Journal of Coastal Life Medicine

journal homepage: www.jclmm.com

Document heading doi:10.12980/JCLM.2.2014J26

Coastal life is not under threat by the carbon dioxide emissions

Albert Parker

School of Aerospace, Mechanical and Manufacturing Engineering RMIT University, Bundoora, VIC, Australia

PEER REVIEW

Peer reviewer
Dr. Don J. Easterbrook, Professor of Geology, Western Washington University, Bellingham, Washington, USA.
E-mail: dbunny4@yahoo.com

Comments
The paper is basically sound and the data provided are very convincing. The author showed a lot of data to demonstrates that the sea levels will more likely rise no more than just a few centimetres during this century.
Details on Page 251

ABSTRACT

The near future of coastal life is threated by the claim of global warming alarmist that sea levels will rise by one to seven metres by 2100, destroying many coastal cities and habitats. This paper shows that sea levels will more likely rise no more than just a few centimetres during this century as the Earth defrosts from the Little Ice Age 500 years ago with a mild warming.

KEYWORDS
Sea level rate of rise, Sea level accelerations, Tide gauge measurements, Global mean sea level reconstructions

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[1,2,8-10], the temperature and salinity of the world oceans 0-2000 m has not changed over the first decade it has been measured[11] 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[12].

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 argueabout 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

*Corresponding author: Albert Parker, School of Aerospace, Mechanical and Manufacturing Engineering RMIT University, Bundoora, VIC, Australia.
E-mail: albertparker@y7mail.com

Article history:
Received 5 Dec 2013
Received in revised form 18 Dec, 2nd revised form 25 Dec, 3rd revised form 29 Dec 2013
Accepted 16 Feb 2014
Available online 28 Mar 2014

century, 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.

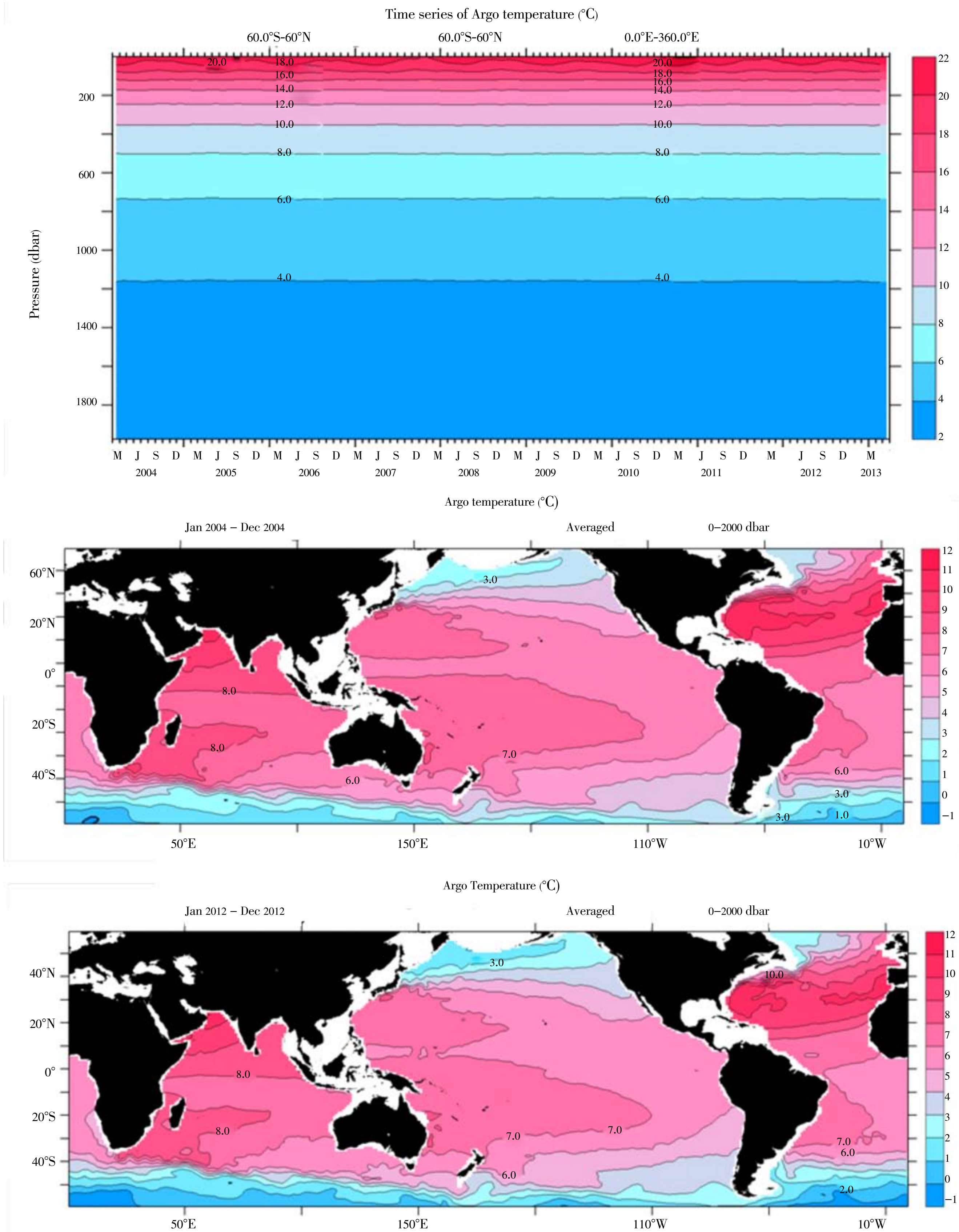

Figure 1. Time series of Argo temperatures of the world oceans March 2004 to March 2013 and yearly averaged constant temperature lines over the years 2004 and 2012 in the layer 0–2000 m.

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

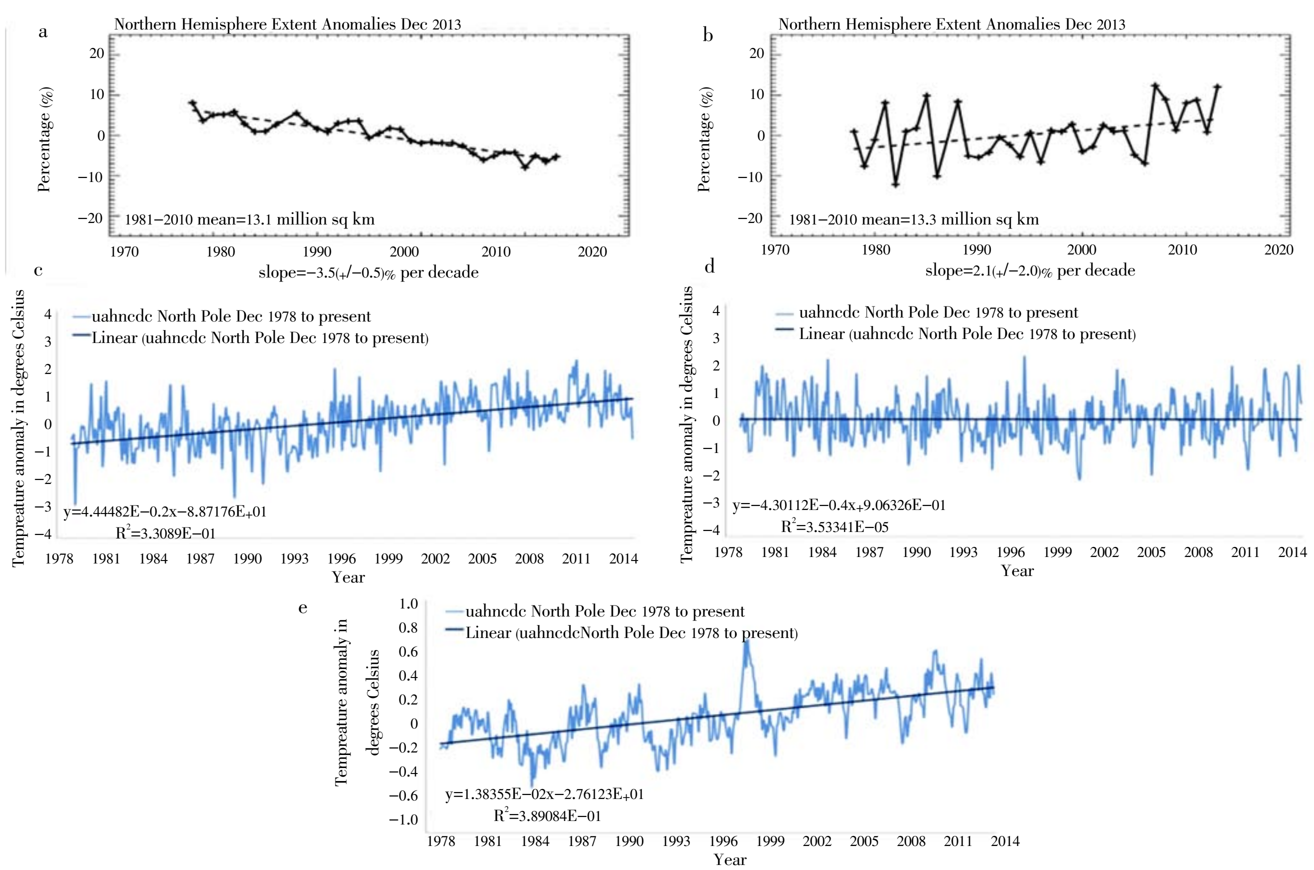

Figure 2. Ice trends and global temperature trends of Arctic and Antarctic.

a) and b) Arctic and Antarctic ice trends[42]; c), d), e) Arctic, Antarctic and global temperature trends[44].

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].

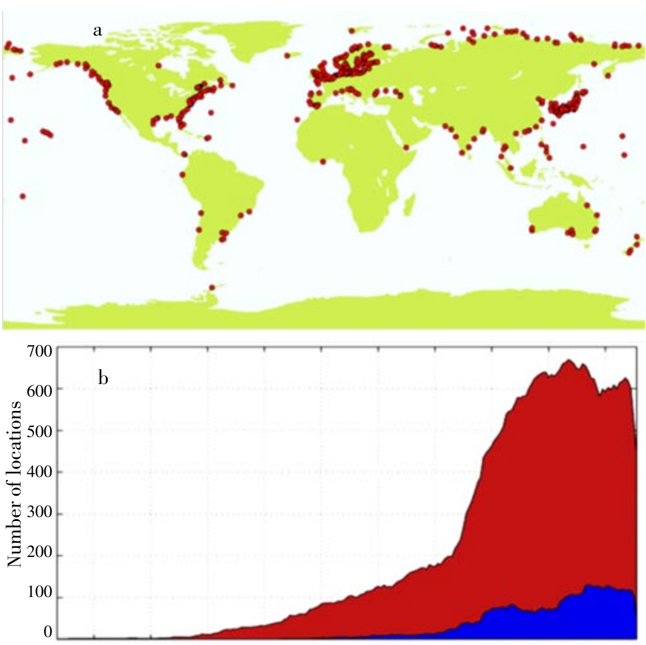

Figure 3. Demography of PSMSL stations[31].

a) stations with at least 40 years of data, b) stations from NH and SH.

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.

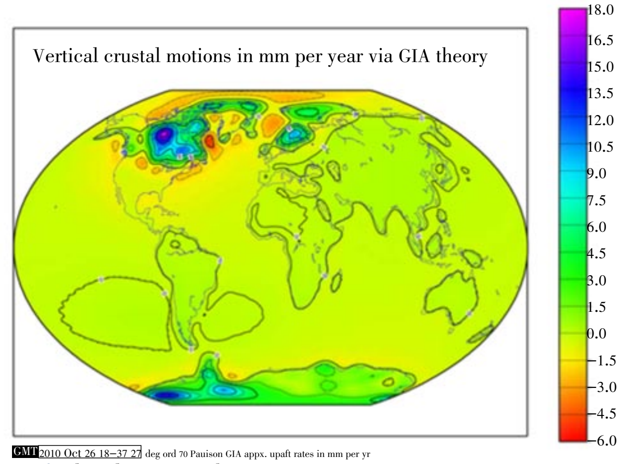

Figure 4. Glacial isostatic adjustment[18].

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 seriesis 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:

$$y=y_0+a\cdot x \qquad (1)$$

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, …, 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:

$$SLRj,k=\frac{\sum_{i=j}^{k}(x_i-\overline{x}).(y_i-\overline{y})}{\sum_{i=j}^{k}(x_i-x)^2} \quad (2)$$

In this equation, $\overline{x}$ and $\overline{y}$ 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 stydy 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±0.44) 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±0.18) 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

Relative sea level rate of rise of stations with more than 60 years of recording in the PSMSL database (from Church and White[31] update 09–Jan–2013).

Tide gauge	Country	Years recorded	Years Open	Comple–teness	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
Maassluis	NLD	164	164	100%	1848	2011	1.66	0.07
Wismar 2	DEU	162	163	99%	1849	2011	1.42	0.06
San Francisco	USA	157	157	100%	1855	2011	1.42	0.08
Warnemunde 2	DEU	155	156	99%	1856	2011	1.25	0.06
Vlissingen	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
Ijmuiden	NLD	140	140	100%	1872	2011	1.62	0.10
New York (The Battery)	USA	138	156	88%	1856	2011	2.84	0.06
Helsinki	FIN	133	133	100%	1879	2011	−2.31	0.15
Poti	GEO	127	136	93%	1874	2009	6.56	0.14
Olandsnorraudde	SWE	125	125	100%	1887	2011	−1.11	0.13
Kungsholmsfort	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

Continued Table 1

Seattle	USA	113	113	100%	1899	2011	1.99	0.09
Gedser	DNK	112	114	98%	1898	2011	1.06	0.10
Hirtshals	DNK	109	120	91%	1892	2011	−0.21	0.11
Korsor	DNK	109	115	95%	1897	2011	0.86	0.09
Hornbaek	DNK	109	114	96%	1898	2011	0.39	0.12
Sydney, Fort Denison	AUS	108	108	100%	1886	1993	0.59	0.09
Baltimore	USA	107	109	98%	1903	2011	3.17	0.09
Honolulu	USA	107	107	100%	1905	2011	1.43	0.11
Philadelphia (Pier 9N)	USA	106	111	95%	1901	2011	2.90	0.13
Oulu/Uleaborg	FIN	105	123	85%	1889	2011	−6.32	0.19
Slipshavn	DNK	105	116	91%	1896	2011	1.04	0.09
Aberdeen II	GBR	103	104	99%	1862	1965	0.58	0.10
Klaipeda	LTU	103	114	90%	1898	2011	1.47	0.20
San Diego (Quarantine Station)	USA	103	106	97%	1906	2011	2.05	0.09
Nedre Sodertalje	SWE	102	102	100%	1869	1970	−3.44	0.19
Galveston II, Pier 21, TX	USA	102	103	99%	1909	2011	6.35	0.15
Cascais	PRT	101	112	90%	1882	1993	1.26	0.09
North Shields	GBR	101	116	87%	1896	2011	1.91	0.09
Fremantle	AUS	101	114	89%	1897	2010	1.49	0.15
Smogen	SWE	101	101	100%	1911	2011	−1.85	0.15
Victoria	CAN	100	102	98%	1910	2011	0.62	0.12
Hanko/Hango	FIN	99	123	80%	1889	2011	−2.59	0.18
Portland (Maine)	USA	99	100	99%	1912	2011	1.88	0.11
Balboa	PAN	98	99	99%	1908	2006	1.64	0.14
Key West	USA	98	99	99%	1913	2011	2.24	0.09
Mantyluoto	FIN	97	101	96%	1911	2011	−5.89	0.22
Ystad	SWE	95	95	100%	1887	1981	0.59	0.16
Varberg	SWE	95	95	100%	1887	1981	−0.86	0.15
Visby	SWE	95	96	99%	1916	2011	−1.21	0.19
Oslo	NOR	94	126	75%	1886	2011	−3.18	0.19
Newlyn	GBR	94	96	98%	1916	2011	1.78	0.10
Furuogrund	SWE	94	96	98%	1916	2011	−8.17	0.27
Fernandina Beach	USA	93	114	82%	1898	2011	1.97	0.11
Sydney, Fort Denison 2	AUS	93	96	97%	1915	2010	0.90	0.10
Auckland II	NZL	92	95	97%	1904	1998	1.26	0.13
Pietarsaari/Jakobstad	FIN	92	97	95%	1915	2011	−7.21	0.26
Tuapse	RUS	92	94	98%	1917	2010	2.42	0.24
Nedre Gavle	SWE	91	91	100%	1896	1986	−6.04	0.23
Ketchikan	USA	91	93	98%	1919	2011	−0.21	0.14
West-Terschelling	NLD	91	91	100%	1921	2011	1.03	0.15
Charleston i	USA	90	90	100%	1922	2011	3.11	0.14
Boston	USA	89	91	98%	1921	2011	2.75	0.12
Bergen	NOR	88	96	92%	1916	2011	−0.16	0.13
Trois-Rivieres	CAN	87	87	100%	1925	2011	−0.08	1.18
Atlantic City	USA	87	100	87%	1912	2011	4.09	0.12
Turku/ABO	FIN	87	90	97%	1922	2011	−3.58	0.27
Halifax	CAN	86	116	74%	1896	2011	3.25	0.10
Los Angeles	USA	86	88	98%	1924	2011	0.85	0.12
Pensacola	USA	86	88	98%	1924	2011	2.15	0.15
Genova	ITA	85	113	75%	1884	1996	1.22	0.07
Bjorn	SWE	85	85	100%	1892	1976	−6.12	0.25
Astoria (Tongue Point)	USA	85	87	98%	1925	2011	−0.34	0.20
Tonoura	JPN	84	90	93%	1894	1983	0.33	0.13
Sewells Point, Hampton Roads	USA	84	84	100%	1928	2011	4.53	0.16
Venezia (Punta Della Salute)	ITA	83	92	90%	1909	2000	2.40	0.16
Kemi	FIN	83	92	90%	1920	2011	−6.93	0.30
Sevastopol	UKR	82	85	96%	1910	1994	1.32	0.28
Buenos Aires	ARG	82	83	99%	1905	1987	1.54	0.21
Klagshamn	SWE	81	82	99%	1930	2011	0.59	0.20
Hosojima	JPN	80	82	98%	1930	2011	−0.43	0.19
Prince Rupert	CAN	80	103	78%	1909	2011	1.13	0.16
Foglo/Degerby	ALA	80	88	91%	1924	2011	−3.72	0.26
Stavanger	NOR	79	93	85%	1919	2011	0.41	0.14
Aburatsubo	JPN	79	82	96%	1930	2011	3.55	0.12
Wajima	JPN	79	82	96%	1930	2011	−0.26	0.14
La Jolla (Scripps Pier)	USA	79	87	91%	1925	2011	2.05	0.13
Kaskinen/Kasko	FIN	79	85	93%	1927	2011	−6.46	0.32
Tregde	NOR	79	84	94%	1928	2011	0.22	0.13
Hamina	FIN	79	83	95%	1929	2011	−0.92	0.35
Newport	USA	79	81	98%	1931	2011	2.70	0.13
Washington DC	USA	79	81	98%	1931	2011	3.06	0.20

Continued Table 1

Lyokki	FIN	78	79	99%	1858	1936	−5.37	0.27
Raahe/Brahestad	FIN	78	89	88%	1923	2011	−6.77	0.31
Lypyrtti	FIN	77	79	97%	1858	1936	−5.04	0.25
Jungfrusund	FIN	77	77	100%	1858	1934	−3.04	0.28
Annapolis (Naval Academy)	USA	77	83	93%	1929	2011	3.52	0.14
Rauma/Raumo	FIN	77	79	97%	1933	2011	−4.61	0.32
Sandy Hook	USA	76	79	96%	1933	2011	4.05	0.16
Friday Harbor (Ocean. Labs.)	USA	75	78	96%	1934	2011	1.02	0.17
Fort Pulaski	USA	75	77	97%	1935	2011	2.93	0.17
Crescent City	USA	74	79	94%	1933	2011	−0.77	0.19
Neah Bay	USA	73	77	95%	1935	2011	−1.72	0.19
Wilmington	USA	73	76	96%	1936	2011	1.96	0.20
Juneau	USA	73	76	96%	1936	2011	13.10	0.21
Sitka	USA	73	74	99%	1938	2011	−2.11	0.18
Tofino	CAN	72	102	71%	1910	2011	−1.77	0.18
Heimsjo	NOR	72	84	86%	1928	2011	−1.48	0.20
Soderskar	FIN	71	71	100%	1866	1936	−1.82	0.35
Quebec (Lauzon)	CAN	71	101	70%	1911	2011	−0.32	0.28
Mayport	USA	71	72	99%	1929	2000	2.35	0.20
Eastport	USA	71	82	87%	1930	2011	2.14	0.14
Woods Hole (Ocean. Inst.)	USA	71	79	90%	1933	2011	2.77	0.15
Goteborg–Ringon	SWE	71	72	99%	1887	1958	−1.69	0.26
Uto	FIN	70	71	99%	1866	1936	−2.71	0.31
Draghallan	SWE	70	70	100%	1898	1967	−8.01	0.37
Point Atkinson	CAN	70	97	72%	1915	2011	0.81	0.15
Solomon's Island (Biol. Lab.)	USA	70	74	95%	1938	2011	3.64	0.17
Dublin	IRL	70	72	97%	1938	2009	0.71	0.23
Alameda (Naval Air Station)	USA	70	72	97%	1940	2011	0.66	0.25
Port Pirie	AUS	69	70	99%	1941	2010	0.61	0.27
Hilo, Hawaii Island	USA	69	85	81%	1927	2011	3.12	0.20
Narvik	NOR	69	80	86%	1932	2011	−2.59	0.26
Aberdeen I	GBR	69	79	87%	1932	2010	1.01	0.16
Santa Monica (Municipal Pier)	USA	69	79	87%	1933	2011	1.38	0.17
Russaro	FIN	68	71	96%	1866	1936	−2.90	0.32
Ko Lak	THA	68	72	94%	1940	2011	0.35	0.22
Oostende	BEL	68	74	92%	1937	2010	1.85	0.16
New London	USA	68	73	93%	1939	2011	2.56	0.17
Yakutat	USA	68	72	94%	1940	2011	−7.19	0.33
Port Adelaide (Outer Harbor)	AUS	68	70	97%	1941	2010	2.20	0.25
Bakar	HRV	66	80	83%	1930	2009	1.06	0.20
Uchiura	JPN	66	68	97%	1944	2011	−0.75	0.25
Ko Taphaonoi	THA	66	72	92%	1940	2011	0.93	0.50
Vigo	ESP	66	67	99%	1944	2010	2.37	0.27
Willets Point	USA	65	68	96%	1932	1999	2.39	0.20
Sassnitz	DEU	65	76	86%	1936	2011	0.89	0.26
St. Petersburg	USA	65	65	100%	1947	2011	2.43	0.15
Quequen	ARG	64	65	98%	1918	1982	0.85	0.20
Lewes (Breakwater Harbor)	USA	64	91	70%	1921	2011	3.41	0.21
Cedar Key II	USA	64	73	88%	1939	2011	1.54	0.17
Charlottetown	CAN	63	74	85%	1938	2011	3.03	0.16
Port Isabel	USA	63	67	94%	1945	2011	3.91	0.23
Liepaja	LVA	62	72	86%	1865	1936	0.82	0.37
La Coruna I	ESP	62	67	93%	1944	2010	2.40	0.26
Ronnskar	FIN	61	70	87%	1867	1936	−7.06	0.33
Kabelvag	NOR	61	64	95%	1948	2011	−1.13	0.37
St. Georges/Esso Pier (Bermuda)	BMU	61	77	79%	1933	2009	2.09	0.28
Kushiro	JPN	61	65	94%	1947	2011	9.31	0.19
Tiksi (Tiksibukhta)	RUS	61	61	100%	1949	2009	1.57	0.41
Stromstad	SWE	60	68	88%	1900	1967	−1.98	0.25
Wellington Harbour	NZL	60	67	90%	1945	2011	2.40	0.19
Providence (State Pier)	USA	60	73	82%	1939	2011	2.17	0.19
Santander I	ESP	60	67	90%	1944	2010	2.16	0.27
Maloy	NOR	60	68	88%	1944	2011	0.61	0.24
Port San Luis	USA	60	66	91%	1946	2011	0.69	0.21
Polyarniy	RUS	60	65	92%	1926	1990	−1.55	0.30
Average		91	97	94%			0.30	0.18

database shown in Figure 5[31,39], all of them appear reasonably acceleration–free over the full length of the record.

• Brest has data from 1807, but two significant gaps in the 1880s in addition to 1 large gap in the 1900s. Swinoujscie 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.

• Warnemunde 2 started in 1855, has no gap, and it is free of acceleration.

• New York (The Battery) started in 1856, has a significant

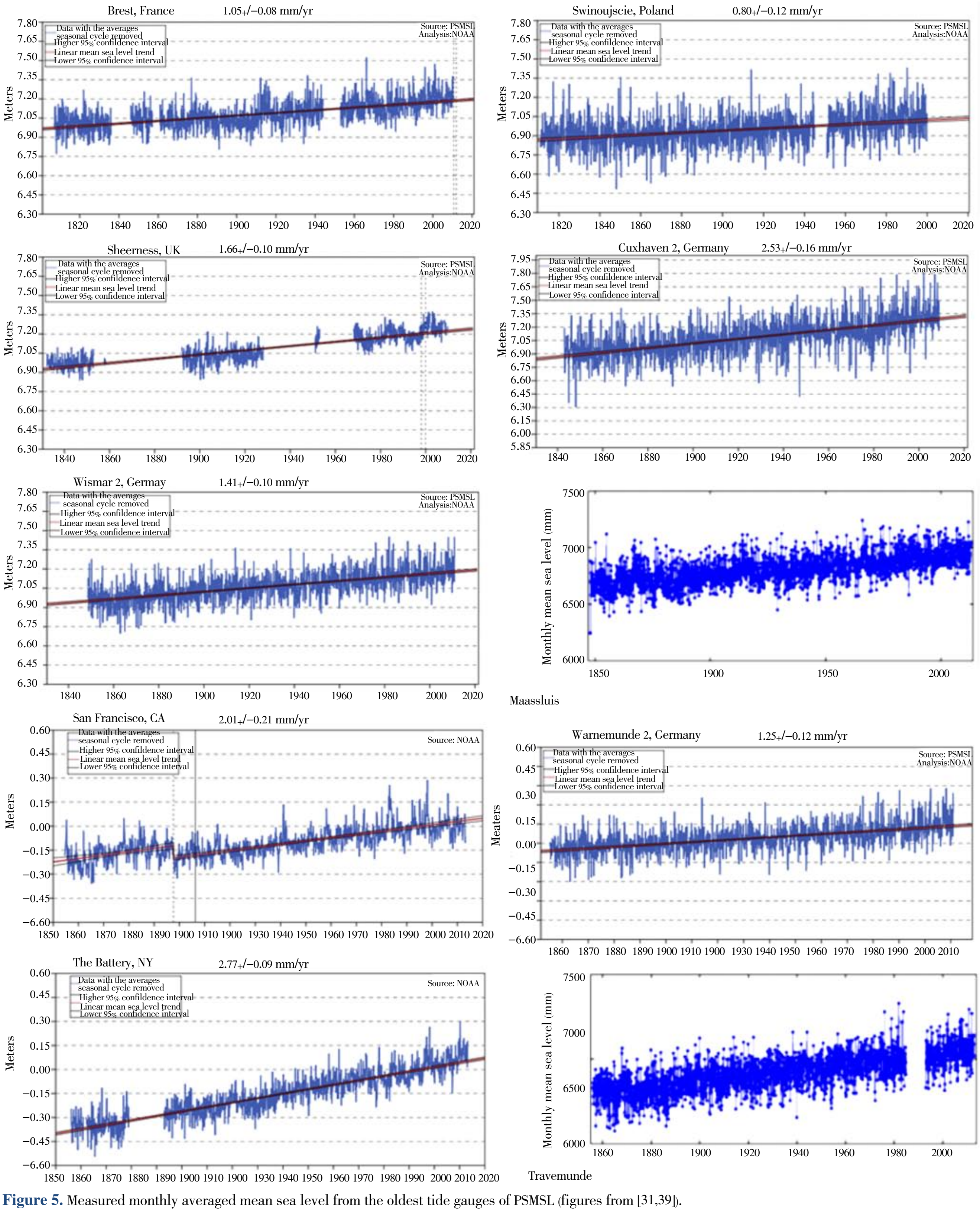

Figure 5. Measured monthly averaged mean sea level from the oldest tide gauges of PSMSL (figures from [31,39]).
The records are acceleration free.

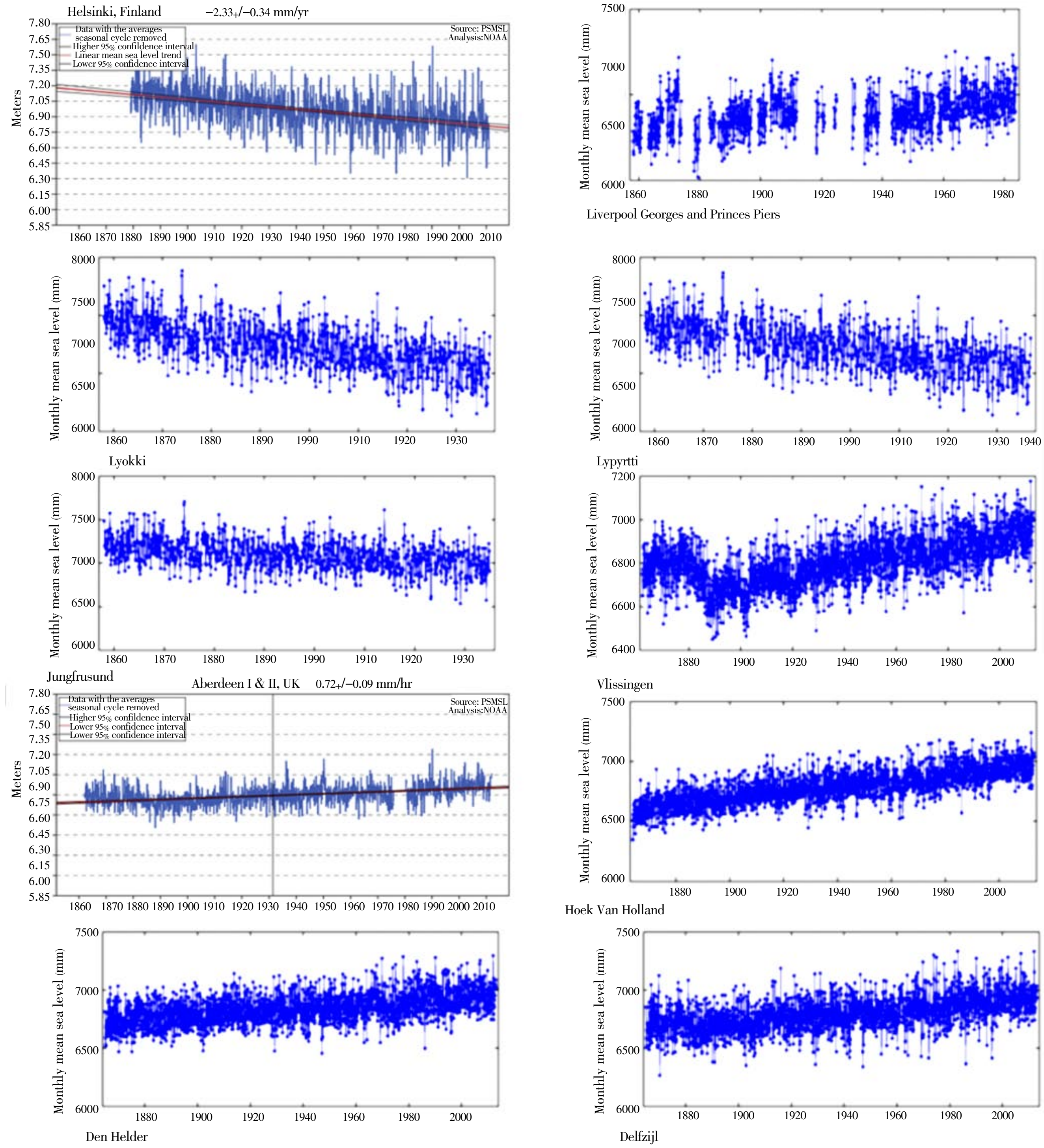

Figure 5 (continued). Measured monthly averaged mean sea level from the oldest tide gauges of PSMSL (figures from [31,39]). The records are acceleration free.

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

• Travemunde 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

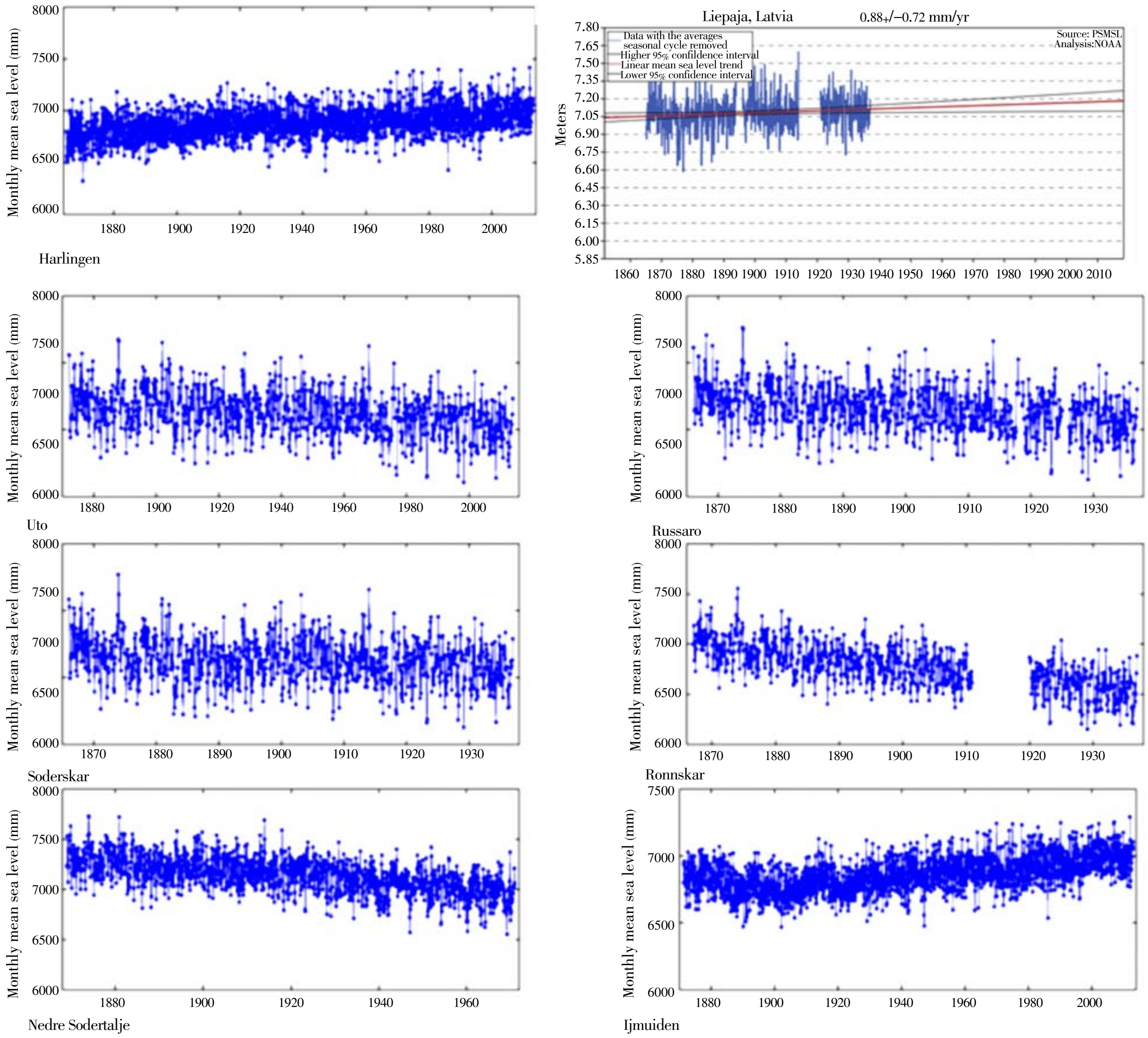

Figure 5 (continued). Measured monthly averaged mean sea level from the oldest tide gauges of PSMSL (figures from [31,39]). The records are acceleration free.

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.

• 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 (C) 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 $SLR_{1,k}$ at any time x_k.

Being the time span of data considered 1910 to present, the computation of $SLR_{1,k}$ 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 San Francisco MSL computed as $SLR_{1,k}$ at any time x_k.

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 CO_2 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:

$$dH/dt=b\cdot(T_t-T_0)$$

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 T_0 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:

$$dH/dt=b\cdot dT^*/dt$$

Where T^* differs considerably from T.

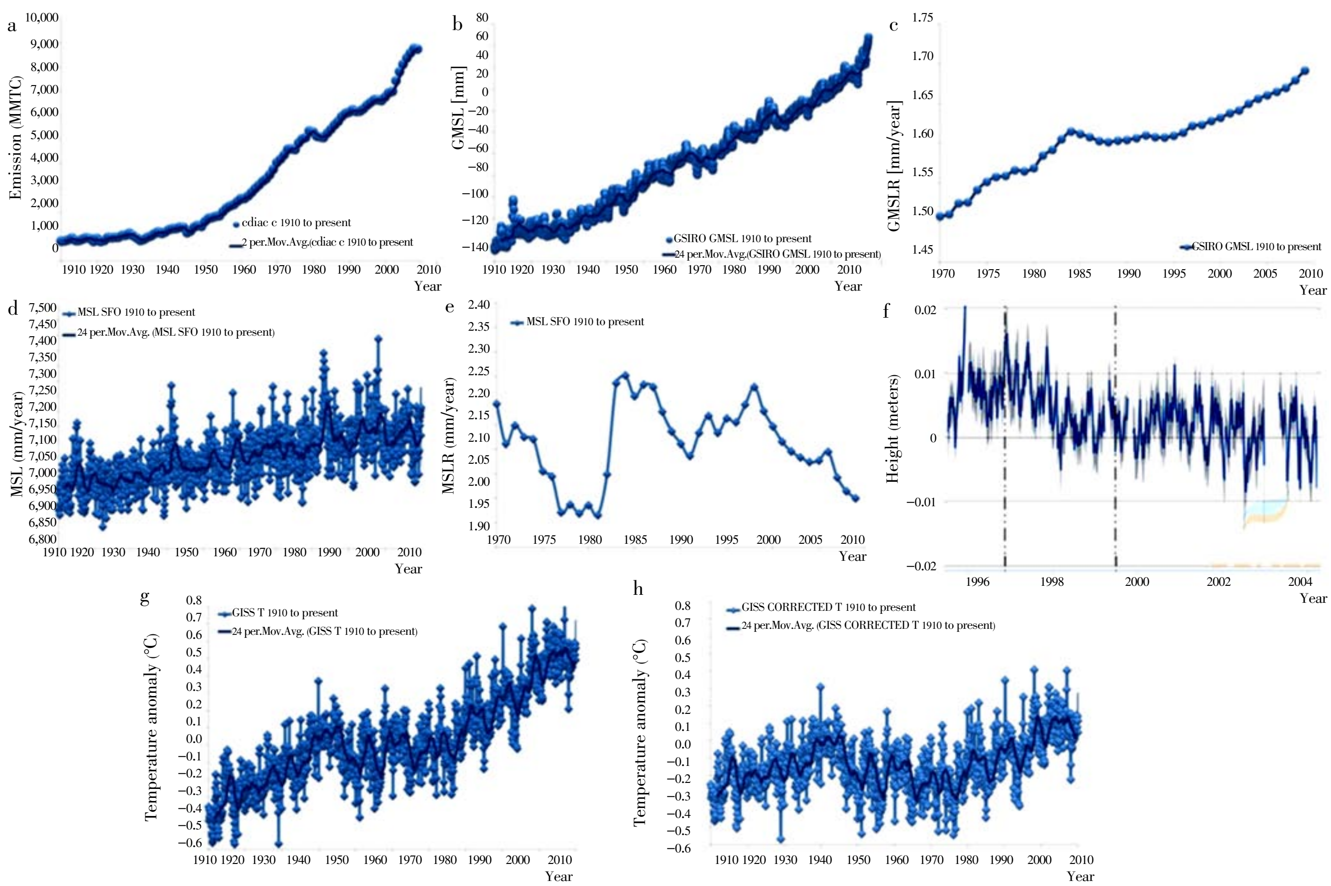

Figure 6. One century of climate data.

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.

Comments

Background

Exaggerated claims of future accelerated sea level rise are not supported by historic data, which show that sea level rise has been relatively constant for many decades.

Research frontiers

This manuscript provides sea level data that demonstrates sea level rise is not accelerating.

Related reports

Several publications by Dr. Niklas Morner (Sweden) document limits to possible sea level rise in modern times. The recently published NIPCC report also has much data on sea level rise.

Innovations and breakthroughs

The data provided in this manuscript document that the rate of sea level rise is not accelerating as widely claimed in the news media.

Applications

Because of fear generated by claims of accelerating sea level rise in the news media, many coastal areas are considering expensive, but unnecessary plans for evacuation of human populations. The data in this manuscript show that these are not needed.

Peer review

The paper is basically sound and the data provided are very convincing. The author showed a lot of data to demonstrates that the sea levels will more likely rise no more than just a few centimetres during this century.

References

[1] Parker A. Mismatch between acceleration of reconstructed sea levels and gradient of reconstructed temperatures. *Environ Sci* Forthcoming 2014.

[2] Parker A. Impacts of sea level rise on coastal planning in Norway. *Ocean Eng* 2013; **78**: 124-130.

[3] Scafetta N. Discussion on climate oscillations: CMIP5 general circulation models versus a semi-empirical harmonic model based on astronomical cycles. *Earth Sci Rev* 2013; **126**: 321-357.

[4] Scafetta N. Solar and planetary oscillation control on climate change: hind-cast, forecast and a comparison with the CMIP5 GCMs. *Energy Environ* 2013; **24**(3-4): 455-496.

[5] Scafetta N. Does the Sun work as a nuclear fusion amplifier of planetary tidal forcing? A proposal for a physical mechanism based on the mass-luminosity relation. *J Atmos Sol-Terr Phys* 2012; **81-82**: 27-40.

[6] Parker A. The "present global warming hiatus" is part of a quasi-60 years oscillation in the worldwide average temperatures in the downwards phase. *Environ Sci* Forthcoming 2014.

[7] Parker A. Why global warming went missing since the year 2000. *Nonlinear Eng* 2013; **2**(3-4): 129-135.

[8] Parker A. Sea level trends at locations of the United States with more than 100 years of recording. *Nat Hazards* 2013; **65**(1): 1011-1021.

[9] Parker A. Oscillations of sea level rise along the Atlantic coast of North America north of Cape Hatteras. *Nat Hazards* 2013; **65**(1): 991–997.

[10] Parker A. Saleem MS, Lawson M. Sea-level trend analysis for coastal management. *Ocean Coast Manag* 2013; **73**: 63–81.

[11] Parker A. The only reliable measurements of ocean temperatures show a statistically not significant warming over the decade since they started. *Appl Oceanogr* Forthcoming 2014.

[12] National Snow & Ice Data Center. Sea Ice Index. Colorado: NSIDC; 2014. [Online] Available from: http://nsidc.org/data/seaice_index/ [Accessed on February 12, 2013].

[13] Watts A. Australian temperature records shoddy, inaccurate, unreliable; 2012. [Online] Available from: http://wattsupwiththat.com/2012/03/15/australian-temperature-records-shoddy-inaccurate-unreliable/ [Accessed on 11th February, 2014].

[14] Watts A. New Zealand's NIWA temperature train wreck; 2010. [Online] Available from: http://wattsupwiththat.com/2010/10/09/new-zealands-niwa-temperature-train-wreck/ [Accessed on 11th February, 2014].

[15] Mörner NA. Sea level changes and crustal movements with special aspects on the Eastern Mediterranean. *Zeitschrift für Geomorphologie* 2005; **137**: 91–102.

[16] Parker A. Some problems with empirical formulae for sea level rise. *Nonlinear Eng* Forthcoming 2014.

[17] National Space Science and Technology Centre. Data. Huntsville: NSSTC; 2014. [Online]. Available from: http://www.nsstc.uah.edu/data/msu/t2lt/uahncdc_lt_5.6.txt [Accessed on February 12, 2013].

[18] Wikipedia. Post-glacial rebound. USA: Wikipedia; 2014. [Online] Available from: http://en.wikipedia.org/wiki/Glacial_isostatic_adjustment [Accessed on 11th February, 2014].

[19] Scafetta N. Multi-scale dynamical analysis (MSDA) of sea level records versus PDO, AMO, and NAO indexes. *Clim Dyn* 2013; doi: 10.1007/s00382-013-1771-3.

[20] Chambers DP, Merrifield MA, Nerem RS. Is there a 60-year oscillation in global mean sea level? *Geophys Res Lett* 2012; **39**: L18607. doi: 10.1029/2012GL052885.

[21] Boretti A. Is there any support in the long term tide gauge data to the claims that parts of Sydney will be swamped by rising sea levels? *Coast Eng* 2012; **64**: 161–167.

[22] Boretti AA. Short term comparison of climate model predictions and satellite altimeter measurements of sea levels. *Coast Eng* 2012; **60**: 319–322.

[23] Watson PJ. Is there evidence yet of acceleration in mean sea level rise around mainland Australia? *J Coast Res* 2011; **27**(2): 368–377.

[24] Houston JR, Dean RG. Sea-level acceleration based on U.S. tide gauges and extensions of previous global-gauge analyses. *J Coast Res* 2011; **27**(3): 409–417.

[25] Wenzel M, Schroter J. Reconstruction of regional mean sea level anomalies from tide gauges using neural networks. *J Geophys Res* 2010; **115**: C08013. doi: 10.1029/2009JC005630.

[26] Mörner NA. Sea level changes past records and future expectations. *Energy Environ* 2013; **24**(3–4): 509–536.

[27] Mörner NA. The Maldives: a measure of sea level changes and sea level ethics. *Evid Based Clim Sci* 2011; doi: 10.1016/B978-0-12-385956-3.10007-5.

[28] Mörner NA. Setting the frames of expected future sea level changes by exploring past geological sea level records. *Evid Based Clim Sci* 2011; doi: 10.1016/B978-0-12-385956-3.10006-3.

[29] Mörner NA. Sea level changes in Bangladesh new observational facts. *Energy Environ* 2010; **21**(3): 235–249.

[30] Mörner NA. Some problems in the reconstruction of mean sea level and its changes with time. *Quatern Int* 2010; **221**(1–2): 3–8.

[31] Church JA, White NJ. A 20th century acceleration in global sea-level rise. *Geophys Res Lett* 2006; **33**: L01602. doi: 10.1029/2005GL024826.

[32] SONEL. GPS Point Blunt. La Rochelle: SONEL; 2013. [Online] Available from: http://www.sonel.org/spip.php?page=gps&idStation=1886 [Accessed on 21st November, 2013].

[33] Permanent Service for Mean Sea Level. Global sea level reconstructions. Liverpool: PSMSL; 2013. [Online] Available from: http://www.psmsl.org/products/reconstructions/ [Accessed on 21st November, 2013].

[34] Olivieri M, Spada G, Intermittent sea-level acceleration. *Global Planet Change* 2013; **109**: 64–72.

[35] Church JA, White NJ. Sea-level rise from the late 19th to the early 21st century. *Surv Geophys* 2011; **32**(4–5): 585–602.

[36] Jevrejeva S, Grinsted A, Moore J, Holgate S. Nonlinear trends and multiyear cycles in sea level records. *J Geophys Res* 2006; **111**: C09012. doi: 10.1029/2005JC003229.

[37] Jevrejeva S, Moore JC, Grinsted A, Woodworth PL. Recent global sea level acceleration started over 200 years ago? *Geophys Res Lett* 2008; **35**: L08715. doi: 10.1029/2008GL033611.

[38] CSIRO Marine and Atmospheric Research. Sea level rise. Hobart: CSIRO Marine and Atmospheric Research; 2013. [Online] Available from: http://www.cmar.csiro.au/sealevel/GMSL_SG_2011.html [Accessed on 21st November, 2013].

[39] Center for Operational Oceanographic Products and Services. Sea Level Trends. Silver Spring: Center for Operational Oceanographic Products and Services; 2013. [Online] Available from: http://tidesandcurrents.noaa.gov/sltrends/ [Accessed on 21st November, 2013].

[40] Carbon Dioxide Information Analysis Center Oak Ridge National Laboratory. Global CO_2 emissions from fossil-fuel burning, cement manufacture, and gas flaring: 1751–2009. Oak Ridge: Carbon Dioxide Information Analysis Center Oak Ridge National Laboratory; 2012. [Online] Available from: http://cdiac.ornl.gov/ftp/ndp030/global.1751_2009.ems [Accessed on 21st November, 2013].

[41] National Aeronautics and Space Administration Goddard Institute for Space Studies. GISS Surface Temperature Analysis (GISTEMP). New York: NASA GISS; 2013. [Online] Available from: http://data.giss.nasa.gov/gistemp/ [Accessed on 21st November, 2013].

[42] Intergovernmental Panel on Climate Change. IPCC Fourth Assessment Report: Climate Change 2007. Geneva: IPCC; 2007. [Online] Available from: http://www.ipcc.ch/publications_and_data/ar4/syr/en/main.html [Accessed on 21st November, 2013].

[43] Nature Education Knowledge Project. Modelling sea level rise. Cambridge: Nature Education Knowledge Project; 2012. [Online] Available from: http://www.nature.com/scitable/knowledge/library/modeling-sea-level-rise-25857988 [Accessed on 21st November, 2013].

[44] Stenhouse N, Maibach E, Cobb S, Ban R, Bleistein A, Croft P, et al. Meteorologists' views about global warming: a survey of American Meteorological Society professional members; 2013. [Online] Available from: http://journals.ametsoc.org/doi/pdf/10.1175/BAMS-D-13-00091.1 [Accessed on 21st November, 2013].