

Consortium  
**GARR**

 **RETINA**  
Red Teleinformática Académica

 **INFN**

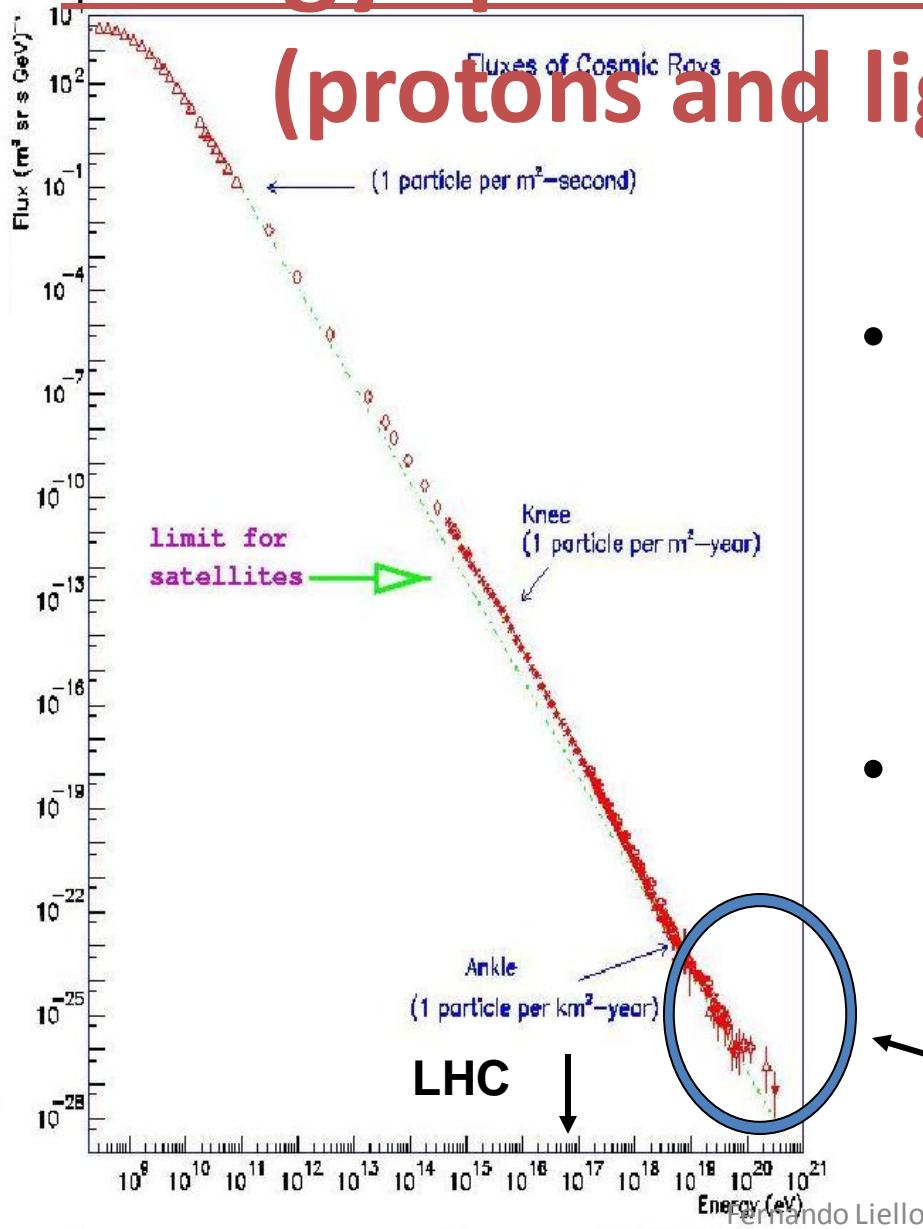
 UNIVERSITY OF LEEDS

 CENTRE NATIONAL  
DE LA RECHERCHE  
SCIENTIFIQUE

 ForschungsZentrum  
Karlsruhe

 Information Society  
Sixth Framework Programme

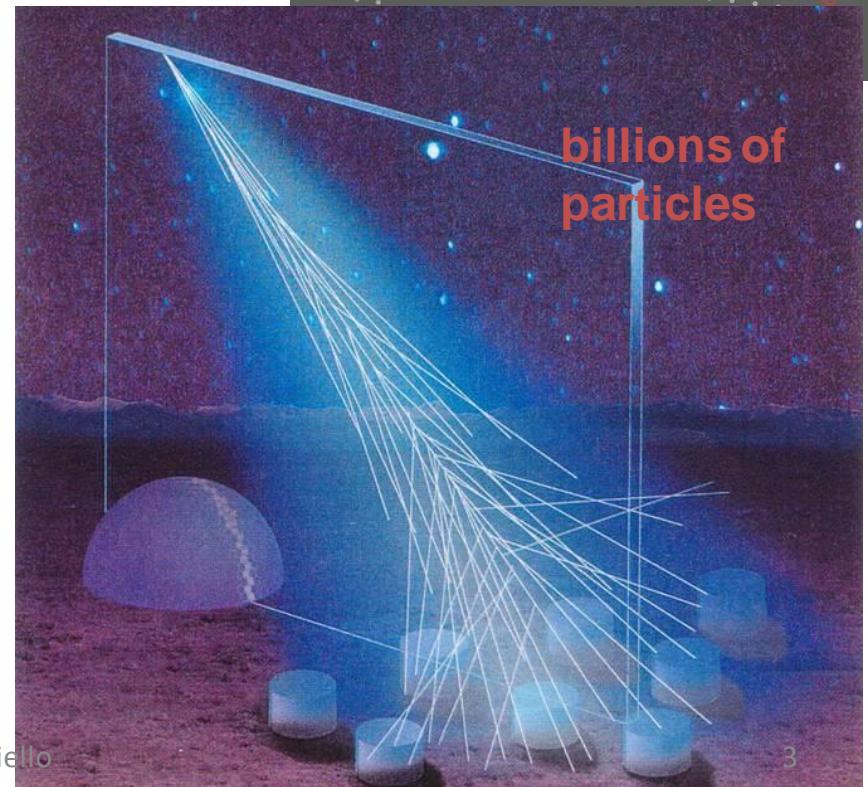
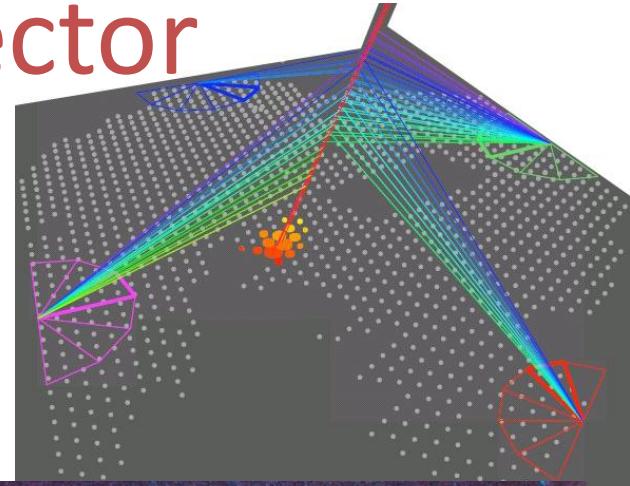
# Energy spectrum of cosmic rays (protons and light nuclei)



- **Galactic origin**
  - explosion of supernovas
  - Galactic center (massive black hole)
- **Extragalactic origin**
  - AGN (Active Galactic Nuclei)

# Auger hybrid detector

- Fluorescence Detector (FD)
  - Fluorescence light in the air (N<sub>2</sub>)
  - Longitudinal development of the shower
  - Calibration of the energy scale
  - Direction of the shower
- BUT:
  - 12% duty cycle !
  - only in moonless nights !
- Surface Detector (SD)
  - Front of shower at ground
  - Direction of the shower

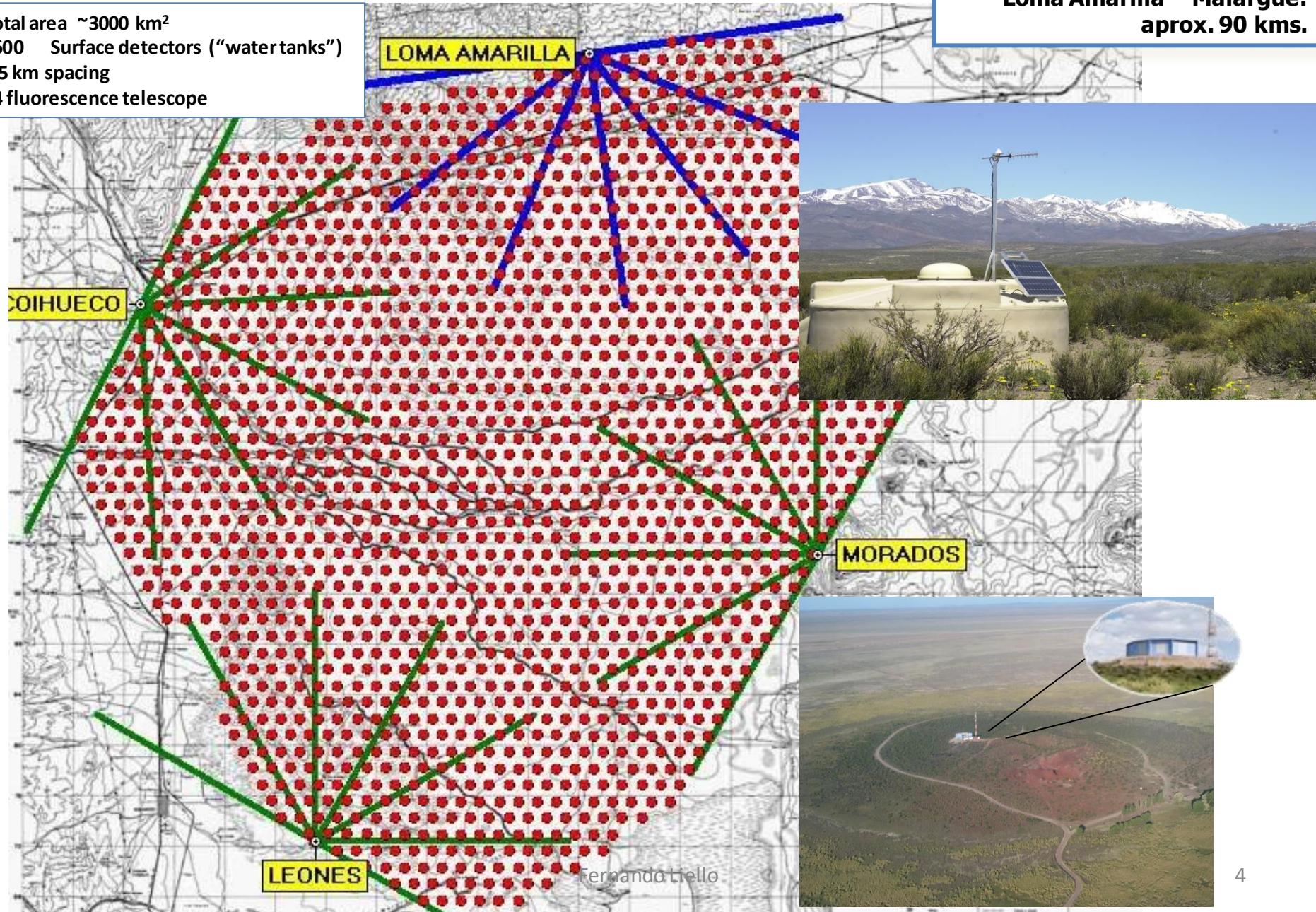


# Pierre Auger Observatory

San Rafael – Loma Amarilla:  
aprox. 100 kms.

Loma Amarilla – Malargüe:  
aprox. 90 kms.

Total area ~3000 km<sup>2</sup>  
1600 Surface detectors ("watertanks")  
1.5 km spacing  
24 fluorescence telescope



# Auger Southern Observatory (Argentina)

Very flat region

“Pampa Amarilla” Malargüe (Argentina)

35° S latitude 69° W longitude

≈ 1400 m height ≈ 875 g/cm<sup>2</sup>

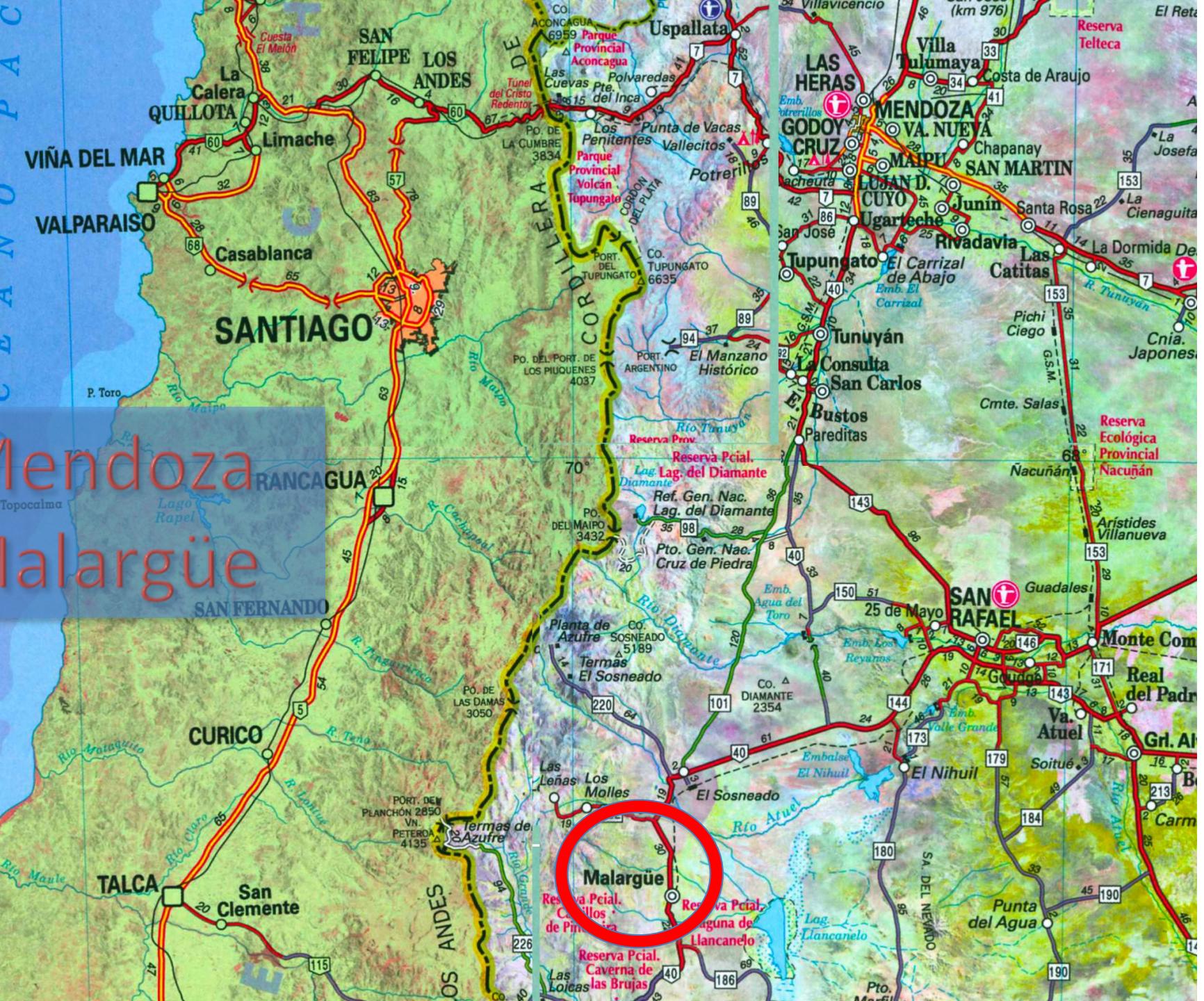
- Very low population density (< 0.1/km<sup>2</sup>)
- Very good atmospheric conditions (clouds, aerosol...)

Plan for a future  
Northern Observatory in USA

Ferr



# Mendoza Malargüe



# Auger Science Needs

- Remote monitoring and control
  - 24/24, 365/365 data taking
  - Expected lifetime 10 to 15 years
- Data Distribution and Access
  - Atmospheric data
  - Calibrations
  - Physics
  - Montecarlo

# Atmosphere Monitoring



Central Laser Facility

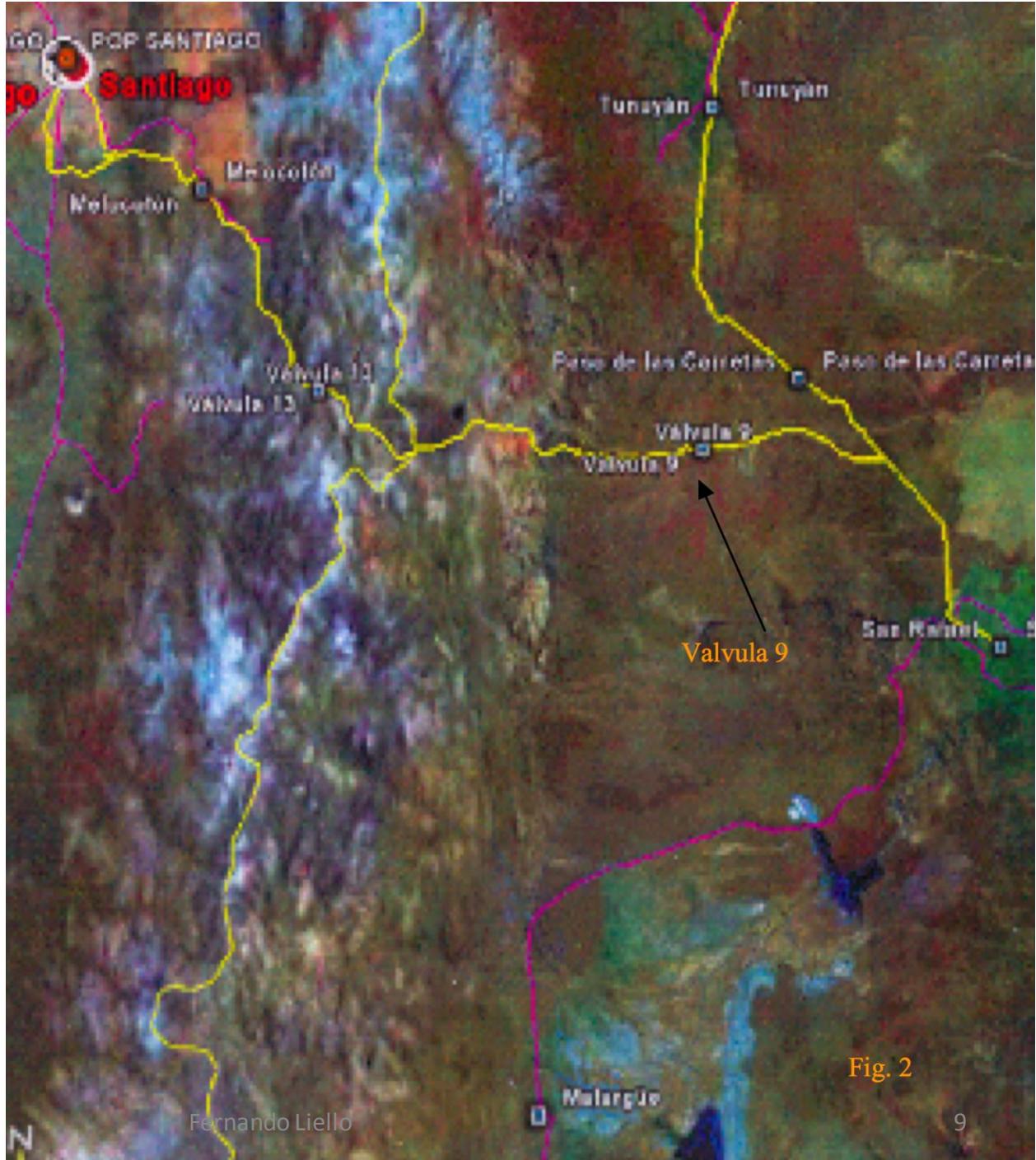


Lidar at each fluorescence eye

# Area Mendoza/ Malargüe

Google Earth view of the Mendoza-Malargüe Area.

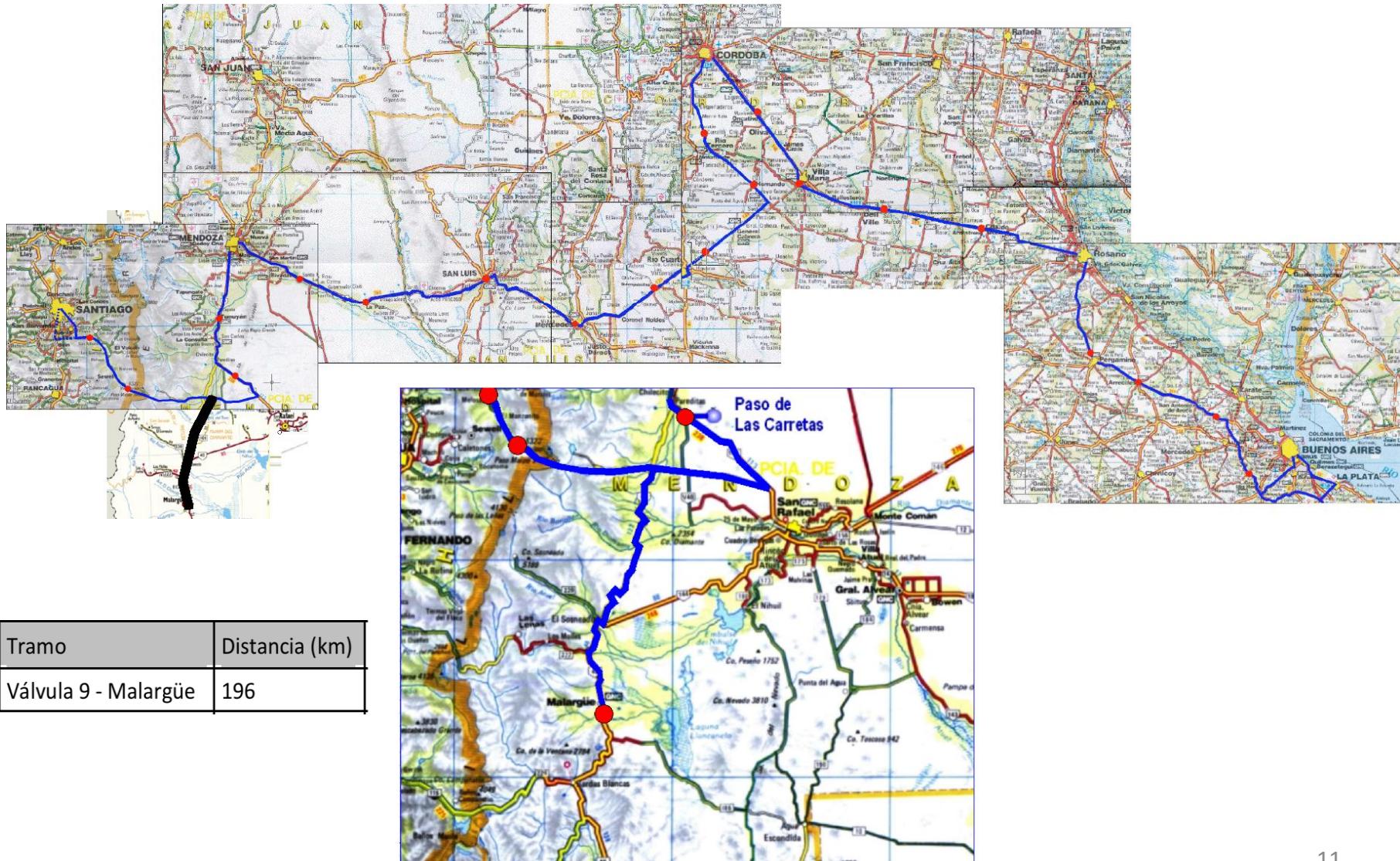
In yellow the path of the main fibre infrastructures in the area



# AugerAccess Physical Infrastructure

- An innovative approach:
  - Inclusion of a Commercial Provider
- Multilateral agreement:
  - Share a Buenos Aires/Santiago fibre
  - Lay-down a new fibre cable to Malargüe
  - Equipment jointly procured by AugerAccess + CLARA + InnovaRed + Provider
  - Capacity shared between AugerAccess, CLARA, InnovaRed + Provider
- Co-financing (from L.A. sources) negotiated by “Ministerio de Ciencia, Tecnología e Innovación Productiva” of Argentina
- Channels ( $\lambda$ s) to Buenos Aires **AND** Santiago del Chile

# Detailed Path



# Service Agreement

- 15 years IRU on the infrastructure
  - Buenos Aires / Santiago existing fibre
  - 200 km of new fibre
- Equipment maintenance
  - guaranteed by InnovaRed/CLARA
  - Handled by SILICA
- Fibre maintenance by SILICA

# A Synergic View



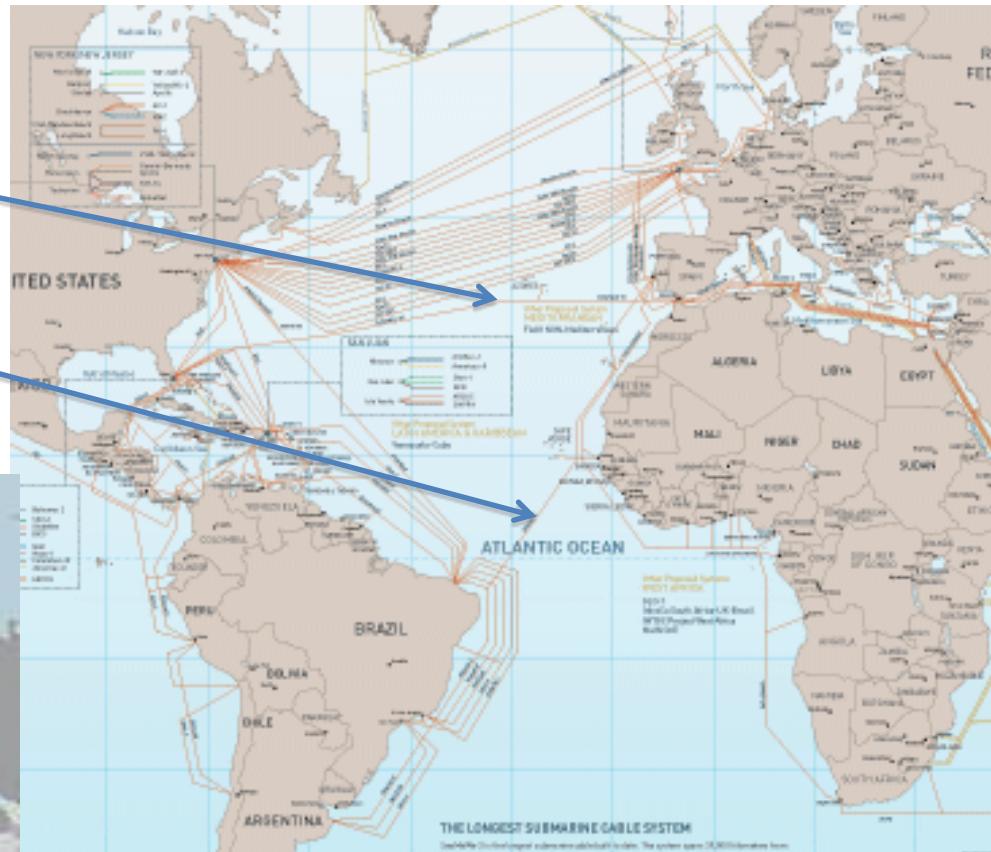
- ★ EVALSO
- ★ AugerAccess

# Atlantic Submarine Cable System



Columbus III

Atlantis 2



Today