The Sun-Geospace connection: toward the 25th solar cycle

*Yoshizumi Miyoshi¹, Shinsuke Imada¹

1. Institute for Space-Earth Environmental Research, Nagoya University

One of the major goals of solar-terrestrial physics is to understand how the transfer of Sun and solar wind energy into the Geospace and vice versa. In the last decade, there have been several flagship missions in Geospace; NASA/THEMIS, Van Allen Probes, and MMS, and JAXA/Arase, making important contributions to our understandings of how the Geospace responds on variations of Sun and solar wind. Solar atmosphere is also observed and monitored by modern satellite, such as Hinode, and Solar Dynamics Observatory. The present solar cycle (cycle 24) is one of the weakest cycles in these 100 years. Existing missions successfully observe several abnormal phenomena during weak solar cycle, such as extremely low-density solar wind, strong asymmetry for solar polar magnetic field, or relatively weak geomagnetic activities. For example, large flux enhancements of the outer belt associated with huge magnetic storms have not observed in cycle 24. Further, a lot of cycle prediction studies suggest that next solar cycle (cycle 25) is also as weak as cycle 24. There are also several preexisting and under-preparing missions which will be flagship missions during solar cycle 25. In this presentation, we briefly review highlights from these missions and discuss what subjects are important for the next decade, i.e, the 25th solar cycle to understand coupling process between Sun and Earth.

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