# Underground Canfranc Laboratory

## LSC

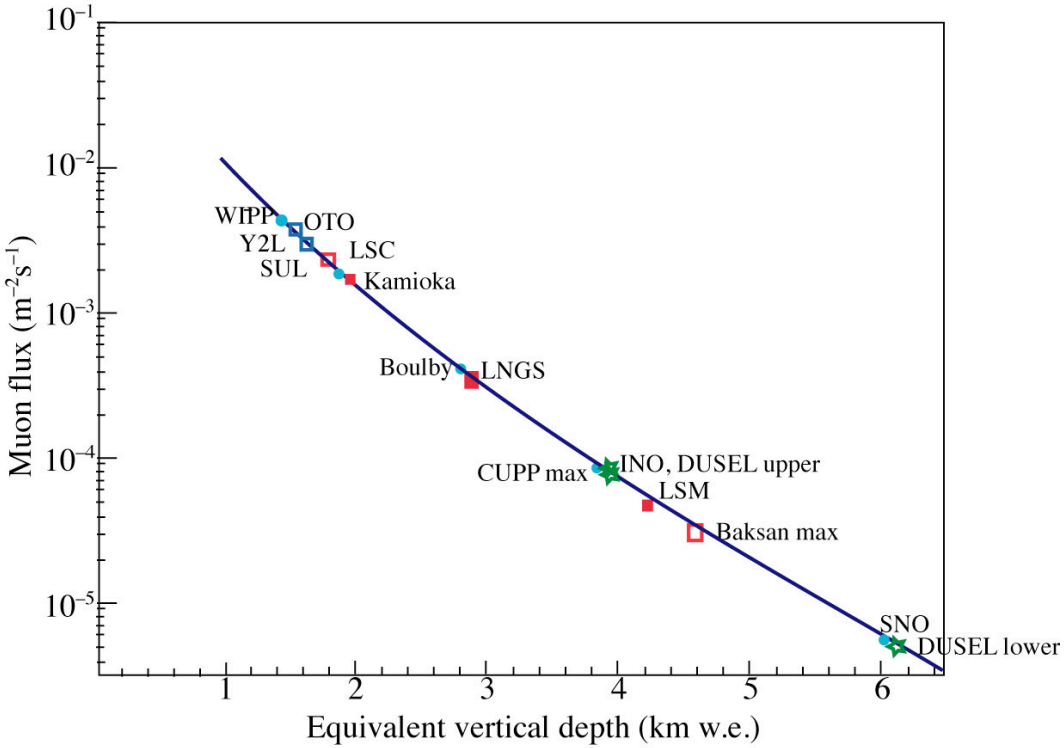
*Laboratorio Subterráneo de Canfranc*

*Luis Labarga (University Autonoma Madrid)*



*ETH, Zurich, 03/07/2008*

[from A.Bettini, "The World Underground Scientific Facilities, a compendium", hep-exp:0712.1051]




## Some technical characteristics:

**Type of access. Interference with nearby activities**

Horizontal, two tunnels (freeway and dismissed railway/safety tunnel). Entrance must be communicated to the freeway tunnel control

**Rock coverage (metres of rock), muon flux, neutron flux, radon activity (average with ventilation)**

Maximum rock coverage: 850 m (2.4 km w.e.); muon flux $2\times10^{-3}$ - $4\times10^{-3}$ $m^{-2}$ $s^{-1}$ depending of the location; neutron flux $2\times10^{-2}$ $m^{-2}$ $s^{-1}$; Radon in the air: 50-80 $Bq/m^3$

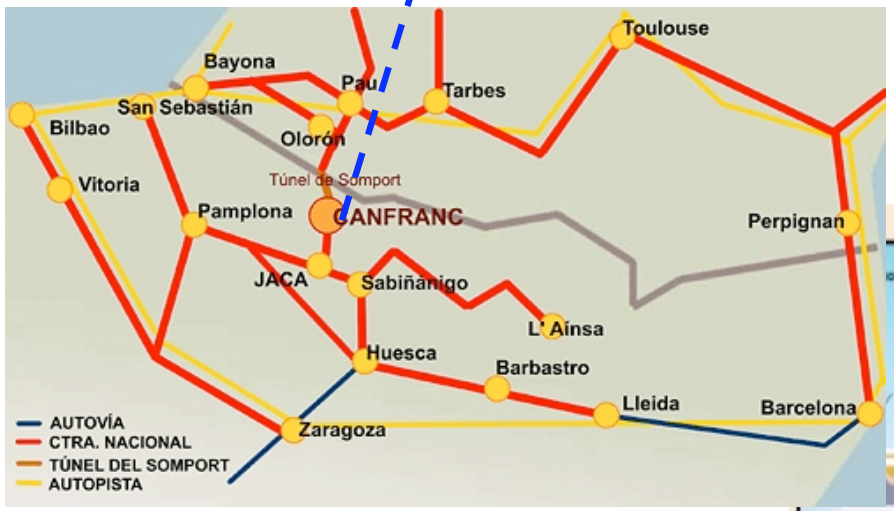
**Ventilation power (time to change one lab volume)**

11 000 $m^3$/h; time to change one volume of the laboratory is 40'.

**Installed electrical power and available heat exhaust per unit time**

Electrical power: 500 kW; exhaust capacity > 500 kW.


El Tobazo


Toulouse
Bayona
Pau
Tarbes
San Sebastián
Bilbao
Olorón
Vitoria
Túnel de Somport
Pamplona
CANFRANC
Perpignan
JACA
Sabiñanigo
L' Ainsa
Huesca
Barbastro
Lleida
Barcelona
Zaragoza
AUTOVÍA
CTRA. NACIONAL
TÚNEL DEL SOMPORT
AUTOPISTA


The New Laboratory
ESPAÑA
FRANCIA

## Some Past and Present history:

The first underground facility under the Pyrenees, close to a dismissed railway tunnel, was created in the 1980s by A. Morales and the Nuclear and High-Energy Physics Department of the Saragossa University. Taking profit of the excavation of a parallel road tunnel, the new laboratory was later built. The underground structures have been completed in 2005. However, more recently a few design and construction defects have emerged and the necessary reparation works are under way, to be completed by 2009.

## Some policy et al.:

LSC is managed by a Consortium between the Spanish Ministry for Education and Science, the Government of Aragon and the University of Saragossa. The surface building has been funded and is presently being designed. It will contain headquarters, administration, library, meeting room, offices, laboratories, storages and a mechanical workshop, safety structures and management, for a total of approximately 1500 $m^2$. A dozen of employees are being hired. In the process of approval of the proposals, an international Scientific Committee advises the Director,

**Director**: Alessandro Bettini; Bettini@pd.infn.it



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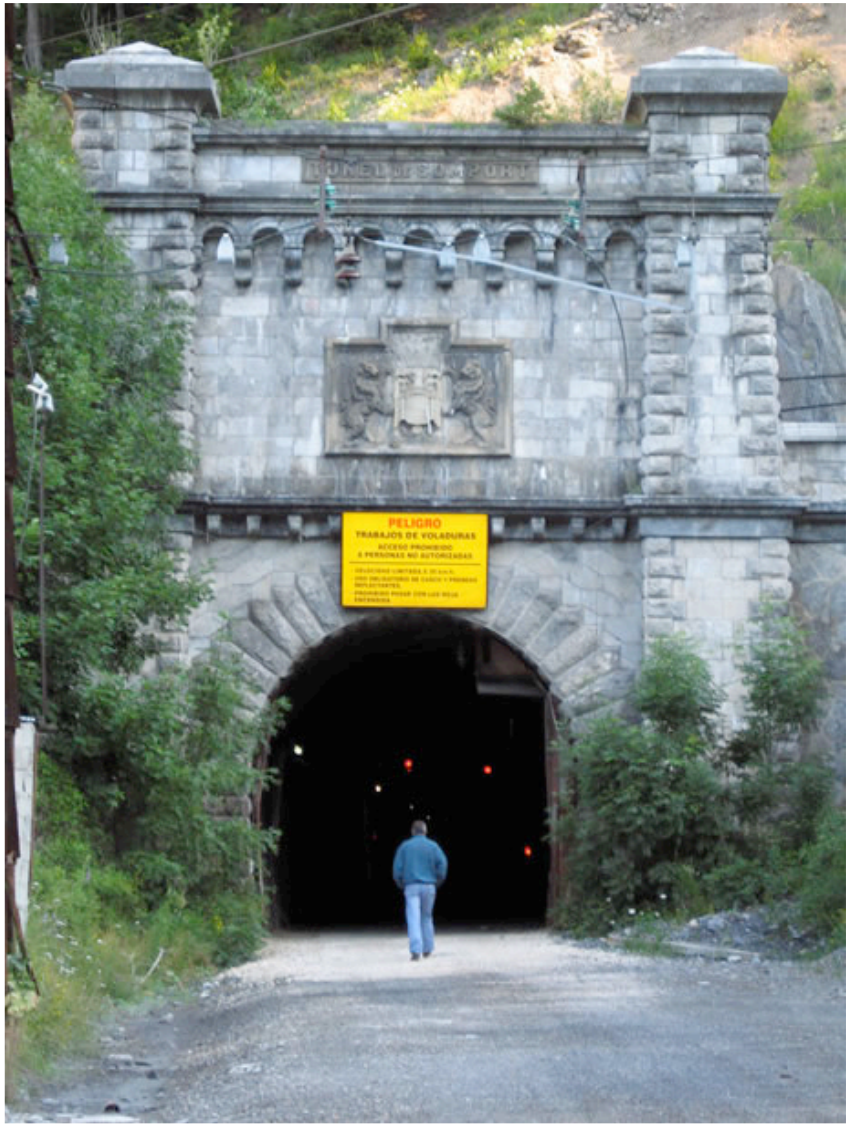
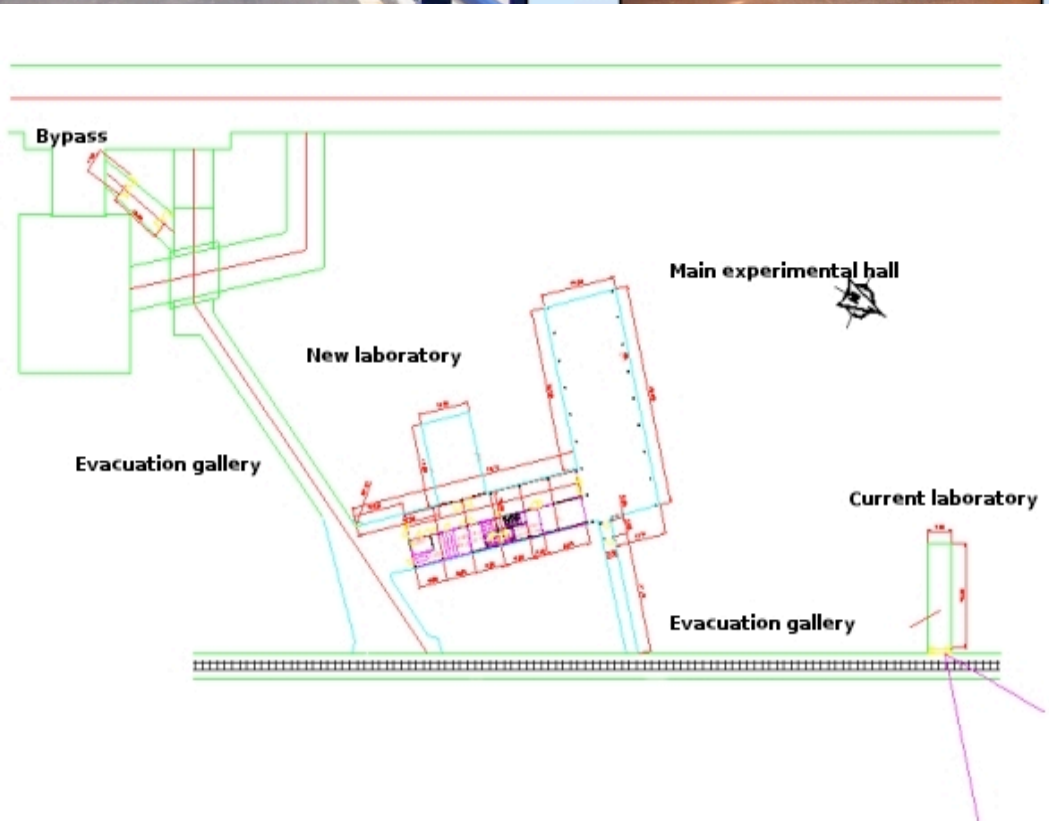
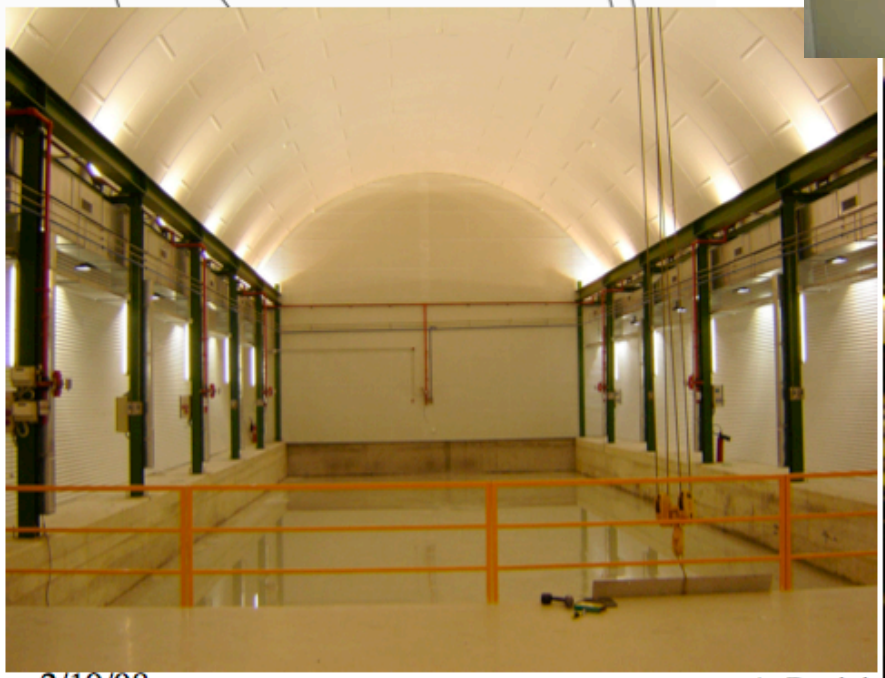

PELIGRO
TRABAJOS DE VOLADURAS
ACCESO PROHIBIDO
A PERSONAS NO AUTORIZADAS


Bypass
Main experimental hall
New laboratory
Evacuation gallery
Current laboratory
Evacuation gallery

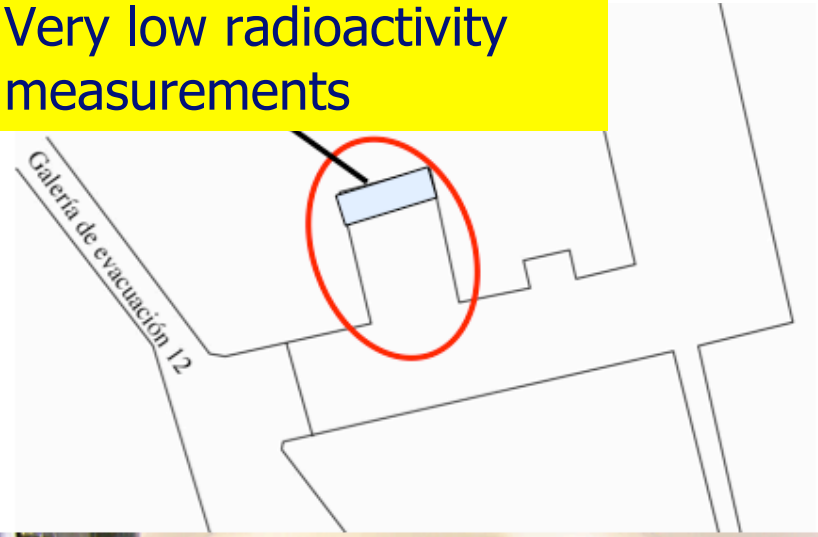
# Hall A

40x15x12 600 m$^2$

# Halls B and C

Hall C:
Very low radioactivity measurements




$15x10x8\ m^3$ $100+50\ m^2$

# *Gallery: clean room & services*


IN

# *Emergency exit*


Connection to the safety (railway) gallery and bay area

The following **experimental proposals** have been submitted, discussed in the Scientific Committee and are presently in different stages of approval:

- the ANAIS proposed search for the annual modulation of Cold Dark-Matter
- the ArDM Dark-Matter search with a liquid Ar TPC,
- the ROSEBUD test facility for bolometer R&D to support European cryogenic detectors
- the BiPo test series in view of the super-NEMO program for $0\nu2\beta$
- the NEXT proposal for a time-projection-chamber for $0\nu2\beta$
- the ULTIMA ultra cold prototype detector for the search the super-fluid phase of a 3He-4He mixture.

⇨ An enlargement of the laboratory to host next-generation nuclear astrophysics experiments and the potentiality of the underground environment for geological and biological sciences are under study

## About the LAGUNA characterization study:

The LSC does not have its own Geotechnic Department and therefore the Characterization-Feasibility Study will be subcontracted to one outside company. This will be chosen between at least three candidates after the mandatory tendering procedure within the Spanish Law. We have identified and contacted three geotechnical companies in Spain that apparently are able to do the job and have explicitly shown their interest on it. They are a) "STMR S.L." which has participated in some crucial phases of the construction of the current LSC, b) "GEOCONSULT-España, Ingenieros Consultores S.A." which accredits the design and construction-supervision of caverns with volumes of the same order of magnitude as required in LAGUNA (mainly for mining purposes), and c) "GEOCONTROL S.A." which accredits the design of large caverns for several hydraulic power plants both in Portugal and Spain.

we have not given up to convince you that LSC should get the same amount of money as some of our industrial partners: they will do exactly the same job for their corresponding laboratory that the one by the company selected from the three above for the LSC

# CAVERNA SUBTERRANEA «A FRAGUIÑA»

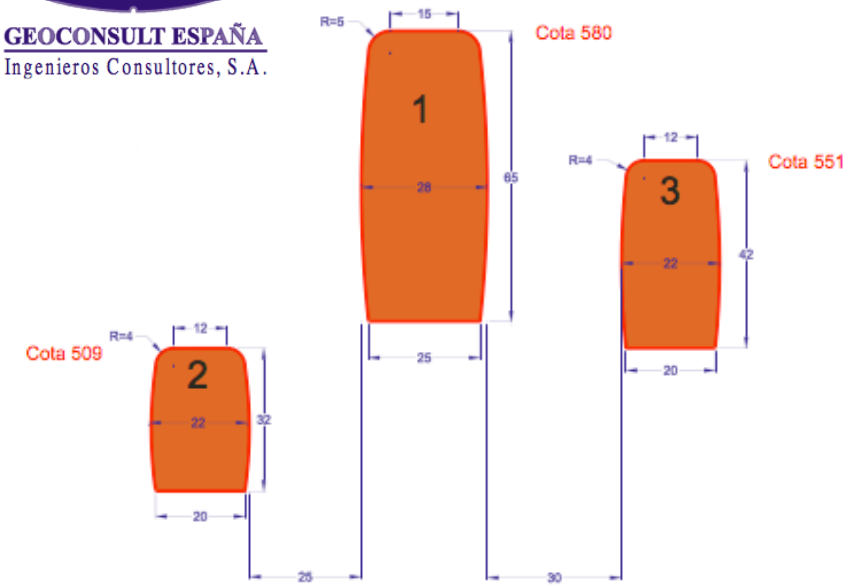
GEOCONSULT ESPAÑA
Ingenieros Consultores, S.A.

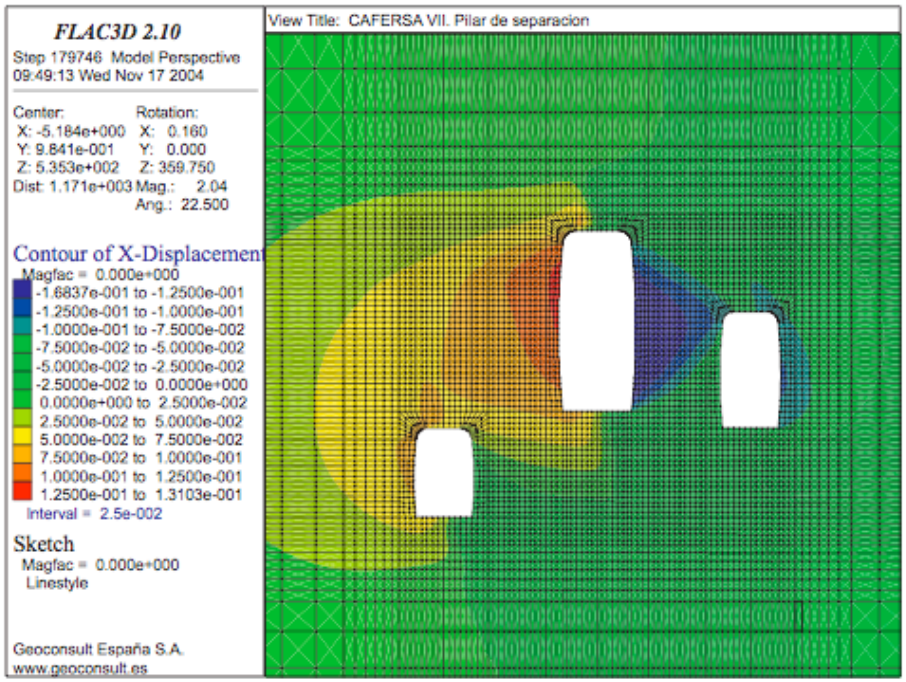
## Dimensiones:

Caverna 1: 28 m Ancho, 65 m Alto y 120 m Largo

Caverna 2: 22 m Ancho, 32 m Alto

Caverna 3: 22 m Ancho, 42 m Alto



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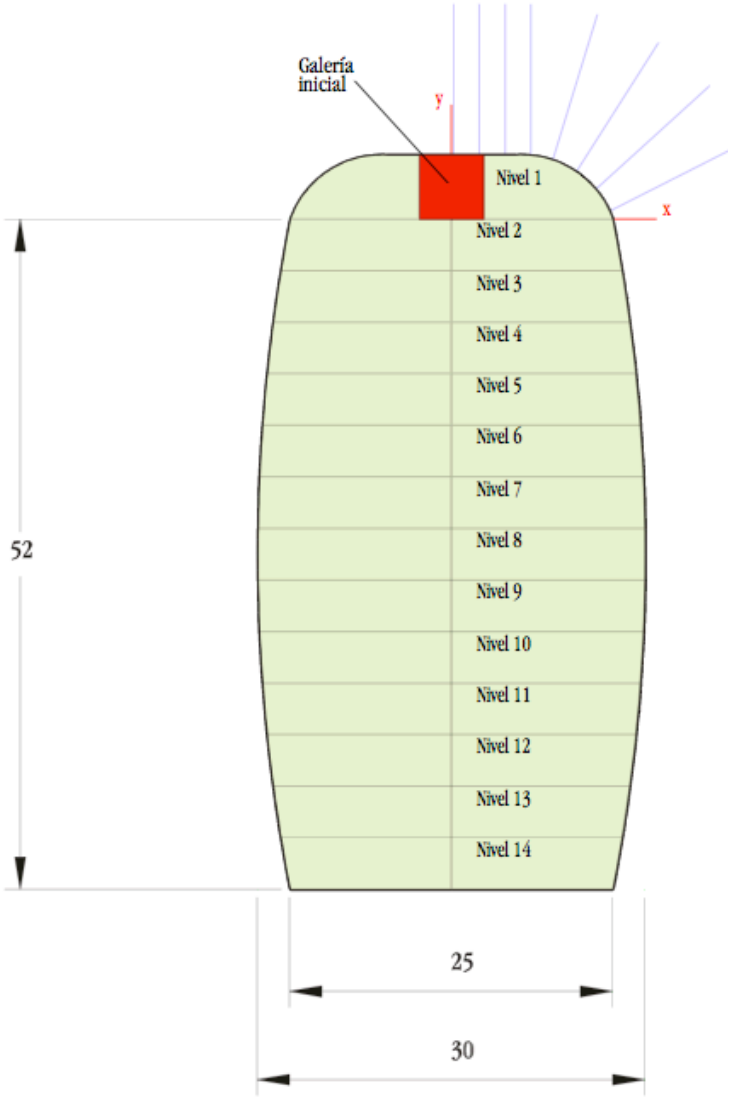


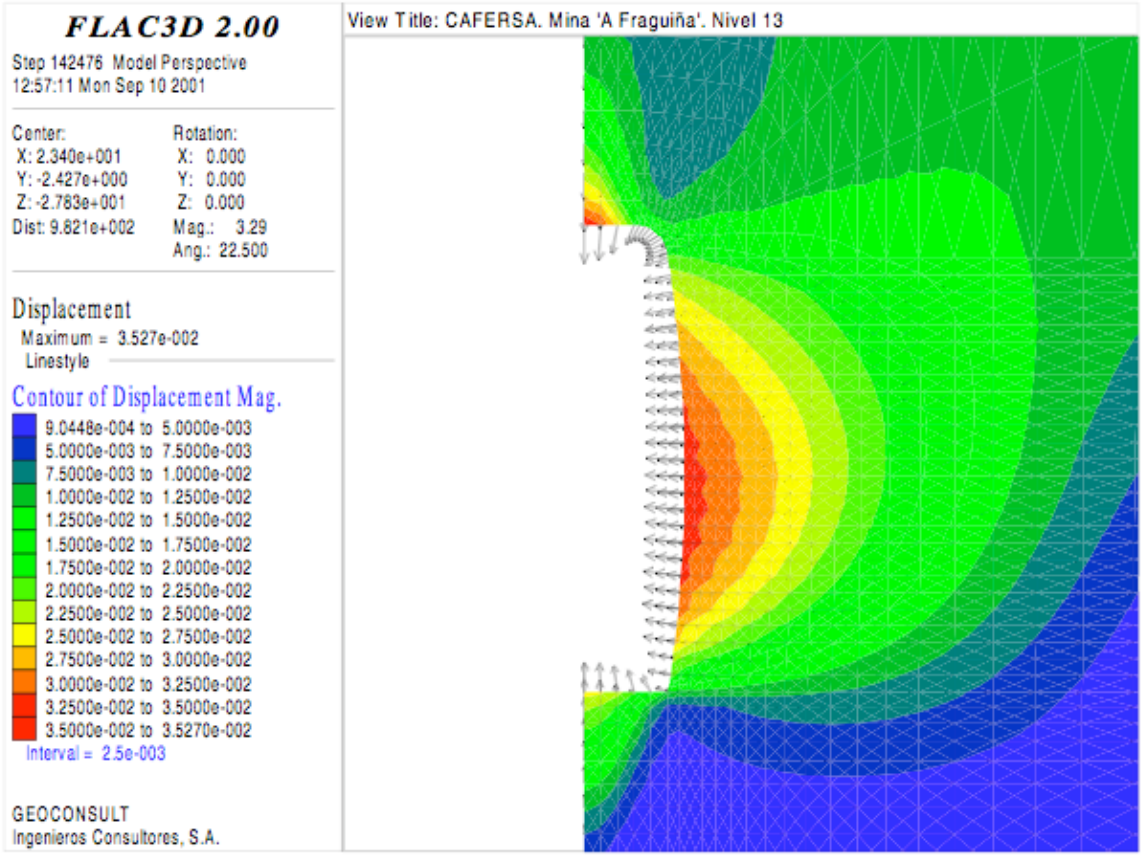

# CAVERNA SUBTERRANEA «A FRAGUIÑA»

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## Last but not least ...

... in the case of  similar scientific, economical, environmental characteristics ...

one may further consider that the technicians, engineers, scientists, etc. may relax after duty in the two  excellent sky resorts in the nearby (< 3 Km) **Candanchú** and **Astún**