

Chandler, D. 2003. Crater find backs falling star legend  
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A METEORITE impact crater dating from the 4th or 5th century AD has been discovered in the Italian Apennine mountains. As well as leaving a distinct scar on the land, the impact may have changed the course of history.

The legend of a falling star has been around in the Apennines since Roman times, but the event that it describes has been a mystery. Other accounts from the 4th century describe how barbarians stood at the gates of the Roman empire while a Christian movement threatened its stability from within. The emperor Constantine saw an amazing vision in the sky, converted to Christianity on the spot, and led his army to victory under the sign of the cross. But what did he see?

Jens Ormo, a young impact geologist from Sweden, thinks he knows. He and his colleagues, Roberto Santilli, Angelo Pio Rossi and Goro Komatsu, have discovered an impact crater in the Sirente mountains that is larger than a football field and dates from the 4th or 5th century. They believe the crater is the origin of the legend. If so, although the account was communicated orally for centuries, it seems to have preserved an amazing and unprecedented amount of detail about what actually happens when a really big meteorite strikes (*Antiquity*, vol 77, p 313).

Ormo made his discovery when he came across a photo of a lake in Italy's Sirente-Velino Regional Park in a guidebook and was immediately struck by its round shape. He hiked to the lake with his colleagues and they quickly identified several telltale features of an impact crater.

The unusual seasonal lake, which measures 115 by 140 metres, has a pronounced raised rim and no inlet or outlet, being filled by rainfall. Nearby the team found a field containing more than a dozen much smaller craters, ranging from 1.5 to 20 metres across. This fits with the fact that an object of around 10 metres across - the size required to make the main crater - would shatter during entry into the atmosphere, creating craters of different sizes (*Meteoritics and Planetary Science*, vol 37, p 150).

The researchers have also found that the soil's magnetic signature indicates the presence of fragments of an iron or stony-iron asteroid, and the layers of soil at the crater's rim show a folding pattern characteristic of impact craters. They have also taken soil samples, to look for the isotopic signature of an extraterrestrial object. So far the results are promising, says Ormo. This is probably the best bet for producing unequivocal proof of an impact, and the team hopes to publish the results later this year.

Samples from the crater's rim have been dated to the year 412, plus or minus 40 years. That matches the period of the Sirente legends. And although Constantine's conversion to Christianity happened a bit earlier, in 312, that date is not ruled out for the impact, since even small amounts of contamination with recent material could have produced a later date.

From the crater size, Ormo estimates that the impact had an explosive force of a kiloton - equivalent to a very small nuclear weapon. Indeed, it would have looked like a nuclear blast, with shock waves, earthquakes and a mushroom cloud.

The Sirente legend may now give planetary scientists their first opportunity to study eyewitness account of such a huge impact. An Italian paper dating from 1898 recounts one version: "All of a sudden, a new star, never seen before, bigger than the other ones, came nearer and nearer, appeared and disappeared behind the top of the eastern mountains. People's eyes looked at the unusual light growing bigger and bigger. Soon the star shone as immense as the new sun. An irresistible dazzling light pervaded the sky. The oak leaves shuddered. The Sirente was shaking."