

Electrostatic Placer Deposits of Gold: a Potentially Lucrative Lunar Resource

LRO-LAMP detected a reported 2σ upper limit of up to 0.3% (3,000 g/t) of gold (along with surprising concentrations of several other metals) within the LCROSS impact plume composed of material from within a permanently shaded region (PSR). We discuss a possible transport mechanism whereby dust particles of native gold are preferentially transported by the Moon's electrical environment to areas in PSRs where electrical forces are nil. Empirical support is found in Apollo 12 samples where pristine rocks averaged 5 ppb Au concentrations, whereas core samples of regolith only averaged 2 ppb. Assuming the missing 3 ppb Au was concentrated within the PSRs and the PSR/total lunar surface area ratio is $\sim 10^{-4}$, then 30 ppm (30 g/t) would be a reasonable, minimum estimate of Au concentrations within the PSRs. However, according to Farrell et al. (2010) strong electrical fields caused by solar wind exist in PSRs. Metallic dust particles could form a "current of last resort". Small but deep polar craters may experience low ion erosion allowing mass accumulation. PSR erosion and subsequent concentration of gold dust could increase Au concentrations by another order of magnitude to ~ 300 ppm.