

WP3: Aerosol spatial mismatch between AATSR and AERONET

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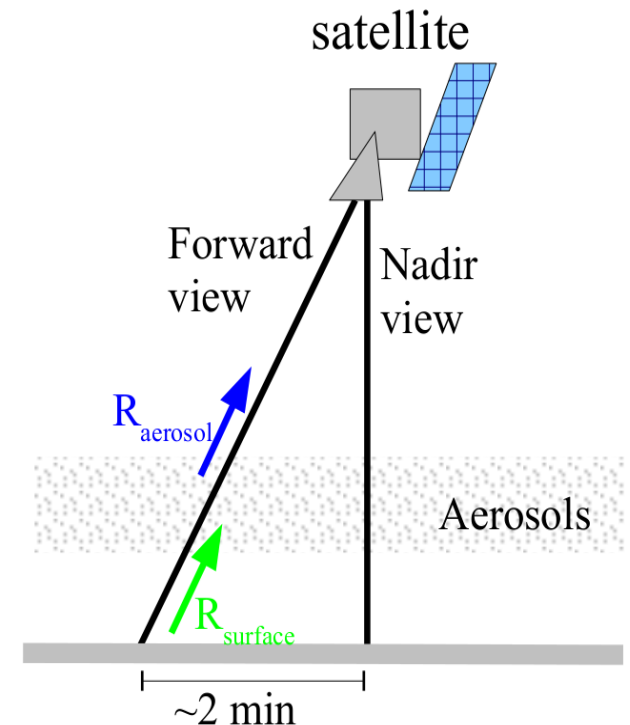


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Background: satellite aerosol retrieval

- We use dual view satellite data from AATSR to retrieve AOD at 10 km resolution
- Products are validated against AERONET
- In WP3 the aim is to characterize the **collocation mismatch uncertainties** in the validation
- Given the limitations of the available uncertainty information, our approach is to study spatial AOD variability of both datasets



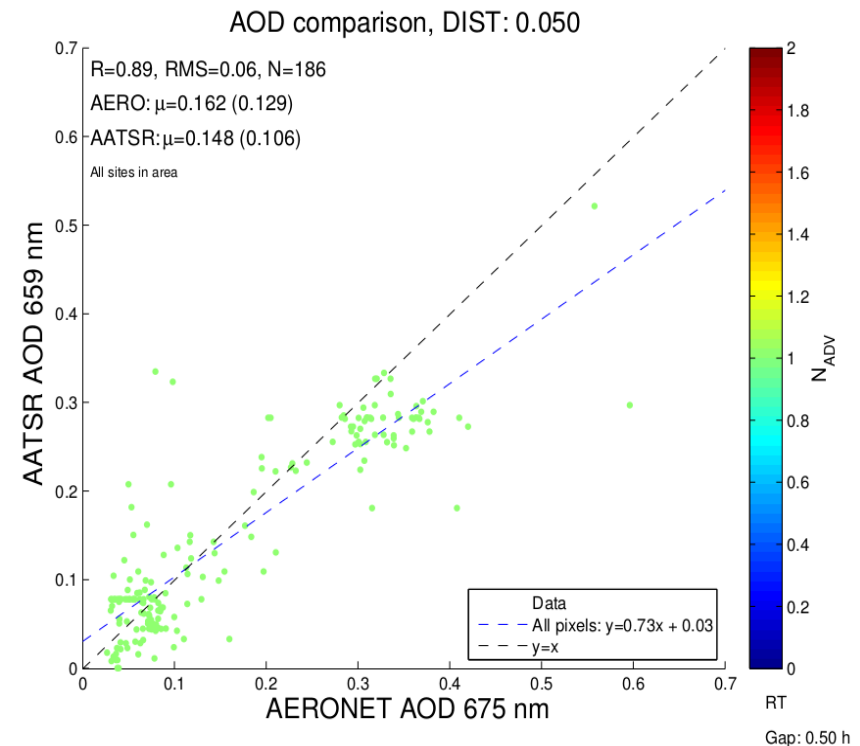
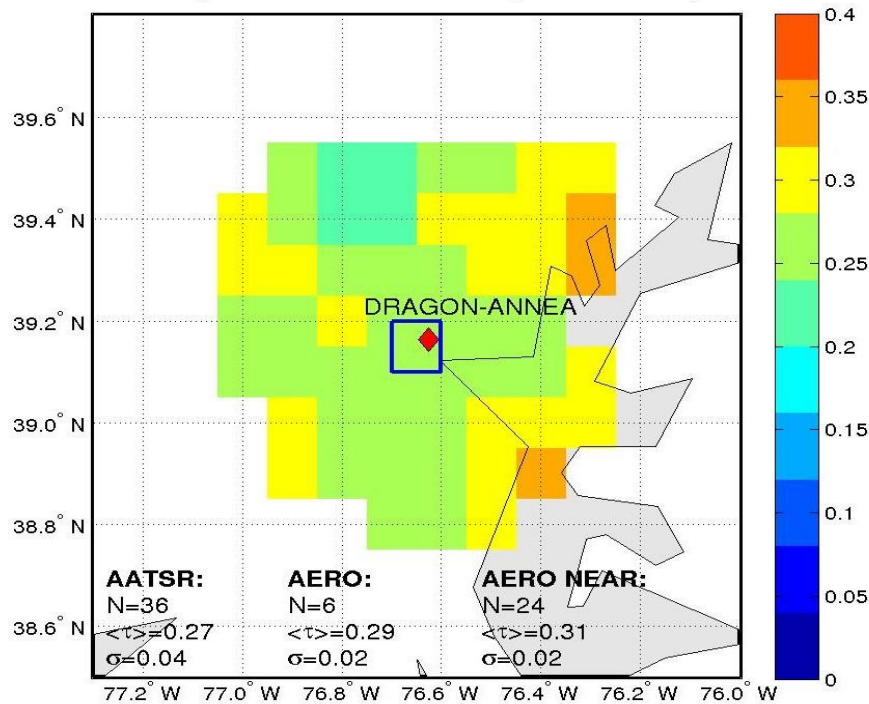
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Simplest validation approach

- Closest AATSR pixel is compared to AERONET
- AERONET observation closest in time to the AATSR overpass is used
- What is the collocation mismatch uncertainty?

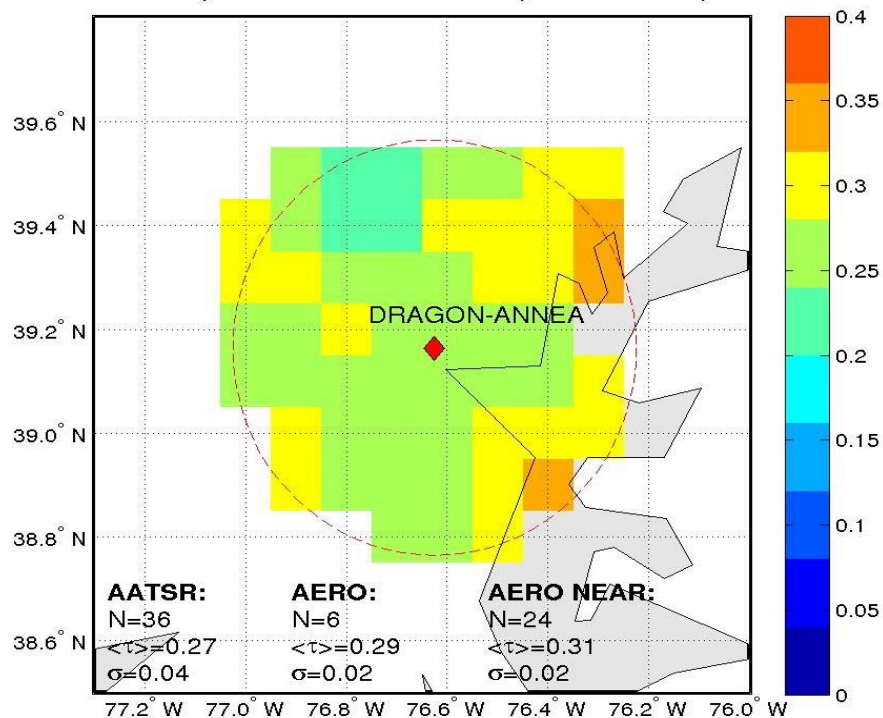
AATSR AOD, DRAGON-ANNEA, 20110722, d=0.400



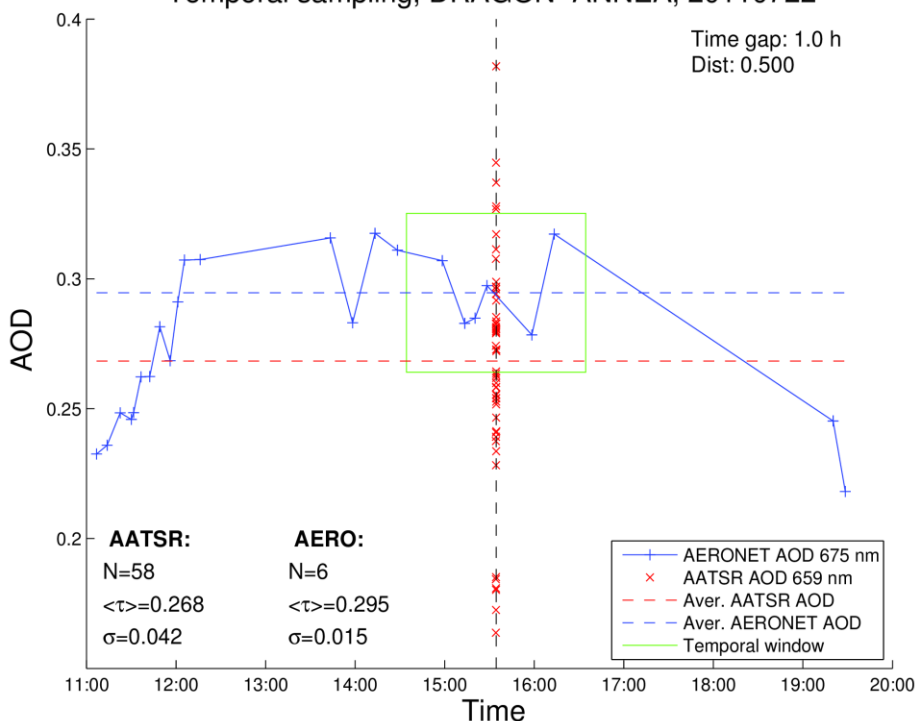
Spatial AOD variability

- Spatial average of AATSR data is preferred in the comparison
- Standard deviation of AOD in the sampling area, σ_{AATSR} , is used as an uncertainty indicator (also N_{AATSR})
- Temporal average of AERONET data is used

AATSR AOD, DRAGON-ANNEA, 20110722, $d=0.400$

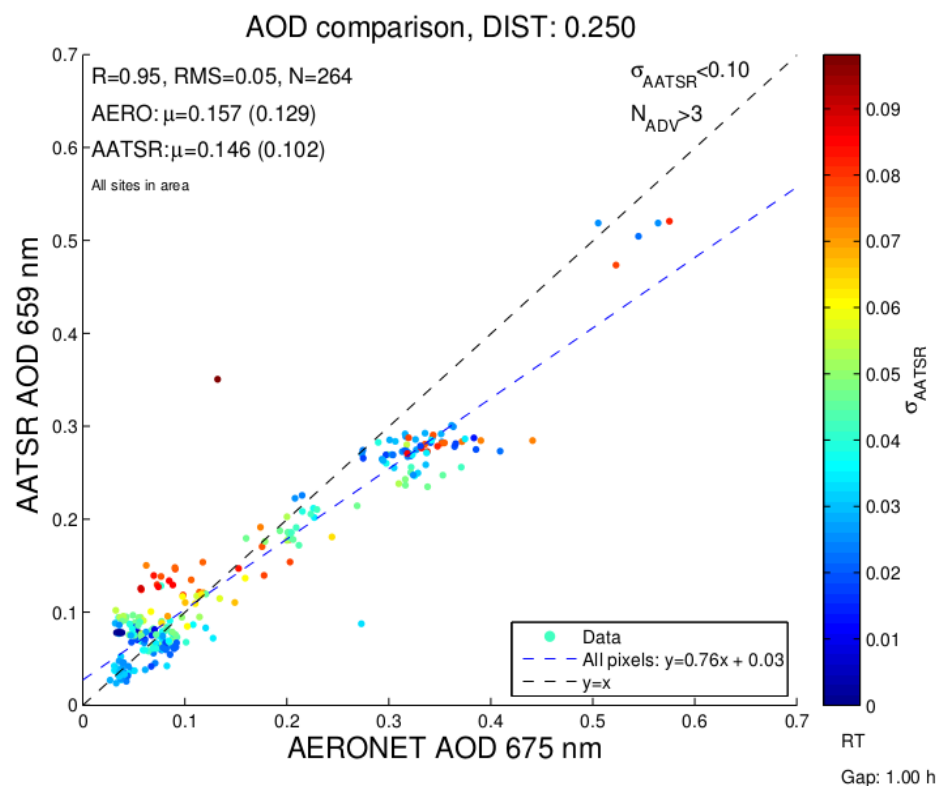
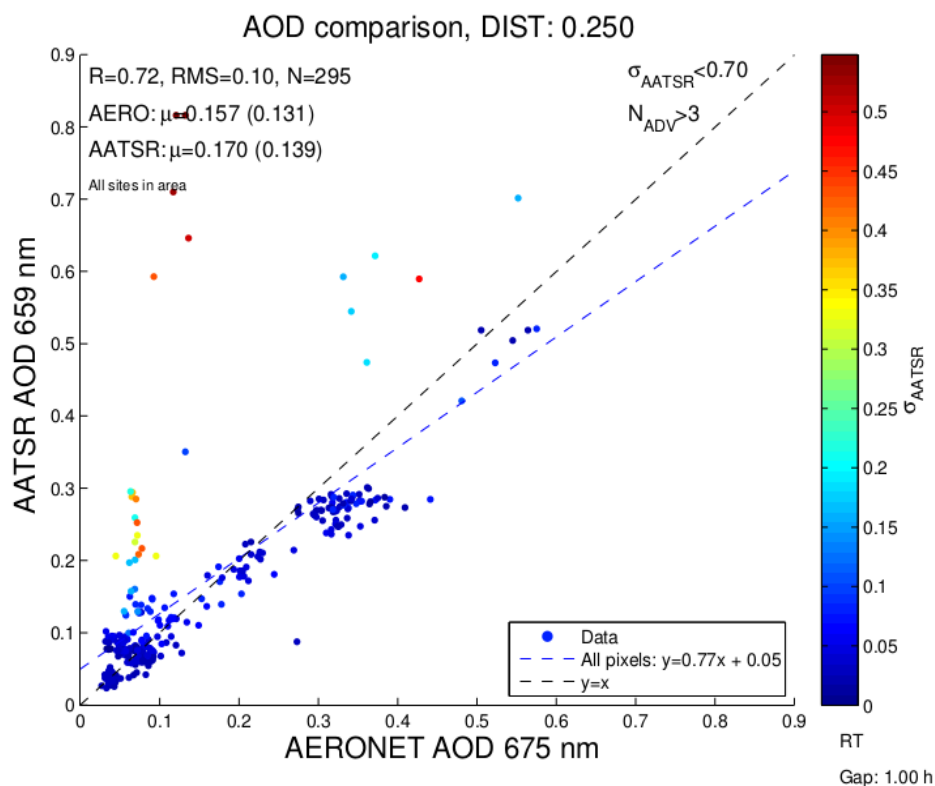


Temporal sampling, DRAGON-ANNEA, 20110722



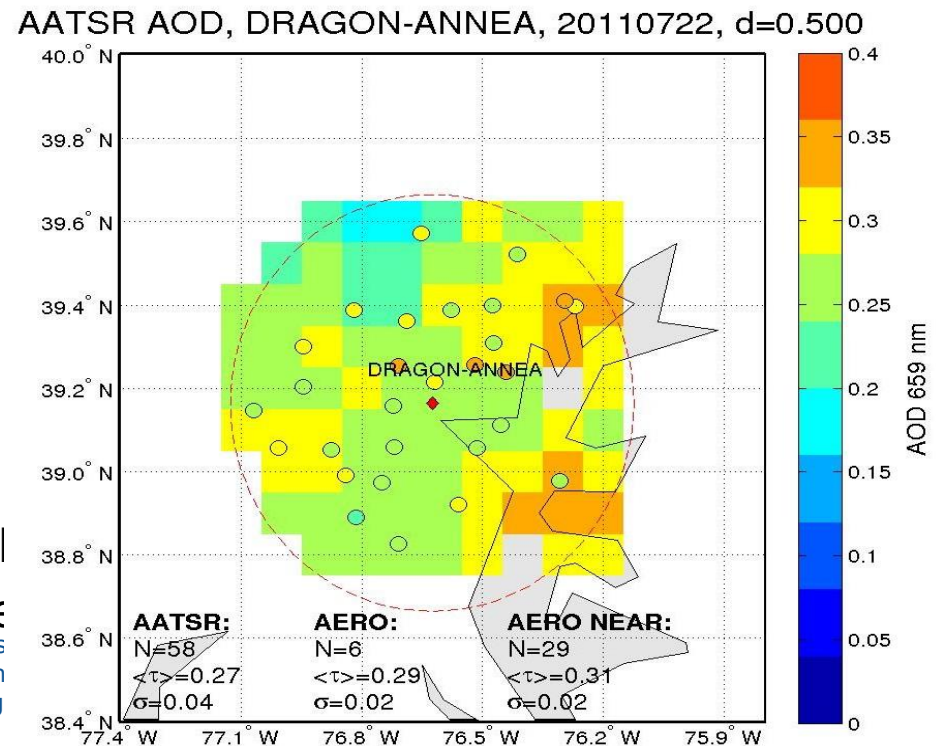
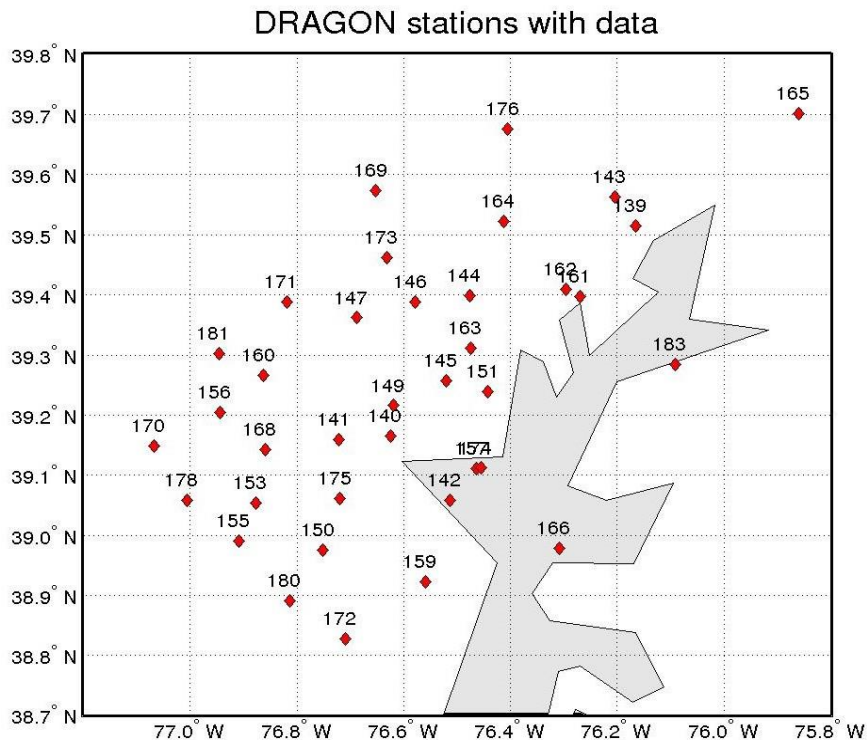
Filtering data with σ_{AATSR} threshold

- Setting a thresholds for σ_{AATSR} and N_{AATSR} improves the AOD comparison



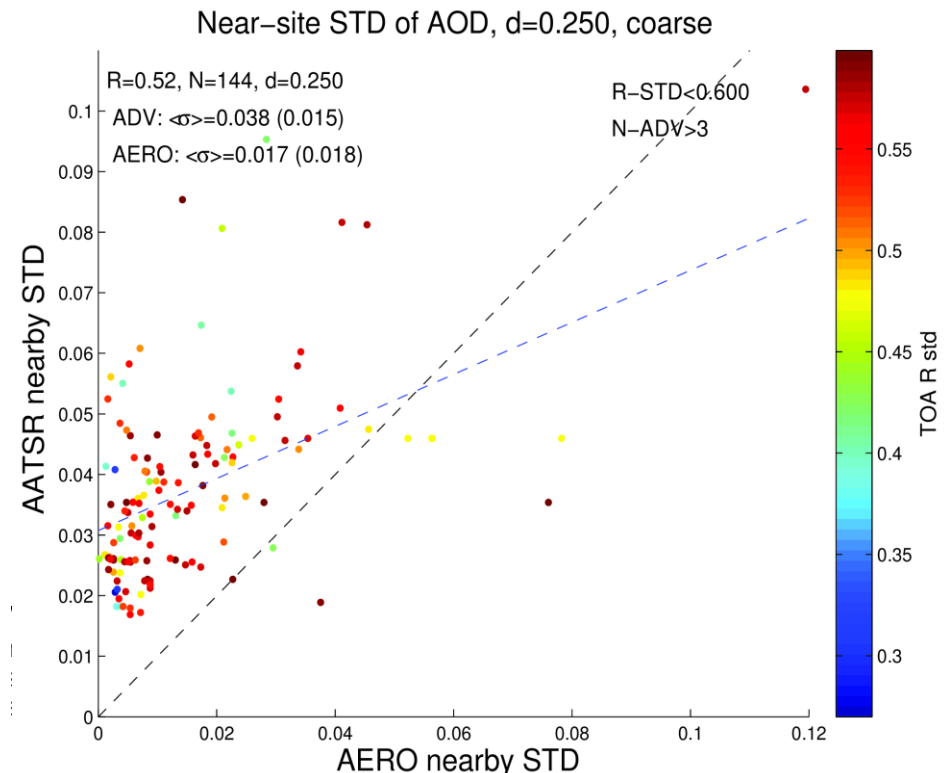
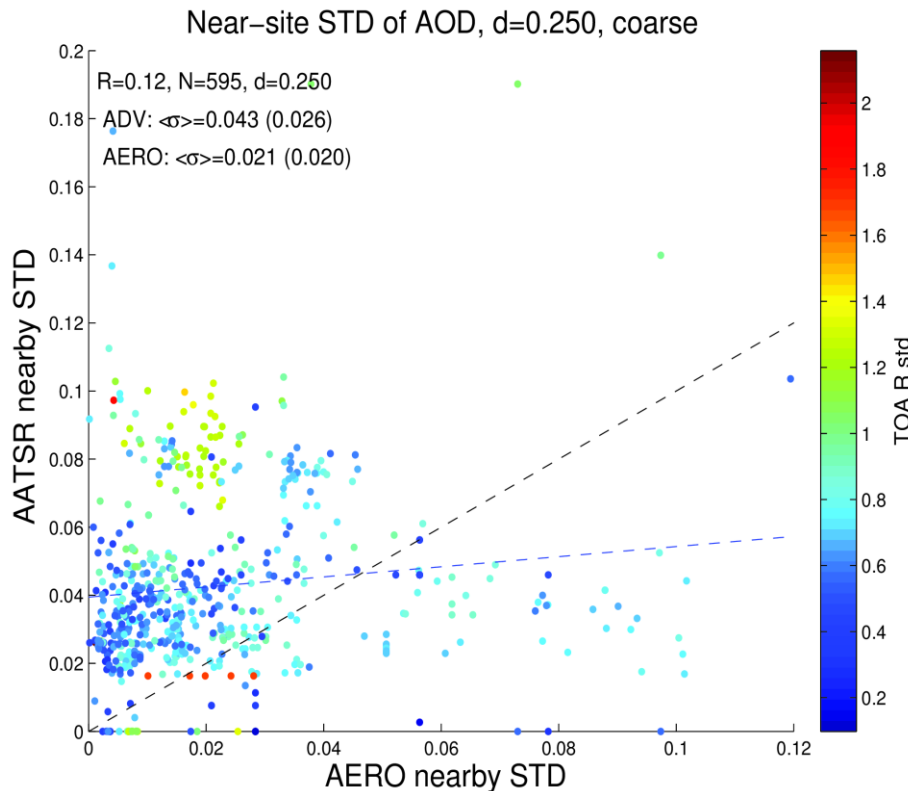
'True' AOD variability

- The AATSR AOD variance (σ_{AATSR}) is only partly caused by 'true' aerosol variability, and is largely due to retrieval errors
- We characterize the 'true' AOD variability using the AERONET data from the dense DRAGON campaign network
- Using the same sampling area as for AATSR, we calculate the standard deviation of the AERONET AOD from the nearby sites.



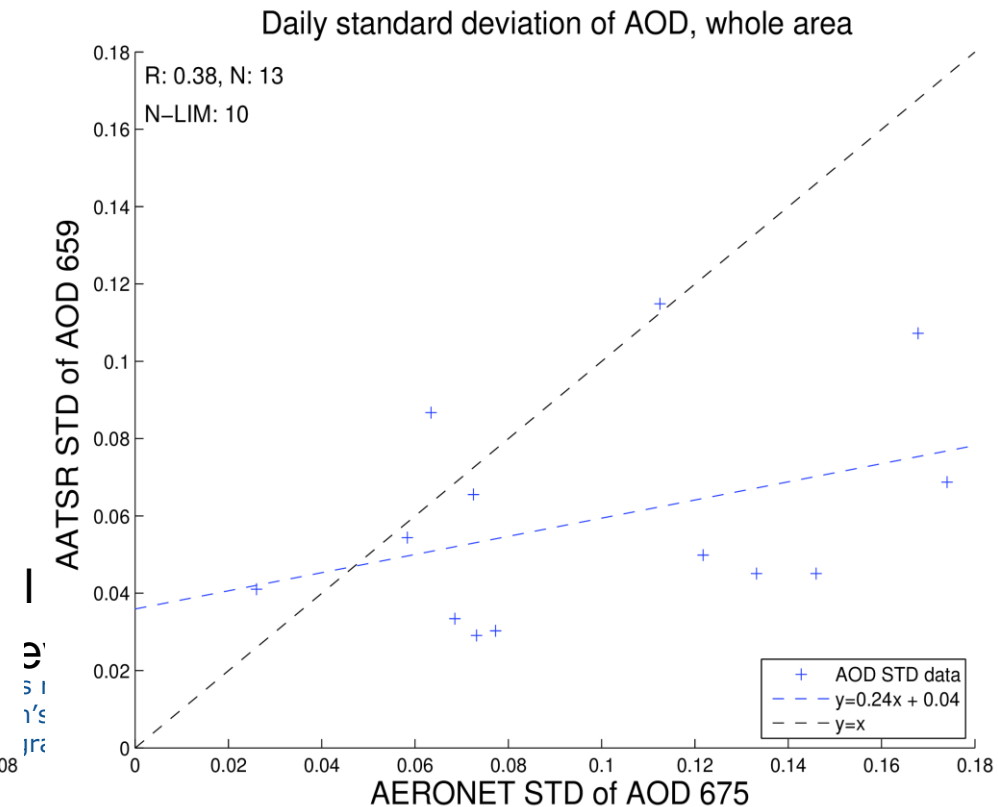
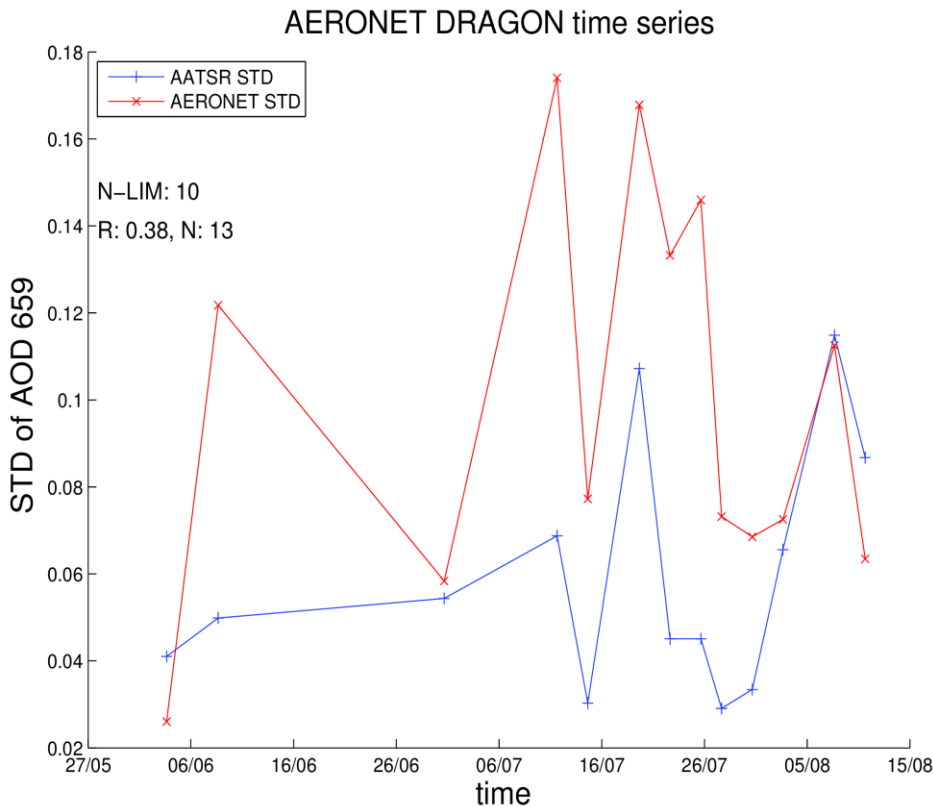
'True' AOD variability

- The data have only weak correlation
- The average collocated standard deviation of AOD is 0.04 for AATSR and 0.02 for AERONET
- Correlation can be improved by applying a threshold to the 555 nm TOA reflectance standard deviation



Large area AOD variability

- Instead of individual sites, we can consider the whole area. There is slightly better correlation.



Conclusions

- The standard deviation of AATSR AOD is a measure of collocation mismatch uncertainty
- The standard deviation of AOD within a 0.25 sampling area is of the order 0.04 for AATSR, and of the order 0.02 for AERONET
- The reported AERONET uncertainty is 0.01 to 0.02 (Eck et al. 1999)
- The average AATSR uncertainty is of the order 0.06 for this data set.



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