

East-west asymmetric crater ejecta on Ryugu

*Naoyuki Hirata¹, Noriyuki Namiki²

1. Kobe University, 2. National Astronomical Observatory of Japan

Asteroid 162173 Ryugu is a top-shaped body formed by a prior period of rapid spin. Major craters on Ryugu appears an east-west asymmetric profile of crater rims; their western crater rims are sharp and tall, while their eastern crater rims are rounded and low. Although there are various possible explanations, we theoretically assess the effect of rotation as a possible origin of this east-west asymmetry. It is known that the trajectories and fates of ejecta are affected by the effect of rotation, especially the Coriolis force and the inertial speed of the rotating surface. As a result, we found that east-west asymmetric crater rim can be explained by the effect of a rotation, only if the inertial speed of the rotating surface is nearly equal to the first cosmic velocity of the body. In particular, Urashima, Cendrillon, and Kolobok craters might be formed, when Ryugu was fast rotator with a rotation period of ~ 3.6 hours. Brabo crater may be relatively younger.

Keywords: Ryugu, impact crater, Hayabusa 2