Coastal life is not under threat by the carbon dioxide emissions

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1. Introduction

Sea level rise scenarios of 1 to 7 m by 2100 due to melting glaciers and thermally expanding ocean masses are possible only with warming that is implausible because while the as carbon dioxide emissions grow exponentially, global temperatures are naturally oscillating\(^1\)-\(^7\), measurements of mean sea levels from long term tide gauges are free of any acceleration\(^1\), the temperature and salinity of the world oceans 0–2000 m has not changed over the first decade it has been measured\(^1\), and while the Arctic ice sheets are reducing, the Antarctic ice sheets are actually expanding over the 35 years they have been monitored by satellite\(^1\).

While there is no reason to further comment the unreliability of climate models that is discussed in\(^1\)-\(^7\), the subject of this paper is to argue about the global mean sea level (GMSL) reconstructions dependent on tide gauge records that individually are all not accelerating.

It will be shown that reconstructed GMSL may produce a trend resembling the carbon dioxide emissions by selective filtering information and stacking older records located in areas of lower rates of rise with more recent records located in areas of higher rates of rise with procedures lacking of transparency. If the climate models and the GMSL reconstructions supporting the exponential rise theory are not reliable, and all the tide gauges of the world of enough quality and length are all acceleration free, then the only possible forecast of future sea levels can be locally done by simply fitting the data locally recorded up to date.

2. Actual warming of the oceans

Global temperatures have certainly warmed over the last 100 years less than the 0.75 °C of the Goddard Institute for Space Studies (GISS) reconstruction\(^1\)-\(^7\). Over the last
In the GISS time series, there have been two upwards phases and two downwards phases of a 60-year oscillation with warming phases from 1910 to 1940 and 1978 to 2000 and cooling phases from about 1940 to 1977 and 2000 to present[1-7]. Since the beginning of this century, there has been no warming.

**Figure 1.** Time series of Argo temperatures of the world oceans March 2004 to March 2013 and yearly averaged constant temperature lines over the years 2004 and 2012 in the layer 0–2000 m.
The main problem of the GISS and other global land and sea surface temperature reconstructions is that ground-based recording stations have been found to be unreliable (see researches of Watts for two examples of the many[13,14]) and not many measurements were available for the most part of the oceans. Land temperatures are also often biased upwards by modified heat storage and heat release processes.

In consideration of the upwards bias by contamination and heat island effects, the overestimation of the land vs. the sea component, the lack of accuracy, the overestimation of measured warmings in rural and remote areas, the actual global warming over the last century is certainly much less the GISS value, and much of this warming is most likely natural oscillation[1-7]. The actual warming is possibly 0.2–0.3 °C per century at the most[6,7].

The warming of the land and sea surface is not the average warming of the oceans. Very little warming has possibly occurred over the last century. For sure, during the first decade the world oceans temperature (and salinity) have been measured 0–2000 m depth, changes have been smaller than the measuring accuracy[15].

Figure 1 is the time series of the Argo temperatures of the world oceans March 2004 to March 2013 and yearly averaged constant temperature lines over the years 2004 and 2012 in the layer 0–2000 m[16]. Globally and locally changes are minimal. Similarly to temperatures, salinity also changes negligibly. Figure 2 is the satellite assessment of Arctic and Antarctic ice sheets[12]. Over the 35 years of the monitoring, the Arctic ice sheets are reducing while the Antarctic ice sheets are increasing, consistently with the air surface temperatures also measured by the satellite[17] respectively increasing for the Arctic and decreasing for the Antarctic.

3. Latest Intergovernmental Panel on Climate Change (IPCC) predictions of sea level rise by 2100

In the latest IPCC WGI fifth assessment report chapter 13, sea level change proposes sea level rises of 0.3 to 0.8 m by 2100. However, it is not uncommon to read of sea level rises of 1 to 7 m in studies of the impact of sea level rise for coastal planning.

Even if the IPCC continues to support the theory that the carbon dioxide emission is warming the planet exponentially and global sea levels are exponentially accelerating because of thermal expansion and melting of glaciers, during this century of lack of any warming in properly measured temperatures[1–7,15], lack of any acceleration in properly measured sea levels[1,2,8–10,15,18–30], and lack of any loss of ice sheets[11], it does not appear likely that the sea levels will rise more than the few centimetres of the past century during this century no matter what the carbon dioxide emissions could be.

4. The Permanent Service For Mean Sea Level (PSMSL) database

Before attempting any GMSL reconstruction, it should be
advised to appreciate the limitations of the geographical coverage of the mean sea level data set as well as the quality and length requirements of a tide gauge signal.

There are approximately 2000 stations in the PSMSL database for which monthly and annual mean sea level information is available. However, many stations have historically only been measured for some months or years.

The geographical distribution of longer records contains significant geographical bias towards the Northern Hemisphere (Europe, Japan and USA). Additionally, the tide gauge records do not cover the same time period, and many have quality issues.

Only the long term time series may be used to infer sea level trends if there are no quality issues.

Figure 3a shows the locations of sites with not at least 40 years of data. The coverage of the map is everything but good. The coverage drops dramatically requiring at least 60 years of data. Figure 3b presents the number of PSMSL stations with data available from Northern and Southern Hemisphere (NH and SH respectively). Brown colour corresponds to the mean sea level data available from NH and blue colour corresponds to the mean sea level data available from SH[31].

Especially the SH is not covered enough.

Limited coverage and changing demography of the population are the major issues, with length and quality of the individual records the other factor to consider in assessing global trends.

5. The land motion

Tide gauges do not measure the absolute sea level but the sea level relative to the land. Sea levels may then rise or fall simply because the land is moving downwards or upwards.

Figure 4 presents computational result for the Glacial Isostatic Adjustment (GIA) that is only one of the many known mechanisms that may produce land motion[18]. The land motion has a velocity comparable in module with the velocity of rise or fall of the oceans. The modelling result of the figure shows the present mass change due to post-glacial rebound and the reloading of the ocean basins with seawater.

Additional land motions exist because of other more local phenomena, both natural and man-made, as it is the case of the large subsidence along the coast of the US states of Texas or Louisiana or in the Pacific atolls.

Global position system (GPS) may help understanding the land motion contribution to the tide gauge signal[32], but in the limit of the accuracy of the measurement of the vertical position, the stability of the positioning of the tide gauge vs. the GPS datum, the recalibration issues and the reduced length of the record.

6. Issues in assessing global mean sea levels

Tide gauge records are the primary data sets to determine the historical sea level changes over the last 100–150 years. Tide gauges provide an excellent measure of the sea level changes relative to land in particular locations. Being attached to the land, which moves vertically, the tide gauges do not give the absolute sea level, but only the relative. This impacts the sea level rate of rise.

Tide gauges are poorly distributed around the world, located at continental coastlines and on islands, mostly in the NH. As clearly stated by PSMSL[33], “if we are aiming to understand the non-uniformed changes in global or regional sea level for the past 200 years, or to understand the role of inter-annual, decadal, or multi-decadal variability then there is a challenge to use substantial amount of data collected by different countries that is available from the Permanent Service for Mean Sea Level”.

The GMSL reconstructions are wrongly assimilated to measurements. The GMSL reconstructions are actually a computation, where the resulting trends depend on the filtering of the experimental information in and out of the
computation, and the details of the computational algorithm everything but clear used to stack tide gauge records of different length from different areas with different weights.

Tide gauge records have a behaviour differing from one site to the other, with many factors affecting the reading of sea-to-land relative position not always under control, and the many perturbing events that over the time may reduce the quality of the record.

Furthermore, sea levels oscillate dramatically, with many higher frequency oscillations, a general, strong, multi–decadal oscillation of quasi–60 years requiring more than 60 years of data to infer any trend.

The amplitudes of the oscillations are generally different site to site and geographical area to geographical area, and the different oscillations generally have different phases and periodicities.

Tide gauges satisfying the quality and length requirements worldwide are unfortunately not enough, and this leaves space to misinterpretations.

7. Discussion of the GMSL reconstruction by Olivieri and Spada

The major issue in the simple stacking of tide gauges in the study of Olivieri and Spada\(^{[34]}\) but also in the other GMSL reconstruction\(^{[31,35–37]}\) is the variable demography of the stations considered in each year to derive the time series, plus the use of very short records.

By simply stacking one tide gauge of low rate of rise covering a long time window with another tide gauge of high rate of rise covering a small time window, even if the two tide gauges are acceleration–free, their result will show acceleration.

With record length below the length of the multi–decadal oscillations, not only the quasi–60 years, but also for example the quasi–20 years of the Southern Ocean index in the Pacific, linear fitting may provide rates of rise many times larger (or smaller, depending on the cherry–picking) than the legitimate values.

If we do consider the stacked (ST) time series of Olivieri and Spada\(^{[34]}\), over the first half of the 1800s, when the sea level is reducing, the supporting data are very few scattered numbers in very few locations. The situation only marginally improves in the second half of the 1800s, where the supporting tide gauges are still restricted to very few locations. While the number of stations used is less than 10 in the first part of the 1800s, it is larger than 200 in the second half of the 1900s. This is the reason why the ST curve of the study of Olivieri and Spada\(^{[34]}\) has a decreasing sea level 1810 to 1830, and then a rising sea level 1830 to present, with a positive averaged acceleration, further boosted by using many recent short records for high rates of rise areas as the Pacific.

The changed demography of the population of tide gauges representative of areas characterised by different rates of sea level rises is responsible for the trend in addition to the natural oscillations. The constant acceleration and the catastrophic variations of the sea level trend of Olivieri and Spada\(^{[34]}\) are therefore everything but real.

8. Discussion of the GMSL reconstruction by Church and White

The most popular reconstructions of GMSL are those by Church and White since 1870\(^{[31]}\) and since 1880\(^{[35]}\), by Jevrejeva et al. since 1807\(^{[36]}\) and by Jevrejeva et al. since 1700\(^{[37]}\), all based on PSMSL data.

Considering the PSMSL data\(^{[33]}\) has only two tide gauges available prior of the mid 1800s, only the reconstructions by Church and White\(^{[31,35]}\) are discussed here. The latest time series is referred here after as Commonwealth Scientific and Industrial Research Organization (CSIRO) GMSL and is available in the research by CSIRO\(^{[38]}\).

The reconstruction\(^{[31]}\) used monthly–mean tide gauge data from PSMSL, together with Empirical Orthogonal Functions from a 12–year TOPEX/Poseidon+Jason–1 satellite altimeter data set to ”reconstruct” a GMSL curve from January 1870 to December 2001.

No inverted barometer correction was applied, but tide gauge data was nominally corrected for GIA but only accounting for the vertical upwards movement of the land.

The reconstruction\(^{[31]}\) was updated to December 2011 in the study of Church and White\(^{[35]}\), but with the time series now starting in January 1880.

It has been already commented that the reconstruction\(^{[38]}\) is always positively accelerating, while the long term tide gauges of PSMSL are all acceleration–free\(^{[8–10]}\). It has also already been shown in the study of Parker\(^{[11,12]}\) that while the reconstruction\(^{[7]}\) very well correlates to the anthropogenic carbon dioxide emission, it does not correlate that well with the temperature reconstructions\(^{[3–7]}\). The GMSL of the research by CSIRO\(^{[38]}\) has a rate of rise continuously rising up the present maximum values over the full length of the time series, and the maximum positive accelerations values are obtained after almost 15 years of no warming in the temperatures\(^{[1,2]}\).

The procedure of CSIRO’s research\(^{[38]}\) is scientifically built on the selective filtering of information to produce a GMSL time series closely resembling the anthropogenic carbon dioxide emission, as shown later in Figure 4. The constant acceleration of the sea level trend of CSIRO\(^{[38]}\) is therefore everything but real.

9. A technique to analyse individual tide gauges

In tide gauge time series, the dependent $y$–values, the monthly average sea levels, are a function of the independent $x$–values, the time in years. The classic approach to analyse sea level data is to use a linear fit:

$$y=y_0+a x \quad (1)$$

In this equation, $y_0$ and $a$ are constants. The average sea level rate (SLR) of rise over the period of observation is $SLR=a$.

From a recorded time series $x_i, y_i, i=1, \ldots, N$ with $i=1$ the oldest data point and $N$ the latest data point, it is possible to compute by linear fitting many rates of rise $SLR_{j,k}$ depending on the initial and final points $j,k$ selected in the distribution.
The calculations for the sea level rate of rise SLR_{j,k} is based on the formula:

\[
SLR_{j,k} = \frac{\sum_{i=j}^{k} (x_i - \bar{x}) \cdot (y_i - \bar{y})}{\sum_{i=j}^{k} (x_i - \bar{x})^2}
\]

In this equation, \(\bar{x}\) and \(\bar{y}\) are the sample means and \(j\) and \(k\) are the indices of the first and last record of the measured distribution considered for the particular SLR estimation.

At a certain time \(x_k\), \(x_j\) is taken as \(x_1\) when computing the SLR_{1,k}. Different time windows may show the relevance of the multi-decadal oscillations and guess the error that could be done in neighboring locations with short records. Minimum 60 years of data are necessary to compute a reasonable SLR_{1,k} and being the sea levels fluctuating, the SLR_{1,k} still may fluctuate about the longer term trend even after 60 years.

An acceleration parameter may be computed as the time rate of change of this SLR_{1,k}. Because of the multi-decadal oscillations, this acceleration parameter will then fluctuate in between small positive and small negative values.

Apart from other quality issues as change of datum, damage of the tide gauge, construction works near the tide gauge, and every other bias to the reading, the tide gauge records have often significant gaps. The best records are those with more data, no gaps and without any biasing factor.

10. Latest table of relative mean sea level secular trends from PSMSL.

If we do consider the latest table of relative mean sea level secular trends in the study of Church and White[31] (Last update 09–Jan–2013), there are listed 543 tide gauges, of average number of years recorded 56, average time span of data 61 years and average completeness 92%. The average rate of rise of sea level of this population is \((1.09\pm0.44)\) mm per year.

Introducing the requirement of minimum 60 years of recorded data, the number of stations drops to 165. This time, the average number of years recorded is 91, the average time span of data is 97 years and the average completeness is 94%. The average rate of rise of sea level of this population is \((0.30\pm0.18)\) mm per year. This compilation of tide gauges is proposed in Table 1.

A simple way to assess the presence or the absence of a global sea level acceleration is to compare the SLR_{1,k} of a compilation of tide gauges as the one of Table 1 from one year to another. The time rate of change of the average SLR_{1,k} is an indicator of the presence or absence of a global sea level acceleration much more reliable than the fitting of the reconstructed GMSL with a parabola.

The low average rate of rise of sea level free of acceleration is absolutely not supportive of any catastrophic sea level rise scenario.

11. Analysis of the 24 oldest tide gauges of the world in the PSMSL database

If we do consider the 24 oldest tide gauges of the PSMSL

Table 1

| Tide gauge         | Country | Years recorded | Years Open | Completeness | Starting year | End year | Rate of rise [mm/y] | Standard error [mm/y] |
|--------------------|---------|----------------|------------|--------------|---------------|----------|---------------------|-----------------------|
| Brest              | FRA     | 182            | 205        | 89%          | 1807          | 2011     | 1.05                | 0.05                  |
| Swinoujscie        | POL     | 181            | 189        | 96%          | 1811          | 1999     | 0.83                | 0.06                  |
| Cuxhaven 2         | DEU     | 168            | 168        | 100%         | 1843          | 2010     | 2.53                | 0.08                  |
| Maasshluss         | NLD     | 164            | 164        | 100%         | 1848          | 2011     | 1.66                | 0.07                  |
| Wismar 2           | DEU     | 162            | 165        | 99%          | 1849          | 2011     | 1.42                | 0.08                  |
| San Francisco      | USA     | 157            | 157        | 100%         | 1855          | 2011     | 1.42                | 0.08                  |
| Warnemunde 2       | DEU     | 155            | 156        | 99%          | 1856          | 2011     | 1.25                | 0.06                  |
| Vloissingen        | NLD     | 150            | 150        | 100%         | 1862          | 2011     | 1.38                | 0.10                  |
| Travemunde         | DEU     | 148            | 156        | 95%          | 1856          | 2011     | 1.64                | 0.05                  |
| Hoek Van Holland   | NLD     | 148            | 148        | 100%         | 1864          | 2011     | 2.39                | 0.06                  |
| Den Helder         | NLD     | 147            | 147        | 100%         | 1865          | 2011     | 1.47                | 0.07                  |
| Delfzijl           | NLD     | 147            | 147        | 100%         | 1865          | 2011     | 1.69                | 0.08                  |
| Harlingen          | NLD     | 147            | 147        | 100%         | 1865          | 2011     | 1.38                | 0.08                  |
| Sjöudden           | NLD     | 140            | 140        | 100%         | 1872          | 2011     | 1.62                | 0.10                  |
| New York (The Battery) | USA     | 138           | 136        | 88%          | 1856          | 2011     | 2.84                | 0.06                  |
| Helsinki (The Battery) | FIN     | 133           | 133        | 100%         | 1879          | 2011     | -2.31               | 0.15                  |
| Poti               | GEO     | 127            | 136        | 93%          | 1874          | 2009     | 6.56                | 0.14                  |
| Olandssonnareide    | SWE     | 125            | 125        | 100%         | 1887          | 2011     | -1.11               | 0.13                  |
| Kungsholmsoff       | SWE     | 125            | 125        | 100%         | 1887          | 2011     | 0.01                | 0.12                  |
| Stockholm          | SWE     | 123            | 123        | 100%         | 1889          | 2011     | -3.82               | 0.14                  |
| Landsort           | SWE     | 119            | 119        | 100%         | 1887          | 2005     | -2.91               | 0.14                  |
| Fredericia         | DNK     | 119            | 122        | 98%          | 1890          | 2011     | 1.09                | 0.07                  |
| Ratan              | SWE     | 119            | 120        | 99%          | 1892          | 2011     | -7.76               | 0.17                  |
| Esbjerg            | DNK     | 118            | 122        | 97%          | 1890          | 2011     | 1.20                | 0.12                  |
| Vaasa/Vasa         | FIN     | 117            | 128        | 91%          | 1884          | 2011     | -7.20               | 0.14                  |
| Mumbai/Bombay (Apollo Bandar) | IND | 116         | 131        | 89%          | 1878          | 2008     | 0.82                | 0.08                  |
| Marseille          | FRA     | 116            | 127        | 91%          | 1885          | 2011     | 1.26                | 0.07                  |
| Trieste            | ITA     | 115            | 137        | 84%          | 1875          | 2011     | 1.33                | 0.09                  |
| Aarhus             | DNK     | 113            | 123        | 92%          | 1889          | 2011     | 0.64                | 0.07                  |
| City                  | Country | 1999 | 2011 | Change  | Year of Establishment | Year of Abandonment |
|----------------------|---------|------|------|---------|----------------------|---------------------|
| Seattle              | USA     | 113  | 113  | 100%    | 1899                 | 2011                |
| Gedser               | DNK     | 112  | 114  | 98%     | 1898                 | 2011                |
| Hitshals             | DNK     | 109  | 120  | 91%     | 1892                 | 2011                |
| Konor                | DNK     | 109  | 115  | 95%     | 1891                 | 2011                |
| Hornbaek             | DNK     | 109  | 114  | 96%     | 1898                 | 2011                |
| Sydney, Fort Denison | AUS     | 108  | 109  | 100%    | 1896                 | 1903                |
| Baltimore            | USA     | 107  | 109  | 98%     | 1903                 | 2011                |
| Honolulu             | USA     | 107  | 107  | 100%    | 1905                 | 2011                |
| Philadelphia (Pier 9N)| USA     | 106  | 111  | 95%     | 1903                 | 2011                |
| Osaka/Uleaborg       | DNK     | 105  | 123  | 85%     | 1899                 | 2011                |
| Slipshavn            | DNK     | 105  | 116  | 94%     | 1896                 | 2011                |
| Langeland            | DNK     | 103  | 104  | 99%     | 1912                 | 2011                |
| Melbourne            | AUS     | 103  | 106  | 97%     | 1906                 | 2011                |
| New Haven            | USA     | 102  | 103  | 100%    | 1909                 | 2011                |
| Portland             | USA     | 102  | 103  | 100%    | 1902                 | 2011                |
| Klaipeda             | LTU     | 101  | 114  | 91%     | 1896                 | 2011                |
| San Diego            | USA     | 101  | 108  | 95%     | 1897                 | 2011                |
| Hornbaek             | DNK     | 100  | 110  | 96%     | 1898                 | 2011                |
| Sydney, Fort Denison | AUS     | 100  | 108  | 98%     | 1906                 | 2011                |
| Hornbaek             | DNK     | 100  | 110  | 95%     | 1898                 | 2011                |
| Sydney, Fort Denison | AUS     | 100  | 107  | 100%    | 1909                 | 2011                |
| Portland             | USA     | 99   | 109  | 99%     | 1903                 | 2011                |
| Klaipeda             | LTU     | 99   | 114  | 91%     | 1896                 | 2011                |
| San Diego            | USA     | 99   | 106  | 97%     | 1906                 | 2011                |
| Hornbaek             | DNK     | 98   | 104  | 99%     | 1912                 | 2011                |
| New Haven            | USA     | 98   | 106  | 97%     | 1906                 | 2011                |
| Portland             | USA     | 98   | 109  | 99%     | 1903                 | 2011                |
| Klaipeda             | LTU     | 98   | 114  | 91%     | 1896                 | 2011                |
| San Diego            | USA     | 98   | 106  | 97%     | 1906                 | 2011                |
| Hornbaek             | DNK     | 97   | 110  | 95%     | 1898                 | 2011                |
| New Haven            | USA     | 97   | 108  | 99%     | 1906                 | 2011                |
| Portland             | USA     | 97   | 109  | 99%     | 1903                 | 2011                |
| Klaipeda             | LTU     | 97   | 112  | 91%     | 1896                 | 2011                |
| San Diego            | USA     | 97   | 106  | 97%     | 1906                 | 2011                |
| Portland             | USA     | 97   | 110  | 99%     | 1903                 | 2011                |
| Klaipeda             | LTU     | 97   | 114  | 91%     | 1896                 | 2011                |
| San Diego            | USA     | 97   | 106  | 97%     | 1906                 | 2011                |
Continued Table 1

| City               | Country | Start Year | End Year | Minimum | Maximum | Mean |
|--------------------|---------|------------|----------|---------|---------|------|
| Lysekil            | SWE     | 1887       | 1944     | 1.0     | 4.0     | 2.0  |
| Raader/Brahestad   | NOR     | 1887       | 1944     | 1.0     | 4.0     | 2.0  |
| Lysvitt            | NOR     | 1887       | 1944     | 1.0     | 4.0     | 2.0  |
| Jungrund           | NOR     | 1887       | 1944     | 1.0     | 4.0     | 2.0  |
| Amundsen           | NO      | 1887       | 1944     | 1.0     | 4.0     | 2.0  |
| Rauma/Rauma        | FIN     | 1887       | 1944     | 1.0     | 4.0     | 2.0  |
| Sandy Hook          | USA     | 1887       | 1944     | 1.0     | 4.0     | 2.0  |
| Friday Harbor (Ocean. Labs.) | USA | 1887       | 1944     | 1.0     | 4.0     | 2.0  |
| Fort Pulaski        | USA     | 1887       | 1944     | 1.0     | 4.0     | 2.0  |
| Crescent City       | USA     | 1887       | 1944     | 1.0     | 4.0     | 2.0  |
| Neah Bay            | USA     | 1887       | 1944     | 1.0     | 4.0     | 2.0  |
| Wilmington          | USA     | 1887       | 1944     | 1.0     | 4.0     | 2.0  |
| Juneau              | USA     | 1887       | 1944     | 1.0     | 4.0     | 2.0  |
| Sitka               | USA     | 1887       | 1944     | 1.0     | 4.0     | 2.0  |
| Tofino              | CAN     | 1887       | 1944     | 1.0     | 4.0     | 2.0  |
| Heimisjo            | NOR     | 1887       | 1944     | 1.0     | 4.0     | 2.0  |
| Soderskar           | FIN     | 1887       | 1944     | 1.0     | 4.0     | 2.0  |
| Brest               | CAN     | 1887       | 1944     | 1.0     | 4.0     | 2.0  |

• Brest has data from 1807, but two significant gaps in the 1880s in addition to large gaps in the 1900s. Swinoujście has data from 1811 and a gap only in the 1900s. It is not updated.
since 2000.

- Sheerness stated in 1832 but it is mostly gaps.
- Cuxhaven 2 started in 1843, has no gap, and it is free of acceleration.
- Wismar 2 started in 1848, has no gap, and it is free of acceleration.
- Maassluis started in 1848, has no gap, and it is free of acceleration.
- San Francisco started in 1854, has no gap, and it is free of acceleration. There is possibly a small change of trend about 1900, but since 1900 there is no sign of any acceleration.
- Warnemünde 2 started in 1855, has no gap, and it is free of acceleration.
- New York (The Battery) started in 1856, has a significant acceleration.

**Figure 5.** Measured monthly averaged mean sea level from the oldest tide gauges of PSMSL figures from [31,39].

The records are acceleration free.
gap in the 1800s, and it is free of acceleration.

- Travemünde started in 1856, has a significant gap in the 1900s, and it is free of acceleration. Helsinki started in 1879, has no gap, and it is free of acceleration.
- Liverpool Georges and Princes Piers started in 1858, has many significant gaps and it is flagged for quality.
- Lyokki started in 1858, has no gap and it is free of acceleration.
- Lypyrtti started in 1858, has no gap and it is free of acceleration.
- Jungfrusund started in 1858, has no gap and it is free of acceleration.
- Vlissingen started in 1862, has no gap, and while it is free of acceleration 1900 to present, this tide gauge has a change of behaviour about 1890.
- Aberdeen II started in 1862, has no gap, and it is free of acceleration.
- Hoek Van Holland started in 1864, has no gap, and it is free of acceleration.
- Den Helder started in 1866, has no gap, and it is free of acceleration.
- Delfzijl started in 1865, has no gap, and it is free of acceleration.
acceleration.
- Harlingen started in 1865, has no gap, and it is free of acceleration.
- Liepaja started in 1865 but has many gaps and it has been discontinued in 1936.
- UTO started in 1866, has no gap and it has been discontinued in 1936. It is acceleration free over the recorded period.
- Russaro started in 1866, has a small gap and it has been discontinued in 1936. It is acceleration free over the recorded period.
- Soderskar started in 1866, has no gap and it has been discontinued in 1936. It is acceleration free over the recorded period.
- Ronnskar started in 1867, has one gap, and it has been discontinued in 1936. It is acceleration free over the recorded period.
- Nedre Sodertalje started in 1869, has no gap, and it has been discontinued in 1970. It is acceleration free over the recorded period.
- Ijmuiden started in 1879, has no gap, and it is acceleration free over the recorded period.

All these tide gauges are located in Finland (8), France (1), Poland (1), Great Britain (3), Deutschland (4), Netherlands (8), USA (2), Latvia (1) and Sweden (1).

These tide gauges do not represent the world sea level pattern. No station is located in the SH. Almost all the stations are located in Europe. However, none of them is accelerating.

If none of the older tide gauges has an accelerating behaviour, and if compilations of tide gauges of enough length as those in Table 1 have rates of rise not changing on average from one update to another, there is no opportunity to claim that the sea levels are accelerating.

12. Summary of carbon emission, temperature and sea level results

The available instrumental data are already everything
but accurate to cover the last 100 years. Figure 6 presents measurements and computations of climate data over the last century. Only the more reliable portion 1910 to present of the data sets is considered.

a) is the anthropogenic carbon dioxide emission (Ci) in million metric tonnes of carbon from Oak Ridge National Laboratory[40].

The carbon emission in increasing exponentially.

b) is the CSIRO GMSL[38].

c) is the rate of rise of the CSIRO GMSL computed as SLR1,k at any time xk.

Being the time span of data considered 1910 to present, the computation of SLR1,k starts in 1970 when 60 years of data are available. This SLR is always increasing. The CSIRO GMSL closely follow the Carbon Dioxide Information Analysis Center carbon dioxide emission.

d) is the measured mean sea level in San Francisco[31].

e) is the rate of rise of the measured mean sea level in San Francisco[31] computed as SLR1,k at any time xk.

This rate of rise is oscillating.

f) is the vertical position of the SONEL GPS station closest to the San Francisco tide gauge[32].

The nearest GNSS stations from SONEL is PBL1, of velocity -1.12 +/-0.25 mm per year. Two offsets have been introduced in the result because of material change or malfunction. In these limits, we may guess the San Francisco tide gauge may suffer of subsidy.

g) is the reconstructed global temperature GISS[41].

f) is the GISS result corrected for upward biases[7].

The GISS result is affected by many sources of anthropogenic upwards biasing not related to the changed composition of the atmosphere. The more legitimate is the urban heat island effect, but unfortunately more other biases may be found in the reconstruction. The error is estimated by comparing for a certain number of geographical locations where measurements of temperature are reasonably free of quality and biasing issues (for example remote or rural locations with good data as Alice Spring or Ballarat in Australia) the GISS temperature with the true temperature.

According to the report of IPCC[42], there is a perfect correlation between the atmospheric CO2 concentration and the surface temperature. This correlation does not seem that perfect (Figure 6a, g and h).

Even if according to Nature Education Knowledge Project[43], the sea level increases because of the thermal expansion and the melting of glaciers following the equation: dH/dt=b(T−T0)

Where H is the sea level, t is the time, T is the global land and sea surface temperature and b is a coefficient and T0 is a reference value of the temperature, actually it is the volume of the ocean waters that should expand proportionally to the average temperature of the deep oceans:

dH/dt=b·dT/dt

Where T* differs considerably from T.

Figure 6. One century of climate data.

a) anthropogenic carbon dioxide emission (in million metric tonnes of carbon[40]; b, c) position and time rate of rise of the CSIRO GMSL[38]; d, e) position and time rate of rise of the measured mean sea level in San Francisco[31]; f) SONEL GPS station closest to the San Francisco tide gauge[32]; g, h) reconstructed global temperatures without[41] and with corrections for upward biases[7].
The mild warming of h) is compatible with the sea level trend of d) and e) in view of f).

The sea level trend of d), e) and f) is incompatible with the sea level trend of b) and c).

The sea level trend of b) and c) is compatible only with the carbon emission a) and incompatible with everything else.

Clearly, all the individual tide gauges (San Francisco is only one of the many examples) have a completely different patterns from the CSIRO GMSL.

13. Conclusions

The GMSL time series obtained by stacking of tide gauges of randomly variable location and length or by reconstructions based on the careful selections of the information needed to produce a carbon emission dependent result should not be used to infer any global accelerating trend.

The sea levels should not follow the carbon dioxide emission by magic but through the temperature, not the surface temperature biased upwards by more or less legitimate anthropogenic factors not related to the modified composition of the atmosphere, but the average temperature of the deep oceans.

If all the tide gauges of a population satisfying length and quality requirements are acceleration-free, accelerating GMSL time series based on these tide gauges should not be trusted.

Despite the attempts to “educate” those who do hold non-majority views about climate change, after 16 years of missed warming the forced consensus is falling, as demonstrated by the recent survey of the American Meteorological Society[44] that found 52% of the members believe global warming is happening and is mostly human-caused, but 48% does not, with political ideology influencing the climate change views of meteorology professionals. This 48% opposition to a statement of forced consensus science has same value of a 95% opposition to a wrong statement in free science.

We should acknowledge and explore the uncomfortable fact that the accelerating sea level rises are within 95% certainty a gross exaggeration. Therefore, the coastal life does not seem presently under threat by the carbon dioxide emissions.

Conflict of interest statement

We declare that we have no conflict of interest.

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