

2nd September 2011

#### Time for a more mature debate on climate change

It is interesting to see how the apparently impenetrable facade of received wisdom on climate change has begun to weaken and show signs of crumbling. Many supporters of the mainstream view have become less antagonistic towards legitimate criticism and the tone of this criticism has in some cases become more moderate as alternative views are more widely reported.

Could this be the start of a new phase of mature and rational debate on the issue?

Don't hold your breath, because for every sign of proper scientific discussion, there are still plenty of dismissive or downright belligerent views expressed. Not all believers in anthropogenic global warming necessarily regard the science as settled, but there are still plenty who at least act as though they do. Take, for example, the long-awaited results from the CLOUD experiment (Cosmics Leaving Outdoor Droplets) at CERN. The press release on a paper published in Nature ([CERN's CLOUD experiment provides unprecedented insights into cloud formation](#)) is suitably neutral, but the results have been interpreted rather differently by those with different views on AGW.

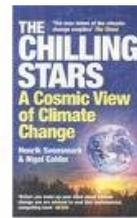
But first, we should remember what the experiment is all about. Readers are probably familiar with the hypothesis proposed by Henrik Svensmark of the Danish Space Research Centre in Copenhagen that low level cloud formation, initiated by high energy cosmic rays, is mediated by variations in the Sun's magnetic field, for which the sunspot cycle is a proxy. More specifically, as the Sun's magnetic field weakens, more cosmic rays penetrate the atmosphere, making more clouds, reducing the amount of sunlight reaching the surface and thus lowering temperatures. Conversely, when the Sun's magnetic activity is higher (and when there are plenty of sunspots), the Earth is shielded to some extent from cosmic rays and temperatures tend to be higher.

Work over the last few years in Denmark had provided evidence that high energy particles (similar to cosmic rays) could induce nucleation and cloud formation, but the results of the more sophisticated CLOUD experiment were keenly awaited to see whether they could provide more definitive evidence. Broadly, the answer was yes: under very carefully controlled conditions, such as would be found as at various heights in the atmosphere, the presence of traces of sulphuric acid and ammonia did result in the formation of nuclei for cloud formation, and the addition of high energy particles increased the rate of nucleation considerably. In essence, Svensmark's basic hypothesis has been shown to be compatible with observations.

However, this is not the whole story. Jasper Kirkby, spokesman for the experiment and lead author of the Nature paper, is quoted as saying "We've found that cosmic rays significantly enhance the formation of aerosol particles in the mid troposphere and above. These aerosols can eventually grow into the seeds for clouds. However, we've found that the vapours previously thought to account for all aerosol formation in the lower atmosphere can only account for a small fraction of the observations - even with the enhancement of cosmic rays."

Not surprisingly, the first results do not tell the whole story and, indeed, pose additional

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questions. The understanding of cloud formation is still far from complete. Since clouds have an important part to play in determining ground temperatures (as anyone unfortunate enough to have spent August in north-west Europe will be only too well aware) and the IPCC modellers recognise that their models do not make a proper allowance for clouds, further experiments which might improve understanding should be welcomed by all scientists.

But initial reaction to the Nature paper has been mixed. Nigel Calder, a long term promoter of the Svensmark hypothesis, who collaborated with him to write *The Chilling Stars* (recommended for those who want to understand more about this issue) put out a blog posting entitled simply [CERN experiment confirms cosmic ray action](#). However, the subtitle, *The global warmists' dam breaks*, perhaps gives a better impression of his views.

Meanwhile, Gavin Schmidt, on the blog RealClimate ('Climate science from climate scientists') posted a piece with an equally neutral title: [The CERN/CLOUD results are surprisingly interesting....](#) But it's not long before we come to this quote: "*It is eminently predictable that the published results will be wildly misconstrued by the contrarian blogosphere as actually proving this link. However, that would be quite wrong.*" He then proceeds to justify his case, in particular pointing to the lack of decline in cosmic rays over recent decades. However, this misses the point: the hypothesis suggests a more subtle effect, since only very high energy cosmic rays penetrate the atmosphere sufficiently to nucleate the low level clouds which might have a cooling influence. It is not total cosmic ray flux which is important, but the high energy part.

The BBC, often criticised by sceptics for its unquestioning acceptance of the IPCC view, report [Cloud simulator tests climate models](#). But the tone of the report downplays any possible influence of cosmic rays. The only quotes are from Dr Kirkby and Professor Mike Lockwood from Reading University, who said "*The result that will get climate change sceptics excited is that they have found that through the influence of sulphuric acid, ionisation can enhance the rate of water droplet growth. Does this mean that cosmic rays can produce cloud? No.*"

Clearly, there is a lot more work to be done on this whole issue. But we should not forget that the first results of CLOUD are still at least consistent with the Svensmark hypothesis. The effect is much smaller than would be needed to have the impact he suggests, but the experiment has also so far failed to reproduce the nucleation rates necessary for cloud formation, with or without the impact of cosmic rays. Until this is done, the hypothesis certainly cannot be dismissed.

And, in contrast, we should not forget that the enhanced greenhouse effect has *no* direct supporting evidence, merely the apparent certainty that there is no other explanation for the pattern of temperature rise over the last century or so. Any 'evidence' put forward is either purely circumstantial or the output of computer models tuned to account for past changes. Since they have singularly failed to account for the temperature plateau of the last decade, confidence in them seems to be misplaced.

In these circumstances, rather than circling the wagons, it is the duty of all true scientists to maintain an open mind and not simply protect their own pet theories to the death. If only...

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