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

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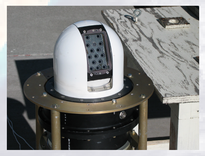
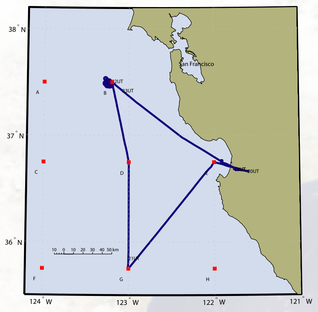
EVE - experiment summary

Platform: CIRPAS Twin-Otter



AATS-14 at Mauna Loa

EVE flight domain and typical flight pattern



EVE flight calendar

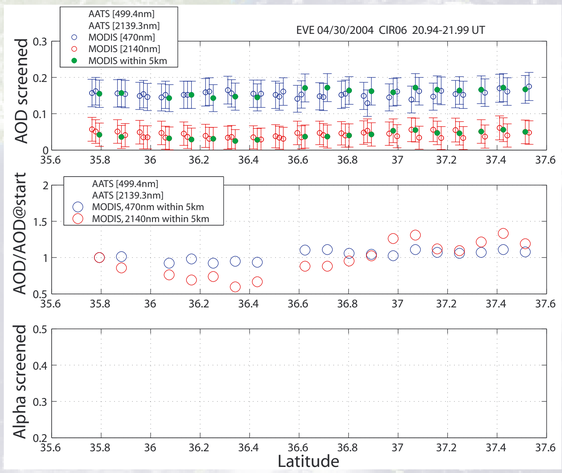
Date	Flight No.	Flight times (UT)	Comments	Terra overpass time(UTC)@Peak		Aqua overpass time(UTC)@Peak	
04/16/04	CIR00	18.9 - 20.9	Test flight, possible comparison with Terra	19:46:07	A, B, C, D, E, F, G	21:22:16	E
04/21/04	CIR01	16.94 - 19.39	possible comparison with Terra	18:26:54	A, B, C, D, E, F, 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

Over-ocean spatial variability of AOD in EVE

Figure: Spatial variability in AOD as derived by AATS-14 and MODIS-Aqua on April 30, 2004. Only the MODIS data closest to the AATS-14 measurement locations (i.e., within 5km) exhibit the same horizontal variability in mid-visible AOD present in the AATS data. In the near IR, the gradient and variability are not apparent in the MODIS data.



Progress + preliminary findings:

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 2.14μm MODIS wavelengths, and are for the smallest regular level 2 AOD retrieval scale of 10km.

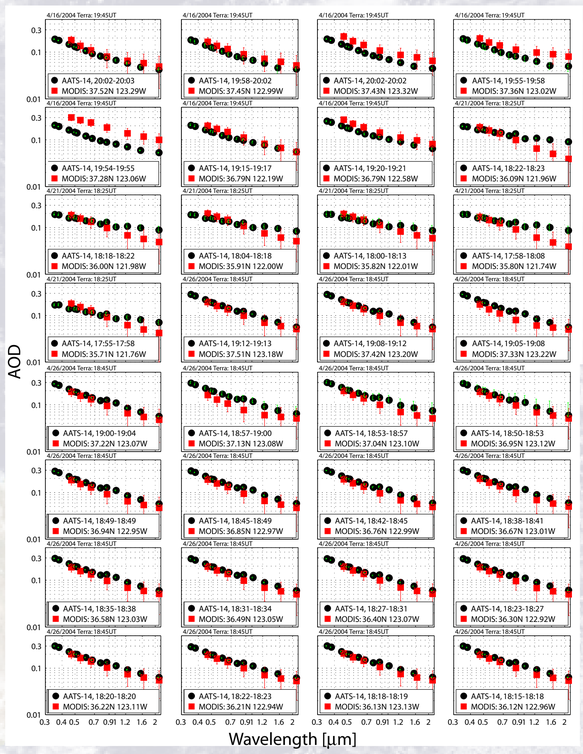
2) A preliminary analysis indicates that for MODIS-Terra about 80% of the MODIS AOD retrievals are within the estimated uncertainty of ±0.03±0.05*AOD, this is true for both the visible and near-IR retrievals.

3) A preliminary analysis indicates that for MODIS-Aqua about 50% of the MODIS AOD retrievals are within the estimated uncertainty of ±0.03±0.05*AOD, the fraction of near-IR retrievals that fall within this uncertainty range is about 25%.

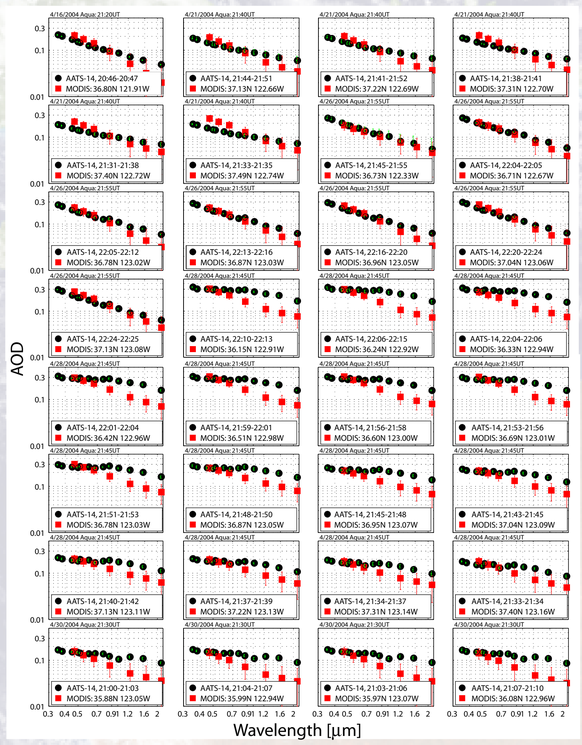
4) This difference is likely due to the fact that there was relatively more dust present during the Aqua validation days as evidenced by the smaller Ångstrom parameters.

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. The analysis shows that only measurements within the scale of one retrieval box (~10km) can be used for such a comparison.

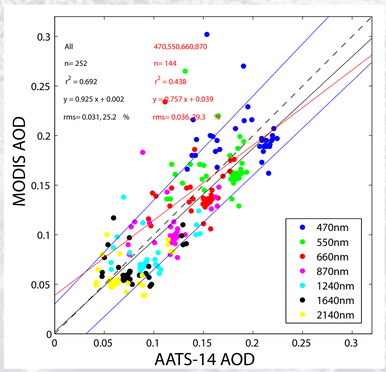
Near-IR AOD validation of MODIS-Terra in EVE



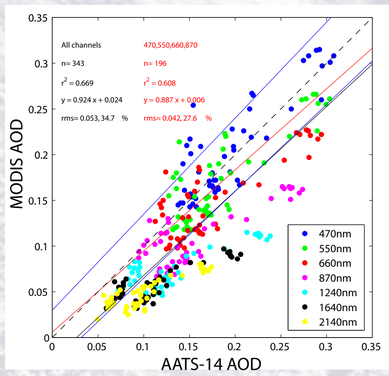
Near-IR AOD validation of MODIS-Aqua in EVE



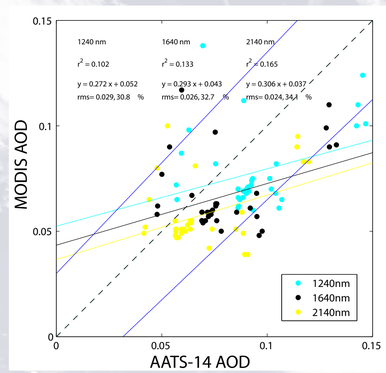
All λ



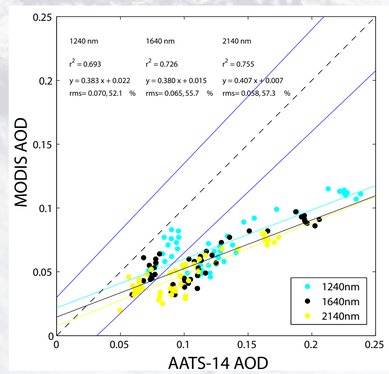
All λ



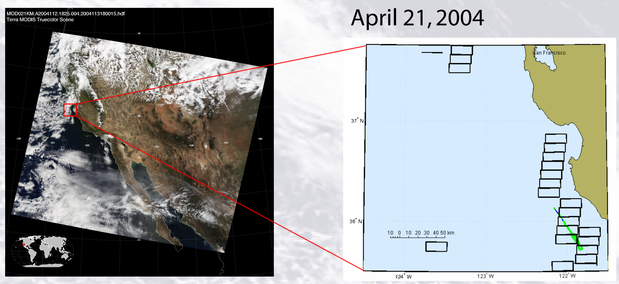
Near-IR λ only

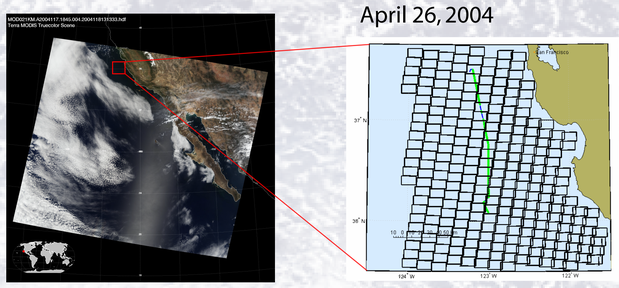
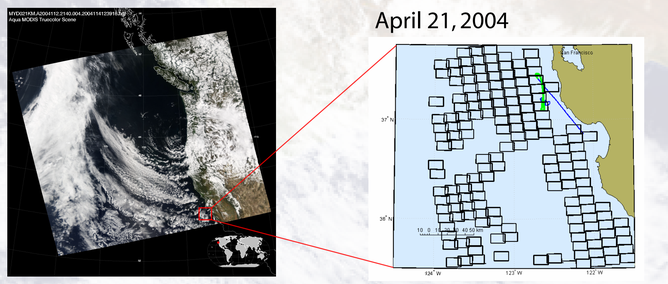
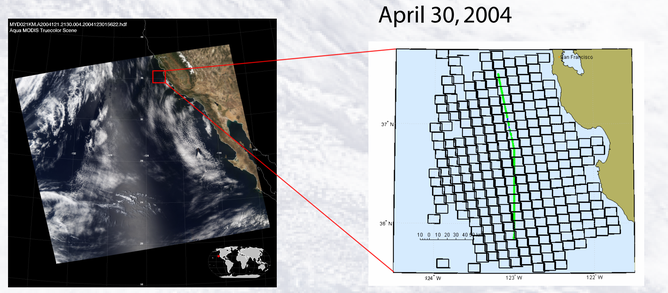


Near-IR λ only



Examples of RGB and successful AOD retrievals

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