Jicamarca Radio Observatory status during COVID-19

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2020 CEDAR Virtual Meeting
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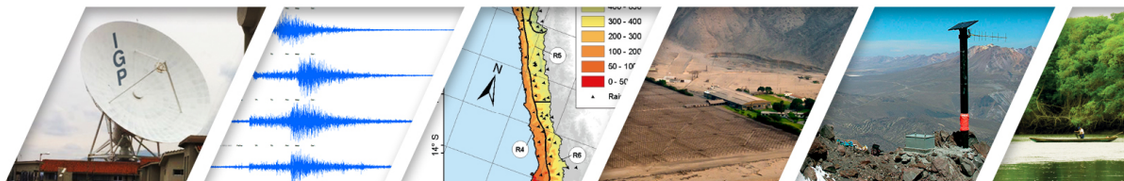
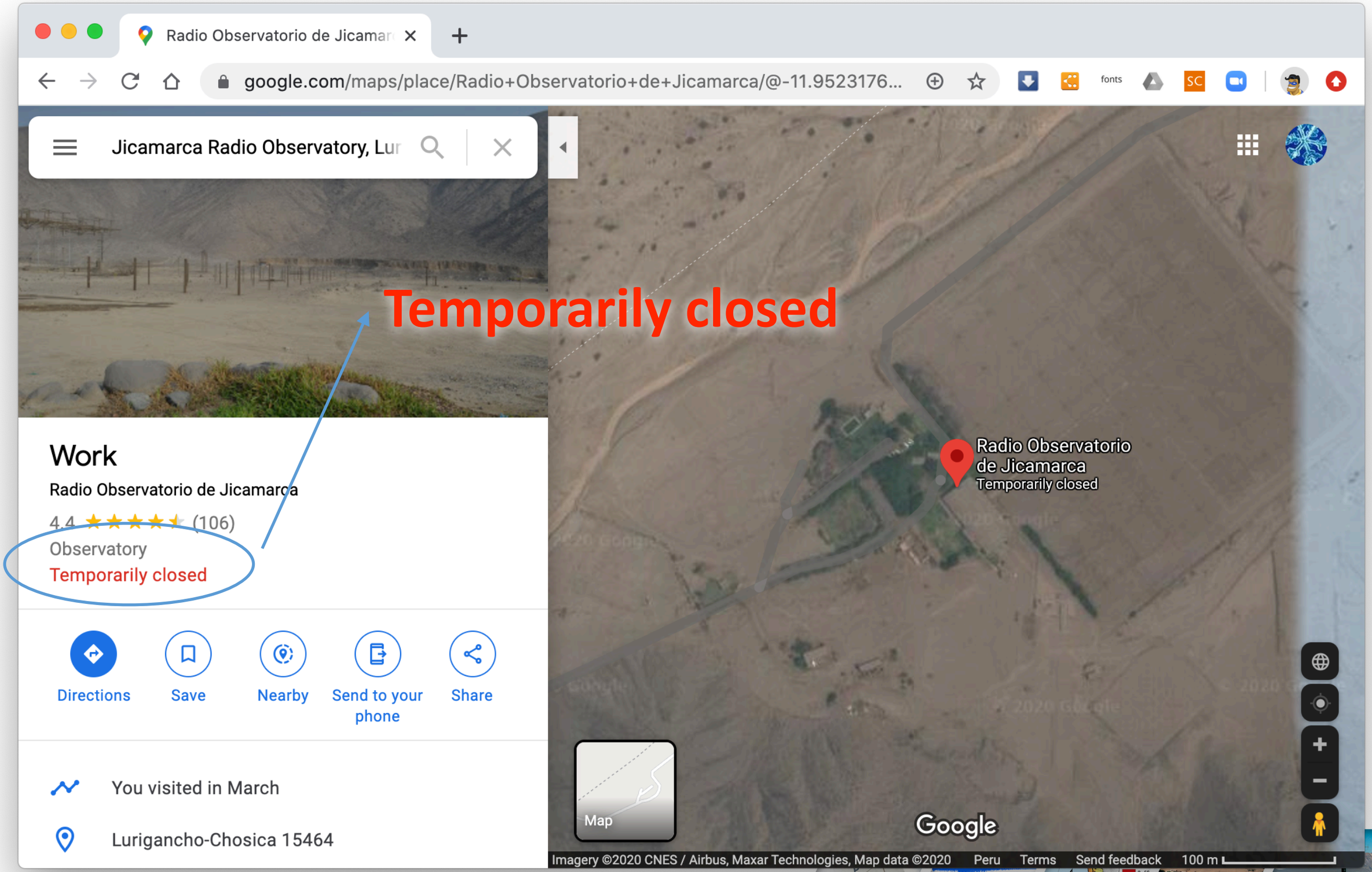
Session: Discovery Science near the magnetic equator

CEDAR Virtual Meeting
June 22-26

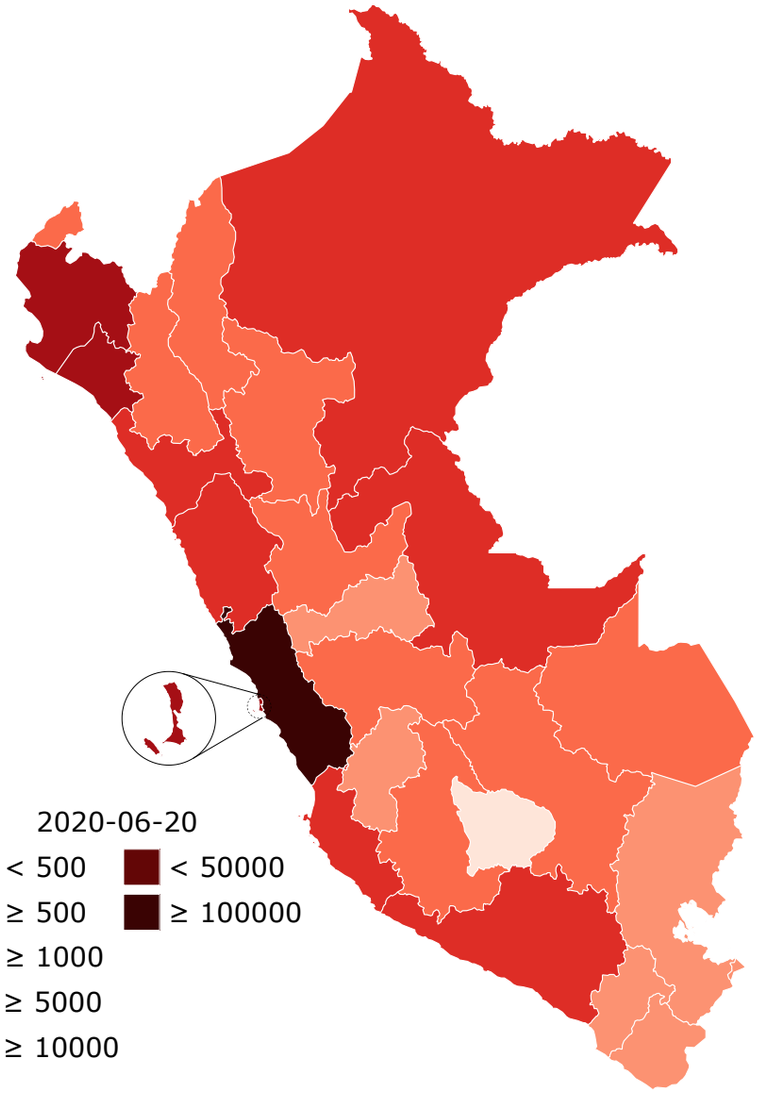


Jicamarca Radio Observatory status

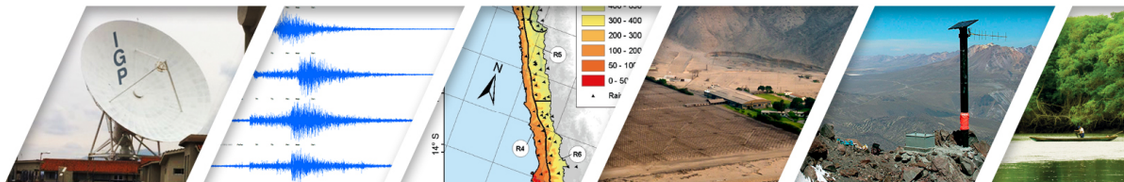


Jicamarca Radio Observatory status

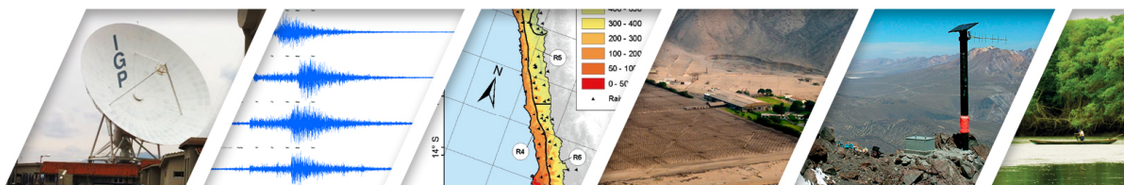
- Peru is in quarantine since March 16 until June 30, 2020.
- The observatory is currently closed.
- The main radar has been running in JULIA mode without interruptions since the beginning of the quarantine.
- JRO personnel are working from their homes.
- Expectations:
  - July: Radar operations team will return.
  - August: High-power operations will restart.



COVID-19 - Peru situation

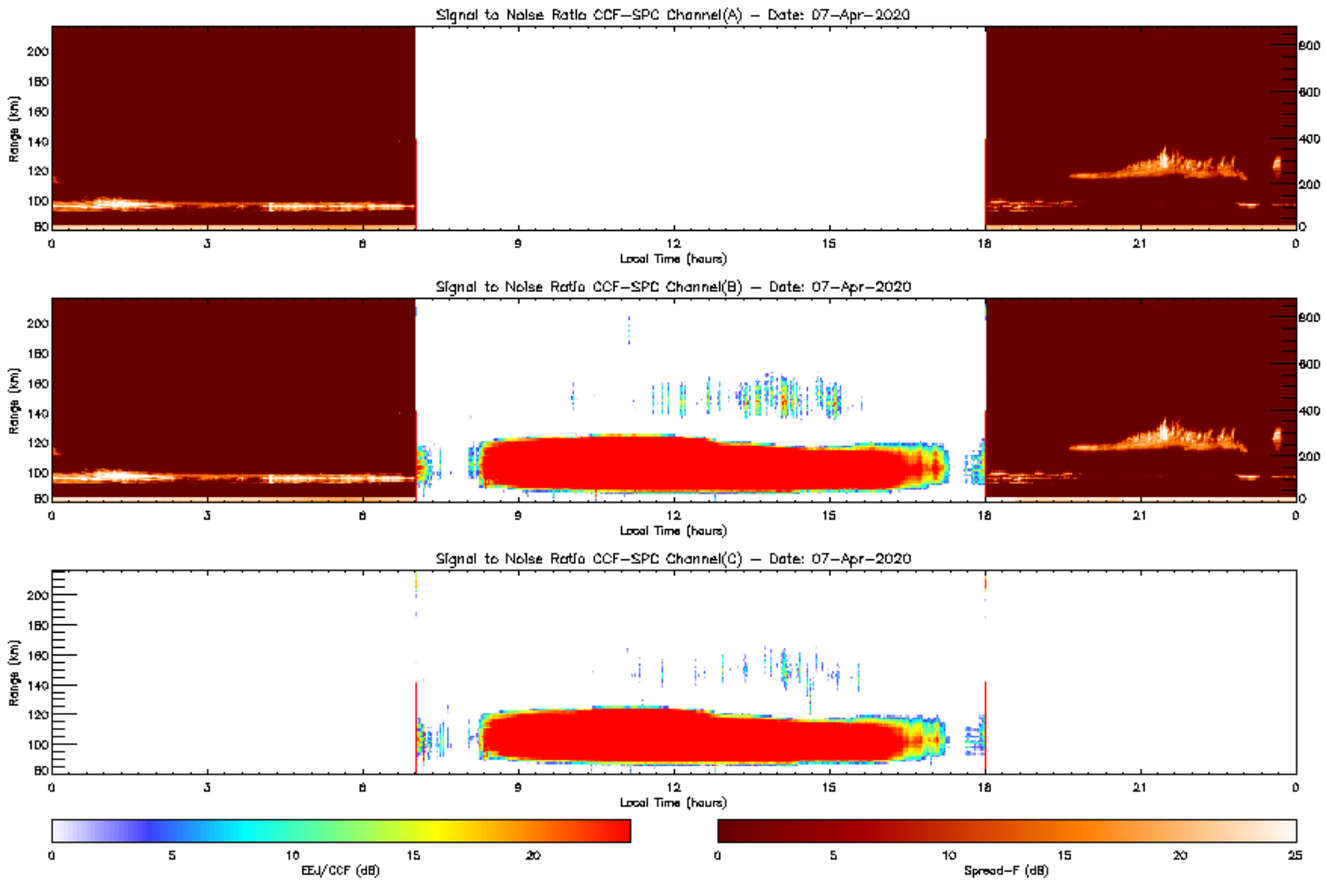


Jicamarca radar and other instruments status

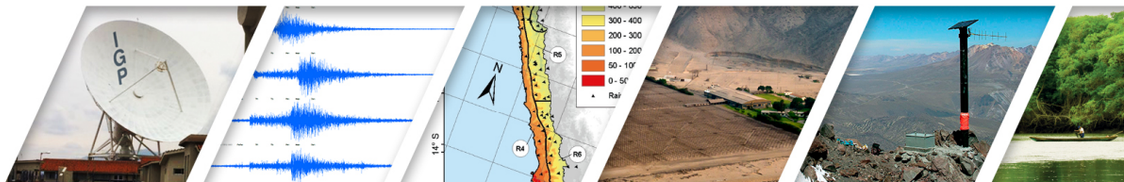


Jicamarca radar operation status

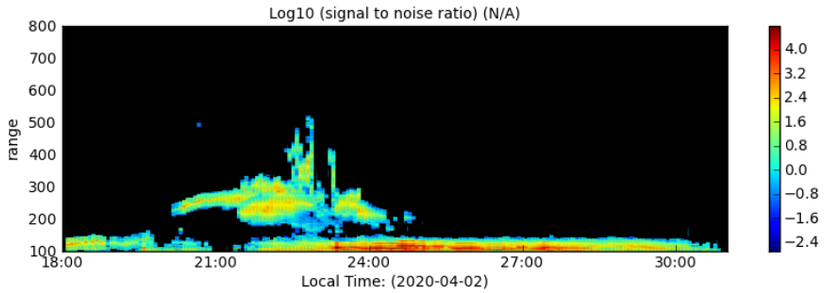
- JULIA observations status
  - Spread-F and imaging data are collected every night.
  - 150-km echoes are low during this season.
  - EEJ oblique observations stopped due to a TX failure.
- To-do list after the quarantine.
  - Full antenna maintenance.
  - Low-power transmitters maintenance.
  - Review interference issues in reception.

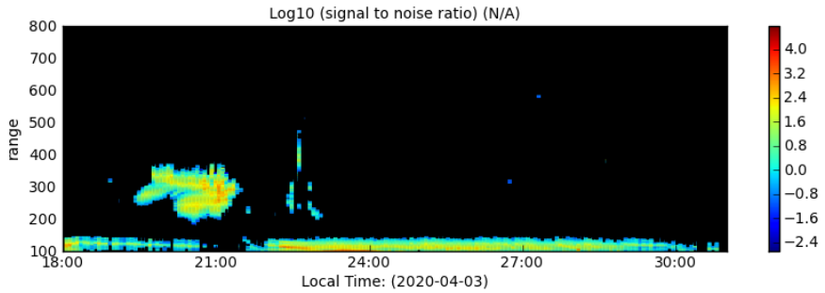


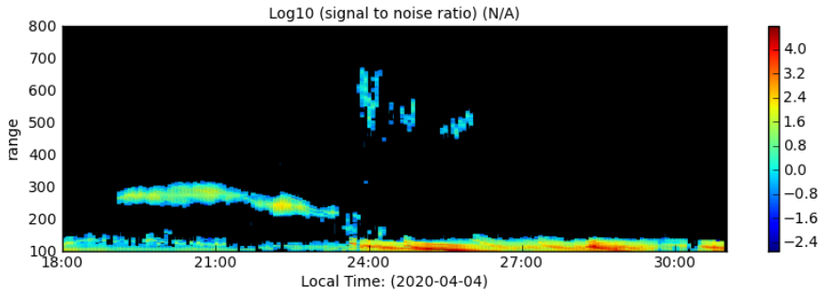
Data available in madrigal
http://jro.igp.gob.pe/madrigal/

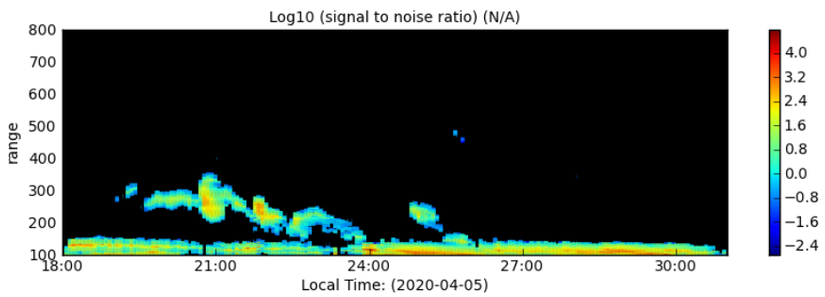


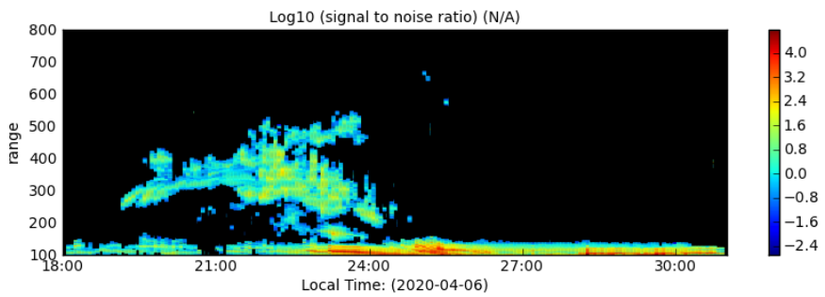
JULIA ESF mode running every night

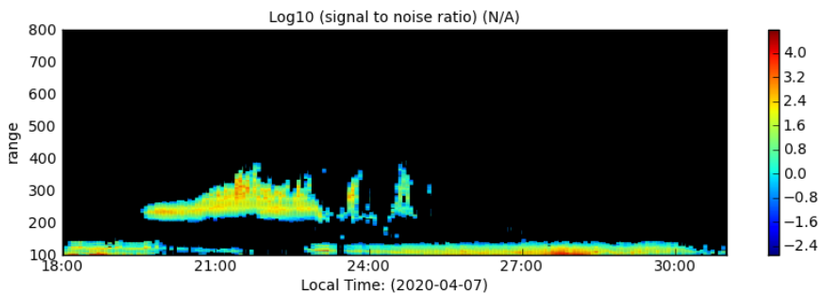


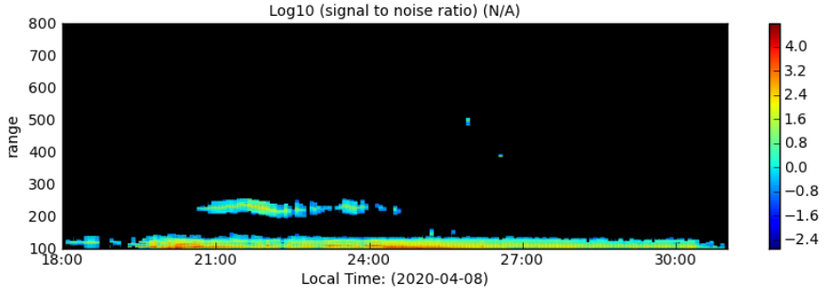


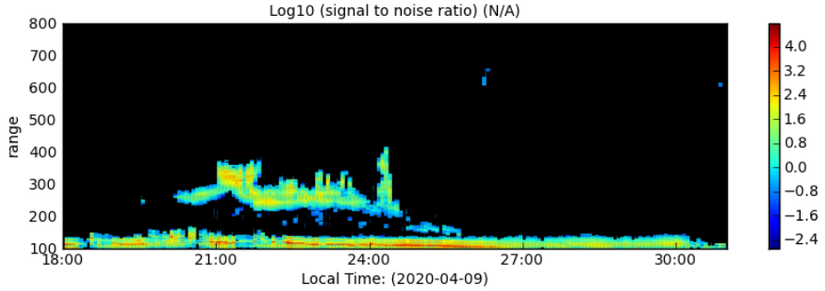


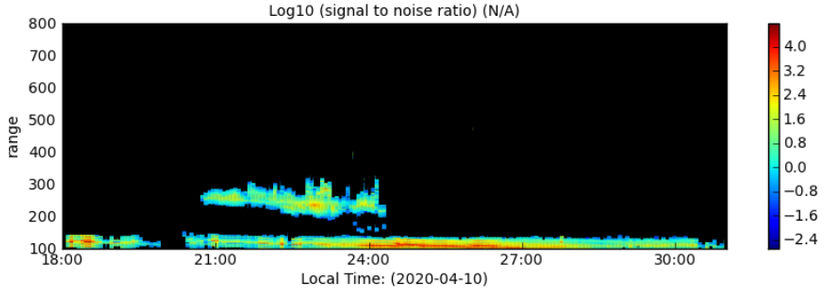


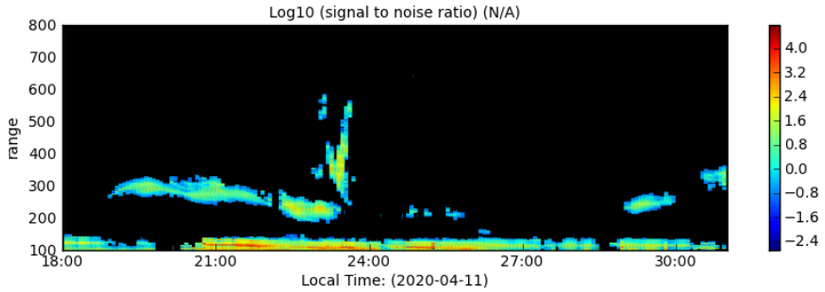


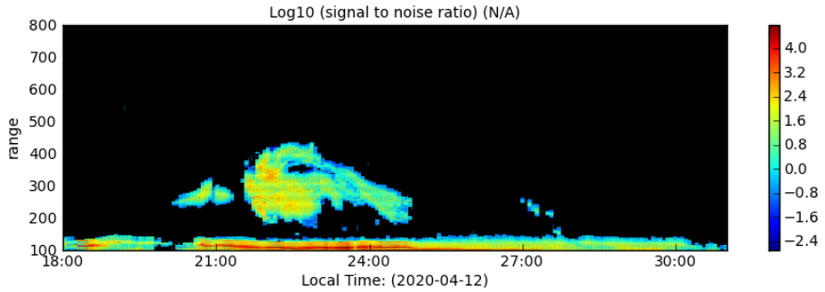


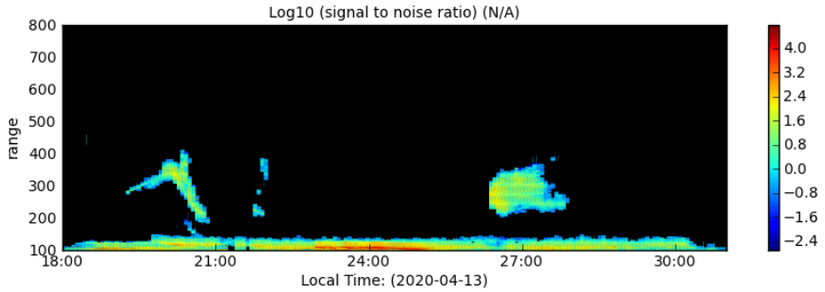


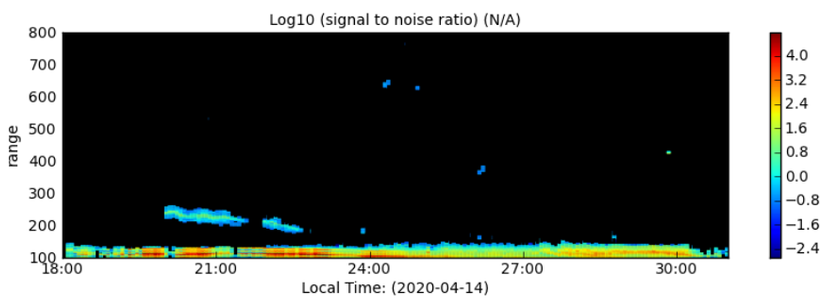


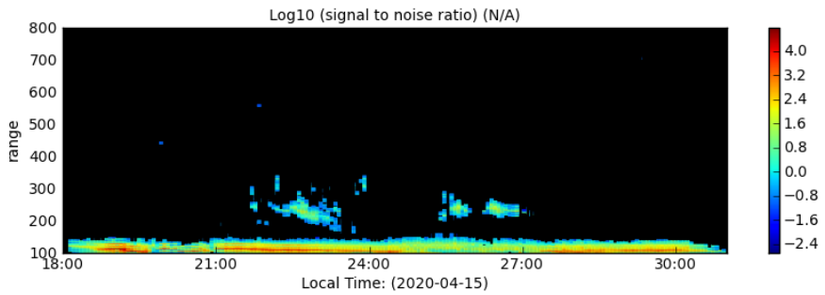


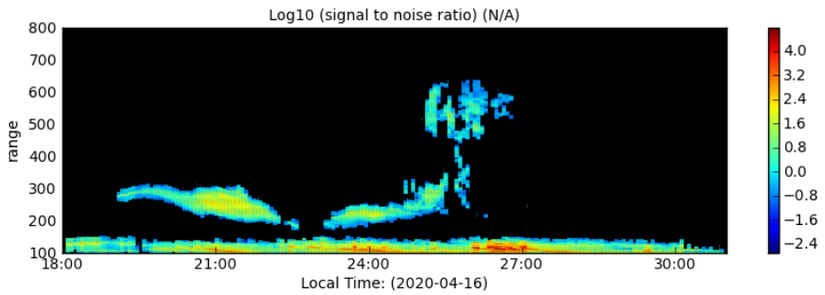


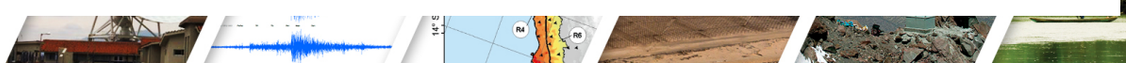




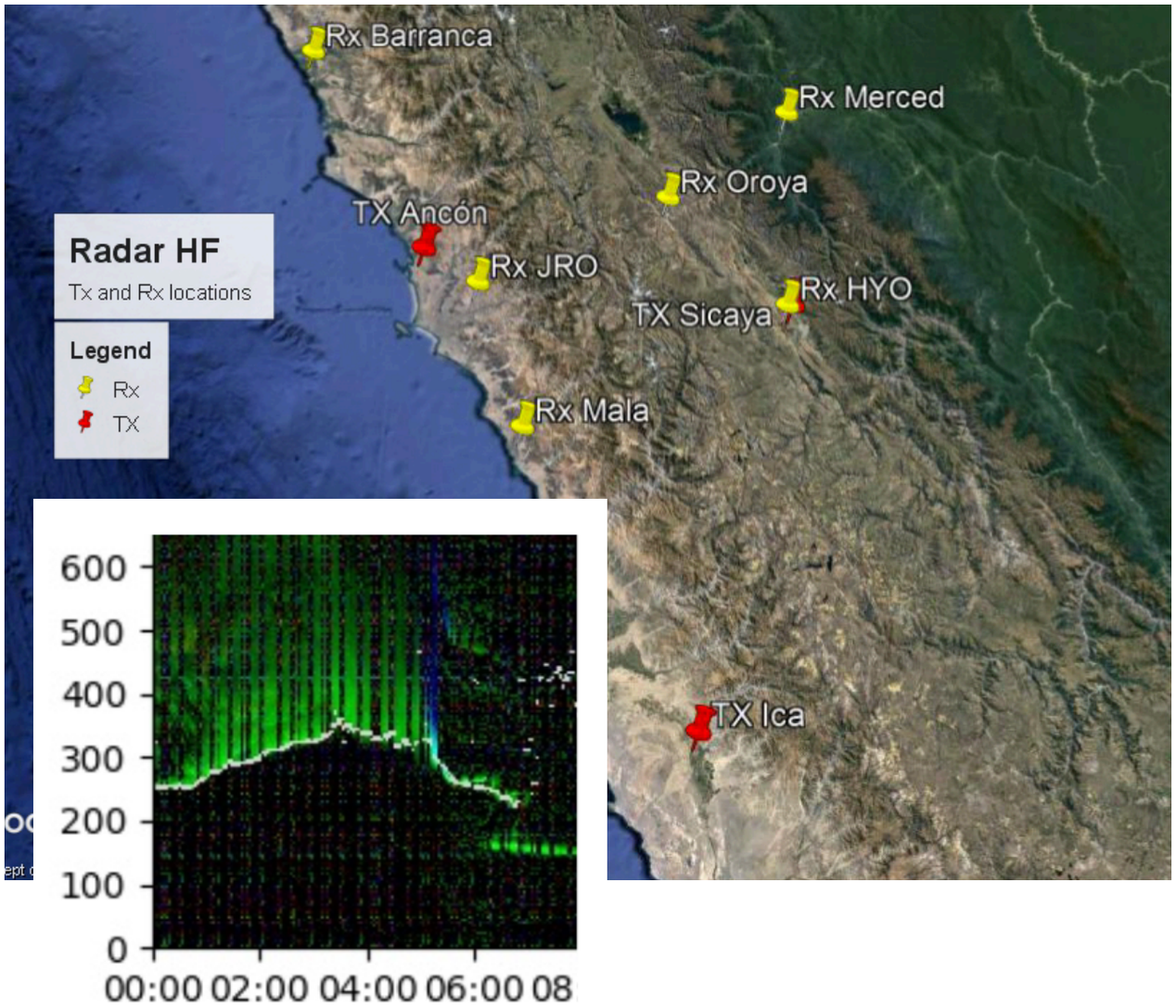


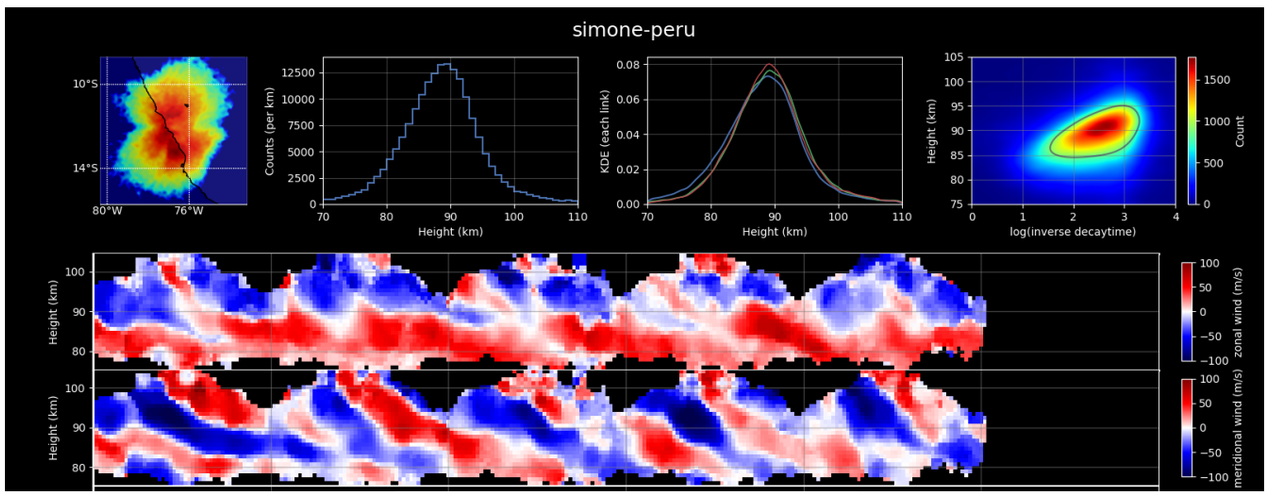






HF radar & SIMONE Peru situation

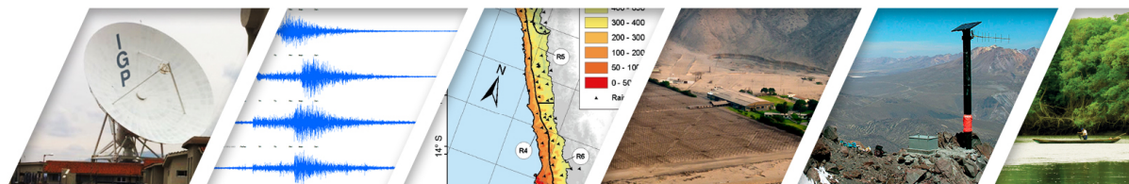




Multistatic HF Sounding System

- 3 Tx Stations: Ancon, Sicaya, Ica
- 6 Rx Stations: Barranca, JRO, Mala, Huancayo, Oroya, La Merced
- Some stations are not running properly and require maintenance.

- SIMONe deployed in September 2019.
- 1 TX station at JRO
- 4 Rx stations in Ancón, Azpitia, Huancayo, Sta. Rosa. 1 Rx station pending to be installed.
- Preliminary wind maps generated daily.



LISN network status

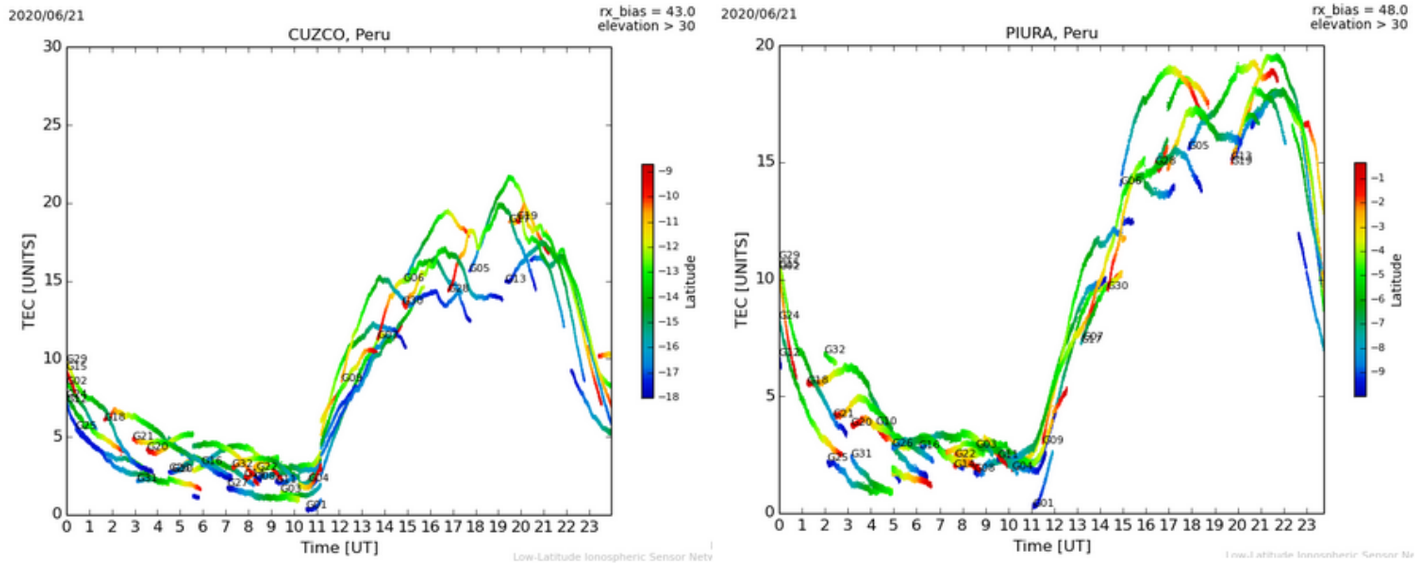
LISN has continued operating during the quarantine period.

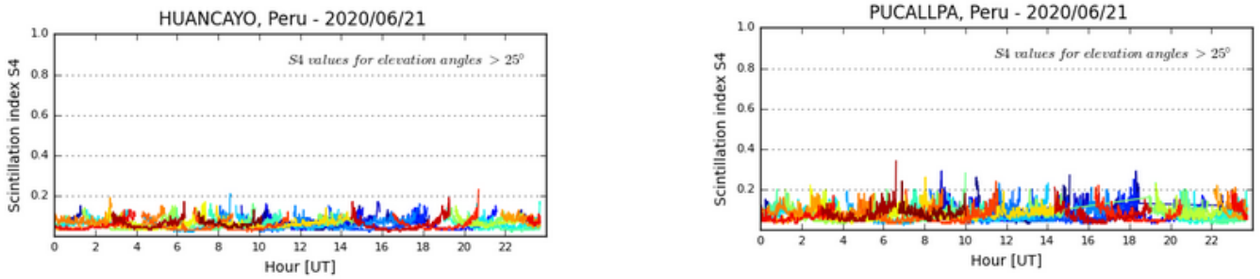
TEC, S4, magnetograms, ionograms and other products are available in the LISN website.

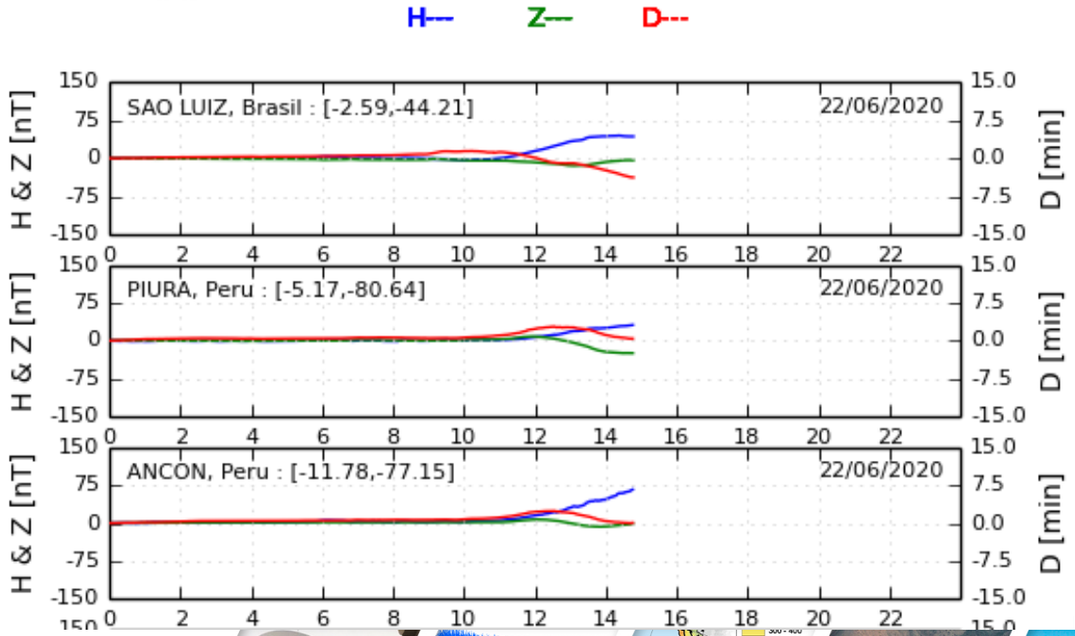
http://lisn.igp.gob.pe

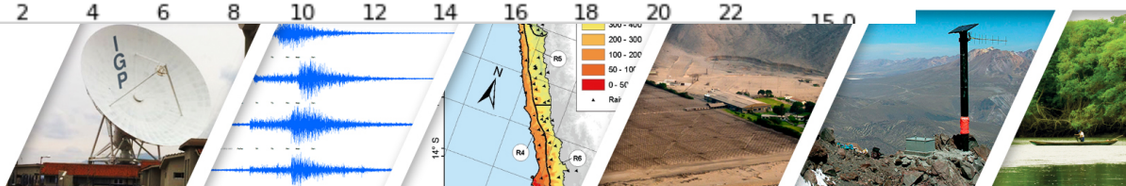
However, some instruments, including all four ionosondes, are not operating now due to maintenance issues.

Maintenance trips to LISN stations are needed, but we cannot plan them yet due to lockdown in South America.

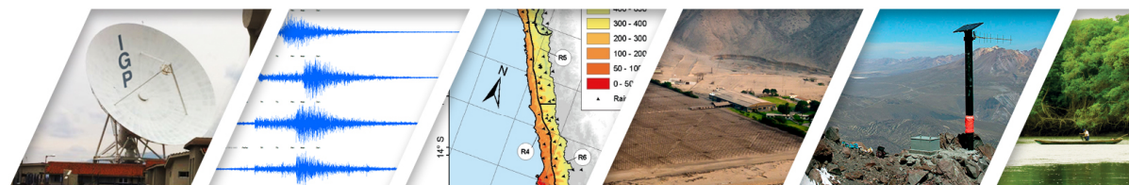








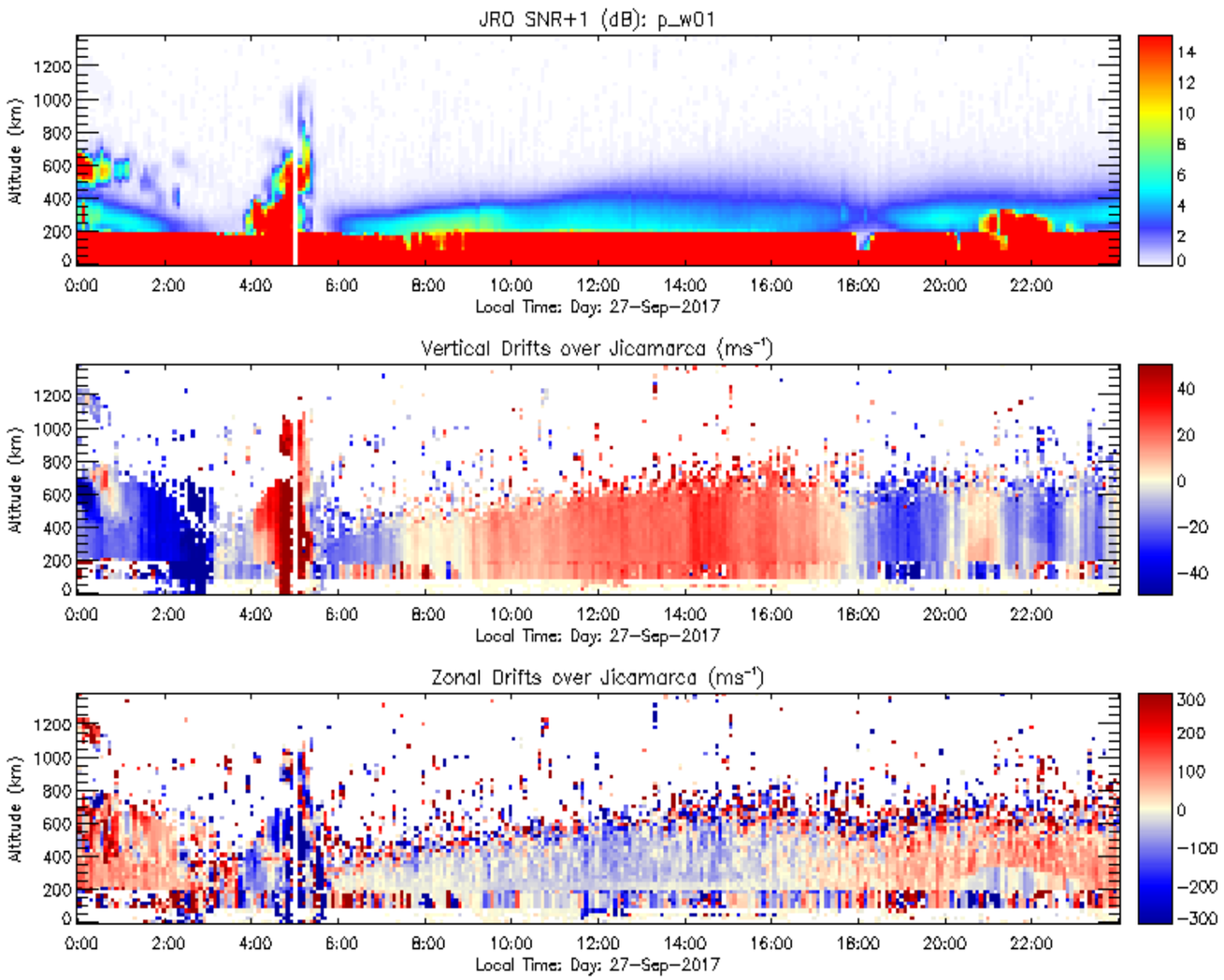
Status of radar upgrades for continuous operation



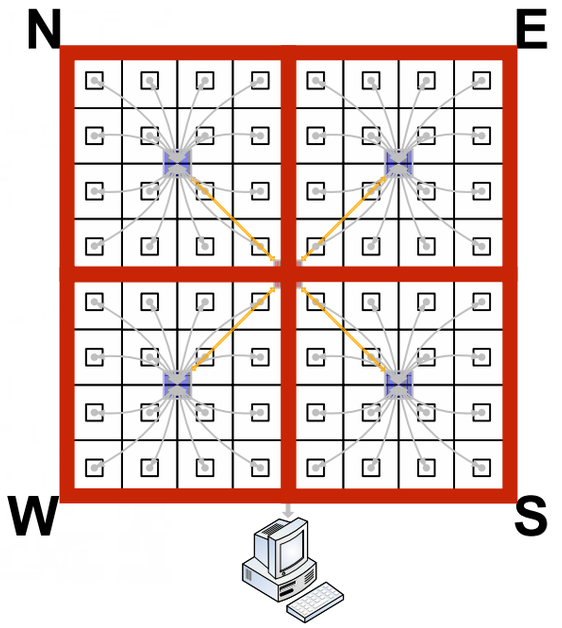
Jicamarca Radar upgrades

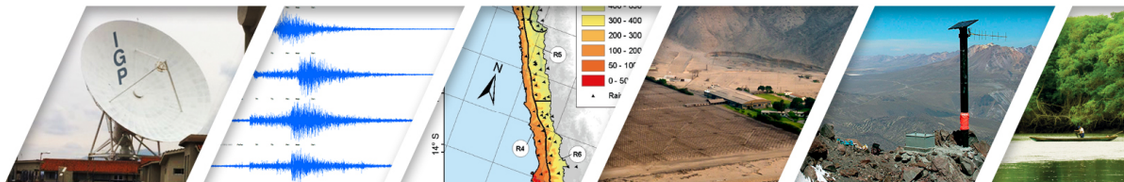
We have received support from NSF to carried out the following radar upgrades.

- Complete the electronic antenna beam switching system.
- Replace the tetrode-based 100kW transmitters with solid-state technology.
- Replace the antenna ground plane.



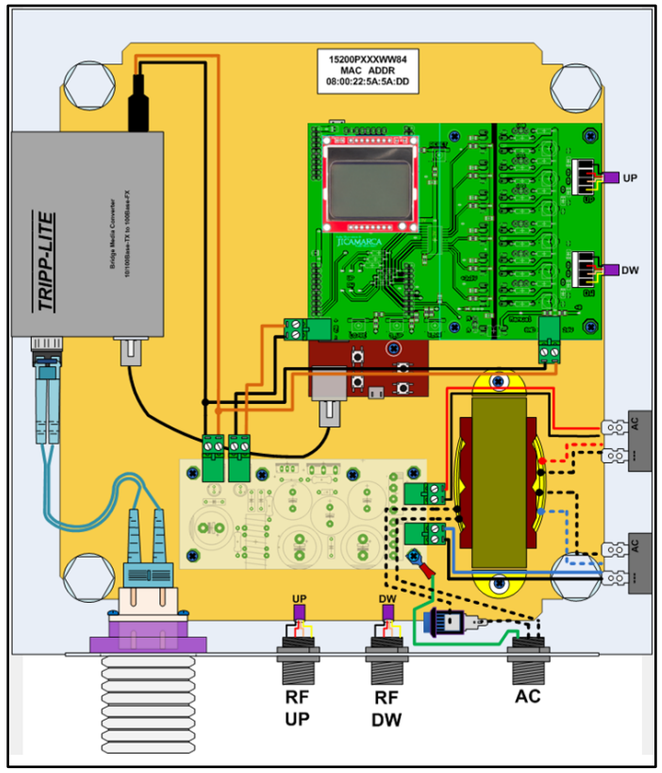
Goal: A new JULIA mode to measure F-region densities and drifts in a routine basis.

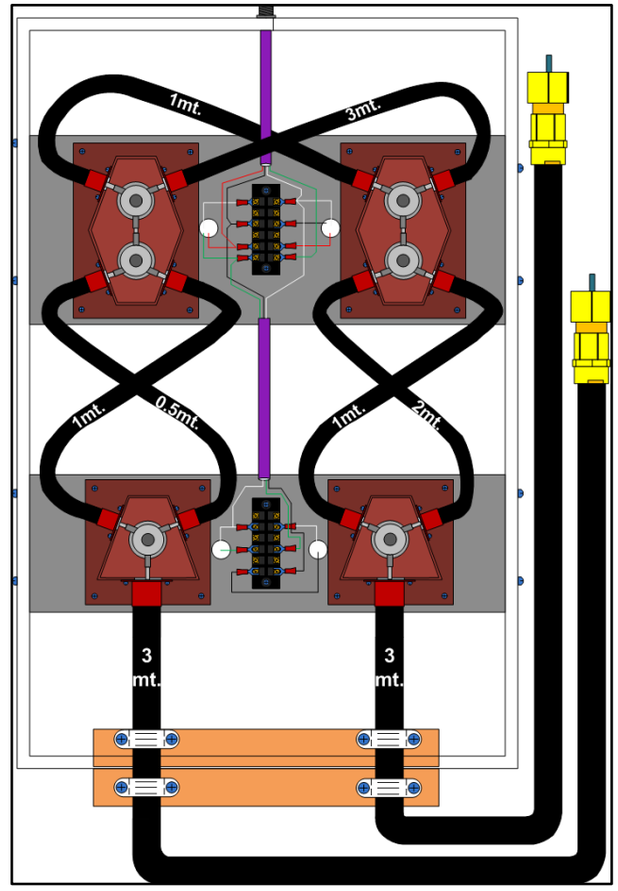


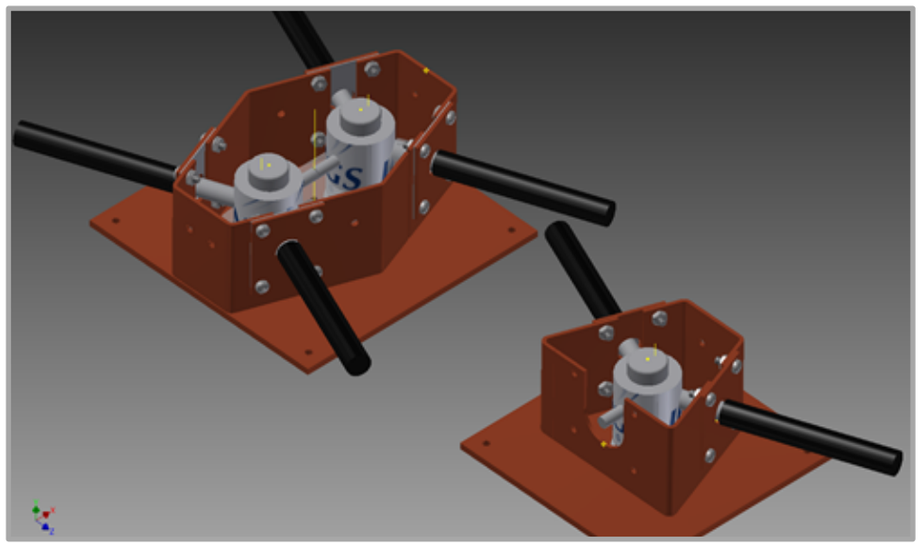


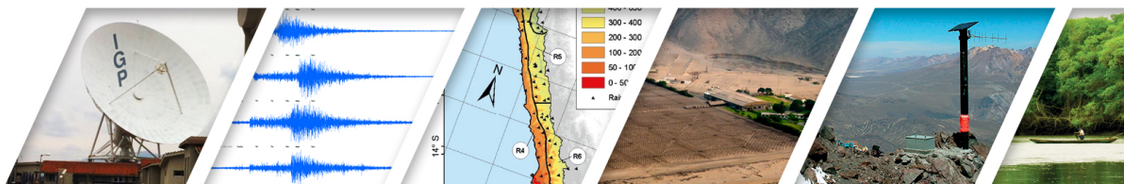
Automatic Beam Switching - ABS

- Updated control modules:
  - Use of IP66 metal enclosure.
  - System control based on a MCU instead of an old embedded linux board.
  - Use of linear power supply to avoid interferences.
- Updated RF modules:
  - Use of IP66 metal enclosure.
  - 3d printed insulation pieces.
  - Compact and smaller size.
- Currently the ABS modules for the east and west antenna quarters are under construction.



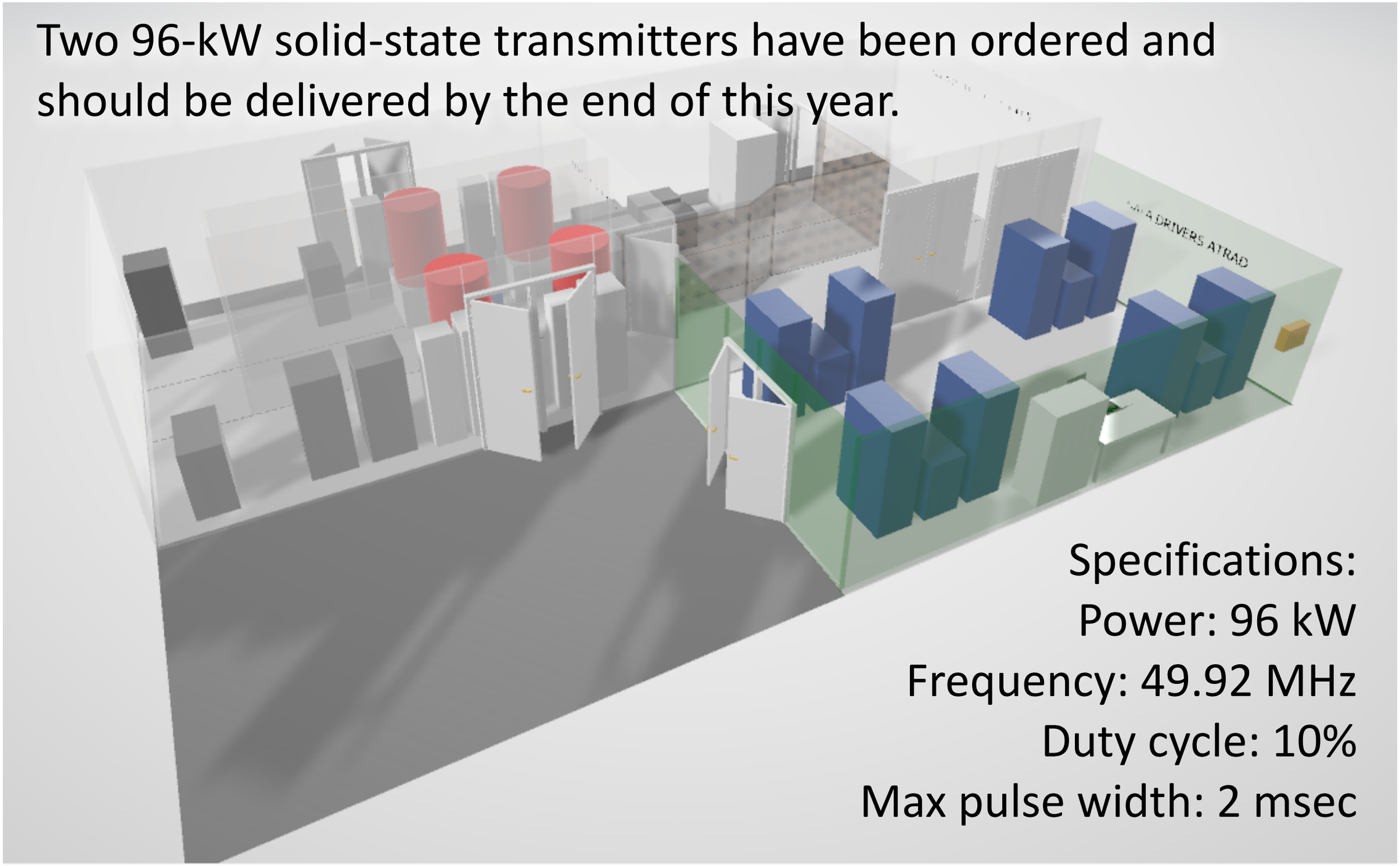






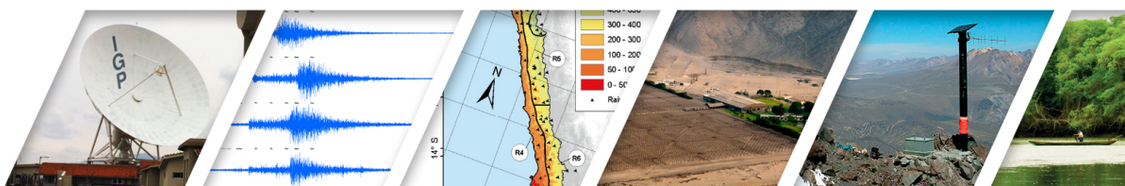
New Drivers - solid state transmitters

Two 96-kW solid-state transmitters have been ordered and should be delivered by the end of this year.



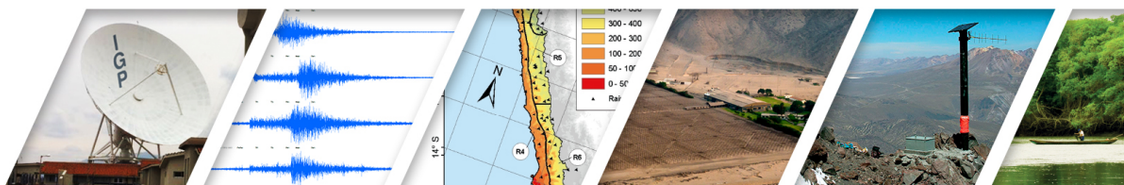
Specifications:
Power: 96 kW
Frequency: 49.92 MHz
Duty cycle: 10%
Max pulse width: 2 msec

Preliminary design of the new TX room for the solid-state “Drivers”.

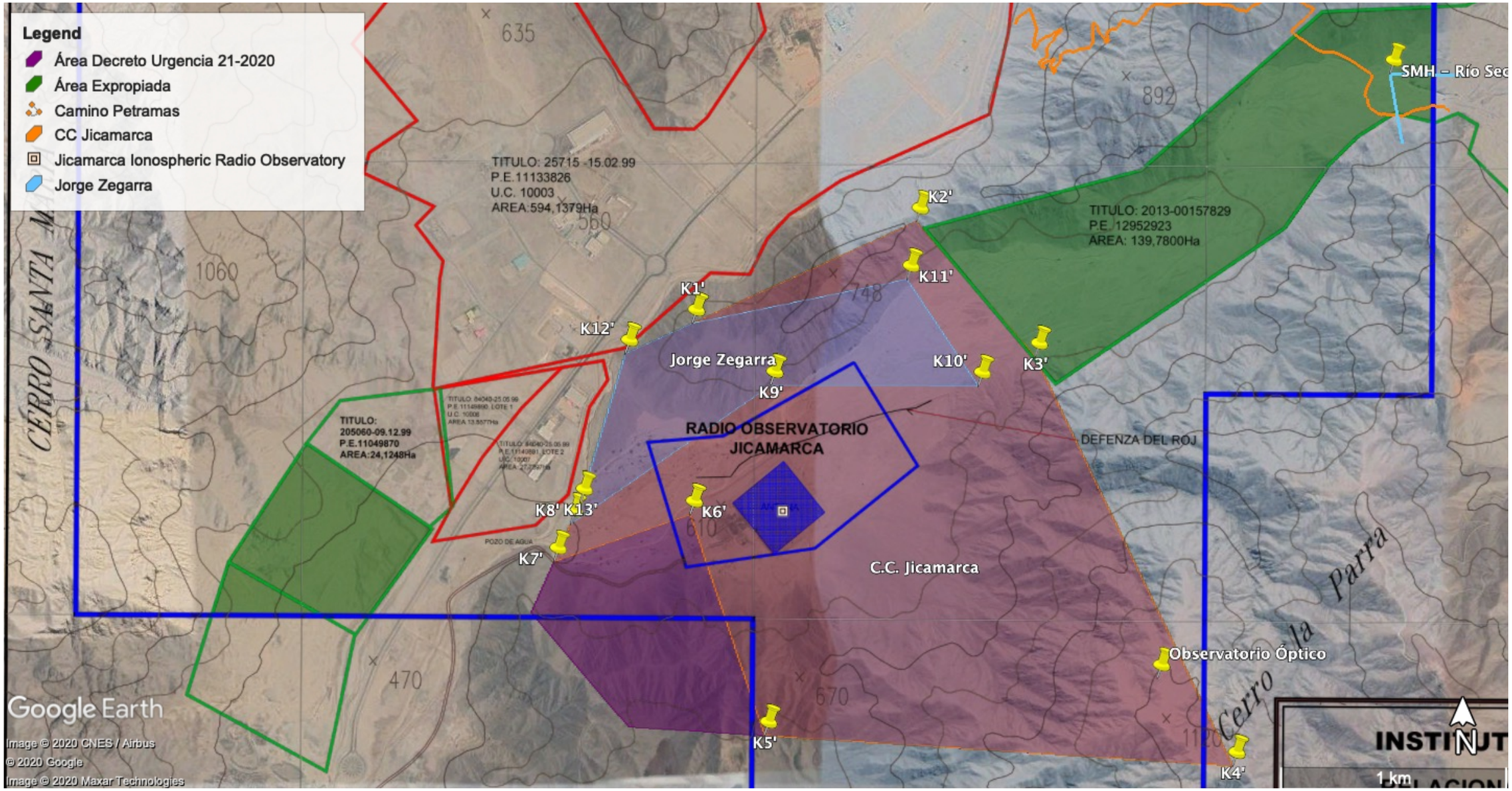


Conclusions

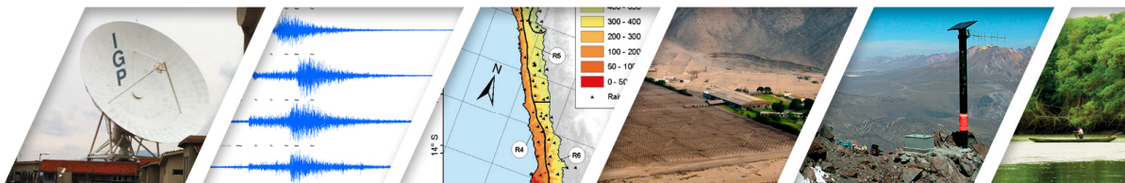
- The Jicamarca radar has been operating in JULIA mode for about 3 months continuously during the quarantine period.
- It is expected that the radar operations team will return to the observatory in July 2020 and that high-power operations will restart in August 2020.
- Other instruments have suffered due to the lack of maintenance. Trips should be scheduled in the next months.
- Radar upgrades are under implementation.
  - Solid-state TXs should be delivered by the end of this year.
  - ABS modules should be deployed in the first months of 2021.



Good news - JRO Protection Area



In January 2020, the Peruvian government declared of national interest and public necessity the implementation of a protection area for the observatory. The goal is to acquire 400 hectares around JRO in order to secure its continuity.



Thanks for your attention!