High energy (500-1500 ev) photoelectrons are ejected from the directly illuminated surfaces of partially illuminated rocks which are located in the dusk lunar terminator. A monopole positive charge will develop on the partially illuminated surface and will force the return of the high energy photoelectron flux to such a rock. Accretion of a fraction of the return flux on the dark, down-sun, surface of the rock results in the creation of a stable multipole charge distribution across the light/dark boundary of the rock. The intense, multipolar electric field (>10^2 volts/centimeter) evoked across the light/dark boundary can levitate micron size soil particles which become electrically charged during the charge separation process. The monopole charge will not develop if low energy photoelectrons can flow onto the directly illuminated region of the rock from adjacent dark areas. Low energy photoelectrons are produced by ultraviolet solar photons which are scattered from the directly illuminated rock to the foreground soil and then back to the dark areas of the rock. The ratio of the solar x-ray to the solar ultraviolet flux must exceed a critical value before levitation of soil particles occurs.

Forward diffraction of sunlight by such levitated particles can explain the post-sunset glow photographed on the western lunar horizon by Surveyors 6 and 7.

The physical factors which govern levitation are: 1) the photoelectric work function of the lunar material; 2) the flux level of solar x-rays with wavelengths less than 25A; 3) the distribution of x-ray sources over the solar disk; and 4) the attenuation of solar ultraviolet photons which are multiply scattered between lunar rocks and the soil.