

ARCTIC METHANE EMERGENCY



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At the Fall Meeting of the American Geophysical Union in San Francisco from 5-9 December 2011, there was a session on *Arctic Gas Hydrate Methane Release and Climate Change* at which Dr Semiletov of the Far Eastern Academy of Sciences reported dramatic and unprecedented plumes of methane – a greenhouse gas about 72 times more potent than carbon dioxide over 20 years – were seen bubbling to the surface of the Arctic Ocean by scientists undertaking an extensive survey of the region.

So far this has been reported in *The Independent* and in a number of online blogs, but the background is explained in detail by a website set up by the Arctic Methane Emergency Group. Essentially the problem they have identified is the following:

This emergency to our planet's biosphere comes from multiple mutually reinforcing positive feedbacks now affecting the Arctic climate. Each of these feedbacks alone would affect the entire biosphere, however, when working in concert with each other will exponentially increase global warming, leading to abrupt and catastrophic climate change. Numerous scientific sources show atmospheric temperatures are rising much faster in the Arctic than in temperate or tropical regions.

The Arctic summer sea ice is in a rapid, self-reinforcing collapse, causing a most dangerous feedback: an albedo flip from a highly reflective state to a highly light absorbing state. (Open sea absorbs 90% of incoming solar radiation and converts it to heat, while sea ice harmlessly reflects 90% of incoming solar radiation back out to space) In hindsight, Arctic summer sea ice clearly passed its tipping point in 2007 – many decades earlier than models projected, meaning that it is now highly likely that the Arctic will become ice free in summer within the next two to seven years. Models, based on measurements going back to 1979, of sea ice volume indicate a seasonally ice free Arctic likely by 2015, with the possibility of a collapse to a small amount of residual ice as soon as summer 2013. Such a collapse will inexorably lead to a number of

positive feedbacks, among which will be a change of today's carbon sinks such as permafrost, peat bogs, and rainforests worldwide to become net sources of atmospheric carbon. The net effect of these positive feedbacks will be planetary catastrophe.

The retreat of sea ice could establish the most catastrophic feedback process of all, which may already have started many decades ahead of projections. This involves the venting of methane to the atmosphere from vast stores of methane capped by sub-sea permafrost that is now thawing and perforating all across the East Siberian Arctic Shelf – the world's widest continental shelf. Such venting can lead to greenhouse warming and further venting in a vicious cycle where global warming spirals out of control towards a hothouse planet.

All of these Arctic feedbacks are described in detail in the 2009 World Wildlife Fund (WWF) report, *Arctic Climate Feedbacks: Global Implications* (<http://en.wwfchina.org/en/publications/?3265/Arctic-Climate-Feedbacks>)

If substantiated as happening on a large scale - and this year's reports suggest that it will be – then this situation can start an uncontrollable sequence of events that would cause worldwide modern agriculture to fail and civilisation to collapse. Change in the Arctic is occurring at an accelerating rate, and when presented with the most recent evidence it is not alarmist to say that it is an all too real threat to the survival of humanity and much other life on Earth.

Emergencies always happen at the worst times – but it doesn't mean that there is any excuse to scrimp in funding whatever it takes. After all, World War II came at the end of ten years of depression, yet the country had to respond to the threat. If the AMEG analysis is right, then the present threat not only to the UK, but to all humankind, is far greater than we faced in 1939, and demands an appropriate response. It requires rapid mobilisation on national and international scales.

The first part of such a response should be the urgent formation of an independent, international team of scientists and engineers to assess the real

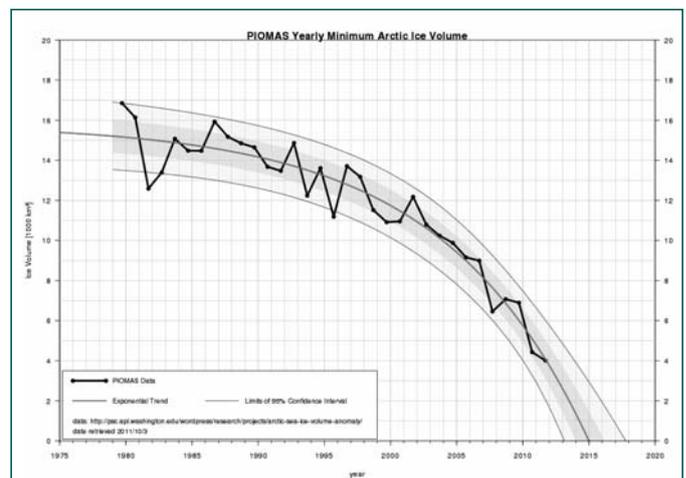


Figure 1: Trend of minimum summer Arctic ice volume. Data from PIOMAS (Polar Science Center, Washington DC, USA)

scale of the problem. This clearly cannot be done by any one nation alone – even Russia, on whose doorstep the most serious symptoms have been seen.

If the AMEG analysis is confirmed, then the second stage is urgently to identify and implement the necessary counter-measures, which also need to be carried out as an international project. There are a number of methods to tackle the problem if action is not delayed: they may be grouped as either geo-engineering or local intervention solutions. Financing these is something which simply has to be done – without long delays and political wrangles. It is an almost

impossible challenge to implement the counter-measures quickly enough to prevent the possible collapse of the Arctic sea ice in summer 2013, but this challenge has to be faced as an international emergency.

It should be added that there have been other reports which suggest that there may be less urgency – though they do not disagree with the existence of the problem. However, this is a case where I believe the precautionary principle must override such doubts. The precautionary principle was invoked during the 1990s to justify international action (such as the Kyoto Protocol) on global warming at a time when the

scientific evidence for man-induced warming, though strong, was not totally certain (at that time, for instance, only CO₂ was being monitored, not methane or nitrogen oxides). The wisdom of that was borne out by the fact that the scientific evidence has become absolutely overwhelming. Doing nothing, in my opinion, is not an option. Delaying action is as bad as doing nothing. If we take action and it proves to have been unnecessary then a lot of money will have been spent – but not altogether wasted even so, as we shall understand these feedback processes much better. If we do nothing and find that action was required, then the future of civilisation is at serious risk, if not worse.

The Arctic Methane Emergency Group is an ad hoc international group, chaired by geoengineering expert John Nissen, whose members include Peter Wadhams, Professor of ocean physics at Cambridge University, Stephen Salter, Emeritus Professor of Engineering Design at Edinburgh University, and Dr Brian Orr, former Principal Scientific Officer, Department of the Environment. Further information can be obtained from <http://www.arctic-methane-emergency-group.org>

A document from AMEG has also been placed on the P&SC web site giving much more information, in language that should be accessible to non-scientists.

WHAT IS THE PUBLIC UNDERSTANDING OF RISK?

Meeting of the Parliamentary and Scientific Committee on Tuesday 13th December

ENGINEERING, ETHICS AND RISK



Dr Chris Elliott FEng
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The public has no difficulty understanding risk. My evidence for that assertion is to look at how people deal with, for example, a three horse accumulator bet. People are quite capable of understanding odds and alternative outcomes, provided they have trustworthy, accurate and impartial information. For horse racing, all they have to do is pick up the Racing Post.

However, the question is not whether the public is capable of understanding risk but whether they do actually understand it. For many of the risks that they have to deal with, there is no equivalent of the Racing Post.

An extreme example was Andrew Wakefield's allegation of a link between autism and the MMR vaccination. Wakefield was at least incompetent and possibly dishonest but the real harm was done by the news media that reported his work sensationally. Poor risk decisions by parents meant that children

were not vaccinated, with a consequent loss of "herd immunity", and it is highly likely that some have died as a result. Did any of those newspapers print as big headlines after his work was discredited? How can lay parents take a sensible risk-based decision when confronted with such poor information?

My understanding of juries and work I have done with focus groups leads me to trust the proverbial "man on the Clapham omnibus" provided we treat him or her like a grown-up. That leads to my first

conclusion: **The public is perfectly capable of understanding risk – if given trustworthy, accurate and impartial information on which to make an informed decision.**

The following cutting from the London Evening Standard quotes an Assembly spokesman saying that driverless trains are "perfectly safe". That is nonsense; nothing is perfectly safe. Every human activity brings good and bad consequences, not all of which can be accurately predicted. We decide