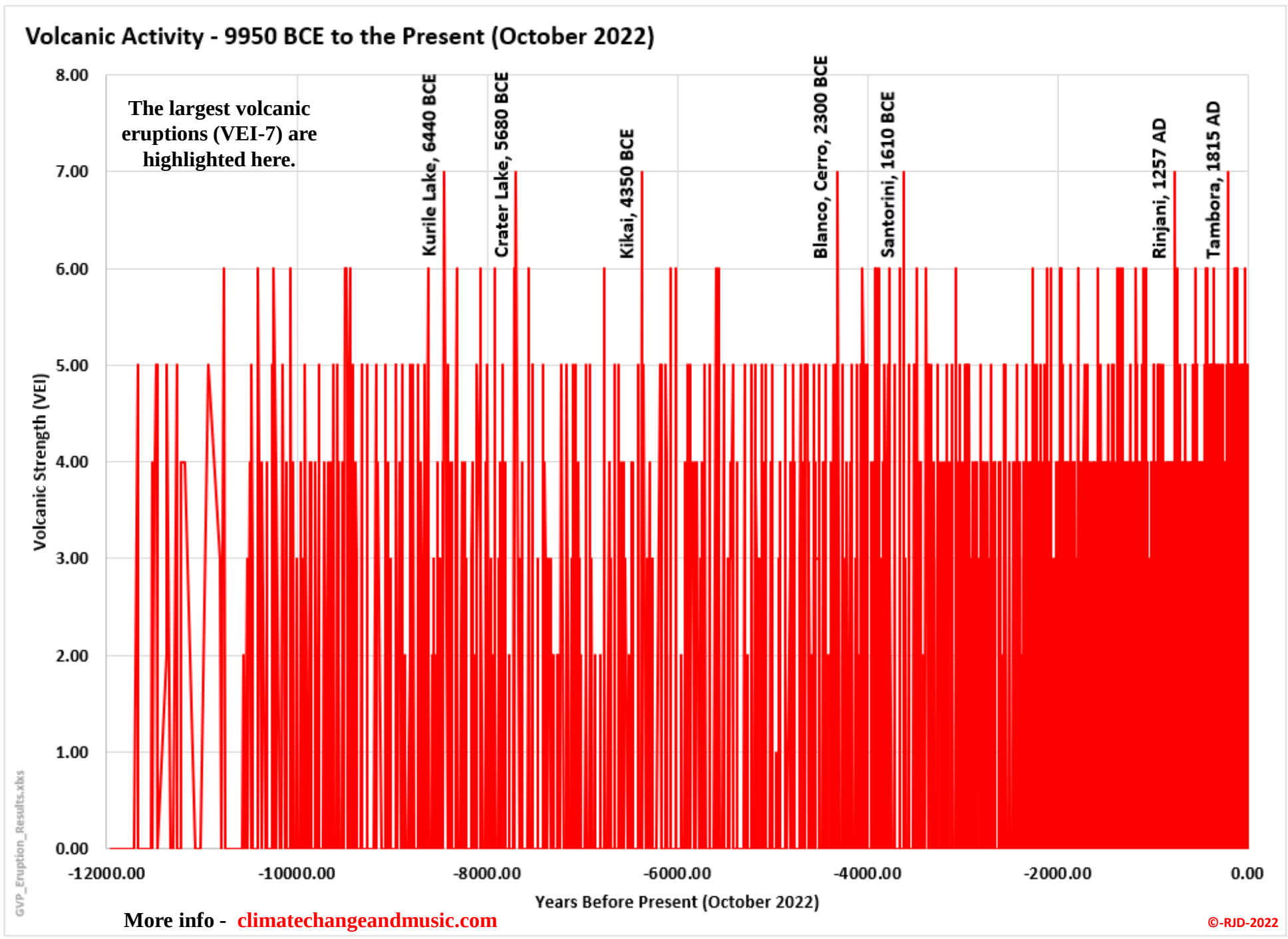
CSS-31a

Volcanic Activity Holocene Period

One of the data sets I have not looked at in detail is the Volcanic activity levels. An online acquaintance (Andy Wienckowski) had read my 2018 Open Letter (thank you, Andy) and asked me a few questions. He had looked at the volcanic activity as laid out in a Smithsonian Institute database and wanted to hear my thoughts. I am always happy to get new data. This post lays that Smithsonian data out in graphical form. The data goes back to 9950 BCE and would get less comprehensive the further back we go. However, we can still pull out some interesting facts and make some interesting musings. Volcanic activity can have a significant short term effect on the climate. A large explosive volcanic eruption can cool the planet noticeably for a year or two after the eruption. The aerosols can directly reflect solar energy back into space and/or lead to additional cloud droplet nucleation resulting in cooling. There appears to be a climate/volcanic correlation.

Volcanoes Holocene



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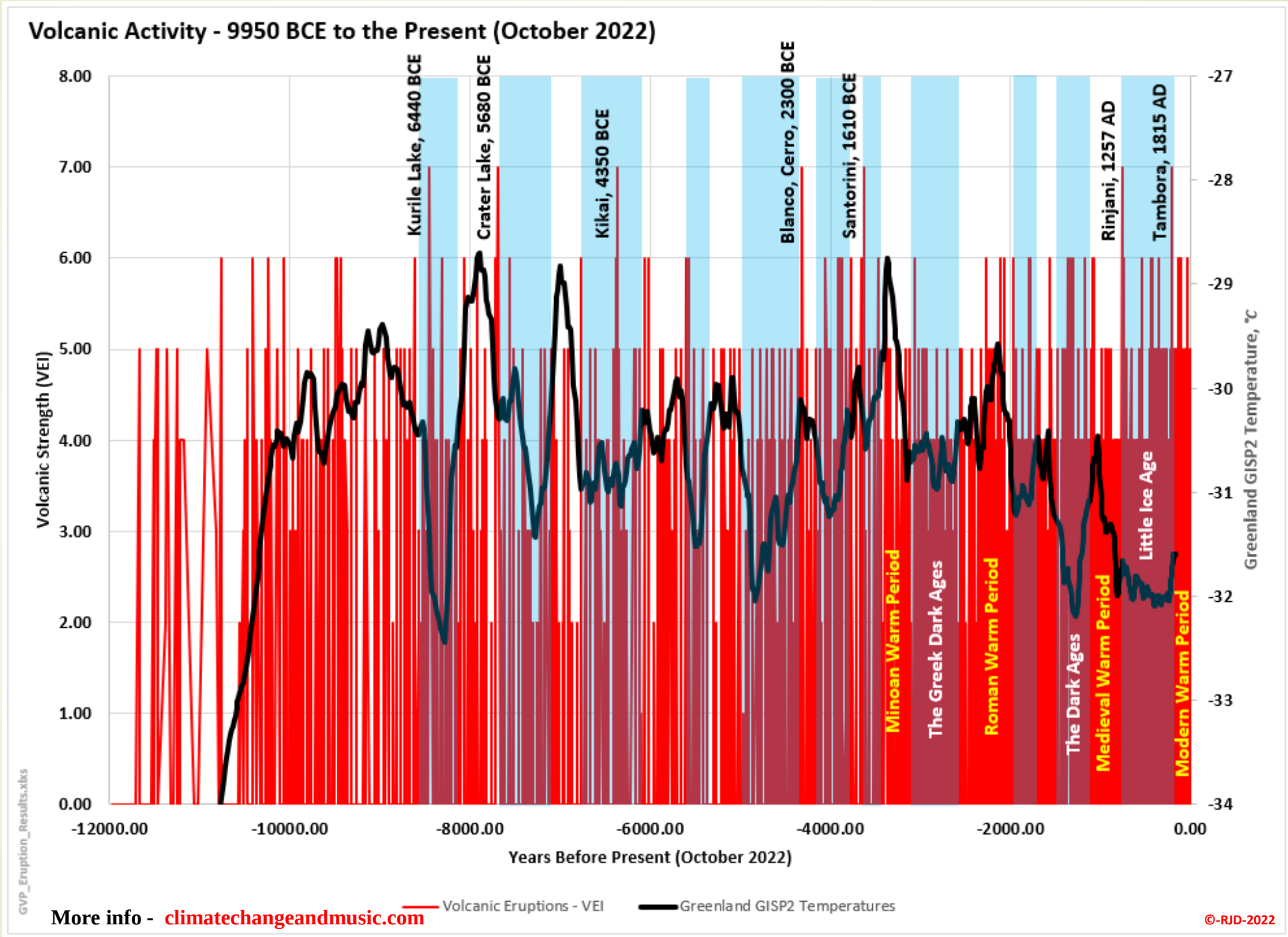
Volcanic Activity Holocene Period GISP2 Temperatures

This is the same plot, but with the Greenland GISP2 Temperature profile added and colder periods highlighted. GISP2 was used here because the natural/solar cycles influences can be readily identified. For the CAGW alarmist crowd, GISP2 does not represent the global temperatures, but something is causing the temperature fluctuations and it is not CO_2, which is virtually flat through the per-MTR (Modern Temperature Record, 1850 to the present). Additional temperature and "almost" properly scaled CO_2 are included on the next slide (for reference). Most of the large volcanic eruptions appear to occur during the cooler periods. Coincidence, probably not. Definitive conclusions are tough on this scale. But we can still definitely say CO_2 has virtually nothing to do with the pre-MTR Holocene temperature changes or volcanic activity.

Volcanoes Holocene GISP2



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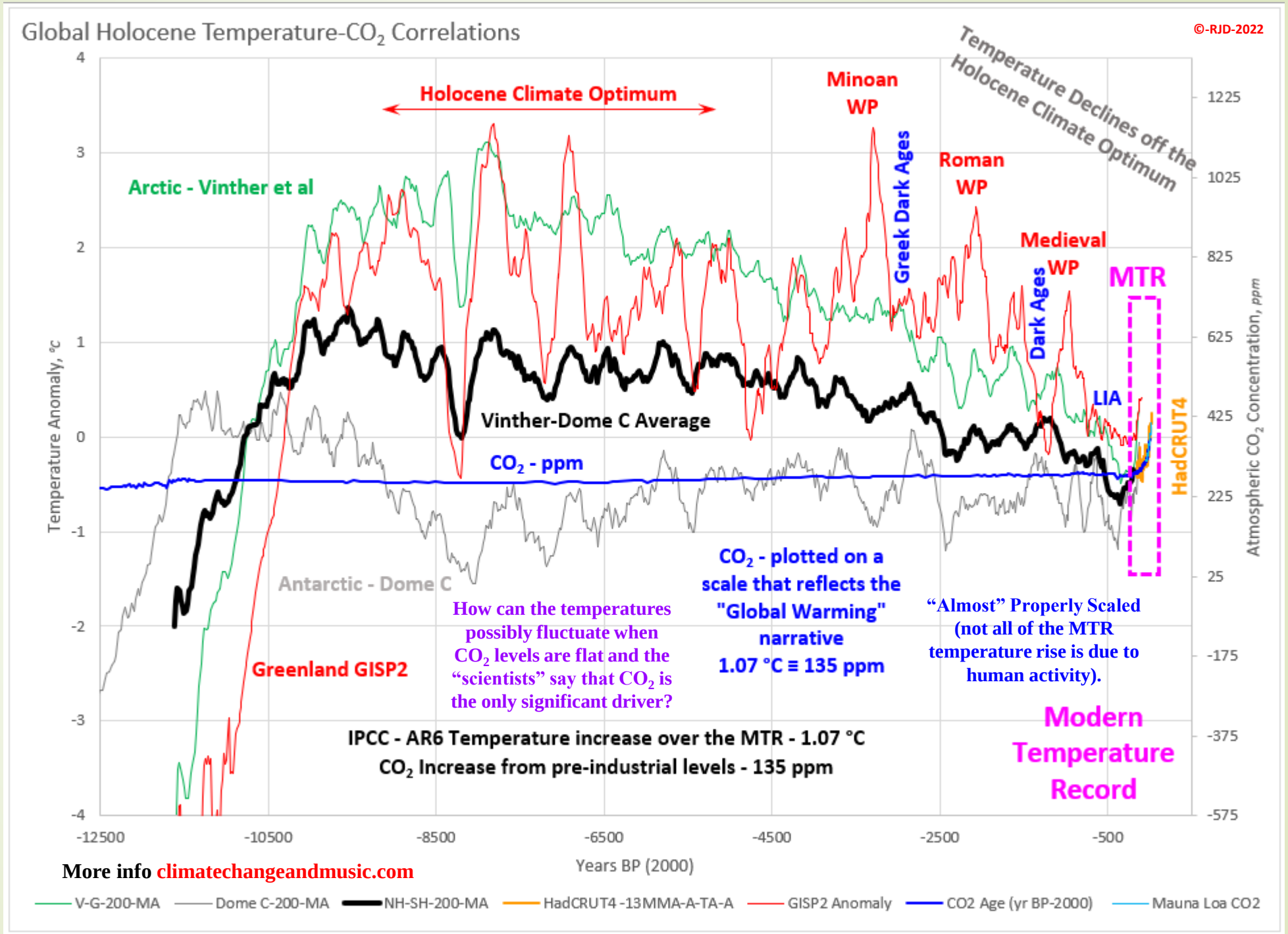
Volcanic Activity Holocene CO_2/Temperatures

Volcanoes Holocene – CO_2 Temperature

This type of plot appears quite often in my writings (for a very good reason). If the CAGW alarmist crowd believes that CO_2 is responsible for all the warming since the pre-industrial period, then the 1.07 °C (the IPCC's official AR6 temperature rise) has to be plotted proportionately to the 135 ppm CO_2 rise over the same period. Almost looks like there might be some other factors affecting global temperatures (regardless of the temperature profile you use). But sure, we should pretend that only CO_2 is driving the climate (as programmed in the IPCC computer Models). All the natural (primarily solar related) forcings responsible for the temperature fluctuations over the Holocene and the billions of years before that, have suddenly stopped acting on the planet, because some idealistic, simple minded "climate scientists" have decreed it to be so. Temperatures are headed down not up!



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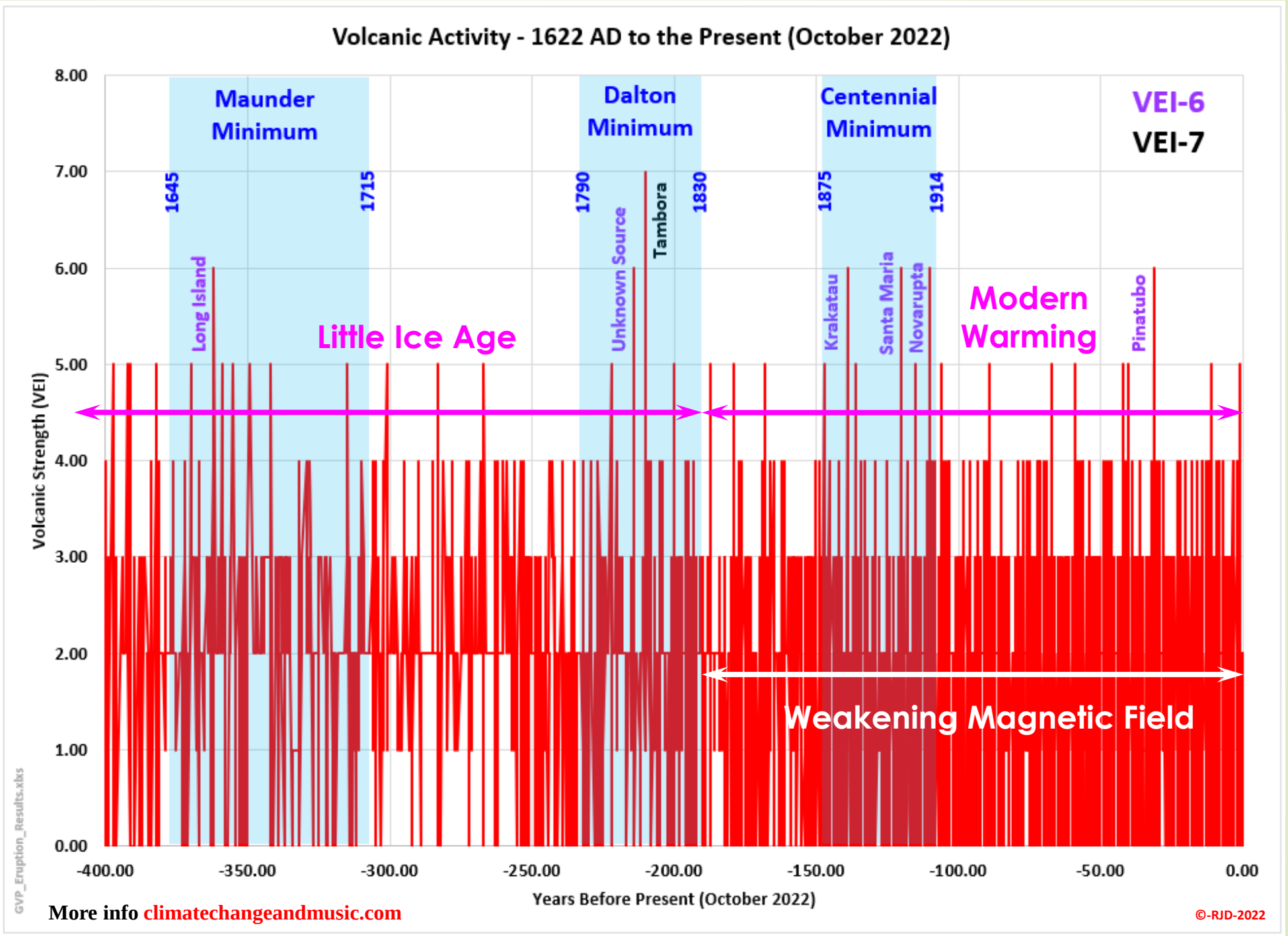
GSM – Grand Solar Minimum. You really should do the Research!

Volcanic Activity 400 Year History

This slide gets into the detail on the last 400 years. The first 50%+ of this data set covers the late stages of the Little Ice Age (LIA). A period where temperatures fell, glaciers advanced, sea levels fell, etc. And as mentioned before, CO_2 had absolutely no role. Even the first portion of the Modern Warming Period (mid 1800s to 1950) could only have minor CO_2 contributions. Remember 86%+ of CO_2 emissions occurred post-1950. Natural forcings (primarily solar related) dominated climate prior to Modern warming, were active during the Modern Warming and will continue to dominate into the future. The takeaway from this graph, large volcanic events appear to be focused in the solar minimums. In general, our climate is intertwined and affected by the entire solar system. The planet configurations and orbital mechanics act on both the sun and earth. Gravitational stresses influence the solar cycles and earth's internal processes. During solar minimums, solar activity is weaker, allowing more space based energy (cosmic rays, high energy particles, etc.) into our atmosphere and mantle. That energy can accentuate magma activity and seismic events.

Volcanoes 400 Year History



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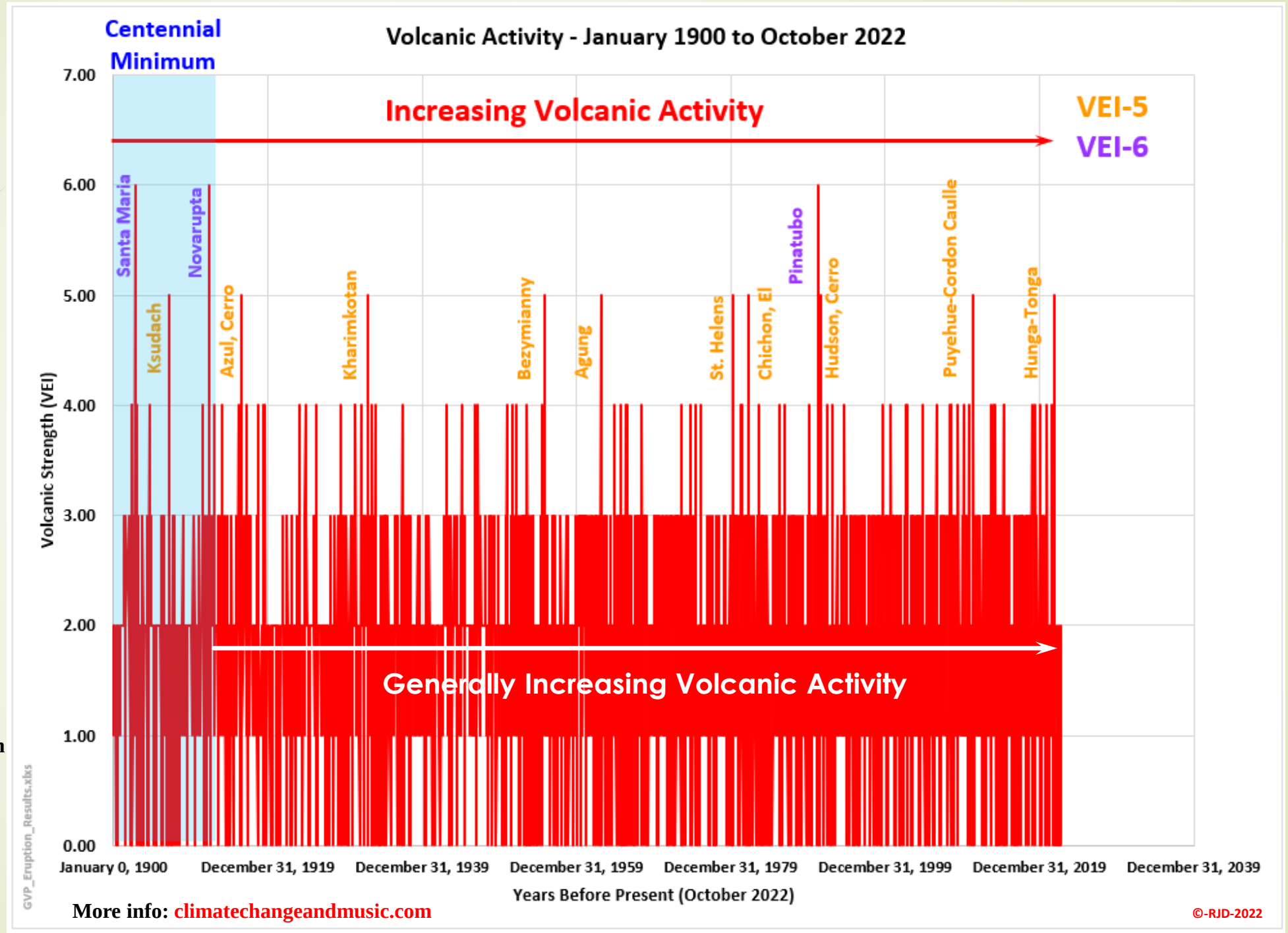
Volcanic Activity 1900 to 2022

This plot focuses in on the last century plus. Given civilization's advance over this period, the volcanic activity should be fairly comprehensive (at least on continental lands and shelves). The history of underwater volcanic activity is still in its infancy. Regardless, general volcanic activity has been increasing over this period. While the Centennial Minimum had a flurry of major volcanic eruptions, minor eruptions were not that numerous (shown more prominently in the next slide). Major volcanic eruptions appear to have a slightly higher frequency in the last half of the past century. I experienced the Mt. St. Helen's eruption. The dust cloud came through my home town in Saskatchewan (definitely blocking out the sun). And with modern communications, we can experience the Pinatubos and Hinga-Tongas in real time. Pinatubo (along with Cerro Hudson) had a very noticeable affect on the planet. Hunga-Tonga is negatively affecting us now!

Volcanoes 1900 to 2022



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CSS-31f

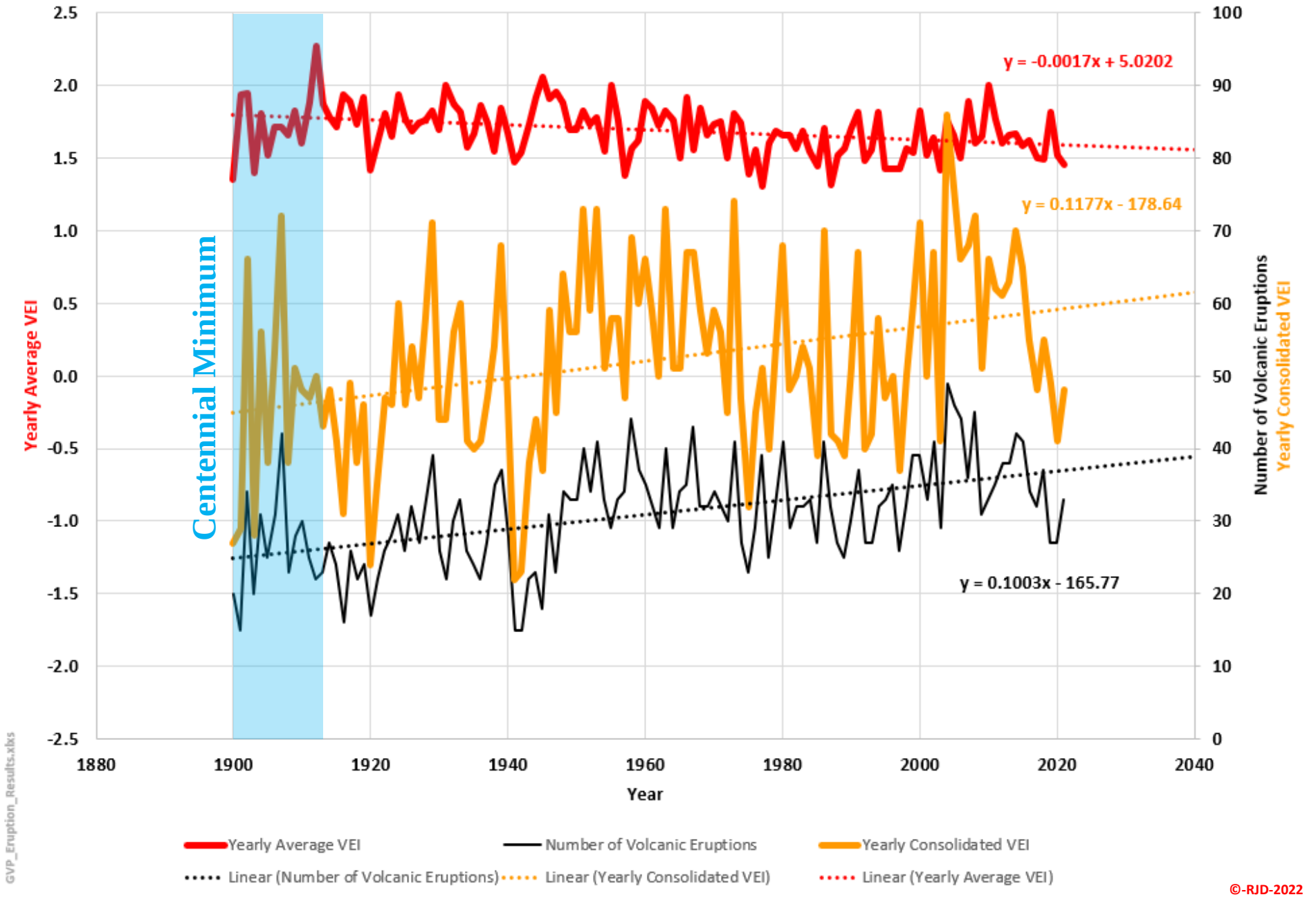
Volcanic Activity 1900 to 2022 Activity Level

This is the same data, just shown in a different (more quantitative) format. Volcanic activity has definitely been increasing since 1900. The number of volcanic eruptions has been increasing at a rate of 10 eruptions/century with the Volcanic Explosivity Index (VEI) increasing at roughly 12 units/century. The yearly average VEI declines because the lower VEI eruptions have become more numerous. What does increasing volcanic activity mean for our climate? The gradual activity incline has not yet had long-term Major impacts (apart from short term events like Pinatubo). The risk going forward is the potential for near future major eruptions. We are entering a Grand Solar Minimum (GSM) and the Atlantic Multi-decadal Oscillation (AMO) is entering its cold phase. Throw a major VEI-6/7/8 eruption or two into the mix and we have some dangerous problems. Mother Nature does not need Bill Gates' help with aerosols!

Volcanoes 1900 to 2022 Activity

GSM – Grand Solar Minimum. You really should do the Research!

More info climatechangeandmusic.com

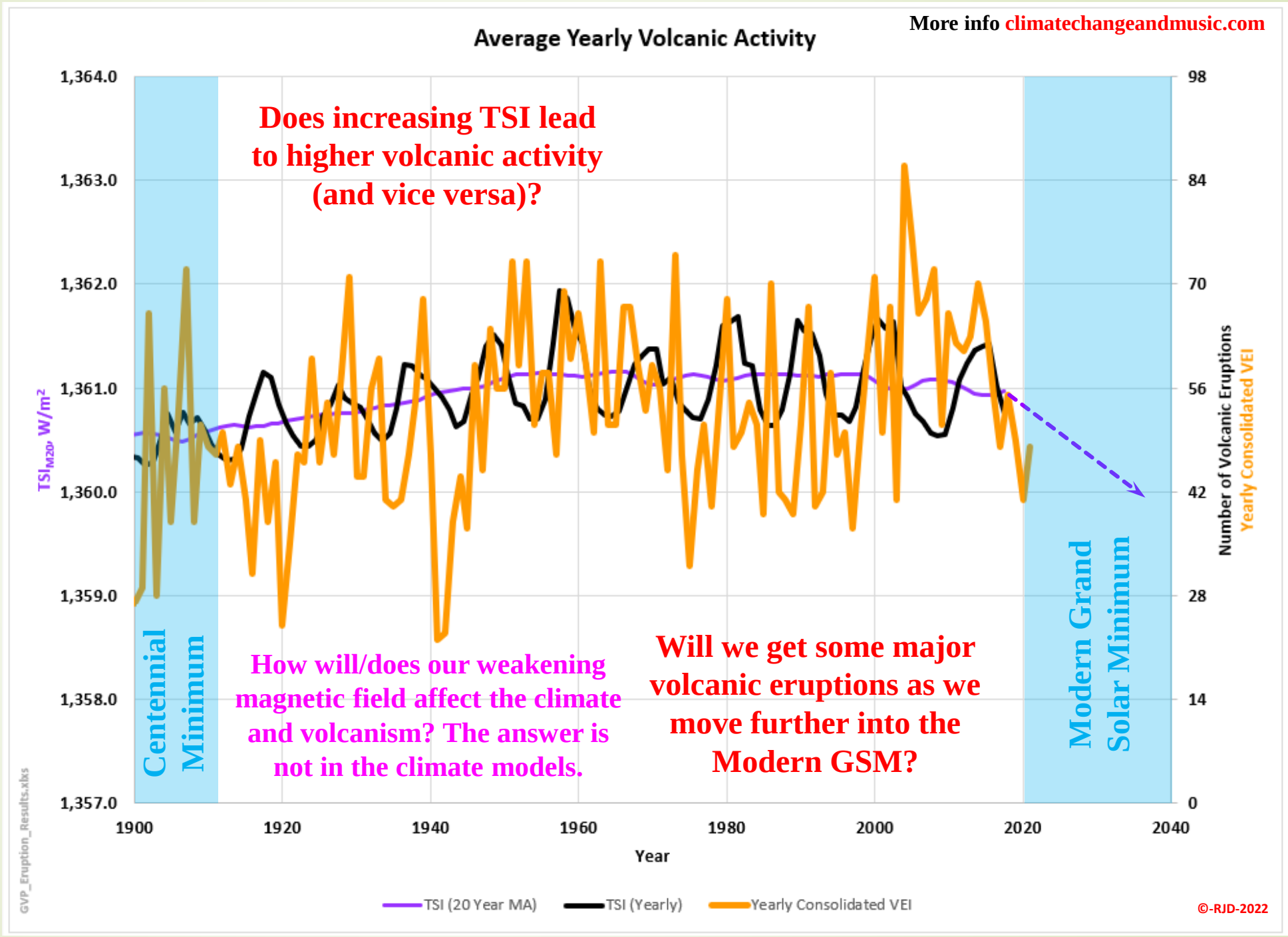


Volcanic Activity 1900 to 2022 TSI_M Correlation

The attached plot lays solar activity over the yearly consolidated VEI. There is a general correlation with the TSI Momentum (TSI_{M20}, 20 Year Moving Average). Do solar activity fluctuations affect the volcanic activity on the planet? Probably, but the magnitude (based specifically on TSI changes) is probably small and not measurable. Are TSI levels a gravitational indicator (which would be more impactful on volcanic activity)? I do not have an answer for that question.

Volcanoes Holocene Solar Activity

However, TSI is very likely a great proxy for solar activity and forcings, but the various mechanisms (orbital mechanics, cosmic ray/high energy particle fluxes, cloud formation, gravity influences, etc.) are still not well understood. The solar influences can be seen in the historical empirical climate data, the CO_2 influences do not show up. Ignoring the solar forcings, has led to unnecessary/dangerous policy decisions!



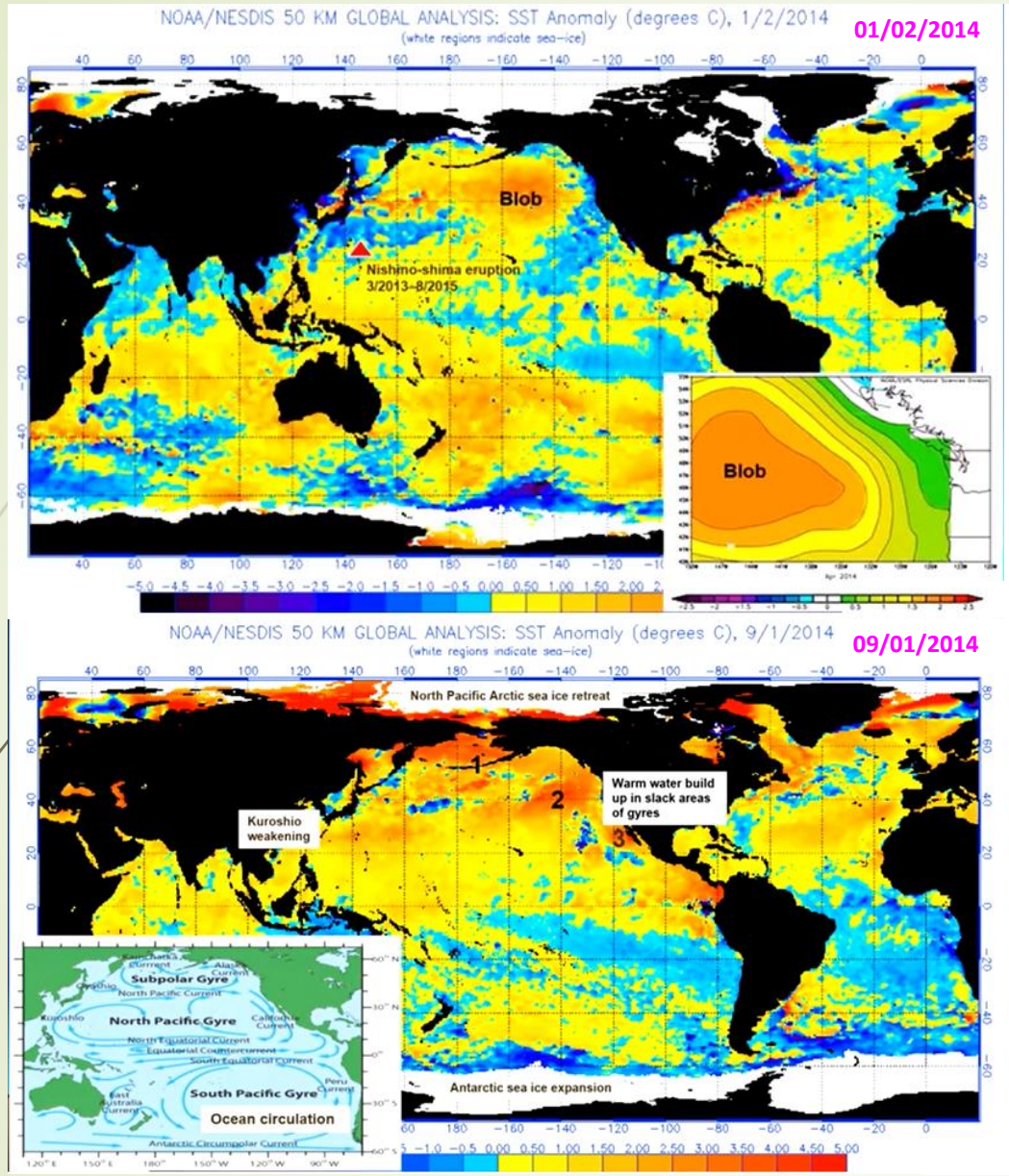
GSM – Grand Solar Minimum. You really should do the Research!

CSS-31h

Volcanic Activity Prof. Wyss Yim 2015-16 El Niño

Prof. Wyss Yim gave an interesting presentation on volcanic activity in late October 2022. I will just highlight a few points that show some of the influences volcanic activity can have. For detail, go to his video presentation. These are Sea Surface Temperature maps

Volcanoes Prof. Wyss Yim 2016 El Niño



More info

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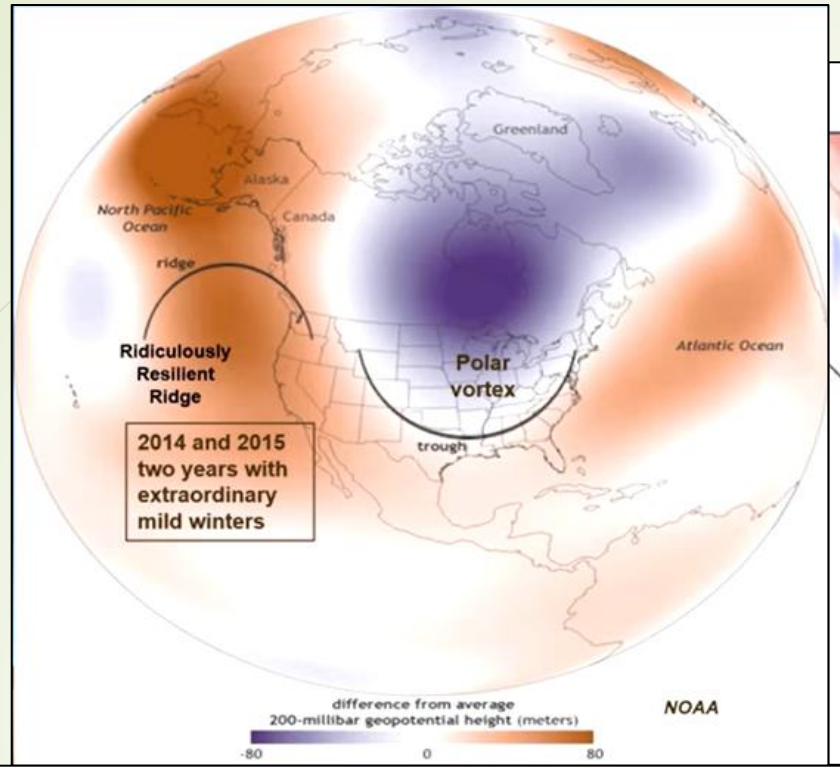
Volcanic Eruptions, a Driver of Natural Climate Variability – ignored by IPCC - Professor Wyss Yim - YouTube

(SST) from the time leading up to the very strong and persistent 2016 El Nino. The upper left SST map shows the Pacific Blob (a "mysterious" warm patch of water in the North Pacific that affected our climate significantly back in 2014). The probable cause was the was the Nishino-shima eruption (March 2013 to August 2015). By September 2014 (lower left), the blob had split into a few distinct patches along the US/Canada western coastlines (captured in the quieter eddies of the various Pacific gyres). Additional volcanic activity (upper right map, Hunga, Wolf (in the Galapagos) and the Axial Seamount (off America's west coast) provided some additional warming in the central eastern Pacific. All these events led to the very strong and persistent 2016 El Nino and global temperatures (not CO_2). Global temperature records were set in 2016 (a few hundredths of a degree warmer than 1998), but they have been declining ever since.

Volcanic Activity
Prof. Wyss Yim
2015-16 El Niño/Arctic Ice

Just a quick add-on to the last statement on the previous slide. The average global temperature anomaly for October 2022 was 0.32 °C (a drop of 0.38 °C from the 0.7 °C high in February 2016). November is likely to be significantly lower. The figure on the upper right shows an ocean temperature comparison between the 1997/98 and 2015/16 El Niños. Noticeable but only a 0.08 °C difference globally. The bottom left figure shows El Chichón's dust cloud distribution. These aerosols block the sun and act as nuclei for cloud droplets, leading to cooling. The plot on the bottom right shows the significant effect that volcanic eruptions can have on Arctic ice extent.



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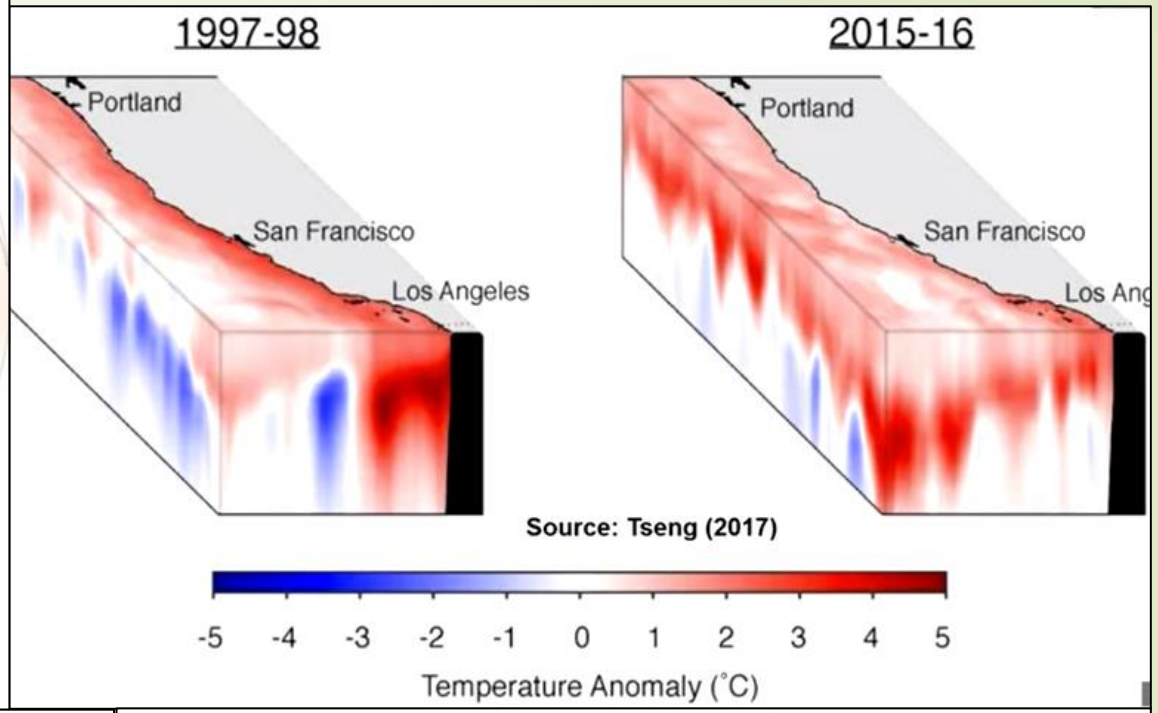
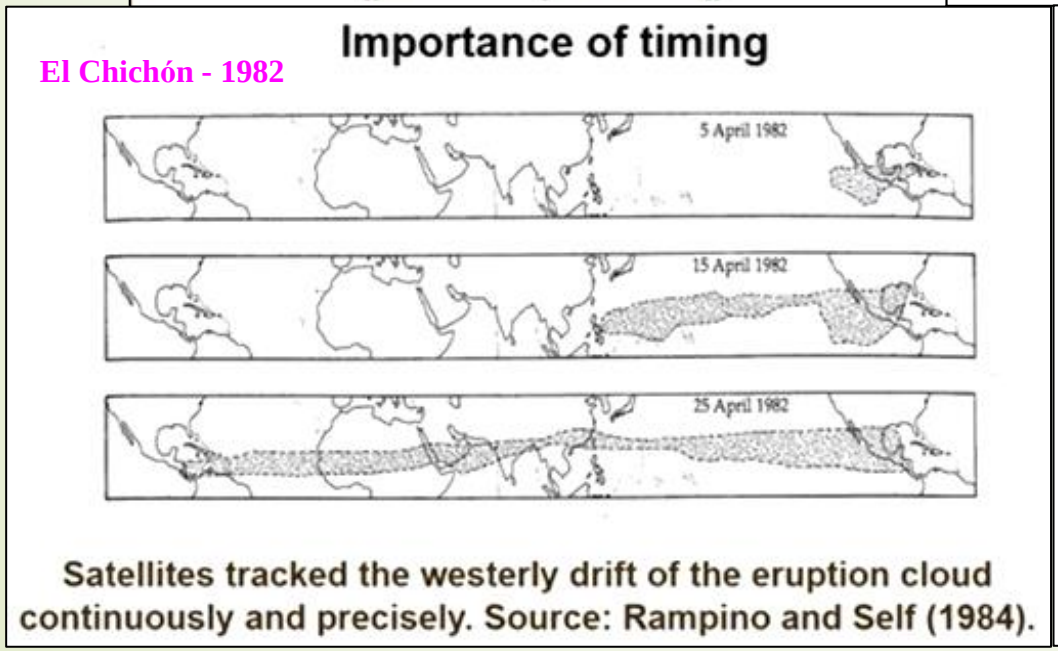
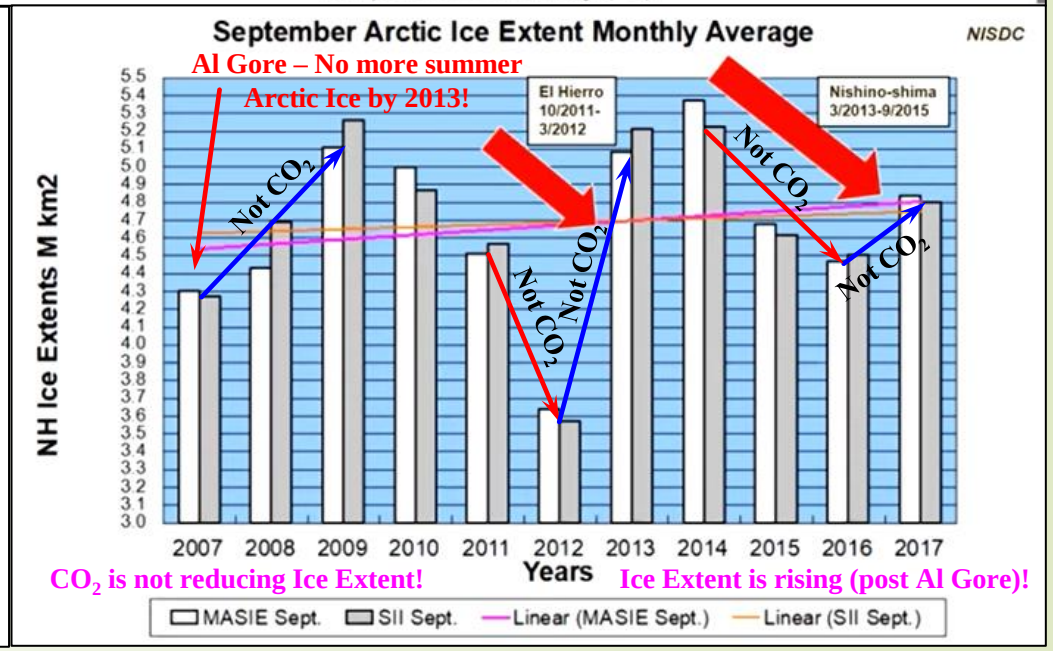


Volcanoes
Prof. Wyss Yim
El Niño/Arctic

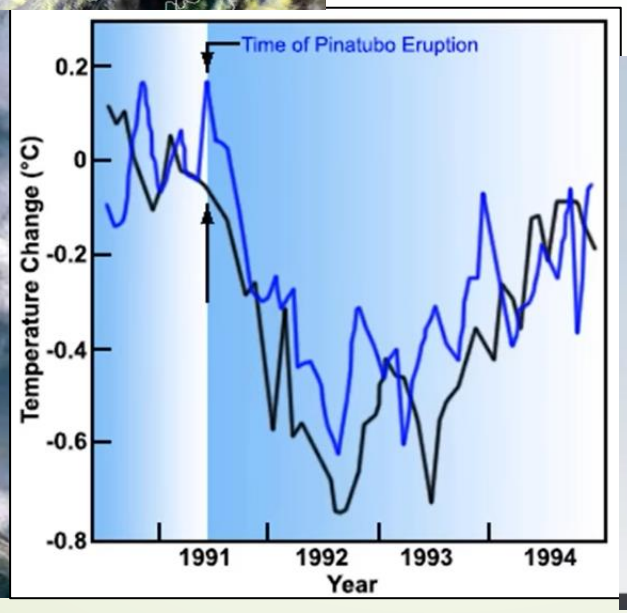
The El Hierro, Canary Island volcano's 2011/12 eruption led to a hot spot in the Northern Atlantic and the lowest recorded modern Arctic ice cover. Ice cover required quickly and then dropped again as the 2013/15 Nishino-shima and previous slide eruptions warmed the Arctic up again.

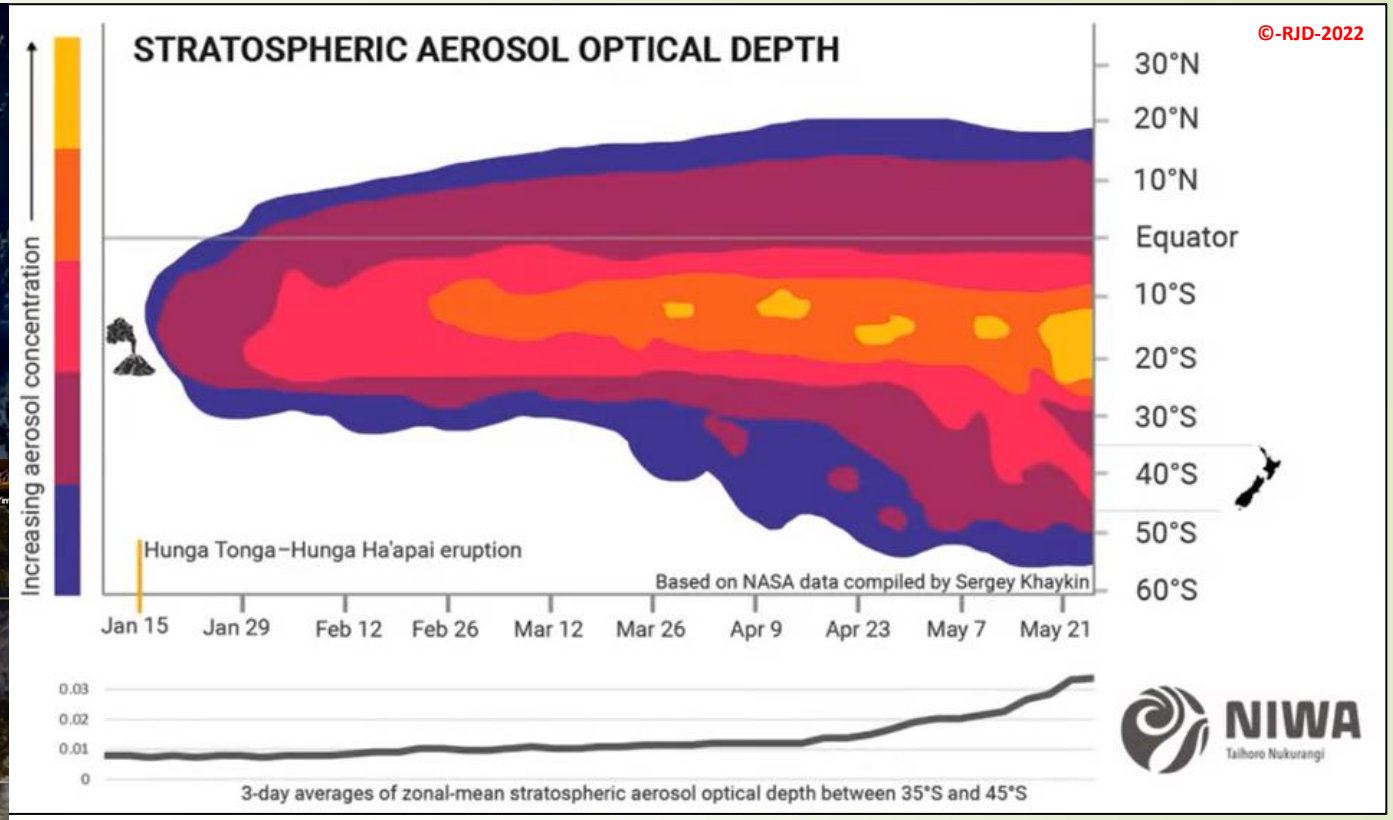




Volcanic Activity
Prof. Wyss Yim
Hunga-Tonga
Pinatubo

A few shots of large volcanic eruptions. The Pinatubo eruption (the blue shading in the middle picture) disrupted Typhoon Yunya and dropped global temperatures by roughly 0.7 °C for more than a year. More recently, the Dec/21 Hunga-Tonga eruption is has begun affecting our planet.



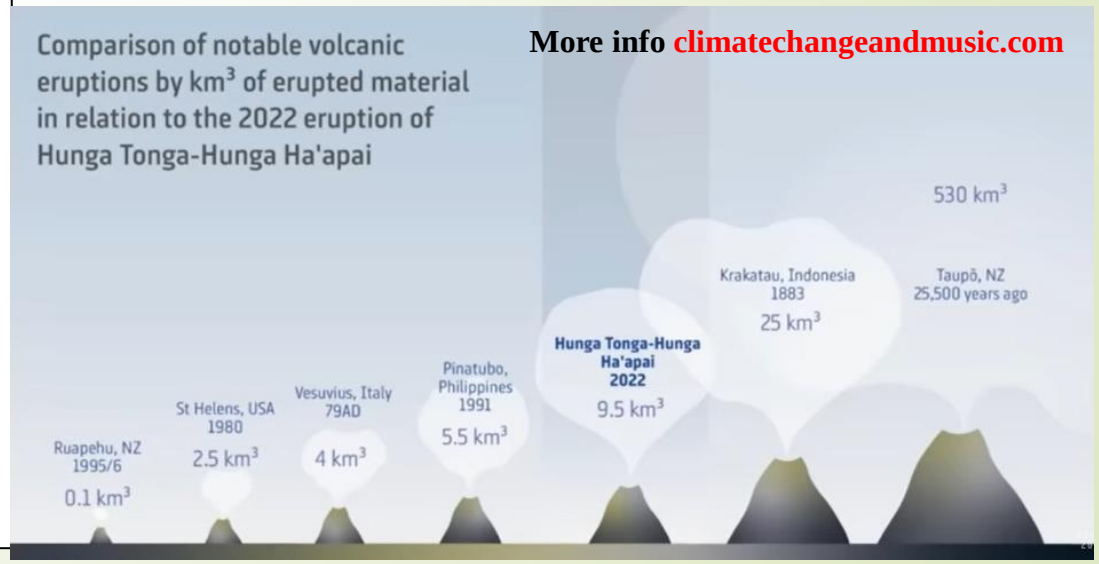


Volcanoes
Hunga-Tonga
Pinatubo

The aerosol dispersion (top left) had already affected a significant portion of the planet by late May/21. The general repercussions are laid out by David Dubyne in his recent Adapt 2030 video series.

[This Explains Extremes Happening Across our Planet at the Same Time - YouTube]

More info climatechangeandmusic.com



GSM – Grand Solar Minimum. You really should do the Research!