

# Traces of a meteorite impact that shook the Earth 600 million years ago have been found

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The impact left a long, shallow crater and sent shock waves rippling through the rock, forming rare geological features called 'shatter cones.' While the full extent of the devastation remains unclear, geologists believe that larger asteroid impacts during this period may have triggered global changes in climate and ocean chemistry, and may have even played a role in one of Earth's earliest mass extinctions.

## A strange ancient world

Some 600 million years ago, during the Ediacaran period, Earth looked very different than it does today. The land, having just emerged from a global ice age, was largely barren and lifeless. The oceans, however, teemed with strange, soft-bodied creatures. Among them were wormlike creatures with sickle-shaped heads, spiral-like clusters with strange three-part symmetry, and giant fern-like structures.

These ancient lifeforms were likely wiped out when a meteorite, estimated to be 200 to 400 metres (700 to 1,300 feet) wide, hurtled across the sky and struck land or shallow water near what is now the Davenport Range in northern Australia. Although the original impact crater has largely eroded away, evidence of the impact remains in the region's folded sedimentary and volcanic rock layers.



On February 3, 2025, the Operational Land Imager (OLI) on the Landsat 8 satellite captured images of the impact site, known as the Amelia Creek impact structure. The impact created a canoe-shaped trench approximately 1 km wide and 5 km long. Analysis of satellite observations revealed deformation in the rock layers of the area extending approximately 10 km north and south of the impact crater, with minimal deformation to the east and west.

The long, narrow shape of the crater, along with the pattern of regional deformation, is an indication that the meteorite impacted at a very oblique (shallow) angle. A meteorite impact at a steeper angle, such as the one that caused the extinction of the dinosaurs, would have left a deeper, more symmetrical crater and created a raised feature in the center of the crater called a 'central uplift.'

## Hidden clues in the rocks

Other clues to the Amelia Creek impact event are buried in nearby quartzite layers. Beginning in the 1980s, geologists discovered fan-shaped fractures later identified as shatter cones, rare geological features that form only when impact events create shock waves that propagate through rock. All of the shatter cones in the area are distributed in a crescent shape, mostly to the south of the crater, another sign that the meteorite struck at a shallow angle.

## The mysterious aftermath of the collision

The extent of the damage caused by the impact is still unclear, but meteorites that hit at shallow angles are thought to cause less damage than those that hit at steep angles. Shallow angles mean the meteorite travels a longer distance through Earth's atmosphere, burns up more mass, and often breaks into smaller pieces before impact.

Overall, the most severe damage was probably confined to the immediate area of the impact. However, geologists have gathered evidence that two other larger impacts during the Ediacaran period may have had far greater, even global, impacts, possibly contributing to the extinction of a mysterious group of creatures called acritarchs and helping to cause global changes in ocean chemistry and climate.

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