Spatial variability of MODIS aerosol products (MOD04_L2/MYD04_L2)

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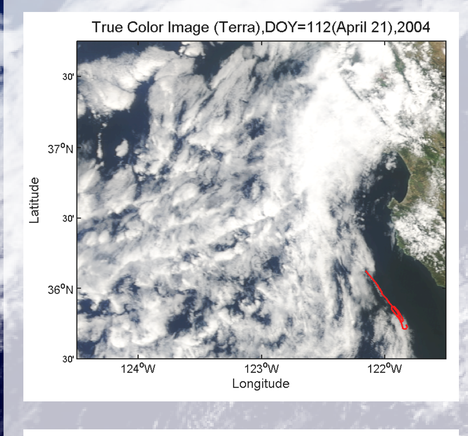
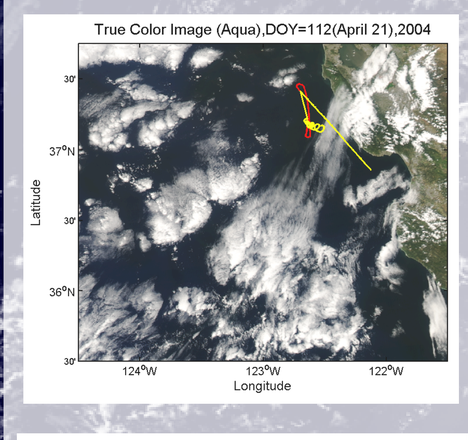
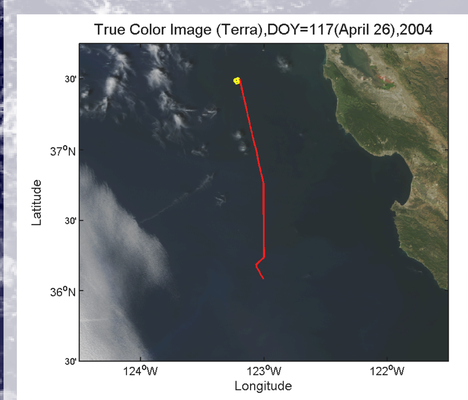
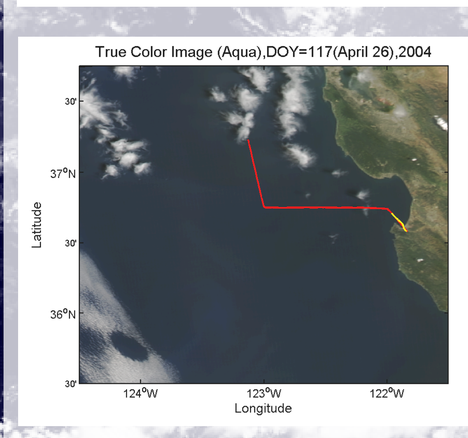
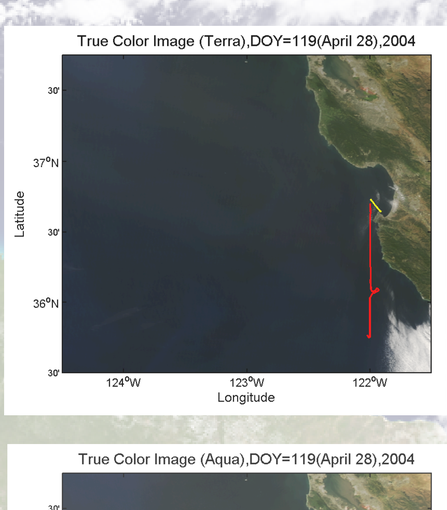
1-3-4 true color

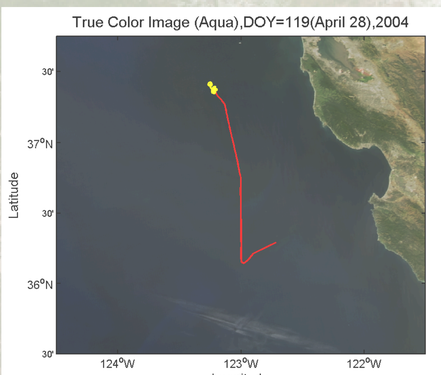


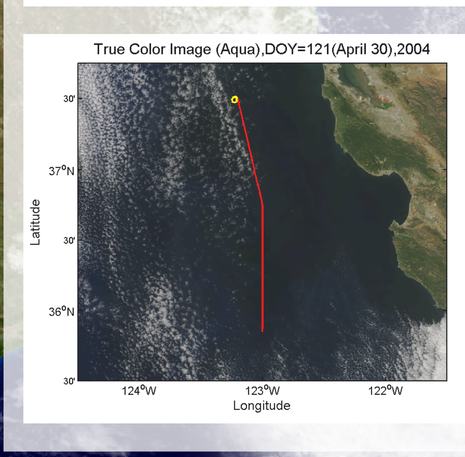




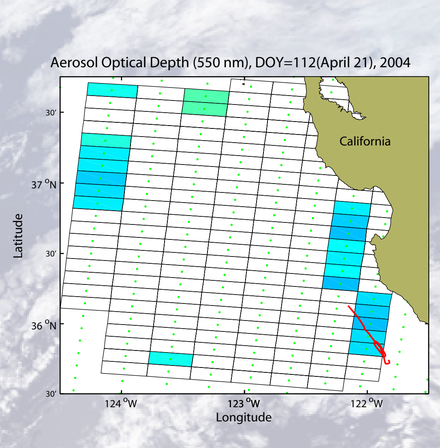


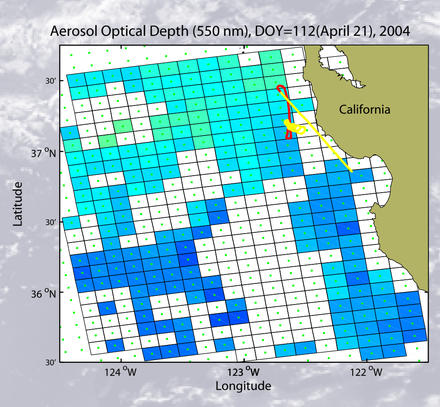


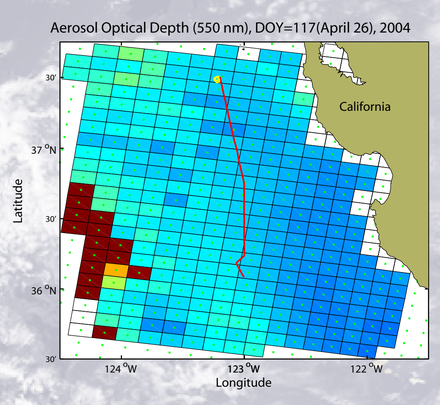


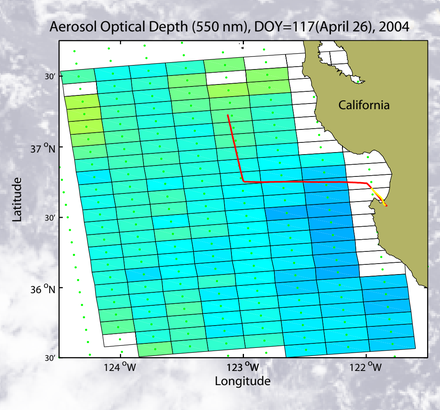


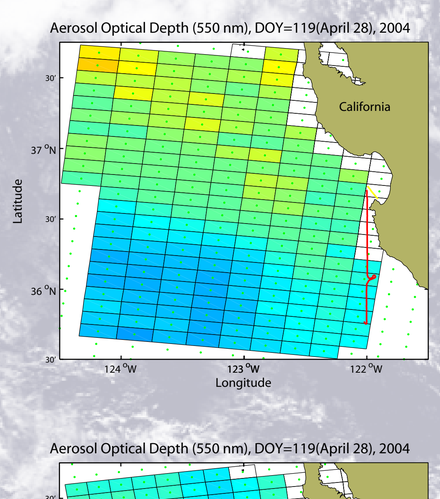
AOD (550 nm)

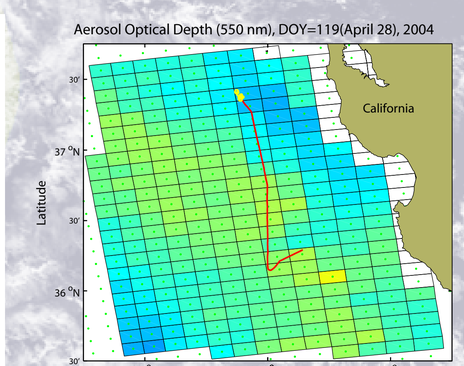


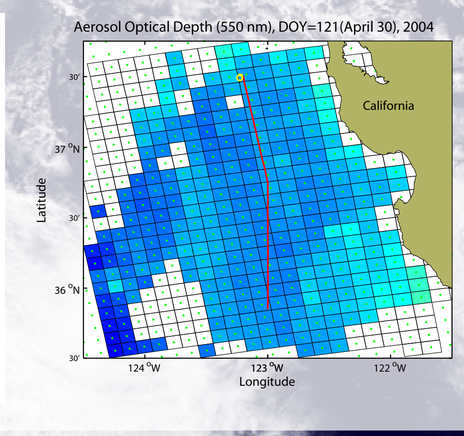


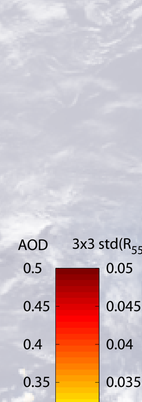




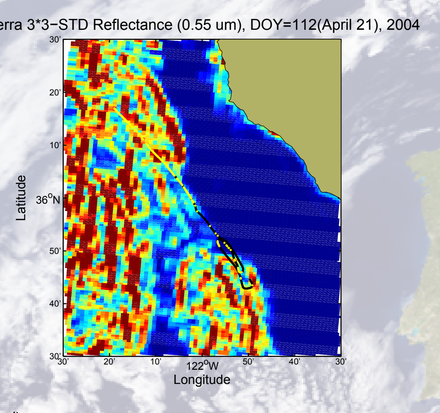


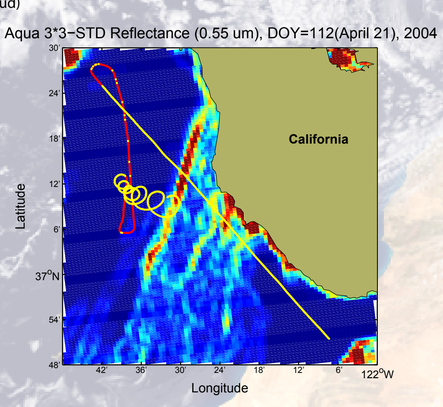


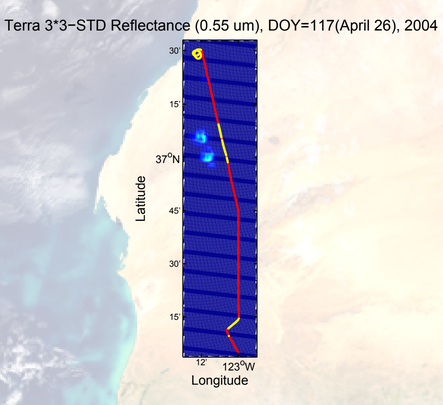


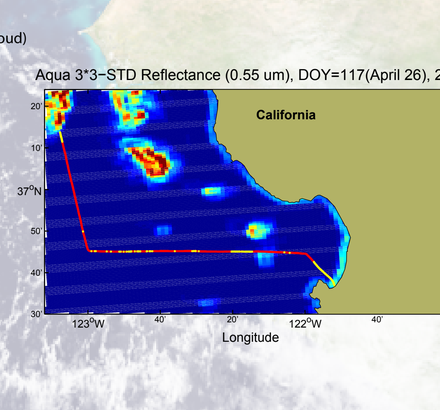


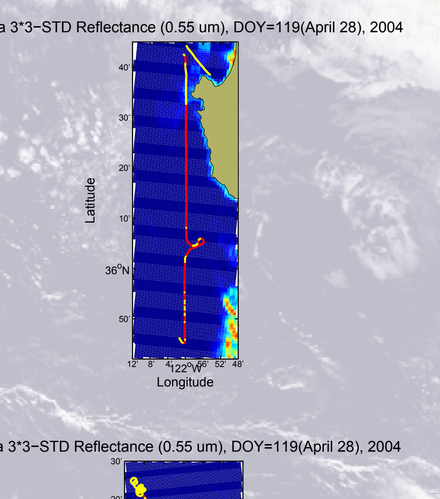
std(3x3 reflectance)

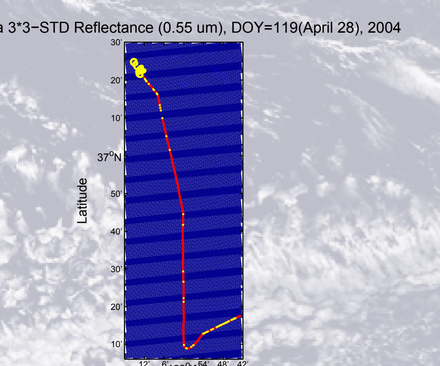


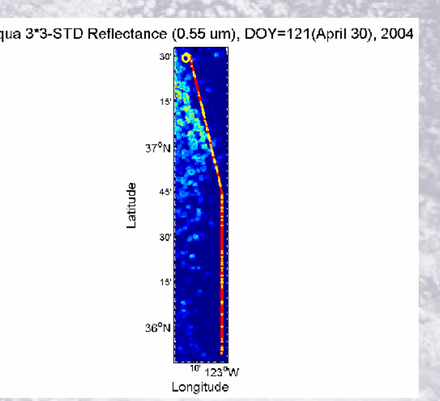




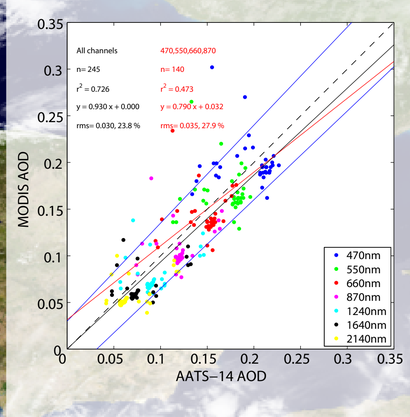


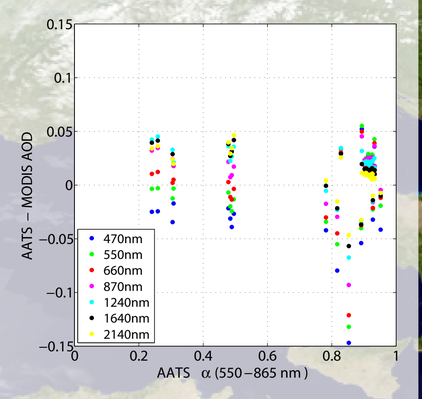


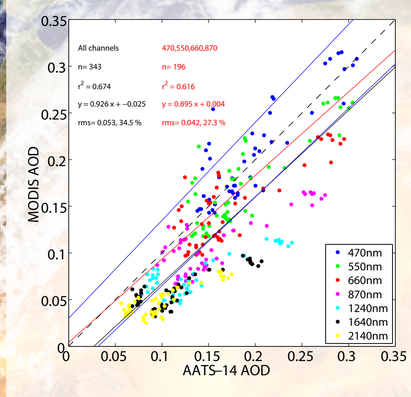


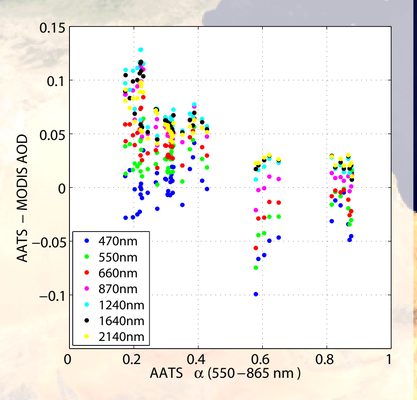


AOD (550 nm) comparisons in EVE



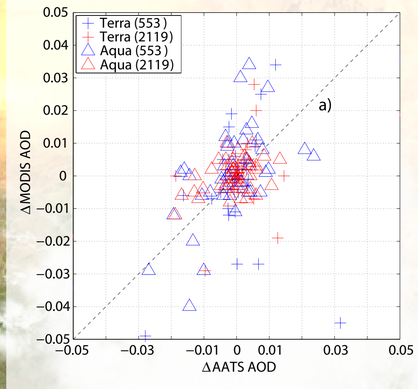




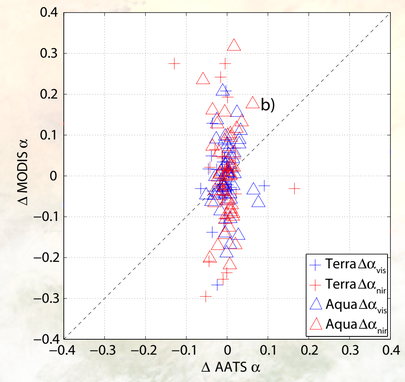


Spatial variability in aerosol properties between adjacent retrieval boxes

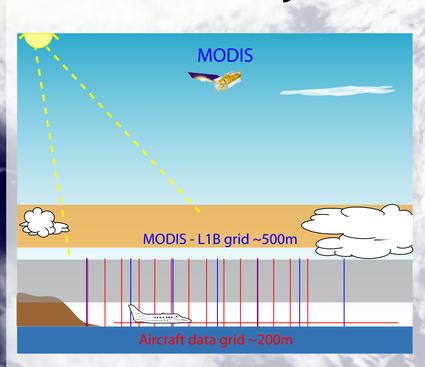
Δ AOD

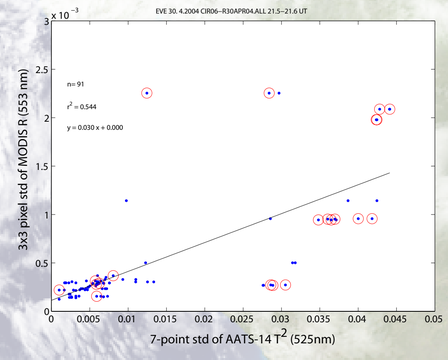


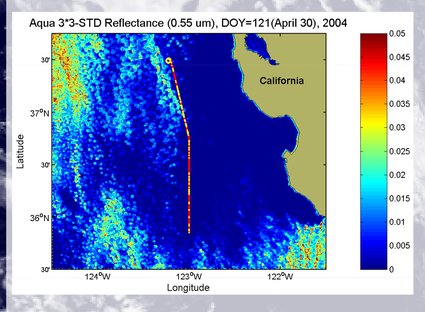
Δα

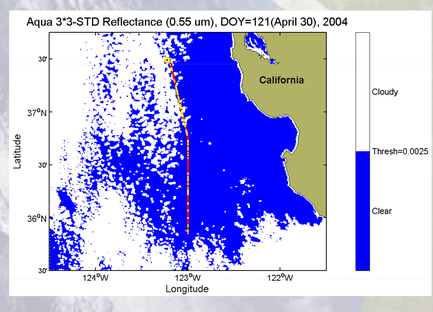


Spatial variability of L1B reflectances between adjacent pixels: Case study









std(3x3 reflectance) -> cloud mask for MOD04_L2

Conclusions

1) In EVE, a total of 36 and 49 coincident AOD validation measurements were collected for Terra and Aqua respectively. These measurements were all taken over dark water, extend to the 1.24, 1.63 and 2.12μm MODIS wavelengths, and are for the smallest regular level 2 AOD retrieval scale of 10km.

2) For MODIS-Terra about 80% of the MODIS AOD retrievals are within the estimated uncertainty of ±0.03±0.05*AOD; this is true for both the visible and near-IR retrievals. For MODIS-Aqua about 45% of the MODIS AOD retrievals are within the estimated uncertainty of ±0.03±0.05*AOD, the fraction of near-IR retrievals that fall within this uncertainty range is about 27%.

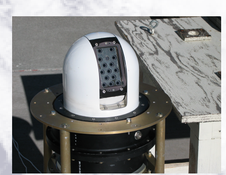
3) The MODIS-Aqua retrievals of the Angstrom exponent (between 550 and 865 nm) show an rms difference of 0.71 to the AATS results, while the MODIS-Terra Angstrom exponents show an rms difference of 0.29 when compared to AATS. The cause of these differences could be instrument calibration and is being explored.

4) The spatial variability of AOD between retrival boxes as derived by MODIS is generally larger than that indicated by the suborbital measurements. Larger-scale gradients (over multiple retrieval grid boxes) in AOD are reproduced well.

5) Spatial variability in MODIS-derived Angstrom exponents between retrieval boxes is considerably larger than that indicated by the suborbital measurements.

6) In our preliminary analysis, we find no clear correspondence between the spatial variability in MODIS L1B reflectances (3x3 500m pixels) and suborbital transmission measurements (7 measurements 200m apart).

Platform: CIRPAS Twin-Otter



EVE - experiment summary

EVE flight calendar

Date	Flight No.	Flight times (UT)	Comments	Terra overpass time(UTC)@Peak		Aqua overpass time(UTC)@Peak	
04/16/04	CIR00	18.9 - 20.9	Test flight, possible comparison with Terra	19:46:07	A, B, C, D, E, F, G	21:22:16	E
04/21/04	CIR01	16.94 - 19.39	possible comparison with Terra	18:26:54	A, B, C, D, E, F, G, H	21:40:38	A, B, C, D, E, F, G, H
04/21/04	CIR02	21.14 - 23.16	possible comparison with Aqua	18:26:54	A, B, C, D, E, F, G, H	21:40:38	A, B, C, D, E, F, G, H
04/26/04	CIR03	17.22 - 20.56	possible comparison with Terra	18:45:20	A, B, C, D, E, F, G, H	21:58:59	A, B, C, D, E, F, G, H
04/26/04	CIR04	21.52 - 24.17	possible comparison with Aqua	18:45:20	A, B, C, D, E, F, G, H	21:58:59	A, B, C, D, E, F, G, H
04/28/04	CIR05	18.19 - 23.10	possible comparison with Terra and Aqua	18:33:01	A, B, C, D, E, F, G, H	21:46:42	A, B, C, D, E, F, G, H
04/30/04	CIR06	17.27 - 23.65	possible comparison with Aqua	18:20:50	E, H	21:34:21	A, B, C, D, E, F, G, H

Blue letters A-H indicate points outside glint, with satellite elevation greater than 40° = good overpass

Red letters A-H indicate points outside glint, with satellite elevation between 30 and 40° = not as good