

Airborne Sunphotometry of Aerosol Optical Depth and Columnar Water Vapor During ACE-Asia

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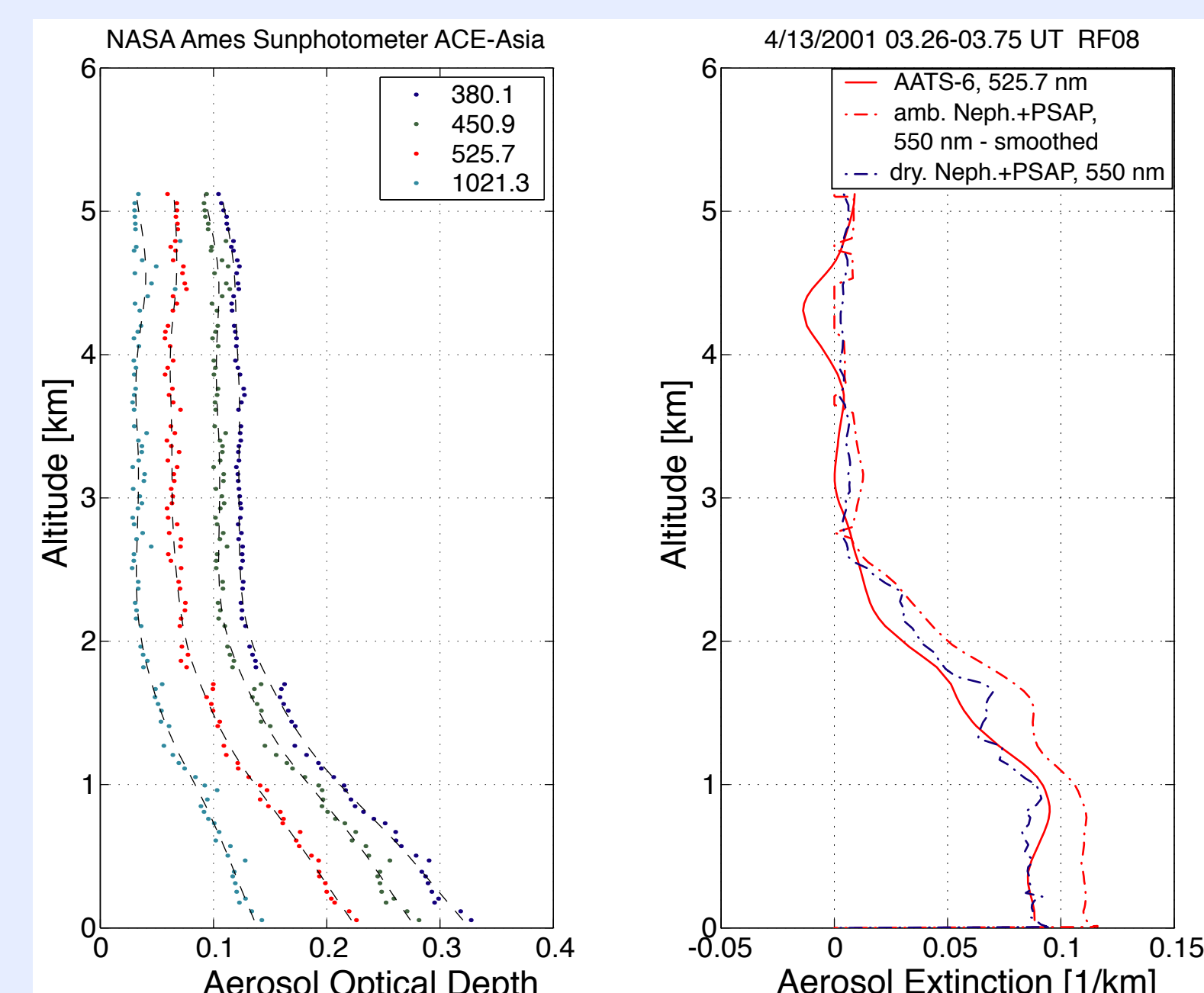
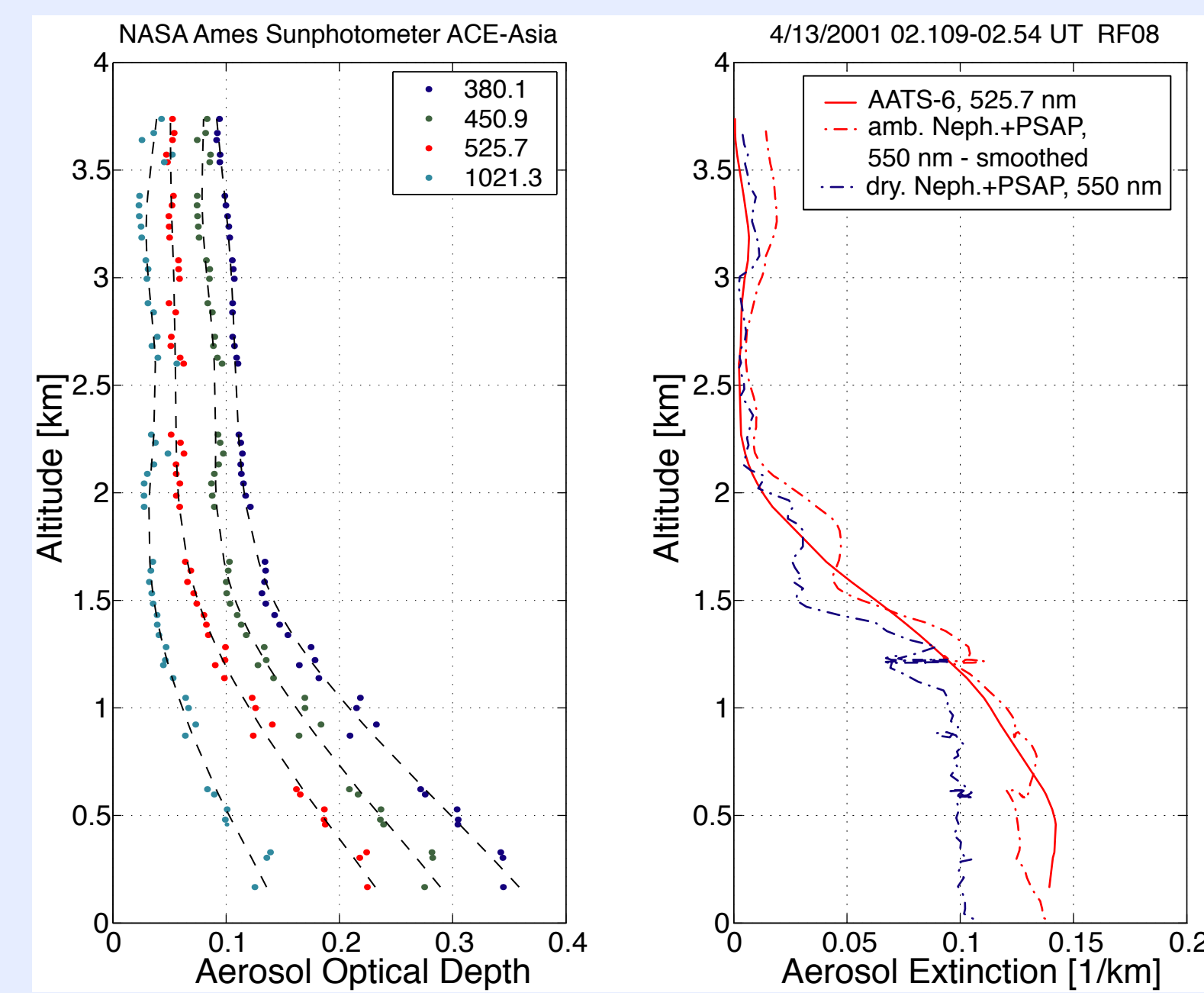
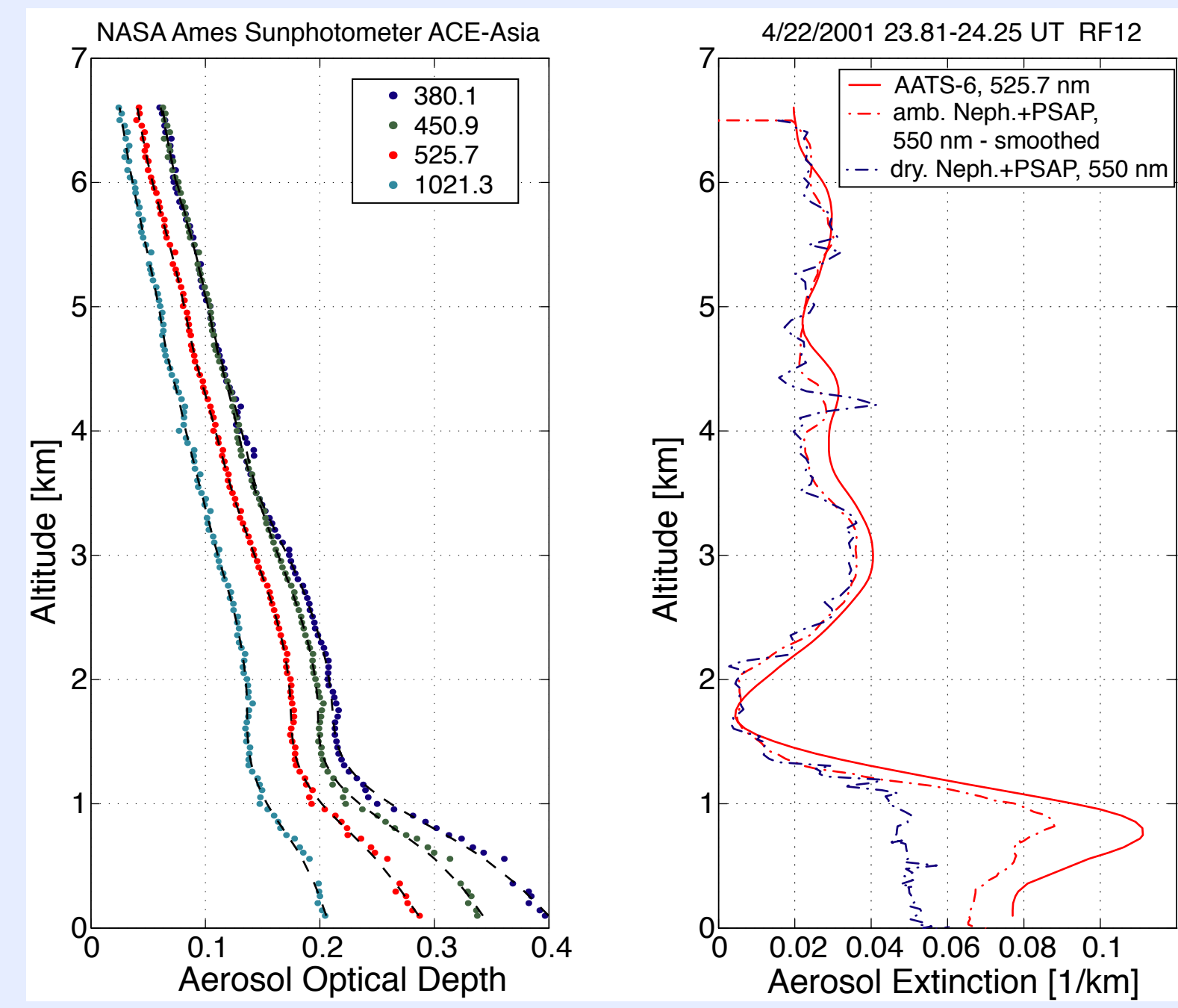
AATS-6 on NCAR C-130



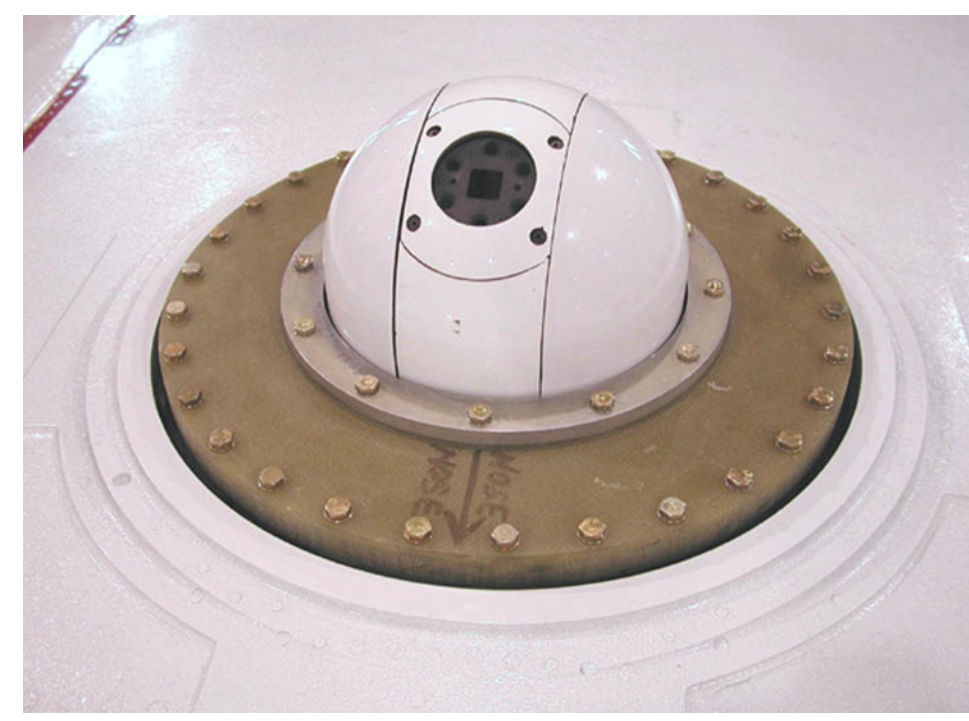
AATS-14 on Cirpas Twin Otter



AATS-6 vs. In Situ, April 13 and 23

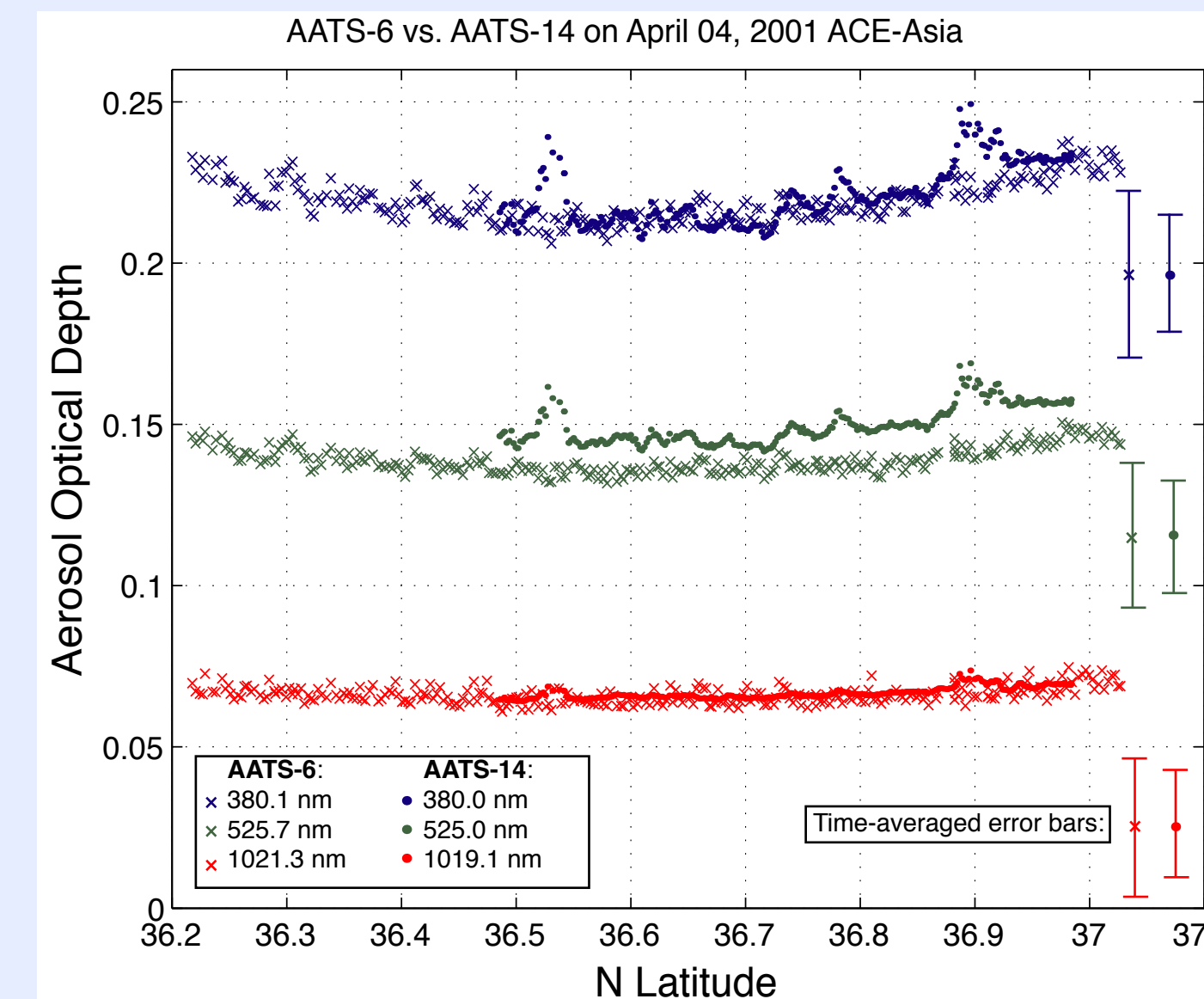


NASA Ames Airborne Tracking Sunphotometer: AATS-6



- Measures direct solar beam transmission @:
380.1 450.9 525.7 864.5 941.9 1021.3 nm
- Yields:
aerosol optical depth + aerosol extinction when A/C flies profiles
columnar water vapor + water vapor concentration when A/C flies profiles
- Size:
Telescope dome 8" OD x Overall telescope height ~15"
Extends ~6" above A/C skin, 9" below
- Weight:
62 lbs. (+39 lbs control system)

AATS-6 vs. AATS-14

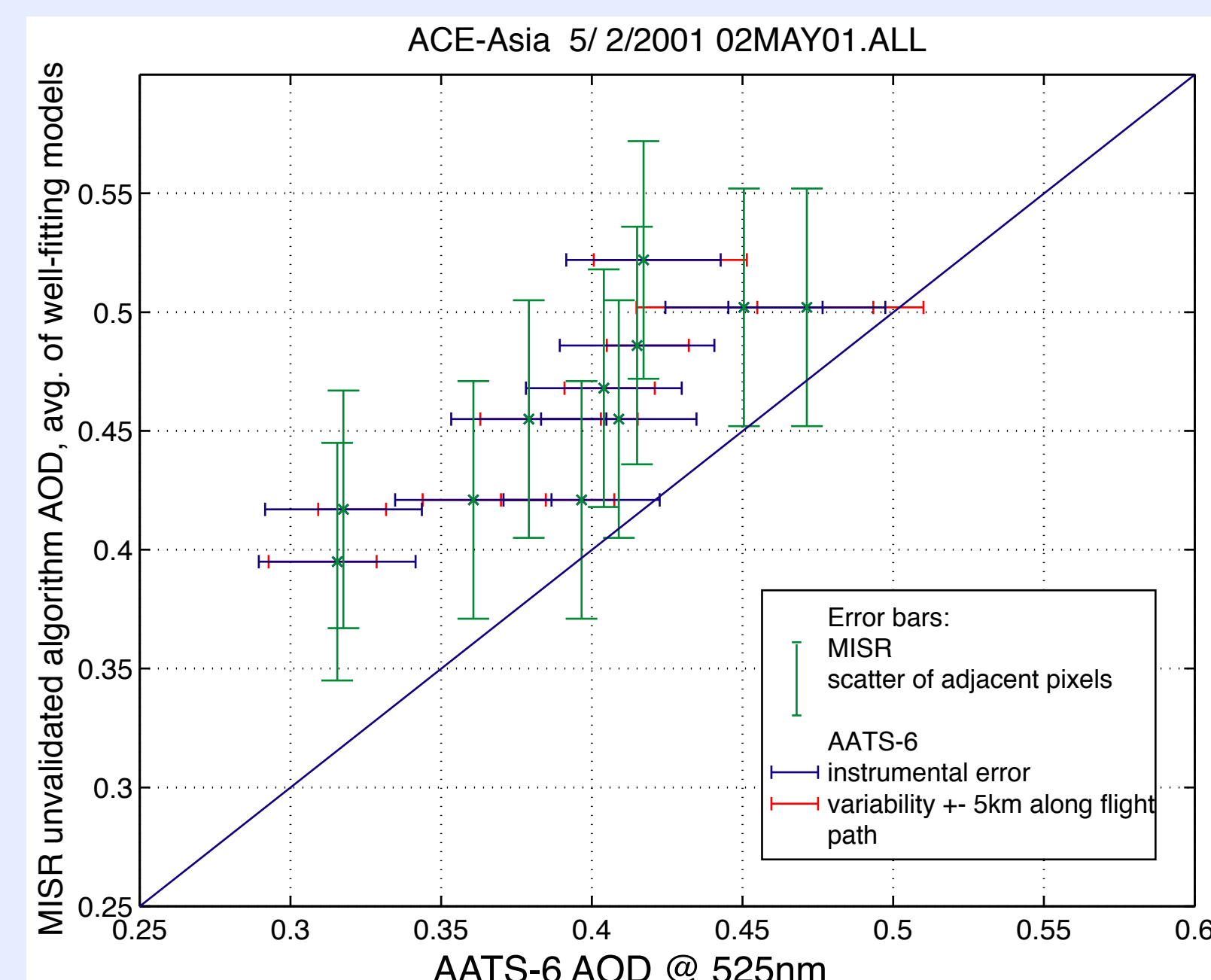
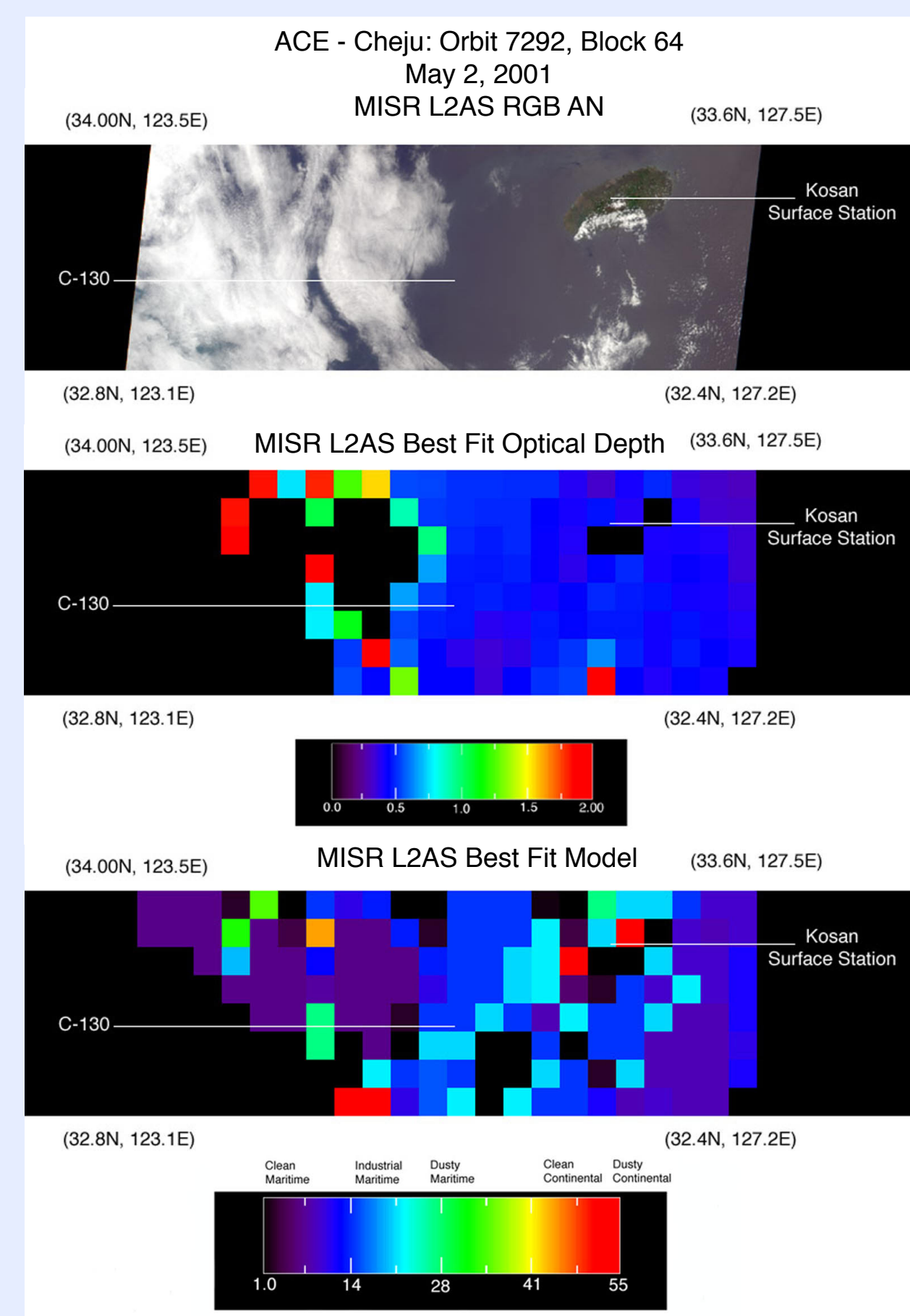


NASA Ames Airborne Tracking Sunphotometer: AATS-14

- Measures direct solar beam transmission @:
353.5 380.0 449.0 499.4 525.0 605.7 675.1 778.4 864.5 939.7 1019.1 1059.4 1241.3 1557.8 nm
- Yields:
aerosol optical depth + aerosol extinction when A/C flies profiles
columnar water vapor (ozone) + water vapor (ozone) concentration when A/C flies profiles
- Size:
Telescope dome 8" OD (hemisphere) atop 5" H pedestal. (Total H: 9" above A/C skin) Inside A/C: 12" D x 18" H cylinder.
- Weight:
131.6 lbs



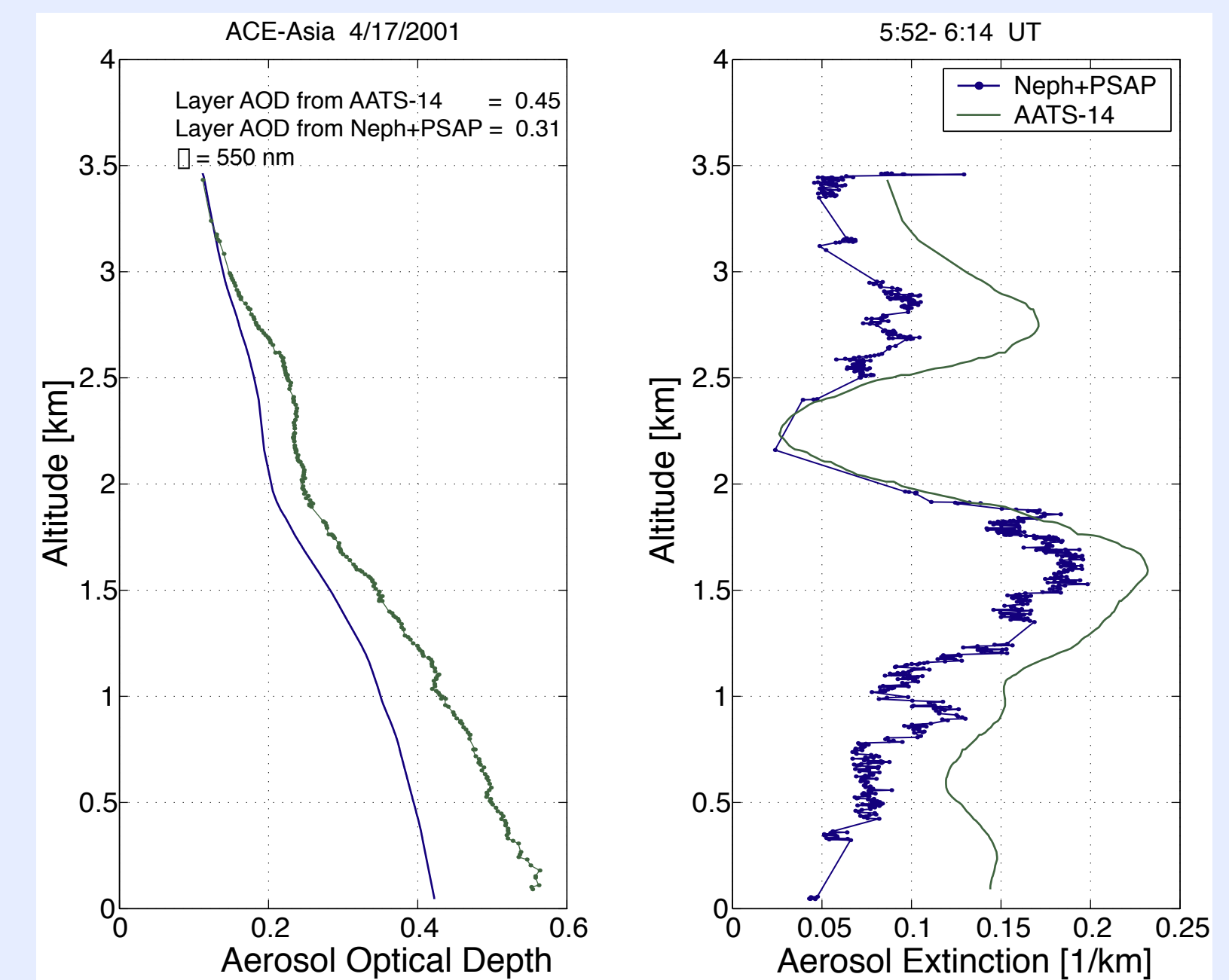
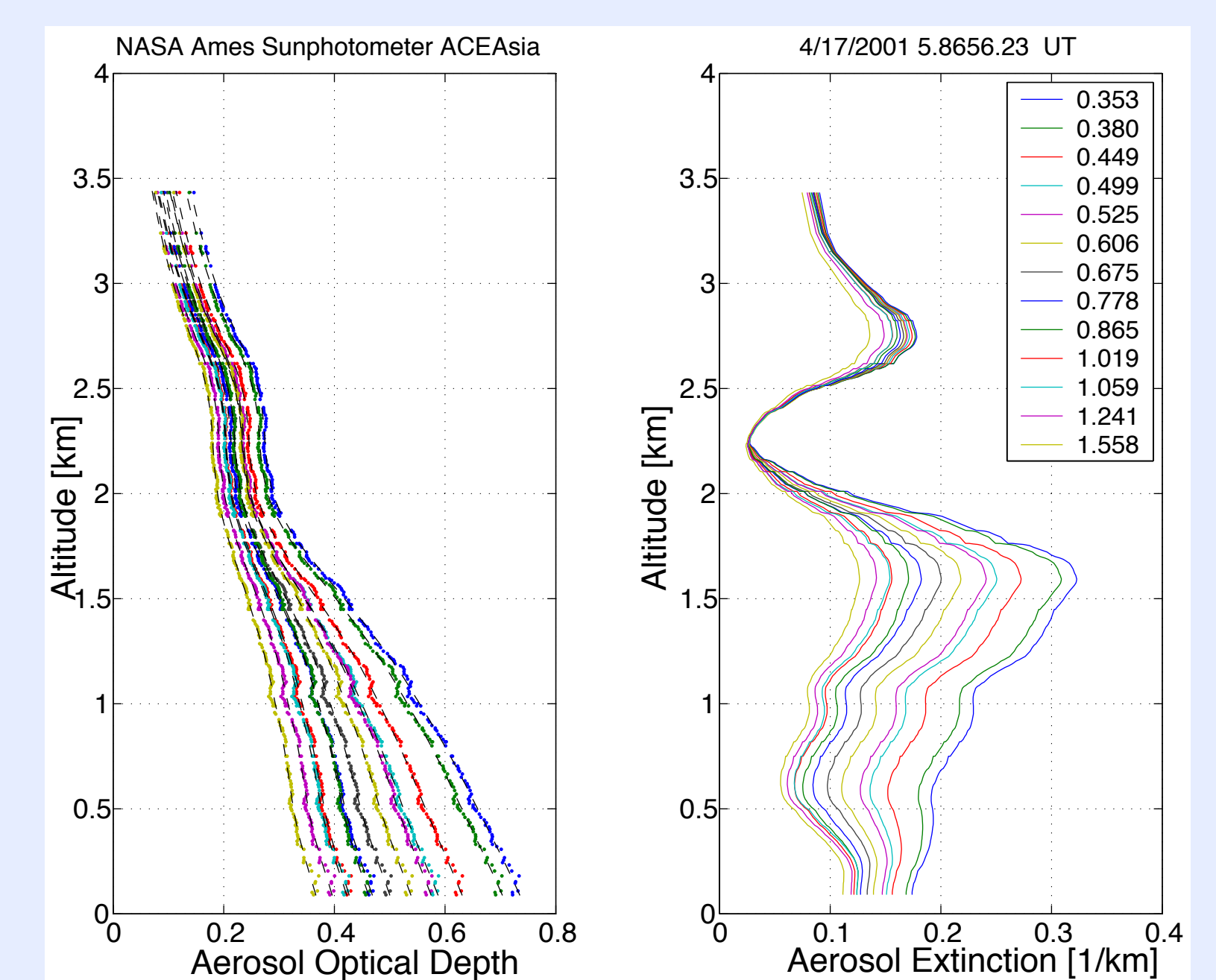
AATS-6 vs. MISR, May 2



Preliminary findings involving the NASA Ames sunphotometers:

- 1) In coordinated flights of the NCAR C-130 and the CIRPAS Twin-Otter on April 4, aerosol optical depths (AOD) measured by the two NASA Ames sunphotometers agreed to well within the instruments' error bars.
- 2) The wavelength dependence of sunphotometer-derived AOD and extinction indicates that supermicron dust was often a major component of the aerosol, frequently extending to high altitudes. In data flights analyzed to date the percentage of full-column AOD (525 nm) that lay above 3 km was typically 34±13%. In contrast, the analogous percentage of CWV was only 10±4%.
- 3) Initial comparisons of mid-visible aerosol extinction derived from in situ measurements (nephelometers + PSAP) and our sunphotometers showed good agreement regarding the vertical distribution of aerosol layers. The agreement in absolute magnitude of aerosol extinction/optical depth varied greatly between the instruments and the various layers sampled.
- 4) First comparisons of sunphotometer-derived AOD to preliminary MISR-derived AOD showed that AODs from the unvalidated MISR algorithm generally exceeded sunphotometer-derived AODs.

AATS-14 vs. In Situ, April 17



AATS-6 and AATS-14 vs. MISR

