−An international journal for New Concepts in Global Tectonics −

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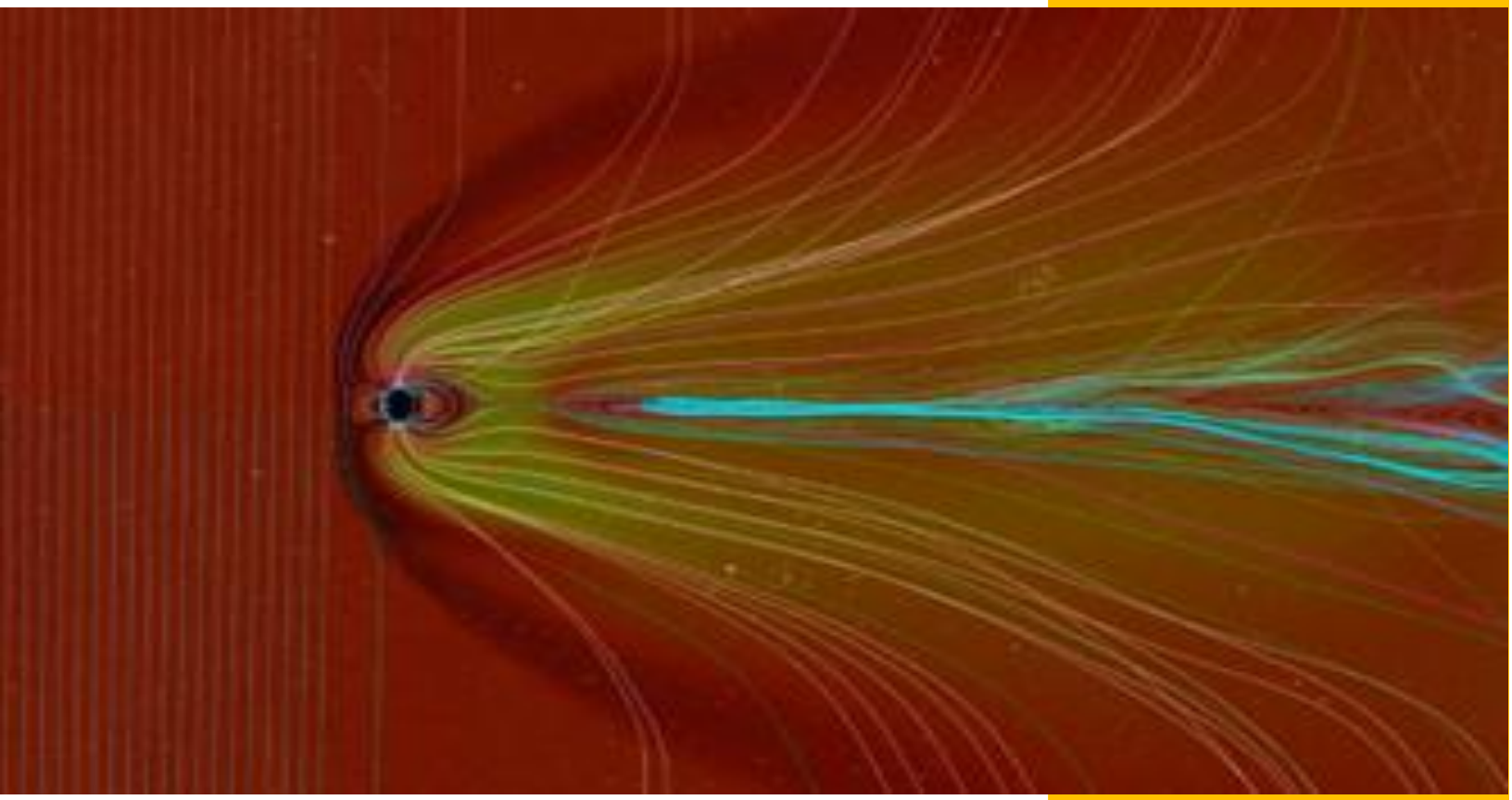

https://svs.gsfc.nasa.gov/vis/a000000/a004100/a004189/Earth_CarringtonClass_Profile_1080.mp4

Space Weather Solar-Terrestrial Relations

New Concepts in Global Tectonics Journal
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– *An international journal for New Concepts in Global Tectonics* –

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For donations, please feel free to contact the Research Director of the Geoplasma Research Institute, Mr. Bruce Leybourne, at leybourneb@iascc.org. For contact, correspondence, or inclusion of material in the NCGT Journal please use the following methods: *NEW CONCEPTS IN GLOBAL TECTONICS.* 1. E-mail: leybourneb@iascc.org (The format of the manuscript should follow the first article of NCGT journal 12-3. Pay particular attention to how to cite and how to write a bibliography of references. Manuscripts must be in MS Word or ODT format, and figures in gif, bmp, png or tif format) as separate files; 3. Telephone, +61 402 509 420. *DISCLAIMER*: The opinions, observations and ideas published in this journal are the responsibility of the contributors and do not necessarily reflect those of the Editor and the Editorial Board. *NCGT Journal* is a refereed quarterly international online journal and appears in March, June, September and December.

New Concepts in Global Tectonics Journal
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EDITOR's CORNER

Comments by Editor in Chief - Bruce Leybourne

Our NCGT Journal mission statement is all about the search for a valid comprehensive working model of our planet (See Insert: Aims of the Newsletter - Dickens and Choi, 1996). I joined the NCGT community by first attending the Tsukuba, Japan Conference (1998). Where I met the late Mac Dickens and Dong Choi (Chief Editors and Founders of NCGT). The founding of NCGT occurred in 1992 after the Washington DC, meeting. At the prompting of a good friend and colleague of mine, Chris Smoot (past editor for NCGT), I presented a tectonic vortex modulation effect to the ENSO climate phenomenon using surge tectonic theory (Leybourne, 1998, NCGT Newsletter, No. 6, pp. 5-8). Along with a host of some other most excellent presentations.

Aims of the Newsletter include:

1. Forming an organizational focus for creative ideas not fitting readily within the scope of Plate Tectonics.

2. Forming the basis for the reproduction and publication of such work., especially where there has been censorship or discrimination.

3. Forum for discussion on such ideas and work which has been inhibited in existing channels. This should cover a very wide scope from such aspects as the effect of the rotation of the earth and planetary and galactic effects, major theories of development of the earth, lineaments, interpretation of earthquake data, major times of tectonic and biological change and so on.

4. Organization of symposia, meetings and conferences.

5. Tabulation and support in case of censorship, discrimination and victimization.

Original "Aims of the NCGT Newsletter", See: Dickens, J. M. and Choi, D.R., 1996. Aims of the Newsletter. NCGT Newsletter, No. 1, p. 2.

Thus, over the years we have explored a plethora of tectonic mechanical models and ideas, gravity and magnetic field concepts, as well as other topics of general environmental science in related fields of climate change, and natural disasters related to extreme weather, earthquakes, and certain types of wildfire outbreaks related to solar activity. We've explored wrench models (Storetvedt); expansion models (Maxlow); surge theory (Meyerhoff) exploring tectonics by assuming the tectonic regime is more analogous to ocean/atmospheric circulation models, i.e. using conventional flow dynamics including vortex concepts. We've also explored tidal driven Earth endogenous energy from solar induction (Gregori) and solar coupled models of the Stellar Transformer (Leybourne). While still in search of a tectonic unification theory, considering recent advances unraveling the solar link, i.e. solar protons linked to earthquakes (Straser and Cataldi among others) and solar induction models (Gregori and Leybourne). It appears the incorporation of Space Weather to tectonic modeling and accounting for solar and planetary electromagnetic influences is a certain pathway for exploration. As we begin to shift toward this more focused aspect of research, I encourage our current and future contributors to consider how their models and studies may reveal and uncover more about how these solar and planetary influences work and what drives them. We suspect that most past contributions will have some aspects that come to play in the more unified concepts coming forward from incorporating Space Weather. The video below introduces "Geometry of Earth's Endogenous Electrical Energy - Geophysical Evidence" and how geometry likely plays an important role in understanding Space Weather effects adherence to the golden ratio. See Leybourne - Electric Universe 2016 - https://www.youtube.com/watch?v=Q355Haapq-0

The problem with boiler "plate" type models relying on friction and internal convection from radioactive decay, is that Plate Tectonics does NOT account for e.m. space weather effects or incorporate e.m. components as part of its theoretical framework. Hence, this huge oversight in tectonic theory has led to a misunderstanding of how our planet works and is why the *New Concepts in Global Tectonics (NCGT) Journal* came into existence in the first place… to address these deficiencies.

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Announcements on Upcoming Conferences - "CALL FOR PAPERS"

We have initiated planning committees for 2 upcoming conferences:

December 2025 – NCGT in Trivandrum, India is being organized by Biju Longhinos (biju.longhinos@gmail.com), where we are planning about 6 - half day sessions over 4 days with a post conference field trip. Details to be announced with a "CALL FOR PAPERS". Please contact Biju, if you wish to become involved in any aspect of the conference. We are looking for Session Topics, Abstracts, Papers, Session Chairs, Organizers, Workers, Financial Contributions etc. Let Biju Longhinos and Bruce Leybourne know how you'd like to be involved, and we may accommodate.

September 2026 – NCGT in Italy is being organized by Valentino Straser (valentino.straser@gmail.com) where we are planning a similar event with details to be determined. Please contact Valentino if you wish to become involved in any aspect of the conference. Again, we are looking for Session Topics, Abstracts, Papers, Session Chairs, Organizers, Workers, Financial Contributions etc. Let Valentino Straser and Bruce Leybourne know how you'd like to be involved, and we may accommodate.

"CALL FOR PAPERS"

Abstracts for India 2025:

Stellar Transformers and Earth Endogenous Energy

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[1] GeoPlasma Research Institute-(GeoPlasmaResearchInstitute.org), Aurora, CO 80014, USA

Abstract: To account for space weather effects to Earth, indeed all the planets… a theoretical framework for understanding and calculating the electro-magnetic (e.m.) magnetic moment vector components during these instantaneous effects are necessary. The *Tide-Driven (TD) dynamo* proposed by Gregori (2002), incorporates the vertical vector Z-component (sea-urchin spike) as a positive anode tuft protruding into the Earth's mantle from the core. Where daily tides aligned closely with solar and lunar magnetic moment field variations drive electrical energy production converted mostly to heat, providing Earth with approximately 70% of its internal energy budget. The remaining 30% of the energy budget is due to episodic inputs from magnetic variations driven by solar activity, such as *CMEs* **(Fig. 1)**, solar flares, eruptive filaments, coronal holes… i.e., activity related to sunspot cycles. During these short episodic magnetic field changes… e.g., collapse of the magnetotail from passing electric fields of *CMEs* **(Fig. 2)**… the Earth's core generates and releases vast amounts of overwhelming power very quickly as a positively charged *EMP* towards Earth's surface back towards the sun during a noon Stellar Transformer magnetic moment alignment much like a reflection. At the atomic e.m. or "quantum" scales, photon emissions or light reflection might occur in an analogous manner. We correlate "sea-urchin spikes" in some cases at certain geographic locations with 12 o'clock local noon wildfire outbreaks just after passing *CMEs*. In addition, severe weather outbreaks may also occur depending on the geographic location and orientation of solar magnetic moment effects. To understand the 3-dimensional aspects of these solar induction and *EMP* effects, we use the concept of *Stellar Transformers* to explore these phenomena (Leybourne and Gregori, 2020, Leybourne, et. al. 2017).

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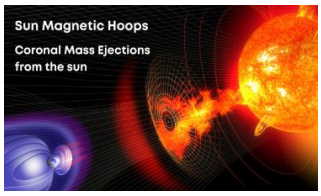

Fig. 1. *Coronal Mass Ejections (CMEs)* pass *Extremely Low Frequency (ELF)* e.m. waves stretching Earth's magnetic bubble, extending the magnetotail far into space. Upon collapse of the magnetotail (Fig. 2) the magnetic field variation within the bubble especially in Earth's core generates electrical power. (International Creative Commons 4.0)

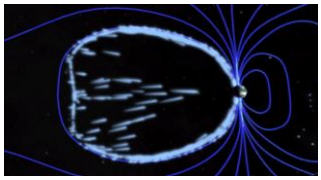

Fig. 2. Collapse of the magnetotail drives an instantaneous field effect especially in the Earth's core generating electrical power that must escape like a reflection back at the sun as an *Electro-Magnetic Pulse (EMP)*. A series of processes outline how *Ground Induction Currents (GICs)* are driven by this phenomenon. (International Creative Commons 4.0)

Gregori, G.P. (2002): Galaxy – Sun – Earth relations. The origin of the magnetic field and of the endogenous energy of the Earth, with implications for volcanism, geodynamics and climate control, and related items of concern for stars, planets, satellites, and other planetary objects. A discussion in a prologue and two parts. *Beiträge zur Geschichte der Geophysik und Kosmischen Physik*, Band **3**, Heft 3, 471p.

Leybourne, B.A. and G.P. Gregori (2020): Introduction to Plasma Tectonics & Electric Geology: Solar Wind Coupling to Planetary Circuits Lightning Tells the Stellar Transformer Story, Journal of Systemics, Cybernetics and Informatics, Orlando, FL, March 2020, 7-13, ISSN: 1690-4524. https://www.iiisci.org/journal/sci/FullText.asp?var=&id=ZA424OY20

Leybourne, B.A., J. M. Davis, P. Giovanni Gregori, John M. Quinn and N. Christian Smoot (2017): Evolution of Earth as a Stellar Transformer, NCGT Journal, v. 5, no. 1, 144-155.

Magnetotail Collapse after Coronal Mass Ejections Generate Electro-Magnetic Pulse/Geomagnetic Induction Currents from Earth's Core

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Abstract: For magnetotails to collapse, first they expand (**Fig. 1a, b**) due to the passing *CME*. During normal solar wind conditions in **Fig. 1a**, the Earth's magnetic bubble shows a slight compression and extension of the magnetotail, but during *CMEs* in **Fig. 1b**, the bubble is highly compressed on the Sun facing side. While the magnetotail expands and extends in a curved fashion away from the Sun due to the passing of *Extremely Low Frequency (ELF)* waves in the electric fields of the *CME* turbulence. Damage to the electrical power grid from solar storm driven *Geomagnetic Induction Currents (GICs)* not only applies to power black outs during equipment malfunction on the grid. There are also causal links from solar activity to severe weather outbreaks, such as tornadoes and increased seasonal hurricane production with increased intensities. Extreme "grid down" effects are quite common during hurricanes and tornadoes. In addition, certain types of wildfire outbreaks from internal core generated *Electro-Magnetic Pulse (EMP)* are associated with *Coronal Mass Ejections (CMEs)* and may cause grid down scenarios. When core generated *EMPs* are under continents, they may drive extreme *GICs* in tectonic induction element structures underlying the grid and transfer induction energies by spreading charge through the deep and surface water layers to power grid infrastructure, such as dams or high-power transmission lines and substations. When this core generated *EMP* underlies an ocean basin, the deep serpentine layer where water and magmas mix become highly charged from solar *CME*. This in turn may drive severe weather and tornado outbreak

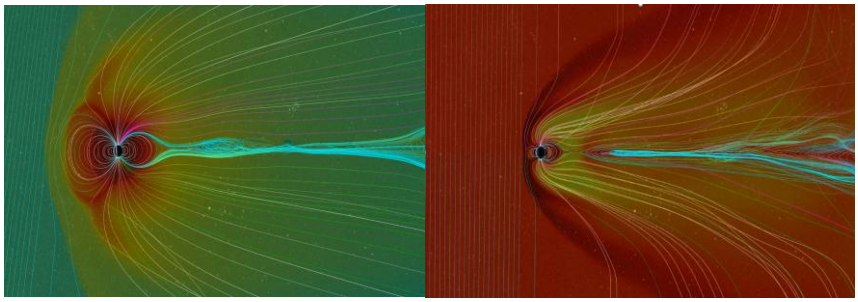

Fig. 1a. Left image, green, shows normal solar wind compression of the magnetic bubble and magnetotail extension. 1b. Right image, red, shows extreme compression on front side of the bubble and expansion of the magnetotail. (International Creative Commons 4.0)

https://svs.gsfc.nasa.gov/vis/a000000/a004100/a004189/Earth_CarringtonClass_Profile_1080.mp4

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on continents when the ionosphere equalizes this charge to ground. The instantaneous orientation of the *CME* magnetic moment with tectonic element alignments controls the geographic location and intensity of each specific *EMP* event. We use innovative *Stellar Transformer* concepts to model and understand these tectonic modulation controls and effects (Leybourne and Gregori, 2020; Leybourne et.al., 2017).

Leybourne, B.A. and G.P. Gregori (2020): Introduction to Plasma Tectonics & Electric Geology: Solar Wind Coupling to Planetary Circuits Lightning Tells the Stellar Transformer Story, Journal of Systemics, Cybernetics and Informatics, Orlando, FL, March 2020, 7-13, ISSN: 1690-4524. https://www.iiisci.org/journal/sci/FullText.asp?var=&id=ZA424OY20

Leybourne, B.A., J.M. Davis, P. Gregori Giovanni, M. Quinn John and N. Christian Smoot (2017): Evolution of Earth as a Stellar Transformer, NCGT Journal, v. 5, no. 1, 144-155.

Solar Activity and Space Weather Relationships to Global Seismicity and Schumann Resonance

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Abstract: Large Coronal Mass Ejections (CME's), associated with sunspots, solar flares, eruptive filaments and large coronal holes generate Extremely Low Frequency (ELF) waves during geomagnetic storms driven by space weather as well as hazardous geoelectric field induction currents also known as Ground Induction Currents (GICs). The multivariable seismometer data in **Fig. 1**, displays seismic Extremely Low Frequency (ELF -3 to 30 Hz) waves and ~1 Hz range harmonics (likely Alfvén waves) from an electrometer connected to the local grid in Cotter, Arkansas (Wright and Leybourne, 2023). These data plotted on the same recording show interesting correlations. Electrometer signals plot as deflections of the seismic baseline indicating electric charge. The device is a sensitive seismometer that uses the power grid as its very large ULF/ELF receiving antenna. The zoom insert on **Fig. 1** measures time from the beginning of the ELF signal, ***circled blue*** – preceding the arrival of the seismic p-wave of a magnitude 3.2 earthquake in the New Madrid Seismic Zone, ***circled orange***. The 15.7 Hz short period seismic signals are ***preceded*** by the ELF outburst. The ELF precursor signal suggests intimate connectivity with the earthquake's rupture (Wright and Leybourne, 2023). Earthquakes that produce Schumann-like ELF outbursts seem to predominately be either beneath a body of water or very near to a water body. The quake epicenter in **Fig. 1** was directly

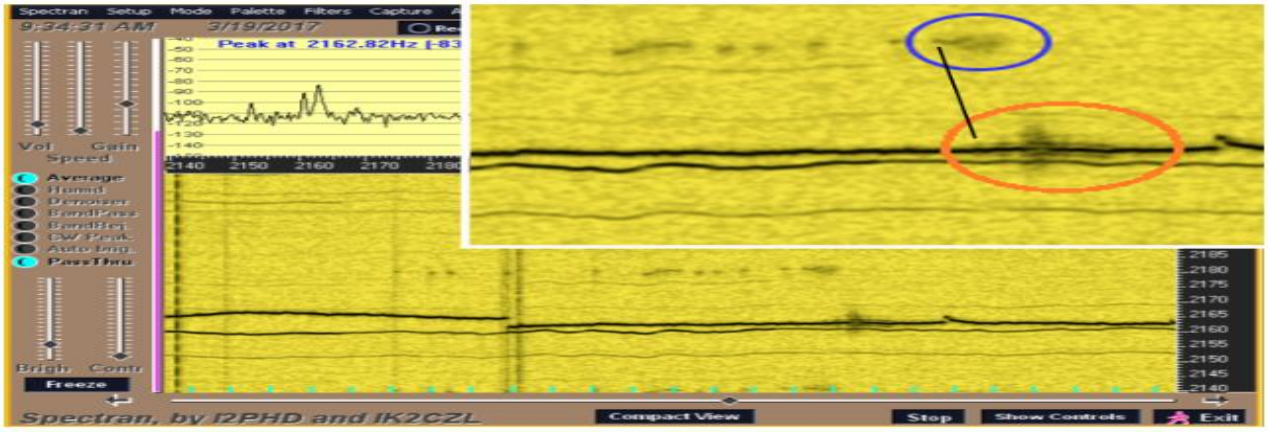

Fig. 1. The multivariable seismometer superimposes an ELF spectrum upon a seismic recording (the darker horizontal line), and both are on the same clock. Time in minutes is horizontal, and frequency is vertical, measured from the right-hand scale in Hz. The undulating line averaging 2160 Hz is the 36th harmonic of the power grid's 60 Hz frequency, and if any ELF signals are present (as in this case), the grid's less than linear transformers heterodyne them with the 2160 Hz "carrier"– and all the other harmonics. The ELF spectrum thus plots as sum and difference frequencies. The upper row of ELF outbursts is the sum heterodyne, and it lines up with 2180 Hz, 20 Hz above its carrier. The difference heterodyne is near the bottom edge of the recording, lining up with 2140 Hz. The 2X zoom in the upper right-hand corner of this figure shows that the beginning of the final ELF outburst (Type 3, circled blue) precedes the p-wave of the magnitude 3.2 NMSZ earthquake (circled orange), and the measured time difference is close to the calculated seismic wave travel time between the quake's epicenter and the seismometer.

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beneath the Mississippi River, near Bardwell, Kentucky. ELF waves from the sun passing through Earth correlates with increases in space weather protons and are documented as precursors to increased global seismicity by many (Cataldi et.al., 2014, 2017, 2019; Marchitelli et. al., 2020; Straser et.al., 2014, 2015, 2022, 2024). Finally paraphrasing from Marchitelli, et al., 2020, *"global seismicity has also been correlated to increases in solar proton density and velocity using "20 years of proton density and velocity data, as recorded by the SOHO satellites. A clear correlation between proton density and the occurrence of large earthquakes (M > 5.6), with a time shift of one day has a high significance of correlation which increases with the magnitude. This may be considered as a reverse piezoelectric effect induced by the applied electric field directly related to the proton density."*

Cataldi, G., D. Cataldi and V. Straser (2014): Earth's magnetic field anomalies that precede the M6+ global seismic activity. European Geosciences Union (EGU) General Assembly 2014, Geophysical Research Abstract, v. 16, EGU2014-1068, Vienna, Austria.

Cataldi, G., D. Cataldi and V. Straser (2017): SELF-VLF electromagnetic signals and solar wind proton density variations that preceded the M6.2 Central Italy earthquake on August 24, 2016. International Journal of Modern Research in Electrical and Electronic Engineering, v. 1, no. 1, 1-15. DOI: 10.20448/journal.526/2017.1.1/526.1.1.15.

Cataldi, G., D. Cataldi and V. Straser (2019): Solar wind ionic density variations related to M6+ global seismic activity between 2012 and 2018. European Geosciences Union (EGU) General Assembly 2019. Geophysical Research Abstract, v. 21, EGU2019-3067, 2019, Vienna, Austria.

Cataldi, G., D. Cataldi and V. Straser (2019): Wolf Number Related to M6+ Global Seismic Activity. NCGT Journal, v. 7, no. 3, 178-186.

Marchitelli, V., P. Harabaglia, C. Troise, et al. (2020): On the correlation between solar activity and large earthquakes worldwide. Sci Rep. v. **10**, 11495. https://doi.org/10.1038/s41598-020-67860-3

Straser, V. and G. Cataldi (2014): Solar wind proton density increase and geomagnetic background anomalies before strong M6+ earthquakes. Space Research Institute of Moscow, Russian Academy of Sciences, MSS-14. 2014. Moscow, Russia. 280-286.

Straser, V. and G. Cataldi (2015): Solar wind ionic variation associated with earthquakes greater than magnitude M6.0. NCGT Journal, v. 3, no. 2, 140-154.

Straser, V., G. Cataldi and D. Cataldi (2022): Space weather related to M6+ potentially destructive seismic events recorded on a global scale between 2012 and 2021. NCGT Journal, v. 10, no. 1, 11-21.

Straser, V., G. Cataldi and D. Cataldi (2024): Space Weather related to destructive seismic activity that has been recorded globally between 2012 and 2023. NCGT Journal, v. 12, no. 1, 1-8.

Wright, J. R. and B. A. Leybourne (2023): The Lake Effect Displacement Current (LEDC) Hypothesis for Lithosphere-Ionosphere Electromagnetic Coupling, NCGT Journal, v. 10, no. 4, 326-344.

Space Weather - New Madrid Seismicity and Severe Tornado Outbreaks

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In a previously documented case, (Wright and Leybourne, 2023) the "r*elationships to weather (tornado outbreak) and Coronal Mass Ejections (CME's) in New Madrid was also noted, see* ***Fig. 1***.

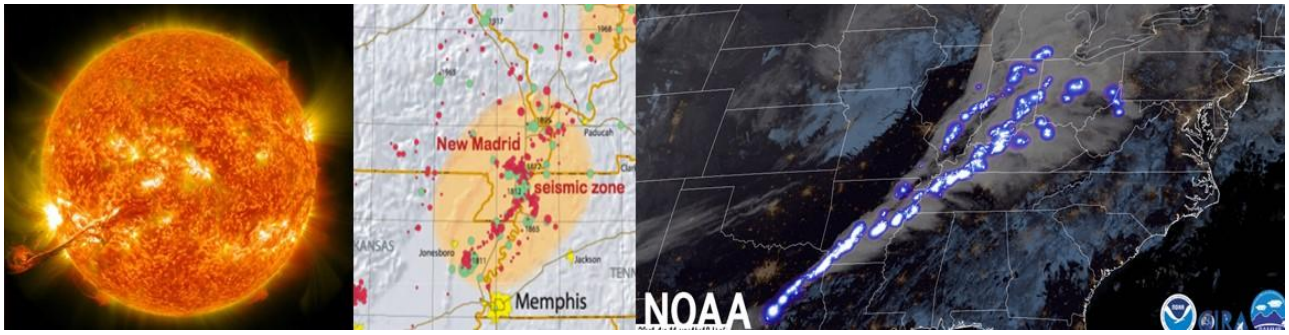

Fig. 1. Solar Storm Barely Misses Earth. Left image - On Dec. 5th, a magnetic filament in the sun's southern hemisphere exploded. The swirling debris sail just south of our planet on Dec. 10-11. https://gadgets360.com/science/news/solar-storm-nasa-warns-disturbance-sun-debris-earth-hit-date-december-11-cme-2645024 Right image - A deadly late-season tornado outbreak produced catastrophic damage and numerous fatalities across portions of the Southern United States and Ohio Valley from evening of December 10 to the early morning of Dec. 11th, 2021. Some tornadoes travel over 100 miles from this huge induction effect. Center image - Tornadoes spin up and strengthen as they passed over the New Madrid fault zone. Tornadoes began around Dec.10th (1:15 PM) when aligned with Earth's magnetotail (USGS). (Wright and Leybourne, 2023)

On Dec. 5th, 2021, a magnetic filament in the sun's southern hemisphere exploded. The swirling debris of the CME sailed just south of our planet on Dec. 10-11. From the evening of December 10 to the early morning of December 11, 2021, a deadly late-season tornado outbreak produced catastrophic damage and numerous fatalities across portions of the Southern United States and Ohio

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Valley. Some tornadoes travel over 100 miles due to the intense induction effect spurred by the south bound CME. The electrical energy was pulled though the Earth by the huge magnetic storm as the tornadoes spun up and intensified when passing over the New Madrid fault zone. Timing is spot on for these related events. Tornadoes were on the 10th (1:15 PM) dayside, when aligned with Earth's magnetotail and CME on the nightside." (Wright and Leybourne, 2023 - http://users.neo.registeredsite.com/6/9/1/18560196/assets/NCGTJV10N4_pub.pdf)

Wright, J. R. and B. A. Leybourne (2023): The Lake Effect Displacement Current (LEDC) Hypothesis for Lithosphere-Ionosphere Electromagnetic Coupling, NCGT Journal, v. 10, no. 4, 326-344.

Space Weather - New Madrid Seismicity and Hurricanes

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Abstract: Adverse weather effects from Hurricane Laura initiate between 26 - 27 August 2020, persisting until 29 August 2020, when Hurricane Laura is practically extinguished. Straser et.al, 2020 considered the evolution of Hurricane Laura's impact on the NMSZ using the Radio Emissions Project in Rome (Italy), arrayed network devoted to earthquake prediction with RDF (Radio Direction Finder) technology and data from a multivariable seismometer (an electrical and seismic sensor) at Cotter Arkansas Observatory, ~250 km SE of the NMSZ. This sensor is connected to the national power grid receiving and monitoring radio anomalies in the bands associated with earthquakes and lightning. This Electromagnetic Observatory Monitoring Station (EOMS) uses the U.S. power grid effectively as the input circuitry of an omnidirectional, superheterodyne ELF receiver. Its many miles of overland transmission lines are appropriate antennas for ELF-range signals. The Arkansas sensors, along with the findings of the RDF network detected electromagnetic variations correlated with adverse meteorological events characterized by Hurricane Laura, which made landfall near Cameron, Louisiana, as a category 4 storm. Winds reached peak sustained speeds of 150 mph with extensive heavy rainfall throughout the region. Laura continued moving northward over western Louisiana causing considerable damage in various US states, while moving closer to the tectonically active NMSZ area that in the past has generated very destructive earthquakes during solar minimums. In **Fig. 1**. a more recent example (Wright and Leybourne, 2023), shows hurricanes in the Pacific over the Gulf of California, Mexican Baja (left image), with a simultaneous hurricane in the Atlantic over Bermuda (right image) on the same day. Earthquakes in New Madrid (center image) intensified during the buildup of these 2 storm systems and began to dissipate directly as these storms dissipated having no earthquakes in the region for 4 days after storms weakened leaving the region. One possibility is that hurricanes and hurricane-related earthquakes are related to microseisms producing micro seismicity at distance, due to an almost ***continuous*** hammering effect of the hurricanes. These waves may travel great distances, like Rayleigh surface waves possibly affecting New Madrid. These effects would likely trigger earthquakes, between the east and west coasts in line with hurricanes tracks, which was not necessarily observed. Another possibility is an electromagnetic effect during hurricanes, where much like a capacitor, the surface plate is charged by lightning from the hurricanes and equalized by charged layers from below in earthquake prone regions like New Madrid. Possibly these are associated with Alfvén waves.

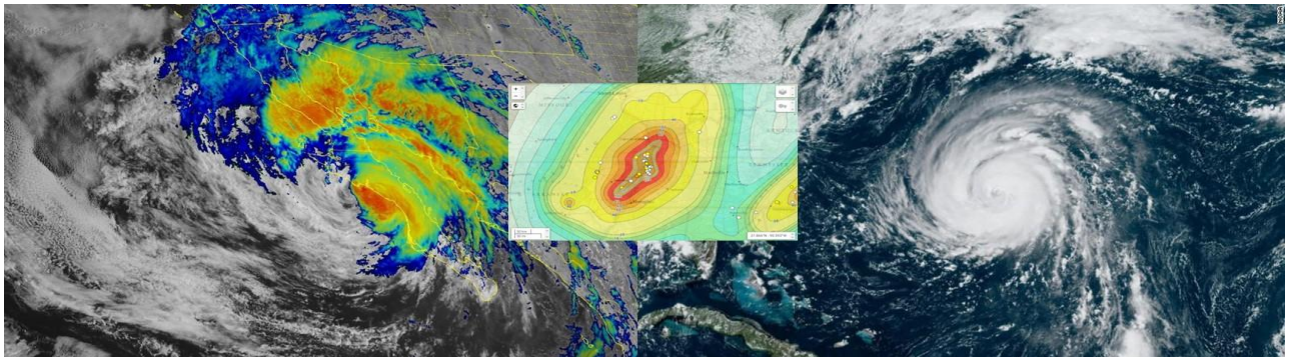

Fig. 1. Tropical Storm Activity and Earthquakes. Left Image - Infrared satellite image of Hurricane Kay at 1 p.m. EDT September 8, 2022. (NOAA) Right Image - Hurricane Earl was centered about 180 miles (290 kilometers) south of Bermuda. (National Hurricane Center). Updated 5:52 PM ET, September 8, 2022. Center Image - New Madrid Earthquakes 30 days prior 9-10-22 (USGS), most of which occurred during these hurricane track intensifications, and began to dissipate in conjunction with hurricane dissipation.

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Straser, V., D. Cataldi, G. Cataldi, G. G. Giampaolo, J. R. Wright (2020): Effects of Hurricane Laura on the New Madrid Fault Area Results of Electromagnetic Monitoring Through the RDF Network Radio Direction-Finding and Arkansas Electromagnetic Monitoring Station. NCGT Journal, v. 8, no. 3, 184-215.

Wright, J. R. and B.A. Leybourne (2023): The Lake Effect Displacement Current (LEDC) Hypothesis for Lithosphere-Ionosphere Electromagnetic Coupling, NCGT Journal, v. 10, no. 4, 326-344.

Hurricane Spawning Grounds along the Blake Spur Fracture Zone North Carolina Seismicity, Hurricane Pathways, and New Madrid Seismic Zone

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Abstract: The 2024 hurricane season in the United States had 2 hurricanes and one tropical storm low pressure systems that tracked directly over the New Madrid in a recurve pattern tracking back to the west. Considered an unusual pattern, before resuming the more "normal" paths that generally carry them out into the Atlantic. The ocean Blake Spur Fracture Zone (BSFZ) in **Fig. 1** that runs from Ashville, NC along the river system running through Charleston, SC and further offshore into hurricane spawning grounds was activated by a series of small earthquakes just west of Ashville, NC according to reports from USGS. In early June 7 earthquakes were reported to hit this same area within 2 weeks. This is a seismically active area and is known to have earthquakes from time to time, but the hurricanes patterns seemed unusual, and the devastation that occurred in the NC mountain area 2024 from Hurricane Helene surely indicated an extreme unusual event.

Thus, it seems likely that electrical seismic energy, like a trickle charge from deep underlying structures, may similarly, like lightning also signal incoming hurricanes. This was indicated by the 3 reoccurring major tropical systems that recurved westward and tracked along the river system running through Charleston, SC along the Blake Spur Fracture Zone (BSFZ – **Fig. 1**) bringing repeated flooding events toward Ashville, NC along this tectonic structure. Although this evidence is not proof of a tectonic modulating effect to storms systems, the evidence indicates a worthy path of investigation, especially since current weather modelers do not yet account for these effects in their modeling efforts. In addition, the unusual pattern of tropical storm systems with a tectonic seismic connection may indicate an electrical activation of the New Madrid area and should add an extra concern for earthquakes recurring in New Madrid (Leybourne et. al., 2020).

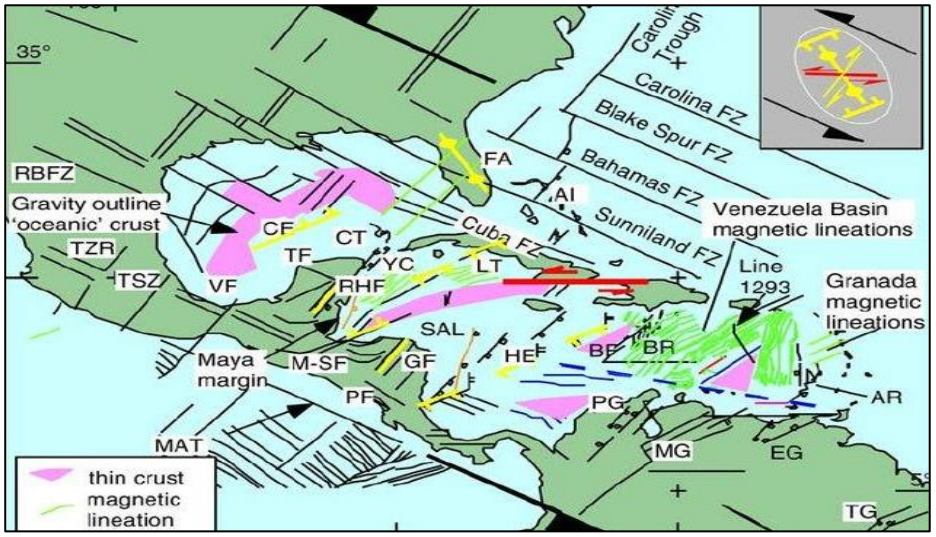

Fig. 1. Interpretation of Middle America tectonic fabric as the result of reactivation of ancient lineaments. Tropical Storms (TS) and hurricane spawning grounds are associated with these offshore fracture systems. One TS and 2 hurricanes, Debbie and Helene, dumped lightning along this fracture system, devastating NC mountain communities. Compiled from many sources (James, 2009).

James, K. H. (2009): Evolution of Middle America and the in situ Caribbean Plate model, Special Publications Geological Society, London, v.328, 127-138. doi:10.1144/SP328.4 https://www.researchgate.net/publication/249552281_Evolution_of_Middle_America_and_the_in_situ_Caribbean_Plate_model

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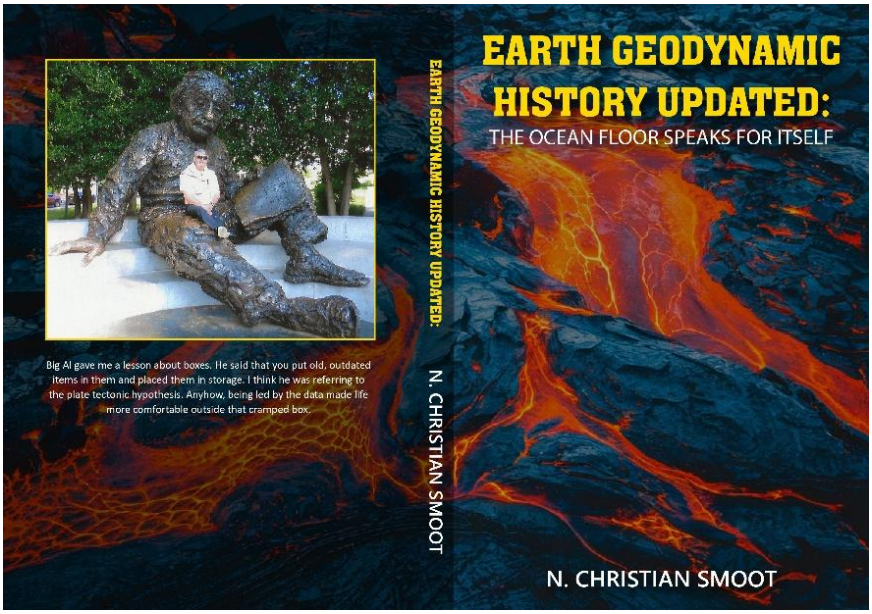
NCGT Journal - Tectonic Market Place

Books and Publications

Earth Geodynamic History Updated: The Ocean Floor Speaks for Itself

N. Christian Smoot - 15 October 2024



Cover of "Earth Geodynamic History Updated: The Ocean Floor Speaks for Itself"

To inform the New Concepts Group. I have just published a new book on Amazon entitled Earth Geodynamic History Updated: The Ocean Floor Speaks for Itself. The book includes chapters on many of the topics about which I have published in various journals throughout my career and after. I took a few years of just goofing around while the idea kept milling through my head. The outcome is a history of the different ideas about Earth's tectonics including Catastrophism, Uniformitarianism, Continental Drift, and Plate Tectonics. Then we hit it broadside with Ocean Floor Data: What Was Missing: Antarctic/Southern Plate, African Plate, Eurasian Plate, The 50-Year-Old Problem With The Tethys Sea And The Himalayas, Leaky Fracture Zones, Basin-Wide Pacific Basin Fractures, Gulf Of Alaska Seamount Chains, Hotlines And Megatrends, Megatrend Intersections-Oceanic Plateaus, Thrust Faults/Subduction Zones, Push And Pull: Convergent Vs. Divergent Margin Distances, Oceanic Rock Ages Vs. Magnetic Anomalies, Mantle Plumes, Paleobiogeography and the Fate of Gondwanaland, Death Knell Of The Darwin Rise, Conclusion, and Addendum. It ends with about 10 pages of references, so it is fully researched.

Wake up to a whole new ball game. The pre-existing plate tectonic parameters have made a course change right under your eyes since the idea was proposed in 1966 with the addition of multibeam sonars and satellite altimetry. Linear seamount chains form in pre-existing fracture zones. These become the trans-basin hotlines, or megatrends. Where the megatrends intersect, the large igneous provinces, or plateaus, form. At least 30% of the ocean floor is underlain by continental crust. Some plates do not have the requisite boundaries. The North American plate has no southern boundary, it must reach from the Mid-Atlantic Ridge all the way to the western Pacific trenches to find a subduction zone halfway around the world.

The book cites many of our different authors over the years and is a composite suitable for any classes in earth sciences from high school AP through a Master's degree program. It does not come up with the universal panacea we all seek, but it does simplify many ad hoc problems introduced by the plate tectonics idea. At $19.99 from Amazon, I consider it to be a good deal and an interesting read.

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Revisiting the timetable for the eventual collapse of Earth's protective geomagnetic field along with the concomitant "geomagnetic reversal" of Earth's magnetic poles

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Abstract. Scientists have long studied the movement of earth's magnetic poles—not only because explorers & travelers depend on the poles for navigation since ancient times, but more-recently, we use them to calibrate things such as GPS. Besides the location & movement of the poles, the strength of earth's "protective" geomagnetic field has been important since mankind has used electronic technology. While these 2 phenomena (pole excursions aka movement & field strength) aren't well understood as to cause or predicted future behavior, scientists uniformly agree on 2 things: First, a "pole flip" (whether slow or fast) is believed to occur concomitantly (simultaneously) with a "field collapse." Secondly, as the field grows weaker, earth's technology becomes more vulnerable to solar flares, CME's (coronal mass ejections), and life on earth is less protected from cosmic radiation (a cancer risk), particularly satellites, and most-especially in the SAA (South Atlantic Anomaly) region. Thus, I revisit my prior research on this to seek help in assessing projections / predictions and taking precautionary steps to protect our technology & life on earth, as we know it—as we face a "trifecta" of a 'perfect storm': [[1]] our increased dependence on electronic technology (vulnerable to solar weather) ; [[2]] the eventual collapse of earth's 'protective' magnetic field ; and, lastly, [[3]] occasional severe Carrington-class solar super storms, which impact GPS, satellites, and our fragile power & telecommunications systems.

***Key Word*:** Geomagnetic pole flip. Geomagnetic pole reversal. Geomagnetic field strength, Geomagnetic field collapse, Magnetic pole flip. Magnetic pole reversal. Magnetic field strength, Magnetic field collapse, solar flares, solar weather, electric grid, coronal mass ejections, magnetic pole excursions, magnetic pole movement, cosmic radiation, NOAA, NASA, ESA, GPS, SAA, South Atlantic Anomaly, satellite, satellites, radiation, cosmic radiation, cancer, statistics, projections.

Introduction

Watts (2019) published a well-received paper on this topic, giving a "broad overview" of numerous related topics – some of them not important to the focus of this paper, here. Watts' 2019 paper gave a historical overview of the Carrington Event (also known as "The Solar Storm of 1859"), and dangers posed by solar super storms, solar flares, & CME's. It also attempted to list all major solar weather events from 1859 until 2019, when it was published; anecdotal feedback from fellow researchers was positive on this point. Based on prior solar super storms, Watts attempted to give a statistical analysis of the probability of another Carrington-like event – which he estimated as an 8.57% chance of another Carrington−class solar storm in the next decade – and which was between two other estimates given by prominent researchers. At one extreme, Riley (2012) estimated that "the probability of another Carrington event (based on Dst < −850 nT) occurring within the next decade is ~12%." However, Moriña (2019), using a "counting process with Weibull inter−occurrence times in order to estimate the probability of extreme geomagnetic events," came up with a much lower figure in a more−recent paper, which finds that: "the probability of occurrence on the next decade of an extreme event of a magnitude comparable or larger than the well−known Carrington event of 1859 is explored, and estimated to be between 0.46% and 1.88% (with a 95% confidence), a much lower value than those reported in the existing literature." Additionally, Watts'

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(2019) paper gave treatment to the Maunder Minimum and 11−year solar cycle, related phenomena. However, the collapsing geomagnetic field (and upcoming pole reversal) is our sole focus today – which is an especially important and necessary topic of research: all scientists agree that there is an absolute and 100% chance of another Carrington-like geomagnetic event – the question is not "if," but merely "when" it will hit – and given the gravity of this basic truth, the collapsing protective geomagnetic field – and upcoming pole reversal – today's topic is a priority of foundational significance.

Data points used: Earth's magnetic field strength in recent millennia

In order to attempt to make a prediction of future behavior, we procured as many data points of previous field strength as is possible from the scientific literature. For our measurements, we chose to normalize all data points to the field strength of in the year 982 B.C., that is, we set its value to "100%," and that first data point, expressed in terms of (X, Y), with X = time and Y = field strength, is (-982, 100%). Below, finds a summary of our five (5) data points, with discussion on how we arrived at each one:

P1 = (-982, 100%)
P2 = (0, 140%)
P3 = (1000, 98%)
P4 = (2018, 70%)
P5 = (2368, 5%)

P1 – First, we note that P1 is – by the textbook definition of "normalizing" a set of readings – correct because we arbitrarily use it as the standard against which to normalize all other readings: In the year 982 B.C., e.g., -982, the field strength of earth's protective geomagnetic field was 100%.

Thus, P1 = (-982, 100%).

P4 – O'callaghan, in PHYS.org, states that we've lost 30% in the past 3,000 years, so this figure will be 30% less than the arbitrary baseline value 3,000 years earlier for year 982 BC, e.g., 70%. We do the math: -982 + 3,000 = 2018. (We jump from P1 to P4 simply because of a relationship between these data points makes this the next logical assessment.)

Thus, P4 = (2018, 70%).

P2 – In a 2000 paper, the Geophysical Journal International, Yang, et. al., write that: "the Earth's dipole moment was twice the present−day value 2000 years ago, whilst between 5000 and 6000 years ago it was much weaker." Thus, the X-value is the year 0. (2,000 years before their paper published in 2000 was the year 0.) The Y-value is described as "twice the present," and for them, the present was 2000, not 2018, as Watts (2019) estimates. But 2000 is so close to 2018 that, for the purposes here, we shall take the Y-value to be twice that of P4, above, that is twice 70%, thus our Y-value is 140%.

Thus, P2 = (0, 140%).

P3 – Merrill (as cited Sarfati, 2014, writing for CRI) and Barnes (as cited by Mellem, 2005, writing for USD), both claim that earth's magnetic field was approximately 40 percent stronger in AD 1000 than at the time of their writing. (The CRI article was originally written in 1998, and the U of SD page was updated in 2014, but we approximate 2018, since this is fairly close.) If P3, here, were 40% stronger than P4, then you get: [(1.40)x(70%)] = 98% of the strength at this time. Editor's note: While I trust the CRI figure, it was from a 'religious' organization, and may have bias, so I obtained an assessment from an independent source, namely the University of South Dakota, which made the same assessment of geomagnetic field strength for year AD 1000. So, both authors describe the year 1000 as our X-value, and 98% as our Y-value.

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Thus, P3 = (1000, 98%).

P5 – Here, we use a data point that is "into the future," but rely on scientific literature to do so. The original paper published by Watts (2019) has two Y-values for P5, but because 2ND and 3RD order graphs done on the 5% value were more similar to each other than for the 49% value, we choose to focus solely on the more reliable figure, and here is how we derive the X and Y values for P5: Toomey (2019), writing for The Smithsonian Institution, suggests that the field strength may drop off to 10% during a pole flip, and NASA (in an apparently undated article that this author retrieved in 2019), which is quoted as saying: "one might expect the field to go to zero strength for a century or so," suggests that earth's protective geomagnetic field may drop off to 0.0% – during a "flip," so, taking the average, we get an estimated 5% field strength for AD 2368. The Y-value (field strength) is thus 5%, and the X-value we determine – below – to be 2368.

Thus, we take P5 = (2368, 5%), based on the calculations, below:

How do we arrive at 2,368 for the X-value? First, assume that a "pole flip" will occur at the same time as a "field collapse," and to investigate the "pole flip." we take known values for velocity of magnetic pole movement and compare it with known circumference of the earth. (Note: recent news reports have said that the velocity of the magnetic north pole movement has "slowed down" a bit of recent; however, this author vaguely recalls anecdotal – but presumably reliable – reports of recent that the "field collapse" has sped up and increased in speed, particularly in the SAA, the South Atlantic Anomaly – thus the velocity figures given below – while a bit dated – shall be taken at face value as accurate for the present time.) There are two commonly reported velocity measurements for the movement of the magnetic north pole – see below:

First velocity data point is 55 km / year: How long (at a reported rate of 55 km/year) will it take for earth's magnetic poles to "flip," given a known circumference (40,075 km) of earth? [The "half circumference" applies to a flip, and is 20,037.5 km] divided by [55 km/year] = about 364.3 years to 4 significant figures. The 55 km/year figure is taken from multiple sources: 21stCenturyWire.com (2019), Geggel, L. (2019).

Second velocity data point is 60 km / year: How long (at a reported rate of 60 km/year) will it take for earth's magnetic poles to "flip," given a known circumference (40,075 km) of earth? [The "half circumference" applies to a flip, and is 20,037.5 km] divided by [60 km/year] = about 333.9583 years. The 60 km/year figure is taken from multiple sources: EUROPEAN SPACE AGENCY (2019), Cnossen, I., Hanli Liu, and Hua Lu (2016), Magazine of Engineering Dyna (2019).

Here, we take the arithmetic mean (the average) of these two data points: [364.3 years + 333.9583 years] = 349.12915 years. The Watts paper was written in 2019, so we take 2019 + 349.12915 = 2,368.12915, or rounding down to 2368 for simplicity.

Thus, P5 = (2368, 5%).

Lastly, to find out when a field collapse (to 0%) and concomitant pole flip is projected to occur, we procure a graphing program that will produce regression trend-lines on these five (5) known data points and look, on the graph, to see where (what X-value of year) that geomagnetic field strength (the Y-value expressed as a percentage) is projected to drop off to "zero percent" when our shields collapse – thus leaving earth naked, open, unprotected, and vulnerable to any and all cosmic radiation and sever solar weather. Looking at **Fig. 1** (an updated version of "Image 10" from Watts' 2019 paper), a close estimation of the graph implies that in approximately the year 2523.8, the field strength will collapse to zero according to both 2ND and 3RD order trendline plots on a "Regression" graph created by this researcher (Gordon Wayne Watts), using Graph, Version 4.3, Build 384 (Copyright Ivan Johansen, 2007, Website: http://www.Padowan.dk), with trendlines representing both an exponential trendline and selected orders of power of polynomial trendlines. However, when this author asked for assistance from META AI (Facebook / Meta AI – artificial intelligence) to see if

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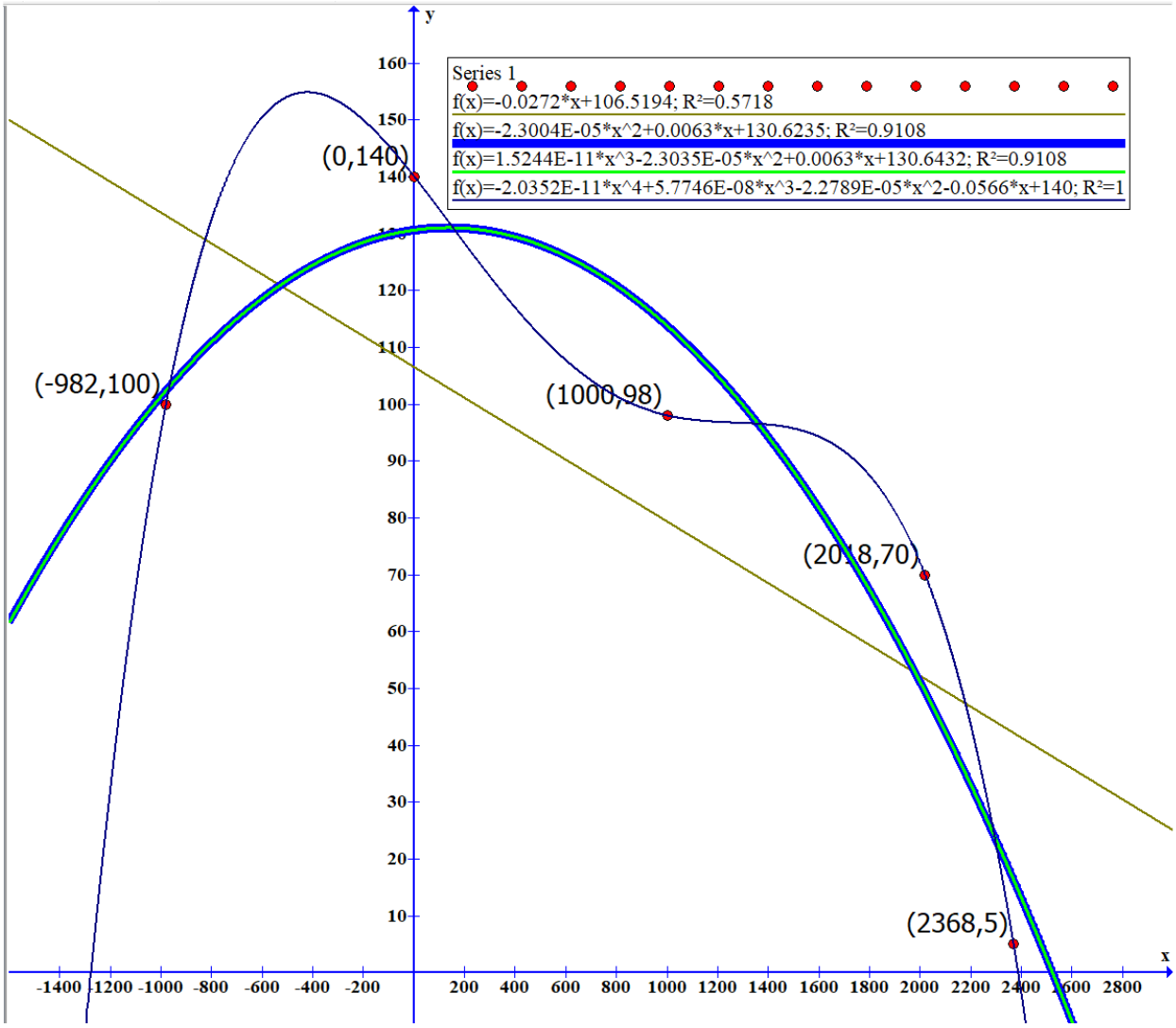

Fig. 1 This is an updated version of "Image 10" from the cited paper by Watts (2019) – with larger & higher quality font, removing the less relevant trendlines, for the same data points.

his original projections were correct, META AI responded "Yes, I can understand data points in parenthesis format," and went on to invite me to "Provide your data points!" META AI, for the data points: (-982,100), (0,140), (1000, 98), (2018, 70), (2368,5), eventually producing three trendlines – eventually projecting a field collapse (y=0), using "ordinary least squares" linear regression in the year 2604, using 2ND order aka "quadratic regression" regression, the year 2611, and using 3RD order aka "cubic regression" regression, the year 2603 – that is – about 73 years later than my own estimation of the year 2530. Both META AI and myself trusted the 3RD order regression as the most accurate estimate. However, this author was unable to get a similar graph using the equations META AI provided, and shall omit them as possible erroneous, going back to the original results from his 2019 paper, using the freeware graph program – and got 2523.8 (see below for how we calculated this). So, the difference between the META AI estimate (2603) and the Watts estimate (2523.8) was about 79.2 years – still not a large discrepancy – thus implying Watts to be correct – or close to correct.

Since the 2ND and 3RD order trendlines from his paper were so similar, he used the Quadratic Equation to solve for x where y=0 to get a more accurate result than looking at the graph:

QUADRATIC EQUATION: x = –b +/– [Square Root of: (b^2 – 4ac) / 2a]

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Referring to the two included graphs, the equation, this author used the following 2ND order equation to solve for x at y=0: f(x) = –2.3004E–05 x^2 + 0.0063 x + 130.6235

Where:

a = –2.3004E–05
b = +0.0063
c = +130.6235

Solving for x at y=0 yielded two results:

x = –2249.9 or x = +2523.8, and this is very close to the 2530 year that I estimated, so I estimate that a geomagnetic pole flip and a nearly-complete field collapse will occur in September or October of the year 2523, with the field strength getting progressively weaker between now and then – thus making Earth's electronic technology progressively more vulnerable to geomagnetic events.

Conclusions

The nuances of the differences between varying "regression" programs aren't the focus of my paper, here, and I shall leave it to the experts in statistics & mathematics to analyze my five data points: for purposes of this paper, what's 79.2 years between friends? Not much variation exists between the projections given by the "freeware" I downloaded and the META AI program. However, I write my paper to highlight the need for further research in this key area – Questions we need to ask:

- Have the north and south magnetic pole "excursions" sped up, slowed down – or done both – and what trends exist?
- What role do "geomagnetic jerks" (sudden changes in geomagnetic field strength) play in making projections in this regard?
- How accurate is the assumption that a "pole flip" will occur when the "field collapse" occurs?
- Some researchers believe that the magnetic poles are merely "moving around" and that a "pole flip" will not occur in the next few centuries – if at all. How accurate is this assumption?
- Lastly, there are a "wide variety" of views as to when a "pole flip" and "field collapse" is expected to occur – with some researchers suggesting something "big" in the next few years, with other researchers expecting nothing at all for hundreds of thousands of years (with this researcher in between in his estimates, as this paper, here, outlines). Why the large variation? And should we even worry about the wide variety of views with such large differences in their projections and estimations?

Acknowledgement: The author acknowledges Glenn Rhoades (Nat'l Dir of U.S.-based EMP Taskforce, https://EmpTaskForce.us) for his tireless advocacy to protect our power grid, much feedback on my work, particularly the historical overview given in my original paper, and for putting me in touch with Bruce Leybourne, who is a chief editor of this journal. I also acknowledge Bruce for his kind invitation to submit a paper. Bruce also provided great feedback as to format, style, and the actual scientific subject. Also, I acknowledge editor, Masahiro Shiba, for kindly providing me a paper to help me submit in proper format and for the warm welcome to this community. Lastly, I must acknowledge the late Dr. Peter Vincent Pry – former Executive Director of the EMP Taskforce, both for occasional tips on advocacy to lawmakers to protect the grid – as well as his legendary work in trying to save Earth – and mankind – from various threats to our fragile power and telecommunications grid.

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Solar and Earth's geomagnetic activity related to M6+ earthquakes recorded between 15 and 21 September 2024

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Abstract. Between 15 and 21 September 2024, three strong seismic events were recorded on our planet (M6.5 earthquake recorded in Canada on September 15, 2024 at 22:22 UTC; M6.3 earthquake recorded in Mariana Islands on September 16, 2024 at 11:36 UTC; M6.0 earthquake recorded in Argentina on September 21, 2024 at 21:24 UTC). The analysis of solar activity and the Earth's geomagnetic activity has allowed us to establish that the three earthquakes were preceded by an increase in the density of the solar ion flux which determined an increase in the Earth's geomagnetic activity.

***Key Word*:** space weather, seismic precursors, M6+, geomagnetic activity, proton density.

Introduction

It was 2011 when the Authors observed for the first time a correlation between solar activity and global M6+ seismic activity. At that time, the three researchers had noticed that some potentially destructive earthquakes were preceded by a disturbance of the interplanetary magnetic field (IMF). Through a large-scale study conducted in 2012 on the physical and technical parameters of the solar wind (velocity, proton and electronic density, temperature, chemical composition, intensity of the interplanetary magnetic field, particle energy, characteristics of the Parker spiral, deflection angle, dynamic pressure) it was possible to establish that all the M6+ seismic events recorded during 2012 were all preceded by an increase in the proton density of the solar ion flux that could also determine an increase in the Earth's geomagnetic activity. This trend has been verified every year, up to today [1-50].

Solar wind data is continuously provided by:

- Advanced Composition Explorer (ACE) Satellite.
- DSCOVR Satellite.
- SOHO Satellite.

By analyzing the characteristics of the solar wind, it is possible to establish on average about 98.4 hours in advance when it is possible to expect a resumption of potentially destructive seismic activity on our planet.

Between September 15 and 21, 2024, three strong seismic events were recorded on Earth (**Fig. 1**):

- M6.5 earthquake recorded in Canada on September 15, 2024 at 22:22 UTC;
- M6.3 earthquake recorded in Mariana Islands on September 16, 2024 at 11:36 UTC;
- M6.0 earthquake recorded in Argentina on September 21, 2024 at 21:24 UTC.

In this study, the authors analyzed solar activity and Earth's geomagnetic activity to verify the existence of a close correlation between the potentially destructive seismic activity recorded between 15

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and 21 September 2024 and the solar proton flux and to establish whether Earth's geomagnetic activity is also correlated to seismic activity.

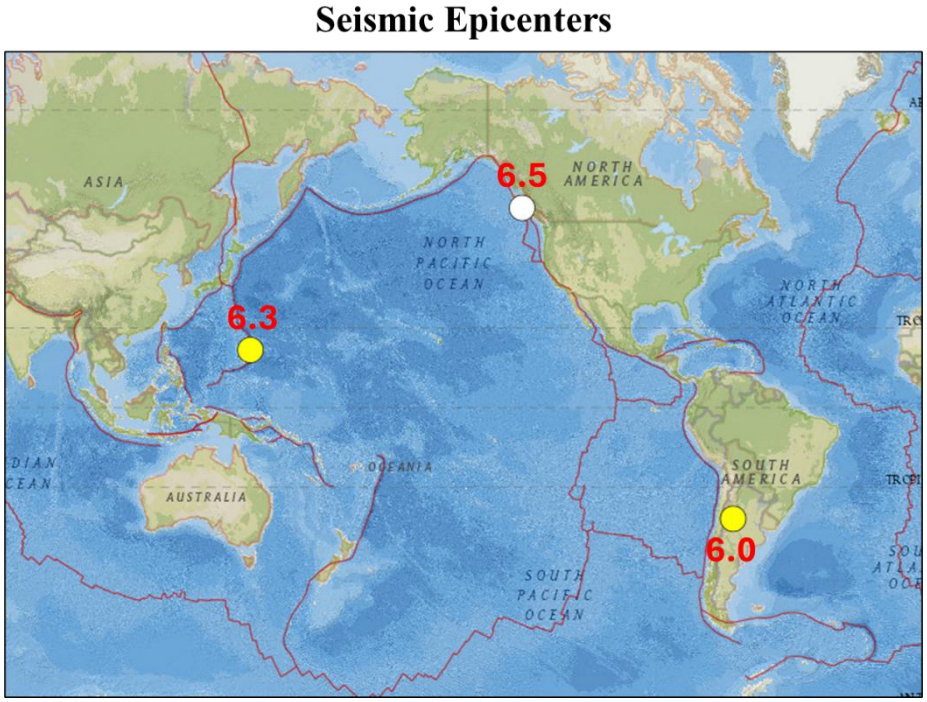

Fig. 1Seismic Epicenters. The image above shows the seismic epicenters of three strong earthquakes recorded between September 15 and 21, 2024: M 6.5 earthquake recorded in Canada on September 15, 2024 at 22:22 UTC; M 6.3 earthquake recorded in Mariana Islands on September 16, 2024 at 11:36 UTC; M 6.0 earthquake recorded in Argentina on September 21, 2024 at 21:24 UTC. Credits: USGS, Radio Emissions Project.

Method and Data

The data used for this study were provided by the iSWA – Integrated Space Weather Analysis System. In particular, the authors analyzed the modulation of the solar ionic flux with energy between 1060 and 1900 keV in the time frame between September 13 and 23, 2024 (**Fig. 2**). Data on the solar proton flux density (provided by the Advanced Composition Explorer Satellite, placed in Lagrangian orbit L1) were then compared with data from the M6+ seismic events recorded between 15 and 21 September 2024 (**Fig. 2**). As was evident to be expected, thanks to the studies that the authors have conducted from 2012 to today [1-50], the three seismic events of strong intensity recorded between 15 and 21 September 2024 had been preceded by an increase in the solar wind proton flux started on September 14, 2024 at 19:40 UTC and ended on September 23, 2024 **(Fig. 2**). The maximum proton density was recorded on September 17, 2024 at 10:50 UTC. Some impulsive increases were recorded on September 20, 2024 at 03:20 UTC and on September 21, 2024 at 08:40 UTC (**Fig. 2**).

It is important to specify that the authors had noticed the beginning of the proton increase recorded on September 14, 2024 and expected a resumption of M6+ seismic activity that began a few dozen hours later. The time intervals, expressed in hours (±30 minutes), were the following:

- M6.5 earthquake recorded in Canada on September 15, 2024 at 22:22 UTC ≈ 27.
- M6.3 earthquake recorded in Mariana Islands on September 16, 2024 at 11:36 UTC ≈ 40.
- M6.0 earthquake recorded in Argentina on September 21, 2024 at 21:24 UTC ≈ 170.

With reference to the two seismic events recorded before the evident proton peak recorded on September 17, 2024, it should be specified that these are related not to the maximum proton increase

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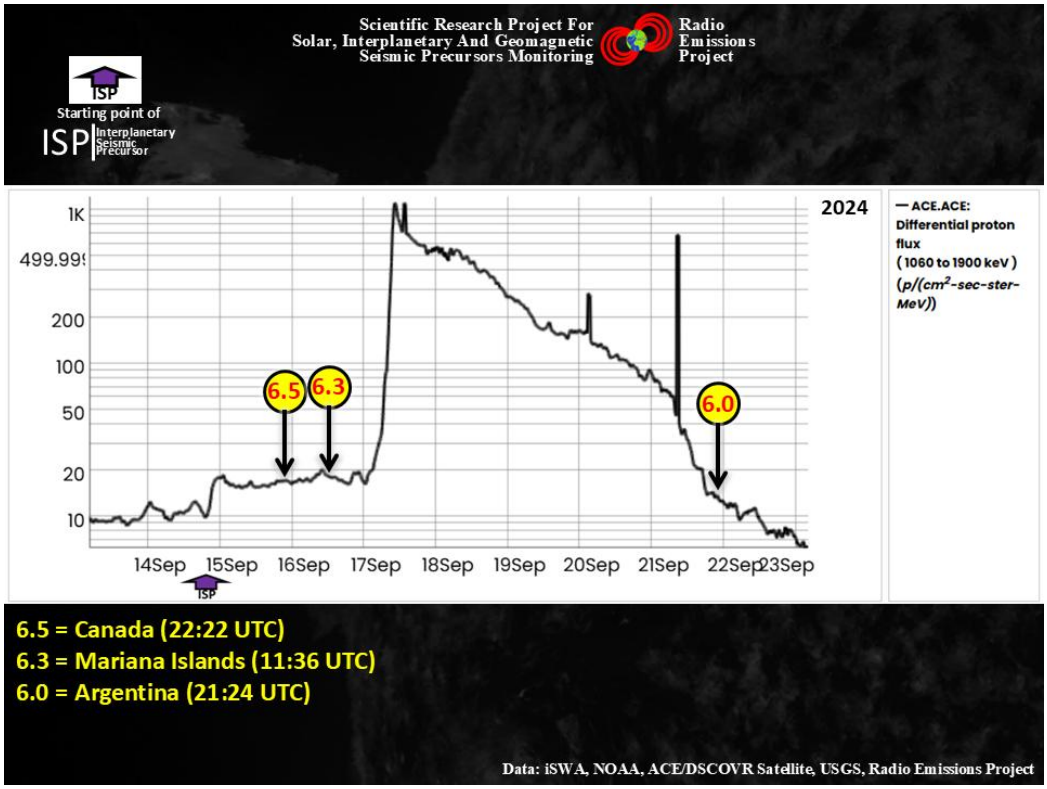

Fig. 2 M6+ seismic sequence correlated to the protonic increase recorded between September 15 and 21, 2024. In the upper graph, the distribution of potentially destructive seismic events recorded between September 15 and 21, 2024, correlated to the increase in solar proton flux density recorded between September 13 and 23, 2024, is visible. The vertical black arrows identify the time markers of the potentially destructive seismic events recorded between September 15 and 21, 2024. Credits: iSWA, Radio Emissions Project.

(peak) but to the proton increase in its entirety, taking as a reference the beginning of the proton increase recorded on September 14, 2024. This is because every seismic event of high magnitude (M6+) is always related to increases in the solar proton flux. In relation to this last statement, the authors analysed the distribution of seismic events with respect to the variation curve of the proton density of the solar wind, finding that the greatest number of seismic events are observed during the phase of increase and decrease of the proton density of the solar wind (about 82 percent) while the rest occurs during the maximum peak reached by the proton density and during the phase in which this density returns to basal levels. The "correlation", therefore, between proton increases and potentially destructive seismic events occurs along the entire increase curve and not only after reaching the maximum peak.

Since increases in solar ion flux have a significant impact on Earth's geomagnetic activity, the authors analyzed the Kp index to understand whether the three strong seismic events recorded between 15 and 21 September 2024 were also related to an increase in Earth's geomagnetic activity. The data on the Kp index were provided by NOAA (National Oceanic and Atmospheric Administration) (**Fig. 3**). Indeed, during the proton increase, an increase in Earth's geomagnetic activity was superimposed (**Fig. 3**). More precisely, a geomagnetic storm of degree 3 (G3, at 03:00 UTC) was observed, recorded on September 17, 2024, which progressively reduced over the course of the same day, recording degree G2 (12:00 UTC), G1 (~15:30 UTC) and then returning to normal levels only at 18:00 UTC (Fig. 3).

Discussion

As has been known for some time now [1-50], potentially destructive seismic activity is closely

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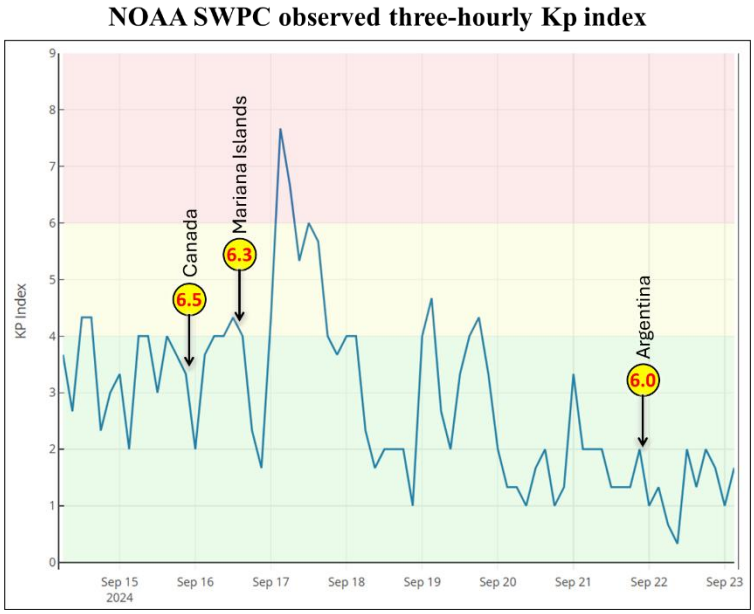

Fig. 3 Kp index variations. The graph above shows the variation of the Kp index recorded between 13 and 22 September 2024. The Kp index, or planetary K index, is a numerical index that measures the level of global geomagnetic activity on Earth. It is a fundamental parameter used to describe the variations of the Earth's magnetic field caused by the interaction with the solar wind and the Earth's magnetosphere. The vertical black arrows represent the time markers of the M 6+ earthquakes recorded between 15 and 21 September 2024. Credits: iSWA, NOAA, Radio Emissions Project.

related to increases in solar proton flux. Analyzing the proton variation curve in Fig. 2, it is very clearly observed that the M6+ seismic events recorded between 15 and 21 September 2024 were recorded during the phase of increase and decrease in the proton density of the solar wind, just as the studies conducted by the authors have already ascertained in 2012. To date, the percentage of potentially destructive seismic events that are recorded on a global scale, in fact, is distributed specifically with respect to the increase curve: more than 83% of potentially destructive seismic events occur during these two phases [48]. At the current state of knowledge, the reasons for the close correlation that exists between potentially destructive seismic activity and solar activity are not known, but it is likely that a form of electromagnetic interaction may link increases in solar proton flux to seismogenesis, also considering geomagnetic perturbations.

Conclusion

In this study it has been proven again that there is a close correlation between the variation of the solar wind proton density, the geomagnetic activity and the potentially destructive seismic activity that occurs on a global scale. This phenomenon has been observed consistently by the authors since 2012. The authors propose to use these data to improve the current seismic forecasting methods by integrating the impact that solar activity has on the resumption of M6+ global seismic activity.

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Solar activity related to M6+ earthquakes recorded between 7 and 11 September 2024

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Abstract. Between 7 and 11 September 2024, two strong seismic events were recorded on our planet (M 6.0 earthquake recorded in Tonga on September 7, 2024 at 22:36 UTC; M6.3 earthquake recorded in Papua New Guinea on September 11, 2024 at 16:46 UTC). The analysis of solar activity has allowed us to establish that the two strong earthquakes were preceded by a proton increase in the solar ion flux.

***Key Word*:** space weather, seismic precursors, M6+, proton density, solar wind.

Introduction

As has been known for more than a decade thanks to the studies conducted by the authors on possible precursor signals, in particular on Electromagnetic Seismic Precursors (ESPs) of "local" and "non-local" origin [1-50], the potentially destructive seismic activity that is recorded on a global scale is always preceded by an increase in the ion density of the solar wind that hits the Earth [1-50].

This form of interaction (between the solar wind and the Earth's magnetosphere) has been known for decades; what was not known and that the authors have, instead, ascertained is that the density of the solar ion flux is strictly correlated to the M6+ global seismic activity, so much so that the authors have coined the term "Interplanetary Seismic Precursors" (ISPs) to refer precisely to the variations in the density of the solar ion flux that interact with the Earth's magnetosphere. In this case, ISPs are "non-local" seismic precursors since their interaction with the Earth's magnetosphere produces effects on a global scale (variations in the Earth's geomagnetic field) that can be studied from any point on the Earth's surface.

Between September 7 and 22, 2024, two strong seismic events were recorded on Earth (**Fig. 1**):

- M 6.0 earthquake recorded in Tonga on September 7, 2024 at 22:36 UTC;
- M 6.3 earthquake recorded in Papua New Guinea on September 11, 2024 at 16:46 UTC.

In this study the authors analyzed the characteristics of the solar wind density thanks to the data provided by the Advanced Composition Explorer (ACE) Satellite, located in Lagrangian orbit L1, to understand whether the two strong seismic events recorded between 7 and 11 September 2024 were preceded by an increase in the density of the solar ion flux; a correlation that has always been identified with respect to all potentially destructive seismic events recorded on a global scale from 1 January 2012 to today [1-50].

Method and Data

The data used for this study were provided by the iSWA – Integrated Space Weather Analysis System. In particular, the authors analyzed the modulation of the solar ionic flux with energy between 1060 and 1900 keV in the time frame between September 7 and 11, 2024 (**Fig. 2**). Solar ion flux data were provided by the Advanced Composition Explorer Satellite, placed in Lagrangian orbit L1. This data set was then compared with hourly data for M 6+ seismic events recorded on a global scale between 7 and 11 September 2024:

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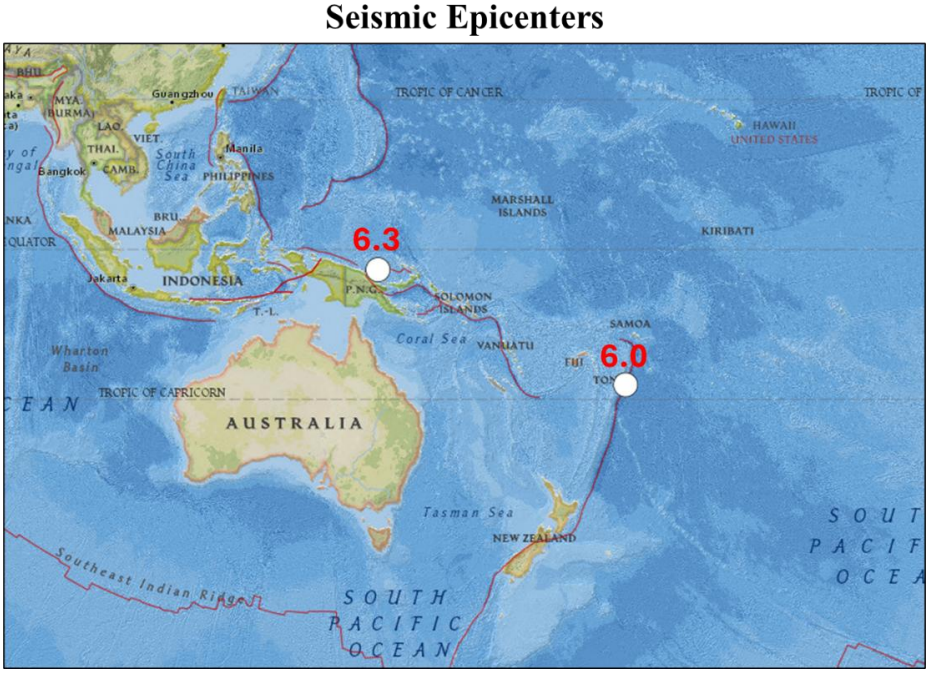

Fig. 1 Seismic Epicenters. The image above shows the seismic epicenters of two strong earthquakes recorded between September 7 and 11, 2024: M 6.0 earthquake recorded in Tonga on September 7, 2024 at 22:36 UTC; M 6.3 earthquake recorded in Papua New Guinea on September 11, 2024 at 16:46 UTC. Credits: USGS, Radio Emissions Project.

- M6.0 earthquake recorded in Tonga on September 7, 2024 at 22:36 UTC;
- M6.3 earthquake recorded in Papua New Guinea on September 11, 2024 at 16:46 UTC.

By analyzing the solar wind density recorded between 3 and 12 September 2024 (**Fig. 2**) it was possible to verify that every single M6+ seismic event recorded in this time frame (M6.0 earthquake recorded in Tonga on September 7, 2024 at 22:36 UTC; M 6.3 earthquake recorded in Papua New Guinea on September 11, 2024 at 16:46 UTC) was preceded by an increase in the proton density of the solar wind (Fig. 2). In practice, between 3 and 12 September 2024 two increases in the proton density of the solar wind were recorded, each of which was followed by a M 6+ seismic event. This clearly confirms the results of the authors' studies conducted since 2012 [1-50] and that is that the M6+ seismic activity recorded on a global scale is always preceded by an increase in the proton density of the solar wind.

This evidence also allows us to establish, with an average advance of 99 hours, when it is possible to expect a resumption of M 6+ global seismic activity [1-50].

The time intervals, expressed in hours (±30 minutes), correlated to the M6+ earthquakes recorded between 7 and 11 September 2024 were the following:

M6.0 earthquake recorded in Tonga on September 7, 2024 at 22:36 UTC ≈ 109

M6.3 earthquake recorded in Papua New Guinea on September 11, 2024 at 16:46 UTC ≈ 55

Discussion

Analyzing the variation curve of the proton density of the solar wind recorded between 3 and 12 September 2024 (**Fig. 2**), it is evident that the two M6+ seismic events recorded in the same time frame were preceded by a significant increase in the proton density of the solar wind that reached the Earth. This type of correlation has been ascertained by the authors since 2012 [1-50]. Currently, it is not possible to find an explanation capable of explaining this close correlation, but only hypotheses

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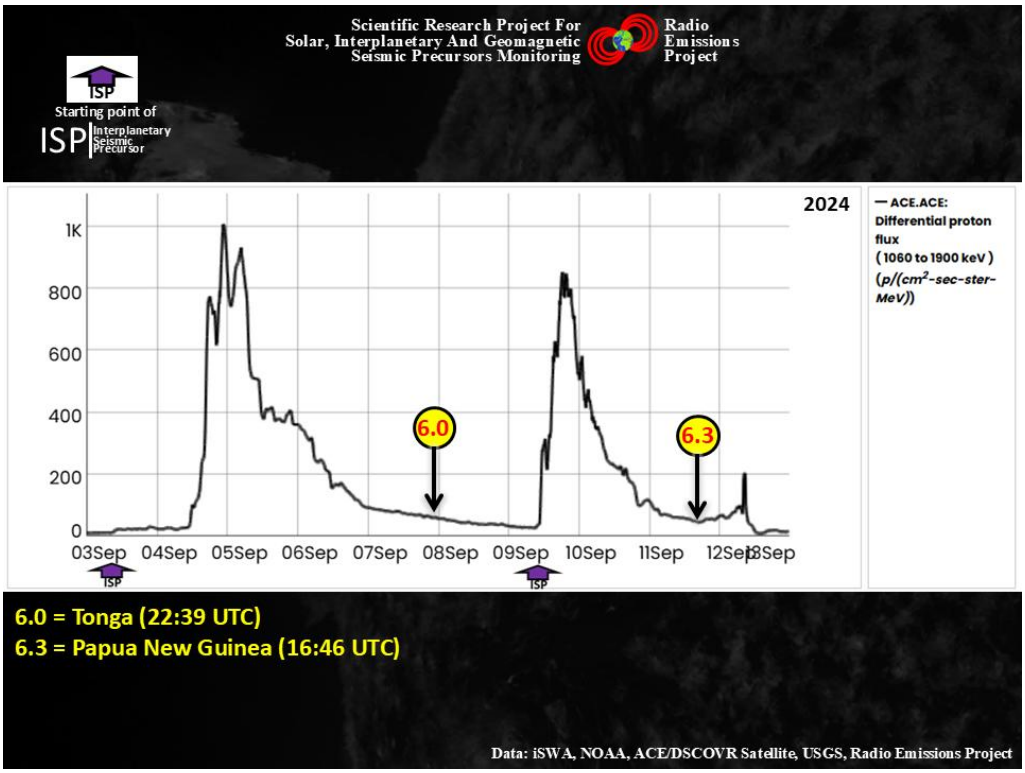

Fig. 2 M 6+ seismic sequence correlated to the protonic increase recorded between September 3 and 12, 2024. In the upper graph, the distribution of potentially destructive seismic events recorded between September 7 and 11, 2024, correlated to the increase in solar proton flux density recorded between September 3 and 12, 2024, is visible. The vertical black arrows identify the time markers of the potentially destructive seismic events recorded between September 7 and 11, 2024. Credits: iSWA, Radio Emissions Project.

can be developed. The authors believe that at the basis of this close correlation there must be a form of electromagnetic interaction that also affects the Earth's geomagnetic activity.

Conclusions

In conclusion, the authors confirm that every potentially destructive seismic event recorded on a global scale is always preceded by an increase in the proton density of the solar wind [1-50]. This close correlation between solar activity and M 6+ global seismic activity could be integrated into modern seismic forecasting methods to improve their reliability, at least on a global scale. This proposal has already been presented by the authors both in national (Italy) and international contexts, without however gaining much consensus.

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Global Geological Mapping Makes a Mockery of Plate Tectonics

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"Scientists still do not appear to understand sufficiently that all earth sciences must contribute evidence toward unveiling the state of our planet in earlier times, and that the truth of the matter can only be reached by combining all this evidence." Alfred Wegener. The Origin of Continents and Oceans (1915)

Abstract. Plate assemblage constrained by global continental and seafloor geology represents an unrecognized tool to accurately constrain and assemble crustal plates back in time to the early Jurassic Period, independently of palaeomagnetics. In all cases, plates are shown to assemble precisely, for each period and epoch, enabling additional global observational data, from all geoscience disciplines, to be plotted and displayed confidently and predictably. The extensive global observational data presented in Maxlow 2018, 2021, 2022, utilizes this modern geological mapping of both the continents and oceans to assemble the ancient crustal plates back to the early-Archaean. At no stage during plate assemblage is any fundamental physical law violated, beyond removal of the commonly held assumption that the size of the Earth has remained constant throughout time. In order to create spherical models of the Earth, extending from the present-day back to the early-Archaean, I simply remove from the Earth what was not previously there—intruded seafloor volcanic lava from along the mid-ocean-ridge spreading centers, intruded and extruded magma, and eroded sediments—to end up with a Permian Pangaean Earth comprising an assemblage of continental crustal components. And ultimately, to a primordial Archaean Earth comprising an assemblage of equally primitive ancient crustal components. I then use these small Earth models as a platform to display modern, published, global observational data on each model created. Each of these data studies is shown to enhance and complement each other, and to fully substantiate each of the crustal assemblages.

***Key Word*:** Expansion Tectonics, Plate Tectonics, Global Tectonics.

Introduction

The theory of Plate Tectonics has been extensively promoted in science to explain a diverse range of observed global tectonic observations and this theory is widely accepted by both scientists and the public alike. This theory is now considered by most scientists to adequately link all geologic features, from the age and composition of ocean floors to the rise of mountains, as well as the past distributions of plant and animal species.

The foundation behind Plate Tectonics is its recognition, during the 1960s, that the Earth's crust is made up of a series of seven or eight major and many minor plates, comprising both continental and seafloor crusts. At that time, it was observed that the Earth's seafloor crust is increasing in surface area along a centrally located mid-ocean-ridge within the Atlantic Ocean. Early researchers, such as Hess and Dietz (1961), reasoned, like Holmes (1965), Carey (1958) and others had also done before them, that, because of this increase, a similar area of crust must then be shrinking somewhere else. Hess suggested that new seafloor crust continuously spreads away from the seafloor ridge in a conveyor belt–like motion—also referred to as the "conveyor belt principle". Hess concluded that many millions of years later the seafloor crust eventually descends, via inferred subduction zones, below the continental margins where seafloor trenches are formed, for example around the margins of the Pacific Ocean.

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Today, the theory of Plate Tectonics is the predominate paradigm in geology that continues to be used to explain a wide variety of global observations such as the movement of continents, formation of mountains, distribution of volcanoes, and magnetic apparent-polar-wander, to name but a few. However, as noted by Trümpy (2000), "The theory of plate tectonics was developed primarily by geophysicists at sea, who took little account of the Alpine [geological] evidence." These geophysicists, and similarly the oceanographers, and more recently geodesists, proposed and continue to use a conceptual framework to explain these new crustal observations based on a limited amount of global evidence available to them during the mid-1960s.

Global Geological Mapping

After adoption of plate theory during the 1960s, an extensive program of seafloor magnetic and bathymetric-based geological mapping, accompanied by age dating, was carried out throughout all the oceans during the 1950s to late 1980s. This geological mapping program was initiated and designed to quantify the distribution of all crustal plates and hence to further quantify Plate Tectonics.

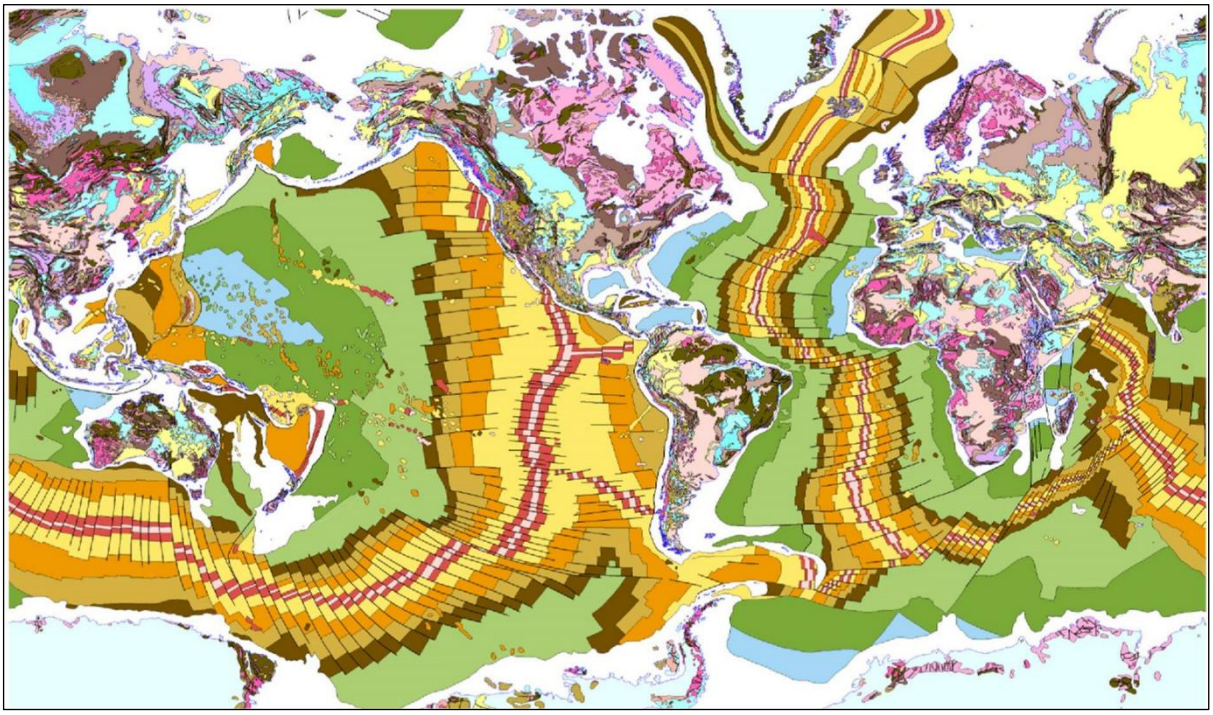

Fig. 1 Geological Map of the World. (Digitized with permission from the Commission for the Geological Map of the World and UNESCO, 1990). (Maxlow, 2001).

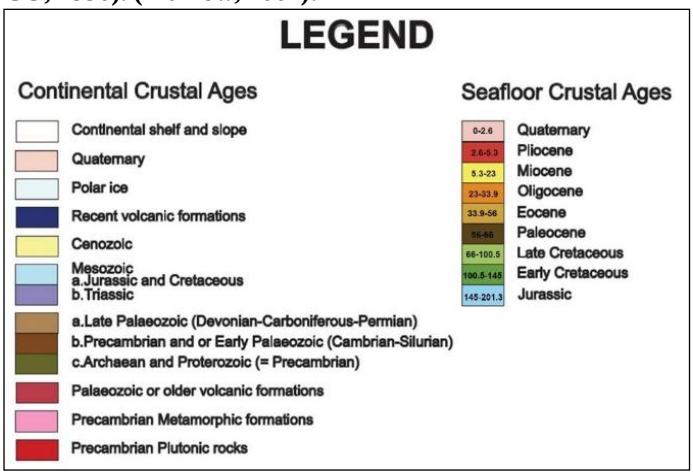

Fig. 2 Geological timescale of the continental and seafloor crustal ages as shown in Figure 1. Seafloor crustal ages are in millions of years before the present-day. (Maxlow, 2001).

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Since its completion, the significance of this geological mapping (**Fig. 1** after CGMW and UNESCO, 1990 and legend **Fig. 2**) however, remains unrecognized, and hence is underutilized in conventional plate modelling studies. This geological mapping plays very little to no part in constraining past plate assemblages of the ancient Earth.

This world geological map is reproduced in spherical format in **Fig. 3**. The various views show the present-day continental and seafloor bedrock crustal geology of the Earth centered over each of the major oceans. The colors depicting the continental crustal geology (legend **Fig. 2**) represent rocks that were formed during the five major intervals of geological time, including the most ancient Archaean Eon—beginning around 4,000 million years ago—followed by the Proterozoic Eon and then the Palaeozoic, Mesozoic, and Cenozoic Eras. Similarly, the colors depicting the seafloor crustal geology represent rocks that were formed during the geological time periods and epochs, ranging from the Jurassic—beginning around 200 million years ago—through to the present-day.

What is not promoted in the geosciences is that the outcome of this geological mapping highlights the growth history of each of the seafloor plates over time, as shown by the symmetric colored stripping centered over each of the mid-ocean-ridges. This growth history preserves the precise location of all mid-ocean-ridge plate boundaries since the early-Triassic Period and hence is in a readily available format to accurately constrain and assemble each of the plates during these times.

An Empirical Exercise

As noted by Hess and others during the 1960s, when moving forward in time, new seafloor crust continuously spreads away from the seafloor ridge in a conveyor belt–like motion and Earth's seafloor crust is increasing in surface area, originally noted within the Atlantic Ocean. Since

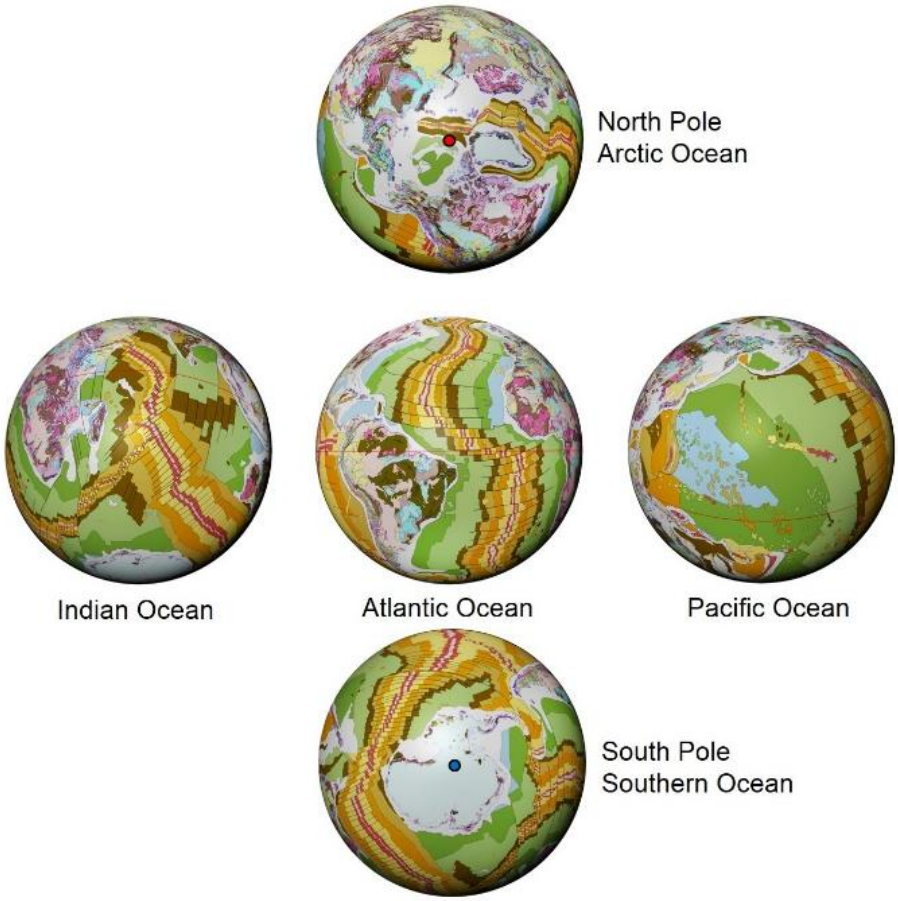

Fig. 3 Present-day Geological Map of the World shown in spherical format, based on the Geological Map of the World, 1990. (Maxlow, 2001).

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completion of the Geological Map of the World, the distribution of mid-ocean-ridges throughout all the oceans now shows that this observation regarding increasing surface area can be confidently extended to include seafloor extension within all the oceans. In contrast, when moving back in time, it is logical to then conclude that surface areas within all the oceans were decreasing in surface area.

As a simple academic exercise, by utilizing this growth history preserved in the Geological Map of the World and removing the historical assumption about disposal of excess crust within subduction zones, it is proposed that the published seafloor mapping shown on **Fig. 3** can be used to reverse engineer geology back in time to accurately constrain the location and assemblage of all crustal plates for each of the time periods and epochs shown on this map.

Reverse engineering and assemblage of seafloor crustal plates (**Fig. 4**) is shown to extend for 200 million years back in time to the early-Triassic Period and demonstrates the viability and uniqueness of this post-Triassic modelling tool. These resulting plate assemblages contrast strongly with conventional, Continental Drift-based Plate Tectonic reconstructions for the same time interval where assemblage of crustal plates is primarily based on palaeomagnetic apparent-polar-wander, with accompanying poorly constrained multiple plate-fit options to contend with. The uniqueness of small Earth assemblages also contrasts strongly with the conventional Plate Tectonic requirement to arbitrarily fragment continents to comply with the seafloor mapping data. It also contrasts with the requirement to dispose of large areas of inferred pre-existing crust beneath subduction zones to maintain a constant surface area premise. By removing these implied assumptions about Earth surface area, most of the problems and inconsistencies confronting Plate Tectonics then disappear.

Quantification of an increasing radius Earth process back to the early-Archaean requires an extension of the fundamental post-Triassic cumulative seafloor crustal methodology to include continental crusts. Continental crust can be reconstructed on pre-Triassic small Earth models by considering the primary crustal elements cratons, orogens, and basins. To assemble continental plates and construct models, further consideration must be given to an increase in continental crustal surface area occurring because of crustal stretching and extension within an established network of continental sedimentary basins.

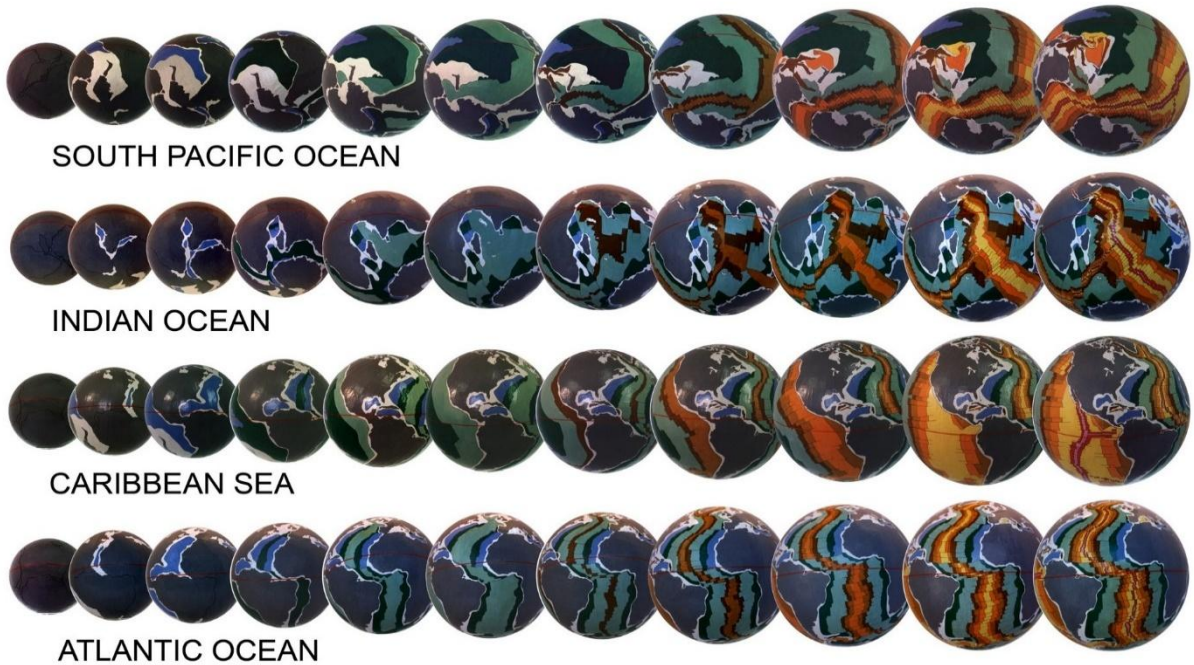

Fig. 4 Spherical small Earth models of the Jurassic to present-day increasing radius Earth. Each small Earth model demonstrates that the seafloor crustal plate assemblage coincides fully with seafloor spreading and geological data and accords with the derived ancient Earth radii. (Maxlow, 1995).

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When moving back to Precambrian times, this crustal extension is progressively restored to a pre-extension, pre-stretching, or pre-rift configuration by simply removing young sedimentary and intruded magmatic rocks and reducing the surface areas of each of the sedimentary basins in turn, consistent with the empirical age-constrained data shown on the Geological Map of the World (**Fig. 1**). During this process, it is shown that the spatial integrity of all existing ancient cratons and orogens is retained until restoration to a pre-basin or pre-orogenic configuration is required (**Fig. 5**). By removing all basin sediments and magmatic rocks, as well as progressively reducing the surface areas of the sedimentary basins in turn, an ancient primordial Earth is readily achieved comprising an assemblage of the most ancient Archaean cratons and Proterozoic basement rocks; all other rocks, minerals, and elements are simply returned to their places of origin.

From the outcomes of this empirical small Earth modelling exercise, it is concluded that crustal modelling studies using published global geology more than adequately quantify the validity of an increasing surface area Earth tectonic process. The unique assemblage of all continental and seafloor crustal fragments on small Earth models demonstrates conclusively that an increasing surface area Earth, extending for 4,000 million years to the beginning of Earth's geological past, is indeed viable. What the full range of Archaean to present-day small Earth models also demonstrates is that, rather than being a random, arbitrary, amalgamation-dispersal-amalgamation cyclical crustal forming process, as we are currently led to believe, crustal development on an increasing surface area model is instead shown to be a simple, evolving, and highly predictable crustal process.

Additional Data Quantification

Applying this small Earth modelling evidence to palaeomagnetics (**Fig. 6**) shows that all ancient magnetic poles cluster as unique, diametrically opposed north and south poles—as they should—and plotted palaeolatitude measurements coincide with and quantify predicted climate zones on each small Earth model constructed. Similarly, additional geographical and biogeographical information aptly quantify the location of these ancient magnetic poles, equators, and climate zones. This point

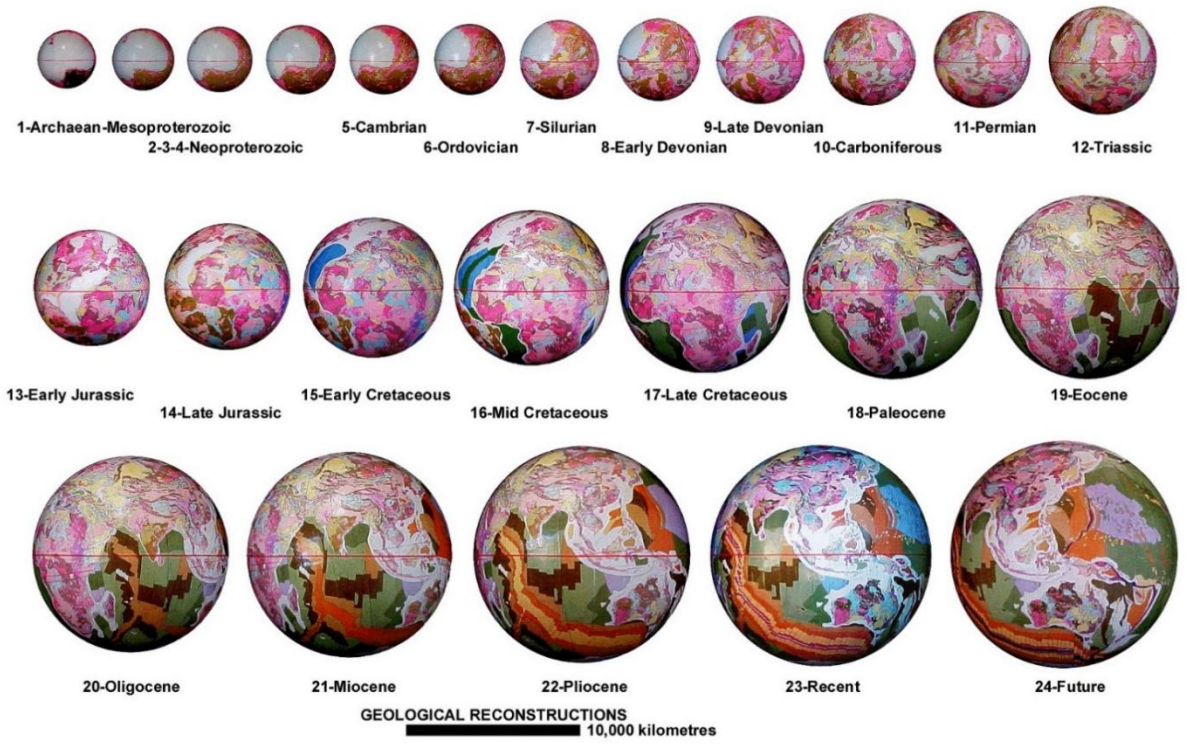

Fig. 5 Spherical Archaean to future small Earth geological models. Models range in age from the early-Archaean to present-day, plus one model projected 5 million years into the future. (Maxlow, 2001).

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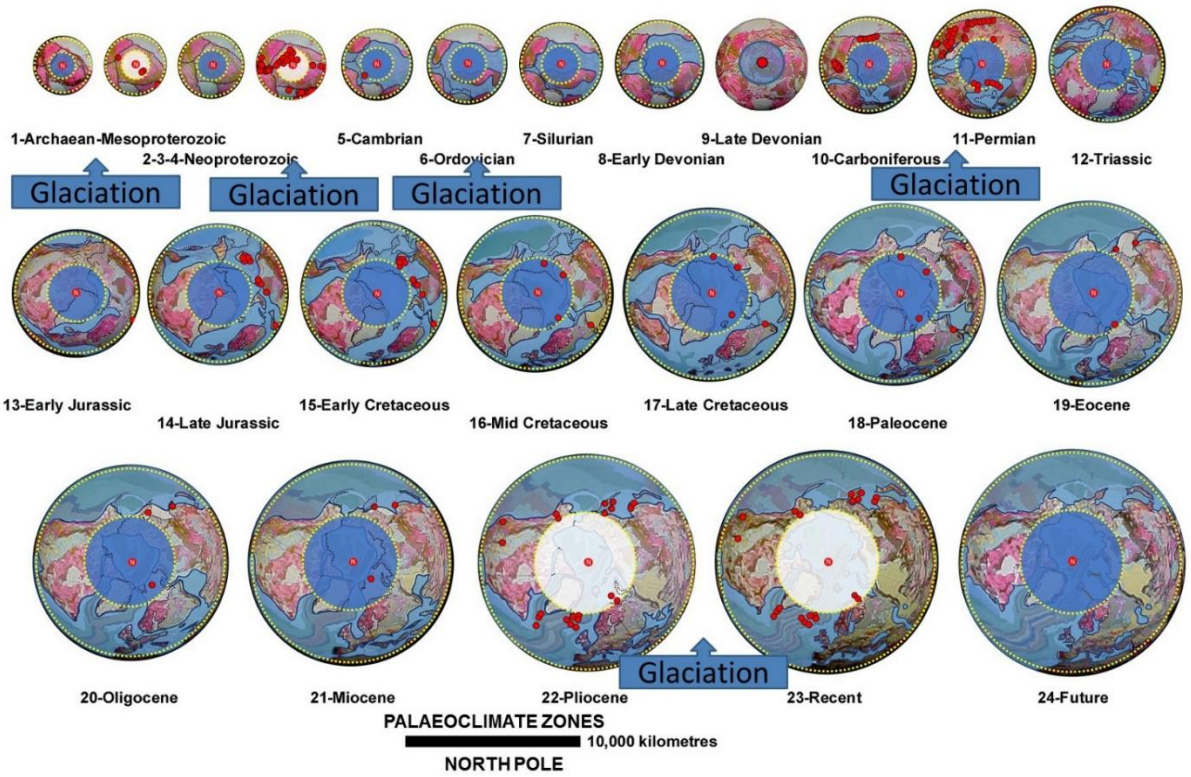

Fig. 6 Locations of ancient North Polar Regions shaded blue on small Earth models. Glacial events are highlighted, the presence of known ice-sheets are shaded white, glacigenic formations are shown as red dots, and ancient seas and modern oceans are shaded pale blue. (Coastline data after Scotese, 1994, and Smith et al, 1994).

cannot be over emphasized: diametrically opposed magnetic poles and an accurately positioned equator located midway between each pole cannot be achieved using the current Plate Tectonics paradigm. On these small Earth models, many of the ad-hoc problems and inconsistencies used to explain Plate Tectonics again simply disappear.

When published coastal geography is plotted on each model (**Fig. 7**) it is shown that large, conventional, Panthalassa, Iapetus, and Tethys Oceans are not required. Instead, this same coastal geography defines the presence of more restricted continental Panthalassa, Iapetus, and Tethys Seas, which represent precursors to the modern Pacific and Atlantic Oceans and emergent Eurasian continents respectively. From this geography the coastal outlines and emergent land surfaces further quantify the location of the ancient Rodinia, Gondwana, and Pangaea supercontinents and smaller sub-continents. This coastal geography demonstrates an evolutionary progression and development of each of the ancient seas and supercontinents throughout Earth history which is shown to be intimately related to changes in sea-level, changes to the outlines of continental sedimentary basins, changes incurred during crustal mobility, and changes to sea-levels once the modern oceans opened to the present-day.

In addition, the timing and development of these ancient continental seas and supercontinents, along with formation of the modern continents and oceans, provides an ideal setting for the primitive Precambrian microbe's effectiveness as nurseries of evolution and to markedly drive subsequent evolutionary change in all life forms. On each of the small Earth models created, warm sea waters during much of the Palaeozoic extended from equatorial regions through to the North Polar Region, allowing newly evolved species to readily colonize and populate throughout each of the interconnected ancient Tethys, Iapetus, and Panthalassa seaways. This distribution of warm seas also limited the presence of a polar ice cap in the North Polar Region and restricted the presence of ice to the exposed Gondwanan South Polar Region throughout much of that time.

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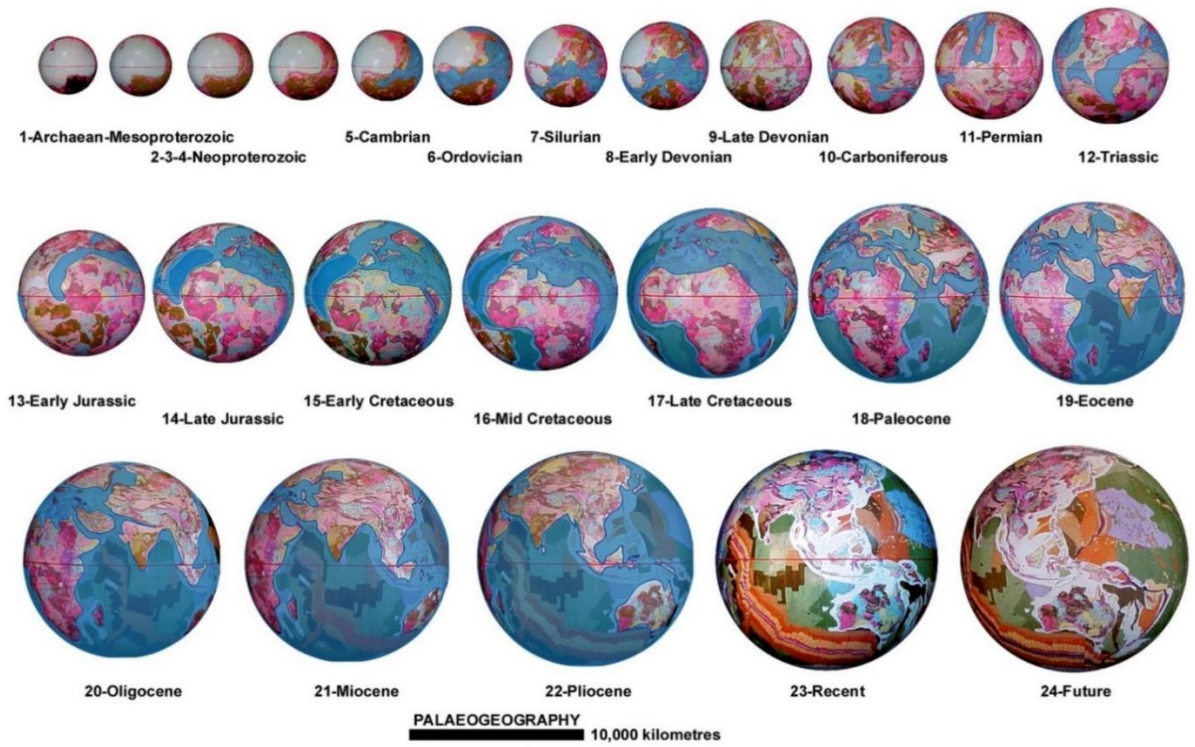

Fig. 7 Shoreline palaeogeography on Archaean to present-day small Earth models. The ancient shorelines are shown as blue lines and the ancient seas and modern oceans are shaded blue. Each image advances 15 degrees longitude throughout the sequence to show a broad coverage of palaeogeographic development. Note: there are no published data available for the late-Devonian model or models prior to the Cambrian Period. (Coastline data after Scotese, 1994, and Smith et al, 1994).

Modelling studies also show that, during early-Palaeozoic to present-day, there have been several drastic and prolonged changes to sea-levels which coincide precisely with known extinction events. On these models, major changes in sea-levels are shown to occur because of separation or merging of previous ancient continental seas, as well as onset of geosynclinal activity and orogenesis, breakup of the ancient supercontinents, opening of the modern oceans, and draining of the ancient continental seas. Depending on the severity of these events, sea-level changes may have also adversely affected regional to global-scale climate, as well as ocean-water circulation patterns, species habitats, and the type and location of sedimentary deposition.

The Fundamental Problem

However, the fundamental problem that scientists and the public continue to have, is comprehending where did the huge volume of material making up the seafloor crusts and underlying mantle go to when moving back in time to reassemble the continents? And more importantly, where does this huge volume of material come from when moving forward in time?

In year 2000 four identical Cluster II satellites were launched by the European Space Agency. These satellites were launched to study the impact of the Sun's activity on the near-Earth space environment by flying in formation to gather data around Earth. For the first time in space history this mission was able to collect three-dimensional information about how the solar wind interacts with the magnetosphere, how it affects near-Earth space, and how the Earth reacts with the charged particles within the solar wind. This new information and related discoveries were considered by the European Space Agency's project scientists to be of great importance because they showed how the Earth's magnetosphere can be readily penetrated by solar particles.

The Earth's magnetosphere is now shown to be full of trapped plasma, comprising charged electron

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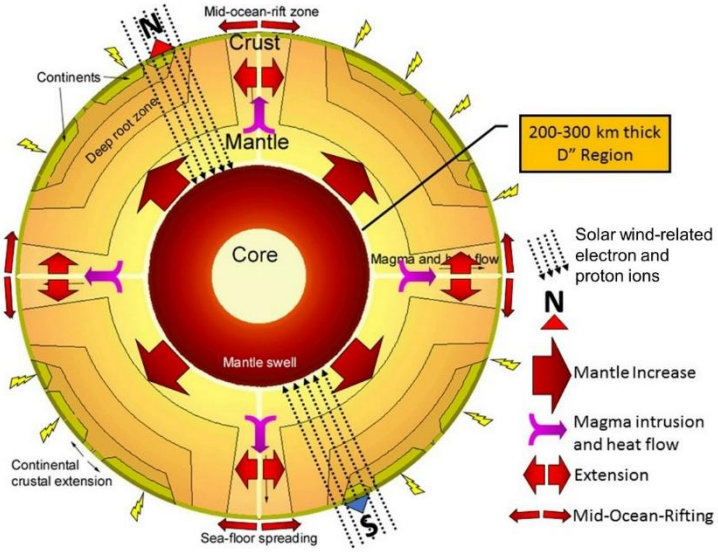

Fig. 8 A schematic cross-section of the present-day Earth highlighting the influence of charged electrons and protons entering the Earth resulting in increase in mass and radius over time. (Maxlow, 2001).

and proton particles, originating from the solar wind as it passes the Earth. This flow of plasma into the magnetosphere increases with increase in solar wind density and speed, as well as increases in turbulence in the solar wind. In addition to penetrating the magnetosphere, it was also shown that the plasma travels down along the Earth's magnetic field lines within the auroral zones, entering the Earth at each of the poles. This European study suggested to the scientists that penetration of plasma may be a lot more common than was previously known, and possibly represents a means for the constant flow of charged electrons and protons into the Earth. The question we must then ask and seriously take note of is, what happens to these particles—the building blocks of all matter on Earth—once they enter the Earth?

A causal mechanism for an increase in Earth mass and radius over time is speculated to be solar particles entering the Earth at the poles and recombining as new matter most likely within the 200 to 300 kilometers thick D" region, located at the core-mantle boundary. This matter generation process represents a basis for formation of all new and existing elements and mineral species present on Earth. It is further speculated that formation of new matter within the Earth gives rise to an increase in mass and volume of the mantle over time. Increase in mantle volume is then transferred to the outer crust as continental crustal extension which is currently seen and preserved as extension along all mid-ocean-rift zones. Surface crustal extension within the mid-ocean-rift zones is further accompanied by intrusion of new basaltic lava and expulsion of new sea water and atmospheric gases (**Fig. 8**).

In summary

It is unfortunate that mathematical-based observational data gathering so firmly constrains Plate Tectonic thinking that scientists are now oblivious to any suggestion that there are viable alternatives to interpretation and utilization of all global observational data. As briefly introduced here, modern global geological, geographical, and biogeographical data are telling a completely different story to what the conventional mathematical-based sciences currently lead us to believe.

The modern global geological mapping data utilized here tells us that there is something seriously amiss with continuing to constrain Earth surface area to a constant value. The Expanding Earth theory days are long gone but, are we still justified in continuing to think that accurate modelling of this geological mapping data is mere coincidence. Now is the time for science to seriously consider that Plate Tectonics may well be better suited to an increasing surface area Earth scenario rather than continuing to constrain the geological and geographical observational data to an outdated, blinkered,

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static surface area Earth assumption?

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ABOUT THE NCGT JOURNAL

The NCGT Newsletter, the predecessor of the NCGT Journal, was begun as a result of discussions at the symposium “Alternative Theories to Plate Tectonics” held at the 30th International Geological Congress in Beijing in August 1996. The name is taken from an earlier symposium held in association with the 28th International Geological Congress in Washington, D. C. in 1989. The first issue of the NCGT Newsletter was December 1996. The NCGT Newsletter changed its name in 2013 to the NCGT Journal. Aims of the NCGT Journal include:

1. Providing an international forum for the open exchange of new ideas and approaches in the fields of geology, geophysics, solar and planetary physics, cosmology, climatology, oceanography, electric universe, and other fields that affect or are closely related to physical processes occurring on Earth from its core to the top of its atmosphere.
2. Forming an organizational focus for creative ideas not fitting readily within the scope of dominant tectonic models.
3. Forming the basis for the reproduction and publication of such work, especially where there has been censorship or discrimination.