**Lunar dust fountain observed near twilight craters**

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**Abstract:** Since the 1960s, electrostatic dust transport on the lunar surface has been puzzling people in both science and engineering. Lunar horizon glows observed by Apollo missions suggested a dense dust exosphere near the lunar terminator, possibly caused by electrostatic dust lofting. But later observations found that the dust density could be 104 smaller than the Apollo results and implied that the electrostatic process could be less important. The high-density dust exosphere was also absent in recent Lunar Atmosphere and Dust Environment Explorer (LADEE) mission, where the tenuous asymmetric dust cloud could be explained as impact ejecta of interplanetary cometary particles. It is still unknown why the Apollo missions can measure so large number of dust particles. Here we report six dust enhancement events observed by the LADEE mission, where the dust densities are comparable to the Apollo results. Moreover, it is interesting to find that the six events just happen near a large crater near the terminator, and the dust densities favor a lower altitude and a higher solar wind temperature. These features are consistent with a local electrostatic dust activity caused by the negatively charged crater surface. In addition, similar larger crater and high temperature conditions can be also found in the Apollo 17 mission, where significant horizon glow and streamers have been observed by the astronauts. Finally, we conclude that the high-density dust cloud/exosphere is a local phenomenon, and it can be only seen sporadically near a shadowed crater when the solar wind temperature is high enough.

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