Short communication

Formation of Mountain Ranges: Described By Whole-Earth Decompression Dynamics

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ABSTRACT

Earth's mountain ranges, characterized by folding and unique among Terrestrial planets, are inexplicable in plate tectonics, but are consequences of Earth's initial formation as a Jupiter-like gas giant, as described by Whole-Earth Decompression Dynamics. The violent T-Tauri outbursts from thermonuclear ignition of the sun stripped away the primordial gases and ices leaving behind a cold, compressed rocky Earth, entirely covered by continental crust without ocean basins, but containing within it two powerful energy sources, the stored energy of protoplanetary compression and a nuclear fission georeactor. Over time heat added by nuclear fission and radioactive decay energy replaced the lost heat of protoplanetary compression making possible Earth's decompression. As Earth decompresses two surface phenomena must necessarily occur: (1) more surface area is produced by the formation of and in-filling of decompression cracks, and (2) continental surface areas adjust to new surface curvature primarily by the surface buckling, breaking and falling over (thereby forming mountain ranges characterized by folding) and secondarily by tension tears at continental edges (thereby forming fjords and submarine canyons). The present continental surface area plus continental shelves provides a "first guess" estimate of the juvenile crustal surface area, but it is an underestimate due to not considering the surface area that had buckled, broken and fallen over to form mountains. Preliminary calculations provide relative estimates of the "excess" surface area during whole-Earth decompression that would form mountains. Currently, there is a dearth of reliable data on the ages of fold-mountain formation and on the amount of surface matter they contain, as well as on the initial time of decompression crack formation, especially those cracks that ultimately became ocean basins. The absence of fold-mountains on other Terrestrial planets may be understood as a consequence of their *not* having been compressed by massive shells of protoplanetary gases and ices.

Keywords: Protoplanetary, Whole-Earth Decompression Dynamics, Orogeny, georeactor, plate tectonics.

1. INTRODUCTION

In 1873, Dana [1] described his idea that mountains formed as a result of Earth's contraction from cooling. In 1878, LeConte [2] wrote that mountains were ridges that are always formed by horizontal pressure, which he thought was inconceivable by contraction. In 1885, in *Das Antlitz der Erde*, Suess [3] disclosed and refined his previous idea [4] that mountains characterized by folding appear to have been pushed laterally, which he assumed was due to Earth's contraction. In 1933, Holmes [5] set forth his idea that mountains are formed by convection currents within the Earth.

With the advent of plate tectonics theory in the 1960s, which is a modernized version of Wagener's continental drift theory [6, 7], mountain formation was assumed to occur by plate collisions driven by mantle-convection and augmented by plate subduction [8]. But there are problems. In plate tectonics, continental masses are assumed to move freely about Earth's surface riding atop mantle convection cells. However, mantle convection is physically impossible [9] and plate tectonics is without an energy source for continental mobility. Moreover, the discovery of mountains whose ages predate the supposed formation of Pangaea led to the fictitious idea of supercontinent cycles (Wilson cycles) [10].

My concept of the consequences of Earth's initial formation as a Jupiter-like gas giant, described by Whole-Earth Decompression Dynamics theory, provides a logical and causally related basis for the formation of mountains characterized by folding [11] as well as virtually all other geological and geodynamic phenomena [12-16] including the nuclear fission georeactor generation of Earth's magnetic field [17-22].

The following is a brief description of the basis of Whole-Earth Decompression Dynamics: Earth's components rained out by condensing from within a giant gaseous protoplanet. Earth's core condensed as a liquid iron alloy, followed by Earth's mantle, and finally by the primordial compliment of gases and ices that comprise about 300 Earth-masses. The rocky part of Earth was compressed to about two-thirds its present diameter by the weight of the gases and ices. The surface regions were cold, a necessary condition for condensed gases and ices which attests to loss of the heat of protoplanetary compression. The violent T-Tauri outbursts from thermonuclear ignition of the sun stripped away the primordial gases and ices leaving behind a cold, compressed rocky Earth devoid of atmosphere, but containing within it two powerful energy sources, the stored energy of protoplanetary compression and a nuclear fission georeactor capable of producing energy that would more than replace the lost heat of protoplanetary compression.

After being stripped of protoplanetary gases and ices, several factors acted to oppose immediate decompression. Unless heat was added to replace the lost heat of compression, decompression would have cooled the planet which would have impeded decompression. Over time heat is added by nuclear fission and radioactive decay energy. Decompression necessitates cracking the hard, rigid crust. Compounding these factors are the mechanical properties of Earth materials, referred to as rheology.

2. FORMATION OF MOUNTAINS CHARACTERIZED BY FOLDING

Following removal of primordial gases and ices, as Earth decompresses, two surface phenomena must occur that (1) increase surface area to compensate for increased diameter and (2) correct for resulting changes in surface curvature. Surface area increases by forming two types of decompression cracks, those with and without underlying heat sources. Basalt extruded from cracks with heat sources subsequently flows into and fills cracks without heat sources as it forms ocean basins. Simultaneously, continental surface areas adjust to new surface curvature primarily by the surface buckling, breaking and falling over and secondarily by tension tears at continental edges as illustrated in Figure 1.

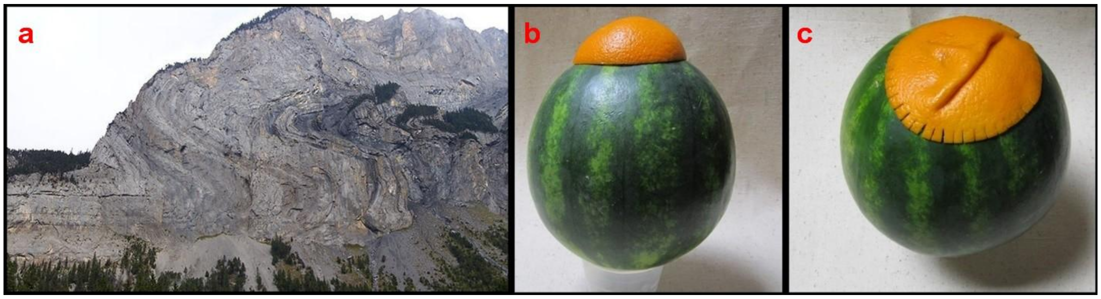

Figure 1. (a) Example of mountain folding; (b) The necessity for surface curvature change during whole-Earth decompression. The un-decompressed Earth is represented by the orange; the larger, decompressed Earth, is represented by the melon. Note the curvatures do not match; (c) Two causally-related curvature-change mechanisms that naturally result in surface curvature change, namely, major curvature adjustment by folded-over tucks, minor curvature adjustment by continental-perimeter tears. From [15].

Figure 1a shows a typical example of folds in mountains, this example from the Alps. Figure 1b illustrates the surface curvature mismatch of a smaller, less decompressed Earth and a larger more decompressed Earth. Note the "excess" surface area of the less decompressed spherical section (orange) contained within its perimeter Figure 1c shows two natural mechanisms for adjusting to surface curvature upon decompressing. The major surface adjustment is by the surface buckling, folding over and breaking. The minor surface curvature adjustment is by the formation of tension fracturing at the edges.

Immediately after the ices and gases were stripped from the juvenile Earth, there were no ocean basins and no mountains. Continental crust entirely covered the globe. If we knew the surface area of that contiguous continental crust, Earth's juvenile radius could be easily calculated. The present continental surface area plus continental shelves, however, would be an underestimate of the juvenile crustal surface area, but it provides a "first guess" estimate.

The calculations below utilize the following geophysical data:
S_p = Present ocean surface area = 361,883,510 km^2 [23]
Continental shelves as fraction of present ocean surface area = .089 [23]
R_p = Present radius of Earth (assumed spherical) = 6371 km [24]
A_p = Present continental crustal surface area ignoring mountain uplift
A_j = Juvenile continental crustal surface area ignoring mountain uplift
R_j = Calculated juvenile radius ignoring mountain uplift

$$A_p = 4\pi R_p^2 - S_p(1-.089) = 180{,}388{,}163 \text{ km}^2 \tag{1}$$

$$R_j = [(A_j/A_p)R_p^2]^{½} = 3789 \text{ km} \tag{2}$$

$$R_j/R_p = 0.595 \tag{3}$$

The "first guess" juvenile Earth radius, R_j, thus calculated is clearly an underestimate as the "excess" surface area, illustrated in Figure 1, was not considered that resulted from fold-mountain formation. From a geological standpoint it is important to understand the time sequence of whole-Earth decompression. Unfortunately, there is a dearth of reliable data on the ages of fold-mountain formation and on the amount of surface matter they contain, as well as on the initial time of decompression crack formation, especially those cracks that ultimately became ocean basins. Nevertheless, it is possible to gain some insight into the relative amount of “excess” surface area that upon whole-Earth decompression would become the mountains characterized by folding.

The orange peel shown in the center image of Figure 1 is referred to mathematically as a *spherical section*. The mathematical relationships related to a spherical section are shown in Figure 2. Using those simple mathematical relationships, it is possible to compare the surface areas of a spherical section at present Earth radius with a corresponding spherical section at an earlier Earth radius provided the *circumferences of the spherical sections are equal*. The circumferences of the spherical sections are equal if their base radii “r” are equal.

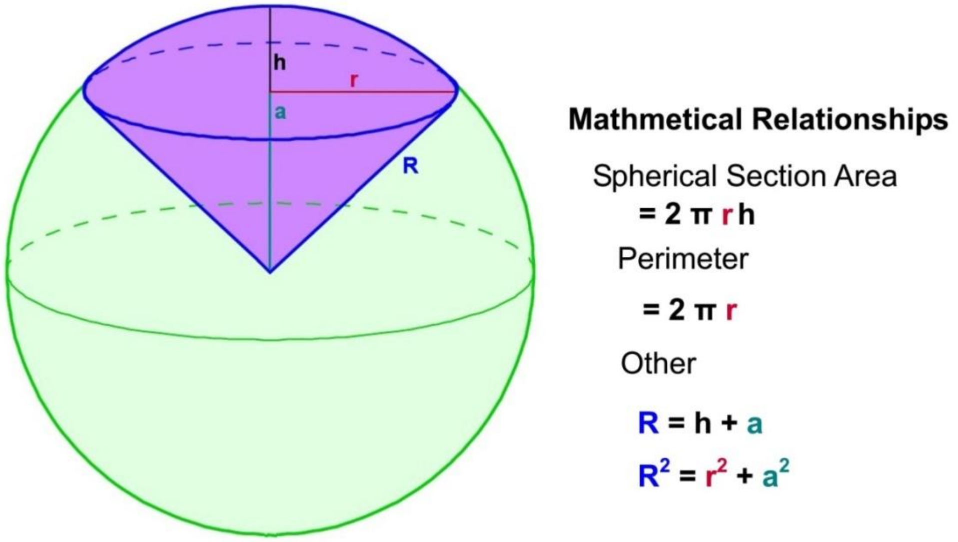

Figure 2. Spherical section diagram with relevant mathematical relationships.

Using the symbols defined above, the surface area of a spherical section for $R_j < R_p$ is given by:

$$A_i = 2\pi r[R_j - (R_j^2 - r^2)^{1/2}] \tag{4}$$

The corresponding present spherical section surface area with equal perimeter is given by:

$$A_p = 2\pi r[R_p - (R_p^2 - r^2)^{1/2}] \tag{5}$$

$$\text{Percent “excess” area} = 100(A_j - A_p)/A_p \tag{6}$$

Figure 3 presents the results of calculations showing percent “excess” area as a function of Juvenile Earth Radius Ratio = R_j/R_p.

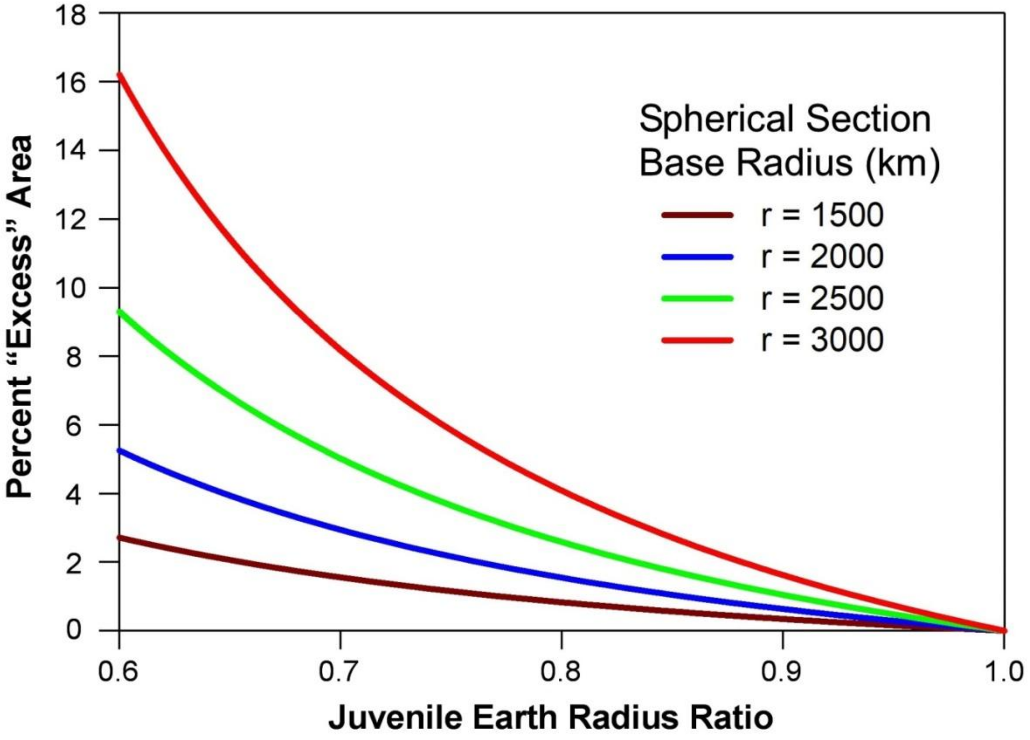

Figure 3. Percent "excess" area that would form mountains characterized by folding, as illustrated in Figure 1, as whole-Earth decompression proceeds from some yet unknown juvenile Earth radius when Earth's surface was a contiguous solid crust without ocean basins.

The circumferences of the spherical sections shown in Figure 3 are shown with corresponding colors on the equal area map in Figure 4.

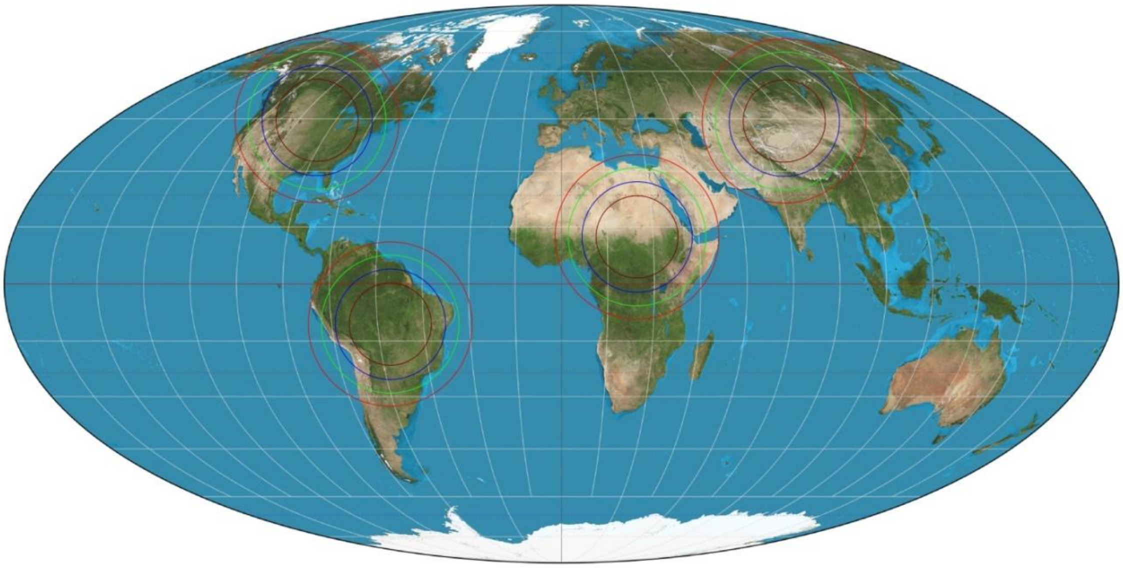

Figure 4. The spherical section circumferences indicated in Figure 3 are shown for comparison on an equal area map of Earth's present surface. Map courtesy of Strebe [25].

The data shown in Figures 3 and 4 demonstrate more precisely than Figure 1 the reasonableness of the origin of mountain ranges characterized by folding as a consequence of Whole-Earth Decompression Dynamics. But there is much yet to learn, especially and importantly, the time sequence of crustal fragmentation and the opening of ocean basins. Whole-Earth Decompression generally involves the splitting of continental masses and in instances the opening of ocean basins as the continents disperse. That process is inherently more straight-forward than the arbitrary, freely-roaming and colliding supercontinent cycles envisioned in plate tectonics.

The formation of ocean basins involves two types of decompression cracks, primary decompression cracks associated with a relatively persistent heat sources (i.e. mid-ocean ridges) and secondary decompression cracks without heat sources that frequently occur along continent margins (i.e. trenches) into which basalt extruded at mid-ocean ridges eventually in-fills. The ocean floors are not static features, but an ongoing process, like that envisioned in plate tectonics, but instead of continuously being recycled by mantle convection, the ocean floors in in Whole-Earth Decompression Dynamics continuously in-fill continuously formed secondary decompression cracks.

In attempting to understand the complex, highly incomplete geological record, much confusion has arisen from interpretations based upon an incorrect paradigm. For example, in the unchanging global-dimension of plate tectonics, the supercontinent Pangaea is thought to be surrounded by ocean. In that view, putative Pangaea-fragmentation shifted land and ocean volumes around without producing any major change in sea level. The only mechanism envisioned in that paradigm for a rapid, major lowering or raising of sea level was the onset or ending of an ice age, when a large volume of ocean water was sequestered or released as polar and glacial ice [26].

The geodynamics and geology of Earth are intrinsically related through my indivisible geoscience paradigm, Whole-Earth Decompression Dynamics. Ultimately, myriad seemingly complex and theoretically unresolved observations can be resolved and understood in logical, causally related ways. For example, the apparent correlation of geomagnetic field reversals with species extinction [27, 28], with major episodes of volcanism [29, 30], and with drastic sea-level changes [31], is understandable as geomagnetic field collapse, in principle, can lead to a spike in georeactor output energy, and thus possibly trigger a decompression spike manifest, for example, by volcanism, earthquakes, continent splitting, species extinction, mountain formation, etc. [19, 20, 32].

The progressive splitting of continental crust and concomitant opening of ocean basins necessarily causes lowering of sea levels, which over time is compensated by new ocean water additions. Continent fragmentation thus exposes sea water to non-oxidized minerals, such as pyrite and arsenopyrite, that can acidify and toxify sea water, and potentially lead to massive species extinctions (Figure 5) [33].

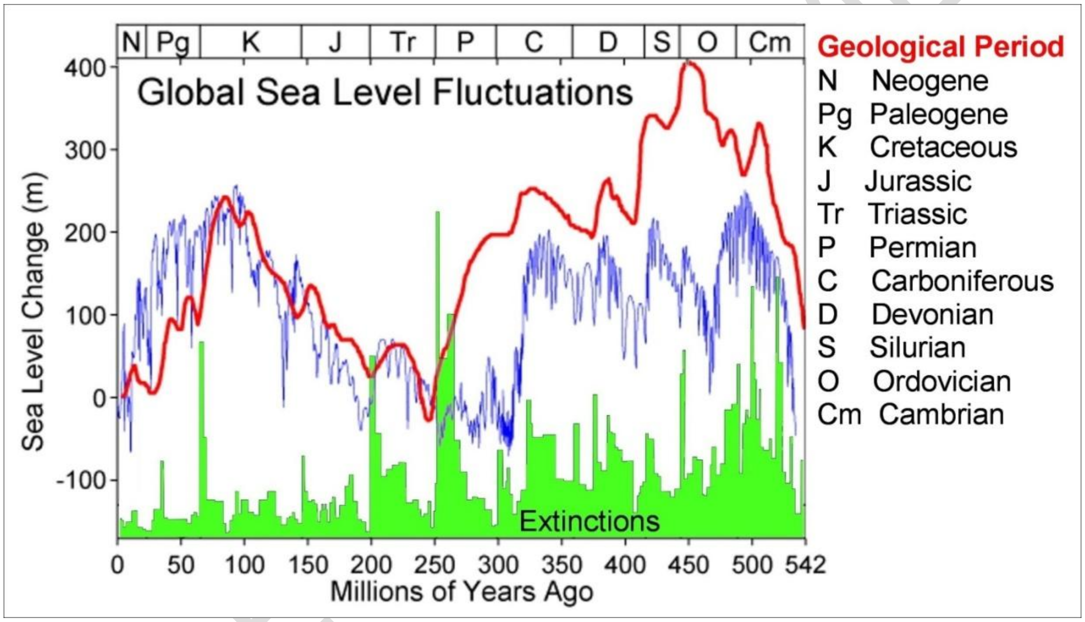

Figure 5. Spikes in seawater levels (red and blue) appear to correlate with spikes in species genus extinction intensity (green), and they correlate as well with boundaries of major divisions of geological time, abbreviated at top of graph. For details and data, see [34-41]. From [14].

Evidence from the geological past is incomplete, but with Whole-Earth Decompression Dynamics, the confusion inherent in previous scientifically incorrect explanations for fundamental geological phenomena can be rectified. Geoscientists can, and hopefully will, begin afresh to attain an understanding of Earth’s history that is securely anchored to the known properties of matter and radiation.

Why among the Terrestrial planets is Earth alone in having mountains characterized by folding? The formation of mountains characterized by folding is understandable in a logical and causally related way as a consequence of Earth originating as a Jupiter-like gas giant. The absence of fold-mountains on other terrestrial planets may be understood as a consequence of their *not* having been compressed by massive shells of protoplanetary gases and ices [16]. In fact, there is evidence that Mercury's protoplanet was disrupted during formation by violent T-Tauri outbursts from thermonuclear ignition of the sun [42].

3. CONCLUSIONS

The formation of Earth's mountain ranges, characterized by folding, is inexplicable in plate tectonics, but is a natural consequence of Whole-Earth Decompression Dynamics that is based upon Earth's subsequent decompression following its initial formation as a Jupiter-like gas giant. As Earth decompresses, not only is new surface area produced by the formation of and filling of decompression cracks, but continental surface areas adjust to new surface curvature primarily by the surface buckling, breaking and falling over. The present continental surface area plus continental shelves provides a "first guess" estimate of the juvenile crustal surface area, but it is an underestimate due to not considering the surface area that had buckled, broken and fallen over to form mountains. Preliminary calculations based upon comparable spherical sections provide relative estimates of the "excess" surface area during whole-Earth decompression that would form mountains. Reliable data is currently needed on the ages of fold-mountain formation and on the relative amount of surface matter they contain, as well as on the initial time of decompression crack formation, especially those cracks that ultimately became ocean basins. The absence of fold-mountains on other terrestrial planets may be understood as a consequence of their *not* having been compressed by massive shells of protoplanetary gases and ices.

COMPETING INTERESTS

The author declares that no competing interests exist.

AUTHORS' CONTRIBUTIONS

This is the sole and original work of the author.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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