

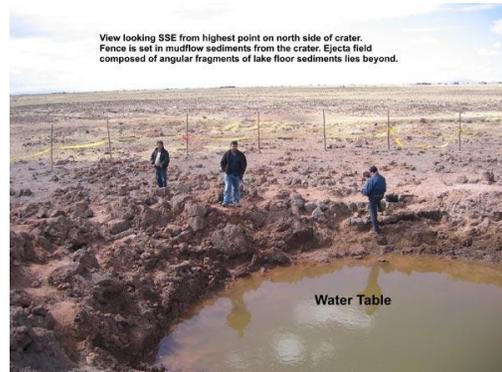
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Mysteries remain over Peru meteorite impact

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- Jeff Hecht

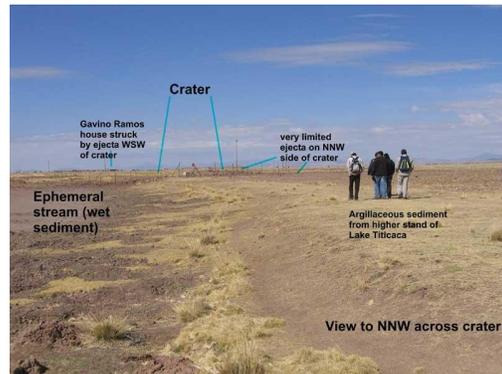
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Ground water quickly filled the crater created by the meteorite impact (Image: Lionel Jackson/Geological Survey of Canada)



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A house near the crater was struck by ejecta from the impact (Image: Lionel Jackson/Geological Survey of Canada)



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The meteorite came from the north-northeast and was bright enough to be seen in the middle of the day by residents of the city of Desaguadero (Illustration courtesy Lionel Jackson/Geological Survey of Canada)



Conspiracy theorists will be disappointed. The object that exploded and formed a crater that emitted mysterious gases in Peru on 15 September was a meteorite that hit soil where the subsurface water table was high, according to the first official report from geologists who have returned from the scene.

Speculation raged about what caused the crater, found in the Peruvian town of Carancas, near the Bolivian border, with a hydrothermal explosion of gas and even a downed spy satellite offered up as culprits.

"The mysterious gases were steam. It was a rock that fell out of the sky and made a hole in the ground. End of story," says Lionel Jackson of the Geological Survey of Canada in Vancouver. But some questions still remain.

The meteorite came from the north-northeast and was bright enough as it streaked over the city of Desaguadero – which lies 20 kilometres north of Carancas – that many residents there clearly saw it at 1145 local time. Witnesses did not see the fireball break up in the air, but people up to 20 kilometres from the crater reported hearing an explosion – presumably the impact. Windows were shattered at the local health center a kilometre from the impact site.

The space rock hit a region of soft red soil a few metres thick at an elevation of 3.8 kilometres in an area that had been covered by Lake Titicaca during the ice age. A [report](#) by Luisa Macedo and José Macharé of the Peruvian [Institute for Geology, Mining and Metallurgy](#) describes a crater measuring 13.3 by 13.8 metres, with a rim a metre above the original soil level.

'Confused and contradictory'

Ground water quickly filled the crater, and witnesses reported that it was boiling. By the time Macedo arrived 36 hours later, she saw "turbid brown" water reaching to within a metre of the original soil level. The crater looks like it was formed in water-saturated soil, says Peter Schultz of Brown University in Providence, Rhode Island, US.

Meteor fragments found at the site were "fine-grained, light grey, fragile rocky material, with disseminated iron [particles] of one-millimetre diameter", Macedo and Macharé report. Thin sections showed tiny silicate spheres found in many meteorites, confirming the rocks came from space.

"The reports about this 'impact' have been confused, contradictory and muddled," says Don Yeomans of NASA's Jet Propulsion Laboratory in Pasadena, California, US. "[This] report is by far the best I've seen."

The Peruvians also reported that early claims of 200 people sickened by the impact were exaggerated. They found only about 30 complaints of ailments such as headaches and nausea, but could not identify a cause. Jackson suspects the victims were simply stunned by "a big explosion in a very quiet area of the world".

Boiling point

Geologists are still puzzling over some details. The fragments look like stony meteorites, but that type normally breaks apart in the air, and local witnesses saw only a single object. The size of the object that hit also remains unclear – estimates range from the size of a basketball to a few metres across.

"This is probably a fragment from a breakup of a larger object, which broke up at an approximate altitude of 50 kilometres," Yeomans told **New Scientist**. "One would expect a three-metre (original size perhaps) meteorite to hit the Earth's atmosphere a few times each year and sometimes a fragment makes it to the ground."

The speed and temperature of the object also remain a puzzle. Witnesses reported that the crater steamed for half an hour after impact. "It makes no sense that the water was actually boiling," says Clark Chapman of the Southwest Research Institute in Boulder, Colorado, US.

Although a meteorite's surface layer may burn off in the atmosphere, its interior normally remains at the cold temperatures of outer space. The crash site's high altitude reduces the boiling point of water, but only by a little over 10° Celsius.

Jackson thinks the kinetic energy of impact could have generated the heat, and is trying to find seismic records of the crash. Schultz says the heat and bubbling might have come from air trapped and heated on the "front" of the meteorite as it sped through the air.

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