



How to Interpret Climate Science into English

The following article embodies one of the principle themes encountered in the world of interpretation of climate science into English. The journalist in this article from the New Scientist is reporting exactly what the scientist discussing the abyss of Antarctica says. The first thing that happens is that the journalists does not define abyss. Abyss means great depths, but very few of the definitions mention water. Abyss is not a term used often and so when it is the main topic of conversation, confusion results – bad form. And besides, the scientists don't call it abyssal water they call it bottom water or deep water. This often happens with science reporting. There are many terms in science used commonly that are exciting or adventurous or romantic to the average journalist who rarely gets to use the terms, so the splurge.

But that is just a side issue. What is going on in this article is that the cold water sinking in the Antarctic is caused by the cold weather in the Antarctic. Because it is so cold down there, more ocean water is cooled than elsewhere. This water then becomes heavier than the water just beneath it (colder water is heavier than warmer water), and it sinks. Water does this naturally without global warming.

The water that has sunk to the bottom of the ocean has been found to be warmer in this latest study than it was a decade ago, when the first study was done. many scientists across the planet have found these abyssal waters in the Arctic and Antarctic are now warmer than they were ten years ago. The cold dense water can be warmer than it was and still sink because, even though it is a few tenths of a degree warmer, it is still colder than the surrounding water and therefore denser, so it sinks. It is like the weather being able to snow even in the face of global warming. If the temperature is 10 degrees warmer because of global warming, it can still snow if that temperature is still below freezing.

So we have this water this is really cold water at the poles because the really cold polar wind is blowing across the polar ocean and cooling the water down and it sinks because it gets so much colder than the water just beneath. The water on the bottom of the sea today is warmer than it was a decade ago. Our climate today, particular in polar areas, is warmer than it was 10 years ago. When the scientist is asked if the abyssal waters are warmer because of global warming, he says – “Dunno”. The scientists then goes on to relate something like: “It could be because of global warming because global warming reduces the amount of deep water forming because the surface waters are not as cold and don't sink as rapidly. This means they have the opportunity to absorb more warmth at the surface. Or it could mean that the melting glacier ice is freshening the oceans surface water. The fresher, or less salty water, is less dense because it has less salt in it. So it is less heavy and it is harder to sink – just like warmer water is less dense and is harder to sink.”

So the scientists gives about a half dozen reasons to show that the water is warmer at the bottom of the ocean because of global warming. Then he says the conservative scientist thing that the reporter

captures and regurgitates without comprehending the impacts of the exact words that are stated, and quoted: the scientist says that the answer to the question about whether or not the warmer deep water is caused by global warming is “it is just too early to say”.

What the scientist means is that we don't have any data that says it is or is not yet, so we can not say. In science the test is even more stringent than in a murder trial. In a murder trial, a jury has to be certain beyond a reasonable doubt to convict. Reasonable doubt is not capable of precise definition, but it doesn't require absolute certainty. It is sometimes referred to as "to a moral certainty". A person can be convicted beyond reasonable doubt through circumstantial evidence.

Circumstantial evidence is not allowed in science. Something must be able to be proven with statistical tests, with mathematical calculations that say: indeed two plus two is equal to four and 1.3 plus 2.6 is equal to four and 2.0134 plus 1.9866 is equal to four and ten thousand other equations that are all equal to four. If all are equal to four, then the scientists can say – sure, this is because of global warming. But many of these studies have not been done, so we don't have the statistics to look at, only anecdotal information. Science is not the industry of anecdotes, just like they are not in the industry of circumstantial evidence – of course unless there is some way derived to “prove statistically” the circumstance or anecdote.

A scientist has to have data before he says something is true or not. It's like going to the market to buy cream. If they are out of cream, what are you going to do? If the scientist has no information from which to draw conclusions, she does not draw conclusions. She just can not say that because the Earth is warming, this warming is creating the warmer abyssal waters. If they are out of cream, you buy milk, not cream, you go somewhere else or you do without. But if they are out of cream, you do not buy cream. The scientist can not say there is global warming if there is no cream.

Another thing that happens when the scientists are put into this situation has to do with the scientists studying very specific things. Their research is very focused. These scientists were studying the temperature of the ocean at different depths at thousands of places across the southern ocean. They drive their ship across straight lines on the map and drop their temperature recorders on great cables to the bottom of the ocean and measure temperatures every one hundred feet all the way to the bottom. Then they move their ship down the straight line a mile or five kilometers and repeat. They do this routine thousands of times and create what is called basic research. They don't really set out to do anything with their findings except create data for the understanding of our world as we know it. This data is then used by countless other scientists as well as the scientists that created the data, in their quest to further the understanding of our world.

This research was very focused on learning the temperature of the water, not the reason why the water changed temperature. This is the way that science works. First they have to find the data and make sure that it is real and accurate. Then they can look at the data and draw conclusions. These conclusions will then start to consider things like glacier melt, decreased salinity and the amount of time it takes the water to sink and the way the ocean currents have changed due to the changing sinking characteristics of the water, etc.

Because of this focus, this scientist can not answer the “big picture” question that all journalists want to know. They all want to know if these research findings are caused by global warming from the scientific viewpoint. The grand communication disconnect then occurs, and it occurs over and over in the journalist / scientist interaction. The journalist does not understand the scientist's relationship with the facts. And the scientist does not understand that the journalist does not understand the general focus of individual research projects and in general, how the industry of science works. The scientists

do not know to make sure that the journalists caveat their articles the same way that the scientists caveats their research findings. The journalist asks his questions and finds that the scientist doesn't know, even through the scientists talks about global warming until they are blue in the face. When asked the point blank question: "is your research results caused by global warming" the scientists answers "dunno" and the journalists think "well it must not be, cause after all that talk about why it could be global warming, and then he says "we don't know" – there must be something out there other than glaobal warming that is causing this.

So the journalists emphasizes the wrong darned thing! He emphasizes that the scientists don't know, that they are indecisive, that they have conflicts. What is the journalist supposed to think? He has just spent 20 minutes talking to a scientists who says that what he has discovered could be caused in umpteen different ways by climate change, but zero ways by natural change, then when asked the point blank question the scientists completely changes his answer. What in the world is the journalist supposed to think?

So, two things happen in the journalist / scientist interaction: 1) The scientist sounds conflicted and indecisive, 2) The impression is given that global warming is NOT to blame.

When I go to the market for cream, and it is not in the cooler, I think, darn, they are out of cream. It is important to me that I get cream for my soufflé and I don't have time to go to another store and milk makes a really goofy soufflé, so I ask the guy with long apron if they are out of cream and he says, I don't know. And of course he goes to check, and when he comes back he says, "it looks like we are out cream". The scientists doesn't say, "it looks like we are out of cream". He says, "we can't tell yet." What if the guy at the market in the long apron had told me that we can't tell yet whether we are out of cream?

I really need some cream. I have this garden full of fresh spinach and I am really Jonesin for some spinach soufflé, can you go ask someone about the cream for me? He could have just not seen the cream, it could be some place that it is not normally, it could be on the truck at the loading platform, it could be just around the corner, they could have delivered it to the wrong market by mistake and it will be here in 10 minutes.

Climate change and global warming are here, that's been proven. But many things dealing with climate change that have huge risks have not been proven yet. Circumstantially – these things are valid, there is a preponderance of evidence to use a term proving a civil court case, and there is evidence to convict beyond a reasonable doubt. But a "moral certainty" is not enough for a scientist. Morality and science are not the same thing, they can not be mixed together. One does not "believe in" science.

If there were a 10% chance that I would die because my soufflé did not have cream instead of milk, I would go to another store to get cream, duh. Today the chance that extremely devastating impacts of climate change will occur on the planet, regardless of what we do to fix things is getting closer to 50/50. Yet the scientists can not take this into consideration in his or her research findings. The industry of science just does not work that way. There is no acknowledged methodology for interpreting the risks to the journalist and the scientists do not understand that the journalist doe not understand the basics of statistics and scientific research. The journalists just do not know enough about the topics they are researching, or about the industry and language of the scientist to know that they are doing a disservice to society by reporting what the scientist says word for word and not allowing for some margin of understanding about the focus of the science, the reality of the big picture and the risks involved.

Global warming reaches the Antarctic abyss, The New Scientist

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Even the deepest, darkest reaches of the Antarctic abyss are feeling the heat, according to new results presented at the [climate change congress](#) in Copenhagen, Denmark, on Tuesday.

[Gregory Johnson](#), of the US National Oceanic and Atmospheric Agency, says even he was surprised by the findings. He says the changes could be responsible for up to 20% of the observed [global sea-level rise](#).

As part of the [CLIVAR project](#), Johnson and a team of international colleagues have been spending weeks at a time at sea, tracing straight lines across all of the world's oceans. As they make these traverses, they measure the temperatures of the water from the very bottom right up to the surface.

The team takes its measurements along the same routes as expeditions carried out in the 1990s, which provides a picture of how things have changed in roughly one decade.

Global influence

The researchers are particularly interested in the masses of cold water that sink down to the abyss along the shores of Antarctica before moving north along the ocean floor into the Atlantic, Pacific and Indian Oceans. These three flows of Antarctic abyssal water overwhelmingly influence the deep waters of the world, says Johnson. Water sinks off the coast of Greenland too, but the Antarctic abyssal water volume is twice that of the north Atlantic.

Early results from CLIVAR show that abyssal water is warmer now than it was in the 1990s. The water that travels from Antarctica into the south-eastern Indian basin is roughly 0.1 °C warmer. The deep ocean current travelling from Antarctica into the Pacific is 0.03 °C warmer.

In the northern hemisphere, the deep abyssal Atlantic water, which sits between the ocean floor and the layer of deep water that sinks off the coast of Greenland and travels south, is 0.04 °C warmer.

What surprises Johnson most is that the warmer deep Antarctic water is apparently carried all the way to the north Pacific, too. Other vessels that have monitored what happens to the abyssal water as it moves north have also noticed a warming, albeit a smaller one.

Diluted oceans

The researchers have also looked at the salinity - important because it affects water buoyancy - of the deep Antarctic waters. They found that here, too, there is change: in both the southeast Indian Ocean and in the Pacific, the water is less salty today than it was in the 1990s. Most likely, says Johnson, this is a direct result of dilution from the melting Antarctic ice.

He is very reluctant, however, to say what is warming the abyss. Two possibilities present themselves: either the water is being warmed more at the surface near Antarctica before sinking into the abyss, or it is taking longer to sink and therefore has a longer time to soak up the surrounding temperatures.

As for whether human-driven climate change has anything to do with it: "It's just too early to say," Johnson says. Either way, the changes are significant. On average, over the last decade, water at the surface of the oceans has gained 0.35 watts per square metre - a measure of the amount of heat absorbed from the warming atmosphere. Johnson's measurements in the abyss are, in some regions, nearly three times that.

Johnson estimates that the warming and consequent expansion of the deep water flows may be responsible for between 10% and 20% of the global sea-level rise seen during that time.