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Meteorite Impact Craters, Crater Simulations and the Meteoric Flux in the Early Solar System

Selected areas of lunar samples 12006, 12022, 12063, 10019 and 10046 were searched for impact craters of cosmic dust particles by means of a binocular microscope and an electron scanning microscope. The maximum crater number densities are 100 craters >0.1 mm diameter and 20 craters >0.3 mm diameter per cm^2 surface area.

The interior of several craters was chemically analyzed using a microprobe, and compared with the composition in the direct neighborhood. We searched for projectile material different from lunar surface matter, especially for nickel. Generally, the chemical composition is similar to the composition of the surrounding material.

Simulated high velocity impact craters on quartz glass, boron silicate glass and norite gave a crater to projectile diameter ratio of about 2 at 20 km/sec impact velocity.

The numbers of large craters in the Mare Tranquillitatis and in the lunar highlands were compared with the meteor influx rates as known by rocket and satellite experiments in the earth's vicinity. These comparisons lead to a time variable cosmic flux of $\phi(m) \cdot e^{-Bt}$ with $\phi(m)$= present flux B=2,6 - 2,8 and t=time in 10^9 years . Then a crater/particle diameter ratio of 2 results,which is consistent with a meteor velocity of about 20 km/sec. The model also gives a ratio of large craters in Mare Tranquillitatis to Mare Procellarum of 3:1.

Cosmic dust exposure ages can be defined and calculated using the time variable flux model. For the 0.1 and 0.3mm diameter craters these ages are in the order of 10^5 -10^6 years.