



## **massive plasma refilling the lunar wake by Earth's bow shock**

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By using measurements from the "Acceleration, Reconnection, Turbulence and Electrodynamics of the Moon's Interaction with the Sun" (ARTEMIS) spacecraft, we report the first observations of massive plasma refilling the near lunar wake ( $< 1$  lunar radius from the surface), which is associated with a quasi-perpendicular bow shock (BS) of the Earth at the dusk side. As expected, the shock was greatly broadened into a magnetic ramp in the lunar wake. However, a small magnetic bifurcation in the shock ramp has been amplified remarkably in the lunar wake. Meanwhile, the local wake density increased so intensively that it surprisingly reached up to the value comparable to that in the solar wind. The density enhancement in the lunar wake is well associated with the magnetic ramp. Pitch angle distributions show that the refilling electrons are perpendicular to and the ions are quasi-parallel to the magnetic field. They are unlikely to enter the lunar wake via any known ways, i.e. drift or gyration. Analysis shows that they are most probably injected by the drift motion due to the magnetic strength gradient within the ramp of the BS outside the lunar wake.