Solar influence on Earth's climate

An increasing number of studies indicate that variations in solar activity have had a significant influence on Earth's climate. However, the mechanisms responsible for a solar influence are still not known. One possibility is that atmospheric transparency is influenced by changing cloud properties via cosmic ray ionisation (the latter being modulated by solar activity). Support for this idea is found from satellite observations of cloud cover. Such data have revealed a striking correlation between the intensity of galactic cosmic rays (GCR) and low liquid clouds (<3.2 km). GCR are responsible for nearly all ionisation in the atmosphere below 35 km. One mechanism could involve ion-induced formation of aerosol particles (diameter range, 0.001-1.0 μm) that can act as cloud condensation nuclei (CCN). A systematic variation in the properties of CCN will affect the cloud droplet distribution and thereby influence the radiative properties of clouds. If the GCR-Cloud link is confirmed variations in galactic cosmic ray flux, caused by changes in solar activity and the space environment, could influence Earth's radiation budget.

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