

Solar wind-regolith interaction in space: Observations at Moon and Phobos

FUTAANA, Yoshifumi^{1*}

¹Swedish Institute of Space Physics

In this presentation, we discuss whether the backscattering of plasma particles is a common physical process of plasma-surface interaction in space. The backscattered protons were first discovered by a plasma package, MAP/PACE, on board the Japanese lunar orbiter, Kaguya. Later, the backscattered protons and neutral hydrogen atoms have been frequently reported near the Moon, for example, by the SARA sensor on Chandrayaan-1. We first review the characteristics of the backscattered protons observed in the lunar environment.

Then, we report the survey of the dataset from the ion sensor (IMA) on board Mars Express recorded during its close encounters to Phobos. During one of the closest encounters (~60 km) we could clearly identify proton signal apart from the solar wind. Careful assessment has lead us to conclude that the signal is the Phobos origin. The characteristics of the Phobos protons are quite similar to those of the reflected lunar protons. The observation provides the first evidence proving that the backscattering is a common process for regolith-plasma interaction in space.

Keywords: solar wind, proton reflection, regolith, Moon, Phobos, backscattering