ACE 2 Local Closure Studies

Aerosol Property	Methods	Comments	Reference
Mass (Sagres-50 m)	Gravimetric analysis Chemical analysis Number size distribution	Agreement within overall experimental uncertainty of ± 20%	Neususess et al.
Scattering and hemispheric backscattering (Sagres-50 m)	Nephelometer Calculated from number size distribution and assumed chemical composition	Best agreement when aerosol was modeled as an internal mixture of sulfate and nonvolatile C	Philippin et al.

ACE 2 Column Closure Studies

Aerosol Property	Methods	Comments	Reference
Aerosol Optical Depth (Tenerife and aircraft)	MPL Lidar a/c Sunphotometer	Differences of ± 0.01 or less for z = 2500 to 3800 m and δ_a = 0.22 to 0.05	Welton et al. Schmid et al.
Aerosol Optical Depth (Ship, aircraft, and satellite)	ship sunphotometer a/c lidar (ARAT) Meteosat radiances	Differences of ± 0.02 or less for sunphotometer and lidar Differences of 0.01 to 0.08 for satellite and lidar—inappropriate aerosol model in satellite retrieval?	Flamant et al.
Aerosol Optical Depth (Ship)	ship sunphotometer ship *in-situ* size distributions and hygroscopic growth model	Large discrepancies due to sensitivity to hygroscopic growth models (models need validation over required particle size range and chemical composition).	Livingston et al.
Aerosol Optical Depth (Pelican)	a/c sunphotometer a/c *in-situ* σ_{ap}, σ_{sp} and/or number size distribution	AOD from *in-situ* measurements less than sunphotometer (inlet losses)	Schmid et al.

ACE 2 Column Closure Studies

Aerosol Property	Methods	Comments	Reference
Aerosol Optical Depth (satellite, land, ship, aircraft)	-- AVHRR radiance measurements -- sunphotometers	African dust: AVHRR δ_a lower than sunphotometer values by 0.01 to 0.08 (aerosol model used in retrieval does not contain absorbing aerosol; dust aerosol shape effects not in scattering phase function not considered)	Durkee et al.