

Gravity maps of moon reveal deeply fractured crust

Irene Klotz, Reuters

(Reuters) - Asteroids and comets colliding with the moon not only pitted its surface but also severely fractured its crust, researchers with NASA said on Wednesday, in a finding that could help crack a Martian puzzle.

On Mars, similar fracturing would have given water on the surface a way to penetrate deep in the ground, where it may remain today, they said.

"Mars might have had an ancient ocean and we're all wondering where it went. Well, that ocean could well be underground," planetary scientist Maria Zuber, with the Massachusetts Institute of Technology, told reporters at the American Geophysical Union conference in San Francisco.

The discovery that the moon's crust is deeply fractured came from a pair of small probes that comprise NASA's Gravity Recovery and Interior Laboratory, or GRAIL, mission. The identical spacecraft have been following each other around the moon for nearly a year.

Scientists have been monitoring the distance between the two, which changes slightly as they fly over denser regions of the moon.

The gravitational pull of the additional lunar mass causes first the leading probe and then the other one to speed up, altering the gap between them.

The data, assembled into the first detailed gravity maps of the moon, reveal that asteroids and comets cratered the surface and fractured the crust, possibly all the way down to the mantle.

"If you look at the surface of the moon and how heavily cratered it is, all terrestrial planets look that way, including the Earth," said Zuber, the lead GRAIL scientist.

Evidence of the phenomenon on Earth was wiped out by tectonic plate movements, erosion and other natural events.

"If we want to study those early periods, we need to go someplace else to do it and the moon is the closest and the most accessible example," Zuber said.

For Mars, the finding that a planet's crust can be so deeply fractured has implications in the search for extraterrestrial life.

The fractures provide a pathway for water to move from inside the planet to the surface, and vice versa. Scientists believe Mars was once much warmer and wetter

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than the cold, dry desert it is today.

"If there ever were microbes on the surface that had to head away to a better environment, they could have gone very deep within the crust of Mars," Zuber said.

The research is published in this week's journal Science.

(Editing by Tom Brown and Xavier Briand)

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