

CLEAR SKY CLOSURE STUDIES OF LOWER TROPOSPHERIC AEROSOL AND WATER VAPOR  
DURING ACE-2 USING AIRBORNE SUNPHOTOMETER, AIRBORNE IN-SITU, SPACE-BORNE,  
AND GROUND-BASED MEASUREMENTS

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We report on clear-sky column closure experiments (CLEARCOLUMN) performed in the Canary Islands during the second Aerosol Characterization Experiment (ACE-2) in June/July 1997. We present CLEARCOLUMN results obtained by combining airborne sunphotometer and in-situ (optical particle counter, nephelometer, and absorption photometer) measurements taken aboard the Pelican aircraft, space-borne NOAA/AVHRR data and ground-based lidar and sunphotometer measurements. During both days discussed here, vertical profiles flown in cloud free air masses revealed three distinctly different layers: a marine boundary layer (MBL) with varying pollution levels, an elevated dust layer, and a very clean layer between the MBL and the dust layer. Agreement between water vapor derived from sunphotometer and in-situ measurements was achieved on both days. Aerosol extinction closure could be reached in the dust layer but not in the MBL. Aerosol size-distribution closure was not achieved in either layer. The presence of the elevated dust layer removes the good agreement between satellite and sunphotometer aerosol optical depth (AOD) usually found in the absence of the dust layer. Excellent agreement was achieved when the airborne sunphotometer AOD was compared to ground-based lidar and sunphotometer measurements.

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