

LATTES @ POSSIBLE SITES

RONALD CINTRA SHELLARD
CBPF — RIO DE JANEIRO

HISTORY CHALCATAYA

1947 Discovery of the pion, emulsions chambers exposed in the Pic di Midi, Pirinées

1947 Cesare Lattes take emulsion chambers to Chacaltaya, Bolivia



First international Laboratory

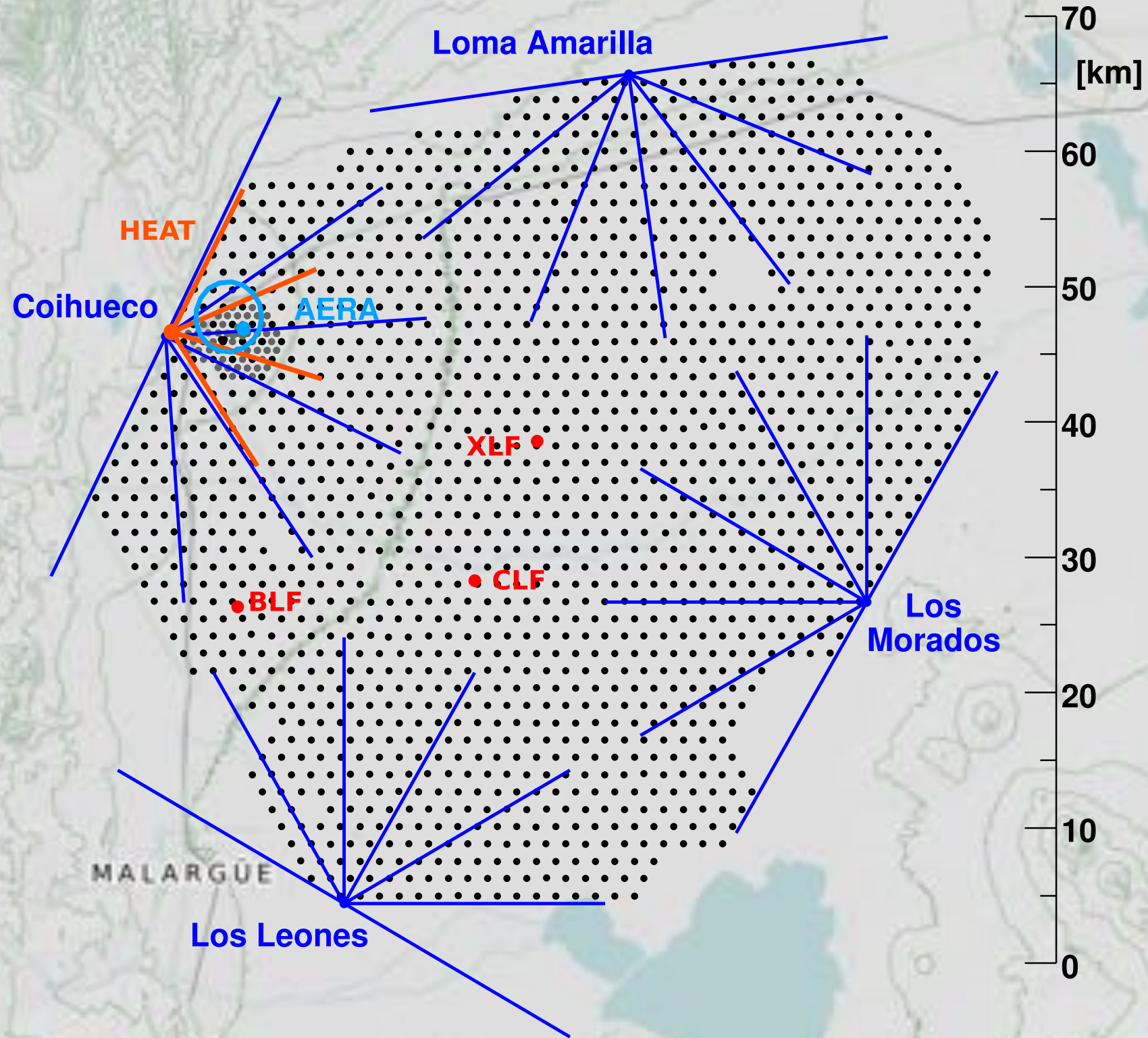
Later, in the 60's Brazil-Japan Collaboration



"Death road is over rated :) Chacaltaya is the real deal with LUNA TOURS"

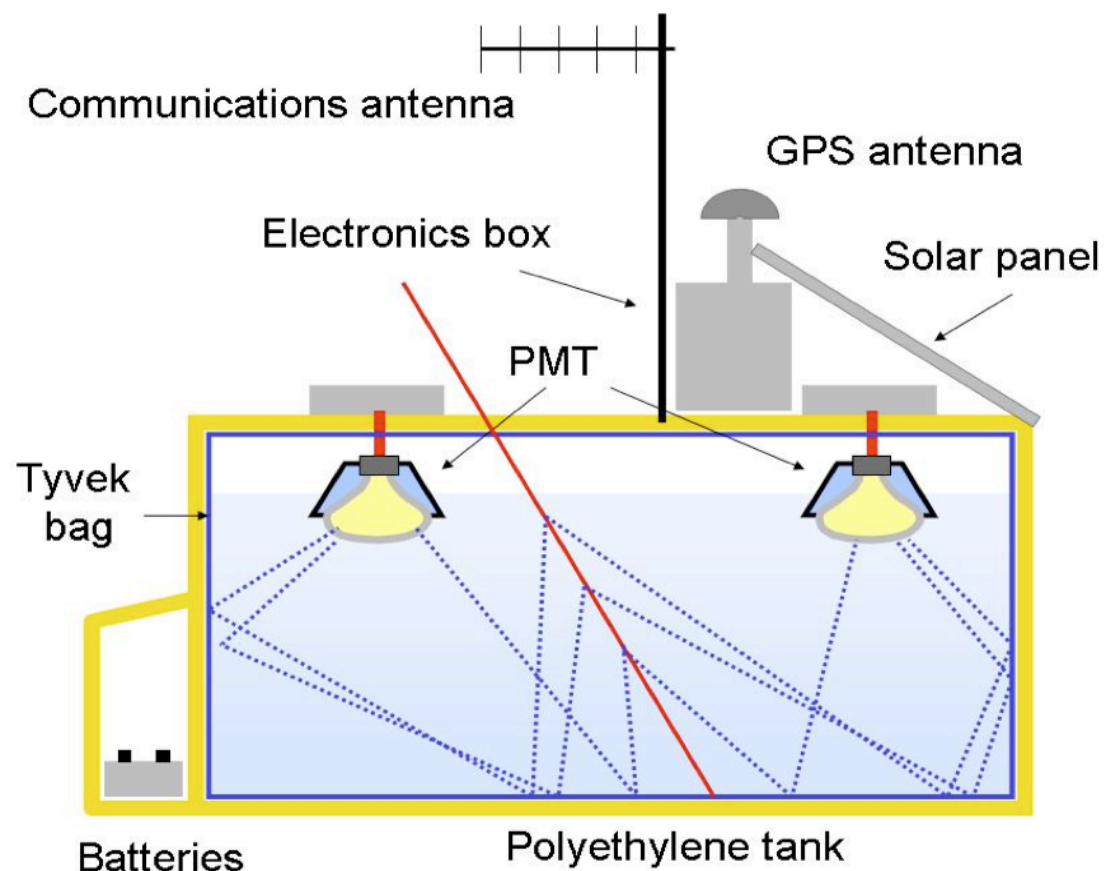
THE PIERRE AUGER OBSERVATORY



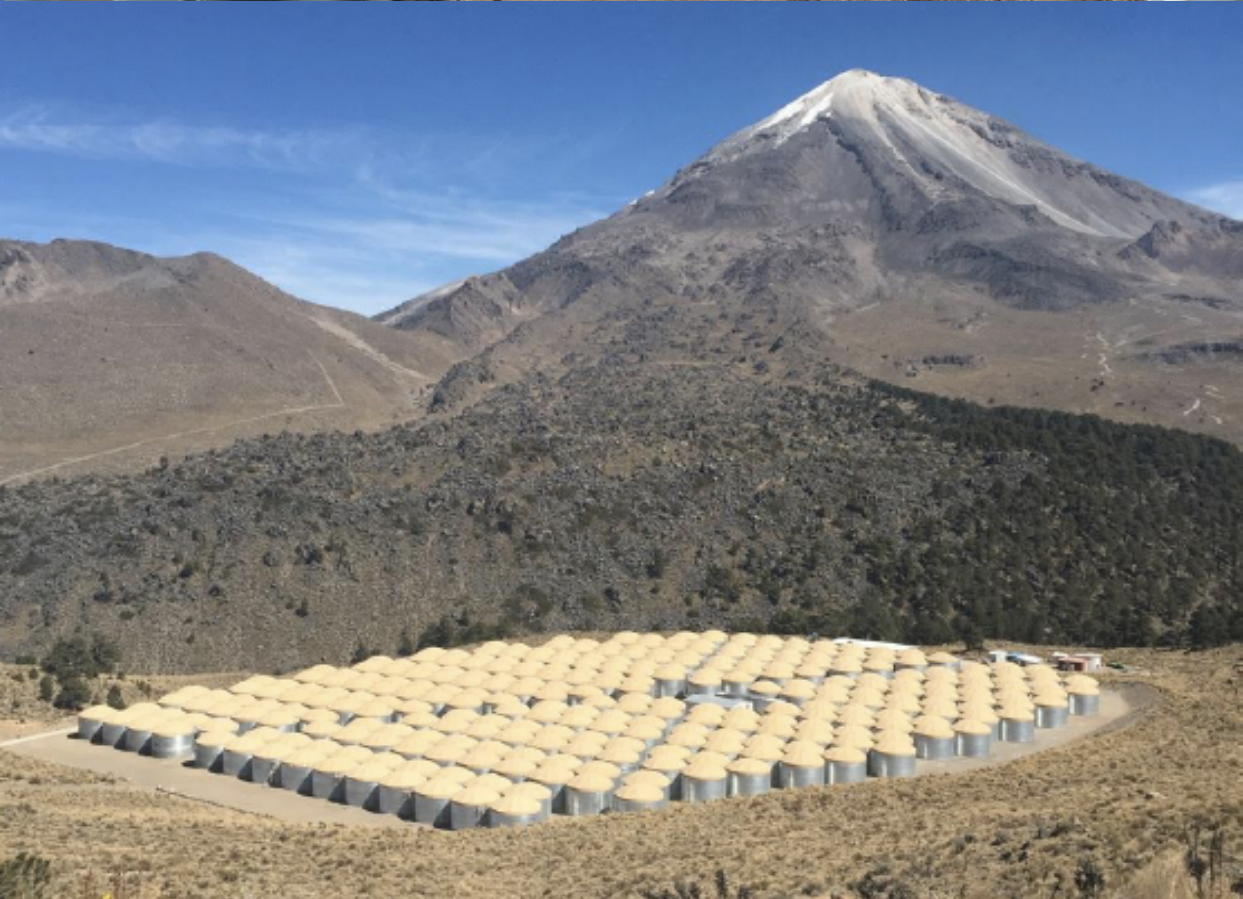




First Auger Tank (2003)



HAWC

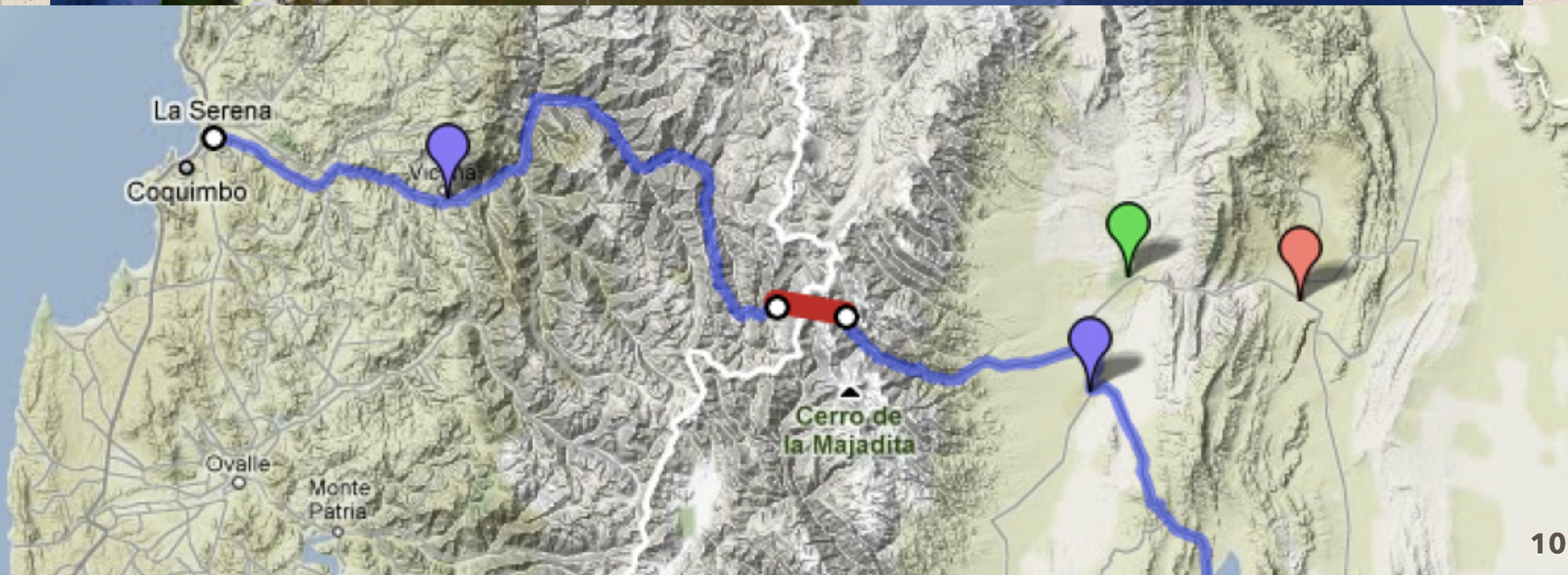


FUTURE EXPERIMENTS

ANDES

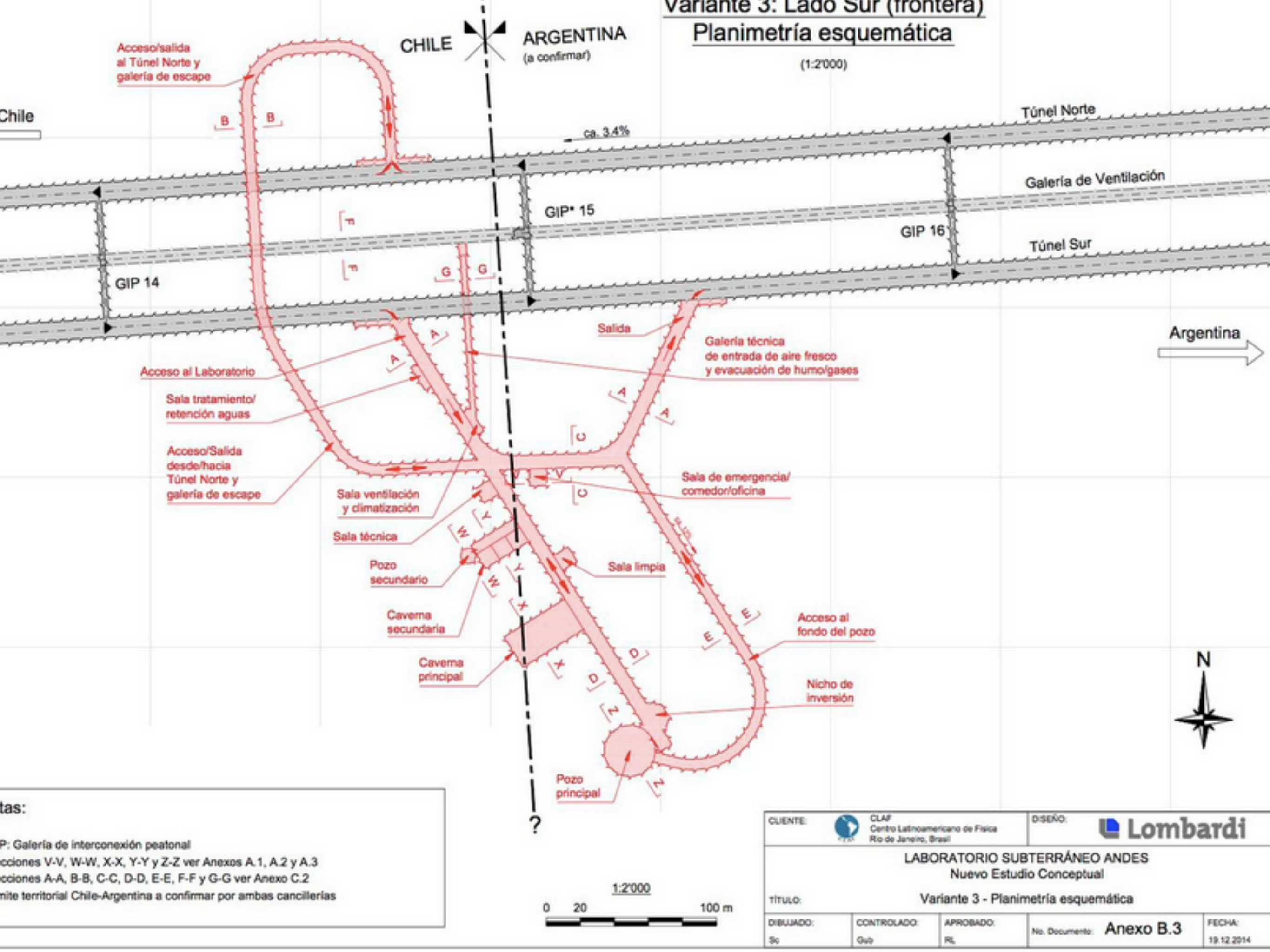
AGUA NEGRA DEEP EXPERIMENTAL SITE

ANDES AGUA NEGRA DEEP EXPERIMENTAL SITE



Planimetría esquemática

(1:2'000)



tas:

P: Galería de interconexión peatonal

cciones V-V, W-W, X-X, Y-Y y Z-Z ver Anexos A.1, A.2 y A.3

cciones A-A, B-B, C-C, D-D, E-E, F-F y G-G ver Anexo C.2

nte territorial Chile-Argentina a confirmar por ambas cancillerías

CLIENTE:



CLAF
Centro Latinoamericano de Física
Rio de Janeiro, Brasil

DISEÑO:



Lombardi

LABORATORIO SUBTERRÁNEO ANDES
Nuevo Estudio Conceptual

TÍTULO:

Variante 3 - Planimetría esquemática

DIBUJADO:

Sc

CONTROLADO:

Gub

APROBADO:

RL

No. Documento:

Anexo B.3

FECHA:

19.12.2014

ANDES INITIAL SCIENTIFIC PROGRAM

- ▶ Neutrino
 - ▶ host double beta decay experiments
 - ▶ large Latinamerican neutrino detector
 - ▶ KamLAND/Borexino style
 - ▶ focus on low energy
 - ▶ solar/SN/geo neutrinos
- ▶ Dark Matter
 - ▶ modulation measurement
 - ▶ new technologies
- ▶ Geophysics
 - ▶ link Argentine and Chilean seismograph networks
- ▶ Biology
- ▶ Low Background measurements
- ▶ Accelerator
 - ▶ Nuclear Astrophysics
 - ▶ DAR neutrino beam?

FUTURE EXPERIMENTS

GAMMA RAYS

LATTES

LARGE ARRAY TELESCOPES FOR TRACKING
ENERGETIC SOURCES

Sítios para LATTES

Observatório Chacaltaya, Bolivia, perto de La Paz

Latitude **16.3 S**, altitude **5200 m a.s.l.**

Sítio ALMA – deserto do Atacama, platô extenso,

Chile perto da fronteira com a Bolívia

Latitude **23.7 S**, altitude **5060 m a.s.l.**

Pressão atmosférica ~ 50 % do nível do mar !

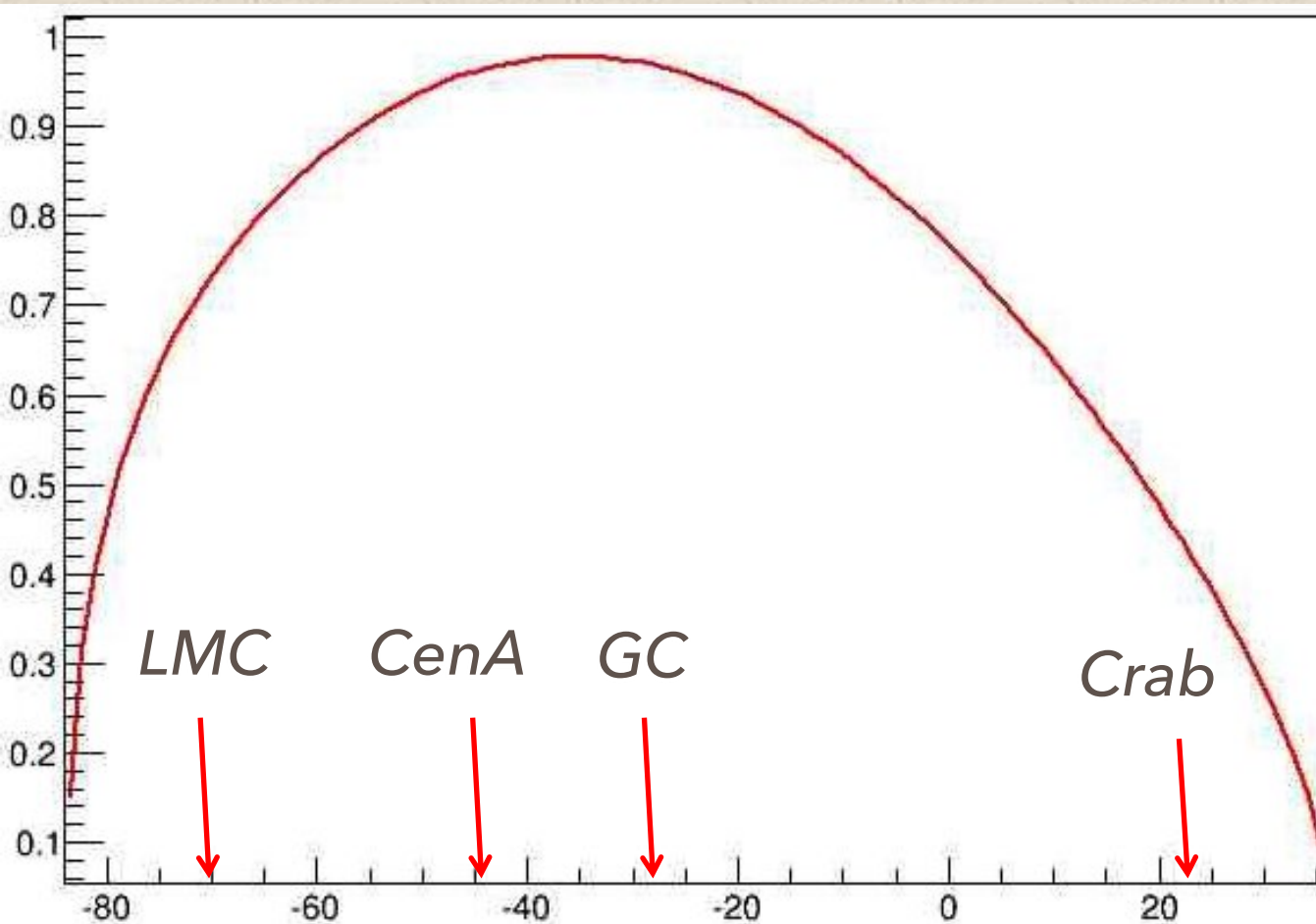


LATTES MAY 2017

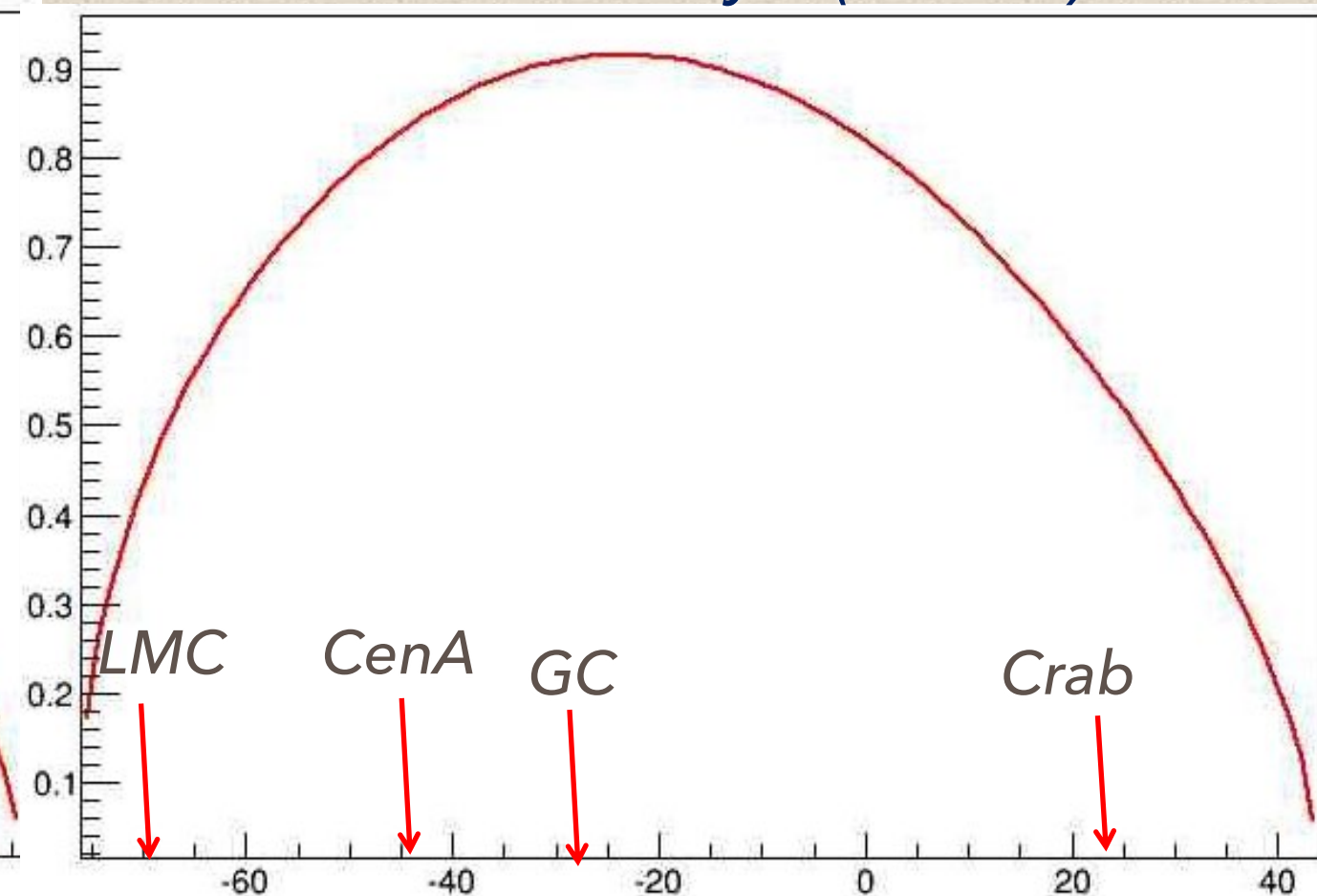
Exposição

- Declinação (ângulo zenital) $< 60^\circ$
- Nebula do Caranguejo é uma "vela padrão" para a astrofísica de fótons de altas energias.

Alma (-23.7°)



Chacaltaya (-16.3°)



Declinação δ

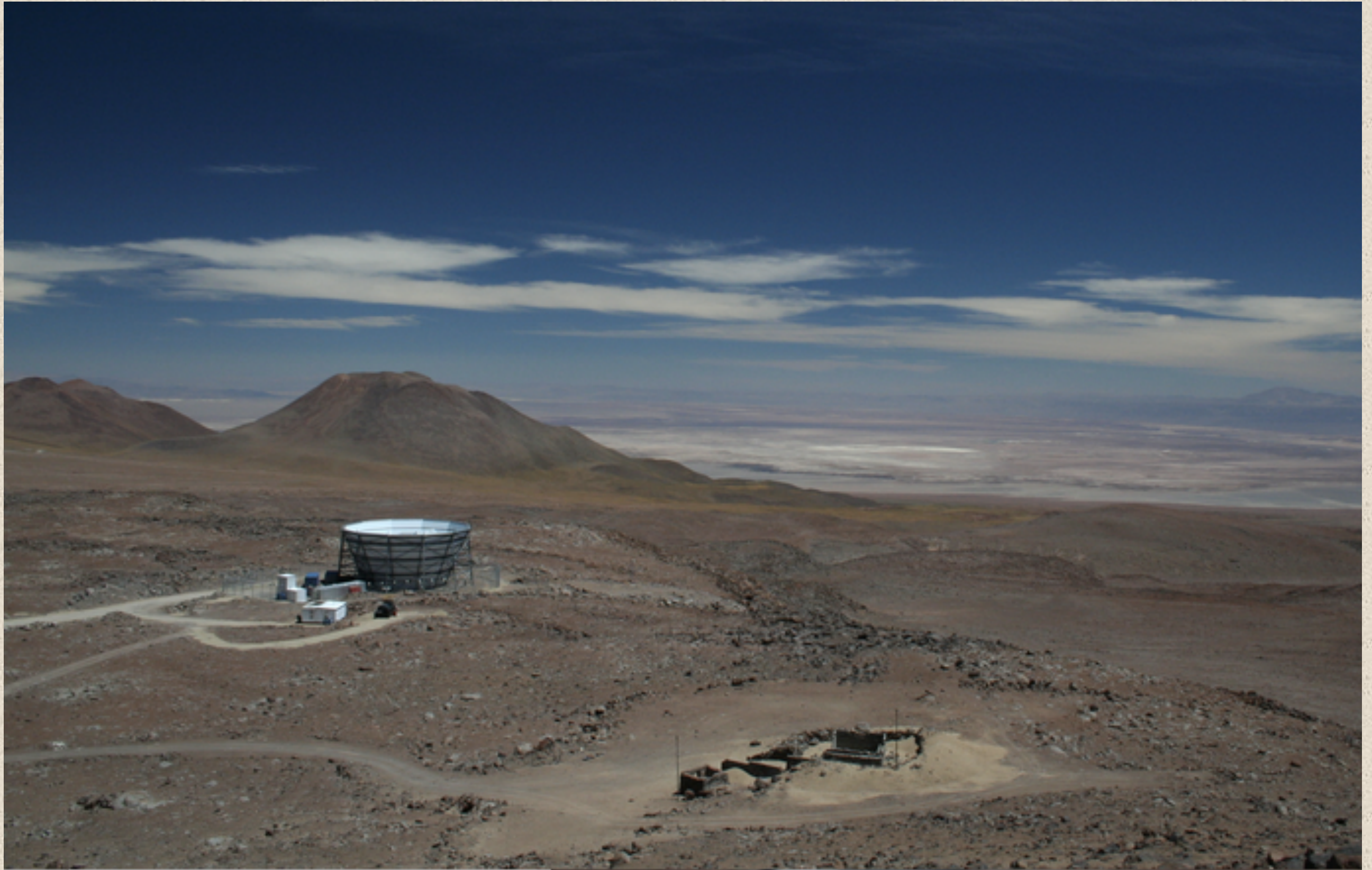
Sítio para LATTES



Sítio para LATTES



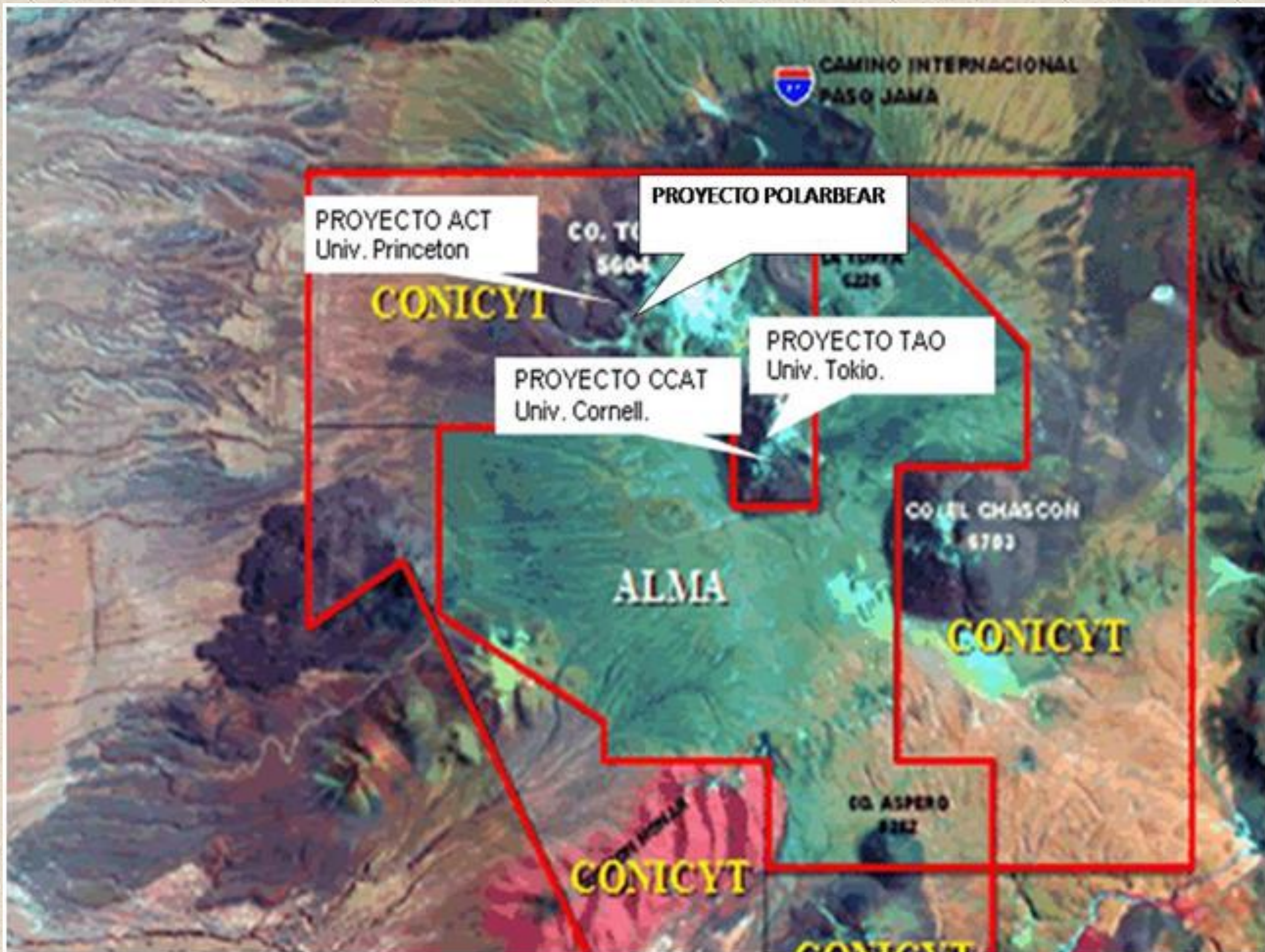
Sítio para LATTES



LATTES MAY 2017

Sítio para LATTES

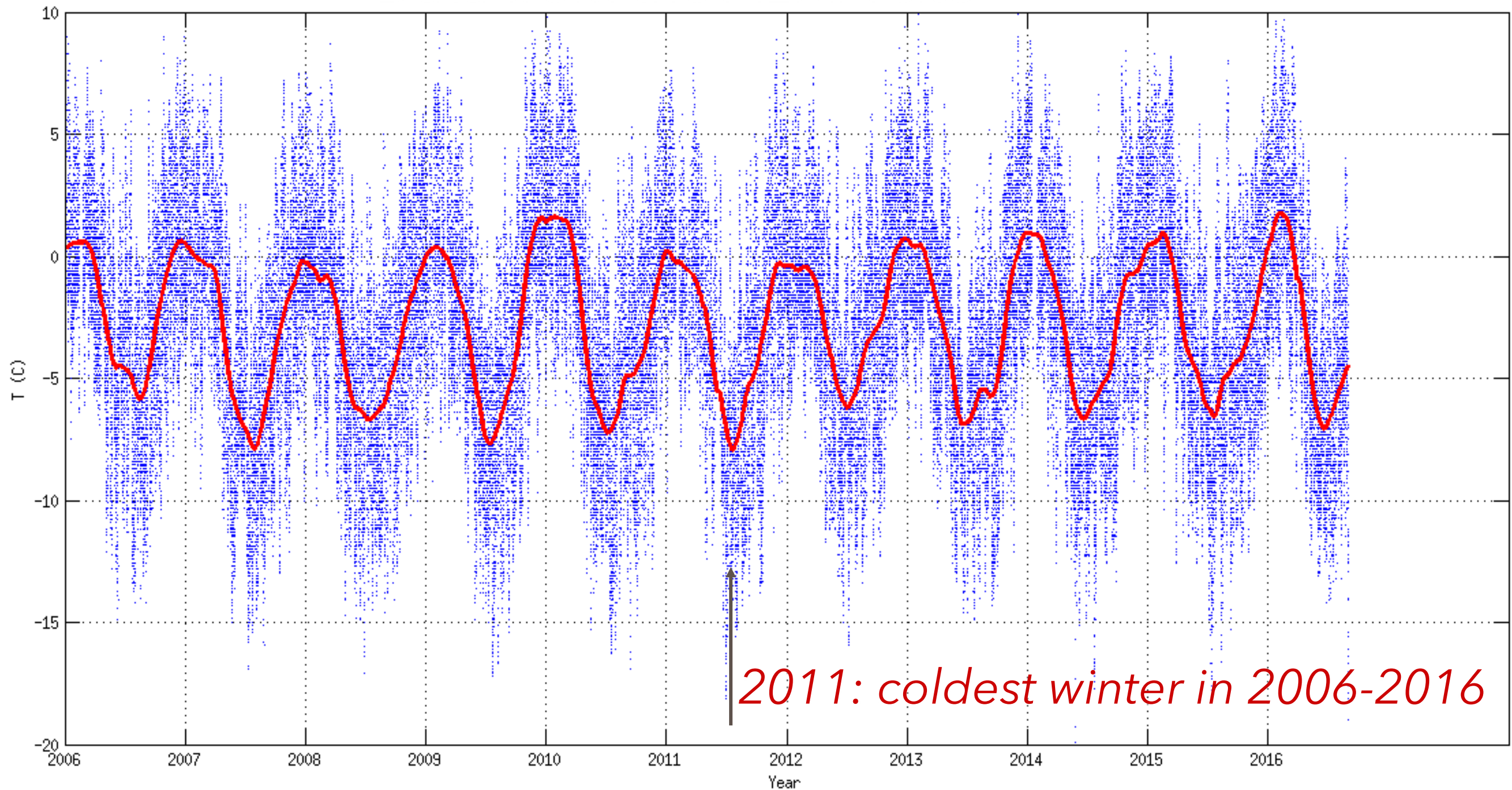




LATTES MAY 2017

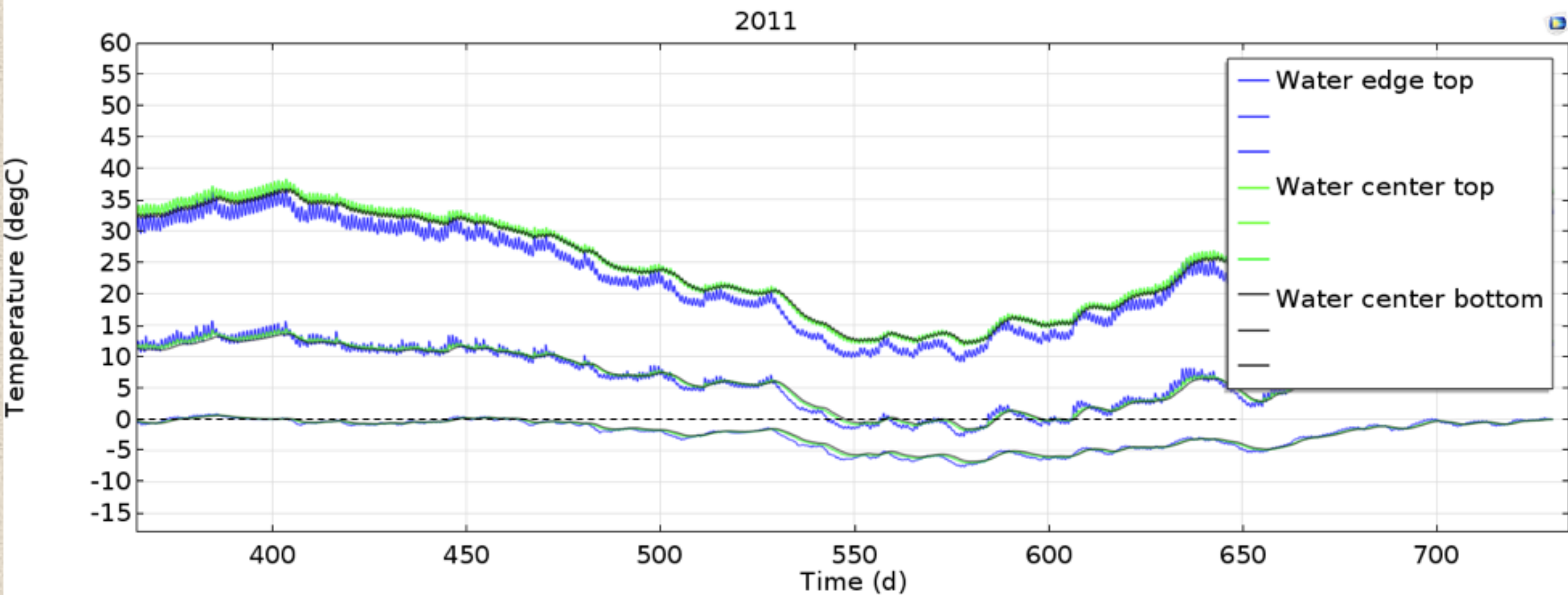
MODELING - ATMOSPHERE

Data from the ALMA site



MODELING - ATMOSPHERE

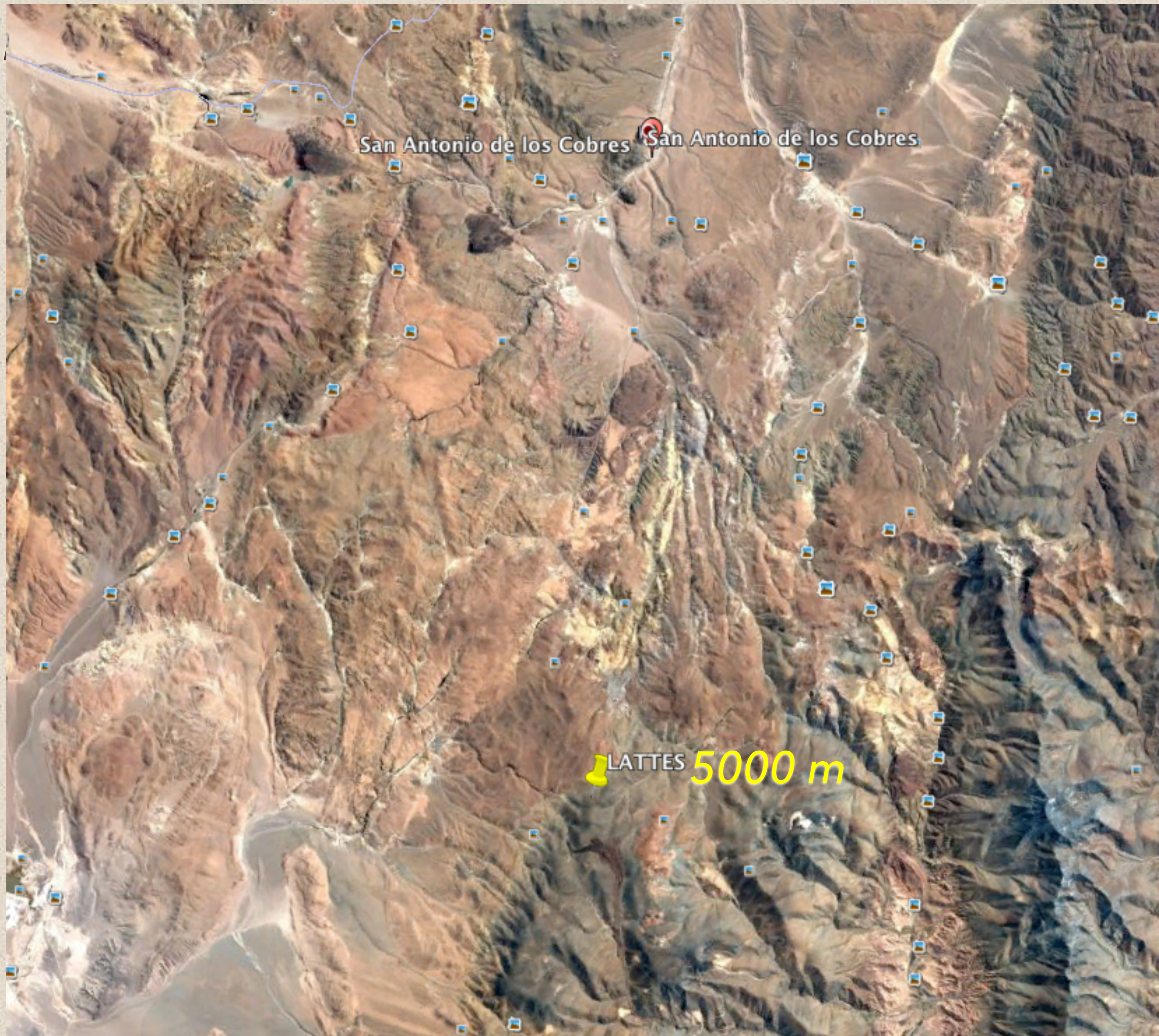
Water only



Will freezing occur?



Site



Site for *LATTES*

San Antonio de los Cobres: 3750 m



Site for *Lunar* Array Telescope for Tracking Energetic Sources



LATTES MAY 2017