Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

PEM09-41 Room:501 Time:April 29 15:30-15:45

Exploration into evolution of solar-planetary environments: Solar variation and a variation and atmospheric escape

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How has the atmosphere of terrestrial planets responded to the evolution of the sun, a center star of our solar system? In order to answer the question of the coevolution of our sun and the planetary environment " planetosphere ", planetary exploration missions have been promoted and related interdisciplinary researches are rapidly developing worldwide. It is scheduled that NASA ' s Mars mission MAVEN arrives at Mars in September 2014 and Venus weather explorer AKATSUKI arrives at Venus at the end of 2015. These missions will provide us new observations and insights in this field. Moreover, the solar evolution is included in one of the next emphasized problems in VarSITI program that starts in 2014, and the time of international collaborations is expected to come. On the other hand, the past researches in the solar-terrestrial sciences have had large emphasis on understanding of dynamic variations of the present sun and planetary environment. The interdisciplinary researches of understanding the coevolution of the sun and planetosphere over past four billion years or so are in the incunabula but start to develop rapidly. In this presentation, we will introduce an attempt to investigate the coevolution of the sun and planetosphere by combining large-scale numerical simulations and the latest observations based on international collaborations and cooperation of solar physics, solar-terrestrial physics, aeronomy, and meteorology.

Keywords: solar evolution, planetosphere, atmospheric escape, coupling of lower and upper atmosphere, climate change, evolution of planetary atmosphere