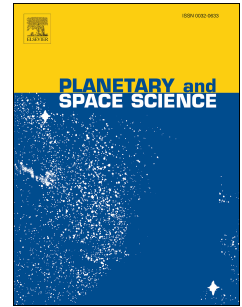


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# Lunar dust and dusty plasmas: recent developments, advances, and unsolved problems

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## Abstract

A renaissance is being observed currently in investigations of the Moon. The Luna-25 and Luna-27 missions are being prepared in Russia. At the same time, in connection with the future lunar missions, theory investigations of dust and dusty plasmas at the Moon are being carried out by scientists of the Space Research Institute of the Russian Academy of Sciences. Here, the corresponding results are reviewed briefly. We present the main theory results of these investigations concerning the lunar dusty plasmas. We show, in particular, the absence of the dead zone near a lunar latitude of  $80^\circ$  where, as was assumed earlier, dust particles cannot rise over the surface of the Moon. This indicates that there are no significant constraints on the Moon landing sites for future lunar missions that will study dust in the surface layer of the Moon. We demonstrate that the electrostatically ejected dust population can exist in the near-surface layer over the Moon while the dust appearing in the lunar exosphere owing to impacts of meteoroids present everywhere. The calculated values of number densities at high altitudes of the particles formed as a result of the impacts of meteoroids with the lunar surface are in accordance (up to an order of magnitude) with the data obtained by the recent NASA mission LADEE. Finally, we formulate new problems concerning the dusty plasma over the lunar surface.

*Keywords:* the Moon, dusty plasma, future lunar missions, photoelectrons,

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