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# Cherry-picking the sea-level rise

**Albert Parker**
**School of Aerospace, Mechanical, and Manufacturing Engineering, RMIT University, Bundoora, (AUSTRALIA)**
**E-mail : albert.parker@rmit.edu.au**

## ABSTRACT

It is shown how cherry-picking the individual sea level records it is possible to reconstruct a continuously accelerating composite sea level record resembling the carbon dioxide emission even if all the individual sea level records are acceleration free. Five individual records are defined by using five different time windows in the Sydney record. The composite record has a rate of rise continuously increasing from values about 0.65 mm/year up to the mid-1900s to values presently about 2 mm/year. The true rate of rise at the present time is the same 0.65 mm/year of 60 years ago.


## A SYDNEY BAY COMPOSITE MSL RECORD RESEMBLING THE CARBON EMISSION

In the science of global warming, the experimental evidence is neglected when contrasting the theory. In the specific of sea levels, over this century there has been no significant warming of the oceans[1] and the sea ice extent of the North and South poles has not been reducing (the growth in Antarctica has more than compensated the loss in the Artic over the time window)[2]. Consistently, all the individual tide gauges of enough quality and length measuring the sea level relative to the land have indicated rates of rise (or fall) very close to the land motion due to the global glacial isostatic adjustment or more localised movements for multiple reasons[3].

The reason why somebody claims the reconstructed sea levels are presently accelerating is simply the stacking of carefully selected tide gauges from areas of subsidy or isostasy also having record lengths smaller than the minimum 60 years requirements.

The tide gauges do not measure the absolute sea level but the sea level relative to the land[4]. The land is subject to isostasy or subsidy. Therefore, some tide gauge may measure positive and some other negative rates of rise. The glacial isostatic adjustment alone may account for land velocities comparable with the velocity of rise or fall of the oceans[5]. Additional land motions exist because of more local phenomena, both natural and man-made. GPS monitoring[6] available in few locations only since few years may only help understanding the land motion contribution to the tide gauge signal, 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.

The present PSMSL stations[4] are about 2000, but many stations have historically only been measured for some months or years, and the records of enough quality and length are very few and mostly located in few selected areas of the Northern Hemisphere (Europe, Japan and USA). With only 2 tide gauges covering with quality the Southern Hemisphere since more than 100 years, and already very few stations having a length exceeding the 60 years necessary to infer a trend, it is impossible to compute a reliable global mean sea level.

If a proper computation of the global mean sea level is extremely challenging, it is certainly a much easier task to cherry-pick tide gauges to produce a sea level trend resembling the carbon dioxide emission. By stacking for example a long tide gauge record of a North European location with strong isostasy and negative rate of rise, and a short tide gauge record of a Pacific Island location with strong subsidy and positive rate of rise, possibly made even larger than the legitimate thanks to the oscillation from a valley of the peaks-and-valleys multi-decadal oscillations, an accelerating composite trend may always be easily manufactured.

The trick of cherry-picking the short record and the land movement is shown once more by using the tide gauge of Sydney, NSW in Figure 1. Figure a presents the monthly average mean sea levels. These values oscillate about a linear long term trend of slope 0.653 mm/year. However, with short time windows for example of 20 years it is possible to compute a present rate of rise of 3.053 mm/year. In the case of Sydney, it is easy to notice how even larger short term rates of rise where computed in the past, but in case the Sydney tide gauge could have started the recording only 20 years ago about a deep of the deeps-and-valleys periodical oscillations, such a conclusion would have been impossible.

The Sydney tide gauge has a clearly not accelerating pattern, with natural oscillations about a linear trend 0.653 mm/year. The natural oscillations have many periodicities with clear the quasi 60 years and the quasi 20 years oscillations. Everything occurred January 1993 to December 2012 is a continuation of the pattern exhibited January 1886 to January 1993. However, because January 1993 is a valley of the peaks-and-valleys multi decadal oscillations, not surprisingly the rate of rise computed by liner fitting of the data January 1993 to December 2012 is 3.053 mm/year, five times the legitimate value.

The now decommissioned Australian Federal Government's Climate Commission[7] proposed in 2011 as the only information about sea level rise and acceleration in Australia the rate of rise of sea level computed by linear fitting of the data collected in the 16 selected locations of the Australian Baseline Sea Level Monitoring Project[8] starting in the early 1990s, not surprisingly a valley of the peaks-and-valleys multi decadal oscillations, and neglecting every other information that could have suggested contemporary smaller trends, to compare with previous estimates obtained by linear fitting of longer records in other locations.

To avoid to acknowledge this evidence, it is enough to forget the Sydney tide gauge, and simply consider a record only 20 years long in the nearby Port Kembla[8], less than 100 km south of Sydney, where we should believe the sea level trend is 3.2 mm/year before and after correcting for a 0.0 mm/year *"trend in the datum of the SEAFRAME sea level sensor as determined from precise levelling between the sensor and the tide gauge benchmark*", then becoming a 2.6 mm/year after correcting for the "*barometric pressure trends*".

The vertical motion of the Sydney tide gauges is unknown, but the nearby GPS station shows a significant subsidy over the last decade with rate -0.89 mm/year as proposed in Figure b. Therefore, the rate of rise of Sydney seems mostly dictated by the land motion rather than the thermal expansion of the world oceans or the melting of ice.

Figure c presents the time history of the rate of rise obtained at any time all the data and performing a linear fitting, while Figure d presents the rate of rise that could have been inferred in Sydney if the recording could have started much later than the 1886. From Figure c, it takes much more than 60 years to stabilize the rate of rise about the long term value, and from Figure d, carefully selecting the time window it is possible to compute rates of rise 10 or 20 times larger the legitimate value.

Suppose now that we do have rather than 1 single tide gauge 5 different tide gauges measuring the sea level in the bay of Sydney: SYD127 starting in 1886 of length 127 years and rate of rise 0.653 mm/year; SYD100 starting in 1913 of length 100 years and rate of rise 0.895 mm/year; SYD70 starting in 1943 of length 70 years and rate of rise 1.013 mm/year; SYD20 starting in 1993 of length 20 years and rate of rise 3.096 mm/year and SYD10 starting in 2003 having a length of 10 years and a rate of rise of 4.169 mm/year. TABLE 1 presents the hypothetical tide gauges measuring the sea level in the Bay of Sydney. The true sea level rise is 0.6527 mm/year. The average sea level rise of the table is 1.965 mm/year.

If we do assume that at any time the average "*Glo-*

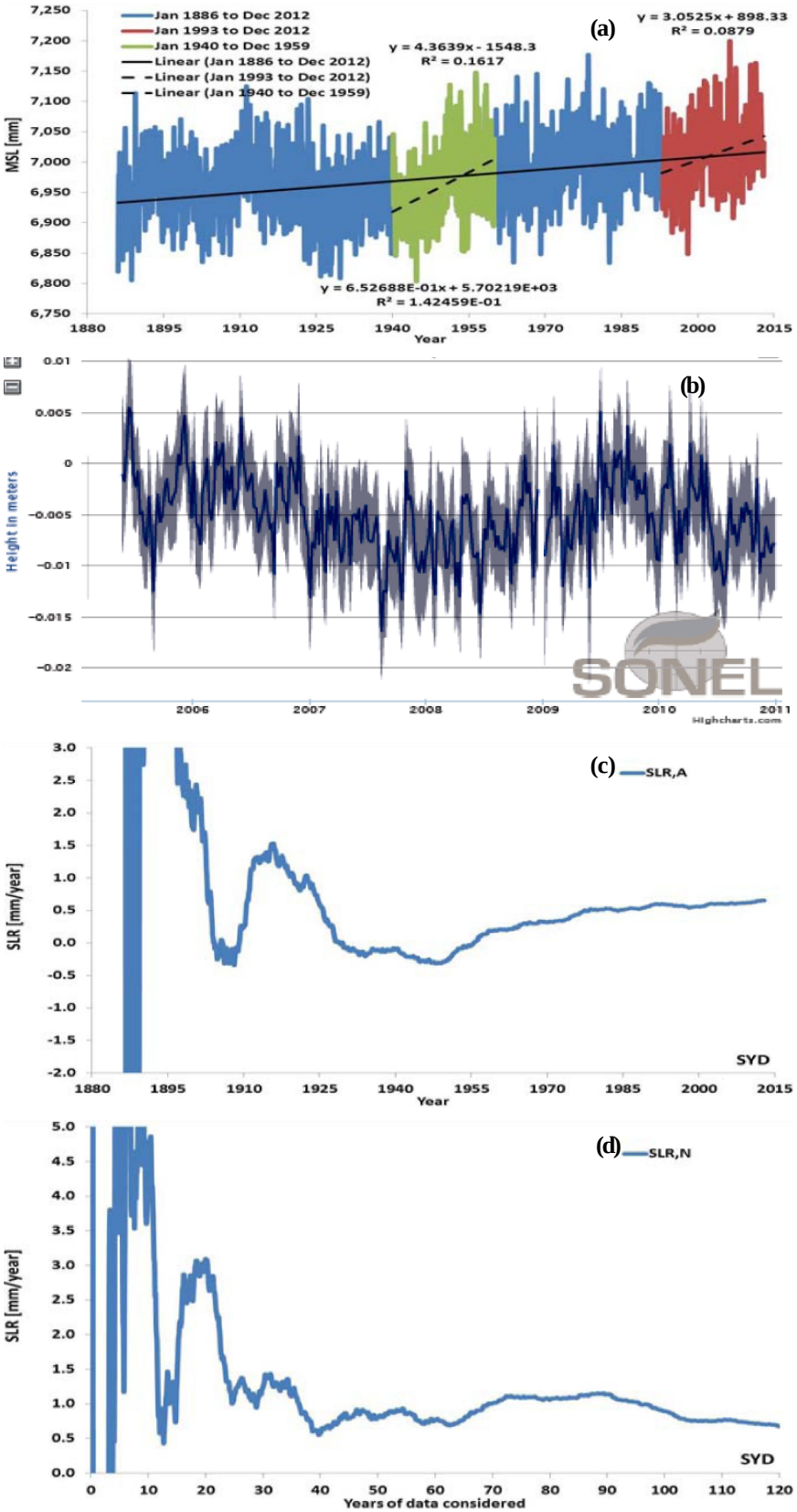


**Figure 1 : Sea levels in Sydney: (a) monthly sea levels and linear trend; (b) land motion in a nearby GPS station; (c) time history of the rates of rise computed by linear fitting of all the data from the start of the record; (d) sea level rise in Sydney in case the recording could have been started later**

**TABLE 1 : Hypothetical tide gauges measuring the sea level in the Bay of Sydney. The true sea level rise is 0.6527 mm/ year. The average sea level rise of the table is 1.965 mm/year**

| Tide gauge | Year Start | Rate of rise [mm/year] | Record Length |
|---|---|---|---|
| SYD127 | 1886 | 0.6527 | 127 |
| SYD110 | 1913 | 0.8945 | 100 |
| SYD70 | 1943 | 1.0117 | 70 |
| SYD20 | 1993 | 3.0956 | 20 |
| SYD100 | 2003 | 4.1691 | 10 |

*bal Sydney Bay"* rate of rise is the average of the rates of rise of all the available tide gauges no matter the length of the record and we compute the "*Global Sydney Bay*" mean sea level by integrating in time the velocity, we get the time distribution of Figure 2.b, that despite representing nothing real closely resemble the carbon dioxide emission of Figure 2.a. Note that in Figure 2.b a fraction of the monthly departures from the linear trend of Figure 1.a is considered. Figure 2.a presents the emission estimates in million metric tons of carbon. For those struggling with chemistry in addition to mathematics and statistics, these estimates may be converted to carbon dioxide simply multiply by 3.667.

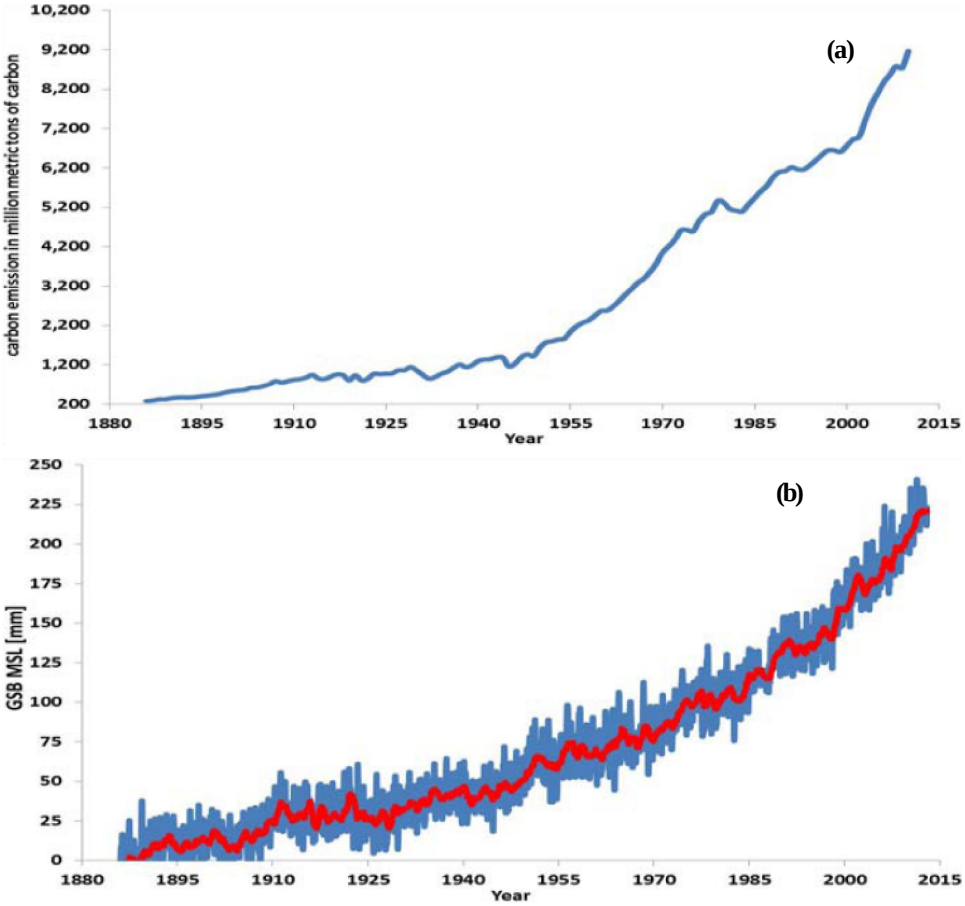


**Figure 2 : (a): Carbon emission; (b): Sydney bay global mean sea level. The stacking of rates of rise of tide gauges of variable length is misleading**

## CONCLUSIONS

Statements like "*there is strong evidence that global sea level gradually rose in the 20th century and is currently rising at an increased rate*" are not based on any experimental evidence.

Compilations of few selected tide gauges of variable quality and length from different areas of the world where the land motion also differs considerably do not represent the global mean sea level.

Similarly to Sydney, Figure 1, there is no single tide gauge record of enough quality and length all over the world that show a gradually increasing rate of rise in the 20th century and more than that currently rising rates at the present time.

There is no legitimate procedure to produce accelerating sea levels patterns by composing individual tide gauges all lacking of acceleration.

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