



News

Colossal crystals cave uncovered

by Michelle Carr
Cosmos Online

Friday, 13 April 20



The gloom of the 290-metre-deep cave is punctuated by spectacular selenite crystals, some of which are 11 metres long.

Image: Javier Truett



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SYDNEY: The monumental gypsum crystals found in Mexico's Cueva de los Cristales are the largest naturally-occurring crystals ever recorded. Now, geologists believe they have uncovered the mystery how these 11-metre monoliths formed.

The discovery, published in the April issue of the journal *Geology*, also suggests that other equally spectacular caves are waiting to be discovered in the mines.

First found in 2000, the 290-metre-deep cave is located in a complex of silver and lead mines below Mol Naica in the Chihuahua desert. The area well known for its selenite crystal deposits. Selenite is translucent, glass-like form of gypsum.

"It's the Sistine Chapel of crystals," said Spanish geologist Juan Garcia-Ruiz. Based at the University Granada, Garcia-Ruiz led the Spanish and Mexican team behind the research.

One of the most famous caves at Naica is the 120-metre-deep Cueva de las Espadas - or the Cave Swords - named for its metre-long crystals. Although there are fewer crystals in the Cueva de los Cristales, their sheer size makes them particularly spectacular.

The gypsum deposits at Naica are thought to be the result of volcanic activity from as long as 26 million years ago, which left behind anhydrite. Anhydrite is a mineral formed of calcium sulphate - it is chemically identical to gypsum, but lacks water. As underground volcanic activity abated, the water in the Naica cave system cooled below 58°C and the anhydrite deposits slowly turned into crystals of gypsum.

To further probe the formation of the massive crystals, Garcia-Ruiz and his team examined tiny pockets of water trapped inside them. These fluid samples retain the chemical signature of the solution from which the giant gypsum shafts developed - and offer clues about the salinity and temperature of the environment.

The results indicated that Cueva de los Cristales must have remained very stable and stayed slightly below the anhydrite-gypsum transition temperature for hundreds of thousands of years. "The conditions were perfect," Garcia-Ruiz told Cosmos Online. "By maintaining the temperature just below 58°C for a very long time you get a few, very big crystals."

The researchers say that it's possible that the temperature in the upper cave - Cueva de las Espadas - cooled to below the transition temperature more rapidly, as it was further from the underground magma. This resulted in the anhydrite more quickly transitioning to gypsum, and forming into many small crystals.

"These singular conditions create a mineral wonderland, a site of scientific interest, and an extraordinary phenomenon worthy of preservation," write the study authors.

According to geologist Paul Burger, based at the Carlsbad Caverns in New Mexico, U.S., crystal size is directly related to the length of time of the crystal formation process - if the formation process happened relatively rapidly then the resulting crystals will be small and numerous. Alternatively, for gigantic crystals to form, the formation process must have taken a long time, he said.

In the correct conditions, crystals can continue growing indefinitely, said Garcia-Ruiz. The water that normally covers the gypsum deposits in Cueva de los Cristales, is being pumped out to allow for mining operations. Once the mine is allowed to refill with water again however, the crystals will start to grow again.

Garcia-Ruiz wants to see the crystals protected from degradation in the meantime. "I've recommended the mining company that they try to preserve them and I would like to see UNESCO [the United Nations Educational, Scientific and Cultural Organisation] get involved," he explained.

Burger is also hopeful that once the mine is allowed to refill with water, the crystals will be preserved once again for future study.

"Many of the previously found caves were stripped and the crystals sold to private collectors and museums. Unfortunately, much like archaeological remains, a significant amount of information is lost once the crystals are taken out of their native context," he said.

More information:

Pictures and more at the Naica Crystal Project

Formation of natural gypsum megacrystals in Naica, Mexico - *Geology*

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