The Chemical Instrumentation Test & Evaluation (CITE) Data Product User Guide

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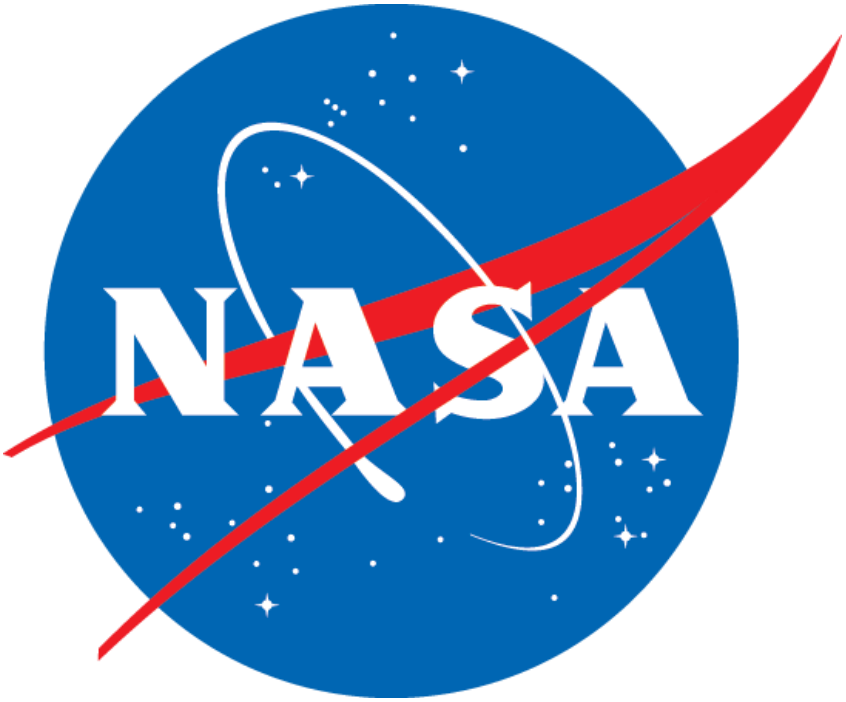

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Introduction:

The Chemical Instrumentation Test and Evaluation (CITE) mission had an overarching goal to test and evaluate the instruments developed for the Global Tropospheric Emissions (GTE) missions to measure atmospheric trace gases and quantify their distribution. Conducted in three parts, CITE collected in situ atmospheric composition data from NASA Aircraft over the Continental United States and the Pacific & Atlantic Oceans. Contained on Earthdata is data from the final two parts, CITE-2 & CITE-3. These data are in two main formats: .xlsx (easily opens in excel) & variations of ASCII based text files (which will easily open on any text reader). The purpose of this user guide is to give relevant contextual information in order to better understand and access this data. (Note: For now CITE-1 data is currently unavailable. If you have any questions about this please reach out to ASDC user services.)

Citation:

How to Cite NASA Data

DOI Citation Formatter

Campaign Level DOI(s):

CITE-2: 10.5067/SUBORBITAL/CITE-2/DATA001

CITE-3: 10.5067/SUBORBITAL/CITE-3/DATA001

Campaign Overview:

The overarching aim of CITE was to assess the GTE instrumentation for quantifying the composition of atmospheric trace gasses and their distribution. This was conducted in three parts ranging from 1983 - 1989. A main component of the entire CITE mission was to use different types of sensors and instruments to assess the same species of atmospheric compound and compare the values. The data on EARTHDATA includes the gathered data from the second and third portions of the campaign, so further detail on these portions are given below.

CITE-2 focused on evaluating the instrumentation developed for assessing “Odd Nitrogen”, a crucial component of tropospheric chemistry. CITE-2 took place over 4 weeks in August 1986 during 13 science flights (Table 1). These flights specifically looked at daytime odd nitrogen compounds including nitrogen dioxide (NO_2), nitrogen oxide (NO), nitric Acid (HNO_3), total odd Nitrogen species (NO_y), and peroxyacetyl nitrate (PAN). Additionally, measurements of Carbon Monoxide (CO), Aerosols, Hydrocarbons, and accompanying meteorological & navigation data were taken. Utilizing the NASA’s Electra Aircraft, CITE flew from Moffett Field, CA and took readings of these species over California and the eastern Pacific Ocean.

CITE-3 meanwhile focused on evaluating the instrumentation created to measure content of atmospheric sulfur species such as: sulfur dioxide (SO_2), dimethyl sulfide (DMS), carbonyl sulfide (OCS), carbon disulfide (CS_2), and hydrogen sulfide (H_2S). CITE-3 had a secondary objective of directly measuring these sulfur species of differing atmospheric conditions. These included altitude, solar flux levels, atmospheric mixing ratios, and surface source strengths of sulfur in a marine environment. Additionally, nitrogen species similar to CITE-2, hydrocarbons, aerosols, and accompanying meteorological & navigational data were taken. Conducted via NASA's Electra aircraft, CITE-3 took place over 16 flights between August and September of 1989 (not counting test flights [1-3] or the return flights from Brazil [20-21]; Table 2). These flights originated from NASA Wallops Flight Facility in Virginia (Flights 4-11), and Natal, Brazil (Flights 13-20). Having two locations allowed for environmental comparisons between the developed East Coast of the United States and the relatively clean marine boundary layer off the northeast coast of Brazil. Note that two transit flights originated from Puerto Rico (Flight 12) and Barbados (Flight 21).

See Below Tables for Flight Information from CITE-2 and CITE-3.

Table 1. CITE-2 Flight Dates (Note that the first 3 flights were test flights. Data gathering flights began with flight 4.)

Flight Number	Date
4	8/11/1986
5	8/11/1986
6	8/15/1986
7	8/19/1986
8	8/21/1986
9	8/24/1986
10	8/26/1986
11	8/28/1986
12	8/30/1986
13	8/31/1986
14	9/2/1986
15	9/5/1986
16	9/5/1986

Table 2. CITE-3 flight dates (Note that the first 3 flights were test flights. Additionally, flights denoted with a/b were legs of Transit Flights from Wallops Flight Center to Natal, Brazil and back.)

Flight Number	Date
1	8/14/1989
2	8/17/1989
3	8/20/1989
4	8/22/1989
5	8/23/1989
6	8/25/1989
7	8/28/1989
8	8/30/1989
9	8/31/1989
10	9/1/1989
11 a/b	9/8/1989
12 a/b	9/9/1989
13	9/12/1989
14	9/15/1989
15	9/16/1989
16	9/19/1989
17	9/20/1989
18	9/22/1989
19	9/22/1989
20 a/b	9/28/1989
21 a/b	9/29/1989

Data Products:

Included on EARTHDATA are data from both CITE-2 & CITE-3. It is organized into 6 collections. 3 collections per campaign contain data on: Trace Gases (Tables 3 & 6), Aerosols (Tables 4 & 7), & Meteorological/Navigational data from the aircraft (Tables 5 & 8). Each row per table is a different grouping of files with similar formats and data structures. It is important to know while there is some consistency between rows, many files have different formatting depending on campaign, flight, PI, etc. Additionally, CITE took place before modern standardization formats were developed. As such the formatting is different than more recent missions.

CITE-2

For CITE-2, each file is in a text-based format. Most of the files are in the .DAT extension, but others included are .prn, .fmt, and .tfr. These can all be opened with any text file opener such as Notepad for Widows. Each row in these tables (3-5) generally came from the original diskette directories these data were recorded on (some rows are individual folders in a given directory). Each directory only contains one species, but there may be multiple directories that measure similar species. In addition, there is a word document ReadMe, and it describes the directory name, PI, PI's institution, and the main species collected in each directory. This document is available from the ASDC upon request.

Most Data IDs for tables 3-5 generally follows this format:

CITE-2-_m*_directoryname/FileName*_file_extension

Where:

m*: Optional character that is Short for "mission number". Data IDs with this denote a group of files that contain one file per flight of data recorded, and the mission number is recorded in the file name after the "m". The Data IDs which do not contain this "m" include data from all flights in one file).

DirectoryName/FileName: The description of what is contained in the Data ID: either the name of the original diskette directory the file was recorded on or the name of the file in the Data ID.

FileExtension: All text files of .dat, .prn, and .tfr formats.

(i.e., CITE-2-m*ap*dat contains .dat files for data gathered from each mission flown from the "ap" directory, which corresponds to PAN data recorded by Hanwant Signh of NASA Ames)

Notes on table specifics:

Files from table 3 generally contain the start and stop times of data collection, the measured species in parts per billion by volume (ppbv), a sigma uncertainty value, the number of samples taken, and a comment value for data readability. Some of the files have these sections in separate orders, so please refer to the Key Variables column for the order & units (and in some cases, column name) of a given variable. Additionally, sometimes files have multiple comment values, or the sigma uncertainty value may be directly related to the species value.

Table 5 contains the navigational and meteorological data from the campaign. Some of the original files contained no data labels, so variable type and unit had to be pieced together from various ReadMes, published literature, and campaigns that also used Electra Aircraft. If there are any noticeable errors, please reach out to the ASDC User Services so this guide can be updated.

Table: 3
Collection: CITE-2_TraceGas_AircraftInSitu_Electra_Data_1
DOI: 10.5067/ASDC/SUBORBITAL/CITE-2/TraceGas_AircraftInSitu_Electra_Data_1
Platform: NASA Electra
Dates: August 11 – September 4, 1986

EARTHDATA

Data ID	Key Variables	File Format	Instrument	Flight Numbers	Principal Investigator	Institution
CITE-2-m*ap*dat	**Start Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop Time** (Hour, Minute, Second) **Stop** (total seconds after midnight) **PAN** (ppbv) **Sigma** (uncertainty) **n** (samples taken) **Comment Value** (file readability)	Text (.DAT)	Gas Chromatograph, Electron Capture	4-16	Hanwant Singh	NASA Ames
CITE-2-m*carn2*dat	**Start Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop Time** (Hour, Minute, Second) **Stop** (total seconds after midnight)	Text (.DAT)	Photolysis, Chemiluminescence	4-16	Mary Anne Carroll	NOAA Boulder

	NO_2 (ppbv) **Sigma** (uncertainty) **n** (samples taken) **Comment Value** (file readability)					
CITE-2-m*carno*dat	**Start Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop Time** (Hour, Minute, Second) **Stop** (total seconds after midnight) **NO** (ppbv) **Sigma** (uncertainty) **n** (samples taken) **Comment Value** (file readability)	Text (.DAT)	Photolysis, Chemiluminescence	4-16	Mary Anne Carroll	NOAA Boulder
CITE-2-ct2co*dat	**Time** (GMT) **CO** (ppbv) **Grab Time** (GMT) **CO** (ppbv)	Text (.DAT)	Grab Sample/Gas Chromatography	4-16	Estelle Condon	NASA Ames
CITE-2-m*gtn2*dat	**Start Time** (Hour, Minute, Second) **Start** (total seconds after midnight)	Text (.DAT)	Photofragmentation, Laser Induced	7-16	Douglas Davis	Georgia Institute of Technology

	Stop Time (Hour, Minute, Second) **Stop** (total seconds after midnight) **NO_2** (ppbv), **Sigma** (uncertainty) **n** (samples taken) **Comment Value** (file readability)					
CITE-2-m*gtno*dat	**Start Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop Time** (Hour, Minute, Second) **Stop** (total seconds after midnight) **NO** (ppbv) **Sigma** (uncertainty) **n** (samples taken) **Comment Value** (file readability)	Text (.DAT)	Photofragmentation, Laser Induced	7-16	Douglas Davis	Georgia Institute of Technology
CITE-2-m*ln3*dat	**Start Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop Time** (Hour, Minute, Second) **Stop** (total seconds after midnight)	Text (.DAT)	Tungstic Acid Denuder	4-16	Peter LeBel	NASA Langley

	HNO_3 (ppbv) **Comment Value** (file readability) **n** (samples taken) **Comment Value** (file readability)					
CITE-2-m*narp*dat	**Start Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop Time** (Hour, Minute, Second) **Stop** (total seconds after midnight) **PAN** (ppbv) **Sigma** (uncertainty) **n** (samples taken) **Comment Value** (file readability)	Text (.DAT)	Gas Chromatograph, Electron	4-16	Brian Ridley	NSF NCAR
CITE-2-m*noy*dat	**Start Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop Time** (Hour, Minute, Second) **Stop** (total seconds after midnight) **NO_y** (ppbv) **Sigma** (uncertainty)	Text (.DAT)	CO-Assisted Au catalytic, Chemiluminescence	6-16	Gerhard Hubler	NOAA Boulder

	n (samples taken) **Comment Value** (file readability)					
CITE-2-hydsingh*prn (ReadMe labelled CITE-2-CT2SINGH*FMT)	**Stop Time** (Seconds GMT) **Altitude** (kFT) **CFC-11** (pptv) **Ethane** (pptv) **Propane** (pptv) **Acetylene** (pptv) **Propene** (pptv) **i-Butane** (pptv) **n-Butane** (pptv) **i-pentane** (pptv) **Sample** (pptv) **Volume** (pptv)	Text (.PRN) (ReadMe is .FMT)	Grab Sample Gas Chromatography	4-16	Hanwant Singh	NASA Ames
CITE-2-m*sn3*dat	**Start Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop Time** (Hour, Minute, Second) **Stop** (total seconds after midnight)	Text (.DAT)	Nylon Filter	4-16	Barry Huebert	Stanford Research Institute

	HNO_3 (ppbv) **Sigma** (uncertainty) **n** (samples taken) **Comment Value** (file readability)					
CITE-2-m*wn2*dat	**Start Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop Time** (Hour, Minute, Second) **Stop** (total seconds after midnight) **NO_2** (ppbv) **Comment Value** (file readability) **n** (samples taken) **Comment Value** (file readability)	Text (.DAT)	$FeSO_4$ Converter, Chemiluminescence	4-16	Arnold Torres	NASA Wallops
CITE-2-m*wno*dat	**Start Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop Time** (Hour, Minute, Second) **Stop** (total seconds after midnight) **NO** (ppbv) **Comment Value** (file readability)	Text (.DAT)	$FeSO_4$ Converter, Chemiluminescence	4-16	Arnold Torres	NASA Wallops

	n (samples taken) **Comment Value** (file readability)					
CITE-2-m*yn2*dat	**Start Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop Time** (Hour, Minute, Second) **Stop** (total seconds after midnight) **NO_2** (ppbv) **Sigma** (uncertainty) **n** (samples taken) **Comment Value** (file readability)	Text (.DAT)	Laser Differential Absorption	4-9, 12-14	Harold Schiff	York University
CITE-2-m*yn3*dat	**Start Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop Time** (Hour, Minute, Second) **Stop** (total seconds after midnight) **HNO_3** (ppbv) **Sigma** (uncertainty) **n** (samples taken) **Comment Value** (file readability)	Text (.DAT)	Laser Differential Absorption	11, 15	Harold Schiff	York University

Table: 4
Collection: CITE-2_Aerosol_AircraftInSitu_Electra_Data_1
DOI: 10.5067/ASDC/SUBORBITAL/CITE-2/Aerosol_AircraftInSitu_Electra_Data_1
Platform: NASA Electra
Dates: August 11 – September 4, 1986

EARTHDATA

Data ID	Key Variables	File Format	Instrument	Flight Numbers	Principal Investigator	Institution
CITE-2-ct2pms*dat	**Time** (GMT) **Aerosols** (#/cm^3)	Text (.DAT)	Forward Scattering Spectrometer	4-16	Gerald Gregory	NASA Langley

Table: 5
Collection: CITE-2_MetNav_AircraftInSitu_Electra_Data_1
DOI: 10.5067/ASDC/SUBORBITAL/CITE-2/MetNav_AircraftInSitu_Electra_Data_1
Platform: NASA Electra
Dates: August 11 – September 4, 1986

EARTHDATA

Data ID	Key Variables	File Format	Instrument	Flight Numbers	Principal Investigator	Institution
CITE-2-CT2M*dat	**Time** (total seconds after midnight) **Day of Year** **Latitude** (Degrees North) **Latitude** (Minutes North) **Longitude** (Degrees West) **Longitude** (Minutes West) **Heading** (Degrees) **Track Angle** (Degrees) **Surface Brightness Temperature** (°C) **Static Pressure** (PSI) **Differential Pressure** (PSI) **Static Air Temperature** (°C) **Dew Point Temperature** (°C)	Text (.DAT)	Standard Aircraft Instruments	2-16	Sherwin Beck	NASA Langley

	Solar UV Flux Upwards (mw/cm^2) **Solar Flux Upwards Temperature** (°C) **Solar UV Flux Downwards** (mw/cm^2) **Solar Flux Downwards Temperature** (°C) **Radar Altitude** (feet) **Pressure Altitude** (feet) **Pitch** (Degrees) **Roll** (Degrees) **Yaw** (Degrees)					
CITE-2-ct2m*tfr	**Time** (GMAT) **Radar Altitude** (BALT; ft) **Pressure Altitude** (PALT; ft) **Static Pressure** (SP; mb) **North Latitude** (NLAT; degrees, minutes) **West Longitude** (WLONG; degrees, minutes) **Track Angle Degree** (TRK) **Wind Speed** (WS; knots) **Wind Direction** (WD; degrees)	Text (.tfr)	Eppley Photometers (300-420 nm), Two- and Three-Stage Dew Point Hygrometer	4-16	Sherwin Beck	NASA Langley

	True Airspeed (TAS; knots) **Static Air Temp** (SAT; C) **Dew Point Temp** (DPT; °C) **Ozone** (O_3; ppbv) **Solar UV Flux Upward** (UVUP; mw/cm^2) **Solar UV Flux Downward** (UVDN; mw/cm^2) **Pitch** (degrees) **Roll** (degrees) **Yaw** (degrees)					

CITE-3

CITE-3 data is contained in a variety of formats. Originally many files were in a .WK1 format, however these have been converted to an excel (.xlsx) format for ease of use as .WK1 are unable to be read with modern file readers. Other files are in text formats with .DAT, .prn, .MIN, .GLG, & .GIT extensions. These formats are easily opened in Microsoft Excel and text reading software (such as Notepad).

Similar to CITE-2, CITE-3 Data IDs are grouped by files containing similar measurements of similar species. Unlike CITE-2, the Data ID/file naming conventions do not have a consistent format, but the following provides guidance on the CITE-3 naming conventions:

- Titles often contain a combination of mission number (Any M*/F*FL*/FL??) and species measured
    - For example, “FL4_DMS.xlsx” from Data ID “CITE-3-FL*_DMS*xlsx” contains DMS data from mission 4 collected by Alan Bandy.
- Sometimes a file has the date of the mission in the titles.
    - (i.e., “8_17_89.xlsx” for August 7th, 1989)
- Uniquely named IDs contain ReadMes explaining the file naming conventions for that particular ID. These ReadMe titles are listed under the respective Data ID.

Also, unlike CITE-2, the data has headers, variable names, and units either in the file or in an accompanying file ReadMe. There is some variation in the ordering of variables so please refer to the Key Variables column for any questions about these.

Table: 6
Collection: CITE-3_TraceGas_AircraftInSitu_Electra_Data_1
DOI: 10.5067/ASDC/SUBORBITAL/CITE-3/TraceGas_AircraftInSitu_Electra_Data_1
Platform: NASA Electra
Dates: August 22 – September 29, 1989

EARTHDATA

Data ID	Key Variables	File Format	Instrument	Flight Numbers	Principal Investigator	Institution
CITE-3-DMS-4-*xlsx	**Start Time** (Hour, Minute, Second) **Stop Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop** (total seconds after midnight) **Code** (file readability) **DMS** (ppbv) **Sigma** (uncertainty) **n** (samples taken) **Comment Value** (file readability)	Excel (.xlsx)	Gas Chromatography	1-19 *Data from flights 11A/B are combined in one file as just 11	Meinrat Andreae	Max-Planck-Institute for Chemistry
CITE-3-H2S-4-*xlsx	**Start Time** (Hour, Minute, Second) **Stop Time** (Hour, Minute, Second) **Start** (total seconds after midnight)	Excel (.xlsx)	Gas Chromatography	1-19	Meinrat Andreae	Max-Planck-Institute for Chemistry

	Stop (total seconds after midnight) **Code** (file readability) **H_2S** (ppbv) **Sigma** (uncertainty) **n** (samples taken) **Comment Value** (file readability)					
CITE-3-FL*_DMS*xlsx	**Start Time** (Hour, Minute, Second) **Start Time** (Hour, Minute, Second) **DMS** (ppbv) **Sigma** (uncertainty)	Excel (.xlsx)	Gas Chromatography	4-19	Alan Bandy	Drexel University
CITE-3-FL*_SO2*xlsx	**Start Time** (Hour, Minute, Second) **Start Time** (Hour, Minute, Second) **SO_2** (ppbv) **Sigma** (uncertainty)	Excel (.xlsx)	Gas Chromatography	4-15	Alan Bandy	Drexel University
CITE-3-FL*_CS2*xlsx	**Start Time** (Hour, Minute, Second) **Start Time** (Hour, Minute, Second) **CS_2** (ppbv) **Sigma** (uncertainty)	Excel (.xlsx)	Gas Chromatography	7-19	Alan Bandy	Drexel University

CITE-3-FL*_OCS*xlsx	**Start Time** (Hour, Minute, Second) **Start Time** (Hour, Minute, Second) **OCS** (ppbv) **Sigma** (uncertainty)	Excel (.xlsx)	Gas Chromatography	11-12	Alan Bandy	Drexel University
CITE-3-LH*PRN *Note that data shows collection from a flight on 9/2 but this is not the time of a CITE-3 mission flight. These data points are likely from the flight on 9/12.	**Date** **Latitude** (Degrees, Minutes) **Longitude** (Degrees, Minutes) **Altitude** (ft) **Ethane** (ppbc) **Ethylene + FC** (ppbc) **Propane** (ppbc)	Text (.prn)	Laser Induced Photofragmentation	5-10, 13-16, 18-19	John Bradshaw	Georgia Institute of Technology
CITE-3-LH*xlsx *Note that data shows collection from a flight on 9/2 but this is not the time of a CITE-3 mission flight. These data points are likely from the flight on 9/12.	**Date** **Latitude** (Degrees, Minutes) **Longitude** (Degrees, Minutes) **Altitude** (ft) **Ethane** (ppbc) **Ethylene + FC** (ppbc) **Propane** (ppbc)	Excel (.xlsx)	Laser Induced Photofragmentation	5-10, 13-16, 18-19	John Bradshaw	Georgia Institute of Technology

	Acetylene (ppbc) **Propylene** (ppbc) **Isobutane** (ppbc) **Butane** (ppbc) **Total Chrom**. (ppbc) **Total Response** (ppbc) **Can (#)**					
CITE-3-GITM*PRN (ReadMe labelled as CITE-3-GITM_README*GIT)	**Time** (Hour, Minute, Second) **NO** (pptv) **1-sigma NO** (pptv) **NO_2** (pptv) **1-sigma NO_2** (pptv) **NO_y** (pptv) **1-sigma NO_y** (pptv) **Comment for NO measurement** **Comment for NO_2 measurement** **Comment for NO_y measurement**	Text (.prn)	Laser Induced Photofragmentation	4-20B	John Bradshaw	Georgia Institute of Technology

CITE-3-M*.GIT (ReadMe labelled as CITE-3-GITM_README*GIT)	**Time** (Hour, Minute, Second) **NO** (pptv) **1-sigma NO** (pptv) **NO_2** (pptv) **1-sigma NO_2** (pptv) **NO_y** (pptv) **1-sigma NO_y** (pptv) **Comment for NO measurement** **Comment for NO_2 measurement** **Comment for NO_y measurement**	Text (.GIT)	Laser Induced Photofragmentation	4-20B	John Bradshaw	Georgia Institute of Technology
CITE-3-M*.xlsx (ReadMe labelled as CITE-3-GITM_README*GIT)	**Time** (Hour, Minute, Second) **NO** (pptv) **1-sigma NO** (pptv) **NO_2** (pptv) **1-sigma NO_2** (pptv) **NO_y** (pptv) **1-sigma NO_y** (pptv) **Comment for NO measurement**	Excel (.xlsx)	Laser Induced Photofragmentation	4-20B	John Bradshaw	Georgia Institute of Technology

	Comment for NO_2 measurement **Comment for NO_y measurement**					
CITE-3-[89]_*_89*xlsx	**Start Time** (Hour, Minute, Second) **Stop Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop** (total seconds after midnight) **Code** (file readability) **Total Sulfur** (pptv) **Sigma** (uncertainty) **n** (samples taken) **Comment Value** (file readability)	Excel (.xlsx)	Metal Foil Collection, Filter Collection, Flame Photometric Detection	2, 4, 6-21B	Sherry Farwell	University of Idaho
CITE-3-PI6DMS*xlsx	**Start Time** (Hour, Minute, Second) **Stop Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop** (total seconds after midnight) **Code** (file readability) **DMS** (pptv) **Sigma** (uncertainty)	Excel (.xlsx)	Gas Chromatography	4-19	Ronald Ferek	University of Washington

	n (samples taken) **Comment Value** (file readability)					
CITE-3-PI6SO2*xlsx	**Start Time** (Hour, Minute, Second) **Stop Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop** (total seconds after midnight) **Code** (file readability) **SO2** (pptv) **Sigma** (uncertainty) **n** (samples taken) **Comment Value** (file readability)	Excel (.xlsx)	Gas Chromatography	4-19	Ronald Ferek	University of Washington
CITE-3-PI[78]0[89]*DAT (ReadMe labelled as CITE-3-PI7_PI8_READ.ME)	**Start Time** (Hour, Minute, Second) **Stop Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop** (total seconds after midnight) **Code** (file readability) **SO_2** (pptv) **Sigma** (uncertainty)	Text (.DAT)	Filter Collection	Filter Technique: 4-18 Continuous Technique: 4-10, 14-16, 19	H.W. Georgii	Institut fur Meteorologie und Geophysik

	n (samples taken) **Comment Value** (file readability)					
CITE-3-CS2_FL*PRN	**Start Time** (Hour, Minute, Second) **Stop Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop** (total seconds after midnight) **Code** (file readability) **CS_2** (pptv) **Sigma** (uncertainty) **n** (samples taken) **Comment Value** (file readability)	Text (.prn)	Gas Chromatography	4-8, 11-15	James Johnson	NOAA Pacific Marine Environmental Laboratory
CITE-3-DMS_FL*PRN	**Start Time** (Hour, Minute, Second) **Stop Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop** (total seconds after midnight) **Code** (file readability) **DMS** (pptv) **Sigma** (uncertainty)	Text (.prn)	Gas Chromatography	4-8, 11-19	James Johnson	NOAA Pacific Marine Environmental Laboratory

	n (samples taken) **Comment Value** (file readability)					
CITE-3-OCS_FL*PRN	**Start Time** (Hour, Minute, Second) **Stop Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop** (total seconds after midnight) **Code** (file readability) **OCS** (pptv) **Sigma** (uncertainty) **n** (samples taken) **Comment Value** (file readability)	Text (.prn)	Gas Chromatography	4-8, 11-15	James Johnson	NOAA Pacific Marine Environmental Laboratory
CITE-3-C3CO*DAT	**10 Second Average Time** (Hour, minute, second) **Altitude** (ft) **CO** (ppbv) **Surface Brightness Temperature** (PRT-5; °C) **Dewpoint Temperature** (DWPT**;**°C) **Ozone** (O3; ppbv)	Text (.DAT)	Differential Absorption Carbon Monoxide Measurement	6-19	Glen Sachse	NASA Langley

CITE-3-C3CO*MIN	**1 Minute Average Time** (Hour, minute) **CO** (ppbv) **Altitude** (ft)	Text (.MIN)	Differential Absorption Carbon Monoxide Measurement	6-19	Glen Sachse	NASA Langley
CITE-3-FL??-DMS*xlsx	**Start Time** (Hour, Minute, Second) **Stop Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop** (total seconds after midnight) **Code** (file readability) **DMS** (pptv) **Sigma** (uncertainty) **n** (samples taken) **Comment Value** (file readability)	Excel (.xlsx)	Gas Chromatography	4-19	Eric Saltzman	University of Miami
CITE-3-FL??-H2S*xlsx	**Start Time** (Hour, Minute, Second) **Stop Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop** (total seconds after midnight) **Code** (file readability) **H_2S** (pptv)	Excel (.xlsx)	Gas Chromatography	4-19	Eric Saltzman	University of Miami

	Sigma (uncertainty) **n** (samples taken) **Comment Value** (file readability)					
CITE-3-1CS2F*xlsx	**Start Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop** (total seconds after midnight) **Code** (file readability) **CS_2** (pptv) **Sigma** (uncertainty; pptv) **Average** (n number of samples) **Comment Value** (file readability)	Excel (.xlsx)	Gas Chromatography	5-7, 10	Donald Thornton	Drexel University
CITE-3-1H2SF*xlsx	**Start Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop** (total seconds after midnight) **Code** (file readability) **H_2S** (pptv) **Sigma** (uncertainty; pptv) **Average** (n number of samples)	Excel (.xlsx)	Gas Chromatography	4-10, 13-19	Donald Thornton	Drexel University

	Comment Value (file readability)					
CITE-3-1OCSF*xlsx	**Start Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop** (total seconds after midnight) **Code** (file readability) **OCS** (pptv) **Sigma** (uncertainty; pptv) **Average** (n number of samples) **Comment Value** (file readability)	Excel (.xlsx)	Gas Chromatography	4-5, 9, 11-21	Donald Thornton	Drexel University
CITE-3-1SO2F*xlsx	**Start Time** (Hour, Minute, Second) **Start** (total seconds after midnight) **Stop** (total seconds after midnight) **Code** (file readability) **SO_2** (pptv) **Sigma** (uncertainty; pptv) **Average** (n number of samples) **Comment Value** (file readability)	Excel (.xlsx)	Gas Chromatography	4, 8, 9, 11-21	Donald Thornton	Drexel University

Table: 7
Collection: CITE-3_Aerosol_AircraftInSitu_Electra_Data_1
DOI: 10.5067/ASDC/SUBORBITAL/CITE-3/Aerosol_AircraftInSitu_Electra_Data_1
Platform: NASA Electra
Dates: August 22 – September 29, 1989

EARTHDATA

Data ID	Key Variables	File Format	Instrument	Flight Numbers	Principal Investigator	Institution
CITE-3-C3*xlsx	**Label** **Aluminum** (Al; ng/m^3) **Silicon** (Si; ng/m^3) **Phosphorous** (P; ng/m^3) **Sulfur** (S; ng/m^3) **Chlorine** (Cl; ng/m^3) **Potassium** (K; ng/m^3) **Cadmium** (Ca; ng/m^3) **Titanium** (Ti; ng/m^3) **Vanadium** (V; ng/m^3) **Chromium** (Cr; ng/m^3) **Manganese** (Mn; ng/m^3) **Iron** (Fe; ng/m^3)	Excel (.xlsx)	Filters/Particle Induced X-Ray Emissions	7-19	Paulo Artaxo	University of Sao Paulo

	Nickel (Ni; ng/m^3) **Copper** (Cu; ng/m^3) **Zinc** (Zn; ng/m^3) **Bromine** (Br; ng/m^3) **Selenium** (Se; ng/m^3) **Strontium** (Sr; ng/m^3) **Zirconium** (Zr; ng/m^3) **Lead** (Pb; ng/m^3)					
CITE-3-C3F*GLG (ReadMe labelled as CITE-3-C3F_README*doc)	**Midpoint of 10 Second Average Time** (Hour, Minute, Second) **Altitude** (ft) **O_3 mixing ratio** (ppb) **Counts/sec*cm^3 from the large aerosol probe** (0.5-8.0 um) **Counts/sec*cm^3 from the small aerosol probe** (0.12-0.312 um) **Percentage of small aerosol counts occurring in size bin 1** (0.125 - 0.15 um diameter)	Text (.GLG) ReadMe (.DOC)	Chemiluminescence Knollenberg, Forward Scattering Spectrometer Probe, Active Scattering Aerosol Spectrometer Probe	4-21B	Gerald Gregory	NASA Langley

CITE-3-AEROSOL*DAT	**Label** **Mission Number** **Date** **Start Time** (GMT) **End Time** (GMT) **Height** (ft) **Comments**	Text (.DAT)	Alpha Decay	7-19	Enio Pereira	Instituto de Pesquisas Espaciasis
CITE-3-RADON*DAT	**Mission number** **Start Time** (GMT) **End Time** (GMT) **Radon** (atm/m^3) **Sigma** (Uncertainty; atm/m^3)	Text (.DAT)	Alpha Decay	7-19	Enio Pereira	Instituto de Pesquisas Espaciasis

Table: 8
Collection: CITE-3_MetNav _AircraftInSitu_Electra_Data_1
DOI: 10.5067/ASDC/SUBORBITAL/CITE-3/MetNav_AircraftInSitu_Electra_Data_1
Platform: NASA Electra
Dates: August 22 – September 29, 1989

EARTHDATA

Data ID	Key Variables	File Format	Instrument	Flight Numbers	Principal Investigator	Institution
CITE-3-CT3M*10S (ReadMe labelled as CITE-3-CT3M_READ.ME)	**Time** (GMT) **Altitude** (Alt; ft) **Latitude** (Lat; Degrees, Minutes) **Longitude** (Long; Degrees, Minutes) **Static Pressure** (StatP; mb) **Cabin Pressure** (Cab Pr; mb) **Differential Pressure** (Dif P; psi) **Ground Speed** (GrSp; knots) **Ground Track** (GTK; degrees) **Wind Direction** (WD; degrees) **Wind Speed** (WS; knots) **Static Temperature** (SAT; °C) **Dew Point Temperature** (DewPt; °C)	Text (.DAT)	Standard Aircraft Instruments	1-21B	John Barrick	NASA Langley

	Surface Brightness Temperature (PRT-5; °C) **Upward-looking Ultra-Violet Radiation** (UVZ; mW/cm^2) **Downward-looking Ultra-Violet Radiation** (UVN; mW/cm^2) **Pitch** (Degrees) **Roll** (Degrees) **Yaw** (Degrees)					

Resources:

CITE-2 Landing Page

CITE-3 Landing Page

Relevant Publications

Hoell Jr., J. M., D. L. Albritton, G. L. Gregory, R. J. McNeal, S. M. Beck, R. J. Bendura, and J. W. Drewry. (1990). Operational overview of NASA GTE/CITE 2 airborne instrument intercomparisons: Nitrogen dioxide, nitric acid, and peroxyacetyl nitrate. J. Geophys. Res., 95(D7), 10047–10054. https://doi.org/10.1029/JD095iD07p10047.

Hoell Jr., J.M., Davis, D.D., Gregory, G.L., McNeal, R.J., Bendura, R.J., Drewry, J.W., Barrick, J.D., Kirchoff, V.W.J.H, Motta, A.G, Navarro, R.L., Dorko, W.D., Owen, D.W. (1993). Operational overview of the NASA GTE/CITE 3 airborne instrument intercomparisons for sulfur dioxide, hydrogen sulfide, carbonyl sulfide, dimethyl sulfide, and carbon disulfide. J. Geophys. Res., 98(D12), 22875-23523. https://doi.org/10.1029/93JD00453.

Acronym List

Short Name	Long Name
CITE	Chemical Instrumentation Test and Evaluation
CS2	Carbon Disulfide
CO	Carbon Monoxide
DMS	Dimethyl Sulfide
GMT/GMAT	Greenwich Mean Time
GTE	Global Tropospheric Emissions
H2S	Hydrogen Sulfide
HNO3	Nitric Acid
NO	Nitrogen Oxide
NO2	Nitrogen Dioxide
NOy	Total Nitrogen Species
OCS	Carbonyl Sulfide
PAN	Peroxyacetyl Nitrate
PI	Principal Investigator
PPBC	Parts per Billion Carbon
PPBV	Parts per Billion by Volume
PPTV	Parts per Trillion by Volume
SO2	Sulfur Dioxide