

Experimental Study of Crater Formation on Simulated Icy Crust with Various Rock Content Rate

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On Mars, crater morphologies attributed to subsurface volatiles are found, e.g., central pit craters and rampart craters. In order to study the effect of the presence of volatiles in crater formation, we performed impact experiments on ice-rock mixture targets (diameter = 10 or 30cm, height = 5cm) with 0 wt.% to 50 wt.% rock. Projectiles were ice cylinders (diameter = 15mm, height = 10mm) or corn-shaped nylon ones and impact velocities were varied from about 300m/s to 3500m/s.

As a preliminary study, we estimated the target tensile strength based on a hydrodynamic ejection model of Melosh(1983), and found that ice-rock mixture with 0wt.% and 50wt.% rock content had strengths of about 9 and 45MPa, respectively. We will discuss on the results of the estimated strength based on detailed analyses of the ejection velocity and spall thickness. We will report on an anti-correlation between the crater volume and the rock contents, and will make a comparison with the similar results obtained by Koschny & Grun(2001) (see Fig.1).

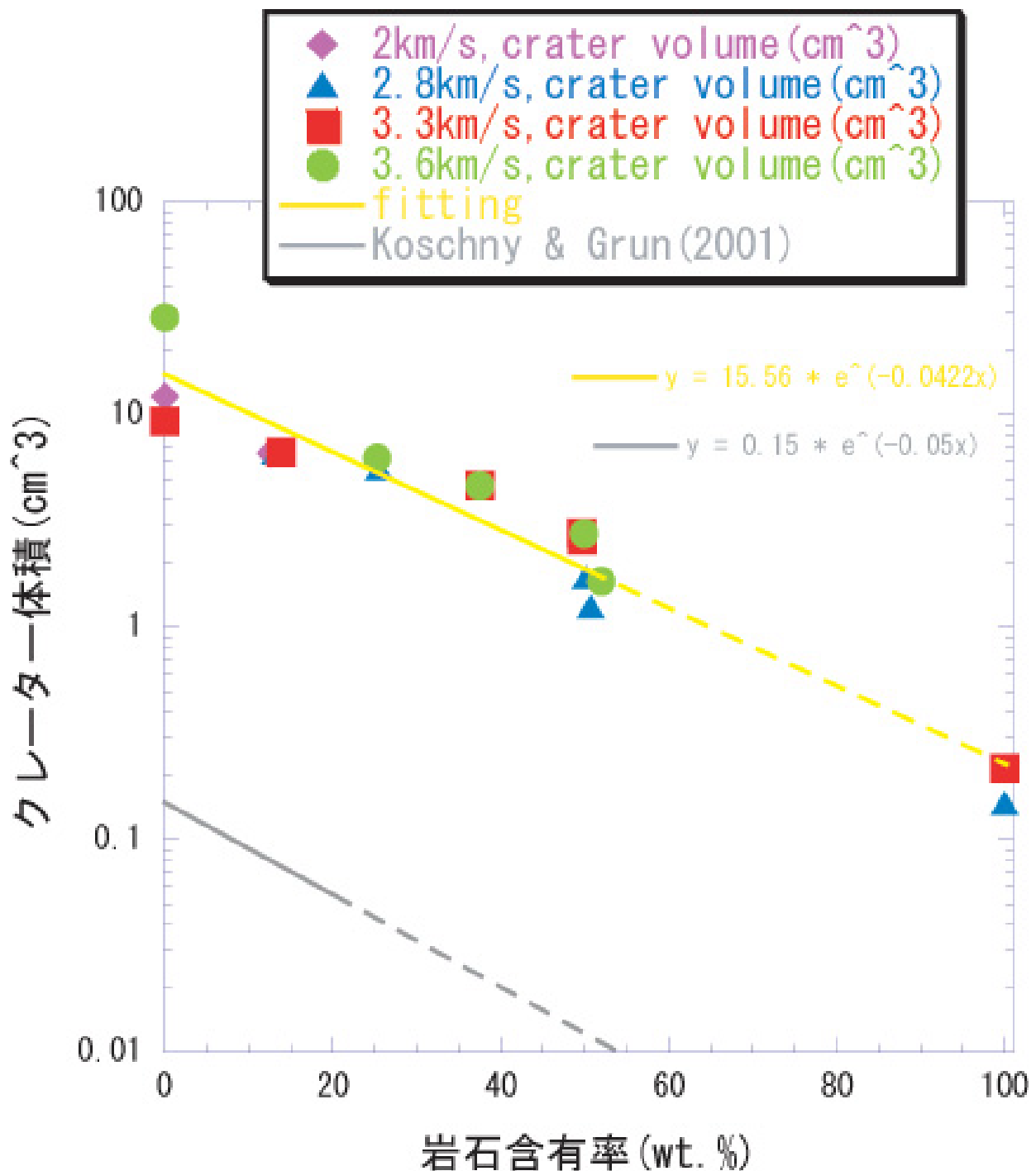


Fig.1 岩石含有率対クレーター体積のグラフ。Koschny & Grun (2001) はプロジェクトイルのエネルギーが1Jのとき。本実験では、13J~50J。