

Impacts and Statistics of Ocean-Reflected RFI Observed by GMI

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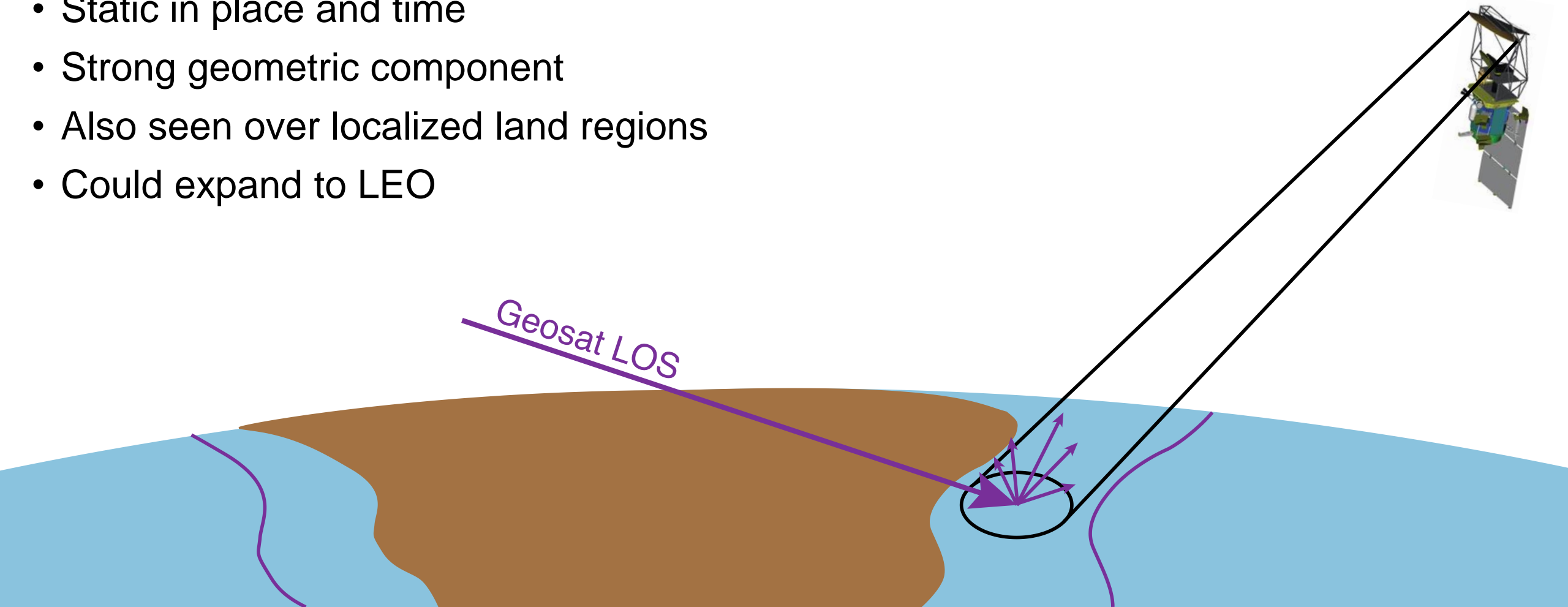
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+now with tomorrow.io

What is ocean-reflected RFI?

Emissions from geostationary satellites reflect off ocean surface

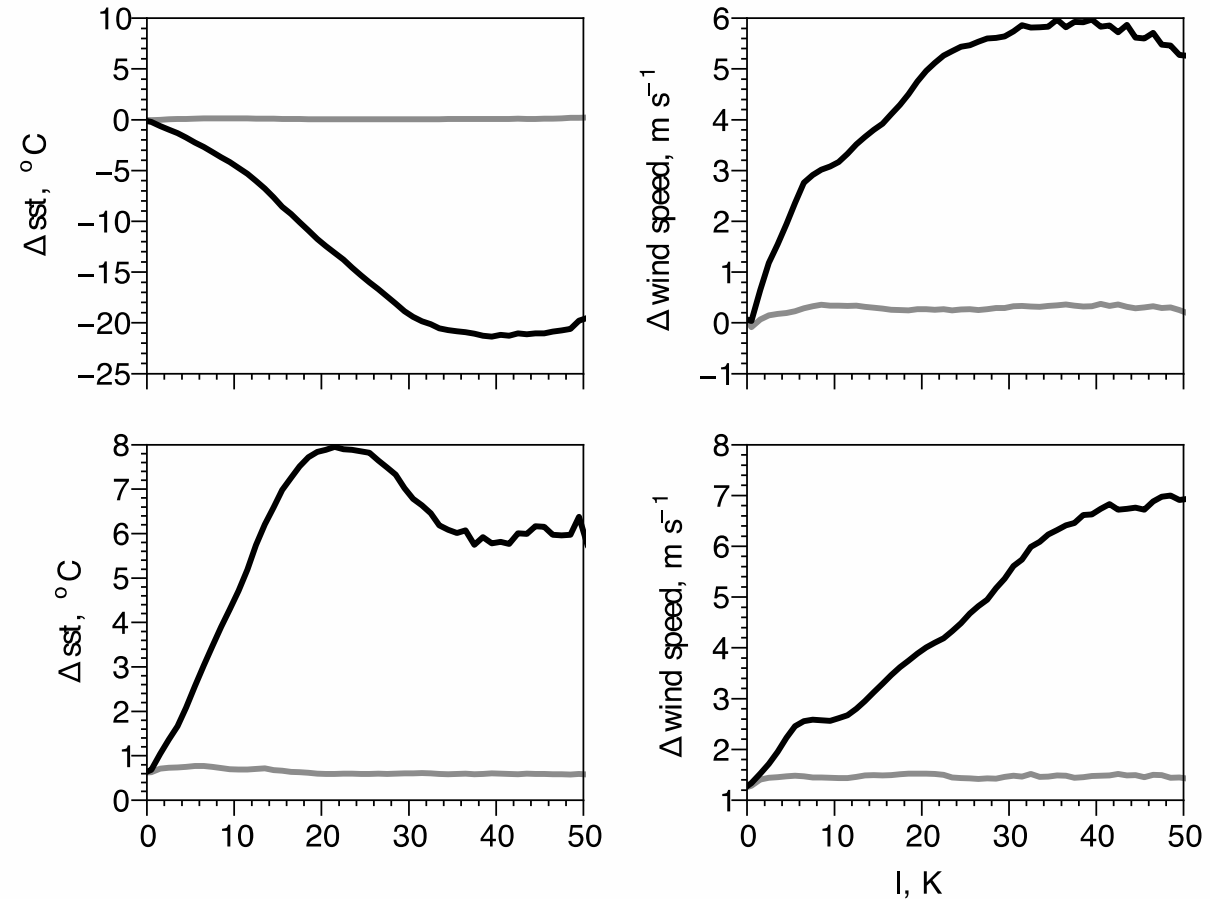
- Static in place and time
- Strong geometric component
- Also seen over localized land regions
- Could expand to LEO



Prior Investigations

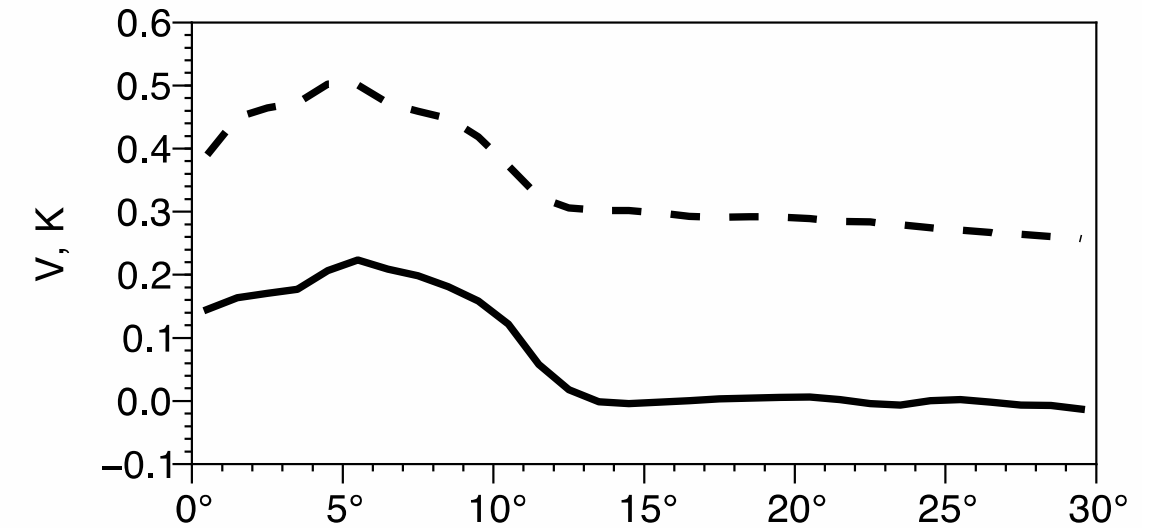
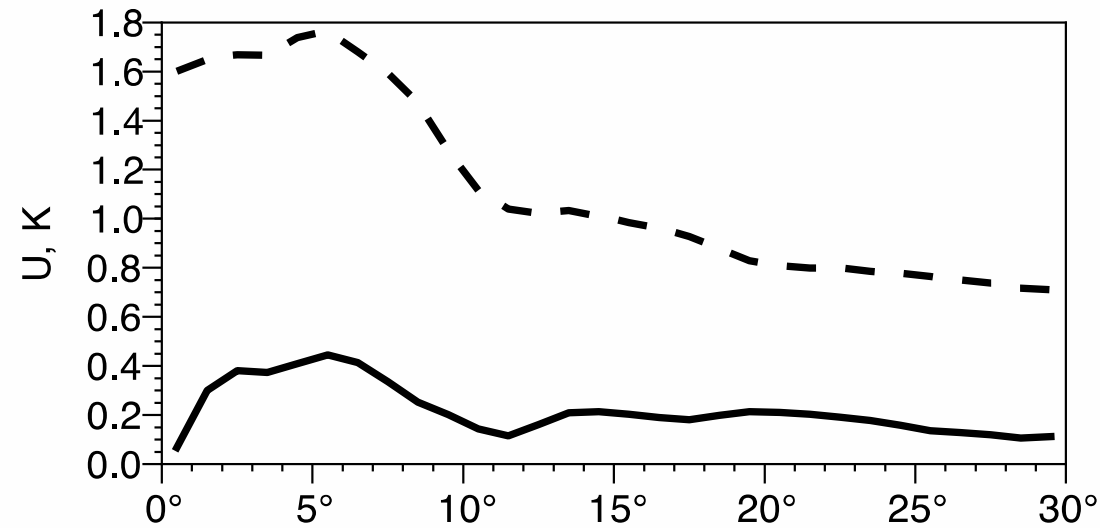
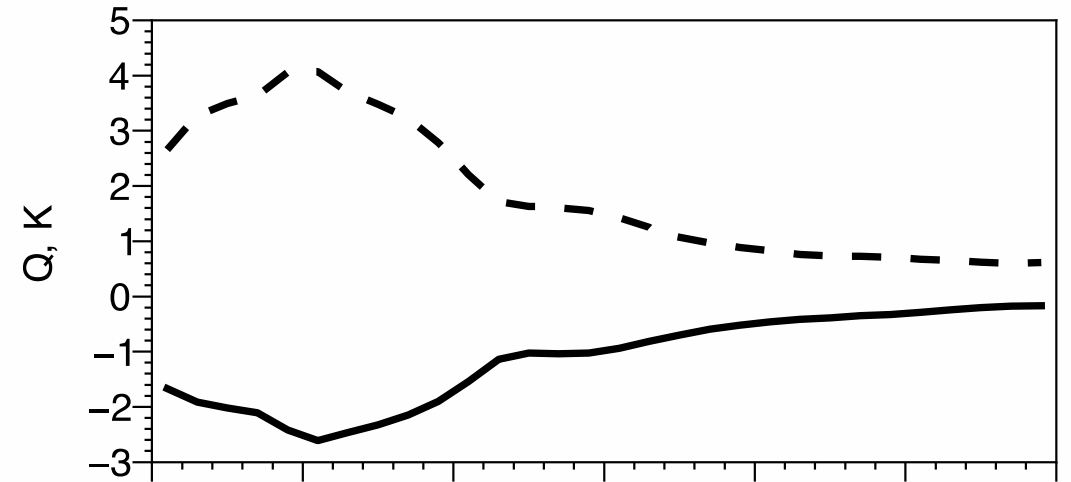
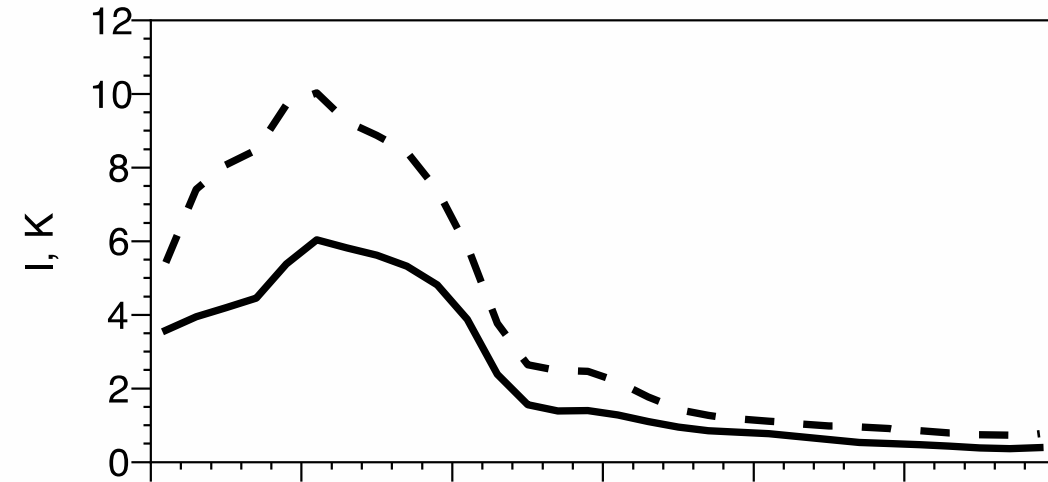
WindSat project identified coastal regions around Europe, Madagascar, and the Americas where X- and K-band emissions produced continental halos

- Tracked the locations and evolution of these sources and the resulting interference
- Developed geometry-based methods for flagging data (Adams et al., 2010)
- Investigated the impacts of X-band interference on geophysical retrievals (Adams et al., 2014)



Adams et al., 2014

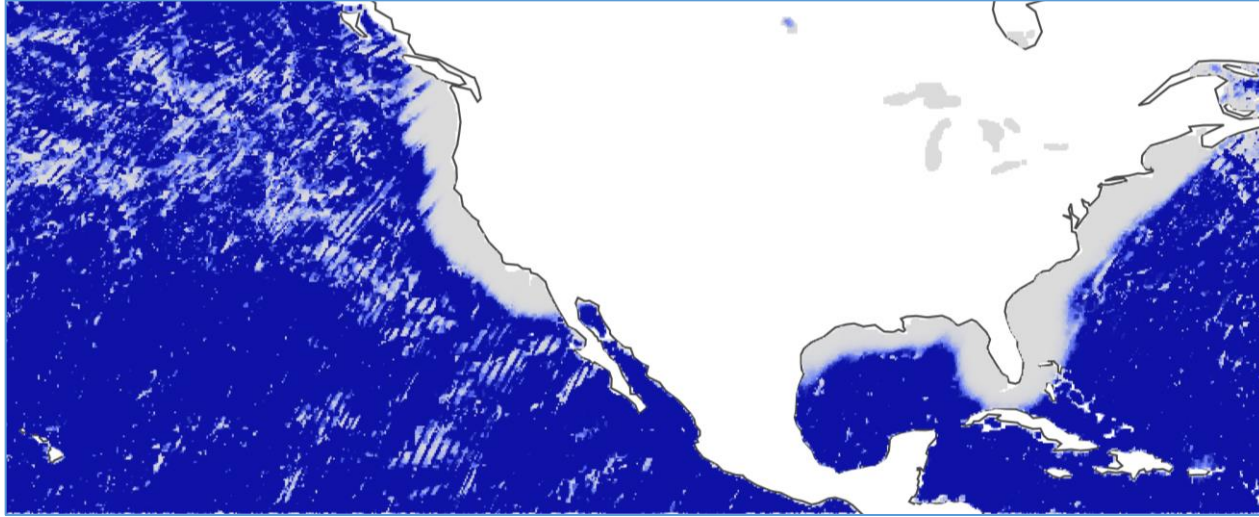
Interference from Multiple Emitters



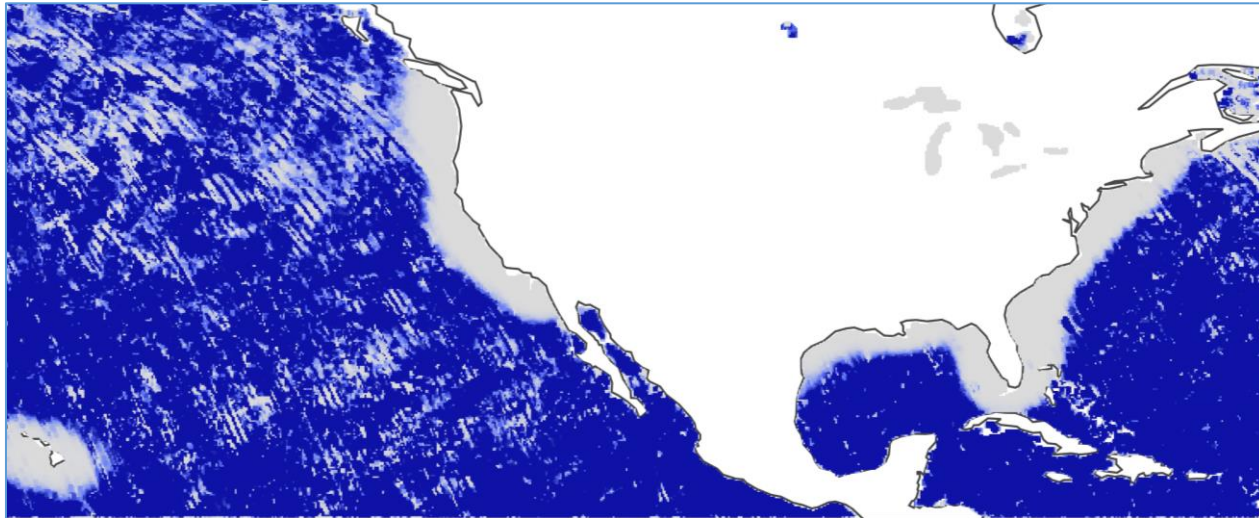
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Extent of Ocean-Reflected RFI Observed by GMI

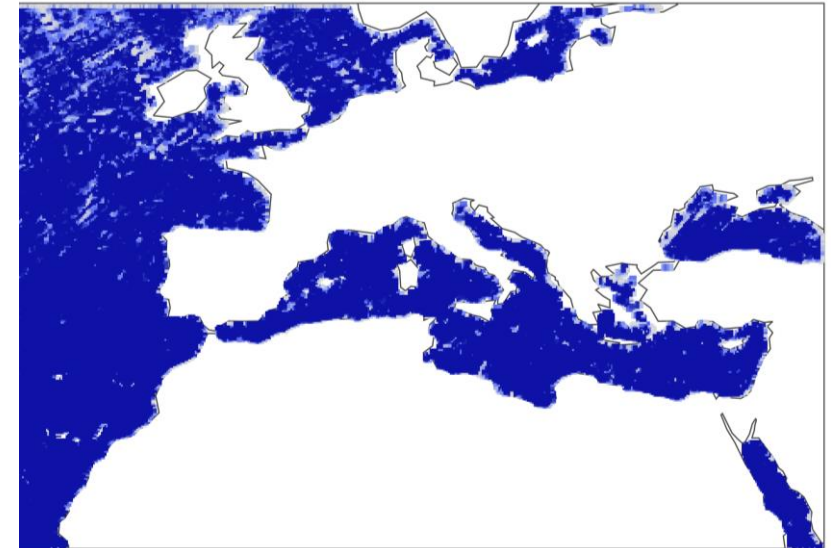
Ascending, 18.7 GHz



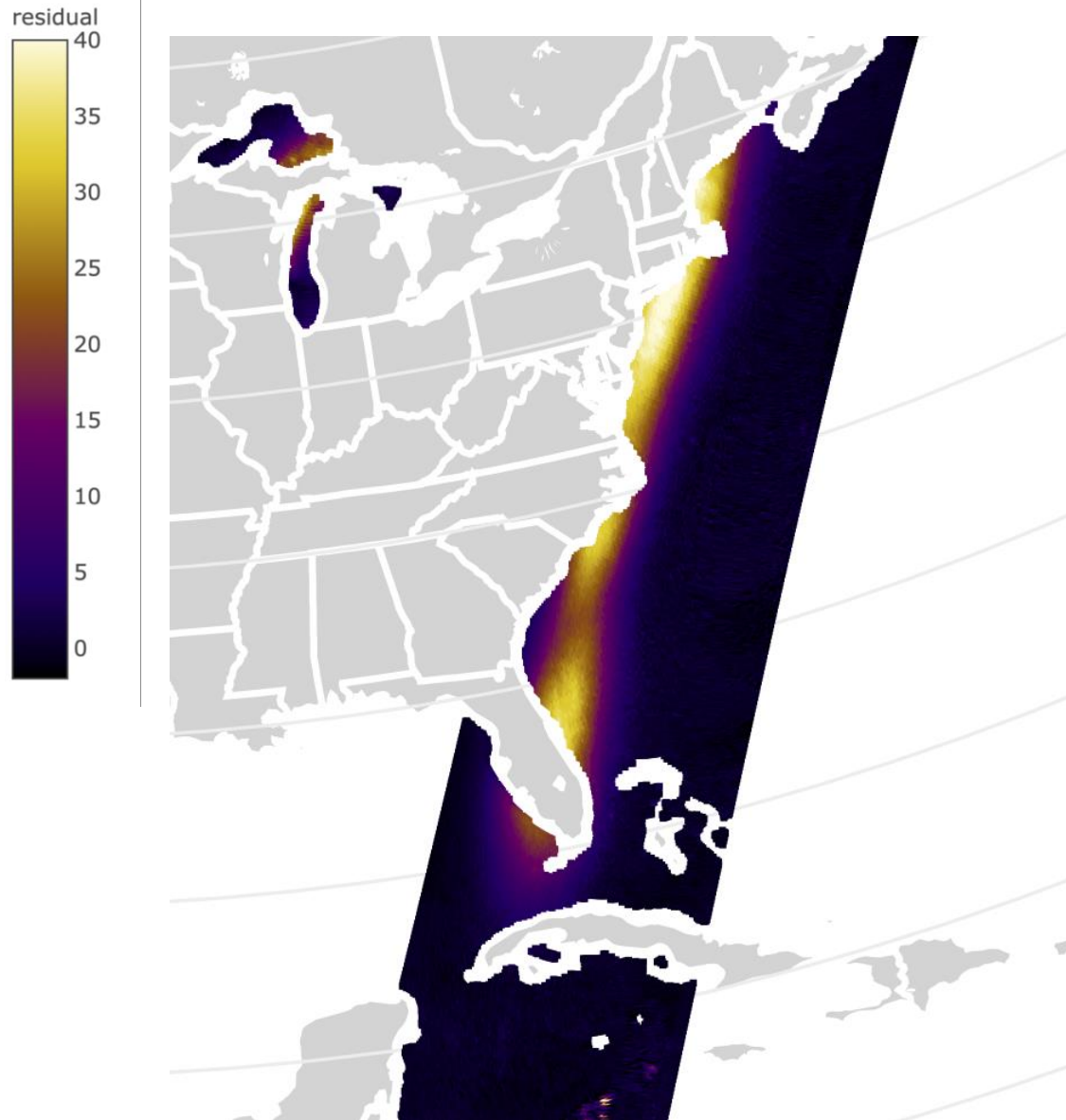
Descending, 18.7 GHz



No RFI at 10.65 GHz



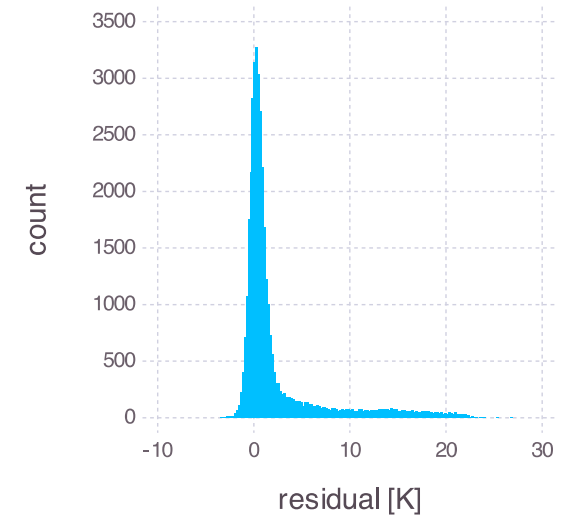
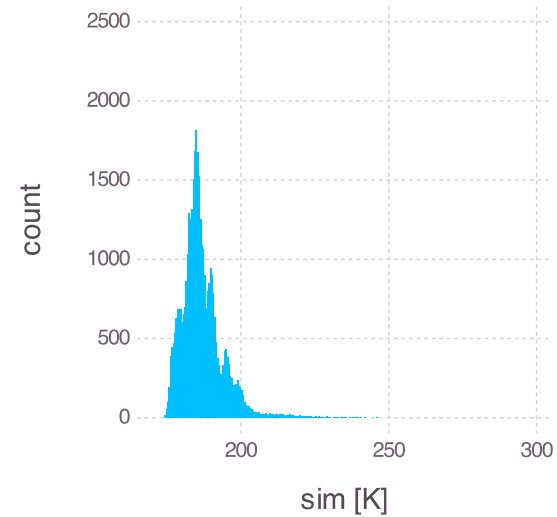
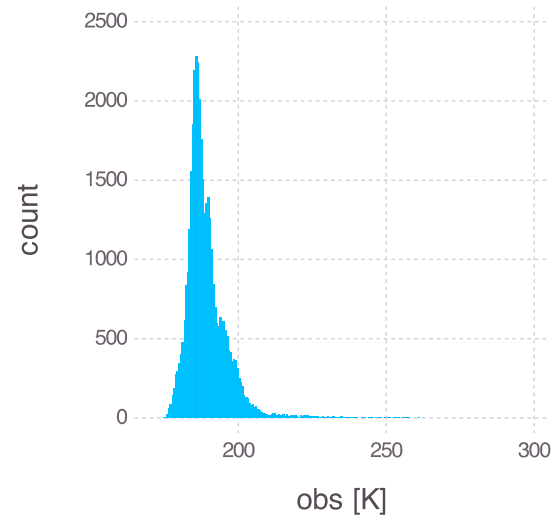
RFI Impact Analysis



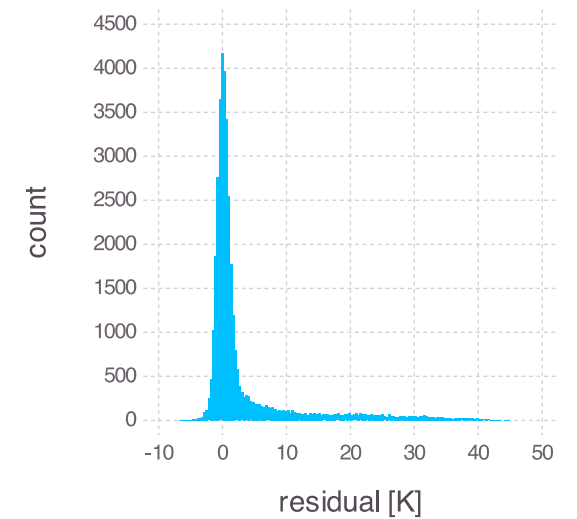
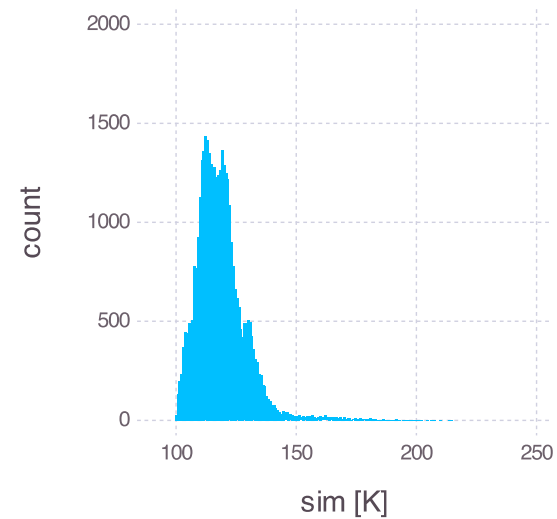
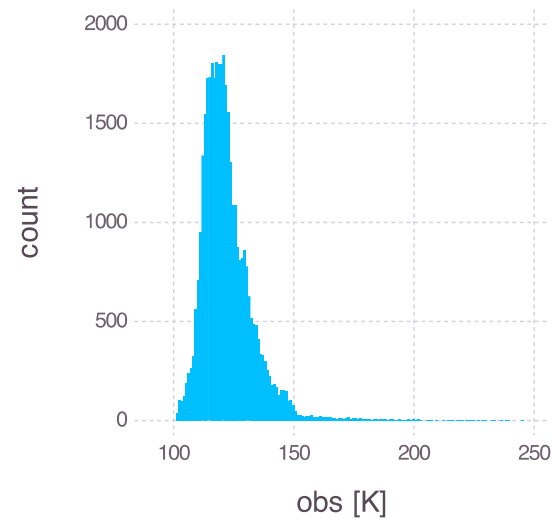
1. Perform ocean retrievals with and without affected band
2. Calculate residual T_b using observations and retrieval forward model
3. Compare retrievals with and without affected band*

GMI Residuals

18.7 GHz, v-pol

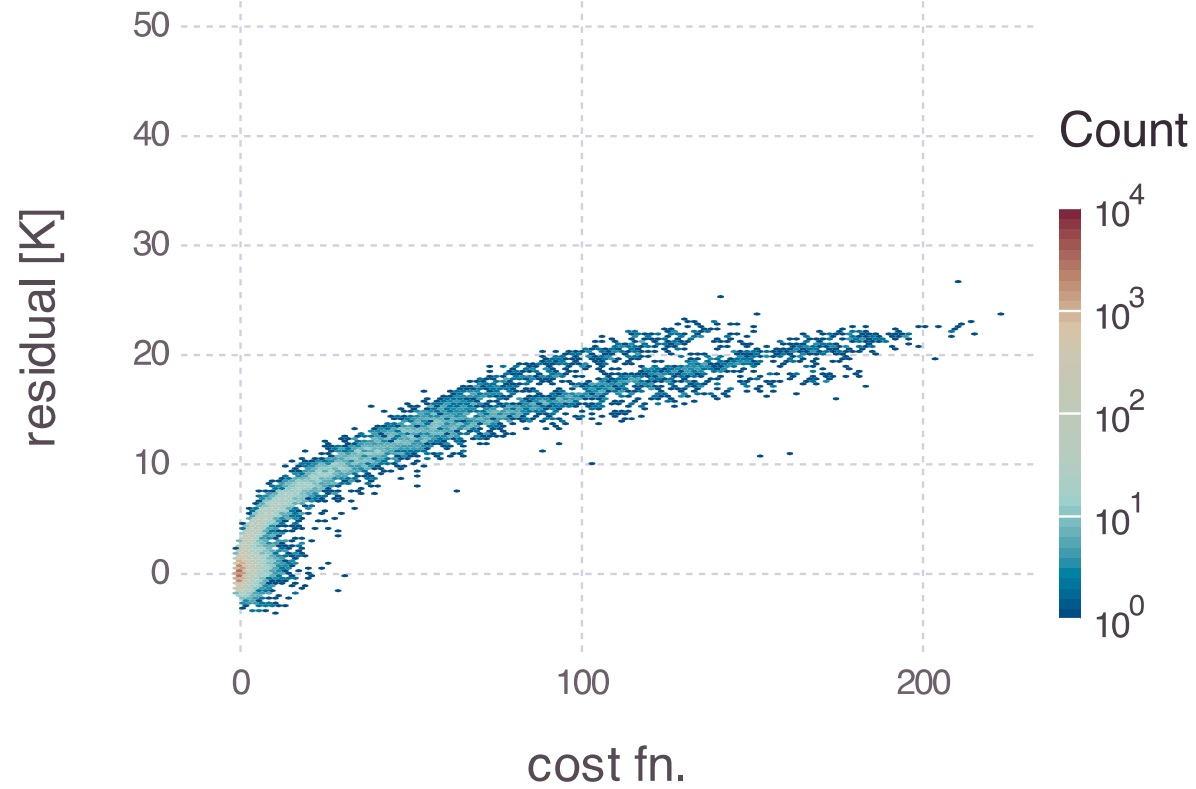


18.7 GHz, h-pol

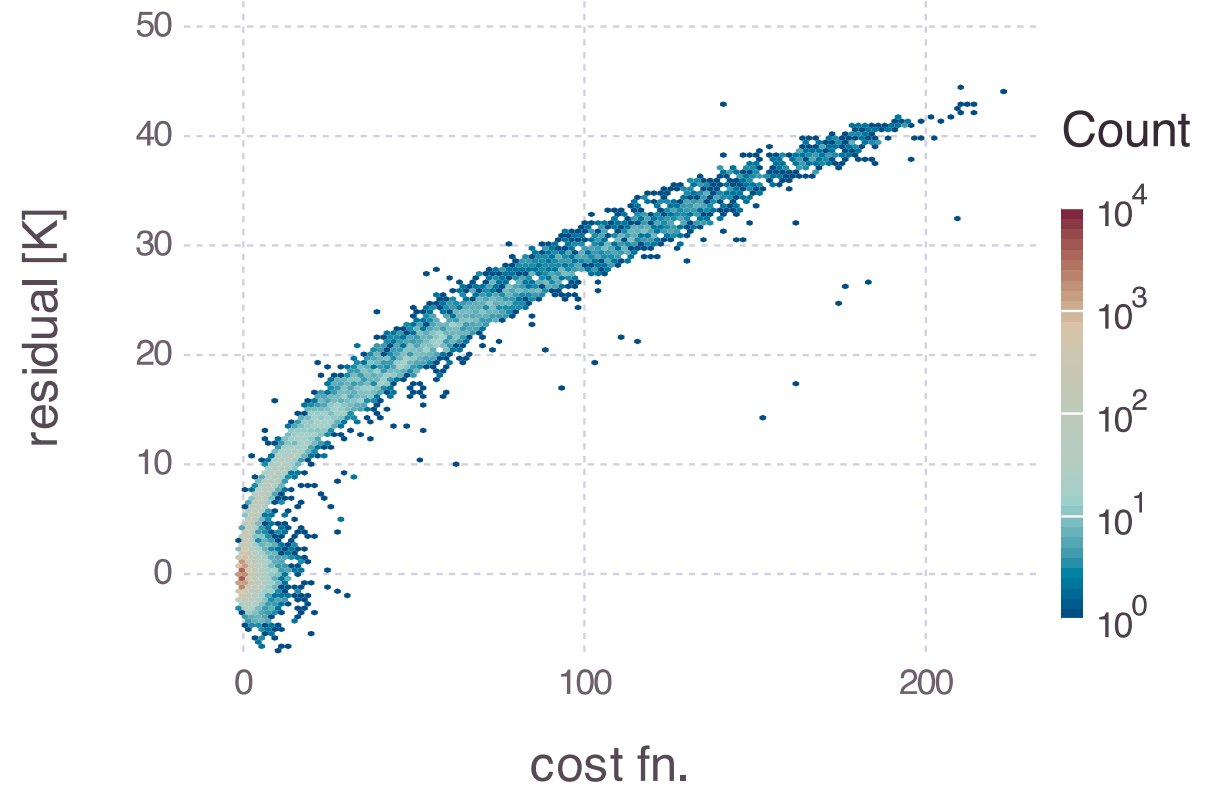


Residual Tb vs. GMI OE Cost Function

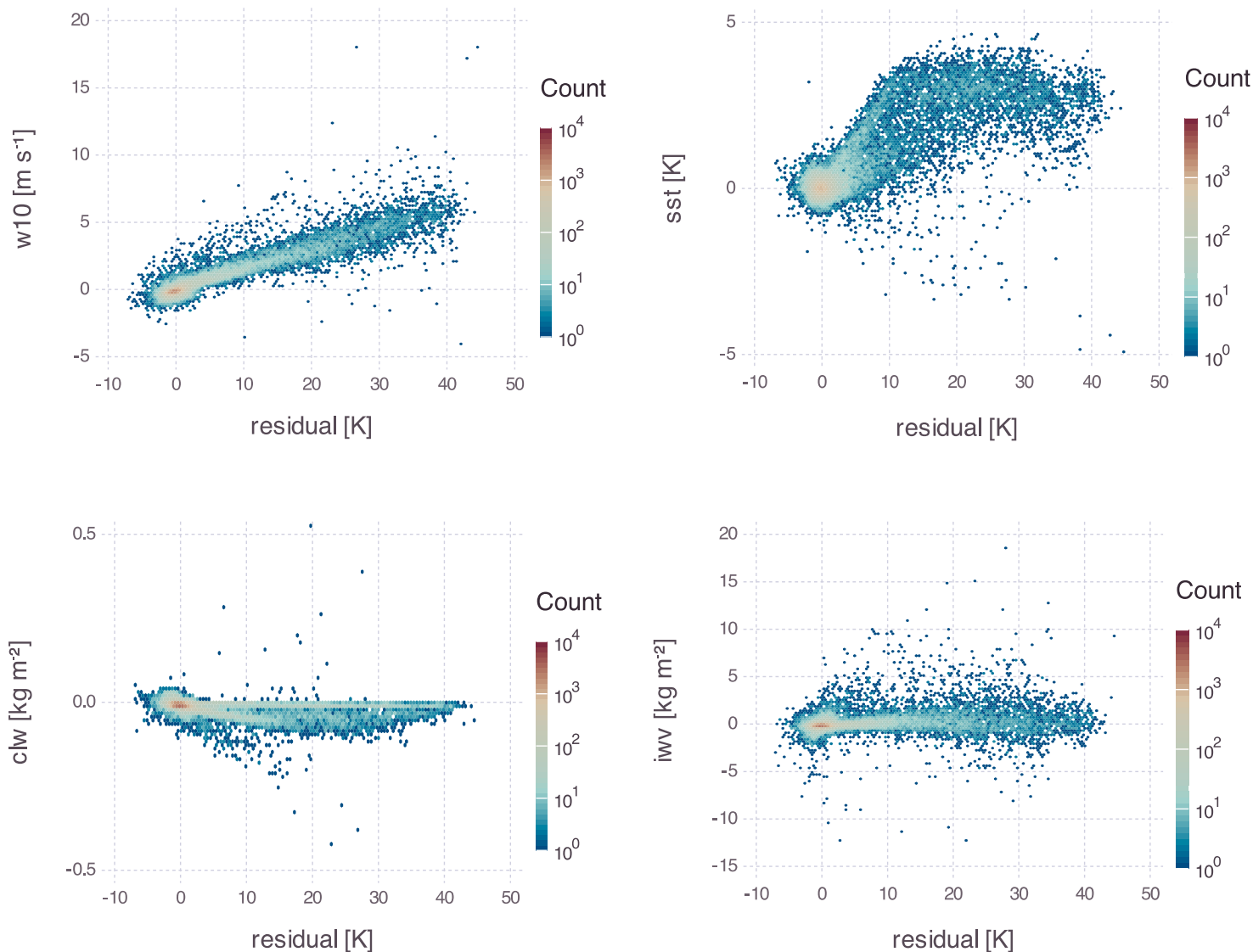
v-pol



h-pol



Retrieval Errors due to RFI



- Noticeable strong biases for w_{10} , SST, and cloud
- Small bias in water vapor, need to do further investigation with reanalysis

Summary and Conclusions

- Ocean reflected RFI from geostationary satellites adversely impacts observables and geophysical retrievals in coastal regions
 - Fixed geostationary locations result in known spatial distribution of RFI
 - Multiple satellites increase interference
 - Large constellations of LEO emitters will exacerbate the issue globally
- RFI skews distribution of brightness temperatures
- Biases are proportional to level of interference
- Uncertainties increased across all levels of interference