Global Tropospheric Experiment (GTE) Langley DAAC Project/Campaign Document

Summary:

This document addresses the formation, major elements, and objectives of several series of atmospheric science missions encompassed within the Global Tropospheric Experiment (GTE). The dates, geographic regions, bibliography, and data availability for the completed expeditions are also included.

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1. Project/Campaign Overview:

In 1984, the National Academy of Sciences recommended initiation of a Global Tropospheric Chemistry Program (GTCP), in recognition of the central role of tropospheric chemistry in global change. Envisioned as the U.S. national component of an ultimately international research effort, GTCP calls for the systematic study, supported by numerical modeling, of (1) biological sources of atmospheric chemicals; (2) global distributions and long-range transport of chemical species; and (3) reactions in the troposphere that lead to the conversion, redistribution, and removal of atmospheric chemicals.

These research challenges demand a broadly-based program to address them. The resources required are distributed among several federal agencies, scores of universities, and a variety of scientific disciplines - including atmospheric science, biology, land processes, and oceanography. It was already clear in 1984, however, that the National Aeronautics and Space Administration (NASA) would play a leading role in such a program. Some GTCP objectives require large-scale field studies and the most advanced instrumentation. NASA brings together the unique research facilities, strength in atmospheric science, technical expertise, and management skills needed to achieve these objectives.

NASA's contribution to GTCP is the Global Tropospheric Experiment (GTE), which utilizes large, extensively instrumented aircraft - ideal platforms for many atmospheric chemistry experiments--as primary research tools. However, GTE also draws heavily upon satellite observations of meteorology, land use, and atmospheric chemical species to aid in experiment design and in the scientific analyses of results obtained from aircraft and ground-based measurements. The GTE is managed through the Tropospheric Chemistry Program in NASA's Earth Science and Application Division of the Office of Space Science and Applications.

Name of Project/Campaign:

Global Tropospheric Experiment, GTE

Project/Campaign Introduction:

The goal of the National Aeronautics and Space Administration's (NASA) Tropospheric Chemistry Program is to develop an understanding of the chemical cycles that control the composition of the troposphere and to assess the susceptibility of the global atmosphere to chemical change. A major component of the NASA program is the Global Tropospheric Experiment (GTE), which consists of a series of airborne field experiments designed to (1) evaluate the capability of instrument techniques to measure, under field conditions, the minute concentrations of key chemical species in the atmosphere and (2) systematically address tropospheric chemistry issues relevant to global change, through airborne sampling expeditions, coupled with modeling and laboratory studies. The GTE airborne expeditions have focused on studies of the remote global atmosphere in order to provide well documented base line measurements of the unperturbed environment and to fully understand the chemical cycles underlying the natural environment.

The GTE, managed through the Tropospheric Chemistry Program in the Mission to Planet Earth Office, at NASA Headquarters, was initiated in the early 1980s. Implementation of the GTE Project is via a Project Office at the NASA Langley Research Center, Atmospheric Science Division.

Project/Campaign Mission Objectives:

Objectives of the NASA Tropospheric Chemistry Program, which encompasses GTE, are to:

- Develop techniques for remote and *in situ* measurement of the concentrations and fluxes of key tropospheric species;
- Determine meteorological and chemical influences of the troposphere on the atmosphere as a whole and in particular to the stratosphere;
- Understand the chemistry of global tropospheric species and the causes of changes in chemical composition of the troposphere;
- Develop a realistic general circulation model of the global troposphere, including its chemistry, for use in field experiment design and data analysis; and,
- Develop and implement a strategy for chemical measurements from space platforms.

In general, the objectives of the GTE series of field expeditions are (1) to evaluate the performance of new instrument techniques for measurement of key trace tropospheric species, and (2) to address specific tropospheric chemistry issues relevant to global change.

Discipline(s):

Atmospheric chemistry, instrument development for airborne and laboratory studies, theoretical models, and meteorology are the major scientific disciplines employed in meeting the objectives of GTE.

Geographic Region(s):

Table 1 lists general geographic regions where intensive airborne measurements for GTE expeditions have been conducted. Data were also obtained during aircraft transits to and from these regions and at ground sites. Detailed geographic information is provided in the Data set Documents for each expedition.

Table 1: Geographic Regions

Expedition	Date	General Geographic Region
CITE 1A	1983	Wallops Island, VA
CITE 1B	1983	Hawaii - Tropical Pacific
CITE 1C	1984	Eastern North Pacific - off the California coast
CITE 2	1986	Western USA
CITE 3	1989	Western North Atlantic - off the Virginia coast and Western South Atlantic - off the Brazilian coast
ABLE 1	1984	Barbados, French Guyana
ABLE 2A	1985	Amazon Basin
ABLE 2B	1987	Amazon Basin
ABLE 3A	1988	Alaska - Barrow, Bethel, Cold Bay
ABLE 3B	1990	Hudson Bay, Schefferville, Canada
PEM-West A	1991	Western North Pacific Rim
PEM-West B	1994	Western Pacific
PEM Tropics A	1996	Tropical Pacific
PEM Tropics B	1999	Tropical Pacific
TRACE A	1992	Brazil, South Atlantic, Southwest Africa
TRACE P	2001	North Western Pacific

Detailed Project/Campaign Description:

The GTE expeditions have been conducted in a diverse range of environments and with different scientific goals. The Chemical Instrument Test and Evaluation (CITE) series were designed to expose selected instrumentation to a wide range of measurement conditions. The Atmospheric Boundary Layer Experiments (ABLE) have been conducted over ecosystems known to have significant influence on the troposphere. The long range transport of natural and anthropogenic emissions on the global troposphere have been investigated in the Pacific Exploratory Missions (PEM) and the Transport and Atmospheric Chemistry Experiment in the Atlantic (TRACE-A).

The dates and general geographic regions for each mission are listed in Table 1.

2. Data Availability:

Data are available from the Langley Distributed Active Archive Center (DAAC). Data are available in the GTE data archives for all missions listed in Table 1.

Data Type(s):

- ASCII data in GTE Data Archive format.
- VHS video tapes from forward and nadir cameras and weather radar aboard airborne platforms.
- meteorological satellite photos and narrative during expedition time frames.
- radiosondes
- model results

Input/Output Media:

Data were transitioned to the Langley DAAC via electronic means.

Data are distributed from the Langley DAAC via ftp.

Proprietary Status:

Data for missions listed in Table 1 are non-proprietary.

3. Data Access:

Data Center Location:

Langley DAAC User and Data Services Office
NASA Langley Research Center
Mail Stop 157D
Hampton, Virginia 23681-2199
USA
Telephone: (757) 864-8656
FAX: (757) 864-8807
E-mail: support-asdc@earthdata.nasa.gov

OR

GTE Data Archive
Mail Stop 483
NASA Langley Research Center
Hampton, Virginia 23681
USA

Associated Costs:

There are no costs associated with these data.

4. Principal Investigator Information:

The Project Principal Investigator and the ABLE 3A Mission Scientist were responsible for the broad scientific aspects of the expedition. The ABLE 3A Data Manager assembled and archived the data products after certification by the persons listed in this section as Investigators, who are the individual experiment Principal Investigators and are the scientists most knowledgeable about the collecting, processing, analyses, and reporting of their respective data sets.

Investigator(s) Name and Title:

Investigator Area	Investigator Information
Principal Investigator	James M. Hoell, Jr. NASA Langley Research Center Hampton, VA 23681 Tel: 757-951-1646 E-mail: james.m.hoell@nasa.gov
ABLE 3A Mission Scientist	Robert C. Harriss NASA Headquarters Director, Sciences Division Mission to Planet Earth Code YS Washington, DC 20546 Tel: 202-358-0265

ABLE 3A Data Manager and Ground Operations Manager	Joseph W. Drewry NASA Langley Research Center Hampton, VA 23681
ABLE 3A Mission Meteorologist	Mark C. Shipham NASA Langley Research Center Hampton, VA 23681
Airborne Meteorological/Position Data	John D. W. Barrick MS 483 NASA Langley Research Center Hampton, VA 23681 Tel: 757-864-5831 Fax: 757-864-5841 E-mail: john.d.barrick@nasa.gov
Non-methane Hydrocarbons	F. Sherwood Rowland University of California-Irvine Department of Chemistry Irvine, CA 92717 Tel: 714-856-6016 Fax: 714-725-2905
Nitric Oxide, Nitrogen Dioxide, NO_y	John Bradshaw Georgia Institute of Technology Earth and Atmospheric Sciences Baker Bldg., Room 107 923 Dalney Street Atlanta, GA 30332-0340 Tel: 404-894-3895/3824 Fax: 404-853-0100 E-mail: jb57@prism.gatech.edu
Aerosols and Ozone Profiles	Edward V. Browell MS 401A NASA Langley Research Center Hampton, VA 23681 Tel: 757-864-1273 Fax: 757-864-7790 E-mail: edward.v.browell@nasa.gov
Surface Level Micrometeorological Parameters	David R. Fitzjarrald State University of New York-Albany Atmospheric Sciences Research Center 100 Fuller Road Albany, NY 12005 Tel: 518-442-3838
Insitu Ozone and Aerosol Size Distribution	Gerald L. Gregory NASA Langley Research Center Hampton, VA 23681
Radon	Enio Pereira INPE C.P. 15 Av dos Astronautas 1758 Sao Jose dos Campos , 12201 Brazil Tel: 55-123-418977, ext. 201 Fax: 55-123-218743
Eddy Correlation Flux (CO, CH_4, O_3, H_2O)	John A. Ritter NASA Langley Research Center Hampton, VA 23681
Carbon Monoxide and Methane	Glen W. Sachse MS 483 NASA Langley Research Center Hampton, VA 23681 Tel: 757-864-1566 Fax: 757-864-8818 E-mail: glen.w.sachse@nasa.gov
PAN, PPN, C_2C_{l4}	Hanwant Singh NASA Ames Research Center Mail Stop 245-5 Moffett Field, CA 94035 Tel: 605-604-6769

	E-mail: hanwant.b.singh@nasa.gov
Aerosol Composition, Nitric and Organic Acids	Robert W. Talbot University of New Hampshire Inst. for Earth Oceans Space Morse Hall Complex Systems Rsch. Ctr. Durham, NH 03820 Tel: 603-862-1546 Fax: 603-862-0188 E-mail: r_talbot@unhh.unh.edu
(1) NO, NO_2, NO_y (surface) and (2) Eddy Correlation Flux -O_3, CO_2, NO_y (surface)	Steven C. Wofsy Harvard University Pierce Hall 29 Oxford St. Cambridge, MA 02138 Tel: 617-495-4566 Fax: 617-495-9837 E-mail: scw@io.harvard.edu

5. Submitting Investigator Information:

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6. References:

This list of References has been provided by the GTE Project Office, NASA Langley Research Center, dated March 7, 1997.

Summary of CITE-1 Special Publications and Presentations

CITE 1 Special Publications:

- *J. Geophys. Res.*, Vol. 90, No. D7, December 20, 1985
- *J. Geophys. Res.*, Vol. 92, No. D2, February 20, 1987

CITE 1 Special Presentations:

- 1984 AGU Fall Meeting, San Francisco, CA, December 3-7, 1984
- (Abstracts published in *EOS, Trans. AGU*, Vol. 65, No. 45, Nov. 6, 198 4)

CITE 1 Publications:

1. Beck, S. M., R. J. Bendura, D. S. McDougal, J. M. Hoell, Jr., G. L. Gregory, H. J. Curfman, Jr., D. D. Davis, J. Bradshaw, M. O. Rodgers, C. C. Wang, L. I. Davis, M. J. Campbell, A. L. Torres, M. A. Carroll, B. A. Ridley, G. W. Sachse, G. F. Hill, E. P. Condon, and R. A. Rasmussen, Operational overview of NASA GTE/CITE-1 airborne instrument intercomparisons: Carbon monoxide, nitric oxide, and hydroxyl instrumentation. *J. Geophys. Res.*, Vol. 92, No. D2, February 20, 1987, pp. 1977-1985.

2. Bradshaw, J. D., M. O. Rodgers, S. T. Sandholm, S. KeSheng, and D. D. Davis, A two-photon laser-induced fluorescence field instrument for ground-based and airborne measurements of atmospheric NO. *J. Geophys. Res.*, Vol. 90, No. D7, Dec. 20, 1985, pp. 12,861-12,873.

3. Browell, E. V., E. F. Danielsen, S. Ismail, G. L. Gregory, and S. M. Beck, Tropopause fold structure determined from airborne lidar and in situ measurements. *J. Geophys. Res.*, Vol. 92, No. D2, February 20, 1987, pp. 2112-2120.

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5. Chameides, W. L., Ozone precursors and ozone photochemistry over eastern north Pacific during the spring of 1984 based on the NASA GTE/CITE-1 airborne observations. *J. Geophys. Res.*, Vol. 94, No. D7, July 20,1989, pp. 9799- 9808.

6. Chameides, W. L., D. D. Davis, J. Bradshaw, M. Rodgers, S. Sandholm, and D. B. Bai, An estimate of the NO_x production rate in electrified clouds based on NO observations from the GTE/CITE-1 fall 1983 field operation. *J. Geophys. Res.*, Vol. 92, No. D2, February 20, 1987, pp. 2153-2156.

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8. Condon, E. P., E. F. Danielsen, G. W. Sachse, and G. F. Hill, Carbon monoxide measurements over the eastern Pacific during GTE/CITE-1. *J. Geophys. Res.*, Vol. 92, No. D2, February 20, 1987, pp. 2095-2102.

9. Crosley, D. R., The measurement of OH and HO_2 in the atmosphere. *J. Atmos. Sci.*, Vol. 52, No. 19, October 1, 1995, pp. 3299-3314.

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12. Danielsen, E. F., R. S. Hipskind, S. E. Gaines, G. W. Sachse, G. L. Gregory, and G. F. Hill, Three-dimensional analysis of potential vorticity associated with tropopause folds and observed variations of ozone and carbon monoxide. *J. Geophys. Res.*, Vol. 92, No. D2, February 20, 1987, pp. 2103-2111.

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37. Torres, A. L., Nitric oxide measurements at a nonurban eastern United States site: Wallops instrument results from July 1983 GTE/CITE mission. *J. Geophys. Res.*, Vol. 90, No. D7, Dec. 20, 1985, pp. 12,875-12,880.

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CITE 1 Presentations:

1. Bradshaw, J. D., S. KeSheng, M. O. Rodgers, S. T. Sandholm, and D. D. Davis, Measurements of tropospheric NO concentrations as part of the NASA GTE/CITE program. Paper No. A21-07. 1984 AGU Fall Meeting.

2. Browell, E. V., G. L. Gregory, S. M. Beck, and E. F. Danielsen, Airborne lidar and in situ measurements of tropopause fold event. Paper No. A21-11. 1984 AGU Fall Meeting.

3. Browell, E. V., S. Ismail, E. F. Danielsen, G. L. Gregory, and S. M. Beck, Airborne lidar investigations of troposphere fold events. Paper No. A21-08, 1985 AGU Spring Meeting.

4. Campbell, M. J., J. C. Sheppard, J. C. Farmer, and M. N. Henry, Radiochemical hydroxyl measurements. Paper No. A21-10. 1984 AGU Fall Meeting.

5. Carroll, M. A. and B. A. Ridley, Tropospheric NO_x measurements. Paper No. A21-05. 1984 AGU Fall Meeting.

6. Condon, E., E. F. Danielsen, G. Sachse, and G. Hill, Carbon monoxide measurements over the eastern Pacific during GTE/CITE-1. Paper No. A22A-13. 1985 AGU Fall Meeting.

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8. Hipskind, R. S., G. L. Gregory, G. W. Sachse, G. F. Hill, and E. F. Danielsen, Correlation between ozone and carbon monoxide in the lower stratosphere, folded tropopause, and maritime troposphere. Paper No. A21-07, 1985 AGU Spring Meeting.

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10. McNeal, R. J., The NASA Global Tropospheric Experiment/Chemical Instrumentation Test and Evaluation (GTE/CITE) Project: A programmatic overview. Paper No. A21-01. 1984 AGU Fall Meeting.

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13. Russell, P. B., E. F. Danielsen, and R. A. Craig, The NASA spring 1984 Stratosphere-Troposphere Exchange Experiment: Science objectives and operations. Invited Paper No. A21-01, 1985 AGU Spring Meeting.

14. Sachse, G. W., G. F. Hill, G. L. Gregory, S. M. Beck, and J. Fishman, Differential absorption diode laser measurements of CO: GTE/CITE results. Paper No. A21-04. 1984 AGU Fall Meeting.

15. Sheridan, P. and W. Zoller, The source of atmospheric particles on the GTE Hawaii mission. Paper No. A21-12. 1984 AGU Fall Meeting.

16. Torres, A. L., Tropospheric nitric oxide measurements during GTE/CITE. Paper No. A21-06. 1984 AGU Fall Meeting.

17. Wang, C. W., L. I. Davis, Jr., J. V. James, G. W. Sachse, and J. Fishman, OH measurements in the Pacific and in California using the technique of laser-induced fluorescence. Paper No. A21-08. 1984 AGU Fall Meeting.

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Summary of CITE-2 Special Publications and Presentations

CITE 2 Special Publications:

- *J. Geophys. Res.*, Vol. 95, No. D7, June 20, 1990

CITE 2 Special Presentations:

- 1987 AGU Fall Meeting, San Francisco, CA, December 6-11, 1987

CITE 2 Publications:

1. Carroll, M. A., D. R. Hastie, B. A. Ridley, M. O. Rodgers, A. L. Torres, D. D. Davis, J. D. Bradshaw, S. T. Sandholm, H. I. Schiff, D. R. Karecki, G. W. Harris, G. I. Mackay, G. L. Gregory, E. P. Condon, M. Trainer, G. Hübler, D. D. Montzka, S. Madronich, D. L. Albritton, H. B. Singh, S. M. Beck, M. C. Shipham, and A. S. Bachmeier, Aircraft measurements of NO_x over the eastern Pacific and continental United States and implications for ozone production. *J. Geophys. Res.*, Vol. 95, No. D7, June 20, 1990, pp. 10,205- 10,233.

2. Chameides, W. L., D. D. Davis, J. D. Bradshaw, S. C. Sandholm, M. Rodgers, B. Baum, B. Ridley, S. Madronich, M. A. Carroll, G. L. Gregory, H. I. Schiff, D. R. Hastie, A. L. Torres, and E. P. Condon, Observed and model-calculated NO_2/NO ratios in tropospheric air sampled during the NASA GTE/CITE 2 field study. *J. Geophys. Res.*, Vol. 95, No. D7, June 20, 1990, pp. 10,235-10,247.

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Summary of CITE 3 Publications and Presentations:

CITE 3 Special Publications:

- *J. Geophys. Res.*, Vol. 98, No. D12, December 20, 1993

CITE 3 Special Presentations:

- 1990 AGU Fall Meeting, San Francisco, CA, December 3-7, 1990

CITE 3 Media Coverage:

1. "Atmospheric experiments over Brazil could answer question: Is the Earth a `living' organism?", *PRNewswire* (Philadelphia), September 6, 1989.

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3. Andreae, M. O., B. E. Anderson, D. R. Blake, J. D. Bradshaw, J. E. Collins, Jr., G. L. Gregory, G. W. Sachse, and M. C. Shipham, Influence of plumes from biomass burning on atmospheric chemistry over the equatorial and tropical south Atlantic during CITE 3. *J. Geophys. Res.*, Vol. 99, No. D6, June 20, 1994, pp. 12793-12808.

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15. Jaeschke, W., N. Beltz, R. Maser, H. Obenland, and H. W. Georgii, Measurements of SO_2 by chemiluminescence techniques using a filter enrichment method and a continuous-flow- system during the GTE/CITE-3 project. Poster No. A42B-6, 1990 AGU Fall Meeting.

16. Johnson, J. E., A. Bandy and D. C. Thornton, The interhemispheric gradient of carbonyl sulfide as observed during CITE-3. Paper No. A41D-8, 1990 AGU Fall Meeting.

17. Kirchhoff, V. W. J. H. and Y. Nakamura, Vertical ozone distribution and surface ozone diurnal variations at Natal during CITE-3. Poster No. A42B-7, 1990 AGU Fall Meeting.

18. Kirchhoff, V. W. J. H., Biomass burning in the Brazilian Amazon region: Measurements of CO and O_3. AGU Chapman Conference, Williamsburg, VA, March 19-23, 1990, also Chapter 12 in *Global Biomass Burning*, ed. by J. S. Levine, MIT Press, 1991.

19. MacTaggart, D. L., W. H. Chatham, and S. O. Farwell, An automated MFC/FD/SSD technique for total sulfur gas measurements during the NASA-CITE-3 project. Poster No. A42B- 8, 1990 AGU Fall Meeting.

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21. Rodgers, M. O., D. D. Davis, J. E. Martinez, S. Smyth, J. D. Bradshaw, J. Schendel, P. Zimmerman, J. B. Greenberg, and D. R. Blake, Atmospheric non-methane hydrocarbon measurements on the NASA/GTE/CITE-3 mission. Poster No. A41B- 2, 1990 AGU Fall Meeting.

22. Saltzman, E. S. and D. J. Cooper, Diurnal variations in atmospheric DMS over the south Atlantic ocean. Paper No. A41D-4, 1990 AGU Fall Meeting.

23. Sandholm, S. T., J. S. Schendel, and J. D. Bradshaw, NO, NO_2, and NO_y distributions and NO_x/NO_y relationships measured during CITE-3. Paper No. A41D-10, 1990 AGU Fall Meeting.

24. Shipham. M. C. and A. S. Bachmeier, CITE-3 meteorological overview, Part 1:Wallops Island, Virginia flights. Paper No. A41D-2, 1990 AGU Fall Meeting.

25. Thornton, D. C. and A. R. Bandy, Distribution of CS_2 over the equatorial southern Atlantic Ocean. Paper No. A21B- 2, 1991 AGU Spring Meeting.

26. Thornton, D. C., A. Bandy, N. Beltz, R. Ferek, J. Johnson and E. S. Saltzman, Advection of SO_2, CS_2, and H_2S over the western Atlantic Ocean in summer. Paper No. A41D-5, 1990 AGU Fall Meeting.

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Summary of ABLE 1 Publications and Presentations:

ABLE 1 Special Presentations:

- 1985 AGU Spring Meeting, Baltimore, MD, May 27-31, 1985

ABLE 1 Publications:

1. Ferek, R. J., R. B. Chatfield, and M. O. Andreae, Vertical distribution of dimethyl-sulphide in the marine atmosphere. *Nature*, Vol. 320, April 10, 1986.

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Summary of ABLE 2A Publications and Presentations:

ABLE 2A Special Publications:

- *J. Geophys. Res.*, Vol. 93, No. D2, February 20, 1988

ABLE 2A Special Presentations:

- 1986 AGU Spring Meeting, Baltimore, MD, May 19-22, 1986

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- "Laser sheds new light on atmosphere", *San José Mercury News* (San José, CA), November 5, 1985.

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Summary of ABLE 2B Publications and Presentations:

ABLE 2B Special Publications:

- *J. Geophys. Res.*, Vol. 95, No. D10, September 20, 1990

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Summary of ABLE 3A Publications and Presentations:

ABLE 3A Special Publications:

- *J. Geophys. Res.*, Vol. 97, No. D15, Oct. 30, 1992.

ABLE 3A Special Presentations:

- 1989 Spring AGU Meeting, Baltimore, MD, May 7-12, 1989

ABLE 3A Publications:

1. Bakwin, P. S., S. C. Wofsy, S. Fan, and D. R. Fitzjarrald, Measurements of NO_x and NO_y concentrations and fluxes over arctic tundra. *J. Geophys. Res.*, Vol. 97, No. D15, October 30, 1992, pp. 16,545-16,558.

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Summary of ABLE 3B Publications and Presentations:

ABLE 3B Special Publications:

- *J. Geophys. Res.*, Vol. 99, No. D1, January 20, 1994.

NOWES Special Publications:

- *J. Geophys. Res.*, Vol. 99, No. D1, January 20, 1994.

ABLE 3B Special Presentations:

- 1991 AGU Spring Meeting, Baltimore, May 28-31, 1991.

NOWES Special Presentations:

- 1991 AGU Spring Meeting, Baltimore, May 28-31, 1991.

ABLE 3B Media Coverage:

1. "UCI researchers find nature can make its own industrial chemicals", *Los Angeles Times* (Los Angeles), May 29, 1991.

ABLE 3B Publications:

1. Anderson, B. E., G. L. Gregory, J. D. Barrick, J. E. Collins, G. W. Sachse, M. C. Shipham, and C. H. Hudgins, Summertime tropospheric ozone distributions over central and eastern Canada. *J. Geophys. Res.*, Vol. 99, No. D1, January 20, 1994, pp.1781-1792.

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3. Bakwin, P. S., J. W. Munger, B. C. Daube, and S. C. Wofsey, Reactive nitrogen oxides at a sub-Arctic site (Schefferville, PQ). Paper No. A41A-11, 1991 AGU Spring Meeting.

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4. Dacey, J., R. Protz, and W. Glooschenko, Dimethylsulfide in waters of southern James Bay. Poster No. A42A6, 1991 AGU Spring Meeting.

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Summary of PEM WEST-A Special Publications and Presentations:

PEM-West A Special Publications:

- *J. Geophys. Res.*, Vol 101, No. D1, January 20, 1996.

PEM-West A Special Presentations:

- 1993 Conference of the International Global Atmospheric Chemistry (IGAC), Eilat, Israel, April 18-22, 1993.
- 1994 AGU Western Pacific Geophysics Meeting, Hong Kong, August 17-21, 1994.
- 1994 2nd Conference of the International Global Atmospheric Chemistry (IGAC), Fuji-Yoshida, Japan, September 5-9, 1994.

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45. Tso, T. -L., J. -G. Lo, S. Chang, T. -T. Chui, and B. -R. Shi, Measurement of CO, CO_2, CH_4, and N_2O at Taiwan ground station during the PEM-West mission. Paper No. A41A-6. 1992 AGU Western Pacific Geophysics Meeting, Hong Kong.

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Summary of PEM WEST-B Special Publications and Presentations:

PEM-West B Special Publications:

- Manuscripts are in preparation and review for publication in a future JGR-Atmospheres

PEM-West B First Special Issue Manuscripts:

1. Arimoto, A., R. A. Duce, J. M. Prospero, D. L. Savoie, R. W. Talbot, J. E Dibb, B. G. Heikes , B. J. Ray, N. F. Lewis , and U. Tomza. Comparisons of trace constituents from ground stations and the DC-8 aircraft during PEM West-B,

2. Blake, Donald R., Nicola, J. Blake, Tai-Yih Chen, James E. Collins, Jr., Glen W. Sachse, Donald C. Thornton, Alan R. Bandy, John T. Merrill and F. Sherwood Rowland. The effect of season on the distribution of selected hydrocarbon and halocarbon over the northwestern Pacific : A comparison of PEM West-A and PEM West-B.

3. Chen, L. -L. *et al*, Analysis of ground-based measurements at Cheju Island, South Korea.

4. Crawford, Davis, Chen, plus other PEM West-B Investigators. Exploring large scale shifts in the NO_x levels in the remote tropical Pacific atmosphere.

5. Dibb, J. E., R. W. Talbot, B. L. Lefer, E. Scheuer, G. L. Gregory, E. V. Browell, J. D. Bradshaw, S.T. Sandholm, and H. B. Singh. Distribution of ^{7}Be and ^{210}Pb over the western Pacific; PEM West-B , February - March, 1994.

6. Eahalt, D. H. *et al*, On the signifance of regional trace gas distributions as derived from aircraft campaigns in PEM West-A and -B.

7. Hoell, J. M., D. D. Davis, S. C. Liu, R. E. Newell, H. Akimoto, R. J. McNeal, and R. J. Bendura. The Pacific Exploratory Mission-West, Phase B: February - March, 1994.

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9. Kajii, J., H. Akimoto, Y. Komazaki, S. Tanaka, H. Mukai, K. Murano, and J. T. Merrill Long-range transport of ozone, carbon monoxide, and acidic trace gases at Oki Island, Japan during PEM West-B/PEACAMPOT-B campaign.

10. Kondo, Y., *et al*, The performance of an aircraft instrument for the measurement of NO_y.

11. Kondo, Y., *et al*, Profiles and partitioning of reactive nitrogen over the Pacific ocean in winter and early spring.

12. Kotamarthi, V. R., *et al*, Evidence of heterogeneous chemistry on sulfate aerosols in stratospheric air masses in PEM West-B.

13. Lam, K. S. , T. Wang, L. Y. Chan, M. Anson, Z. L. Cheng, and M. A. Carroll. Seasonal variation of surface ozone and carbon monoxide measured at a rural site in Hong Kong.

14. Liu, C. M., M. Buhr and J. T. Merrill. Ground-based observation of ozone, carbon monoxide and sulfur dioxide at Kenting, Taiwan during PEM West-B campaign.

15. Merrill, John T., R. E. Newell, A. S. Bachmeier, *et al*, A meteorological overview for the Pacific Exploratory Mission- West, Phase B.

16. Pueschel, R. F. , G. V. Ferry, A. W. Strawa, and D. A. Allen. Physical, chemical and optical properties of western Pacific free tropospheric aerosols: Effects of Asian continental outflow.

17. Sandholm, S., J. Bradshaw, R. Talbot, H. Singh, G. Gregory, G. Sachse, and D. Blake. Comparison of N_xO_y budgets from NASA's ABLE-3, PEM West and TRACE-A measurement programs: An update.

18. Talbot, R. W., J. E. Dibb, B. L. Lefer, J. D. Bradshaw, S.T. Sandholm, S. Symth, D. R. Blake, N. Blake, G. W. Sachse, J. Collins, B. G. Heikes, G. L. Gregory, B.E. Anderson, H. B. Singh, D. C. Thornton, A. Bandy, J. T. Merrill, *et al*, Chemical characteristics of continental outflow from Asia to the troposphere over the western Pacific Ocean during February-March 1994: Results from PEM WEST B.

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2. Gregory, G. L. and A. D. Scott, Jr., Compendium of NASA Data Base for the Global Tropospheric Experiment's Pacific Exploratory Mission West-B (PEM West-B). NASA Technical Memorandum 110193, October 1995, 154 p.

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5. Singh, H. B. , M. Kanakidou, P. J. Crutzen, and D. J. Jacob, High concentrations and photochemical fate of oxygenated hydrocarbons in the global troposphere. *Nature*, Vol. 378, November 2, 1995, pp. 50-54.

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PEM-West B Presentations:

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2. Chen, G., D. D. Davis, A. R. Bandy, and D. C. Thornton, An assessment of DMS oxidation as a source of SO_2 based on PEM West-A and PEM West-B observations. Paper No. A11E-4, 1995 AGU Fall Meeting.

3. Crawford, J. H., D. D. Davis, G. Chen, and the PEM West-B Science Team, Exploring large scale shifts in NO_2 in the remote tropical Pacific atmosphere. Paper No. A21G-10, 1995 AGU Fall Meeting.

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Summary of TRACE-A Special Publications and Presentations:

TRACE-A Special Publications:

- *J. Geophys. Res.*, Vol. 101, No. D19, October 30, 1996

TRACE-A Special Presentations:

- 2nd Scientific Conference of the International Global Atmospheric Chemistry (IGAC) Project, Fuji-Yoshida, Japan, September 5-9, 1994

SAFARI-92 Special Publications:

- *J. Geophys. Res.*, Vol. 101, No. D19, October 30, 1996.

SAFARI-92 Special Presentations:

- 1993 AGU Fall Meeting, San Francisco, December 6-10, 1993.

TRACE-A Media Coverage:

1. "Inpe e Nasa estudam efeitos de queimadas", *Folha De São Paulo* (São Paulo), August 9, 1992.

2. "Nasa estuda gás nos ares do Brasil", *O Estado De São Paulo* (São Paulo), August 15, 1992.

3. "Inpe e Nasa medem efeito das queimadas no céu", *Vale Paraibano* (Sao José Dos Campos), August 28, 1992.

4. "INPE inicia pesquisa sobre concentrações de ozônio na região central do País", *Gazeta Mercantil* (São Paulo), September 2, 1992.

5. "Nuvem tóxica gigante sobrevao Atlântico", *Folha De São Paulo* (São Paulo), September 10, 1992.

6. "Falha em avião da Nasa atrasa projeto do Inpe", *Folha De São Paulo* (Sao Paulo), September 11, 1992.

7. "Nuvem tóxica de ozônio sobre o mar tem tamanho do Brasil", *Jornal Do Brasil* (Rio De Janeiro), September 11, 1992.

8. "Maus ventos trazem Nasa ao País", *O Estado De São Paulo* (São Paulo), October 3, 1992.

9. "Nasa detecta no Tocantins o maior foco de queimadas", *O Globo* (Rio De Janerio), October 3, 1992.

10. "Nasa e Inpe vêem mancha de ozônio e queimadas", *ValeParaibano* (Sao José Dos Campos), October 3, 1992.

11. "Avião decola do Rio astrás de nuvem tóxica", *Folha De São Paulo* (Sao Paulo), October 3, 1992.

12. "Nasa investiga a mancha de ozônio sobre o Atlântico Sul", *Jornal Do Brasil* (Rio De Janeiro), October 3, 1992.

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2. Andreae, M. O. , J. Fishman, M. Garstang, J. G. Goldammer, C. O. Justice, J. S. Levine, R. J. Scholes, B. J. Stocks, A. M. Thompson, B. van Wilgen and the STARE/TRACE- A/SAFARI-92 Science Team, Biomass burning in the global environment: First results from the IGAC/BIBEX field campaign STARE/TRACE-A/SAFARI-92. *Global Atmospheric-Biospheric Chemistry*, R.Prinn (ed.), Plenum Press, New York, 1994, pp.83-101, presented at First Scientific Conference of IGAC, Eilat, Israel, April 18-22, 1993.

3. Andreae, M. O., J. Fishman, and J. Lindesay, The Southern Tropical Atlantic Region Experiment (STARE): Transport and Atmospheric Chemistry near the Equator-Atlantic (TRACE-A) and Southern African Fire-Atmosphere Research Initiative(SAFARI): An Introduction. *J. Geophys. Res.*, Vol. 101, No. D19, October 30, 1996, pp. 23519-23520.

4. Bachmeier, A.S., and H.E. Fuelberg, A meteorological overview of the TRACE-A period. *J. Geophys. Res.*, Vol. 101, No. D19, October 30, 1996, pp. 23881-23888.

5. Bartlett, K.B., G.W. Sachse, J.E. Collins, Jr., and R.C. Harriss, Methane in the tropical South Atlantic: Sources and distribution during the late dry season. *J. Geophys. Res.*, Vol. 101, No. D19, October 30, 1996, pp. 24139-24150.

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- JGR issue pending

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7. Glossary and Acronyms:

EOSDIS Acronyms (PDF).

No non-standard terms are used in this document.

ABLE - Atmospheric Boundary Layer Experiment
ASCII - American Standard Code for Information Interchange
CITE - Chemical Instrumentation Test and Evaluation
DAAC - Distributed Active Archive Center
EOS - Earth Observing System
FTP - File Transfer Protocol
GTCP - Global Tropospheric Chemistry Program
GTE - Global Tropospheric Experiment
JGR - Journal of Geophysical Research
MAPS - Measurement of Air Pollution from Satellite
NASA - National Aeronautics and Space Administration
PEM - Pacific Exploratory Missions
TOMS - Total Ozone Measurement Spectrometer
TRACE-A - Transport and Chemistry near the Equator in the Atlantic
URL - Uniform Resource Locator

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