



## **Singular year of high geomagnetic responses to the same solar wind input**

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Using high-resolution (5 min) solar wind data and westward auroral electrojet index (AL) index since 1981, temporal variation of the Sun-Earth coupling efficiency (AL response to the solar wind electromagnetic energy/flux input) was examined. To separate the seasonal variation, 3-month averaged statistics is used.

- (1) The Sun-Earth coupling efficiency for moderate solar wind input occasionally increased beyond the seasonal variation for about half a year during the declining phase of solar cycles;
- (2) Excluding these singular years and seasonal variation, the Sun-Earth coupling efficiency for moderate or low solar wind input continuously decreased over the past three decades;
- (3) These temporal variations do not correlate with F10.7 index (proxy for the Solar UV flux).

The results confirm some of the previous study using 1-hour resolution data with a better accuracy, and suggest that the existence of additional controlling mechanisms either at the Sun (e.g., magnetic field or solar cycle strength) or solar wind-magnetosphere-ionosphere coupling (e.g., through the solar wind composition). On the other hand, the Sun-Earth coupling efficiency for large solar wind input is very variable and the present correlation method is not sufficient to determine the conditions for large AL activities and its temporal variation.

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