

Science and Global Warming

Ron Greene

Reading Bucky Cochrane's latest letter dealing with global warming prompted me to do some literature research on the subject, since i had not done so for several years. I was first struck by the sheer number of websites and blogs denouncing the "global warming hoax". If you look at some of these, it becomes obvious that they fall into a couple of categories. Some are produced by people who clearly know nothing about science. They tend to denounce climate scientists as being part of some liberal conspiracy, and can easily be identified by the use of words like "hoax" or "junk science". A second category are the people who take a pseudo science approach. They tend to quote each other or cherry pick research that favors their view and ignore research that disagrees with their opinion.

Mr. Cochrane falls into the cherry picking camp. For example, he quotes a Danish Meterological Institute (DMI) study that found a thickening of the Greenland ice sheet in several interior areas due to increased snowfall. They did indeed (although the conclusions are based on computer modeling, which Mr. Cochrane has repeatedly trashed in the past). In this case, however, he fails to tell us that the *same DMI study* noted that increased calving of icebergs from Greenland more than compensates for the increased precipitation, and that Greenland is losing ice at about 200 billion tons a year. (As for the increased precipitation, off hand i'd say that's what you'd expect from warming of a very cold place – anyone who lives where it snows is aware that snow is more probable when the temperature is near freezing than much below.)

The National Snow and Ice Data Center summarized the 2016 Greenland melt season as follows: "Melt extent in Greenland was above average in 2016, ranking tenth highest (tied with 2004) in the 38-year satellite record. Melt area in 2016 was slightly greater than in 2015, which ranked twelfth. However, near-average to below-average coastal snowfall levels that exposed bare ice earlier in the melting season, combined with warm and sunny conditions at lower elevations, led to high overall ice loss from runoff."

Cochrane also refers to Joe MacGregor of the University of Texas at Austin as supporting his view. Here's a quote from a 2016 paper co-authored by Dr. MacGregor: "Contemporary climate warming over the Arctic is accelerating mass loss from the Greenland Ice Sheet through increasing surface melt, emphasizing the need to closely monitor its

surface mass balance in order to improve sea-level rise predictions.” Many of his papers are in the same vein. Does that sound like MacGregor is a skeptic of global warming?

Similar cherry picking has been done in the matter of Antarctic ice. Mr. Cochrane selectively refers to a study by Jay Zwally. However, he fails to tell us that Zwally’s study reports that measured Antarctic ice gain has been decreasing, and between 2003 to 2008 (the most recent year reported by Zwally) the gain was 82 billion tons per year – less than half of the Greenland losses. Moreover, Zwally himself has stated that his results are consistent with global warming and most computer models of climate. Furthermore, other reputable scientists have argued that altimeter measurements of ice sheet thicknesses (as used by Zwally) are not as reliable as gravity measurements – primarily because the underlying land rises slightly when the weight of the ice pressing down is reduced (by, e.g., melting and running off). Satellite measurements using the gravity method have consistently shown net ice losses in Antarctica that have been increasing in recent years. A simple internet search is sufficient to turn up references to quite a few refereed scientific papers to that effect. But apparently Mr. Cochrane did not like those cherries.

With regard to Arctic sea ice, Cochrane’s letter implies that it has not been decreasing. NASA and the National Snow and Ice Data Center recently reported that this winter satellite data showed the wintertime maximum extent of ice reached a record low. (That is, there was less sea ice this winter in the North polar region than any previous winter since we’ve had accurate measurements.) Although ice levels do oscillate, numerous papers have confirmed that the general trend for years has been downward. As Mr. Cochrane correctly points out, melting of floating ice does not cause sea level rise; it does, however, provide direct evidence in support of Arctic warming.

Moreover, there is considerably more relevant evidence than just the extent of ice in the polar regions. The rise of sea level is direct evidence of average global warming. The diebacks of coral reefs (huge in the Great Barrier Reef off Australia) is direct evidence of average global warming. The shrinkage or outright disappearance of glaciers in North America is direct evidence of warming, at least of North America. The shift of habitats of many species of animals and plants northward (in the Northern Hemisphere) or to higher elevations is direct evidence of average global warming. None of these by themselves can prove the theory of global warming. But collectively they make the theory much more plausible than not. Except to the cherry pickers.

And finally, though Mr. Cochrane may be comforted by the current small rate of ocean rising, i am not. The melting of ice in Greenland and Antarctica has a built in feedback mechanism – the more ice that melts, the greater the absorption of sunlight in those regions (due to exposure of bare rock and increased algae growth), leading to still greater melting.