

# Asteroid strikes cause the Moon's surface to smooth

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The lunar surface is marred by impact craters, remnants of the collisions that have occurred over the past 4.5 billion years. The Orientale basin, the Moon's most recently formed sizeable crater, stands out from the rest. The crater, which lies along the southwestern boundary between the near and far sides of the moon, appears as a dark spot ringed by concentric circles of ejecta that reach more than 900 kilometers (560 miles) from the impact location.

Though other craters have similar rings, the lunar surface surrounding the Orientale basin is unusually rough with reduced concavity. The anomalous features were identified by Kreslavsky and Head after they produced a map of the lunar surface topographic roughness using observations from the Lunar Orbiter [Laser Altimeter](#) aboard the Lunar Reconnaissance Orbiter.

The fact that other craters—even those of similar size and age—lack similar features suggests to the authors that mechanisms such as weathering or gravitational settling cannot explain the anomaly. Instead, the authors suggest that the Orientale basin, which formed about 3.8 billion years ago, stands out simply because it is the youngest large crater. They propose that whenever a large body slams into the Moon, seismic waves produced during the impact travel through the solid lunar material, inducing seismic shaking that causes landslides and surface settling. They estimate that the impactor would need to be at least 100 km (62 mi) across to cause sizeable seismic shaking.

Unfortunately, the authors may need to wait more than a little while to conclusively test their hypothesis-until the Moon is next rocked by a massive asteroid, an event not expected to occur in the foreseeable future.

**More information:** New observational evidence of global seismic effects of basin-forming impacts on the Moon from Lunar Reconnaissance Orbiter Lunar Orbiter Laser Altimeter data, *Journal of Geophysical Research-Planets*, [doi:10.1029/2011JE003975](https://doi.org/10.1029/2011JE003975), 2012

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