

## Plasma intrusion into the lunar wake detected by SELENE-MAP

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The moon spends more than 80 percent of its life staying in the solar wind, where a quasi-vacuum region called the lunar wake is formed on the night side. The solar wind electrons with higher energy can come into the lunar night-side surface, while ions are thought to be unable to approach the low altitude region on the night side because their thermal speed is much lower than the solar-wind bulk speed. Here we show direct observations of solar-wind ion intrusion into the anti-subsolar region at ~100 km altitude, using recent comprehensive measurement by the MAP instrument onboard SELENE. The ion intrusion deep into the lunar wake was accompanied by an enhancement of field-aligned electrons in the wake, which suggests that electron-rich wake environment strengthened the bipolar electric field at the wake boundary to let solar-wind ions approach the lunar night side. Furthermore, we have found that a part of the ions detected in the anti-subsolar region came from the lunar surface, which means that the ions of solar wind origin reflected at the night-side surface. We discuss mechanism of plasma intrusion into the lunar wake, taking into account the electric and magnetic field configurations around the moon.