

Magnetic fluctuations detected by Kaguya in the central wake

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Since the moon does not have a global magnetic field system, the solar wind particles can access the lunar surface directly. The solar wind particles that hit the moon are absorbed by the dayside lunar surface, and the solar wind plasma are essentially absent on the downstream side of the moon (the lunar wake). Kaguya MAP-PACE instrument has revealed that not all the solar wind particles are absorbed, but 0.1 - 1% of the solar wind protons are reflected by the lunar surface (Saito et al., 2008).

Due to the reflection of the solar wind particles, the magnetic field is almost always fluctuating over the frequency range of 0.03 - 10 Hz (Nakagawa et al., 2011). They were basically absent in the central wake.

Magnetic fluctuations of about 0.1-10 Hz are found by Kaguya MAP-LMAG magnetometer in the deepest wake region, where magnetic fluctuations were rarely expected. The magnetic fluctuations were rather 1-dimensional, showing no preferred polarity. They were often detected when the SSE-y component of the solar wind magnetic field was dominant. At least 80 percent of them were accompanied by ions, which are thought to be the solar wind protons once reflected by the dayside surface, picked up by the solar wind electric field and entered the deepest wake (Type-II entry protons, Nishino et al., 2009). Accordingly, the magnetic fluctuations in the central wake are thought to be generated by the type-II protons.

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