

"OVERVIEW OF MEASUREMENTS
OBTAINED ABOARD THE UNIVERSITY
OF WASHINGTON'S CONVAIR-580
RESEARCH AIRCRAFT IN SAFARI-2000
AND SOME RESULTS"

by

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BROAD GOALS OF CONVAIR-580 TEAM IN SAFARI-2000

- Provide in situ measurements of physical and chemical properties of aerosols (and gases and clouds) beneath ER-2 and Terra overpasses and above SAFARI-2000 ground sites.
- Document the physical and chemical properties of aerosols (and gases) in various locations in Southern Africa during the dry season.
- Measure emission factors and the nature of emissions from various types of biomass fires (and other sources) in Southern Africa.
- Obtain measurements of spectral albedo and BRDF of various surfaces and clouds.

MEASUREMENTS OBTAINED ABOARD THE UNIVERSITY OF WASHINGTON'S CONVAIR-580 AIRCRAFT

a) University of Washington

- *State Parameters*
- *Radiation*
 - Broadband visible-near-IR (300-3000 nm, up and down)
 - Surface radiative temperature
- *Aerosol Physics*
 - CN concentrations
 - Size distributions (0.01-47 μm)
 - Light scattering (450, 550, 700 nm)
 - Light absorption (550 nm)
 - Light extinction (in plumes)
 - Humidification factor
 - Total aerosol mass
 - Ionic (some organic) species
 - Aerosol shape
- *Gases*
 - CO
 - CO₂
 - SO₂
 - NO, NO_x
 - O₃
 - Hydrocarbons (with D. Blake)

b) Guest Investigators

- 1) NASA Goddard (King, Gatebe, Platnick, etc.):
Absorption and scattering of solar radiation by aerosols and clouds, and BRDF of surfaces and clouds, using 13- λ (470-2300 nm) scanning radiometer (CAR).
- 2) NASA Ames (Russell, Schmid, Redemann, etc.):
Aerosol OD, water vapor and ozone using 14- λ (350-1558 nm) sun-tracking photometer.
- 3) NASA Ames (Pilewskie, etc.): Solar spectral irradiance and radiance, and spectral transmission and reflectance using spectral flux radiometer (300-2500 nm).
- 4) University of Montana (Yokelson): Gaseous combustion emissions using FTIR.
- 5) Lawrence Berkeley National Lab (Novakov, Kirchstetter): Carbonaceous particles (black and organic) via quartz filters and thermal evolution analysis.
- 6) Brigham Young University (Eatough): Carbonaceous particles, PM(2.5), SO_4^- , NO_3^- , NH_4^+ , pH using PC-BOSS.
- 7) Arizona State University (Buseck): Particle size, shape, elemental composition, etc. down to a few nm using grids and various electron beam techniques.
- 8) NCAR (Bruitjes): CCN measurements (in Namibia only).

STATUS OF DATA QUALITY ASSESSMENT (QA) AND ARCHIVING OF DATA COLLECTED ABOARD THE CONVAIR-580 IN SAFARI-2000

a) University of Washington

Done:

- Aircraft position plots
- State parameters
- Gases
- Aerosol anion analysis
- Aerosol humidification factors
- Cloud microphysical measurements
- Typed transcripts of verbal summaries for all flights

To do:

- Aerosol size distributions, light scattering and absorption
- Aerosol cation and organic analysis
- Broad-band radiation

Continued

(b) Guest Investigators

Largely done:

- Measurements of trace gases with FTIR (Bob Yokelson)
- Black and inorganic carbon (Tom Krichstetter and Tica Novakov)

Do not have much information on:

- Aerosol measurements (Delbert Eatough)
- Aerosol measurements (Peter Buseck)

See following talks for information:

- CAR measurements (Charles Gatebe et al.)
- Ames sunphotometer measurements (Beat Schmidt et al.)
- SSFR Radiation measurements (Peter Pilewskie)
- CCN measurements in Namibia (Roelof Bruintjes)

INTERACTIONS NEEDED FOR CONTINUING ANALYSIS OF CONVAIR-580 MEASUREMENTS

Over next 6-12 months:

- Between those who obtained measurements on Convair-580.
- Between those who obtained measurements on Convair-580 relevant to SAFARI planned biomass fires and those investigators involved in ground-based management and measurements of those fires and those interested in remote sensing measurements on those fires.

These interactions should lead to a series of publications.

Over next 1-3 years:

- Continuing interactions among Convair-580 scientists.
- Interactions between Convair-580 scientists and those interested in validation of remote sensing measurements of aerosols, gases, clouds, surfaces, etc.

**PAPERS DESCRIBING MEASUREMENTS OBTAINED
ABOARD UW CONVAIR-580 IN SAFARI-2000 THAT
HAVE BEEN PRESENTED AT OR SUBMITTED
TO CONFERENCES AS OF APRIL 2001**

1. "Semi-Volatile Particular Organic Material in Southern Africa During SAFARI-2000: A Preliminary Report" by D. J. Eatough et al. Presented by D. Eatough at the *Seventh International Conference on Carbonaceous Particles in the Atmosphere*, San Juan, Puerto Rico, November 2000.
2. "Airborne Sunphotometers and Closure Studies in SAFARI-2000 Dry Season Campaign" by B. Schmid et al. To be presented by B. Schmid at the *2001 Assembly of the International Association of Meteorology and Atmospheric Sciences*, Innsbruck, Austria, July 2001.
3. "Water-Soluble Chemical Components in Biomass-Burning Aerosols in Southern Africa" by S. Gao et al. To be presented by S. Gao at the *American Association for Aerosol Research Conference*, Portland, Oregon, November 2001.
4. "Effects of Humidity on Light Scattering by Aerosols in Southern Africa During the Burning Season" by B. I. Magi and P. V. Hobbs. To be presented by B. Magi at the *American Geophysical Union Conference on Regional Haze and Global Radiation Balance: Aerosols, Measurements, and Models: Closure, Reconciliation and Evaluation*, Bend, Oregon, October, 2001.
5. "Emissions of Trace Gases and Aerosols from Biomass Burning in Southern Africa" by P. Sinha and P. V. Hobbs. To be presented by P. Sinha at the *American Geophysical Union Conference on Regional Haze and Global Radiation Balance: Aerosols, Measurements, and Models: Closure, Reconciliation and Evaluation*, Bend, Oregon, October, 2001.