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Geomorphological notes on the Impossible Cave (Classical Karst, Italy)

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The Impossible Cave has been discovered, near Trieste (Classical Karst, northern Italy) in the year 2004 during tunnel road construction and up to today has been explored for 3 km.

This cave is characterized by a large cavern from which many small galleries departs. The caverns and galleries inside the Impossible Cave are rich in calcitic concretions and in rests of old rockslides. This cave opens in Paleocene - Eocene pure limestones, similarly to the ones situated in Rosandra Valley and to the Skilan Cave (situated a few hundreds meters from the entrance of this cave) that is the longest cave of the Karst of Trieste.

In the area where the Impossible Cave has been found, the calcareous strata form a knee fold and overtrusts the marly arenaceous strata of the Eocene Flysch of Trieste with a large NW-SE fault. The cave entrance is situated approximately 500 m from the contact between the limestones and the Flysch. The large galleries that form the Impossible Cave are better developed in an E-W direction and they are mostly orientated 45 degrees towards the crests of the Karst plateau, while the smaller galleries are orientated NW-SE and therefore almost parallel to this crest and to the direction of the strata.

The most particular feature of the Impossible Cave is the large gallery that for size is close to the one of the Grotta Gigante that is the bigger tourist cave worldwide. The Impossible Cave main cavern has an axis of 150x65 m and the ceiling is as high as 75

m and the pavement is full of large boulders that often have on top well developed stalagmites. The galleries and the smaller caverns are very rich in concretions variously shaped.

The Impossible Cave differs from theoretical cave models for the Classical Karst and that's the reason of the nickname of impossible. The main cavern develops in a direction and at an altitude not related to the previously known hydrogeological evolution of this region. Messinian geomorphological features are hidden by concretions and other cave deposits and their evidences are limited to few places. In addition, the secondary galleries are developed in anomalous altitudes and have morphologies and directions completely different to the ones of the caverns and they dip towards southeast instead of southwest as for most of the galleries of the Trieste Karst area. Some of the boulders that are found on the pavement of the caverns are full of concretions while others have very few small concretions, and by comparison to other speleothemes in Classical Karst are at least 1 M years old. Another peculiar aspect of the Impossible Cave is that the surface where the cave has been discovered is characterized by the absence of well developed dolines or sinkholes and the classical karst morphologies are very few or poorly developed.