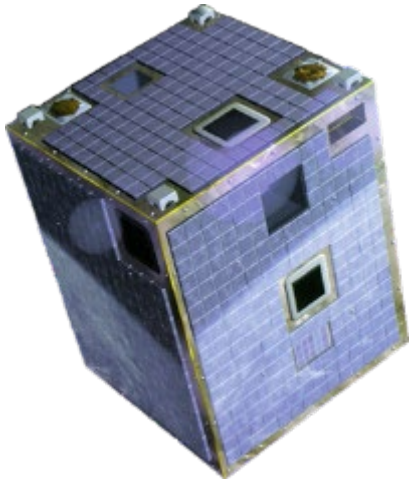

IDEAS-QA4EO

CHRIS/PROBA-1 CROSS-MISSION CALIBRATION

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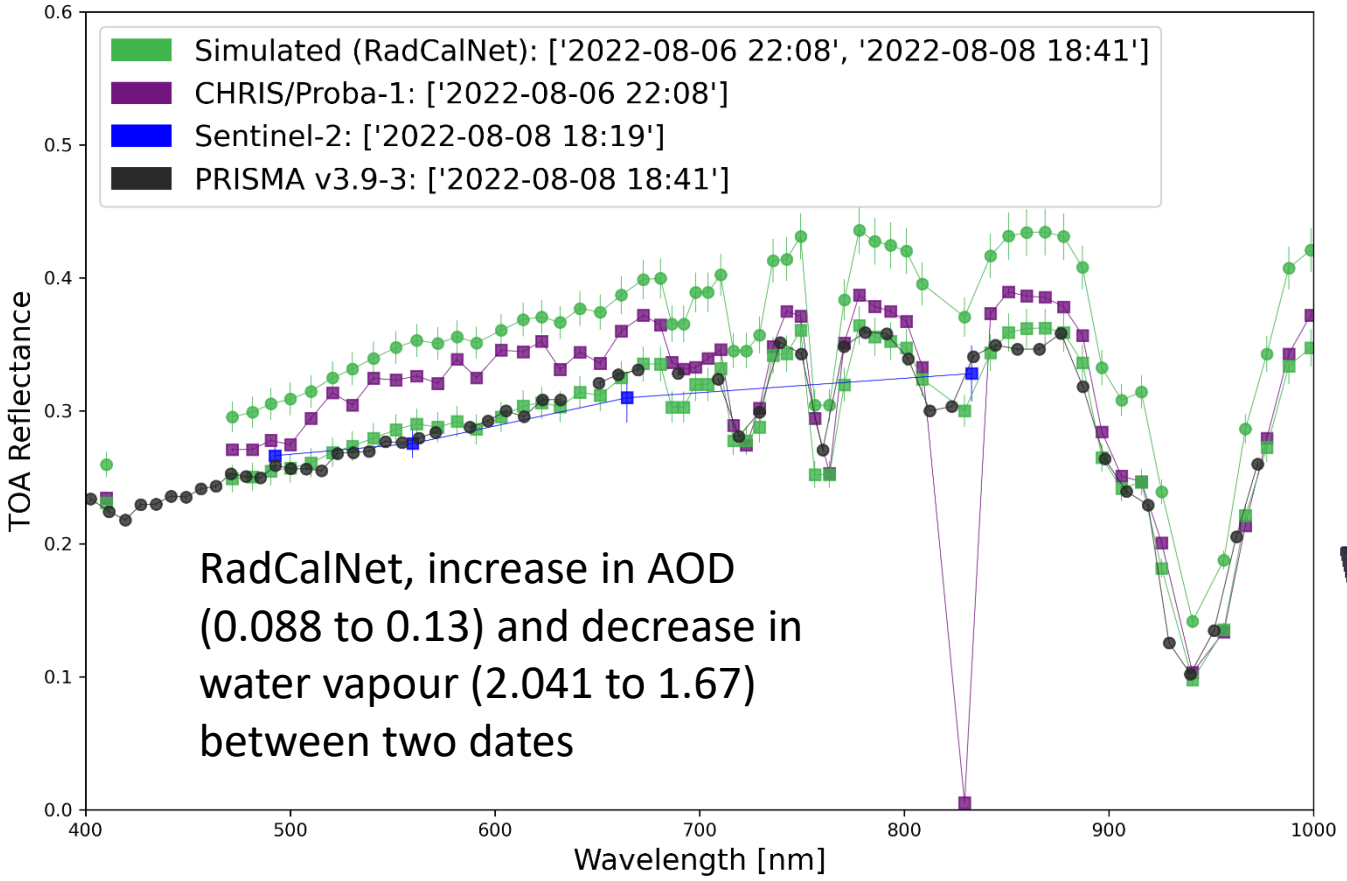
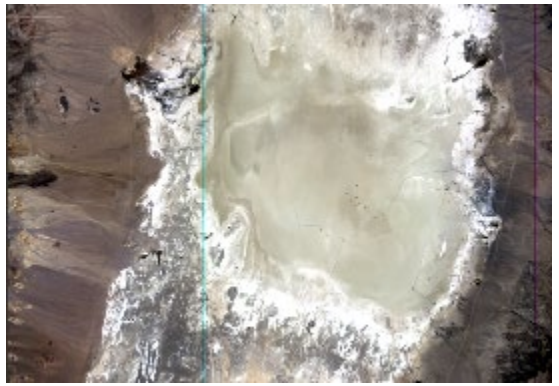
TELESPAZIO
a LEONARDO and THALES company

Introduction

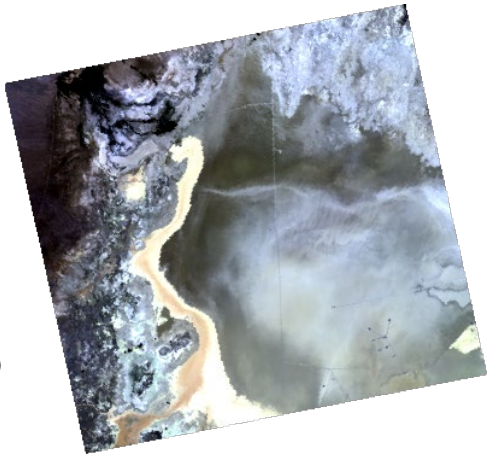
- Compact High Resolution Imaging Spectrometer (CHRIS): Up to 62 channels over the 400-1050 nm, operating in five modes with an originally defined nadir ground sampling distance of 17 m.
- Calibration sites are collected using Mode 1, 62 channels and 34 m resolution (in practice, this is now approx. 40 m resolution)
- To acquire additional comparisons, during August 2022, a cross-mission campaign was organised with the PRISMA team.
- The three sites we focused on were Barrax, La Crau, and Railroad Valley, where the latter two have RadCalNet measurements.
- RadCalNet (Bouvet et al. 2019) provides SI-traceable, spectrally resolved top-of-atmosphere reflectance for a nadir view at 30 min. Spectral sampling of 10 nm intervals covering the 400 nm to 1000 nm spectral range, with longer wavelengths (up to 2500 nm) where available.

Multi-Sensor Analysis: Railroad Valley





PRISMA Level 1C data

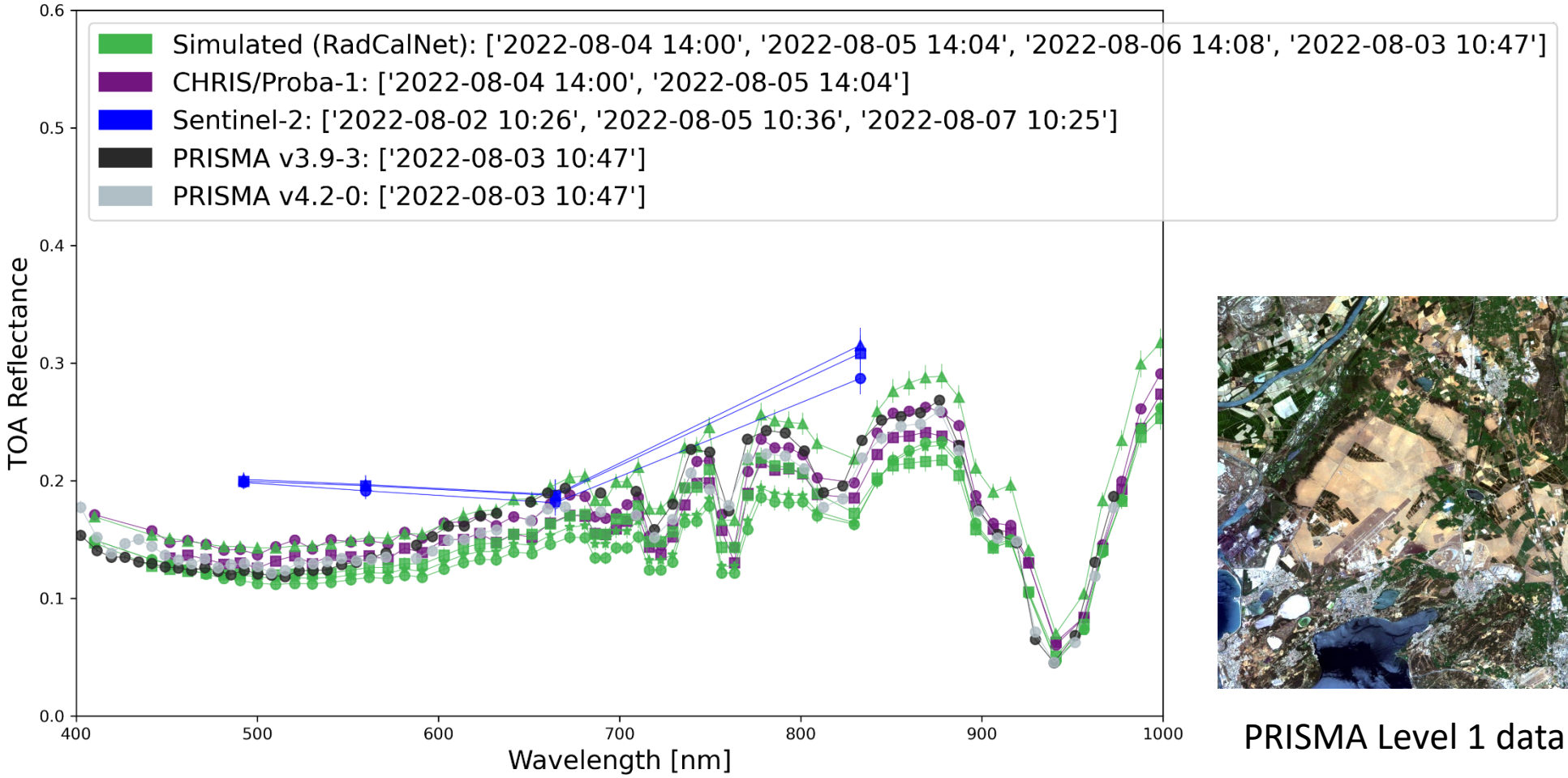


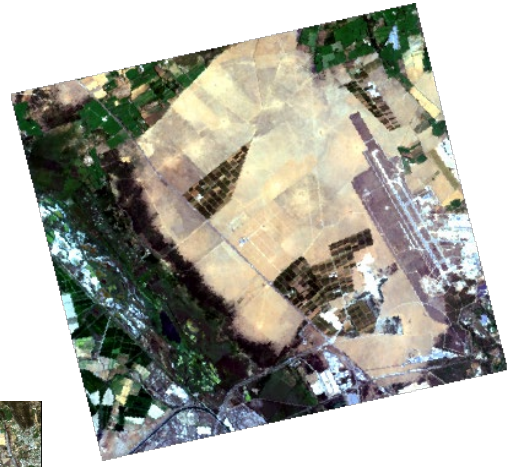
CHRIS Level 1A data

Sentinel-2A MSI Level 1C

CHRIS/Proba-1, PRISMA and Sentinel-2 MSI spectra alongside RadCalNet for the Railroad Valley site during 2022. The symbol date order is square, then circle.

Multi-Sensor Analysis: La Crau





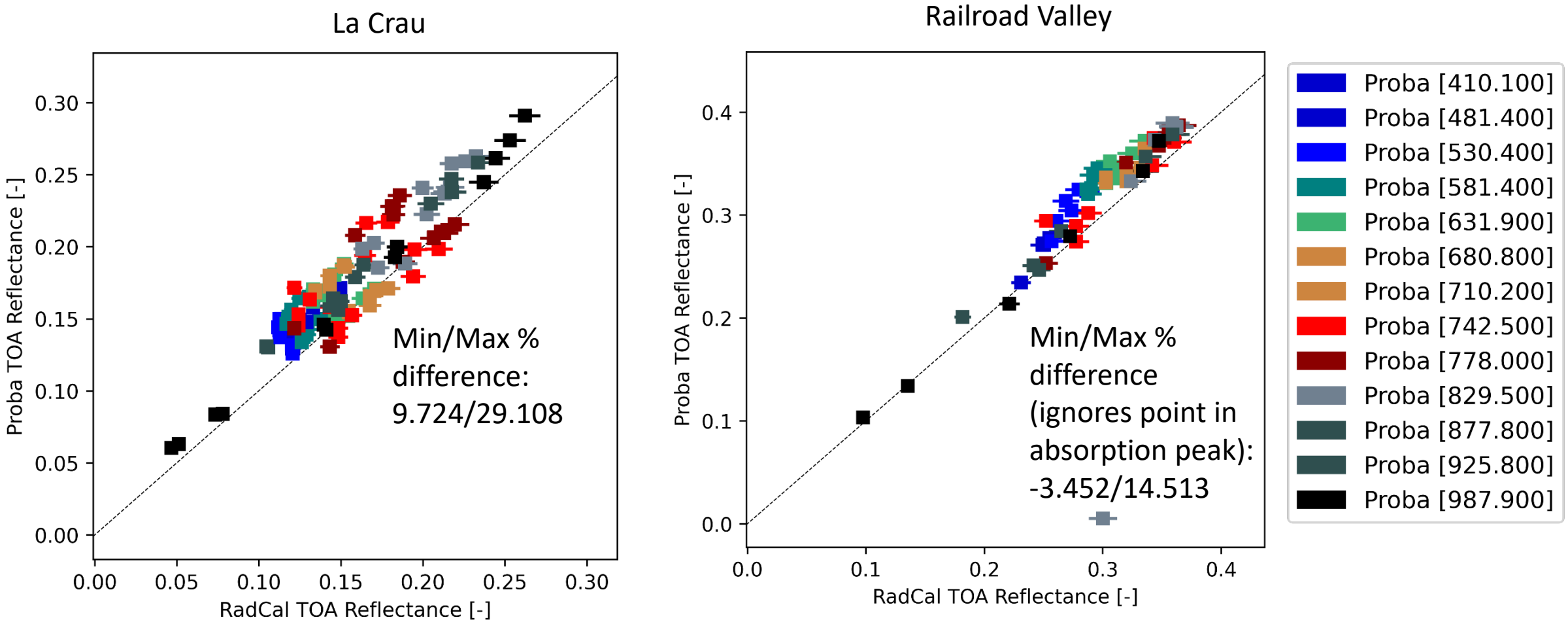
CHRIS Level 1A data

PRISMA Level 1 data

S2A MSI Level 1C

CHRIS/Proba-1, PRISMA and Sentinel-2 MSI and EnMAP spectra alongside RadCalNet for the La Crau site during 2022. Symbol date order is square, circle, triangle, pentagon, and star.

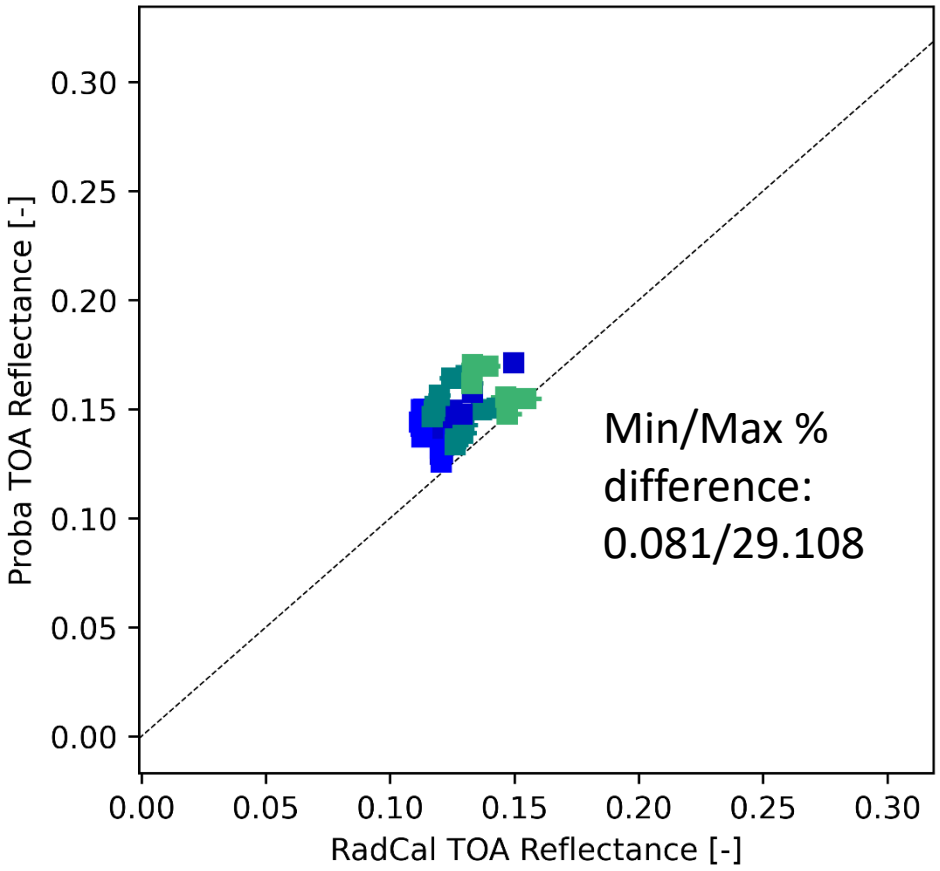
RadCalNet Site Analysis: Comparisons



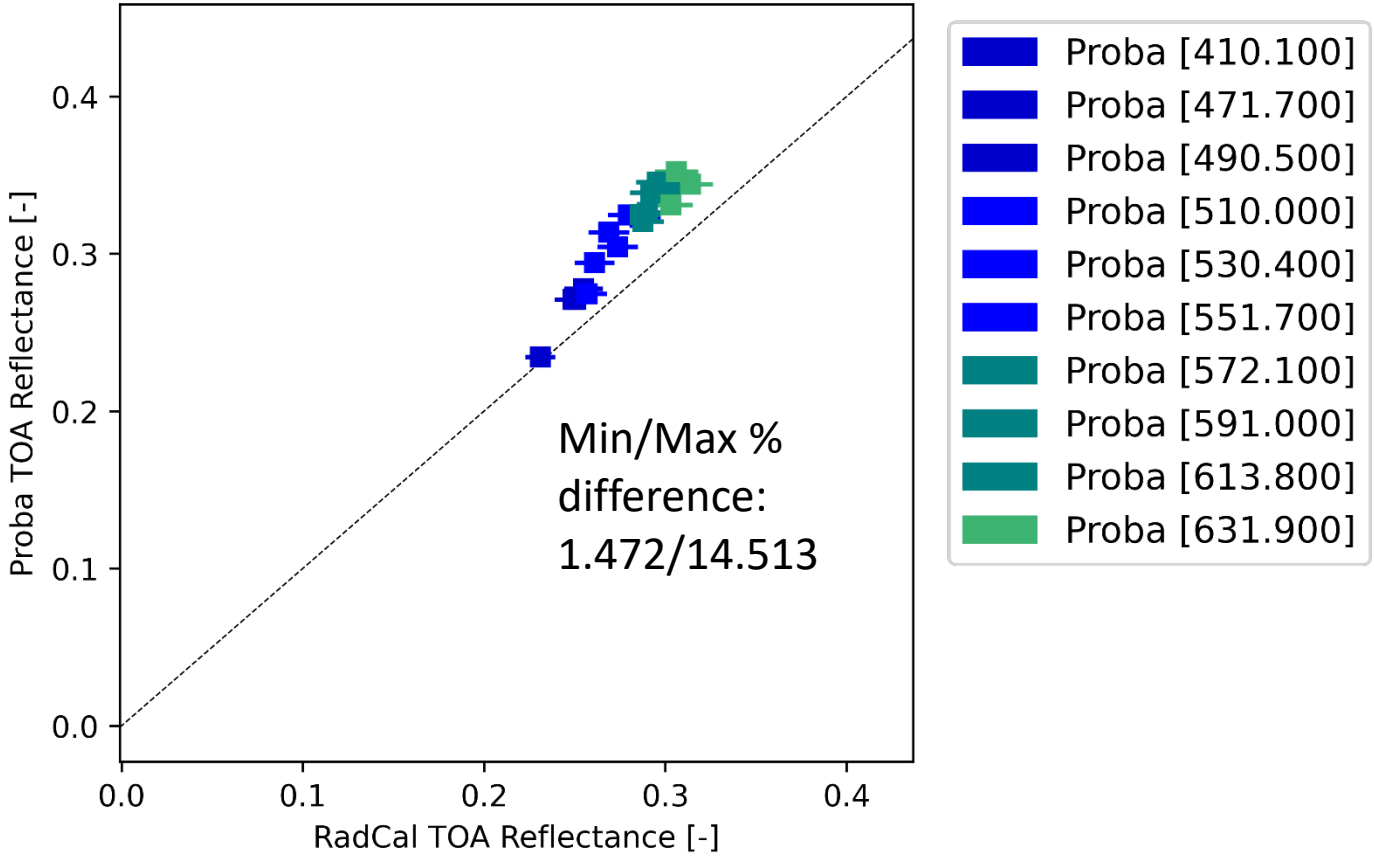
Spectral difference between the CHRIS Mode 1 and RadCalNet for both sites

RadCalNet Site Analysis: Comparisons

La Crau



Railroad Valley



Spectral difference between the CHRIS Mode 1 and RadCalNet for both sites

Conclusions

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- CHRIS-Proba provides a useful dataset, both historically and going forward in parallel with the launch of new hyperspectral missions.
- In addition to the historical analysis with the Barrax test site, analysis has been expanded to RadCalNet sites alongside comparisons to other hyperspectral and multispectral missions.
- The multi-sensors comparisons against CHRIS/Proba-1 appear to show that the instrument performs reasonably well, considering that it hasn't been calibrated since the start of the mission.
- However, plotting values against RadCalNet shows the size of the difference, which is much larger than the target for modern-day sensors. So, work must continue to ensure the radiometric characteristics are suitable for time-series analysis.
- RadCalNet is a very useful on-land reference and, in the future, will be joined by the HYPERNETS network for above-water sites.

ESA campaign data courtesy of ESA and those involved in the campaigns, RadCalNet data courtesy of the network (https://doi.org/10.3390/rs11202401) , Sentinel-2 courtesy of ESA/Copernicus, PRISMA courtesy of ASI and CHRIS/Proba-1 is jointly operated by ESA and SSTL, with support from Airbus DS and RSAC.