

Part I

Atmospheric Correction over Optically-complex Waters



Key findings of current IOCGG WG *Intercomparison of Atmospheric Correction Algorithms Over Optically-Complex Waters*

Cédric Jamet
ULCO, LOG, France



Term of references

- **Goal:** Inter-comparison and evaluation of existing AC algorithms over turbid waters
 - **Understanding retrievals differences algorithms**
- **Challenge:** to understand the advantages and limitations of each algorithm and their performance under certain atmospheric and oceanic conditions
- High demand for AC guidelines
- **Outputs timely**
 - **Guidances on the use of AC over turbid waters**
 - **Recommendations for improving and selecting the optimal AC**



Scope of the WG

- This WG: only on $nLw(NIR) \neq 0$
- **Not sensor-specific** → MODIS-A just an application
- Other issues not adressed
- One dedicated chapter
 - Adjacency effects
 - Other issues (absorbing aerosols, CDOM)
 - MERIS/OLCI Case2x round-robin, others



Choice of AC

- NASA standard AC (GW94; Bailey et al., 2010)
- MUMM AC (Ruddick et al., 2000; 2006)
- NIR-SWIR (Wang and Shi, 2008)
- UV AC (He et al., 2012)
- SWIR Extrapolation AC (He and Chen, 2014)
- ANN inversion (Fan et al., 2017)
- Gaussian-based extrapolation (Singh and Shanmugam, 2014)
- ANN inversion (Schroeder et al., 2007)
- Polymer (Steinmetz et al., 2011)



Evaluation of atmospheric correction

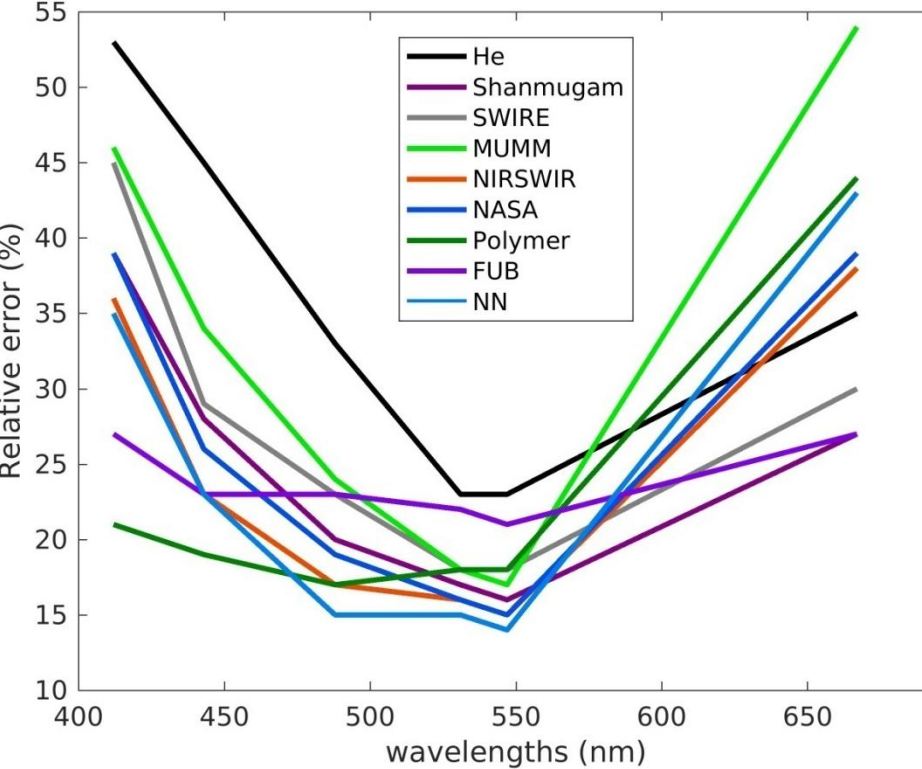
- Classic match-up analysis
- Simulated dataset for sensitivities studies
- Inspection of satellite images over contrasted coastal regions (R_{rs} and aerosol optical properties)



Evaluation of atmospheric correction

- **Classic match-up analysis: AERONET-OC data (889 match-ups)**
- Simulated dataset for sensitivities studies
- Inspection of satellite images over contrasted coastal regions (R_{rs} and aerosol optical properties)

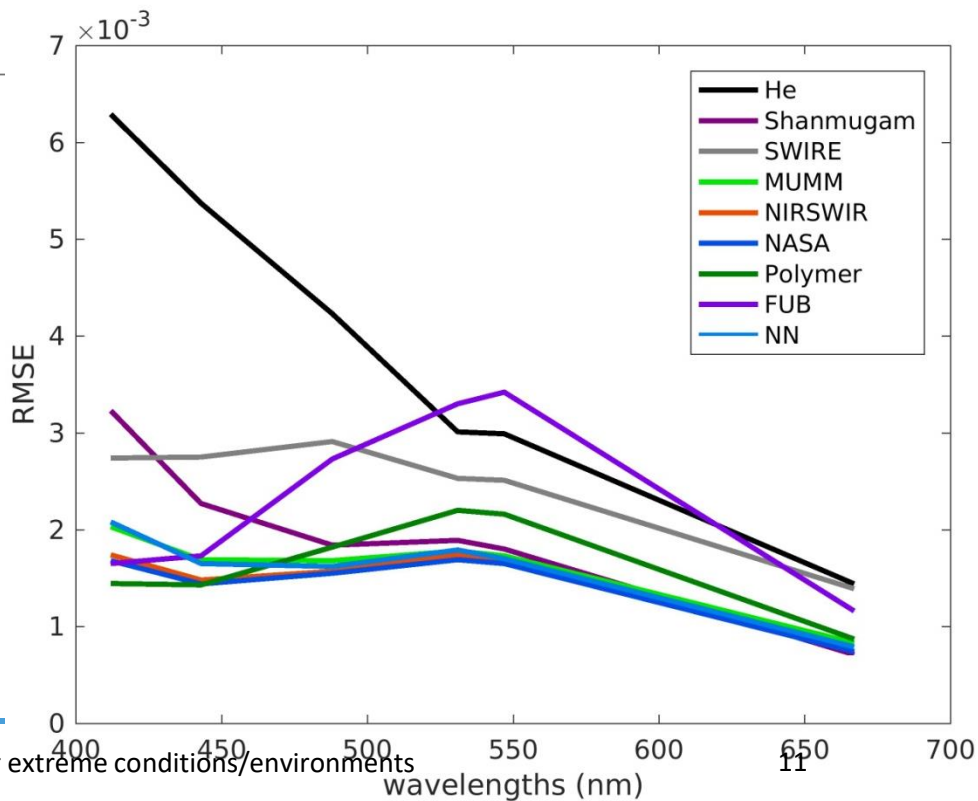




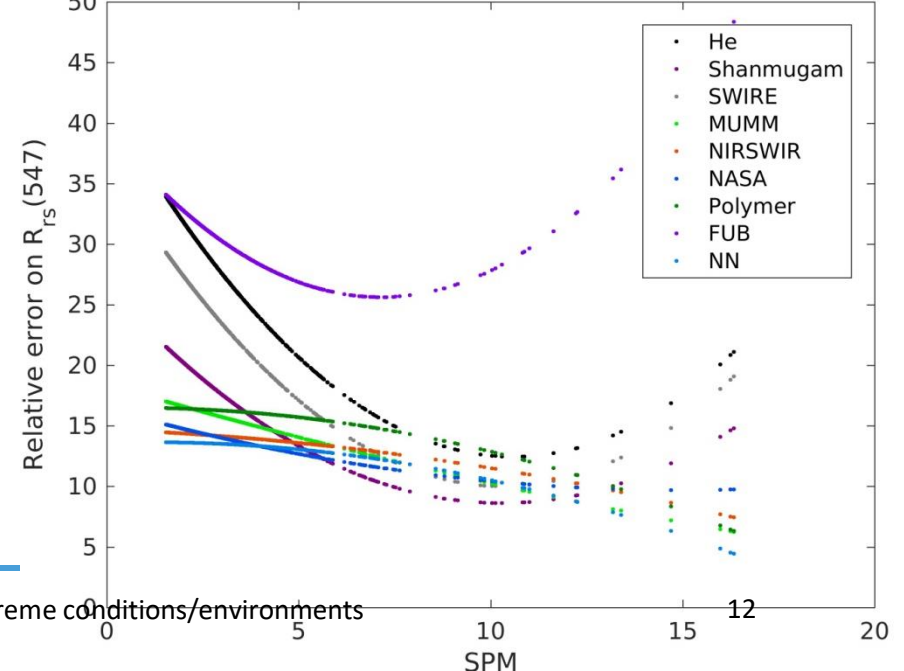
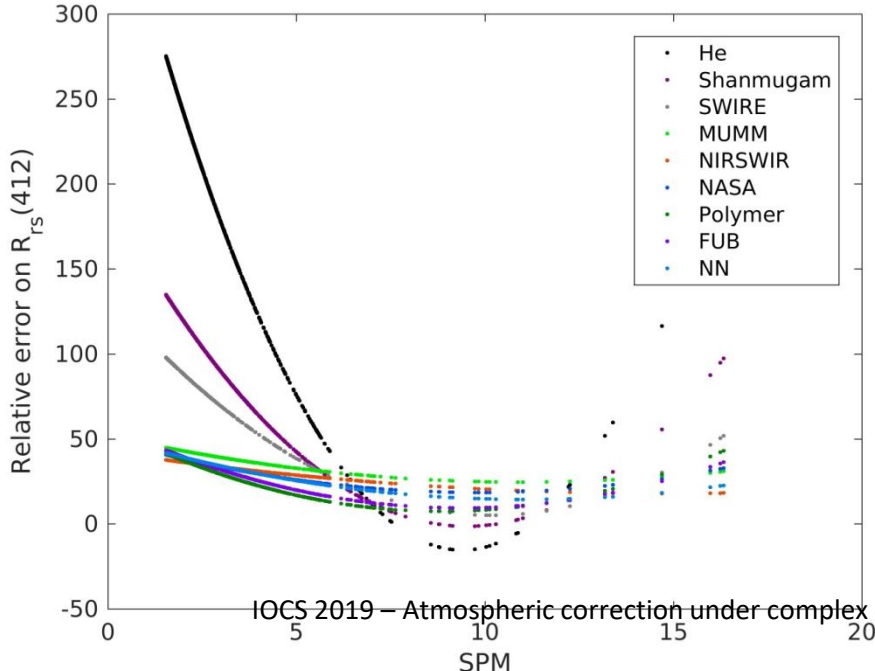
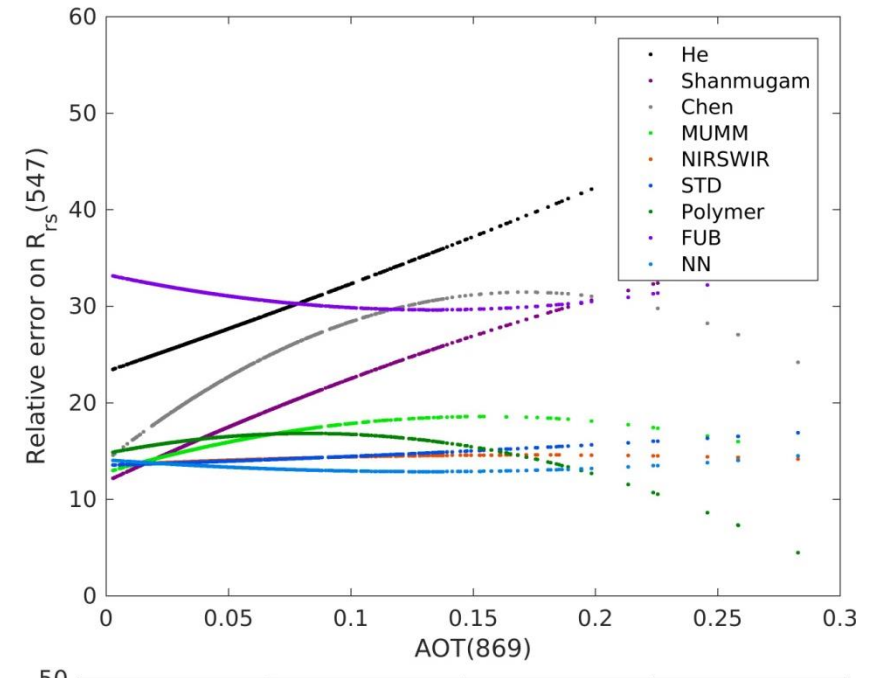
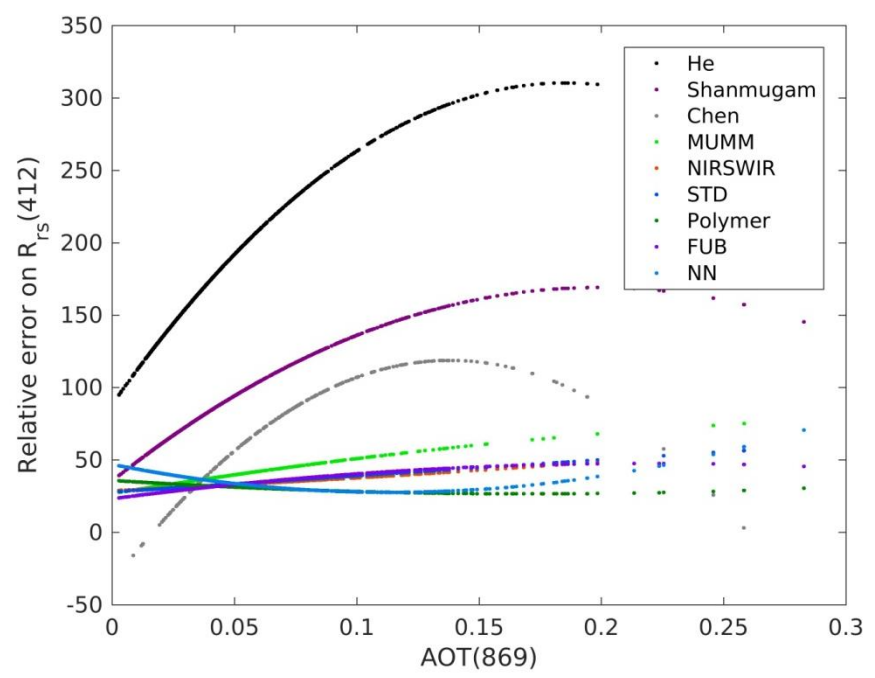
Number of match-ups vary

- Per wavelength

- Per algorithm



Variation of errors as a function of AOT(869) and SPM



Conclusion

- **Performances of AC:**
 - OK in green and yellow bands
 - Need improvements in blue and red bands
 - Some algorithms are sensitive to atmospheric/marine constituents
→ Limitations in range of variability
- **Report as an IOCCG technical series**
 - All algorithms available as plug-ins or open-source code
 - Simulated dataset freely available
 - End of the year

