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NEWS

Jun 25, 2009

Galactic link to climate change in doubt

Some physicists believe that changes to the Earth's climate can be explained in large part by variations in the flux of cosmic rays reaching the Earth. These occur as the solar system pass in and out of our galaxy's spiral arms – passages that seem to correlate closely with the timing of ice ages. However, new research based on a recent model of the structure and motion of the spiral arms finds there is no such correlation.



More asymmetrical

In 2003 physicists Nir Shaviv and Ján Veizer reported a close correlation between the motion of the solar system through the Milky Way and changes to the Earth's climate. They found that the solar system passes through one of the galaxy's four spiral arms about once every 140 million years, and these intersections correspond with both the peaks of successive ice ages and fluctuations in the abundance of oxygen-18 in fossils – which is related to temperature. Both climatic variables also vary with a period of about 140 million years.

To explain such a link, the researchers note that higher rates of local supernovae should lead to greater fluxes of cosmic rays as the solar system passes through the Milky Way's spiral arms, which are higher-density regions of stars and gas within the galaxy. Physicist Henrik Svensmark has proposed that the secondary particles created by these cosmic rays as they pass through the atmosphere can help the formation of condensation nuclei for clouds, with the increased formation of low clouds blocking more sunlight and hence cooling the Earth. This hypothesis has proved controversial, given its implications for our understanding of global warming.

Now, physicists [Adrian Melott](#) and Andrew Overholt of the University of Kansas and [Martin Pohl](#) of Iowa State University in the US have carried out a new study of the supposed link

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between the solar system's galactic motion and climate change and have found that the correlation does not exist.

New view of the Milky Way

They base their work on a new model of the galaxy produced last year by astronomer Peter Englmaier, who used the distribution of carbon monoxide molecules throughout the Milky Way, as revealed in infrared data collected by NASA's Spitzer mission, to trace out the structure of the spiral arms. Englmaier found that the arms branch off at varying angles to one another and that the galaxy therefore has quite an asymmetrical shape.

In using this model to work out when the Sun intersects the galactic arms, Melott's group also needed to know how quickly the spirals move (the speed of the solar system itself is well known). The spiral pattern propagates through the galactic material much as a sound wave propagates through air, and its speed of propagation is found out by measuring the speed with which newly born star clusters move away from the spiral arms where they are created.

Combining this speed data with the asymmetric position of the spirals in Englmaier's model, the researchers found that the distance and therefore time between successive intersections of the solar system with spirals was not constant, and that there was therefore no correlation with ice ages on Earth. They discovered that this result held up across a wide range of pattern propagation speeds.

What about the galactic plane?

Pohl points out that, strictly speaking, this research only rules out a correlation between climate and spiral-arm passages, and that there has been speculation that the motion of the Sun in and out of the galactic plane could have effects on Earth.

Svensmark, however, believes the spiral-arm correlation itself still stands. He says the analysis by Melott and co-workers has problems in determining the location of spiral arms and also wrongly assumes that the whole spiral-arm pattern moves with a single speed. " "This latest work does not make me reconsider the link between galactic dynamics and the climate on Earth," he added.

The research is reported on [arXiv](#).

About the author

Edwin Cartlidge is a science journalist based in Rome

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Oliver K. Manuel
Jun 25, 2009 8:01 PM
United States

CLIMATE CHANGE LINKED TO VARIABLE STAR
I also doubt a galactic link to climate change.

But there is little or no doubt that climate change is closely linked with cycles of variability in the star that heats planet Earth and sustains life here. arxiv.org...0905.0704

With kind regards,
Oliver K. Manuel

Edited by Oliver K. Manuel on Jun 25, 2009 8:02 PM. Reason: correct typo

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hughlaue
Jun 26, 2009 12:30 PM
Port Elizabeth, South Africa

Climate change and sun

Yes, climate change must obviously be linked to the sun's variability, and this variability is included in the climate models. But it does not explain the the recent rapid warming for which only AGW theory provides a satisfactory explanation.

Quote:

Originally posted by Oliver K. Manuel [Go to comment](#)

I also doubt a galactic link to climate change.

But there is little or no doubt that climate change is closely linked with cycles of variability in the star that heats planet Earth and sustains life here. arxiv.org...0905.0704

With kind regards,
Oliver K. Manuel

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psycherevolt
Jun 26, 2009 3:00 PM
Hancock, United States

I'm a fan of the "meteor hits the Earth and dust blocks sunlight causing an ice age" theory and the "heavy volcanic activity caused by meteor hitting earth causing an ice age" theory.

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gunslinger
Jun 26, 2009 4:55 PM
United States

hey!!
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Oliver K. Manuel
Jun 27, 2009 3:26 AM
United States

IOP CENSORSHIP?

Quote: Originally posted by gunslingor [Go to comment](#)

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Many of my comments have also vanished without explanation.

A statement from IOP would be helpful.

With kind regards,
Oliver K. Manuel

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chrisforbes1989
Jun 27, 2009 2:52 PM
COVENTRY, United Kingdom

Disappearing Comments

Could this be due to your constant criticisms of every piece of research published in physics world? if you were to promote yourself a little less, and be more fair in your analysis of articles, you may find that your comments will be kept

Quote:

Originally posted by Oliver K. Manuel [Go to comment](#)

Quote:

Originally posted by gunslingor [Go to comment](#)

Someone deleted my comment. I never thought I would see such flagrant censorship on this site. Oh well, guess I need a new source cause I won't touch this site again.

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With kind regards,
Oliver K. Manuel

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Neeyik
Jun 27, 2009 2:55 PM
Workington, United Kingdom

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guysoft
Jun 27, 2009 8:52 PM
Israel

Actually the information here is not really enough. I had a lecture by Nir Shaviv. And he did bombard us with a lot of data that shows that ions in the atmosphere from supernovas are in correlation with global warming (he also showed that CO2 seems to be indirect correlation to global warming).

The information brought in the article seems to make his less valid, but it seems that the spiral structure of the arms is not the only way to measure where there is more radiation. And there is data from other empirical measurements.

It does not mean its not true.

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regsoft
Jun 28, 2009 6:39 AM
United States

What about the galactic plane?
I have seen other articles on the 62 million year cycle and it makes sense. see on the second page of news.nationalgeograp...420-extinctions.html
"At regular intervals, the system's wanderings take it up and down through the thin central portion of the disk. The sun reaches its farthest distance from the central plane every 62 million years." Location relative to the spiral arms must also have some effect. Common sense tells me that.

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