

A long-term all-sky imager observation of lunar sodium tail

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The Moon possesses long tail of neutral sodium atoms that are emitted from the lunar surface and transported anti-sunward by the solar radiation pressure. Since the earth crosses the lunar sodium tail for a few days around the new moon, the resonant light emission from sodium atoms can be detected from the ground. Although it has been reported that bright emissions from sodium atoms of the tail is observed during the Leonids meteor shower, only few events without meteor shower have been investigated so far. Here we show a long-term (over 15 years) observation of the lunar sodium tail using all-sky imager at Shigaraki Observatory (35N, 136E), Japan. We have surveyed our database of all-sky sodium images at a wavelength of 589.3 nm to find that a bright spot emerges around the anti-lunar point for a few days around the new moon. Although the sodium spot is the brightest during the Leonids meteor shower, a weaker sodium spot is detected in the period without meteor shower as well. The sodium spot gradually moves eastward (roughly, 0.2 hours a day), which shows that the sodium tail is strongly affected by the earth's gravity. We will present the latest results of our data analysis to discuss signatures of the lunar sodium tail as well as the origin of the lunar sodium exosphere.

Keywords: Lunar sodium tail, Lunar exosphere, All-sky imager observation