

Near-IR AOD validation and spatial variability studies in the Extended-MODIS- λ Validation Experiment (EVE)

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Platform – Instruments in EVE



Instruments:

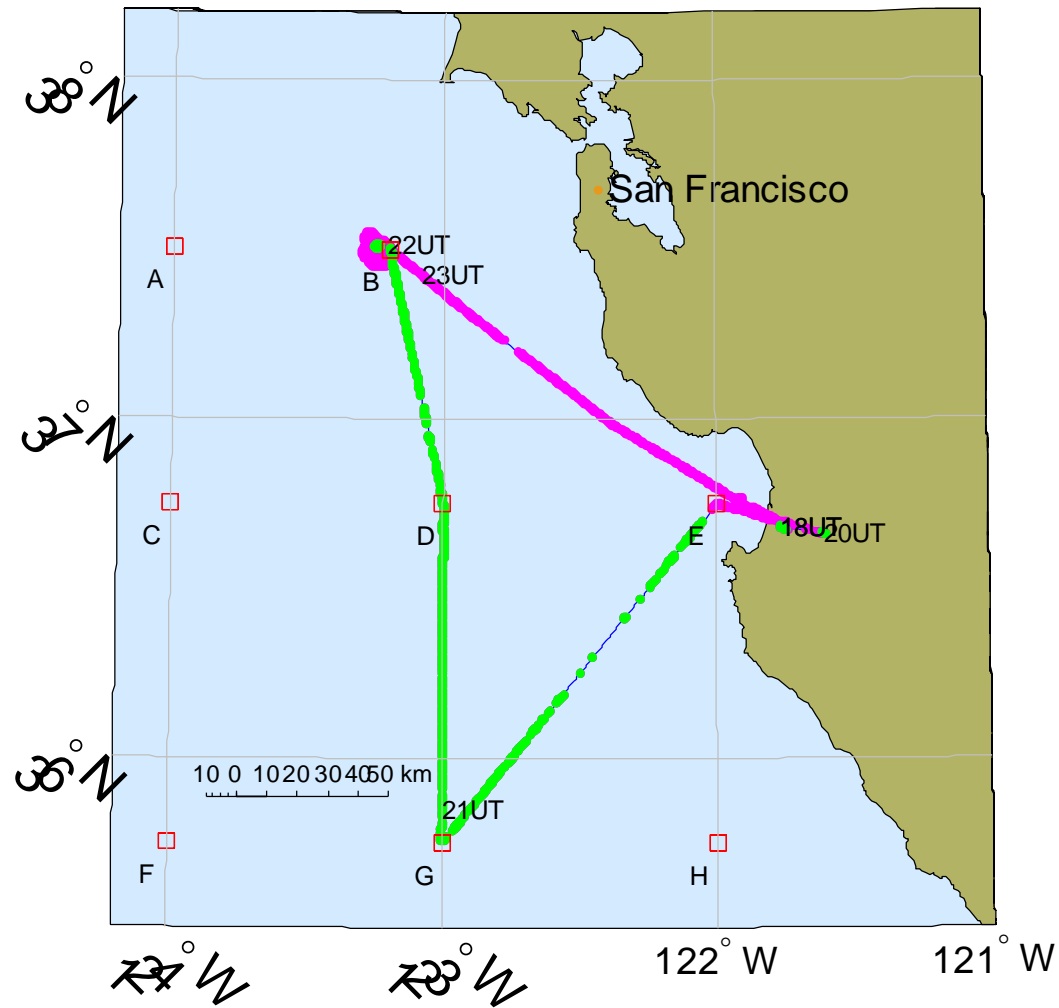
AATS-14, 14-channel airborne sunphotometer, AOD $0.35\text{-}2.14\mu\text{m}$

CADENZA, Cavity-Ringdown, aerosol extinction - 0.675 and $1.55\mu\text{m}$

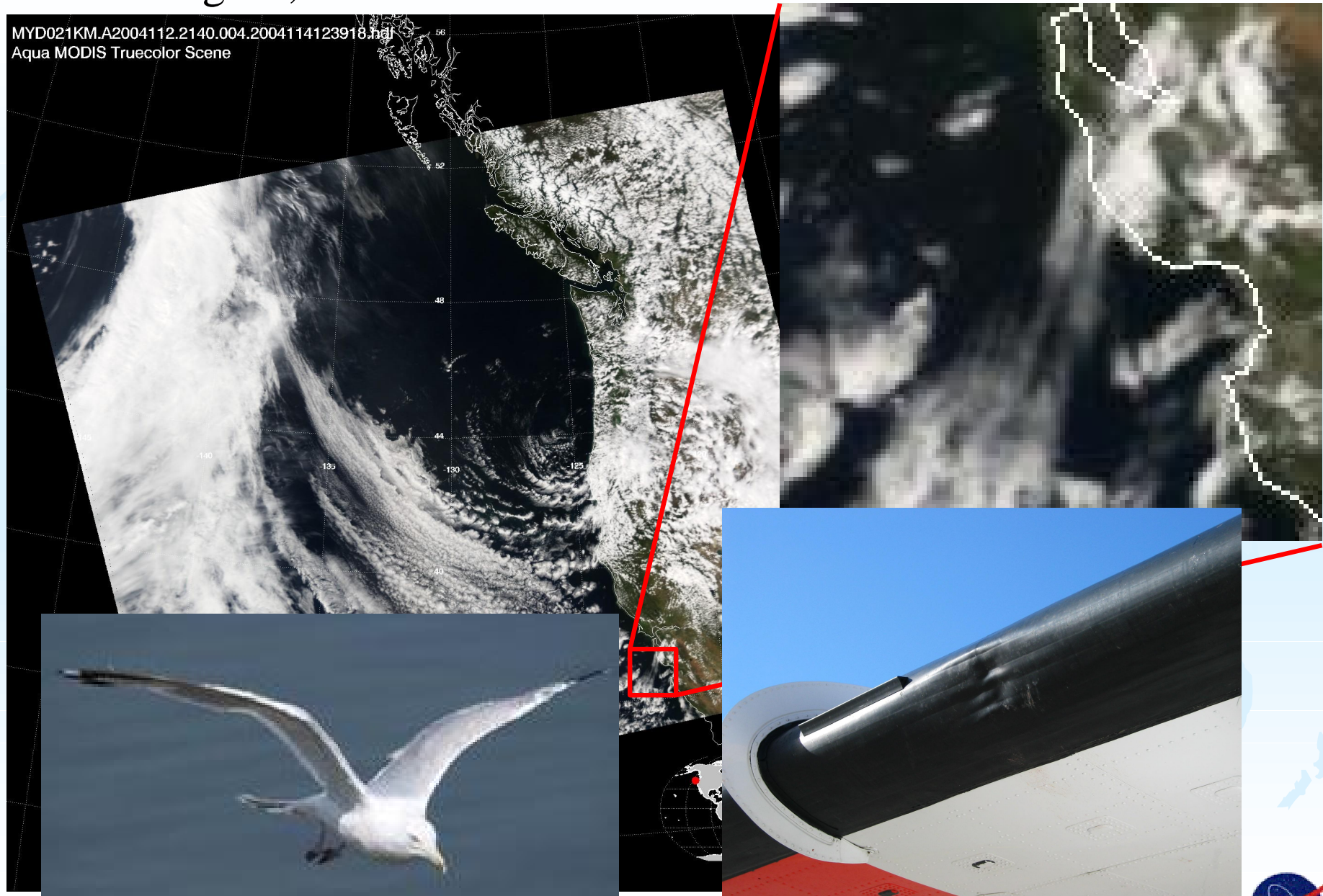
3- λ nephelometer + PSAP, aerosol extinction - 0.453 , 0.519 , $0.675\mu\text{m}$



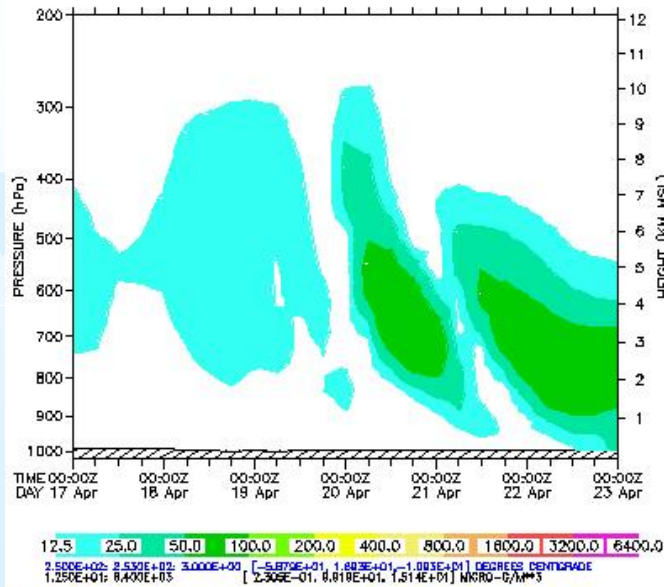
EVE – domain and ideal flight track



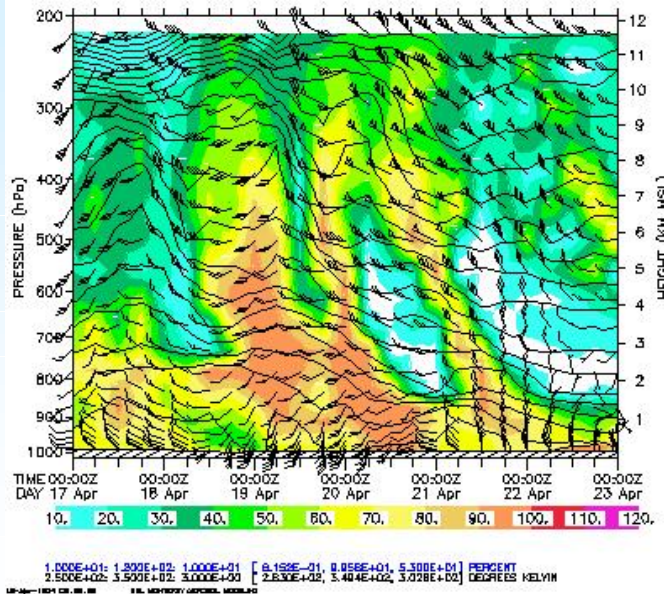
EVE – glint, clouds and B-1-r-d-s



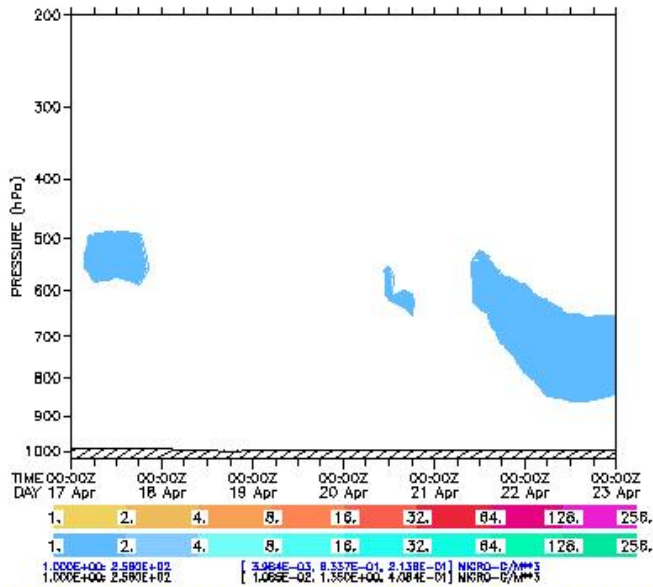
NAAPS Dust (ug-m**3)
at monter (36.60,121.83) for 2004041700_2004042300



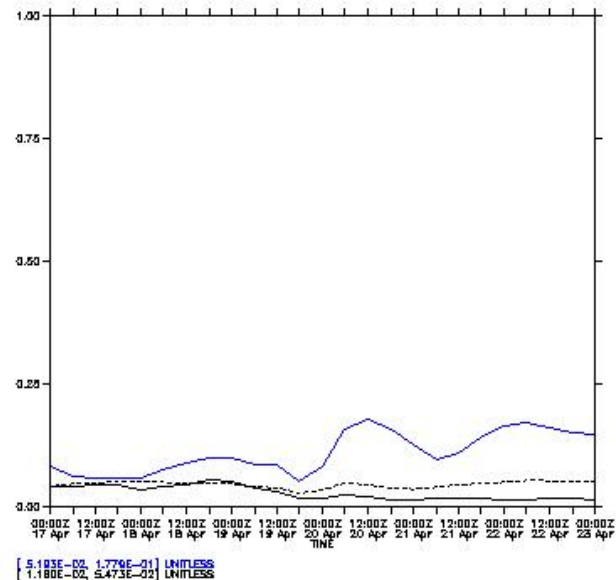
NOGAPS RH (%), Pot. Temp. (K), Winds (full barb = 5m/s)
at monter (36.60,121.83) for 2004041700_2004042300



NAAPS Sulfate (red, ug-m**3), Smoke (blue, ug-m**3)
at monter (36.60,121.83) for 2004041700_2004042300



NAAPS Optical Depth: Dust (blue), Sulfate (black), Smoke (dash)
at monter (36.60,121.83) for 2004041700_2004042300



Flight calendar

Flight No.	Flight times (UT)	Comments	Terra overpass time(UTC)@Peak	Aqua overpass time(UTC)@Peak	Date	
17	18.9 - 20.9	Test flight, possible comparison with Terra	19:46:07	21:22:16	04/16/04	CIR01
16, 94	18.94 - 19.39	with Terra possible comparison	18:26:54	21:40:38	04/21/04	CIR01
14 - 23	18.16	with Aqua possible comparison	18:26:54	21:40:38	04/21/04	CIR02
17, 56	with Terra possible comparison	18:45:20	21:52:59	04/26/04	CIR03	17.22 - 21.17
17	with Aqua possible comparison	18:45:20	21:52:59	04/26/04	CIR04	21.52 - 24.17
18	with Terra and Aqua possible comparison	18:33:01	21:46:42	04/28/04	CIR05	18.19 - 23.10
19	with Aqua possible comparison	18:20:50	21:34:21	04/30/04	CIR06	17.27 - 23.65

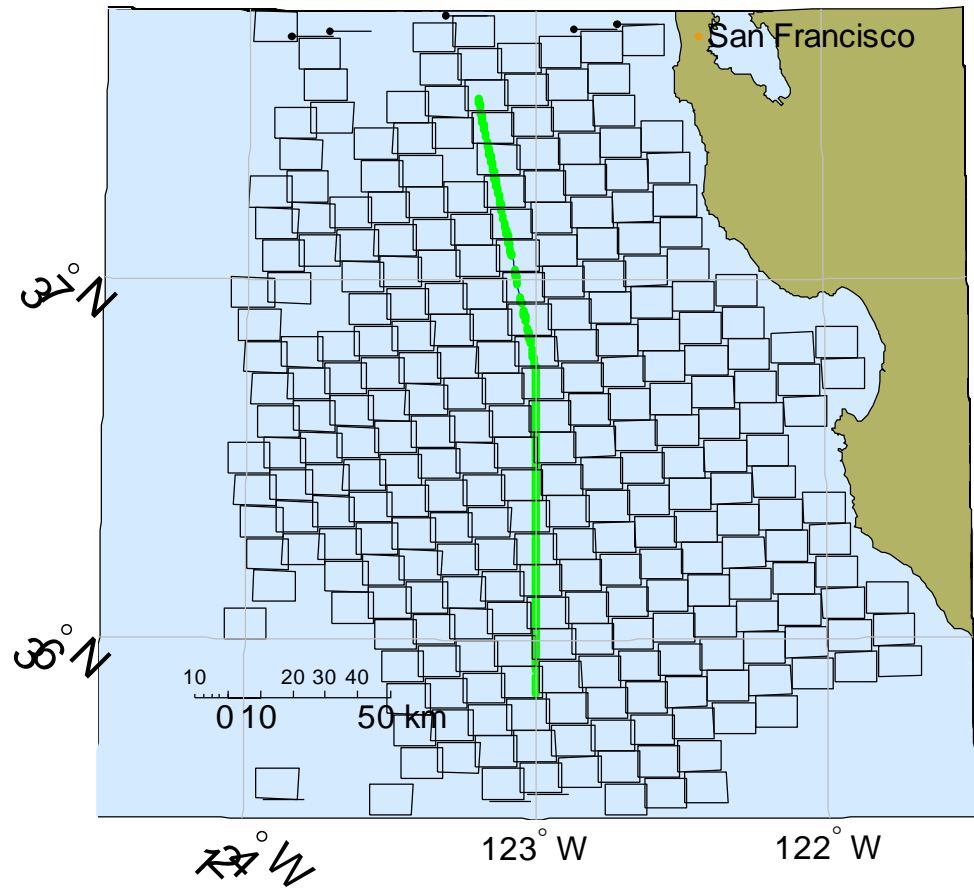
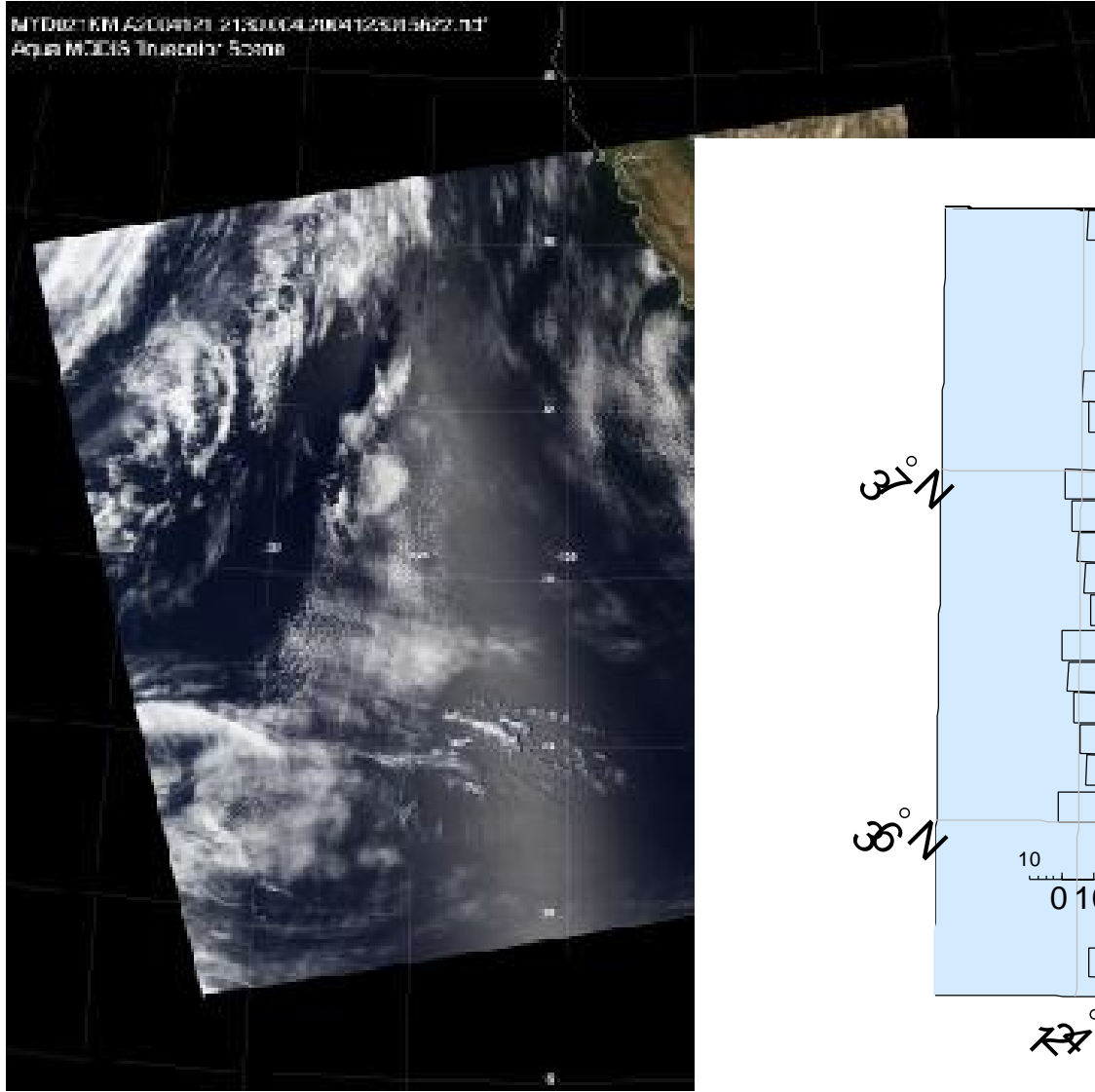
Total: 4 days-36 L2 retrievals 5 days-49 L2 retrievals

satellite elevation greater than 40° = good overpass
 satellite elevation between 30 and 40° = not as good

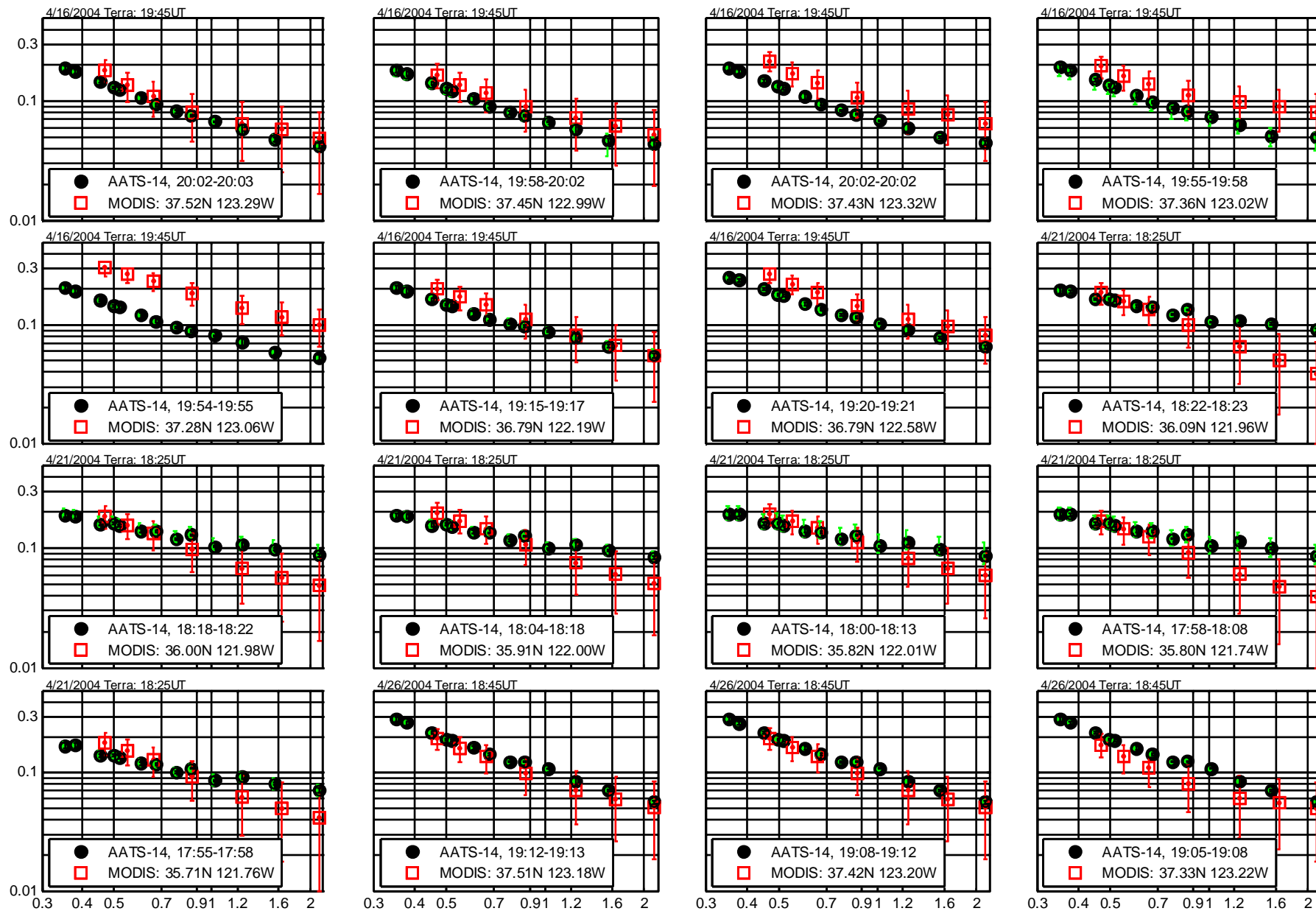
Blue letters: A-H indicate points outside glint, with satellite elevation greater than 40°
 Red letters: A-H indicate points outside glint, with satellite elevation between 30 and 40°



MYD021KM_A20040121_2130_004_210041230015622.tif
Aqua MODIS Truecolor Scene



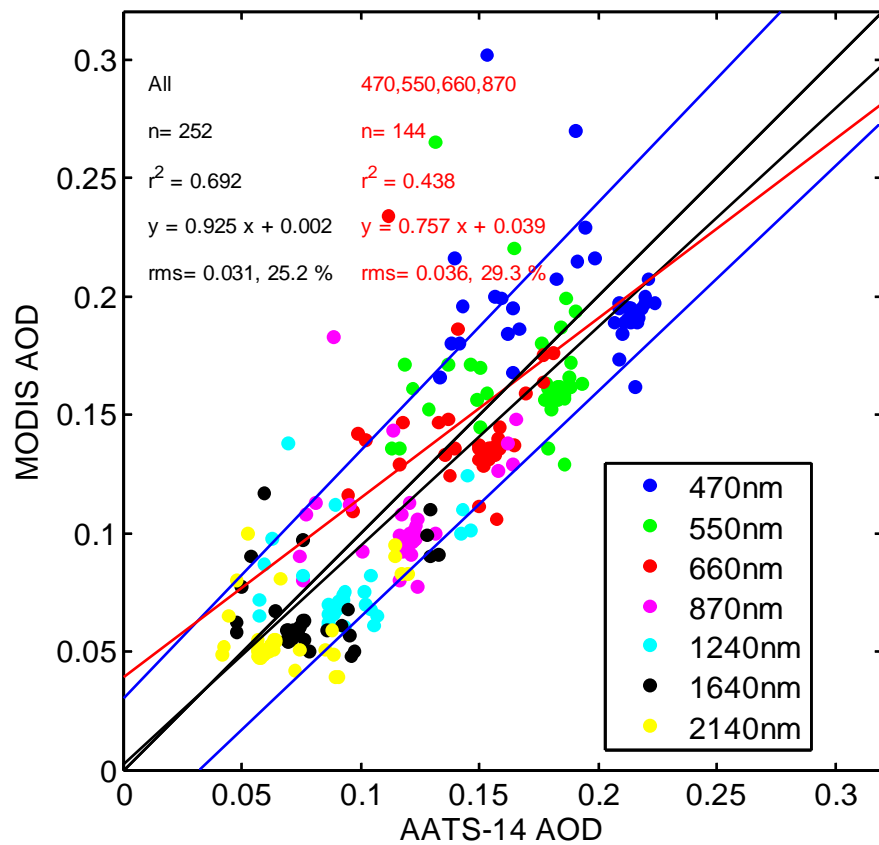
Aerosol Optical Depth



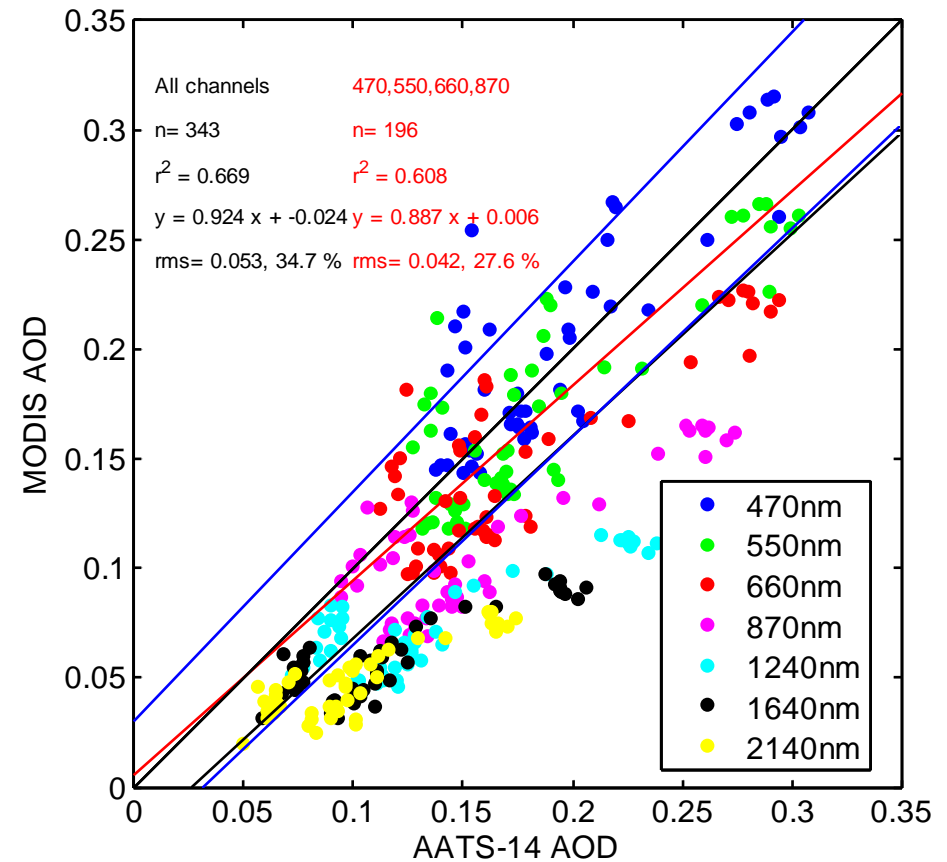
Wavelength [μm]

AOD validation, all wavelengths

MODIS-Terra



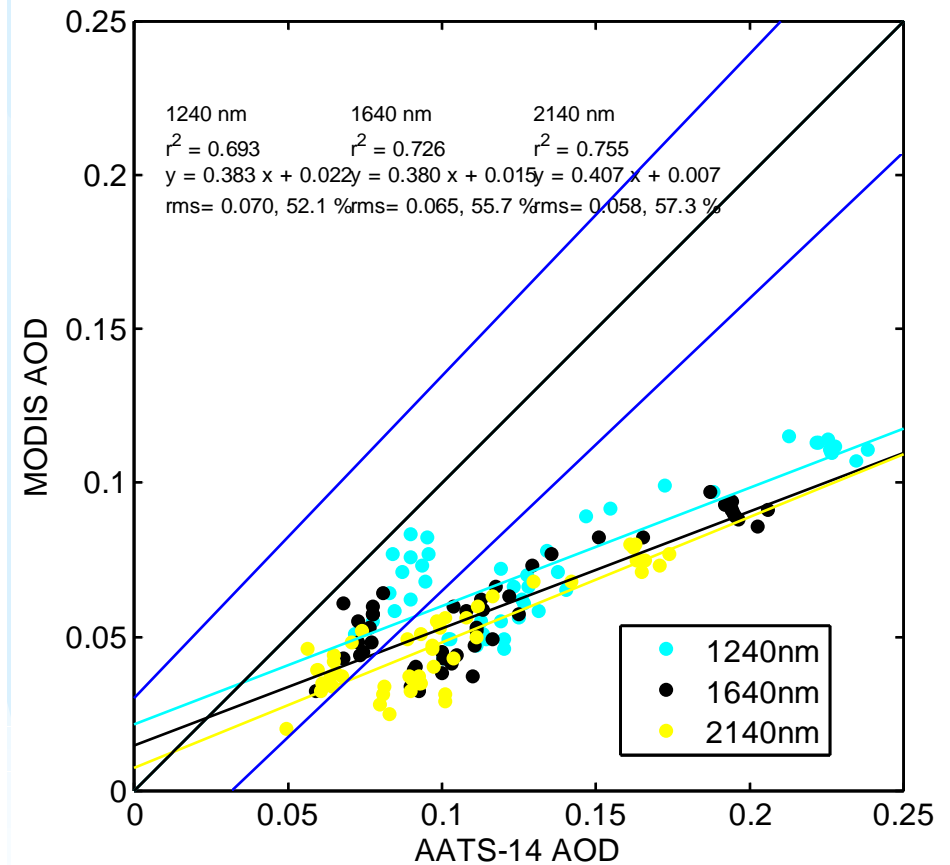
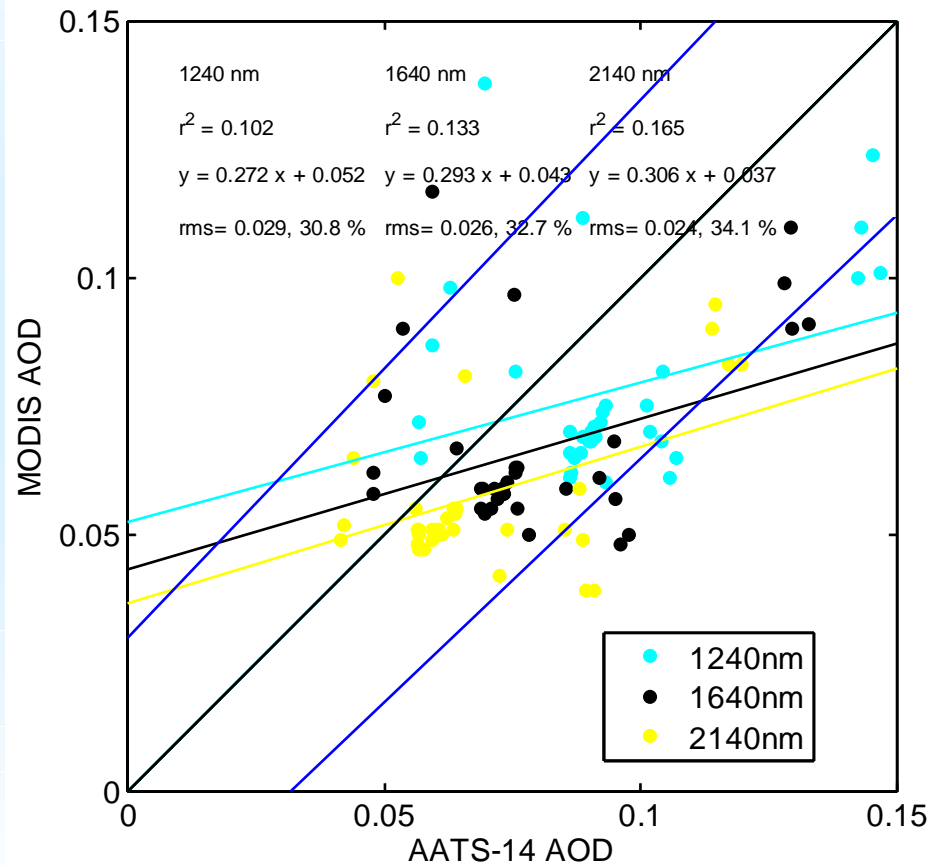
MODIS-Aqua



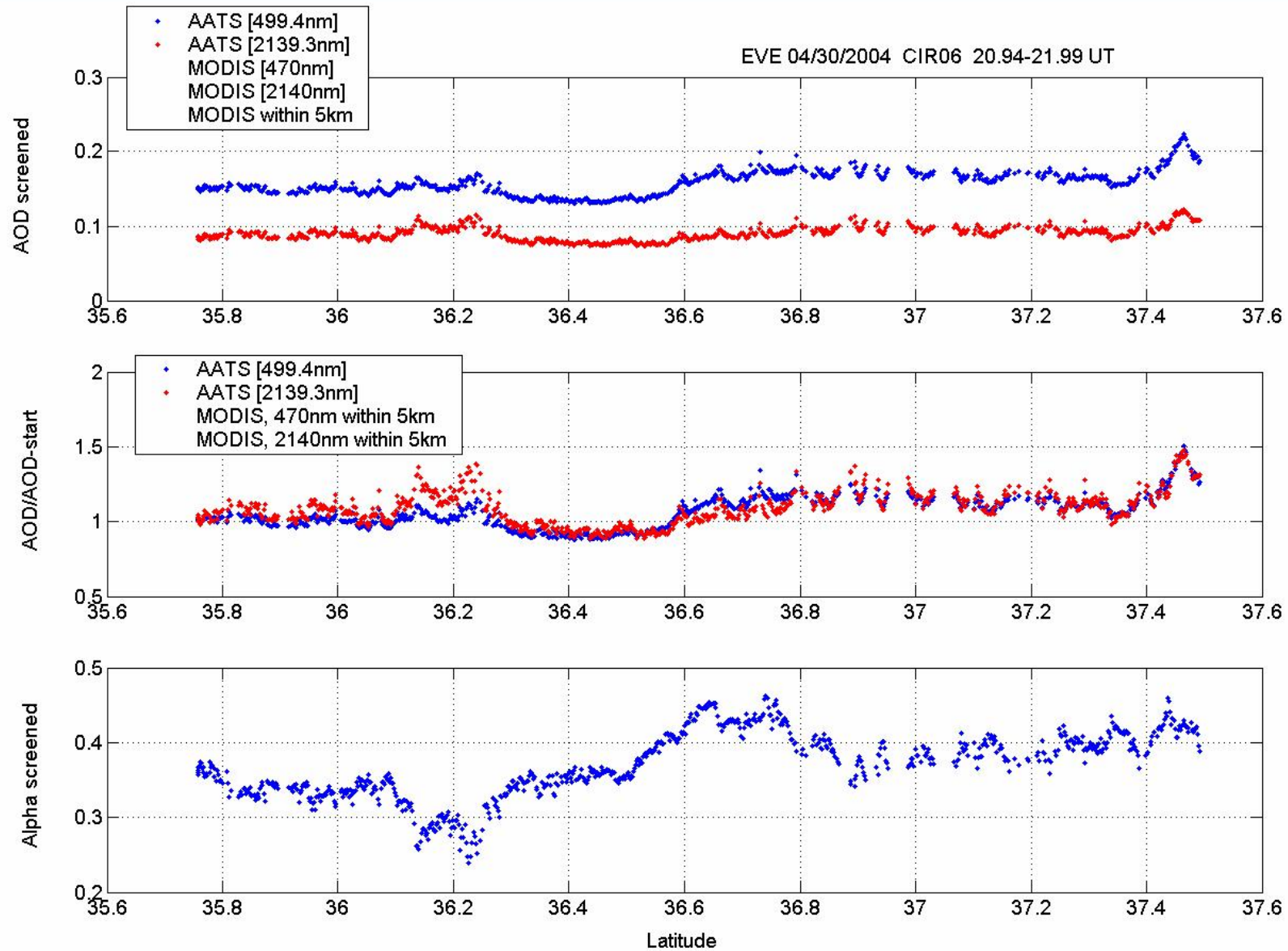
AOD validation, near-IR (1.24, 1.64, 2.14 μm)

MODIS-Terra

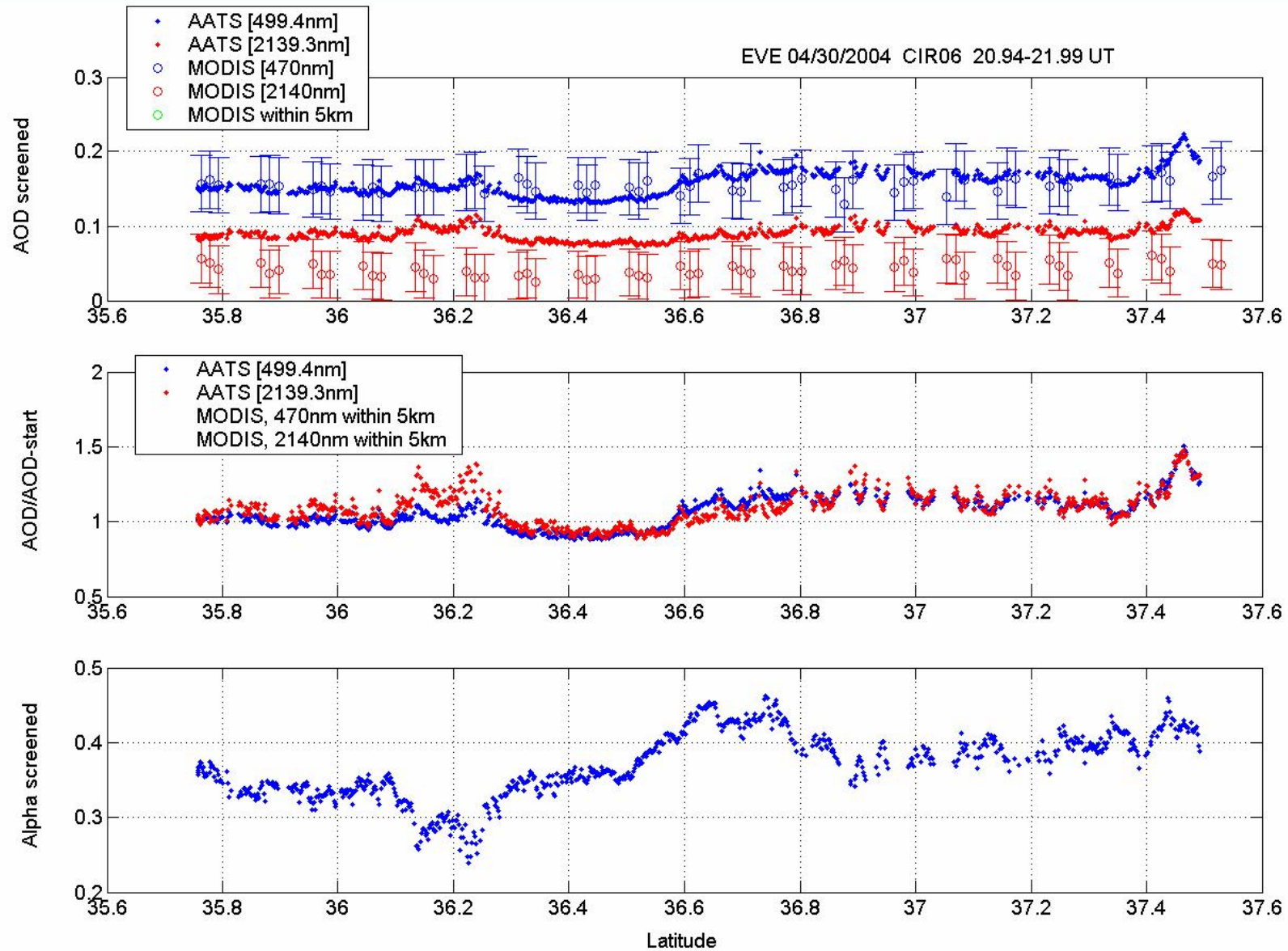
MODIS-Aqua



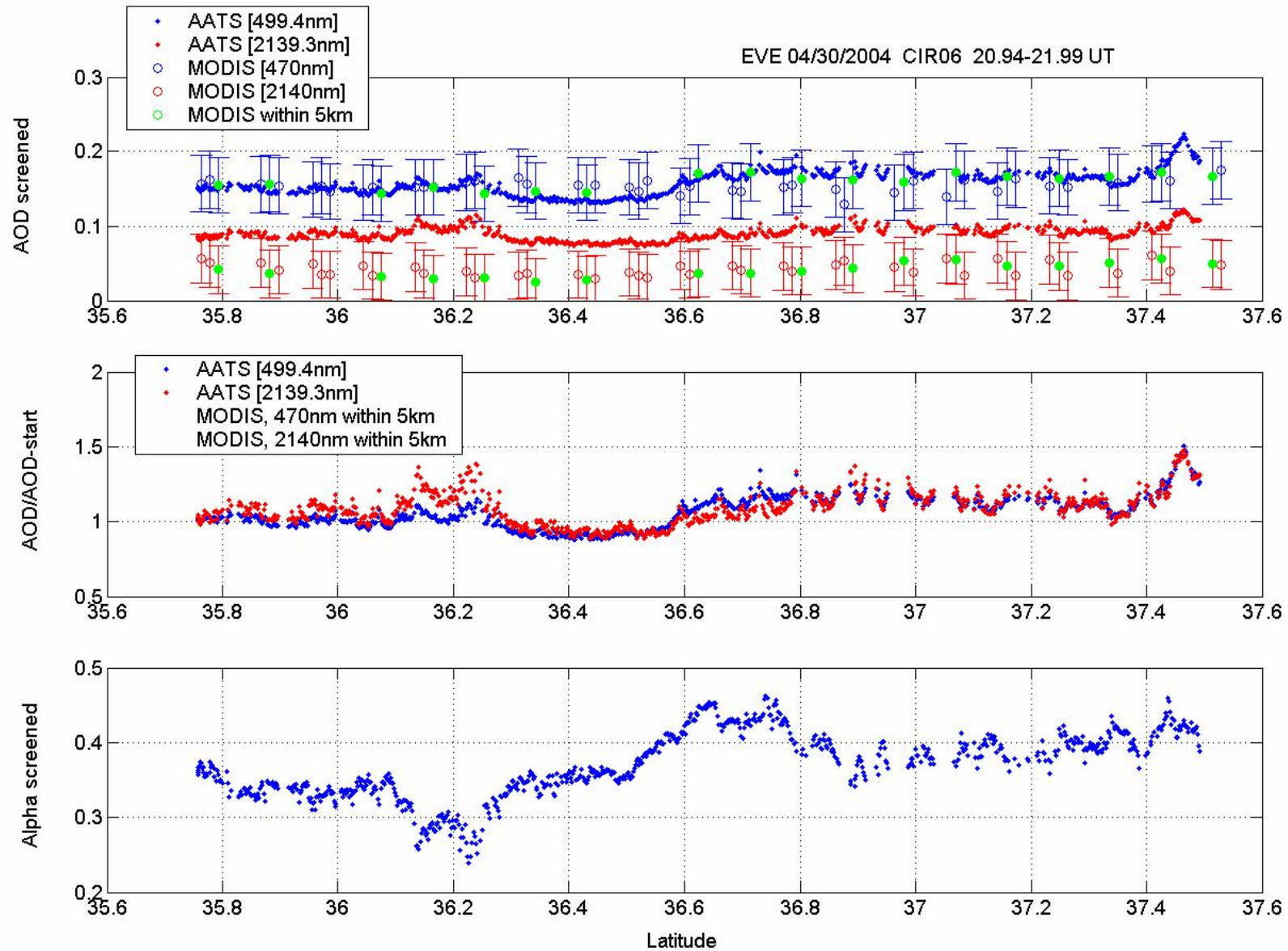
Spatial variability in AOD



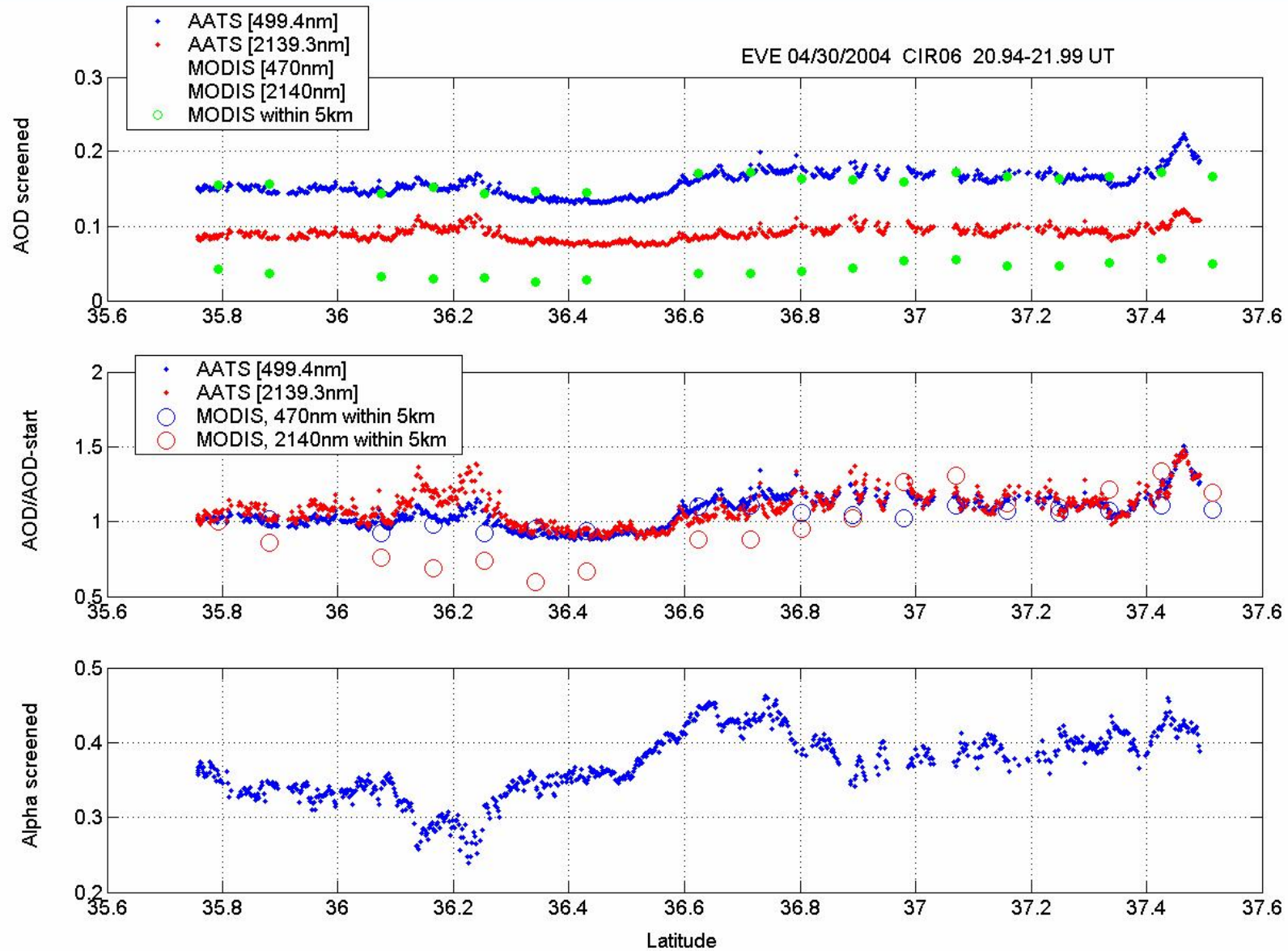
Spatial variability in AOD



Spatial variability in AOD



Spatial variability in AOD



Summary / Progress

- 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, 1.64 and 2.14 μ m MODIS wavelengths, and are for the smallest regular level 2 AOD retrieval scale of 10km.
- 2) A preliminary analysis indicates that for MODIS-Terra about 80% of the MODIS AOD retrievals are within the estimated uncertainty of $\pm 0.03 \pm 0.05 * AOD$, this is true for both the visible and near-IR retrievals.
- 3) A preliminary analysis indicates that for MODIS-Aqua about 50% of the MODIS AOD retrievals are within the estimated uncertainty of $\pm 0.03 \pm 0.05 * AOD$, the fraction of near-IR retrievals that fall within this uncertainty range is about 25%.
- 4) This difference could be due to the fact that there may have been relatively more dust present during the Aqua validation days . Aqua calibration could also be an issue.
- 5) The spatial variability as derived from the suborbital measurements during a few select flight segments is larger than that derived by MODIS, in particular in the near-IR.
- 6) The analysis shows that only measurements within the scale of one retrieval box (~10km) can be used for studies of spatial variability of AOD.

