MS15-P17 Twinning is the key aspect of giant gypsum crystals in Naica

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The giant gypsum crystals discovered in 2000 at Naica (Mexico) have been since them a source of deep fascination not only because of their look, but also due to the wealth of scientific information that the mineralogical/crystallographic community can get from them. The first report explaining the extremely unusual size of these crystals [1] showed that they are only compatible with very low nucleation and growth rates under extremely steady conditions very close to equilibrium. These results lead to a deeper understanding of the nucleation and growth processes at very low supersaturation and to the definition of geological settings where nucleation and growth of giant crystals is plausible. Even the state of the art of our knowledge concerning the equilibrium morphology of gypsum was challenged [2] by these unique crystals growing in conditions very close to equilibrium, where no experiments can be performed in the laboratory.

After 14 years of study, [3] one question was still open. The presence of two clearly distinct crystal habits for gypsum in Naica (bulky crystals with a morphology close to the equilibrium one, and much longer crystals, called “beams”, up to 11 meters long) was reported, but left unexplained. Our last results show that the reason for the presence of the long crystals that make Naica so exceptional is related to twinning. All long crystals are 100 twins and the reentrant angle of the twin is the source of growth steps required for the extremely unusual development of the giant c-elongated beams. The origin and operation of this structurally controlled mechanism is explained.

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[3] Otálora, F. and García-Ruiz, J.M. (2013): Nucleation and growth of the Naica giant gypsum crystals. Chem Soc Rev. 43, 2013-2026.

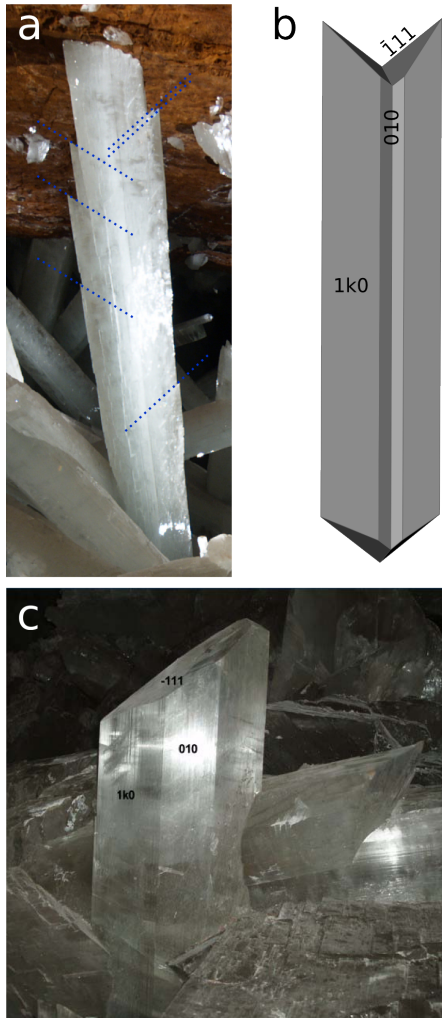

Figure 1. The two gypsum habits present in the Cave of Crystals at Naica. 10 meters long beam (a) showing the reentrant twin angle; sketch of the twin (b); 0.8 meters blocky crystal close to the equilibrium habit of gypsum (c).

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