A Comment on Sea Level in the IPCC Climate Reports

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Abstract

When meteorologists with today's great computing power can only predict the weather with some degree of certainty about 3 days into the future, how can we then expect climate scientists to predict the climate 100 years into the future?

We have considered a single tide gauge at the Norwegian coast, Tregde. It has been chosen because the change in sea level is zero in relation to a fixed point in the rock at the tide gauge. During the almost 100 years the tide gauge has been in operation, it does not at any time show a significant change in sea level.

Although the IPCC reports say that there may be local differences in the sea level change around the earth, we find that zero change at the random Norwegian station, cannot be covered under "local differences". A relevant question is whether climate scientists' models really manage to capture the complexity of Nature.

The theoretical models for sea level change

In September 2019, the Intergovernmental Panel on Climate Change (IPCC) released its latest report, which largely addresses the future theoretical changes in sea levels. A quick reading shows that the roughly 1100 pages span a large number of possible scenarios, from sea level rising by about 1 metre to only a few decimetres over the next 100 years. Indeed, one of the figures in the report claims to predict something about sea level rise as far ahead as 300 years into the future.

One is consequently tempted to ask some critical questions. Meteorologists - with their best models of the atmosphere, with their mathematical formulas developed over 100 years and with the largest and most modern computers available – seem unable to predict the weather with some certainty more than a week into the future. That being so, how can we then accept that climate researchers operate with models that enable them to say something about climate and sea level changes 20, 50 or even 300 years into the future? Are climate scientists' models really that good?

Testing the models

To test the quality of these models, we considered the first IPCC report that came out in 1990. There, we found a figure at p. xxx [*sic*.] that showed what climate scientists expected concerning global sea level rise from 1990 until the year 2100, reproduced here, Figure 1.

Of course, the report made it clear that there would be local variations in sea level rise. The curves in the figure show a cross-section of what the climate researchers then thought would happen to the average global sea level. The media in the 1990s immediately focused on the higher line describing the worst possible outcome of climate change. It was probably this worst-case scenario that slipped into the public consciousness. The upper curve in the figure forecasts that the sea level can rise globally by up to about 25 cm from 1990 to 2020. The lower curve shows that the sea level in the same period could rise globally by approximately 7 cm. So, what in fact actually happened? It has now been 25 years since the figure was presented, and this is a long enough time interval to make a careful check of the forecasts.

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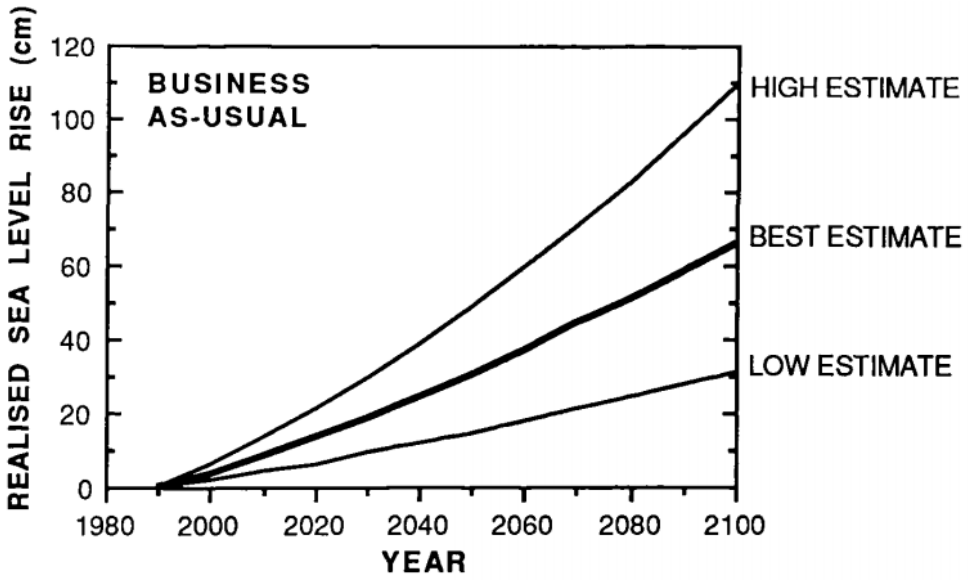

Figure 12: Sea level rise predicted to result from Business-as-Usual emissions, showing the best-estimate and range

Figure 1. Sea level change scenarios in the 1990 IPCC report.

The tide gauge at Tregde

In this connection, we have looked more closely at the data from one of the 25 tide gauges that the Norwegian Mapping Authority (NMA) has distributed around the Norwegian coast. The tide gauge at Tregde (southern Norway) near the southern tip of Norway was selected, not least because Tregde is located in an area that, according to geophysics researchers, has experienced no land uplift over a long period of time, compared to the mean sea level (See: *Geodetiske arbeider, hefte 6, Høyder for presisjonsnivellement i Sør-Norge*, published by Norges geografiske oppmåling, 1956).

At all of the NMA's tide gauges, sea level height as measured by the gauge is related to a fixpoint of known height that is emplaced in solid rock on land. This fixpoint is the reference mark for the tide gauge - the Tide Gauge Bench Mark (TGBM). The given height of the TGBM thus defines the position of the zero level in the tide gauge itself - somewhere in the water. What is measured by the tide gauge is therefore the water level at all times in relation to this defined zero level. At Tregde, the tide gauge has recorded the sea level continuously from 1927 until today. Data from the NMA provides the curves in Figure 2.

The vertical axis shows the height above or below the gauge's zero level in cm, while the horizontal axis shows the time from 1927 up to and including the year 2018.

The blue curve in the middle shows the average sea level for each year through the 91 years.

The upper curve shows the year's highest registered water level for each year during these 91 years.

The lower curve shows the corresponding year's lowest water level in the same time period.

What we can conclude from the curve for average sea level in Tregde (the middle curve), is that the sea level in relation to the TGBM in solid rock does not show any significant change during these 91 years. The curve appears to be fixed around a horizontal line from 1927 to 2018.

In other words, sea levels have remained stable relative to land throughout the observation period. We see no relative change in sea level in relation to land, neither before nor after 1990.

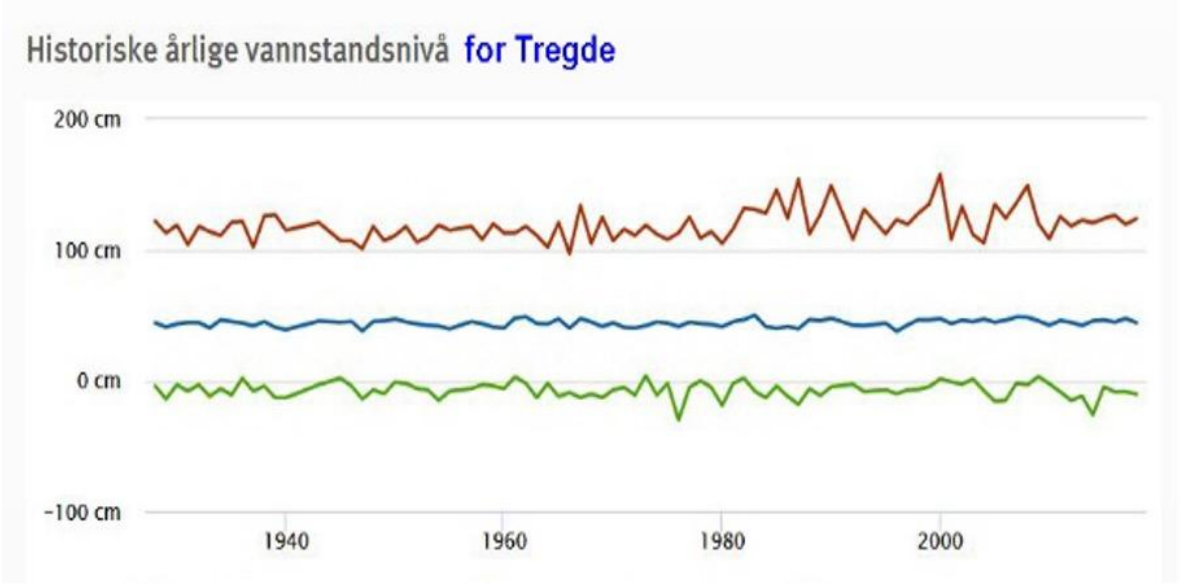

Figure 2. Historical annual sea level measures for Tregde.

If the sea has risen, then at Tregde it has risen steadily throughout the period of 91 years, and it must have risen at the same rate as land uplift, since the tide gauge shows no change in mean sea level at Tregde. At no point along the curve do we see a change in the speed at which the sea may rise.

Conclusion

Among professionals, it is estimated that land uplift has been very close to constant for at least 1000 years. Therefore, there is good reason to believe that the land uplift speed has been unchanged in Tregde throughout the time the water level gauge has been in operation.

Although the IPCC report from 1990 makes reservations about local differences in sea level rise, it must be possible to characterise Tregde as an unexplained exception, where mean sea level has remained unchanged in relation to land for 91 years since 1927.

We can only conclude that the climate scientists here have a difficulty of explanation. Zero change at Tregde cannot be covered by an explanation about local deviations from a global sea level change. Is it conceivable that climate scientists have models that do not fully reflect natural phenomena that are more complex than we are willing to admit? Do we have reason to believe that the models on which the 2019 report is based are more reliable?

We believe that all nations should do their part to reduce emissions that can be detrimental to the climate, and we must work for the sustainable development of our inhabitation of the planet. The way the climate debate has taken off in recent years, however, seems to suggest that climate is becoming the religion of our time. Raising critical questions about the climate panel's claims is by many non-specialists considered almost blasphemous. The data from the tide gauge at Tregde alone gives reason to question the quality of some of the climate models that may govern large investments in the future.

Figure 3. The house of the tide gauge at Tregde.