IMPACT MICROCRATERS ON 12054 ROCK
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Through the 12054 Consortium led by J.B. Hartung we have been kindly provided by sample 12054,58. This sample about 1cmX1cm, although intensely fractured and covered by accretionary fragments displays on half of its area a glassy smooth surface suitable for impact microcrater investigation.

The orientation of 12054 on lunar surface is very well documented by photograph taken by Apollo 12 team before collection and duplication at the laboratory as reported by R.L. Sutton (1970) and by H. Zook (1975). Sample 58 comes from the middle of south facing part, S, about 2cm down from the top. The normal to this face made approximately an angle of 35° ± 5° with the lunar local surface and consequently an angle of 55° ± 5° with the direction of ecliptic plane. The solid angle viewed by the sample is about 4π/3 steradians.

Size Frequency Distribution of Microcraters - SEM photomosaic of whole sample has been made at 100 X magnification, some areas have been mapped at 300 X and 1000 X, a few crater pits have been mapped at 3000 X. Size frequency distribution of craters is log-log plot is shown in Figure 1, altogether with previous measurements reported by HoTz et al. (1975).

The slope of -2 between 50μ and 300μm pit diameters is consistent with previous data, the flattening for smaller craters is in part an observational artifact and is removed if we include crater counts made at higher magnification or inside crater pits.

Spall to diameter ratio of craters ranges from about 2.4 for 10μm sized pits to 3.5 for 500μm sized pits, this trend is similar to those quoted by Morrison et al. (1973).

The surface is obviously in a production cratering state and the density of craters corresponds to 2-3% of saturation value defined by Gault (1970).

Depth/Diameter Ratio of Craters - Depth/diameter ratio of about 100 craters have been measured to infer density of impacting micrometeoroids as previously stated, (Brownlee (1975), Nagel et al. (1975, 1976), Mandeville (1975, 1976)). Preliminary results are shown in Figures 2 and 3; comparison is made with experimental microcraters. The bulk of craters are obviously created by impacts of particles with 3-4g/cm³ average density.

Direction of Impacting Particles - Many craters show evidence of oblique impact (elongated shape, spalling more extensive down-
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range), according to the orientation of the sample this corresponds to impact of particles confined in the plane of ecliptic.

Exposure Age of Sample - Based on meteoroid impact production rates the exposure time for 12054 should be ~10^8 years. (Morrison and Zinner).

HoFz F. et al. (1975) Planet Space Sci. Vol. 23, p. 151-172
Smith et al. (1975) Nature 252, p. 101-106
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