

## Development of imaging instruments for planetary explores

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Recent in-situ plasma observations find that large amount of  $O^+$  are escaping from the terrestrial ionosphere to the magnetosphere. The remote-sensing methods using the extreme ultraviolet (EUV) emission of  $O^+$  have been expected to be a powerful tool to provide global perspectives on the escaping processes. The overall picture is also very important for the practical use such as monitoring the space weather. The  $O^+$  ions resonantly scatter the solar photon with the wavelength of 83.4 nm. The key to success of the observation is to prevent from detecting the H Ly-alpha line (121.6 nm), which is very stronger than the predicted O II emission by an order of 4. We have successfully detected the O II emission from the uppermost part of the ionosphere using the sounding rocket SS-520-2 to investigate the heavy ions escaping from the cusp/cleft region. This success demonstrates the capability of the remote-sensing method to take an instantaneous 2-Dimensional image of the  $O^+$  distribution, and leads to the optical observations for the magnetosphere. We plan to observe the O II images of the polar wind using the Telescope for Extreme ultraviolet light, which is an upgrade version of the instrument for the sounding rocket, in the Upper atmosphere and Plasma Imager component (UPI-TEX) on the SELenological and ENgineering Explorer (SELENE). We present the feasibility of the O II imagery from the lunar orbiter.