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# Volcanic Caves in El Hierro Island, Canary Islands, Spain\*

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## Abstract

The complete catalogue of volcanic caves from El Hierro Island (Canaries) is presented. The total number of caves known up to today is 35, of which 27 are lava tubes, 7 are pit caves and 1 is a pit-tube. The unpublished maps of 10 caves are shown as well as a brief commentary about their more relevant geological and biological features.

## Introduction

El Hierro Island, with an area of only 278 square kilometers and maximum age of between one and three million years (Abdel-Monem *et al.*, 1972), shows a great number of caves of volcanic nature. This is mostly due to the youth of the lava flows spread all over the insular area (only a few thousand years) together with the basal character of the materials of which they are made.

## Background

Among the caves of El Hierro Island, one, called "Cueva de Don Justo," is outstanding for its great length. It, with its 6,315-meter total length, has motivated the presence in the island of several speleological expeditions.

The first report we have about speleological exploration in the island is dated from 1961. In that year a local speleological group—surely the first one in the Canary Islands—called "Grupo Herreño de Espeleología, Montañismo y Escalada" (GHEME) was established. Even though its work was never published, the members of this group achieved the first exploration and mapping of the Cave of Don Justo.

More recently, in the year 1974, the Department of Crystallography and Mineralogy of the University of Barcelona and the Group for Underground Exploration of the Club Muntanyenc from Barcelona started with the mapping of this cave (anonymous, 1975; Montoriol-Pous and De Mier, 1977). In the year 1976 the Speleological Exploration Team of the Exploration Center of Cataluña visited it again. In 1978 another exploration by the same catalan group together with the Speleology Branch of the Exploration Society of Malaga, finished the survey of this cave (Montoriol-Pous *et al.*, 1979).

At that time, only five caves of the island were known to speleologists: the above mentioned, three more of the subaerial type discovered during 1974's exploration (Montoriol-Pous and De Mier, 1980), and an old report about the "Cueva

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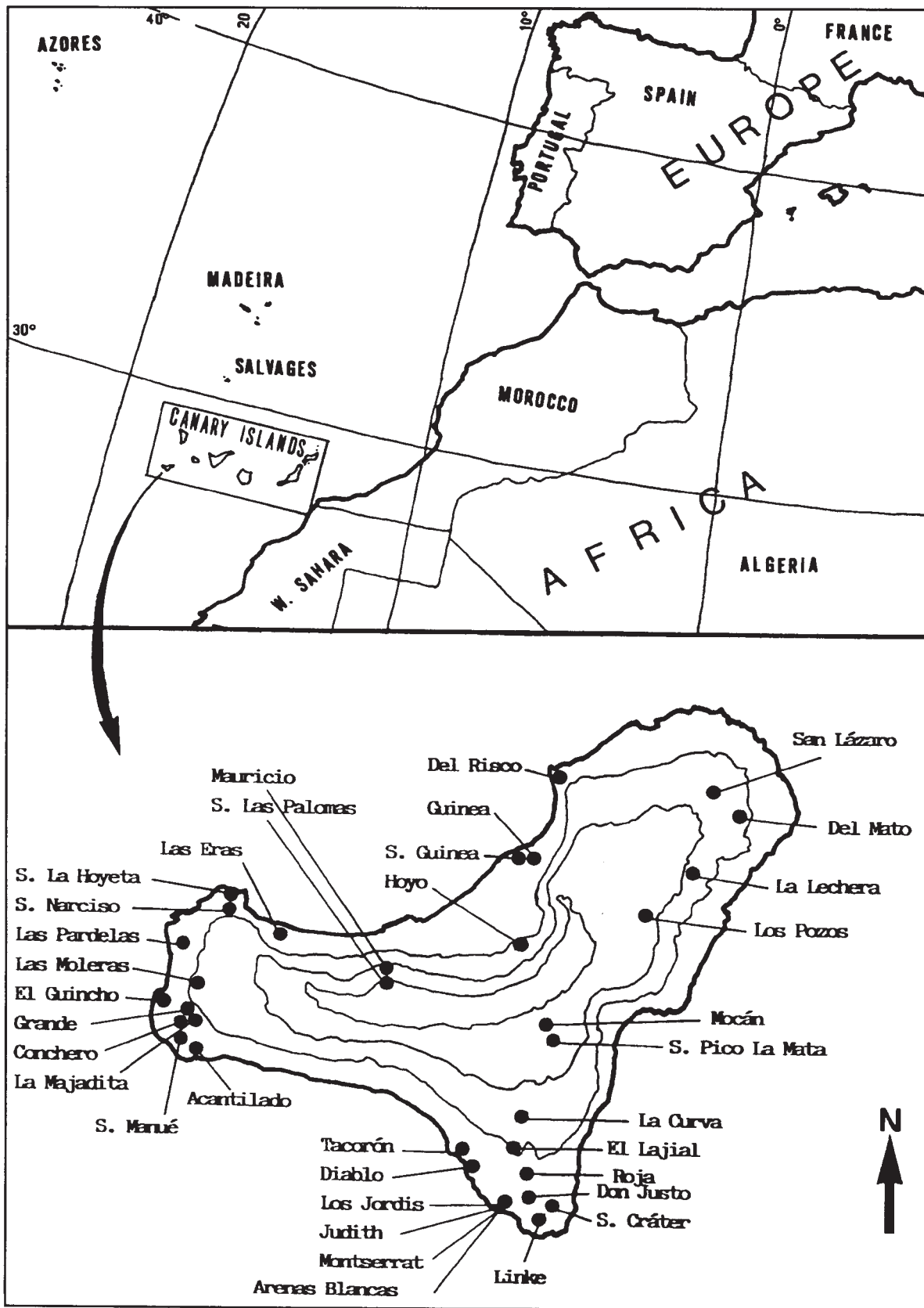


Figure 1—Location of volcanic caves in El Hierro Island (Canaries - Spain).

del Hoyo" at the beginning of this century (Fernandez Navarro, 1908). Nevertheless, the information we had about the island showed a greater quantity of lava tubes. For this reason we decided to complete various explorations in order to increase the speleological chart of El Hierro and also biological studies, so as to demonstrate whether or not cave fauna is possible inside these tubes.

For this purpose, the Group of Speleological Researchers of Tenerife (GIET), from the University of La Laguna, has made two trips to the island during the months of April and May 1984, which resulted in the study of 16 caves. This work was published in the II Regional Symposium of Speleology which took place in Burgos (Spain) in 1984 (Martín *et al.* 1985a, Socorro, 1985) and in the 9th International Congress of Speleology, which took place in Barcelona, Spain, in 1986 (Socorro, 1986). Afterwards, the authors went on with this work during various visits to the island (May 1985; May, December 1986; March, April, and November 1987) the results of which are the basis of this report.

## Results

For the time being, as a result of these last explorations, 35 caves are known, spread all over El Hierro. Among them, seven are of the volcanic pit type, the biggest being the "Sima de Las Palomas" with a depth of 75 meters. Among the 28 lava tubes known, the longest one is the already mentioned Cave of Don Justo, the third volcanic tube of Canary Islands and one of the longest of the world.

Table I shows the caves known to date, with data of interest such as location, length, whether there is a map or not, interest, and degree of preservation. In some cases, the interest is purely a geological one, while in others it is outstanding botanical and zoological outlooks (Martín *et al.*, 1987). Some caves are of archaeological value since they have been used during historical periods by the "bimbaches" i.e. primitive inhabitants of the island. Others are of paleontological value, since inside can be found remains of bones of big vertebrate species now extinct (Izquierdo *et al.*, 1989). The location of each cave is shown in Figure 1.

## Report of the Caves Studied

Following is the topographic study completed in the caves of Linke, El Mocan, Los Pozos, Taco-

ron, La Curva, and Roja and the pits of Guinea, Crater, Las Palomas, and Pico La Mata, with a brief description of each cave and comments about the fauna found inside.

### Cave of Linke

Location: La Restinga (Frontera)

UTM: 28BR067635

Length: 290 meters

Description: The cave is situated at 800 meters on the east side of Mount Prim, between a lot of small ovens ranked up to the coast. Its only entrance is at an altitude of 150 meters above sea level, it is tight and of a trigonical shape. The hole gives access to an ascending tube 60 meters long and another descending tube of approximately 300 meters. There is a lot of dust inside, such a quantity that the numerous lava stalactites buried in the ground can hardly be seen.

Biology: The cave shelters species peculiar of the underground environment of the island. Some of them, such as the earwig *Anataelia lavicola* Martín and Oromí or the cockroach *Loboptera ombriosa meridionalis* Martín and Izquierdo, are essential to the ecosystem of the Cave of Don Justo, which is within one kilometer.

### Cave of Mocan

Location: El Pinar (Frontera)

UTM: 28BR037694

Length: 214 meters

Description: A lava tube with only one entrance on the upper end at a height of 1,100 meters above sea level. The tube, of an average height of seven meters, is large throughout all its length. In the middle area there is a small split in the roof, where a beam of light can find its way through. The appearance of the cave shows that it is often frequented since varied rubbish is found inside.

Biology: The invertebrate fauna seems to be very poor. The discovery of subfossil remains of giant lacertids stands out.

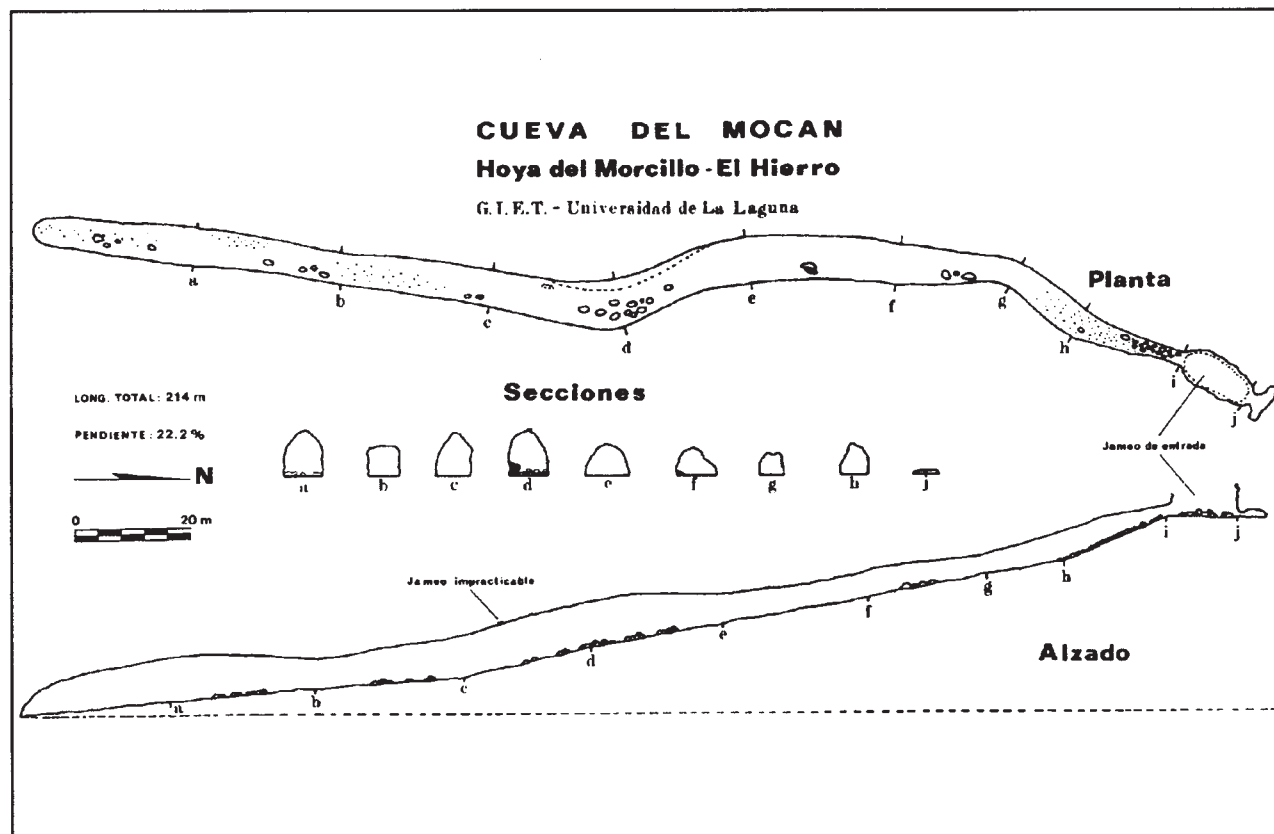
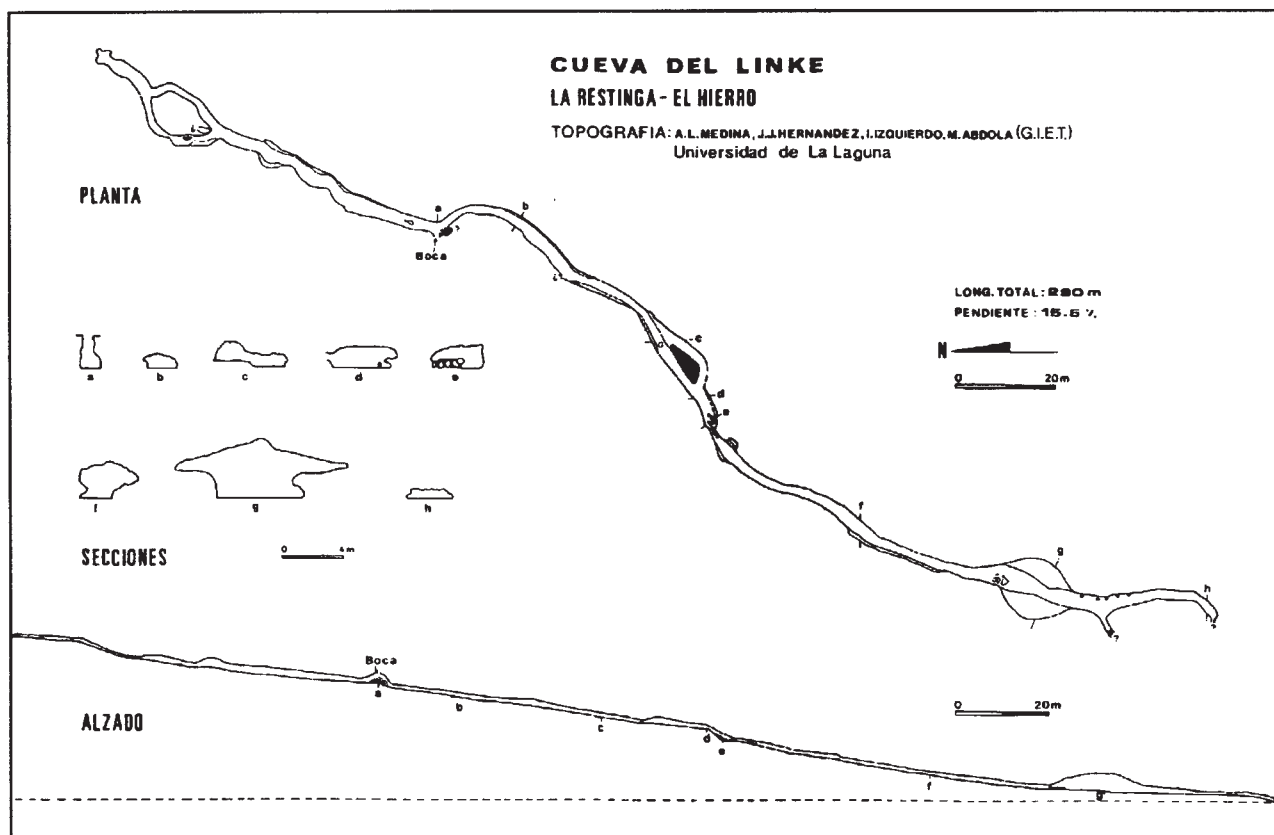
### Caves of San Andres or Los Pozos

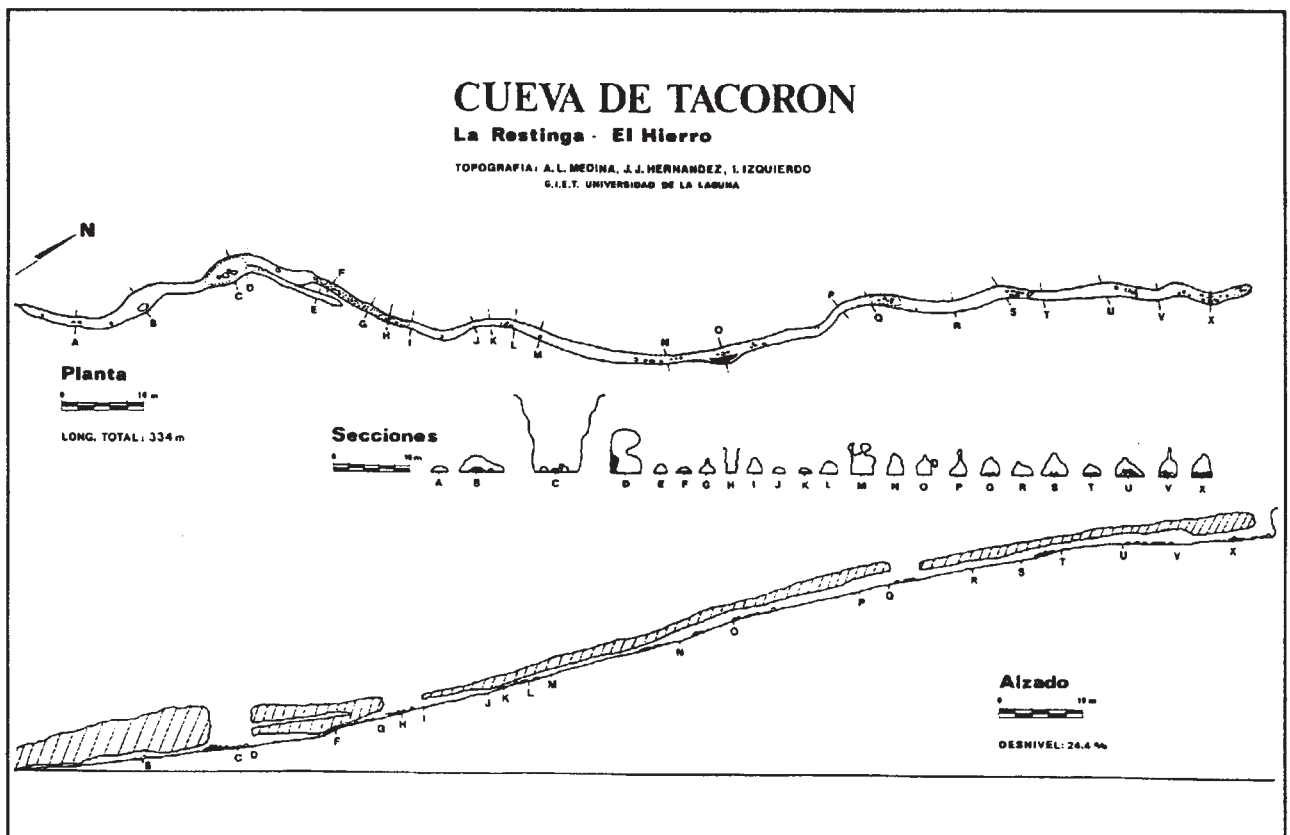
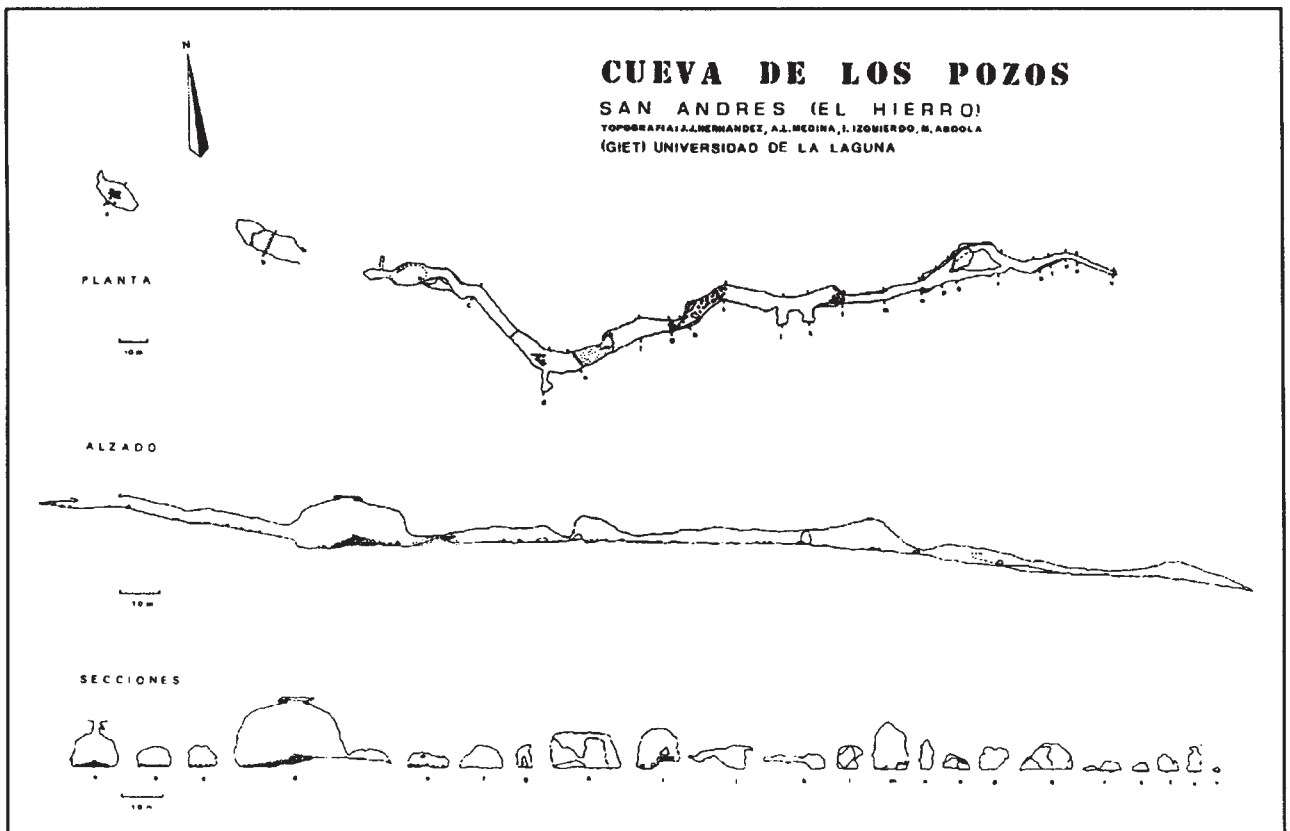
Location: San Andres (Valverde)

UTM: 28BR082741

Length: 390 meters

Description: This is a small area of three ranked caves, with a total of five entrances situated at an elevation of 1,000 meters. The extreme west entrance is a closed oven eight meters deep that can only be entered with ropes. The middle





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Cave	Locality	Length (m)	Map	Interest	Preservation
Sima de Marciso	Arenas Blancas	-29	Yes	Geol	Good
Sima de La Hoyeta	Arenas Blancas	-26	Yes	Geol	Good
Cueva Las Paredas	Lomo Negro	180	Yes	Geol/Zool	Acceptable
Cueva Cuaclo Las Moleras	La Dehesa	170	Yes	Zool/Archaeol	Acceptable
Cuava Grande de Orchilla	Pta de Orchilla	85	No	Archaeol	Acceptable
Cueva del Conchero	Pta de Orchilla	80	No	Archaeol	Acceptable
Cueva del Guincho	Pta de Orchilla	20	No	None	Acceptable
Cueva La Majadita	Pta de Orchilla	50	No	None	Acceptable
Sima de Manué	Pta de Orchilla	-15	No	Geol	Acceptable
Cueva del Acantilado	Pta de Orchilla	401	Yes	Geol	Good
Cueva de Judith	La Restinga	120	Yes	Geol	Good
Cueva de Los Jordis	La Restinga	46	Yes	Geol	Good
Cueva Monserrat	La Restinga	114	Yes	Geol	Good
Cueva de Arenas Blancas	La Restinga	95	No	None	Acceptable
Cueva del Linke	La Restinga	290	Yes	Geol/Zool	Good
Sima del Cráter	La Restinga	-36	Yes	Geol	Acceptable
Cueva de Don Justo	La Restinga	6,315	Yes	Geol/Zool	Good
Cueva Roja	El Lajial	300	Yes	Geol	Good
Cueva de Tacorón	El Lajial	334	Yes	Geol/Zool	Acceptable
Cueva del Lajial	El Lajial	??	No	Geol/Zool	Good
Cueva de La Curva	El Pinar	141	Yes	Zool	Acceptable
Sima Pico la Mata	El Pinar	-23.5	Yes	None	Acceptable
Cueva El Mocán	El Pinar	214	Yes	Tourist	Acceptable
Cueva de Los Pozos	San Andrés	390	Yes	Zool	Acceptable
Cueva La Lechera	Isora	??	No	None	Acceptable
Cueva San Lázaro	Echedo	~100	No	None	Acceptable
Cueva del Mato	Valverde	20	No	None	Acceptable
Cuevas de Guinea	Frontera	30	No	Archaeol	Acceptable
Sima de Guinea	Frontera	57 (-8.7)	Yes	Zool/Tourist	Good
Cueva del Hoyo	Frontera	247	Yes	Geol/Zool	Good
Sima Las Palomas	El Golfo	300 (-75)	Yes	Geol/Zool/Bot	Good
Cueva de Mauricio	El Golfo	193	Yes	Zool/Geol	Good
Cueva Las Eras	Sabinosa	80	No	None	Acceptable
Cueva del Diablo	La Restinga	20	No	Tourist	Acceptable
Cueva del Risco	Frontera	40	No	None	Acceptable

Table 1 – Relation of all volcanic caves known to date in El Hierro Island (Canaries).



cave has two entrances and is 26 meters in total length. The extreme east cave is the biggest with two entrances and a total length of 350 meters. At that point the cave presents a high degree of wetness and shows a great adduction of organic material from the outside. There are ponds some meters long and the stratum is made of muddy deposits.

#### Cave of Tacoron

Location: El Lajial (Frontera)

UTM: 28BR032642

Length: 334 meters

Description: This is a volcanic tube with four entrances all along its length, located at 500 meters above sea level. It presents a pronounced slope due to the dip of the soil on which it formed. From the lower entrance a small gallery starts upwards until reaching the upper level, about 20 meters long. The four entrances are not the usual type of collapse but seem to have originated during the geological formation of the tubes. Its morphology shows the ups and downs of the lava flow, which seems to demonstrate that the holes were genuine lava drains.

Biology: The presence of the earwig *Anataelia lavicola*, also to be found in other caves of the lowlands, is interesting.

#### Cave of La Curva

Location: El Pinar (Frontera)

UTM: 28BR069667

Length: 141 meters

Description: This is a small lava tube, located at a height of 400 meters, beneath the road leading to Taibique. It presents two overlapped tubes, the upper one with only 40 meters of length. At its lower end the cave is obstructed by landslides.

Biology: In spite of its short length, the cave shows a great biological wealth. Inside, both humidity and temperature are high and the cave has many roots covering the floor and walls. The fauna found includes the cockroach *Loboptera ombriosa meridionalis*, a small troglitic Fulgoroid (Cixiidae), and another Fulgoroid belonging to the family Meenoplidae, possibly *Meenoplus canavus* Rename and Hoch, also found living in the Cave of Don Justo (Hoch and Asche, 1988).

#### Roja Cave

Location: El Lajial (Frontera)

UTM: 28BR043642

Length: 300 meters

Description: This cave is only a hole, just on the crater of Mount Julian at a height of 350 meters. This hole takes one to a tube of great magnitude which shortly divides into two branches. The one from the right goes gradually downward. It reaches a 70 percent slope at some points, and then continues level until its deepest point. The branch to the left is tighter, with scarcely any dip until it gets to a point where the tube changes into a real volcanic cavern of about 12 meters depth. As we step downward, it enlarges and grows so as to form a big vault with layers of different colors on its walls.

In some stretches of the cave one can observe how the basaltic plaques have fallen from the walls showing a pyroclastic stratum of the lapilli type. This stresses the point that the lava flows that originated Roja Cave excavated under the material covering the surface of the area, which in that particular case is a large stratum made of pyroclastic materials.

#### Pit of Guinea

Location: Guinea (Frontera)

UTM: 28RB047756

Length: 57 meters (-8.7 meters)

Description: A small lava tube belonging to the Guinea's Cave area, at an elevation of 95 meters. Ropes are necessary to enter since the only entrance is collapse of the roof of a big cavern 8.7 meters high. From there starts a large tube 57 meters long, running southeast to northwest. There is an important deposit of clay covering the whole cave and even closing both ends of the tube.

Biology: Outstanding is the presence of Curculionidae beetles of the group *Paratorneuma*, spiders belonging to the Linyphiidae and Dysderidae families, and other species of springtails, gastropods, woodlice, and so on. Bones of lizards and goats can be observed which proves a former communication with the outside, now disappeared, since the entrance hole existed only a few days before our exploration. It is possible that the clay deposit on the inside could have a paleontological interest.

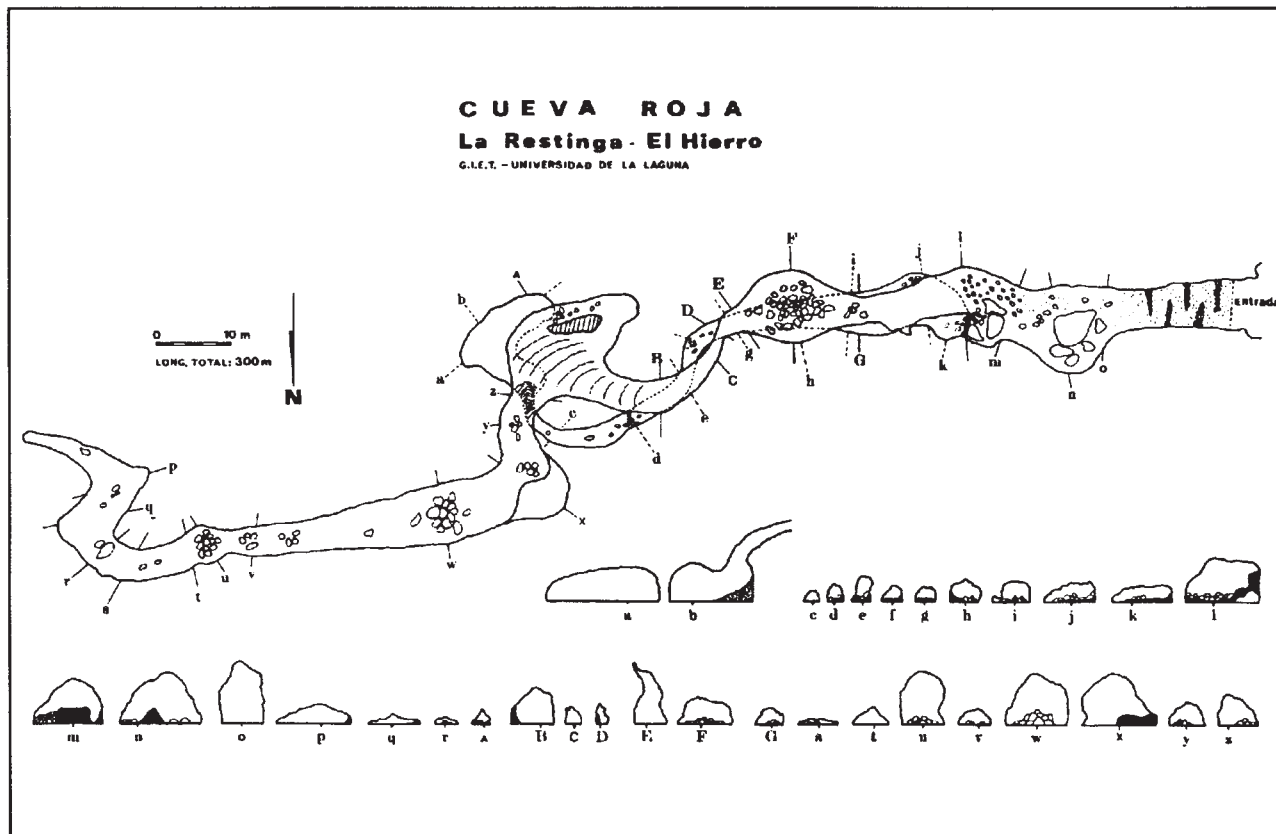
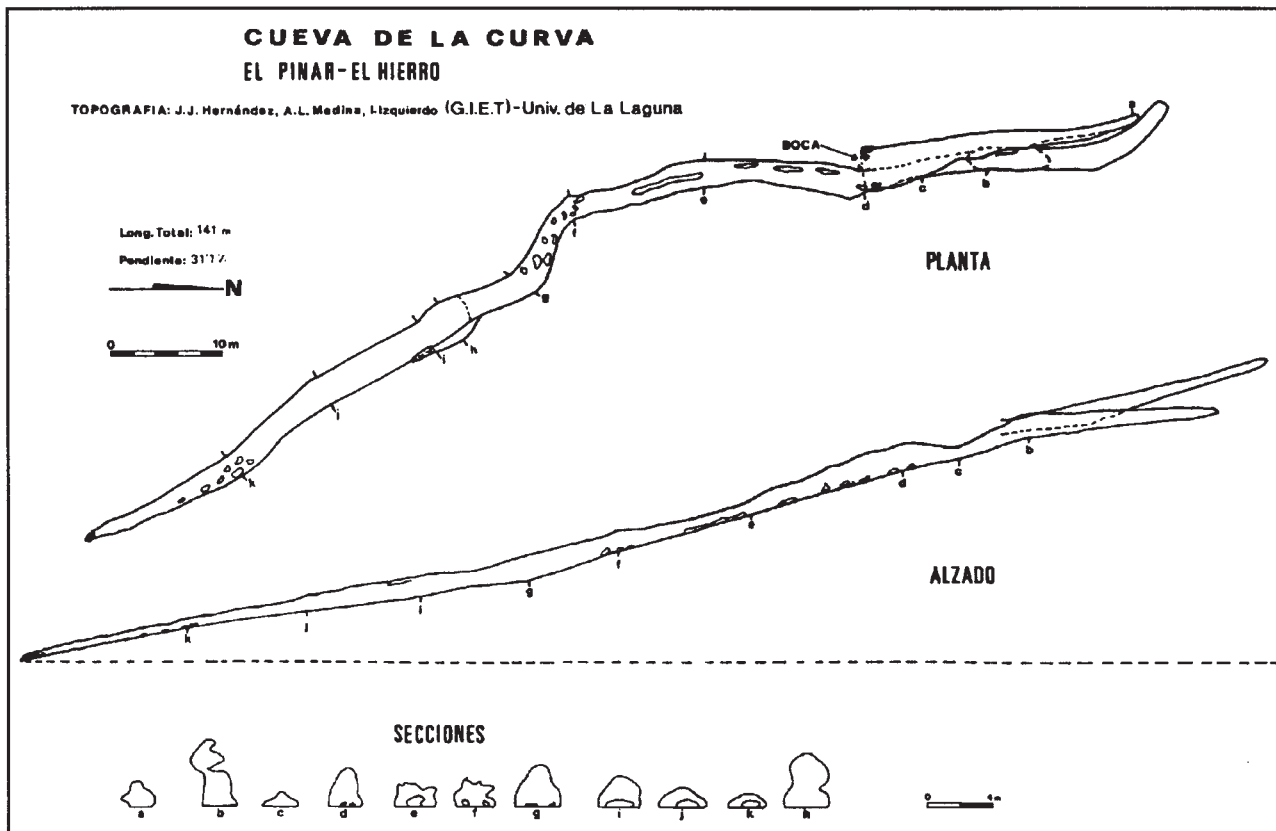
#### The Crater Pit

Location: La Restinga (Frontera)

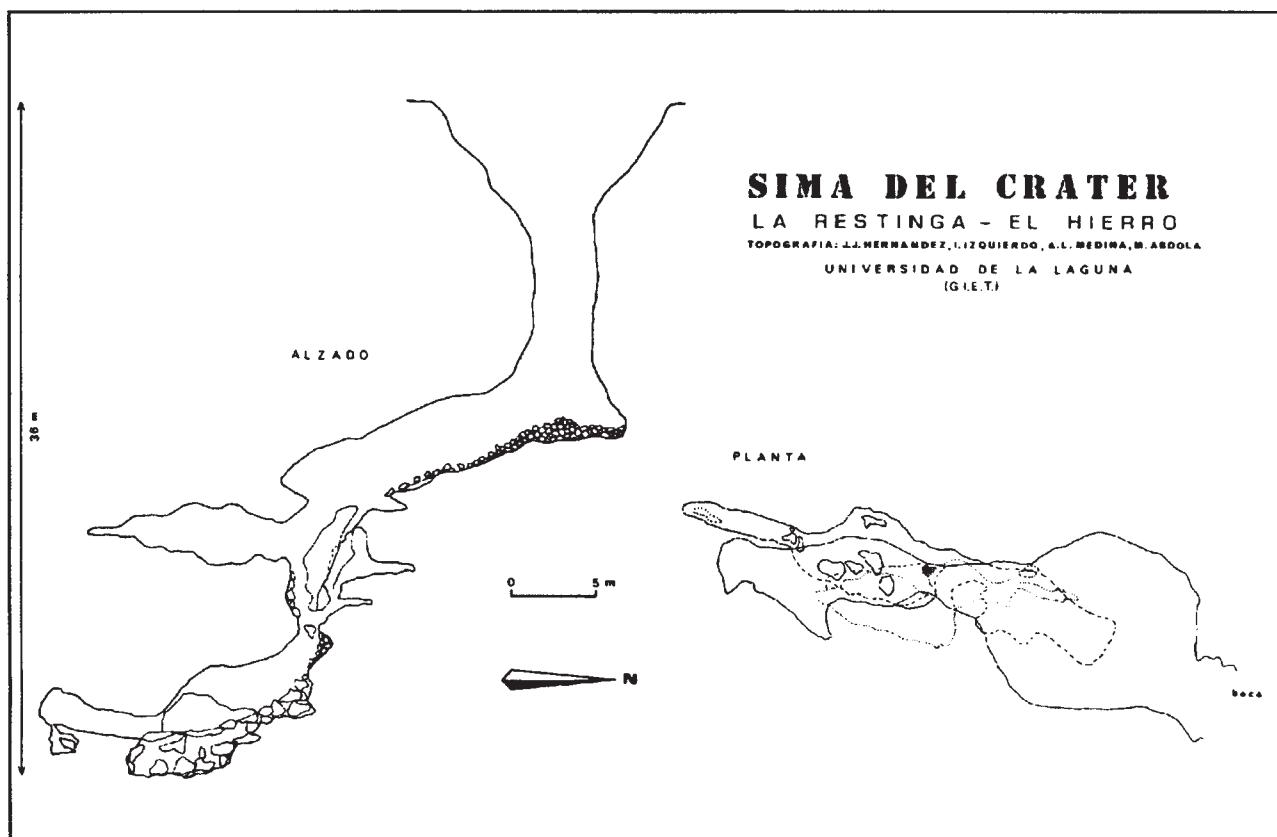
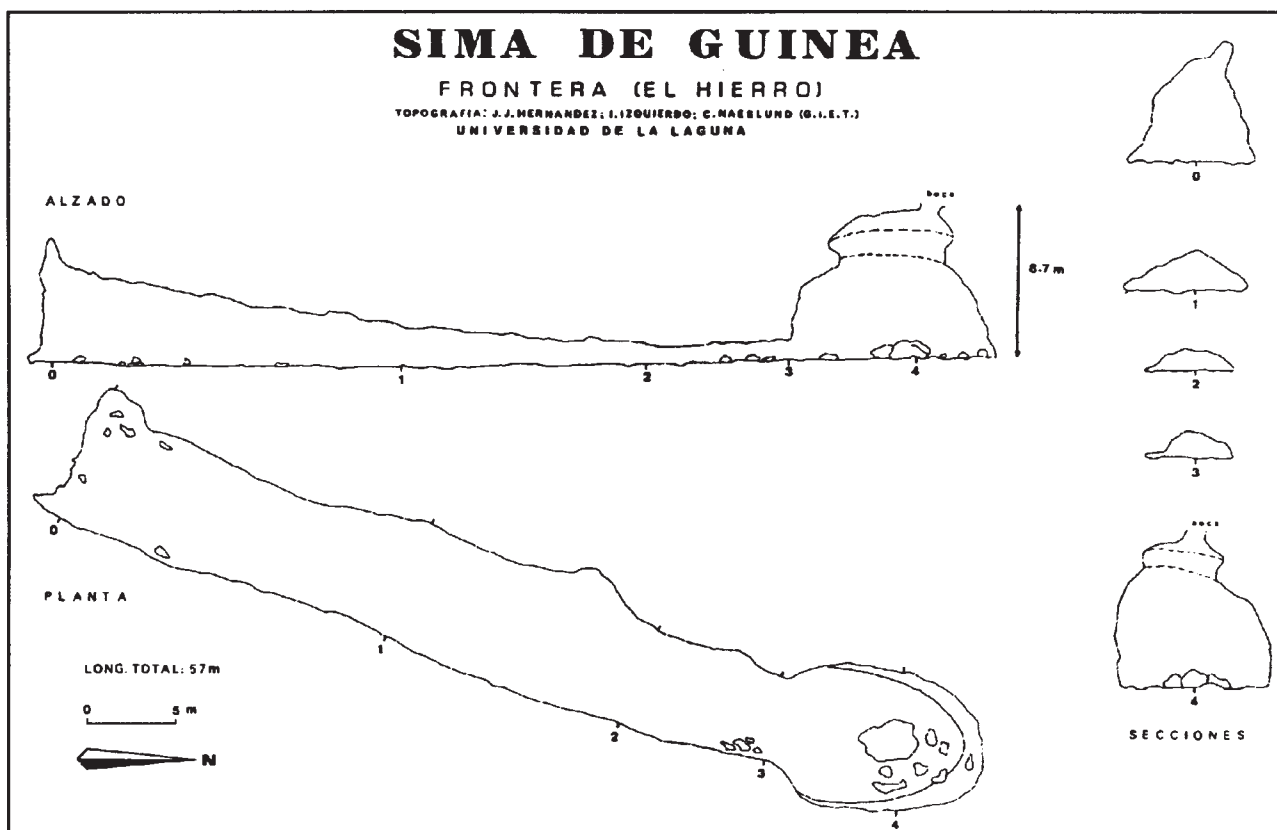
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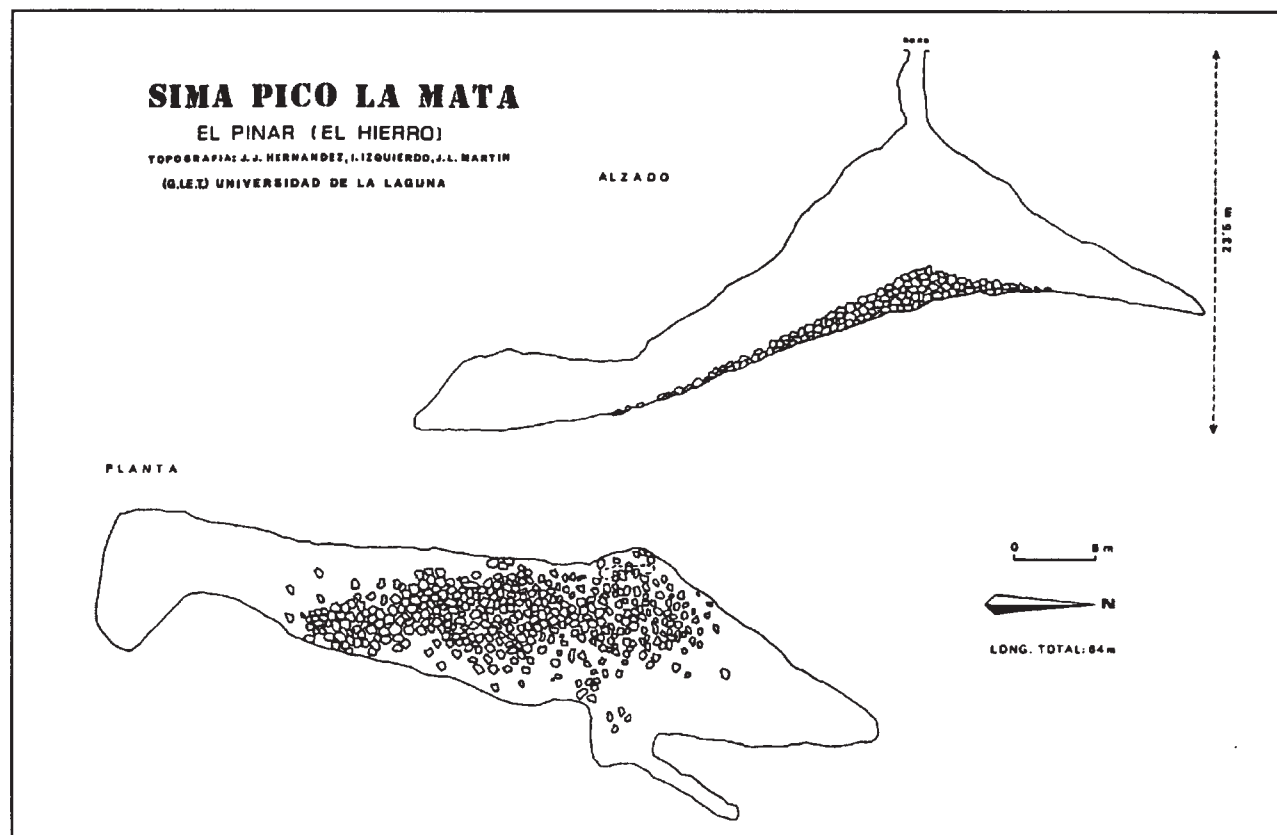
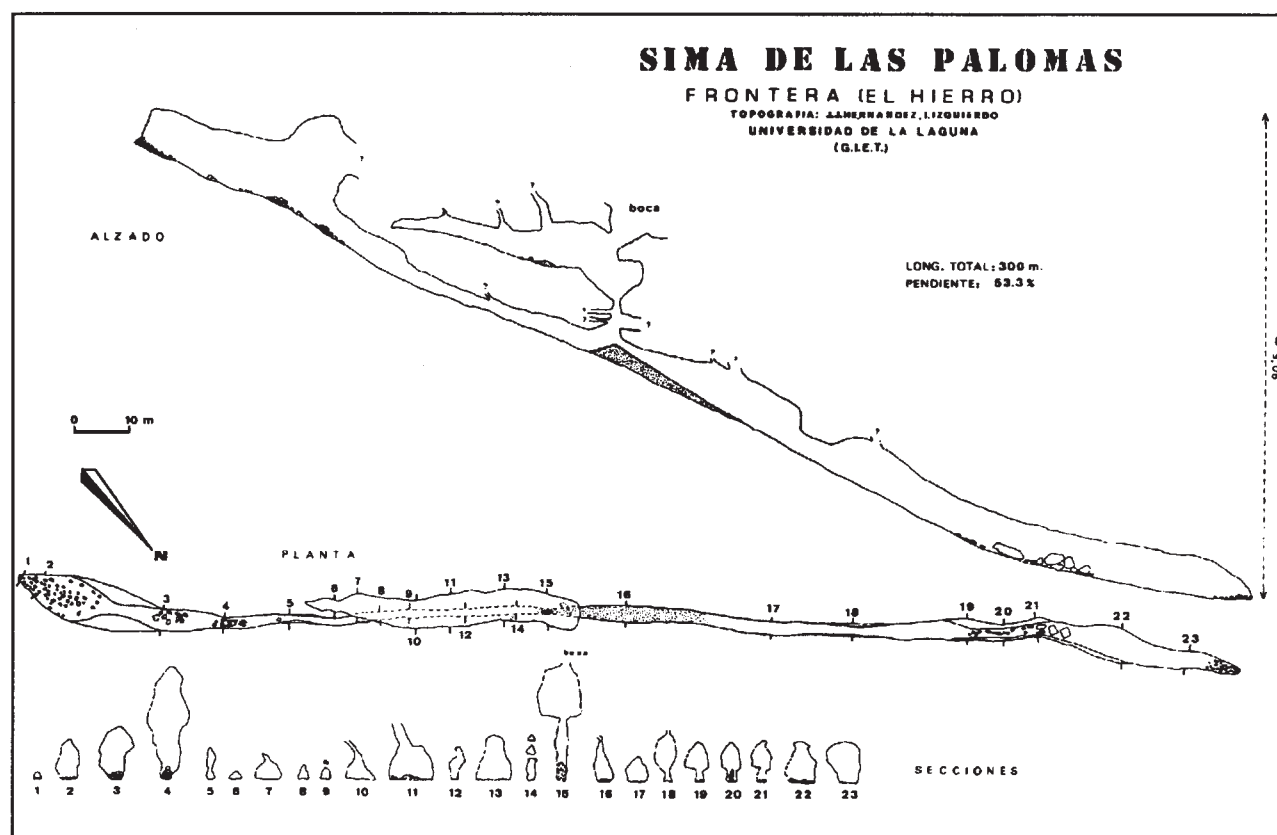
Depth: 36 meters

Description: The pit, located at an elevation of about 800 meters, is northeast of Mount Prim









and near the sea cliff where an aggregate of small ovens and craters can be observed. The eruptive chimney of one of them is the entrance to the cave. The hole is about four meters in diameter at the access of the first pit of eight meters depth, with approximately the same diameter as the hole. In this area there are lots of blocks fallen from outside and from the walls. Further away there are two more pits of four and seven meters. They are much smaller than the entrance one and lots of scours and slips obstructing the way down force one to find his way between fitted blocks.

**Biology:** There are remarkable and various remains of living vertebrates such as goats, rabbits, sea gulls, and others. As occurs in many pits, it is used as a nesting place by numerous pigeons.

#### **Pit of Las Palomas**

**Location:** El Golfo (Frontera)

**UTM:** 28AR986721

**Depth:** 75 meters

**Description:** This is an amazing and frightening cave located in the slope of the Tanganasoga volcano. Its entrance, whose vertical diameter forms a descending slope of 45 percent, gives way to a small oven from which three overlying tubes go in the same direction and with same declivity as that of the slope. The lower tube can reach heights of 15 meters. This is one of the deepest volcanic pits of the archipelago and in its birth the typical mechanism of lava tube formation was merged with the latter melting of the overlying tubes (Martín *et al.*, 1985a).

**Biology:** There are lots of pigeons' nests (*Columba livia gmelin*) on the floor of the upper tube. In the vertical wall of the entrance there is much pigeon guano and a rich, recently investigated arthropod fauna (for example, the rove-beetles *Sepedophilus tenuicornis* Lind, and *Omalium ocellatum* Woll).

#### **Pit of Pico La Mata**

**Location:** El Pinar (Frontera)

**UTM:** 28BR057690

**Depth:** 23.5 meters

**Description:** This cave is located at about 900 meters above sea level. It presents the characteristic form of a typical chimney of the Canarian volcanic pits: it has a diameter larger at the bottom (50 meters) than at the entrance (2 meters). From the entrance there is a free drop of 13.5 meters to the top of a pile of blocks which have fallen from the outside. From here on, the

cave runs about six more meters until it reaches the deepest point. It does not seem to be very old since its walls are not very damaged and are full of lava stalactites. The piling up of the blocks fallen from outside is not very important, since just underneath the lava flows of the primitive stratum can be seen. The external structures peculiar to an eruptive hole, are very well preserved.

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