# Sea Level Rise Fact Check



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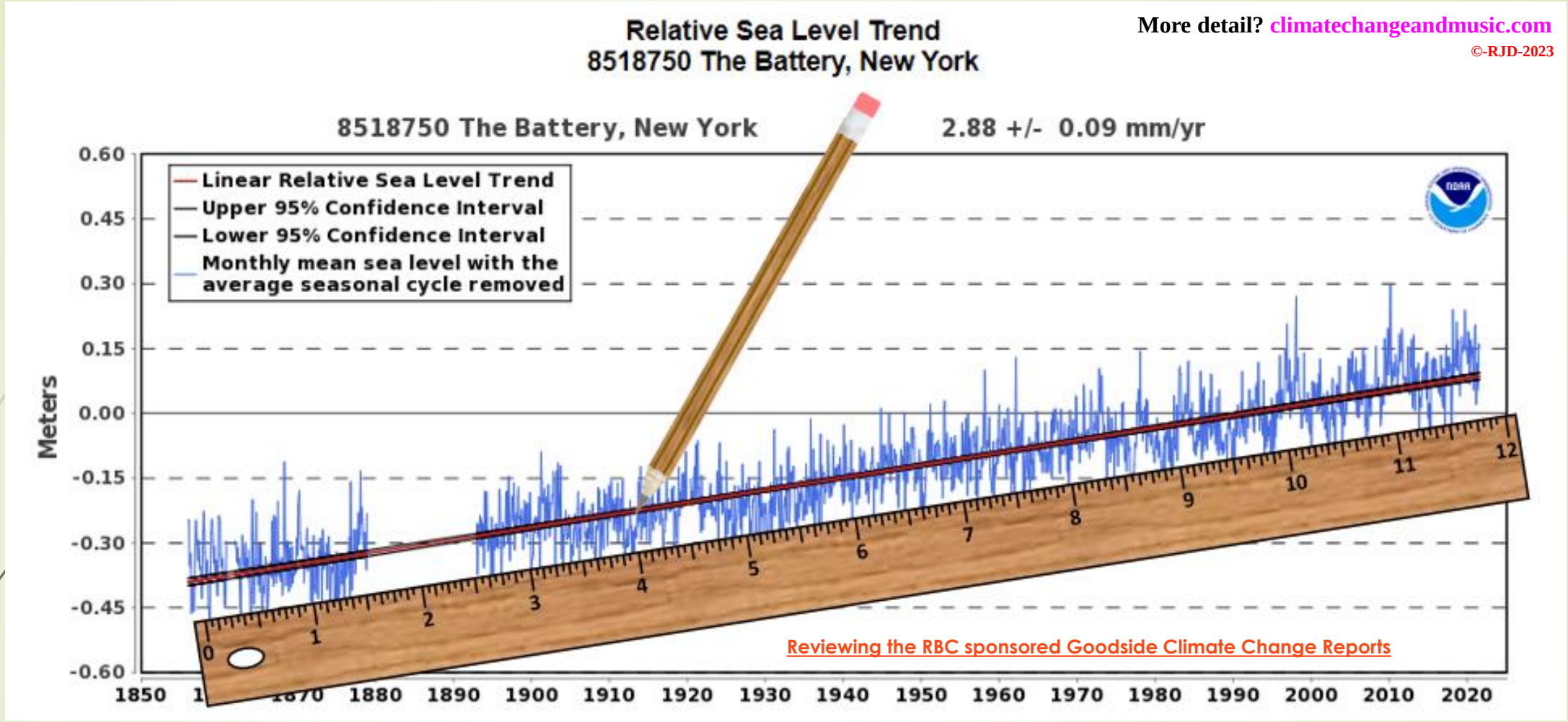


Back in January 2022, I was asked to look at the Goodside – Learning About Climate Change Report sponsored by the Royal Bank of Canada. I will not be going through the documents here. I am just going to address one small fact check that was recently brought to my attention. The "fact" check (by one of the prominent, "authoritative" organizations) is typical of the opinion checks that are routinely used to try and discredit real data and valid opinions that they do not like. The name of the organization is irrelevant, they all follow the same game plan. The chart above (a screen shot from NOAA's tide gauge database) shows the sea level rise at The Battery, New York since the mid 1800s. The linear regression is NOAA's. The pencil and ruler are my adds to show that a grade school student back in the early 1900s could have predicted the sea level at The Battery in the early 2020s. The statement that was fact checked is highlighted in red below. My analysis was questioned. Which is interesting since the analysis on this plot was done by NOAA, not me. And unless I am mistaken, that looks like a very good linear fit. And yes, The Battery at New York is typical. The tidal gauges all over the world are generally good, linear fits (regardless of how fast or whether sea levels are rising or declining). If the tidal gauge trend is linear, there is no long-term sea-level rise acceleration. Note, there are accelerations and decelerations on many different time scales throughout the data. But over time sea level rise has always returned to the long-term trend. There is some additional data available since this screenshot was produced. Additional ENSO activity has pushed the current sea level back above the trend. However, the AMO cold phase will bring the sea level back to trend.

**Sea Level Rise Fact Check**

"The tide gauges at the Battery in New York are representative of other tide gauge data around the world. The magnitude of the perceived sea level rise or fall can change (i.e.: the land itself may be rising, falling or stationary), but the long-term trends are generally straight lines. Meaning that sea level rise is not accelerating despite the continually increasing $CO_2$ levels."

# Sea Level Rise – Fact Check Related Tidal Charts

The two charts to the right are among the other chart options that NOAA provides. The top chart is the monthly mean sea level with the average seasonal cycle and linear trend removed. The data cycles above and below zero (i.e.: accelerations and decelerations) but the general trend is flat. Most of the positive mean sea levels over the last two and a half decades coincide with strong positive El Niño Southern Oscillation (ENSO) events (i.e.: El Niños). Many of the positive and negative spikes throughout the data would be related to El Niños and La Niñas, respectively, not necessarily $CO_2$. There are also longer-term trends in the data. The 60-year Atlantic Multi-decadal Oscillation (AMO) cycle can be seen in the data (a schematic representation is highlighted in red), There are, of course other forcings that act on the climate that can and do cause deviations. The climate is complicated and no one variable will correlate perfectly to the any climate parameter. The Variation of 50-Year Relative Sea Level Trends (the chart directly to the right) also shows the 60-year AMO trend. The 50-year Relative trend centered around 1950 peaked at a higher value (3.87 mm/year) than the current 1995 value (3.81 mm/year). Now that value could still go up when we have data out to 2045. But will that increase be statistically significant? Not likely, especially given the cooling expected from the coming cold AMO.

**Sea Level Rise Related Tidal Charts**



Interannual Variation
8518750 The Battery, New York

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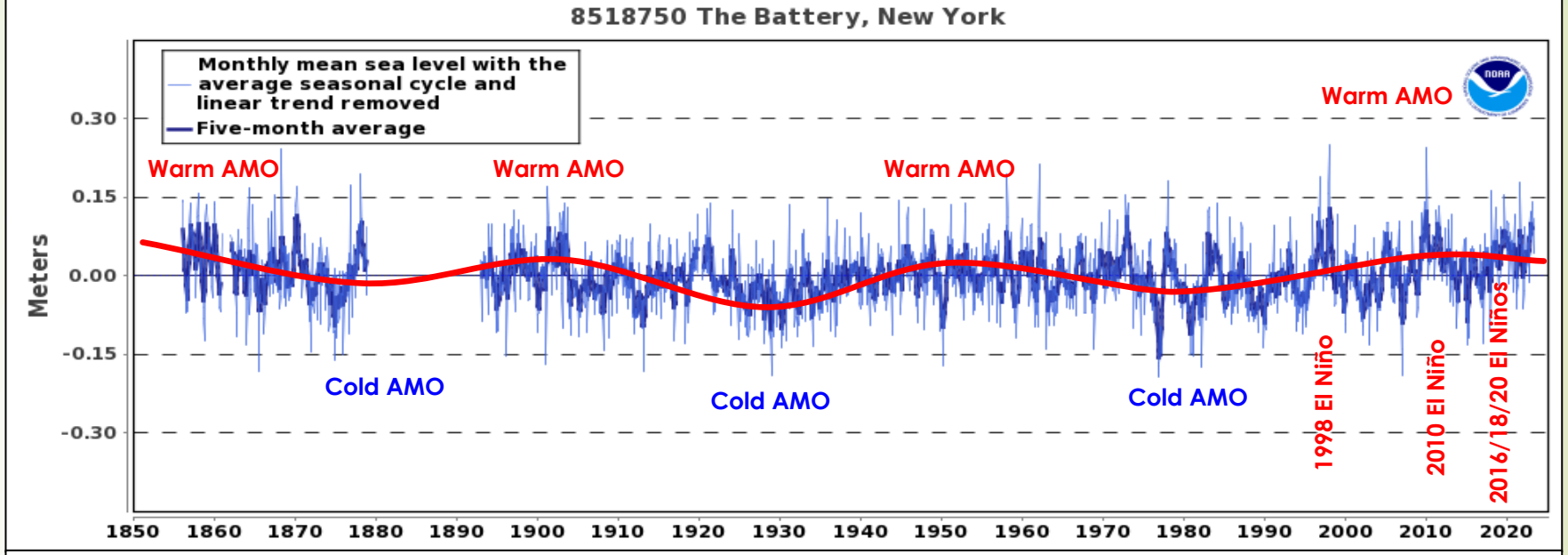
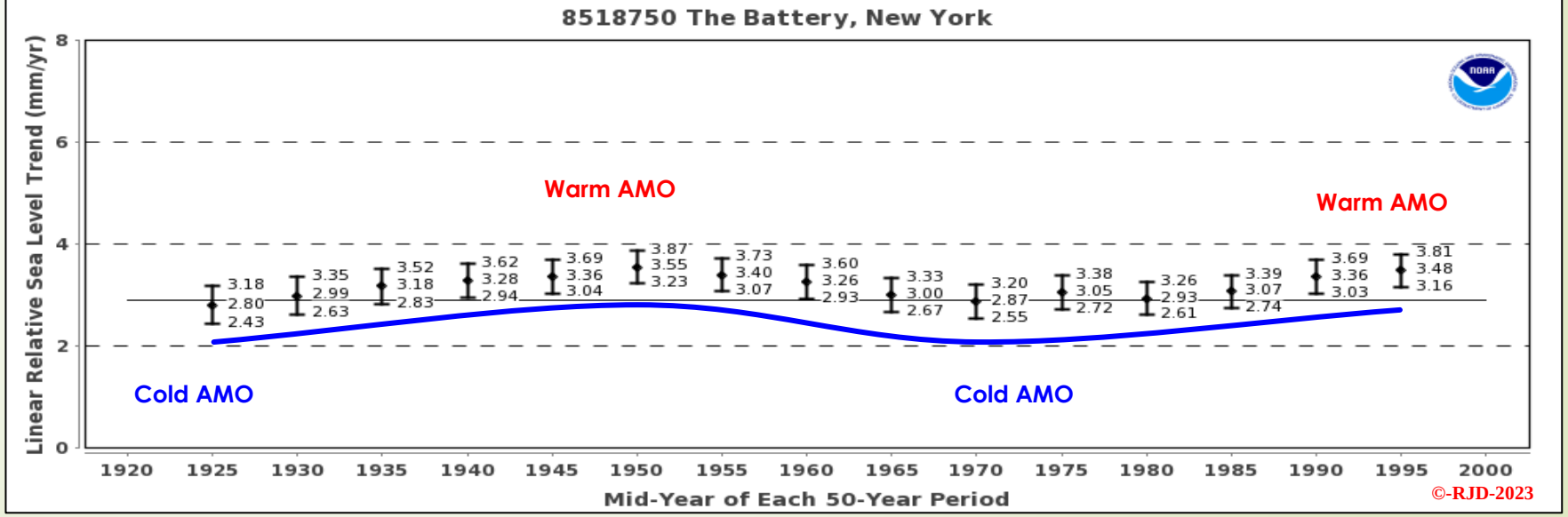



Variation of 50-Year Relative Sea Level Trends
8518750 The Battery, New York



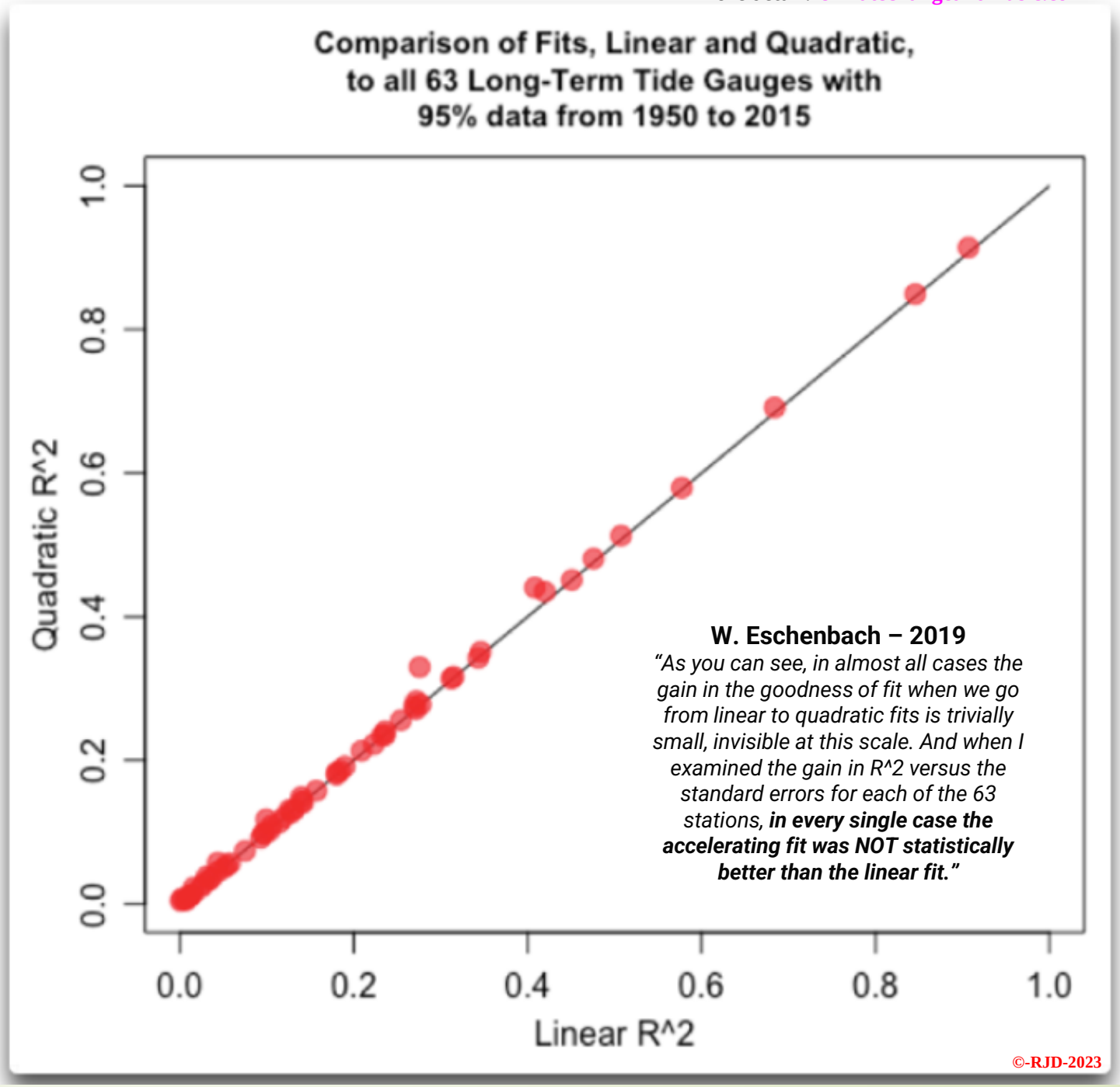
# Sea Level Rise – Fact Check - Global





**Sea Level Rise Fact Check Global**

Two documents were brought forward to dispute the statement I made. Which is again interesting because the statement I made was 100% factual. The documents use cherry picked data to argue for acceleration and leave out some very important perspective. The first document is a paper published in Nature ("*Persistent acceleration in global sea-level rise since the 1960s*", Dangendorf, S. et al, 2019). This study shows acceleration (on a global scale), but sea level rise did not begin in 1960. As with the tidal gauges, the global consolidations are subject to accelerations and decelerations throughout their history on many different time frames. When all the data is considered, that 1960 to the present acceleration is primarily an artifact of ocean cycle influence. $CO_2$ may have a small influence, but the ocean cycles are the main driver. We are just entering the cold phase of the Atlantic Multi-decadal Oscillation (AMO), which will lead to a deceleration in sea level rise and bring the sea level rise back to the long-term trend (as it has during every other AMO cold phase). Given the coming Grand Solar Minimum (GSM, forecasted by NOAA and others), we could very likely see sea levels begin declining as they were doing pre-1856. I will show those influences in the upcoming slides. The second document is a 2018 IPCC Report ("Sea Level Rise and Implications for Low-Lying Islands, Coasts and Communities"). The IPCC compared the 1900 to 1990 average sea level rise with the 2006 to 2015 average sea level rise. Yes, that is cherry picking. Comparing a 90-year period to a 10-year period does not even come close to representing any changes that may be present in the data. The same discussion associated with the Nature paper above applies here. The chart to the right shows a a comparison between linear and quadratic trends for the 63 long-term (pre-1950) tide gauges (with 95% data coverage) that are available. The chart comes from some work done be W. Eschenbach ("Sea Level Rise Accelerating? Not."). The tide gauges are statistically linear. So, any effects that are seen globally, do not show up in the tide gauges. There are potential reasons for these perceived discrepancies, and we will explore them throughout this post. But with respect to the original "fact" check, there is no doubt that the tide gauges show the individual trends are linear. There are only a few instances where the quadratic fit is even slightly better.



# CSS-46d Sea Level Rise – Fact Check - Global

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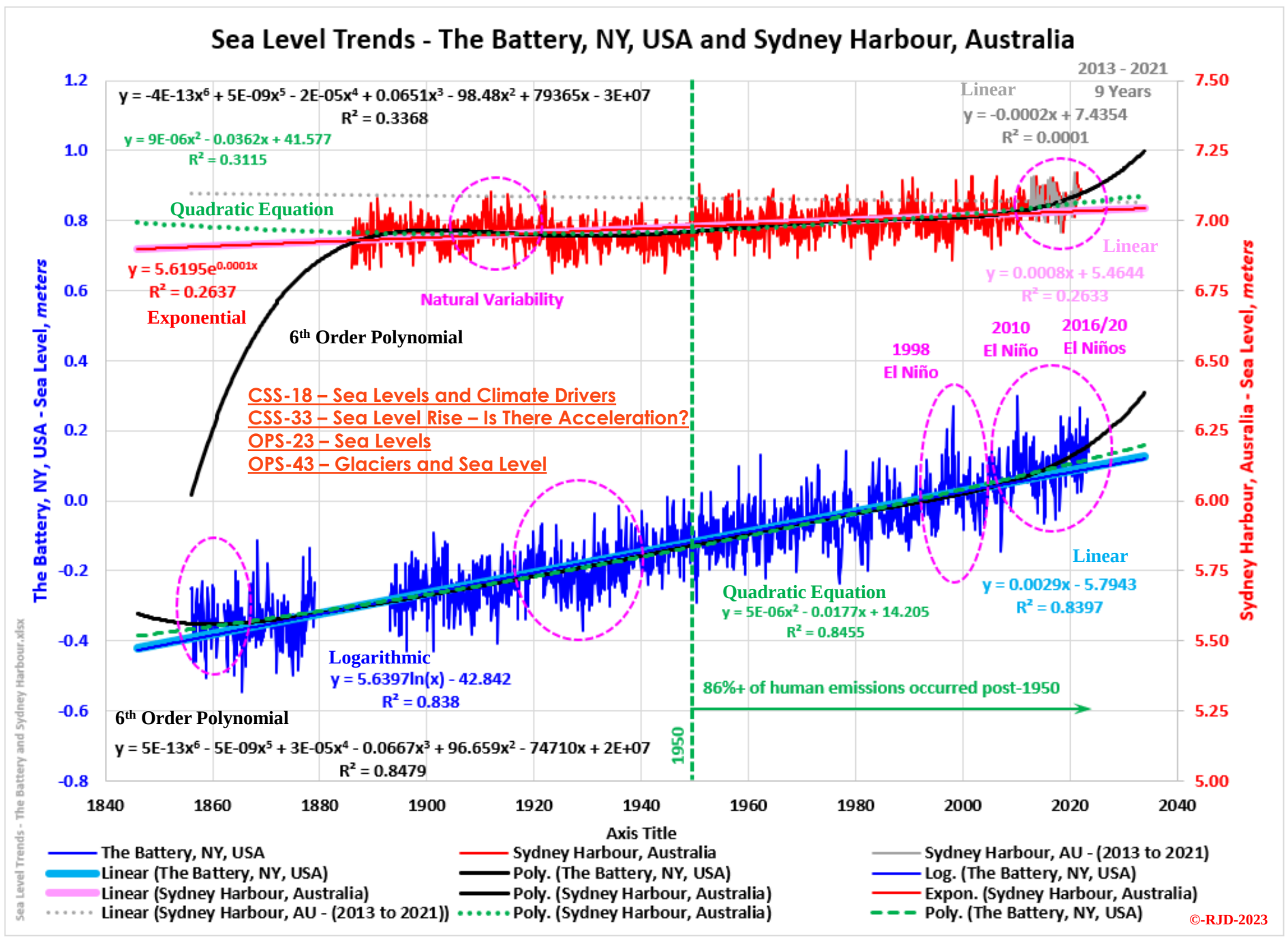
GSM – Grand Solar Minimum. The real "Climate Change" existential threat is right around the corner. Do the Research!

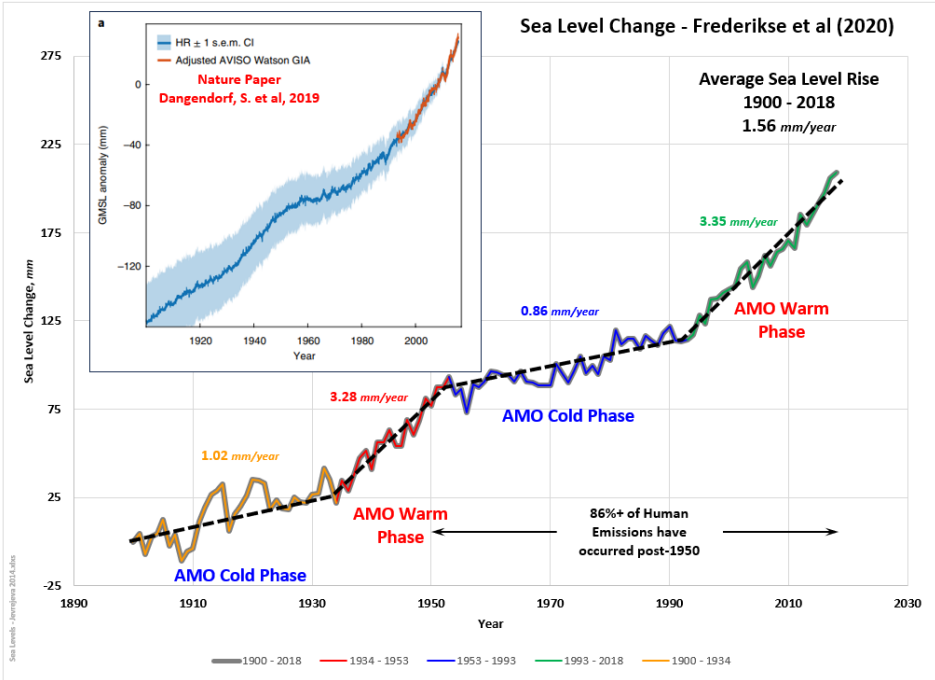
**Sea Level Rise**
**Battery, NY**
**Sydney, AU**

Before leaving the individual tidal gauge data, I have updated The Battery data, added in Sydney, Australia and did my own analysis on the two data sets. There are obviously many more tidal gauges around the world (many of which I have reviewed in the past (some links on the chart to the right)). Almost all of which will yield similar results. I applied a few different regressions (Linear, Logarithmic, Exponential, Quadratic Equation and 6th Oder Polynomial) to the two datasets. For the Battery, the Goodness of Fit is statistically the same for linear, logarithmic, quadratic and 6th order polynomial regressions. Sydney has a little more variation, but the fit is essentially linear through most of the history. The small deviations in the early and recent data will very likely revert to the long-term linear trend once the natural oscillations (i.e.: ocean cycles0 are properly considered. Note, the Sydney data ended in 2021 but had been flat since 2013. The fact checking community could easily do the same analysis on NOAA's tidal gauge database and disprove my original statement. After all, they do get paid to, I assume, check facts (i.e.: data). Or they may just continue to sow doubt on valid facts and opinions they do not like. Sea Levels do not fit the alarmist narrative.



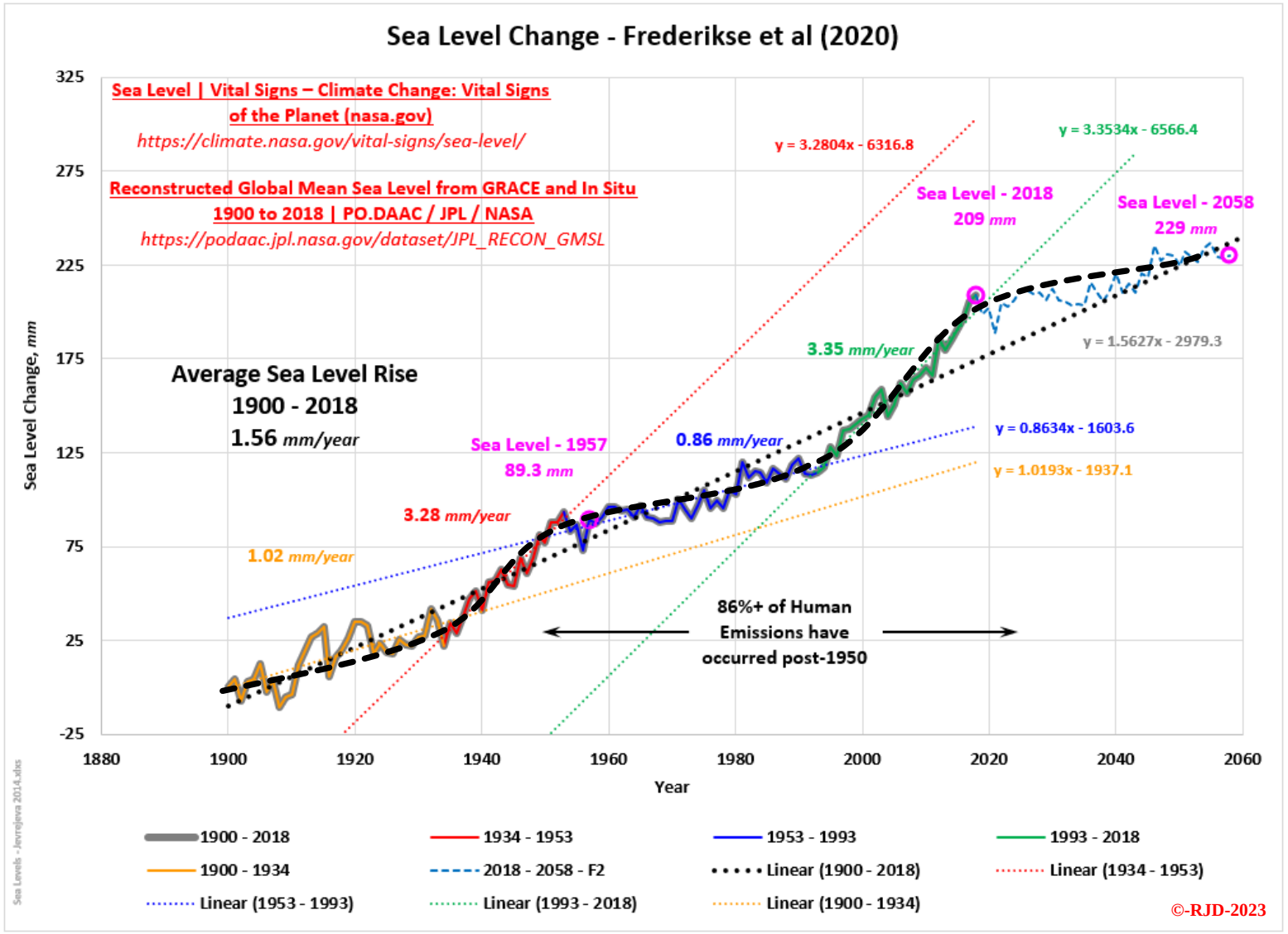
# Sea Level Rise – Fact Check – Global Consolidation






This slide looks at global sea level consolidations. The small inset on the plot to the left is a sea level rise image I pulled from the 2019 Nature paper referenced on the previous slide. The other curve to the left (and below) was prepared using the Frederikse et al 2020 data set. That same curve and the digital data can be found on NASA's website. The two datasets (to the left) both show the same acceleration and deceleration trends. What do they not show? The sea level rise deceleration that can be expected as the Atlantic Multi-decadal Oscillation (AMO) moves through its cold phase over the next 30 years. There are of course other ocean cycles that are also active (both locally and globally). The El Nino Southern Oscillation (ENSO) influence was highlighted on NASA's Earth Observatory website. The Pacific Decadal Oscillation (PDO) also acts globally (enhancing or muting the AMO Influence). What happens when the sea level rise decelerates? The sea levels revert to the long-term, "LINEAR" trend (i.e.: no statistically significant acceleration). That very likely deceleration is shown in the chart to the right by duplicating, then projecting the mid-1900s deceleration post-2018. While the sea level rise (3.35 mm/year) over the last 25 years has been higher than the long-term trend (1.56 mm/year), that rise is not unprecedented. The sea level was rising in the early 1900s at a 3.28 mm/year rate. Most of humanity's emissions (86%+) have occurred post-1950. So, the early 1990s sea level rise had very little to do our emissions. If the AMO was responsible for that rise, the AMO could just as easily be responsible for the 21st century rise with ENSO help in 2010/16.

**SLR Consolidation Global**



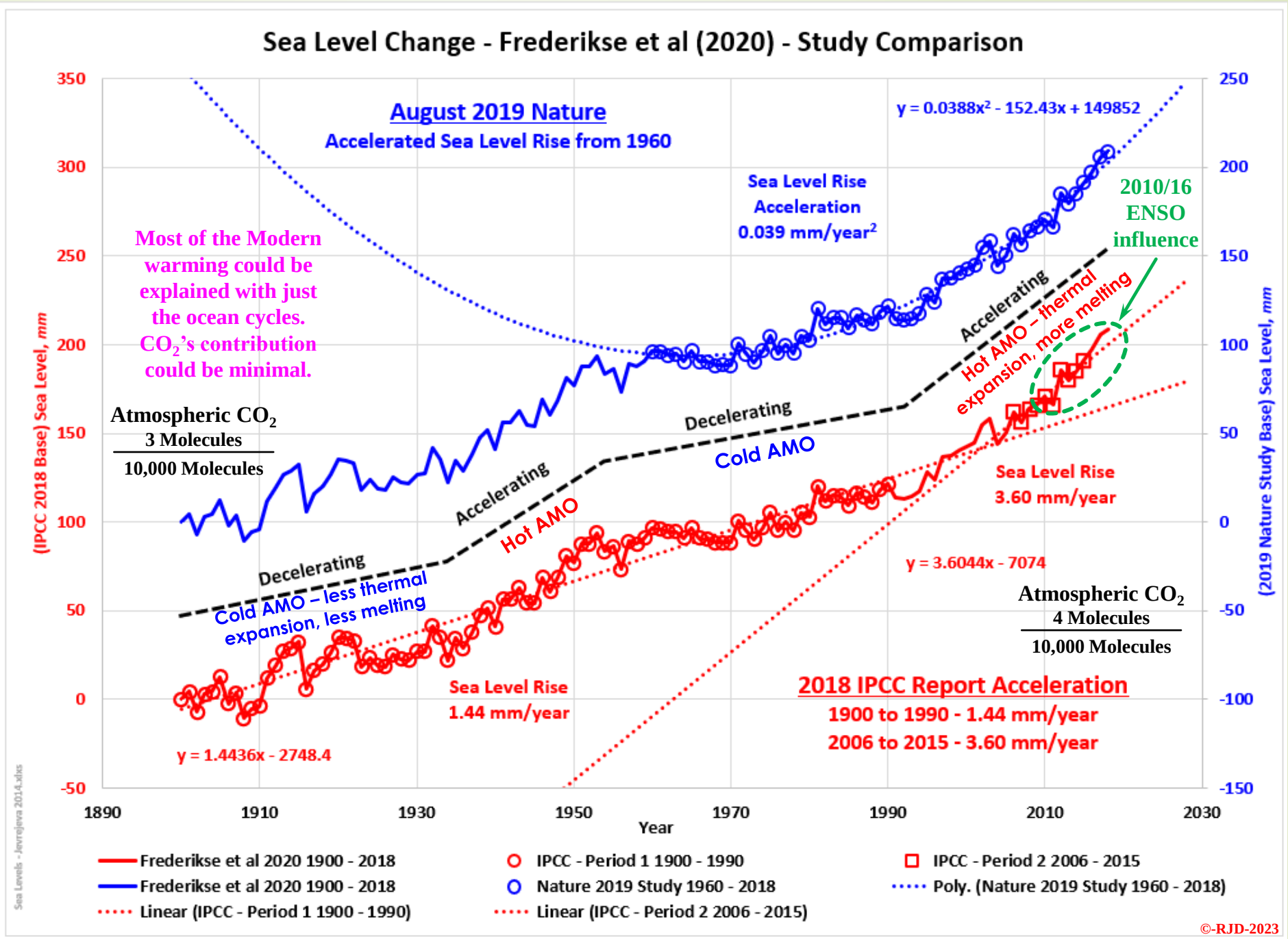
# Sea Level Rise – Fact Check – Study Comparisons





**This slide lays out the studies referenced in the original fact check pictorially. The blue curve highlights the post 1960 "acceleration" laid out in the August 2019 Nature paper. Ignoring half of the available data could be described as cherry picking. The natural forcings that produce the sea level rise oscillations (i.e.: alternating between accelerations and decelerations) will still be active in the future and they are being ignored by the current crop of ideological "climate scientists". The 60-year AMO appears to be the most prominent driver. During the AMO warm phase, sea level rise accelerates based on more thermal expansion and additional melting. During the cold phase, the opposite happens. The 2018 IPCC Report is highlighted in red. A different form of cherry picking, but still cherry picking. Comparing the 1900 to 1990 (90-year) sea level rise to the 2006 to 2015 (9-year) is totally unscientific. The IPCC should be ashamed. A reputable "fact checking" organization would investigate the IPCC and the rest of the alarmist community. Their ideologically simplistic, unscientific narratives are leading the world further into the financial, economic and environmental mess they had already helped to create. There is a whole lot more to "Climate Change" than $CO_2$.**

**SLR Study Comparisons**



# Sea Level Rise – Fact Check – Frederikse/Jevrejeva Comparison

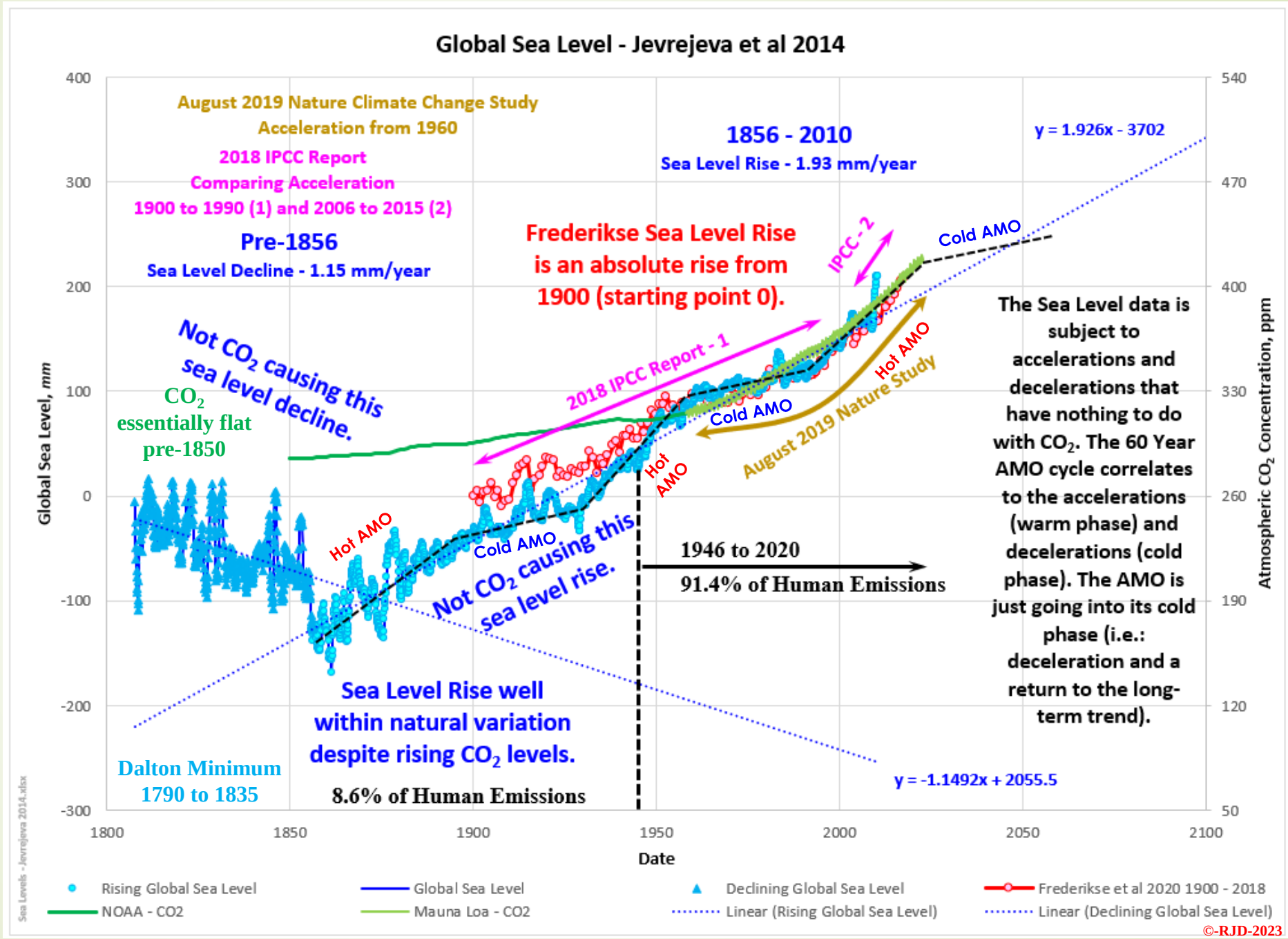




**Contrary to what most people see in the mainstream media, sea levels began changing well before 1900. The alarmist community does not like drawing any attention to any of the earlier data. I wonder why? I suspect that they really do not want to (nor want you to) see that sea levels were declining for decades pre-1856. If you believe that $CO_2$ is responsible for "Global Warming", then the pre-1856 sea level declines must be an affront to your belief systems. $CO_2$ was virtually flat pre-1850, with a modest rise of 26 ppm from 1850 to 1950 (≈20% of the increase since 1850). Since 1950, $CO_2$ concentrations have increased another 100+ ppm (≈80% of the increase since 1850). Given that 91.4% of our emissions have occurred post-1946, we have had very little to do with pre-1950 atmospheric $CO_2$ concentrations or sea level increases.**

**SLR Frederikse Jevrejeva**

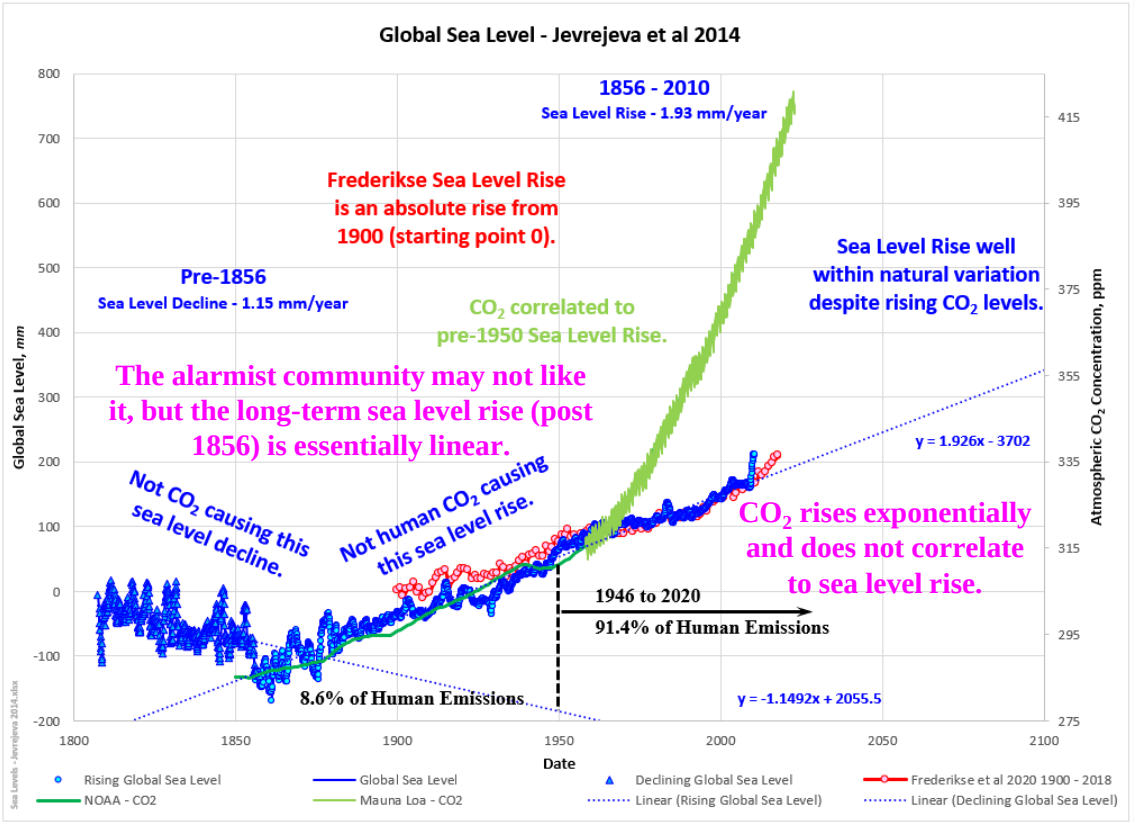
**The Frederikse et al data is plotted here with the longer Jevrejeva et al data set. The AMO influence is still visible in the Jevrejeva et al data. However, some other influence was obviously active pre-1856 (but definitely not $CO_2$). Strange how sea levels were declining during the cold of the Dalton Minimum and started rising again when Total Solar Irradiance had reached its post Dalton Minimum high. And somehow that was possible despite minor $CO_2$ increases.**



# Sea Level Rise – Fact Check – $CO_2$ Correlations

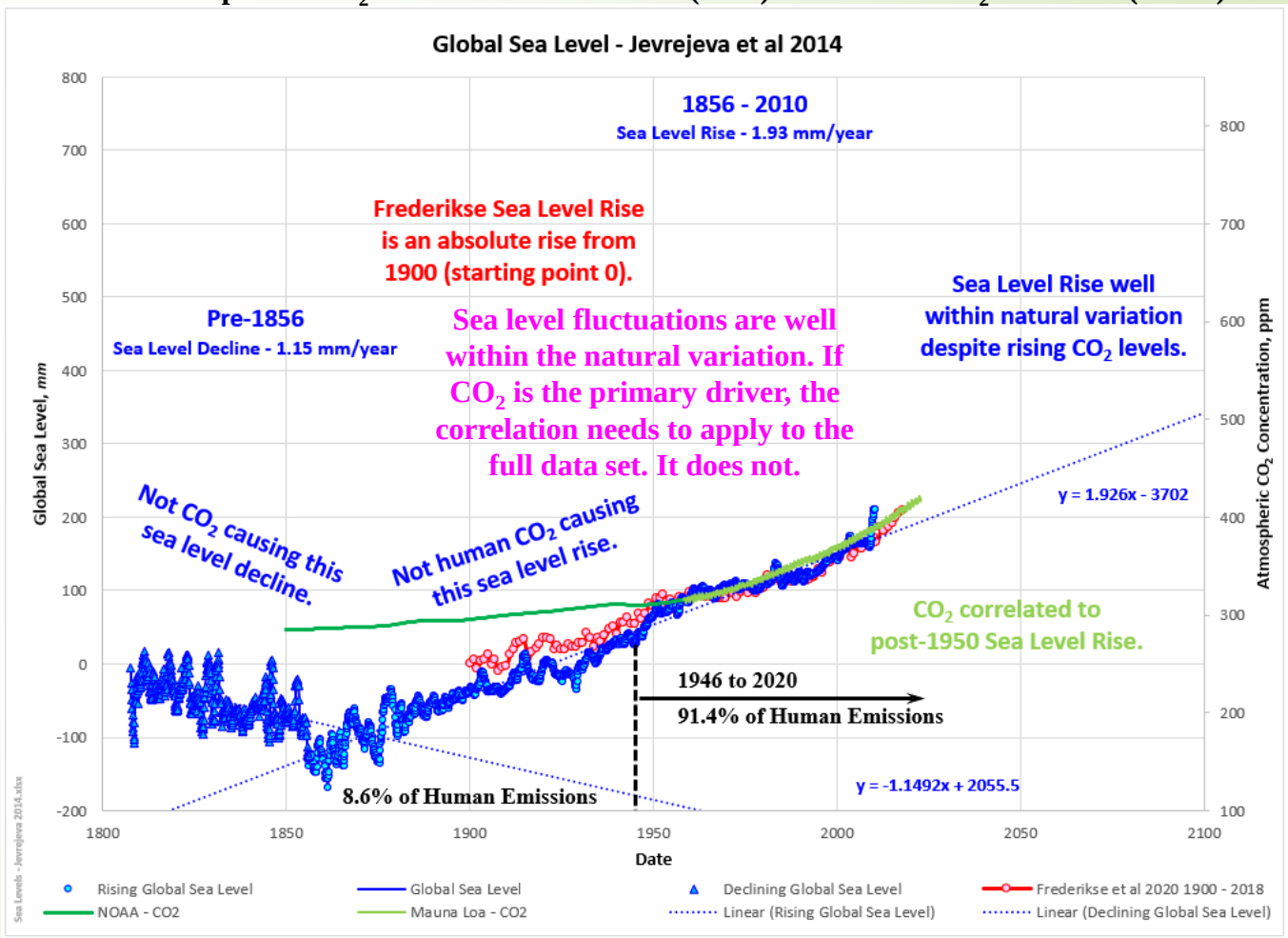







**SLR $CO_2$ Correlation**

**The Catastrophic Anthropogenic Global Warming (CAGW) alarmist community likes to constantly beat the rest of us over the head with their "$CO_2$ is the supreme climate driver of the universe" stick. Unfortunately for the alarmist community, sea levels do not actually cooperate with the alarmist narrative when all the data is considered. This slide lays out the $CO_2$/Sea Level correlation options. One obvious correlation does not exist. The alarmist narrative states that $CO_2$ is the primary climate driver and is responsible for the 1.07 °C temperature rise from pre-industrial levels. By extension, the alarmist narrative has also been attached to sea level rise. Someone forgot to review the correlation. $CO_2$ obviously has only minor if any influence on sea levels. The chart to the left is correlated to sea level rise from 1856 to 1950. Given that most of the atmospheric $CO_2$ concentration increases (80%) and human $CO_2$ emissions (86%+) occurred post-1950, the 1856 to 1950 sea level rise had very little to do with $CO_2$. The correlation post-1950 (to the right) corresponds more closely to the CAGW alarmist narrative since most of our anthropogenic influence (i.e.: $CO_2$ emissions) occurred post-1950. But for that to be true, you need to explain why sea level rise was the same before and after 1950. The natural forces acting on pre-1950 sea level rise did not suddenly stop in 1950 and hand the baton to $CO_2$ to keep sea level rise on the same long-term trend. Common sense would suggest that the pre-1950 natural forces were still active post-1950 and will still be active in the future. There are obviously accelerations and decelerations throughout the data (on many time scales) that are obviously not $CO_2$ driven. Those accelerations and decelerations have always brought sea levels back to the long-term linear trend. The cold AMO phase will likely do the same over the next few decades. Declining sea levels also do not fit the narrative.**




GSM – Grand Solar Minimum. The real "Climate Change" existential threat is right around the corner. Do the Research!

# Sea Level Rise – Fact Check – Model Projections





**The only place the alarmist narrative is alive and well is in the climate models. Those same models that are self-acknowledged by the IPCC and their modelers to run way too hot and use low likelihood (i.e.: implausible) emission scenarios. Does it surprise anyone that sea level projections are also overstated? If you are projecting unrealistic future temperatures, you will also project unrealistic sea level increases. How bad are the projections? Really bad! Even the lowest emission scenario projects significantly more sea level rise than any of the data extrapolations. And that ignores the very real deceleration that the cold AMO will very likely produce over the next 30 years. That deceleration can very easily morph into a declining sea level as we move into the Grand Solar Minimum (GSM, as NOAA (and others) have forecasted). An abrupt correction in sea level rise (the reverse of what happened in 1856) may well be on the horizon. The AMO and GSM will gradually drop the temperatures but will likely be accompanied by a more abrupt cooling event, the Beaufort Gyre (BG, fresh cold water) release into the Atlantic. Sea level changes will be manageable, but the temperature changes that affect sea level will have very profound negative effects on our society as temperatures decline over the next few decades.**

**SLR Model/Data Projections**