

**National Climatic Data Center**

**DATA DOCUMENTATION**

**FOR**

**DATASET 9704 (DSI-9704)**

**NASA Global Atmospheric Sampling Program (GASP)**

**October 21, 2003**

National Climatic Data Center  
151 Patton Ave.  
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**1. Abstract:** The National Climatic Data Center (NCDC) has, in archive, digital data from the historical NASA Global Atmospheric Sampling Program (GASP). The GASP program began in 1972 with a feasibility study of the concept of using commercial airliners in routine service to obtain atmospheric data. While GASP was operational, from March 1975 to June 1979, NASA obtained data with instruments placed aboard a United Airlines B-747, two Pan American Airways B-747s, a Qantas Airways B-747, and the NASA CV-990 research aircraft. There is some data between 1972 and the official start of GASP in 1975. There is also some data between 1979, the year the program officially ended, and 1983. The objectives of GASP were to provide baseline data of selected atmospheric constituents in the upper troposphere and lower stratosphere and to document and analyze these data to 1) prove a better understanding of the dynamics of the atmosphere in the region where commercial aircraft flew, and 2) provide initial value boundary conditions for atmospheric models being used to assess potential adverse effects from aircraft exhaust emissions on the natural atmosphere. For each GASP flight, data acquisition began on ascent through the 6 KM altitude flight level, and terminated on descent through 6 KM. A complete GASP sampling cycle was 60 minutes, divided into 12 five minute sampling segments. During alternate segments (at 10 minute intervals), air sample data was recorded for all instruments. During the intervening segments, the system was on one of six different calibration cycles to allow for in-flight checks on instrument operation (if required). Whenever any calibration cycle was not needed for a given instrument, that instrument acquired air sample data during the segment. For normal GASP sampling, a 16 second recording was made at the end of each five minute sampling segment. The parameters that make up this digital data are beginning and ending times of the flight (GMT), ambient ozone, cabin ozone, water vapor, clouds, carbon monoxide, and filter samples of sulfate, nitrates, chlorides, and fluorides. Also included are tropopause pressure fields and other meteorological data from National Meteorological Center analyses. The National Meteorological Center is now the National Centers for Environmental Prediction (NCEP).

**2. Element Names and Definitions:**

**Format for DATA Records**

Bytes	Name	Parameter Description, Units and Comments
1-4	RECID	RECID='DATA'
5	LBFLG	LBFLG='L' if this is the last data record this flight; LBFLG='G' if this is the last GASP data record in the file and the following file is a GASP data file; LBFLG='T' is this is the last GASP data record is the file and the following file is a tropopause pressure file; otherwise LBFLG=''
6-9	RECORD	Record number on TAPID*

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10	FRAME	Frame number on TAPID*
11-12	MODE	Program mode*: = 4 - normal recordings = 10 - continuous recordings
13	TYPE	Record type*: = 'N' for normal recordings = 'L' for continuous limit recordings = 'C' for continuous recordings##
14	CYCLE	Calibration cycle number, or CYCLE='D' for data; cal and data cycles alternate at 5 min intervals, unless MODE = 10 or TYPE = 'L'
15-20	DATE	Mo=15-16, Da=17-18, Yr=19-20
21-24	TIME	Time (GMT), Hr=21-22, Min=23-24
25-30	ALTFAV	Pressure altitude (ft)
31-36	ALTMAV	Pressure altitude (meters) - see ALTAG, byte 44
37-43	PAMB	Ambient static pressure in hPa - calc from ALTFAV
44	ALTAG	ALTAG='C', 'D', or 'G' indicates climb, descent, or ground if ALTAG='T', ALTMAV and TRPRHM are geopotential heights (m)
45-49	LAT	Latitude (deg)
50	LATAG	Latitude hemisphere, 'N' or 'S'
51-56	LONG	Longitude (deg)
57	LONGTAG	Longitude hemisphere, 'E' or 'W'
58-62	XI	Aircraft position in NMC grid coordinates
63-67	YJ	Aircraft position in NMC grid coordinates
72	HEADGT	Tag for HEADG**
73-76	TASK	True airspeed (knots)
77-81	XMATAS	Flight mach number
82	TATAG	Tag for TASK and XMATAS**
83-86	WS	Wind speed (knots)
87-90	WSM	Wind speed (meters/sec)
91	WSTAG	Tag for WS and WSM**
92-95	WDEG	Wind direction (deg)
96	WDEGTG	Tag for WDEG**
97-100	SAT	Static (ambient) air temperature (deg C)
101	SATAG	Tag for SAT**
102-229	ACC (I)	Vertical acceleration (G's); 32 values each record at 8/sec

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230-233	ACCMAX	Max of ACC(I)
234-237	ACCMIN	Min of ACC(I)
238-239	NE	Number of times ACC(I) > 1.2 or ACC(I) <0.8
240	ACCTAG	Tag for ACC(I), ACCMAX, ACCMIN, NE**
241-245	ZEN	Solar elevation angle (deg); 0 deg = horizontal
246	SUNTAG	SUNTAG='N' if sun below horizon**
247-252	O3	Ozone data (ppbv)
253	O3TAG	Tag for O3** If O3TAG='Z', O3 = instrument zero (ppbv) - see text
254-259	O3A	Ozone ave (ppbv); for 128 sec preceding recording
260	O3ATAG	Tag for O3A**
261-266	O3S	Ozone std deviation (ppbv); for 128 sec preceding recording
267	O3STAG	Tag for O3S**
268-273	DFPTA	Dew/frost point temperature (deg C)
274-279	WVMRA	Water vapor mixing ratio (ppmv)
280	DFTAGA	Tag for DFPTA and WVMRA; if DFPTA ≥ SAT, DFTAGA='S'**
281-286	COAVG	Carbon monoxide data (ppbv)
287	COTAGA	Tag for COAVG** If COTAGA='Z', COAVG = instrument zero (mv) - see text If COTAGA='G', COAVG = instrument gain (mv) - see text
288-293	COA	Carbon monoxide ave (ppbv); for 128 sec preceding recording
294	COATAG	Tag for COA**
295-300	COSD	Carbon monoxide std deviation (ppbv); for 128 sec preceding recording
301	COSTAG	Tag for CASD**
302-311	PD1	Particle density for particles > D1 (particles/m**3)
312	PDTAG1	Tag for PD1**
313-322	PD2	Particle density for particles > D2 (particles/m**3)
323	PDTAG2	Tag for PD2**
324-333	PD3	Particle density for particles > D3 (particles/m**3)
334	PDTAG3	Tag for PD3**

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335-344	PD4	Particle density for particles > D4** (particles/m**3)
345	PDTAG4	Tag for PD4**
346-355	PD5	Particle density for particles > D5** (particles/m**3)
356	PDTAG5	Tag for PD5**
357-361	CLSEC	Time in clouds (sec) during 255 sec preceding recording
362-365	CLAYR	Number of cycles in and out of clouds (layers) during 255 sec preceding recording
366	CLTAG	Tag for CLSEC and CLAYR; if CLSEC > 0, CLTAG='C'**
367-373	TRPRMB	Tropopause pressure in hPa (mb); time and space interpolated from NMC data fields+
374	TPTAG	Tag for tropopause data+ If TPTAG='', TRPRMB from 12 hour interpolation If TPTAG='L', TRPRMB from 24 hour interpolation If TPTAG='E', TRPRMB from nearest NMC reporting period If TPTAG='T', TRPRMB from 1200 GMT reporting period# If TPTAG='M', data not available
375-381	DELP	DELP = TRPRMB - PAMB, in hPa (mb)+
382-387	TRPRHM	Tropopause height in meters If ALTAG#'T', TRPRHM from TRPRMB assuming std. atm. If LTAG='T', TRPRHM interpolated from NMC data fields
388-394	DELHGT	DELHGT = ALTFAV* from TRPRMB assuming std. atm.
395	GMTTAG	Tag for TIME** ++
396-401	CNC	Condensation nuclei data; number/cc
402	CNTAG	Tag for CNC**
403-408	AVA	Condensation nuclei data; number/cc - average over 240 sec prior to recording - see text
409	AVATAG	Tag for AVA**
410-415	ATKMAX	Max condensation nuclei (number/cc) during 240 sec period for AVA - see text
416	AMXTAG	Tag for ATKMAX**
417-422	ATKMIN	Min condensation nuclei (number/cc) during 240 sec

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		period for AVA - see text
423	AMNTAG	Tag for ATKMIN**
424-428	RHOR	Density ratio correction used in processing O3 and CO data - see text
429-433	DENS	Density ratio correction used in processing CN data - see text
434-440	O33	Inside (Cabin) ozone; ppbv
441	O33TAG	Tag for O33
442-446	CDENS	Density ratio correction used in processing O33 data - see text
447-452	RPFLOM	Conversion from particle counts to particle density
453-456	BLDGND	15 <sup>th</sup> stage bleed indicator - VL0010 only
457-460	BLFFLT	15 <sup>th</sup> stage bleed indicator - VL0010 only
461-512		Spares

\* Each recording period is 16 sec in duration with 4 frames/record; only 1 frame from each recording period is reported inless MODE = 10 or TYPE = 'L' or 'C'.

\*\* If TAG='M', corresponding data field will be zero; the 'M' tag is used whenever data are not available, have been edited out, or an instrument is in a calibration cycle which is not used directly in the data processing.

+ Added beginning with VL0004 to provide time and space interpolated tropopause data.

++ Added beginning with VL0006 to identify records for which GMT is not available

# Added beginning with VL0007 to identify tropopause data obtained from 1200 GMT arrays when GASP GMT is not available.

## Added beginning with VL0009 to identify continuous recordings with normal cal/data cycling - see CYCLE, byte 14.

3. **Start Date:** 19720101

4. **Stop Date:** 19831231

5. **Coverage:**

- a. Southernmost Latitude: -90.0S
- b. Northernmost Latitude: 90.0N
- c. Westernmost Longitude: -180.0W
- d. Easternmost Longitude: 180.0E

6. **How to Order Data:**

Ask NCDC's Climate Services about the cost of obtaining this data set.

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Phone: 828-271-4800  
FAX: 828-271-4876  
E-mail: [NCDC.Orders@noaa.gov](mailto:NCDC.Orders@noaa.gov)

7. **Archiving Data Center:**

Archive Branch  
National Climatic Data Center  
151 Patton Avenue  
Asheville, NC 28801

8. **Technical Contact:**

National Climatic Data Center  
151 Patton Avenue  
Asheville, NC 28801

9. **Known Uncorrected Problems:** None.

10. **Quality Statement:**

11. **Essential Companion Datasets:**

12. **References:**

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