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Did cosmic rays bring on the ice age?

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Cosmic rays are charged, sub-atomic particles created in violent events deep in our galaxy and they stream through space at speeds near that of light. Exposure to their full fury would have made life, climate and much else on earth quite different from the way we know them. Fortunately, our own sun throws out a ‘solar wind’, of charged particles, because of its own thermonuclear fire. These, with the help of the earth’s magnetic field, form an ‘umbrella’, which deflects comic rays and allows only a small part to enter the atmosphere.

The effect on the Weather

Cosmic rays collide with molecules in the air and cause them to split up into pairs of electrically charged ‘ions’. These ions then seed the growth of water droplets and the formation of clouds. Low altitude clouds, where the water content is liquid, have the effect of reflecting sunlight and causing cooling. High altitude clouds, which contain ice, do not send the sunlight away, but keep the earth’s heat in, causing warming. Now, it is in the case of low altitude clouds that cosmic rays are much more effective in promoting cloud formation. Greater levels of cosmic ray entry would thus lead to cooling and lower levels of cosmic ray activity to global warming!

The sun’s cyclic activity

Sudden bursts of activity on the sun’s surface are called ‘sun spots’. Sun spot activity results in emission of charged particles that affect the ionized upper layer of the atmosphere and this is well known to affect the working of radio sets on aircraft. The level of sun spot activity is also known to rise and fall every 11 years. (Some persons have even tried to link the sun spot cycle to the rise and fall of the stock market!). But in respect of the weather, more sun spot activity means a better guard against cosmic rays. As less cosmic rays lead to less low altitude cloud formation, which results in rising temperatures.

The ice ages

The idea is now suggested that it may be variations in the sun’s activity that switched the ice ages in the earth’s history on and off.

Svante Bjorck and others of Lund University in Sweden have studied underwater sediments, barks of ancient pine trees and ancient ice deep within Greenland’s ice sheet. The changes in the chemistry of the ice core and the distance between the rings in the barks of the trees suggest that the climate suddenly got colder about 10,300 years ago.

To test the tempting thought that this was because of a rise in cosmic rays, Bjorck relied on another effect of cosmic rays. As cosmic rays are particles of very high energy, they are able to

smash atomic nuclei and generate new, often unstable ‘daughter’ products. In fact, the effect on Oxygen and Nitrogen atoms in the atmosphere is to create Beryllium^{10}, a radioactive element.

The parts of the Greenland ice of the era do show markedly higher levels of beylium^{10} !