First comparison of MSI and specMACS observations during PERCUSION

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LMU specMACS: polarization camera
+ hyperspectral imager

LMU spectral information, Ewald et al (2016)

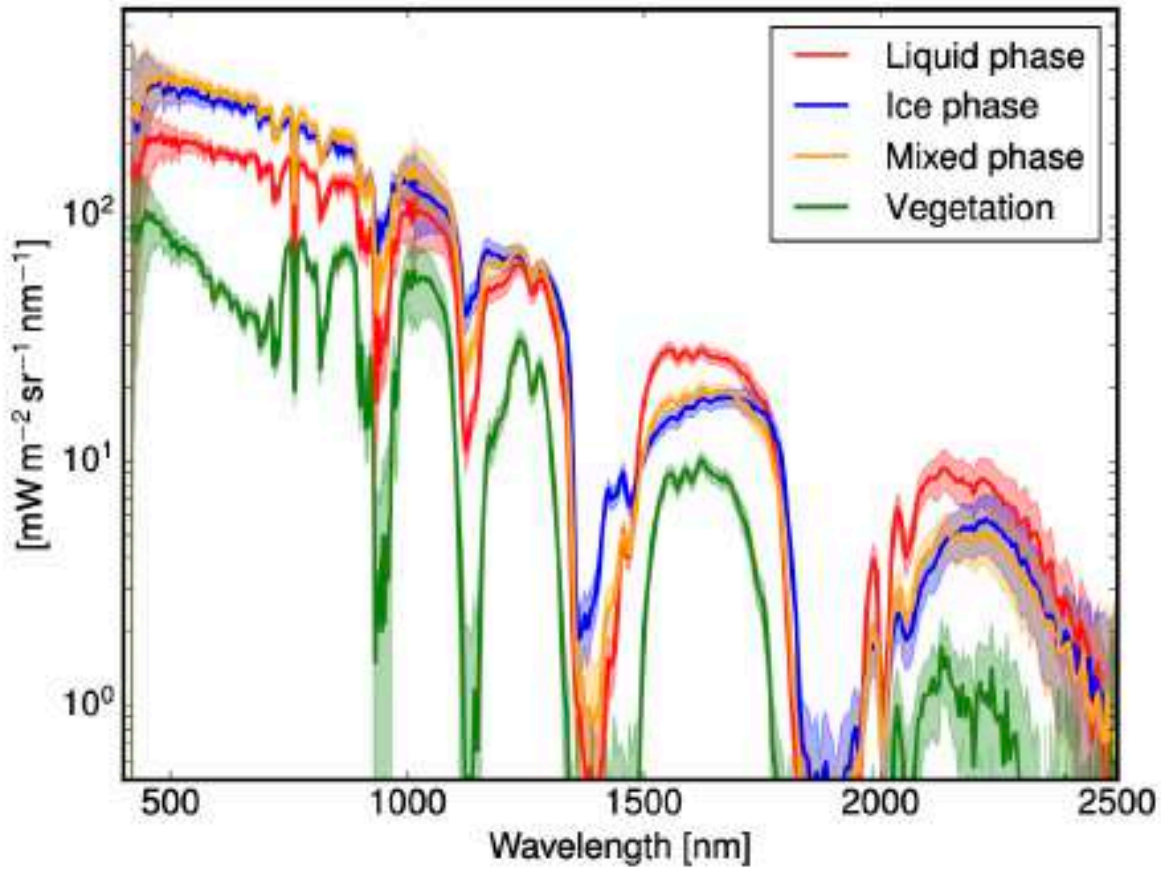
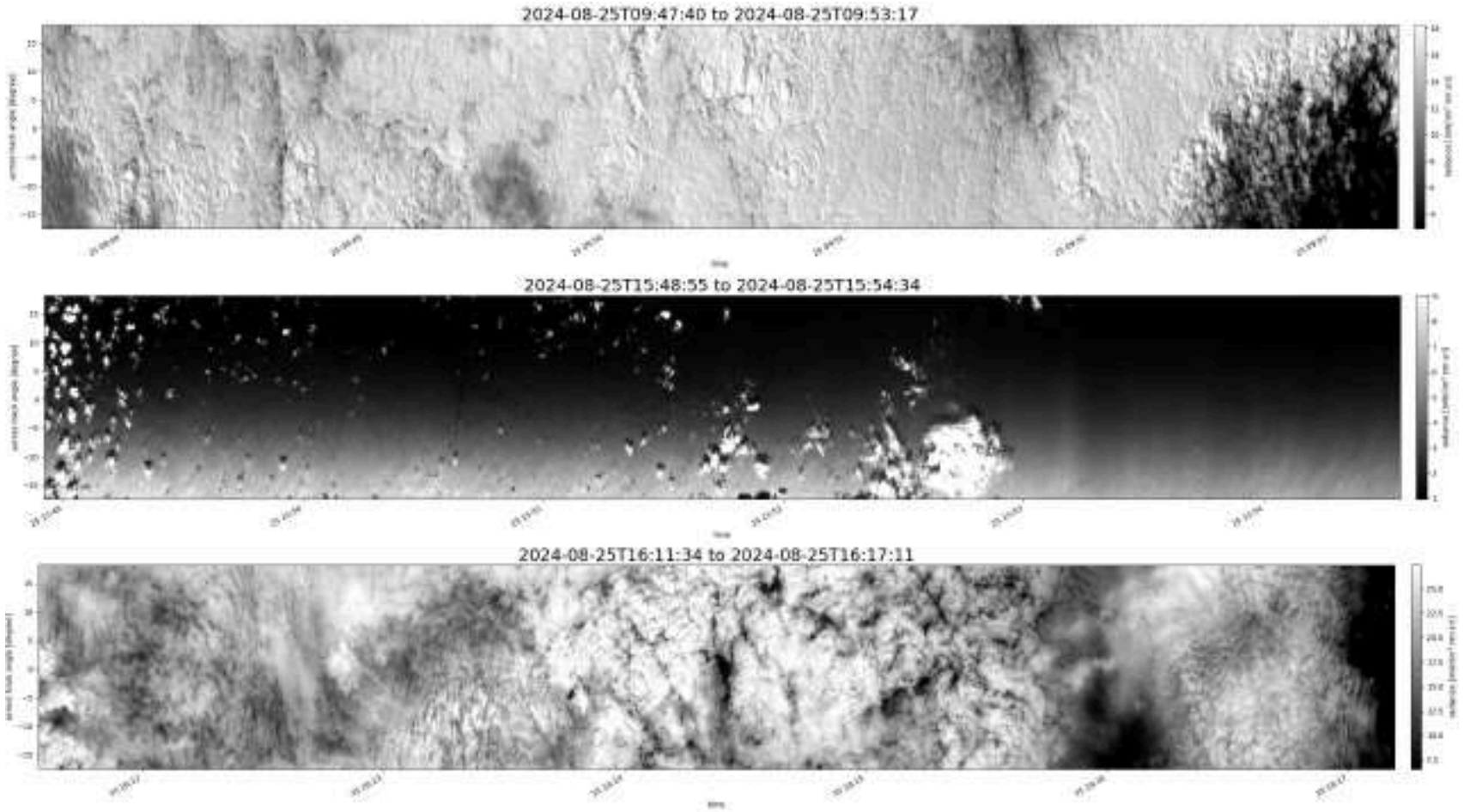


Figure 22. Reflected solar spectra measured with specMACS on-board HALO during the ACRIDICON-CHUVA campaign in Brazil.

LMU spatial information, 1600 nm, 25.8.2024



LMU specMACS capabilities, Ewald et al (2016)

	VNIR	SWIR
Detector	SiO2 CMOS	HgCdTe CMOS
Spectral range	417–1016 nm	1015–2496 nm
Spectral bandwidth	typ. 2.5–4 nm	typ. 7.5–12 nm
FOV	32.7°	35.5°
IFOV (across-track)	typ. 1.4 mrad	typ. 3.8 mrad
IFOV (along-track)	typ. 2.0 mrad	typ. 1.8 mrad
Spatial pixels	1312	320
Spectral channels	800	256
Radiometric quantization	12 bit	14 bit
Usable dynamic range	9.5 bit	typ. 11–11.6 bit
Max. frame rate	145 Hz	103 Hz
Temp. control	uncooled	200 K

LMU specMACS accuracy, Ewald et al (2016)

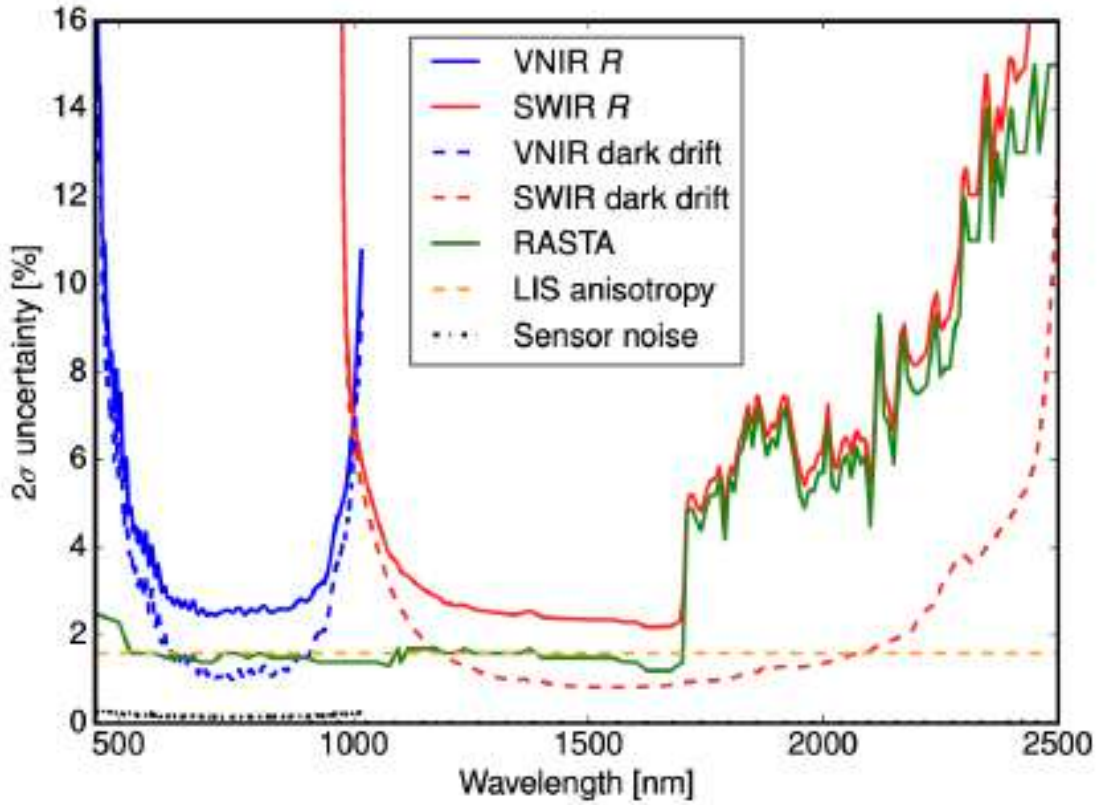
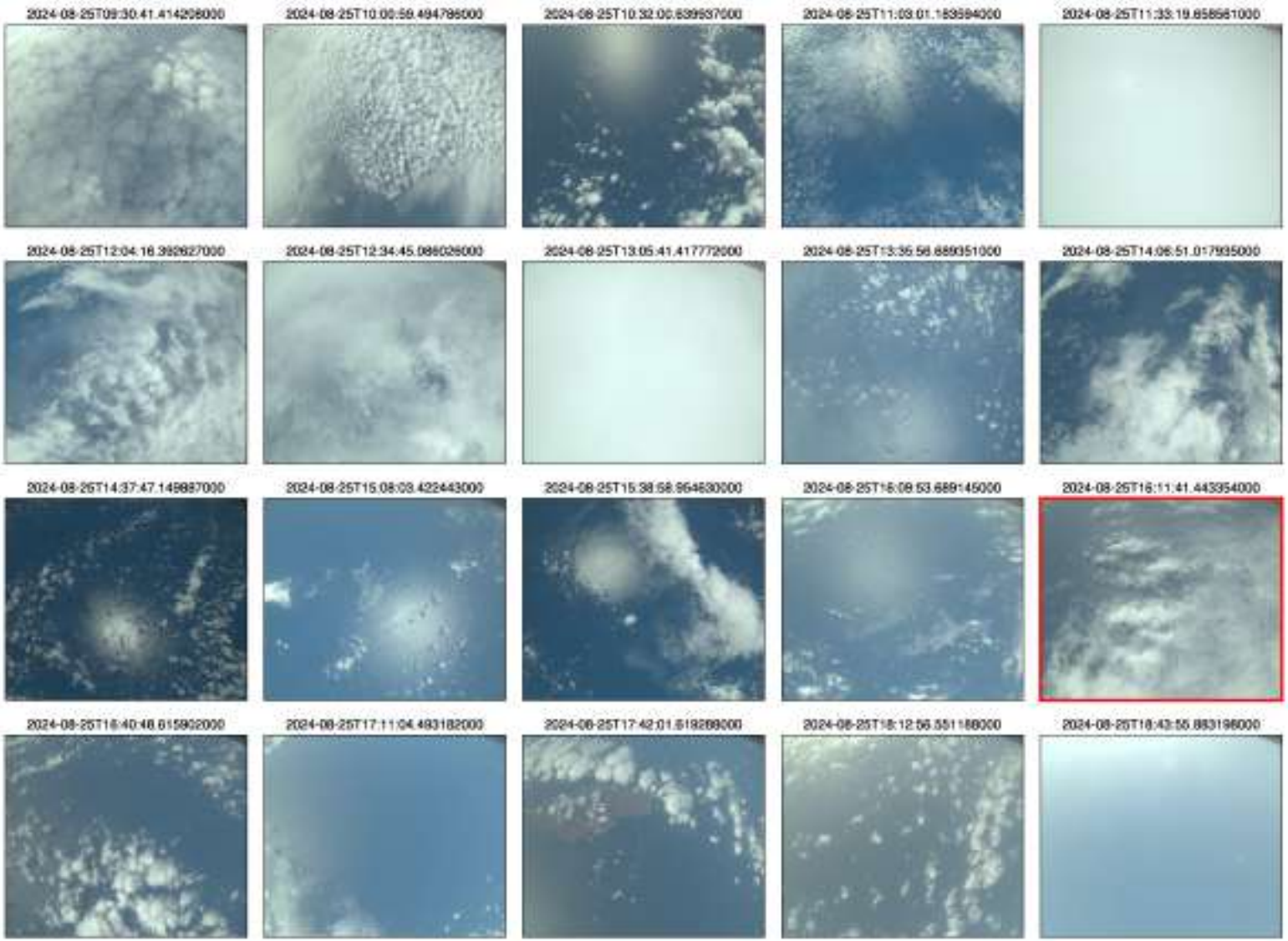
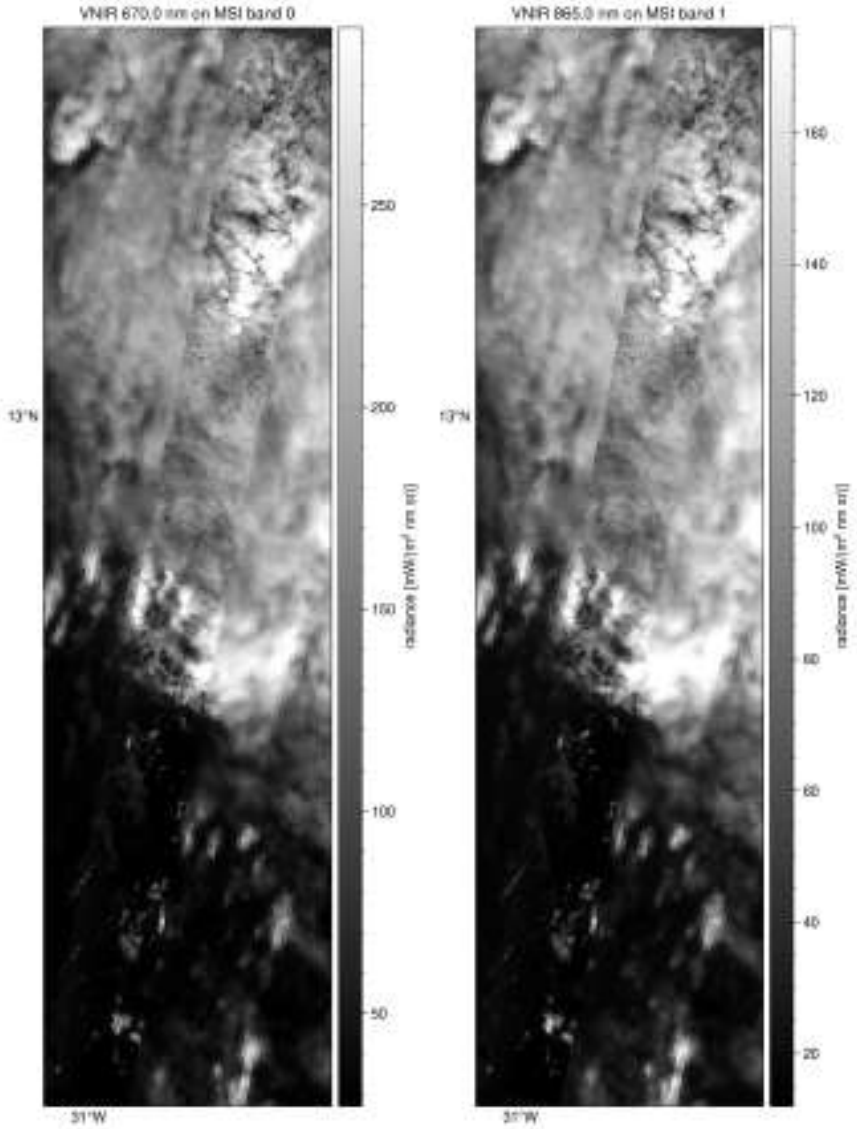


Figure 12. Main contributions to the 2σ uncertainty of the absolute radiometric response R. The uncertainties resulting from sensor noise and dark current drift are shown for the RASTA measurements. Due to the lower radiance of the RASTA, other noise and drift components contribute less to the total error.

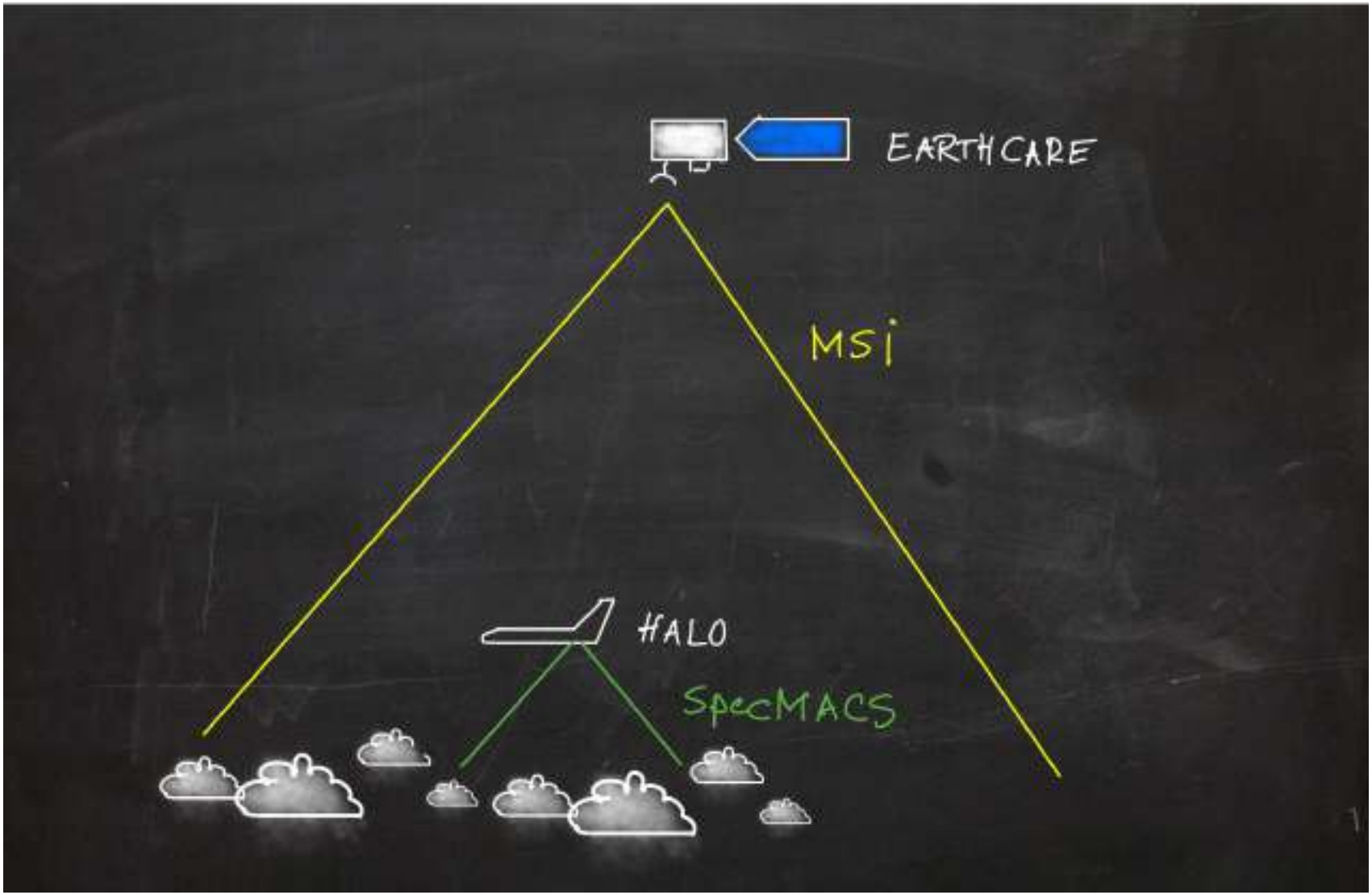
PERCUSION, 25.8.2024, specMACS polcam



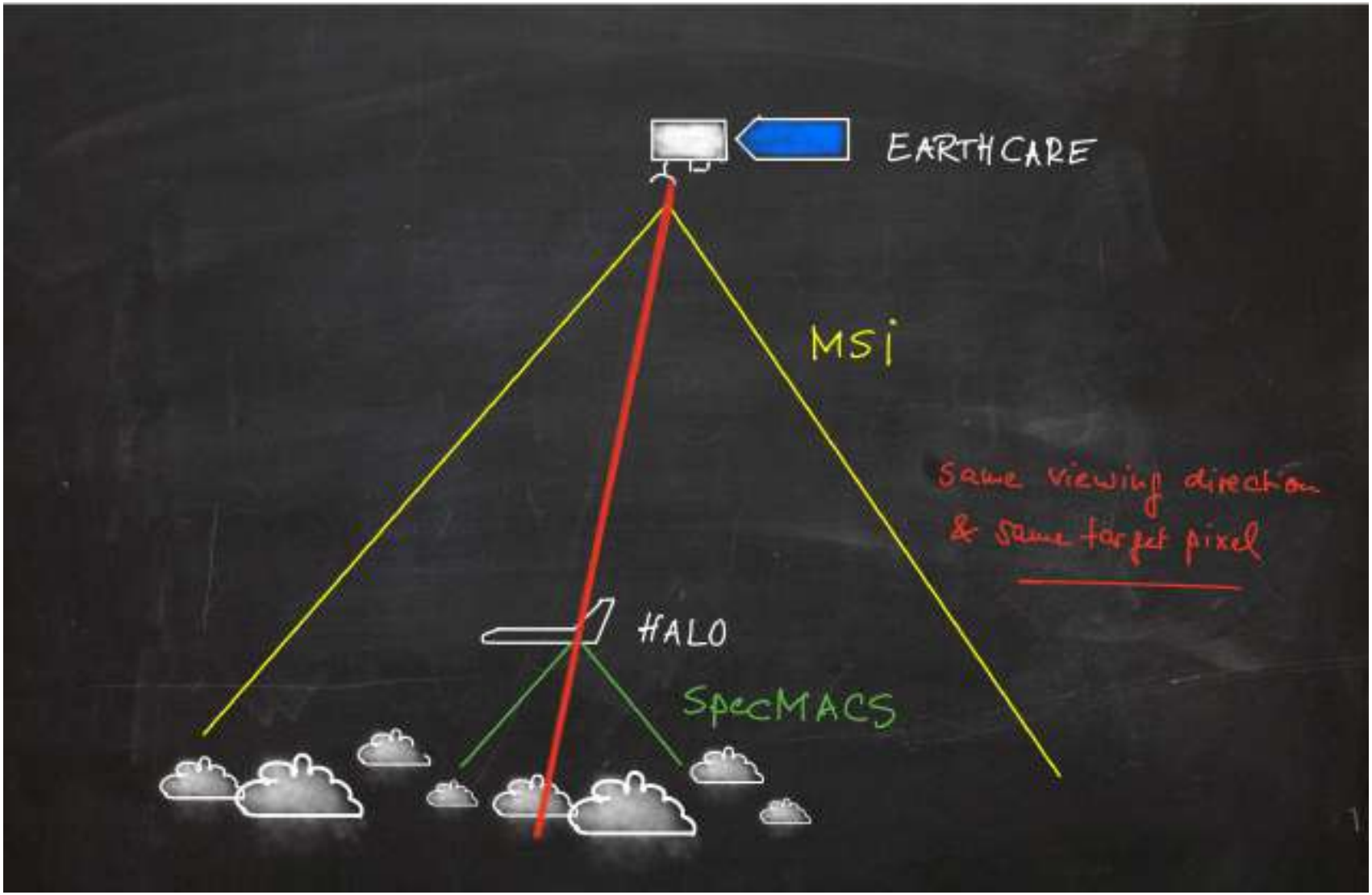
PERCUSION, 25.8.2024, MSI + specMACS VNIR



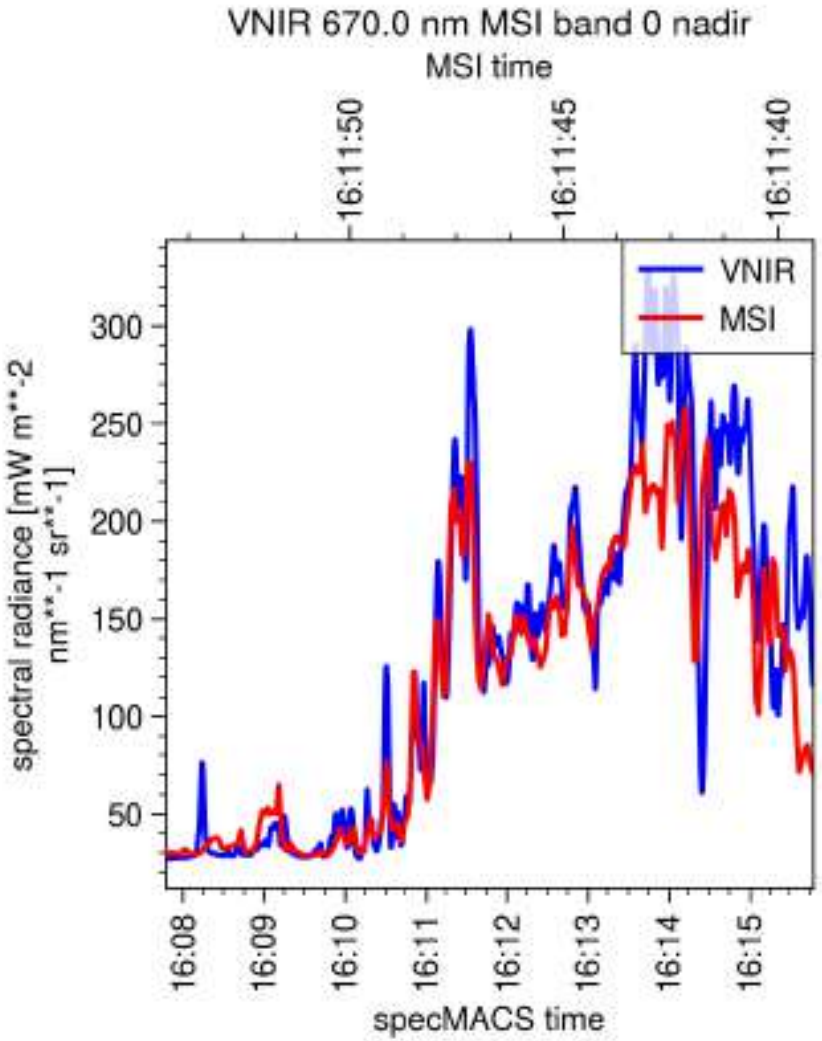
Observation Geometry

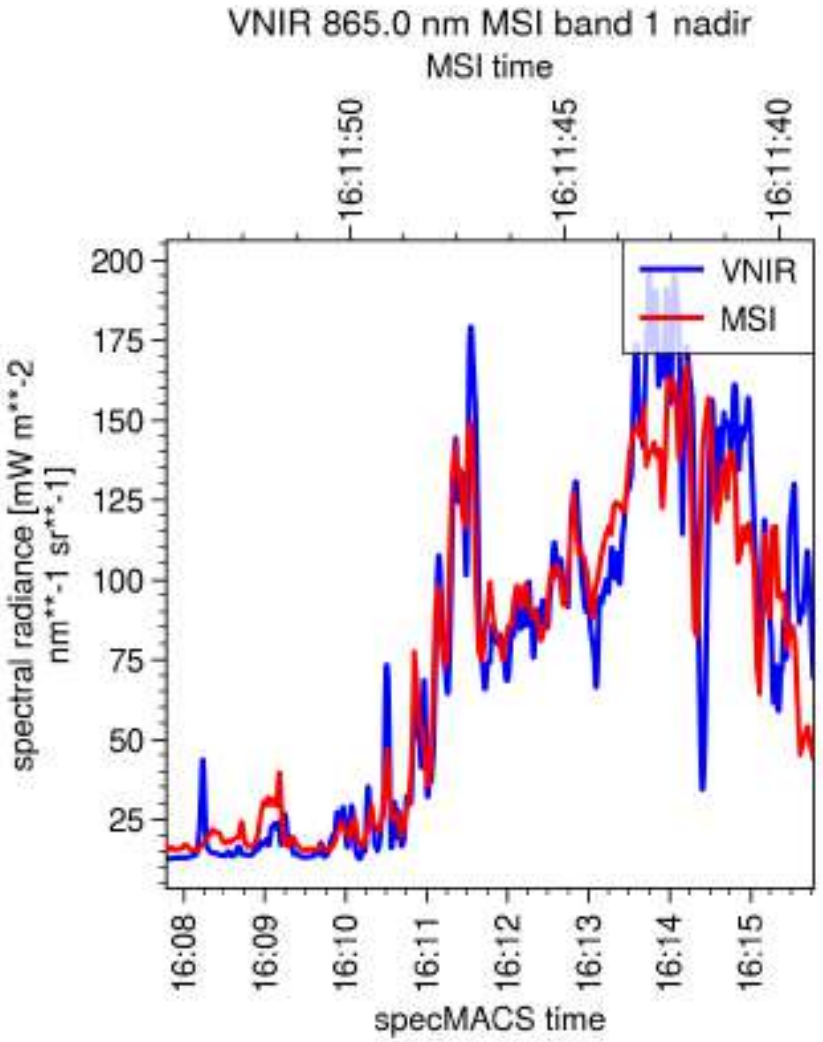


Observation Geometry

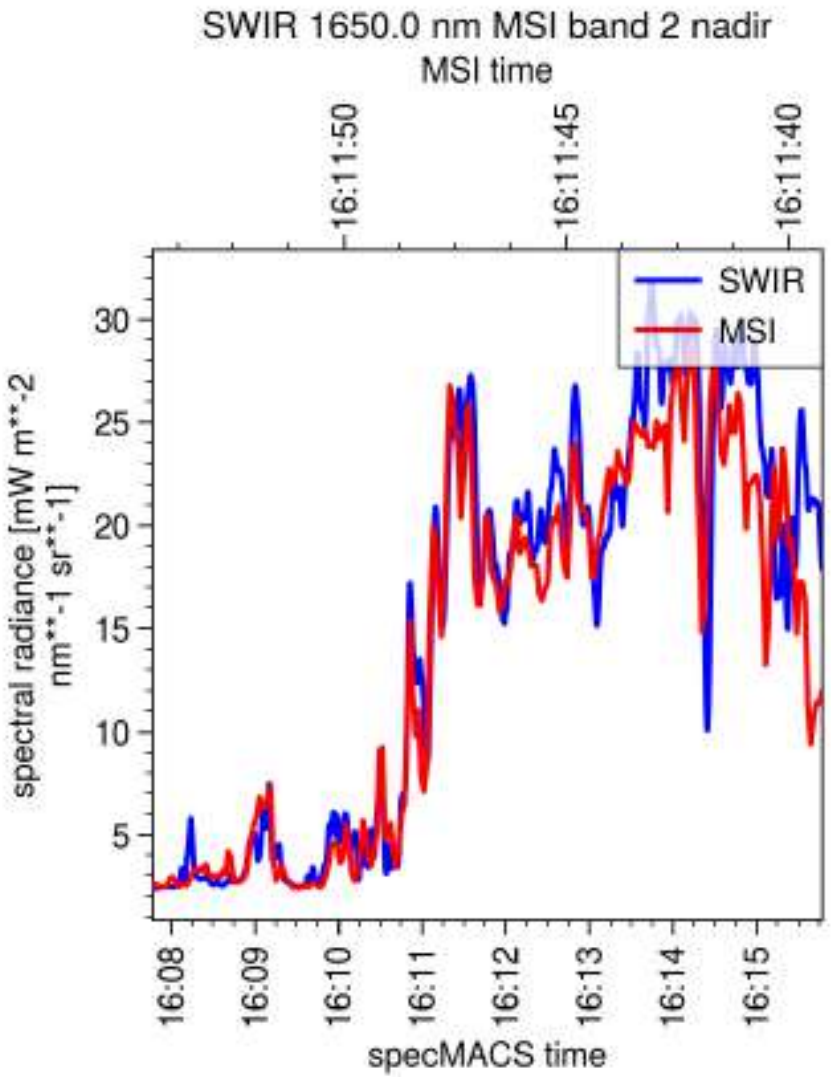


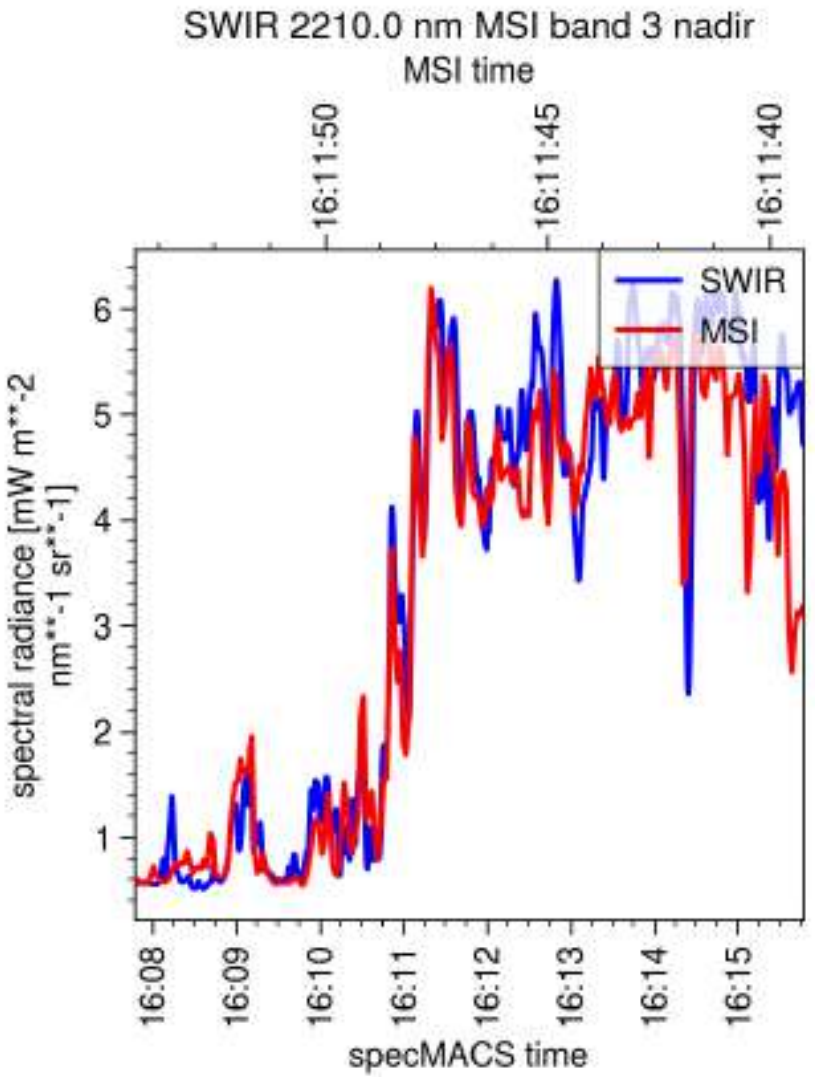
PERCUSION, 25.8.2024, MSI + specMACS VNIR



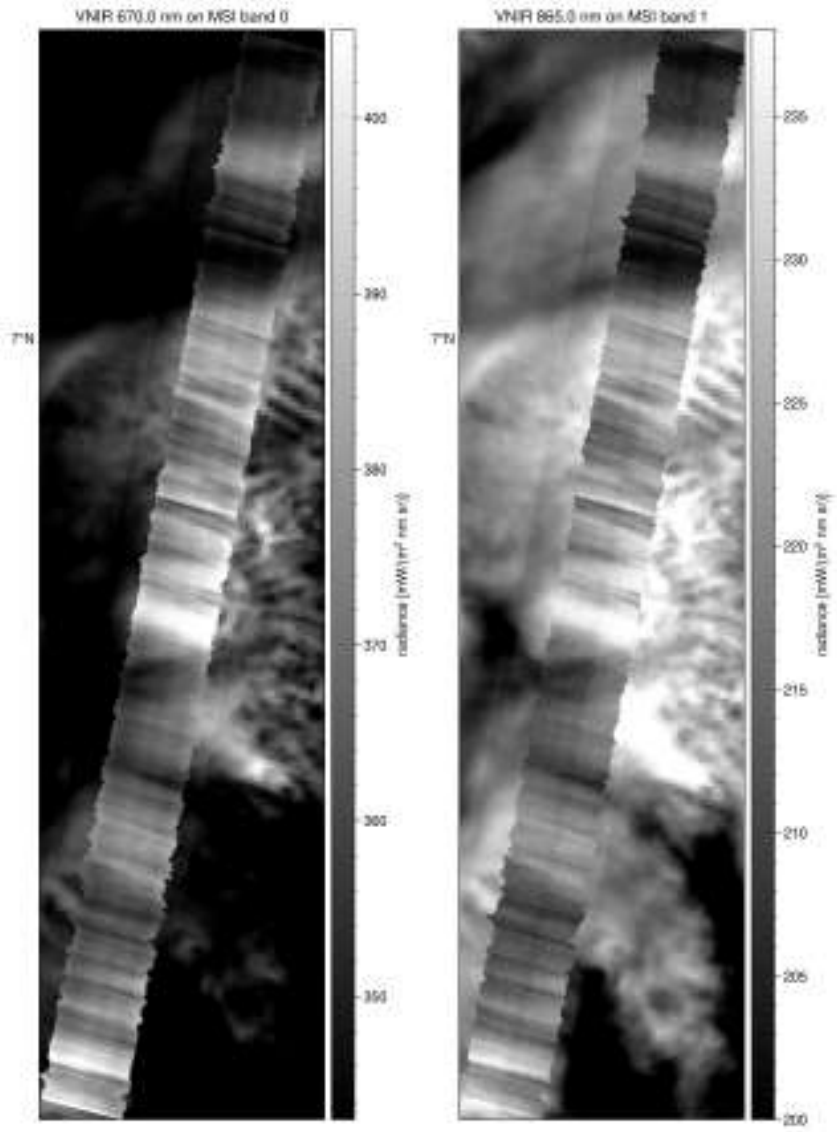


PERCUSION, 25.8.2024, MSI + specMACS SWIR

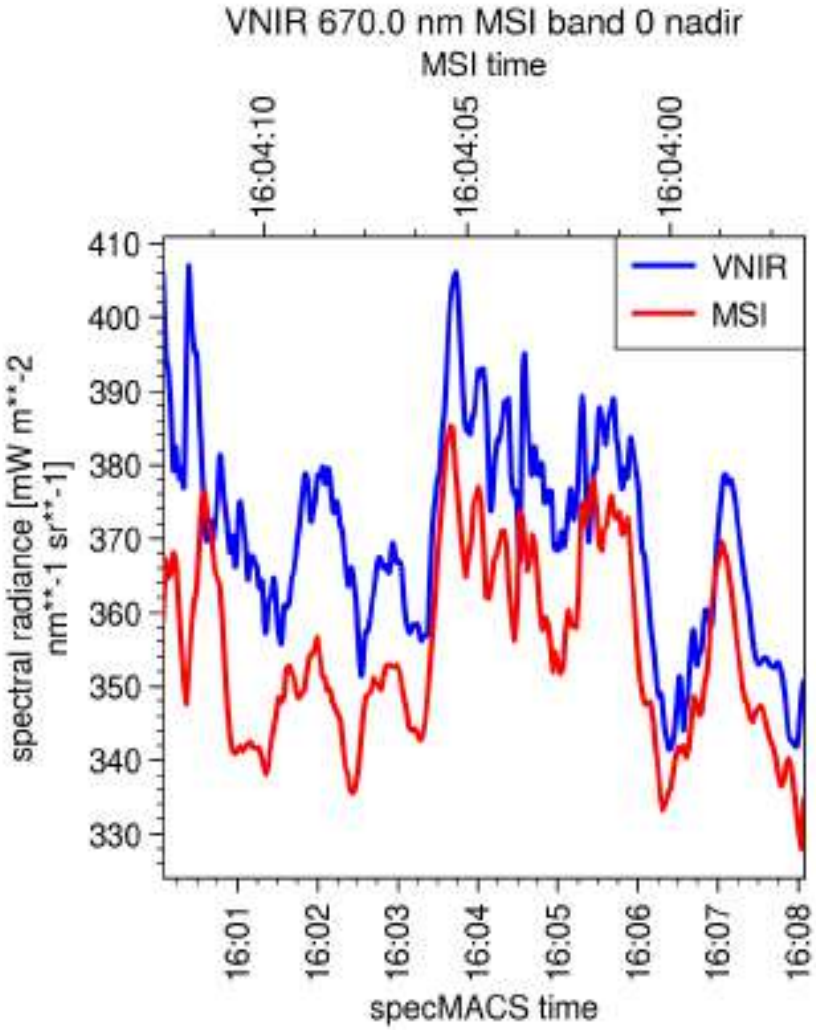


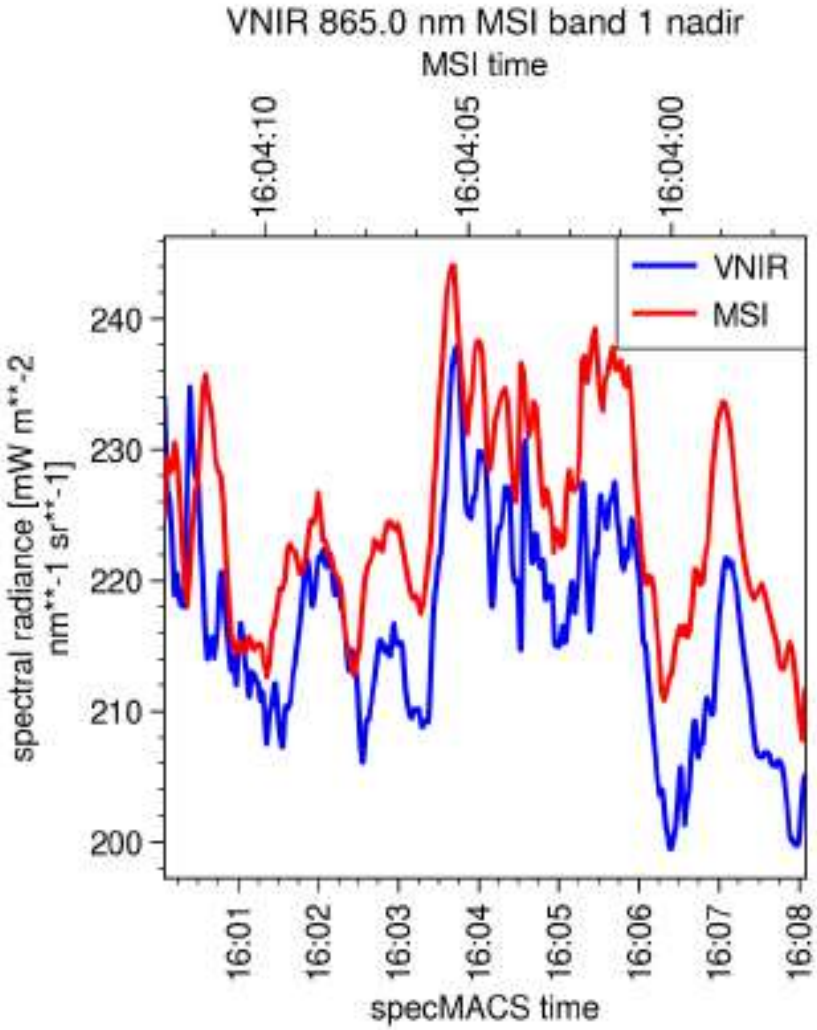


PERCUSION, 18.8.2024, MSI + specMACS VNIR

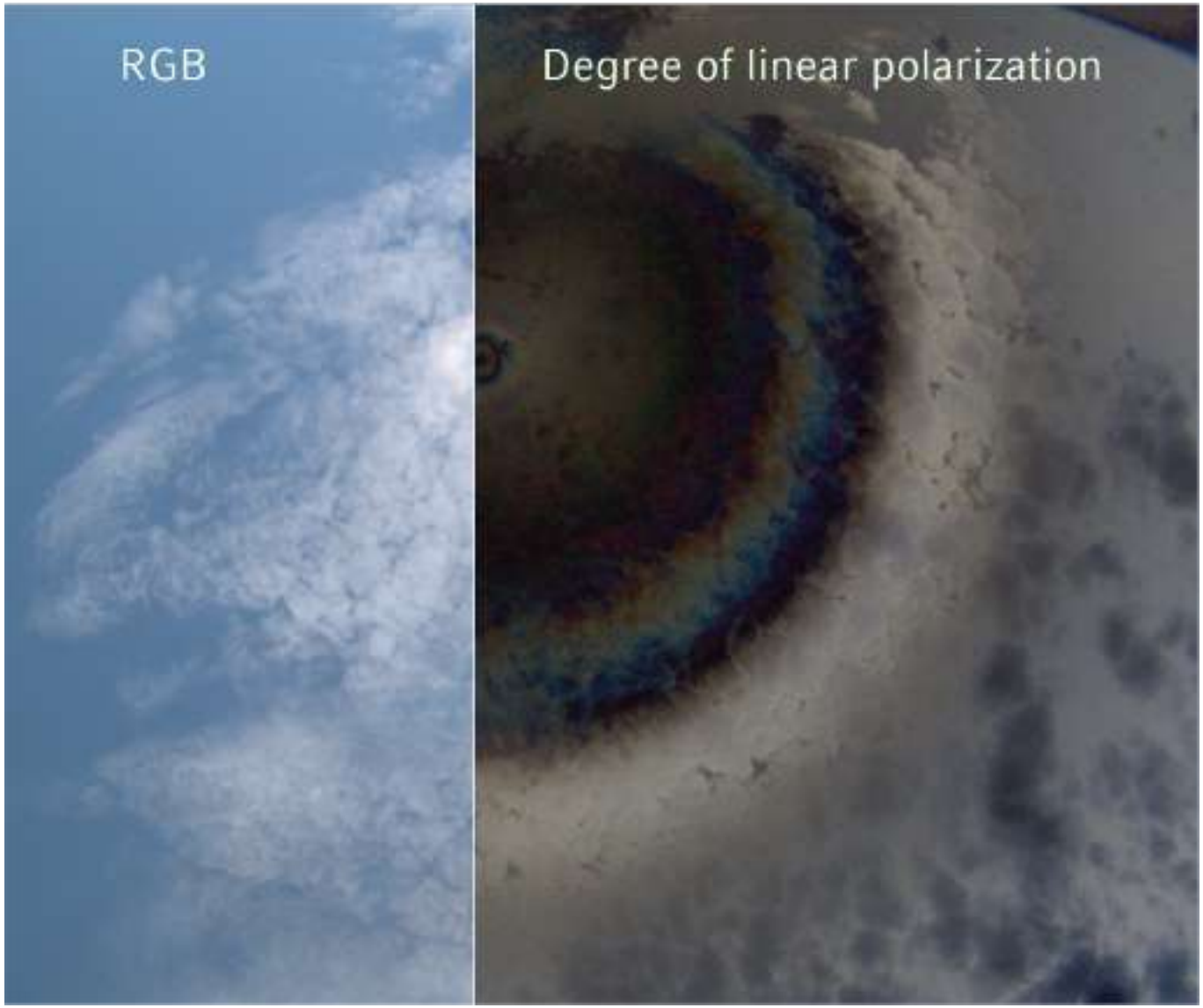


PERCUSION, 18.8.2024, MSI + specMACS VNIR

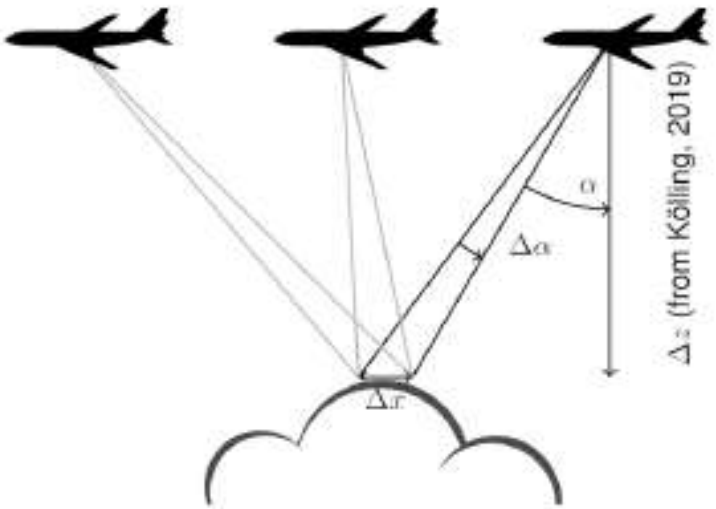


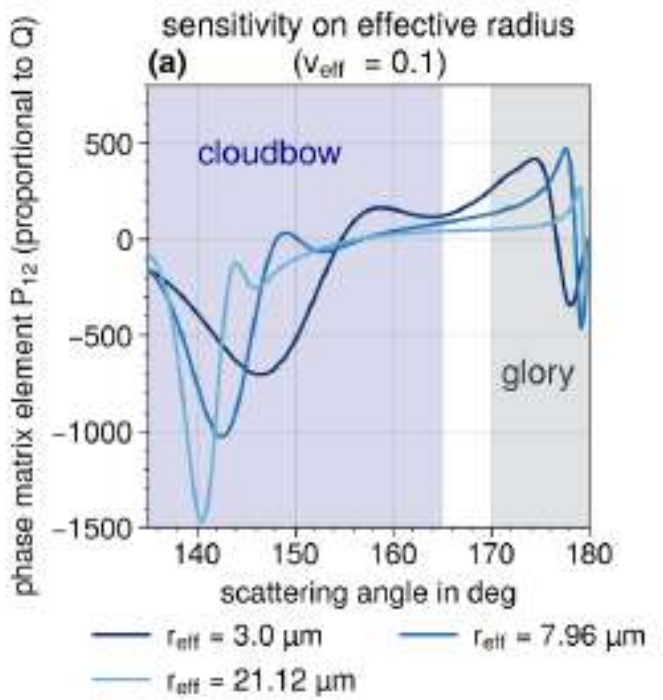


specMACS Polarized Observations of the Cloudbow



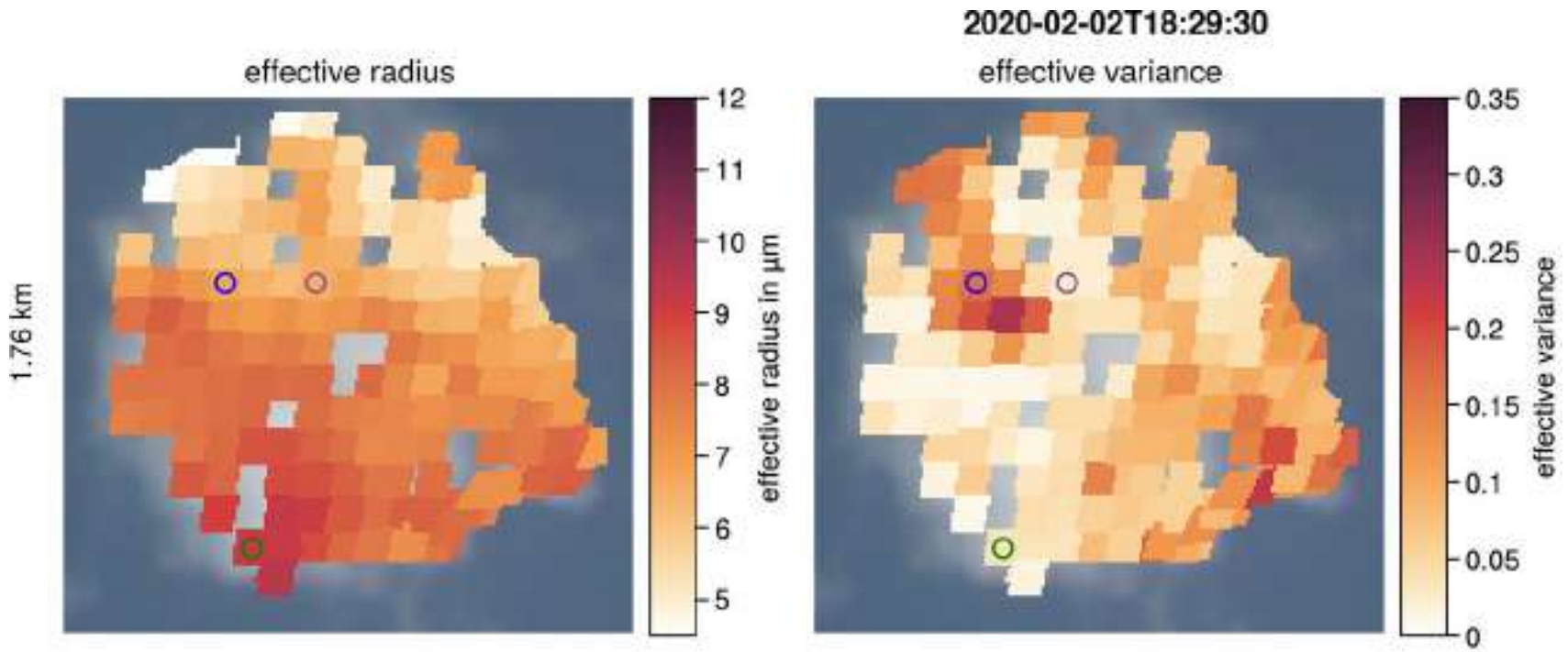
Cloud Top Height and Cloud Droplet Size





Pörtge et al, AMT, 2023

Cloud Droplet Size and Width of the Size Distribution



Pörtge et al, AMT, 2023

Summary and Outlook

- First quick & dirty comparison of radiances shows promising results
- Comparison of products (droplet size and phase, optical thickness) is interesting as well

References

- *Ewald et al.*, AMT 2016: Design and characterization of specMACS, a multipurpose hyperspectral cloud and sky imager
- *Pörtge et al.*, AMT 2023: High-spatial-resolution retrieval of cloud droplet size distribution from polarized observations of the cloudbow
- *Volkmer et al.*, AMT 2024: Model-based evaluation of cloud geometry and droplet size retrievals from two-dimensional polarized measurements of specMACS
- *Weber et al.*, AMT 2024: Polarization upgrade of specMACS: calibration and characterization of the 2D RGB polarization-resolving cameras