

*Scare*Watch

*Melting Greenland ice “will
drown coastlines”*

by

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Melting Greenland ice “will drown coastlines”

The scare: In early January 2008, Stephen Schneider, a biologist turned climatologist, put up a blog posting to say that “We cannot pin down whether sea levels will rise a few feet or a few meters in the next century or two”; that there is a “potential for up to 7 meters of sea-level rise stored as ice on Greenland”; that “Greenland is apparently melting at an unprecedented rate, and way faster than any of our theories or models predicted”; that “mounting evidence from ice cores says probably there is unprecedented melting going on right now”; that “another decade or two of such scientifically-documented acceleration of melting could indeed imply we will get ... meters of sea-level rise”; that “another 5 meters of potential sea level rise lurks ... in West Antarctica”; and that “this is a gamble with Laboratory Earth that we can’t afford to lose.”

The truth: Remarkably, Mr. Schneider does not provide references – or any other evidence whatsoever – for his assertions. He merely declaims. Let us examine his declamations *seriatim*, comparing them with the scientific evidence and data.

“We cannot pin down whether sea levels will rise a few feet or a few meters in the next century or two.” If that were true, there would be no basis for worrying. However, considerable attention has been given to measuring rates of sea-level rise and to projecting rates of future rise. The world’s ranking expert on sea level is Professor Nils-Axel Mörner, who has been studying sea level for a third of a century. He has actually climbed the glaciers that Schneider writes about. His conclusion (in Mörner, 2004) is that there is very little reason to suppose that the rise in sea level in the present century will be significantly greater than in the past century, when it rose less than eight inches. The Jason/Topex/Argo satellites have been measuring sea level with unprecedented accuracy for the past ten years, and they find it rising at a rate of 1 foot per century. The IPCC has thrice revised downward its high-end estimate of sea-level rise, reducing it by more than one-third, from 3 feet/century in its 2001 report to less than 2 feet/century in its 2007 report. The IPCC’s current central estimate of sea-level rise to 2100 is just 1 ft 5 in. Furthermore, the IPCC’s latest climate assessment says that global mean surface temperatures at least 2 °C higher than the present would need to be sustained for several millennia in order to melt just half the Greenland ice sheet. However, since the turn of the millennium on 1 January 2001 global temperatures have exhibited eight straight years of a falling trend, so disintegration of the Greenland ice sheet is not thought to be at all likely at any time in the near future.

“There is a potential for up to 7 meters of sea-level rise stored as ice in Greenland.” So there is. The vast Greenland ice sheet last melted 850,000 years ago, when conifers grew even at some of the highest altitudes. Humankind’s industrial activities are not thought to have been responsible, for we were not there at the time. Therefore, even if Greenland’s ice sheet were to melt away entirely, it would not be possible to say that the melting was unprecedented and therefore definitely attributable to anthropogenic influences on the climate.

“Greenland is apparently melting at an unprecedented rate, and way faster than any of our theories or models predicted.” Note the use of the word “apparently”. Mr. Schneider does not provide evidence for the “apparent” melting. However, let us assist him by saying that, according to satellite observations, the area of Greenland that is covered in ice has decreased by 0.3% in the past 30 years. This relatively trivial diminution in the *area* is, however, more than compensated for by a very considerable increase in the *thickness*. According to Johannesen *et al.* (2005), the ice sheet grew in thickness by 5.4 cm (more than 2 inches) *per year* in the 11 years 1993-2003. Johannesen *et al.* used satellite altimetry, a well-tried technique, to estimate the change in thickness over the period of observation. However, more recent experiments, also using the GRACE satellites, have attempted to measure changes in the thickness of the Greenland ice sheet by the more indirect method of studying variations in gravitational anomaly. Calibration of such measurements poses formidable problems because of changes in the location and altitude of the tectonic plates that make up the Earth’s surface, compounded by isostatic alterations in the altitude of the underlying rock caused by changes in the weight of Greenland’s ice as it melts or accumulates. So, which is right – Johannesen or GRACE? Sometimes in science a sensitive and intelligent device known as the Mark 1 Eyeball can come in handy. The United States of America used to maintain a chain of Distant Early Warning (DEW-line) radar stations across Greenland, watching for incoming Soviet or Chinese intercontinental ballistic missiles. We shall present photographs of two of these now-abandoned stations, DYE-2 and DYE-3:

Figure 1: Accumulating ice and snow around DEW stations



DYE-2 proud of the ice in 1966 ...



... and surrounded by it in 1998



DYE-3 on the ice surface in 1972 ...



... and engulfed by it in 2006

The history of the attempts by the US military to keep the DYE-2 station above the accumulating ice and snow is revealing. It was essential that all of the radars should remain above the surface of the ice sheet at all times so that they would be able to work efficiently at long range. This is what happened –

- 1959** DYE-2 station constructed on the surface of the Greenland ice sheet
- 1962** DYE-2 jacked up by 1.8 meters to keep it clear of the surface
- 1965** DYE-2 jacked up by 2.7 meters to keep it clear of the surface
- 1967** DYE-2 jacked up by 3.2 meters to keep it clear of the surface
- 1970** DYE-2 jacked up by 7.6 meters to keep it clear of the surface
- 1976** DYE-2 jacked up by 8.2 meters to keep it clear of the surface
- 1988** DYE-2 station closed

At least in the region of these two stations on the DEW-line, the Greenland ice sheet has clearly been thickening, consistent with the findings of Johannesen *et al.* (2005).

“Mounting evidence from ice cores says probably there is unprecedented melting going on right now”: It is impossible to deduce past melt-rates from ice-cores, because the layers of snow are compacted to form ice, preserving distinct annual layers discernible by seasonal changes in the state of the snow. However, because the masses of ice are shifting, little or nothing can be learned about past rates of melting by studying the ice-cores. However, since we know that the entire Greenland ice sheet melted away 850,000 years ago, there is no reason to suppose that such melting as may be occurring is in any degree “unprecedented”. But is there any significant melting? Given that global temperatures have been declining since the turn of the millennium, little melting is to be expected.

“Another decade or two of such scientifically-documented acceleration of melting could indeed imply we will get ... meters of sea-level rise”: Since we are not told what the “scientifically-documented acceleration of melting” is based upon, it is difficult to comment definitively: but very little in the way of new evidence of rapid ice-melt in Greenland has become available in the two years since the IPCC produced its 2007 report, in which it stated clearly that there would be no significant melting of Greenland for several millennia, and only then if global temperatures remained at least 2 °C above today’s temperatures throughout those millennia. There is, therefore, no scientific basis for assuming that “we will get meters of sea-level rise” from Greenland.

“Another 5 meters of potential sea level rise lurks ... in West Antarctica”: The only significant loss of ice in Antarctica has been on the Antarctic Peninsula, which occupies less than 2% of Antarctica. Seven ice shelves, accounting for an area less than 2% the area of Texas, have disappeared in the past decade. However, Larsen B, one of these shelves, was not present during the mediaeval warm period (Pudsey *et al.*, 2006), so the disappearance of the shelves is not only insignificant but not unprecedented. The vast majority of Antarctica has cooled considerably over the past half-century, with corresponding accumulation of snow and ice, and there has also been environmental damage arising from intense cold in some Antarctic glens (Doran *et al.*, 2002). A proxy for summertime temperatures at the poles is the extent of summer sea ice. In Antarctica, the summer of 2008 saw a record high sea-ice extent. Once again, there is little reason to suppose that the West Antarctic Ice Sheet is about to disintegrate. Even if it were to do so, the event would not be

unprecedented, and could not be safely attributed chiefly to anthropogenic influences on the climate. The weather has been getting warmer at a rate of 0.5-0.7 °C/century (Akasofu, 2008) for 300 years since the end of the 70-year Maunder Minimum, during which there were no sunspots on the Sun and the weather was colder than at any time in the past 10,000 years. Temperatures climbed between 1700, at the end of the Maunder Minimum, and 1998, at the end of the 70-year Solar Grand Maximum, during which the Sun was more active, and for longer, than at almost any previous similar period in the past 11,400 years (Solanki *et al.*, 2005, and see Usoskin *et al.*, 2003; Proceedings of the Symposium of the International Astronomical Union, 2004; Hathaway *et al.*, 2004). Throughout 275 of the past 300 years, humankind cannot have had much to do with the warmer weather, which was plainly caused chiefly by the inexorable increase in the activity of the Sun between the Maunder Minimum and the Grand Maximum.

“This is a gamble with Laboratory Earth that we can’t afford to lose”: By “this”, Mr. Schneider presumably means the emission of carbon dioxide by human industries. However, it is important to put these emissions into context. During the Cambrian era, 550 million years ago, there was up to 25 times as much CO₂ in the atmosphere as there is today (IPCC, 2001). Compared with the beginning of the industrial revolution in 1750, CO₂ occupies just one-ten-thousandth more of the atmosphere than it did. Furthermore, its concentration, though still increasing, is rising at a rate so far below even the minimum rate predicted by the IPCC that if the current trend continues temperatures will rise this century at less than half the IPCC’s predicted rate – i.e. well below 2 °C by 2100. It is generally accepted that temperature increases of as little as this would be harmless. After 2100, with declining population and reserves of fossil fuels, carbon dioxide emissions will be likely to stabilize even without government intervention. Therefore there is no climatic reason – and certainly none in Greenland – for governments or individuals to take any action whatsoever to curb carbon emissions. **End of scare.**

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