

Fossil supervolcano highlighted in new UNESCO Geopark

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Piedmont territory in northwest Italy is designated geopark backed by 80 Alpine communities. Area is an important geological and cultural locale that promotes awareness of earth sciences and sustainable use of resources.

"It is a rare event that geology is a catalyst of public cooperation and celebration," says geologist and volcano expert James E. Quick, Southern Methodist University, Dallas.

The new Sesia-Val Grande Geopark is an example of just that, says Quick, whose international team in 2009 discovered a fossil supervolcano that now sits at the heart of the new geopark. The discovery sparked worldwide scientific interest and a regional geotourism industry.

Recently designated a geopark by the United Nations Educational, Scientific and Cultural Organization (UNESCO), the Sesia-Val Grande Geopark encompasses more than 80 communities in the Italian Alps.

The communities joined forces more than two years ago to promote the park's creation, which UNESCO made official in September. The geopark spans tens of thousands of acres and has at its center the massive, 282 million-year-old fossil supervolcano.

"Sesia Valley is unique," said Quick. "The base of the Earth's crust is turned up on edge, exposing the volcano's plumbing—which normally extends deep into the Earth and out of sight. The uplift was created when Africa and Europe began colliding about 30 million years ago and the crust of Italy was turned on end. We call this fossil the 'Rosetta Stone' for supervolcanoes because the depth to which rocks are exposed will aid scientific understanding of one of nature's most massive and violent events and help us to link the geologic and geophysical data."

The fossil supervolcano was discovered by Quick's scientific team, which included scientists from Italy's University of Trieste. The supervolcano has an unprecedented 15 miles of volcano plumbing exposed from the surface to the source of the magma deep within the Earth. Previously, the discovery record for exposed plumbing was about

three miles, said Quick.

Located in the Piedmont region of northwest Italy, the geopark also includes Val Grande National Park, the largest wilderness area in Italy. Sesia Valley and Val Grande are important historical and cultural locales.



Only a handful of locations worldwide are chosen annually for UNESCO's coveted geopark designation, which supports national geological heritage initiatives.

Geoparks promote awareness of the [earth sciences](#), including natural hazards and sustainable use of resources. Worldwide, there are now 100 geoparks. Sesia-Val Grande is Italy's ninth.

Sesia-Val Grande area is popular for diverse geology, culture, ecosystems

Community cooperation is new to this part of the Alps, where villages have valued their independence for centuries and residents in adjacent valleys may speak distinct dialects. In the wake of the supervolcano discovery, the communities in Val Sesia and Val Grande joined in an unprecedented partnership to promote tourism, education and a collective identity, then applied to UNESCO for admission to the Global Geopark Network.

Delineated by two neighboring Alpine valleys in northwest Italy, the territory of the geopark is a well-established tourist region that is popular for its wine, cheese, quarried marble, cultural heritage spanning thousands of years, hiking, skiing, rafting, biking and climbing.

The area is about half the size of Rhode Island and has 153,000 residents. Its four environmentally diverse ecosystems are rich in biodiversity and diverse microhabitats, progressing from lowland agricultural prairies to expansive forests to Alpine peaks, the highest of which is 15,203-foot Monte Rosa in one of Europe's largest ski resorts.

Supervolcano was cataclysmic eruption, set off catastrophic global cooling events

The Sesia Valley supervolcano is a vast rocky expanse, in some places visible in plain sight and in others hidden by forests or under young sedimentary deposits. The supervolcano extends over a third of the Sesia-Val Grande geopark's territory, said Quick, who previously served as program coordinator for the Volcano Hazards Program of the U.S. Geological Survey.

The supervolcano was active for about 6 million years, beginning about 288 million years ago, Quick said. Its volcanic activity culminated 282 million years ago with an eruption that left an enormous crater measuring more than eight miles in diameter. The cataclysmic eruption released gas from molten rock or "magma," raining down particles and gases measuring more than 186 cubic miles in volume, Quick has estimated. His team reported the discovery in the scientific journal "*Geology*" in a 2009 article, "Magmatic plumbing of a large Permian caldera exposed to a depth of 25 km."

Throughout Earth's geologic time, supervolcanoes have spread lava and ash vast distances. Scientists believe the fallout may have set off catastrophic global cooling events at different periods in the Earth's past.

"We want to use this discovery. It can help us understand the fundamental processes that influence eruptions: Where are magmas stored prior to these giant eruptions? From what depth do the eruptions emanate?" Quick said.

Sesia Valley's unprecedented exposure of magmatic plumbing provides a model for interpreting geophysical profiles and magmatic processes beneath active calderas, he said. The exposure also serves as direct confirmation of the cause-and-effect link between molten rock moving through the Earth's crust and explosive volcanism.

"It might lead to a better interpretation of monitoring data and improved prediction of eruptions," said Quick, who is a professor in the SMU Roy M. Huffington Department of Earth Sciences and SMU associate vice president for research and dean of graduate studies.

Provided by Southern Methodist University

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