

RFI measurements for the selection of the RAEGE antenna sites

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Index

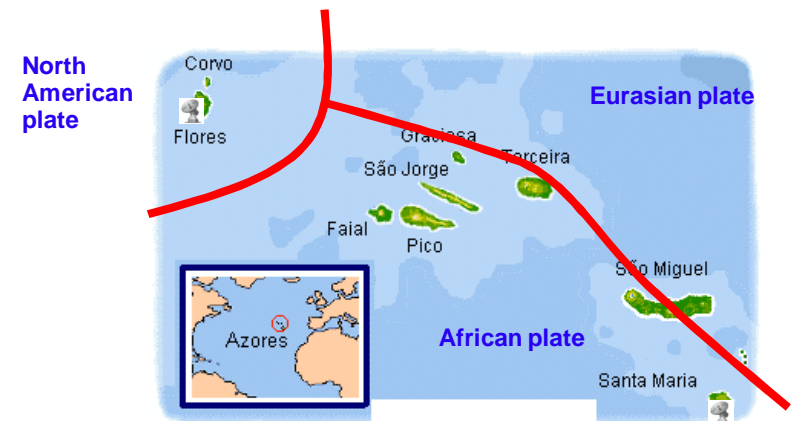
- The RAEGE project
- Current RFI protection
- RFI measurement system
- RFI measurements in Yebes Observatory
- RFI measurements in Santa María island
- RFI measurements in Tenerife island
- RFI measurements in Flores island
- RFI databases
- Conclusions and References

RAEGE Project

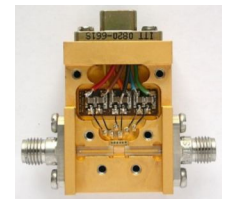
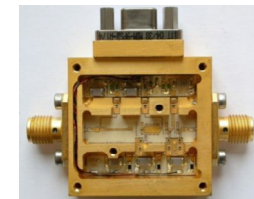
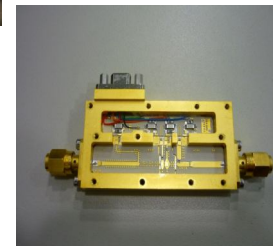
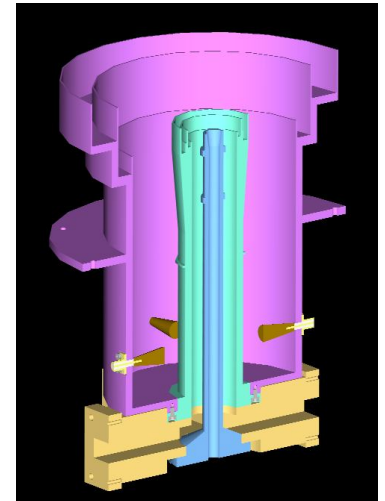
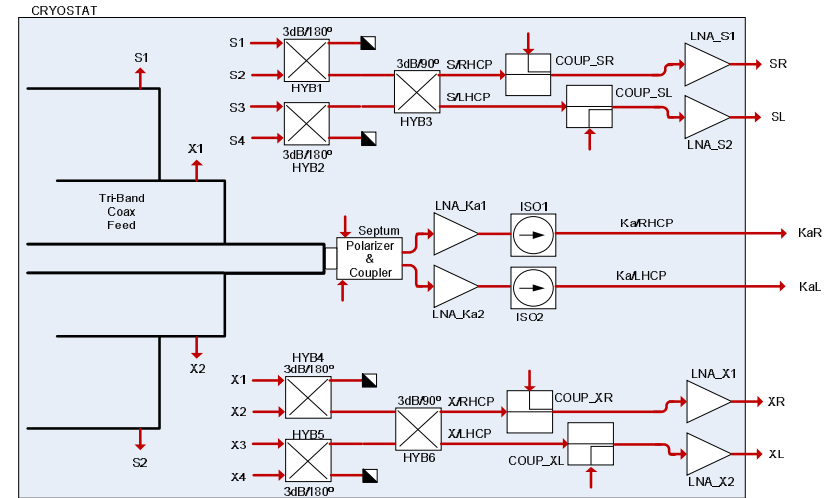


Baselines:

- Yebes – Tenerife : 1800 km
- Yebes – Santa María : 2000 km
- Yebes – Flores : 2400 km
- Tenerife – Flores : 2000 km
- Santa María – Flores : 540 km



RAEGE Project



Yebes Observatory; February 27, 2013

Current RFI protection

- Set at “SETSI” (used to be in Ministry of Development, now at Ministry of Industry and Commerce)
- “Ley General de Telecomunicaciones” (current in 2003, now being changed):
 - *“can not be established by regulation, limitations on property or easements that contain more stringent conditions than the following...”*
 - Protection now proposed in bands from 15 kHz to 270 GHz, both for continuum and spectral lines.

Current LGTel: Ley 32/2003

<http://bit.ly/ZxBmmk>

New writing:

<http://bit.ly/10uVXc7>

Yebes RFI protection table

Banda de frecuencias	Densidad de flujo de potencia (db(w/m ²))	Intensidad de campo eléctrico equivalente (dB(μV/m))
1400-1427 MHz	-180	-34,2
1610,6-1613,8 MHz	-181	-35,2
1660-1670 MHz	-181	-35,2
2690-2700 MHz	-177	-31,2
4990-5000 MHz	-171	-25,2
10,6-10,7 GHz	-160	-14,2
15,35-15,4 GHz	-156	-10,2
22,21-22,5 GHz	-148	- 2,2
23,6-24 GHz	-147	- 1,2
31,3-31,8 GHz	-141	4,8
42,5-43,5 GHz	-137	8,8
86-92 GHz	-125	20,8

Para todas las demás frecuencias, se establece una limitación de la intensidad del campo eléctrico de +88.8dB (μV/m), medida en la ubicación de la Estación de Radioastronomía.

OM CTE/1444/2003

<http://bit.ly/16eAj0R>

RFI measurement system



- Wideband 90cm parabolic antenna AC008 from Rohde on a tripod.
- Wideband 0.85 - 26.5 GHz log-periodic antenna HL050 from Rohde, as parabola's feed.
- Wideband 0.5 - 26.5 GHz microwave amplifier from Agilent (83017A) to improve system sensitivity.
- DC - 40 GHz HP8564E spectrum analyzer for the measurements
- Low-loss coaxial cables
- Laptop for data acquisition

The system is calibrated and the measurements are transformed to E-field units (dBuV/m) to compare with the regulations.

Currently, this system is lent to the Onsala Space Observatory to perform their RFI survey.

Yebes RFI panorama @ 0° El.

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If you wish to see the figures, please contact:

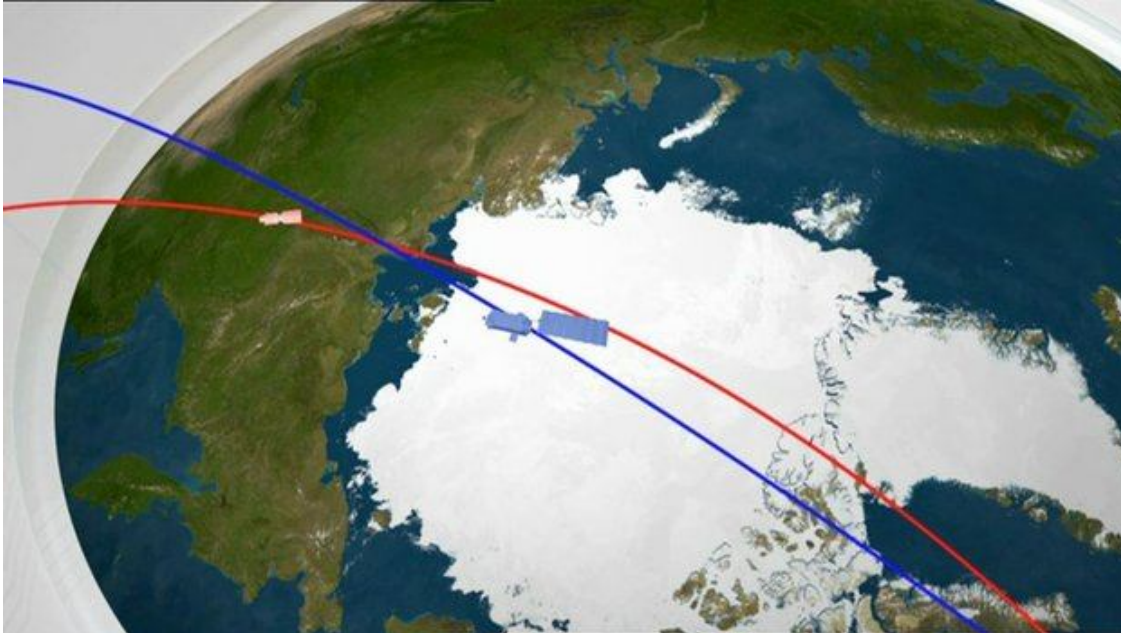
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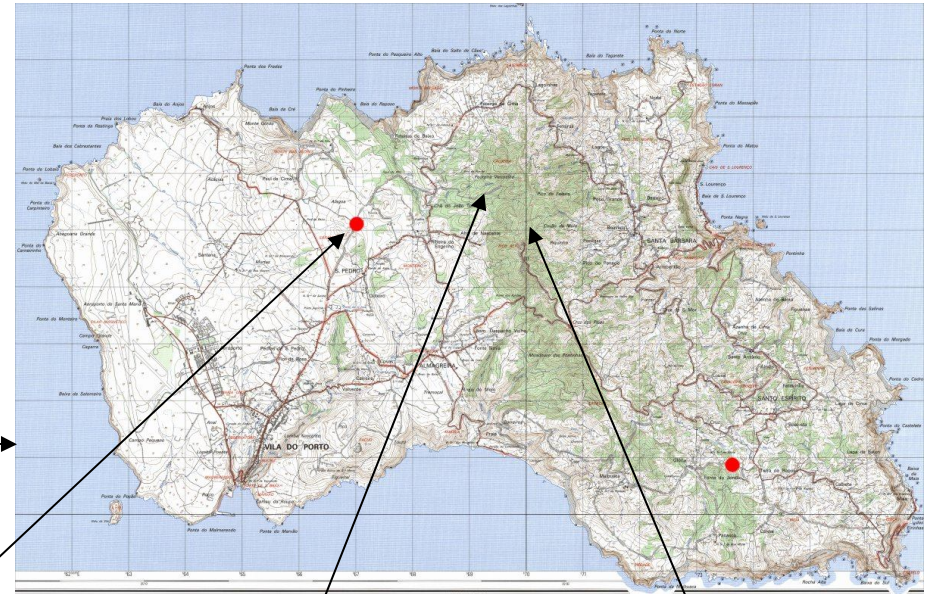
New RFI hazards ?

New ESA radar system being developed by Indra Espacio
@ L-band (1.2-1.4 GHz)), in Santorcaz, at 12 km from
Yebeas Observatory, to help safeguard space missions
(Space Situational Awareness, SSA)

http://www.esa.int/esaCP/SEMJXQ3S18H_Spain_0.html



Santa María RFI measurements



Santa María RFI panorama

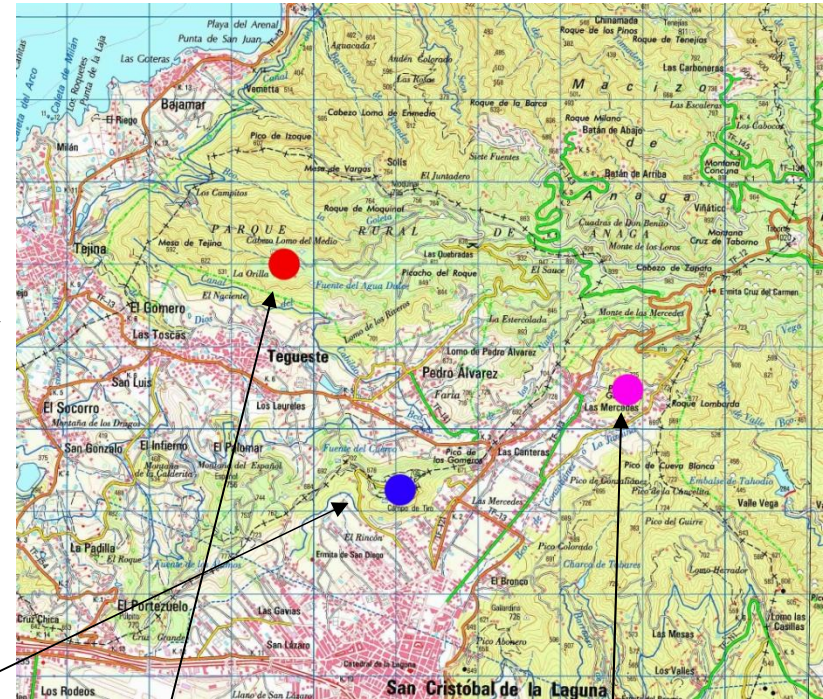
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Tenerife RFI measurements



Tenerife RFI panorama

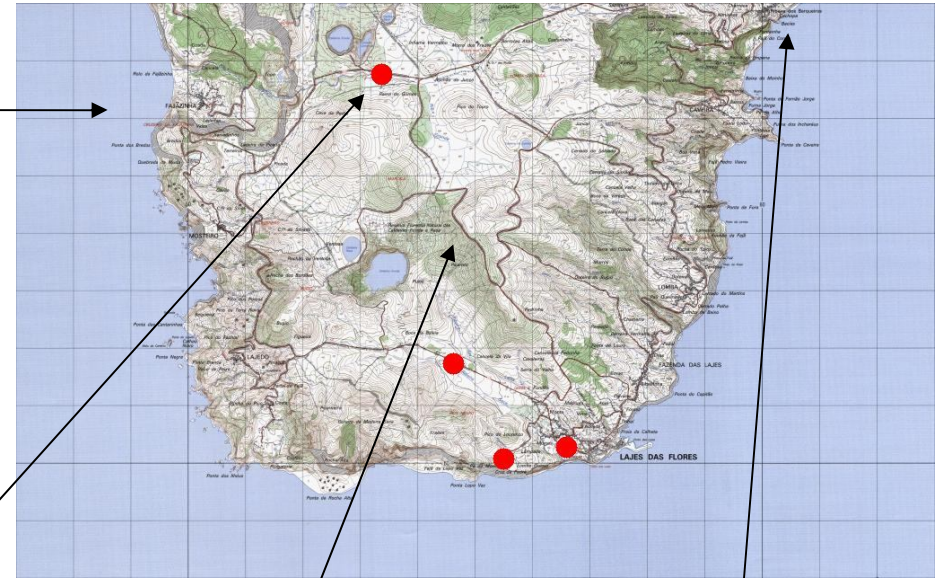
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Flores RFI measurements



Flores RFI panorama

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RFI databases

EVN database:

<http://srt-wp4.oa-cagliari.inaf.it/~rfi/rfidb/>

IVS database:

ivs-rfi@ivsc.gsfc.nasa.gov

RFI cases - into database

Query RFI information (beta version)

Get from data from **Start date** to **Stop date**.

Start date blank, gives data untill **Stop date**

If **Stop date** is let blank, all the database entries from **Start date** are shown.

If both the form field are left empty, all the database is shown.

The fields start and stop freq act in the same way of the as the date fields. If the fre
by date.

Otherwise, if a query by frequency is needed, the date fields must be blank.

If all the fields are filled, the query is a logical AND between date and frequency.

Start Date (yyyy-mm-dd): ...

Stop Date (yyyy-mm-dd): ...

Start Freq(MHz):

Stop Freq(MHz)

Station

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If you wish to see the figures, please contact:

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Conclusions

- The *Yebes RFI measurement system* is good to detect RFI signals with levels higher than 20-25 dB(uV/m). This limit could be improved with a better preamplifier.
- **Yebes** RFI environment is very polluted. Actions are being taken to reduce RFI in coordination with Spanish authorities.
- **Saramago** is the best location in Santa María island. In fact, it has been selected and civil works have already started.
- **La Orilla** seems to be the best choice for Tenerife island from RFI point of view.
- **Rochado do Junco** seems to be the best option for Flores island from RFI point of view.

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Questions?

IGN Yebes Observatory

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