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SCIENCE OBSERVER

It Came from Outer Space?

[David Schneider](#)

In 1981, I was a beginning graduate student taking a course in field geology at UC Berkeley. This was only a year after Berkeley physicist Luis Alvarez, his geologist son Walter and two colleagues published what was then a startling (and not-much-believed) theory suggesting that the impact of an asteroid or comet caused, among other things, the extinction of the dinosaurs. If these Berkeley luminaries could offer up such patently absurd ideas, the students figured we were entitled to do the same. So whenever our professor queried us about some puzzling geologic structure, we had a ready response: "Must have been an asteroid." Alvarez's theory ultimately triumphed, and appreciation of the importance of impact events grew enormously within the geological community. Now earth scientists are far more ready to accept the validity of extraterrestrial influences. But a recent episode suggests that the pendulum might have swung too far.

In 2002, Jens Ormö, Angelo P. Rossi and Goro Komatsu, working at the International Research School of Planetary Sciences in Pescara, Italy, reported evidence for what they claimed was a relatively recent meteorite strike: a field of craters located in the Abruzzi Apennines, roughly 100 kilometers east of Rome. The largest feature of the field is a 100-meter-diameter circular basin, situated in the Prato del Sirente plain, close to the town of Secinaro. Associated with the main basin are 17 nearly circular depressions, which presumably formed at the same time because the extraterrestrial object responsible for them broke up in the atmosphere just before hitting.

Ormö's team was unable to locate any definitive markers of an impact, such as meteoritic material emplaced below a crater or telltale grains of shocked quartz in the target rock. But these signs could be missing for good reason: Quartz is

almost absent from the limestone-rich sediments found in the area, and perhaps the group's 4.5-meter-deep excavation of one of the craters had been too shallow to reach the meteorite they believed to be buried below. Ormö and his colleagues did find one line of evidence that they found very compelling—curious magnetic anomalies associated with many of the smaller craters, which they interpreted to mean that remnants of meteorites (which are quite often highly magnetic) were indeed buried there.

In 2003, Ormö and his two coworkers, joined by Roberto Santilli, used radiocarbon dating to argue that the meteorite that formed this crater field might have done more than just that, publishing their ideas in the journal *Antiquity*. Their finding that the impact took place in the 4th or 5th century A. D. fit well with a locally preserved legend that describes people seeing a star falling to earth, an event that was seemingly important to their conversion from paganism to Christianity. These authors also proposed ties with the conversion of Emperor Constantine himself, which took place at very roughly the same time and place and was said to have been preceded by notable celestial phenomena.

Not surprisingly, this intriguing story garnered the attention of the popular press. For example, last year *New Scientist* published a piece entitled "Crater find backs falling star legend." It seems the glib answer I gave to my geology professor a quarter-century ago had become mainstream.

My graduate student career was not long enough to see this shift in the attitude of the scientific community through, but it was long enough to introduce me to Pierre Rochette, a French rock magnetist who later became a close friend. So I was quite interested to learn that earlier this year he and two Italian colleagues, Fabio Speranza and Leonardo Sagnotti, published a challenge to the notion that the circular depressions on the Sirente plain are impact craters at all, much less ones that have anything to do with Constantine's conversion to Christianity. (I should note that, having personal connections with one of the players in this debate, I harbored some bias toward his position from the outset.)

Rochette, who normally works out of the University of Aix-Marseille, became interested in the topic while on a sabbatical at the Istituto Nazionale di Geofisica e Vulcanologia in Rome, where he discovered that one of his new colleagues was very skeptical of the crater theory. Speranza, a structural geologist, explains the source of his initial doubt: "I have a house about 10 kilometers away. I've known this place since I

was a child," adding, "I knew that the landscape of Abruzzi was full of similar shapes." Could they all be impact craters? Surely not, he thought.

Speranza points out another difficulty with the impact-origins theory. Large blocks of limestone sit within the boundaries of the Sirente "crater." Such limestone would not have survived an impact. So if Ormö's theory is correct, one must surmise that somebody set these giant chunks of rock in place since the crater formed. To Speranza, that just didn't make sense. Speranza and colleagues further argue that Ormö's radiocarbon dating gave one age for the main feature (placing it in the 4th or 5th century a.d.) and a completely different age for a nearby "crater" called C9, a date in the 3rd millennium B.C.

Indeed, to Speranza, the only suggestive evidence for an impact origin seemed to be the magnetic anomalies that Ormö and his colleagues had measured over some of the smaller depressions. But according to Rochette, even those anomalies are easy enough to understand. One needs simply to realize that these pockets are "dolines," places where the limestone has dissolved and the hole has filled in with sediments that are slightly more magnetic. Careful measurements of the magnetic properties of these materials showed that this mechanism is sufficient to account for the magnetic anomalies.

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If not an impact crater, what is the large circular depression found in the Sirente plain? Speranza, Sagnotti and Rochette give a plausible answer: It is a reservoir made by human hands for the purpose of watering herds of sheep. They describe how this area of Italy was one of the main wool-producing regions of Europe between the 12th and 16th centuries, although locals have been involved in the activity since before Roman times. The great permeability of the underlying rock, however, does not allow rivers or even large springs to form, which creates a problem for shepherds trying to maintain millions of sheep there through the summer. The logical answer to this problem, they posit, was to dig reservoirs at the low points of these plains, where water tends to accumulate.


Ormö, Rossi and Komatsu have refused to be questioned about this recent challenge to their theory. In a written reply to my request for an interview, Ormö states: "It is not possible for us to comment in [the] media on the work done

by other scientists and on our own unpublished results." Fair enough. Curiously, the short written remarks these authors shared with me appear far more tentative than the statements given in their published papers. They say: "As long as the structure is not a proven impact crater field, it is impossible to draw any conclusions about historical consequences." This tone is in stark contrast to almost the entire body of their *Antiquity* paper, which is all about linking the structures seen in the Sirente plain with historical events.

Speranza notes that officials in the nearby town of Secarino are now in a bit of a quandary. After Ormö's papers were published, they began promoting the site as a crater park, hoping to make it a local tourist attraction. In August of last year they held a meeting on the "crater," which brought together many of the local dignitaries. But now that a significant scientific challenge has been published, it is hard to see how officials of the community of Secarino can in good conscience go ahead with those plans. After all, what tourist would want to visit a "Crater or Just-Plain-Watering-Hole Park"?—*David Schneider*

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