



## **Variable Sun-Earth energy coupling function: dependence on solar cycle strength**

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Correlation between monthly geomagnetic activity and monthly sunspot numbers for more than 50 years revealed that the geomagnetic activity during the current solar maximum is lower than what can be expected from the sunspot numbers. This is valid for both one station (Kiruna K index, since 1962) and world-wide average (Kp index, since 1932). The Kp data with more than 80 years record also revealed that monthly Kp for given sunspot numbers are lower during solar cycles with small amplitude than those with large amplitude when we define the cycle from the end of solar maximum to the end of next solar maximum. The result suggests that the Sun-Earth coupling function itself (including the multiplication constant) might be different between different solar cycles when the amplitude is different, and therefore that there might be unknown solar parameter that should contribute to the Sun-Earth coupling. Such a hidden parameter might bridge missing physical link between the solar effect and the terrestrial environment such as the global temperature.

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