pH

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The main proxy that has been used is based on the boron isotopic composition of marine carbonates. This is part of a paper on this topic, and the relevant part for this discussion is picked out in red. (read)

For more recent pH history we can look to actual measurements. Although these have not been without problems.

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Empirical data withheld by key scientists shows that since 1910 ocean pH levels have not decreased in our oceans as carbon dioxide levels increased. Overall the trend is messy but more up than down, becoming *less* acidic. So much for those terrifying oceans of acid that were coming our way.

Scientists have had pH meters and measurements of the oceans for one hundred years. But experts decided that computer simulations in 2014 were better at measuring the pH in 1910 than the pH meters were. The red line (below) is the models recreation of ocean pH. The blue stars are the data points — the empirical evidence.

Some sign of the shenanigans were uncovered by Mike Wallace, a hydrologist with nearly 30 years' experience then working towards his PhD at the University of New Mexico. While studying a chart produced by a couple of authors, Feely and Sabine, apparently showing a strong correlation between rising atmospheric CO2 levels and falling oceanic pH levels, Wallace noticed that some key information had been omitted.

Mysteriously, the chart only began in 1988. But Wallace knew for a fact that there were oceanic pH measurements dating back to at least 100 years earlier and was puzzled that this solid data had been ignored, in favour of computer modelled projections.

Instrumental ocean pH data have been measured for more than 100 years — since the invention of the glass electrode pH (GEPH) meter. As a hydrologist, Wallace was aware of GEPH's history and found it odd that the Feely/Sabine work omitted it. He went to the source. The NOAA paper with the chart beginning in 1850 lists **Dave Bard**, with Pew Charitable Trust, as the contact.

Wallace sent Bard an e-mail: *"I'm looking in fact for the source references for the red curve in their plot which was labelled 'Historical & Projected pH & Dissolved CO_2.' This plot is at the top of the second page. It covers the period of my interest."* Bard responded and suggested that Wallace communicate with Feely and Sabine—which he did over a period of several months. Wallace asked again for the “time series data (NOT MODELING) of ocean pH for 20th Century.”

Sabine responded by saying that… *it was inappropriate for Wallace to question their “motives or quality of our science,” adding that if he continued in this manner,* ***“you will not last long in your career.”*** He then included a few links to websites that Wallace, after spending hours reviewing them, called “blind alleys.” Sabine concludes the e-mail with: *“I hope you will refrain from contacting me again.”* But communications did continue for several more exchanges.

In an effort to obtain access to the records Feely/Sabine didn’t want to provide, Wallace filed a Freedom of Information Act (FOIA) request.

Mike Wallace obtained some of the data and produced some interesting analyses. –

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(Pelagic = relating to the open sea) That hidden data suggested the ocean had been getting slightly more alkaline in the 20th Century –the opposite of the man-made acidification theory — but that pH change hasn’t been a linear shift. The pH has been cycling up and down, and on his blog back in February Wallace suggested that the pH of the ocean was varying naturally as the PDO cycled (*PDO means Pacific Decadal Oscillation – the 15 – 30 year long cycles of warmer or cooler sea surface temperatures in the northern Pacific. In a positive phase the western side is cool and the east is warmer, it rains more in California and less in Australia. The negative phase is the opposite.)

It’s an interesting theory. He’s used the PDO index and his global ocean pelagic zone pH time series chart that was based on 1.5 million pH readings.

It’s nice to watch a real scientist at work. His website is worth a look; it covers more than just ocean pH.

A number of studies have been made to investigate the effect of lower pH in sea water on corals and other marine life forms, and none support the hype.

According to Patrick Moore, a co-founder of Greenpeace, long one of ocean acidification theory’s fiercest critics, the term is ‘just short of propaganda’. The pH of the world’s oceans ranges between 7.5 and 8.3 — well above the acid zone (which starts below ‘neutral’ pH7) — so more correctly it should be stated that the seas are becoming slightly less alkaline. ‘Acid’ was chosen, Moore believes, because it has ‘strong negative connotations for most people’.

Another example is that of Dr Shallin Busch, who works for NOAA’s Ocean Acidification Program when she discussed the draft of a proposed New York Times article with fellow scientist Ms Applebaum. She warns that they can’t say that ocean acidification is a problem anywhere at the moment:

This email was obtained under FoI request.

Unfortunately, I can't provide this information to you because it doesn't exist. As I said in my last email, currently there are NO areas of the world that are severely degraded because of OA or even areas that we know are definitely affected by OA right now. If you want to use this type of language, you could write about the CO2 vent sites in Italy or Polynesia as examples of things to come. Sorry that I can't be more helpful on this!

Busch admits that ocean acidification studies are immature, and the evidence is not there "yet":

2) I think it is really important to resist the NYT editor's impulse to say that OA is wreaking all sorts of havoc RIGHT NOW, because for ecological systems, we don't yet have the evidence to say that. OA is a problem today because it is changing ocean chemistry so quickly. The vast majority of the biological impacts of OA will only occur under projected future chemistry conditions. Also, the study of the biological impacts of OA is so young that we don't have any data sets that show a direct effect of OA on population health or trajectory.

Best, Shallin..[4]

It's good that Busch is trying to make the article more accurate, but when she does public Q and A's on ocean acidification she doesn't say things quite the same way:

When asked: What is the single most important thing for people to know about ocean acidification?

She answered: ***That ocean acidification is a problem for today, not just for the future.*** *We know from earth's history and from experiments that we're doing in the lab that many marine species are sensitive to changes in ocean chemistry. So, acidification is a problem for marine ecosystems. We can take that a step further and say, well, why should we care about marine ecosystems? First of all, many societies value biodiversity. Furthermore, acidification's potential effects on marine ecosystems are an economic concern. Acidification may impact fisheries and the jobs and revenue that depend on fisheries. This may raise food security issues. Ocean acidification is an environmental problem, it's a potential economic issue, and it's a potential food security issue. And it's all those things today, not some distant day in the future.*

Busch is probably speaking only her honest convictions, but we need more from scientists. It's not enough to be technically correct, we need scientists who convey what we don't know, what the present state is, and provide the uncertainties in the same terms, no matter who the audience is.

If scientists think headlines are gratuitous and exaggerated, they need to say so publicly. If editors are not publicly shamed for the hype, they will keep doing it.

Ozone

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A bit of chemistry to start.

Slide 7

Montreal Protocol on Substances that Deplete the Ozone Layer it was agreed on 16 September 1987, and entered into force on 26 August 1989. Since then, it has undergone nine revisions,

There have been some challenges to the theory regarding the basic chemical mechanism that supposedly explains the depletion.

At least one saw light of day in a leading publication. And it took some while before that in turn was challenged. It's is easy to get the sense that things are far from certain.

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Antarctic ozone depletion causes an intensification of the Southern Ocean super-gyre circulation

Decadal changes of wind stress over the Southern Ocean associated with Antarctic ozone depletion.

Slide 9

The volcano they forgot to mention.

Sunlight is another required element in Molina's "dimer" chemistry. Sunlight is the "trigger" for the chemical reaction that destroys ozone molecules; this is why the ozone hole appears only at the beginning of the Antarctic spring, although the chlorine molecules have been there all through the winter darkness. ANI

Again, reality intrudes. The National Oceanic and Atmospheric Administration (NOAA) announced in September 1990 that its polar satellites were detecting the development of the ozone hole a full month before the appearance of sunlight. In other words, the hole is already well developed before sunlight strikes Antarctica, exactly the opposite of what Molina's heterogeneous chemistry theory predicts. If chemical reactions are creating the hole, these reactions are occurring in the darkness, which invalidates the theory. Not surprisingly, the news media ignored the importance of the NOAA discovery in refuting Molina's dimer chemistry. Instead, the press played the news as another scare story, reporting that the NOAA satellite data showed Antarctic ozone depletion to be more serious than originally thought, because the hole was-unexpectedly-appearing early.

One of the main scares put out about ozone is that the additional ultra violet that we, and other life forms, will be exposed to will cause all sorts of degradation, including of course the BIG C – Cancer! It seems that skin cancers have increased in places like Australian, and of course among people of European origin. Most of the cancers have been benign it seems (though the scaremongers just talk about cancer), and apparently the increase can be accounted for by people living longer. Also, of course, people these days are much more inclined to expose themselves to the sun. Anyway, just how a hole over the uninhabited Antarctic is going to affect people elsewhere needs some imagination. Further more it occurs when the sun doesn't shine – even more curious.

It's is interesting to read some studies of what the ozone concentrations are doing in the rest of the globe, these are posted on the website.