Institute of Space Sciences

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Status of the Polarimetric RO data processing at ICE-CSIC / IEEC

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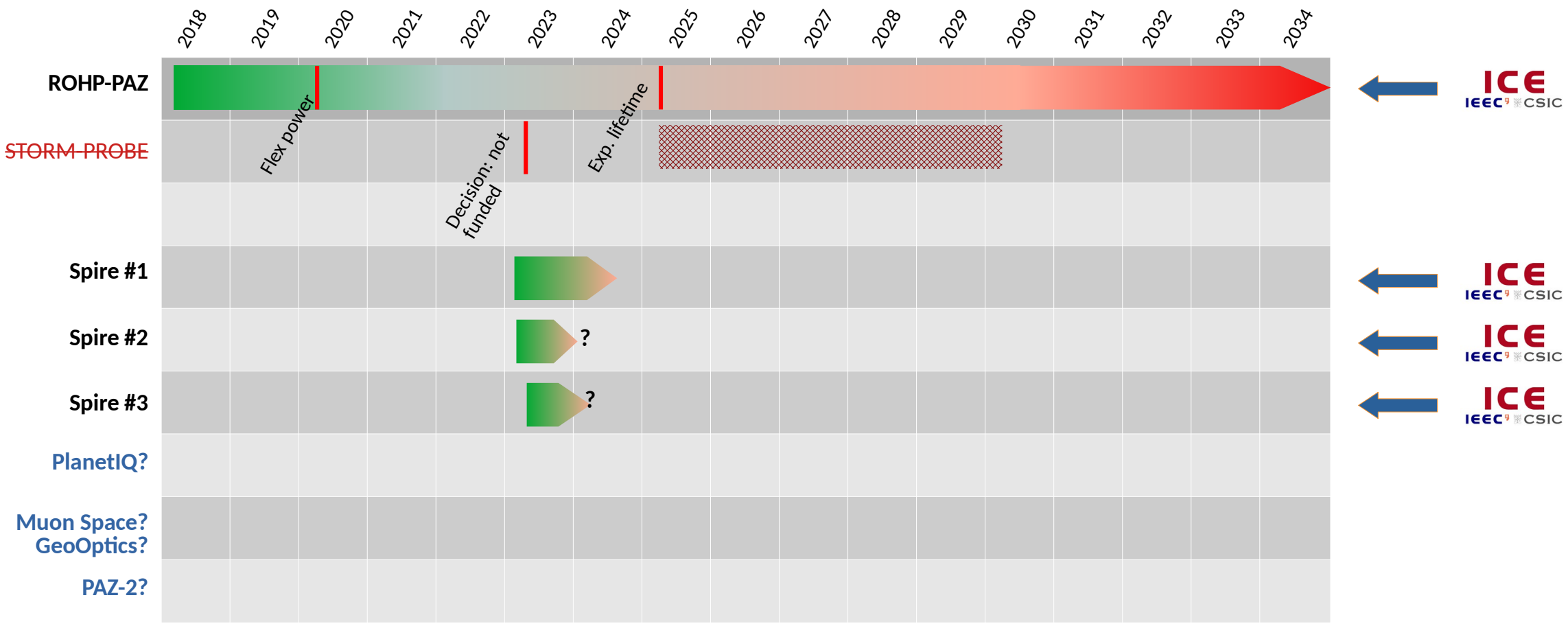
CSIC Institute of Space Sciences EXCELENCIA MARÍA DE MAEZTU

IEEC Institut d'Estudis Espacials de Catalunya

Polarimetric Radio Occultations



Polarimetric RO at ICE-CSIC

- ROHP-PAZ processing and validation
  - Processing steps
  - Collocations
  - Data release
- Standard products
- Horizontal resolution
- Δϕ and cloud top height

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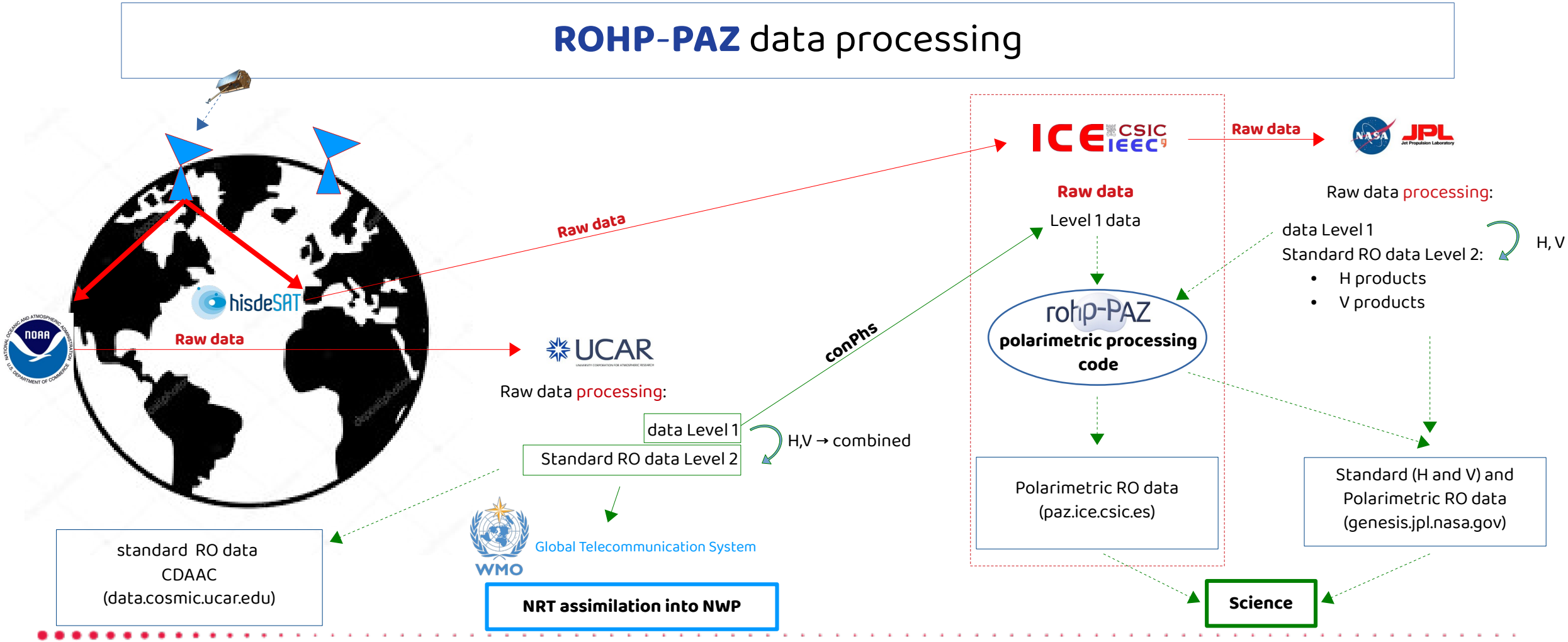
ROHP-PAZ Data flow



Polarimetric RO processing ICE-CSIC

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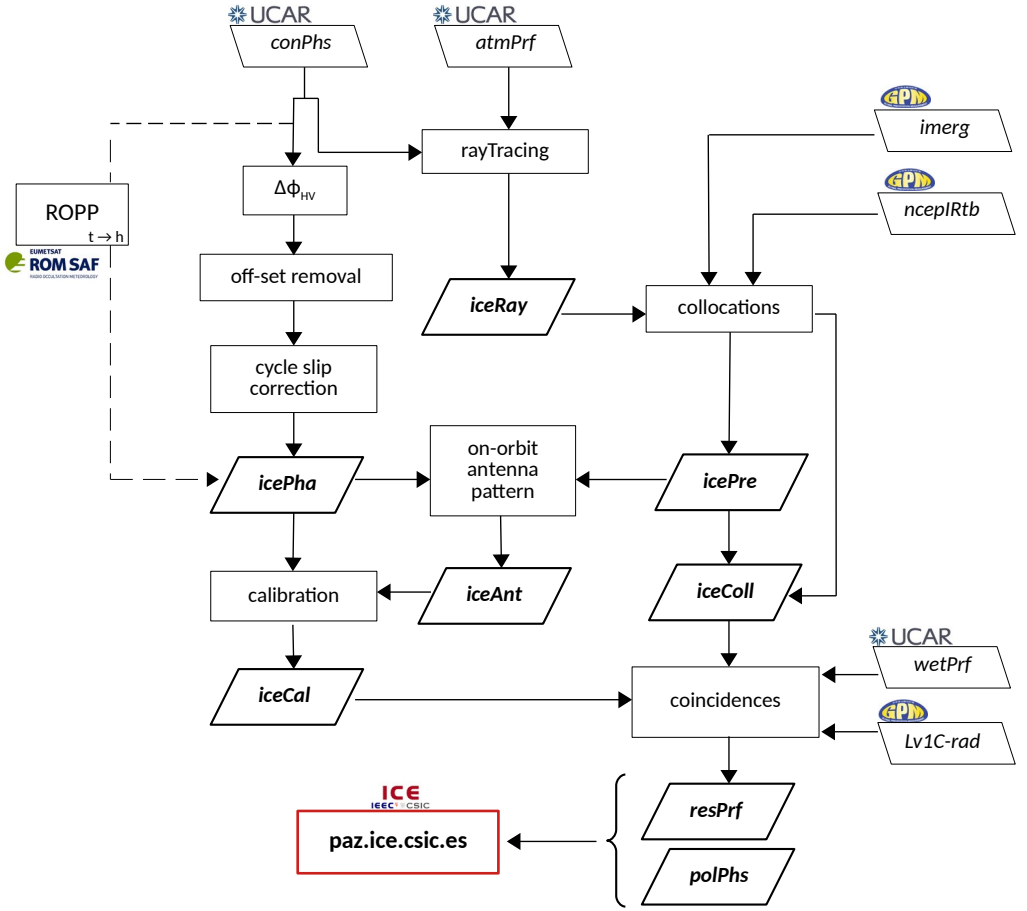
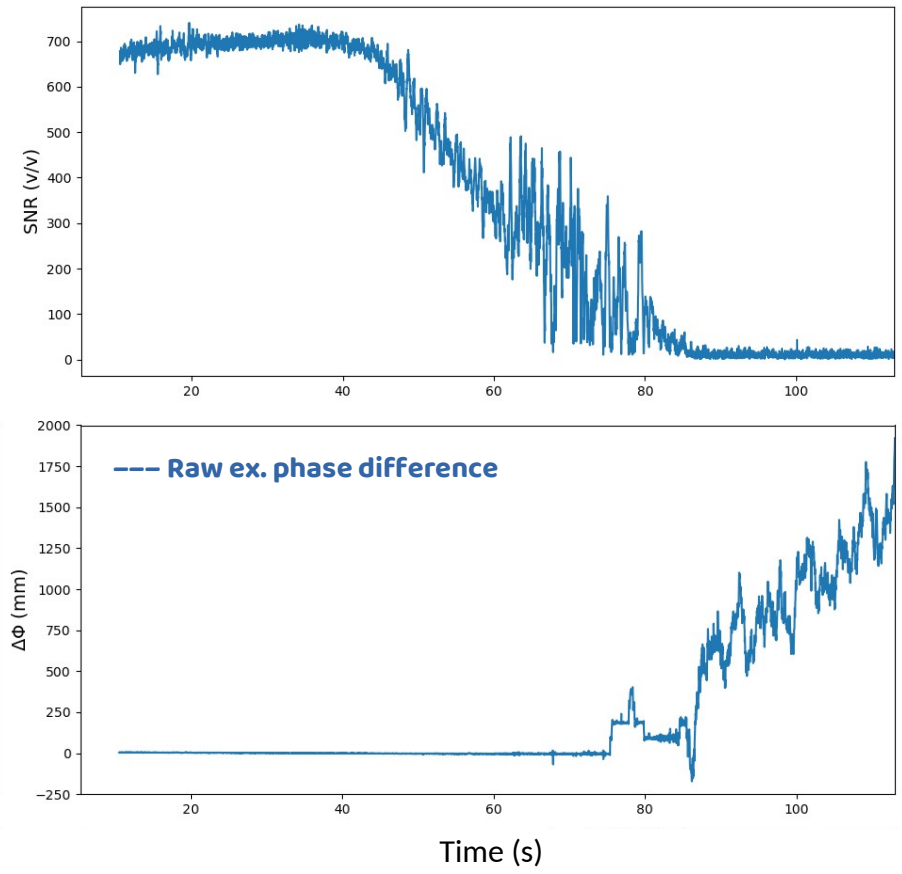
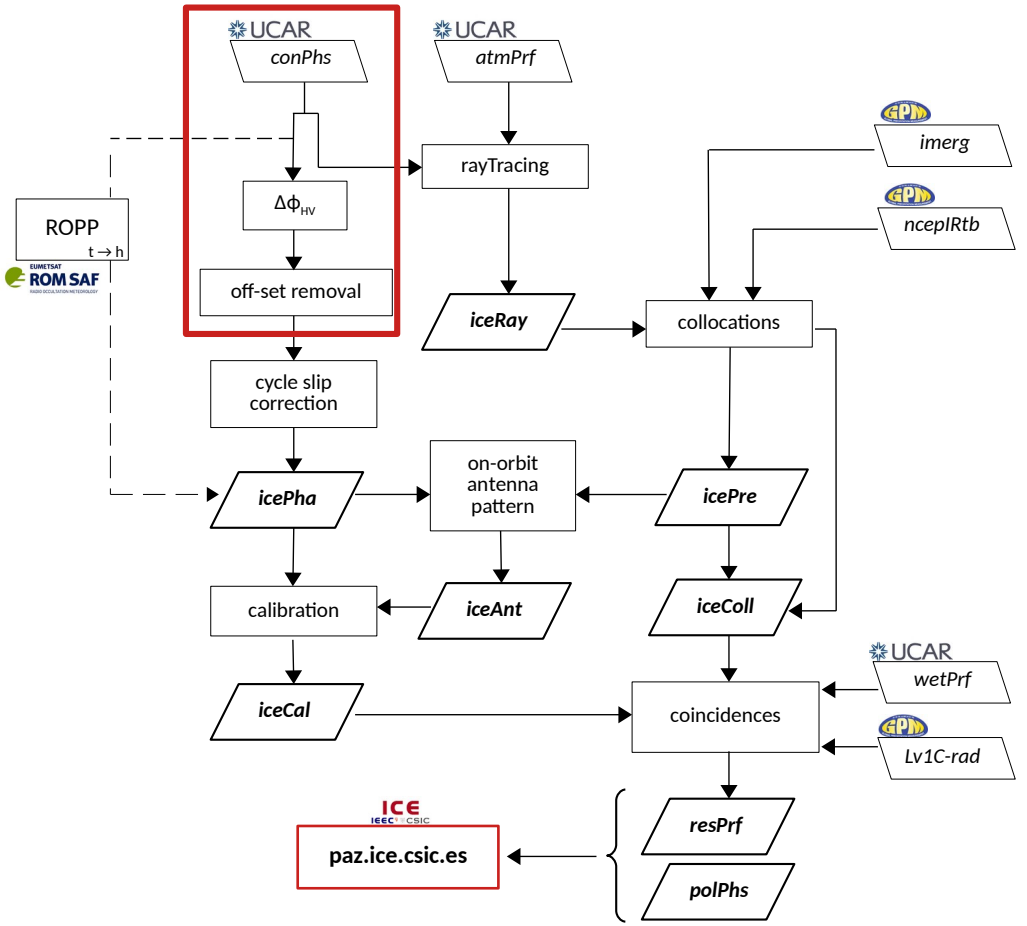
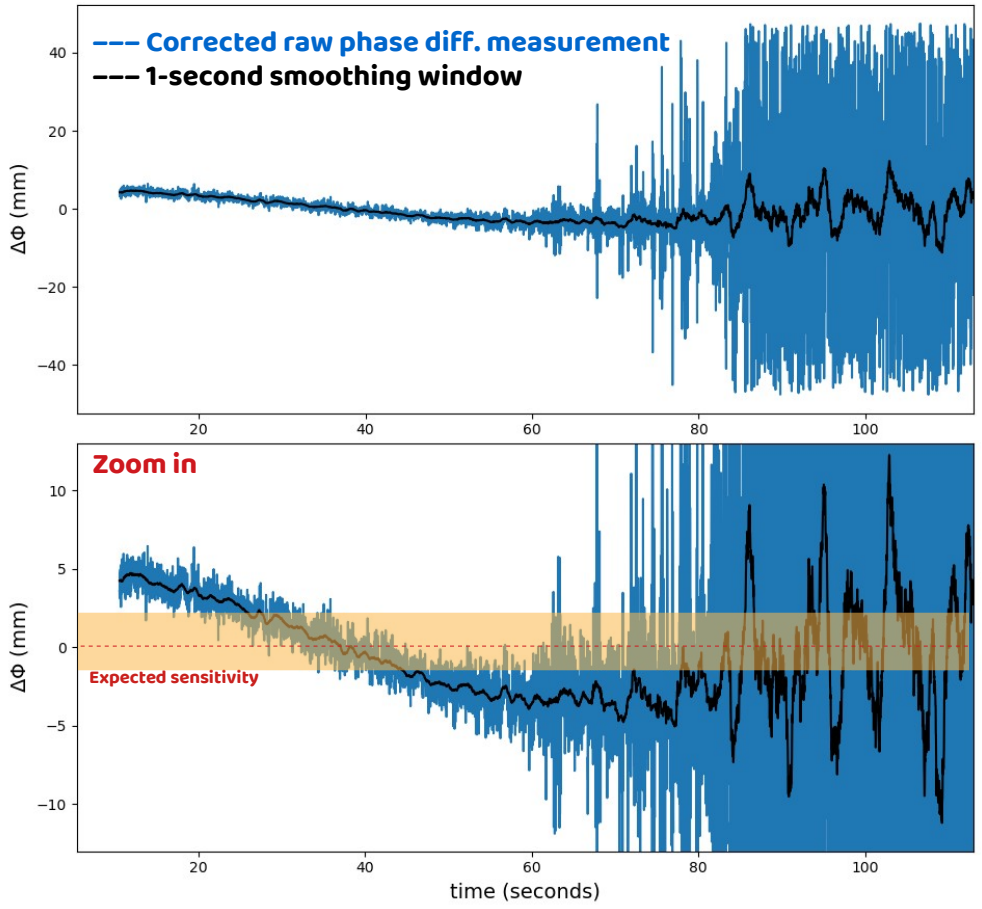


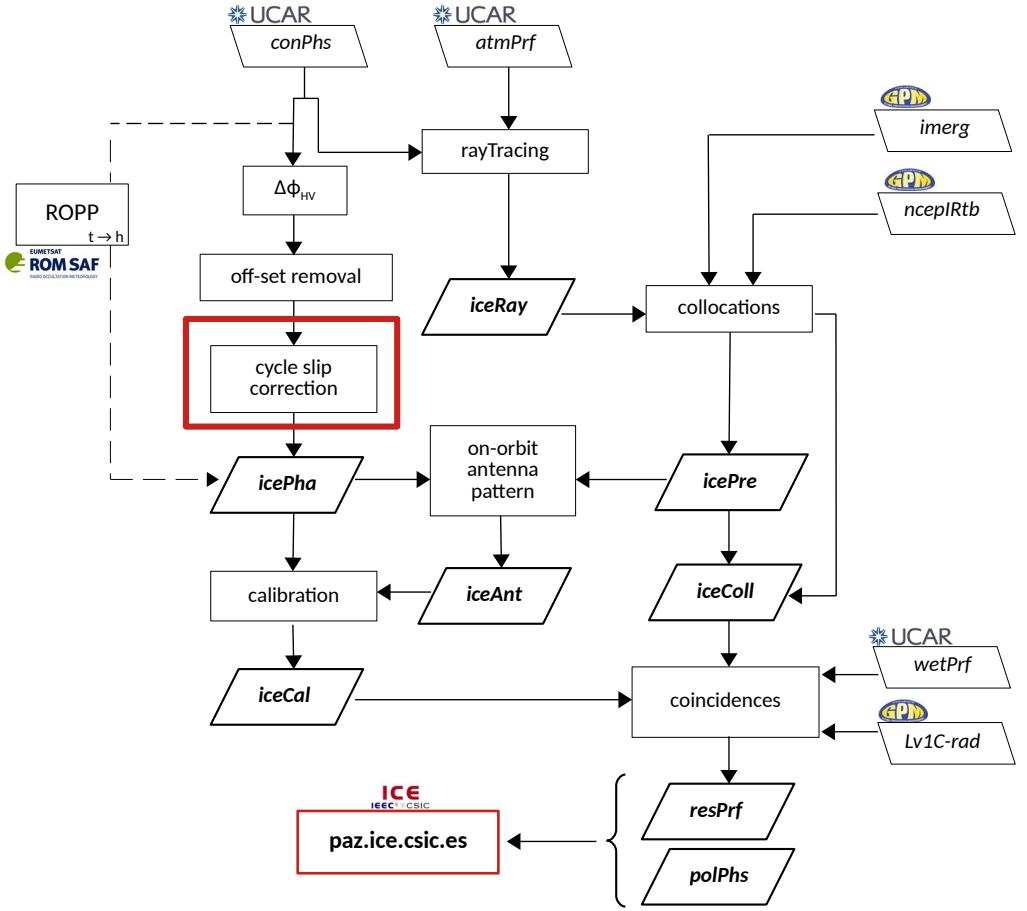
Polarimetric RO processing ICE-CSIC





Polarimetric RO processing ICE-CSIC





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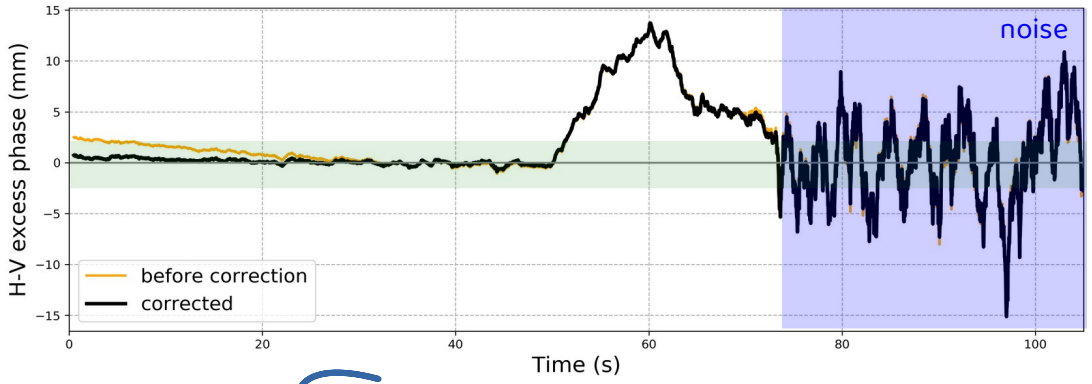
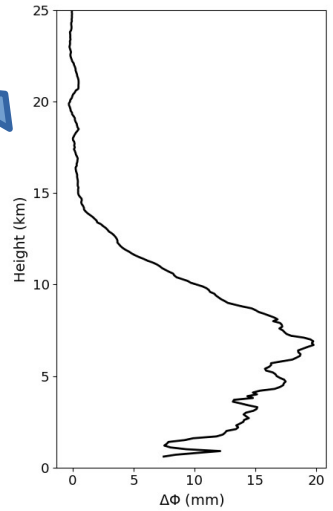
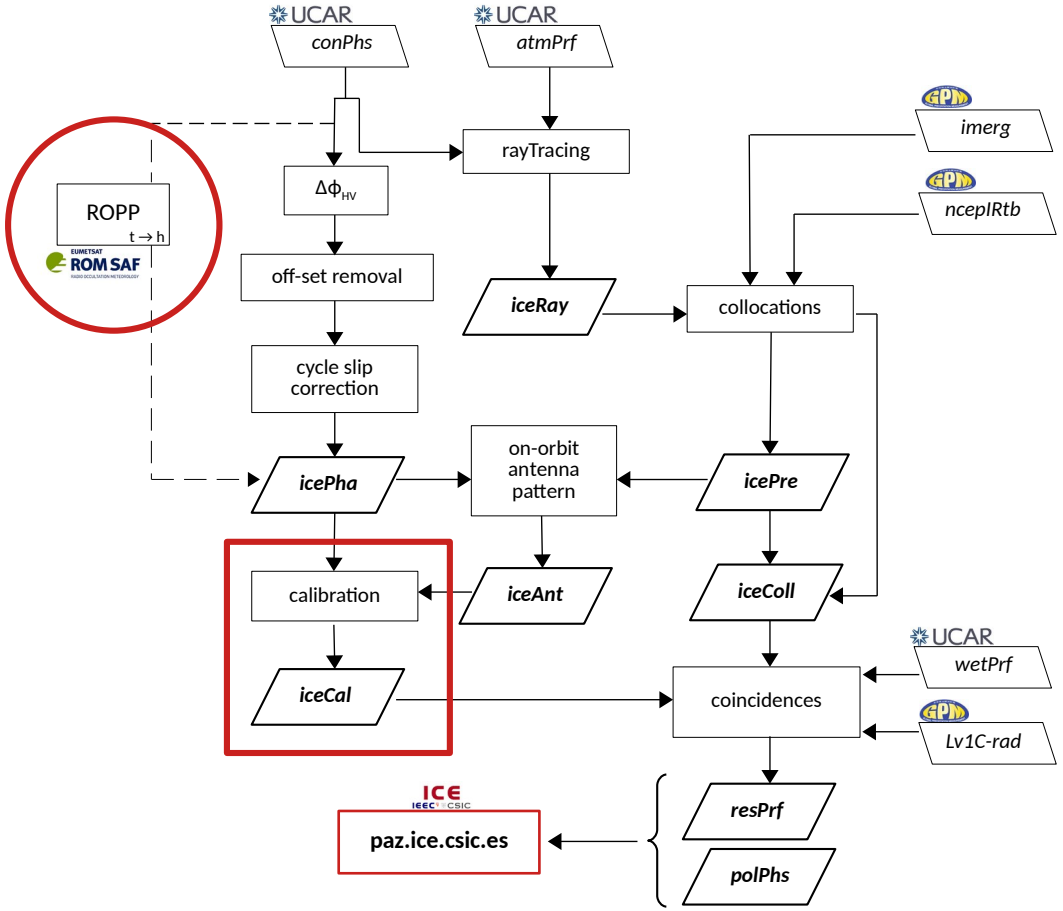


geometric optics





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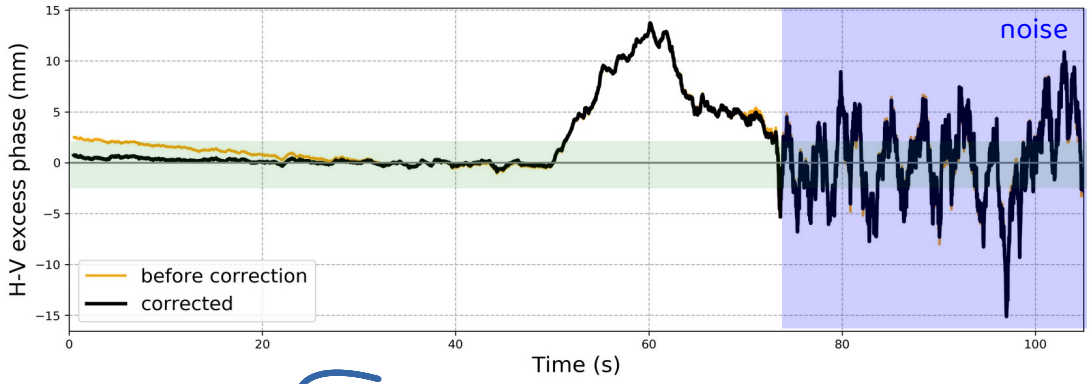
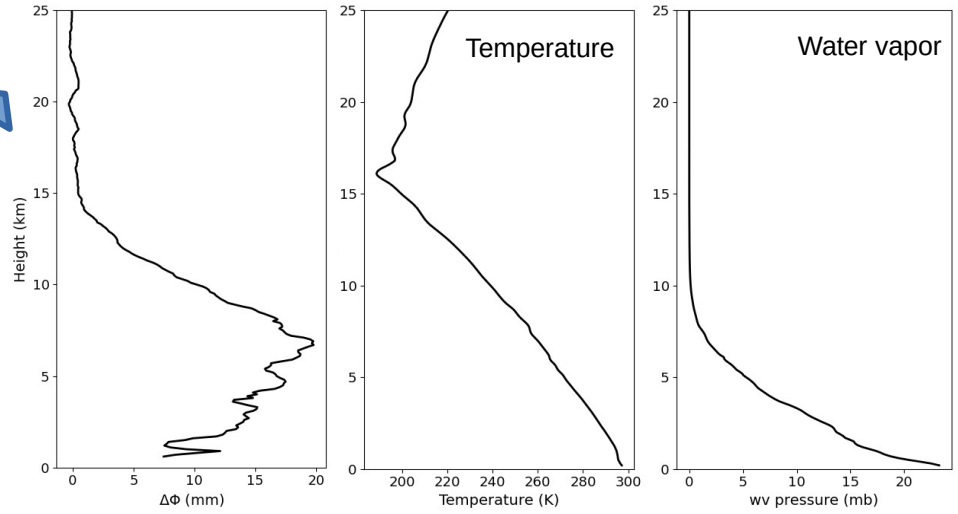
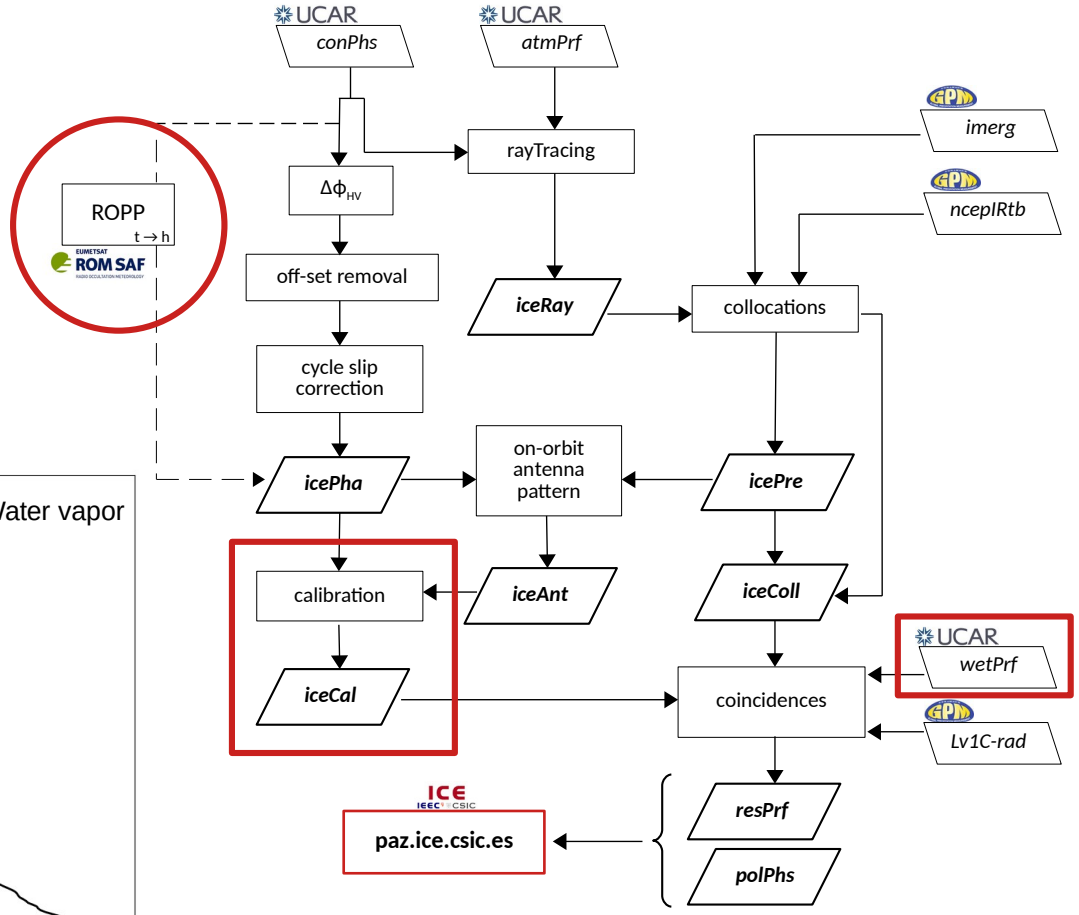


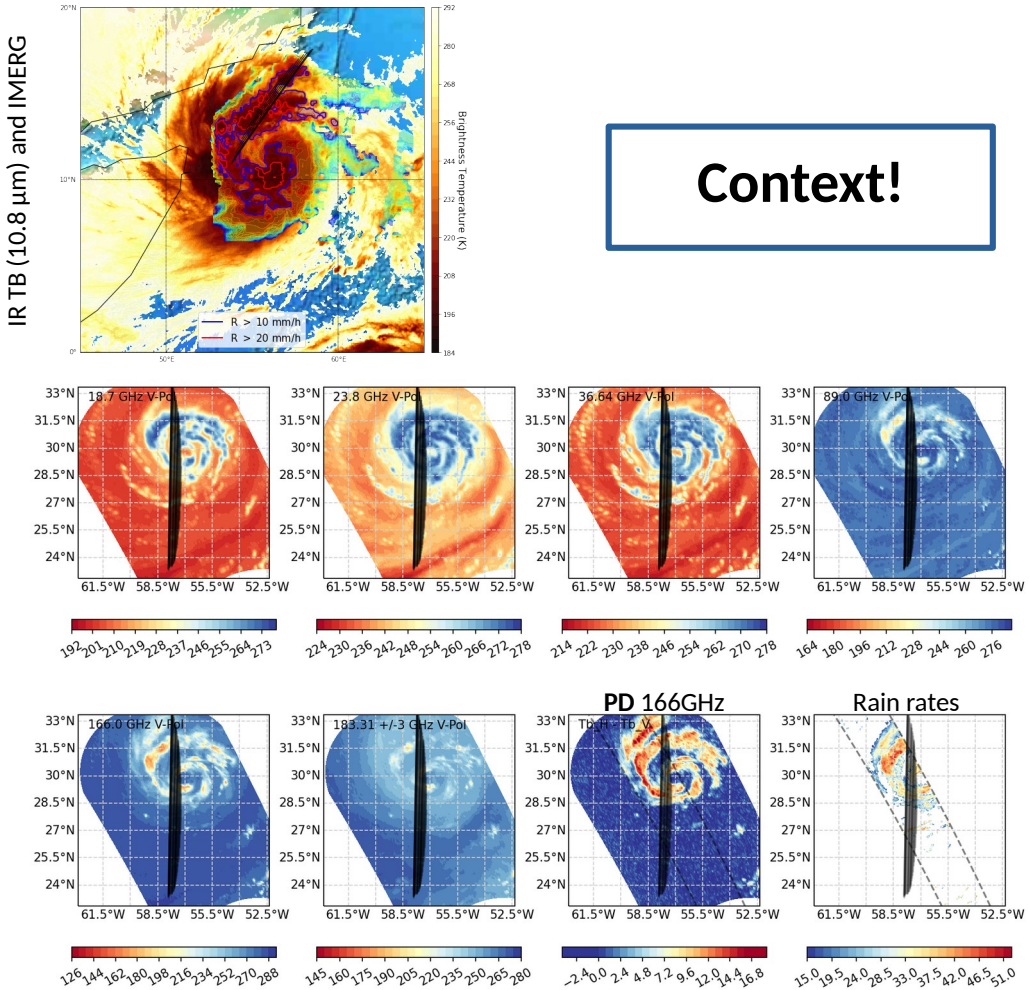
geometric optics



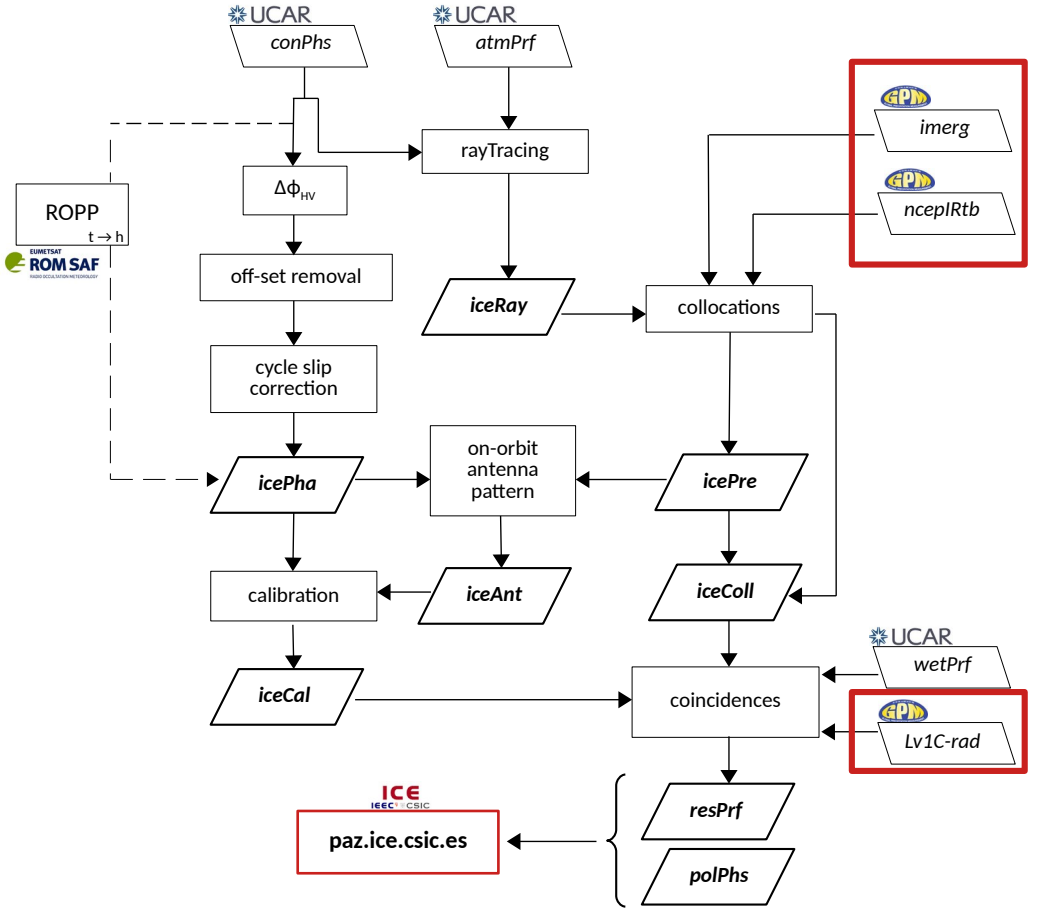
Thermodynamics interpolated at the same vertical levels



Polarimetric RO processing ICE-CSIC



Context!

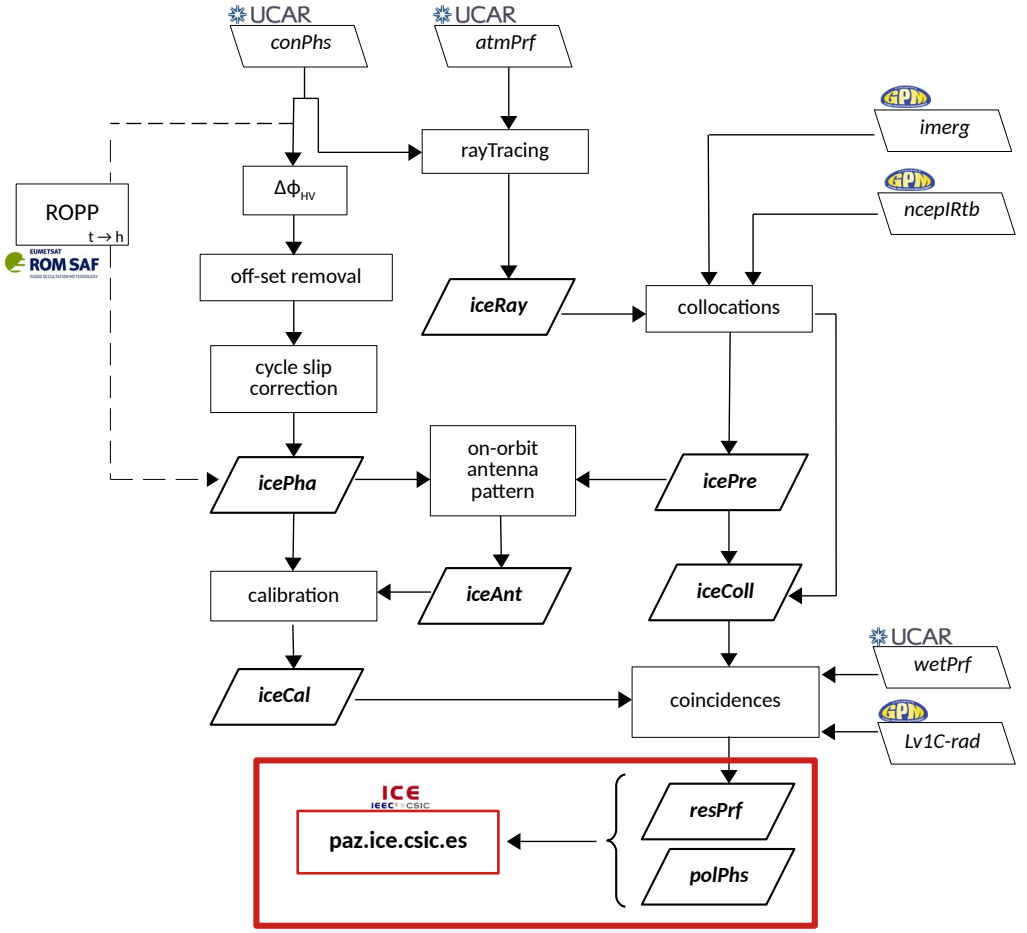


Polarimetric RO processing ICE-CSIC

Processing version: V07
New filetype: resPrf
Available soon from *paz.ice.csic.es*. Pending DOI and manuscript submission

Data structure:

```
netcdf resPrf_PAZ1.YYYY.DOY.HH.MM.GXX_proc.vers_V07 {
        group: profiles
                variables: height, dphi, temp, pres, vp, ref
        group: rays
                variables: lat, lon, hei
        group: coll
                group: precipitation
                        variables: precipitation
                group: irtb
                        variables: irtemp
                group: GPM radiometer
                        group Swaths
                                variables: channels
```



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Polarimetric RO Standard Products

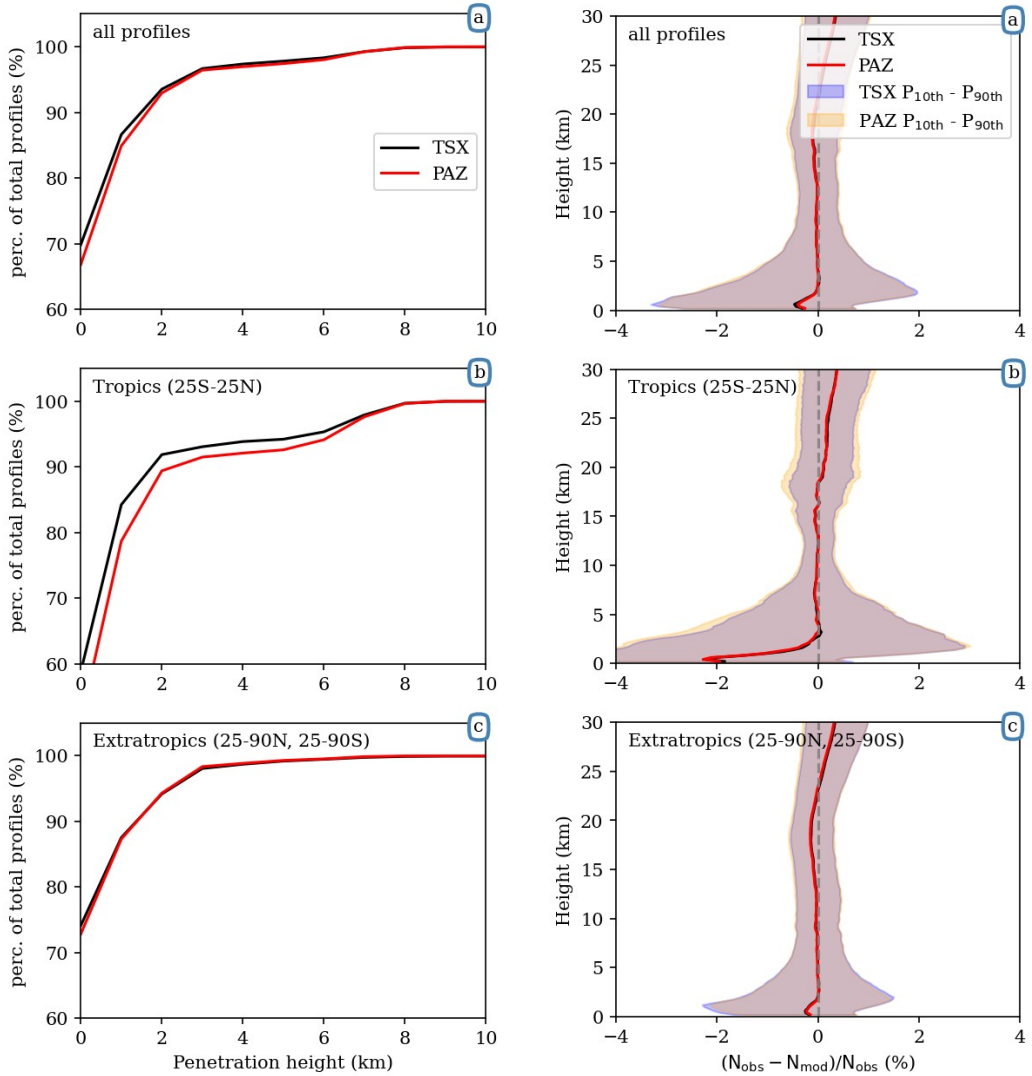
Comparison between PAZ and Terrasar-X:

Dual-pol vs standard antenna

- Very similar satellite
- Same receiver (IGOR+)
- Same orbit inclination (polar)

- 6 months (Jan 2019 – Jun 2019)
- Refractivity:
  - Penetration height
  - O-B

Small difference in penetration height (~ 4% more profiles TSX reach < 1 km, in the tropics)



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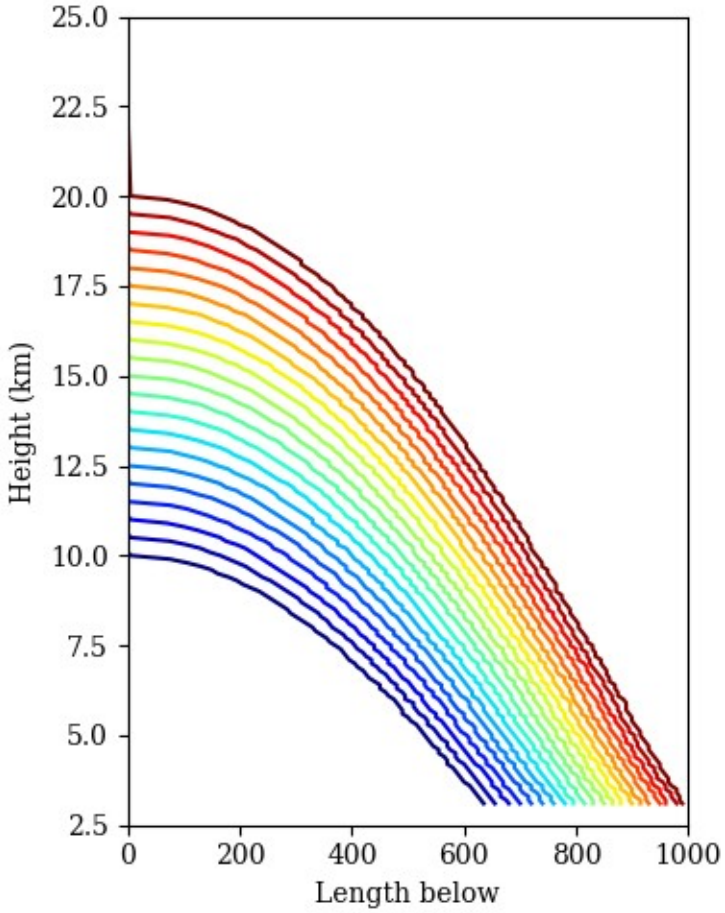
Polarimetric RO horizontal resolution

What is the horizontal resolution of Δϕ

1) Everything present along the ray-path contributes to Δϕ

   Assuming a height at which clouds may be present, we can compute the theoretical (maximum) horizontal resolution

→ Horizontal resolution depends on height



Polarimetric RO horizontal resolution

What is the horizontal resolution of Δϕ

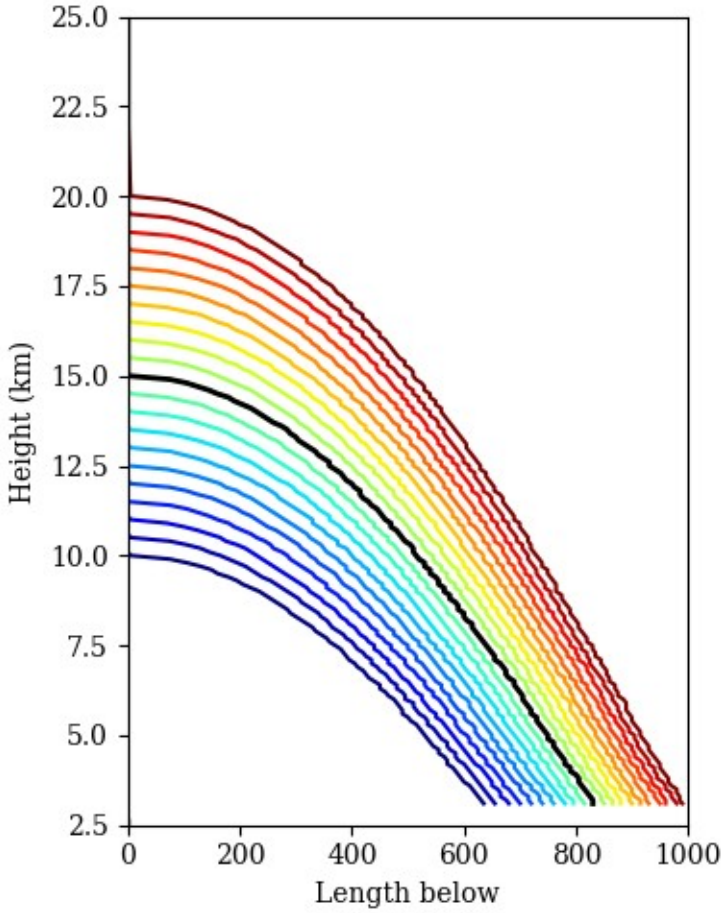
1) Everything present along the ray-path contributes to Δϕ

Assuming a height at which clouds may be present, we can compute the theoretical (maximum) horizontal resolution

→ Horizontal resolution depends on height

2) If we can know the cloud top height, we can reduce the maximum horizontal resolution

→ External information

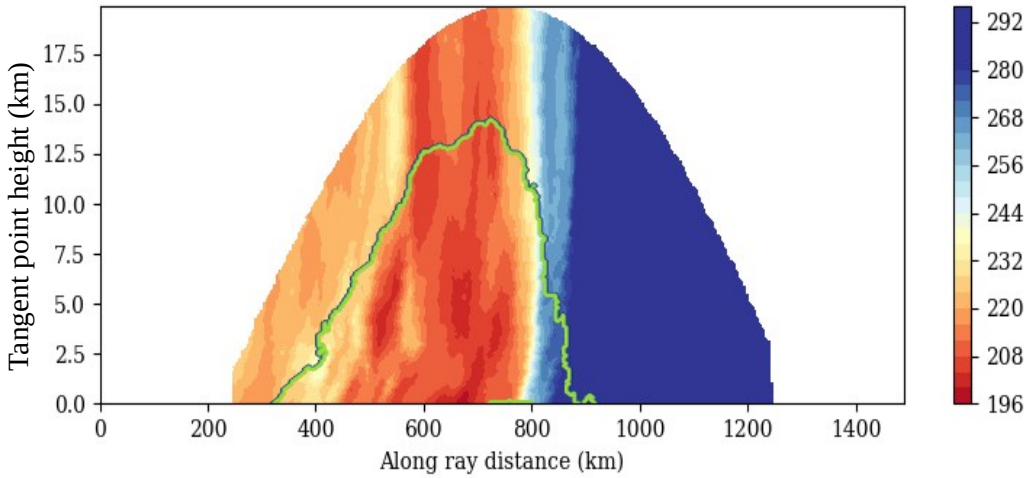


Polarimetric RO horizontal resolution

What is the horizontal resolution of Δϕ

3) External information (IR Tb) + temperature profile

→ portions of rays actually inside clouds



Polarimetric RO horizontal resolution

What is the horizontal resolution of Δϕ

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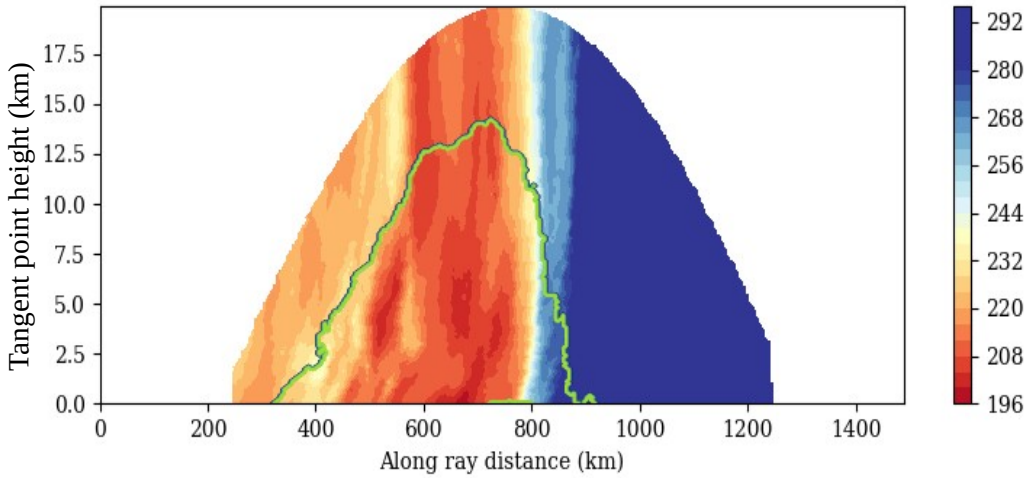

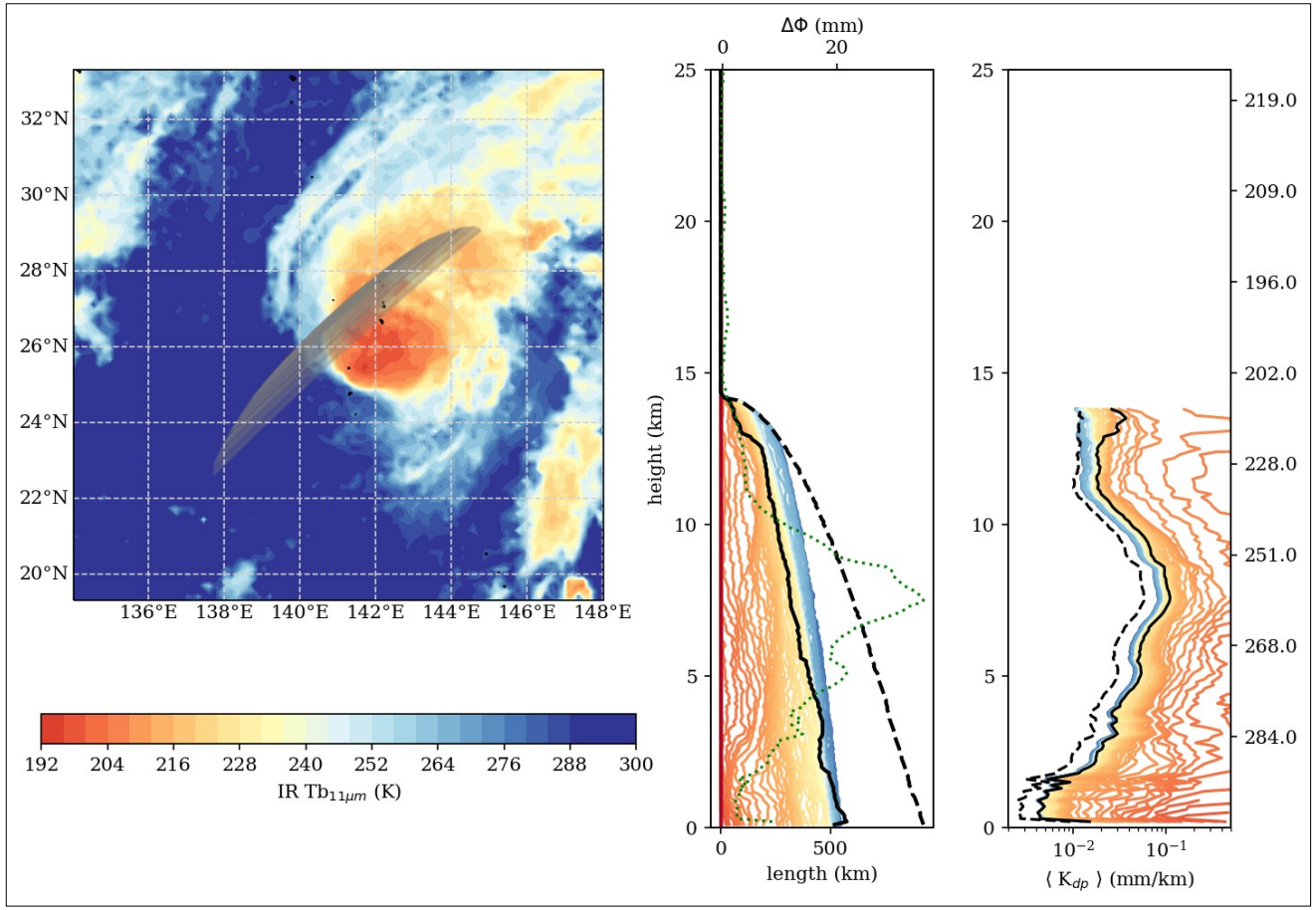

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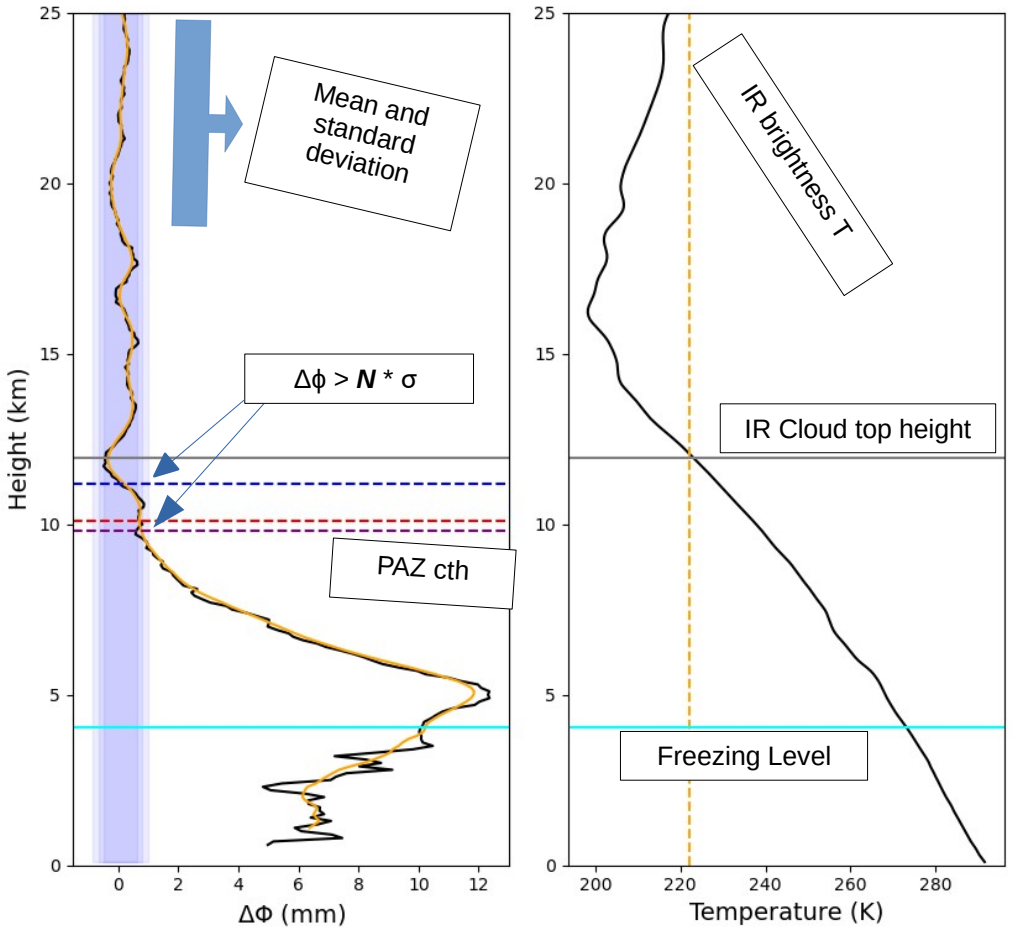
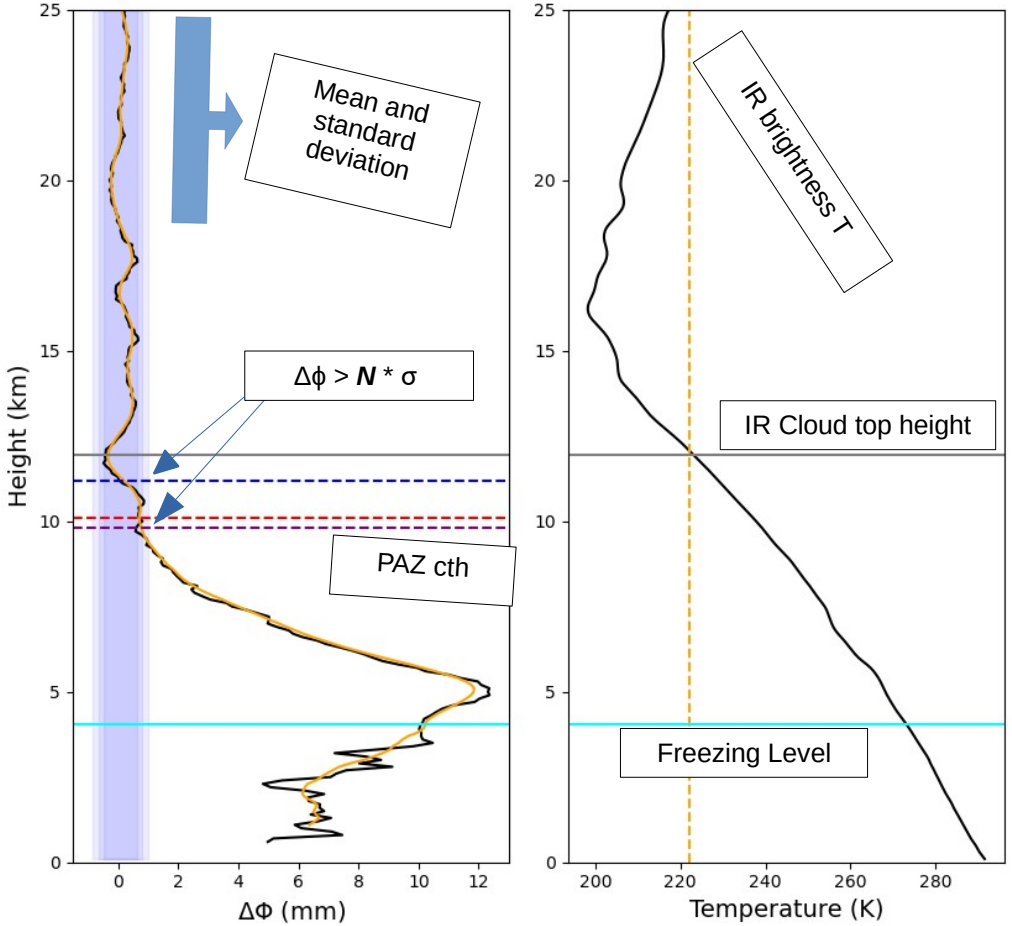
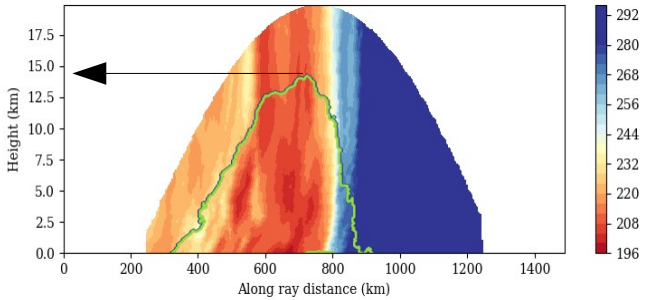
Polarimetric RO cloud top height



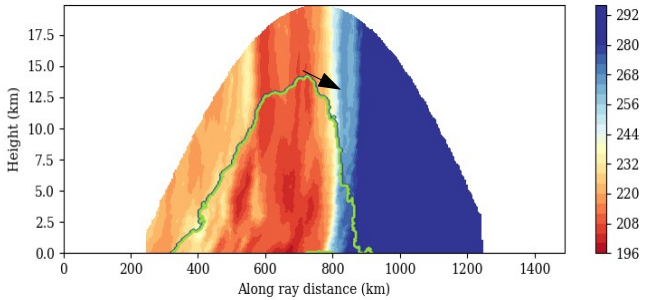
Polarimetric RO cloud top height

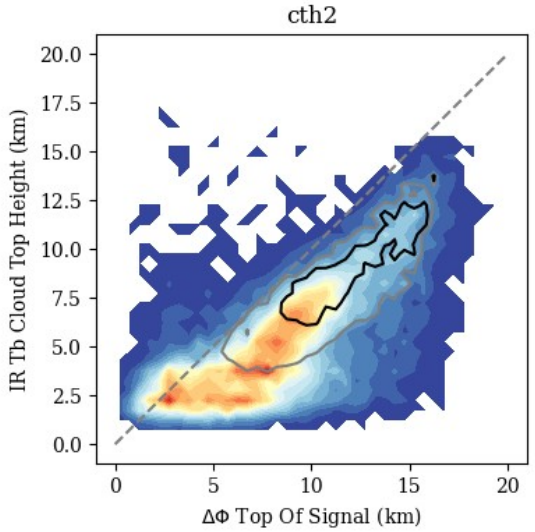


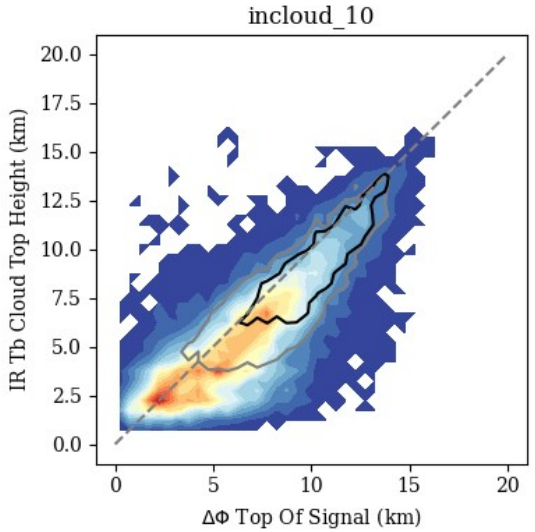


Match minimum IR TB with temperature profile

Match minimum IR TB with temperature profile, and propagate it to the tangent point







Conclusions

- New data version to be released soon
  - A few bugs fixed
  - Thermodynamics provided at same vertical levels
  - Detailed (ray-points) collocations information
- Standard products: results from TSX are equivalent to PAZ
- Horizontal resolution: external information can help constraint the horizontal resolution
- Δϕ Top of the signal: sensitivity to most cloud structure

Thanks!

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