



PR TARS coordination example

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Objectives

1. Give an example of Coordination between active and passive services to minimize RFI
2. Summarize challenges for Passive sensors
3. Quiz

Arecibo Observatory

RAS radio telescope with capabilities to operate as:

1. passive sensor
(radiometer measuring natural emissions) and
Sensitivity: -250dBW/Hz.m^2
2. as active sensor (radar Tx & Rx from planets and other targets. $\sim 30\%$ time



Tethered Aerostat Radar System (TARS)

- A low-level airborne ground surveillance system that uses aerostats (moored balloons) as radar platforms, ran by US CBP.



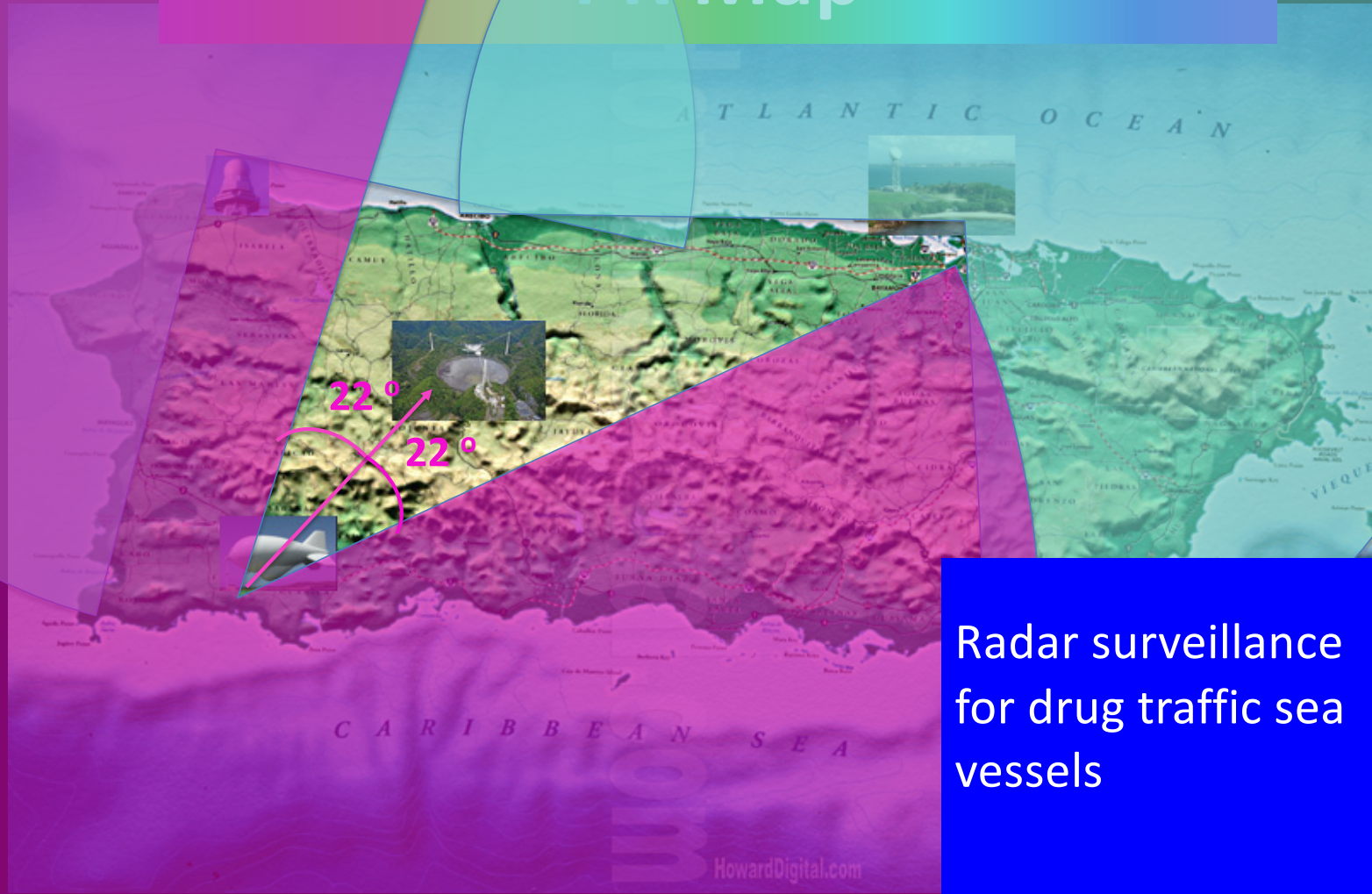
<https://www.cbp.gov/frontline/frontline-november-aerostats>

MOU –Coordination

Objects under Study
(e.g. Pulsars,
sunspots, galaxy)
... far, far Away



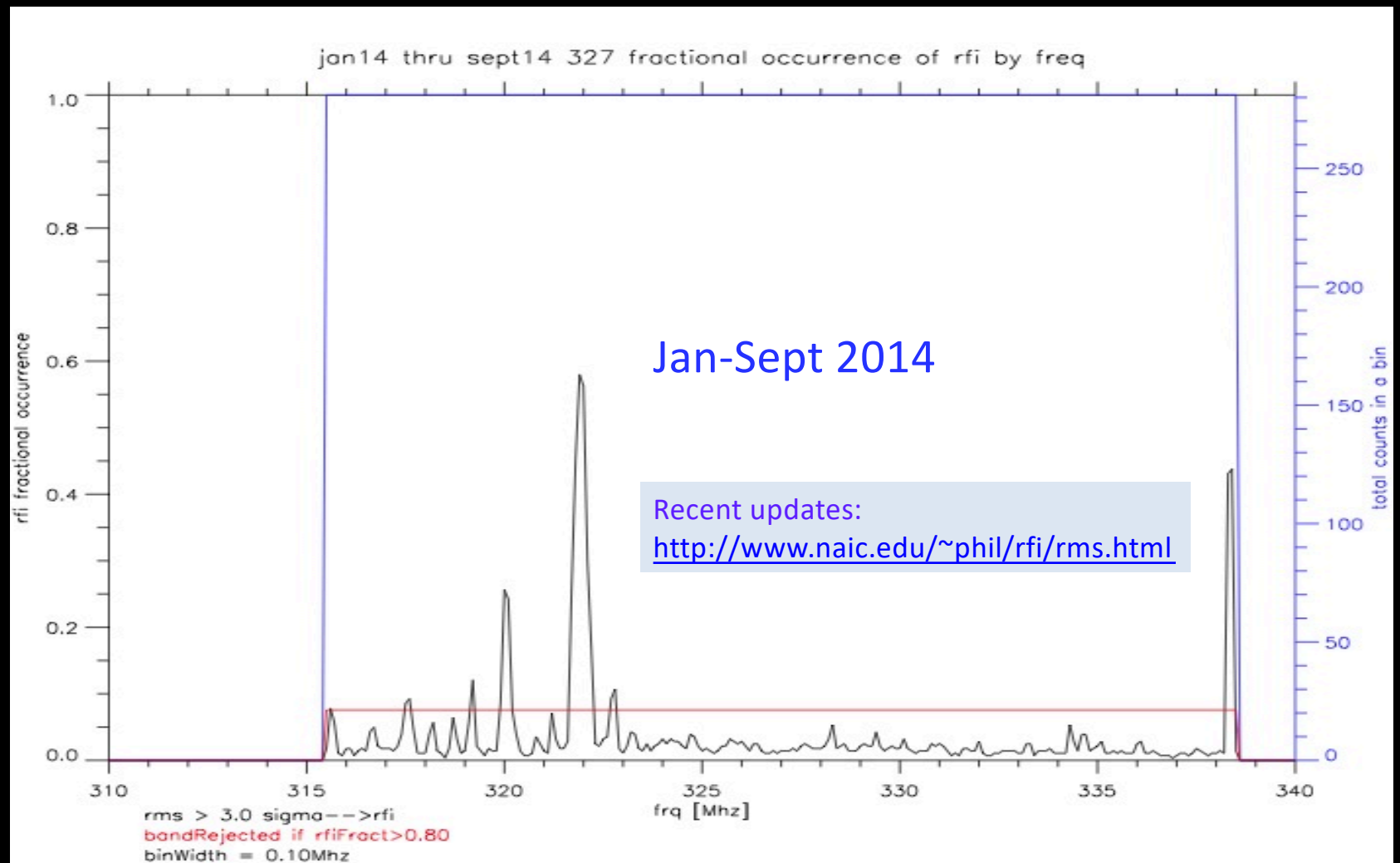
PR Map



Radar surveillance
for drug traffic sea
vessels



Occurrence of RFI versus frequency by month for Arecibo Obs.



ITU-R Rec important for passive sensors

- **RA.769** : Protection criteria used for radio astronomical measurements
- **SM.1542** The protection of passive services from unwanted emissions
- **RA.1513** Levels of data loss to radio astronomy observations and percentage-of-time criteria resulting from degradation by interference for frequency bands allocated to the radio astronomy on a primary basis

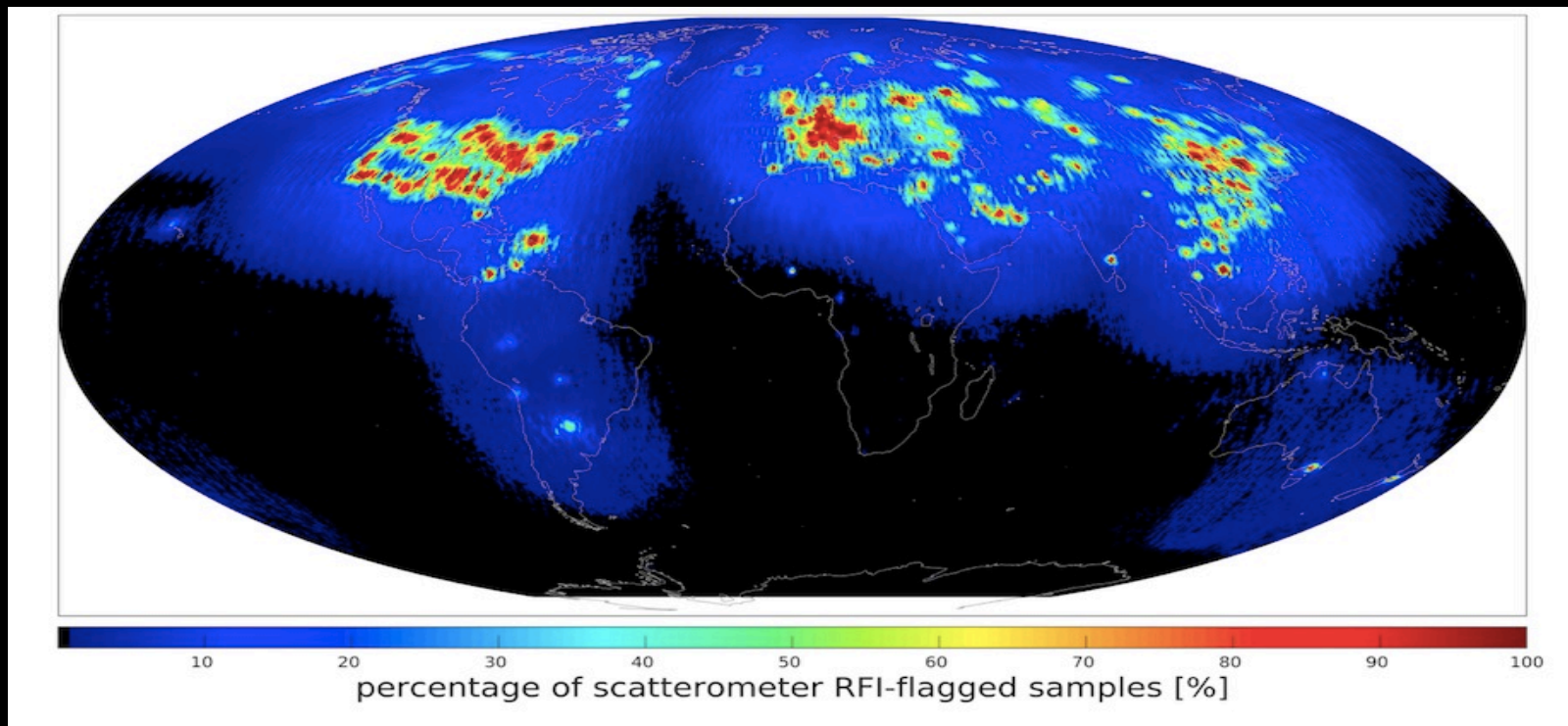
Summary of challenges for passive sensors

- **Aggregate effect**- accumulated radiation from a multitude of emitters on the ground, both from in-band and out-of-band.
- **RFI of similar level** to observable data -undetected corrupting data that is then mistaken for valid data leading to flawed conclusions.

Remember: Mitigation \neq Excision

EXTRA SLIDES

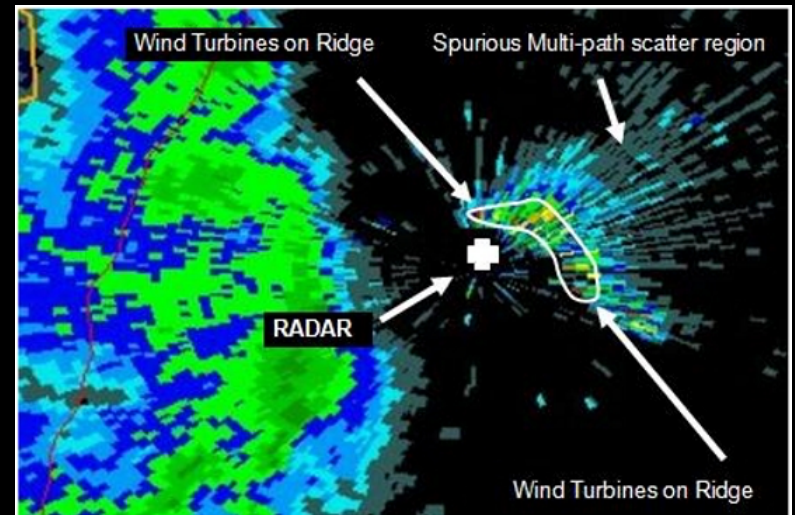
RFI example @ Active sensors



Average percentage of scatterometer observations at L-band with RFI for the whole year of 2014 on the NASA Aquarius. (Image Courtesy of De *Matthaeis*, NASA)

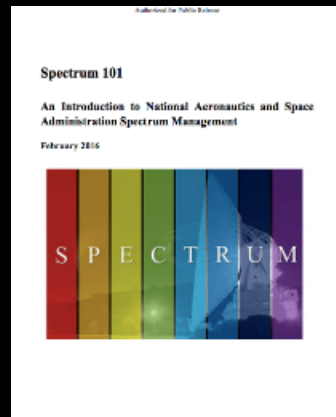
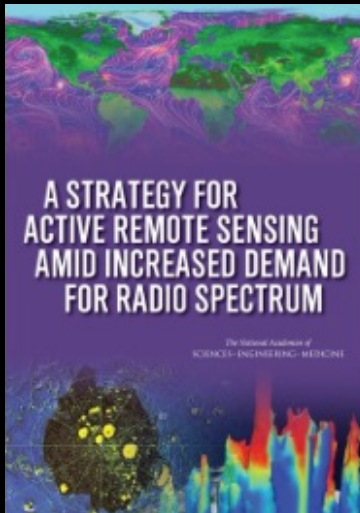
RFI from Wind turbines on Radars

- Large radar cross-section (RCS)
- Due to blades movement → Doppler frequency shift.
- May cause severe RFI on airborne, ground-based, & spaceborne radars.
- Mitigation techniques

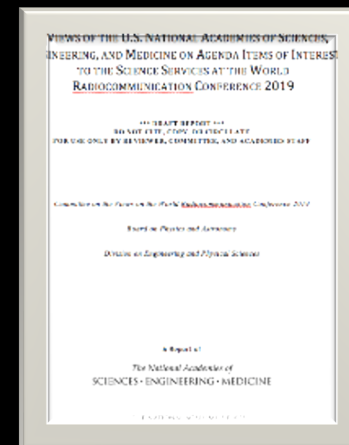


Detecting and Mitigating Wind Turbine Clutter for Airspace Radar Systems
WenQin Wang*

Free in PDF



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TIME



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