



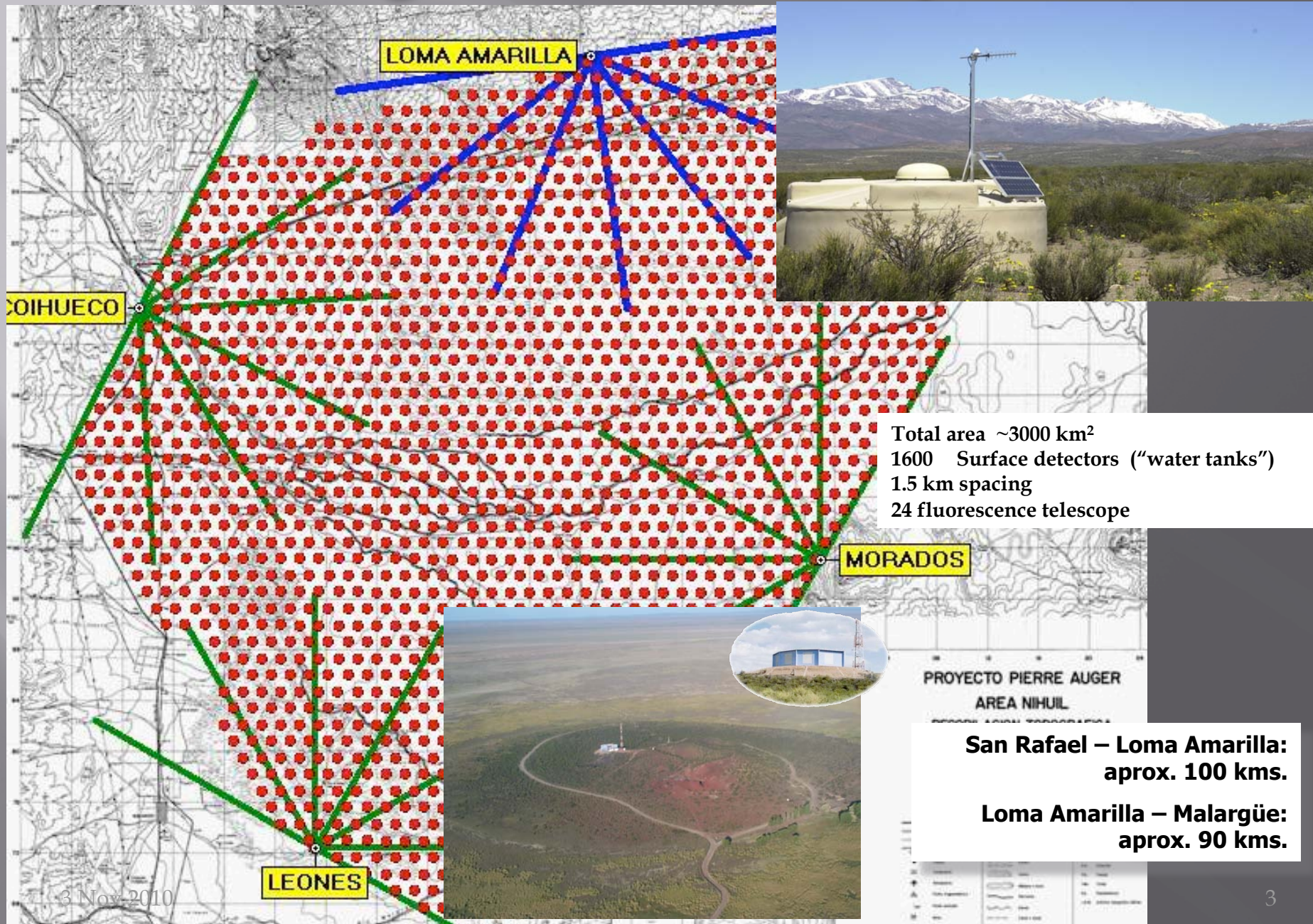
ICT AND E-INFRASTRUCTURES FOR R&D

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World-class research facilities

- ▣ Are extremely expensive
 - As a consequence cannot be duplicated
- ▣ Attract scientists from all over the world
- ▣ Often HAVE to be in remote locations
- ▣ Travelling difficulties and Social impact are usually underestimated
- ▣ Data availability in quasi-real-time is vital
- ▣ ICT and e-Infrastructures can contribute to partially overcome these difficulties

Pierre Auger Observatory



Auger Southern Observatory

“Pampa Amarilla” Malargüe
(Argentina)

35°S latitude 69°W longitude

≈ 1400 m height ≈ 875 g/cm²

- Very low population density (< 0.1/km²)
- Very good atmospheric conditions (clouds, aerosol...)

Plan for a future
Northern Observatory in USA



Malargüe (Mendoza)



Two Observatories in Chile

Cerro Armazones (OCA)



Cerro Paranal (ESO)



ESO
European Organisation
for Astronomical
Research in the
Southern Hemisphere

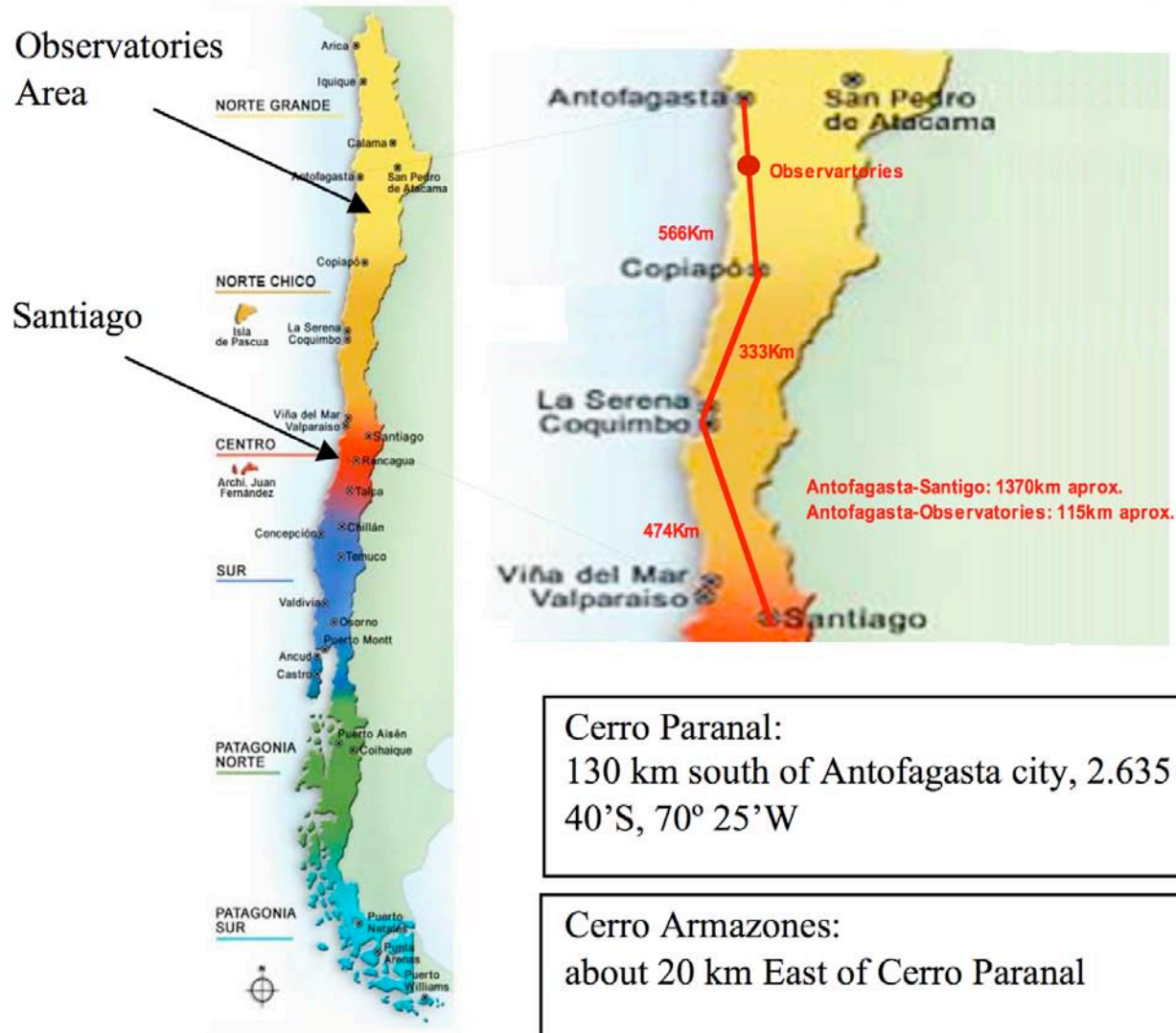
The ESO Sites



Chajnantor

Paranal
La Silla
Santiago

Observatories' Area



The Options

- ▣ Microwave link to the connect with a “traditional” service provider
 - Limited capacity
 - Limited to data transfer only
 - Very limited Growth capability
- ▣ State of the Art
 - Create or Extend a fibre infrastructure to connect the Observatories
 - Develop services to allow a better interaction between “Local” and “Remote” Scientists

Solution in Argentina

- ▣ AugerAccess
 - To acquire and extend a physical infrastructure to connect Malargüe to Buenos Aires
 - To develop services to
 - ▣ Remote monitor the observatory
 - ▣ Manage the data-taking
 - ▣ Distribute the collected data in real-time

Solution in Chile

▣ EVALSO

- To build a physical infrastructure to connect Paranal and OCA observatories to a Antofagasta
- To acquire long-term access to state-of-the art communication channels between Antofagasta and Santiago and a distribution infrastructure in Santiago
- To develop services to
 - ▣ Distribute the collected data in quasi-real-time
 - ▣ Allow remote effective interaction between local crew and remote scientists
 - ▣ Investigate the feasibility of new observing modes

Coordinated Approach

- ▣ Integrate the above mentioned infrastructures with the infrastructures of InnovaRed and REUNA
- ▣ Cooperate with ALICE & ALICE2
 - To create and maintain a continental-wide data communication infrastructure building on the experience of the European GEANT
- ▣ Have common physical fibre infrastructures wherever possible

Network Infrastructure



- ★ EVALSO
- ★ AugerAccess
- Alice2

Submarine Cables 2008



The Weaknesses of the System

- ▣ There are obvious bottlenecks in the worldwide research network
- ▣ Satellites are NOT a solution
- ▣ Connect through USA is NOT a solution
 - It is vital to upgrade the direct links
- ▣ A wide range of initiatives can only be successful if the services provided by the integrated infrastructures of the NRENs and Regional backbones are available

Final Considerations

- ▣ Science is a two-way road
 - Connectivity is ALWAYS beneficial to both sides
- ▣ Improve NRENs infrastructures and guarantee their sustainability
- ▣ Improve the Intercontinental Connectivity
 - governmental and funding agencies support is essential
 - ... but synergy with commercial enterprises is what will make the difference

Specifically in Latin America

- ▣ Produce a survey of the research facilities that would benefit from better communication infrastructures
- ▣ Extend the infrastructure programs to properly connect these facilities at the national and international level
- ▣ Make possible a quantum leap in intercontinental connectivity infrastructures