "real scientists" here are just a few of the professionals who first proposed and have continued to endorse the idea of mega-tsunami generated chevrons:

Dieter Kelletat, Ph.D: Retired as head of the Dept. of Physical Geography, University of Cologne, expert in Quaternary Geomorphology, author of the **Atlas of coastal geomorphology and zonality** and numerous scientific publications and collaborations.

Dallas Abbott, Ph.D: Research scientist at Lamont-Doherty Earth Observatory of Columbia University, Ph.D. in Marine Geology, author or co-author of over 120 peer-reviewed scientific papers. Author of **Chevron Dunes in Madagascar: The Most Spectacular Tsunami Deposits on Earth** published in the proceedings of the Aerospace Conference, 2000 IEEE

Dee Breger: Manager of Lamont Doherty Scanning Electron Microscope Facility, participant in more than 30 land based and oceanographic expeditions. Expert in analysis of microscale evidence of cosmic impact.

Viacheslav Gusiakov, Ph.D: Head of the Tsunami Laboratory, Institute of Computational Mathematics and Mathematical Geophysics, Novosibirsk, Russia, responsible for developing the Historical Tsunami Database for the World Ocean

Anja Scheffers, Ph.D: Southern Cross University, Associate Professor of Geoscience, expert in coastal evolution, sea-level change and marine natural hazards. See Curriculum Vitae here: [tsun.sccc.ru/hiwg/SCHEFFERS.htm](http://tsun.sccc.ru/hiwg/SCHEFFERS.htm). Author or co-author of at least 42 peer reviewed scientific papers. Is considered by her colleagues to be a chevron expert.

There are more but I think you get the point. If these people aren't "real scientists" then nobody is, certainly they are as "real" as Dr. Bourgeois. But in the end what matters are not the credentials of an individual but the facts. The history of science is littered with examples of highly credentialed scientists who ended up being spectacularly wrong about one thing or another when more information became available. It is also replete with examples of outsiders who took on the academic

establishment and prevailed against entrenched dogmas. A preeminent example is that of J Harlan Bretz, a high school teacher whose research in the 1920s and 30s led him to propose that gigantic, catastrophic floods had occurred in the Pacific Northwest. For decades he was marginalized by mainstream academia but due to his dogged investigation of the facts he was eventually vindicated, ultimately being awarded the Penrose Medal, the geological professions highest honor. Many examples could be invoked but that is not my intention here. Incidentally, Bretz's work in southeastern Washington State is directly relevant to one of the arguments advanced by Bourgeois to discredit the megatsunami hypothesis, a matter to which I will return directly.

What I would like to do is to take a closer look at the arguments and some of the actual evidence relating to the issue of chevrons and megatsunamis.

Here is the reference for the article linked by the poster:

Science Daily, April 20, 2009. **Past Tsunamis? Contrary to Recent Hypothesis, 'Chevrons' Are Not Evidence of Megatsunamis.**

The article, posted also on the University of Washington website, was based upon work by Bourgeois and her colleague Robert Weiss that was about to be published in the journal *Geology*, the next month. (**"Chevrons" are not mega-tsunami deposits—A sedimentologic assessment:** *Geology*, Vol. 37, no. 5, May, 2009, pp. 403 – 406)

The website article begins by describing the formations in question as "large dunes shaped something like the stripes you might see on a soldier's uniform that are hundreds of meters to a kilometer in size and were originally found in Egypt and the Bahamas." It goes on to say that "the discovery of similar forms in Australia and Madagascar led some scientists to theorize that they were, in fact, deposits left by huge tsunami waves, perhaps 10 times larger than the devastating Indian Ocean tsunami of December 2005."

The article goes on to say that geologist and tsunami expert Jody Bourgeois considers that idea to be "nonsense." Of course the word "nonsense" is not in quotes and is therefore attributable not to Bourgeois but to the author of the article. Quotes directly attributable to Bourgeois are bit more measured. A popular treatment of her opinions also appeared in the online version of *Earth* for Wednesday, August 5, 2009.

Bourgeois makes the argument that the chevrons on Madagascar are not the product of tsunamis but of wind. She bases this conclusion upon 3 primary considerations.

Her first objection to the giant tsunami hypothesis is that forms similar to them are found in continental interiors. As an example she correctly points out that "They are the same forms in the Palouse in eastern Washington State, and those are clearly not from a tsunami."

The comparison with the Palouse in eastern Washington I find to be very suggestive. The Palouse is one of the most spectacular loess deposits found around the planet. The exact mechanism of loess deposition is still being debated but an aeolian (wind) process is usually considered the most likely. Also there is no doubt that when the Palouse loess was devoid of stabilizing biomass it would be subject to modification by wind. In her 2009 *Geology* article, Bourgeois argued that since forms such as the Palouse landscape, very similar to the coastal chevrons in Madagascar, are found within continents this proves that the coastal chevrons are not created by tsunamis. However, a growing mass of evidence supports the idea that large scale megafloods have occurred over vast areas, affecting many of the major river valleys and ancient lake basins of continental interiors, and have left distinctive geomorphic evidence of their passage, including chevron-like formations. As far as the Palouse region goes it was almost certainly submerged by vast sheet floods characterized by subcritical flow during episodes of the catastrophic Missoula floods at the close of the Pleistocene, the same floods studied by Harlan Bretz three quarters of a century ago. At the northern

boundary of the Palouse region the Spokane Valley was discharging peak flows of up to 800 million cubic feet per second of glacial meltwater. This water would have flowed south over the Palouse deposits and then emptied into the Snake River valley causing an inundation that may have been at least several hundred feet deep in its early stages. Assuming the major geomorphic shaping agent of the Palouse loess deposits was indeed large currents of water, and assuming that the coastal chevrons were produced in a similar fashion, by large currents of water, this comparison between coastal chevrons and the rolling Palouse landscape actually supports the tsunami hypothesis rather than contradicting it. I am including, at the end of this article, a photograph of the Palouse loess landscape along with one of identical forms on a small scale that are produced on sandbars of normal sized creeks after floods. The parabolic shaped dune forms, open towards the upcurrent direction, are clearly visible in both photographs.

But whether produced by wind or water, the chevrons of Madagascar were deposited by a fluid (air is a fluid) moving in a northwesterly direction, from the direction of the sea onto the land.

Bourgeois comments on the presence in the chevron of marine fossils found by the Abbott team in a Science Daily article:

“Marine fossils can get into non-marine deposits. It’s not uncommon. You only have to change sea level a little bit or have them wash up on a beach in a storm . . . And some marine organisms can be carried by the wind. I am convinced these are largely wind-blown deposits.”

Here Bourgeois is extremely vague about the process whereby marine fossils get into non-marine deposits. Note the qualifying term: “I am convinced that these are largely wind-blown deposits.” Largely, but not totally? A potential problem with this assumption is that actual samples taken from the chevron deposits by Abbott and her team were reported to contain benthic foraminifera, which are ocean bottom dwelling organisms. The type of species can be used as a depth indicator. These were deep sea dwellers. How does changing sea level “a little bit” extract these forams from the deep ocean floor and deposit them many km inland? I think description of the specifics of this process would be obligatory to claim that Bourgeois’ work could be considered to have debunked the mega-tsunami hypothesis.

Having read and reread Bourgeois’ 2009 Geology article I find no reference to the discovery by Dee Breger of cosmic material fused to the marine fossils found within samples extracted from the chevrons by the Abbott team. When Breger examined the samples under a scanning electron microscope she found that many of the fossils had significant amounts of nickel, chrome and iron welded to the fossils. Where did this come from? Is it just a coincidence that they were found in the same relative proportions as would result from the vaporization of a chondritic meteor impacting into the ocean?

Abbott and her colleagues dispute the assumption that the chevrons were formed by wind as claimed by Bourgeois. In a paper presented at the 2006 Philadelphia Annual Meeting of the Geological Society of America titled **Impact Craters as Sources of Megatsunami Generated Chevron Dunes** they state:

“Chevron dunes are not formed by wind. Chevron dunes are not oriented in the direction of the prevailing wind, they can form where there are no beaches, and they contain grains larger than 2 mm in diameter. Chevrons are produced by megatsunamis originating from point sources, i.e. landslides, impact craters, and volcanic explosions. We have assembled data on chevrons worldwide. Most are best explained as the result of tsunami generated from large impact cratering events.”

The matter of grain size is important as discussed below. After 4 more years of research and study the same authors wrote:

“Although some propose a wind-blown origin for V-shaped chevron dunes that are widely distributed around the coastlines of the Indian Ocean and in the Gulf of Carpentaria, we have evidence in favor of their mega-tsunami formation. In southern Madagascar we have documented evidence for tsunami wave run-up reaching 205 m above sea-level and penetrating up to 45 km inland along the strike of the chevron axis. Subtly, the orientation of the dunes is not aligned to the prevailing wind direction, but to the path of refracted mega-tsunami originating from Burckle impact crater.”

“The results of our study show that substantive oceanic comet impacts not only have occurred more recently than modeled by astrophysicists, but also that they have profoundly affected Earth’s natural systems, climate and human societies.”

(Viacheslav Gusiakov, Dallas H. Abbott, Edward A. Bryant, W. Bruce Masse, Dee Breger (2010) **Mega Tsunami of the World Oceans: Chevron Dune Formation, Micro-Ejecta, and Rapid Climate Change as the Evidence of Recent Oceanic Bolide Impacts.** *Geophysical Hazards*, International Year of Planet Earth, pp. 197 – 227)

It is not the least bit surprising that some researchers would find the proposition of tsunami waves hundreds of feet high in the recent geological history of the Earth disconcerting, and this is the way it should be, extraordinary claims do require extraordinary proofs, and it is up to Abbot et al. to make a strong case for their claim before it is accepted by the scientific community. However, there is nothing intrinsically unsound or implausible about the basic idea of a cosmic impact into the ocean. It has undoubtedly occurred multiple times throughout the history of the planet, and there is no doubt whatsoever that an impact of a sizable object, say a mile or two in diameter, into the ocean would generate tsunamis of prodigious size. Using empirical formulas scaled from underwater nuclear testing Jack Hills and Charles Mader of Los Alamos National Laboratory were able to determine that a stony asteroid with a 600 meter radius could generate a wave with amplitude near dozens of meters high as it made landfall, up to 1000 miles from the epicenter, and could penetrate inland, depending upon topography, up to 100 miles. Whether formed by wind or water, the Madagascar chevrons, supposedly discredited by Bourgeois, are oriented along an axis with a back azimuth of about 120 degrees, pointing in the direction of origin. When the Abbott team projected this line about 900 miles to the southeast they found a large crater-like feature on the floor of the Indian Ocean. Deep sea core samples taken in the vicinity of this feature contained magnetic spherules, some nearly pure carbon, tear-drop shaped tektites and unique vitreous material. The fact that a crater-like formation on the floor of the Indian Ocean, in the appropriate location, has been identified and associated with cosmic material is powerful evidence supporting the possibility of a very large impact induced tsunami. However, further *in situ* investigation is required to prove one way or another whether this large, circular feature is in fact produced by the impact of a cosmic object, a prospect rendered difficult by virtue of the fact that it lies under two miles of ocean water.

Michael E. Brookfield, PhD. with the University of Massachusetts, Department of Environmental, Earth and Ocean Sciences presented a paper at the first joint meeting of IGCP 490 and ICSU “*Rapid and catastrophic environmental changes in the Holocene and human response*”, entitled **Deposits of tsunamis and their recognition**. The remarks he made include the following:

“Tsunami waves are produced by any process, which vertically displaces the sea surface. Such processes, accompanied by earthquakes, include direct displacement by extraterrestrial impacts, and displacements of the sea floor caused by explosive submarine eruptions, fault movements, and submarine slides . . . Tsunamis capable of affecting deep shelf and oceanic sea floors . . . need to be of very large amplitude and wavelength . . . Most open ocean tsunami waves have the required wavelengths but not the amplitude (a few metres maximum) to significantly move sediment in deep water. Tsunamis of the order of metres in amplitude are relatively common in all oceans, and at least 50 large tsunami deposits (>5 metre runup height) occur on the Pacific coast of Kamchatka over the last 7,000 years. More than 2,000 tsunami events have been recorded during the past 4,000 years, some with run-up heights of over 100 metres . . . Large meteorite impacts into oceans can immediately displace the entire water column and generate tsunamis initially higher than the depth of the ocean. A large kilometre-sized asteroid impacting a deep ocean generates initial tsunami waves of comparable height to the ocean depths, and these would still be more than 100 metres high when they reached the surrounding coasts . . . Tsunami deposits can be recognized primarily as rapidly deposited, tabular and extensive unusually coarse layers laid down (or at least) reworked by traction currents within finer grained sections.”

A significant fact brought out by Brookfield’s remarks above is that most open ocean waves are of low amplitude and hence incapable of entraining deep ocean bottom sediment, including benthic forams such as found in the Madagascar chevrons. As he points out “Tsunamis capable of affecting deep shelf and oceanic sea floors, however, need to be of very large amplitude and wavelength . . .” and that “Large meteorite impacts into oceans can immediately displace the entire water column . . .” Again, to assume that the Madagascar chevrons are purely the product of wind neglects the specifics of the process whereby deep sea marine fossils are incorporated into the chevron sediments, not to even mention the process by which they come to be fused with nickel, chrome and iron in relative cosmic proportions.

It is not unlikely that the depositional signature of a tsunami generated by an asteroid impact would be distinct from that generated by an undersea seismic event, especially if the incoming object was in some stage of fragmentation when it encountered the ocean. This could modify the refraction pattern of the wave trains considerably, adding a level of complexity not found in a wave train emanating radially from a seismic epicenter. As discussed in the last sentence of Brookfield above tsunami deposits are described as being composed of “extensive unusually coarse layers laid down by traction currents.” A traction current is one in which the water is moving material of a varied size and coarseness that can range from sand and silt up to large boulders. Further investigation of the stratigraphy and sedimentology of the chevrons is necessary before anyone can come to a final conclusion about their origin.

Research into the origin of chevron formations goes back several decades and is not confined either to Dallas Abbott and her team or to Bourgeois. In 1998 Paul J. Hearty, A. Conrad Neumann and Darrell S. Kaufman (all accomplished Ph.D’s in their respective fields) published an article in *Quaternary Research* describing their research into chevron formations found in the Bahamas. In the abstract they describe the Bahamian chevrons:

“Landward-pointing V-shaped sand ridges several kilometers long are common along the windward margin of the Bahama Islands. Their axes share a northeast-southwest trend. Internally, the ridges contain low-angle oolitic beds with few erosional truncations. Commonly interbedded are tabular, fenestrae-rich beds such as those formed by sheet flow of water over dry sand. Defined here as

'chevron ridges,' these landforms appear to have originated in the rapid remobilization of bank margin ooid bodies by the action of long-period waves from a northeasterly source. Deposits along adjacent coastlines also preserve evidence of the impact of large waves.'

Later in the article they address the question of aeolian (wind) formation.

"Although similar to parabolic dunes in gross morphology, several features in chevrons demonstrate that chevrons are deposited by water rather than by wind. These distinctions include the presence of beach fenestrae, (perforations) graded bedding, and the absence of the compact bedding and bedforms typical of the migratory parabolic dunes. Indeed, there are no known examples of true migratory carbonate dunes in the Bahamas despite abundant sand supply and strong prevailing winds. As described below, runup deposits and giant boulders provide supporting evidence of the occurrence of large waves during the last interglaciation on pre-existing, older coastlines adjacent to the lowland areas where chevron ridges are found."

So here are reputable scientists, who presumably have no stake in the outcome of the megatsunami hypothesis, asserting that chevron formations in the Bahamas, while smaller in scale than those in Madagascar, are, nonetheless, produced not by wind but by water in the form of large waves, and they offer some rather convincing evidence.

Let's address one more issue. In the first quote by Abbot et al. I have underlined an important point. Regarding the sediment composing the chevrons they state that "they contain grains larger than 2 mm in diameter." In fact, the team identified 10 cm (4 inch) thick lag deposits of shells in some chevrons which is inconsistent with aeolian deposition. Remember, they actually visited Madagascar and extracted samples.

In the computer model employed by Bourgeois and Weiss they test sediment transport regimes by calculating for flow velocity using a formula developed previously by R. I. Ferguson and M. Church for the "fall velocity" of different sized sediments in a variety of current flow situations. (**A Simple Equation for Grain Settling Velocity**, *Journal of Sedimentary Research*, v. 74, #6, Nov., 2004). In regards to fall velocity civil engineer John P. Ahrens says "Increased interest in fall velocity reflects acknowledgement of the fundamental physical importance of this variable in littoral sedimentation processes. Fall velocity has a strong influence on suspended sediment transport, beach profile shape and evolution, and beach morphology." (Ahrens, John P., March, April, 2000: **A Fall-velocity Equation**; *Journal of Waterway, Port, Coastal and Ocean Engineering*; Vol. 126, No.2, pp. 99 – 102) The point of this is that the chevrons take the form of ripples and dunes, and Bourgeois and Weiss assume that this form implies more subdued water flow in which the sediment is primarily transported as bed load rather than as suspended sediment, and that a more powerful flow, such as a tsunami, would deposit a continuous sheet of sand. However, some of the large chevrons overlap onto the coast up to 2 or more miles. As a sea wave traverses over land it undergoes substantial attenuation and energy loss. At the distal reach of sediment deposition the wave has essentially lost all of its forward momentum and begins its backwash into the ocean. It only makes sense that there would be a continuum of energy loss and transformation from suspended load to bedload along the depositional pathway.

The morphological effects of fall velocity on beach evolution is dependent upon grain size, symbolized by the letter D in the fluid mechanics formulas employed in the computer models. (D = grain diameter). In the formula used in for their calculations the value of D for Madagascar chevrons is given as .0002 meters, or 2 millimeters, which is typical of wind deposition. (See Table 1 in Bourgeois and Weiss, 2009) However, as quoted earlier Abbott and her team unambiguously state that the chevrons "contain

grains larger than 2 mm in diameter.” Clearly, additional research is needed to settle this disagreement. Sedimentary grains in the chevrons substantially larger than 2 mm would invalidate the computer models.

An important point made by the Abbott team was articulated in the journal *Zeitschrift für Geomorphology* in 2008. From the abstract:

“Chevrons are enigmatic yet understudied sedimentary structures. This paper presents a comprehensive description of chevrons along the world’s coastlines . . . Although morphologically variable, chevrons all show lancet-like forms at different shoreline angles. Their origin could only be wind or waves driven. Although many chevrons resemble narrow parabolic coastal dunes, a young aeolian genesis can be excluded where orientation contradicts main wind direction, or where no beach sand or sand deposit exists. Where storm origin can be excluded due to chevron height and extension far beyond storm wave reach pre-historic tsunamis were considered.”

Summarizing key points and questions regarding this controversy:

If wind blown what was the source of the sediment composing the chevrons where

there is no substantial beach sand available?

How were deep sea microfossils originally entrained in the sediments?

What is the explanation for the presence of nickel, chrome and iron fused to the fossils

as found by Dee Breger?

The chevron formations of Madagascar match other smaller scale chevron formations

attributed to large waves or to flowing water by other well qualified researchers.

Parabolic forms in the Madagascar chevrons mimic those of the Palouse landscapes of

Eastern Washington which were likely the product of subaqueous alteration.

Many of the chevrons studied by geologists have large boulders associated with them, sometimes, weighing hundreds of tons. These boulders were not emplaced by wind.

Clearly, more work is needed. I have addressed this issue somewhat in depth as the comments by my online critic are all too typical. The crucial lesson here is that one link to one internet article does not constitute a rebuttal, nor does a throwaway remark about “real scientists.” Again, the history of science is littered with “real scientists” who were spectacularly wrong about one thing or another. It is also replete with amateurs, outsiders and independent thinkers who have not only advanced but have even revolutionized scientific understanding.

The appeal to authority is NOT a scientific argument. In the end it is the facts that matter.

Regrettably, as I have come to know the Internet over the years I have become aware of the widespread lack of basic critical thinking skills rampant among the participants of this medium. Once upon a time if one desired to refute or confirm something said on television, or the radio, or in newspapers, magazines or by a college professor, one had to actually go to a library and do some research, invest some time, do some actual homework, seek out teachers and individuals more knowledgeable about the matters in question. Regarding authentic scholarly disputation there has evolved a procedure that subjects all claims and assertions to critical examination and



rigorous debate. Until recently there was no medium by which scientific or academic illiterates could parade their ignorance before the world. Now, one can simply post a link and make some stupid, uninformed, or misinformed, comments about some subject of which they know nothing while inflating their egos in inverse proportion to their lack of knowledge.

I would submit that here we have an example of the epidemic of superficiality to which large segments of the American population have succumbed. Could this be attributed to the government run monopoly of “education” whose primary purpose is the dumbing down of the populace to the point where they can no longer think for themselves, or to know the truth for themselves, but must turn instead to the opinions of state approved and sanctioned “experts” and “authorities” for their interpretation of reality? I had better be careful here, I am treading dangerously close to “conspiracy.” (However, see John Taylor Gatto, **Dumbing Us Down: The Hidden Curriculum of Compulsory Schooling.**)

Let’s face it— acknowledgement of the reality of the catastrophic history of this extraordinary planet we live upon is not conducive to the passive acceptance of politically contrived dogmas blaming all climate and environmental change on human activities.

No, the question regarding the genesis of mega-chevrons has not been settled. But as I look at the evidence it seems that the stronger arguments lie with those who are willing to think outside the constraints of geological gradualism. If Dallas Abbott and her team are correct, the implications are profound on multiple levels, both for understanding our past, but perhaps even more importantly for our future. For, if they are correct, a sea level rise of a couple of feet over the next century or two due to global warming evaporates into utter insignificance when contrasted with tsunamis that are perhaps 10 times more powerful than the devastating debacles of 2004 and 2011. Remember, a quarter million people died in the Indian Ocean cataclysm where the waves, in some locations, reached 80 feet in height. What would a tsunami wave 500 feet in height mean in terms of human casualties, economic loss and social disruption?

Yes, we can understand why many people would prefer to endorse any theory that would alleviate them from the necessity of contemplating such appalling scenarios and their unavoidable implications. But the giant chevrons are there, mantling the worlds’ coastlines, and any person with an internet connection can now begin to see for themselves, that which, because of its vast scale, remained utterly invisible to human perception for thousands of years, and now, perhaps urgently, demands recognition and explanation.

Perhaps the main point I am trying to make with this more in depth treatment of the question of mega-tsunamis is that all of the foregoing information, data and evidence had been investigated and considered in some depth by myself prior to publically bringing it up for discussion on the Joe Rogan Experience. I will also state that other items that came up for discussion are also backed by substantial research, which references I am more than happy to share with those who are sincerely interested in learning more and not just blowing hot air online in order to impress themselves.

One final point. Bourgeois states that “. . . if it really was from an impact, you should find evidence on the coast of Africa too, since it is so near.” Yes, you should. So please carefully peruse the final two Google Earth images included that show the coast of Mozambique, Africa, where it is intersected by the projected axes of the southern Madagascar chevrons.

Randall



Chevron forms found on the southern tip of Madagascar. Were these formations created by wind or water? If the chevrons are formed of fine-grained wind transported sediment why is the line of demarcation at the distal end so distinct? What kind of aeolian process would produce features of this form and magnitude? The light colored deposits near the upper end of the chevrons are sand. This sand is undoubtedly being modified by wind, but this does not mean that the whole complex of lancet-like forms composing the chevrons were originally created by wind.





Chevron forms created on a stream sandbar by local spring floods in Georgia, USA. The significant point is that these forms were produced by flowing water, not wind. After the flood subsides and the sand deposits dry out they will become subject to wind erosion and modification until they are stabilized by vegetation.

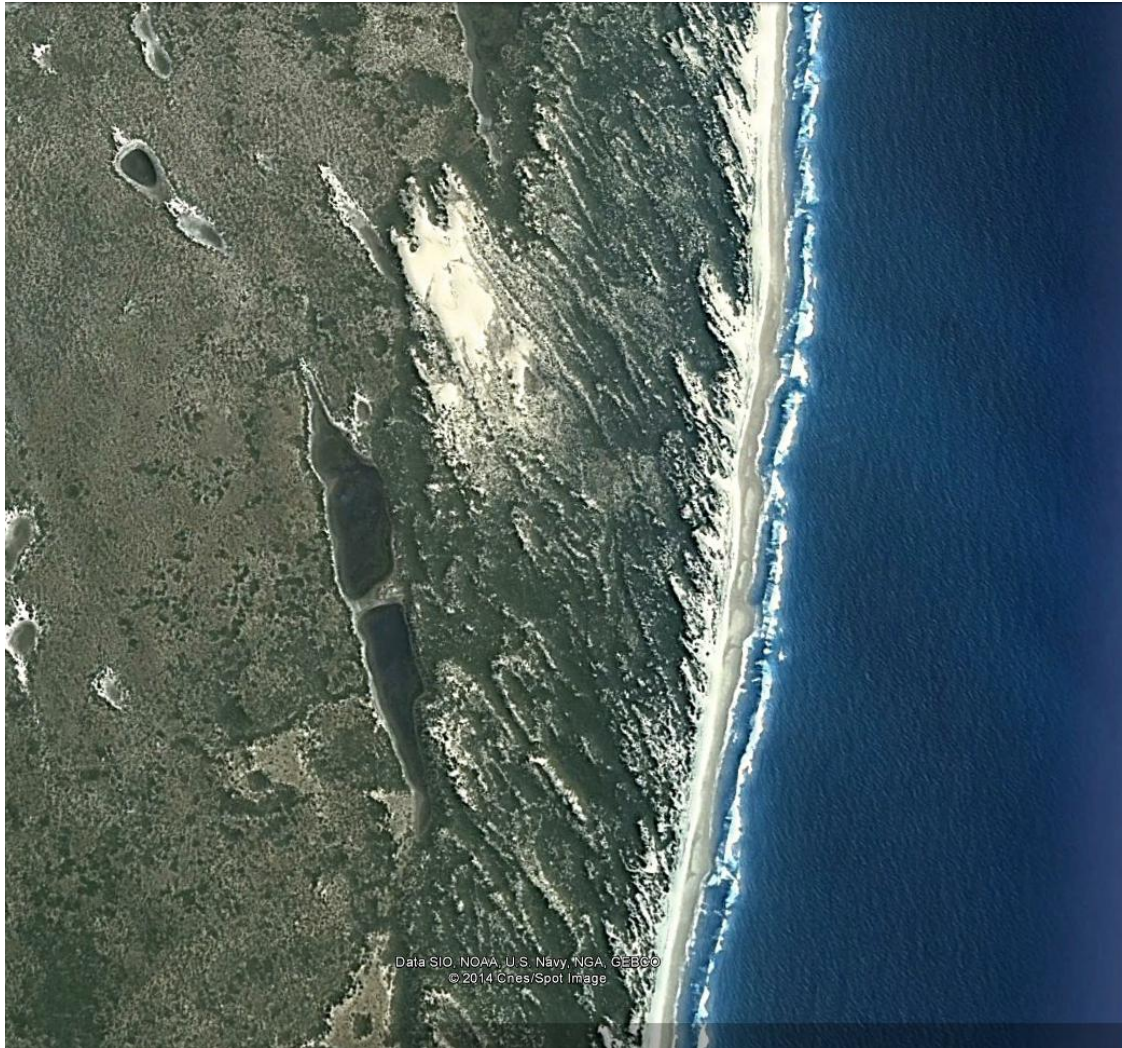


Small scale parabolic dune forms and hummocky topography produced by local flooding in Peachtree Creek, GA are clearly visible in this photograph. The open end of the parabola seen in the top center points in the up-current direction which was from right to left. Again, these sedimentary forms are initially produced by flowing water and later modified by wind.





Large scale parabolic dune forms on the Rolling Palouse landscape of SE Washington State. Note the large parabolic shaped dune in the foreground. It opens upcurrent, flow was from right to left (north to south). Compare the general morphology of this landscape with the water shaped forms in the previous photograph. This landscape is the product of wind AND water. A study of mega-scale paleohydrology reveals the scale-invariant, or self-similar nature of fluvial forms across a wide variety of spatial scales and signifies its value as a means of comparison and recognition of mega features whose origins it is not possible to witness directly.



Chevron deposits along the coast of Mozambique, occurring along the same azimuth line defined by the axis of the Madagascar chevrons. Were these features produced by the same event responsible for the Madagascar chevrons?





More chevron deposits along the SE coast of Africa almost due west of southern Madagascar.

Please go to Google Earth and investigate these formations for yourself. Whether these forms are of the same age as the ones on Southern Madagascar remains to be determined. I think that there is too much evidence to dismiss out of hand the possibility that these chevrons are the product of massive tsunami waves generated by bolide impacts into the ocean. That such a thing has happened frequently throughout the history of the Earth there can be no doubt. Whether or not such a thing could have happened within historical times is the real question here. I would state that it is critically important that these features are subject to more rigorous on-sight investigation, with extensive sample retrieval, including core samples, stratigraphic and sedimentological studies and radiocarbon dating. A close examination of the morphology in the image above suggests the likelihood of at least two events, with the older event being the largest.

