

"A DIRECT MEASUREMENT OF THE IMPACT RATE OF SECONDARY MICROMETEOR-  
OIDS ON THE LUNAR SURFACE". D.E. Brownlee, Department of Astronomy, Univ. of  
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SEM analysis of the Surveyor III television camera's glass optical filters provided a unique opportunity to directly measure the impact rate of secondary micrometeoroids on the Lunar surface. The following properties of the glass filters and their lunar exposure made such a measurement possible; relatively artifact free optical quality of the surfaces, position of the filters inside the camera hood prevented surface abrasion during return to earth, orientation of the filters and shielding by the hood prevented impact of debris generated by the surveyor landing or the LM landing, the anti-reflection  $MgF_2$  coating on the filters enables determination of azimuth for low angle impact craters, the camera hood restricted possible azimuthal incidence angles. Detailed SEM analysis of the "clear" filter revealed a large number of the micron-sized indentations which have raised rims, show evidence of plastic flow, and show associated chipping of the  $MgF_2$  over-coating. The indentations are not hypervelocity impact sites but are identified as low velocity impact signatures of secondary lunar ejecta because of the following lines of evidence; no similar features were found on the "clear" backup filter which did not go to the moon, no similar features were found on the side (bottom) of the "clear" flight filter which was not exposed to space, estimates of azimuthal impact angles for the features correlate with the exposure window of the filter, exact duplication of the morphological characteristics of the craters has been accomplished by firing irregular micron-sized silicate particles into  $MgF_2$  coated glass at  $0.3\text{kms}^{-1}$ . The measured impact rate of sub-escape velocity micron-sized particles ( $>1\mu$ ) averaged over the 2.6 year exposure on the lunar surface is approximately 10,000 times the estimated impact rate of primary micrometeoroids (using the Kerridge 1970 model). This measured flux of lunar ejecta particles agrees well with that predicted by Gault et. al. 1963 on the basis of artificial cratering studies.