The EarthCARE Multi Spectral Imager Cloud Products
Level 2 M-CLD

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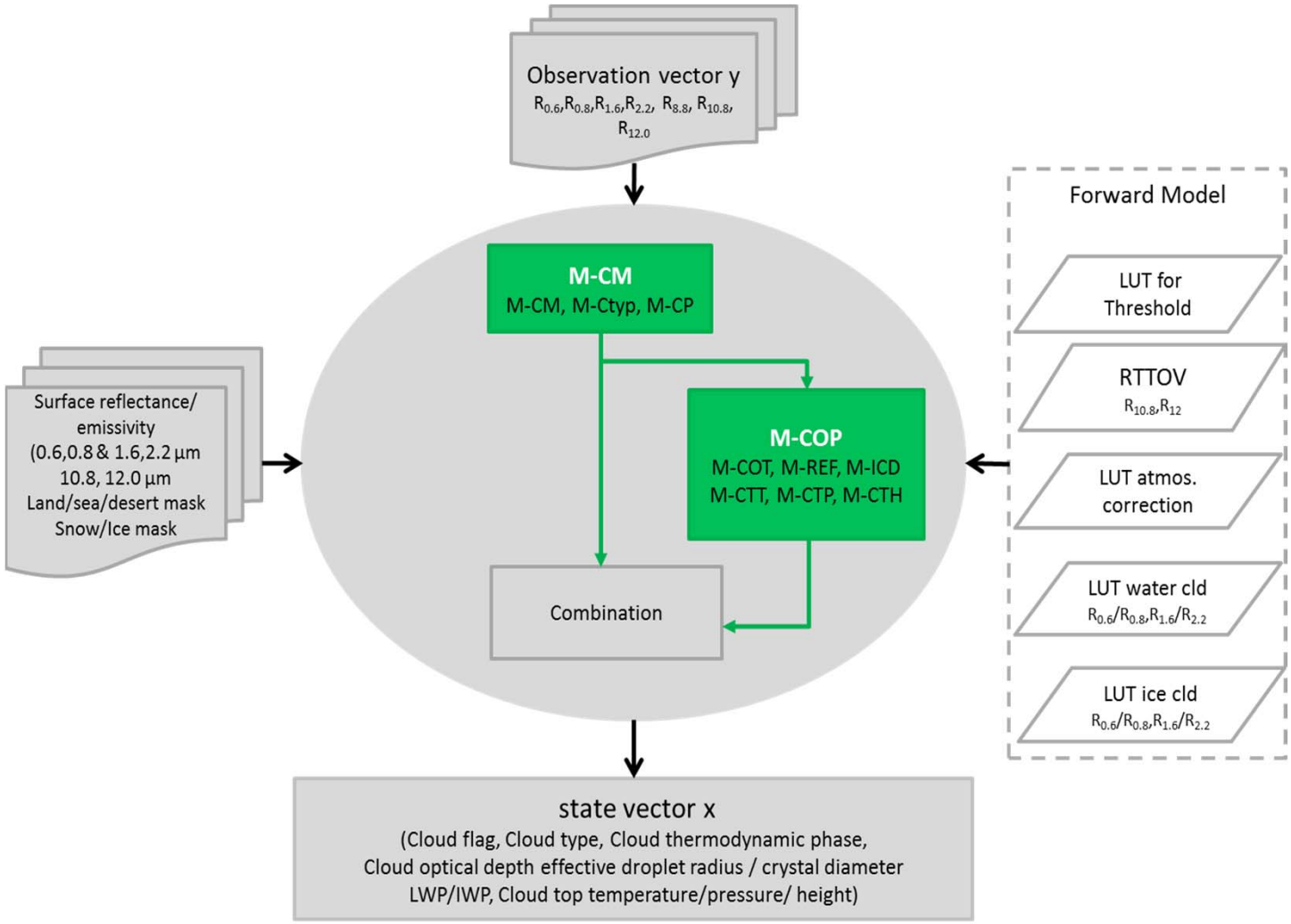
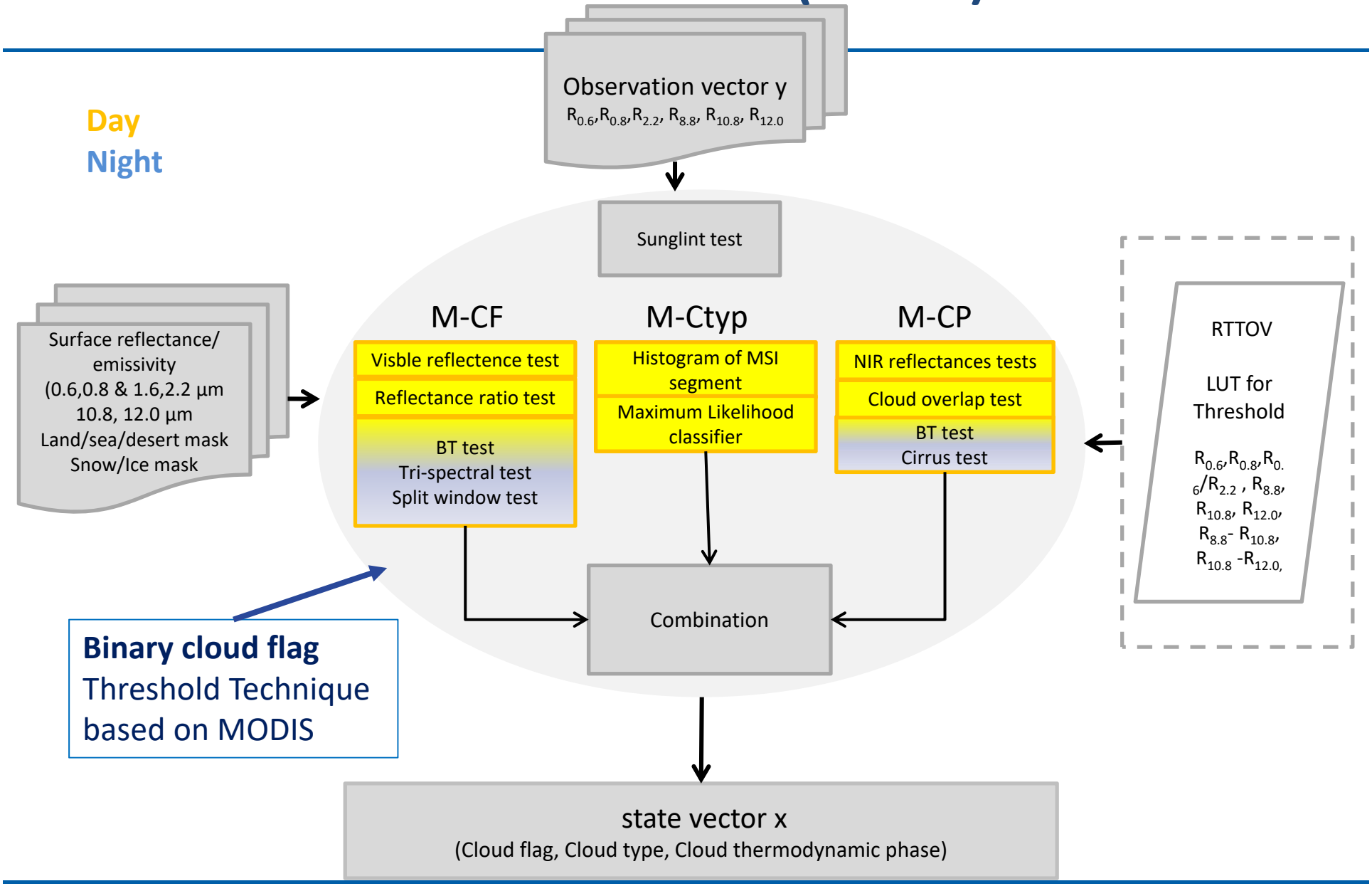
MSI cloud processing chain (M-CLD)



contact: anjah@tropos.de

MSI cloud mask (M-CM)



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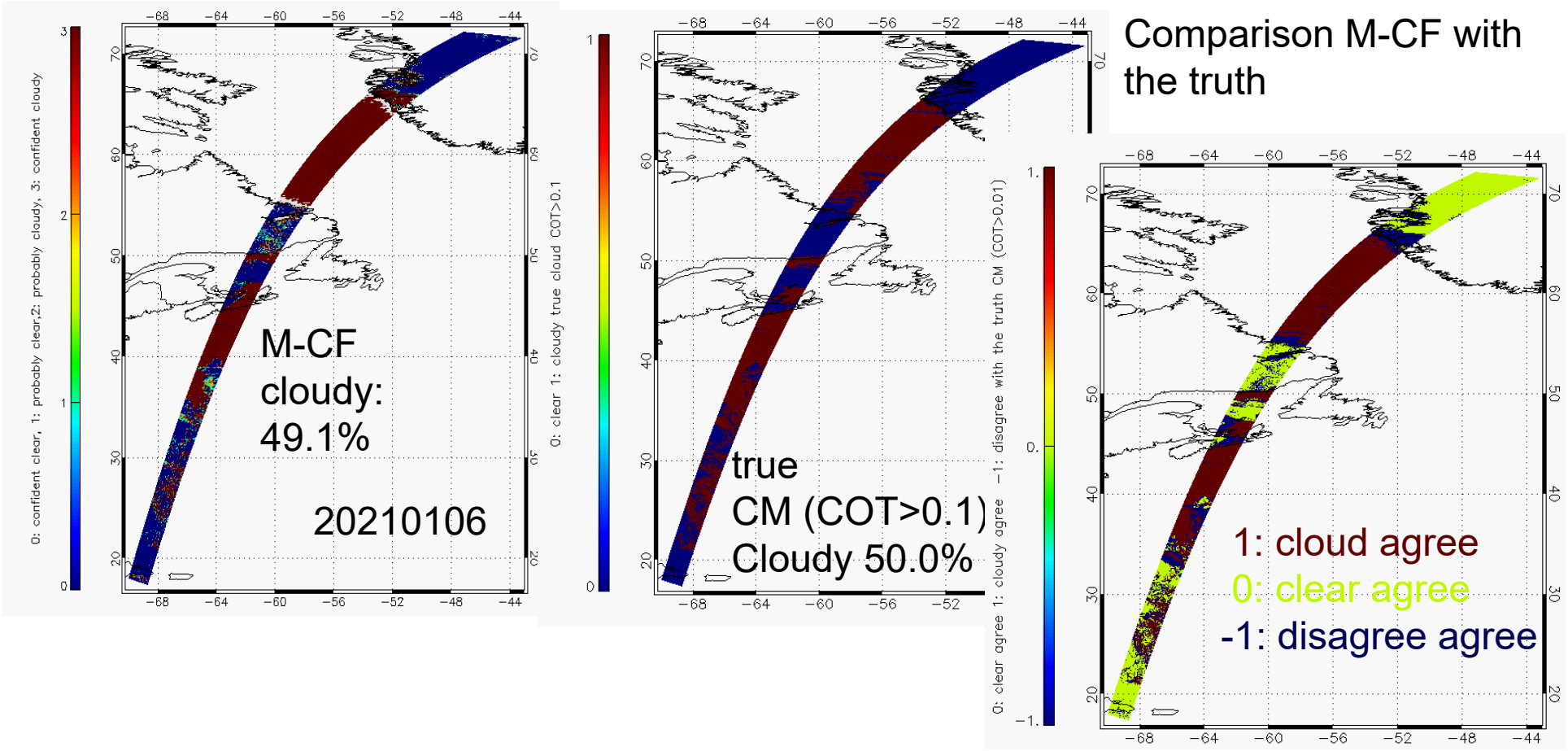
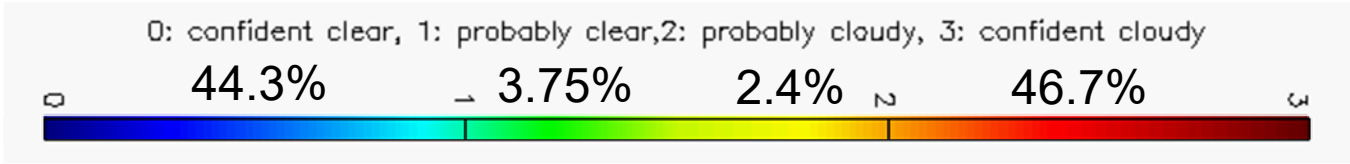
EarthCARE simulated test scenes

HALIFAX scene v12





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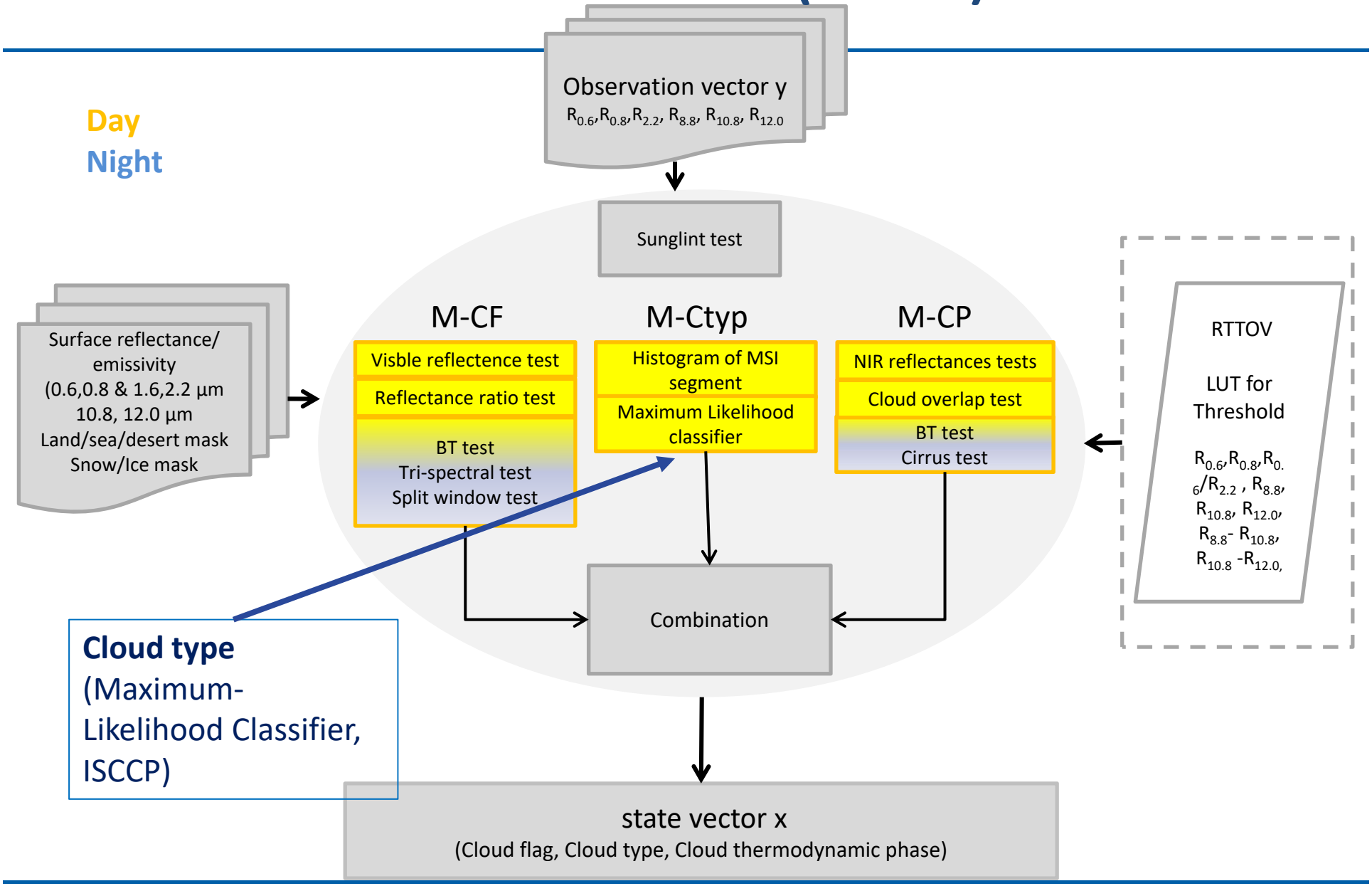
MSI cloud mask (M-CM)



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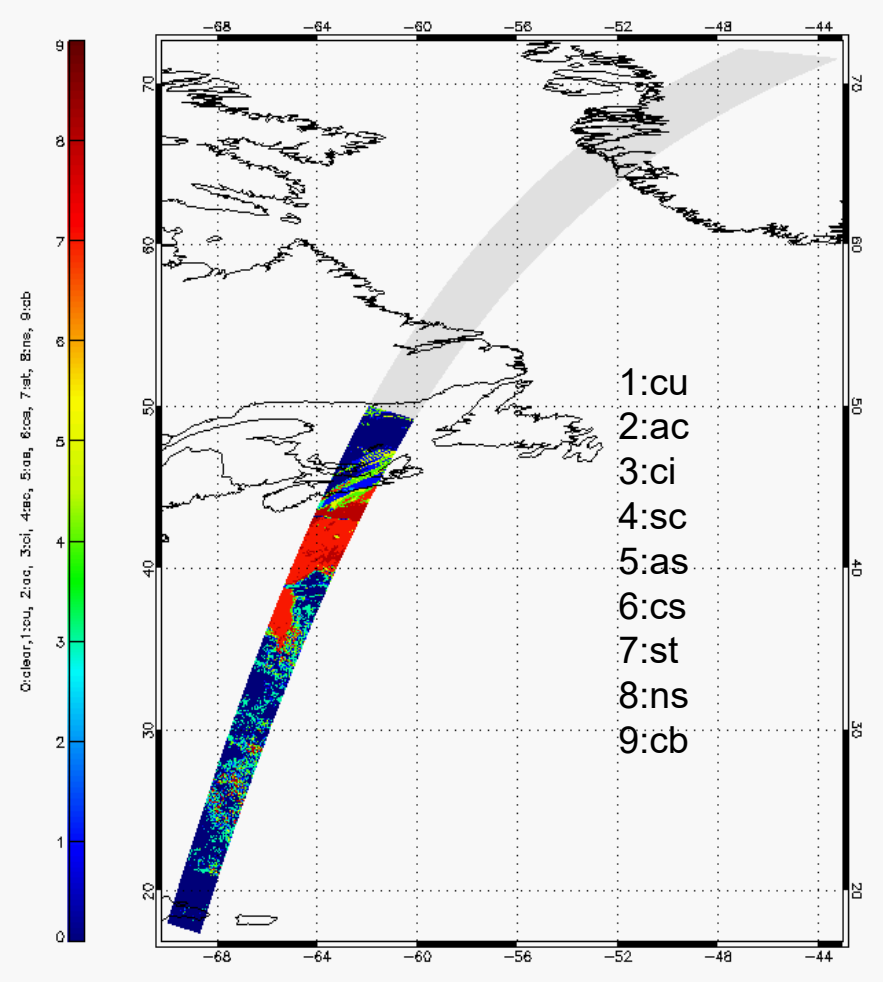
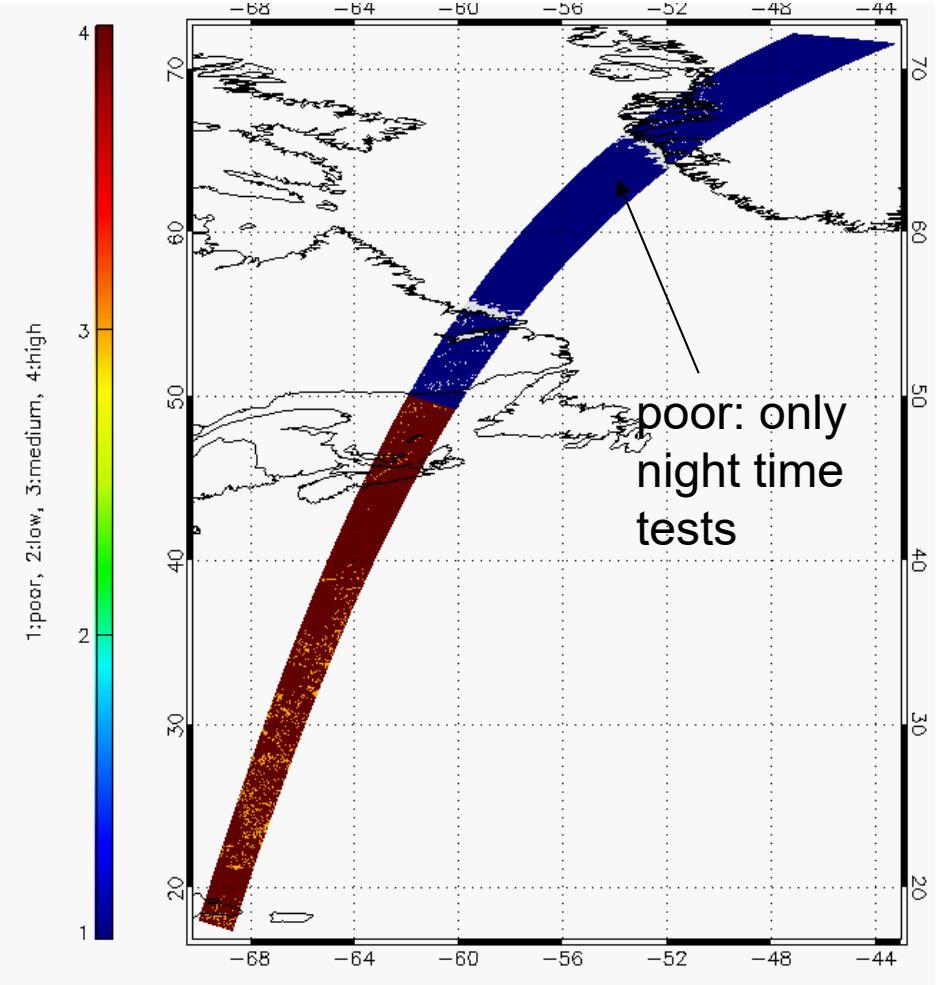
EarthCARE simulated test scene

HALIFAX scene v12

M-Ctype



M-CM Quality flag



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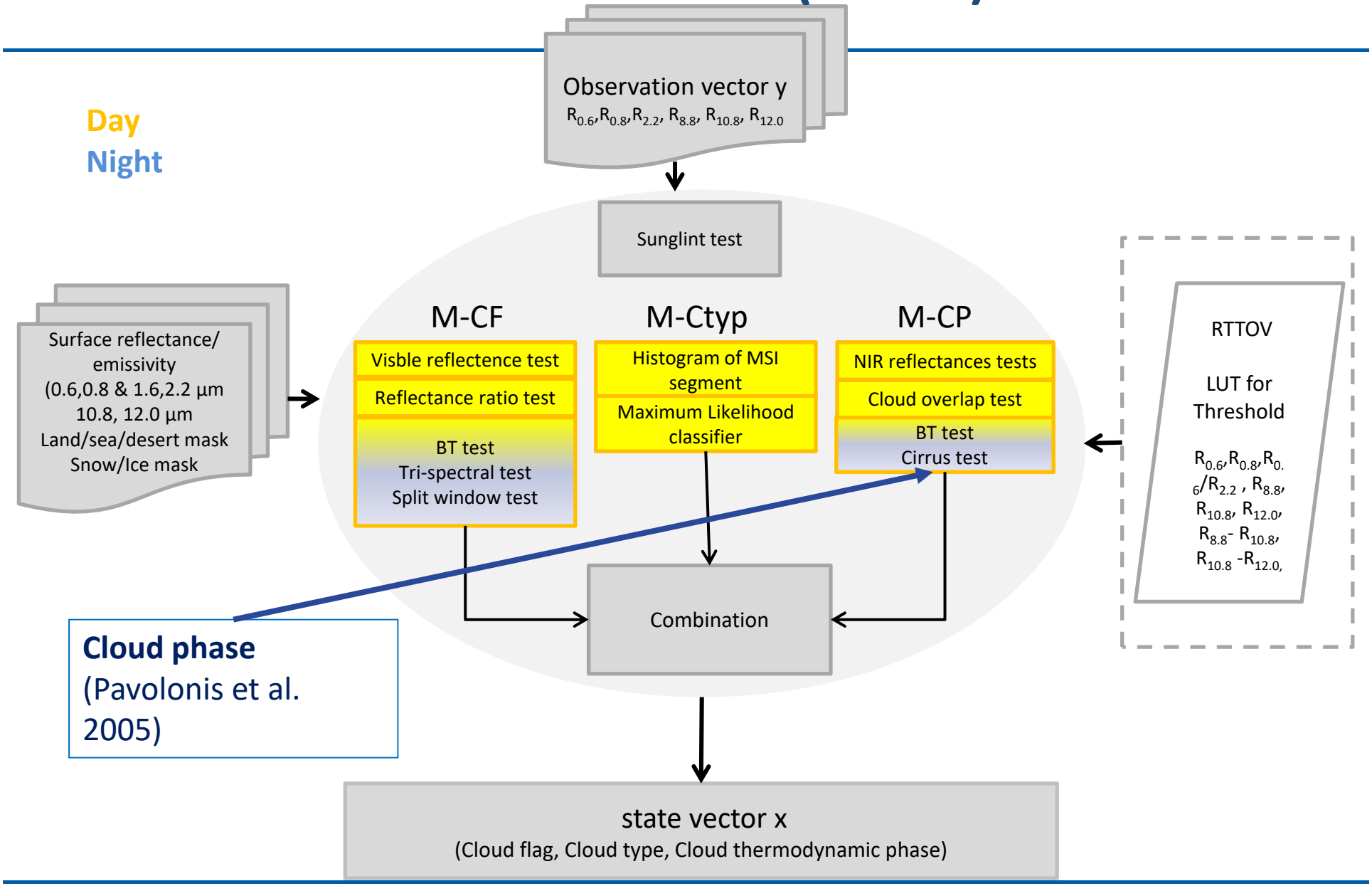

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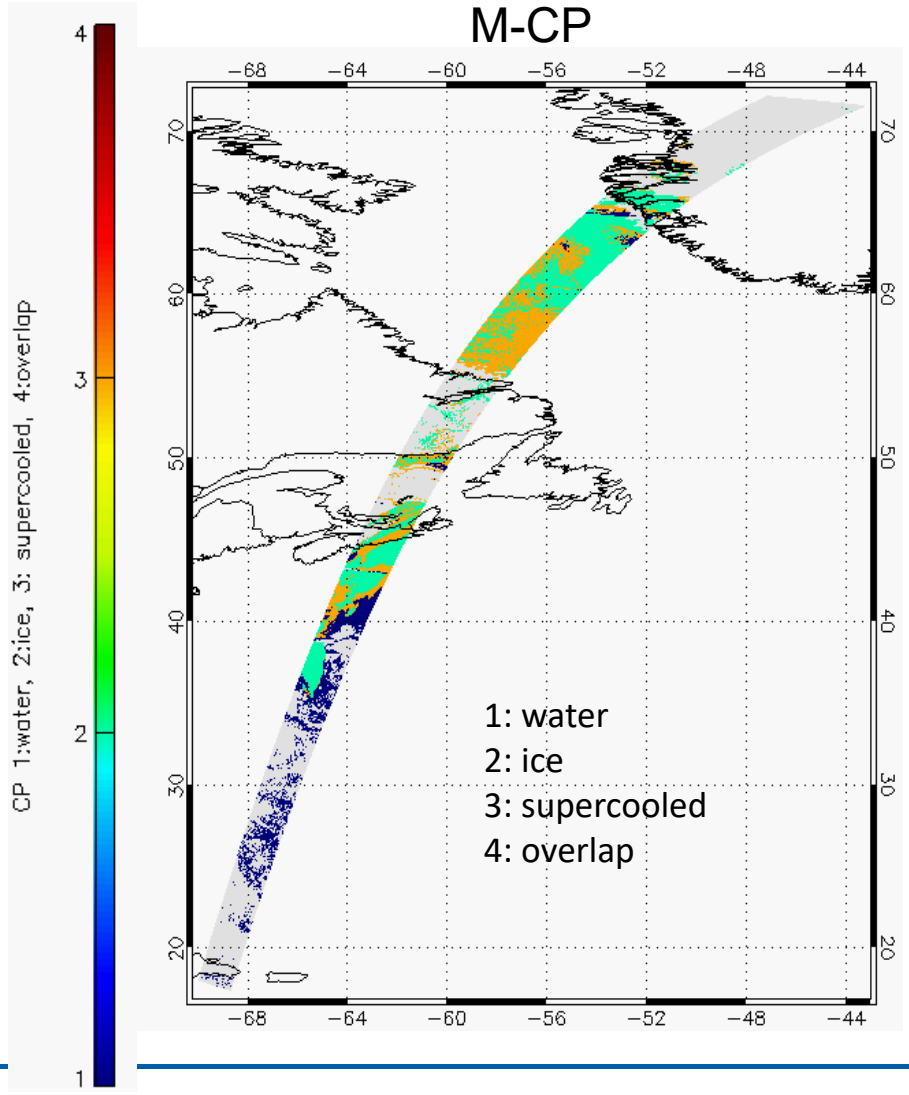
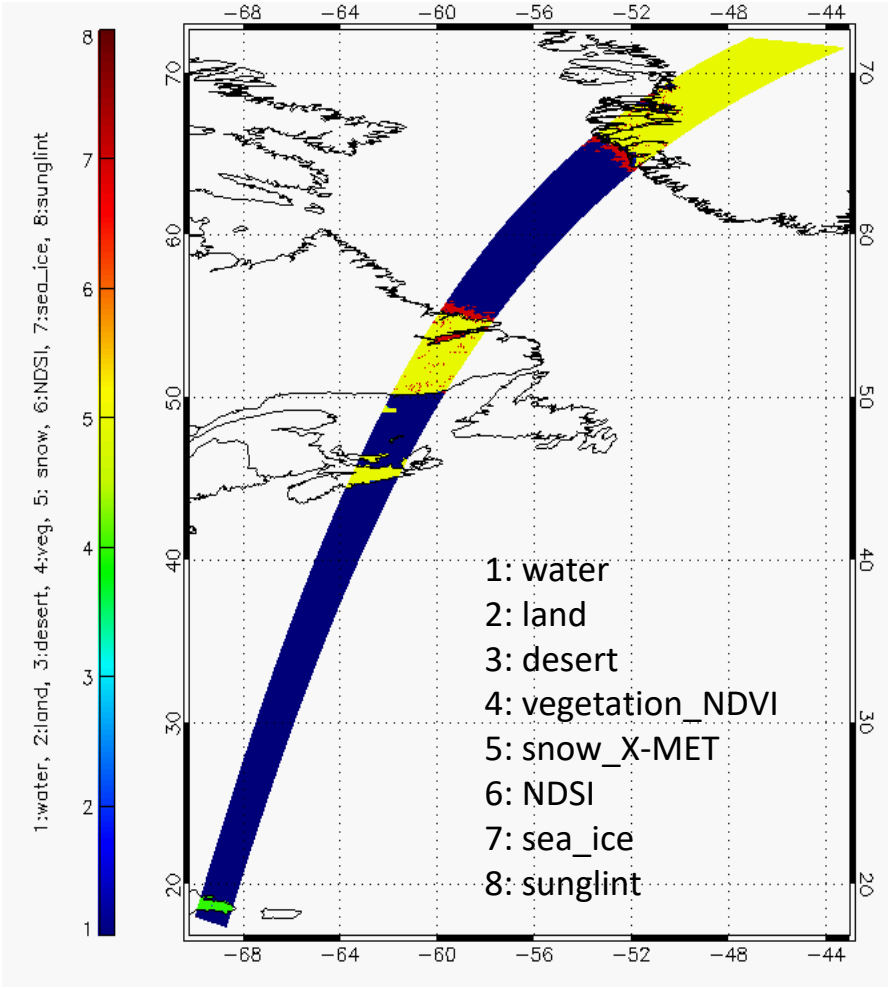
EarthCARE simulated test scenes

HALIFAX scene v12

M-CP



M-CM Surface flag



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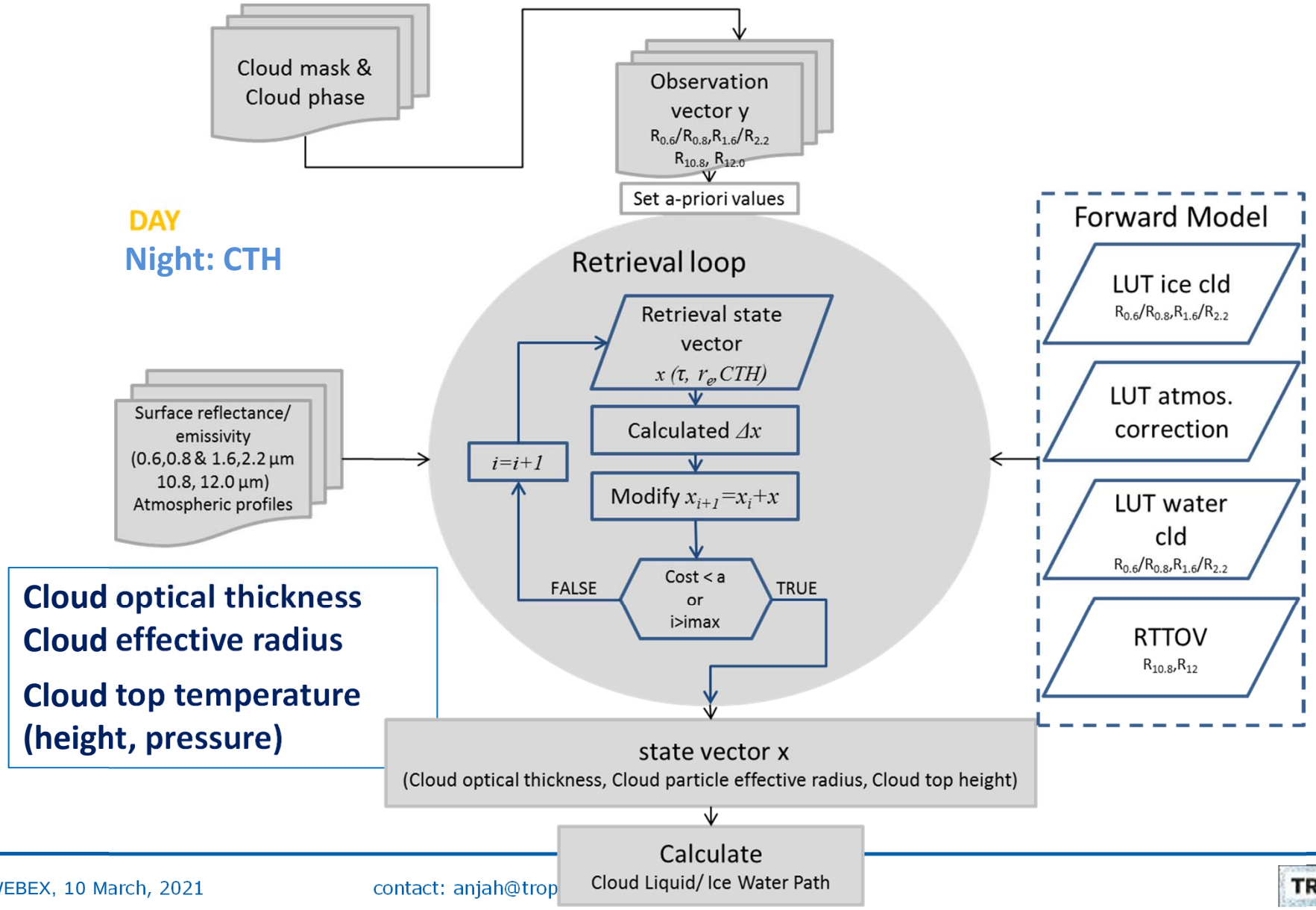
MSI cloud optical and physical properties (M-COP)



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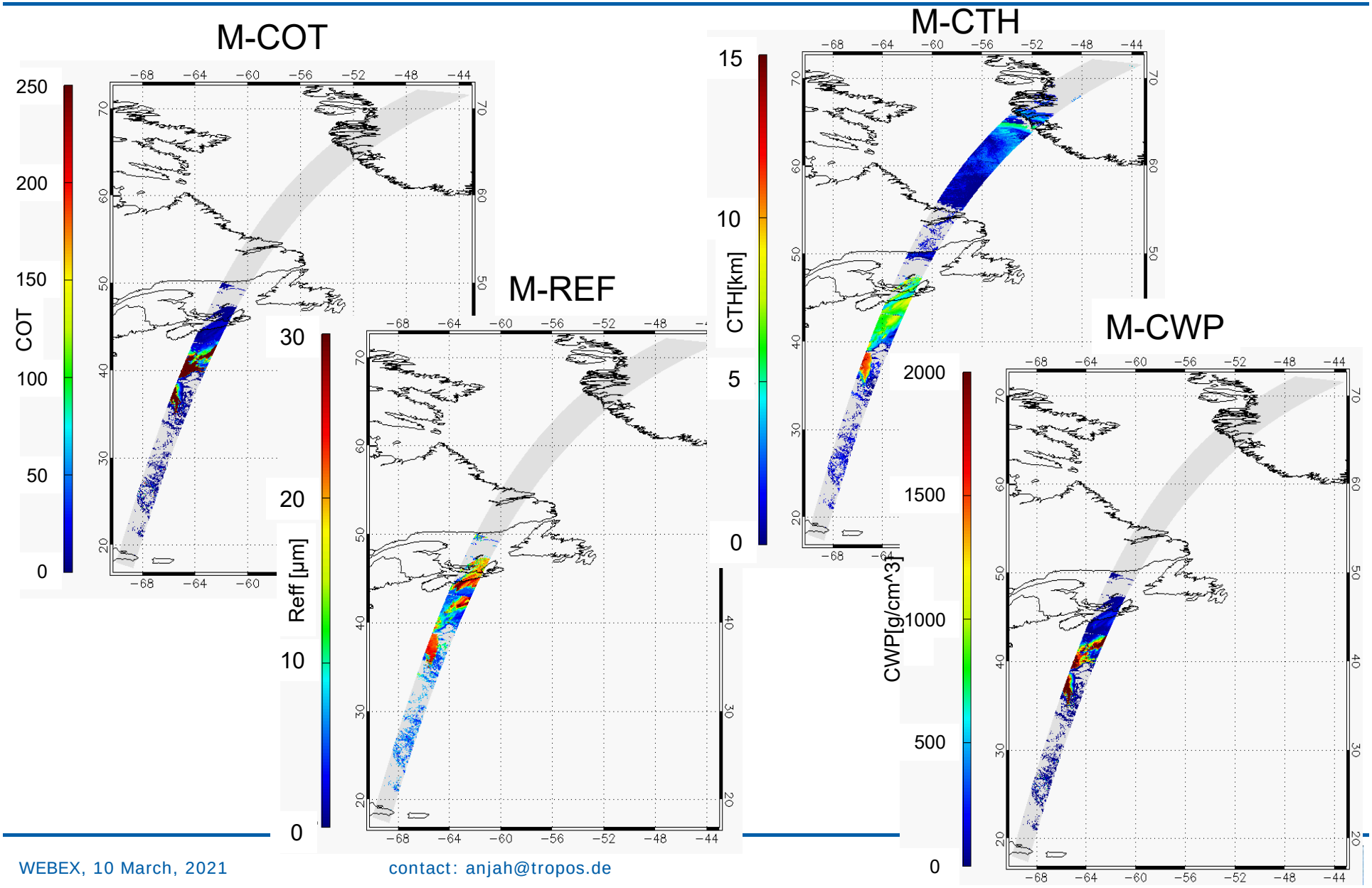
EarthCARE simulated test scene



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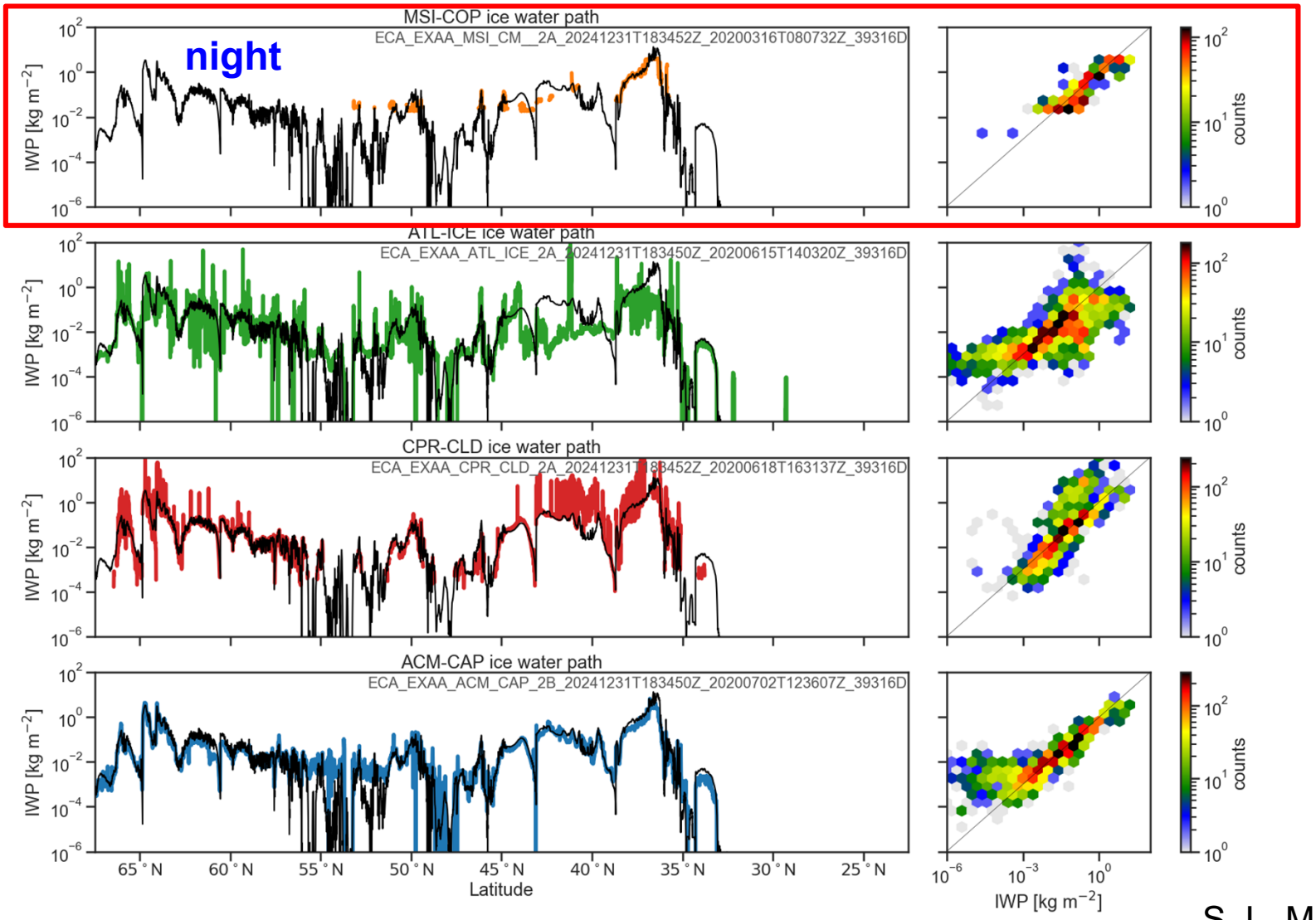
Inter-comparison of retrievals Halifax scene

IWP



S. L. Mason

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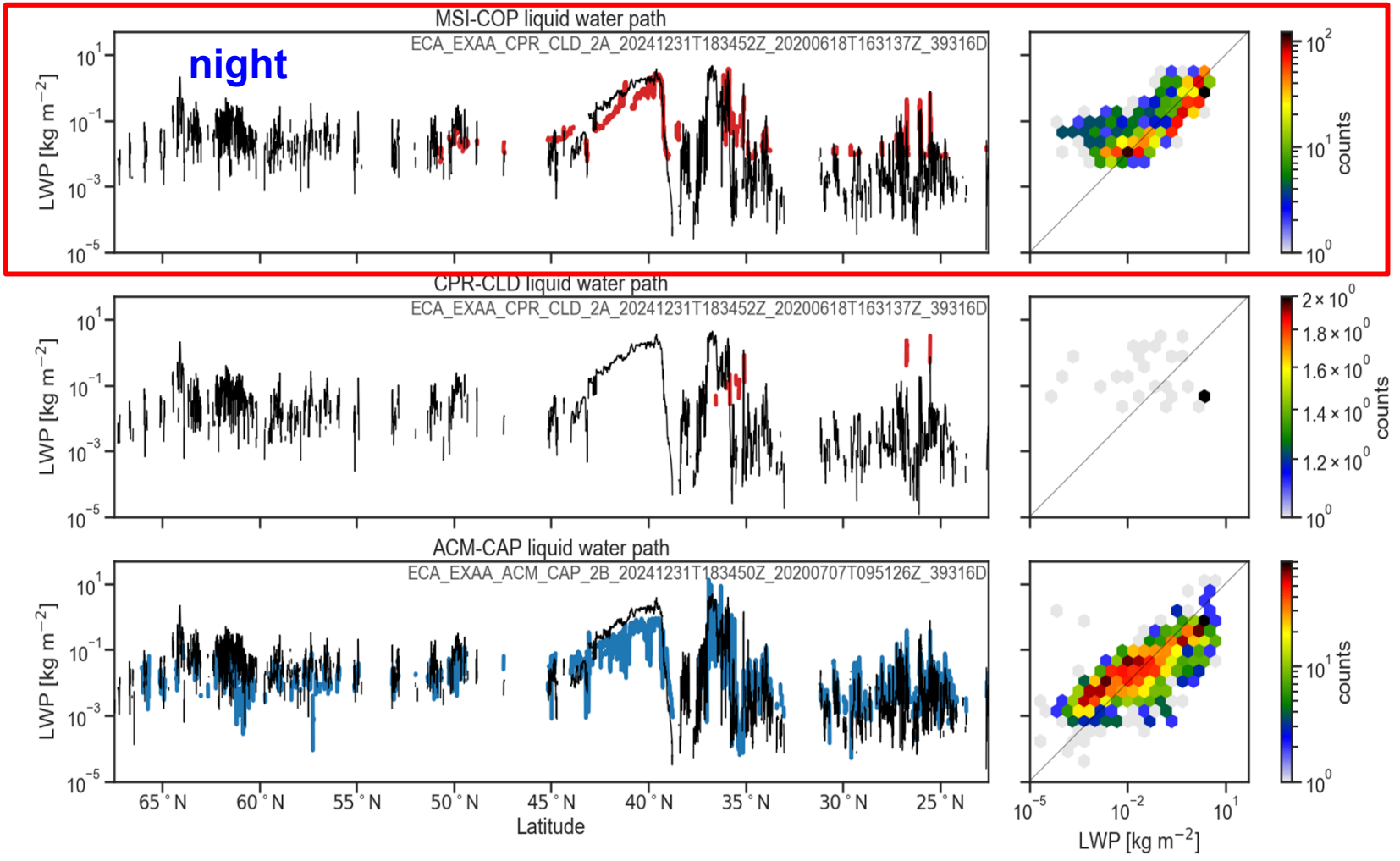
Inter-comparison of retrievals Halifax scene

LWP



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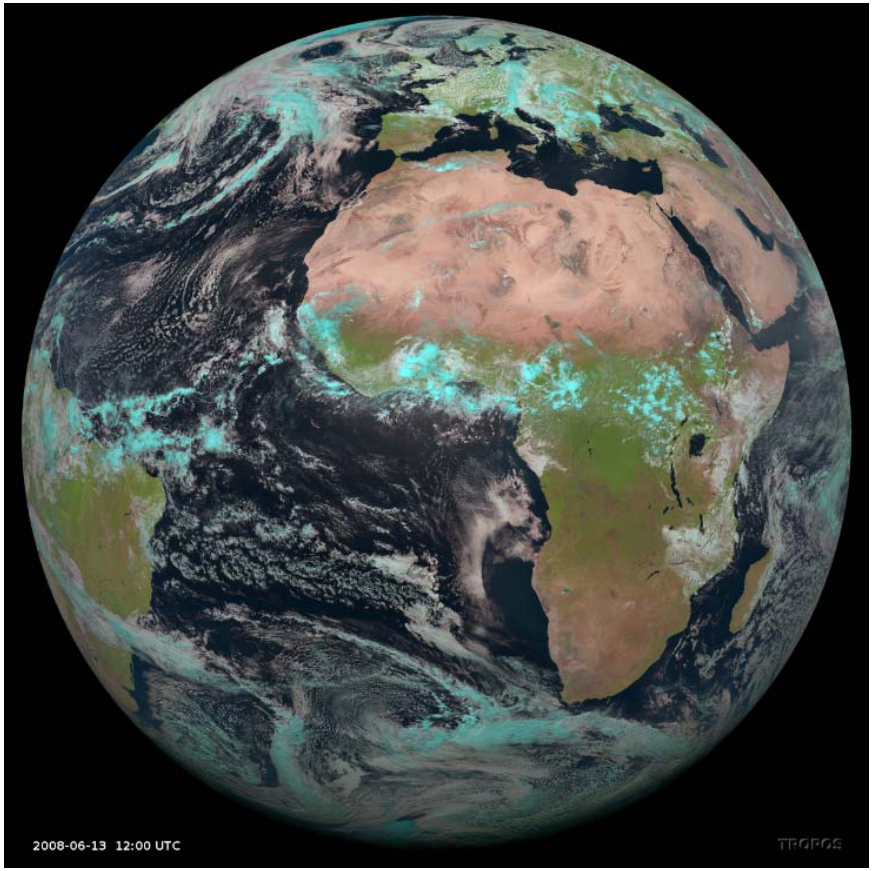
Validation M-CM adapted to SEVIRI

Adapted M-CLD OE to SEVIRI for comparison with International Cloud Working Group (ICWG)

1. golden day 13.06.2008 12:00 UTC

Some adaptation:
Input: ECMWF data, h5-SEVIRI, dem.nc on SEVIRI grid,

Set MSI_2.21 band = SEVIRI 1.65 band
(for cloud mask and cloud type!!!)



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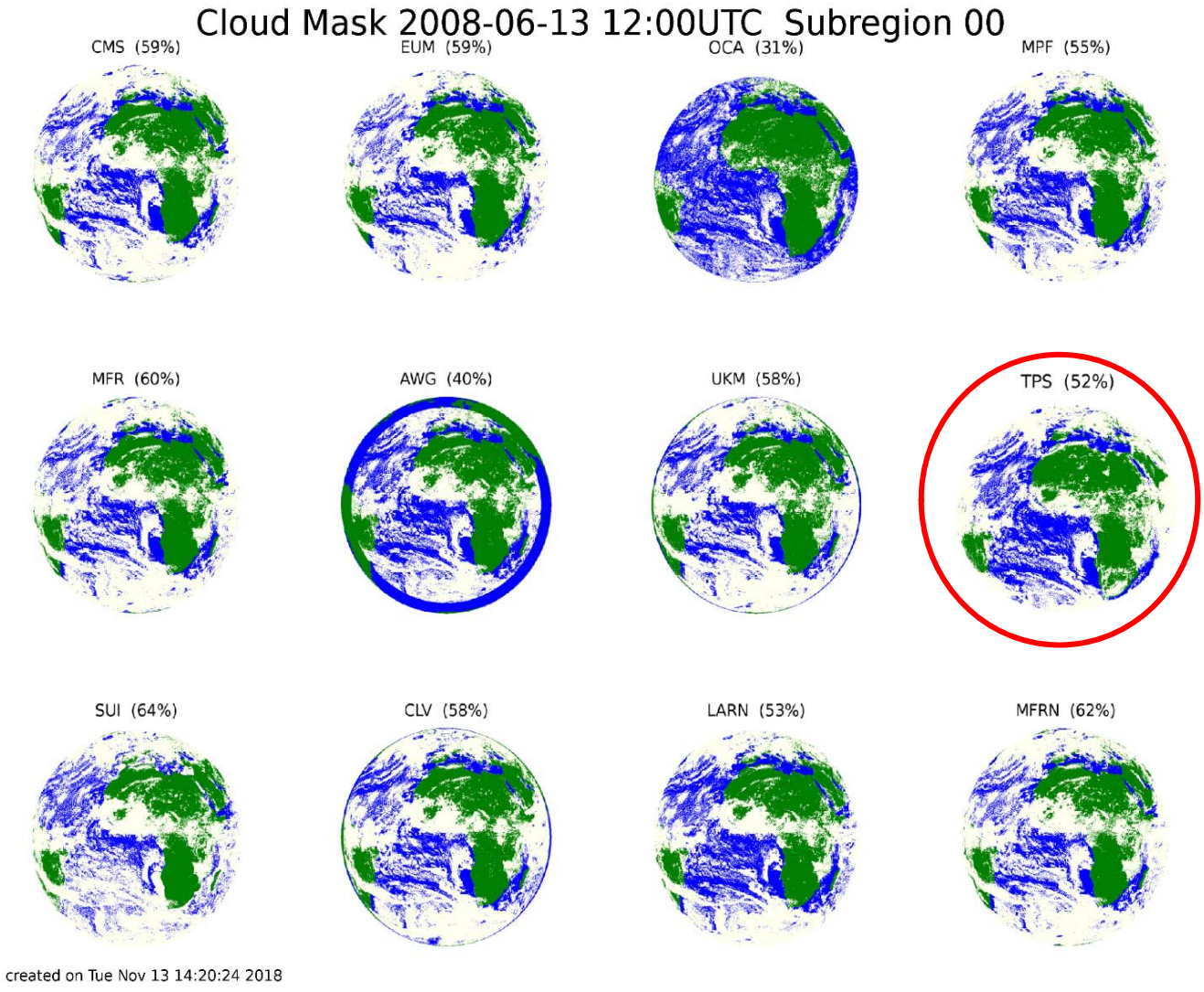
Validation M-CM adapted to SEVIRI



cloud detection of 52% in the range of the other retrieval results, from 31% to 64%

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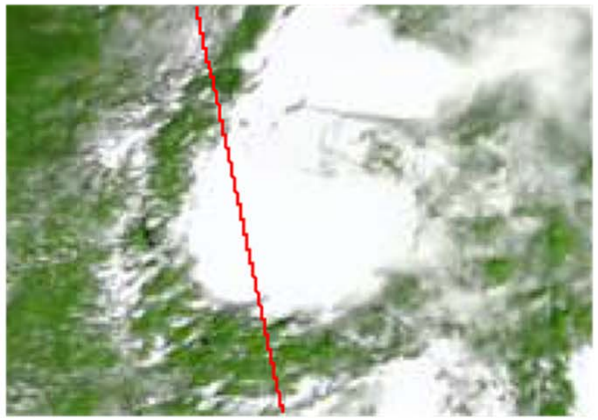
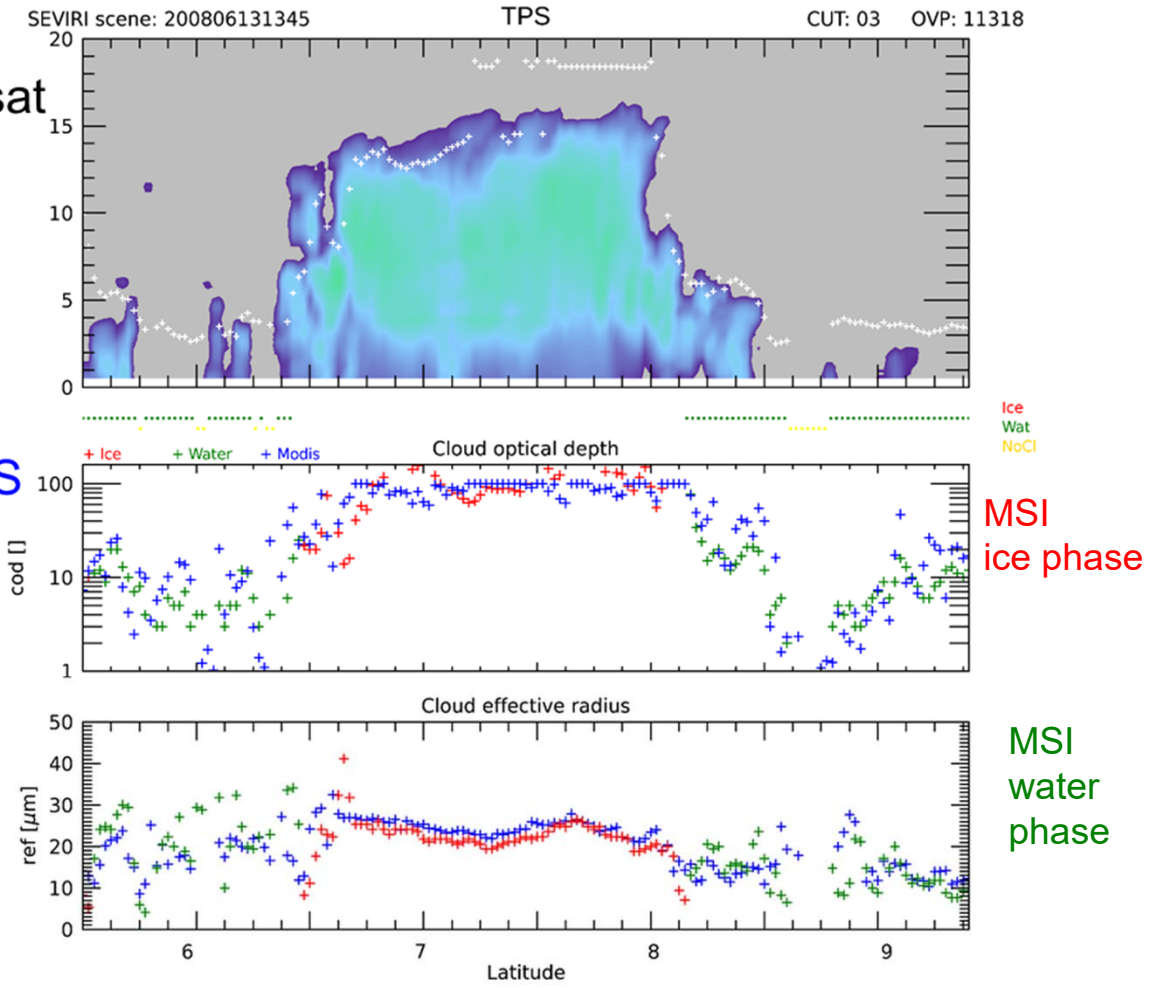
Comparison with A-Train data

Selected CloudSAT, AMSR-E and SEVIRI cloud properties over region CUT 03 for the M-CLD algorithm (TPS).



Cloudsat

MODIS



MSI ice phase

MSI water phase

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Summary

M-CLD products combine visible to infrared MSI channels to determine cloud microphysical and macro-physical properties for each pixel (500m, swath width 150km)

Baseline-products comparable to Modis products (follow-on A-Train)

- cloud cover (M-CF), cloud type (M-Ctyp) and cloud phase (M-CP)
- cloud optical thickness (M-COT), cloud effective radius (M-REF), cloud top height (M-CTH) and cloud water path (M-CWP)

M-CLD developments in APRIL:

Start

IDL codes for **M-COP** and some fortran snipped from CASPER project for **M-CM**

APRIL

M-CLD processor build:

- **V1.0 took 20 min**
- Forward operator simplification, improvements, verification with ECSIM test scenes …
- M-CLD v8.0

M-CLD algorithm are adapted to passive imager instruments onboard polar and geostationary satellites (MODIS and SEVIRI) and verify successful against state of the art algorithms

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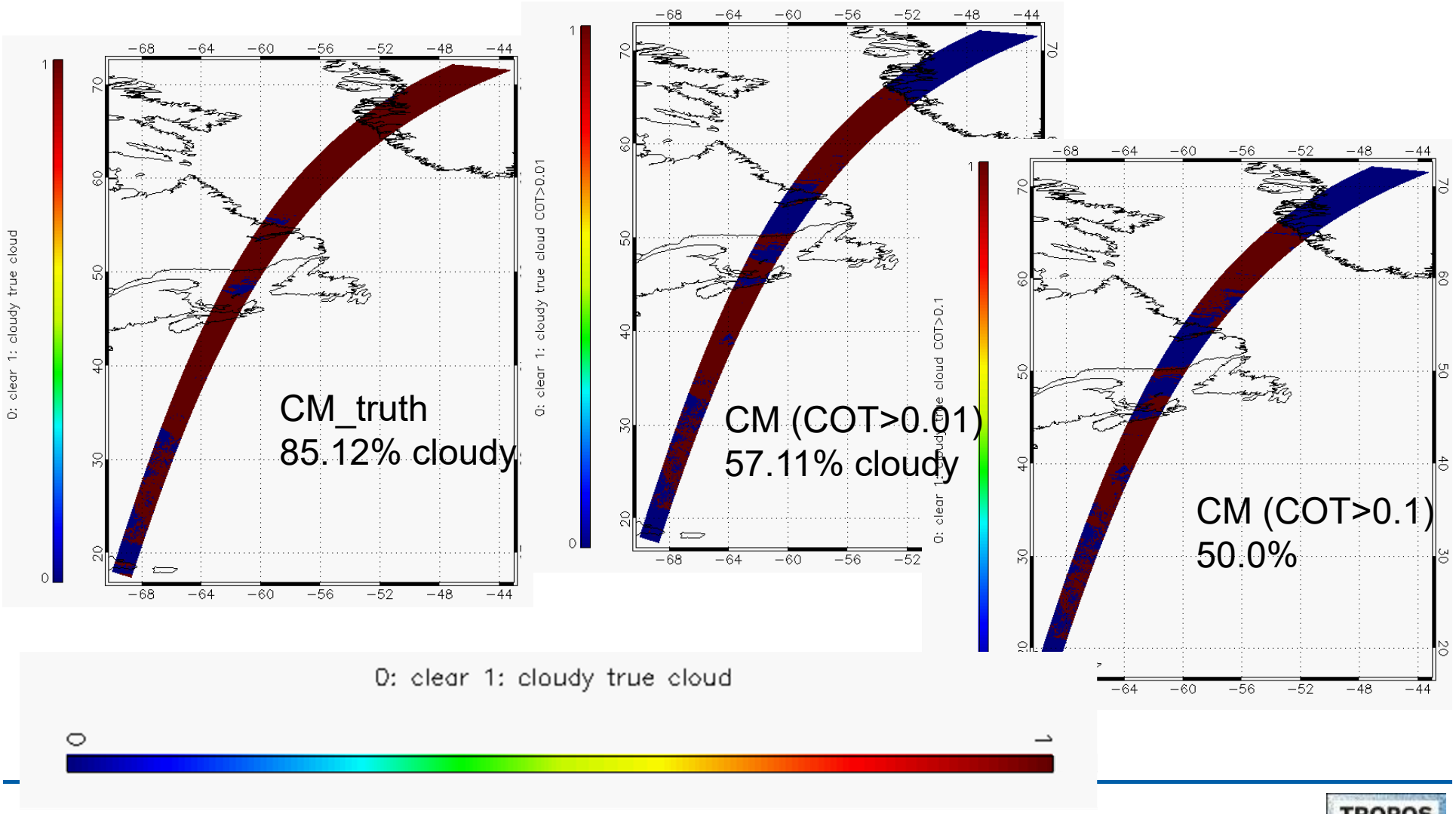
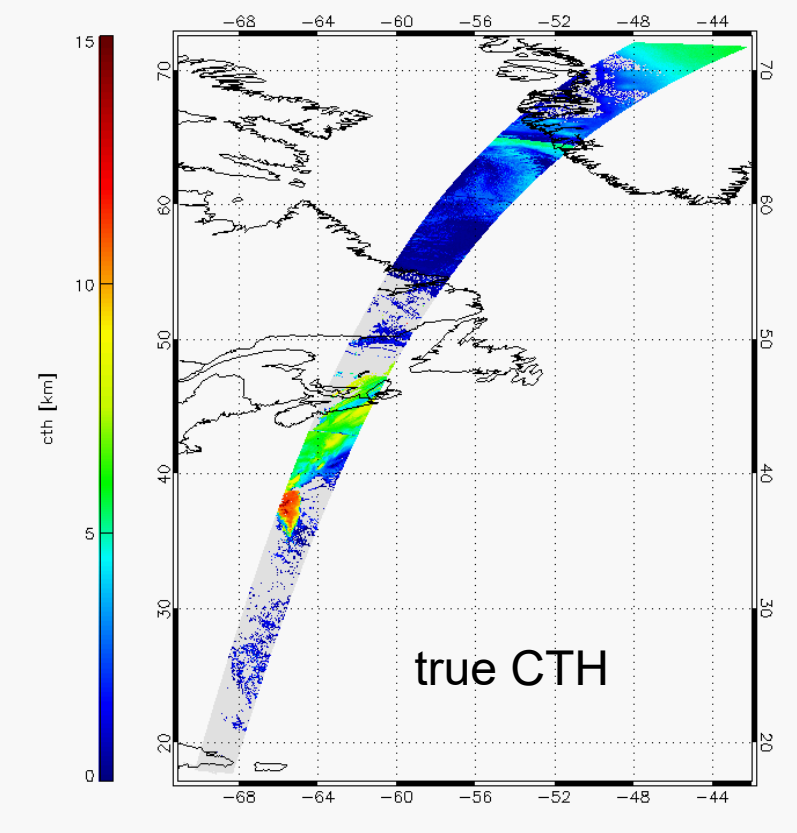
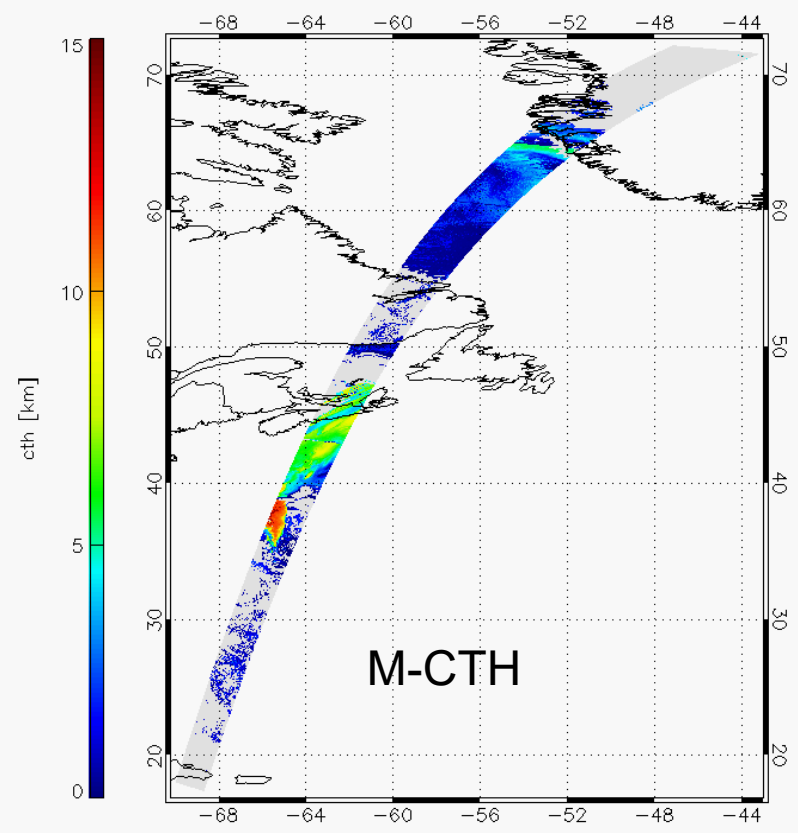
Halifax v12 (20201125)

Cloud cover for the Halifax scene with different thresholds



Halifax v12 (20201125)





- model cloud top height are calculated based on the transmission
- the transmission integrated from the top as to be 1 and than the CTH is taken

BAJA v12 (20201125)

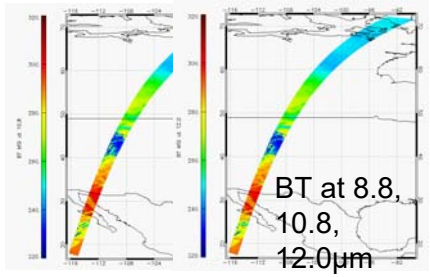
Meteorologie

Meteorologie

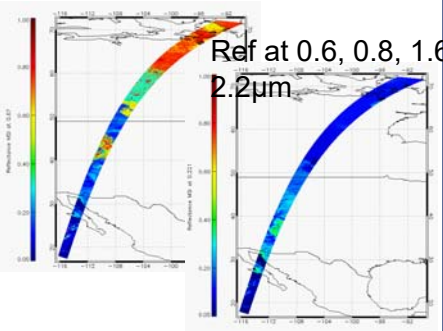
Measurement L1

M-CM

M-COP

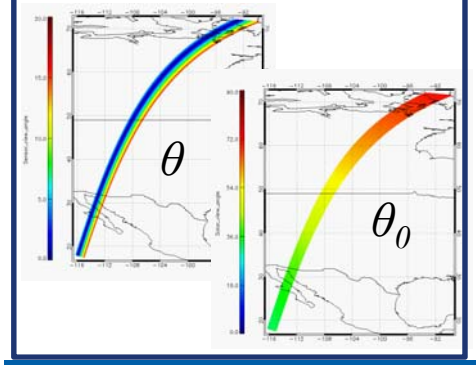


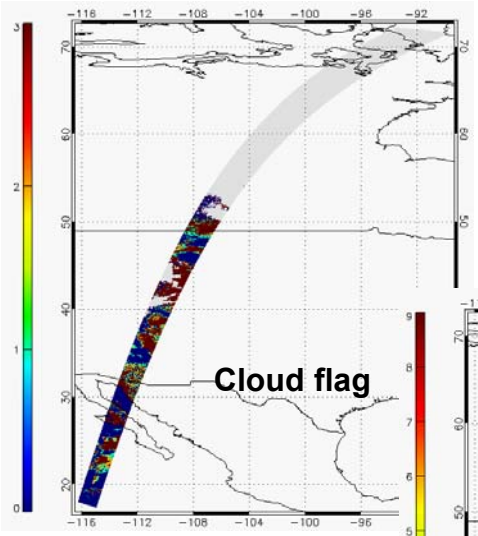
BT at 8.8, 10.8, 12.0µm



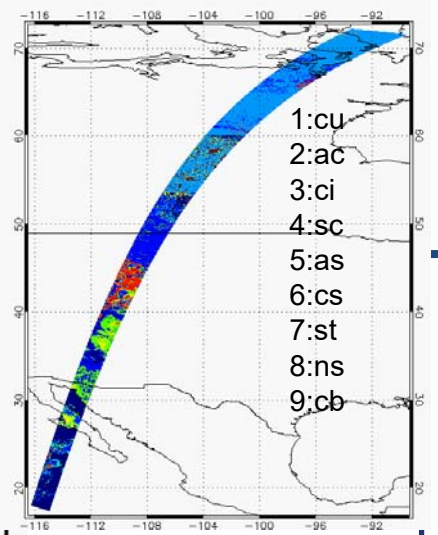
Ref at 0.6, 0.8, 1.6, 2.2µm

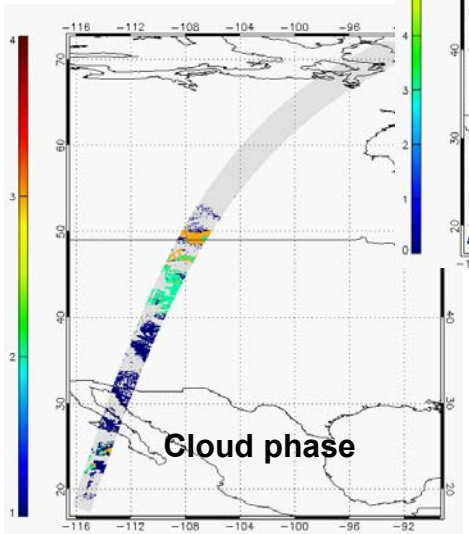
observation geometry



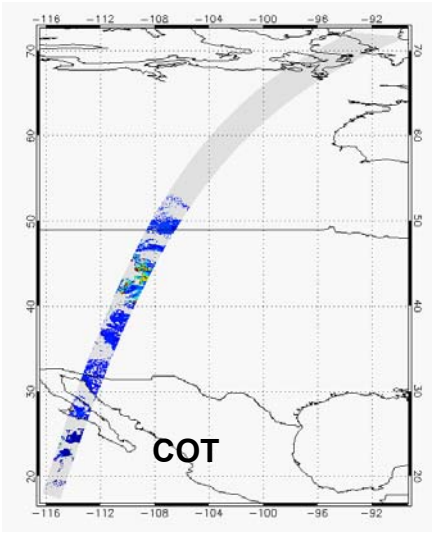


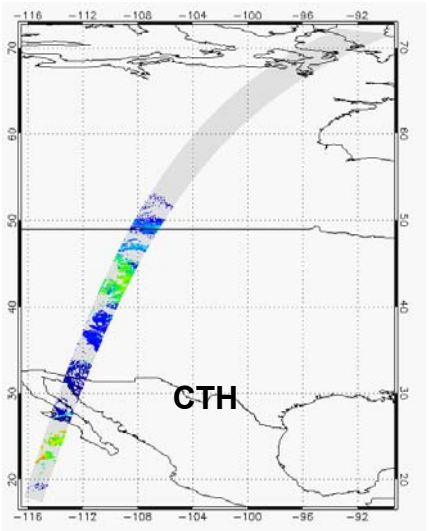
0: confident clear
1: probably clear
2: probably cloudy
3: confident cloudy





1: water
2: ice
3: supercooled
4: overlap





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HAWAII v12 (20201026)

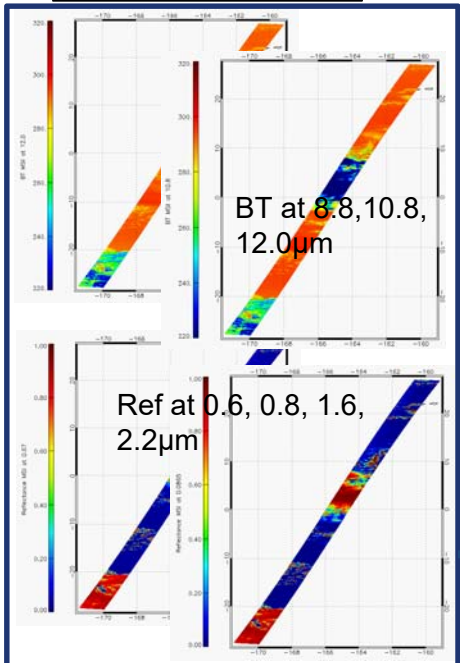
Meteorologie

Meteorologie

Measurement L1

M-CM

M-COP



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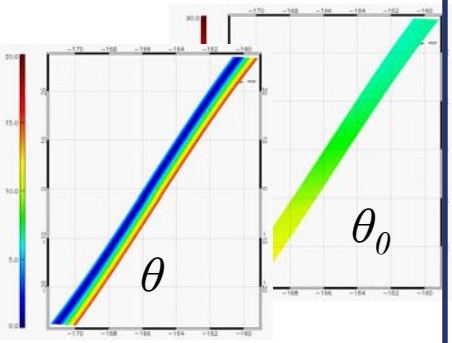

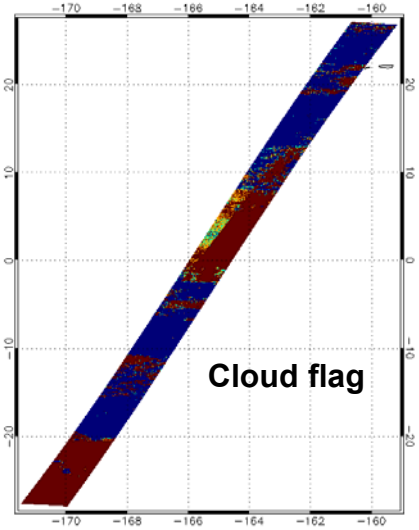

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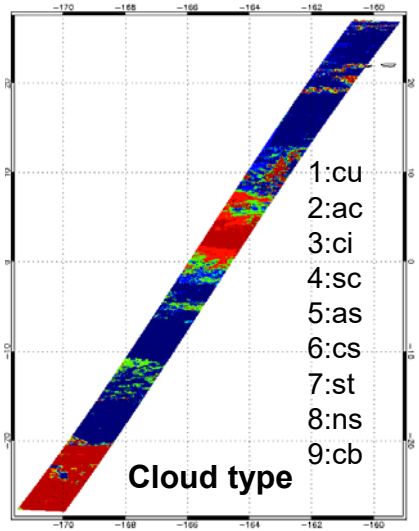

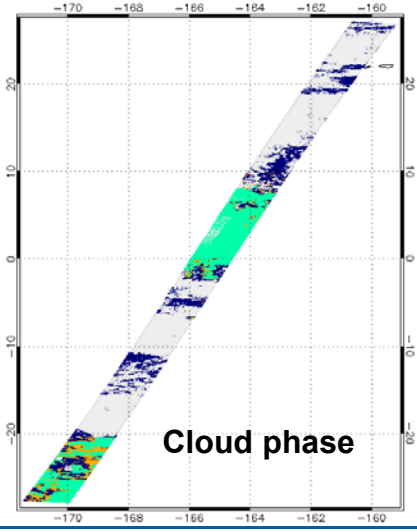

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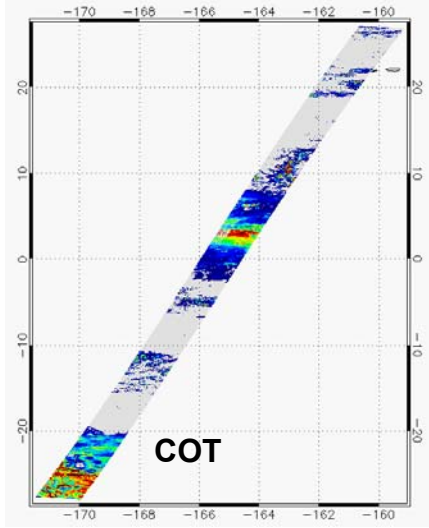

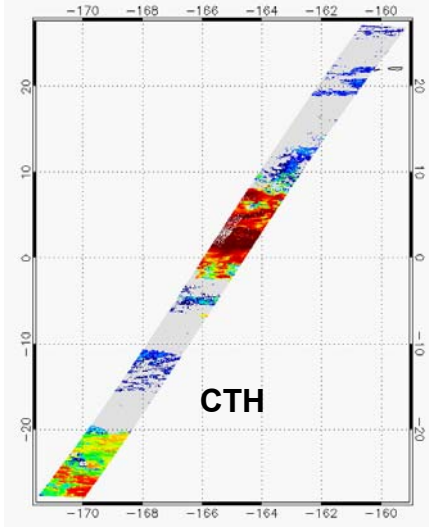

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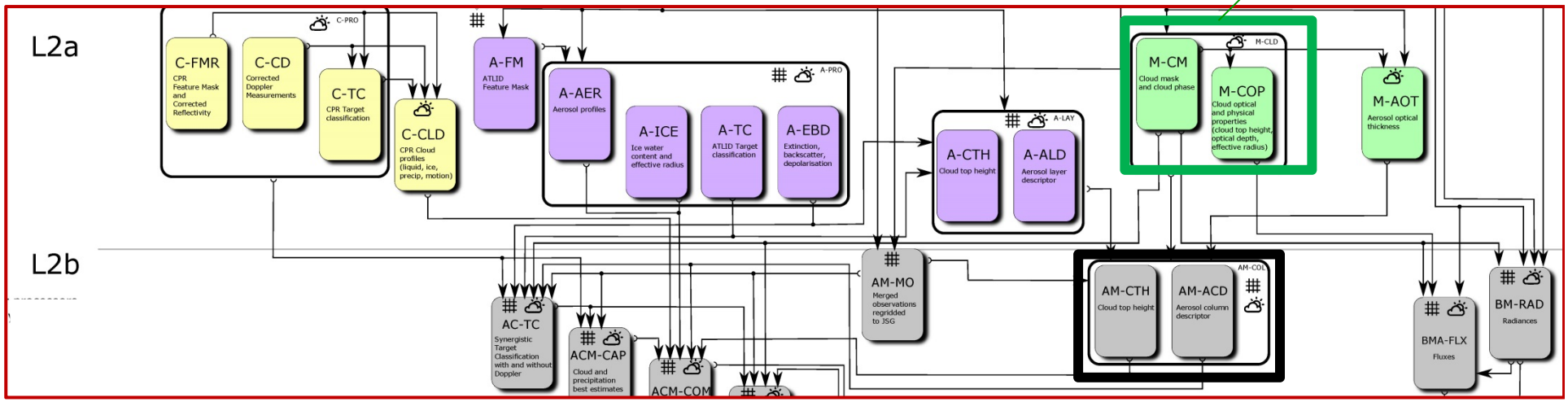
APRIL Developments

MSI Column Products
M-CM: Cloud Mask
M-COP: Cloud Optical Properties
Cloud Top Height
Cloud Optical Thickness



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