



Does the earth's magnetic field influence climate?

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A number of recent studies raise the possibility of an interaction between climate and the geomagnetic field over a range of time scales from decades to hundreds of thousands of years. Le Mouél et al (2005) introduced new indices which allow to study high frequency variations in the geomagnetic field, principally linked to external currents in the ionosphere and magnetosphere and forced by the solar wind. A largely common “overall magnetic trend” emerges from this study, which mimics the evolution of solar irradiance, the magnetic aa index and the Wolf number from 1900 to the 1980s. Thus, the ionospheric and magnetospheric current systems pulse in rough unison with the Sun. The “overall magnetic trend” also resembles the recent evolution of global temperature. But global temperature departs from all other indicators in the late ‘80s, a signal which may indicate when anthropogenic warming started emerging from noise (as shown earlier by Solanki using irradiance data). The connexion between solar activity and temperature is strong but not perfect. Solar irradiance is a complex time function involving respective time changes of intergalactic cosmic rays, changes in solar activity and the modulation due to changes in the geomagnetic field. Based on newly acquired archeomagnetic data all the way from western Europe to the Middle-East, Gallet et al (2003) have noted the coincidence of sharp curvature changes in direction and sharp maxima in the intensity of the ancient field. Gallet et al (2005) have compared the occurrences of these “archeomagnetic jerks” with paleo-climate indicators. There is a remarkable coincidence between jerks (particularly their rising period) and indicators of climate cooling, such as advances of glaciers in western Europe. The robustness of these and other geomagnetic evidences for causal connexions with climate and possible mechanisms will be discussed.

Gallet, Y. et al., *Earth Planet. Sci. Lett.*, 214, 237-242, 2003; Gallet, Y. et al., *Earth*

Planet. Sci. Lett., 236, 339-347, 2005; Le Mouél, J.L. et al., Earth Planet. Sci. Lett., 232, 273-286, 2004.