# SHOCK-METAMORPHIC EFFECTS IN THE LUNA-16 SOIL SAMPLE FROM MARE FECUNDITATIS

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## ABSTRACT

Shock-metamorphic effects characteristic of meteorite impact and virtually identical to those observed in Apollo samples are common in fragments of the Luna-16 soil sample from Mare Fecunditatis. Two types of shock effects are present: (1) deformation and partial melting features in rock and mineral fragments (1-2 percent of fragments); (2) heterogeneous glasses and glassy breccias produced by shock melting (70-80 percent of fragments). Shock effects were observed in pyroxene (deformation twin lamellae; multiple planar shock lamellae; extreme mosaicism; partial isotropization); in plagioclase (planar shock lamellae; complete isotropization to form maskelynite); and in basalt fragments (plagioclase isotropization; selective partial melting). The glasses exhibit several characteristics of shock melting, especially: (1) diversity in chemical composition; (2) association with shocked mineral fragments and Ni-Fe spherules; (3) heterogeneous schlieren and incipient fusion of mineral inclusions.

Two types of source rocks are present in the Luna-16 sample, basaltic (85-90 percent) and feldspathic (gabbros to anorthosites) (10-15 percent). The basaltic rocks are predominant and generally occur as unshocked fragments, indicating that they form the bedrock underlying Mare Fecunditatis. The more shocked feldspathic material may have been transported from adjacent highlands or from nearby large postmare craters. The shock-metamorphic effects in the Luna-16 soil and its similarity to Apollo material indicate that regolith formation by meteorite impact has occurred on Mare Fecunditatis and is a general process over the entire moon.