Sentinel-2/MSI and Sentinel-3/OLCI radiometry vicarious-validation status

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Disclaimer

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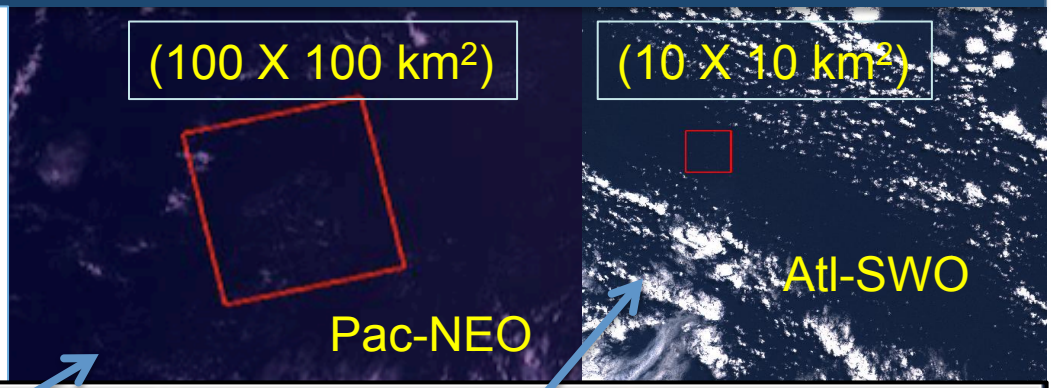
AGENDA

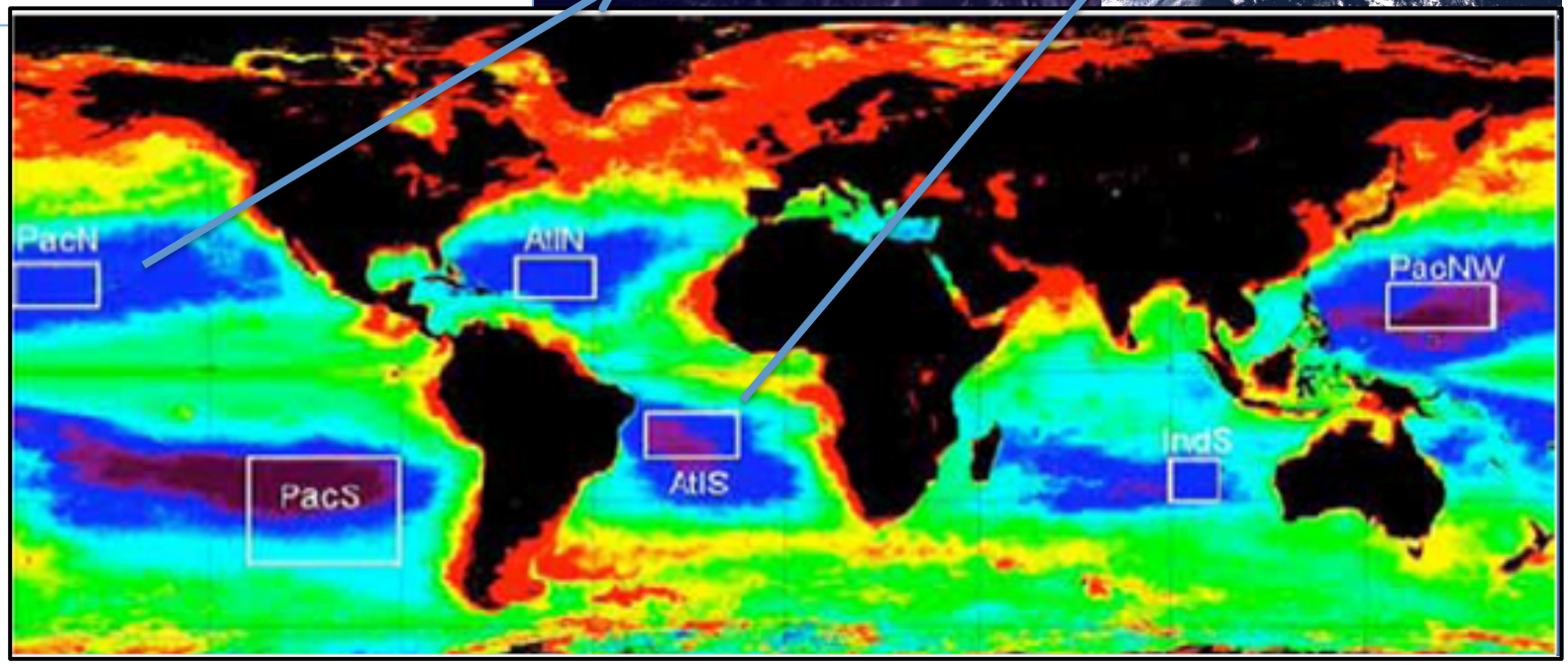
- CalVal-Sites & Tools
- Radiometry validation results
  - Sentinel-2/MSI
  - Sentinel-3/OLCI
- Cross-mission Intercomparison over PICS
- Conclusions

(Yukon Delta from Sentinel-2/MSI on 29 August 2017)
Image credit: contains modified Copernicus Sentinel data (2017), processed by ESA, CC BY-SA 3.0 IGO

OCEAN CalVal Sites

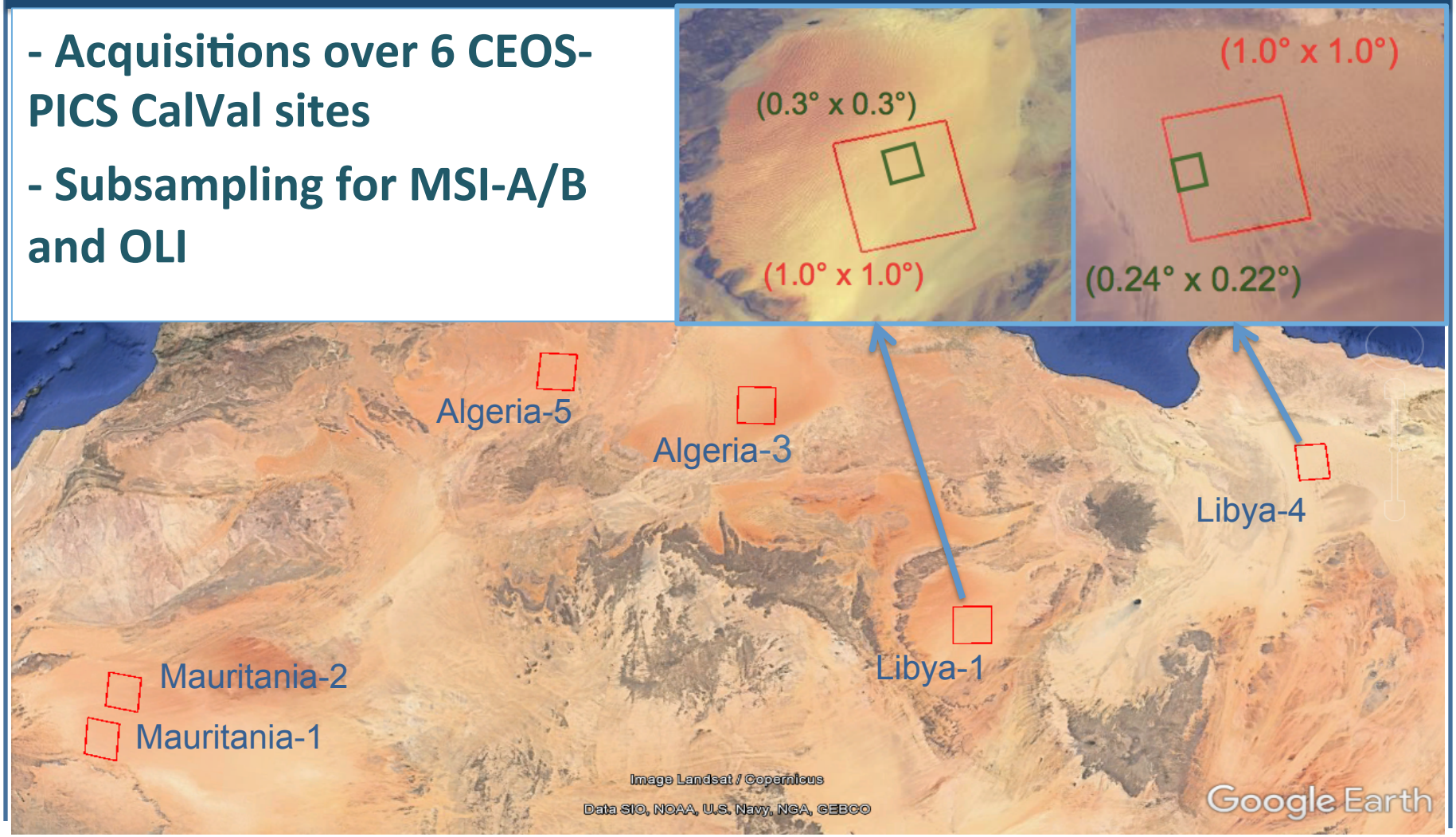
- Acquisitions over 6 OCEAN CalVal sites
- Small-sites for MSI-A/B and large ones for OLCI





PICS-CEOS CalVal Sites

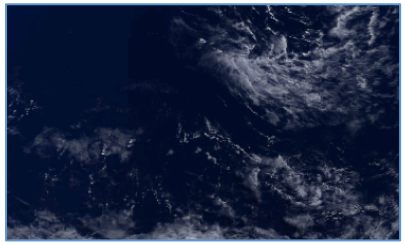
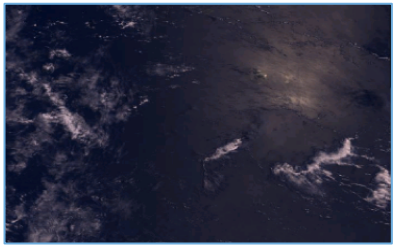
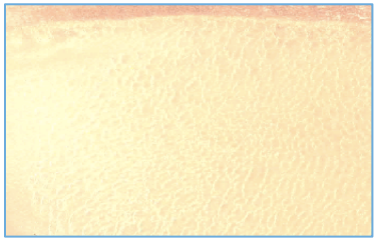
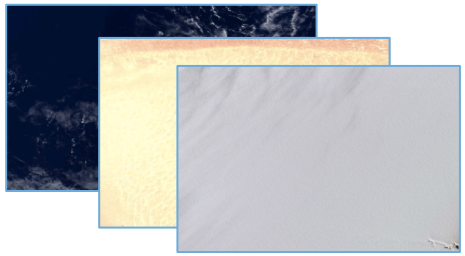
- Acquisitions over 6 CEOS-PICS CalVal sites
- Subsampling for MSI-A/B and OLI



Overview of the VC methods in DIMITRI Toolbox

DIMITRI

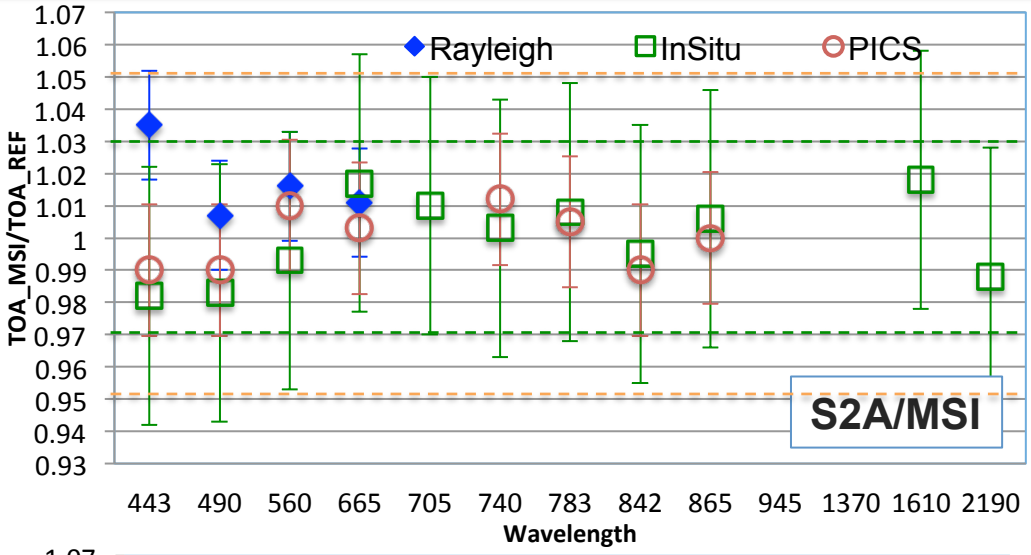
Database for Imaging Multi-spectral Instruments and Tools for Radiometric Intercomparison

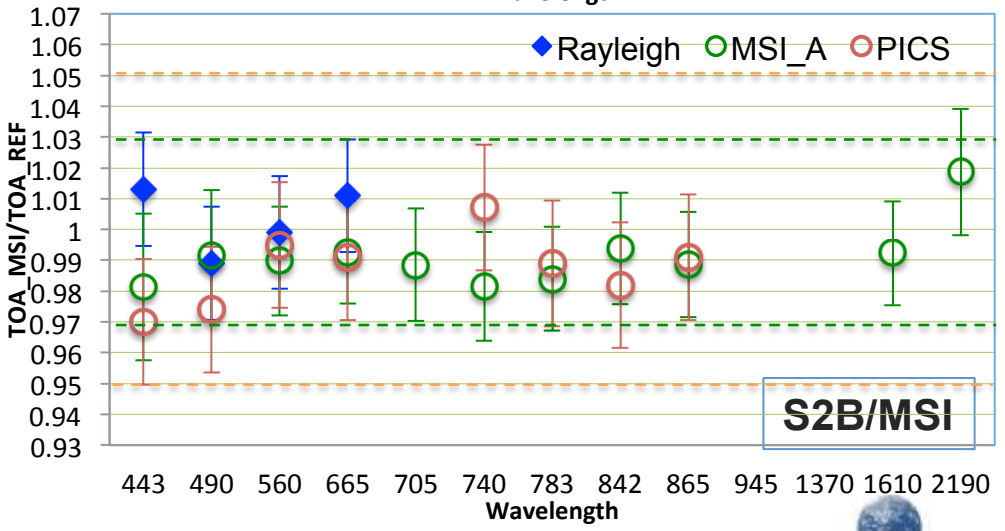





Rayleigh scattering calibration	Sun-Glint inter-bands calibration	Desert (PICS) calibration	Sensor-to-Sensor intercalibration
Absolute calibration coefficient: as ρ^{obs}/ρ^{sim}	Absolute Inter-band calibration coefficient: as $\rho^{B(i)}/\rho^{B(ref)}$	Absolute calibration coefficient: as ρ^{obs}/ρ^{sim}	Absolute inter-calibration coefficient: as ρ^{obs}/ρ^{REF}
Vermote et al (1992); Hagolle et al (1999)	Hagolle et al (1999; 2004); Nicolas et al (2006)	Bouvet (2014)	Bouvet et al. (2006)
- Over VIS bands - Uncertainty <5% - Very stringent criteria	- Over VNIR bands - Uncertainty <2% - Very stringent criteria	- Over VNIR bands - Uncertainty <5% - Uses surface BRDF	- VIS, NIR & SWIR bands - Uncertainty <5% - Limited matchups

Synthesis over the Radiometry Vicarious Validation Results: MSI-A/B

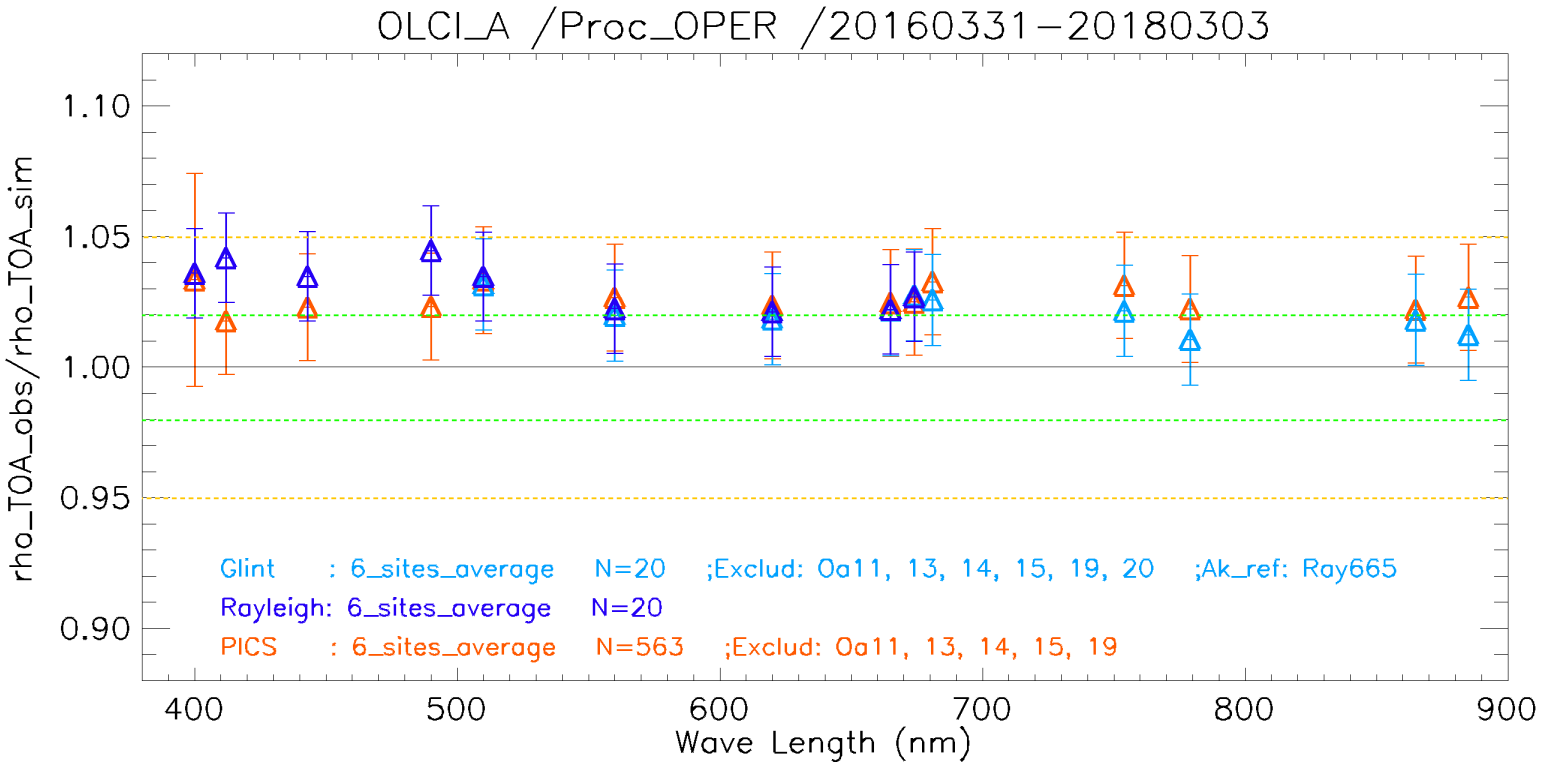
- Good consistency over all methods
- Results are within 5% (mission req.)
- Rayleigh over S2B/MSI performed over only 5 sites (14 products)
- Maximum discrepancy is observed over Rayleigh S2A/B01 (> 3%)





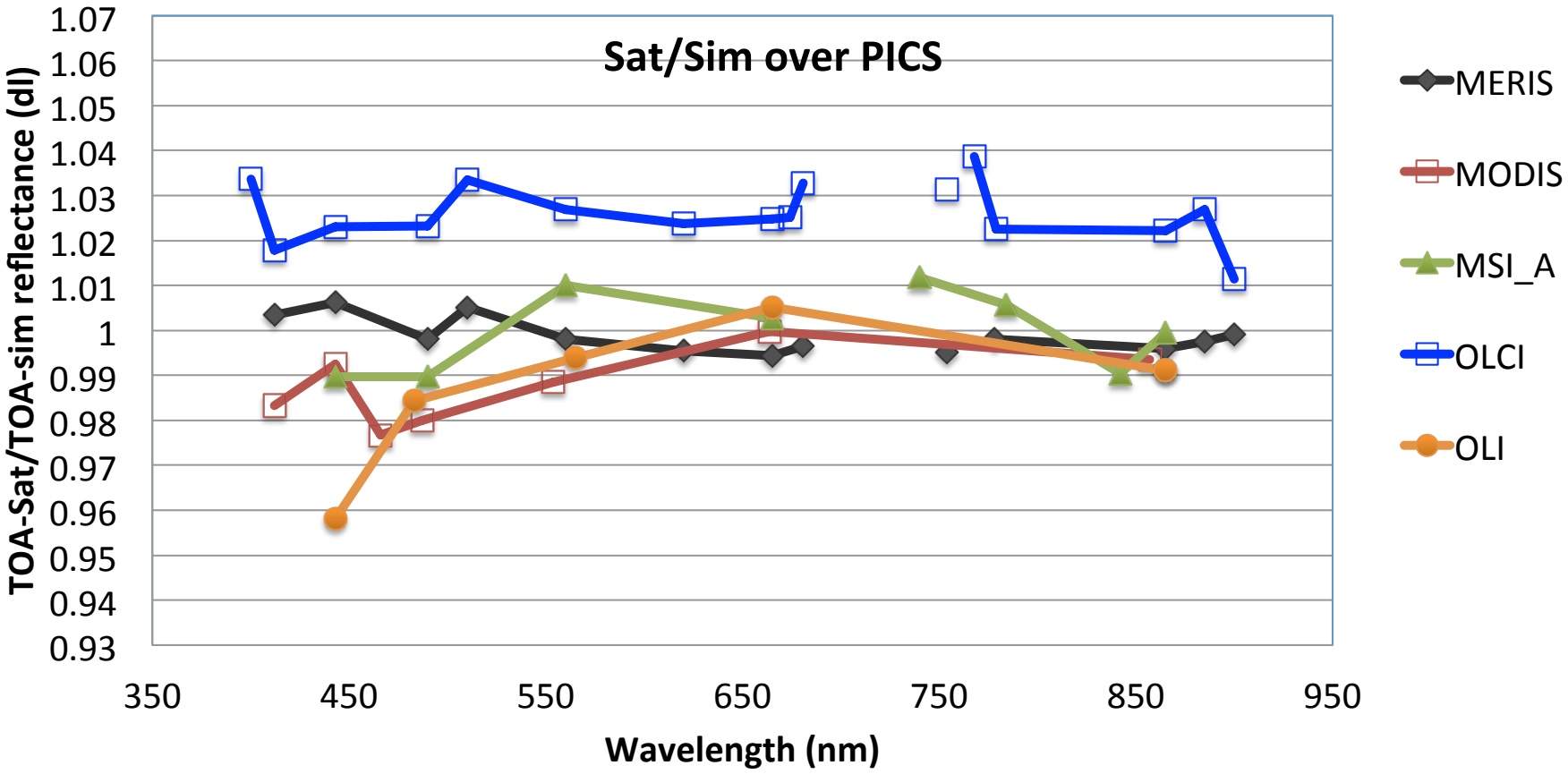
Synthesis over the Radiometry Vicarious Validation Results: OLCI-A

- Operational products Apr. 2016 – Feb. 2018 from 3 Methods over 12 sites
- Good consistency over all methods
- Results are within 2%-5%



Cross-Mission Intercomparison: MERIS/MSI/MODISA/OLCI/OLI

- The ratio of observed/simulated TOA reflectance



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CONCLUSION

- MSI-A/B show an excellent calibration, image quality and very good temporal stability
- Both sensors show a good agreement with OLI and MODIS-A over PICS (<2%)
- MSI-A shows brighter reflectance than MSI-B one of ~1% over PICS
- OLCI-A show an excellent image quality & very good temporal stability
- OLCI-A shows slightly higher reflectance wrt MERIS, MODIS-A and MSI over PICS (~2%)
- S3B-tandem provides a unique opportunity to understand OLCI's discrepancy wrt other sensors

Thank you for your attention

The Bahamas, 20170426 as seen by S3A/OLCI; Courtesy to S3MPC.