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Comparison of Polygonal Impact Craters on Mercury and on other Terrestrial Planets

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The rims of a polygonal impact crater partly are composed of several straight segments. Analyzing the images transmitted back to Earth by the spacecrafts Mariner 10 and MESSENGER, polygonal impact craters with at least two straight rim segments, were detected on Mercury. The search for polygonal impact craters on Mercury was carried out, using the IAU/NASA/USGS-Planetary-Database: each of the 15 quadrangle-maps was scanned for impact craters with at least two straight rims. In a second step the data preparation was resulting in a set of two images per PIC, one with marked straight rims and an original one for the purpose of comparison. The polygonal impact craters found were documented: a total number of 33 polygonal impact craters out of 291 by IAU approved craters, is according to our expectation of 10 to 15 % polygonal impact craters out of all impact craters on Mercury. The polygonal impact craters' diameters reach from 65 km to 240 km, the mean diameter is about 120 km, the same value as for all Mercury's impact craters. Angles between the straight rims are found in a range between 98° and 132°. The specific morphology of polygonal impact craters on Mercury in general is of the type of complex craters with terraced rims, which often are found on other terrestrial planets like Mars. An assumed connection between the structure of polygonal impact craters and the structure of the geologic environment on the surface was not found at first sight. Several problems detecting the polygonal shape occurred, because many of the craters are heavily degraded. Though the quality of some of the images taken by Mariner 10 and MESSENGER is partly limited, it was possible to detect the polygonal shapes. The study proves the existence of polygonal impact craters on Mercury. Furthermore the assumption was confirmed, that polygonal impact craters are an integral part of impact craters and common on the Moon, all terrestrial planets and several asteroids and icy moons like Europa.