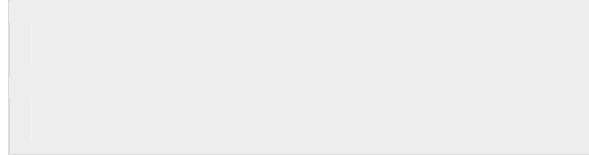


# Earth causes asteroids to shake, rattle and roll

## Gravity triggers quakes on asteroids passing up to 30 million miles away



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Earthlings casting a wary eye for rogue asteroids may be comforted to learn that our planet is not a sitting duck.


New research published in this week's *Nature* shows Earth's gravity triggers ground-shifting quakes on asteroids passing as far as about 30 million miles away.

The findings may not only help scientists deflect an Earth-bound asteroid, but also provide fresh insights into the connections between asteroids and meteorites.

Scientists made the discovery by comparing differences in light reflected off asteroids that have breezed by Earth with those that orbit farther away. Though they are made of the same materials, the asteroids that encounter Earth's gravity have fresh surfaces that are noticeably less weathered by the space environment.


Scientists believe the resurfacing is due to slow-falling landslides , triggered by tidal forces from Earth.

"Asteroids get sunburned out there by the light from the sun, the radiation from the sun," Dan Durda, a planetary scientist with the Southwest Research Institute  in Boulder, Colo., told Discovery News.

Over time, the weathering causes a change in an asteroid's spectra — the breakdown of reflected light into its component wavelengths .

Backtracking the orbits of 95 near-Earth asteroids, scientists determined that over the past 500,000 years, 75 of them had passed closer to Earth than the moon, which is about 239,000 miles (or about 385,000 kilometers) away. The 75 asteroids included 20 bodies with spectra of fresh surface materials.

Most notably, there were no freshly surfaced asteroids among those that hadn't had recent close encounters with Earth. The team then did some math and showed that Earth's gravitational muscle could be strong enough to trigger asteroid-quakes as far as about one-quarter of the way to the moon.

"We need to rethink how sensitive these objects are," lead researcher Richard Benzel, a planetary scientist with Massachusetts Institute of Technology , told Discovery News. "They are very small, with almost no gravity of their own. It takes almost nothing to shake them up."

The finding may prove important to scientists and engineers thinking about how to deflect an asteroid that may be on a collision course with Earth.

"They're like big rubble piles," Benzel said. "You shake them and they just rearrange themselves."

The research also provides a key missing link between meteorites that have been recovered on Earth and their suspect parent asteroids.

Analysis of the most common type of meteorite shows a match with the fresh-surface asteroids. It had been a long-standing puzzle why meteorites were similar, but not an exact match, to the spectra of most asteroids.

"It's one more piece of evidence in this long detective story of trying to match these asteroids to the meteorites," Durda said.

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