Argentinian site
SGSO

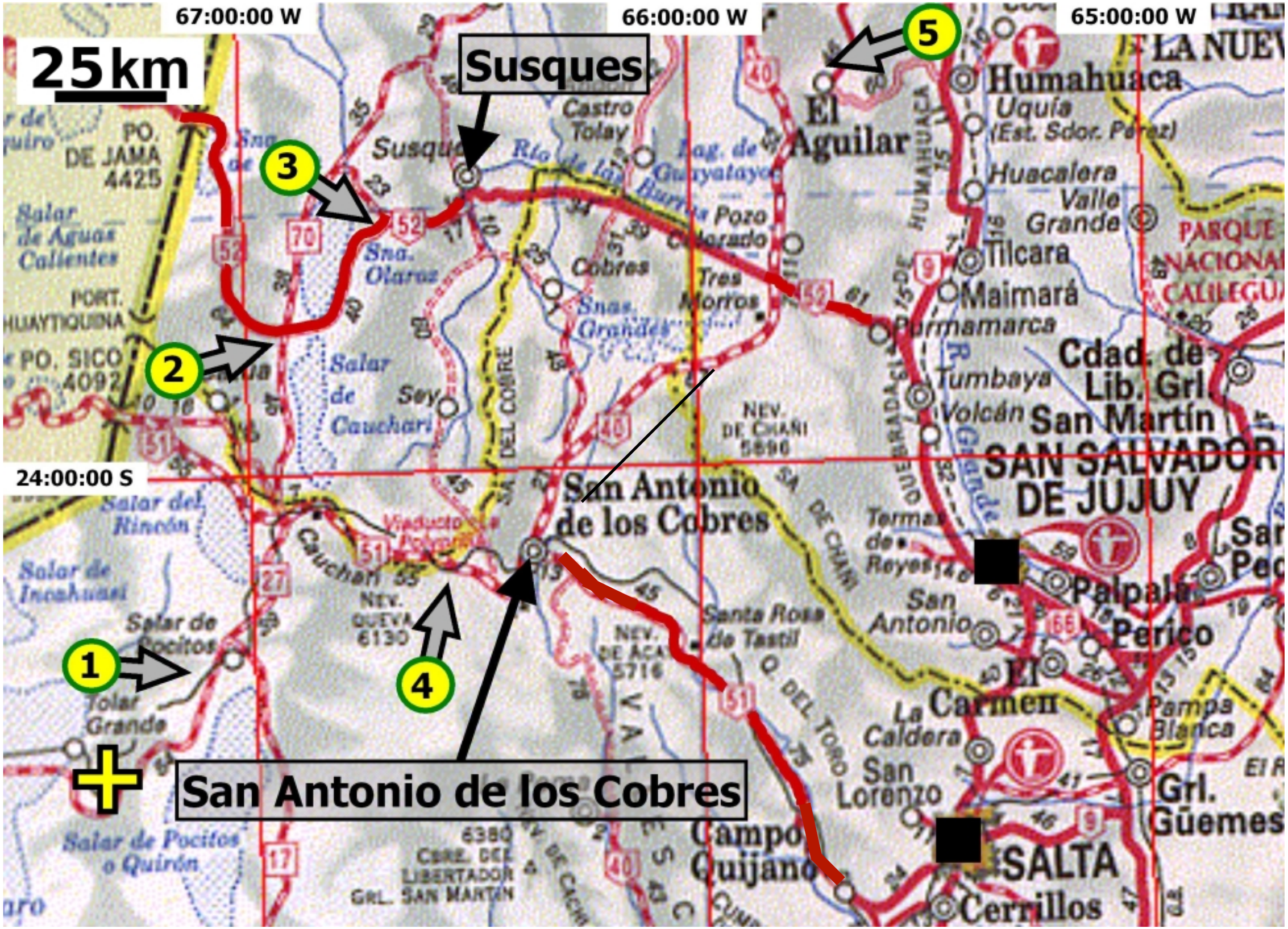
Adrián Rovero
Instituto de Astronomía y Física del Espacio

SGSO, Lisbon, May 2019

Location: near San Antonio de los Cobres (SAC)

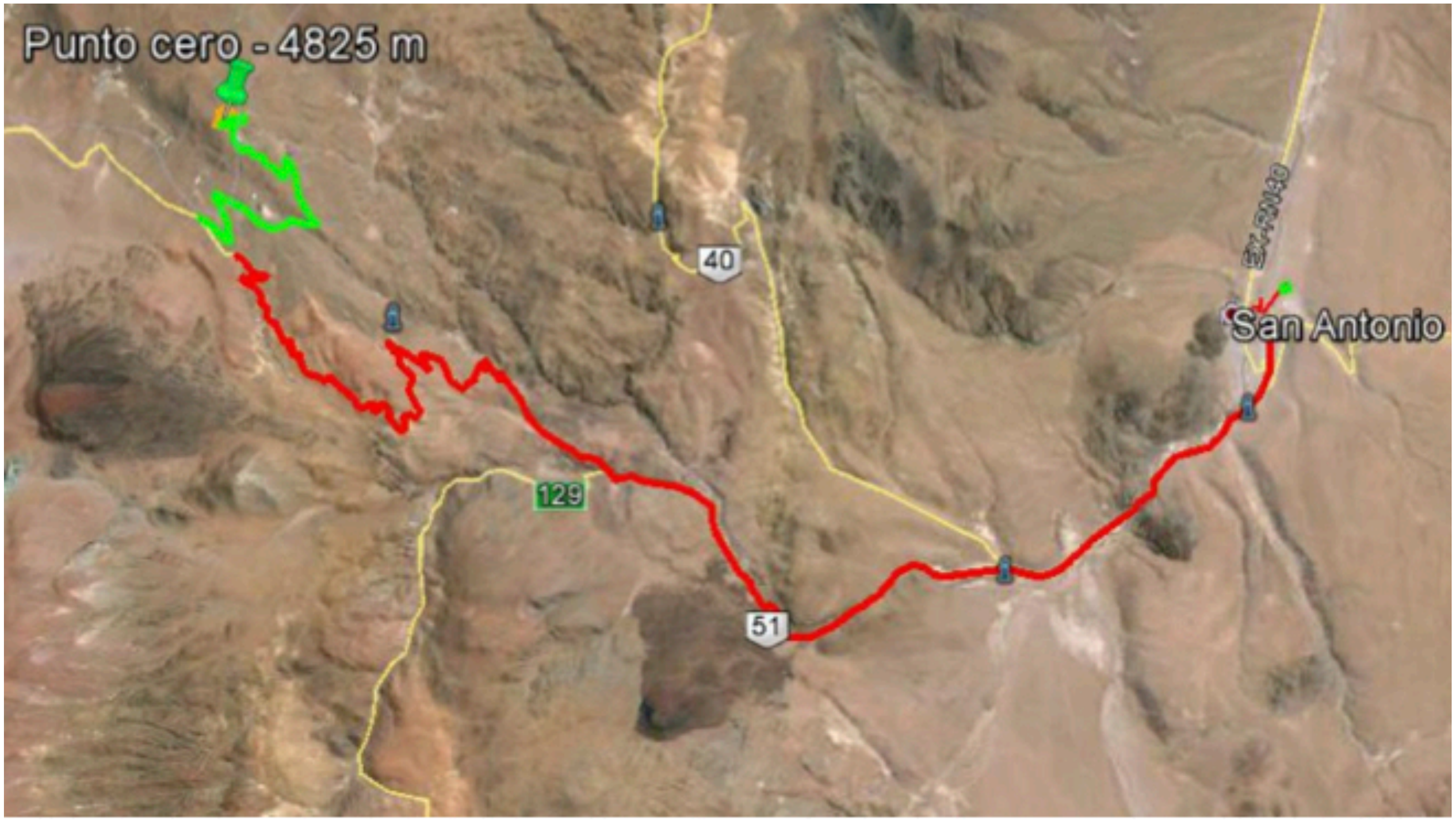
Salta International airport to SAC

Road 51, 155 km (168km from the city)



SAC to the site:

Route 51 (graved) + access road ~30 km.



Site: Cerro Vecar (4850 masl)

3 projects: LLAMA, QUBIC, “SGSO”

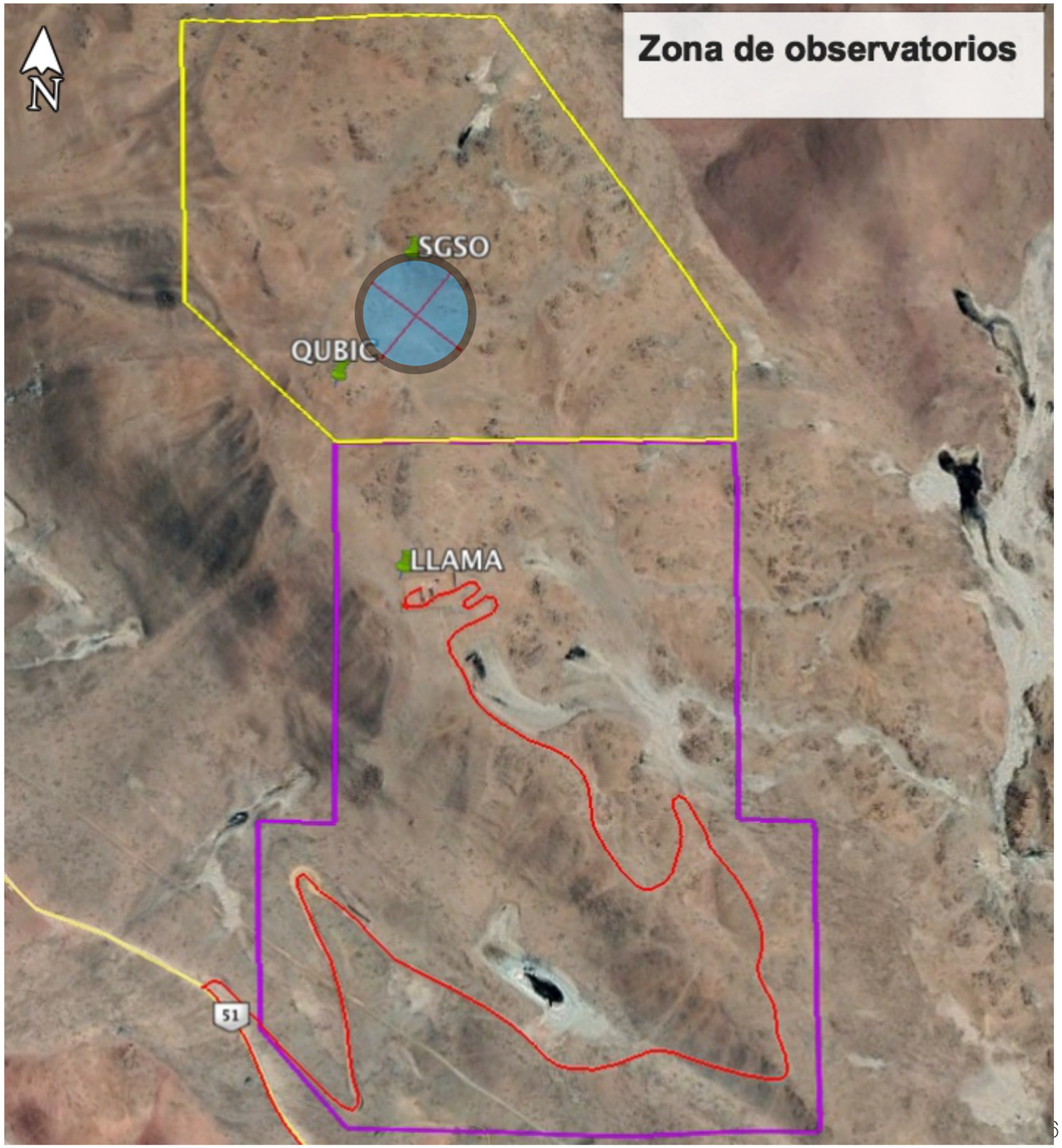
Site: Cerro Vecar

3 projects: LLAMA, QUBIC, “SGSO”

2 AREAS:

Assigned to LLAMA

Being assigned to QUBIC + OTHERS



LLAMA (Large Latin American Millimetre Array)

Project and status

VLBI:
186 km from ALMA
(130 km E-W)

Single 12 m antenna:
constructed by Vertex AntennenTechnik GmbH (same as ALMA).
Band 35 to 700 GHz.

Financed project:
12 M Euro by FAPESP (Brazil) and Ministry of Science (Argentina), 50/50

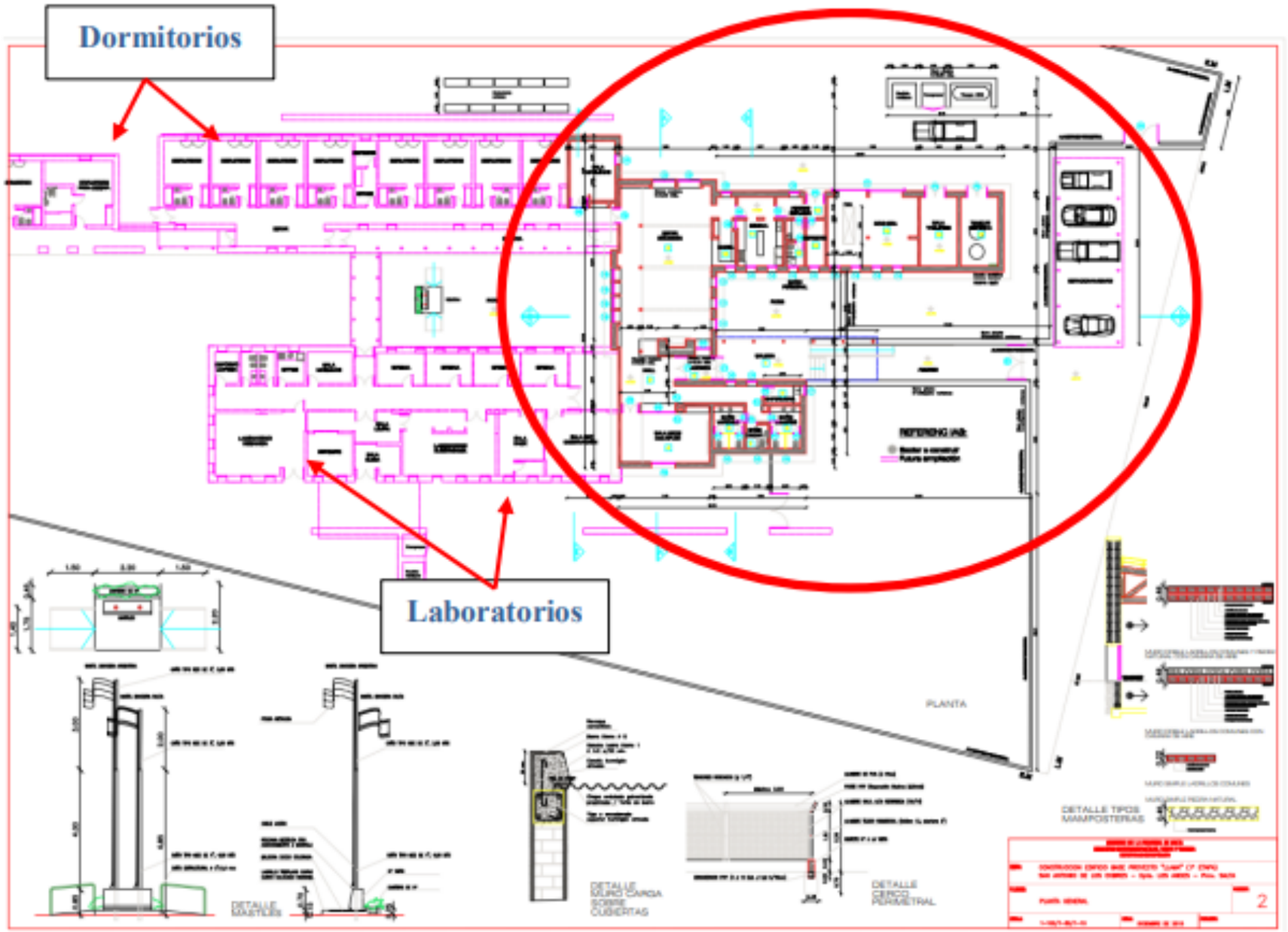
In SAC: Operations Center, dorms and labs.

First stage: Operations center: 440 m²

Government of the province of Salta

USD 1.5M

- Etapa 1: servicios generales.
- Etapa 2: primeros módulos de dormitorios y laboratorios.
- Etapa 3: segundos módulos de dormitorios y laboratorios.
- Etapa 4: tercer módulo de dormitorios (opcional) y Taller.



In SAC: Operations Center, dorms and labs.

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The antenna:

Moved to the mountain in January 2018

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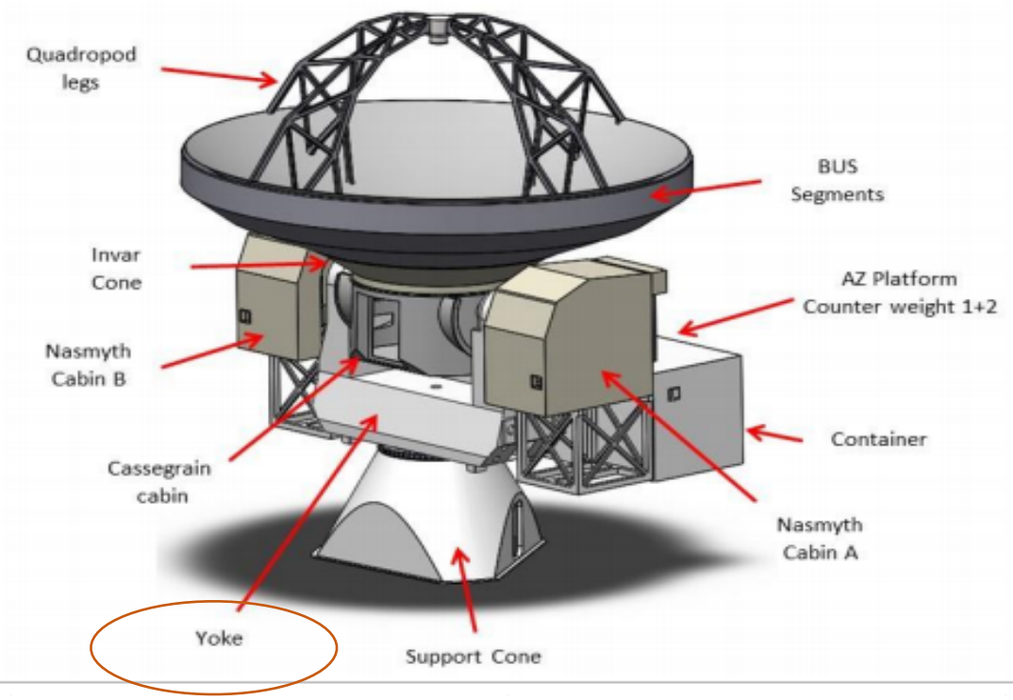
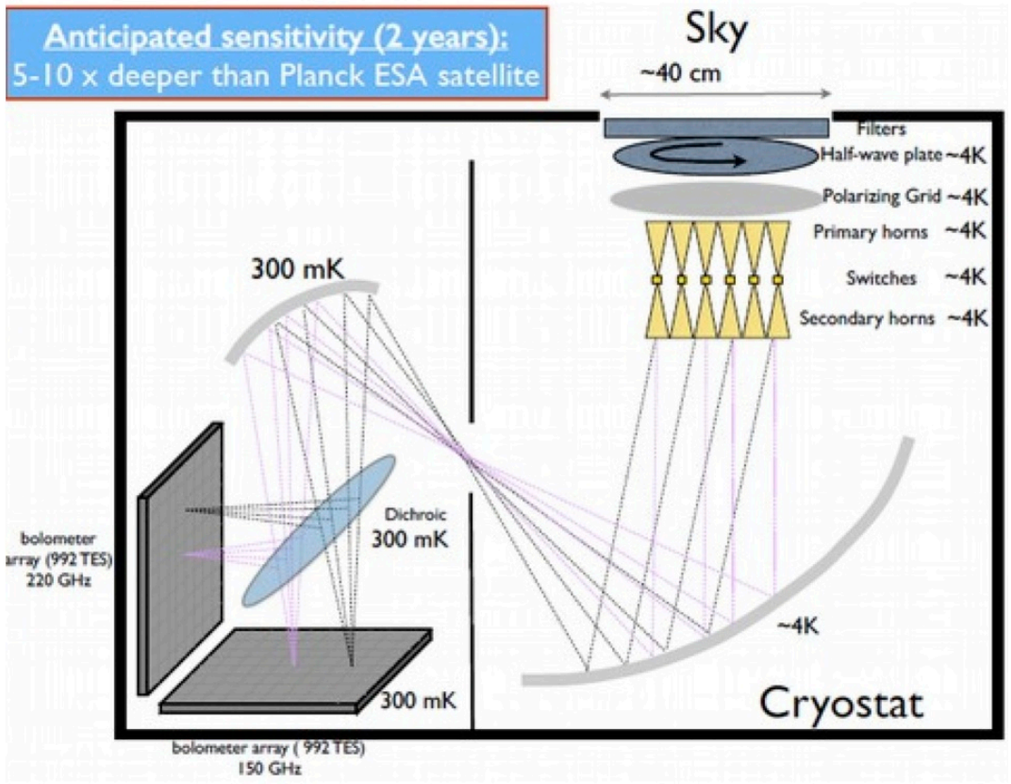


Spare part made and ready to be shipped from Italy

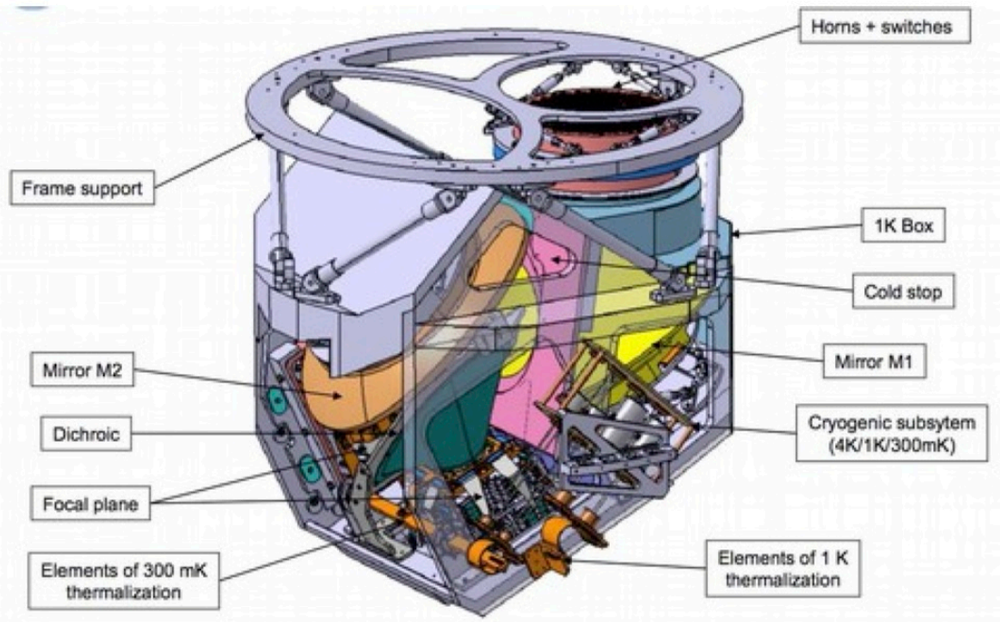
QUBIC (Q&U Bolometric Interferometer for Cosmology)

Project and status



French-Italian instrument to be installed in Argentina (decision made in June 2016)

Cosmology experiment which aims to measure the B-mode polarization of the Cosmic Microwave Background.

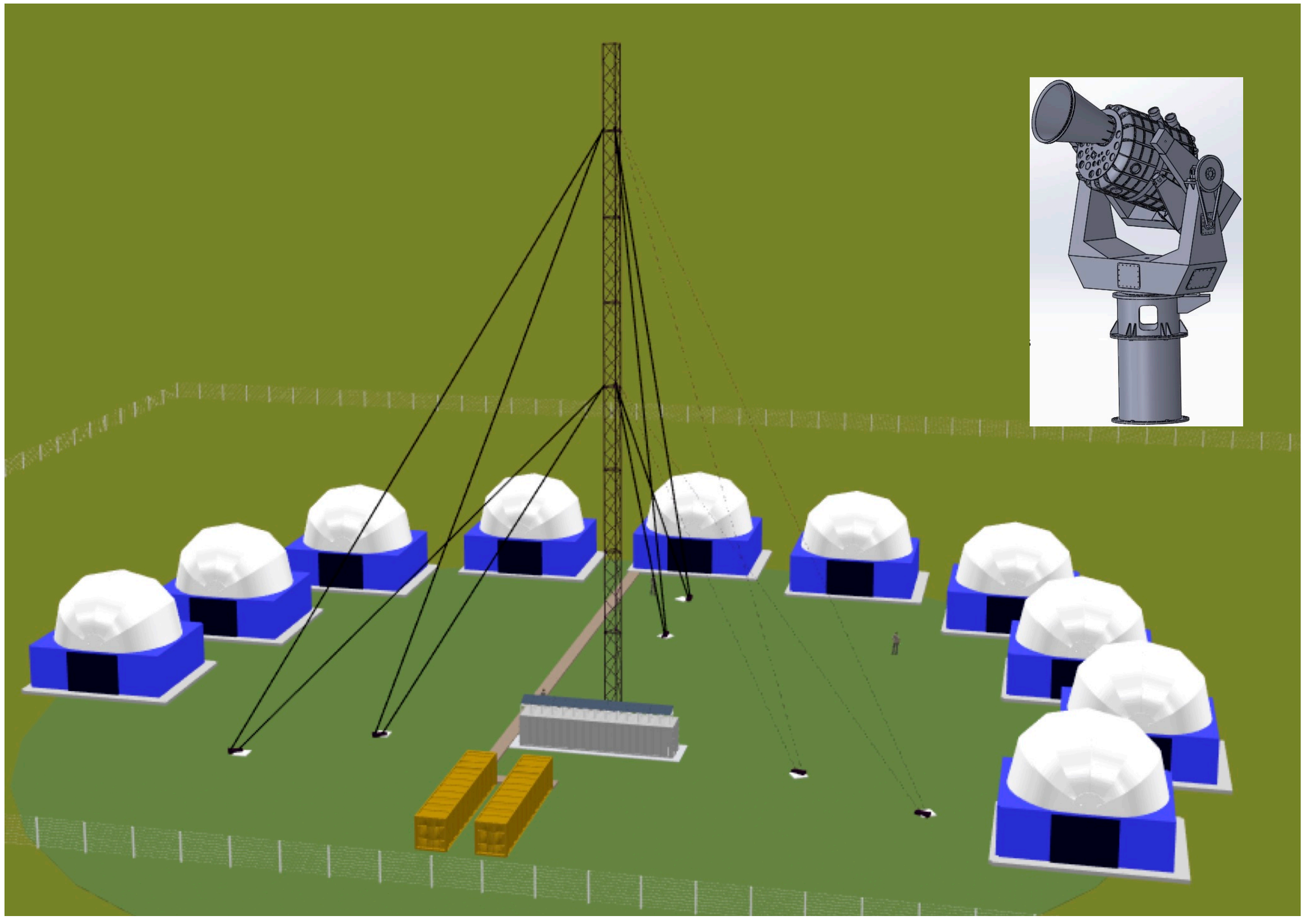


Financed project:

- Instrument: France-Italy
- Infrastructure on site: Argentina:
  Initial budget of USD 500k from Ministry of Science

QUBIC (Q&U Bolometric Interferometer for Cosmology)

Project and status

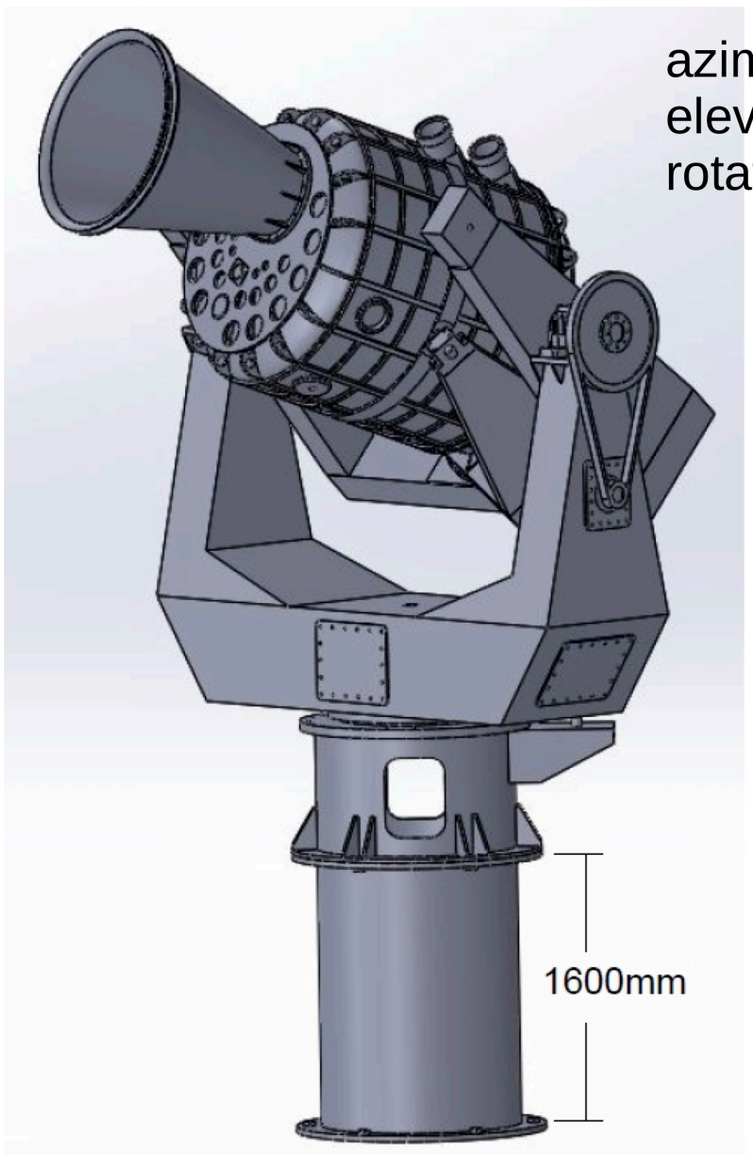


In Salta city: Assembly building

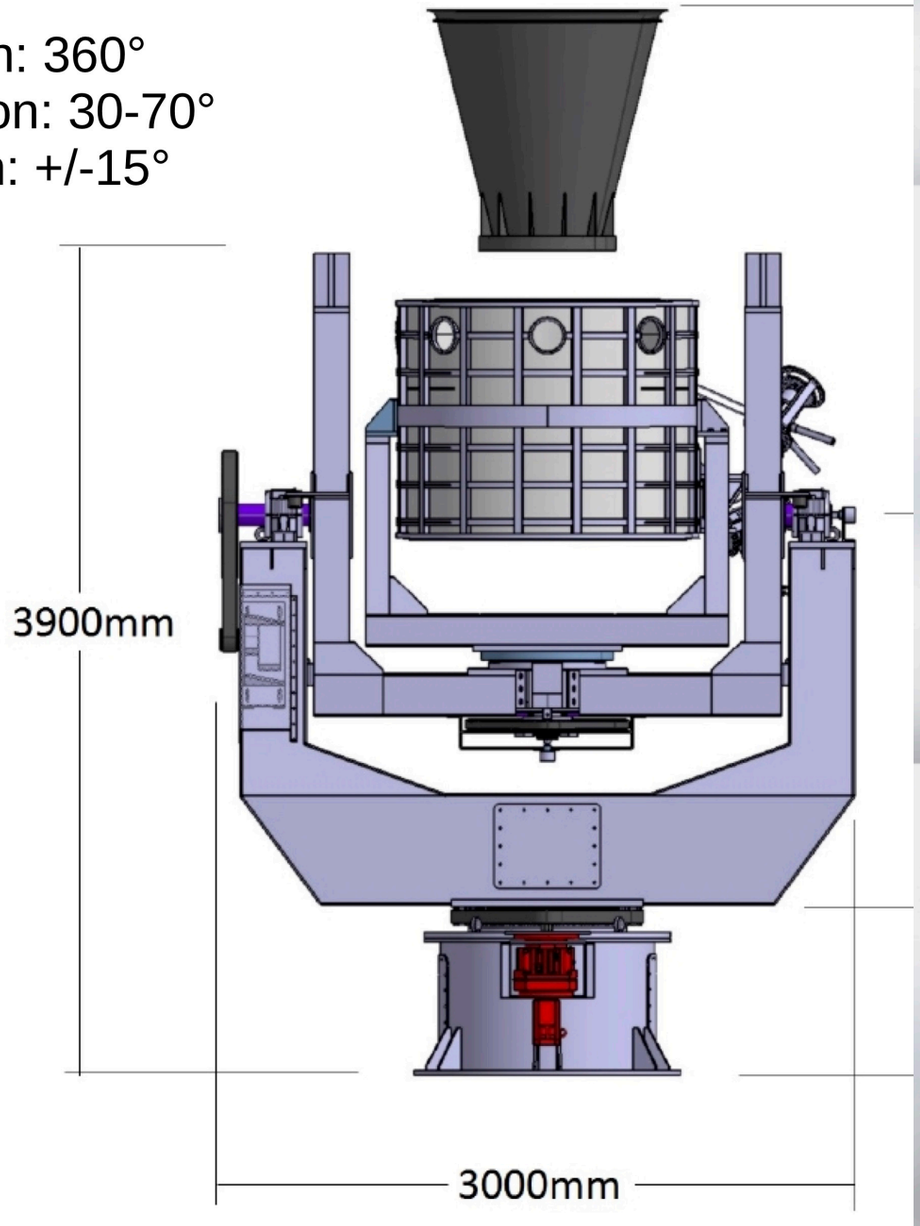
At CNEA campus

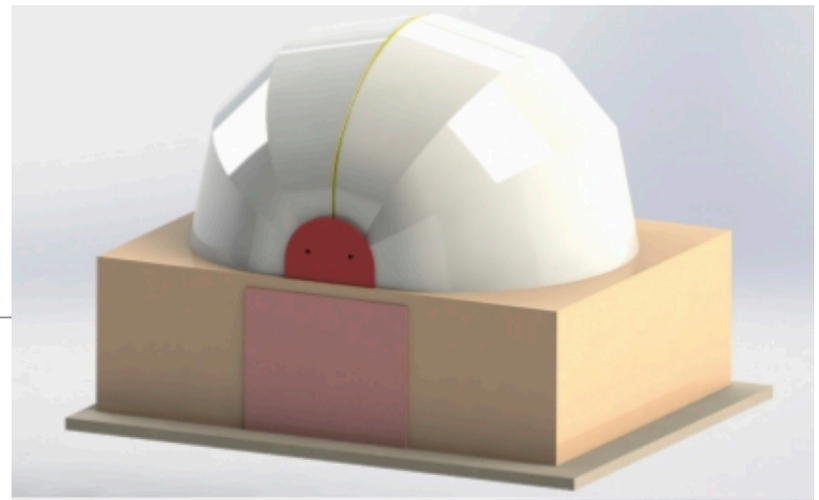
At University of La Plata (Buenos Aires), GEMA

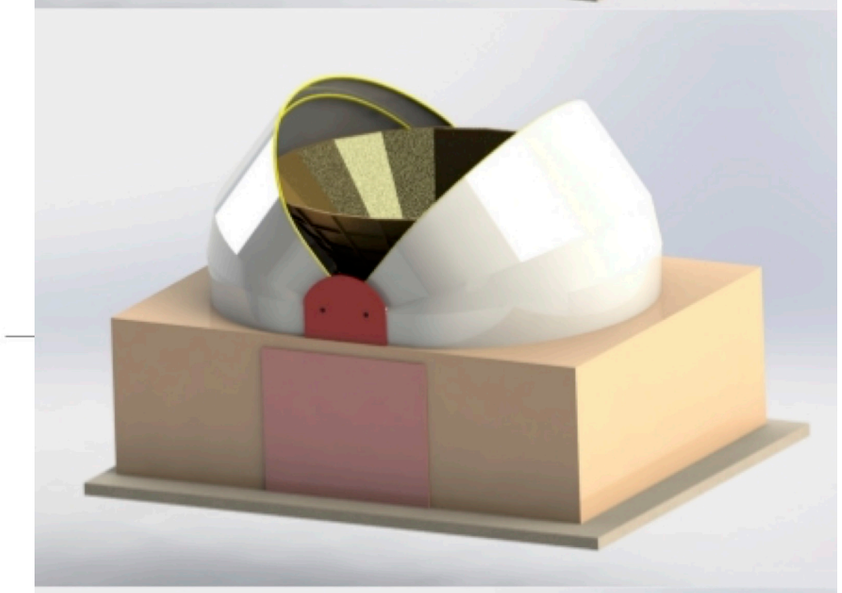
Mount, shelter and dome being constructed (for one unit)

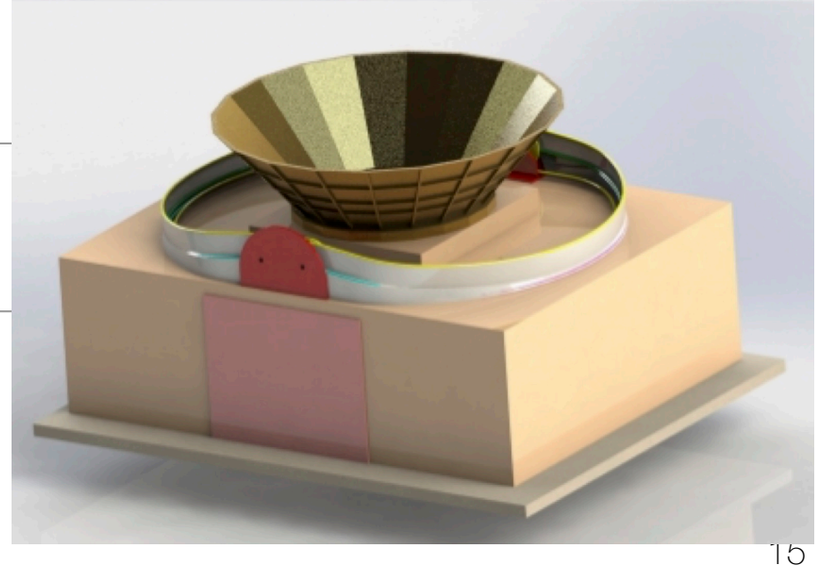


azimuth: 360°
elevation: 30-70°
rotation: +/-15°







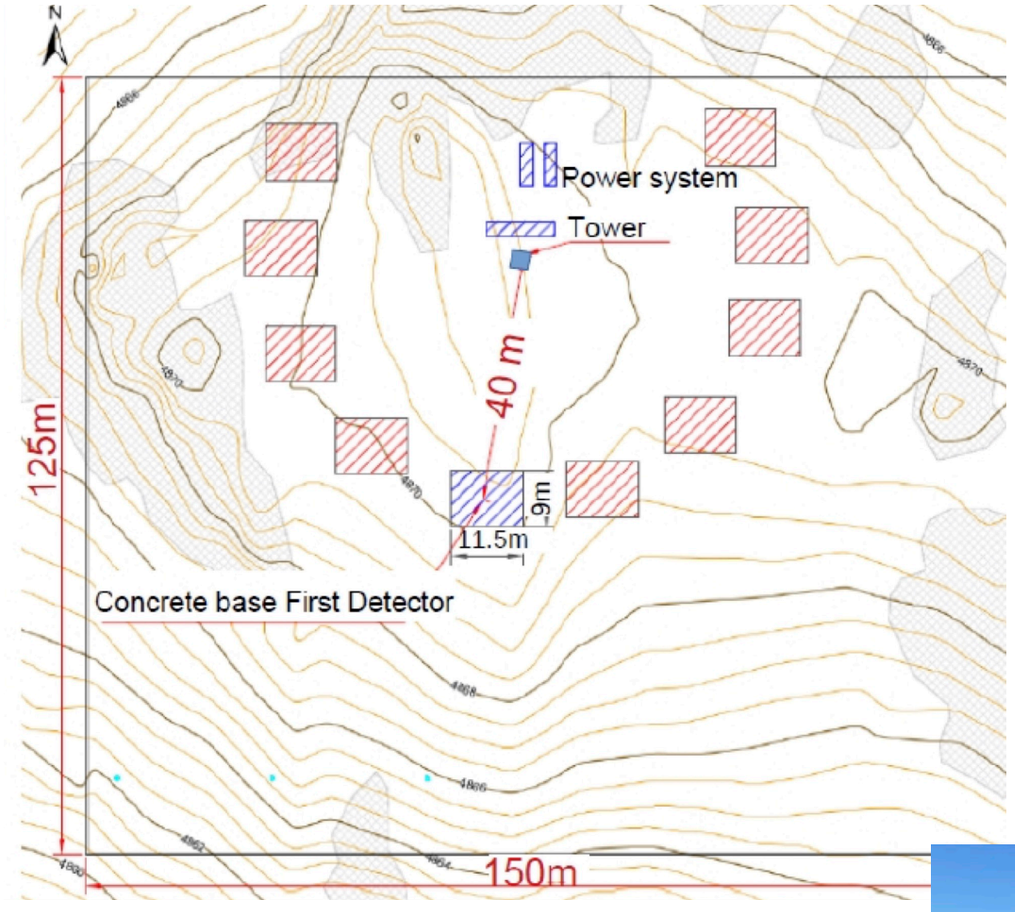


Dibujos: Mariano Mundo
Centro Tecnológico Aeroespacial (CTA) Grupo de Ensayos Mecánicos Aplicados (UID-GEMA)

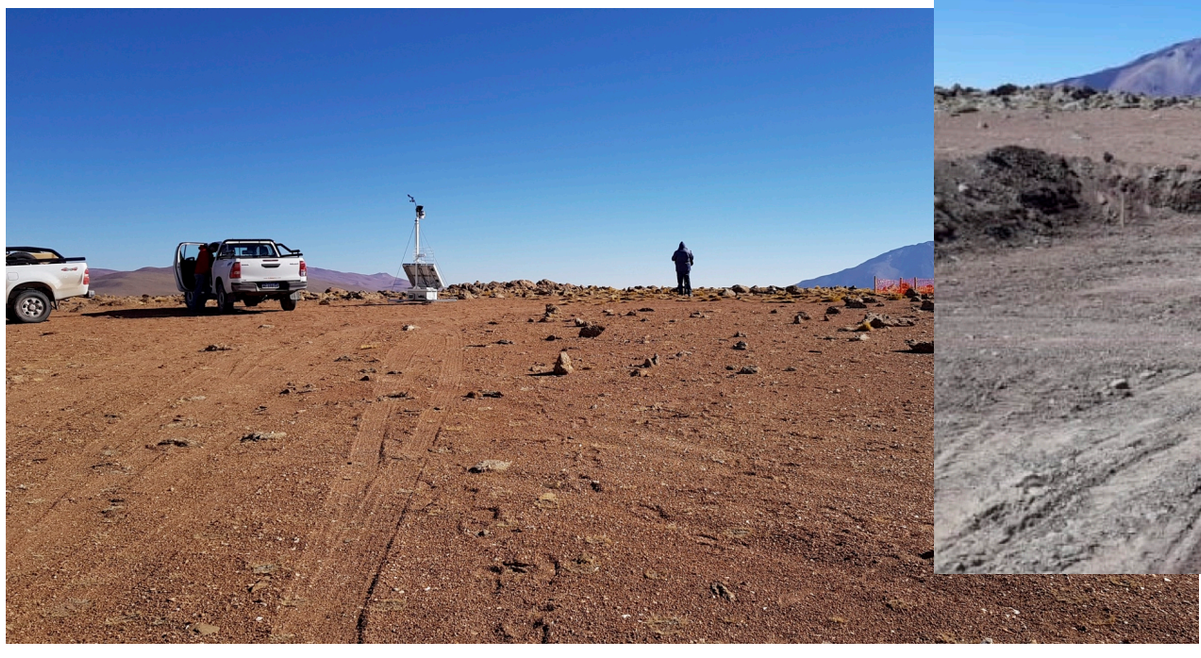
At the mountain

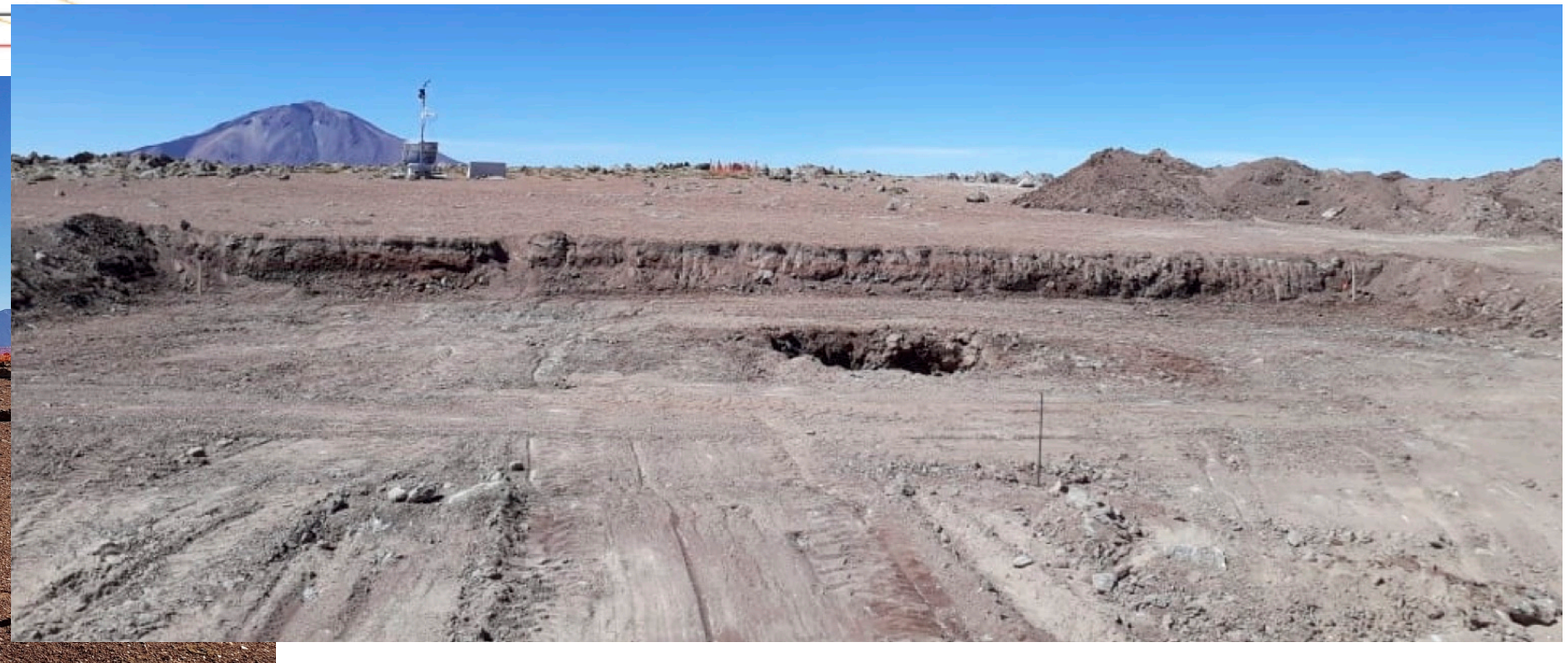
Access road, link connection, basement

Layout



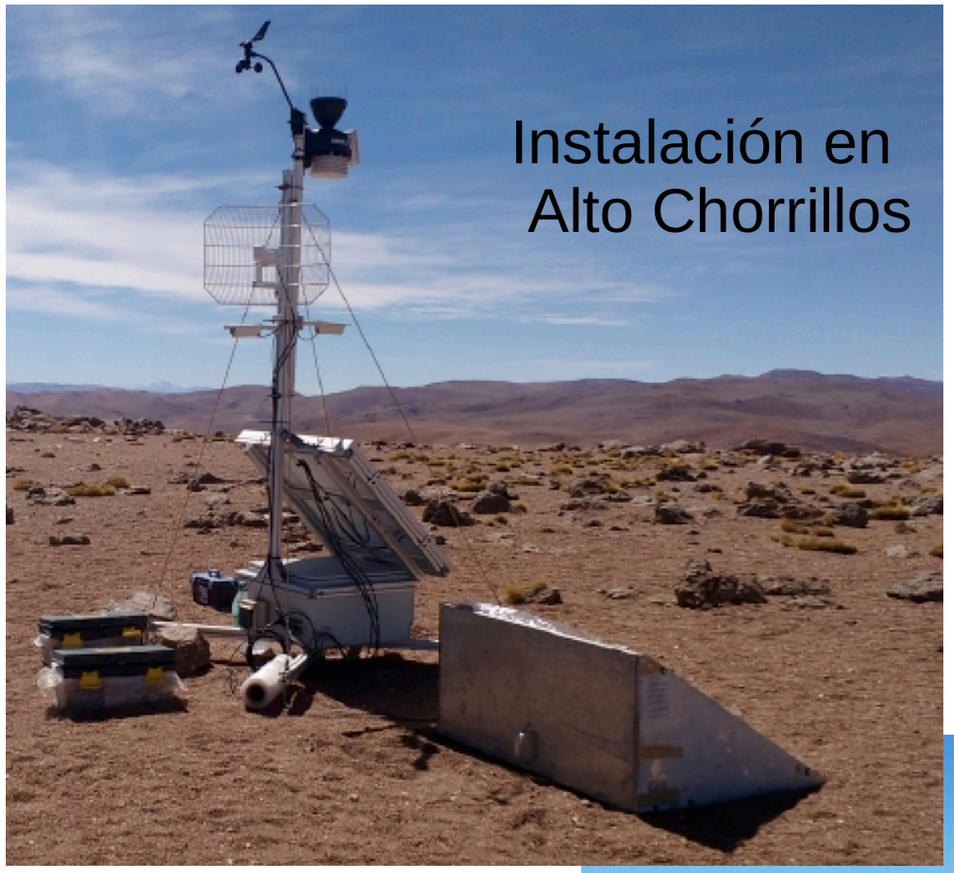
Road from LLAMA to QUBIC site: 800m

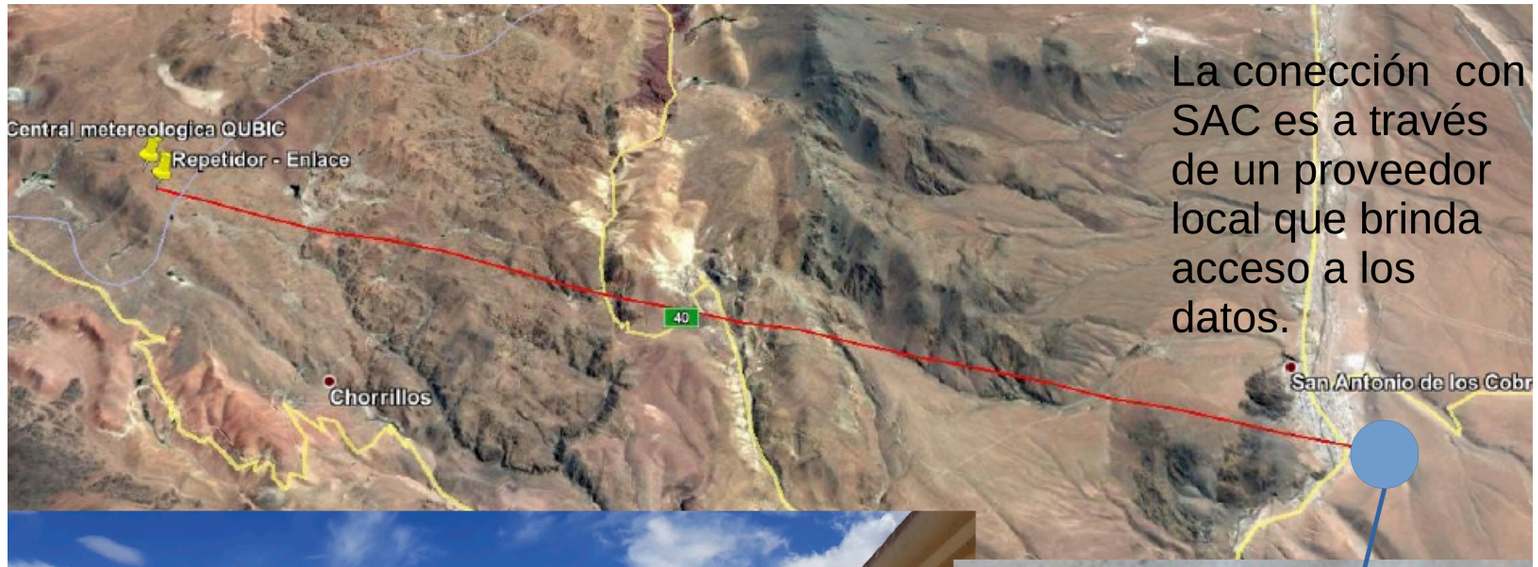




At the mountain

Access road, link connection, basement





La conección con SAC es a través de un proveedor local que brinda acceso a los datos.

5 Mbps link to SAC

Connected to a local provider.

Weather station + webcam

At the mountain

Power for both LLAMA and QUBIC

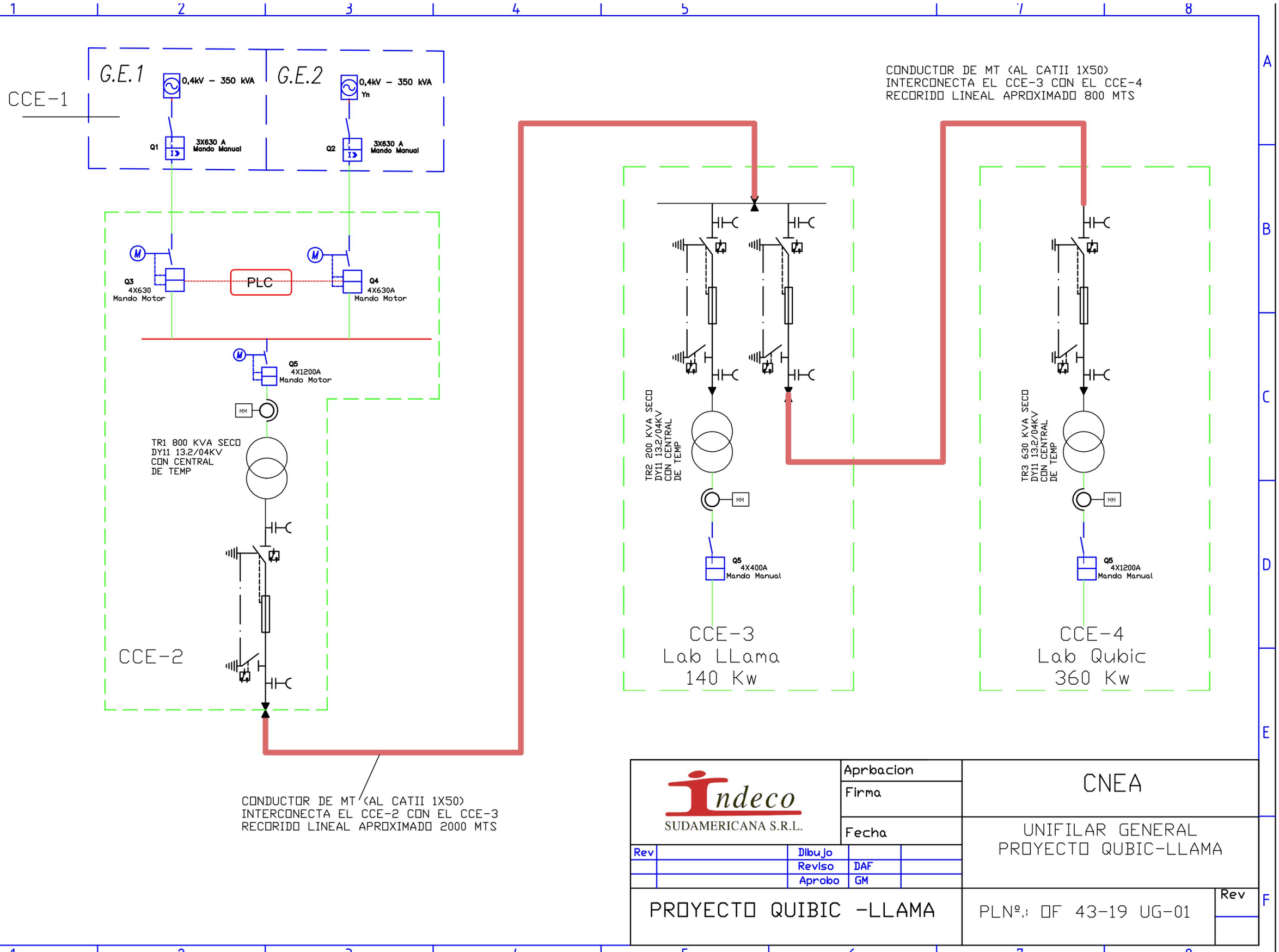
Natural gas pipe.

Generators at the base and a 13.2 KV buried line.

Total cost: USD 840K
3 1/3 (LLAMA, QUBIC, Province)

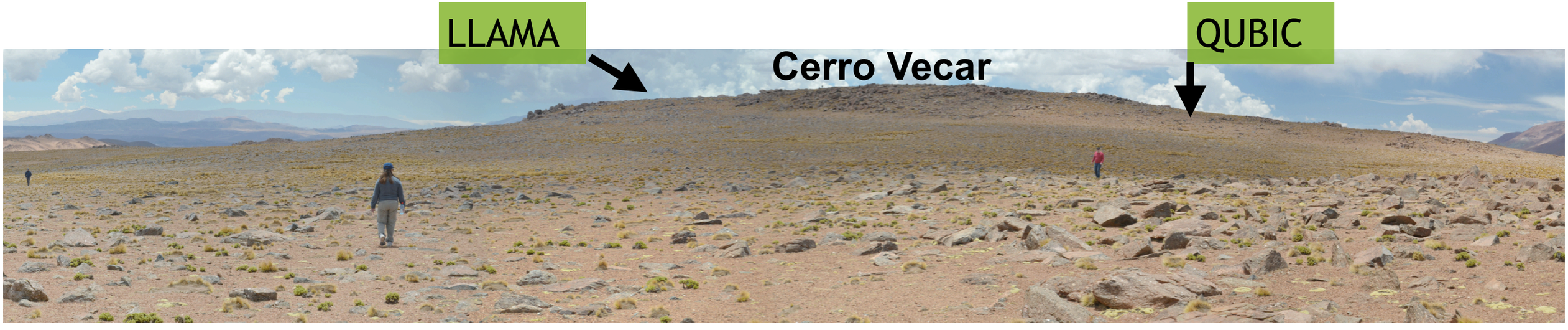
LLAMA=QUBIC=Federal funds

Power plant and lines:



SGSO site:

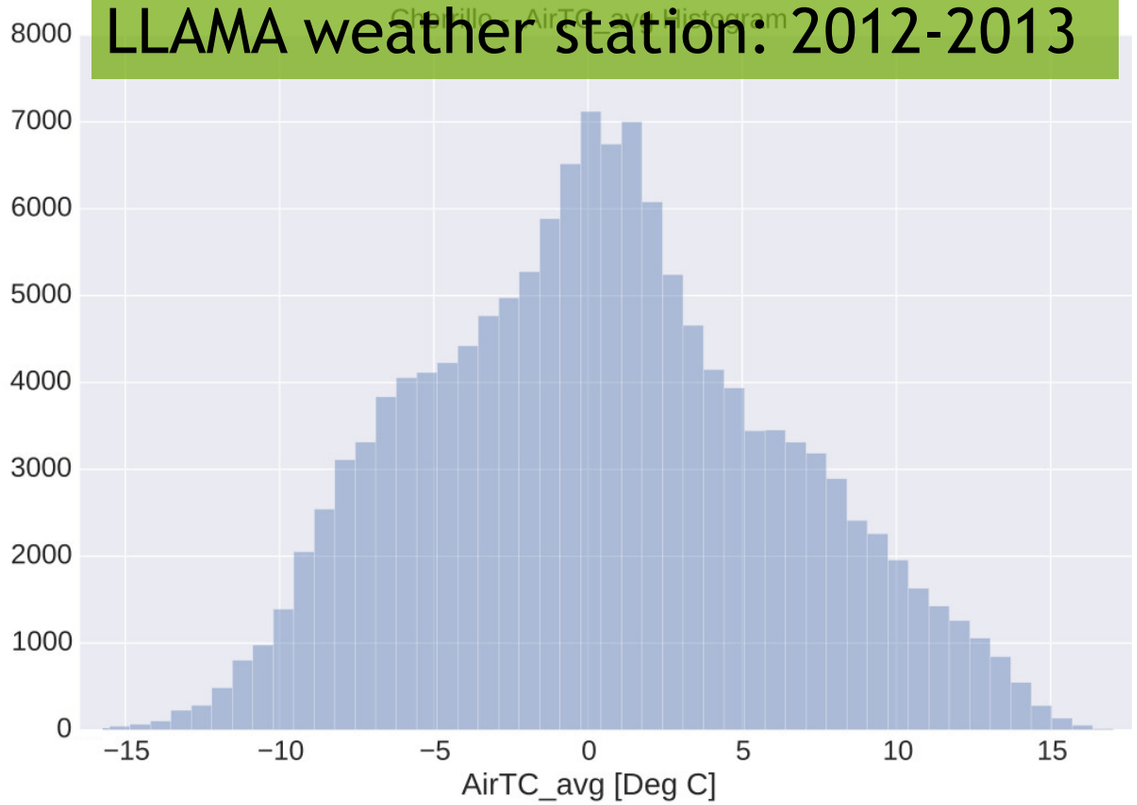
Visited by some of you in Dic. 2017.

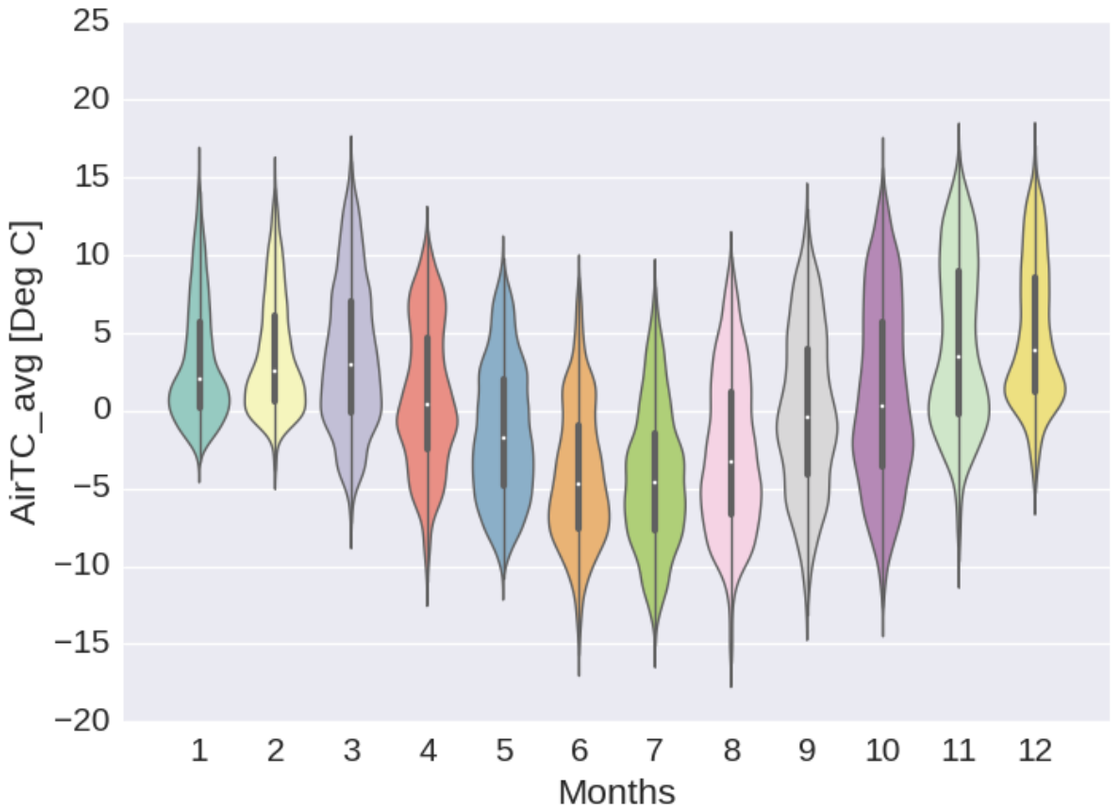


SGSO site:

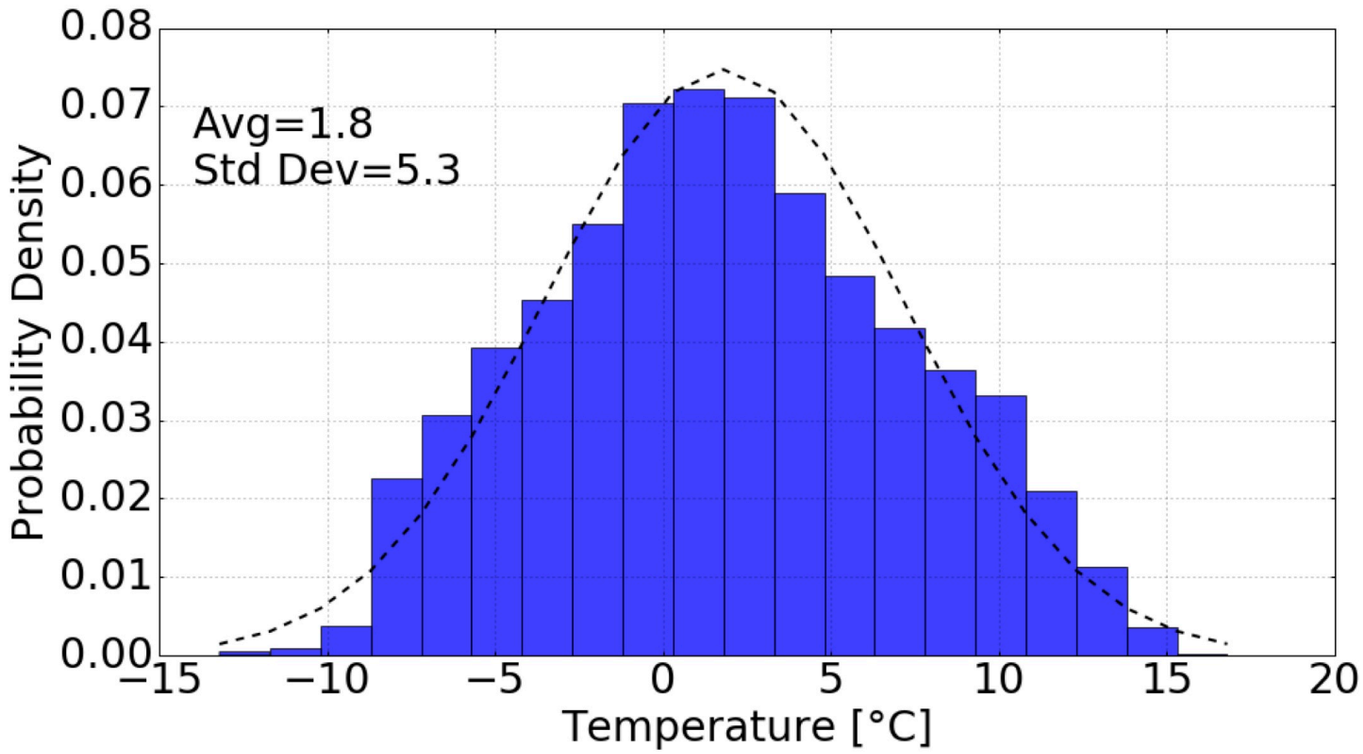
Temperature measurements

LLAMA weather station: 2012-2013





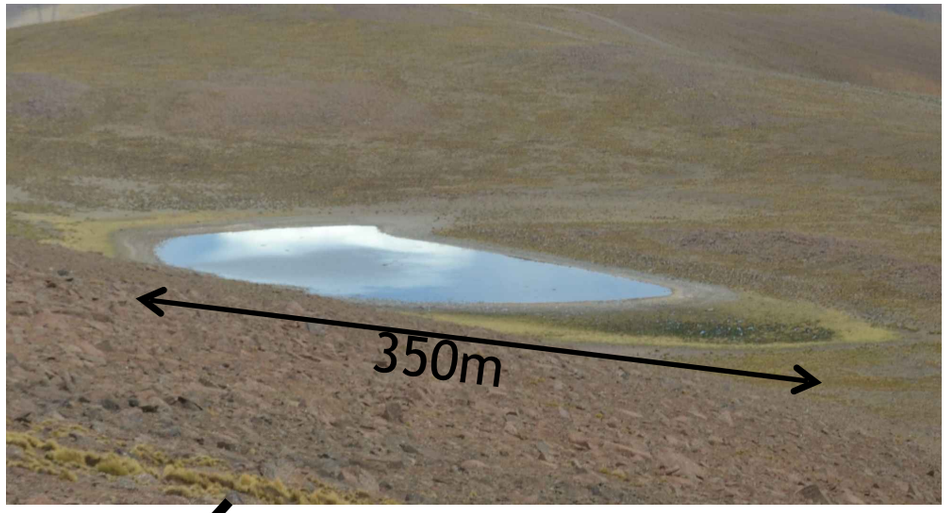
QUBIC weather station: 2018



SGSO site:

Water sources nearby

Laguna Escondida
(water used for construction)



San Antonio
de los Cobres
river

Site

SGSO site:

Hydrological studies: budget

INTI
(Instituto Nacional de Tecnología Industrial)

Water sources and maximum rates per year.

Budget Dic 2018 **(~USD 3200)**

INTI Salta Centro de Investigación y Desarrollo Salta	**PRESUPUESTO**	**SG-FO30-R01**

Fecha:

27 de diciembre 2018

Presupuesto Nº: SLA 715/18	
Cliente: Instituto de Astronomía y Física del Espacio (IAFE)	**Responsable:** Adrián C. Rovero
Domicilio: GUIRALDES 1428	**CUIT: 30-70972332-0**
	Localidad: CIUDAD AUTONOMA BUENOS AIRES
Correo electrónico: adrianrovero@gmail.com	**Tel.:** +54(11)5285-7837 - +54(11)4783-2642/4781-6755/4786-8114 (#139)

Estimado/a:

Atento a su solicitud, tenemos a bien presupuestar el siguiente servicio:

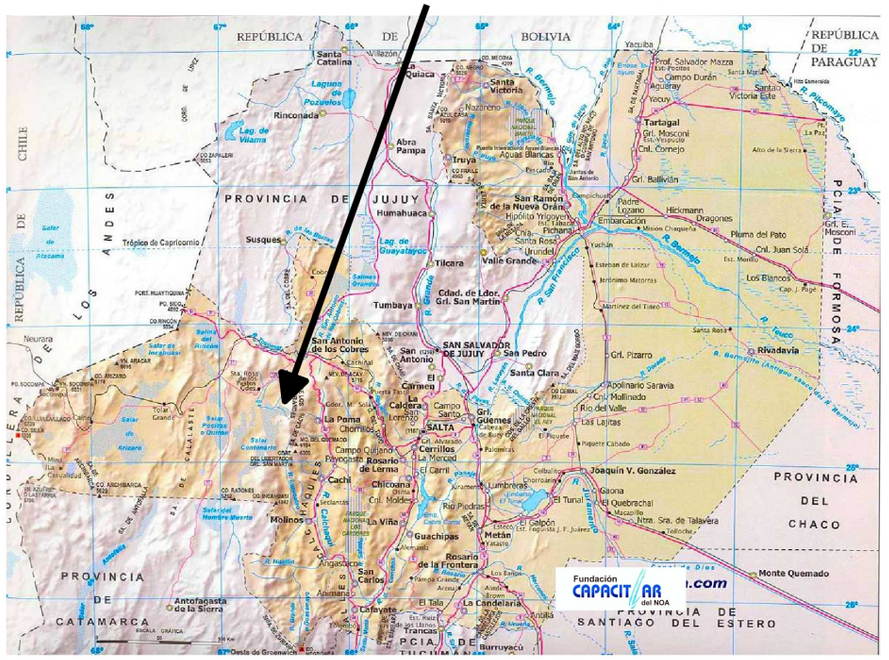
Ítem	Cant.	Descripción del Servicio	Arancel ($)
1	1	65.02.01.02.00.001 - Estudio Hidrogeológico y Anteproyecto de Obra.	$ 42.264,00
2	1	65.04.01.12.00.001 Viáticos ($ 46.521,00 para 3 agentes x 3 comisiones) y traslados ($8.000,00 para aprox. 1000 km en tres comisiones)	$ 54.521,00
3	1	65.04.01.00.00.002 Insumos y materiales (incluye 3 análisis físico-químicos)	$ 25.509,00
		TOTAL	**$ 122.294,00**

SGSO site:

Levels study (radar satellite data): Carlos Peralta (INENCO, UNSa)

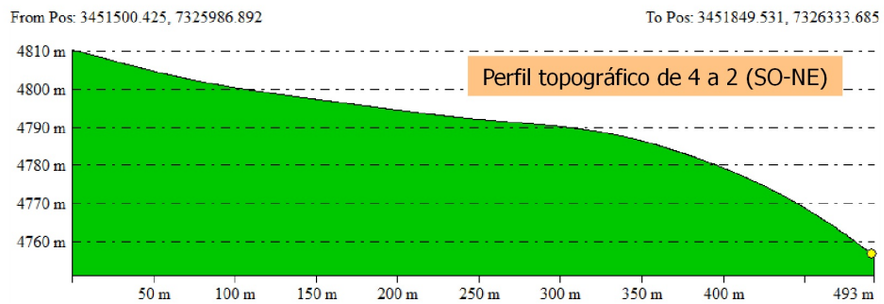
Estimación Movimientos de Tierra

Ubicación Relativa del Proyecto

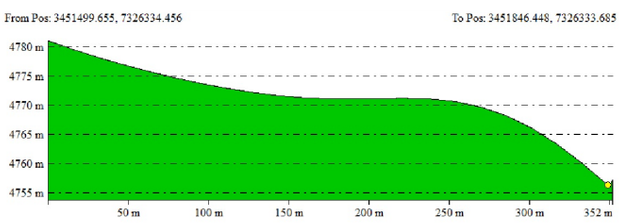


Rectangulo	Numero	Coord X	Coord Y
	1	3451499.52	7326336.3
	2	3451849.52	7326336.3
	3	3451849.52	7325986.3
	4	3451499.52	7325986.3

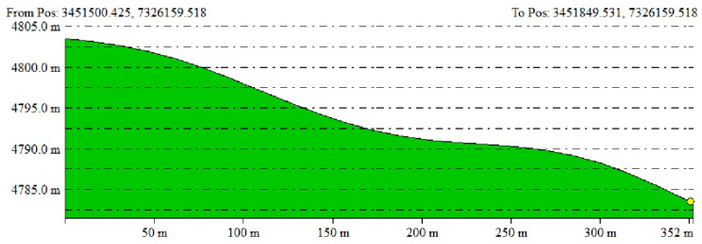
Coordenadss Planas Gauss Kruger según Posgar 94, Faja 3 para Argentina (IGN



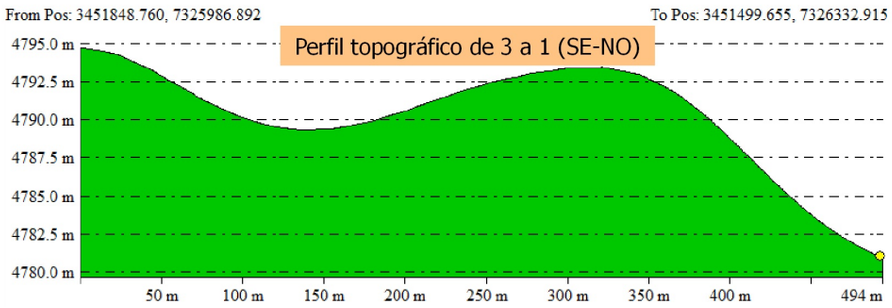
Perfil topográfico de 4 a 2 (SO-NE)



Perfil topográfico de 1 a 2 (O-E)



Perfil topográfico de 4 a 3 (O-E)



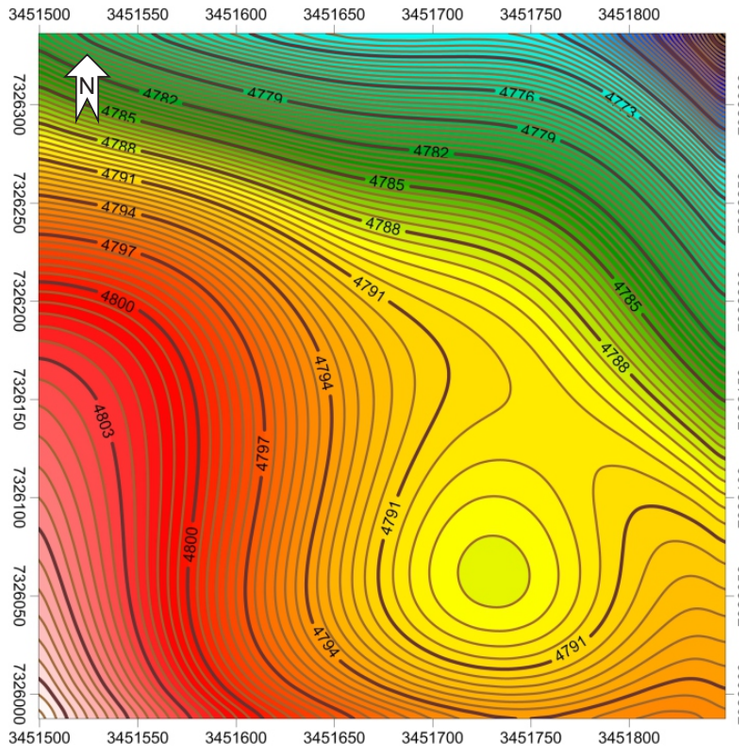
Perfil topográfico de 3 a 1 (SE-NO)

SGSO site:

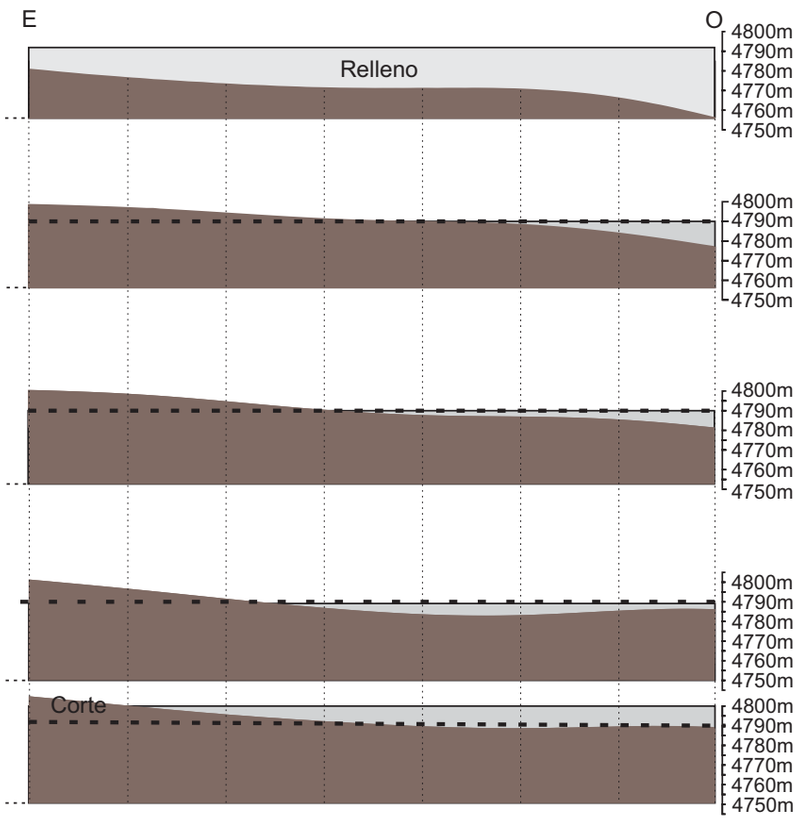
Earthworks to make it horizontal:

Carlos Peralta (INENCO, UNSa)

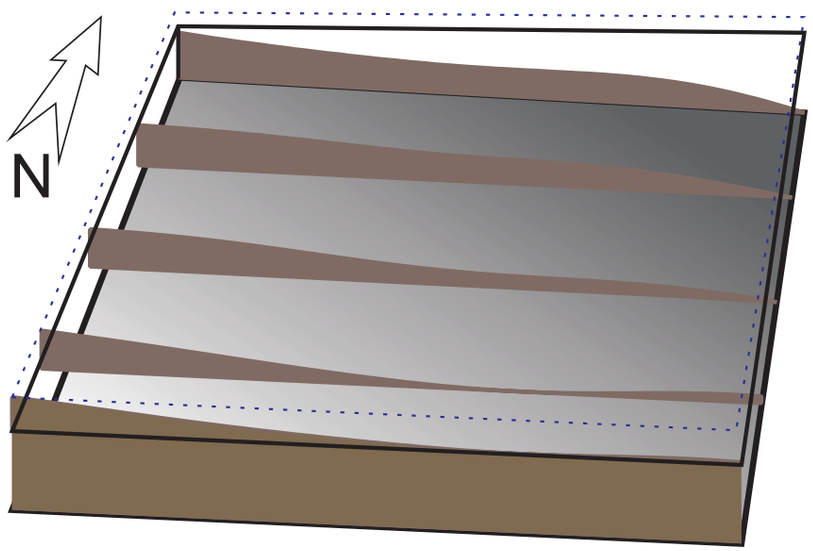
Curvas de nivel
(equedistancia 0.5m)

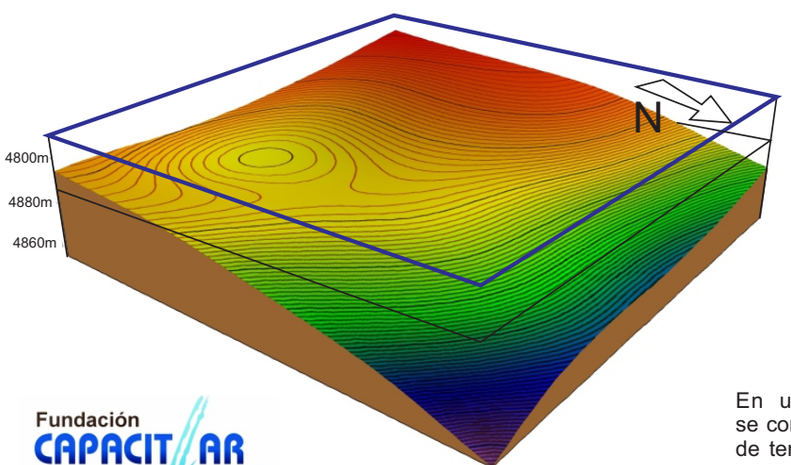


Perfiles de Corte y Relleno O-E



Vistas 3D modelos de Corte y Relleno





Fundación CAPACITAR del NOA

Calculo de Corte y Relleno

Thu Dec 06 18:09:43 2018

Upper Surface

Grid File Name: M:\Gamma\MedRecFilSm.grd
Grid Size: 298 rows x 298 columns

X Minimum:3451499.52
X Maximum:3451848.93
X Spacing:1.1764646464651

Y Minimum:7325987.584
Y Maximum:7326336.3
Y Spacing:1.174127946128

Z Minimum:4756.3938937785
Z Maximum:4810.215844466

Lower Surface

Level Surface defined by Z = 4790.1

Volumes

Z Scale Factor:1

Total Volumes by:

Trapezoidal Rule:690.69124648641
Simpson's Rule:694.40978120914
Simpson's 3/8 Rule:693.88276313415

Cut & Fill Volumes

Positive Volume [Cut]:405834.61821101m3
Negative Volume [Fill]:405142.90839751m3
Net Volume [Cut-Fill]:691.70981350529m3

Areas

Planar Areas

Positive Planar Area [Cut]: 69048.859126536
Negative Planar Area [Fill]: 52795.998433522
Blanked Planar Area: 0
Total Planar Area: 121844.85756006

Surface Areas

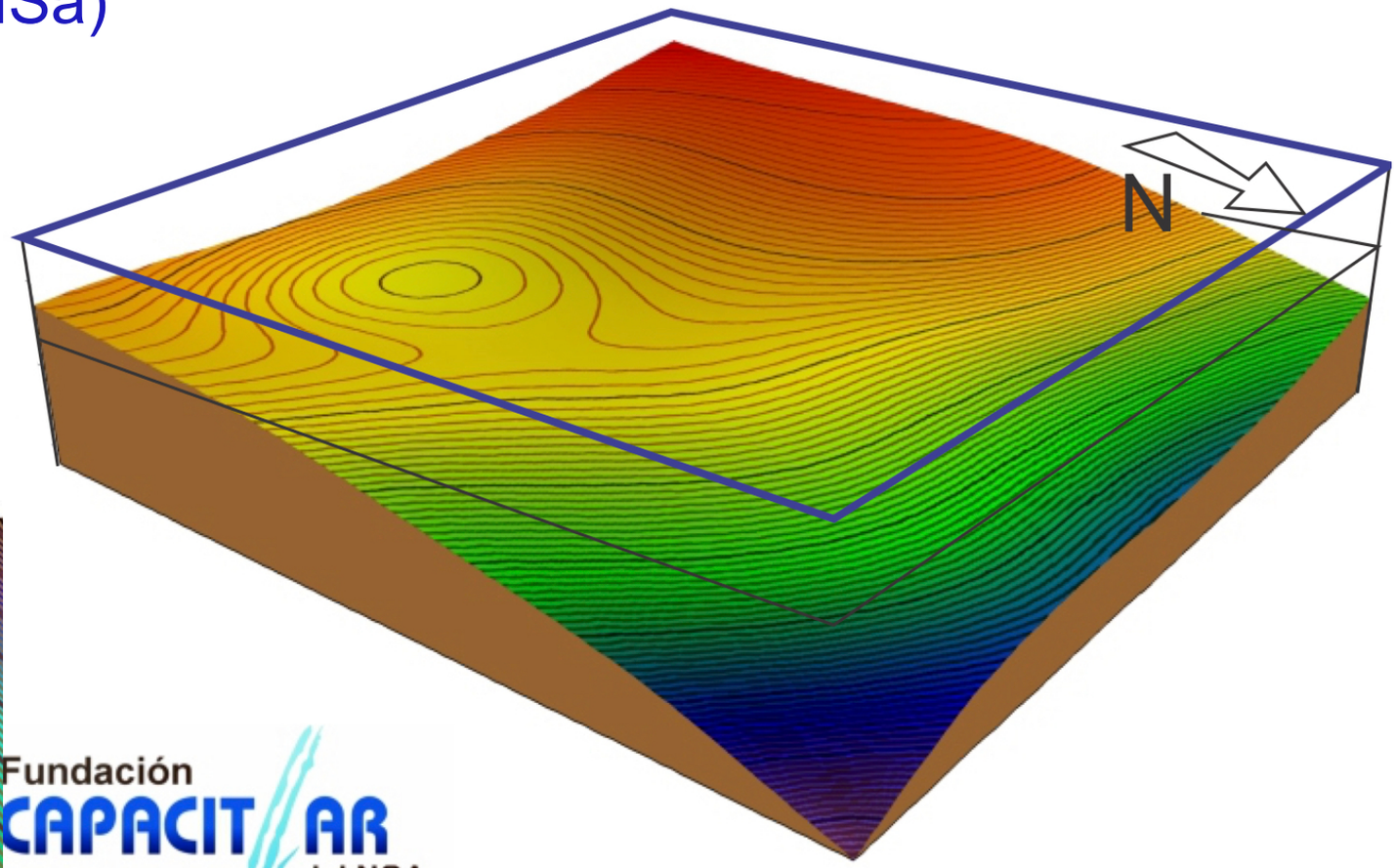
Positive Surface Area [Cut]: 69347.077194034
Negative Surface Area [Fill]: 53479.55630505

En un plano horizontal a 4790.1m de altura sobre nmm, se compensa la altura de corte y relleno del sector con un volumen de terreno a descarpar de aproximadamente 406000m3. Con este material se rellenara la porción restante para nivelar a 4790.1 metros de altura la superficie del polígono de 350 x 350m.

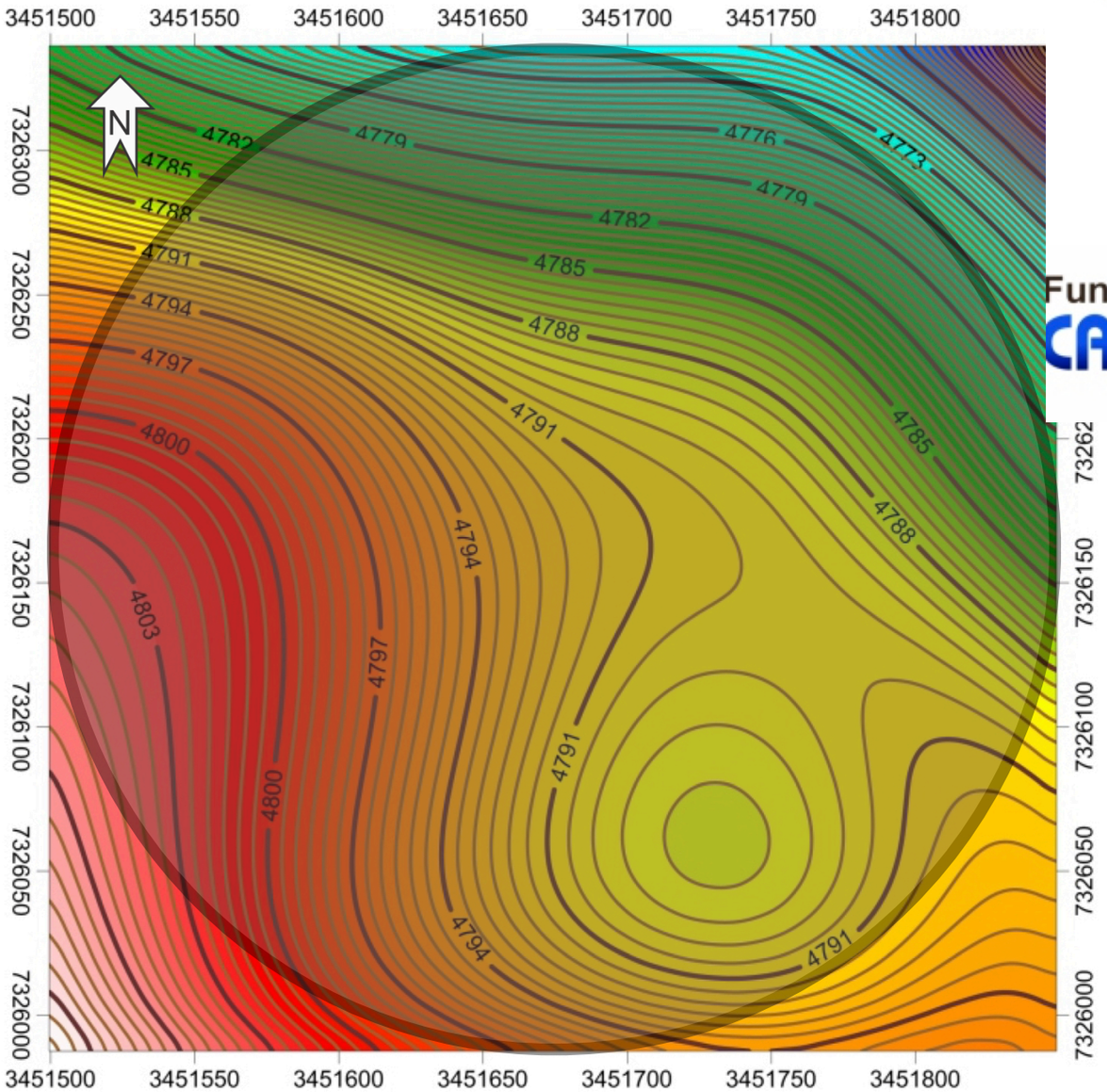
SGSO site:

Earthworks to make it horizontal:

Carlos Peralta (INENCO, UNSa)



Curvas de nivel
(equedistancia 0.5m)



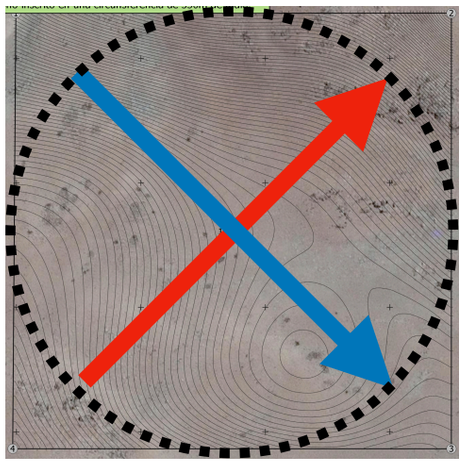
Fundación CAPACITAR del NOA

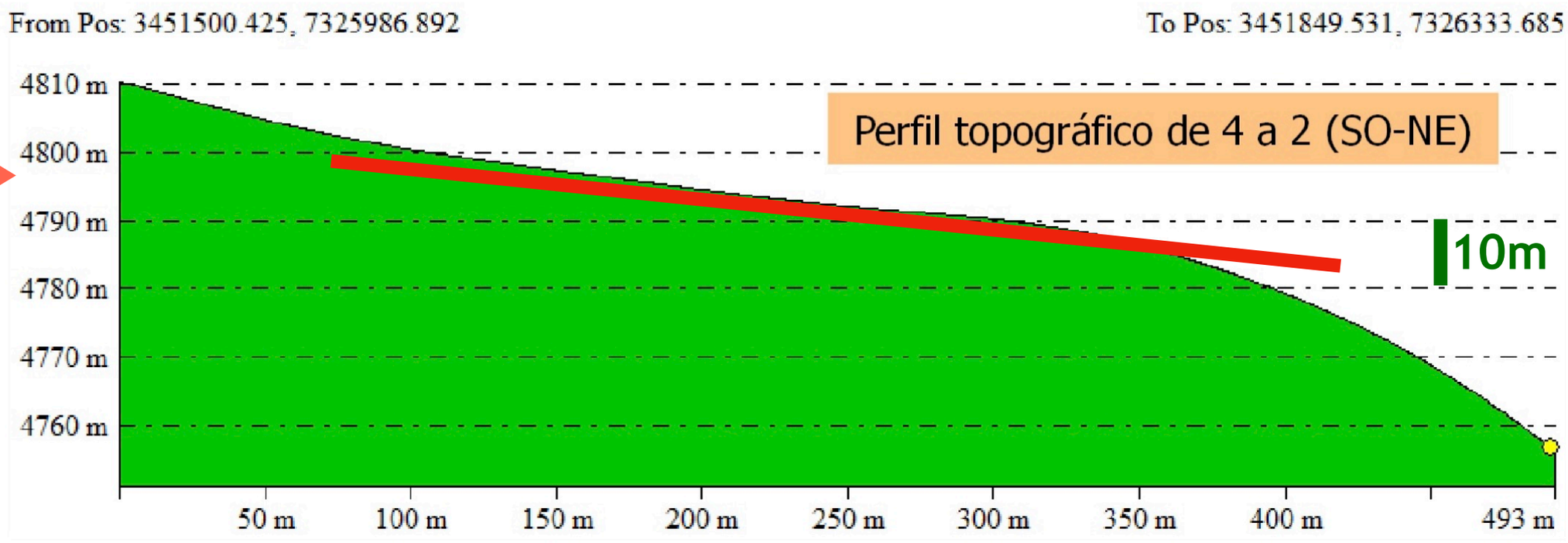
Circle:
300K m3

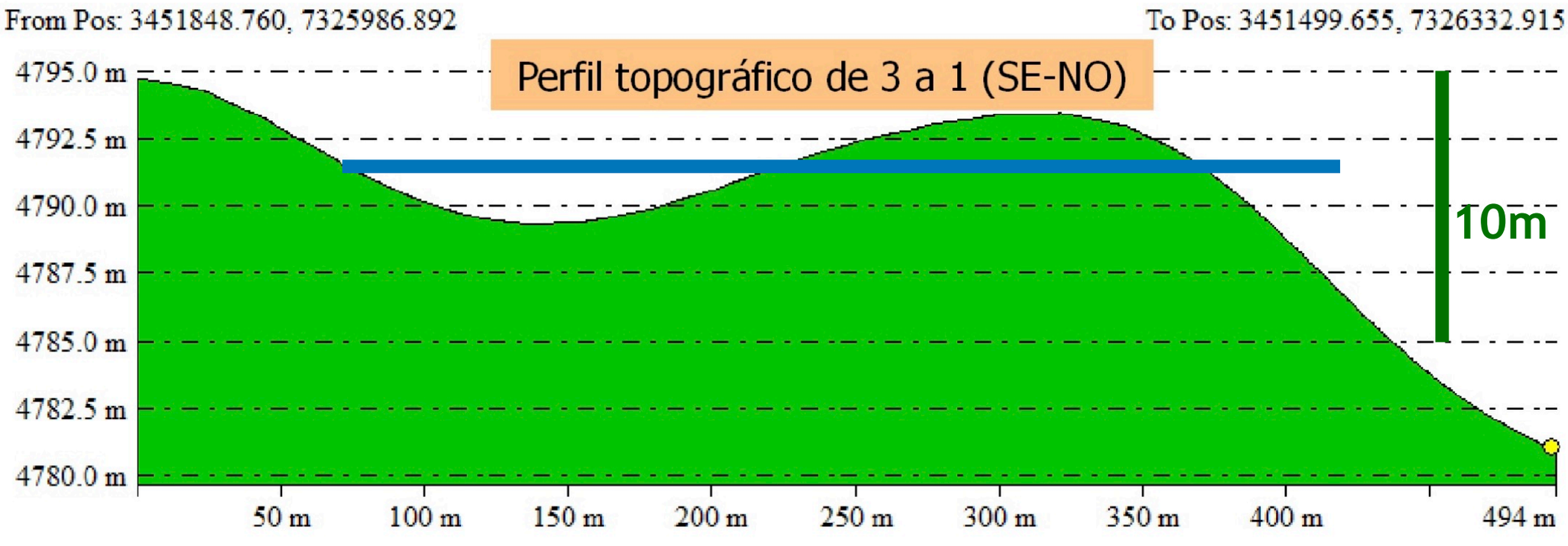
SGSO site:

Earthworks to make it flat with ~1.5º slope (~2.6%)

barometric altitude: +10m







Government support

Federal government: Secretary of Science and Technology
Similar to what is done for LLAMA and QUBIC (and many others)
Typically for infrastructure

Provincial government: Salta is willing to develop the Astronomical Pole
(LLAMA, QUIBIC and several small optical telescopes in
Cerro Macón, Tolar Grande). The addition of SGSO would be taken positively.

Two requirements are usually desired (needed):
- a white paper (done)
- a minimum international organization (?)

Other financial sources are available for science: require scientific returns in 3 yr.
Only feasible for dedicated sub-projects (financed by the IDB - Inter-American Development Bank).

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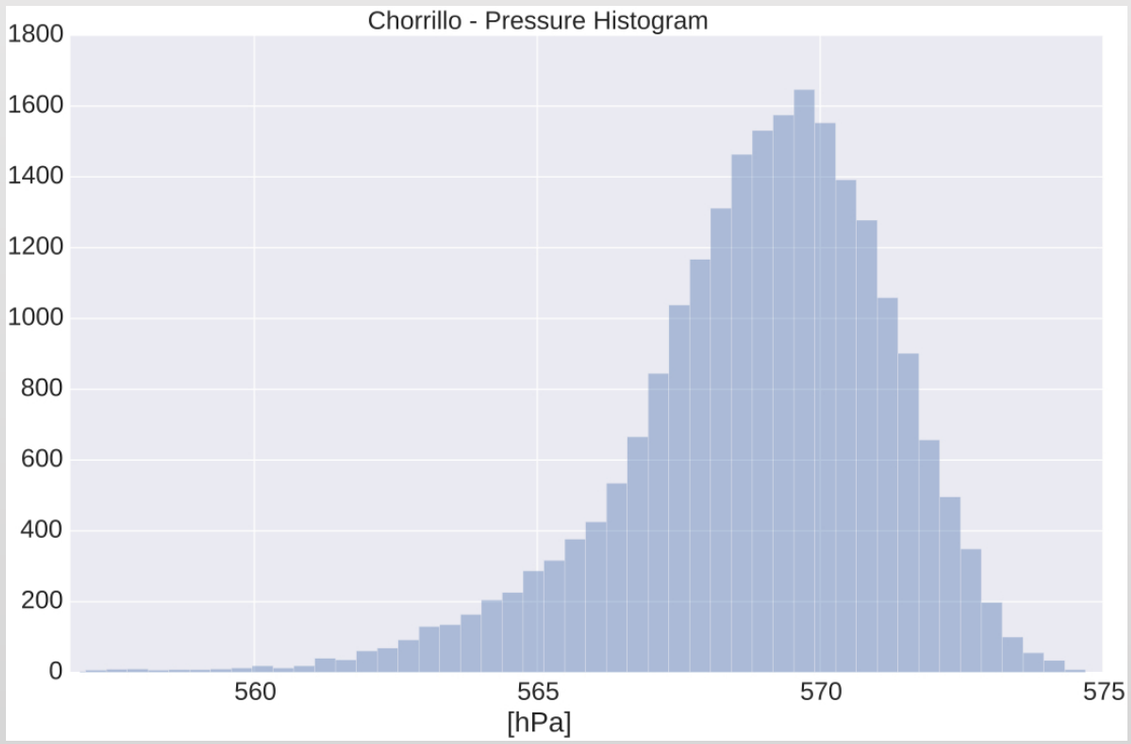
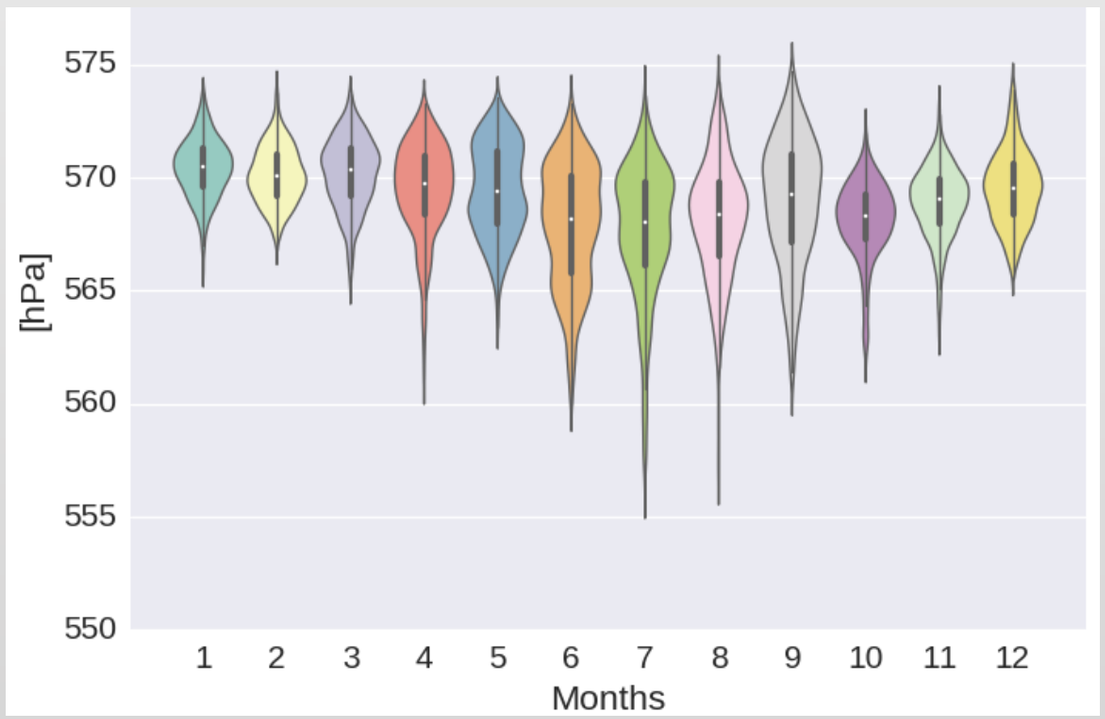
Thanks

LLAMA: Weather station

data taken May 2011 - Dec 2013: Temp; Rel.Hum.; Wind; Pressure;
Installed and operated by IAR (Instituto Argentino de Radioastronomía)

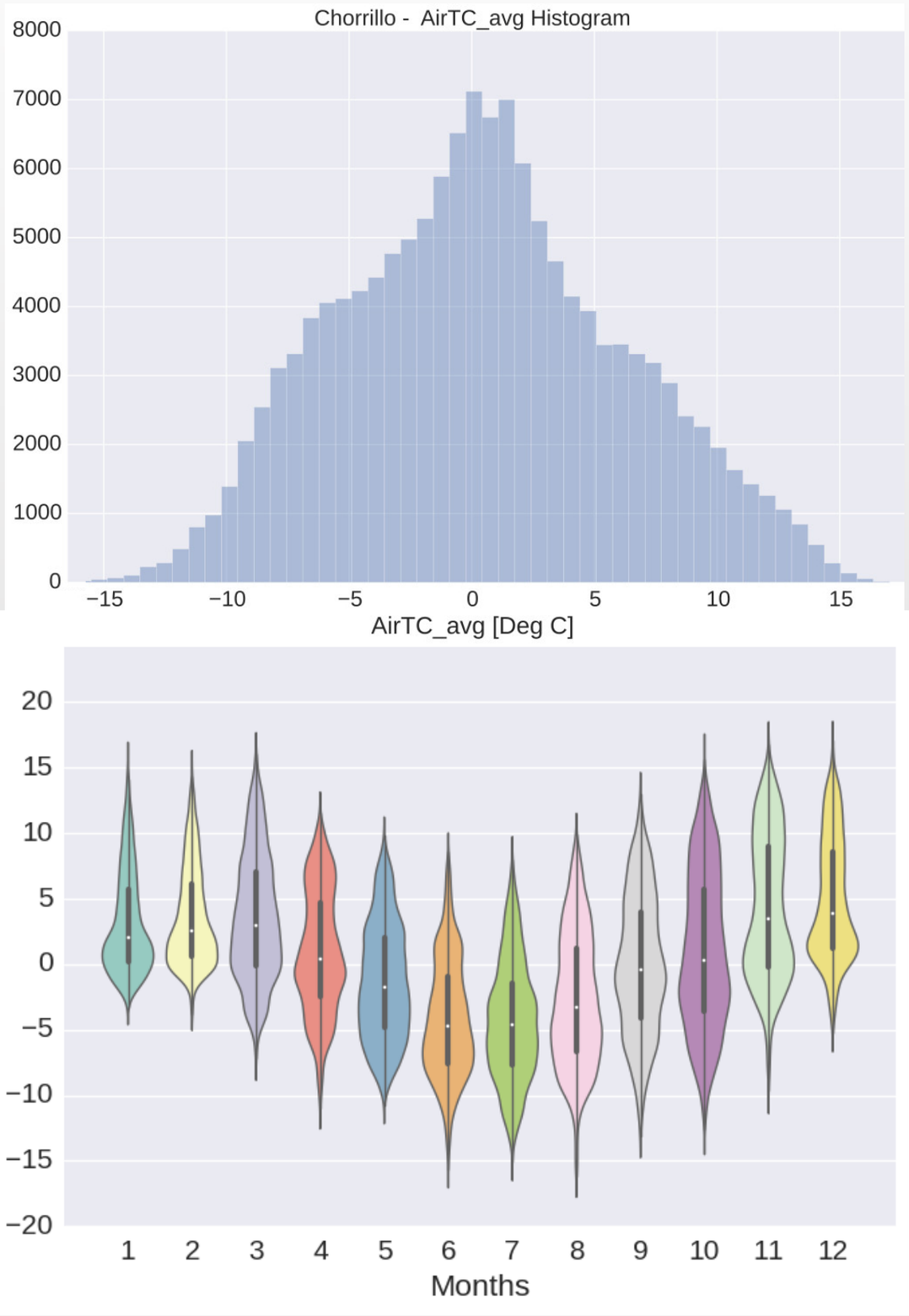
Barometric pressure (hPa)



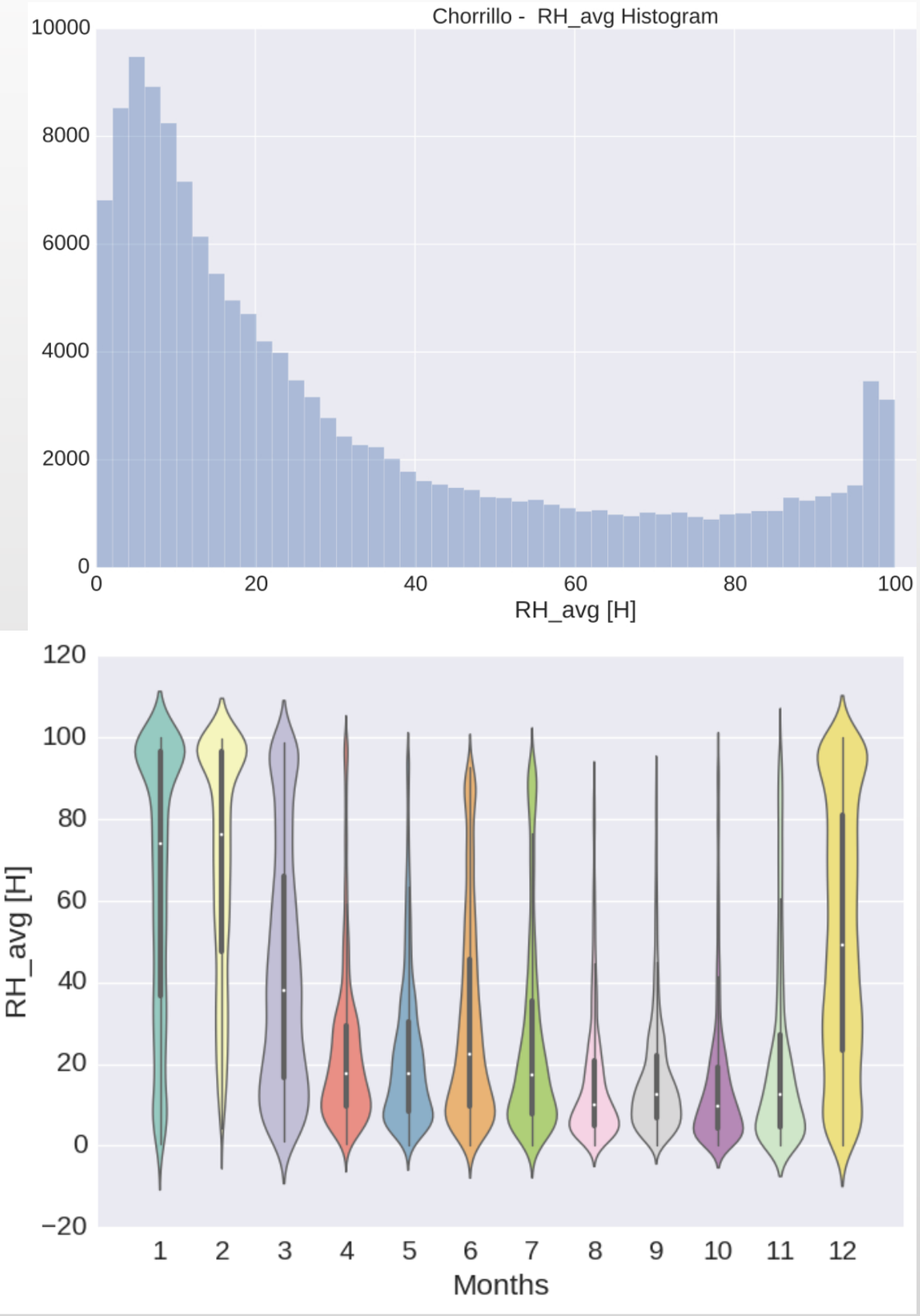


Weather station: Data 2012-2013

Temperature (ºC)

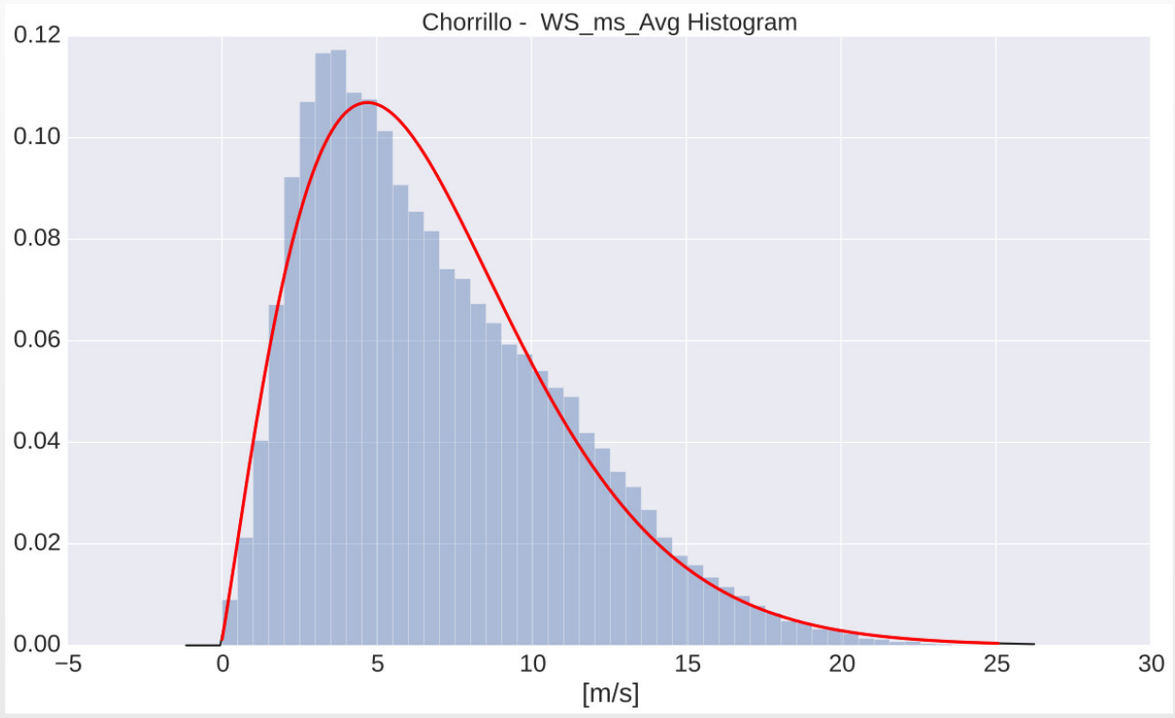


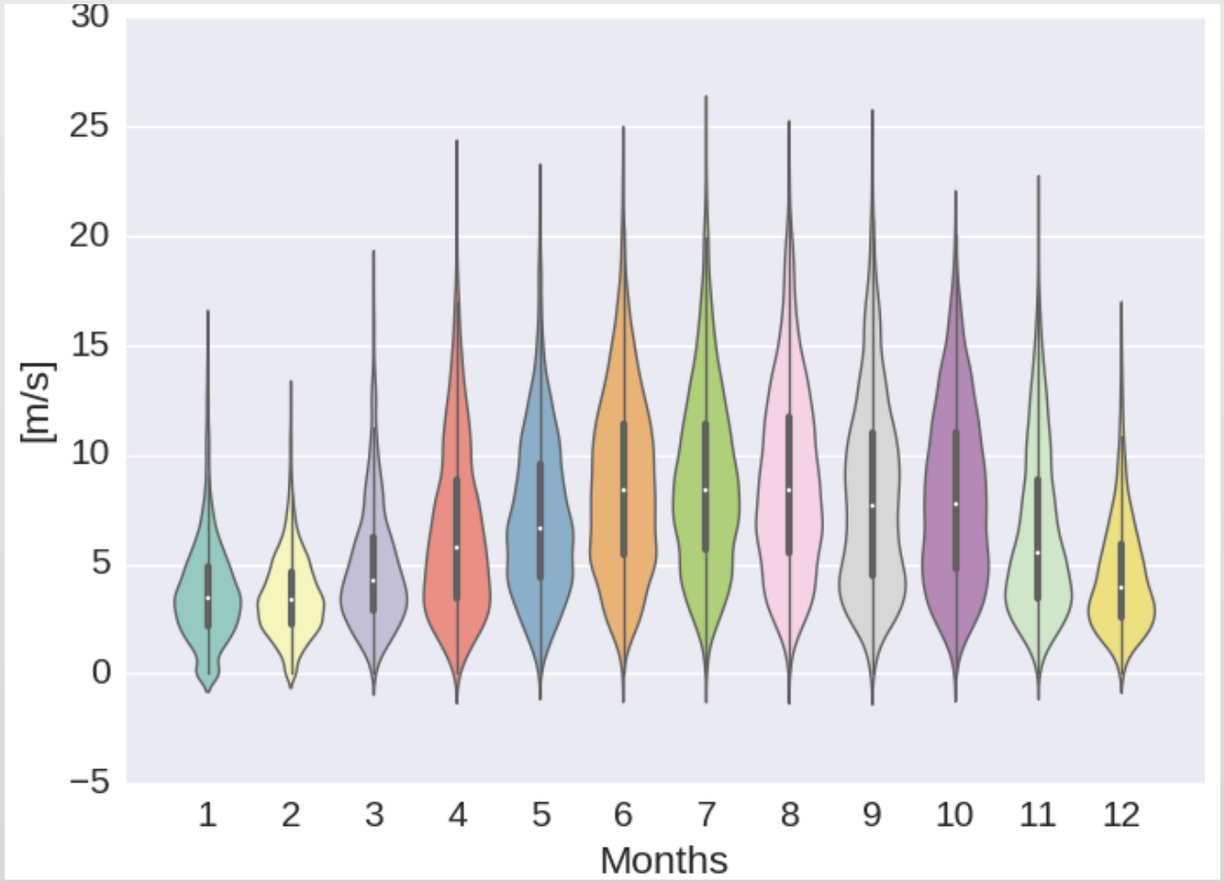
R.H. (%)



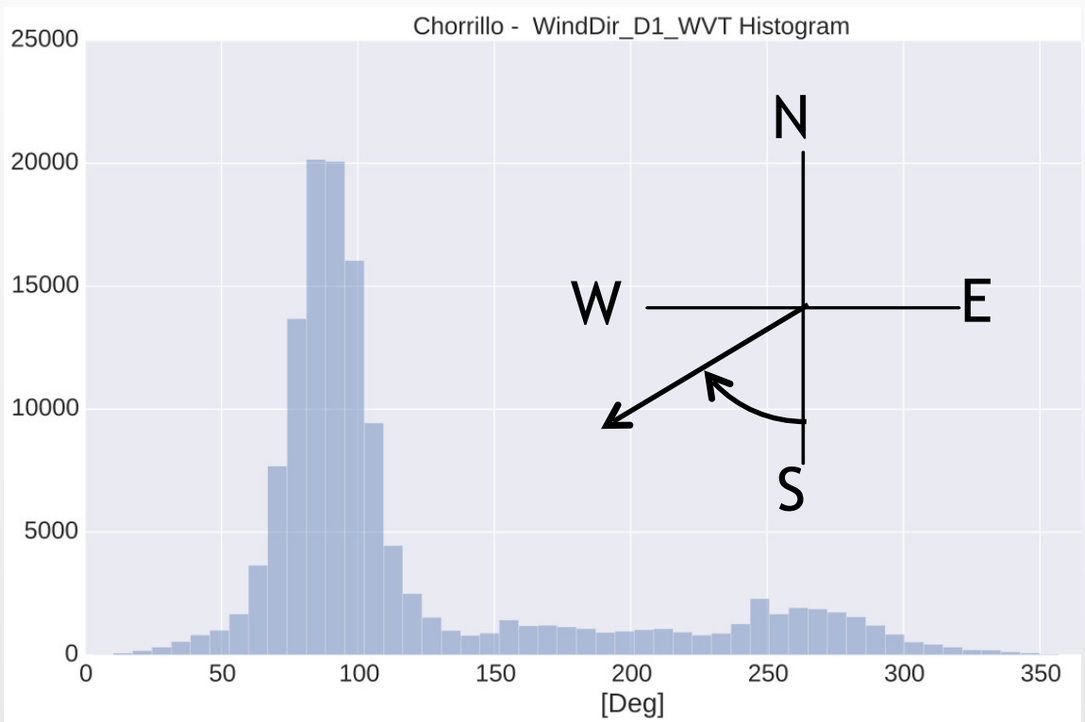
Weather station: Data 2012-2013

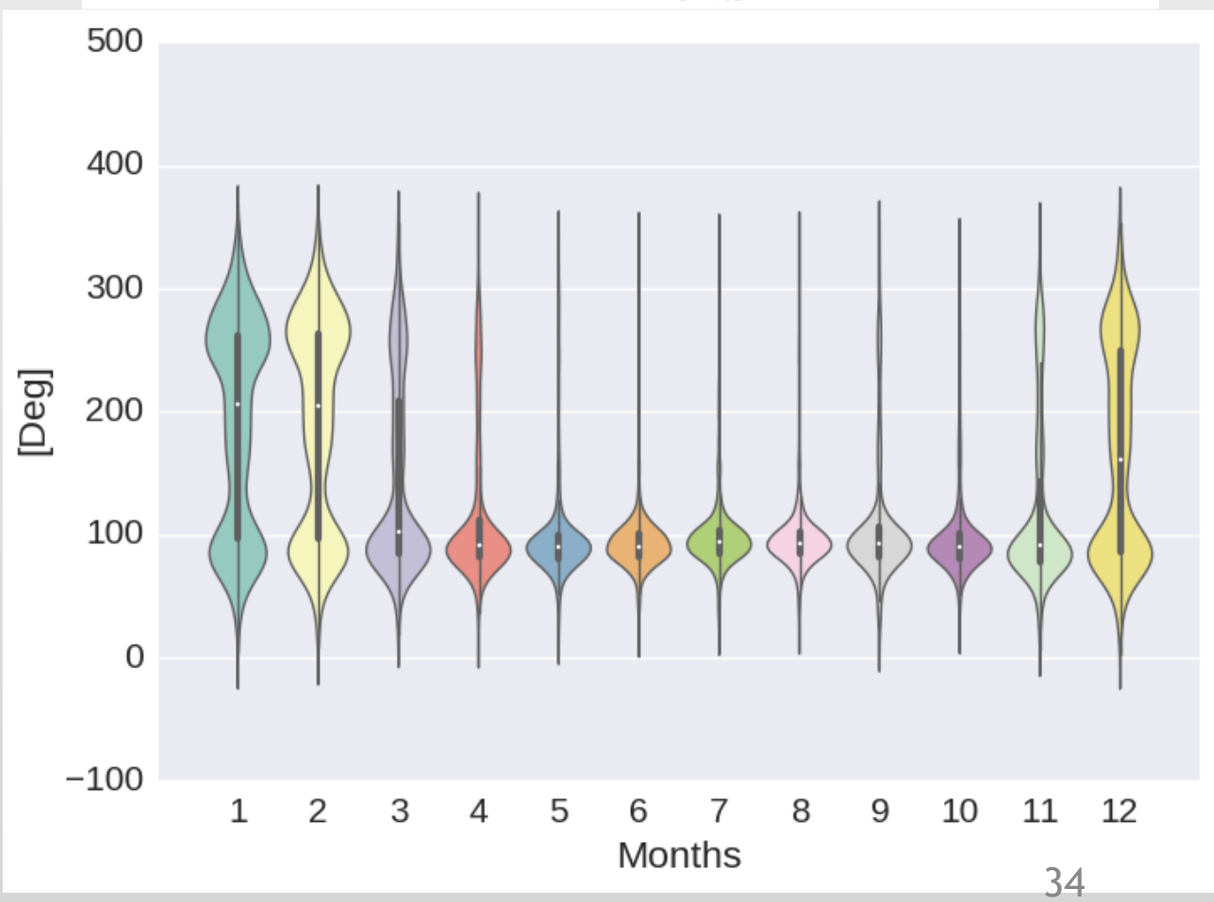
Wind speed (m/s)





Wind direction (deg)





SAC: Access roads

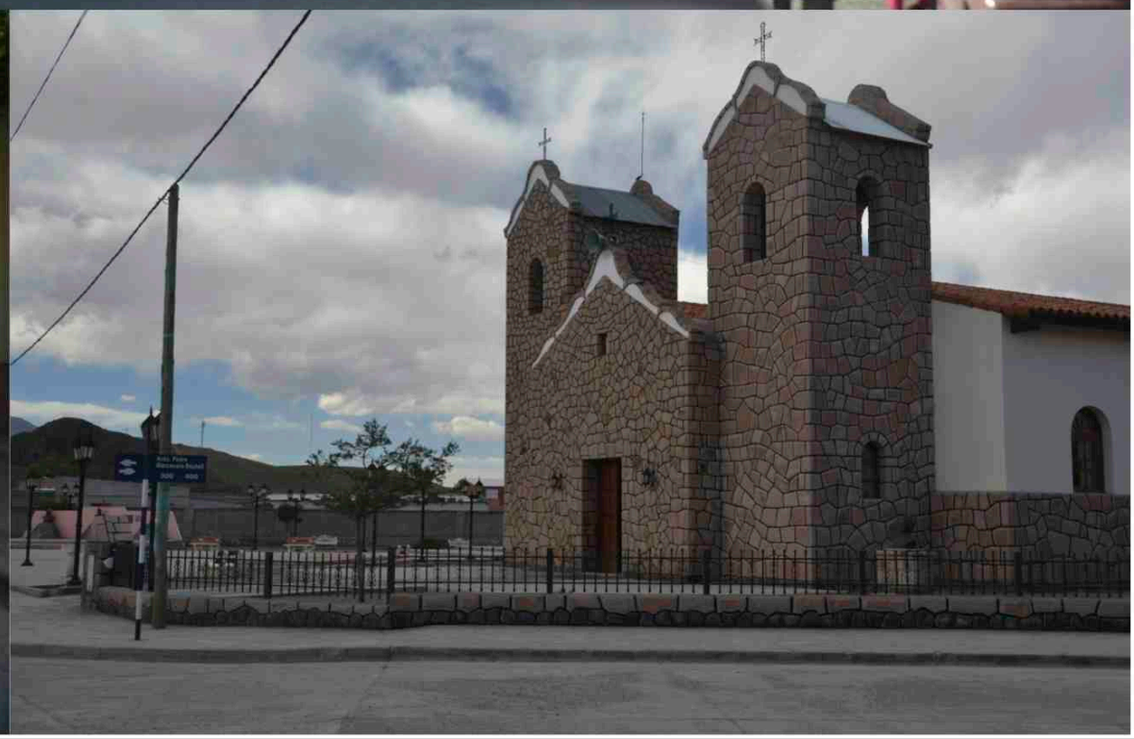
SAC: Lodging: one main hotel + few others

Town

Hotel de las Nubes (lobby)

(entrance)

SAC: Street views



SAC: Street views

El accidente: 19/1/2018