

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

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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**.



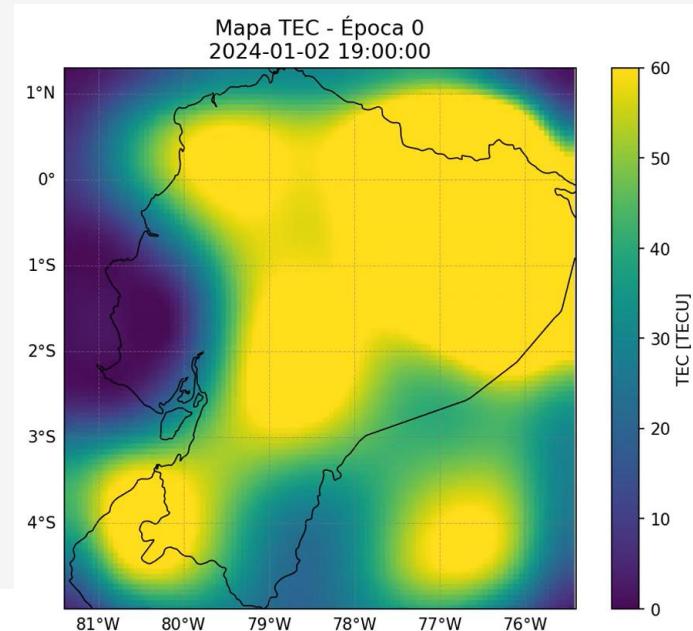
PRELIMINARY REPORT: CANDIDATE RADIO-QUIET REGIONS IN ECUADOR

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

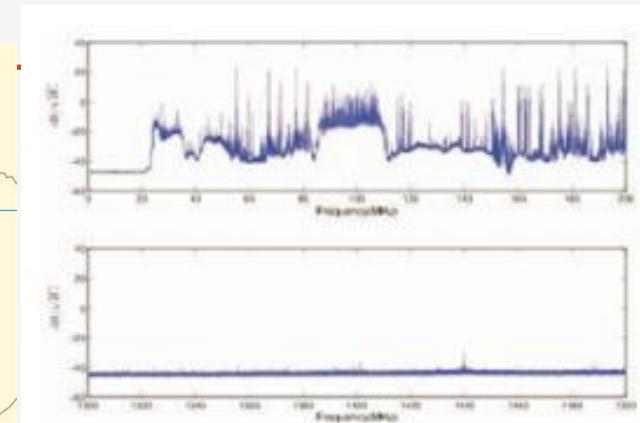
Ecuador currently lacks a protected RQZ

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

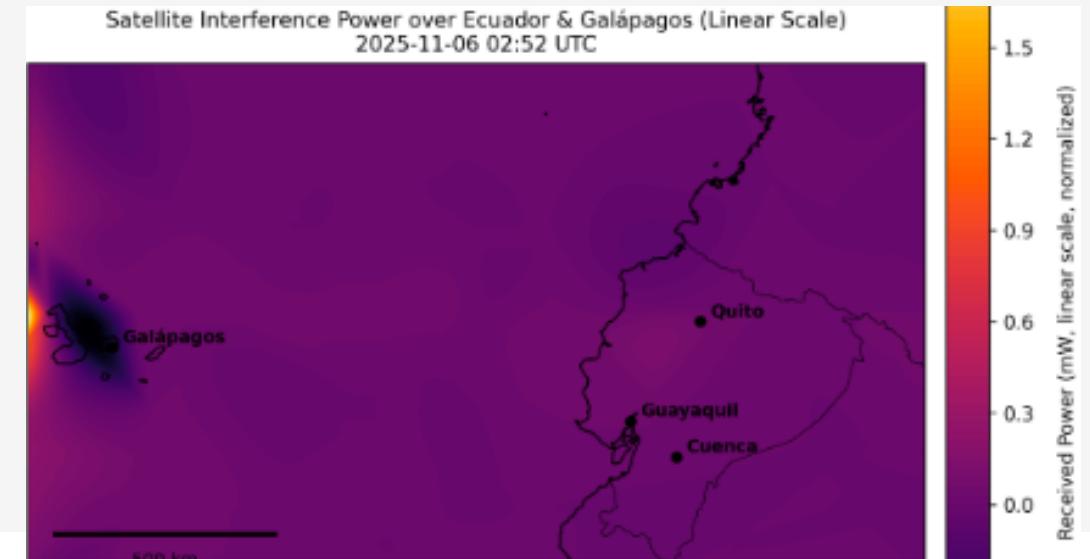
Ionospheric studies



Location of
the new radio
astronomical
observatory



1.420 GHz satellite contamination map



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 (C _{II} \downarrow window)	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.



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THANK YOU!