

Solar Influence on Climate

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More and more studies indicate that variations in solar activity have had a significant influence on Earth's climate. In spite of many ideas and much effort, the mechanisms responsible for solar influence on climate is still not known. One possibility is to influence the atmospheric transparency by changing cloud properties via cosmic ray ionisation (the latter is 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 km). GCR is responsible for nearly all ionisation in the atmosphere below 35 km. One explanation could involve ion-induced formation of aerosol particles (0.001- 1 μ m in diameter) 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 the solar activity could influence Earth's radiation energy budget. In particular the magnetic flux carried by the solar wind has more than doubled during the last 100 years, at the same time as the global temperature has risen.