

Preserving Dark and Quiet Skies in Equatorial Regions: Ecuador's Vision for a Radio Astronomy Future

Ericson Lopez

Quito Astronomical Observatory, National Observatory of Ecuador

Escuela Politécnica Nacional, Ecuador

IMPORTANCE FOR ECUADOR'S NEW RADIO ASTRONOMICAL OBSERVATORY

- Protecting dark and quiet skies is crucial to the scientific viability of Ecuador's upcoming radio observatory, planned within the next 15 years.
- Early implementation of regional radio-quiet zones and international cooperation will help safeguard observational integrity.

Satellite impacts on observational astronomy are especially crucial for the planning of the new radio observatory .

Future radio and optical observatories in Ecuador (e.g., proposed facilities in Malchinguí or Jerusalem Park) **must plan** for high levels of satellite activity.

Ecuador can observe **both northern and southern skies year-round.**



PRELIMINARY REPORT: CANDIDATE RADIO-QUIET REGIONS IN ECUADOR

Project: Establish the first Radio Quiet Zone in the equatorial Andes.

Ecuador currently lacks a protected RQZ

Candidate Areas: Sites like **Parque Jerusalén**, **Cayambe-Coca Highlands**, and **Antisana** (already protected natural áreas) have low population density, high altitude, and natural RFI shielding.

Location of the new radio astronomical observatory

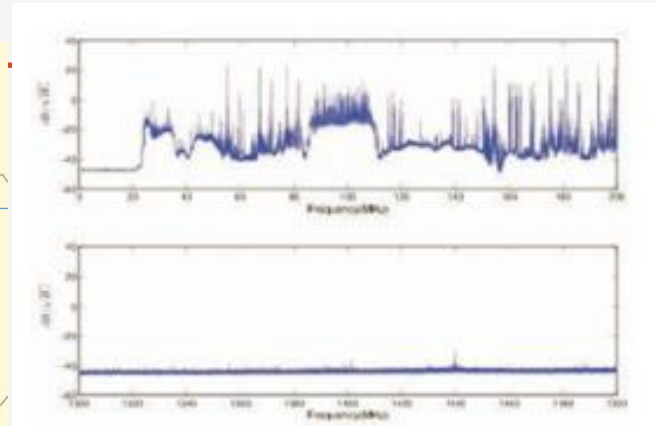
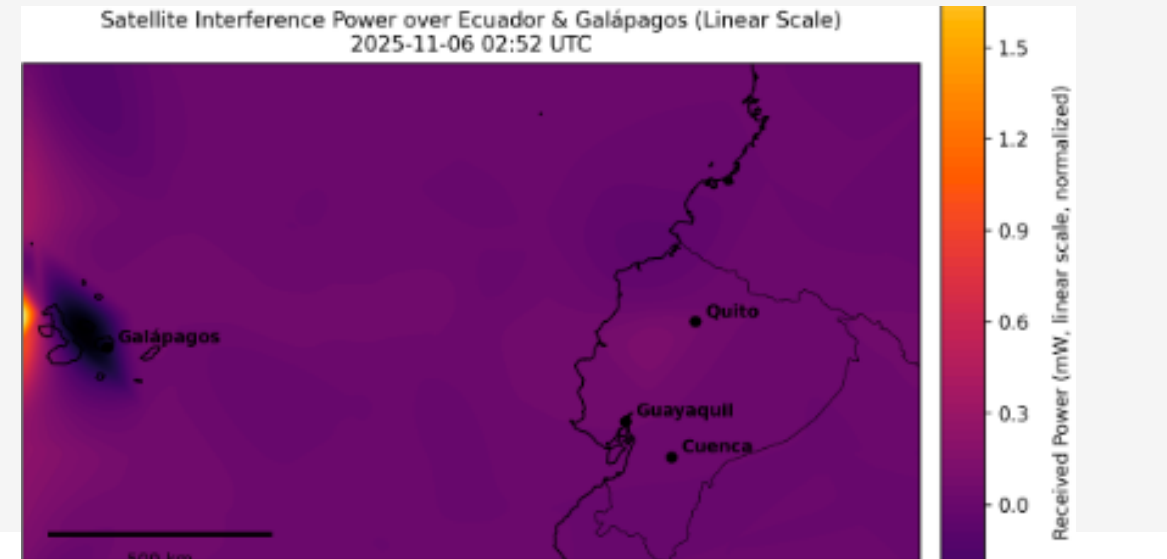
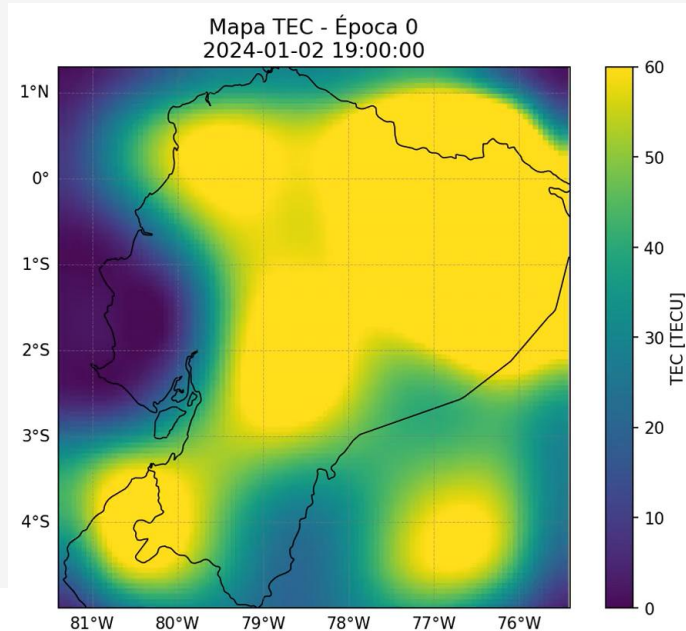


Figura 12.8: Espectro de Radio en el parque Jerusalén: rango 1-200 MHz (arriba) y rango 1300-1400 MHz (abajo)

1.420 GHz satellite contamination map

Ionospheric studies



REGULATORY FRAMEWORK IN ECUADOR

National regulator: ARCOTEL. Plan Nacional de Frecuencias (PNF). Satellite / satellite-services regulation.
“There do not appear to exist any regulations to protect radio-astronomy in Ecuador.” cps.iau.org

ARCOTEL publishes “**Satélites Autorizados**”: **INTELSAT, HISPASAT, AMAZONAS, GALAXY, STARLINK, O3b / MEO systems, Iridium / LEO networks & global constellations ..**

For orbital positions and international filings, Ecuador follows ITU coordination principles and regional procedures.

- Integration of lessons from global initiatives will position Ecuador as a key player in sustainable space and radio astronomy development.

ITU Protected Frequency Bands for Radio Astronomy

Band (GHz)	Wavelength (cm)	Main Scientific Target	Notes
1.400 – 1.427	21.4 cm	Neutral hydrogen (H I 21 cm line)	Studies of Galactic structure, rotation curves, and interstellar medium.
4.8 – 5.0	6 cm	Continuum emission (synchrotron, H II regions)	Galactic and extragalactic sources.
8.4 – 8.5	3.5 cm	AGN jets, quasars (VLBI reference band)	Used for astrometry and high-frequency calibration.
10.6 – 10.7	2.8 cm	Atmospheric & cosmic background continuum	Good for instrument calibration and RFI testing.
22.21 – 22.50	1.35 cm	Water vapor masers (H ₂ O)	Star-forming regions, evolved stars, Galactic Center.
23.6 – 24.0	1.27 cm	Continuum (CM ↓ indow)	Used in cosmology and atmospheric studies.

COLLABORATIONS

In Ecuador, we are seeking collaboration with astronomers, spectrum-management experts, satellite operators, and legal/policy specialists. We need support both in technical solutions for RFI mitigation and in developing a regulatory framework for radio-quiet zones, since Ecuador currently has no specific legal protection for radio astronomy.



Ericson López
Quito Astronomical Observatory
ericsson.lopez@epn.edu.ec
Phone/Whatsapp: +593 996521134
Quito-Ecuador

THANK YOU!