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Could Cosmic Ray Influence Climate By Charging Up More Frequent Lightning Storms?

ScienceDaily (July 22, 2009) — Could cosmic rays be influencing climate by charging up more frequent lightning storms? European researchers hope to answer that question in the inaugural issue of the International Journal of Global Warming.

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Earth & Climate

- Global Warming
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- Consensus of scientists regarding global warming
- Solar radiation
- Geologic temperature record
- Climate model

Several factors influence global climate change. Long-term influences that work over hundreds of thousands of years have an astronomical origin, namely the eccentricity, axial tilt and precession of the Earth's orbit. Natural processes on earth, such as volcanic activity and lightning also affect the levels of particulates in the atmosphere and so affect climate. Higher levels of particulates in the atmosphere increase cloud cover, which reduces the amount of energy from sunlight absorbed by the earth's surface.

However, our burning of fossil fuels at an increasingly high rate is adding the greenhouse gas, carbon dioxide to the atmosphere, at alarming rates. This activity together with human activities that are also raising levels

of other greenhouse gases, including methane, are cause for concern and underpin efforts to prevent irreversible climate change.

Heitor Reis and Cláudia Serrano of the Geophysics Centre of Évora, Portugal, point out that another factor must be considered in detailed climate models. They explain that on a shorter timescale, solar activity, which follows an eleven-year cycle, may have a subtle effect not previously recognised.

Their research suggests that the eleven year solar cycle causes a rise and fall in cosmic rays reaching the earth's surface and so causes a rise and fall in lightning activity. Less solar activity means higher cosmic rays flux and fewer lightning storms, whereas at times of maximum solar activity there are fewer charged particles in the atmosphere so it is more resistant to the smooth flow of charge and lightning bolts occur as the resistance suddenly breaks down.

This lightning effect is in turn affected by the amount of particulate matter in the atmosphere, which depends on fossil fuel burning. The team explains that these two confounding factors also influence cloud cover and so depending on the specific point at which we are in the solar cycle the effect of particulates from fossil fuel burning may have a positive or negative effect on storms, cloud cover, and so the earth's ability to reflect away energy from sunlight.

When solar activity is close to its minimum cosmic rays will increase cloud cover and lightning, which will almost completely cancel out the warming effect of added greenhouse gases at that point in time.

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