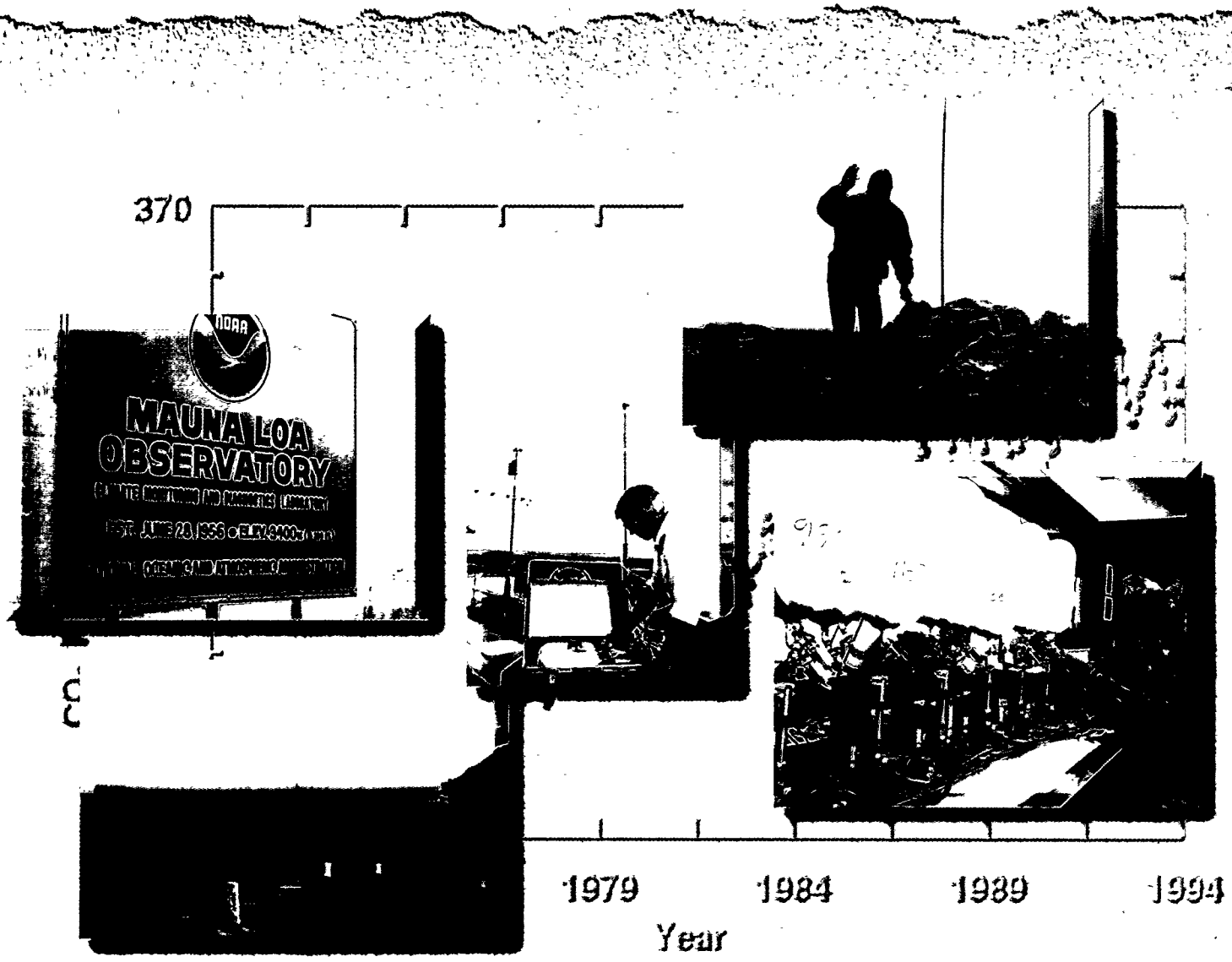
Atmospheric Carbon Dioxide Mixing Ratios from the NOAA Climate Monitoring and Diagnostics Laboratory Cooperative Flask Sampling Network, 1967 – 1993



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ON THE COVER

Upper left NOAA sign at Mauna Loa Observatory, Hawaii. (Photo courtesy of Dr. Russ Schnell, Director, Mauna Loa Observatory)

Lower left Air sampling location near Serreta Lighthouse on Terceira Island, Azores, Portugal. (Slide courtesy of Tom Conway)

Center Tom Conway, of NOAA/CMDL, demonstrating air sample collection on the roof of the CMDL Laboratory in Boulder, Colorado. (Photo courtesy of Warren Gretz)

Upper right Dr. Alexandru Bologa collecting the first air sample on the coast of the Black Sea at Constanta, Romania. (Slide courtesy of Tom Conway)

Lower right Patricia Lang, of NOAA/CMDL, measuring CO_2 in air samples collected at the CMDL cooperative air sampling network. (Photo courtesy of Warren Gretz)

The cover was designed and developed by Jamie P. Payne, Graphic Arts Department, Oak Ridge National Laboratory.

DISCLAIMER

ORNL/CDIAC-73
NDP-005/R3

ATMOSPHERIC CARBON DIOXIDE MIXING RATIOS FROM THE NOAA CLIMATE MONITORING AND DIAGNOSTICS LABORATORY COOPERATIVE FLASK SAMPLING NETWORK, 1967–1993

Contributed by

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ABSTRACT

Conway, T. J., and P. P. Tans. 1996. *Atmospheric Carbon Dioxide Mixing Ratios from the NOAA Climate Monitoring and Diagnostics Laboratory Cooperative Flask Sampling Network, 1967–1993.* ORNL/CDIAC-73, NDP-005/R3. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, Oak Ridge, Tennessee. 202 pp.

The National Oceanic and Atmospheric Administration's Climate Monitoring and Diagnostics Laboratory (NOAA/CMDL) has measured CO_2 in air samples collected weekly from a global network of sites since the late 1970s and from two stations since the late 1960s. Determinations of atmospheric CO_2 mixing ratios in the air samples collected in glass flasks are accomplished by nondispersive infrared gas analysis. All CMDL flask samples are measured relative to standards traceable to the World Meteorological Organization Central CO_2 Laboratory operated by C. D. Keeling at the Scripps Institution of Oceanography. These measurements constitute the most geographically extensive, carefully calibrated, internally consistent atmospheric CO_2 data set available and are essential for studies aimed at better understanding the global carbon cycle budget.

This data report documents monthly atmospheric CO_2 mixing ratios and CO_2 measurements obtained by analyzing individual flask air samples from the NOAA/CMDL global cooperative flask sampling network. Records of measurements at 40 land-based sites and of shipboard measurements covering 14 latitude bands in the Pacific Ocean and South China Sea are provided. These include the earliest NOAA/CMDL flask CO_2 records, which date back to 1967, and records for all operating sites through 1993. Approximately 60,000 individual flask CO_2 measurements are provided, including those not considered indicative of regional background tropospheric conditions. Each measurement is flagged according to the degree the CO_2 determination satisfies the NOAA/CMDL data selection criteria.

Analysis of the NOAA/CMDL flask CO_2 database shows a long-term increase in atmospheric CO_2 mixing ratios since the late 1960s. Growth rates for individual sites and the global growth rate vary over time. The database shows a hemispheric gradient that varies over time from 2-5 parts per million (ppm). Detailed analyses have been published by the authors and these reprints are provided as an appendix of this data report.

This report and all the data it describes are available from the Carbon Dioxide Information Analysis Center (CDIAC) without charge. The NOAA/CMDL flask CO_2 database comprises 163 data files totaling 8.5 megabytes in size. The data are provided on a variety of media, including 9-track magnetic tape, IBM- or Macintosh-formatted floppy diskettes, 8-mm tape, and 0.25-inch tape cartridges. This database may also be obtained by accessing CDIAC's anonymous file transfer protocol (FTP) area or the NOAA/CMDL anonymous FTP area on the Internet. This database may be subsetted or reformatted for users upon request. This report describes how the samples are collected and analyzed and how the data are processed, defines limitations and restrictions of the data, describes the contents and format of the data files, provides tabular listings of the monthly CO_2 records, and contains two reprints that offer greater detail on methodologies and analysis results.

PART 1

OVERVIEW

1. NAME OF THE NUMERIC DATA PACKAGE

Atmospheric Carbon Dioxide Mixing Ratios from the NOAA Climate Monitoring and Diagnostics Laboratory Cooperative Flask Sampling Network, 1967–1993

2. PRINCIPAL INVESTIGATORS

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3. KEYWORDS

Atmospheric carbon dioxide mixing ratios; atmospheric carbon dioxide concentrations; monitoring network; flask sampling; infrared gas analysis

4. BACKGROUND INFORMATION

The National Oceanic and Atmospheric Administration's (NOAA) Climate Monitoring and Diagnostics Laboratory (CMDL) has measured CO_2 in flask air samples from a global network of sites since the late 1970s and from Niwot Ridge, Colorado, since the late 1960s. The size of this network has grown over time and presently consists of 38 fixed sampling sites. The measurements from these sites are complemented by shipboard measurements made in the Pacific Ocean and South China Sea (Fig. 1 and Table 1). Determinations of CO_2 mixing ratios are made by nondispersive infrared gas analysis. These measurements constitute the most geographically extensive, carefully calibrated, internally consistent atmospheric CO_2 data set available (Conway et al. 1994a).

Results from analysis of CO_2 measurements from the NOAA/CMDL cooperative flask sampling network have been presented in Komhyr et al. (1985a), Tans et al. (1989a,b; 1990), Thoning et al. (1989), and Conway et al. (1988, 1993, 1994a). Atmospheric CO_2 mixing ratios from individual flasks have been documented by the Carbon Dioxide Information Analysis Center (CDIAC) in Gammon et al. (1984) and Conway and Tans (1990). Monthly atmospheric CO_2 mixing ratios have been documented in Conway et al. (1990, 1991, 1994b). This data document provides atmospheric CO_2 mixing ratio records from individual flasks for all past and present sampling locations and monthly CO_2 mixing ratio records for all sites for which sufficient data exists to calculate representative monthly averages. The earliest NOAA/CMDL flask CO_2 measurements date back to 1967, and virtually all sites have records through the end of 1993.

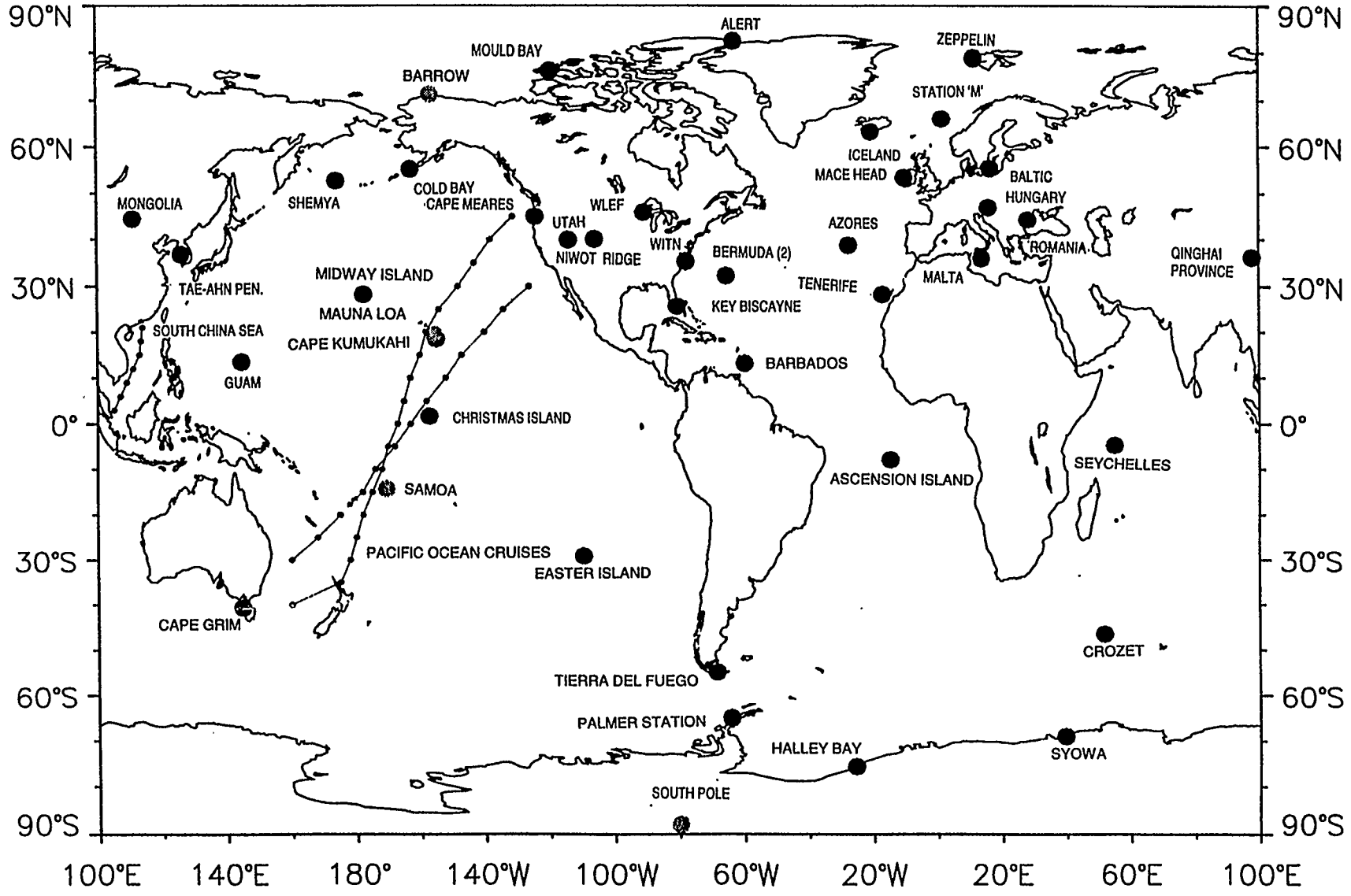

Fig. 1. Locations of the Climate Monitoring and Diagnostics Laboratory cooperative flask-sampling network sites.

Table 1. Summary of the NOAA/CMDL flask sampling sites

Site code	Site	Country	Cooperating agency[a]	Site type	Latitude	Longitude	Elevation (m)	Period of record
ALT	Alert, Northwest Territories	Canada	Environment Canada/AES	barren coastal hill	82°27′ N	62°31′ W	210	1985–93
AMS	Amsterdam Island	France	Centre des Faibles Radioactivités	island seashore	37°57′ S	77°32′ E	150	1979–90
ASC	Ascension Island	U.K.	USAF, Pan American World Airways	island seashore	7°55′ S	14°25′ W	54	1979–93
AVI	St. Croix, Virgin Islands	U.S.	Fairleigh Dickinson University	island seashore	17°45′ N	64°45′ W	3	1979–90
AZR	Azores (Terceira Is.)	Portugal	USAF/7th Weather Wing	air base	38°45′ N	27°05′ W	30	1979–92
BAL	Baltic Sea	Poland	MIR, Sea Fisheries Institute	ferry	55°30′ N	16°40′ E	7	1992–93
BME	St. David's Head	Bermuda	Atmosphere/Ocean Chemistry Experiment	rocky seashore	32°22′ N	64°39′ W	30	1989–93
BMW	Southampton	Bermuda	Bermuda Biological Station	promontory seashore	32°16′ N	65°53′ W	30	1989–93
BRW	Point Barrow, Alaska	U.S.	CMDL baseline observatory	Arctic coastal seashore	71°19′ N	156°36′ W	11	1971–93
CBA	Cold Bay, Alaska	U.S.	NOAA/National Weather Service	treeless peninsula	55°12′ N	162°43′ W	25	1978–93

Table 1. (continued)

Site code	Site	Country	Cooperating agency[a]	Site type	Latitude	Longitude	Elevation (m)	Period of record
CGO	Gape Grim, Tasmania	Australia	CSIRO/Division of Atmospheric Research	promontory seashore	40°41′ S	144°41′ E	94	1984–93
CHR	Christmas Island	Kiribati	Scripps Institution of Oceanography	island seashore	1°42′ N	157°19′ W	3	1984–93
CMO	Cape Meares, Oregon	U.S.	Oregon Graduate Institute of Science & Technology	promontory seashore	45°29′ N	124°00′ W	30	1982–93
CRZ	Crozet, Indian Ocean	France	Centre des Faibles Radioactivités	island seashore	46°27′ S	51°51′ E	120	1991–93
GMI	Guam, Mariana Islands	U.S. Territory	University of Guam	island seashore	13°26′ N	144°47′ E	2	1979–93
GOZ	Dwejra Point, Gozo	Malta	Ministry of Environment	promontory seashore	36°03′ N	14°11′ E	30	1993
HBA	Halley Bay	Antarctica	British Antarctic Survey	barren seashore	75°40′ S	25°30′ W	10	1983–93
HUN	Hegyhatsal	Hungary	Hungarian Meteorological Service	vegetated plain	46°58′ N	16°23′ E	240	1993
ICE	Heimaey, Vestmannaeyjar	Iceland	Icelandic Meteorological Service	lighthouse	63°15′ N	20°09′ W	100	1992–93

Table 1. (continued)

Site code	Site	Country	Cooperating agency[a]	Site type	Latitude	Longitude	Elevation (m)	Period of record
ITN	Grifton, North Carolina	U.S.	WITN Television	television broadcast tower	35°21′ N	77°23′ W	505	1992–93
IZO	Tenerife, Canary Islands	Spain	Izaña Observatory/ Spanish National Meteorological Institute	volcanic mountain	28°18′ N	16°29′ W	2300	1991–93
KEY	Key Biscayne, Florida	U.S.	NOAA/Atlantic Oceanographic and Meteorological Lab.	coastal island seashore	24°40′ N	80°12′ W	3	1972–93
KUM	Cape Kumukahi, Hawaii	U.S.	CMDL site	island seashore	19°31′ N	154°49′ W	3	1971–93
MBC	Mould Bay, Northwest Territories	Canada	Environment Canada/AES	island tundra	76°14′ N	119°20′ W	15	1980–93
MHT	Mace Head, County Galway	Ireland	University College, Galway	island promontory	53°26′ N	9°44′ W	5	1991–93
MID	Sand Island, Midway	U.S.	U.S. Navy/ITT	island seashore	28°13′ N	177°22′ W	4	1985–93
MLO	Mauna Loa, Hawaii	U.S.	CMDL baseline observatory	barren volcanic mountain slope	19°32′ N	155°35′ W	3397	1969–93

Table 1. (continued)

Site code	Site	Country	Cooperating agency[a]	Site type	Latitude	Longitude	Elevation (m)	Period of record
NWR	Niwot Ridge, Colorado	U.S.	University of Colorado/INSTAAR	alpine mountain	40°03′ N	105°38′ W	3749	1968–93
OPC	Shipboard measurements aboard the *California Star*		Blue Star Line, Ltd.	ocean				1987–93
PAC	Shipboard measurements aboard the *Southland Star*		Blue Star Line, Ltd.	ocean				1987–93
PAW	Shipboard measurements aboard the *Wellington Star*		Blue Star Line, Ltd.	ocean				1987–93
PSA	Palmer Station (Anvers Is.)	Antarctica	National Science Foundation/Antarctic Support Associates	barren island seashore	64°55′ S	64°00′ W	10	1978–93
QPC	Qinghai Province	Peoples Republic of China	Chinese Academy of Meteorological Sciences	semi-desert	36°16′ N	100°55′ E	3810	1991–93
RPB	Ragged Point	Barbados	International Science Consultants	island seashore	13°10′ N	59°26′ W	3	1987–93
SEY	Mahé Island	Seychelles	New Mexico State Univ./ Physical Science Lab.	island seashore	4°40′ S	55°10′ E	3	1980–93
SGI	South Georgia Island	U.K.	British Antarctic Survey	island seashore	54°00′ S	38°03′ W	30	1989–92

Table 1. (continued)

Site code	Site	Country	Cooperating agency[a]	Site type	Latitude	Longitude	Elevation (m)	Period of record
SHM	Shemya Island, Alaska	U.S.	USAF	barren island	52°43′ N	174°06′ E	40	1985–93
SMO	American Samoa	U.S. Territory	CMDL baseline observatory	island rocky promontory	14°15′ S	170°34′ W	30	1972–93
SPO	Amundsen Scott (South Pole)	Antarctica	CMDL baseline observatory/National Science Foundation	ice- and snow-covered plateau	89°59′ S	24°48′ W	2810	1975–93
STC	Ocean Station "C"	U.S.	NOAA/National Weather Service	open ocean	54°00′ N	35°00′ W	6	1968–73
STM	Ocean Station "M"	Norway	Norway Meteorological Institute	open ocean	66°00′ N	2°00′ E	6	1981–93
SYO	Syowa Station	Antarctica	Japanese Antarctic Research Expedition/ National Institute for Polar Research	barren island seashore	69°00′ N	39°35′ E	11	1986–93
TAP	Tae-ahn Peninsula	South Korea	Korea National University of Education	vegetated peninsula	36°44′ N	126°08′ E	20	1990–93
UTA	Wendover, Utah	U.S.	NOAA/National Weather Service	desert	39°54′ N	113°43′ W	1320	1993
UUM	Ulaan Uul	Mongolia	Mongolian Hydrometeor-ological Service	desert	44°27′ N	111°06′ E	914	1992–93

[a] AES = Atmospheric Environment Service; CMDL = Climate Monitoring and Diagnostics Laboratory; CSIRO = Commonwealth Scientific and Industrial Research Organisation; INSTAAR = Institute for Arctic and Alpine Research (University of Colorado); NOAA = National Oceanic and Atmospheric Administration; USAF = United States Air Force.

5. SAMPLING METHODS AND DATA SELECTION CRITERIA

Flask samples are always collected in pairs, once or twice per week, on a schedule determined largely by the sample collector. The sample collectors have been given guidelines concerning preferred wind speeds, wind directions, and time of day for sample collection. Whole air samples are collected with no attempt to remove water vapor. Samples are dried during analysis by using a cryogenic trap at –70°C.

When sampling first started in 1967, air samples were collected in cylindrical glass flasks tapered at both ends to ground-glass stopcocks lubricated with hydrocarbon grease. From 1980 to 1985, samples at several sites were collected in spherical 5-L flasks equipped with a single ground-glass stopcock. (These flasks were filled by the evacuation method described later in this section.) In 1983, NOAA/CMDL began to measure CH_4 in the flask samples. Experiments at this time revealed that CO mixing ratios increased with time in the greased flasks. In 1989, 0.5-L glass flasks equipped with glass piston Teflon O-ring stopcocks were introduced into the network so CO could be measured in addition to CO_2 and CH_4. In 1990, the NOAA/CMDL began to measure ratios of $^{13}C/^{12}C$ and $^{18}O/^{16}O$ of CO_2 in the flask samples. Because the larger volume flasks improved the precision of the isotopic measurements, 2.5-L glass flasks with two Teflon O-ring stopcocks began to replace the 0.5-L flasks in 1991. In 1994, the conversion of the network to 2.5-L flasks was completed.

From 1968 to 1980, collectors used a hand-held aspirator bulb to pull air through the flasks. In 1980, a portable battery-powered pumping unit was introduced. This method allowed the sample collector to move downwind while the flasks, connected in series, were being flushed. It also enabled pressurization of the flasks and incorporated an intake line that could be extended to 2 m above the ground. This device resulted in improved agreement between members of flask pairs and decreased scatter in the measurements. To avoid artifacts caused by this inhomogeneity in the data quality, most CMDL analyses of the flask data begin with the 1981 data.

The sampling method changed again in mid-1990 when an improved portable sampler was introduced. Although the sampling principles were unchanged, the new sampler employed a single, larger battery; a more rugged pump with a higher capacity; a 5-m intake line; and a back-pressure regulator to control the pressure in the flasks.

The effect of the flask and sampler improvements has been an increase in the percentage of sample pairs meeting a CO_2 agreement criterion of 0.5 ppm, from ~75% in the mid-1980s to ~90% in 1992. When overlapped sampling was conducted at several sites, no offsets due to the new flasks or sampling equipment were observed.

At Barrow, Niwot Ridge, Mauna Loa, Cape Kumukahi, Christmas Island, and Samoa, flask samples have also been collected in evacuated 3-L flasks. This type of flask is also used on the containerships making regular voyages in the Pacific Ocean between Los Angeles and New Zealand. The evacuation method involves filling two flasks in rapid succession by holding each flask into the wind to purge the dead volume in the flask inlet, opening the stopcock, and allowing each flask to fill with air to ambient atmospheric pressure. In overlapped sampling at Mauna Loa and Niwot Ridge, no significant difference was found between the 3-L flasks and the pressurized flasks. At Barrow and Cape Kumukahi, there is an indication of an offset of ~0.3 ppm, with the evacuated flasks generally being higher.

From 1968 until 1980, a mercury displacement pump was used to transfer the air manually from the flasks to a nondispersive infrared (NDIR) analyzer (Komhyr et al. 1983). In 1980, this manual apparatus was replaced by a semiautomatic analysis apparatus described by Komhyr et al. (1983). In 1988, the semiautomatic system was replaced by a more highly automated system that gave more precise CO_2 measurements and could handle up to three times as many flasks per analysis day.

All the CMDL CO_2 measurements are reported in the World Meteorological Organization's (WMO) X93 mole fraction scale. The CMDL measurements are made using standard gases traceable to the WMO Central CO_2 Laboratory operated by C. D. Keeling at Scripps Institution of Oceanography (Thoning et al. 1987). From 1968 to 1980, the working standard gases consisted of CO_2 in N_2. From 1980 to 1990, the secondary standards were CO_2 in natural air, and the tertiary and working gases were CO_2 in synthetic air composed of N_2, O_2, and Ar (Komhyr et al. 1985a). Since 1990, only CO_2-in-natural-air standards have been used.

The data selection methods used to obtain the values from which monthly and annual means are calculated have been discussed in detail by Komhyr et al. (1985a), Conway et al. (1988), and Conway et al. (1994), so only a brief description will be given here. First, both members of a sample pair are flagged when the CO_2 difference between them is greater than 0.5 ppm. Before 1989, one value of a bad pair was sometimes retained, based on the results of the curve-fitting procedure described below. Since 1989, both members of bad pairs are automatically rejected. Samples affected by improper sampling techniques or analytical problems are also flagged as rejected data. A curve is fit to the remaining data, and values lying more than ±3 residual standard deviations from the curve are flagged as not representing well-mixed, regionally representative air masses. The curve-fitting procedure is repeated until no more samples are flagged. The fitted curves are then used to calculate monthly and annual means. Most analyses of the NOAA/CMDL flask CO_2 data use only the retained data, but the samples flagged as not representative of background conditions may still contain useful information and are provided here.

6. APPLICATIONS OF THE DATA

Because the NOAA/CMDL flask CO_2 database documents the global distribution of atmospheric CO_2 over the past several decades (Fig. 2), it has been and can be used for many carbon cycle and global climate change-related studies. Long-term, precise measurements from a network of remote sampling sites such as this one are essential for researchers and modelers trying to elucidate the global carbon-cycle budget. This database, coupled with CMDL's other trace gas and trace gas-related (e.g., atmospheric carbon isotopes) measurements, has made an enormous contribution toward the present day understanding of the sources and sinks of the global carbon-cycle budget.

When using the CO_2 flask data in a publication or presentation, you should acknowledge the NOAA/CMDL Carbon Cycle Group. The principal investigators would appreciate being notified of any studies involving the data and would also like to receive preprints of publications to ensure that the quality and limitations of the NOAA/CMDL data are accurately represented. Feedback from users may also help to improve the quality of the data and the location of the sampling sites. Comments regarding the **readme** files and the data files are encouraged. The principal investigators may be reached at the following electronic mail addresses:

tconway@cmdl.noaa.gov or ptans@cmdl.noaa.gov

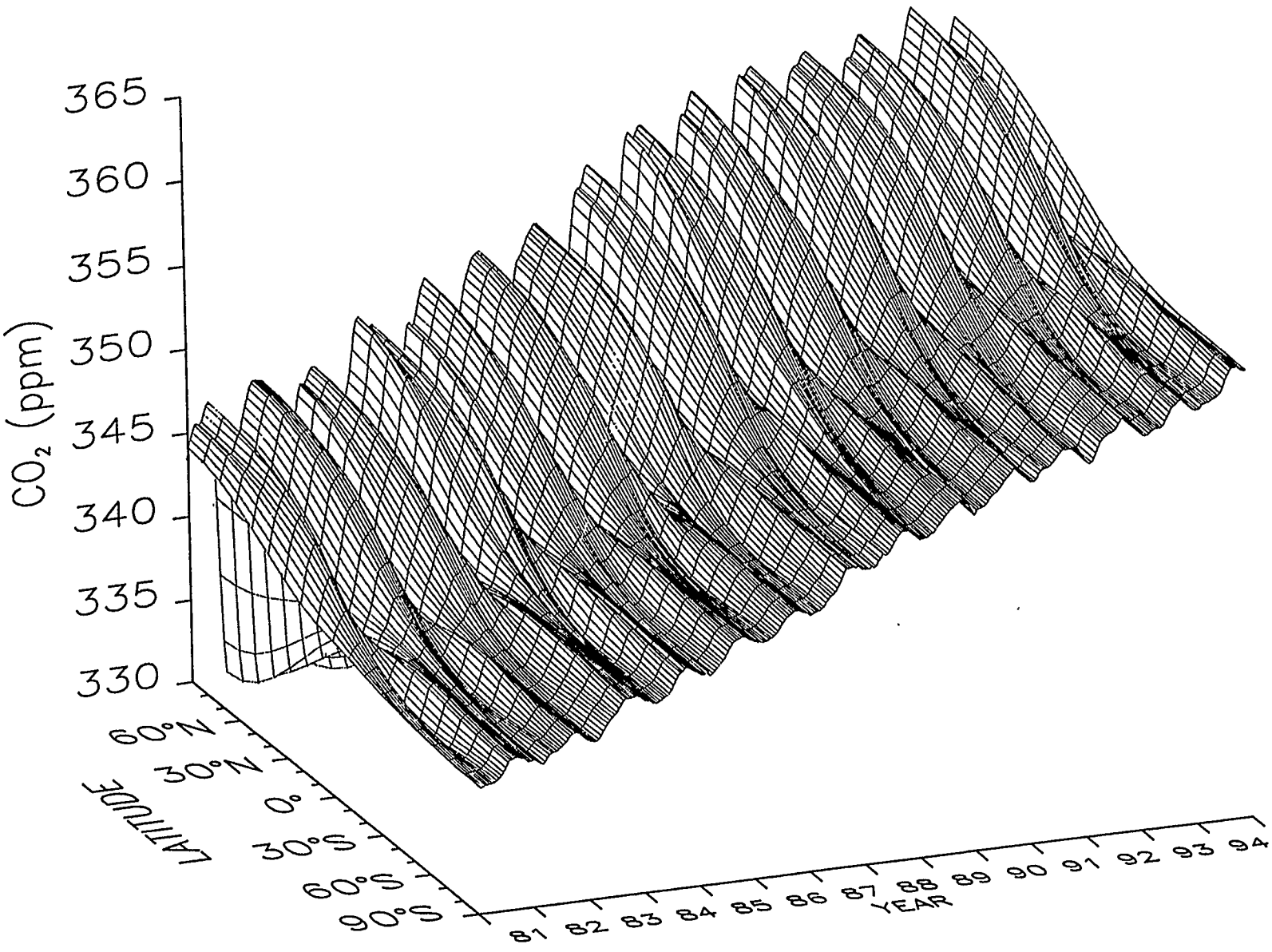

Fig. 2. Global distribution of atmospheric carbon dioxide.

7. DATA LIMITATIONS AND RESTRICTIONS

The global carbon cycle is so complex and intricate that even a network as dense as the NOAA/CMDL global, cooperative flask network cannot provide sufficient data to resolve all budget complexities. Nevertheless, the network is substantially larger than any other trace gas-monitoring network in the world and is expanding. The extension of the network in recent years to include data-sparse regions, continental sites, and shipboard measurements has been driven by data needs to address specific global carbon-cycle research questions.

Weekly flask sampling is sufficient to identify long-term trends in atmospheric CO_2 mixing ratios and to identify regional and hemispheric atmospheric CO_2 features. However, this weekly sampling regime may not provide sufficient data for some studies, such as those looking at diurnal or hourly variations in the atmospheric CO_2 records. For these studies, individuals may want the NOAA/CMDL continuous CO_2 database from their four *in situ* monitoring sites (Barrow, Mauna Loa, Samoa, and the South Pole). Like the database described in this numeric data package (NDP), the continuous CO_2 database is available from both CMDL and CDIAC.

Whereas NOAA/CMDL CO_2 flask data have been expressed in several Scripps Institution of Oceanography (SIO) provisional CO_2 calibration scales, the data presented here have been updated to the SIO 1993 manometric mole fraction scale by using SIO calibration values of 15 NOAA/CMDL reference gases with concentrations ranging from 246.6 to 520.7 ppm. Corrections for the temporal drift of the calibration gases used for sample analyses were applied where necessary. Corrections for nonlinearity of the NDIR analyzer have been applied as needed since sampling began in the late 1960s.

Some of the early flasks were not suitable for particular locations or for sampling the full suite of parameters measured by NOAA/CMDL. However, the flasks presently used by NOAA/CMDL are not believed to have the limitations of the earlier flasks and are suitable for monitoring numerous gas species simultaneously.

This database contains some CO_2 measurements that are not considered indicative of background tropospheric conditions. **Please pay attention to the flag codes associated with each CO_2 determination.** To avoid erroneous analysis and interpretation of these data, users should read and understand all associated **readme** files before using the data files. Users are strongly advised to consult the relevant published literature. Although NOAA/CMDL has attempted to provide the most accurate and precise measurements possible in a timely manner, this database is subject to change. The NOAA/CMDL Carbon Cycle Group reserves the right to adjust the data in these files on the basis of recalibrations of reference gases and instruments.

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9. QUALITY ASSURANCE CHECKS AND DATA-PROCESSING ACTIVITIES PERFORMED BY CDIAC

An important part of the data documentation and dissemination process at CDIAC is the quality assurance (QA) of data before distribution. Data received at CDIAC are rarely in perfect condition for immediate distribution, regardless of the source. To guarantee data of the highest possible quality, CDIAC conducts extensive QA reviews, which involve examining the data for completeness, reasonableness, and accuracy. Although these reviews have common objectives, they are tailored to each data set, often requiring extensive programming efforts. This time-consuming process is an important component in the value-added concept of assuring accurate, usable data for researchers.

The NOAA/CMDL flask CO_2 database contains CO_2 measurements and other parameters from many sites. That only a few minor problems were discovered by CDIAC reflects the considerable effort and scrutiny exerted by the NOAA/CMDL Carbon Cycle Group in providing high-quality, well-documented, consistently-formatted data to an international scientific audience. The few problems encountered by CDIAC were quickly addressed and resolved by the NOAA/CMDL Carbon Cycle Group. The following summarizes the QA checks and data-processing activities performed by CDIAC.

QA Checks

CDIAC obtained the original NOAA/CMDL flask CO_2 database from the NOAA/CMDL Carbon Cycle Group anonymous FTP area as two UNIX "tar" files. These files were transferred to CDIAC using FTP commands and exploded (i.e., untarred). Working copies of the files were created and processed in the following ways:

1. All data files contributed by the NOAA/CMDL Carbon Cycle Group were checked to ensure that each was formatted as stated, contained the data described, and contained the period of record specified.

2. Each file was checked to ensure that the prescribed missing value conventions (i.e., -999.99 for CO_2 mixing ratios and 99 for date parameters) were consistent throughout all files and that no other missing value designations were used in the files.

3. Frequencies of occurrence were generated for the instrument codes and data selection codes to assess the abundances of each code, check for bogus codes, and permit documentation of all possible codes.

4. Mean values were generated for each numeric variable in each data file and these values were checked for reasonableness (e.g., a range of month values from 1 to 12).

5. All data were plotted. Extreme values were identified, and these values were traced to the original data files to ensure that nonbackground flag codes were associated with each value.

Data Processing

1. CDIAC did not alter the format of the NOAA/CMDL flask CO_2 database files. The files distributed by CDIAC are identical in format to the files distributed by NOAA/CMDL.

2. To assist users wishing to retrieve and process fewer files, two files were created by CDIAC from the >100 files distributed by NOAA/CMDL. One (**all.co2**) contains CO_2 mixing ratios from all individual flask air samples for all sites except the shipboard measurements. The second file (**allmm.co2**) contains the monthly atmospheric CO_2 measurements for all sites, again excluding the shipboard measurements.

3. The annual values shown in the data listings in Appendix B were generated by CDIAC for those wishing to have annual atmospheric CO_2 mixing ratios. Annual values were calculated arithmetically for years having all 12 monthly values. These values are not provided in the machine-readable data files.

10. HOW TO OBTAIN THE DATA AND DOCUMENTATION

The NOAA/CMDL flask CO_2 database is available in machine-readable form, upon request, from CDIAC without charge. CDIAC will also distribute subsets of the database as needed. The NOAA/CMDL flask CO_2 database can be acquired from CDIAC's anonymous FTP area (see FTP access instructions below), on 9-track magnetic or 8-mm tape, or on IBM- or Macintosh-formatted floppy diskettes. Requests for 9-track magnetic tapes should include preferred tape specifications (i.e., 1600 or 6250 BPI, labeled or nonlabeled, ASCII or EBCDIC characters, variable or fixed-record lengths). Requests not accompanied by tape specifications will be filled on 9-track, 6250 BPI, nonlabeled tapes with ASCII characters with the file attributes shown on pages 21–29.

This documentation is available only from CDIAC. Requests should be addressed to

Carbon Dioxide Information Analysis Center
World Data Center–A for Atmospheric Trace Gases
Oak Ridge National Laboratory
Post Office Box 2008
Oak Ridge, TN 37831-6335, USA

The tapes, diskettes, and documentation may also be ordered by telephone, facsimile, or electronic mail:

Telephone: (423) 574-3645 or (423) 574-0390
Fax: (423) 574-2232

Electronic mail: cdiac@ornl.gov

FTP access: **ftp cdiac.esd.ornl.gov** (or 128.219.24.36)
Enter **anonymous** as the userid.
Enter your electronic mail address as the password (e.g., **tab@ornl.gov**)
Change to the directory **/pub/ndp005r3**

The NOAA/CMDL flask CO_2 database may also be obtained in machine-readable form from CMDL's anonymous FTP area. This area may be reached at the following address:

FTP access: **ftp ccg.cmdl.erl.gov** (or 140.172.192.20)
Enter **anonymous** as the userid.
Enter your electronic mail address as the password (e.g., **tab@ornl.gov**)
Change to the directory **/pub/co2/flask**

The file **flask.co2.tar.Z** is a compressed tar file containing all of the files in the **flask** directory. If you would like all of the flask data, retrieve this file instead of each individual site file. File transfer should be in binary mode for this file, for example,

ftp> binary
ftp> get flask.co2.tar.Z
ftp> bye

Then type on your system

$ uncompress flask.co2.tar.Z
$ tar xvf flask.co2.tar

This will create the directory **complete** and place each of the flask site files inside that directory.

PART 2

CONTENT AND FORMAT OF DATA FILES

11. LISTING OF FILES PROVIDED

The following is a list of the files that compose the NOAA/CMDL flask CO_2 database and that are distributed by CDIAC along with this documentation. These files are available on a variety of media (see Sect. 10, How To Obtain The Data). This listing has been tailored to reflect a 9-track magnetic tape request. The record formats, record lengths, and block sizes shown are the defaults for those not specifying these parameters when requesting machine-readable data files on 9-track magnetic tape. The default tape density, labeling, and characters are 6250 BPI, nonlabeled, and ASCII, respectively.

File number, name, and description	Logical records	FTP file size in K	Record format[a]	Block size	Record length
1. General descriptive information file (**readme**)	577	30.9	FB	8000	80
2. FORTRAN 77 data retrieval code to read and print the files containing atmospheric CO_2 records from individual flasks in the NOAA/CMDL flask air sampling network (files 6–107) (**flask.for**)	40	1.5	FB	8000	80
3. SAS® data retrieval code to read and print files 6–107 (**flask.sas**)	8	0.3	FB	8000	80
4. FORTRAN 77 data retrieval code to read and print the files containing monthly NOAA/CMDL flask CO_2 records (files 108–163) (**month.for**)	32	0.9	FB	8000	80
5. SAS® data retrieval code to read and print files 108–163 (**month.sas**)	6	0.1	FB	8000	80
Files containing atmospheric CO_2 records derived from individual flask air samples for 42 sites					
6. All sites (**all.co2**) (does not include shipboard measurement files 35–86 and files 90–96)	59247	3910.3	FB	6500	65
7. Alert, Northwest Territories, Canada (**alt.co2**)	903	59.6	FB	6500	65
8. Amsterdam Island, Indian Ocean (France) (**ams.co2**)	1528	100.8	FB	6500	65

9.	Ascension Island, Atlantic Ocean (United Kingdom) **(asc.co2)**	2743	181.0	FB	8000	80
10.	St. Croix, Virgin Islands, United States **(avi.co2)**	2217	146.3	FB	6500	65
11.	Azores (Terceira Island), North Atlantic Ocean (Portugal) **(azr.co2)**	1133	74.7	FB	6500	65
12.	Baltic Sea, Poland **(bal.co2)**	296	19.5	FB	6500	65
13.	Bermuda (east), North Atlantic Ocean (United Kingdom) **(bme.co2)**	478	31.5	FB	6500	65
14.	Bermuda (west), North Atlantic Ocean (United Kingdom) **(bmw.co2)**	408	26.9	FB	6500	65
15.	Point Barrow, Alaska, United States **(brw.co2)**	4949	326.6	FB	6500	65
16.	Cold Bay, Alaska, United States **(cba.co2)**	2766	182.5	FB	6500	65
17.	Cape Grim, Tasmania, Australia **(cgo.co2)**	1178	77.7	FB	6500	65
18.	Christmas Island, Indian Ocean (Kiribati) **(chr.co2)**	843	55.6	FB	6500	65
19.	Cape Meares, Oregon, United States **(cmo.co2)**	1909	126.6	FB	6500	65
20.	Crozet, Indian Ocean (France) **(crz.co2)**	180	11.8	FB	6500	65
21.	Guam, Pacific Ocean (U.S. Territory) **(gmi.co2)**	2514	165.9	FB	6500	65
22.	Dwejra Point, Gozo, Malta **(goz.co2)**	30	1.9	FB	6500	65
23.	Halley Bay, Antarctica **(hba.co2)**	585	38.6	FB	6500	65
24.	Hegyhatsal, Hungary **(hun.co2)**	98	6.4	FB	6500	65
25.	Heimaey, Vestmannaeyjar, Iceland **(ice.co2)**	133	8.7	FB	6500	65
26.	Grifton, North Carolina, United States **(itn.co2)**	151	9.9	FB	6500	65

27.	Izaña Observatory, Tenerife, Canary Islands, Spain (**izo.co2**)	196	12.9	FB	6500	65
28.	Key Biscayne, Florida, United States (**key.co2**)	1516	100.0	FB	6500	65
29.	Cape Kumukahi, Hawaii, United States (**kum.co2**)	3597	237.4	FB	6500	65
30.	Mould Bay, Northwest Territories, Canada (**mbc.co2**)	2528	166.9	FB	6500	65
31.	Mace Head, County Galway, Ireland (**mht.co2**)	278	18.3	FB	6500	65
32.	Sand Island (Midway), Pacific Ocean (United States) (**mid.co2**)	959	63.3	FB	6500	65
33.	Mauna Loa, Hawaii, United States (**mlo.co2**)	4576	302.0	FB	6500	65
34.	Niwot Ridge, Colorado, United States (**nwr.co2**)	4090	269.9	FB	6500	65
	Shipboard measurements from the Pacific Ocean between the U.S. west coast and New Zealand aboard the *California Star*					
35.	45° N latitude (**opcn45.co2**)	12	0.8	FB	6500	65
36.	40° N latitude (**opcn40.co2**)	12	0.8	FB	6500	65
37.	35° N latitude (**opcn35.co2**)	12	0.8	FB	6500	65
38.	30° N latitude (**opcn30.co2**)	18	1.1	FB	6500	65
39.	25° N latitude (**opcn25.co2**)	18	1.1	FB	6500	65
40.	20° N latitude (**opcn20.co2**)	16	1.0	FB	6500	65
41.	15° N latitude (**opcn15.co2**)	18	1.1	FB	6500	65
42.	10° N latitude (**opcn10.co2**)	16	1.0	FB	6500	65
43.	5° N latitude (**opcn05.co2**)	16	1.0	FB	6500	65
44.	Equator (**opc000.co2**)	16	1.0	FB	6500	65
45.	5° S latitude (**opcs05.co2**)	16	1.0	FB	6500	65
46.	10° S latitude (**opcs10.co2**)	16	1.0	FB	6500	65

47.	15° S latitude (**opcs15.co2**)	16	1.0	FB	6500	65
48.	20° S latitude (**opcs20.co2**)	16	1.0	FB	6500	65
49.	25° S latitude (**opcs25.co2**)	16	1.0	FB	6500	65
50.	30° S latitude (**opcs30.co2**)	16	1.0	FB	6500	65
51.	35° S latitude (**opcs35.co2**)	12	0.8	FB	6500	65
52.	40° S latitude (**opcs40.co2**)	12	0.8	FB	6500	65
	Shipboard measurements from the Pacific Ocean between the U.S. west coast and New Zealand aboard the *Southland Star*					
53.	45° N latitude (**pacn45.co2**)	77	5.0	FB	6500	65
54.	40° N latitude (**pacn40.co2**)	81	5.3	FB	6500	65
55.	35° N latitude (**pacn35.co2**)	92	6.0	FB	6500	65
56.	30° N latitude (**pacn30.co2**)	197	13.0	FB	6500	65
57.	25° N latitude (**pacn25.co2**)	198	13.0	FB	6500	65
58.	20° N latitude (**pacn20.co2**)	188	12.4	FB	6500	65
59.	15° N latitude (**pacn15.co2**)	200	13.2	FB	6500	65
60.	10° N latitude (**pacn10.co2**)	194	12.8	FB	6500	65
61.	5° N latitude (**pacn05.co2**)	199	13.1	FB	6500	65
62.	Equator (**pac000.co2**)	196	12.9	FB	6500	65
63.	5° S latitude (**pacs05.co2**)	206	13.6	FB	6500	65
64.	10° S latitude (**pacs10.co2**)	195	12.8	FB	6500	65
65.	15° S latitude (**pacs15.co2**)	204	13.4	FB	6500	65
66.	20° S latitude (**pacs20.co2**)	202	13.3	FB	6500	65
67.	25° S latitude (**pacs25.co2**)	197	13.0	FB	6500	65
68.	30° S latitude (**pacs30.co2**)	190	12.5	FB	6500	65
69.	35° S latitude (**pacs35.co2**)	168	11.0	FB	6500	65
	Shipboard measurements from the Pacific Ocean between the U.S. west coast and New Zealand aboard the *Wellington Star*					

70.	45° N latitude (**pawn45.co2**)	47	3.1	FB	6500	65
71.	40° N latitude (**pawn40.co2**)	54	3.5	FB	6500	65
72.	35° N latitude (**pawn35.co2**)	54	3.5	FB	6500	65
73.	30° N latitude (**pawn30.co2**)	101	6.6	FB	6500	65
74.	25° N latitude (**pawn25.co2**)	105	7.0	FB	6500	65
75.	20° N latitude (**pawn20.co2**)	95	6.2	FB	6500	65
76.	15° N latitude (**pawn15.co2**)	103	6.8	FB	6500	65
77.	10° N latitude (**pawn10.co2**)	98	6.4	FB	6500	65
78.	5° N latitude (**pawn05.co2**)	98	6.4	FB	6500	65
79.	Equator (**paw000.co2**)	108	7.1	FB	6500	65
80.	5° S latitude (**paws05.co2**)	99	6.5	FB	6500	65
81.	10° S latitude (**paws10.co2**)	104	6.8	FB	6500	65
82.	15° S latitude (**paws15.co2**)	95	6.2	FB	6500	65
83.	20° S latitude (**paws20.co2**)	101	6.6	FB	6500	65
84.	25° S latitude (**paws25.co2**)	95	6.2	FB	6500	65
85.	30° S latitude (**paws30.co2**)	100	6.6	FB	6500	65
86.	35° S latitude (**paws35.co2**)	86	5.6	FB	6500	65
87.	Palmer Station (Anvers Is.) Antarctica (**psa.co2**)	1588	104.8	FB	6500	65
88.	Qinghai Province, P.R.C. (**qpc.co2**)	401	26.4	FB	6500	65
89.	Ragged Point, Barbados (**rpb.co2**)	618	40.7	FB	6500	65
	Shipboard measurements from the South China Sea between Hong Kong and Singapore aboard the *Carla A. Hills*					
90.	21° S latitude (**scsn21.co2**)	172	11.3	FB	6500	65
91.	18° S latitude (**scsn18.co2**)	189	12.4	FB	6500	65
92.	15° S latitude (**scsn15.co2**)	195	12.8	FB	6500	65

93.	12° S latitude (**scsn12.co2**)	191	12.6	FB	6500	65
94.	9° S latitude (**scsn09.co2**)	191	12.6	FB	6500	65
95.	6° S latitude (**scsn06.co2**)	196	12.9	FB	6500	65
96.	3° S latitude (**scsn03.co2**)	184	12.1	FB	6500	65
97.	Seychelles (Mahe Island), Indian Ocean (United Kingdom) (**sey.co2**)	1907	125.8	FB	6500	65
98.	South Georgia Island, South Atlantic Ocean (United Kingdom) (**sgi.co2**)	165	10.9	FB	6500	65
99.	Shemya Island, Alaska, United States (**shm.co2**)	714	47.1	FB	6500	65
100.	American Samoa, Pacific Ocean (U.S. Territory) (**smo.co2**)	5642	372.3	FB	6500	65
101.	Amundsen Scott (South Pole) Antarctica (**spo.co2**)	2064	136.2	FB	6500	65
102.	Ocean Station "C," North Atlantic Ocean (United States) (**stc.co2**)	345	23.4	FB	6500	65
103.	Ocean Station "M," Norwegian Sea (Norway) (**stm.co2**)	2577	170.0	FB	6500	65
104.	Syowa Station, Antarctica (**syo.co2**)	313	20.6	FB	6500	65
105.	Tae-ahn Peninsula, S. Korea (**tap.co2**)	279	18.4	FB	6500	65
106.	Wendover, Utah, United States (**uta.co2**)	78	5.1	FB	6500	65
107.	Ulaan Uul, Mongolia (**uum.co2**)	164	10.8	FB	6500	65
	Files containing monthly atmospheric CO_2 mixing ratios derived from flask air samples					
108.	All sites (**allmm.co2**, 41 sites, does not include data from files containing monthly averages from shipboard samples; files 137–150)	4834	101.9	FB	2000	20
109.	Alert, Northwest Territories, Canada (**altmm.co2**)	113	2.8	FB	2000	20

110. Amsterdam Island, Indian Ocean (France) (**amsmm.co2**)	115	2.8	FB	2000	20
111. Ascension Island, Atlantic Ocean (United Kingdom) (**ascmm.co2**)	183	4.3	FB	2000	20
112. St. Croix, Virgin Islands, United States (**avimm.co2**)	148	3.5	FB	2000	20
113. Azores (Terceira Island), North Atlantic Ocean (Portugal) (**azrmm.co2**)	156	3.7	FB	2000	20
114. Baltic Sea, Poland (**balmm.co2**)	34	1.1	FB	2000	20
115. Bermuda (east), North Atlantic Ocean (United Kingdom) (**bmemm.co2**)	69	1.9	FB	2000	20
116. Bermuda (west), North Atlantic Ocean (United Kingdom) (**bmwmm.co2**)	66	1.8	FB	2000	20
117. Point Barrow, Alaska, United States (**brwmm.co2**)	282	6.3	FB	2000	20
118. Cold Bay, Alaska, United States (**cbamm.co2**)	193	4.5	FB	2000	20
119. Cape Grim, Tasmania, Australia (**cgomm.co2**)	127	3.1	FB	2000	20
120. Christmas Island, Kiribati (**chrmm.co2**)	128	3.1	FB	2000	20
121. Cape Meares, Oregon, United States (**cmomm.co2**)	152	3.6	FB	2000	20
122. Crozet, Indian Ocean (France) (**crzmm.co2**)	41	1.3	FB	2000	20
123. Guam, Pacific Ocean (U.S. Territory) (**gmimm.co2**)	188	4.4	FB	2000	20
124. Dwejra Point, Gozo, Malta (**gozmm.co2**)	13	0.7	FB	2000	20
125. Halley Bay, Antarctica (**hbamm.co2**)	142	3.4	FB	2000	20
126. Hegyhatsal, Hungary (**hunmm.co2**)	20	0.8	FB	2000	20
127. Heimaey, Vestmannaeyjar, Iceland (**icemm.co2**)	25	0.9	FB	2000	20

128. Grifton, North Carolina, United States (**itnmm.co2**)	28	1.0	FB	2000	20
129. Tenerife, Canary Islands, Spain (**izomm.co2**)	36	1.2	FB	2000	20
130. Key Biscayne, Florida, United States (**keymm.co2**)	263	5.9	FB	2000	20
131. Cape Kumukahi, Hawaii, United States (**kummm.co2**)	224	5.1	FB	2000	20
132. Mould Bay, Northwest Territories, Canada (**mbcmm.co2**)	175	4.1	FB	2000	20
133. Mace Head, County Galway, Ireland (**mhtmm.co2**)	41	1.3	FB	2000	20
134. Sand Island (Midway), Pacific Ocean (United States) (**midmm.co2**)	114	2.8	FB	2000	20
135. Mauna Loa, Hawaii, United States (**mlomm.co2**)	303	6.8	FB	2000	20
136. Niwot Ridge, Colorado, United States (**nwrmm.co2**)	322	7.2	FB	2000	20
Monthly mean mixing ratios derived from shipboard measurements in the Pacific Ocean aboard the *Wellington Star* and *Southland Star*					
137. 30° N latitude (**pocn30mm.co2**)	106	2.4	FB	2000	20
138. 25° N latitude (**pocn25mm.co2**)	106	2.4	FB	2000	20
139. 20° N latitude (**pocn20mm.co2**)	106	2.4	FB	2000	20
140. 15° N latitude (**pocn15mm.co2**)	106	2.4	FB	2000	20
141. 10° N latitude (**pocn10mm.co2**)	106	2.4	FB	2000	20
142. 5° N latitude (**pocn05mm.co2**)	106	2.4	FB	2000	20
143. Equator (**poc000mm.co2**)	106	2.4	FB	2000	20
144. 5° S latitude (**pocs05mm.co2**)	106	2.4	FB	2000	20
145. 10° S latitude (**pocs10mm.co2**)	106	2.3	FB	2000	20
146. 15° S latitude (**pocs15mm.co2**)	106	2.3	FB	2000	20
147. 20° S latitude (**pocs20mm.co2**)	106	2.4	FB	2000	20

148. 25° S latitude (**pocs25mm.co2**)	106	2.4	FB	2000	20
149. 30° S latitude (**pocs30mm.co2**)	106	2.4	FB	2000	20
150. 35° S latitude (**pocs35mm.co2**)	106	2.4	FB	2000	20
151. Palmer Station (Anvers Is.) Antarctica (**psamm.co2**)	202	4.7	FB	2000	20
152. Qinghai Province, Peoples Republic of China (**qpcmm.co2**)	38	1.1	FB	2000	20
153. Ragged Point, Barbados (**rpbmm.co2**)	84	2.2	FB	2000	20
154. Seychelles (Mahe Island) (**seymm.co2**)	178	4.1	FB	2000	20
155. Shemya Island, Alaska, United States (**shmmm.co2**)	110	2.7	FB	2000	20
156. American Samoa, Pacific Ocean (U.S. Territory) (**smomm.co2**)	255	5.8	FB	2000	20
157. Amundsen Scott (South Pole), Antarctica (**spomm.co2**)	232	5.3	FB	2000	20
158. Ocean Station "C," North Atlantic Ocean (United States) (**stcmm.co2**)	65	1.8	FB	2000	20
159. Ocean Station "M," Norwegian Sea (Norway) (**stmmm.co2**)	164	3.9	FB	2000	20
160. Syowa Station, Antarctica (**syomm.co2**)	105	2.6	FB	2000	20
161. Tae-ahn Peninsula S. Korea (**tapmm.co2**)	48	1.4	FB	2000	20
162. Wendover, Utah, United States (**utamm.co2**)	18	0.8	FB	2000	20
163. Ulaan Uul, Mongolia (**uummm.co2**)	34	1.1	FB	2000	20
TOTAL	137,218	8,543.0			

[a]Fixed-block record format

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12. FILE DESCRIPTIONS

This section describes the content and format of each of the 163 files that compose this NDP and the NOAA/CMDL flask CO_2 database.

DATA FILES

This NDP consists of the following 163 files:

- a descriptive file that contains an overview of the NOAA/CMDL flask sampling network and detailed descriptions of the remaining 162 files (**readme**),
- one FORTRAN 77 data retrieval routine to read and print any of the files containing atmospheric CO_2 mixing ratios derived from air samples collected in glass flasks (**flask.for**),
- one FORTRAN 77 data retrieval routine to read and print any of the files containing monthly atmospheric CO_2 averages derived from individual flask samples (**month.for**),
- one SAS® data retrieval routine to read and print any of the files containing atmospheric CO_2 measurements from individual flask samples (**flask.sas**),
- one SAS® data retrieval routine to read and print any of the files containing monthly atmospheric CO_2 averages derived from individual flask samples (**month.sas**),
- one data file containing all atmospheric CO_2 measurements from individual flask samples (**all.co2**),
- 100 data files (one for each sampling site and each latitude band covered by shipboard measurements) containing atmospheric CO_2 measurements from individual flask air samples (***.co2 — *see subsection on site naming convention*),
- one data file containing monthly atmospheric CO_2 measurements for all sampling sites (**allmm.co2**), and
- 56 data files (one for each sampling site and each latitude band covered by shipboard measurements) containing monthly CO_2 averages derived from individual flask samples (***mm.co2).

DATA FILE NAMING CONVENTION

The file names are the appropriate 3-letter codes with the extension **.co2** (e.g., **alt.co2** identifies the file for Alert, Northwest Territories, Canada). For the shipboard programs, the data have been grouped into 5-degree (PAC, PAW) or 3-degree (SCS) latitude bins. The file names consist of the appropriate 3-letter code plus an additional 3 characters identifying the latitude bin and the **.co2** extension. The first additional character specifies the hemisphere (**n** = northern, **s** = southern) and the two digits specify the latitude on which the 5-degree (PAC, PAW) or 3-degree (SCS) latitude bins are centered. The equator is specified by **000**.

DATA FORMAT FOR FILES CONTAINING CO_2 MIXING RATIOS FROM INDIVIDUAL FLASK SAMPLES

This numeric data package contains 101 data files containing CO_2 mixing ratios in air samples collected in glass flasks at NOAA/CMDL flask network sites. The mixing ratios were determined by a nondispersive infrared absorption technique. One data file (**all.co2**) contains measurements from all 42 past and present NOAA/CMDL fixed-position sampling sites. Individual files are also provided for each sampling site (*.co2) and for each latitude band covered by shipboard measurements (e.g.,

pacn05.co2). The individual files are named according to the station codes used by NOAA/CMDL (see description of the variable STA below). For the shipboard programs the data have been grouped into 5-degree (PAC, PAW) or 3-degree (SCS) latitude bins. The file names consist of the appropriate 3-letter code plus an additional 3 characters identifying the latitude bin and the **.co2** extension. The first additional character specifies the hemisphere (**n** = northern, **s** = southern) and the two digits specify the latitude on which the 5-degree (PAC, PAW) or 3-degree (SCS) latitude bins are centered. The equator is specified by **000**.

All data files have the same format. Each file is sorted by sample collection date and may be read with the following FORTRAN 77 code:

```
      CHARACTER STA*3,FLASKID*8,SMETHOD*1,DATASEL*3,INSTRU*2,DAYFILE*6
      READ(5,100,END=99) STA,YYYY,MM,DD,HR,MIN,FLASKID,SMETHOD,CO2,
     1  DATASEL,INSTRU,SAMYY,SAMMM,SAMDD,DAYFILE
  100 FORMAT(A3,1X,I4,1X,I2,1X,I2,1X,I2,1X,I2,1X,I2,1X,A8,1X,A1,2X,
     1  F7.2,1X,A3,1X,A2,1X,I4,1X,I2,1X,I2,1X,A6)
```

The following SAS® input statement may also be used to read these files:

```
input sta $ 1-3 yyyy 5-8 mm 10-11 dd 13-14 hr 16-17 min 19-20 flaskid $ 22-29
      smethod $ 31 co2 34-40 datasel $ 42-44 instru $ 46-47 samyy 49-52
      sammm 54-55 samdd 57-58 dayfile $ 60-65;
```

Stated in tabular form, the contents include the following:

Variable	Variable type	Variable width	Starting column	Ending column
STA	Character	3	1	3
YYYY	Numeric	4	5	8
MM	Numeric	2	10	11
DD	Numeric	2	13	14
HR	Numeric	2	16	17
MIN	Numeric	2	19	20
FLASKID	Alphanumeric	8	22	29
SMETHOD	Character	1	31	31
CO2	Numeric	7	34	40
DATASEL	Character	3	42	44
INSTRU	Alphanumeric	2	46	47
SAMYY	Numeric	4	49	52
SAMMM	Numeric	2	54	55
SAMDD	Numeric	2	57	58
DAYFILE	Alphanumeric	6	60	65

where

STA is the three-letter station or ocean cruise code. The codes and the stations or ocean cruises they denote are as follows:

ALT	Alert, Northwest Territories, Canada
AMS	Amsterdam Island, Indian Ocean (France)
ASC	Ascension Island, Atlantic Ocean (United Kingdom)
AVI	St. Croix, Virgin Islands, United States
AZR	Azores (Terceira Island), North Atlantic Ocean (Portugal)
BAL	Baltic Sea (Poland)
BME	Bermuda (east), North Atlantic Ocean (United Kingdom)
BMW	Bermuda (west), North Atlantic Ocean (United Kingdom)
BRW	Point Barrow, Alaska, United States
CBA	Cold Bay, Alaska, United States
CGO	Cape Grim, Tasmania, Australia
CHR	Christmas Island, (Kiribati)
CMO	Cape Meares, Oregon, United States
CRZ	Crozet, Indian Ocean (France)
GMI	Guam, Pacific Ocean (United States)
GOZ	Dwejra Point, Gozo, Malta
HBA	Halley Bay, Antarctica
HUN	Hegyhatsal, Hungary
ICE	Heimaey, Vestmannaeyjar, Iceland
ITN	Grifton, North Carolina, United States
IZO	Izaña Observatory, Tenerife, Canary Islands, Spain
KEY	Key Biscayne, Florida, United States
KUM	Cape Kumukahi, Hawaii, United States
MBC	Mould Bay, Northwest Territories, Canada
MHT	Mace Head, County Galway, Ireland
MID	Sand Island (Midway Islands), Pacific Ocean (United States)
MLO	Mauna Loa Observatory, Hawaii, United States
NWR	Niwot Ridge, Colorado, United States
OPC	shipboard measurements in the Pacific Ocean aboard the *California Star*
PAC	shipboard measurements in the Pacific Ocean aboard the *Southland Star*
PAW	shipboard measurements in the Pacific Ocean aboard the *Wellington Star*
PSA	Palmer Station (Anvers Island), Antarctica
QPC	Qinghai Province, Peoples Republic of China
RPB	Ragged Point, Barbados
SCS	shipboard measurements in the South China Sea aboard the *Carla A. Hills*
SEY	Seychelles (Mahe Island), Indian Ocean
SGI	South Georgia Island, South Atlantic Ocean (United Kingdom)
SHM	Shemya Island, Alaska, United States
SMO	American Samoa (United States)
SPO	South Pole (Amundsen Scott), Antarctica
STC	Ocean Station "C," North Atlantic Ocean (United States)
STM	Ocean Station "M," Norwegian Sea (Norway)
SYO	Syowa Station, Antarctica
TAP	Tae-ahn Peninsula, South Korea

UTA Wendover, Utah, United States
UUM Ulaan Uul, Mongolia

YYYY is the four-digit Greenwich Mean Time (GMT) year when the air sample was collected.

MM is the two-digit GMT month when the air sample was collected. Missing values are denoted by 99.

DD is the two-digit GMT day when the air sample was collected. Missing values are denoted by 99.

HR is the two-digit GMT hour when the air sample was collected. Missing values are denoted by 99.

MIN is the two-digit GMT minute when the air sample was collected. Missing values are denoted by 99.

FLASKID is the flask sample identification number. These identification numbers may be numeric, character, or alphanumeric with one to eight characters.

SMETHOD is a one-letter code that identifies the sample collection method. The codes and their meaning are as follows:

P is a sample collected by means of a portable, battery-powered pumping unit. Two flasks are connected in series, flushed with air, and then pressurized to 1.2–1.5 times ambient pressure.

T is an evacuated flask filled by opening an O-ring sealed stopcock.

S are flasks filled at NOAA/CMDL observatories by sampling air from the *in situ* CO_2 measurement air-intake system.

N are flasks filled, before 1981, by means of a hand-held aspirator bulb and, since 1981, by means of a pump different from those used in method P.

F are 5-L evacuated flasks filled by opening a greased, ground-glass stopcock.

CO2 is the atmospheric CO_2 mixing ratio expressed in parts per million (ppm) relative to the SIO X93 manometric scale. Missing values are denoted by -999.99.

DATASEL is a three-character code that reflects the results of the NOAA/CMDL data selection process. Because samples are collected in pairs, the pair difference is calculated, and samples with a pair difference >0.5 ppm are flagged. Through 1988, one or both members of a bad pair were sometimes retained if they fell within ± 3 sigma from a fitted curve. However, from 1989 to the present, both members of bad pairs have been automatically rejected. Retained and rejected flasks are flagged as follows. (**NOTE**: if either the first or second of these three characters is not a period, the sample has been rejected.)

	Flag	Description
Retained	... (3 periods)	good pair (D $\leq$ 0.5 ppm)
	..H	high member of bad pair; retained
	..L	low member of bad pair; retained
	..S	single flask; retained
Rejected	.X.	rejected as not representative of background conditions (>3 sigma from a fitted curve)
	+..	high member of bad pair; rejected
	-..	low member of bad pair; rejected
	R..	single flask; rejected
	*..	off scale or broken flask; rejected
	N..	rejected due to error in sampling or analysis
	T..	sample collected as part of a methods test; not used in data analysis

********** WARNING **********
To avoid erroneous analysis and interpretation of these data, users should read and understand these codes before using the data files. It is also strongly recommended that users consult the relevant published literature. NOAA/CMDL has attempted to provide the most accurate and precise measurements possible in a timely manner. However, NOAA/CMDL reserves the right to adjust the data in these files on the basis of recalibrations of reference gases and instruments.

Users of these data should be aware that data selection is a difficult but necessary aspect of the analysis and interpretation of atmospheric trace gas data sets, and the specific data selection scheme used may be determined by the goals of a particular investigation. It is possible, and even likely, that some of the rejected values are valid measurements but represent poorly mixed air masses influenced by local anthropogenic sources or strong local biospheric sources or sinks. The retained values compose the data set that Tom Conway, Pieter Tans, and the NOAA/CMDL Carbon Cycle Group staff feel best represents the CO_2 distribution in the remote, well-mixed global troposphere. These are the values they use in their studies of the global carbon cycle to calculate long-term trends and interannual and seasonal variations.
****

INSTRU — is a two-character code that identifies the instrument used for the CO_2 determination. The codes and the instruments they denote are as follows:

L1	Lira 200 #1809
L2	Lira 202 #20719
S1	Siemens Ultramat3 #U08-450
U1	UNOR 2 #631710
U2	UNOR 2 #631521
U3	UNOR 4N #719

SAMYY — is the year in local time of the CO_2 measurement.

SAMMM is the month in local time of the CO_2 measurement.

SAMDD is the day in local time of the CO_2 measurement.

DAYFILE is a six-character number that identifies the daily file for this analysis date.

DATA FORMAT FOR FILES CONTAINING MONTHLY CO_2 MIXING RATIOS DERIVED FROM INDIVIDUAL FLASK SAMPLES

This numeric data package provides 57 data files containing monthly CO_2 mixing ratios derived from individual flask measurements. One data file (**allmm.co2**) contains monthly CO_2 mixing ratios from all the past and present fixed-position NOAA/CMDL sampling sites. Separate files are also provided for each sampling site (***mm.co2**) and for each latitude band covered by shipboard measurements in the Pacific Ocean taken aboard the *Wellington Star* and *Southland Star* (e.g., **pocn05mm.co2**). Because the sampling frequency for each 5-degree latitude band covered by the *Wellington Star* and *Southland Star* cruise lines is insufficient to calculate monthly means, the measurements from these two cruise lines were merged to calculate monthly means for fourteen 5-degree latitude bands from 30° N to 35° S. No monthly mean file for South Georgia Island exists because there is not sufficient data to calculate monthly means for this site. The individual files are named according to the station codes used by NOAA/CMDL (see description of the variable STA on pages 32–33). The data for the shipboard measurements have been grouped into 5-degree latitude intervals. The file names consist of the appropriate 3-letter code plus an additional 5 characters identifying the latitude band, monthly data (i.e., **mm**), and the **.co2** extension. The first additional character specifies the hemisphere (**n** = northern, **s** = southern). The next two digits specify the 5-degree latitude band. The equator is specified by **000**. All data files have the same format with one line for each monthly value. Each file is sorted chronologically and may be read with the following FORTRAN 77 code:

```
C
C SKIP HEADER RECORD THAT IDENTIFIES CONWAY AND TANS AS
C THE DATA SOURCE - PLEASE CREDIT CONWAY & TANS WHEN USING
C THESE DATA!
C
      READ(5,75)
75    FORMAT(/,/,/,/,/,/,/,/,/)
C
C READ AND WRITE DATA
C
 1    CONTINUE
      READ(5,100,END=99) STA,YYYY,MM,CO2
100   FORMAT(A3,1X,I4,1X,I2,2X,F7.2)
```

These files may also be read with the following SAS® input statement:

```
input sta $ yyyy mm co2;
```

Stated in tabular form, the contents include the following:

Variable	Variable type	Variable width	Starting column	Ending column
STA	Character	A3	1	3
YYYY	Numeric	I4	5	8
MM	Numeric	I2	10	11
CO2	Numeric	F7.2	14	20

where

STA is the three-letter station or ocean cruise code. The codes and the stations or ocean cruises they denote are shown on pages 32–33.

YYYY is the year.

MM is the month expressed as an integer value (i.e., January = 1, February = 2, ... December = 12).

CO2 is the monthly CO_2 mixing ratio expressed in parts per million (ppm) according to the SIO X93 manometric scale. The monthly means were calculated from a smooth curve obtained by a combination of curve fitting and digital filtering based on the methods of Thoning et al. (1989) and Tans et al. (1989b). The value -999.99 denotes months where there was not sufficient data to calculate a monthly mean.

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13. LISTING OF THE FORTRAN 77 DATA RETRIEVAL PROGRAMS

The following is a listing of the FORTRAN 77 data retrieval code (**flask.for**) written by CDIAC to read and print any of the files containing NOAA/CMDL CO_2 mixing ratios from individual flask air samples.

```
C FORTRAN 77 CODE TO READ AND PRINT ANY OF THE NOAA/CMDL DATA
C FILES CONTAINING THE INDIVIDUAL FLASK OR SHIPBOARD CO2 MEASUREMENTS

C
      CHARACTER STA*3,FLASKID*8,SMETHOD*1,DATASEL*3,INSTRU*2,DAYFILE*6
      OPEN(UNIT=5,FILE='alt.co2')
C
C INSERT COLUMN HEADINGS TO IDENTIFY DATA
C
      WRITE(6,50)
50    FORMAT(11X,'GMT TIME OF',42X,'DATA',32X,'DAILY',/,
     1 'STATION',1X,'SAMPLE COLLECTION',6X,'FLASK',2X,
     2 'SAMPLING',6X,'CO2',6X,'SELECTION',12X,
     3 'ANALYSIS DATE',3X,'DATAFILE',
     4 /,1X,'CODE',3X,'YYYY',1X,'MM',1X,'DD',1X,'HR',1X,'MIN',8X,
     5 'ID',4X,'METHOD',2X,'MIXING RATIOS',4X,'CODE',3X,
     6 'INSTRUMENT',1X,'YYYY',2X,'MM',3X,'DD',4X,'NUMBER',/)
C
C SKIP HEADER RECORD THAT IDENTIFIES CONWAY AND TANS AS
C THE DATA SOURCE - PLEASE CREDIT CONWAY & TANS WHEN USING
C THESE DATA!
C
      READ(5,75)
75    FORMAT(/,/,/,/,/,/,/,/,/)
C
C READ AND WRITE DATA
C
1     CONTINUE
      READ(5,100,END=99) STA,YYYY,MM,DD,HR,MIN,FLASKID,SMETHOD,CO2,
     1  DATASEL,INSTRU,SAMYY,SAMMM,SAMDD,DAYFILE
100   FORMAT(A3,1X,I4,1X,I2,1X,I2,1X,I2,1X,I2,1X,I2,1X,A8,1X,A1,2X,
     1  F7.2,1X,A3,1X,A2,1X,I4,1X,I2,1X,I2,1X,A6)
      WRITE(6,200) STA,YYYY,MM,DD,HR,MIN,FLASKID,SMETHOD,CO2,
     1  DATASEL,INSTRU,SAMYY,SAMMM,SAMDD,DAYFILE
200   FORMAT(2X,A3,3X,I4,1X,I2,1X,I2,1X,I2,2X,I2,4X,A8,5X,A1,7X,
     1  F7.2,9X,A3,7X,A2,5X,I4,2X,I2,3X,I2,4X,A6)
      GOTO 1
99    CONTINUE
      CLOSE(UNIT=5)
      STOP
      END
```

The following is a listing of the FORTRAN 77 data retrieval code (**month.for**) written by CDIAC to read and print any of the files containing the NOAA/CMDL monthly CO_2 mixing ratios.

```
C FORTRAN 77 CODE TO READ AND PRINT ANY OF THE NOAA/CMDL
C FILES CONTAINING THE MONTHLY CO2 MEANS DERIVED FROM
C INDIVIDUAL FLASK AIR SAMPLES
C
      CHARACTER STA*3
      OPEN(UNIT=5,FILE='altmm.co2')
C
C INSERT COLUMN HEADINGS TO IDENTIFY DATA
C
      WRITE(6,50)
50     FORMAT(22X,'ATMOSPHERIC',/,'STATION',15X,'CO2 MIXING',/,
     1  2X,'CODE',3X,'YEAR',2X,'MONTH',2X,'RATIO (PPM)',/)
C
C SKIP HEADER RECORD THAT IDENTIFIES CONWAY AND TANS AS
C THE DATA SOURCE - PLEASE CREDIT CONWAY & TANS WHEN USING
C THESE DATA!
C
      READ(5,75)
75     FORMAT(/,/,/,/,/,/,/,/,/)
C
C READ AND WRITE DATA
C
 1     CONTINUE
      READ(5,100,END=99) STA,YYYY,MM,CO2
100    FORMAT(A3,1X,I4,1X,I2,2X,F7.2)
      WRITE(6,200) STA,YYYY,MM,CO2
200    FORMAT(2X,A3,4X,I4,4X,I2,4X,F7.2)
      GOTO 1
99     CONTINUE
      CLOSE(UNIT=5)
      STOP
      END
```

14. LISTING OF THE SAS® DATA RETRIEVAL PROGRAMS

The following is a listing of the SAS® data retrieval code (**flask.sas**) written by CDIAC to read and print any of the files containing CO_2 mixing ratios from individual flask samples.

```
filename dat 'alt.co2';
data cmdlco2;
infile dat firstobs=11;
input sta $ 1-3 yyyy 5-8 mm 10-11 dd 13-14 hr 16-17 min 19-20 flaskid $ 22-29
     smethod $ 31 co2 34-40 datasel $ 42-44 instru $ 46-47 samyy 49-52
     sammm 54-55 samdd 57-58 dayfile $ 60-65;
proc print;
run;
```

The following is a listing of the SAS® data retrieval code (**month.sas**) written by CDIAC to read and print any of the files containing the NOAA/CMDL monthly CO_2 mixing ratios.

```
filename dat 'altmm.co2';
data monthly;
infile dat firstobs=11;
input sta $ yyyy mm co2;
proc print;
run;
```

15. PARTIAL LISTINGS OF DATA FILES

The following presents partial listings of two data files. The first partial data file listing (**alt.co2**) contains atmospheric CO_2 measurements from individual flask air samples collected at Alert, Northwest Territories, Canada. This file is identical in format to all other files containing atmospheric CO_2 mixing ratios from individual flask air samples. The second partial data file listing shows the monthly atmospheric CO_2 measurements from Alert (**altmm.co2**). This file is identical in format to all other files containing monthly atmospheric CO_2 mixing ratios.

The first 35 lines of the file **alt.co2** are as follows:

```
************************************************************
*** Source: Thomas J. Conway                               ***
***         Pieter Tans                                    ***
***         National Oceanic & Atmospheric Administration ***
***         Climate Monitoring and Diagnostics Laboratory ***
***         325 Broadway                                   ***
***         Boulder, Colorado 80303                        ***
***                                                        ***
*** NDP005R3 (February 1996)                               ***
************************************************************
ALT 1985 06 10 18 20   387-85 P   349.22 .X. U3 1985 08 01 000929
ALT 1985 06 10 18 20   388-85 P   348.92 .X. U3 1985 08 01 000929
ALT 1985 06 17 19 27   389-85 P   350.59 ... U3 1985 08 01 000929
ALT 1985 06 17 19 27   390-85 P   350.32 ... U3 1985 08 01 000929
ALT 1985 06 24 19 04   391-85 P   349.91 ..L U3 1985 07 30 000927
ALT 1985 06 24 19 04   392-85 P   354.32 +.. U3 1985 07 30 000927
ALT 1985 07 01 19 13   393-85 P   348.94 ... U3 1985 07 30 000927
ALT 1985 07 01 19 13   394-85 P   348.95 ... U3 1985 07 30 000927
ALT 1985 07 08 21 18   881-83 P   344.20 ... U3 1985 09 16 000950
ALT 1985 07 08 21 18   882-83 P   344.21 ... U3 1985 09 16 000950
ALT 1985 07 15 19 05   905-82 P   343.80 ... U3 1985 09 16 000950
ALT 1985 07 15 19 05   906-82 P   343.44 ... U3 1985 09 16 000950
ALT 1985 07 22 18 49  1669-82 P   341.32 ... U3 1985 09 16 000950
ALT 1985 07 22 18 49  1670-82 P   341.33 ... U3 1985 09 16 000950
ALT 1985 07 29 19 04  1661-82 P   339.96 ... U3 1985 09 16 000950
ALT 1985 07 29 19 04  1662-82 P   339.85 ... U3 1985 09 16 000950
ALT 1985 08 26 19 22  1829-82 P   337.40 ... U3 1985 10 04 000963
ALT 1985 08 26 19 22  1830-82 P   337.16 ... U3 1985 10 04 000963
ALT 1985 09 02 18 57   877-82 P   337.37 ... U3 1985 10 04 000963
ALT 1985 09 02 18 57   878-82 P   337.22 ... U3 1985 10 04 000963
ALT 1985 09 10 18 58   771-83 P   339.48 ... U3 1985 10 29 000971
ALT 1985 09 10 18 58   772-83 P   339.29 ... U3 1985 10 29 000971
ALT 1985 09 16 19 41   627-82 P   338.68 ... U3 1985 10 29 000971
ALT 1985 09 16 19 41   628-82 P   338.55 ... U3 1985 10 29 000971
ALT 1985 09 23 18 58  1097-82 P   339.26 ... U3 1985 10 29 000971
```

The first 35 lines of the file **altmm.co2** are as follows:

```
************************************************************
*** Source: Thomas J. Conway                               ***
***         Pieter Tans                                    ***
***         National Oceanic & Atmospheric Administration  ***
***         Climate Monitoring and Diagnostics Laboratory  ***
***         325 Broadway                                   ***
***         Boulder, Colorado 80303                        ***
***                                                        ***
*** NDP005R3 (February 1996)                               ***
************************************************************
ALT 1985  6   350.01
ALT 1985  7   343.77
ALT 1985  8   337.71
ALT 1985  9   338.98
ALT 1985 10   342.77
ALT 1985 11   345.54
ALT 1985 12   348.83
ALT 1986  1   351.20
ALT 1986  2   351.97
ALT 1986  3   352.58
ALT 1986  4   352.95
ALT 1986  5   353.10
ALT 1986  6   351.24
ALT 1986  7   345.55
ALT 1986  8   340.18
ALT 1986  9   339.78
ALT 1986 10   344.28
ALT 1986 11   347.82
ALT 1986 12   349.57
ALT 1987  1   350.88
ALT 1987  2   352.22
ALT 1987  3   353.34
ALT 1987  4   353.86
ALT 1987  5   354.06
ALT 1987  6   352.71
```

16. VERIFICATION OF DATA TRANSPORT

The data files contained in this NDP can be read with the FORTRAN 77 or SAS® data retrieval programs provided. To verify that the data have been correctly transported to their systems, users should generate some or all of the statistics presented in Tables 2 and 3. These tables present simple summary statistics for the files that contain data for all sites (i.e., files **all.co2** and **allmm.co2**). If the statistics generated by the user differ from those presented here, the data files may have been corrupted in transport.

These statistics are presented only as a tool to ensure proper reading of the data files. They are not to be construed as a summary of the data set.

Table 2. Characteristics of numeric variables in the file containing all CO_2 measurements from individual flask air samples

Variable	Number of observations	Mean	Standard deviation	Minimum value	Maximum value
YYYY	59237	1985.95	5.0554437	1967	1993
MM	59237	6.6129784	3.4087795	1	12
DD	59237	15.7100967	8.7681133	1	31
HR	59237	13.9755727	9.7567204	0	99
MIN	59237	25.6106319	18.2319032	0	99
CO2	59237	325.3679989	174.1507799	-999.99	677.61
SAMYY	59237	1986.10	5.0537625	1967	1994
SAMMM	59237	6.4441987	3.4435111	1	12
SAMDD	59237	15.6599085	8.6035267	1	31

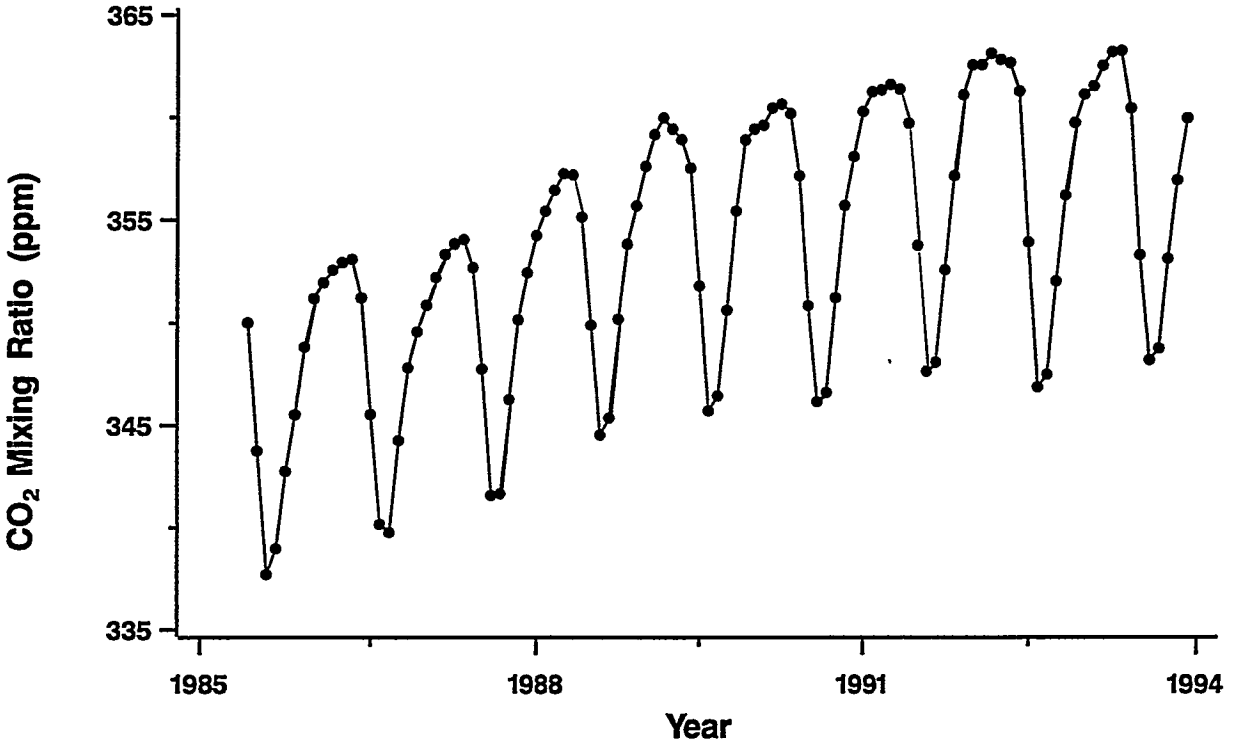
Table 3. Characteristics of numeric variables in the file containing all monthly CO_2 measurements from the NOAA/CMDL global flask sampling network

Variable	Number of observations	Mean	Standard deviation	Minimum value	Maximum value
YYYY	4824	1985.55	5.8742749	1968	1993
MM	4824	6.5789801	3.4462764	1	12
CO2	4824	280.3019693	293.1109038	-999.99	369.30

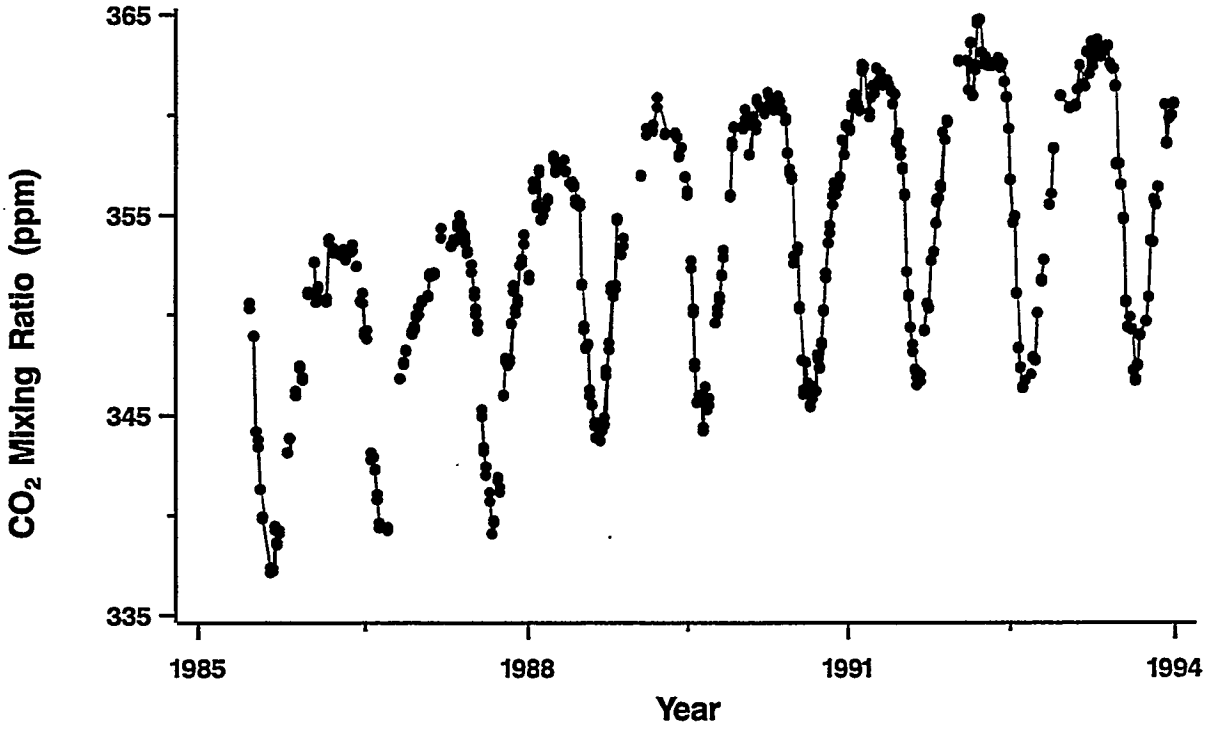
reprints removed. ds

APPENDIX B

TABULAR LISTING OF MONTHLY CO_2 MIXING RATIOS AND GRAPHICAL DISPLAYS OF MONTHLY AND INDIVIDUAL CO_2 MIXING RATIOS FROM ALL NOAA/CMDL FLASK SAMPLING SITES



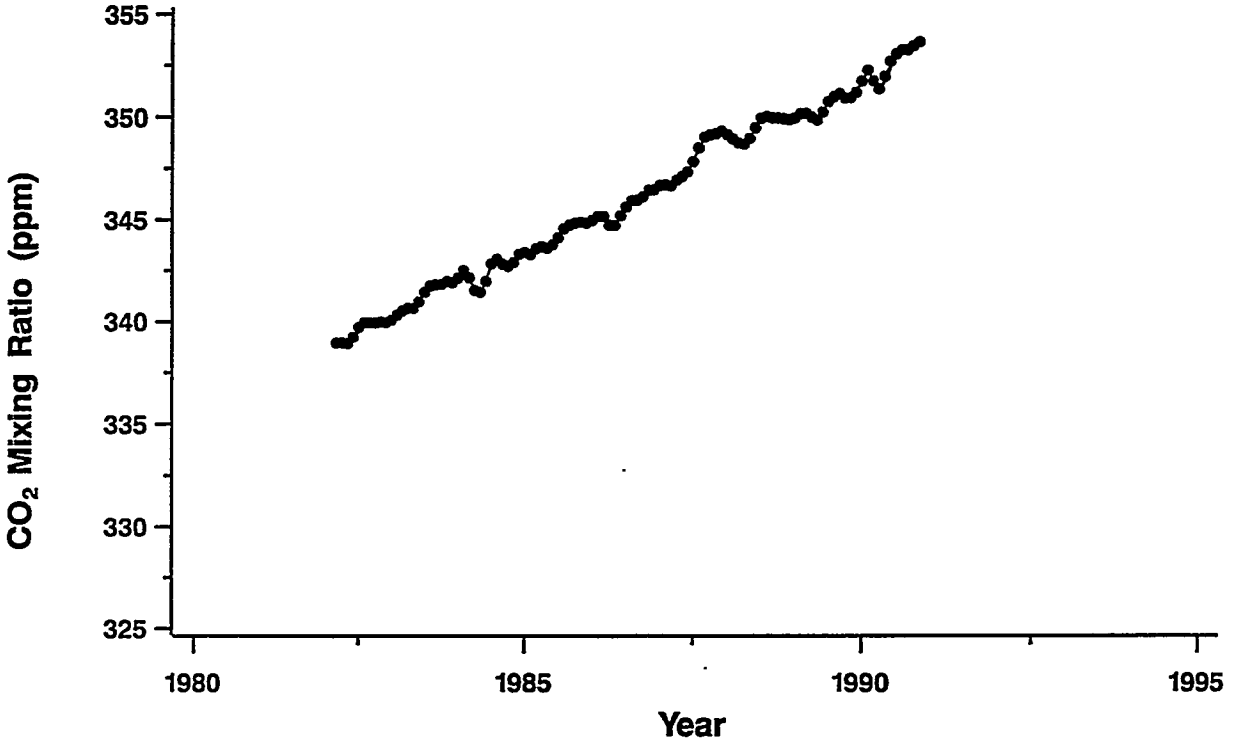
Monthly atmospheric CO_2 mixing ratios from Alert, Northwest Territories, Canada.



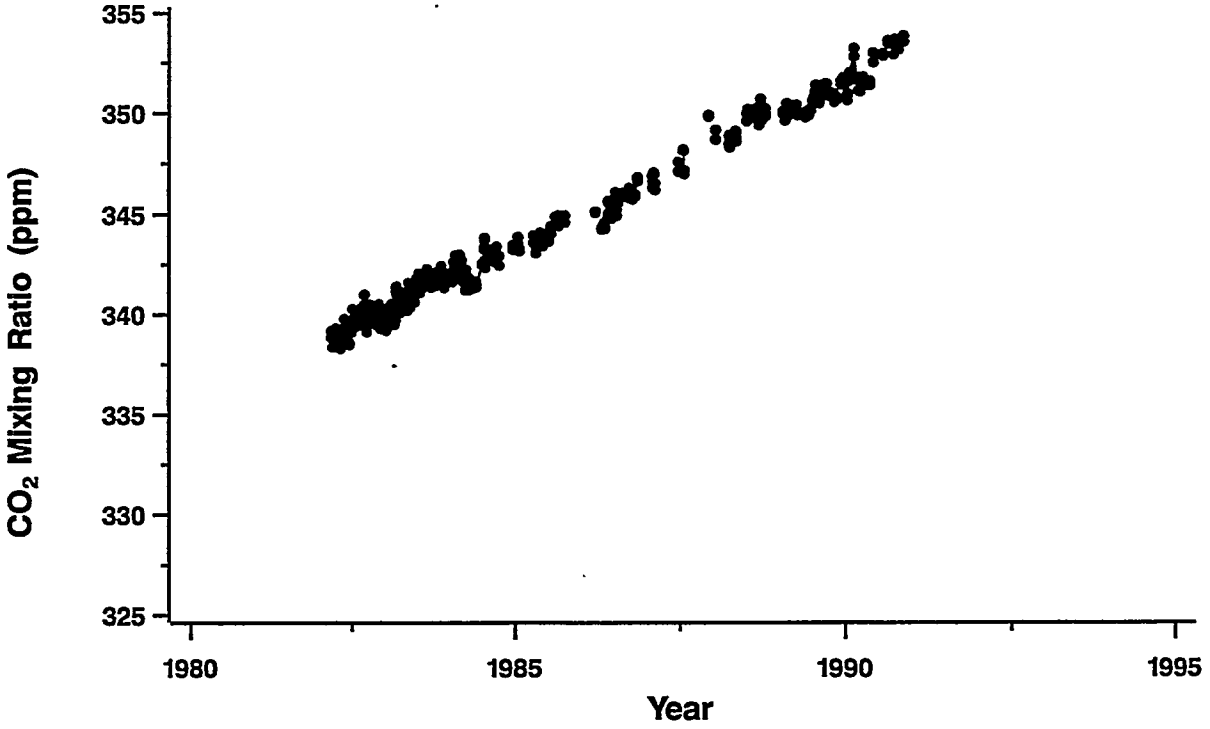
Background atmospheric CO_2 mixing ratios from individual flask air samples for Alert, Northwest Territories, Canada. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Alert, Northwest Territories, Canada, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1985	-99.99	-99.99	-99.99	-99.99	-99.99	350.01	343.77	337.71	338.98	342.77	345.54	348.83	-99.99
1986	351.20	351.97	352.58	352.95	353.10	351.24	345.55	340.18	339.78	344.28	347.82	349.57	348.35
1987	350.88	352.22	353.34	353.86	354.06	352.71	347.76	341.60	341.68	346.29	350.17	352.46	349.75
1988	354.27	355.46	356.47	357.28	357.22	355.17	349.91	344.56	345.38	350.20	353.85	355.71	352.96
1989	357.63	359.19	360.00	359.46	358.95	357.55	351.81	345.73	346.46	350.64	355.46	358.93	355.15
1990	359.46	359.65	360.48	360.67	360.21	357.18	350.87	346.18	346.63	351.25	355.74	358.13	355.54
1991	360.32	361.28	361.37	361.63	361.41	359.75	353.80	347.67	348.11	352.61	357.18	361.13	357.19
1992	362.58	362.59	363.14	362.85	362.69	361.31	353.96	346.90	347.51	352.06	356.23	359.77	357.63
1993	361.15	361.56	362.56	363.22	363.28	360.47	353.34	348.22	348.78	353.16	356.97	359.99	357.73



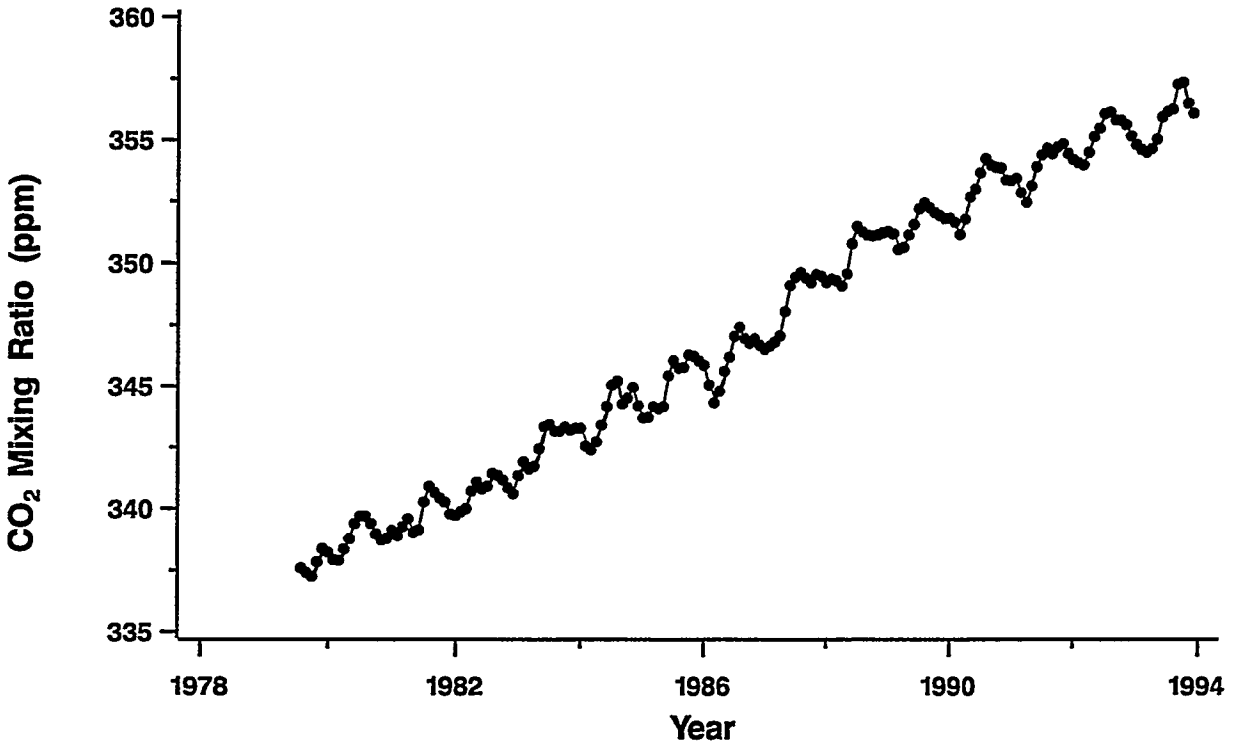
Monthly atmospheric CO_2 mixing ratios from Amsterdam Island.



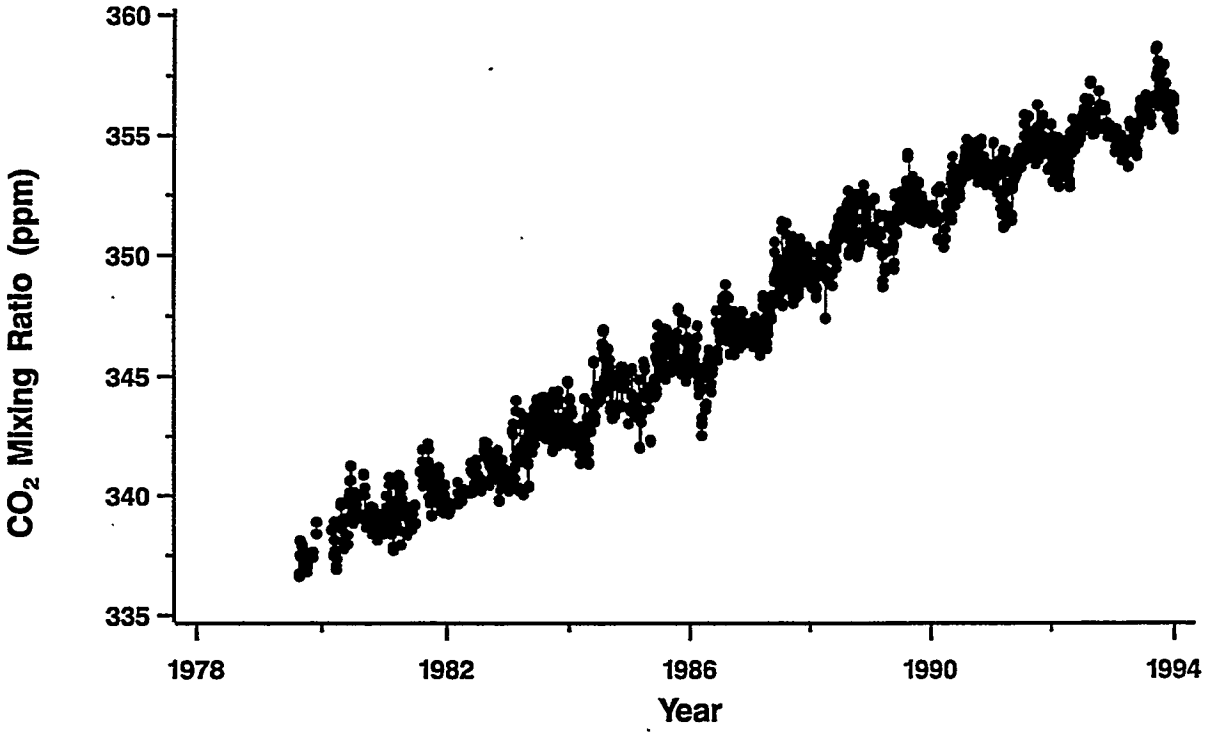
Background atmospheric CO_2 mixing ratios from individual flask air samples for Amsterdam Island. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Amsterdam Island, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1982	-99.99	-99.99	338.95	338.96	338.93	339.24	339.71	339.95	339.94	339.94	339.99	339.96	-99.99
1983	340.07	340.32	340.53	340.66	340.66	340.98	341.44	341.75	341.82	341.83	341.97	341.93	341.16
1984	342.14	342.51	342.16	341.54	341.46	341.98	342.85	343.08	342.84	342.73	342.92	343.32	342.46
1985	343.40	343.31	343.59	343.70	343.62	343.79	344.13	344.56	344.75	344.85	344.89	344.85	344.12
1986	344.97	345.17	345.16	344.75	344.74	345.21	345.63	345.94	345.97	346.14	346.45	346.48	345.55
1987	346.68	346.71	346.67	346.93	347.12	347.35	347.84	348.52	349.04	349.15	349.21	349.32	347.88
1988	349.17	348.95	348.76	348.70	348.98	349.49	349.95	350.03	349.98	349.97	349.93	349.89	349.48
1989	349.97	350.17	350.19	350.01	349.87	350.26	350.76	351.00	351.15	350.94	350.96	351.22	350.54
1990	351.78	352.29	351.79	351.40	352.00	352.74	353.09	353.29	353.29	353.49	353.67	-99.99	-99.99



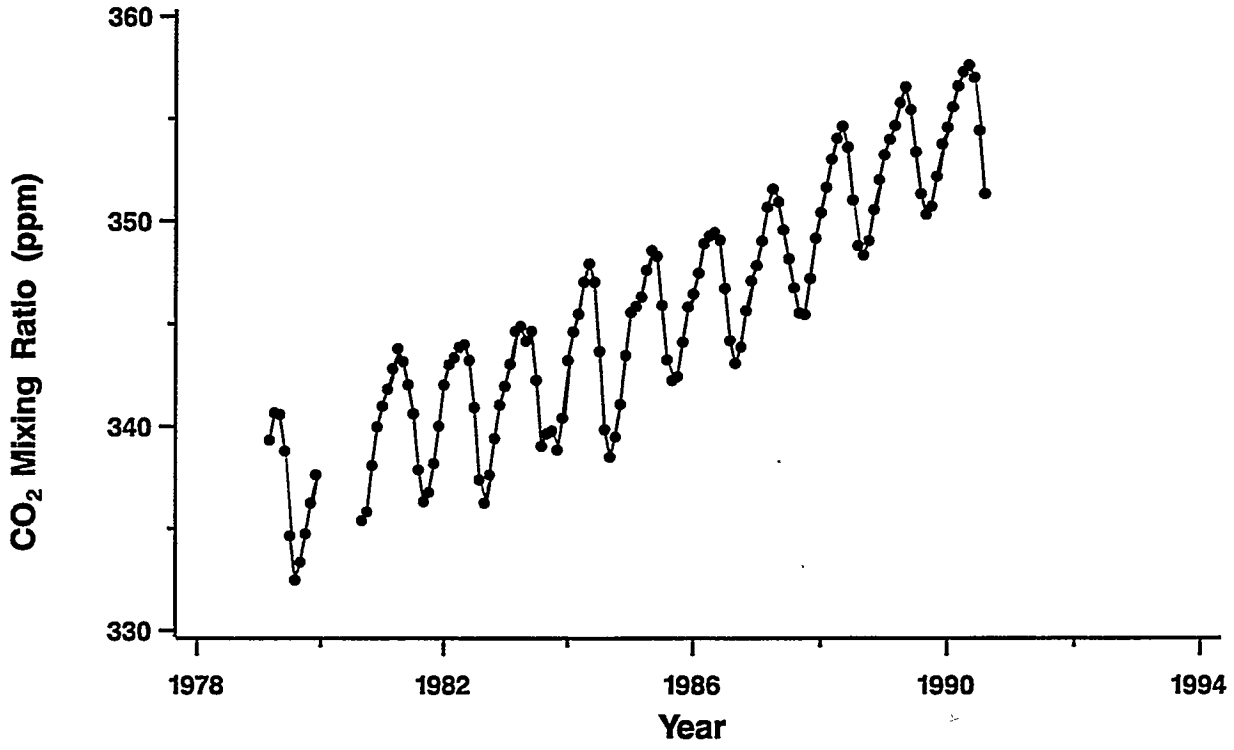
Monthly atmospheric CO_2 mixing ratios from the Ascension Island.



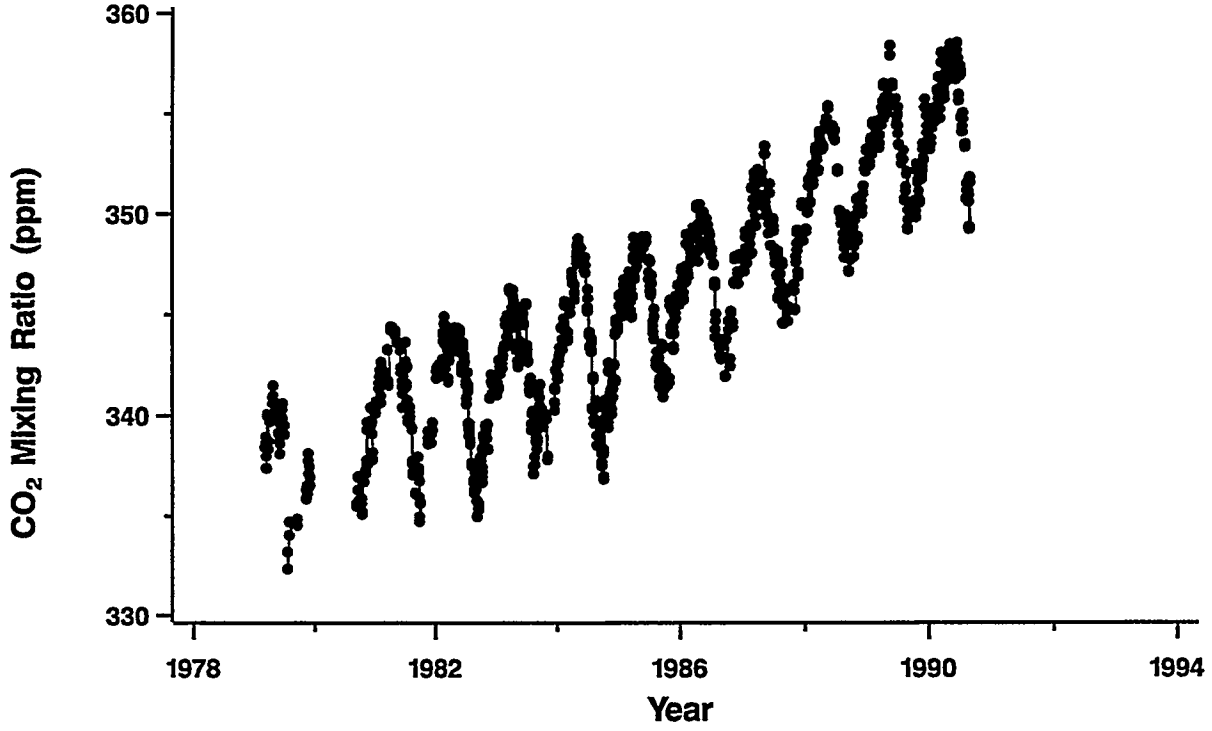
Background atmospheric CO_2 mixing ratios from individual flask air samples for the Ascension Island. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for the Ascension Island, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1979	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	337.59	337.41	337.25	337.84	338.38	-99.99
1980	338.23	337.94	337.91	338.37	338.78	339.39	339.69	339.68	339.39	338.98	338.74	338.80	338.83
1981	339.10	338.92	339.26	339.58	339.05	339.13	340.27	340.91	340.66	340.44	340.26	339.78	339.78
1982	339.72	339.87	340.00	340.72	341.09	340.81	340.92	341.44	341.36	341.17	340.86	340.62	340.72
1983	341.36	341.91	341.62	341.74	342.45	343.35	343.45	343.18	343.18	343.34	343.22	343.29	342.67
1984	343.29	342.57	342.42	342.74	343.43	344.18	345.06	345.22	344.29	344.54	344.96	344.21	343.91
1985	343.72	343.75	344.17	344.09	344.18	345.44	346.06	345.76	345.79	346.29	346.23	346.05	345.13
1986	345.87	345.06	344.34	344.81	345.62	346.20	347.05	347.41	346.97	346.77	346.94	346.69	346.14
1987	346.52	346.65	346.82	347.07	348.05	349.11	349.44	349.63	349.41	349.23	349.55	349.48	348.41
1988	349.24	349.37	349.30	349.10	349.58	350.81	351.50	351.29	351.16	351.13	351.16	351.25	350.41
1989	351.30	351.21	350.57	350.66	351.17	351.58	352.22	352.45	352.26	352.07	351.94	351.82	351.60
1990	351.83	351.67	351.18	351.80	352.69	353.01	353.68	354.26	354.00	353.91	353.88	353.39	352.94
1991	353.37	353.46	352.88	352.49	353.15	353.94	354.42	354.69	354.47	354.73	354.86	354.48	353.91
1992	354.23	354.10	354.02	354.52	355.16	355.49	356.09	356.14	355.84	355.82	355.64	355.19	355.19
1993	354.84	354.64	354.52	354.67	355.05	355.95	356.17	356.27	357.27	357.35	356.50	356.11	355.78



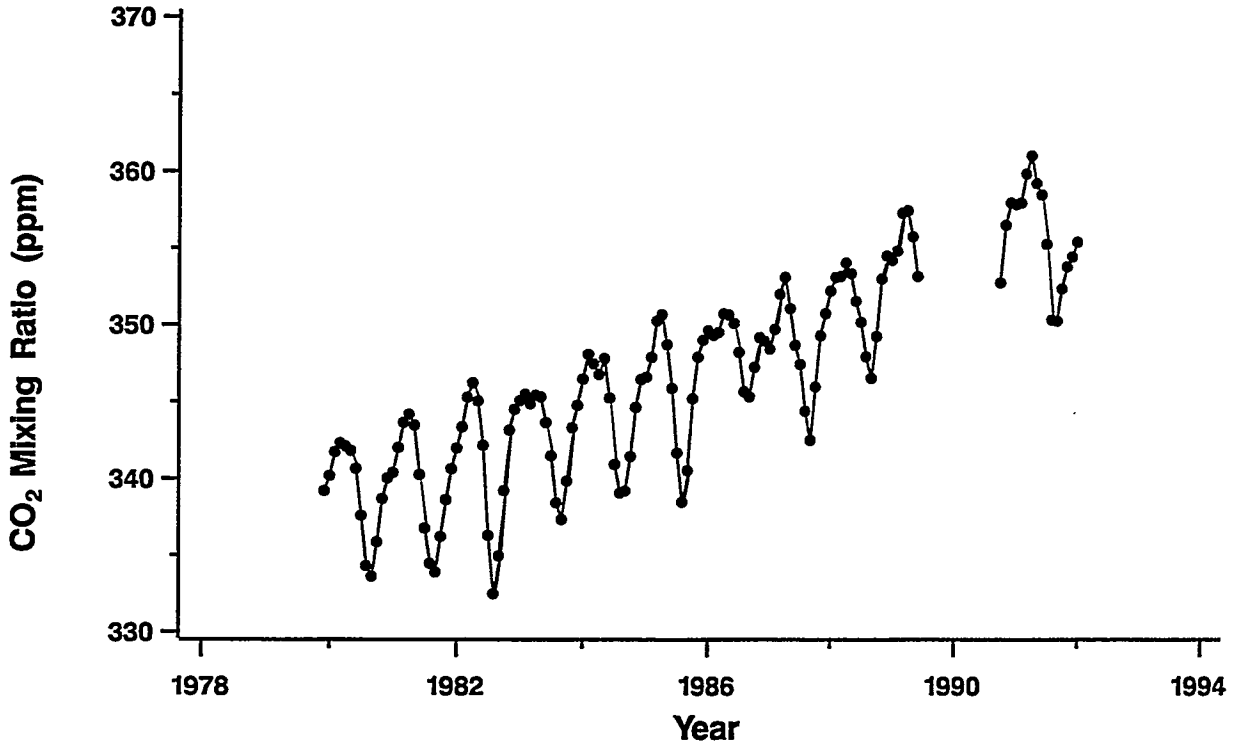
Monthly atmospheric CO_2 mixing ratios from St. Croix, Virgin Islands.



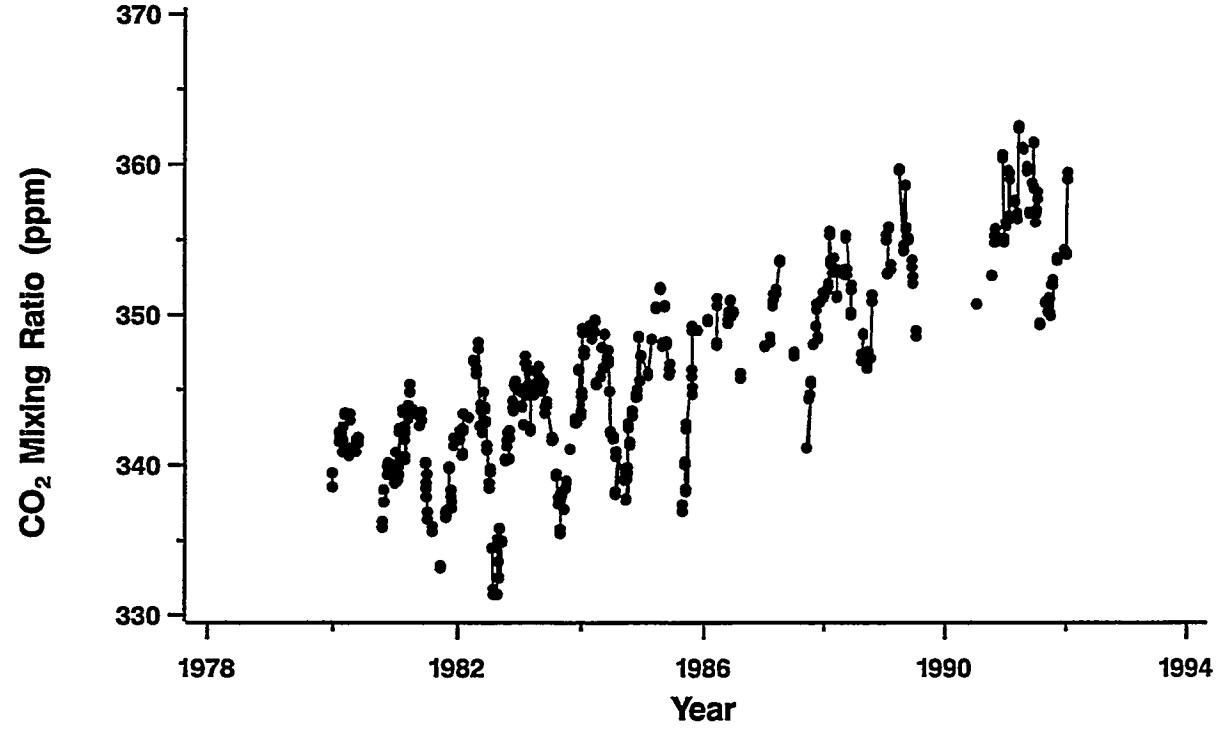
Background atmospheric CO_2 mixing ratios from individual flask air samples for St. Croix, Virgin Islands. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for St. Croix, Virgin Islands, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1979	-99.99	-99.99	339.35	340.66	340.59	338.81	334.64	332.48	333.35	334.74	336.25	337.64	-99.99
1980	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	335.39	335.82	338.10	340.00	-99.99
1981	341.01	341.83	342.82	343.79	343.16	342.04	340.64	337.89	336.32	336.78	338.20	340.03	340.38
1982	342.03	343.01	343.36	343.85	343.98	343.22	340.94	337.40	336.25	337.63	339.42	341.06	341.01
1983	341.97	343.04	344.64	344.87	344.16	344.64	342.26	339.05	339.66	339.78	338.87	340.42	341.95
1984	343.22	344.61	345.48	347.03	347.92	347.03	343.66	339.86	338.52	339.50	341.09	343.46	343.45
1985	345.56	345.85	346.30	347.61	348.56	348.28	345.90	343.25	342.25	342.44	344.11	345.82	345.49
1986	346.44	347.46	348.89	349.26	349.43	349.07	346.72	344.18	343.07	343.87	345.63	347.08	346.76
1987	347.83	349.02	350.68	351.56	350.93	349.57	348.16	346.74	345.53	345.46	347.20	349.16	348.49
1988	350.42	351.66	353.04	354.05	354.63	353.62	351.02	348.80	348.35	349.04	350.56	352.03	351.44
1989	353.24	354.00	354.68	355.79	356.56	355.45	353.39	351.33	350.33	350.72	352.19	353.77	353.45
1990	354.59	355.58	356.61	357.30	357.62	357.03	354.44	351.33	-99.99	-99.99	-99.99	-99.99	-99.99



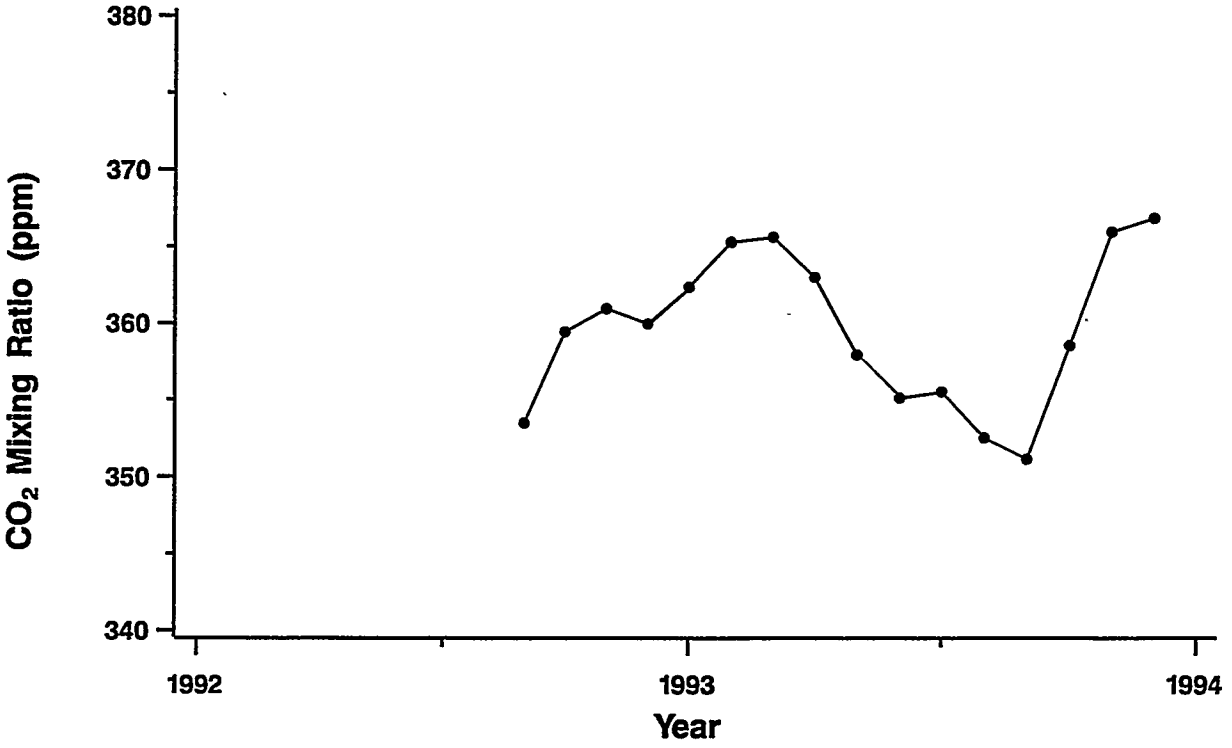
Monthly atmospheric CO_2 mixing ratios from the Azores.



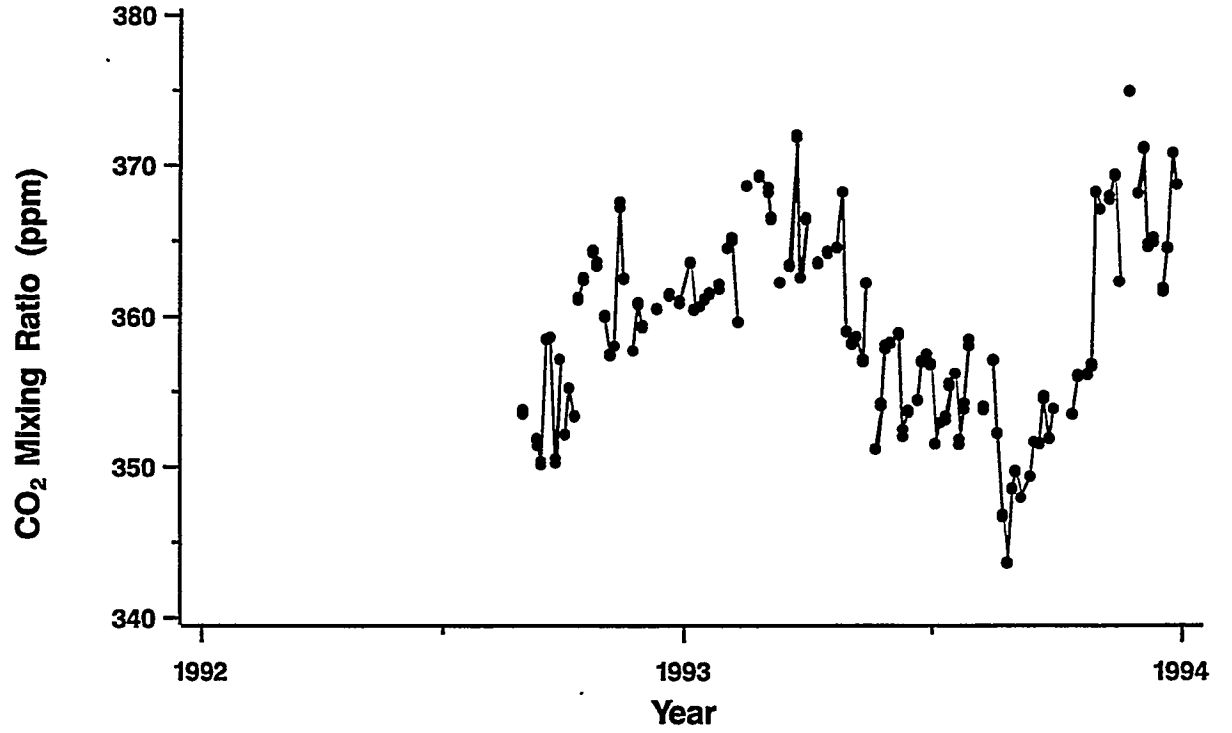
Background atmospheric CO_2 mixing ratios from individual flask air samples for the Azores. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for the Azores, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1979	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	339.21	-99.99
1980	340.20	341.74	342.31	342.11	341.83	340.66	337.60	334.32	333.64	335.88	338.70	340.05	339.09
1981	340.40	342.02	343.66	344.18	343.49	340.27	336.78	334.48	333.91	336.22	338.63	340.65	339.56
1982	341.99	343.37	345.29	346.23	345.06	342.17	336.30	332.50	334.96	339.23	343.17	344.52	341.23
1983	345.08	345.48	344.89	345.42	345.32	343.65	341.49	338.43	337.35	339.85	343.33	344.78	342.92
1984	346.48	348.08	347.48	346.80	347.81	345.26	340.94	339.07	339.21	341.45	344.65	346.45	344.47
1985	346.60	347.90	350.25	350.66	348.72	345.88	341.68	338.47	340.53	345.21	347.91	349.01	346.07
1986	349.62	349.33	349.52	350.72	350.64	350.11	348.22	345.67	345.34	347.25	349.19	348.94	348.71
1987	348.44	349.71	352.01	353.11	351.07	348.68	347.44	344.41	342.52	345.97	349.30	350.74	348.62
1988	352.22	353.11	353.17	354.04	353.35	351.55	350.18	347.94	346.55	349.27	353.01	354.51	351.58
1989	354.24	354.83	357.31	357.46	355.77	353.17	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99
1990	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	352.76	356.52	357.96	-99.99
1991	357.87	357.97	359.87	361.04	359.25	358.50	355.29	350.33	350.26	352.38	353.81	354.45	355.92
1992	355.42	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99



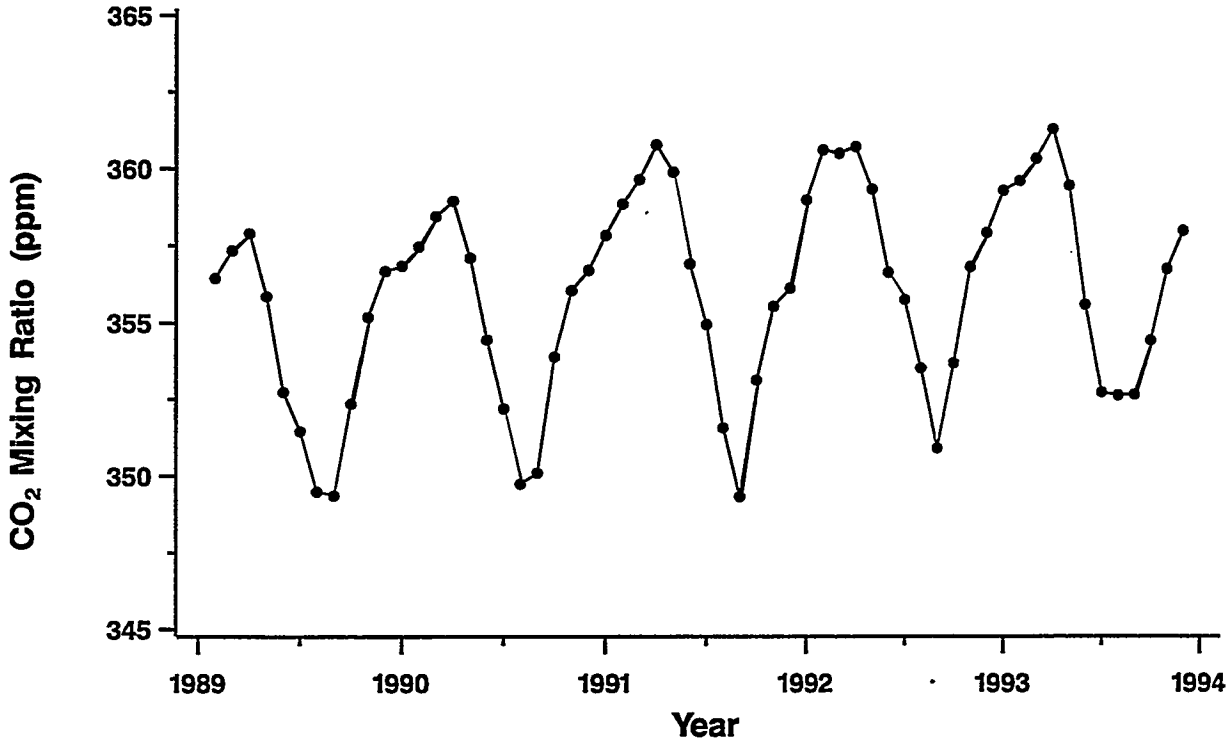
Monthly atmospheric CO_2 mixing ratios from the Baltic Sea.



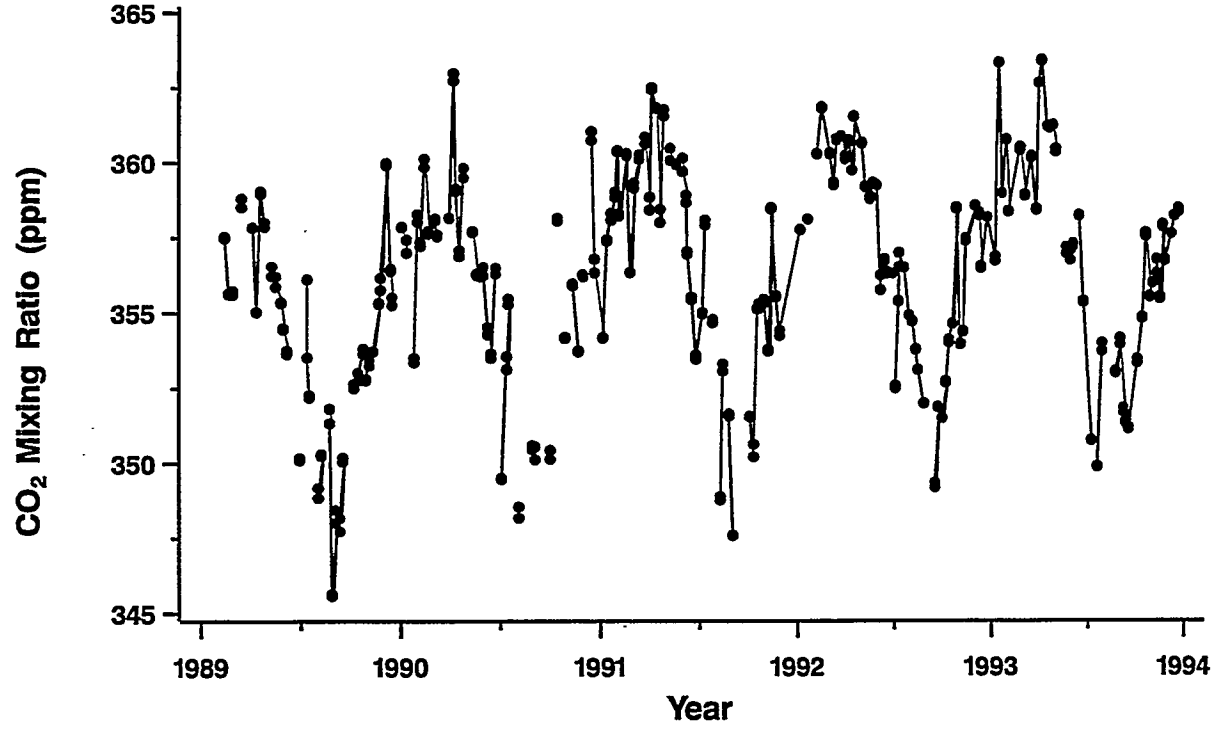
Background atmospheric CO_2 mixing ratios from individual flask air samples for the Baltic Sea. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios from air samples collected on a ferry in the Baltic Sea. These mixing ratios are expressed in parts per million (ppm) relative to the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1992	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	353.50	359.45	360.97	359.97	-99.99
1993	362.37	365.30	365.64	363.02	357.94	355.12	355.53	352.54	351.16	358.55	365.98	366.88	360.00



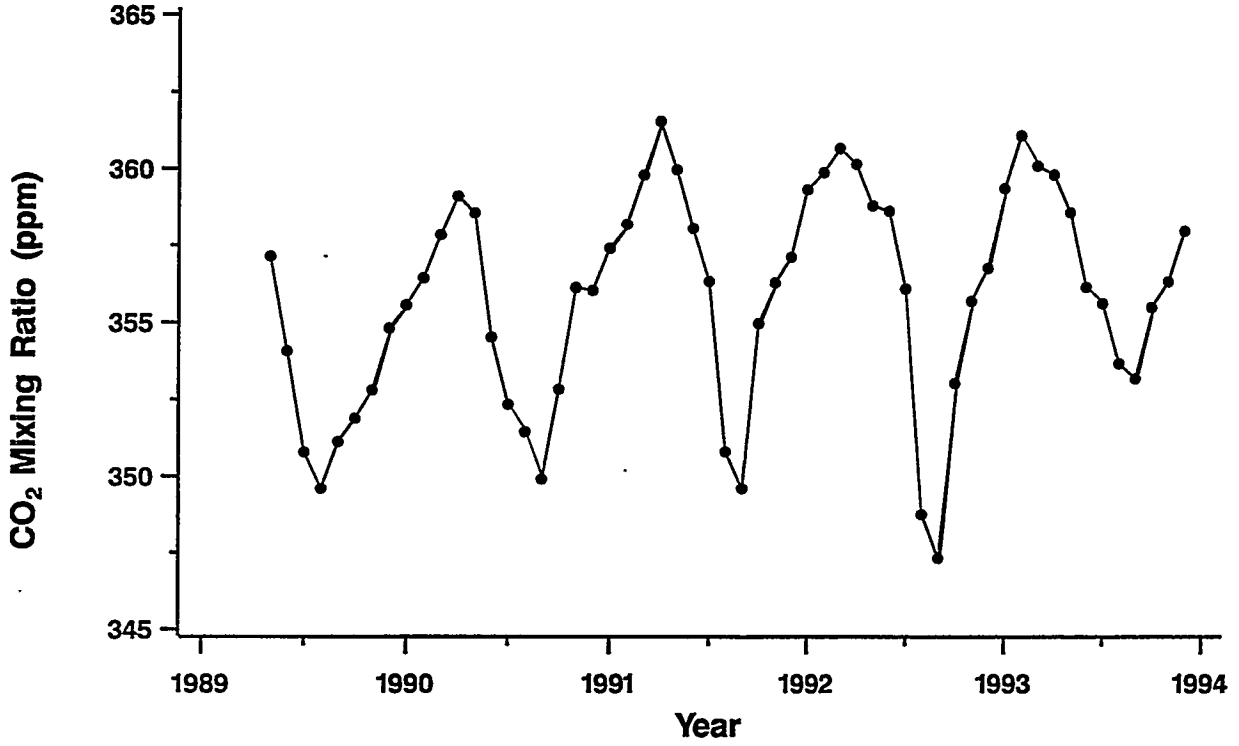
Monthly atmospheric CO_2 mixing ratios from St. David's Head, Bermuda.



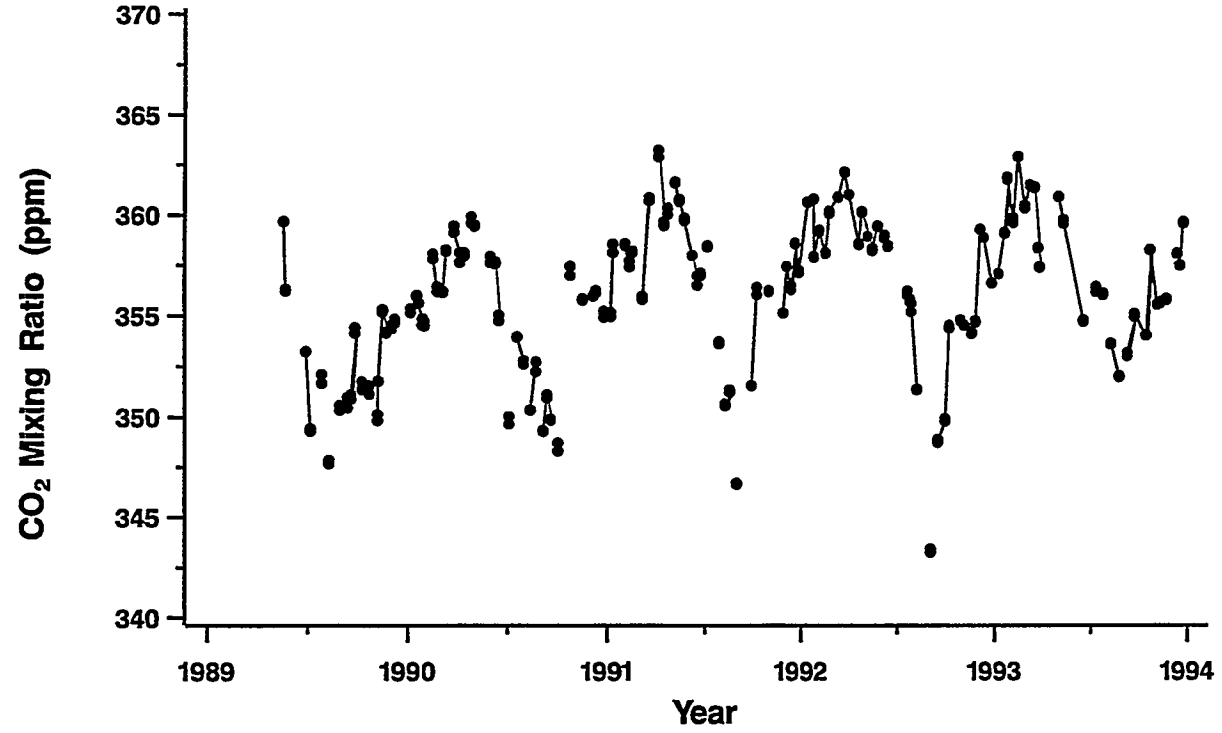
Background atmospheric CO_2 mixing ratios from individual flask air samples for St. David's Head, Bermuda. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for St. David's Head, Bermuda, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1989	-99.99	356.45	357.34	357.89	355.86	352.73	351.45	349.47	349.34	352.35	355.18	356.67	-99.99
1990	356.84	357.46	358.44	358.93	357.10	354.44	352.19	349.73	350.09	353.89	356.05	356.71	355.16
1991	357.83	358.84	359.64	360.76	359.88	356.91	354.94	351.56	349.31	353.12	355.53	356.12	356.20
1992	358.97	360.59	360.49	360.70	359.32	356.63	355.75	353.52	350.89	353.68	356.81	357.91	357.11
1993	359.27	359.59	360.31	361.27	359.44	355.59	352.72	352.62	352.65	354.42	356.74	357.97	356.88



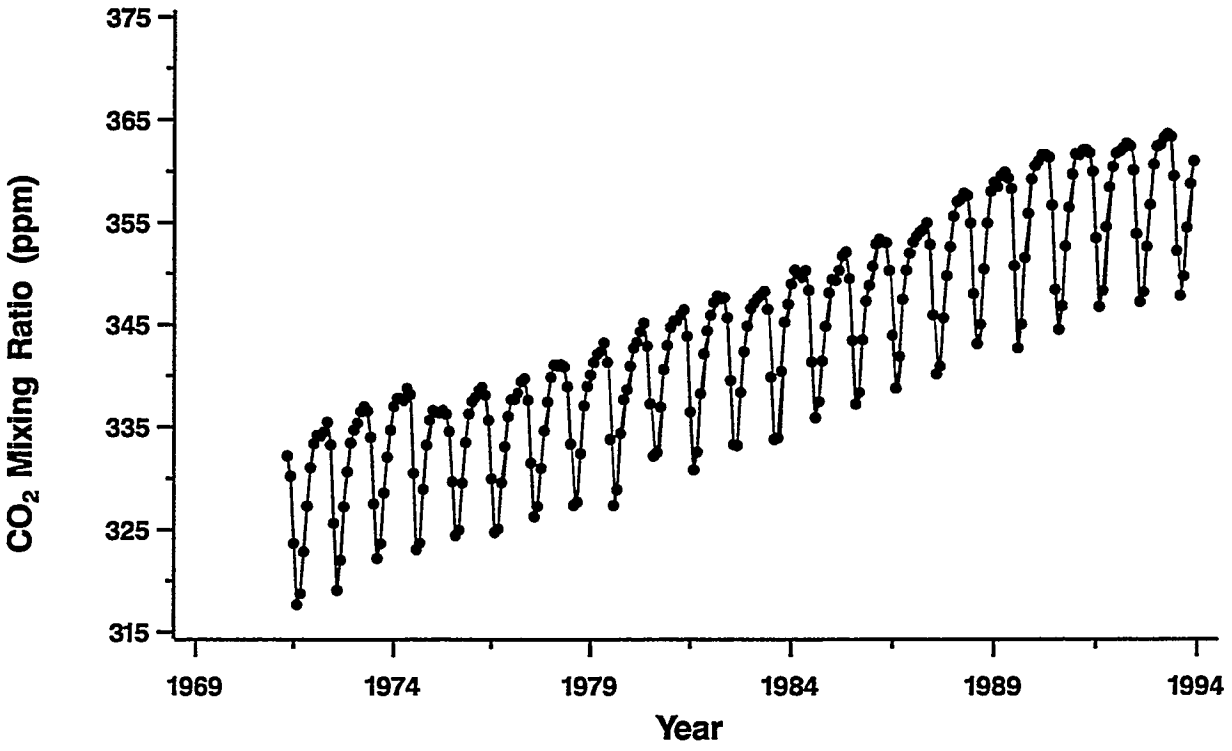
Monthly atmospheric CO_2 mixing ratios from Southampton, Bermuda.



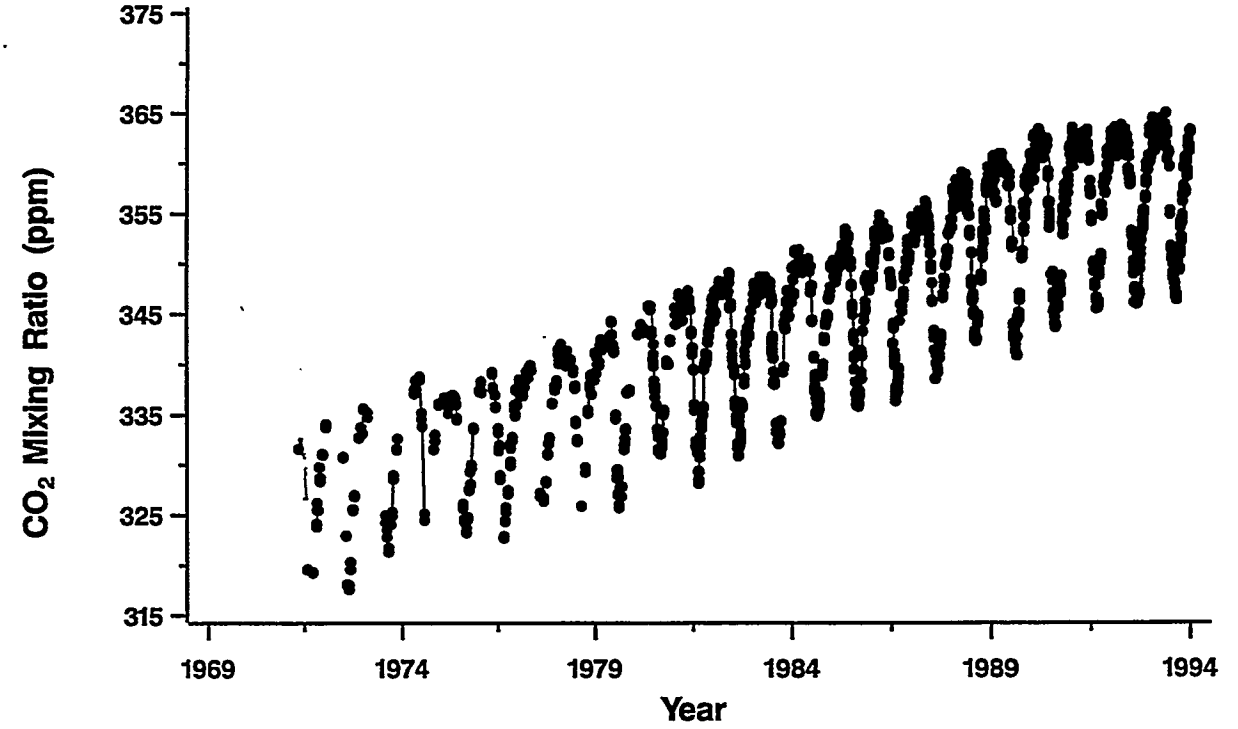
Background atmospheric CO_2 mixing ratios from individual flask air samples for Southampton, Bermuda. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Southampton, Bermuda, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1989	-99.99	-99.99	-99.99	-99.99	357.14	354.08	350.78	349.60	351.12	351.88	352.81	354.81	-99.99
1990	355.56	356.44	357.85	359.10	358.56	354.53	352.35	351.45	349.91	352.84	356.13	356.04	355.06
1991	357.41	358.19	359.80	361.55	359.98	358.06	356.33	350.80	349.60	354.97	356.29	357.13	356.68
1992	359.33	359.89	360.68	360.17	358.81	358.63	356.10	348.76	347.32	353.04	355.70	356.77	356.27
1993	359.37	361.09	360.11	359.82	358.59	356.16	355.63	353.69	353.20	355.50	356.34	357.98	357.29



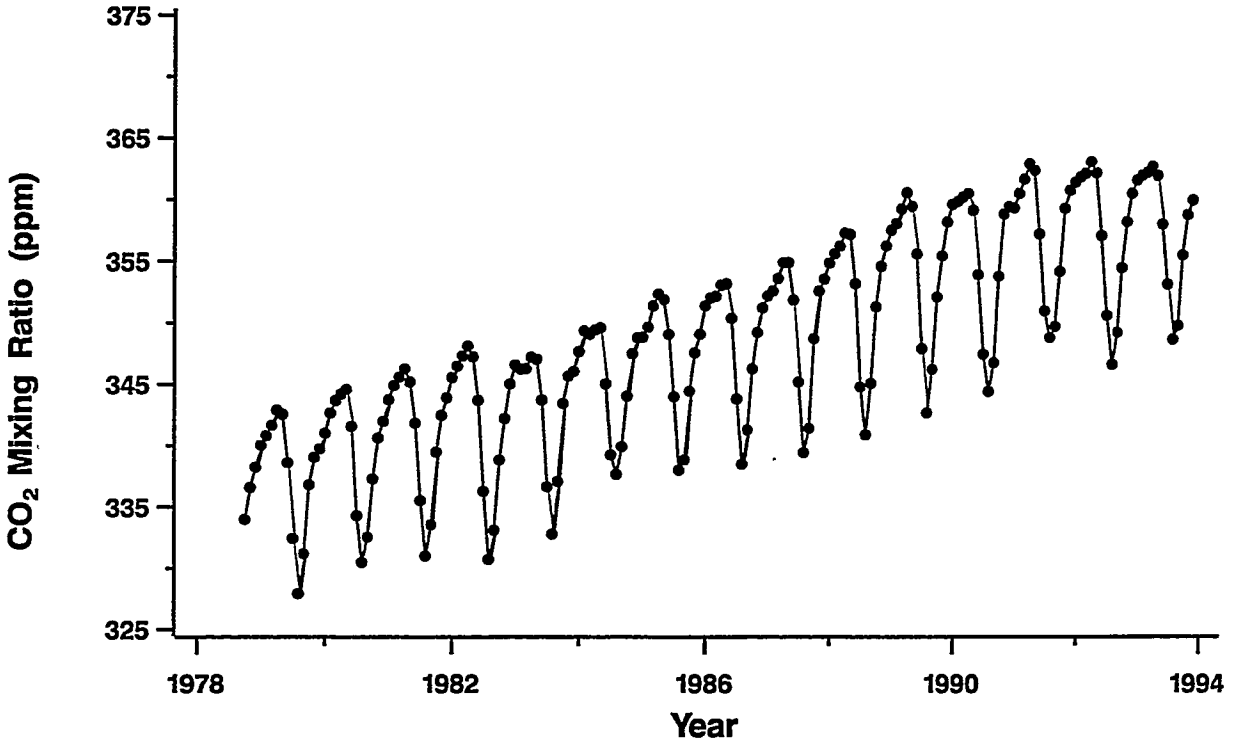
Monthly atmospheric CO_2 mixing ratios from Point Barrow, Alaska, U.S.



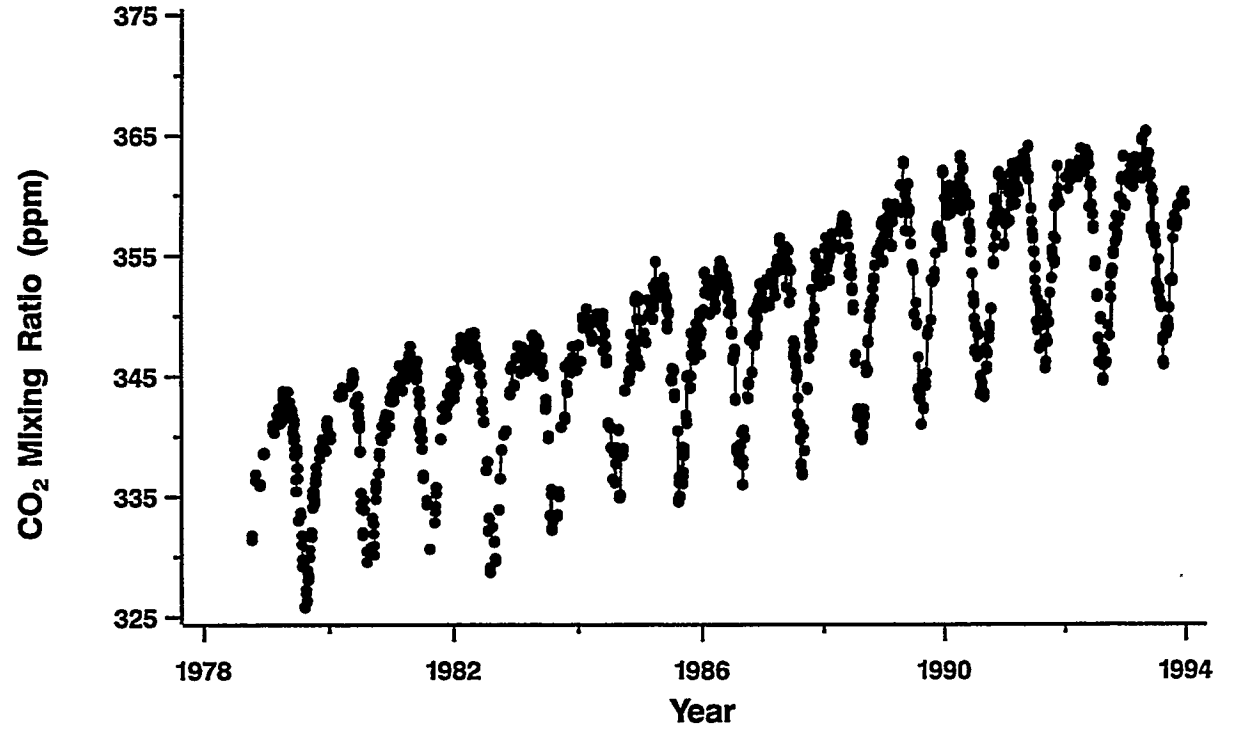
Background atmospheric CO_2 mixing ratios from individual flask air samples for Point Barrow, Alaska, U.S. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Point Barrow, Alaska, U.S., expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1971	-99.99	-99.99	-99.99	-99.99	332.20	330.23	323.67	317.70	318.77	322.86	327.31	331.07	-99.99
1972	333.39	334.19	334.12	334.51	335.45	333.28	325.66	319.10	322.05	327.26	330.66	333.46	330.26
1973	334.71	335.40	336.48	336.98	336.55	334.01	327.53	322.22	323.65	328.60	332.08	334.70	331.91
1974	337.01	337.78	337.80	337.59	338.73	338.17	330.53	323.08	323.73	328.95	333.26	335.69	333.53
1975	336.62	336.46	336.39	336.60	336.25	334.57	329.69	324.46	324.97	329.56	333.50	336.28	332.95
1976	337.48	337.89	338.55	338.85	338.10	335.65	329.98	324.76	325.10	329.61	333.11	336.03	333.76
1977	337.67	337.71	338.31	339.41	339.69	337.62	331.50	326.29	327.28	331.01	334.62	337.44	334.88
1978	339.84	341.03	340.96	341.05	340.87	338.93	333.36	327.39	327.70	332.42	337.07	338.97	336.63
1979	340.08	341.29	342.07	342.33	343.20	341.32	333.81	327.38	328.90	334.37	337.66	338.64	337.59
1980	340.93	342.71	343.29	344.32	345.15	342.89	337.27	332.20	332.53	336.96	340.60	342.97	340.15
1981	344.75	345.38	345.44	345.99	346.45	343.86	336.46	330.85	332.60	338.25	342.13	344.40	341.38
1982	345.94	347.19	347.81	347.55	347.64	345.69	339.54	333.30	333.20	338.38	342.34	344.87	342.79
1983	346.58	347.13	347.59	347.88	348.25	346.51	339.86	333.79	333.95	340.42	345.24	347.01	343.68
1984	349.01	350.36	349.94	349.66	350.31	348.36	341.33	335.90	337.47	341.42	344.85	348.12	345.56
1985	349.44	349.34	350.33	351.77	352.13	349.53	343.45	337.24	338.36	343.53	347.32	348.87	346.78
1986	350.74	352.92	353.38	353.07	353.04	350.33	343.97	338.79	341.89	347.49	350.36	352.04	349.00
1987	353.10	353.69	354.10	354.36	354.97	352.87	345.97	340.19	340.91	345.67	349.82	352.65	349.86
1988	355.63	357.05	357.28	357.85	357.64	354.96	348.05	343.12	345.04	350.47	354.96	358.06	353.34
1989	358.93	358.55	359.56	359.93	359.33	358.33	350.80	342.70	345.07	351.57	355.91	359.27	355.00
1990	360.57	361.02	361.61	361.57	361.37	356.70	348.45	344.53	346.86	352.72	356.50	359.73	355.97
1991	361.69	361.63	362.05	362.09	361.80	360.00	353.52	346.78	348.37	354.60	358.48	360.46	357.62
1992	361.77	361.96	362.28	362.70	362.45	360.14	353.92	347.26	348.22	352.68	356.75	360.68	357.57
1993	362.43	362.63	363.27	363.61	363.37	359.55	352.26	347.86	349.77	354.52	358.81	360.99	358.26



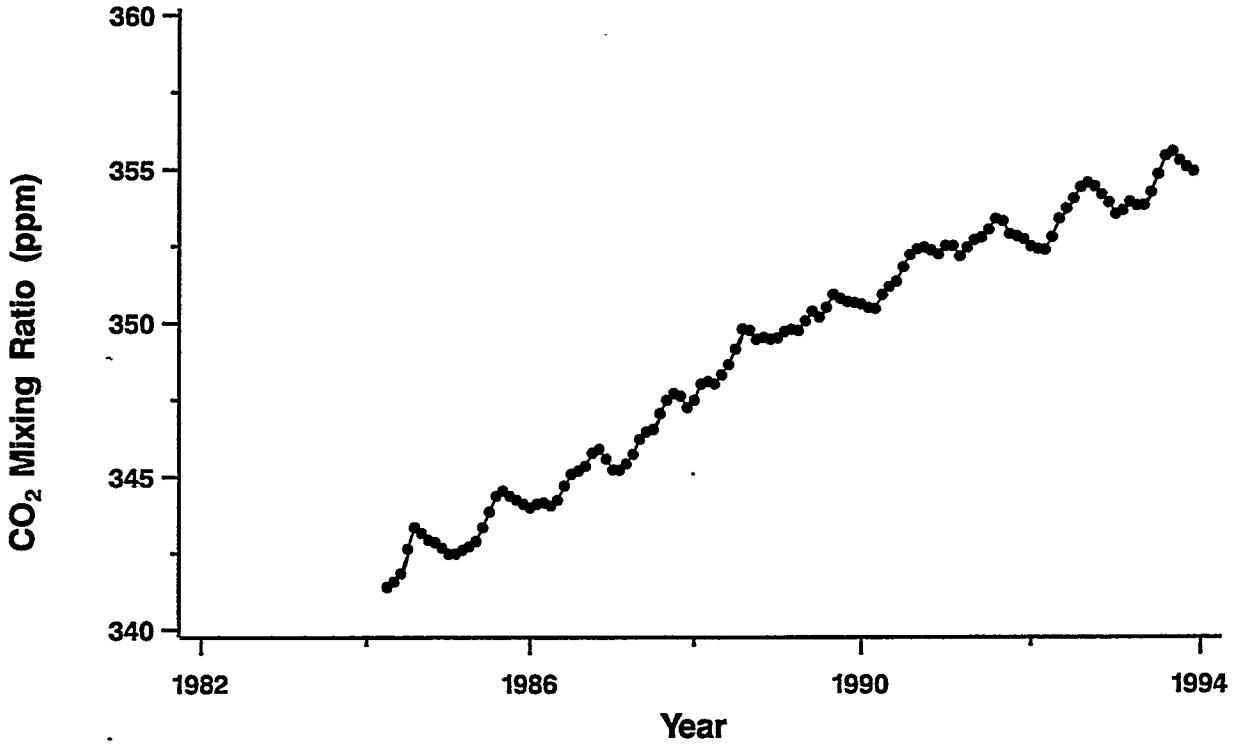
Monthly atmospheric CO_2 mixing ratios from Cold Bay, Alaska, U.S.



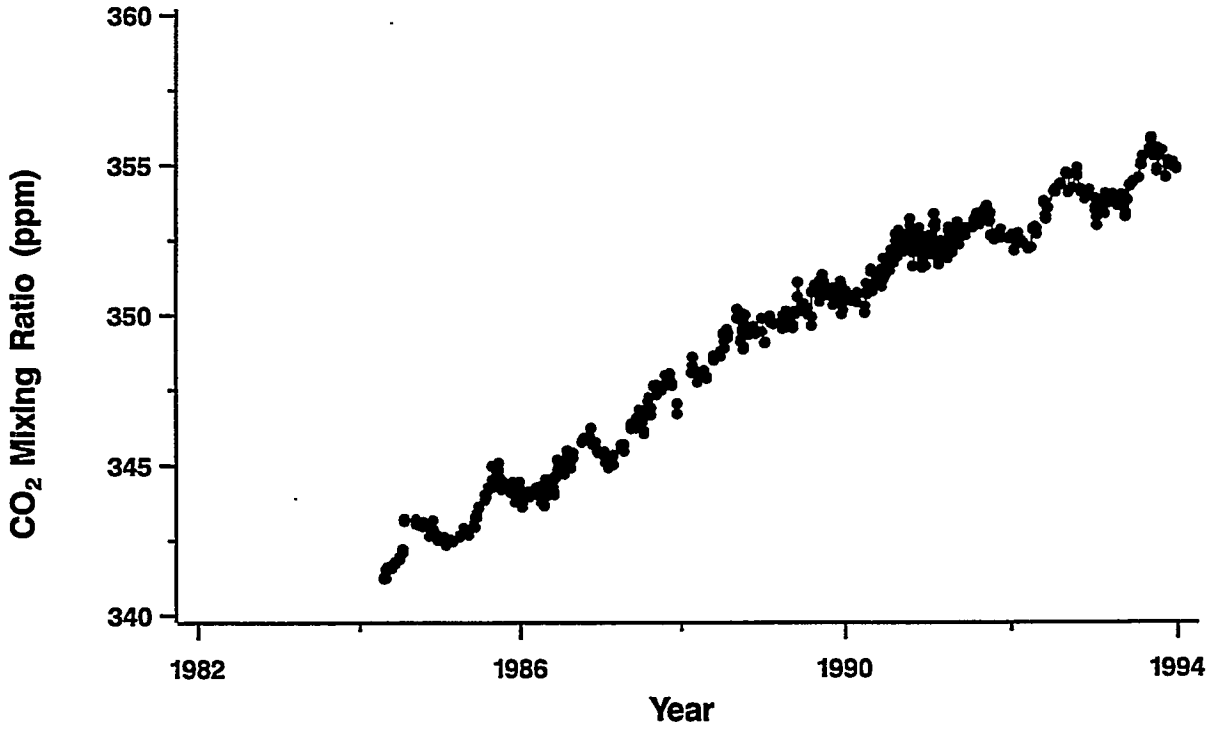
Background atmospheric CO_2 mixing ratios from individual flask air samples for Cold Bay, Alaska, U.S. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Cold Bay, Alaska, U.S., expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1978	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	333.99	336.60	338.25	-99.99
1979	340.06	340.84	341.69	342.91	342.57	338.62	332.43	327.94	331.18	336.82	339.06	339.75	337.82
1980	341.04	342.68	343.69	344.22	344.59	341.59	334.29	330.47	332.53	337.30	340.64	342.00	339.59
1981	343.75	344.91	345.58	346.25	345.20	341.85	335.53	330.99	333.54	339.48	342.48	343.90	341.12
1982	345.55	346.49	347.31	348.08	347.24	343.69	336.28	330.72	333.10	338.84	342.23	345.04	342.05
1983	346.58	346.25	346.29	347.21	347.05	343.73	336.66	332.78	337.08	343.46	345.69	346.05	343.24
1984	347.67	349.34	349.09	349.44	349.60	345.05	339.26	337.67	339.93	344.04	347.50	348.79	345.62
1985	348.85	349.64	351.39	352.33	351.90	349.07	343.99	338.01	338.85	344.45	347.56	349.07	347.09
1986	351.40	352.02	352.17	353.06	353.16	350.37	343.81	338.49	341.30	346.27	349.21	351.23	348.54
1987	352.19	352.60	353.62	354.89	354.89	351.87	345.20	339.44	341.44	348.72	352.59	353.55	350.08
1988	354.87	355.61	356.23	357.28	357.17	353.18	344.80	340.91	345.09	351.31	354.59	356.25	352.27
1989	357.52	358.05	359.23	360.55	359.47	355.59	347.90	342.68	346.23	352.10	355.44	358.19	354.41
1990	359.62	359.84	360.19	360.49	359.14	353.92	347.44	344.42	346.77	353.79	358.83	359.42	355.32
1991	359.33	360.50	361.68	362.92	362.37	357.21	350.97	348.79	349.70	354.17	359.28	360.76	357.31
1992	361.40	361.83	362.15	363.06	362.19	357.08	350.60	346.63	349.21	354.47	358.19	360.50	357.28
1993	361.60	361.97	362.21	362.68	361.97	358.01	353.14	348.66	349.78	355.50	358.76	359.95	357.85



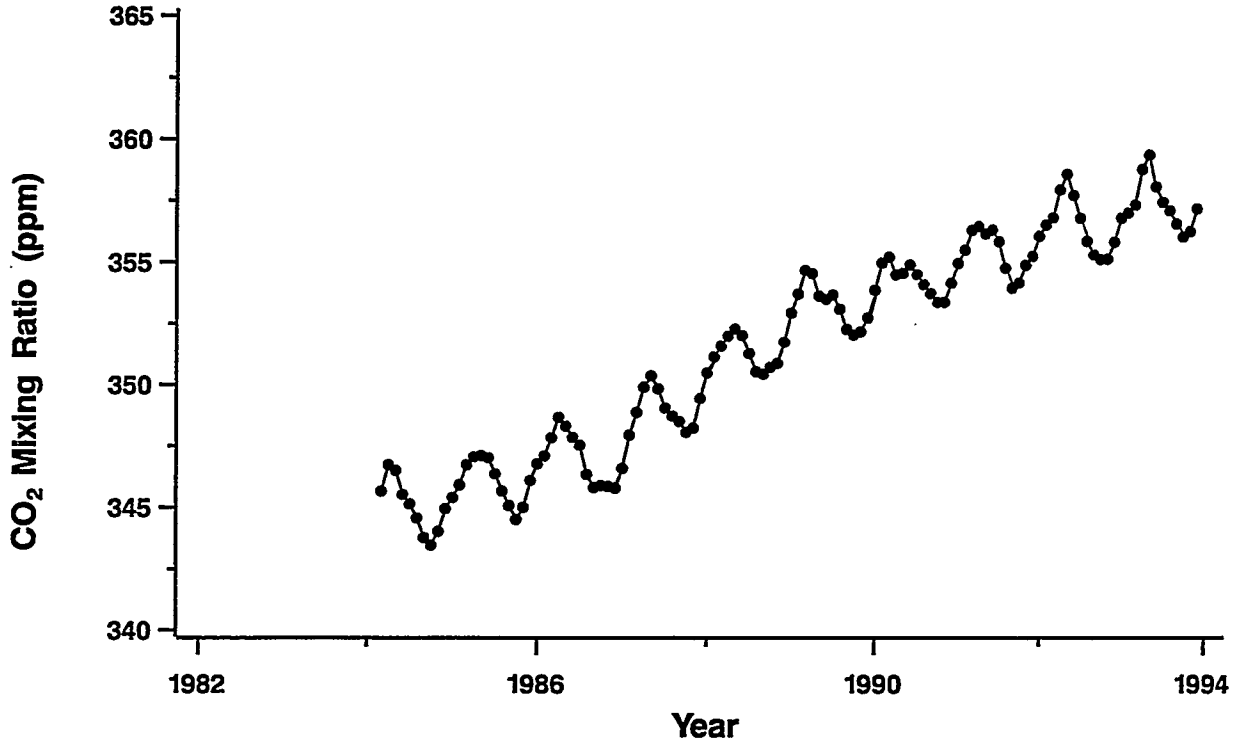
Monthly atmospheric CO_2 mixing ratios from Cape Grim, Tasmania, Australia.



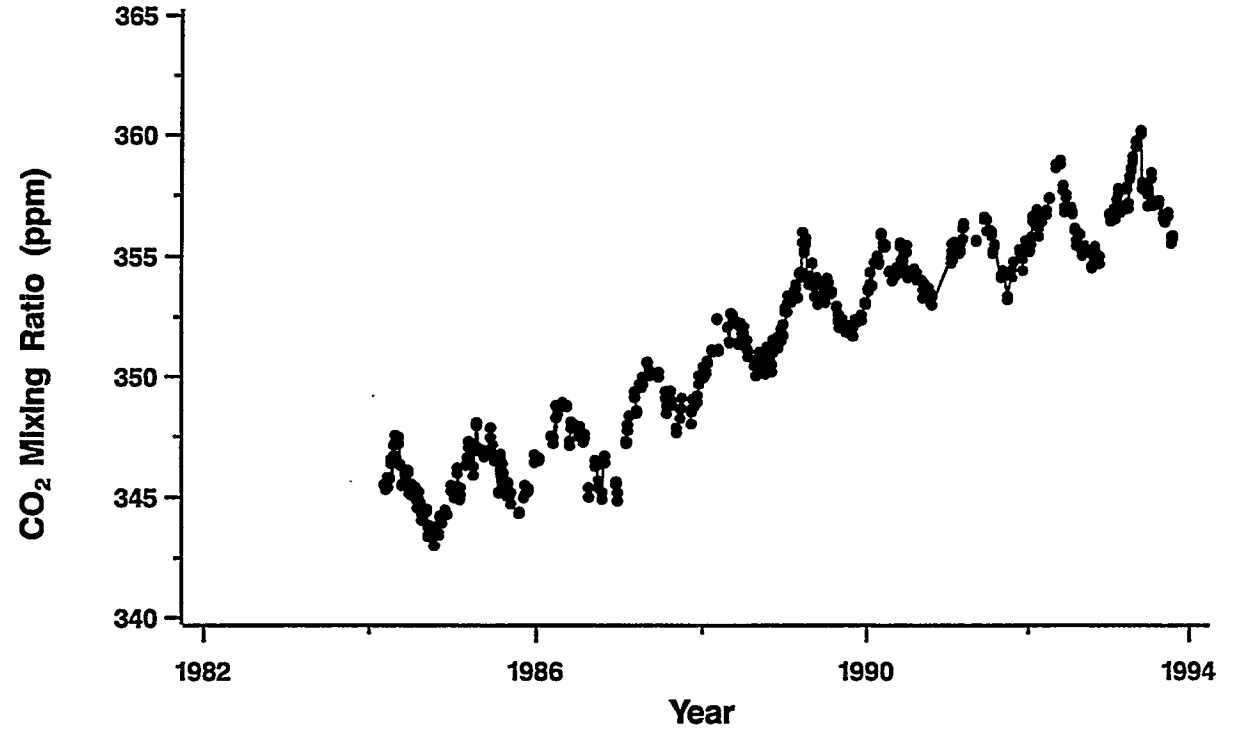
Background atmospheric CO_2 mixing ratios from individual flask air samples for Cape Grim, Tasmania, Australia. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Cape Grim, Tasmania, Australia, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1984	-99.99	-99.99	-99.99	341.40	341.58	341.84	342.65	343.35	343.16	342.94	342.86	342.68	-99.99
1985	342.48	342.49	342.61	342.73	342.90	343.35	343.86	344.37	344.54	344.37	344.24	344.11	343.50
1986	343.99	344.11	344.15	344.06	344.24	344.71	345.09	345.20	345.35	345.78	345.90	345.59	344.85
1987	345.24	345.22	345.43	345.74	346.23	346.47	346.55	347.06	347.50	347.71	347.63	347.26	346.50
1988	347.50	348.02	348.10	348.03	348.32	348.65	349.16	349.80	349.76	349.48	349.53	349.48	348.82
1989	349.52	349.72	349.79	349.76	350.07	350.38	350.20	350.51	350.93	350.80	350.70	350.66	350.25
1990	350.62	350.50	350.47	350.93	351.19	351.36	351.83	352.23	352.41	352.47	352.37	352.25	351.55
1991	352.51	352.51	352.19	352.46	352.70	352.79	353.04	353.39	353.32	352.90	352.83	352.73	352.78
1992	352.50	352.42	352.39	352.80	353.40	353.73	354.05	354.42	354.57	354.45	354.19	353.93	353.57
1993	353.55	353.67	353.94	353.83	353.84	354.26	354.85	355.44	355.57	355.30	355.09	354.95	354.52



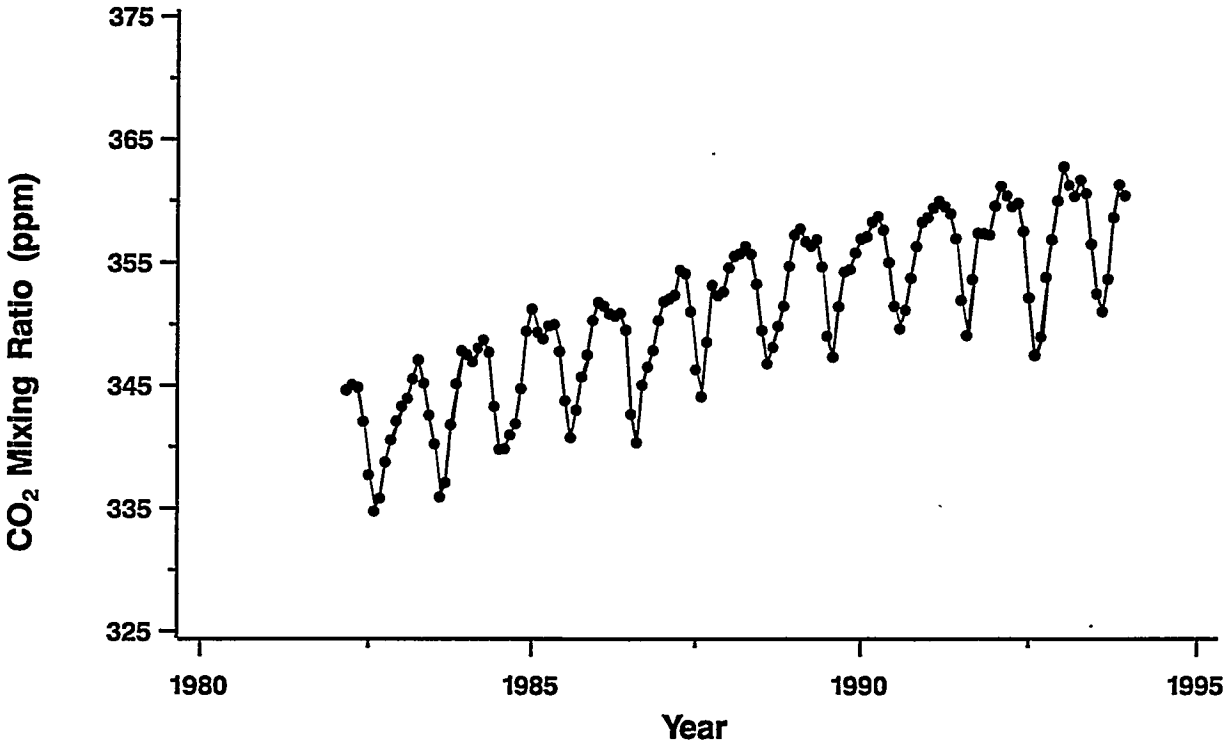
Monthly atmospheric CO_2 mixing ratios from Christmas Island.



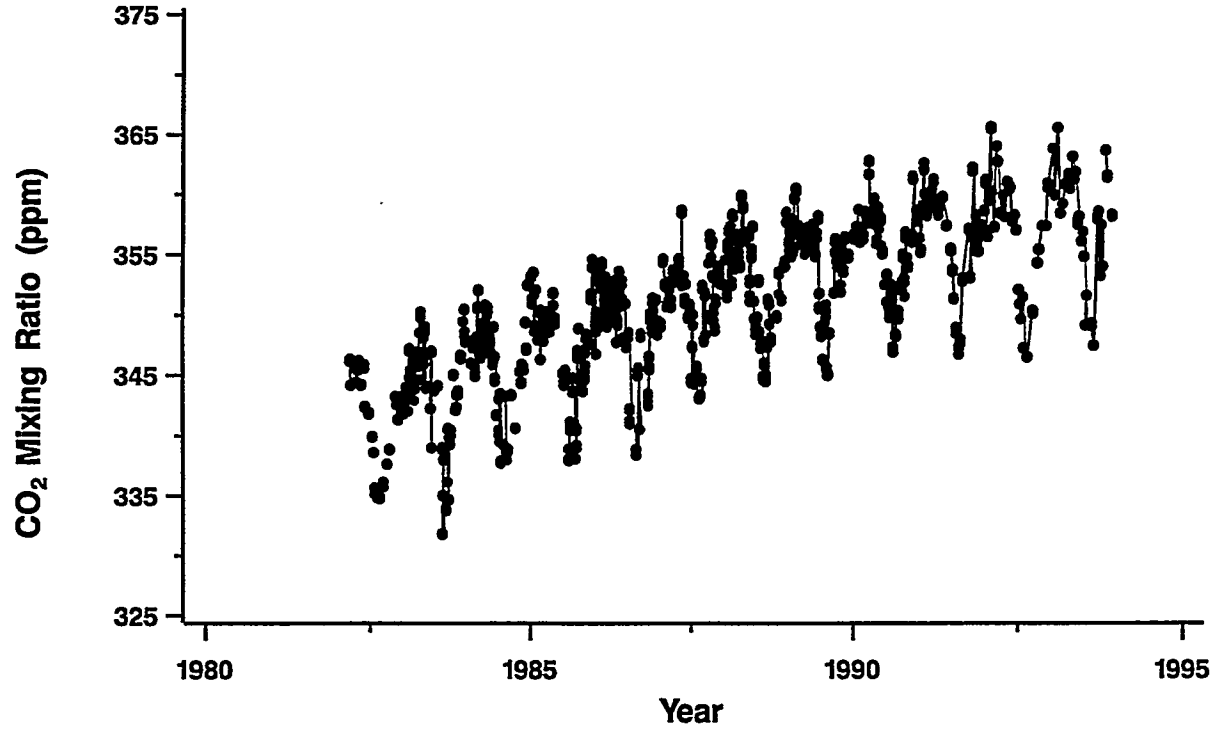
Background atmospheric CO_2 mixing ratios from individual flask air samples for Christmas Island. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Christmas Island, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1984	-99.99	-99.99	345.67	346.74	346.51	345.53	345.15	344.57	343.77	343.47	344.02	344.95	-99.99
1985	345.40	345.92	346.74	347.06	347.11	347.03	346.37	345.67	345.07	344.51	345.00	346.10	346.00
1986	346.78	347.10	347.85	348.67	348.32	347.86	347.54	346.35	345.82	345.90	345.87	345.80	346.99
1987	346.60	347.96	348.88	349.91	350.37	349.84	349.05	348.73	348.51	348.07	348.24	349.45	348.80
1988	350.49	351.14	351.58	351.98	352.27	352.01	351.28	350.54	350.45	350.72	350.88	351.74	351.26
1989	352.94	353.71	354.67	354.54	353.63	353.50	353.67	353.09	352.27	352.04	352.17	352.74	353.25
1990	353.87	354.98	355.21	354.50	354.56	354.89	354.51	354.10	353.73	353.37	353.37	354.15	354.27
1991	354.96	355.50	356.30	356.45	356.16	356.31	355.84	354.77	353.95	354.17	354.89	355.25	355.38
1992	356.06	356.52	356.81	357.94	358.58	357.72	356.79	355.86	355.31	355.12	355.14	355.83	356.47
1993	356.80	357.01	357.33	358.78	359.36	358.07	357.44	357.10	356.56	356.04	356.25	357.17	357.33



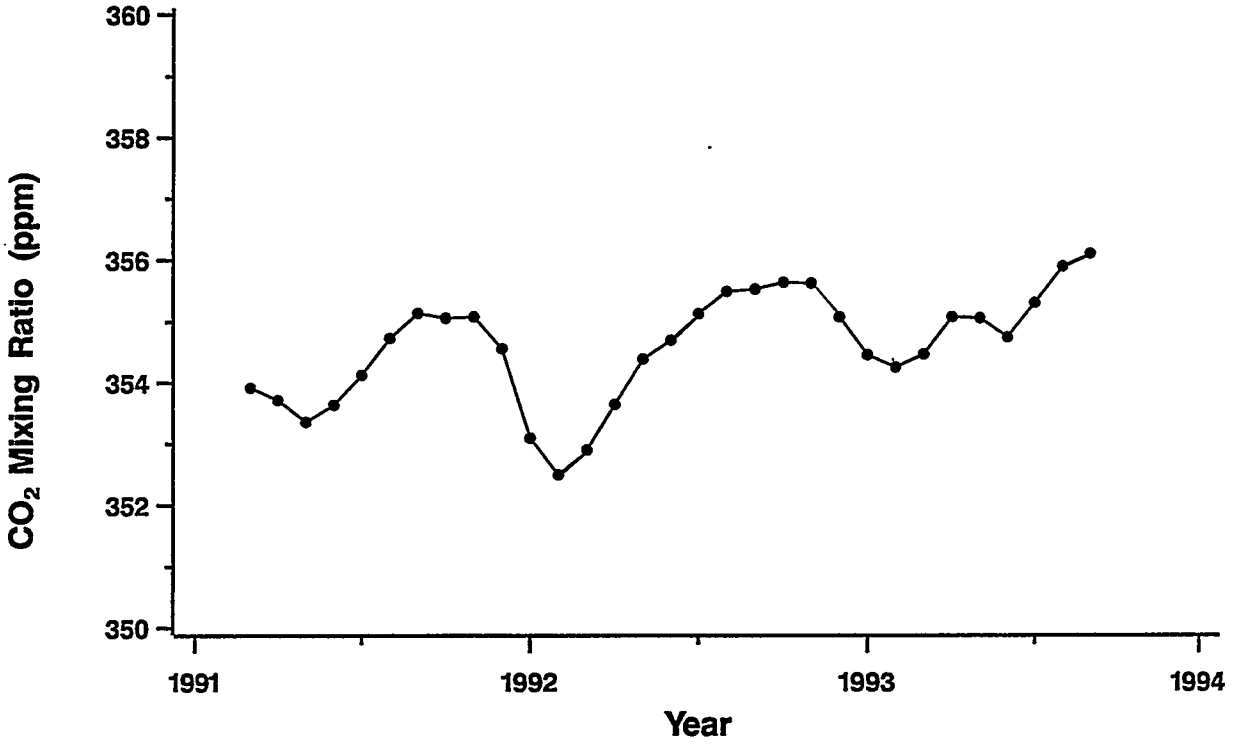
Monthly atmospheric CO_2 mixing ratios from Cape Meares, Oregon, U.S..



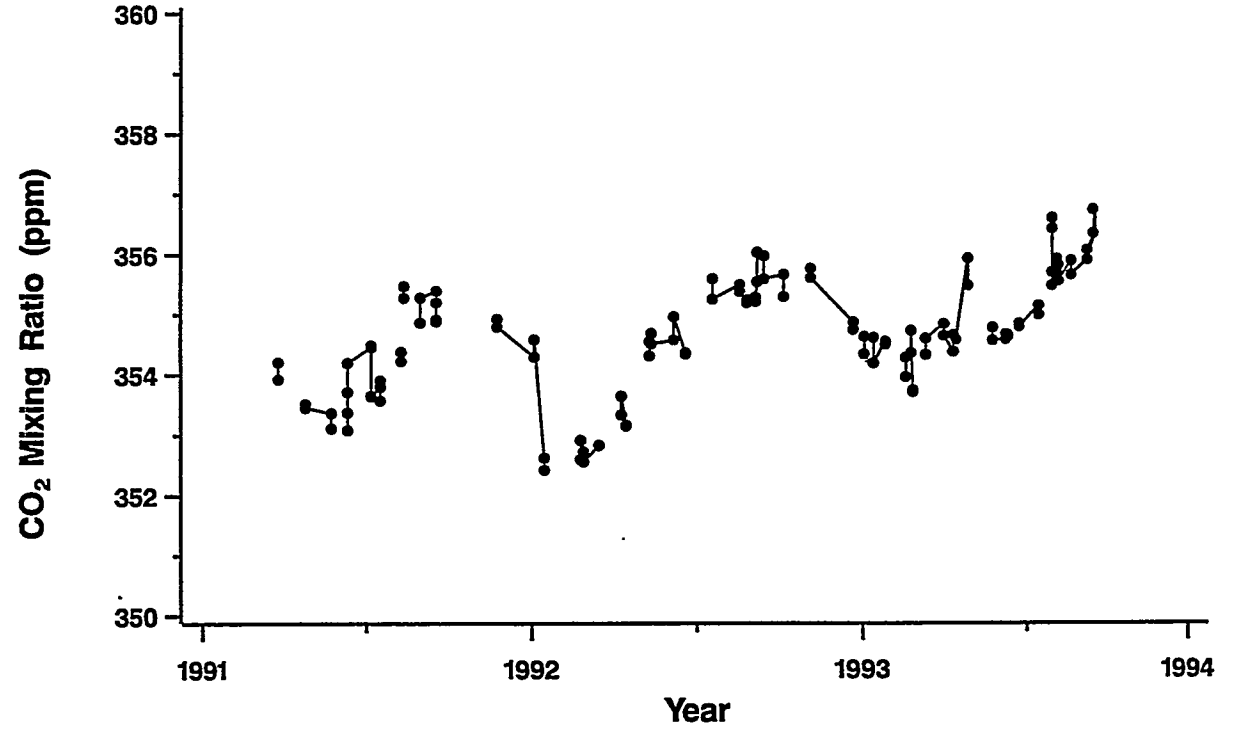
Background atmospheric CO_2 mixing ratios from individual flask air samples for Cape Meares, Oregon, U.S. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Cape Meares, Oregon, U.S., expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1982	-99.99	-99.99	344.63	345.07	344.85	342.09	337.72	334.77	335.82	338.77	340.58	342.11	-99.99
1983	343.32	343.95	345.55	347.10	345.21	342.61	340.25	335.93	337.11	341.82	345.15	347.84	342.99
1984	347.53	346.97	348.06	348.71	347.73	343.31	339.83	339.86	340.99	341.91	344.76	349.43	344.92
1985	351.24	349.37	348.83	349.86	349.97	347.79	343.78	340.78	343.02	345.73	347.52	350.33	347.35
1986	351.80	351.48	350.87	350.68	350.89	349.54	342.69	340.37	345.05	346.54	347.87	350.32	348.18
1987	351.85	352.09	352.39	354.42	354.11	351.04	346.31	344.11	348.55	353.17	352.37	352.67	351.09
1988	354.62	355.55	355.76	356.33	355.72	353.29	349.51	346.82	348.15	349.87	351.51	354.75	352.66
1989	357.28	357.77	356.75	356.39	356.90	354.70	349.05	347.37	351.47	354.27	354.48	355.82	354.35
1990	356.97	357.14	358.32	358.75	357.68	355.06	351.50	349.66	351.19	353.78	356.35	358.30	355.39
1991	358.70	359.45	359.99	359.56	359.00	356.99	351.98	349.12	353.67	357.42	357.38	357.30	356.71
1992	359.62	361.22	360.45	359.59	359.82	357.57	352.18	347.50	348.98	353.82	356.89	360.03	356.47
1993	362.80	361.31	360.42	361.70	360.63	356.55	352.51	351.07	353.69	358.69	361.34	360.45	358.43



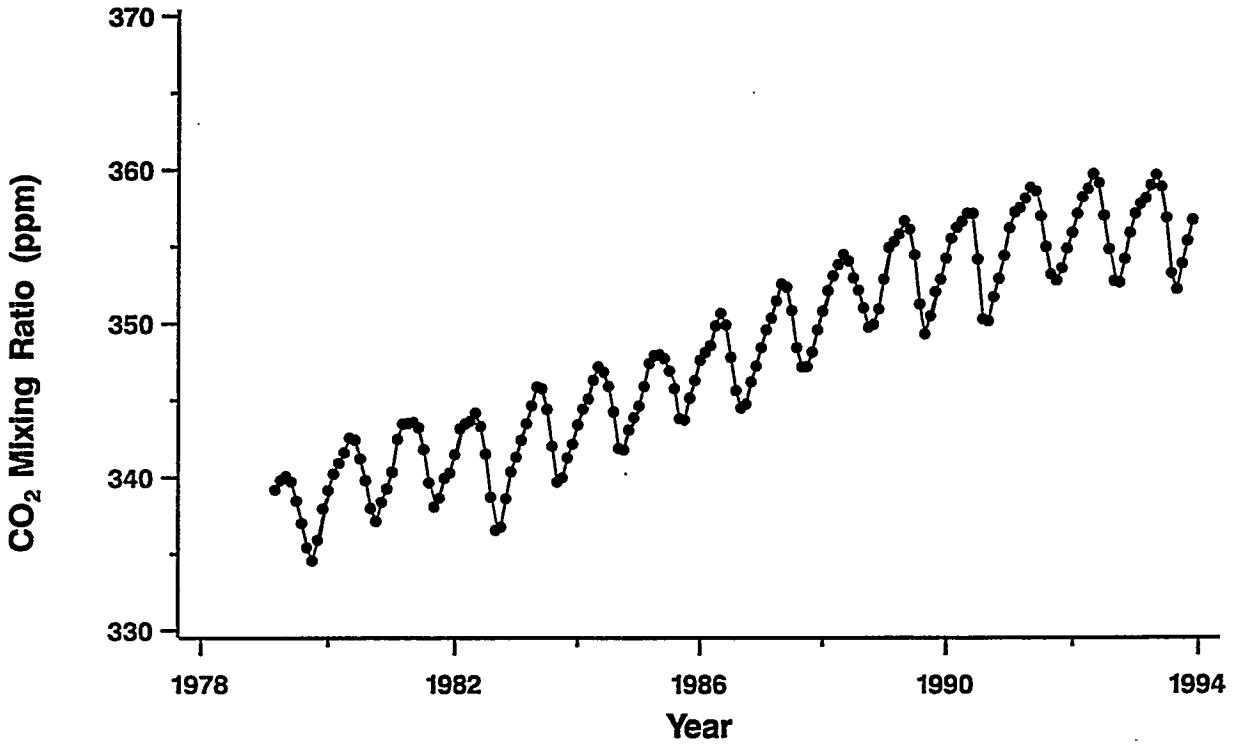
Monthly atmospheric CO_2 mixing ratios from the Crozet Islands.



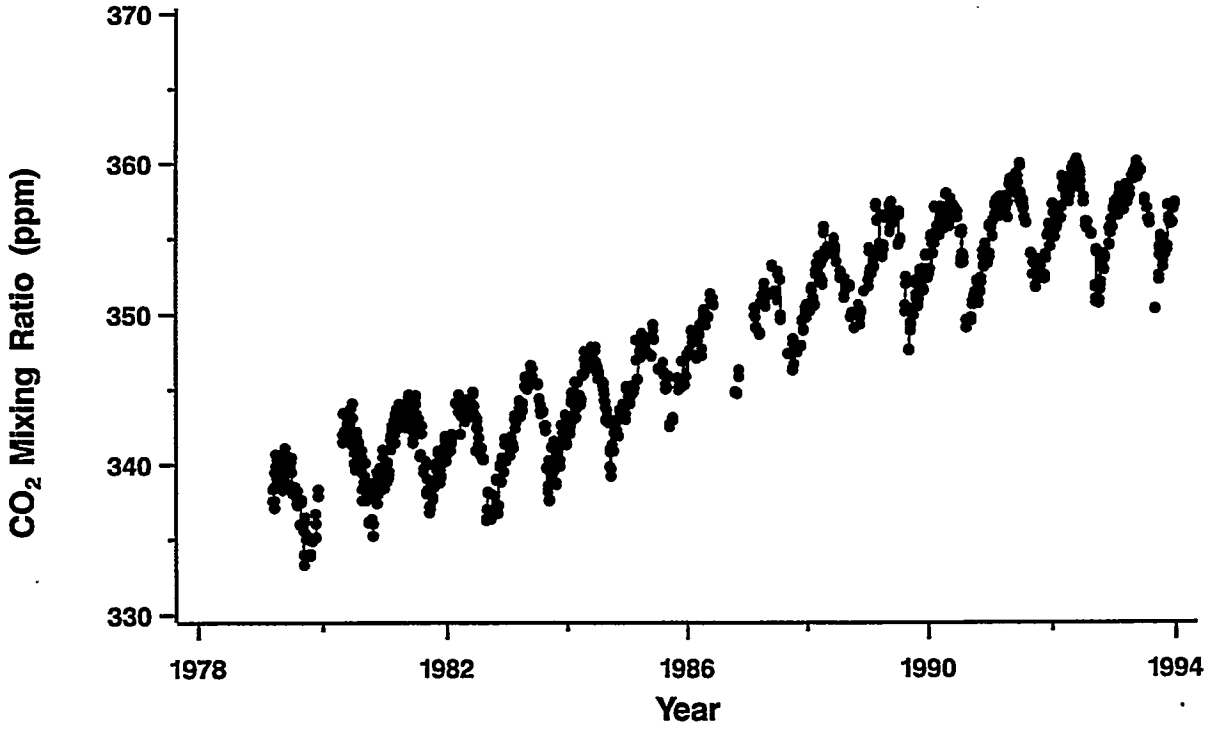
Background atmospheric CO_2 mixing ratios from individual flask air samples for the Crozet Islands. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for the Crozet Islands, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1991	-99.99	-99.99	353.92	353.72	353.36	353.64	354.13	354.73	355.14	355.06	355.08	354.56	-99.99
1992	353.10	352.50	352.91	353.65	354.39	354.70	355.13	355.49	355.53	355.64	355.63	355.08	354.48
1993	354.46	354.26	354.47	355.08	355.06	354.75	355.31	355.90	356.11	-99.99	-99.99	-99.99	-99.99



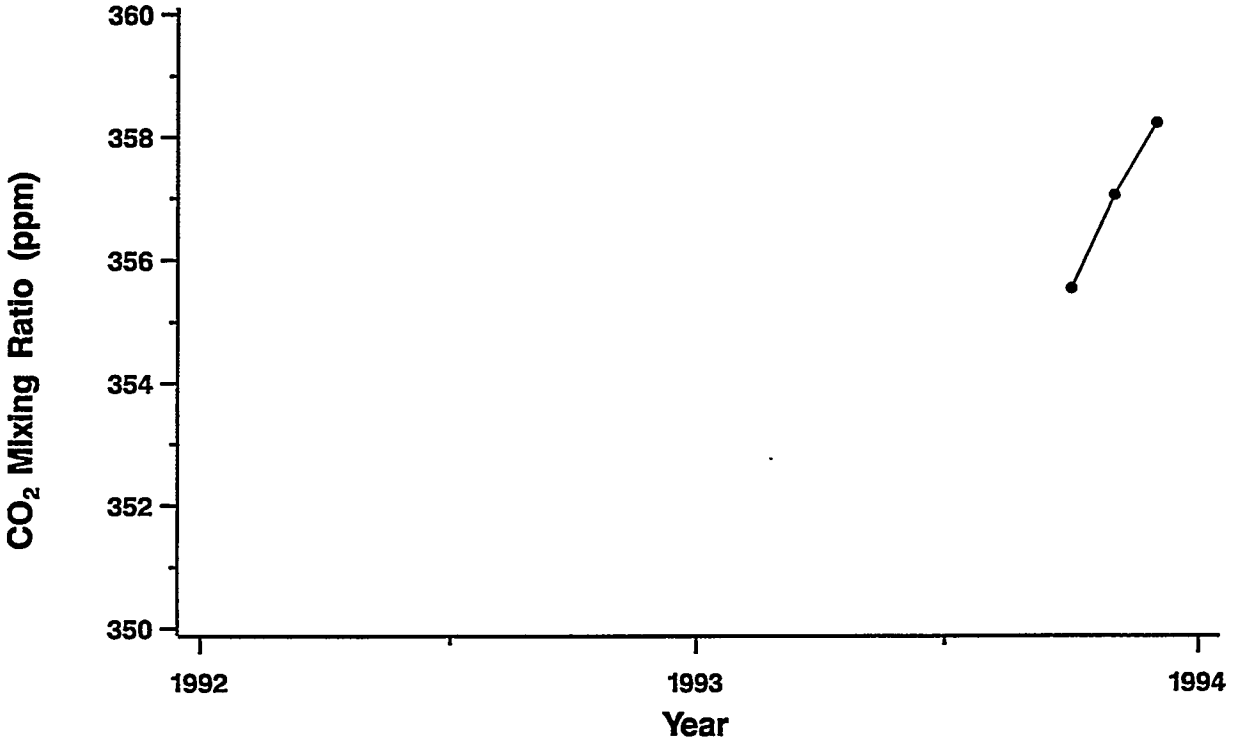
Monthly atmospheric CO_2 mixing ratios from Guam.



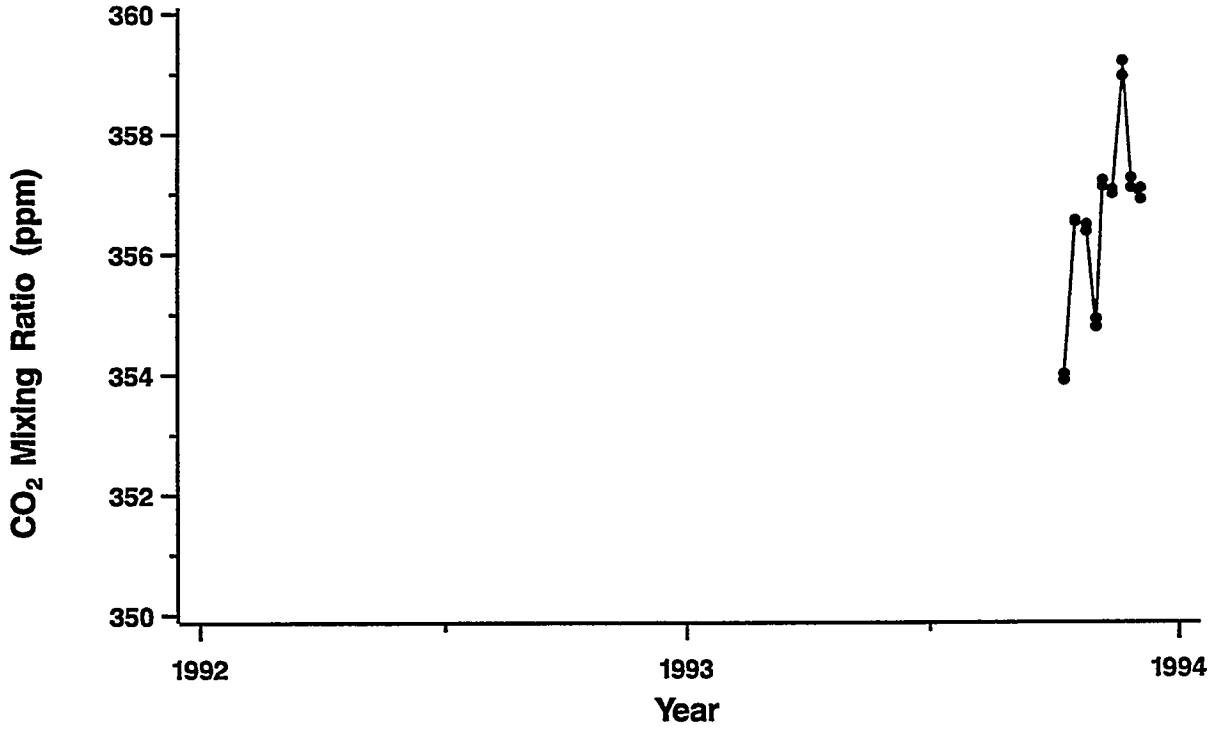
Background atmospheric CO_2 mixing ratios from individual flask air samples for Guam. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Guam, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1979	-99.99	-99.99	339.20	339.81	340.07	339.72	338.46	337.00	335.42	334.56	335.90	337.95	-99.99
1980	339.15	340.23	340.93	341.62	342.58	342.44	341.22	339.80	337.98	337.13	338.37	339.25	340.06
1981	340.35	342.49	343.48	343.52	343.58	343.24	341.82	339.66	338.07	338.64	339.94	340.29	341.26
1982	341.49	343.17	343.48	343.66	344.17	343.33	341.52	338.70	336.55	336.77	338.61	340.37	340.99
1983	341.32	342.43	343.50	344.65	345.87	345.75	344.42	342.04	339.71	339.99	341.28	342.18	342.76
1984	343.42	344.44	345.08	346.32	347.18	346.84	345.91	344.26	341.89	341.80	343.08	343.89	344.51
1985	344.63	345.90	347.40	347.91	347.96	347.71	346.91	345.76	343.82	343.74	345.14	346.29	346.10
1986	347.61	348.12	348.56	349.84	350.65	349.91	347.79	345.64	344.51	344.76	346.20	347.23	347.57
1987	348.42	349.59	350.35	351.47	352.57	352.36	350.84	348.43	347.19	347.20	348.14	349.58	349.68
1988	350.80	352.13	353.09	353.82	354.48	354.07	352.96	352.17	351.02	349.75	349.95	350.95	352.10
1989	352.88	354.94	355.32	355.83	356.66	356.14	354.47	351.27	349.32	350.48	352.07	352.87	353.52
1990	354.24	355.54	356.24	356.63	357.14	357.13	354.18	350.28	350.15	351.72	352.91	354.40	354.21
1991	356.20	357.22	357.52	358.13	358.82	358.59	356.98	354.99	353.19	352.80	353.59	354.87	356.08
1992	355.90	357.13	358.20	358.75	359.70	359.13	357.01	354.83	352.76	352.67	354.19	355.89	356.35
1993	357.13	357.77	358.13	358.98	359.64	358.89	356.87	353.28	352.24	353.89	355.37	356.73	356.58



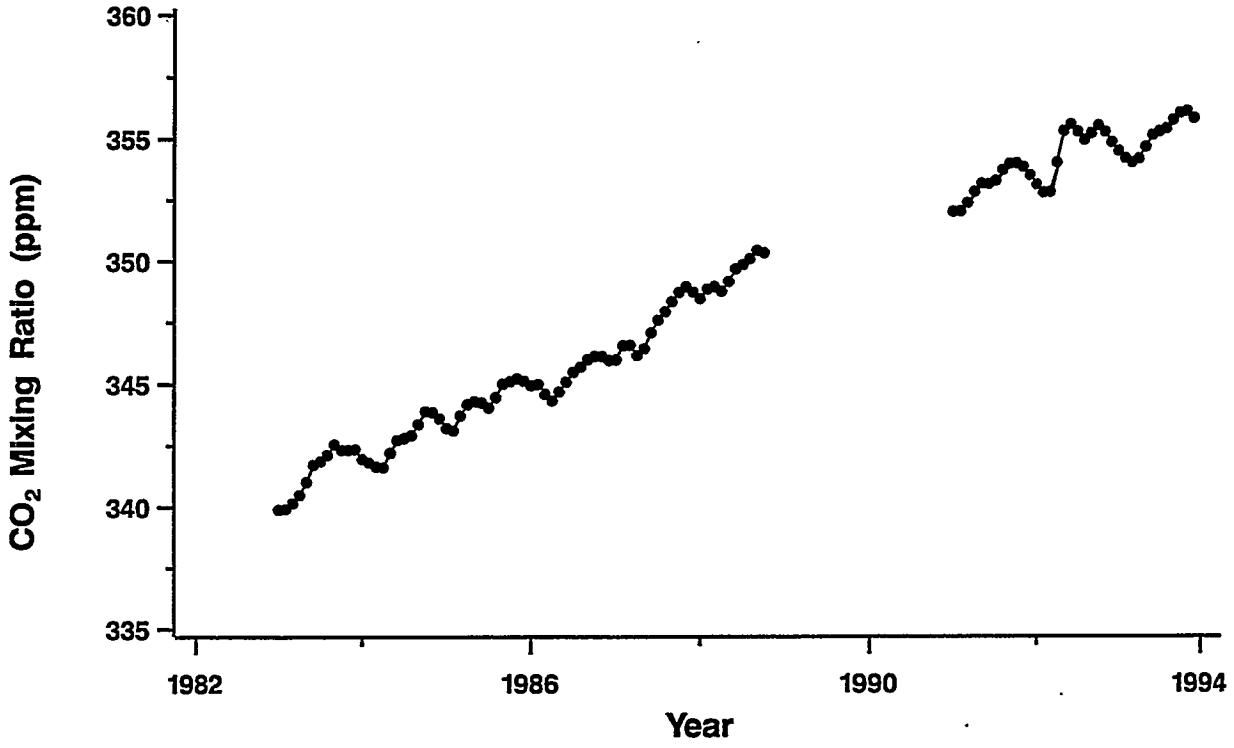
Monthly atmospheric CO_2 mixing ratios from Dwejra Point, Gozo, Malta.



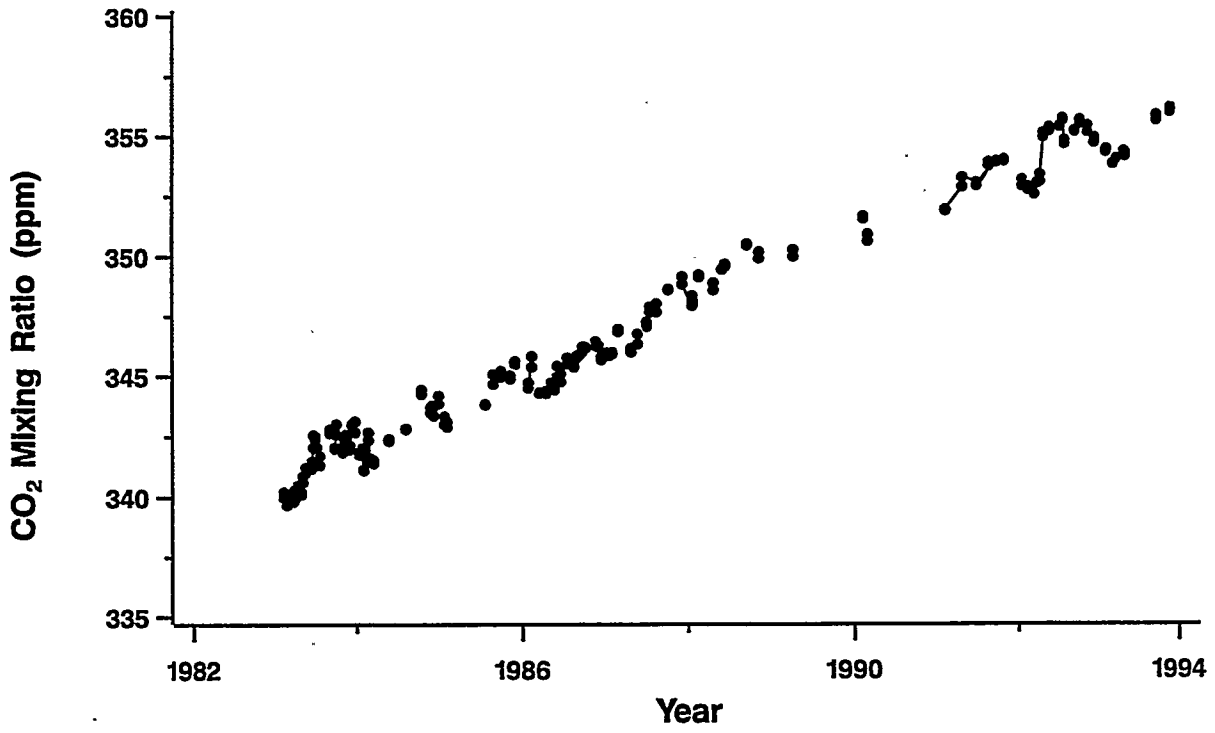
Background atmospheric CO_2 mixing ratios from individual flask air samples for Dwejra Point, Gozo, Malta. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Dwejra Point, Gozo, Malta, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1993	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	355.55	357.06	358.24	-99.99



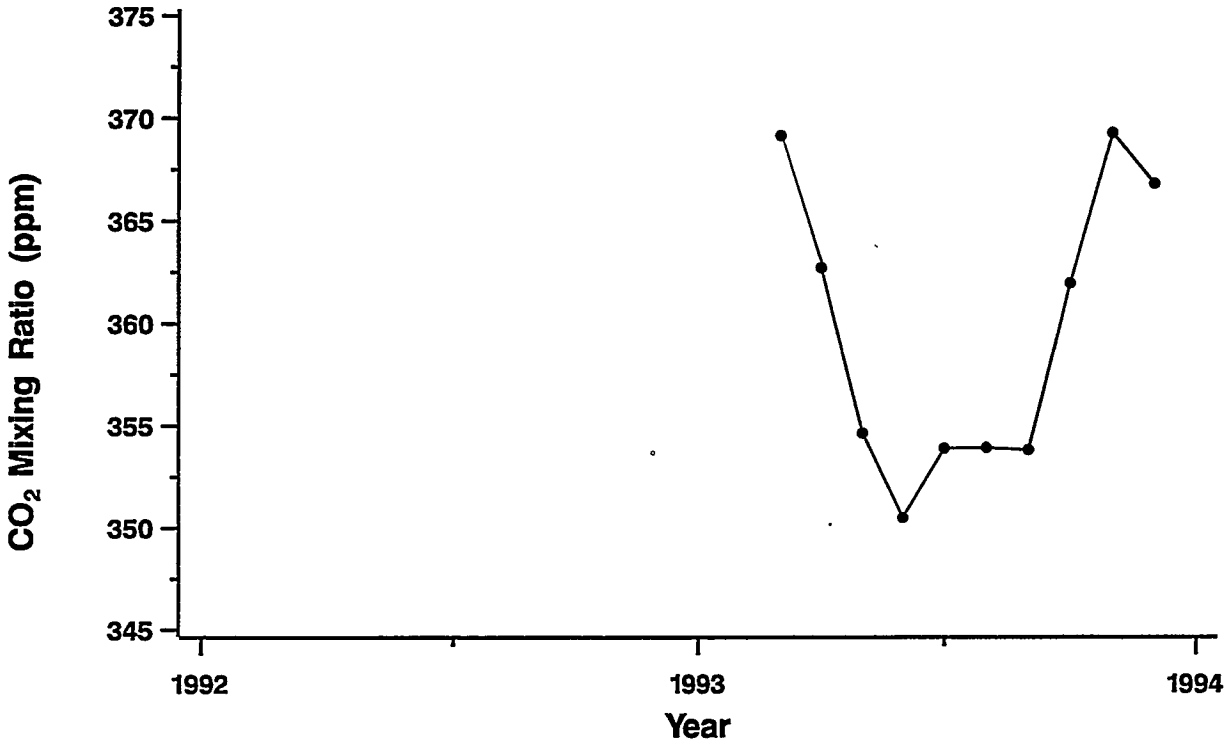
Monthly atmospheric CO_2 mixing ratios from Halley Bay, Antarctica.



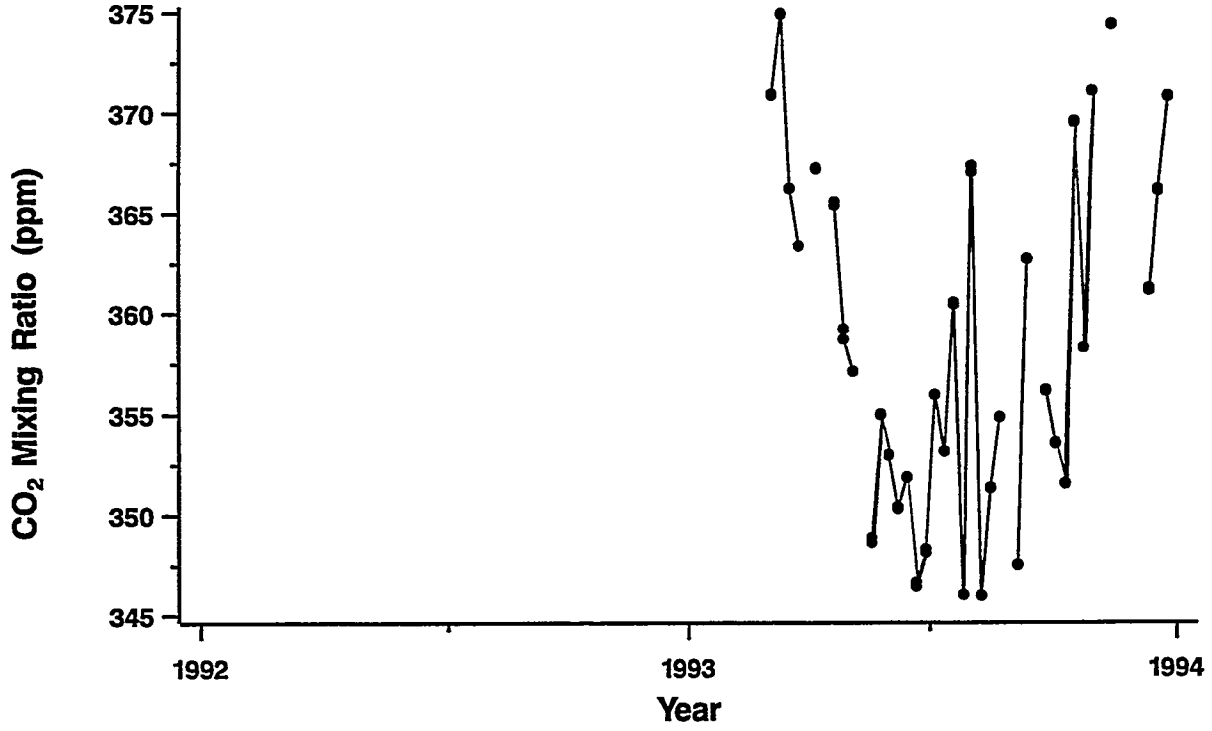
Background atmospheric CO_2 mixing ratios from individual flask air samples for Halley Bay, Antarctica. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Halley Bay, Antarctica, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1983	339.90	339.93	340.17	340.50	341.03	341.74	341.88	342.14	342.56	342.34	342.34	342.36	341.41
1984	341.97	341.82	341.66	341.63	342.22	342.74	342.82	342.94	343.39	343.91	343.87	343.62	342.72
1985	343.23	343.13	343.73	344.19	344.31	344.27	344.06	344.48	345.02	345.12	345.23	345.14	344.33
1986	344.96	345.00	344.61	344.35	344.70	345.10	345.49	345.71	346.00	346.13	346.13	345.98	345.35
1987	346.00	346.56	346.58	346.18	346.44	347.09	347.60	347.94	348.35	348.72	348.95	348.74	347.43
1988	348.48	348.86	348.96	348.78	349.17	349.69	349.86	350.11	350.44	350.35	-99.99	-99.99	-99.99
1989	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99
1990	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99
1991	352.03	352.05	352.39	352.85	353.18	353.17	353.30	353.74	353.99	354.02	353.86	353.53	353.18
1992	353.15	352.82	352.84	354.04	355.32	355.59	355.30	354.97	355.23	355.54	355.29	354.87	354.58
1993	354.52	354.22	354.05	354.20	354.68	355.15	355.30	355.42	355.77	356.05	356.12	355.84	355.11



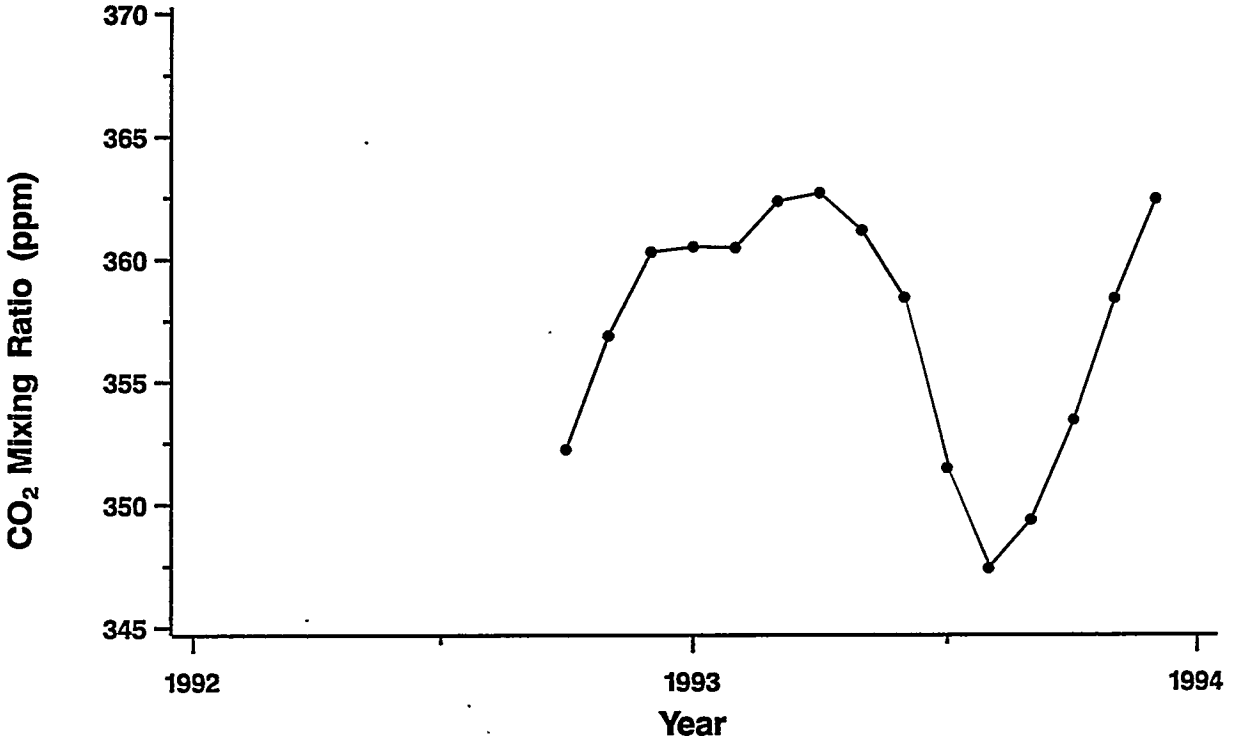
Monthly atmospheric CO_2 mixing ratios from Hegyhatsal, Hungary.



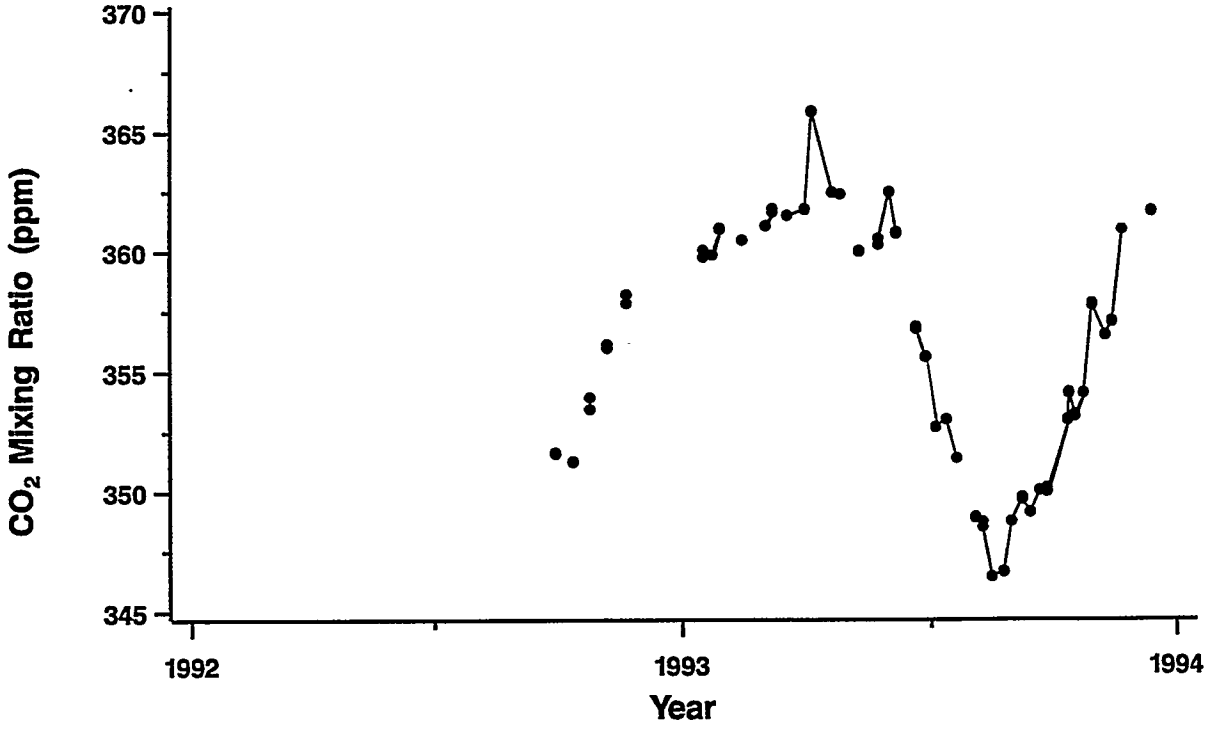
Background atmospheric CO_2 mixing ratios from individual flask air samples for Hegyhatsal, Hungary. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Hegyhatsal, Hungary, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1993	-99.99	-99.99	369.17	362.73	354.64	350.50	353.90	353.93	353.83	361.98	369.30	366.83	-99.99



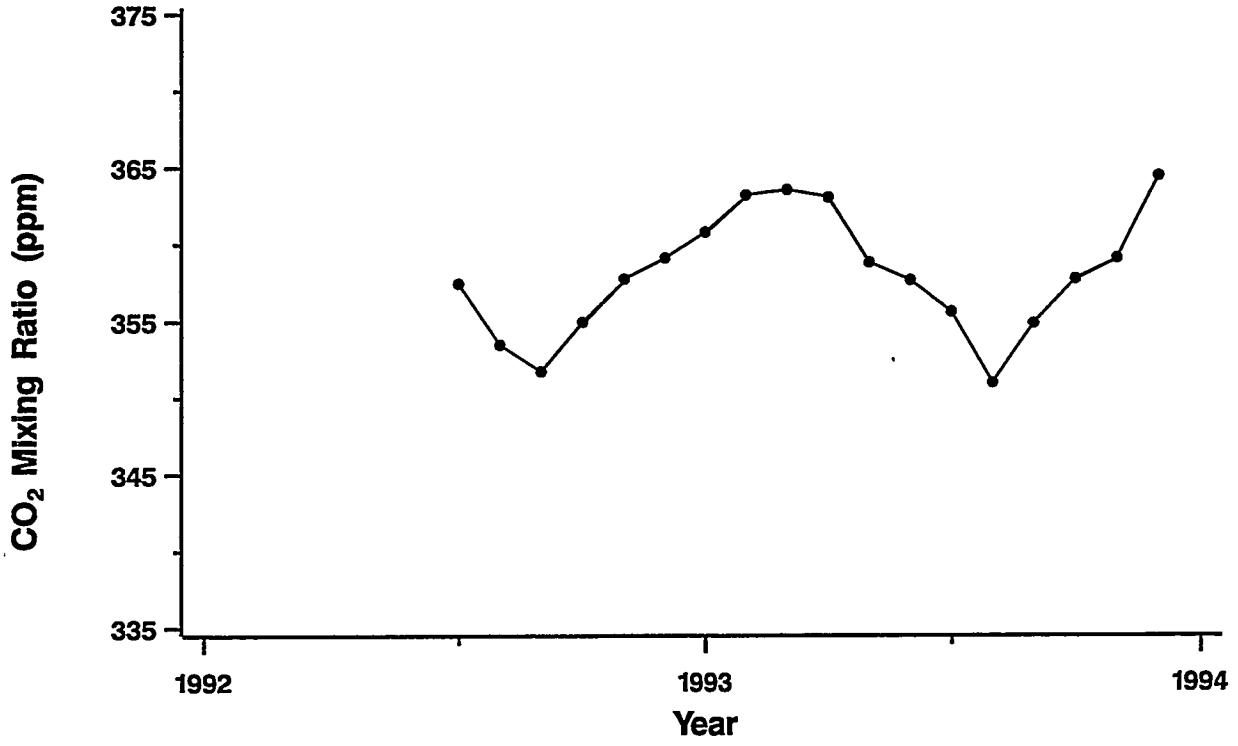
Monthly atmospheric CO_2 mixing ratios from Heimaey, Vestmannaeyjar, Iceland.



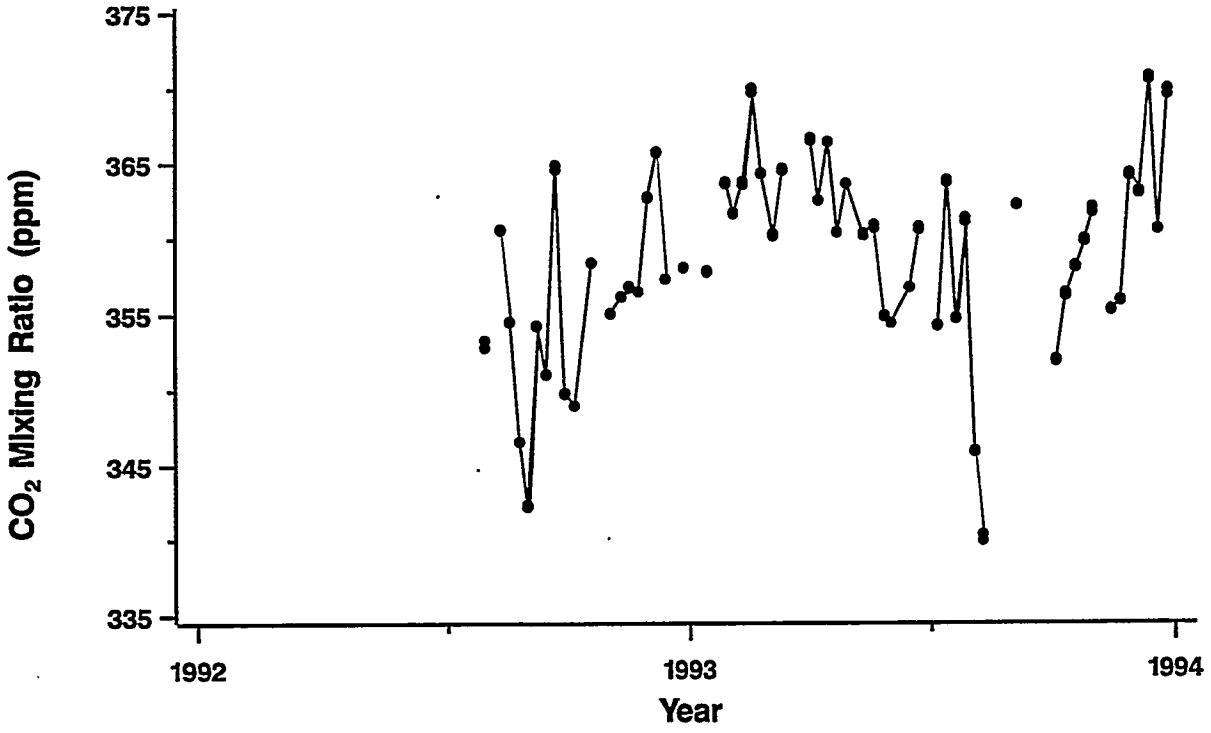
Background atmospheric CO_2 mixing ratios from individual flask air samples for Heimaey, Vestmannaeyjar, Iceland. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Heimaey, Vestmannaeyjar, Iceland, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1992	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	352.25	356.89	360.31	-99.99
1993	360.52	360.49	362.37	362.71	361.19	358.45	351.49	347.41	349.39	353.45	358.42	362.46	357.36



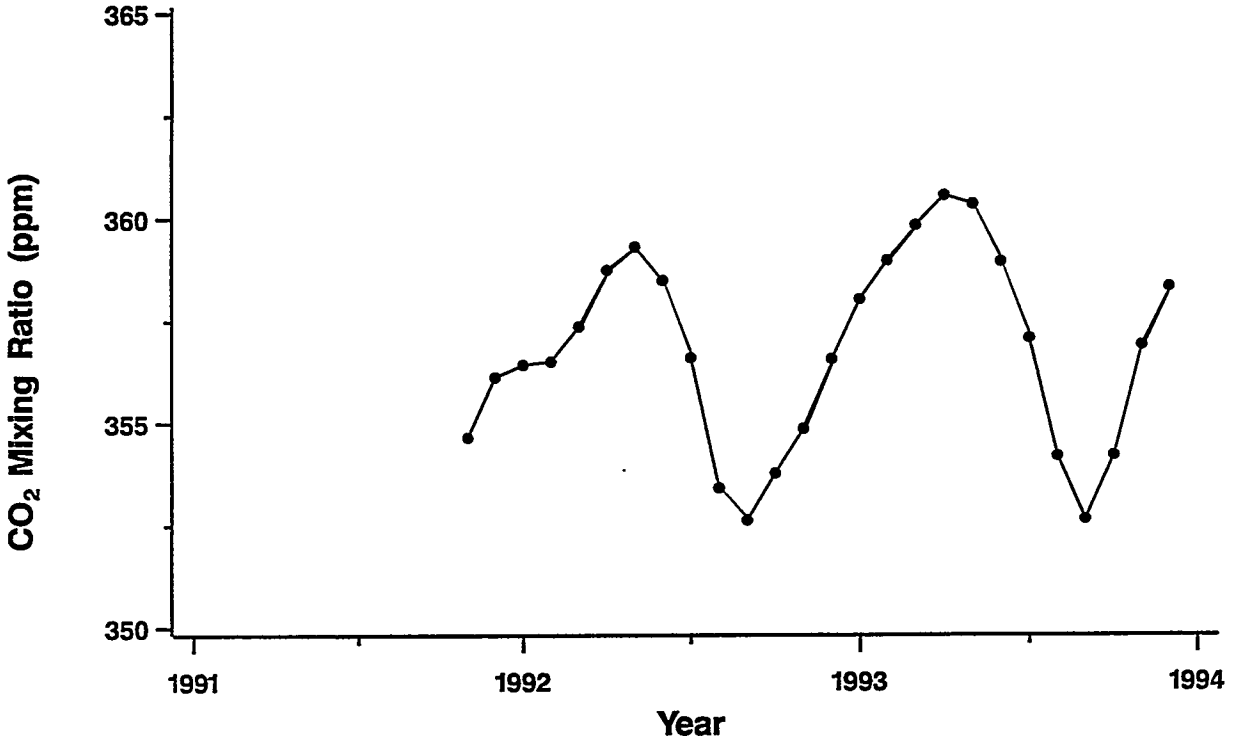
Monthly atmospheric CO_2 mixing ratios from Grifton, North Carolina, U.S.



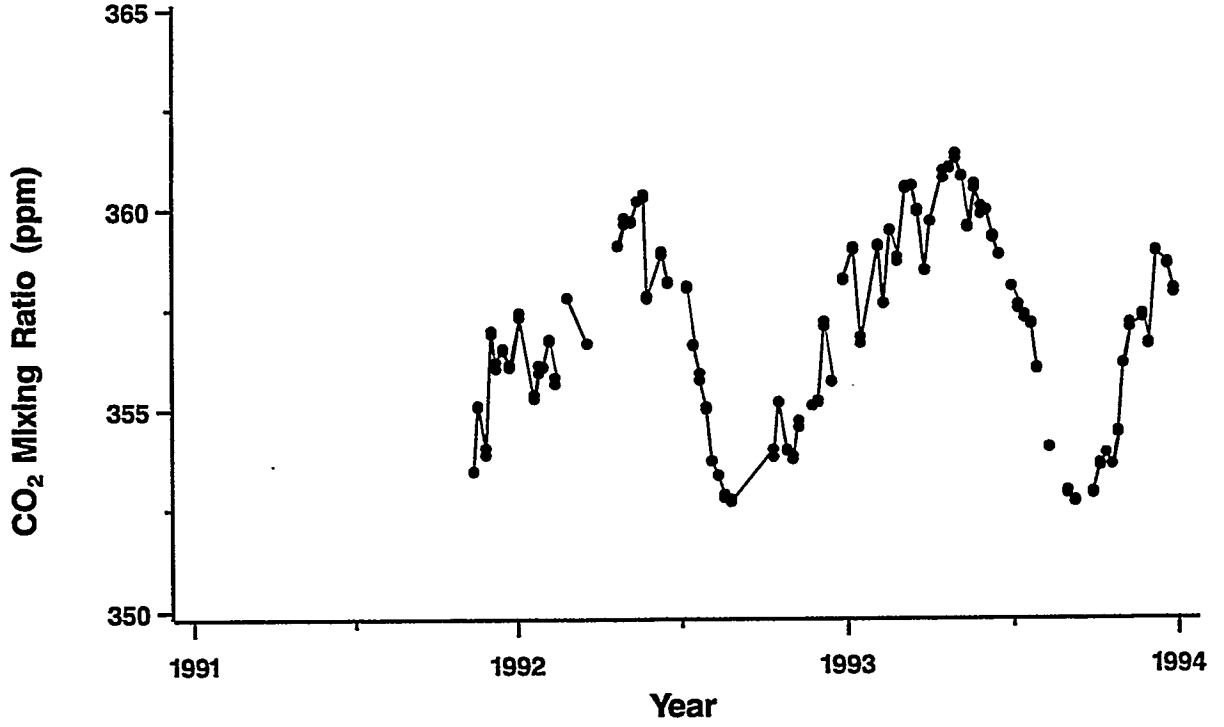
Background atmospheric CO_2 mixing ratios from individual flask air samples for Grifton, North Carolina, U.S. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Grifton, North Carolina, U.S., expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1992	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	357.47	353.51	351.77	354.99	357.78	359.14	-99.99
1993	360.81	363.22	363.56	363.07	358.85	357.70	355.65	351.02	354.91	357.79	359.14	364.47	359.18



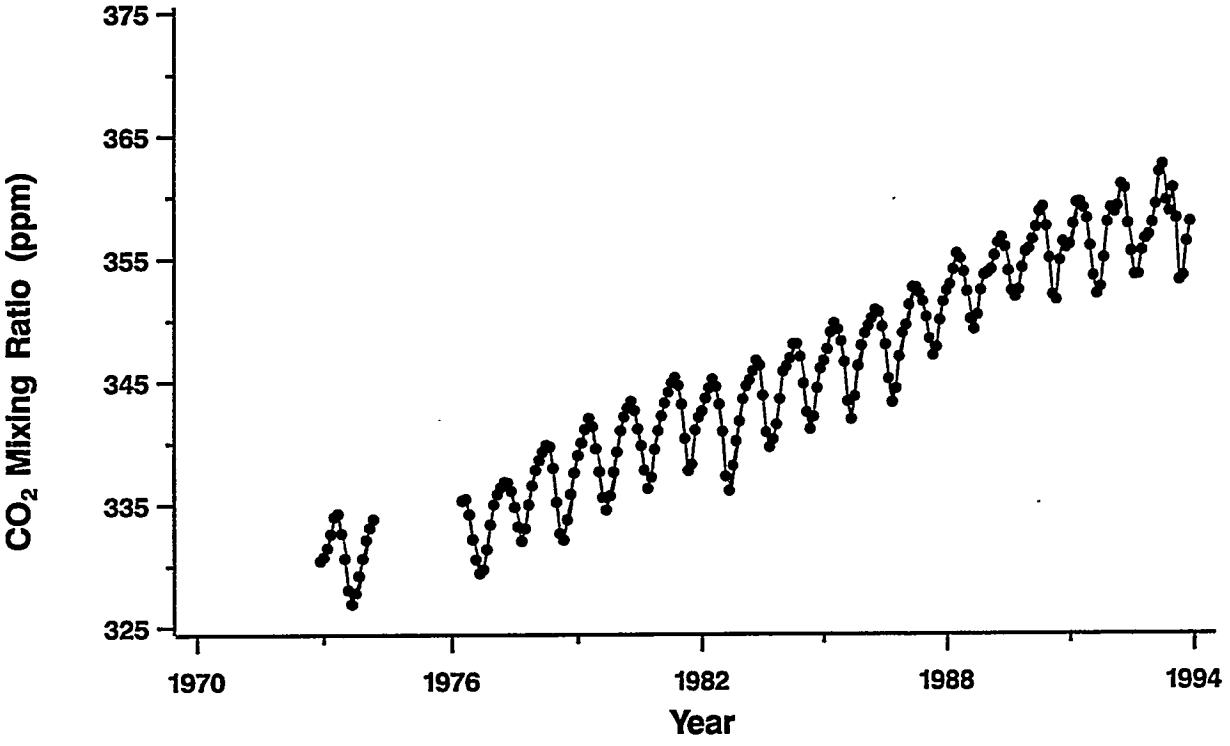
Monthly atmospheric CO_2 mixing ratios from Tenerife, Canary Islands, Spain.



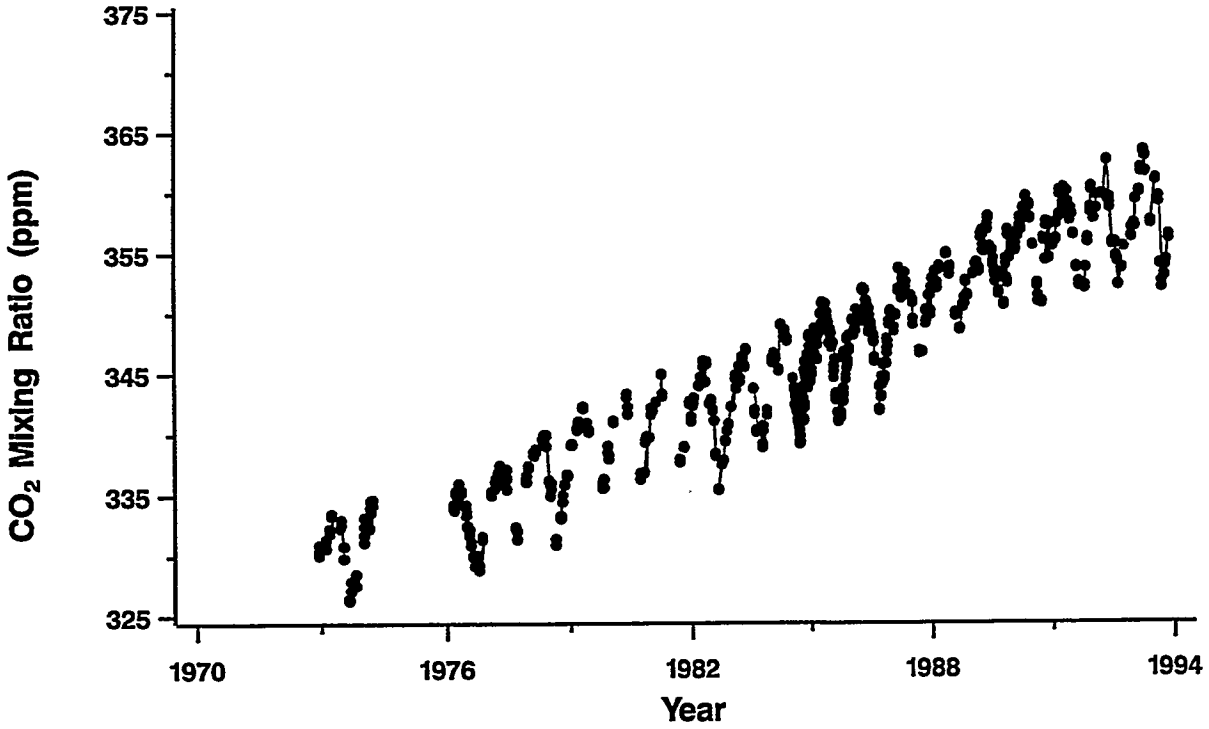
Background atmospheric CO_2 mixing ratios from individual flask air samples for Tenerife, Canary Islands, Spain. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Tenerife, Canary Islands, Spain, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1991	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	354.66	356.13	-99.99
1992	356.43	356.51	357.37	358.75	359.32	358.50	356.60	353.42	352.63	353.78	354.87	356.57	356.23
1993	358.04	358.98	359.84	360.57	360.36	358.96	357.08	354.20	352.66	354.22	356.91	358.34	357.51



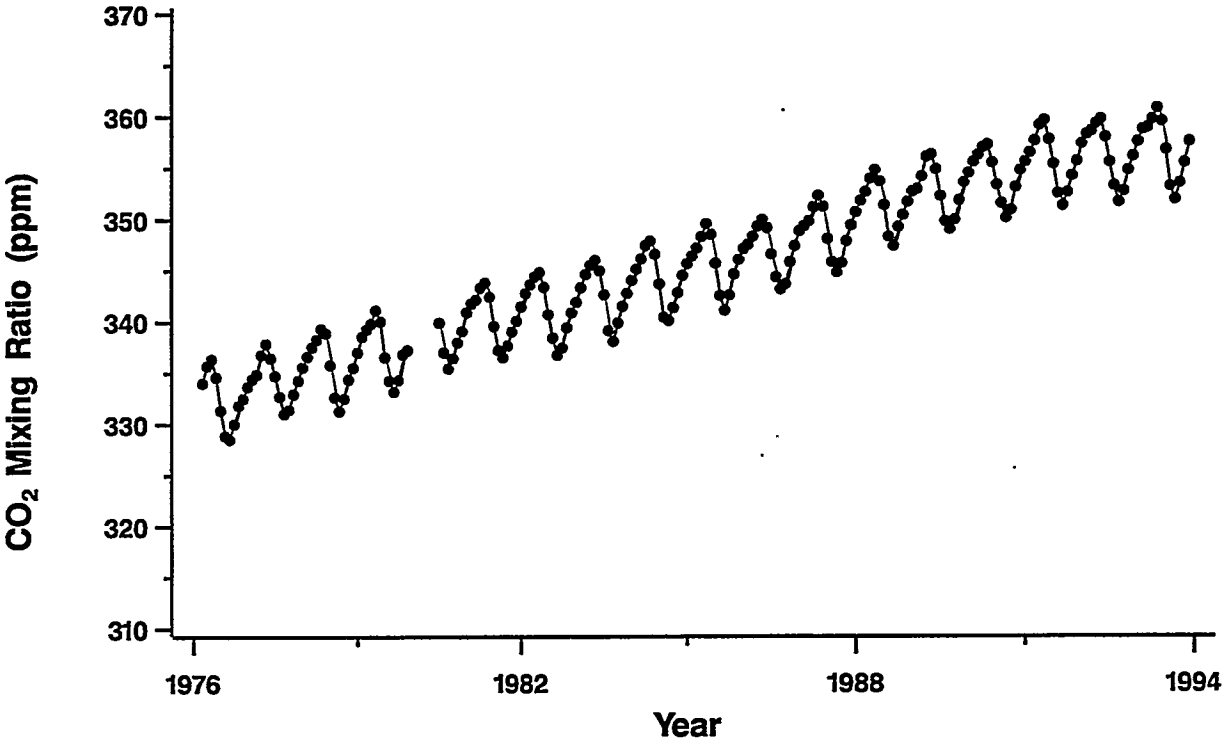
Monthly atmospheric CO_2 mixing ratios from Key Biscayne, Florida, U.S.



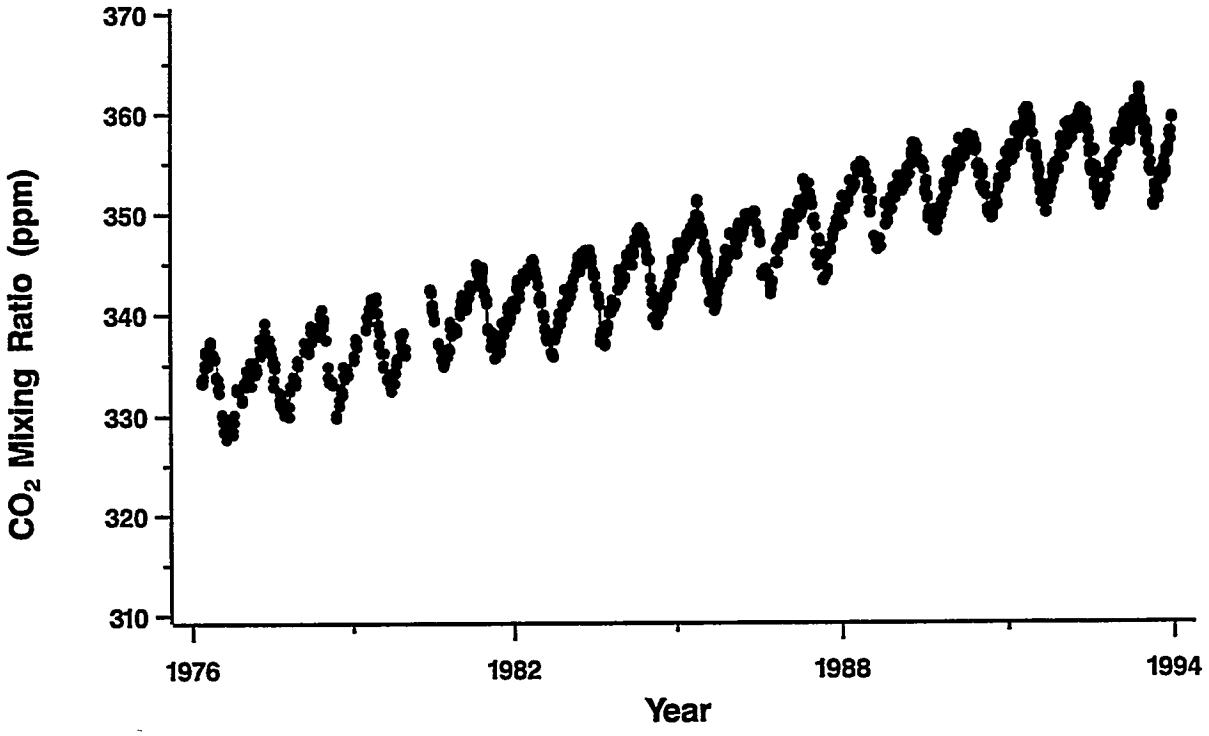
Background atmospheric CO_2 mixing ratios from individual flask air samples for Key Biscayne, Florida, U.S. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Key Biscayne, Florida, U.S., expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1972	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	330.45	-99.99
1973	330.77	331.50	332.65	334.04	334.28	332.69	330.65	328.09	326.94	327.84	329.24	330.65	330.78
1974	332.17	333.15	333.84	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99
1975	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99
1976	-99.99	-99.99	-99.99	335.33	335.45	334.22	332.19	330.55	329.44	329.76	331.38	333.40	-99.99
1977	335.02	335.84	336.40	336.83	336.77	336.12	334.81	333.22	332.05	333.08	335.01	336.56	335.14
1978	337.83	338.63	339.31	339.84	339.73	337.99	335.21	332.66	332.15	333.77	335.86	337.61	336.72
1979	339.02	340.03	341.14	342.02	341.35	339.56	337.69	335.58	334.59	335.73	337.66	339.30	338.64
1980	341.03	342.16	342.87	343.40	342.66	341.17	339.81	337.81	336.30	337.23	339.49	341.00	340.41
1981	342.21	343.28	344.13	344.88	345.32	344.69	343.16	340.36	337.76	338.29	341.05	342.10	342.27
1982	342.62	343.65	344.47	345.19	344.58	343.16	340.94	337.31	336.13	338.16	340.15	341.77	341.51
1983	343.58	344.65	345.14	345.86	346.70	346.33	343.87	340.89	339.69	340.31	341.51	343.58	343.51
1984	345.82	346.24	346.89	348.03	348.05	347.02	344.84	342.51	341.14	342.15	344.48	346.07	345.27
1985	346.69	347.64	349.01	349.75	349.25	348.30	346.61	343.40	341.95	343.82	346.28	347.93	346.72
1986	348.94	349.54	350.15	350.83	350.65	349.47	348.00	345.23	343.32	344.46	347.04	348.95	348.05
1987	349.61	351.24	352.66	352.63	352.19	351.52	350.25	348.49	347.14	347.81	350.00	351.49	350.42
1988	352.39	352.88	354.10	355.37	354.98	353.91	352.31	350.08	349.26	350.45	352.43	353.67	352.65
1989	353.83	354.10	355.23	356.23	356.67	355.90	353.98	352.39	351.90	352.46	354.24	355.52	354.37
1990	355.78	356.51	357.51	358.77	359.16	357.59	355.02	352.07	351.66	354.84	356.32	355.88	355.93
1991	356.13	357.76	359.50	359.53	359.05	358.21	355.99	353.59	352.14	352.72	355.04	357.91	356.46
1992	359.06	358.71	359.22	360.98	360.66	357.79	355.54	353.68	353.71	355.64	356.56	356.90	357.37
1993	357.86	359.36	361.99	362.61	359.67	358.81	360.68	358.21	353.25	353.60	356.33	357.93	358.36



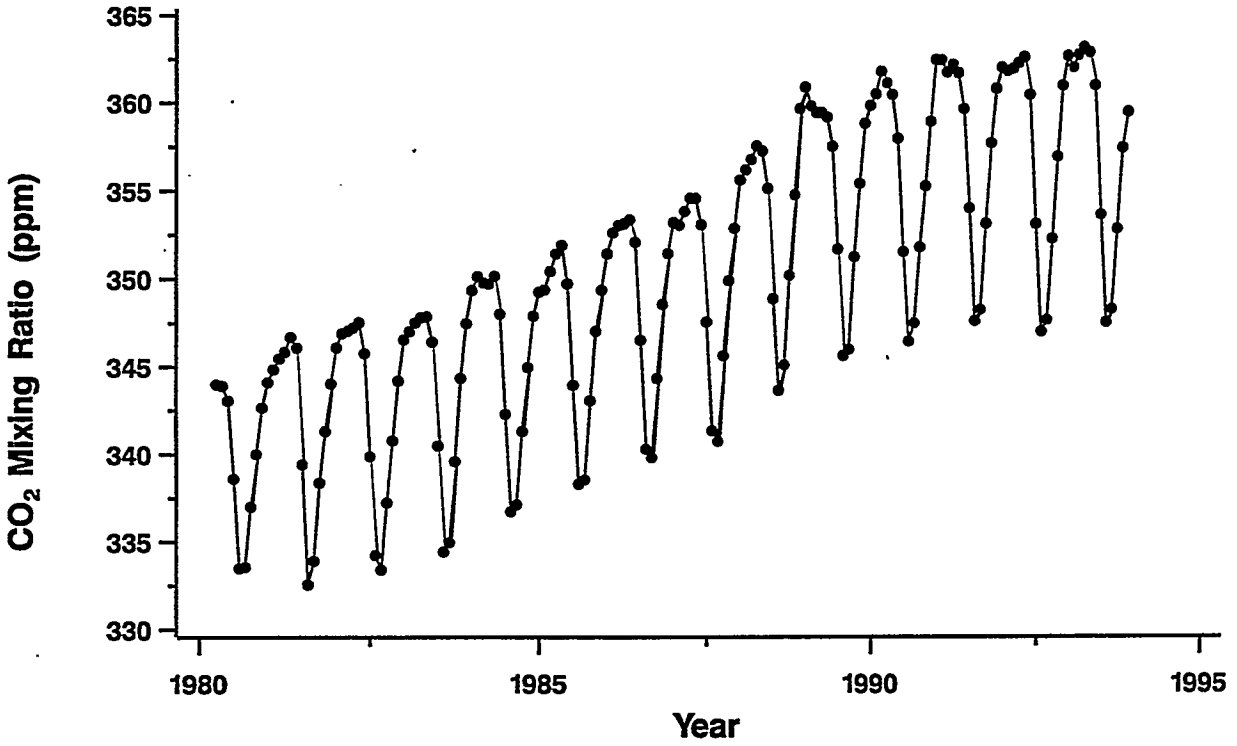
Monthly atmospheric CO_2 mixing ratios from Cape Kumukahi, Hawaii, U.S.



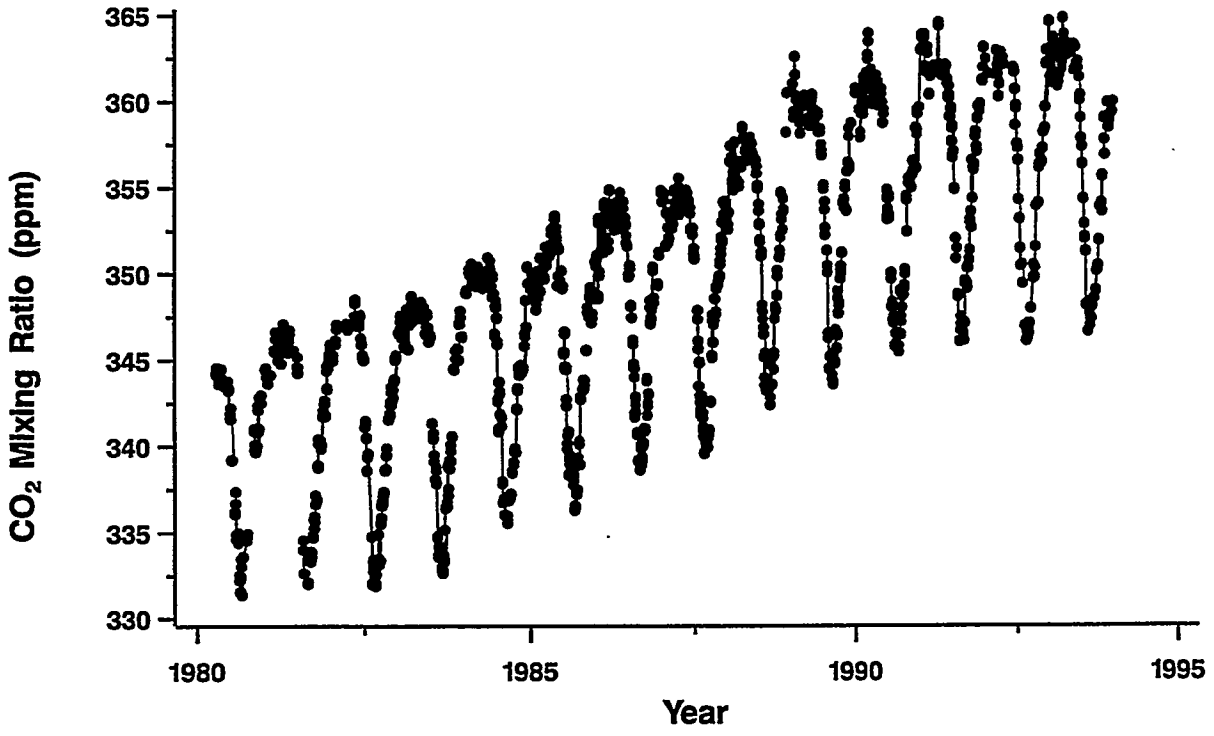
Background atmospheric CO_2 mixing ratios from individual flask air samples for Cape Kumukahi, Hawaii, U.S. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Cape Kumukahi, Hawaii, U.S., expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1976	-99.99	-99.99	334.04	335.73	336.38	334.63	331.40	328.90	328.54	330.06	331.87	332.55	-99.99
1977	333.70	334.43	334.90	336.81	337.86	336.48	334.77	332.75	331.07	331.47	332.99	334.31	334.30
1978	335.61	336.66	337.57	338.30	339.35	338.92	335.83	332.68	331.34	332.56	334.43	335.56	335.73
1979	337.05	338.59	339.30	339.87	341.16	340.09	336.59	334.29	333.23	334.35	336.85	337.26	337.39
1980	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	339.94	337.04	335.48	336.48	338.02	339.11	-99.99
1981	340.95	341.82	342.20	343.36	343.86	342.50	339.61	337.27	336.58	337.70	339.09	340.11	340.42
1982	341.53	342.84	343.70	344.46	344.86	343.44	340.76	338.46	336.80	337.51	339.48	340.94	341.23
1983	341.94	343.39	344.69	345.56	346.05	345.05	342.69	339.19	338.15	339.93	341.57	342.84	342.59
1984	344.10	345.20	346.17	347.50	347.94	346.65	343.75	340.51	340.18	341.43	342.90	344.58	344.24
1985	345.73	346.46	347.27	348.35	349.61	348.58	345.77	342.60	341.16	342.66	344.70	346.15	345.75
1986	347.18	347.63	348.40	349.38	350.01	349.23	346.65	344.43	343.25	343.75	345.89	347.47	346.94
1987	348.92	349.41	349.89	351.24	352.34	351.30	348.17	345.89	344.92	345.81	347.95	349.50	348.78
1988	350.78	351.86	352.71	354.03	354.86	353.76	351.45	348.39	347.49	349.33	350.49	351.77	351.41
1989	352.75	353.00	354.24	356.16	356.38	354.95	352.33	349.89	349.14	350.04	351.91	353.67	352.87
1990	354.60	355.66	356.36	357.07	357.35	355.61	353.44	351.64	350.24	351.00	353.21	354.87	354.25
1991	355.70	356.60	357.72	359.24	359.73	357.86	355.48	352.61	351.43	352.70	354.33	355.75	355.76
1992	357.46	358.33	358.66	359.38	359.83	358.09	355.68	353.37	351.78	352.85	354.90	356.25	356.38
1993	357.66	358.85	359.03	359.84	360.89	359.63	356.88	353.30	352.03	353.62	355.62	357.66	357.08



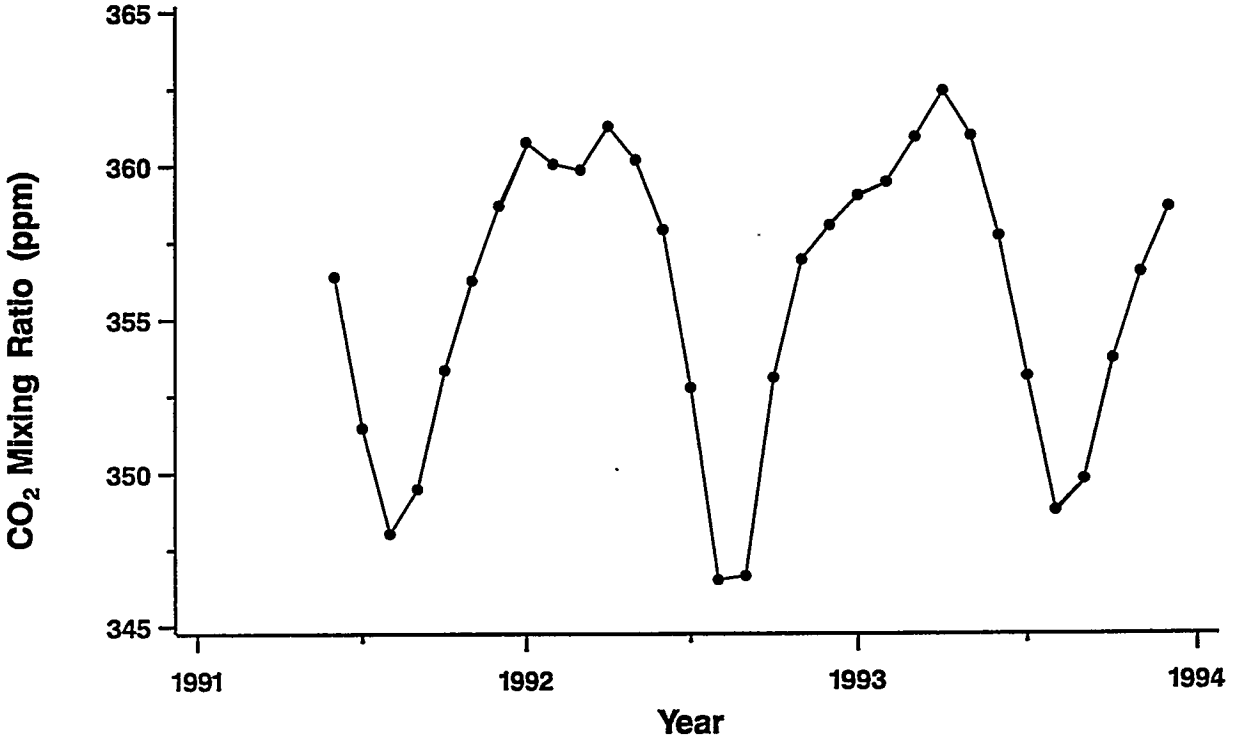
Monthly atmospheric CO_2 mixing ratios from Mould Bay, Northwest Territories, Canada.



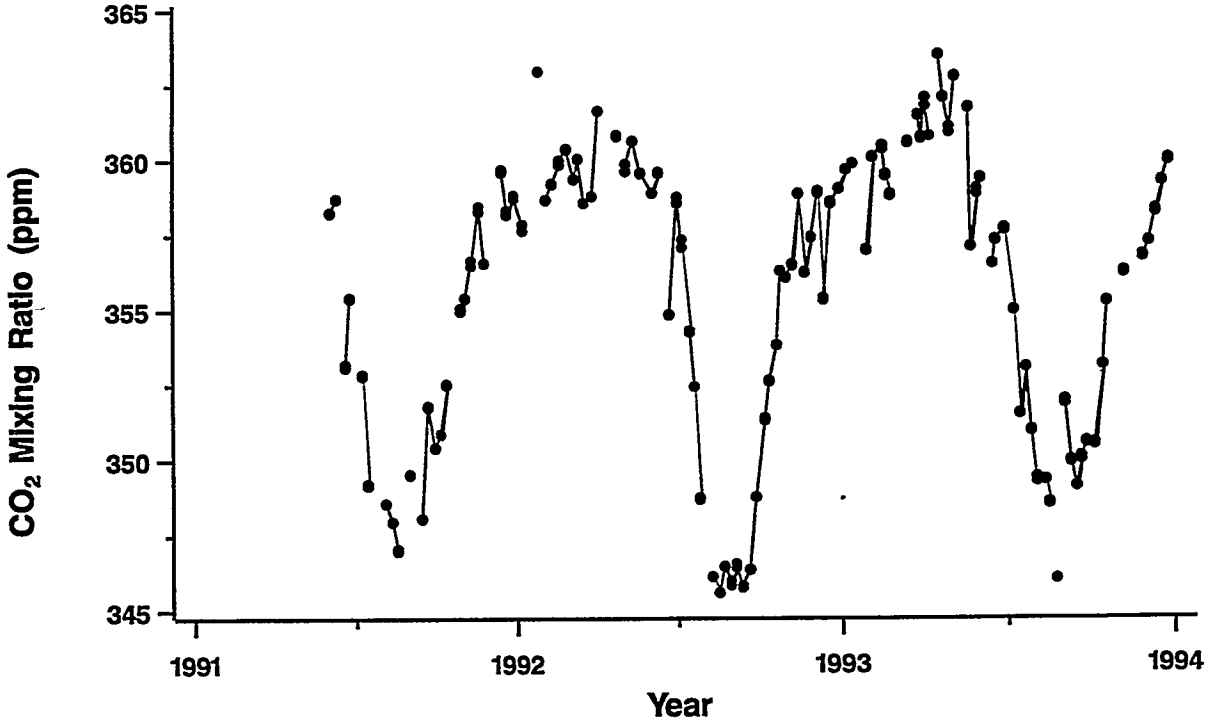
Background atmospheric CO_2 mixing ratios from individual flask air samples for Mould Bay, Northwest Territories, Canada. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Mould Bay, Northwest Territories, Canada, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1980	-99.99	-99.99	-99.99	344.00	343.91	343.07	338.60	333.49	333.57	337.00	340.02	342.67	-99.99
1981	344.12	344.85	345.47	345.85	346.69	346.10	339.43	332.56	333.92	338.38	341.33	344.05	341.90
1982	346.10	346.90	347.05	347.24	347.54	345.77	339.90	334.24	333.41	337.24	340.81	344.21	342.53
1983	346.55	347.02	347.52	347.81	347.86	346.43	340.51	334.44	334.97	339.61	344.36	347.48	343.71
1984	349.36	350.14	349.80	349.74	350.16	348.02	342.31	336.74	337.13	341.33	344.97	347.91	345.63
1985	349.27	349.40	350.44	351.44	351.92	349.73	343.96	338.31	338.55	343.08	347.03	349.37	346.88
1986	351.43	352.62	353.04	353.14	353.36	352.09	346.52	340.32	339.83	344.34	348.57	351.45	348.89
1987	353.20	353.06	353.84	354.58	354.58	353.09	347.56	341.36	340.77	345.63	349.91	352.88	350.04
1988	355.62	356.19	356.78	357.55	357.26	355.14	348.88	343.67	345.10	350.21	354.77	359.67	353.40
1989	360.89	359.82	359.45	359.43	359.19	357.54	351.70	345.63	345.99	351.26	355.42	358.82	355.43
1990	359.84	360.49	361.78	361.13	360.46	357.97	351.54	346.45	347.49	351.79	355.26	358.93	356.09
1991	362.45	362.43	361.75	362.17	361.70	359.64	354.02	347.61	348.25	353.13	357.70	360.80	357.64
1992	362.01	361.82	361.95	362.26	362.59	360.45	353.12	347.00	347.67	352.28	356.94	360.97	357.42
1993	362.65	362.03	362.73	363.16	362.87	360.98	353.64	347.53	348.28	352.83	357.43	359.46	357.80



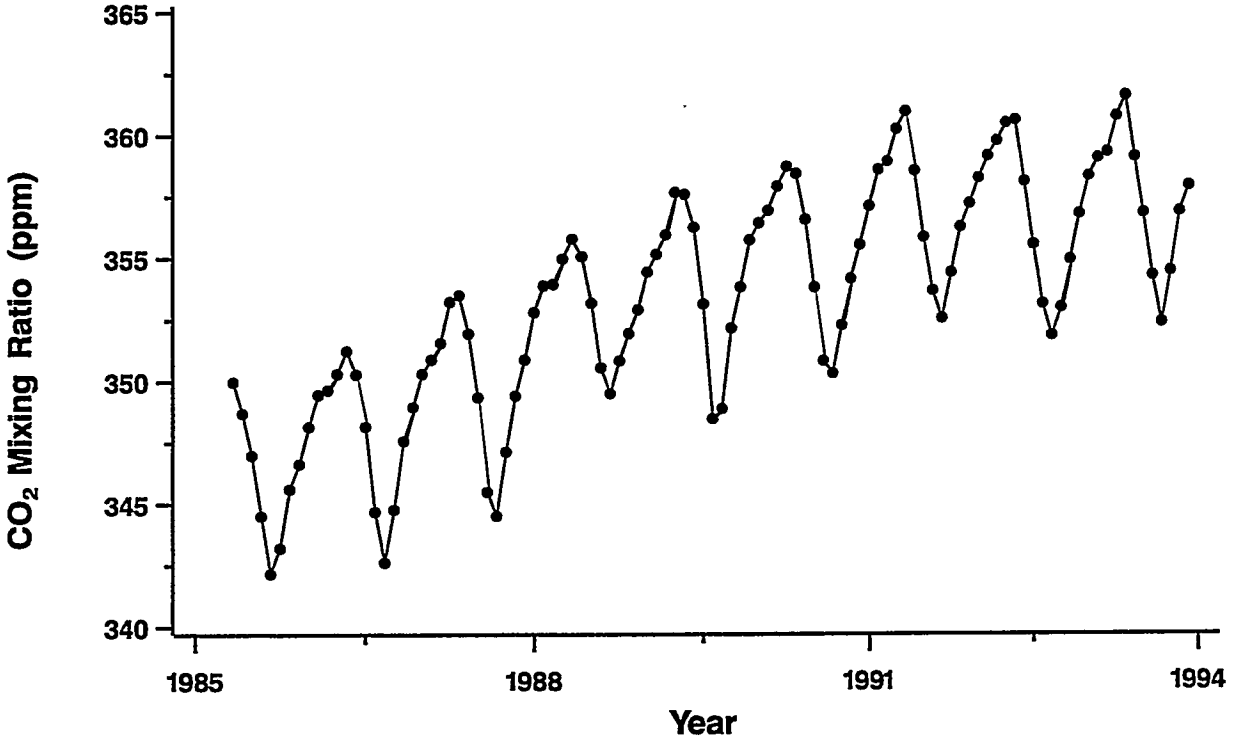
Monthly atmospheric CO_2 mixing ratios from Mace Head, County Galway, Ireland.



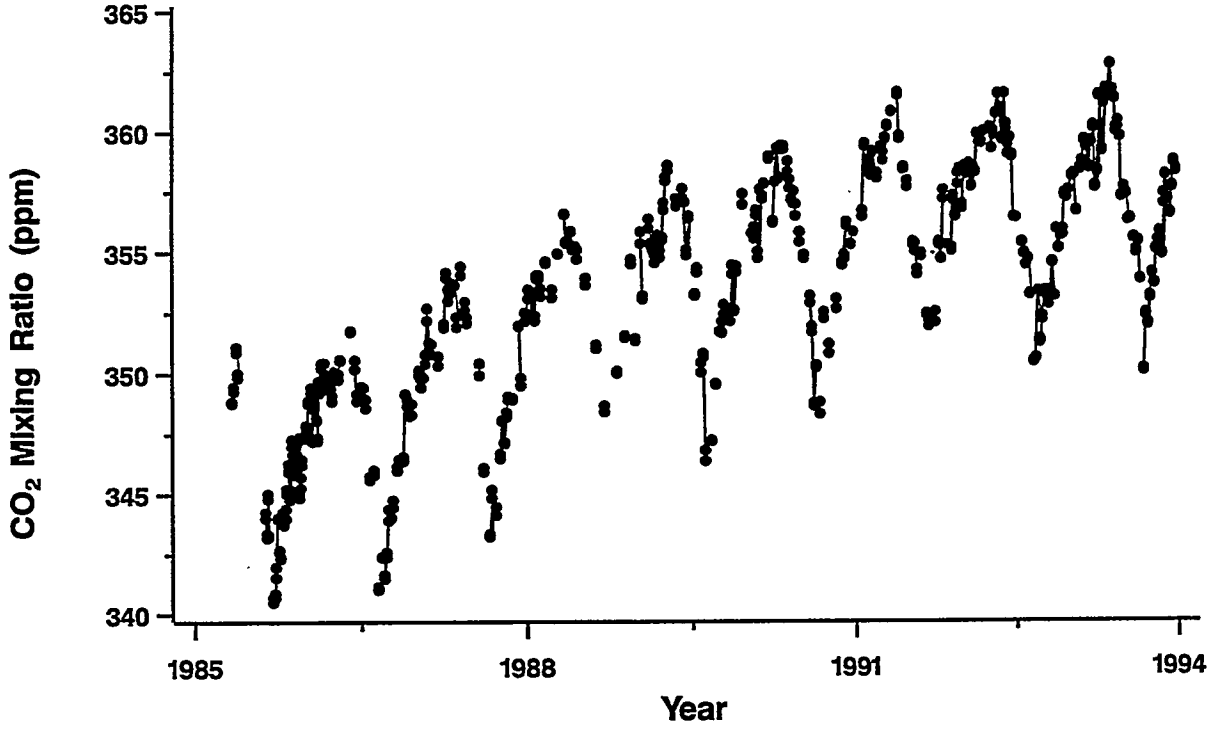
Background atmospheric CO_2 mixing ratios from individual flask air samples for Mace Head, County Galway, Ireland. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Mace Head, County Galway, Ireland, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1991	-99.99	-99.99	-99.99	-99.99	-99.99	356.40	351.48	348.04	349.50	353.36	356.28	358.71	-99.99
1992	360.77	360.07	359.88	361.29	360.20	357.93	352.79	346.52	346.65	353.11	356.96	358.07	356.19
1993	359.04	359.48	360.93	362.44	360.99	357.74	353.16	348.80	349.82	353.73	356.56	358.66	356.78



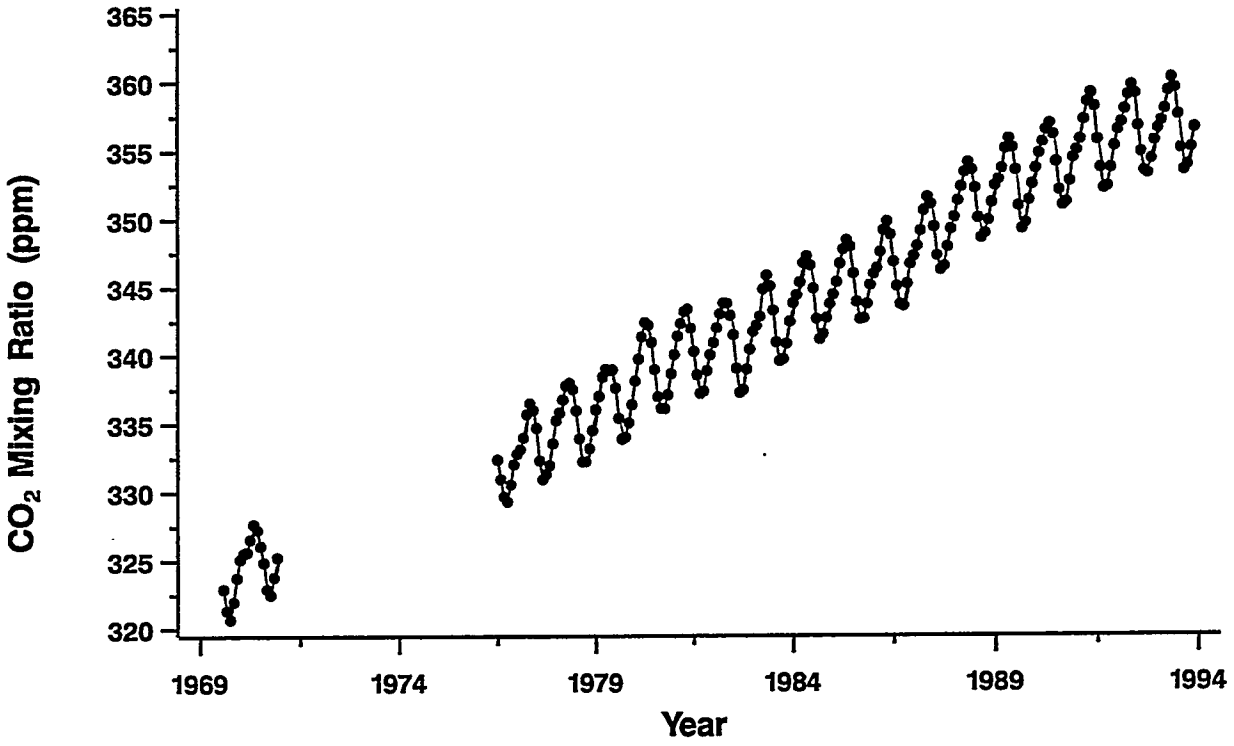
Monthly atmospheric CO_2 mixing ratios from Sand Island.



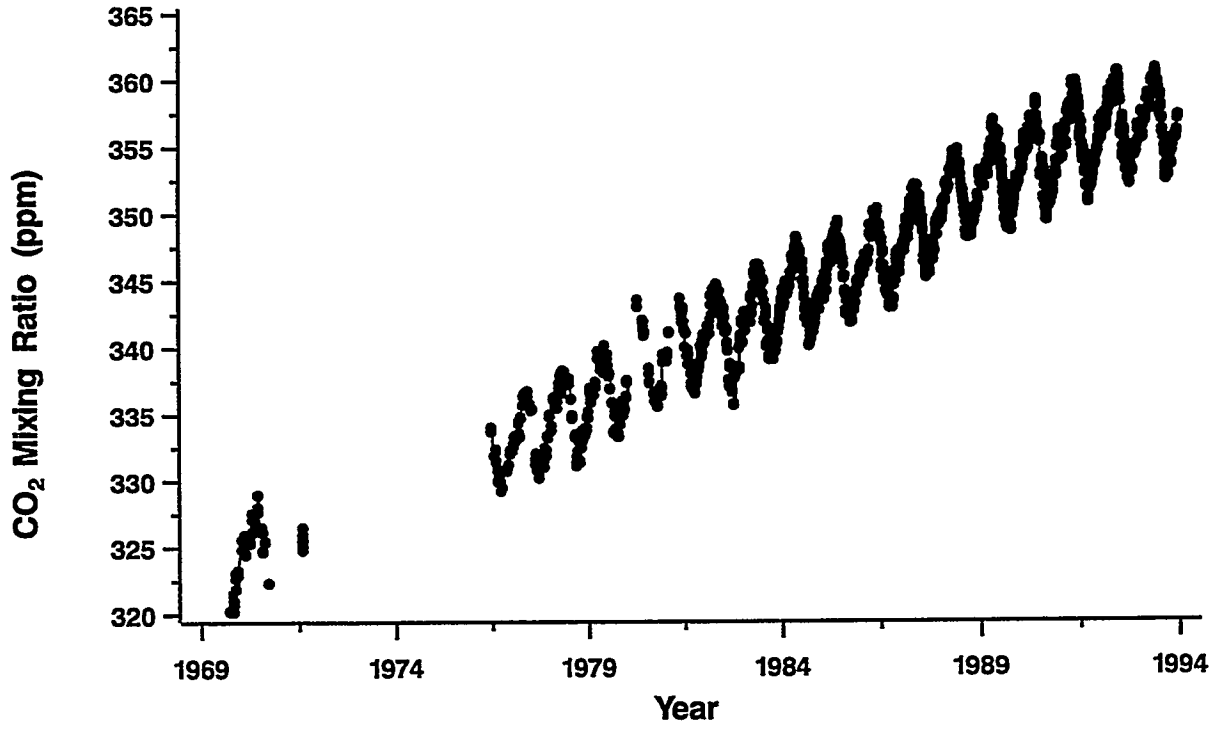
Background atmospheric CO_2 mixing ratios from individual flask air samples for Sand Island. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Sand Island, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1985	-99.99	-99.99	-99.99	-99.99	349.99	348.71	347.00	344.52	342.17	343.21	345.62	346.64	-99.99
1986	348.16	349.47	349.66	350.32	351.25	350.29	348.17	344.69	342.62	344.78	347.58	348.97	348.00
1987	350.32	350.90	351.58	353.23	353.50	351.95	349.36	345.50	344.52	347.14	349.42	350.89	349.86
1988	352.81	353.88	353.94	354.97	355.77	355.06	353.18	350.56	349.51	350.84	351.95	352.91	352.95
1989	354.43	355.15	355.94	357.66	357.58	356.24	353.14	348.48	348.89	352.16	353.82	355.72	354.10
1990	356.41	356.92	357.90	358.70	358.42	356.55	353.81	350.83	350.33	352.28	354.16	355.53	355.15
1991	357.10	358.58	358.91	360.23	360.94	358.53	355.83	353.67	352.56	354.40	356.25	357.20	357.02
1992	358.24	359.13	359.75	360.47	360.59	358.09	355.53	353.14	351.86	352.99	354.92	356.77	356.79
1993	358.31	359.05	359.29	360.74	361.58	359.09	356.81	354.27	352.39	354.46	356.87	357.91	357.56



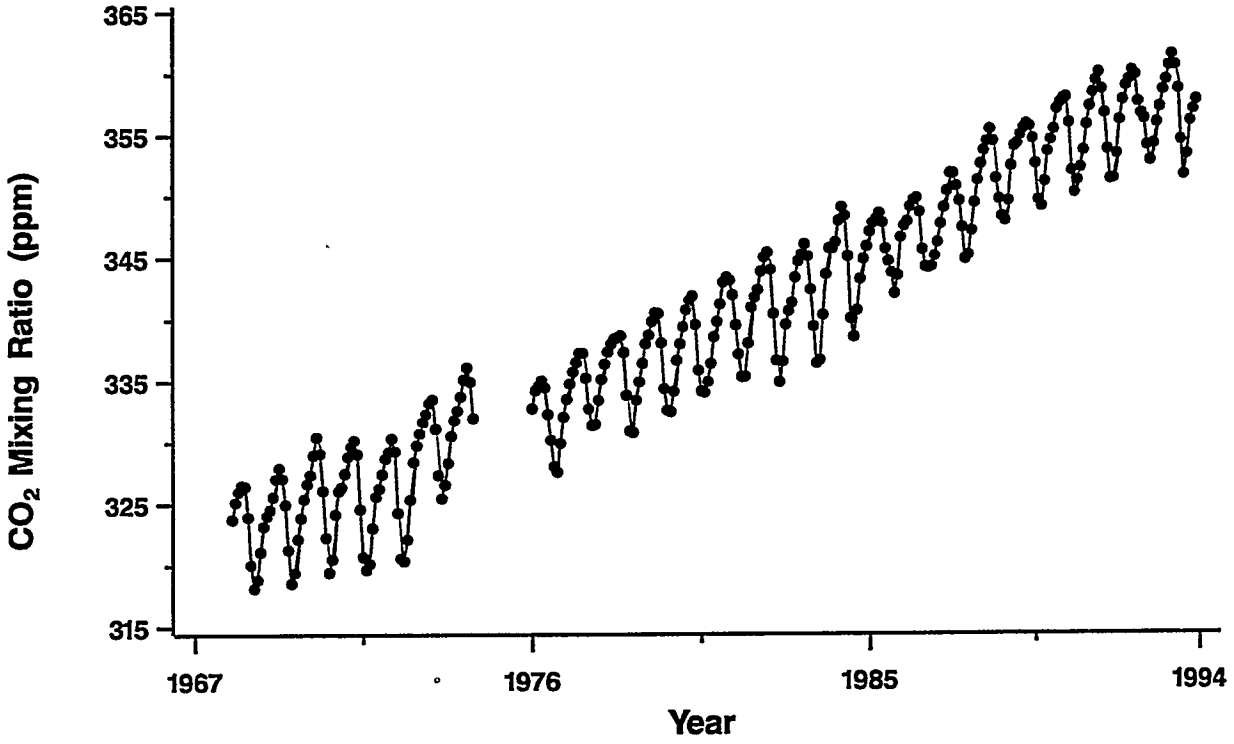
Monthly atmospheric CO_2 mixing ratios from Mauna Loa, Hawaii, U.S.



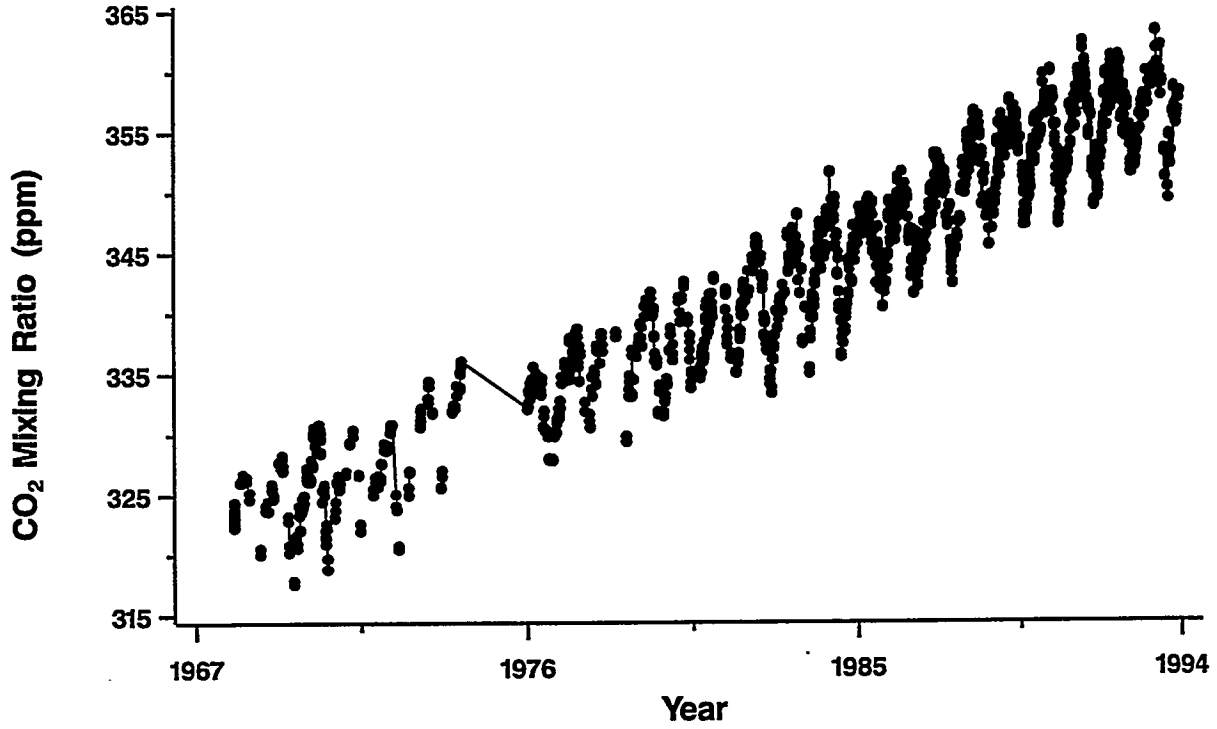
Background atmospheric CO_2 mixing ratios from individual flask air samples for Mauna Loa, Hawaii, U.S. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Mauna Loa, Hawaii, U.S., expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1969	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	322.95	321.37	320.71	322.01	323.77	-99.99
1970	325.13	325.54	325.67	326.59	327.68	327.28	326.12	324.91	322.96	322.54	323.83	325.27	325.29
1971	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99
1972	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99
1973	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99
1974	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99
1975	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99
1976	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	332.39	330.96	329.71	329.33	330.58	332.05	-99.99
1977	332.80	333.14	333.99	335.69	336.49	336.00	334.71	332.32	330.96	331.36	331.98	333.57	333.58
1978	335.25	335.81	336.76	337.78	337.98	337.52	335.97	333.94	332.25	332.26	333.19	334.52	335.27
1979	336.04	337.01	338.42	338.99	338.90	338.95	337.62	335.42	333.90	334.04	335.09	336.40	336.73
1980	338.13	339.74	341.35	342.41	342.21	340.95	338.96	336.97	336.15	336.10	337.11	338.65	339.06
1981	340.05	341.41	342.33	343.21	343.38	341.99	340.28	338.57	337.21	337.38	338.86	340.03	340.39
1982	340.92	342.01	343.06	343.82	343.79	342.92	341.49	339.03	337.27	337.49	338.97	340.44	340.93
1983	341.74	342.18	342.84	344.85	345.85	345.08	343.29	340.95	339.58	339.73	340.85	342.47	342.45
1984	343.84	344.42	345.36	346.78	347.25	346.60	344.91	342.67	341.18	341.56	342.74	343.77	344.26
1985	344.45	345.37	346.72	347.77	348.44	347.97	346.00	343.93	342.66	342.71	343.77	345.17	345.41
1986	345.97	346.40	347.58	349.18	349.80	348.84	346.85	345.07	343.75	343.62	345.24	346.71	346.58
1987	347.28	348.00	349.13	350.61	351.58	351.06	349.40	347.30	346.26	346.54	347.94	349.25	348.70
1988	350.11	351.31	352.33	353.40	354.10	353.57	352.24	350.06	348.61	348.93	349.90	351.18	351.31
1989	352.43	352.88	353.68	355.12	355.83	355.19	353.55	350.93	349.27	349.71	351.34	352.52	352.70
1990	353.67	354.79	355.59	356.49	356.93	356.14	354.15	352.08	350.98	351.21	352.73	354.44	354.10
1991	355.01	355.78	357.22	358.49	359.14	358.16	355.76	353.71	352.21	352.36	353.70	355.29	355.57
1992	356.48	357.03	357.96	359.00	359.69	359.09	356.74	354.85	353.49	353.30	354.35	355.70	356.47
1993	356.56	357.13	357.97	359.28	360.23	359.49	357.57	355.12	353.52	353.92	355.19	356.62	356.88



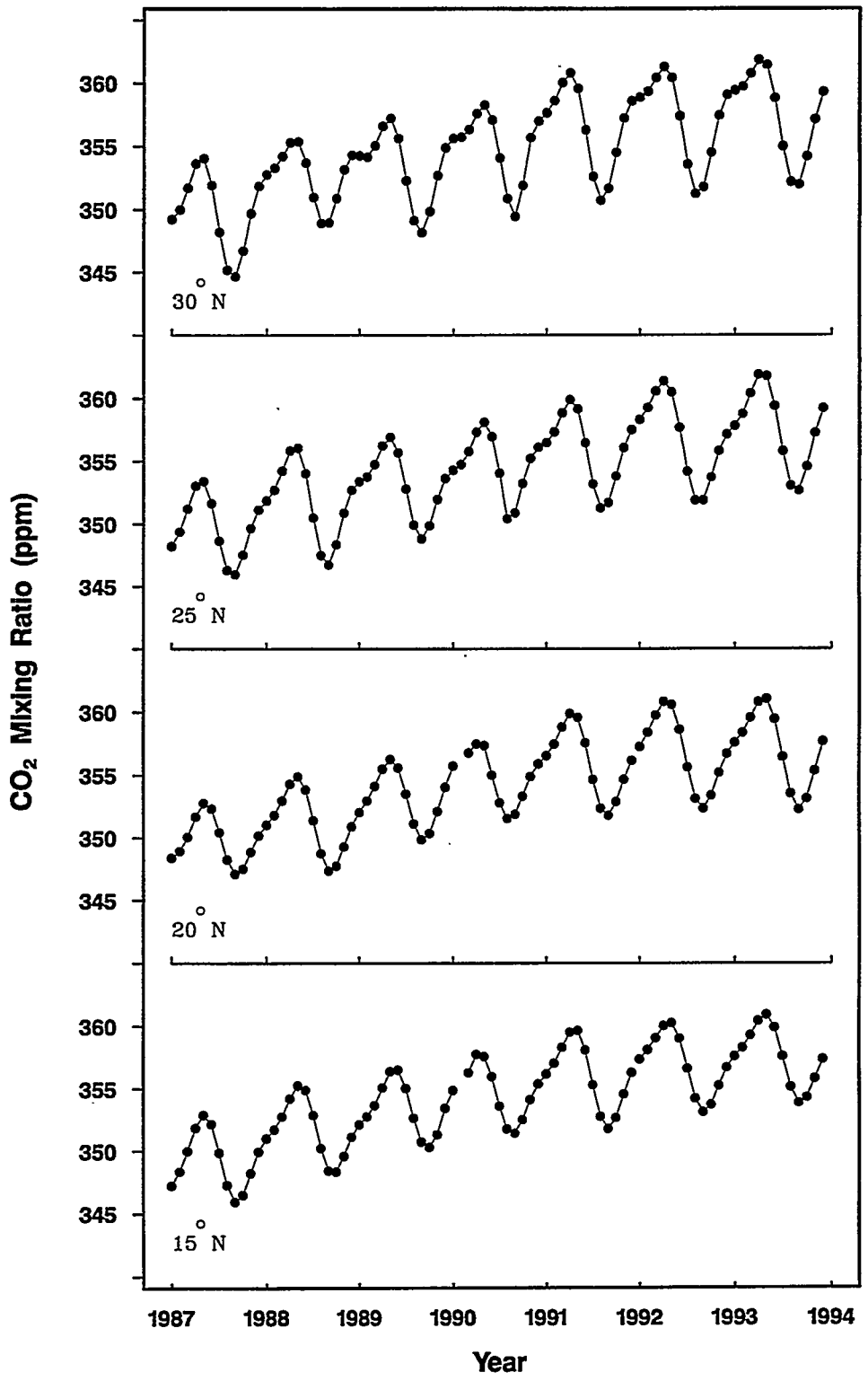
Monthly atmospheric CO_2 mixing ratios from Niwot Ridge, Colorado, U.S.



Background atmospheric CO_2 mixing ratios from individual flask air samples for Niwot Ridge, Colorado, U.S. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Niwot Ridge, Colorado, U.S., expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

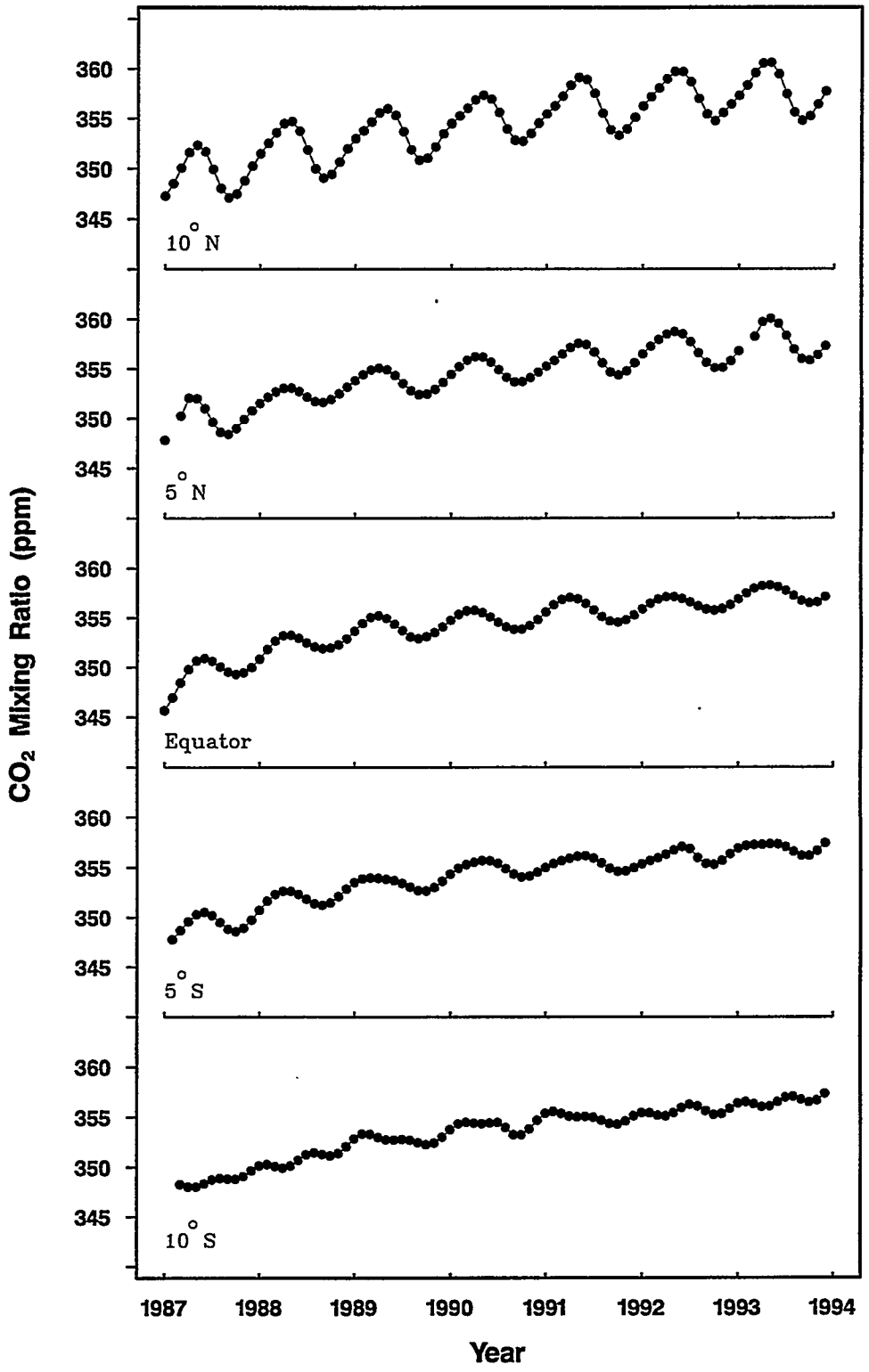
Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1968	323.77	325.16	326.03	326.53	326.46	323.96	320.08	318.18	318.88	321.13	323.22	324.04	323.12
1969	324.56	325.61	327.09	327.95	327.11	324.98	321.31	318.60	319.43	322.17	323.88	325.42	324.01
1970	326.67	327.40	329.02	330.48	329.15	326.11	322.29	319.46	320.54	324.18	326.09	326.41	325.65
1971	327.52	328.90	329.70	330.21	329.11	324.60	320.74	319.69	320.17	323.07	325.63	326.28	325.47
1972	327.46	328.75	329.26	330.37	329.32	324.30	320.60	320.38	322.14	325.38	328.45	329.81	326.35
1973	330.79	331.70	332.36	333.22	333.53	331.17	327.39	325.48	326.60	328.38	330.58	331.85	330.25
1974	332.60	333.76	335.15	336.13	334.96	331.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99
1975	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99
1976	332.79	334.26	334.61	335.04	334.49	332.31	330.22	328.09	327.63	329.97	332.09	333.54	332.09
1977	334.81	335.78	336.54	337.28	337.28	335.27	332.76	331.43	331.51	333.46	335.17	336.41	334.81
1978	337.39	338.02	338.41	338.54	338.69	337.34	333.86	330.96	330.83	333.46	334.95	336.45	335.74
1979	338.04	338.74	339.85	340.52	340.49	338.10	334.39	332.63	332.52	334.16	336.69	338.02	337.01
1980	339.41	340.78	341.52	341.86	339.57	335.88	334.18	334.09	334.95	336.42	338.57	339.82	338.09
1981	341.24	342.99	343.39	343.14	341.95	339.54	337.18	335.36	335.38	338.06	340.97	341.77	340.08
1982	342.36	343.88	345.02	345.40	344.01	340.45	336.67	334.93	336.59	339.57	340.68	341.35	340.91
1983	343.37	344.71	345.22	346.07	345.09	342.40	339.44	336.46	336.72	340.36	343.63	345.74	342.43
1984	345.74	346.22	347.97	349.06	348.38	345.10	340.08	338.58	340.73	343.25	344.88	345.89	344.66
1985	347.09	347.77	348.09	348.57	347.81	345.70	344.69	343.78	342.07	343.53	346.62	347.54	346.11
1986	347.90	349.10	349.61	349.81	348.66	345.63	344.24	344.16	344.28	345.10	346.21	347.69	346.87
1987	349.03	350.38	351.82	351.80	350.78	349.57	347.41	344.86	345.20	347.14	349.41	351.25	349.05
1988	352.57	353.67	354.40	355.38	354.43	351.39	349.71	348.30	347.95	349.57	352.40	354.00	351.98
1989	354.24	354.91	355.43	355.79	355.61	354.63	352.58	349.63	349.12	351.12	353.58	354.52	353.43
1990	355.36	357.00	357.48	357.82	357.95	355.88	352.01	350.23	351.24	352.26	353.65	355.72	354.72
1991	357.22	358.32	359.32	359.95	358.59	356.66	353.74	351.33	351.40	353.39	356.10	357.72	356.15
1992	358.87	359.35	360.07	359.76	357.56	356.63	356.17	354.05	352.81	354.16	355.89	357.14	356.87
1993	358.54	359.34	360.49	361.37	360.52	358.60	354.47	351.64	353.32	356.02	356.93	357.70	357.41



Monthly atmospheric CO_2 mixing ratios from shipboard measurements in the Pacific Ocean.

Monthly atmospheric CO_2 mixing ratios from shipboard measurements in the Pacific Ocean, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

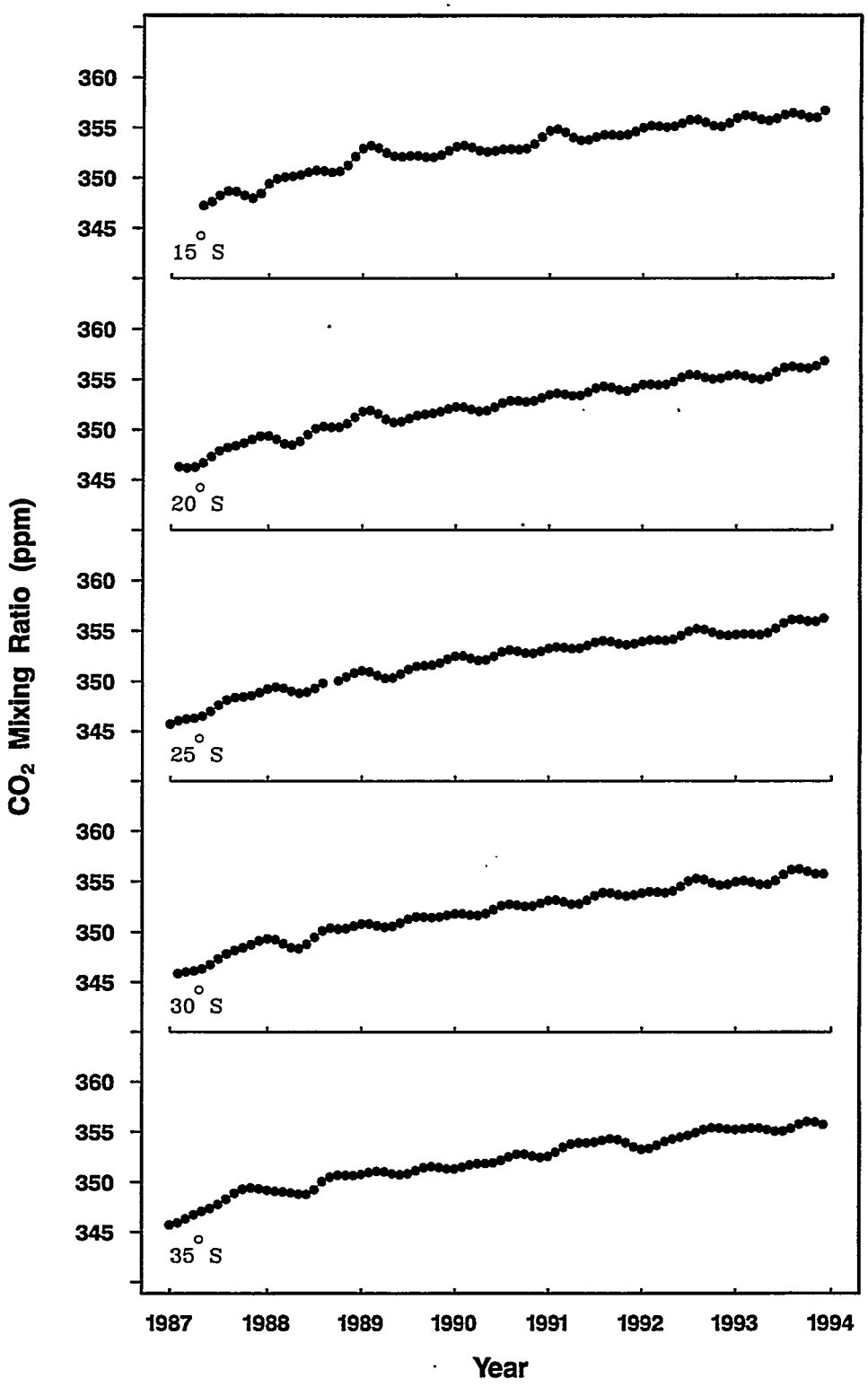
Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
						30°N							
1987	349.23	349.99	351.72	353.64	354.04	351.93	348.22	345.19	344.68	346.72	349.68	351.85	349.74
1988	352.78	353.29	354.21	355.28	355.36	353.69	350.96	348.92	348.97	350.90	353.17	354.31	352.65
1989	354.26	354.16	355.06	356.60	357.22	355.64	352.29	349.13	348.19	349.85	352.70	354.87	353.33
1990	355.62	355.73	356.34	357.58	358.26	357.08	354.07	350.87	349.46	351.92	355.69	357.00	354.97
1991	357.65	358.61	360.04	360.81	359.58	356.30	352.62	350.74	351.69	354.51	357.24	358.59	356.53
1992	358.89	359.34	360.44	361.30	360.44	357.40	353.58	351.26	351.79	354.52	357.45	359.07	357.12
1993	359.43	359.74	360.77	361.85	361.46	358.83	355.01	352.20	352.00	354.21	357.15	359.31	357.66
						25°N							
1987	348.23	349.37	351.22	353.03	353.40	351.64	348.65	346.30	345.97	347.54	349.66	351.13	349.68
1988	351.86	352.70	354.23	355.83	356.04	354.02	350.50	347.50	346.74	348.35	350.88	352.70	351.78
1989	353.38	353.75	354.75	356.23	356.92	355.68	352.80	349.92	348.81	349.86	351.96	353.62	353.14
1990	354.30	354.73	355.77	357.31	358.09	356.95	354.05	350.42	350.88	353.23	355.22	356.10	354.75
1991	356.46	357.32	358.82	359.87	359.14	356.45	353.18	351.28	351.70	353.80	356.07	357.50	355.97
1992	358.30	359.25	360.56	361.37	360.48	357.67	354.18	351.90	351.91	353.72	355.82	357.13	356.86
1993	357.81	358.75	360.39	361.87	361.76	359.40	355.81	353.05	352.68	354.58	357.25	359.20	357.71
						20°N							
1987	348.39	348.92	350.07	351.69	352.77	352.33	350.44	348.25	347.10	347.50	348.85	350.17	349.71
1988	351.04	351.81	352.97	354.30	354.88	353.85	351.39	348.74	347.34	347.73	349.28	350.90	351.19
1989	352.03	352.94	354.12	355.50	356.27	355.59	353.51	351.13	349.86	350.35	352.11	354.03	353.12
1990	355.73	-99.99	356.77	357.48	357.36	355.00	352.80	351.55	351.88	353.33	354.89	355.89	-99.99
1991	356.54	357.46	358.81	359.87	359.58	357.56	354.65	352.36	351.80	352.89	354.66	356.16	356.03
1992	357.26	358.39	359.75	360.82	360.59	358.62	355.63	353.13	352.36	353.39	355.21	356.71	356.82
1993	357.59	358.38	359.57	360.80	361.04	359.46	356.47	353.56	352.29	353.16	355.37	357.69	357.12
						15°N							
1987	347.22	348.35	349.99	351.85	352.89	352.17	349.86	347.27	345.93	346.47	348.21	349.93	349.18
1988	351.00	351.72	352.76	354.21	355.26	354.89	352.88	350.22	348.42	348.33	349.59	351.11	351.70
1989	352.12	352.76	353.66	355.08	356.38	356.51	355.04	352.64	350.72	350.30	351.30	353.44	353.33
1990	354.87	-99.99	356.29	357.75	357.58	355.97	353.60	351.76	351.42	352.52	354.13	355.38	-99.99
1991	356.17	357.03	358.30	359.51	359.65	358.09	355.31	352.76	351.78	352.67	354.56	356.28	356.01
1992	357.36	358.12	359.06	360.04	360.26	359.03	356.62	354.23	353.14	353.73	355.26	356.71	356.96
1993	357.61	358.30	359.29	360.45	360.92	359.93	357.62	355.16	353.89	354.32	355.84	357.38	357.56



Monthly atmospheric CO_2 mixing ratios from shipboard measurements in the Pacific Ocean.

Monthly atmospheric CO_2 mixing ratios from shipboard measurements in the Pacific Ocean (continued)

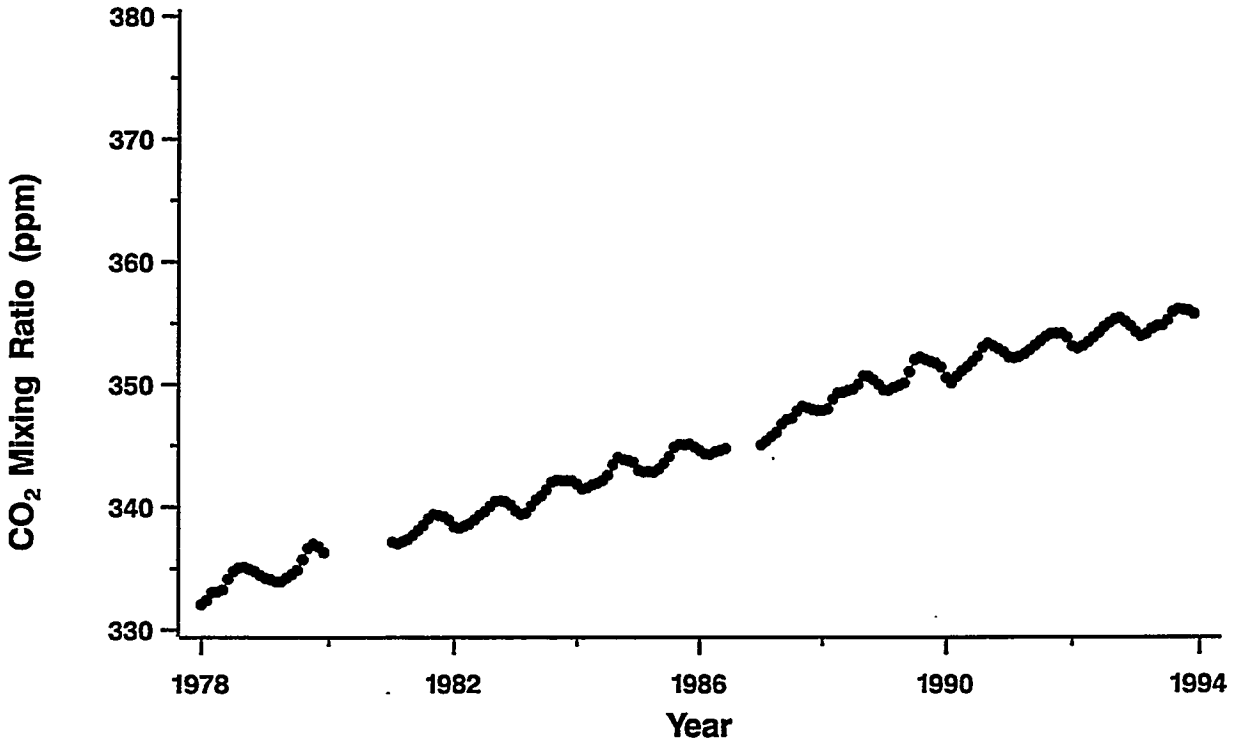
Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
						10°N							
1987	347.29	348.51	350.08	351.63	352.36	351.72	349.95	348.05	347.10	347.48	348.79	350.27	349.44
1988	351.50	352.55	353.61	354.52	354.72	353.77	351.90	350.01	349.08	349.45	350.68	352.01	351.98
1989	353.01	353.80	354.68	355.59	355.99	355.35	353.73	351.91	350.86	351.06	352.18	353.50	353.47
1990	354.52	355.28	356.05	356.88	357.35	356.95	355.62	353.97	352.85	352.76	353.52	354.56	355.03
1991	355.46	356.27	357.25	358.37	359.15	358.94	357.55	355.54	353.89	353.35	353.95	355.12	356.24
1992	356.26	357.19	358.07	359.01	359.73	359.71	358.69	357.01	355.45	354.77	355.58	356.44	357.33
1993	357.31	358.35	359.58	360.56	360.63	359.46	357.47	355.63	354.81	355.24	356.43	357.74	357.77
						5°N							
1987	347.82	-99.99	350.26	352.05	352.01	351.01	349.63	348.62	348.42	348.98	349.90	350.79	-99.99
1988	351.52	352.14	352.68	353.04	353.07	352.71	352.16	351.71	351.62	351.92	352.49	353.15	352.35
1989	353.81	354.40	354.87	355.08	354.90	354.33	353.52	352.79	352.39	352.45	352.91	353.62	353.76
1990	354.43	355.22	355.86	356.22	356.17	355.68	354.91	354.14	353.68	353.70	354.10	354.67	354.90
1991	355.26	355.84	356.48	357.14	357.56	357.45	356.69	355.59	354.67	354.37	354.77	355.60	355.95
1992	356.50	357.28	357.95	358.48	358.74	358.51	357.72	356.61	355.62	355.10	355.13	355.80	356.95
1993	356.79	-99.99	358.25	359.72	360.06	359.55	358.34	356.96	356.01	355.86	356.40	357.30	-99.99
						Equator							
1987	345.66	346.95	348.44	349.79	350.66	350.91	350.62	350.06	349.54	349.30	349.45	349.98	349.28
1988	350.83	351.81	352.67	353.19	353.25	352.94	352.48	352.08	351.89	351.96	352.29	352.88	352.36
1989	353.65	354.45	355.04	355.22	354.95	354.37	353.72	353.07	352.90	353.10	353.51	354.09	354.01
1990	354.75	355.34	355.71	355.77	355.53	355.09	354.57	354.11	353.85	353.87	354.22	354.83	354.80
1991	355.59	356.31	356.84	357.05	356.90	356.44	355.78	355.13	354.68	354.56	354.80	355.29	355.78
1992	355.89	356.46	356.88	357.11	357.12	356.92	356.58	356.18	355.87	355.75	355.91	356.32	356.42
1993	356.88	357.47	357.95	358.23	358.29	358.12	357.74	357.24	356.75	356.49	356.60	357.12	357.41
						5°S							
1987	-99.99	347.80	348.70	349.61	350.31	350.54	350.21	349.52	348.85	348.60	348.94	349.75	-99.99
1988	350.75	351.67	352.33	352.66	352.65	352.34	351.86	351.42	351.26	351.51	352.12	352.88	351.95
1989	353.52	353.88	353.98	353.95	353.86	353.72	353.44	353.06	352.73	352.67	353.01	353.65	353.46
1990	354.36	354.93	355.30	355.54	355.69	355.68	355.42	354.91	354.37	354.07	354.16	354.55	354.92
1991	355.01	355.39	355.67	355.91	356.12	356.18	355.95	355.47	354.93	354.62	354.66	354.98	355.41
1992	355.36	355.69	355.97	356.32	356.74	357.08	356.87	355.97	355.41	355.31	355.71	356.36	356.07
1993	356.91	357.19	357.26	357.29	357.35	357.32	357.06	356.60	356.21	356.19	356.67	357.43	356.96
						10°S							
1987	-99.99	-99.99	348.29	348.04	348.04	348.36	348.75	348.91	348.83	348.81	349.09	349.65	-99.99
1988	350.15	350.29	350.10	349.94	350.15	350.71	351.26	351.47	351.31	351.16	351.39	352.07	350.83
1989	352.86	353.33	353.31	353.01	352.77	352.74	352.80	352.72	352.47	352.27	352.43	353.02	352.81
1990	353.78	354.34	354.51	354.43	354.37	354.45	354.49	354.00	353.28	353.27	353.84	354.72	354.12
1991	355.40	355.59	355.39	355.13	355.05	355.09	355.01	354.72	354.39	354.32	354.64	355.15	354.99
1992	355.48	355.45	355.22	355.15	355.46	355.96	356.28	356.13	355.66	355.29	355.38	355.88	355.61
1993	356.40	356.56	356.33	356.07	356.13	356.54	356.98	357.07	356.79	356.53	356.71	357.37	356.62



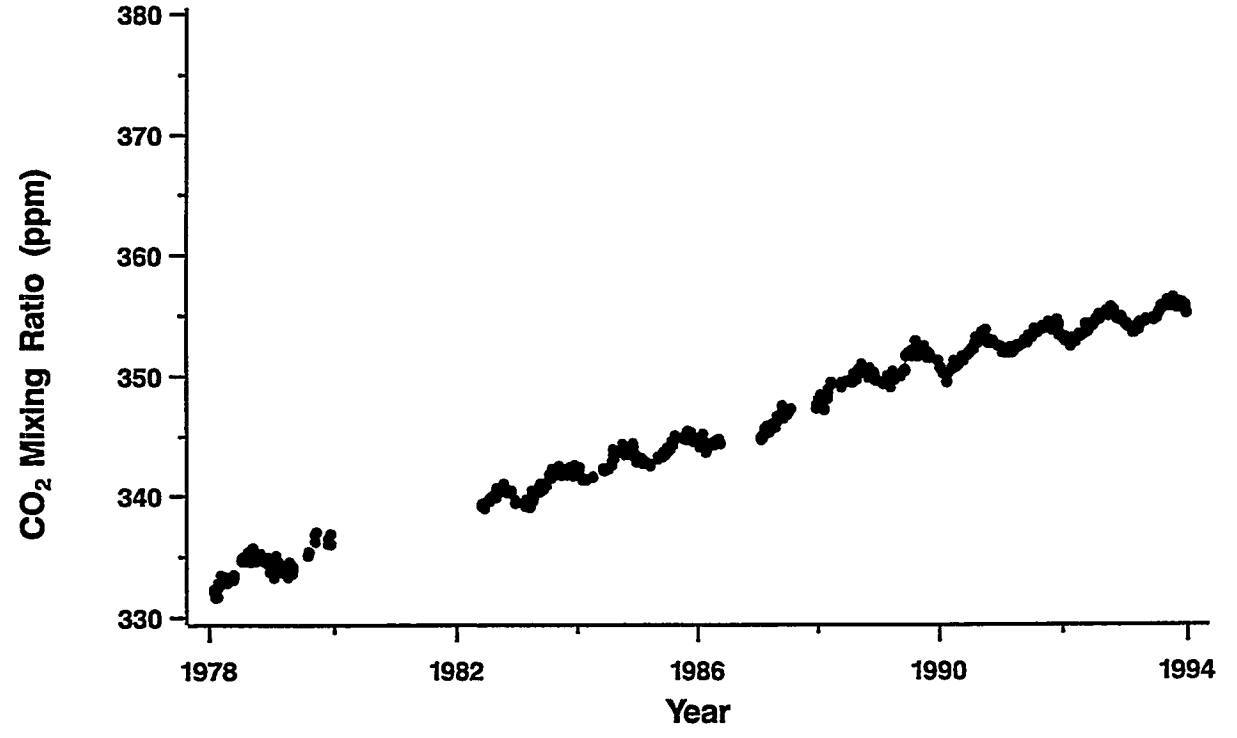
Monthly atmospheric CO_2 mixing ratios from shipboard measurements in the Pacific Ocean.

Monthly atmospheric CO_2 mixing ratios from shipboard measurements in the Pacific Ocean (continued)

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
						15°S							
1987	-99.99	-99.99	-99.99	-99.99	347.24	347.63	348.23	348.66	348.63	348.26	347.98	348.43	-99.99
1988	349.42	349.90	350.07	350.14	350.30	350.56	350.74	350.69	350.56	350.67	351.24	352.14	350.54
1989	352.93	353.23	352.99	352.51	352.18	352.12	352.21	352.21	352.10	352.06	352.28	352.72	352.46
1990	353.12	353.24	353.04	352.74	352.61	352.70	352.85	352.89	352.84	352.94	353.39	354.09	353.04
1991	354.69	354.87	354.56	354.06	353.76	353.82	354.09	354.29	354.30	354.24	354.33	354.64	354.30
1992	355.01	355.21	355.16	355.06	355.14	355.45	355.78	355.82	355.55	355.20	355.14	355.48	355.33
1993	355.98	356.25	356.14	355.84	355.72	355.94	356.30	356.47	356.31	356.04	356.04	356.72	356.15
						20°S							
1987	-99.99	346.30	346.19	346.27	346.69	347.32	347.88	348.22	348.41	348.67	349.04	349.37	-99.99
1988	349.40	349.05	348.61	348.47	348.84	349.52	350.11	350.33	350.25	350.25	350.59	351.23	349.72
1989	351.80	351.92	351.57	351.04	350.74	350.81	351.12	351.41	351.54	351.62	351.79	352.06	351.45
1990	352.27	352.24	352.02	351.83	351.90	352.24	352.66	352.88	352.87	352.78	352.86	353.15	352.48
1991	353.48	353.62	353.52	353.37	353.42	353.73	354.11	354.31	354.21	353.97	353.85	354.14	353.81
1992	354.50	354.51	354.44	354.50	354.79	355.20	355.46	355.42	355.20	355.04	355.12	355.35	354.96
1993	355.47	355.35	355.10	355.00	355.25	355.73	356.15	356.26	356.14	356.09	356.35	356.82	355.81
						25°S							
1987	345.71	346.05	346.21	346.29	346.51	346.99	347.60	348.11	348.37	348.45	348.57	348.87	347.31
1988	349.23	349.43	349.31	349.01	348.80	348.92	349.29	349.81	-99.99	350.06	350.43	350.82	-99.99
1989	351.05	350.94	350.58	350.30	350.35	350.73	351.18	351.47	351.55	351.61	351.83	352.20	351.15
1990	352.50	352.52	352.29	352.08	352.14	352.50	352.92	353.11	353.01	352.81	352.78	352.98	352.64
1991	353.27	353.41	353.35	353.24	353.29	353.55	353.87	354.02	353.94	353.73	353.63	353.73	353.59
1992	353.94	354.08	354.08	354.04	354.16	354.51	354.94	355.20	355.14	354.86	354.61	354.54	354.51
1993	354.62	354.68	354.65	354.61	354.79	355.23	355.76	356.10	356.11	355.94	355.92	356.24	355.39
						30°S							
1987	-99.99	345.88	346.04	346.14	346.36	346.79	347.35	347.85	348.20	348.47	348.78	349.13	-99.99
1988	349.35	349.25	348.86	348.46	348.38	348.80	349.50	350.13	350.41	350.32	350.35	350.60	349.53
1989	350.81	350.82	350.64	350.50	350.59	350.91	351.29	351.50	351.51	351.46	351.51	351.67	351.10
1990	351.82	351.82	351.70	351.65	351.85	352.25	352.63	352.78	352.69	352.56	352.61	352.87	352.27
1991	353.13	353.18	353.00	352.78	352.81	353.16	353.62	353.91	353.89	353.70	353.58	353.68	353.37
1992	353.88	354.01	353.97	353.91	354.08	354.52	355.04	355.32	355.21	354.89	354.67	354.73	354.52
1993	354.97	355.09	354.96	354.74	354.73	355.11	355.70	356.16	356.24	356.01	355.78	355.77	355.44
						35°S							
1987	345.73	345.93	346.33	346.74	347.08	347.38	347.77	348.30	348.88	349.30	349.44	349.35	347.69
1988	349.19	349.09	349.03	348.94	348.82	348.79	349.24	350.07	350.52	350.71	350.69	350.67	349.65
1989	350.78	350.97	351.09	351.04	350.86	350.75	350.86	351.16	351.46	351.57	351.48	351.34	351.11
1990	351.34	351.51	351.73	351.85	351.88	351.95	352.19	352.53	352.79	352.81	352.62	352.47	352.14
1991	352.58	352.98	353.46	353.80	353.91	353.91	353.98	354.16	354.32	354.25	353.93	353.52	353.73
1992	353.28	353.36	353.68	354.04	354.30	354.48	354.67	354.95	355.25	355.42	355.41	355.31	354.51
1993	355.25	355.30	355.40	355.40	355.26	355.09	355.11	355.38	355.78	356.04	356.01	355.75	355.48



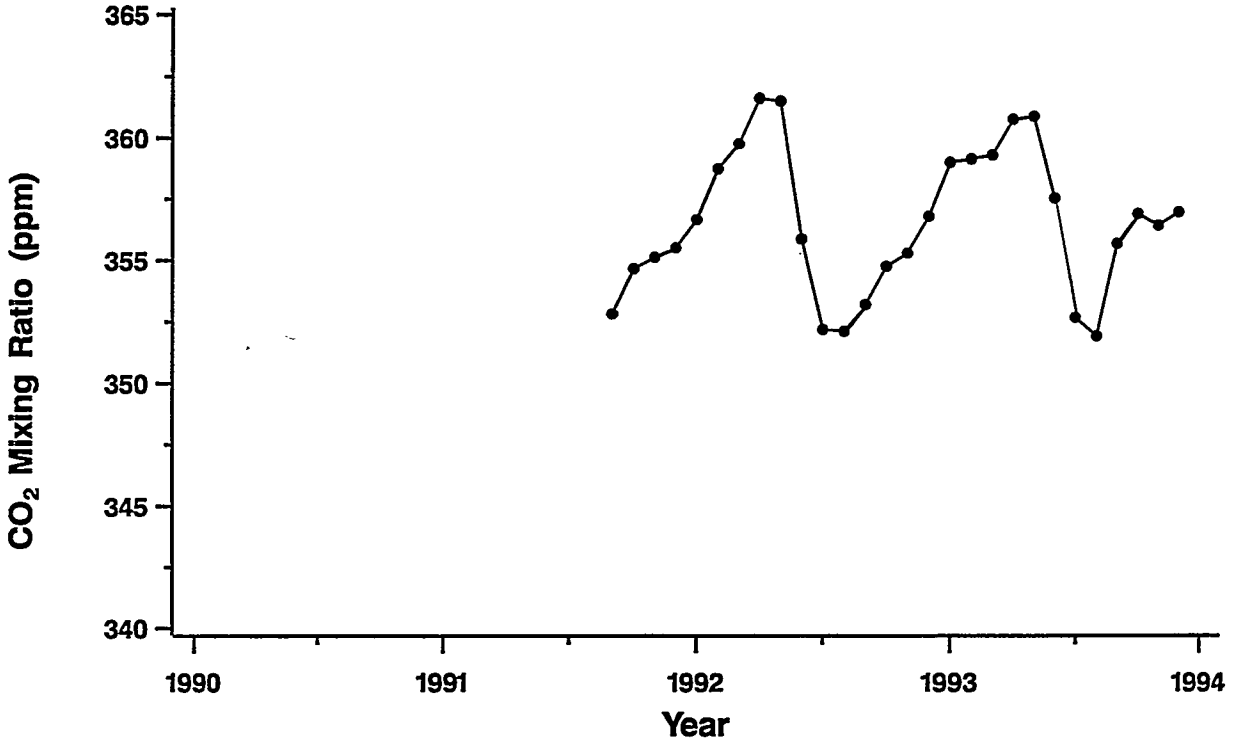
Monthly atmospheric CO_2 mixing ratios from Palmer Station, Antarctica.



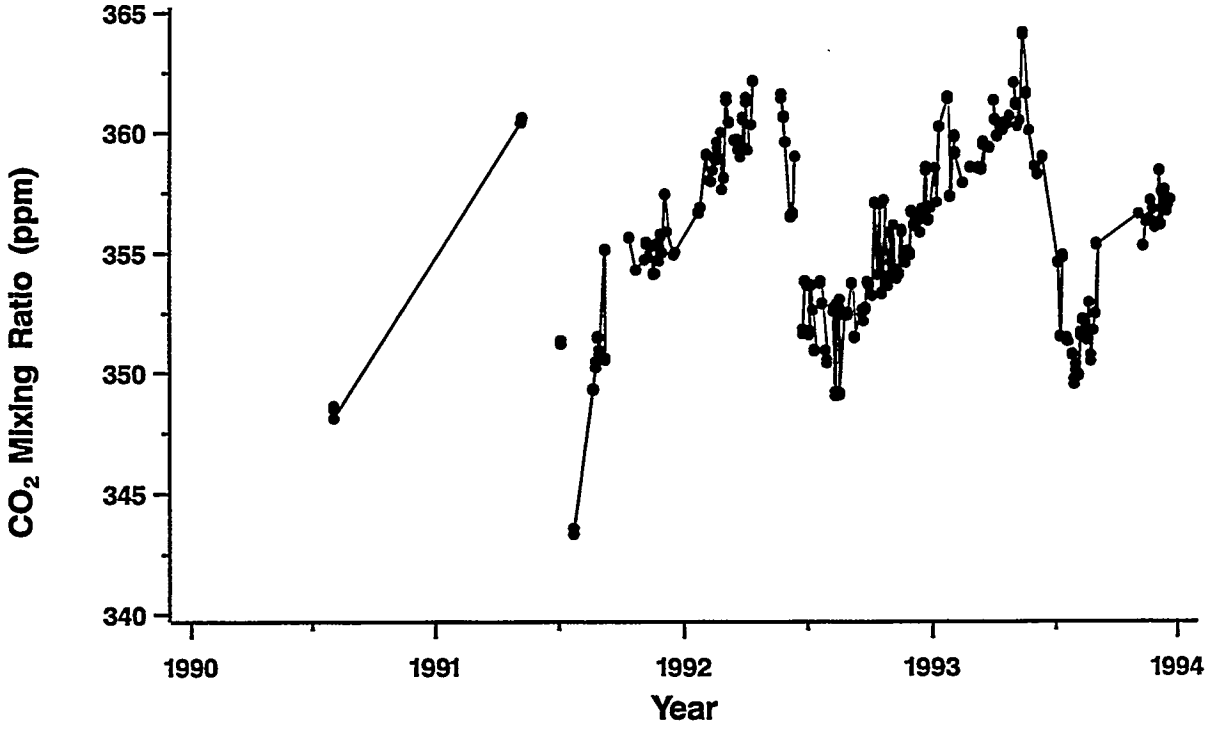
Background atmospheric CO_2 mixing ratios from individual flask air samples for Palmer Station, Antarctica. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Palmer Station, Antarctica, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1978	332.07	332.41	333.05	333.08	333.28	334.14	334.76	335.06	335.12	334.94	334.77	334.46	333.93
1979	334.21	334.11	333.94	333.94	334.23	334.53	334.88	335.72	336.64	336.99	336.76	336.30	335.19
1980	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99
1981	337.12	337.00	337.17	337.36	337.70	338.09	338.49	339.03	339.39	339.31	339.23	338.93	338.24
1982	338.40	338.26	338.43	338.62	338.94	339.34	339.63	340.05	340.45	340.50	340.42	340.15	339.43
1983	339.69	339.40	339.50	340.06	340.58	340.90	341.41	342.01	342.18	342.15	342.15	342.14	341.01
1984	341.86	341.48	341.57	341.80	341.94	342.15	342.59	343.43	344.03	343.85	343.79	343.63	342.68
1985	343.01	342.86	342.89	342.85	343.10	343.55	344.10	344.84	345.08	345.06	345.12	344.87	343.94
1986	344.58	344.31	344.28	344.50	344.60	344.76	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99
1987	345.05	345.36	345.74	346.08	346.75	347.11	347.22	347.80	348.17	348.08	347.93	347.86	346.93
1988	347.84	347.98	348.76	349.29	349.33	349.50	349.60	349.99	350.67	350.64	350.36	349.99	349.50
1989	349.53	349.51	349.74	349.90	350.11	351.02	352.00	352.19	352.01	351.85	351.71	351.39	350.91
1990	350.55	350.09	350.64	351.08	351.42	351.83	352.29	353.00	353.32	353.12	352.88	352.62	351.90
1991	352.22	352.14	352.27	352.47	352.79	353.16	353.52	353.87	354.11	354.13	354.14	353.82	353.22
1992	353.11	352.93	353.11	353.43	353.82	354.19	354.66	355.00	355.28	355.41	355.09	354.73	354.23
1993	354.26	353.93	354.11	354.51	354.73	354.78	355.21	355.87	356.12	356.06	356.00	355.72	355.11



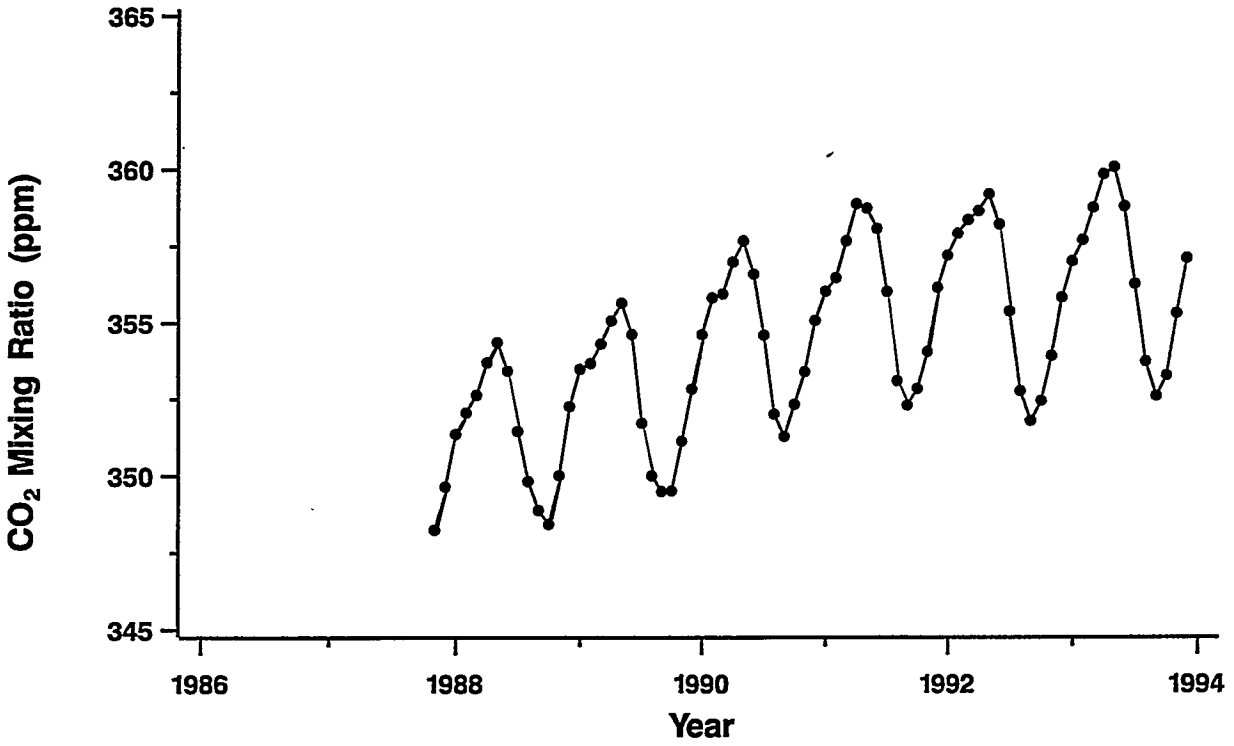
Monthly atmospheric CO_2 mixing ratios from Qinghai Province, P.R.C.



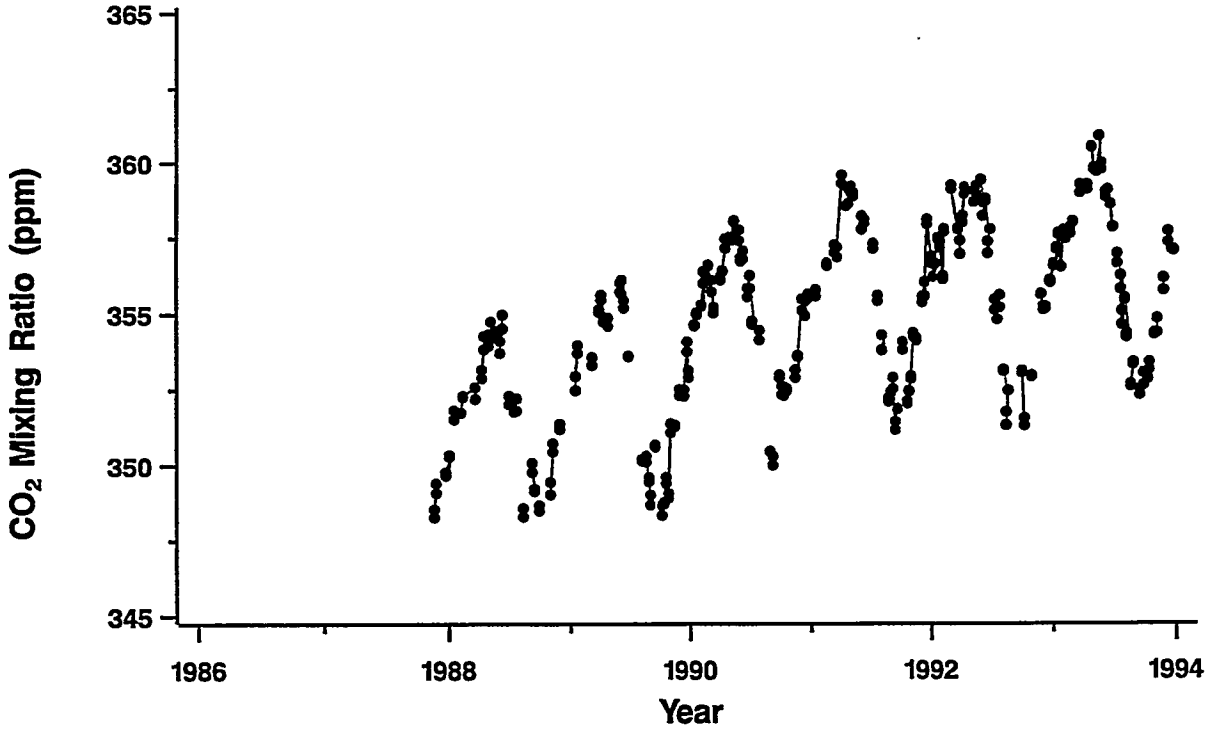
Background atmospheric CO_2 mixing ratios from individual flask air samples for Qinghai Province, P.R.C. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Qinghai Province, P.R.C., expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1991	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	352.83	354.67	355.14	355.53	-99.99
1992	356.68	358.75	359.77	361.61	361.50	355.89	352.19	352.12	353.21	354.77	355.31	356.81	356.55
1993	359.01	359.15	359.31	360.76	360.87	357.55	352.68	351.92	355.70	356.91	356.43	356.98	357.27



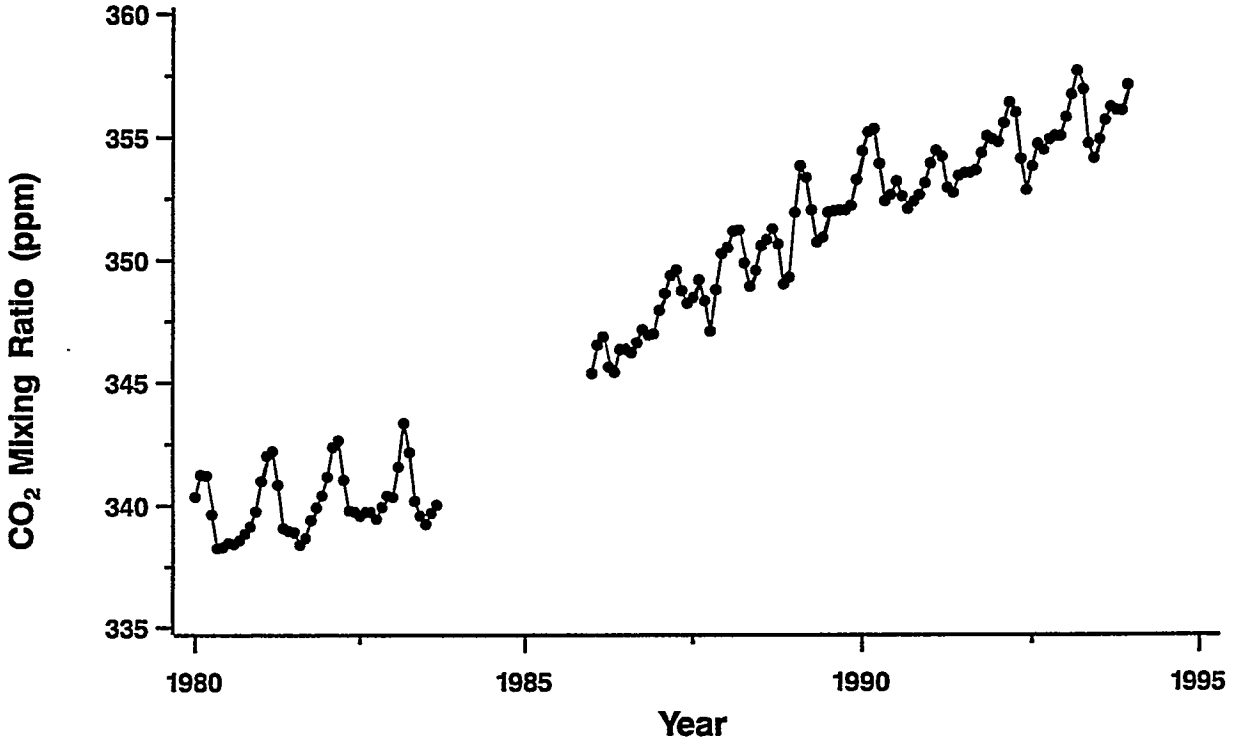
Monthly atmospheric CO_2 mixing ratios from Ragged Point, Barbados.



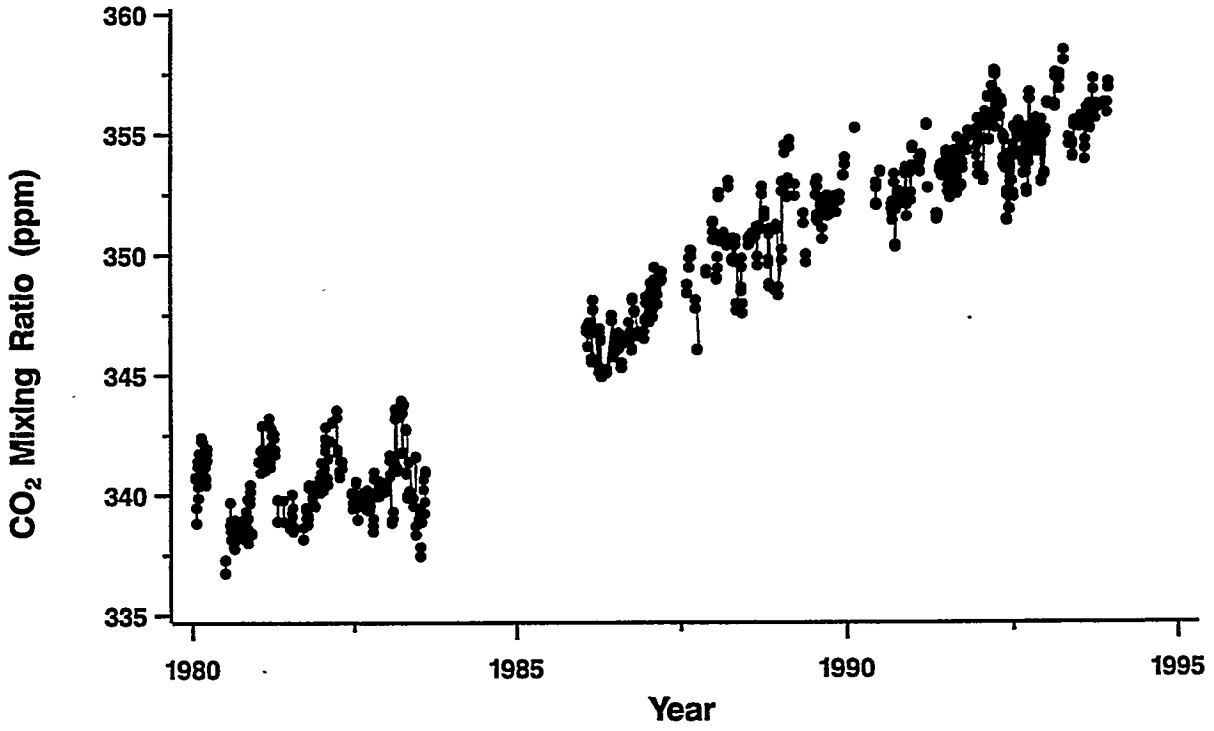
Background atmospheric CO_2 mixing ratios from individual flask air samples for Ragged Point, Barbados. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Ragged Point, Barbados, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1987	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	348.25	349.65	-99.99
1988	351.37	352.07	352.65	353.71	354.37	353.44	351.47	349.83	348.89	348.44	350.02	352.28	351.55
1989	353.50	353.69	354.32	355.08	355.65	354.63	351.73	350.01	349.50	349.52	351.14	352.85	352.64
1990	354.62	355.82	355.95	356.99	357.67	356.60	354.61	352.03	351.30	352.35	353.42	355.09	354.70
1991	356.04	356.48	357.68	358.88	358.74	358.08	356.03	353.12	352.32	352.86	354.07	356.16	355.87
1992	357.21	357.92	358.36	358.65	359.19	358.22	355.39	352.78	351.81	352.46	353.93	355.83	355.98
1993	357.02	357.71	358.76	359.85	360.07	358.80	356.28	353.75	352.62	353.29	355.32	357.12	356.72



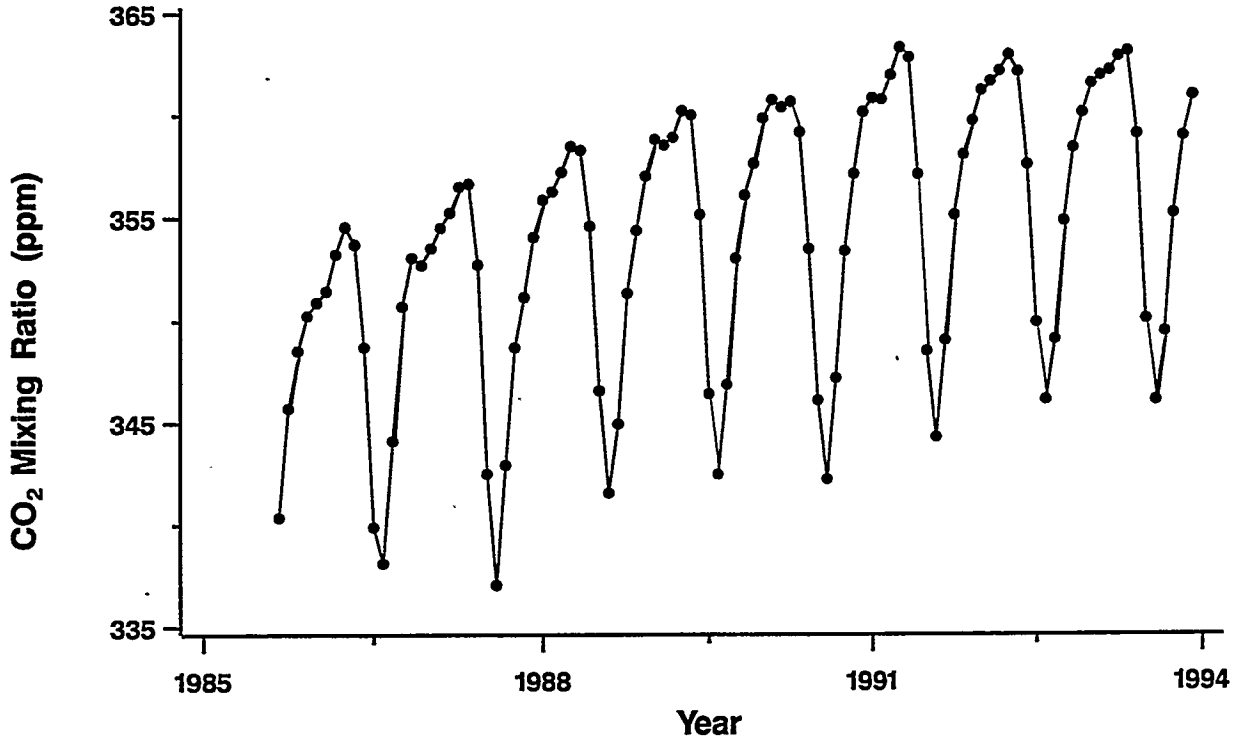
Monthly atmospheric CO_2 mixing ratios from the Seychelles.



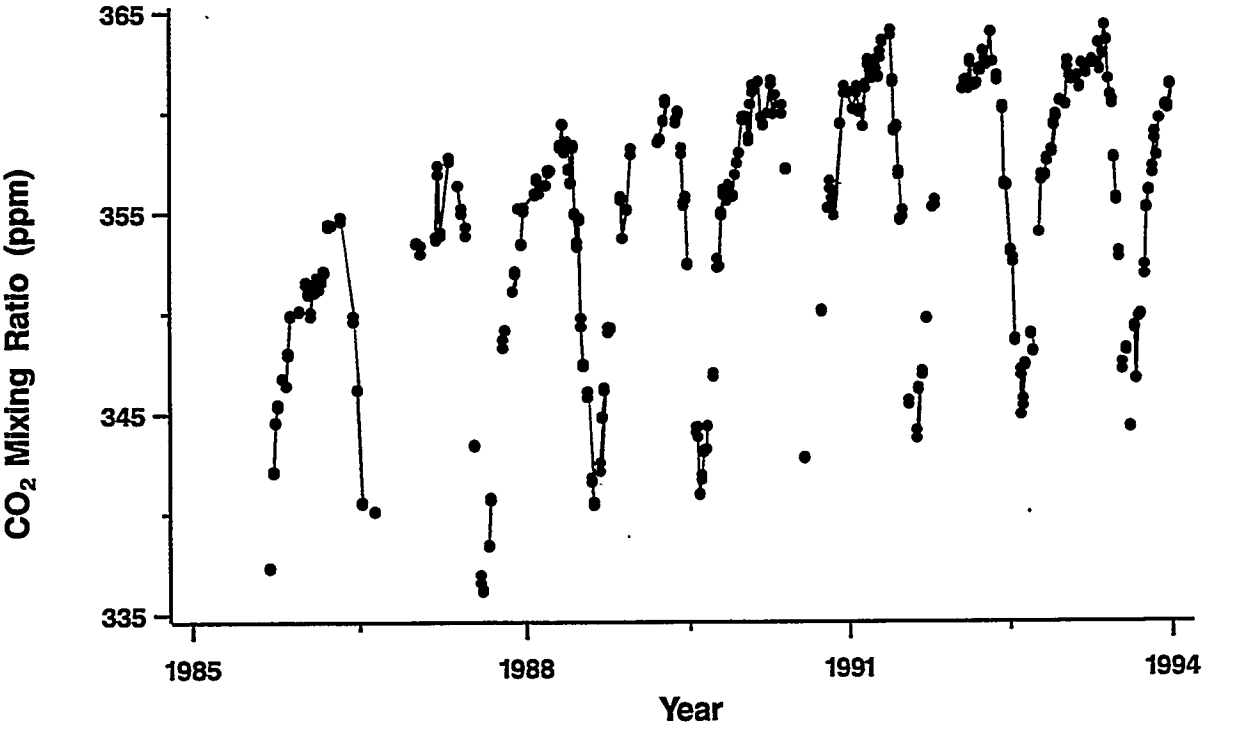
Background atmospheric CO_2 mixing ratios from individual flask air samples for the Seychelles. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for the Seychelles, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1980	340.37	341.26	341.23	339.65	338.27	338.31	338.48	338.44	338.59	338.86	339.15	339.77	339.37
1981	341.01	342.03	342.22	340.86	339.09	338.97	338.91	338.41	338.68	339.41	339.93	340.42	340.00
1982	341.18	342.39	342.66	341.06	339.80	339.75	339.59	339.74	339.74	339.47	339.94	340.41	340.48
1983	340.36	341.59	343.36	342.18	340.19	339.59	339.26	339.70	340.03	-99.99	-99.99	-99.99	-99.99
1984	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99
1985	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99
1986	345.39	346.54	346.86	345.65	345.43	346.35	346.37	346.24	346.63	347.15	346.94	346.99	346.38
1987	347.95	348.65	349.38	349.61	348.76	348.25	348.48	349.20	348.35	347.10	348.80	350.28	348.73
1988	350.52	351.19	351.24	349.89	348.94	349.59	350.60	350.85	351.28	350.67	349.03	349.31	350.26
1989	351.95	353.85	353.38	352.05	350.75	350.94	351.95	352.01	352.05	352.05	352.23	353.29	352.21
1990	354.45	355.22	355.35	353.94	352.42	352.67	353.22	352.61	352.11	352.40	352.66	353.15	353.35
1991	353.95	354.46	354.23	352.96	352.75	353.45	353.56	353.57	353.67	354.36	355.05	354.92	353.91
1992	354.82	355.58	356.41	356.01	354.13	352.86	353.83	354.73	354.50	354.91	355.06	355.06	354.83
1993	355.82	356.73	357.68	356.94	354.76	354.16	354.92	355.70	356.23	356.11	356.10	357.12	356.02



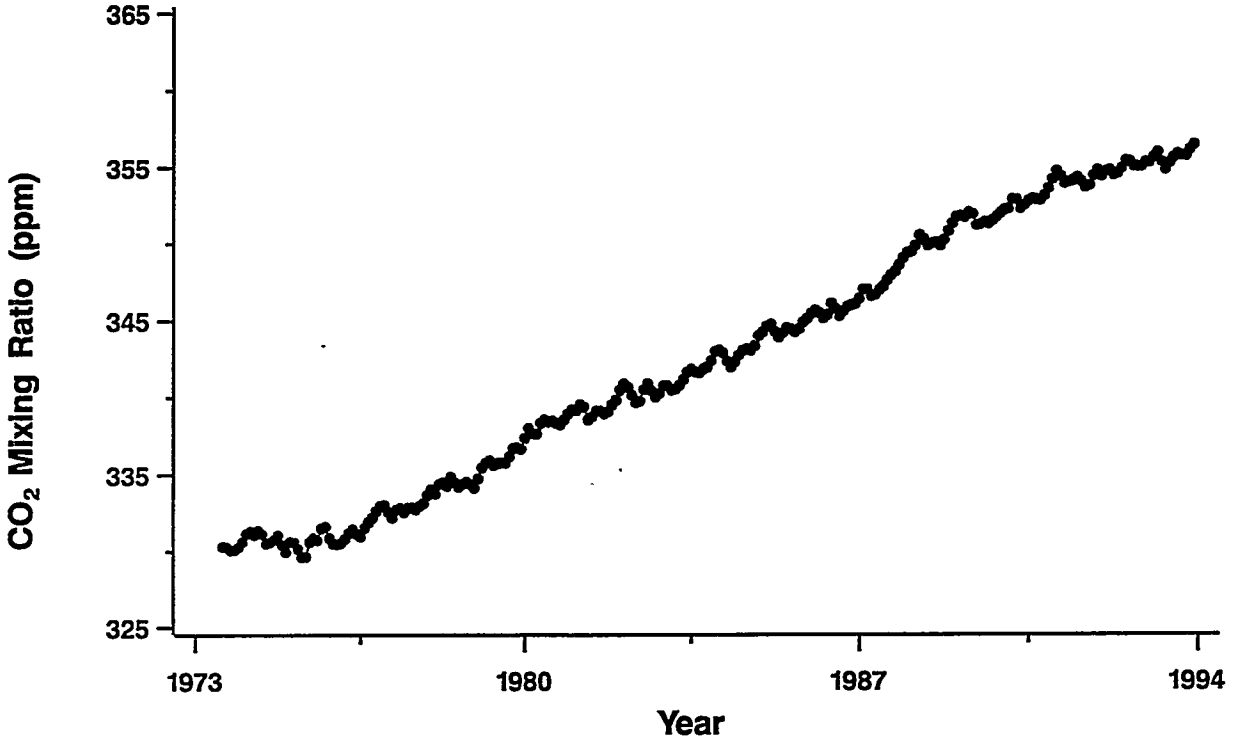
Monthly atmospheric CO_2 mixing ratios from Shemya Island, Alaska, U.S.



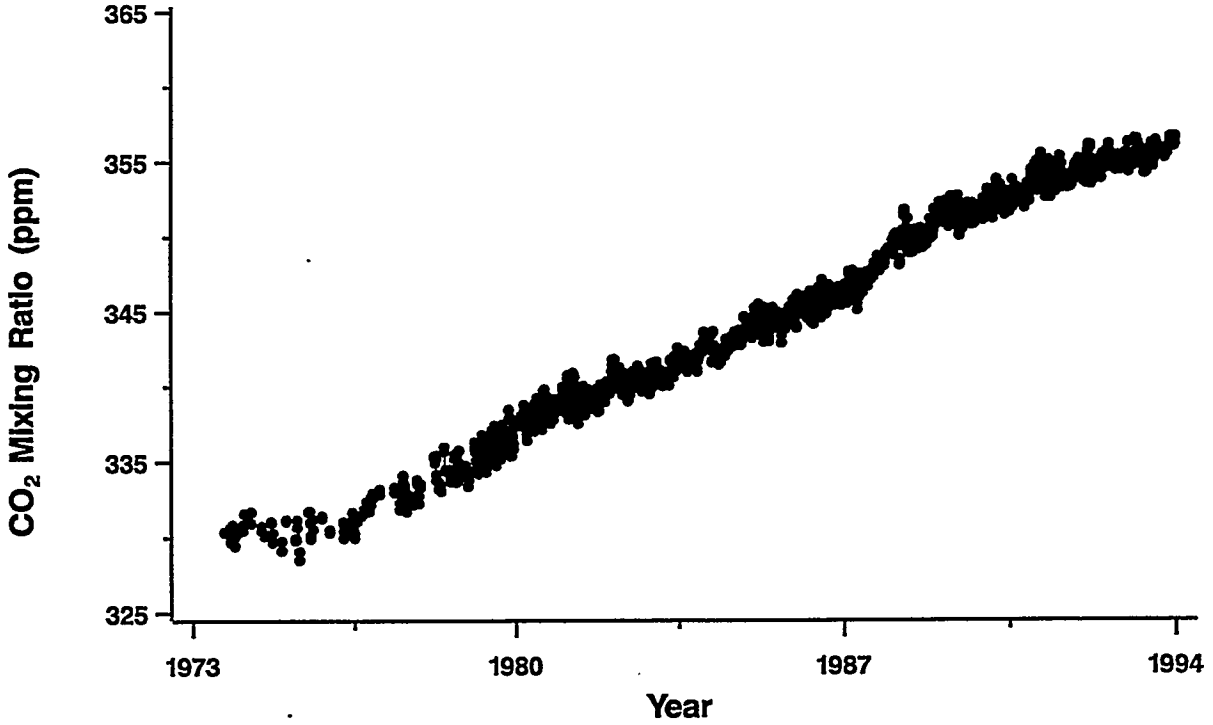
Background atmospheric CO_2 mixing ratios from individual flask air samples for Shemya Island, Alaska, U.S. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Shemya Island, Alaska, U.S., expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1985	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	340.37	345.73	348.55	350.27	-99.99
1986	350.91	351.46	353.25	354.56	353.72	348.73	339.90	338.13	344.12	350.72	353.06	352.72	349.27
1987	353.53	354.52	355.24	356.50	356.64	352.74	342.50	337.06	342.93	348.71	351.16	354.07	350.47
1988	355.86	356.26	357.22	358.47	358.29	354.60	346.59	341.57	344.95	351.35	354.39	357.03	353.05
1989	358.81	358.54	358.92	360.22	360.02	355.15	346.43	342.48	346.88	353.04	356.09	357.63	354.52
1990	359.85	360.74	360.39	360.66	359.16	353.49	346.10	342.23	347.20	353.39	357.13	360.15	355.04
1991	360.82	360.76	361.95	363.29	362.82	357.10	348.52	344.29	349.05	355.12	358.05	359.71	356.79
1992	361.20	361.64	362.15	362.93	362.11	357.57	349.93	346.13	349.09	354.83	358.38	360.10	357.17
1993	361.53	361.93	362.18	362.86	363.10	359.06	350.10	346.10	349.47	355.20	358.96	360.95	357.62



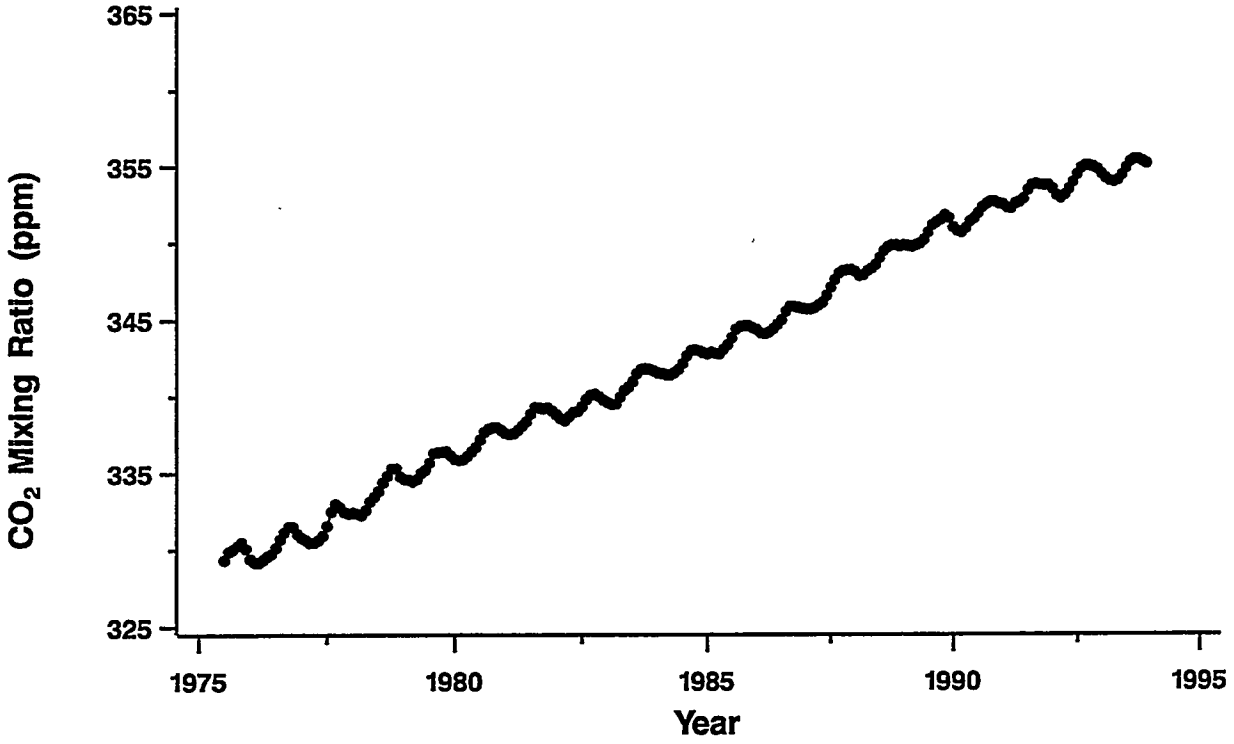
Monthly atmospheric CO_2 mixing ratios from American Samoa.



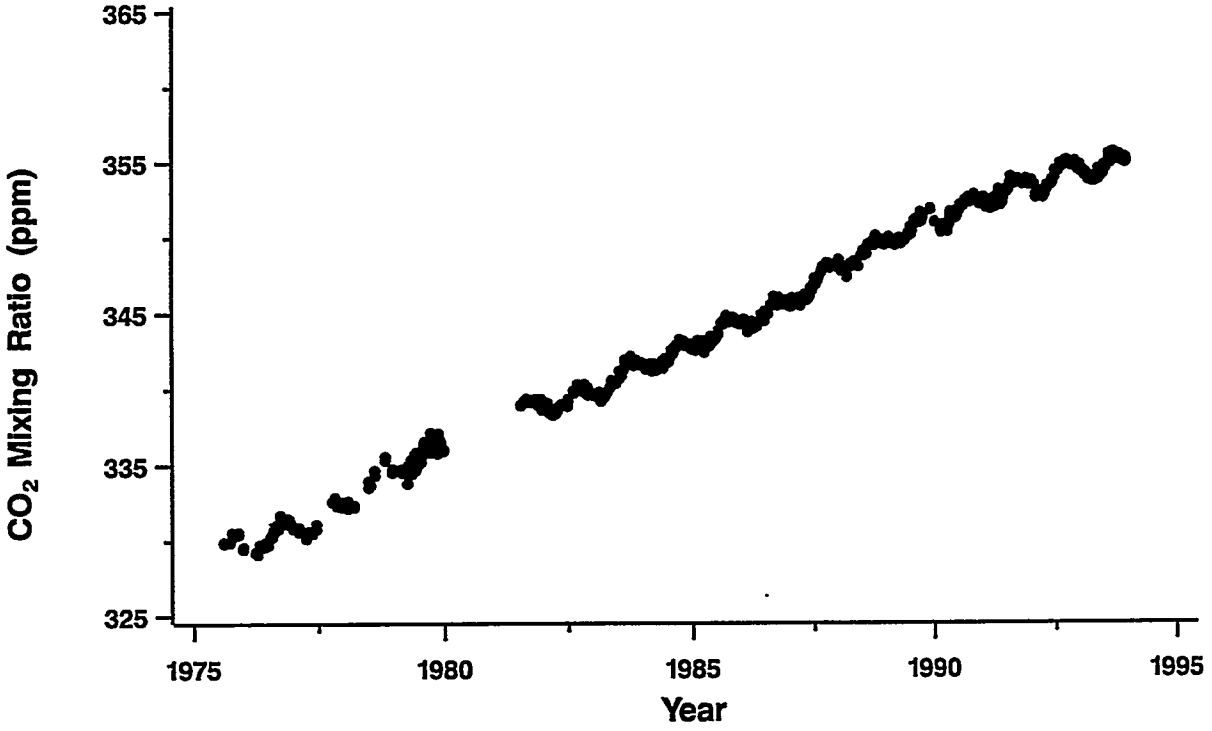
Background atmospheric CO_2 mixing ratios from individual flask air samples for American Samoa. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for American Samoa, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1973	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	330.32	330.28	330.08	330.09	330.29	-99.99
1974	330.63	331.15	331.30	331.08	331.37	331.13	330.52	330.61	330.77	331.05	330.45	329.98	330.84
1975	330.63	330.59	330.17	329.65	329.66	330.61	330.86	330.74	331.50	331.60	330.88	330.53	330.62
1976	330.48	330.54	330.81	331.18	331.43	331.15	330.99	331.53	331.91	332.20	332.63	332.96	331.48
1977	333.01	332.59	332.22	332.71	332.81	332.55	332.84	332.86	332.74	332.96	333.14	333.66	332.84
1978	334.04	333.77	334.37	334.48	334.26	334.83	334.50	334.20	334.38	334.51	334.38	334.14	334.32
1979	334.75	335.46	335.75	335.91	335.63	335.75	335.77	335.77	336.18	336.70	336.77	336.67	335.93
1980	337.37	338.00	337.68	337.65	338.33	338.55	338.44	338.48	338.35	338.25	338.56	338.94	338.22
1981	339.21	339.16	339.54	339.39	338.58	338.79	339.13	339.13	338.96	339.11	339.53	339.84	339.20
1982	340.49	340.89	340.65	340.16	339.69	339.79	340.50	340.88	340.45	340.05	340.28	340.75	340.38
1983	340.75	340.48	340.56	340.79	341.16	341.64	341.82	341.66	341.61	341.84	341.98	342.39	341.39
1984	342.98	343.08	342.88	342.37	341.98	342.34	342.76	343.05	343.15	343.07	343.37	344.02	342.92
1985	344.26	344.62	344.76	344.29	343.92	344.21	344.53	344.45	344.29	344.48	344.90	345.13	344.49
1986	345.45	345.66	345.50	345.17	345.39	346.11	345.77	345.31	345.62	345.89	346.01	346.09	345.66
1987	346.44	347.02	347.02	346.60	346.69	346.98	347.22	347.62	347.97	348.20	348.62	349.07	347.45
1988	349.39	349.49	349.87	350.53	350.30	349.89	350.02	350.07	349.87	350.26	350.82	351.32	350.15
1989	351.74	351.80	351.72	352.03	351.91	351.22	351.28	351.40	351.30	351.52	351.75	351.98	351.64
1990	352.20	352.28	352.87	352.85	352.30	352.50	352.77	352.90	352.87	352.84	353.12	353.59	352.76
1991	354.19	354.71	354.37	353.93	354.02	354.10	354.29	354.05	353.68	353.80	354.42	354.79	354.20
1992	354.41	354.69	354.78	354.49	354.60	354.91	355.39	355.34	355.05	355.03	355.04	355.30	354.92
1993	355.32	355.62	355.94	355.34	354.85	355.26	355.60	355.83	355.75	355.73	356.12	356.44	355.65



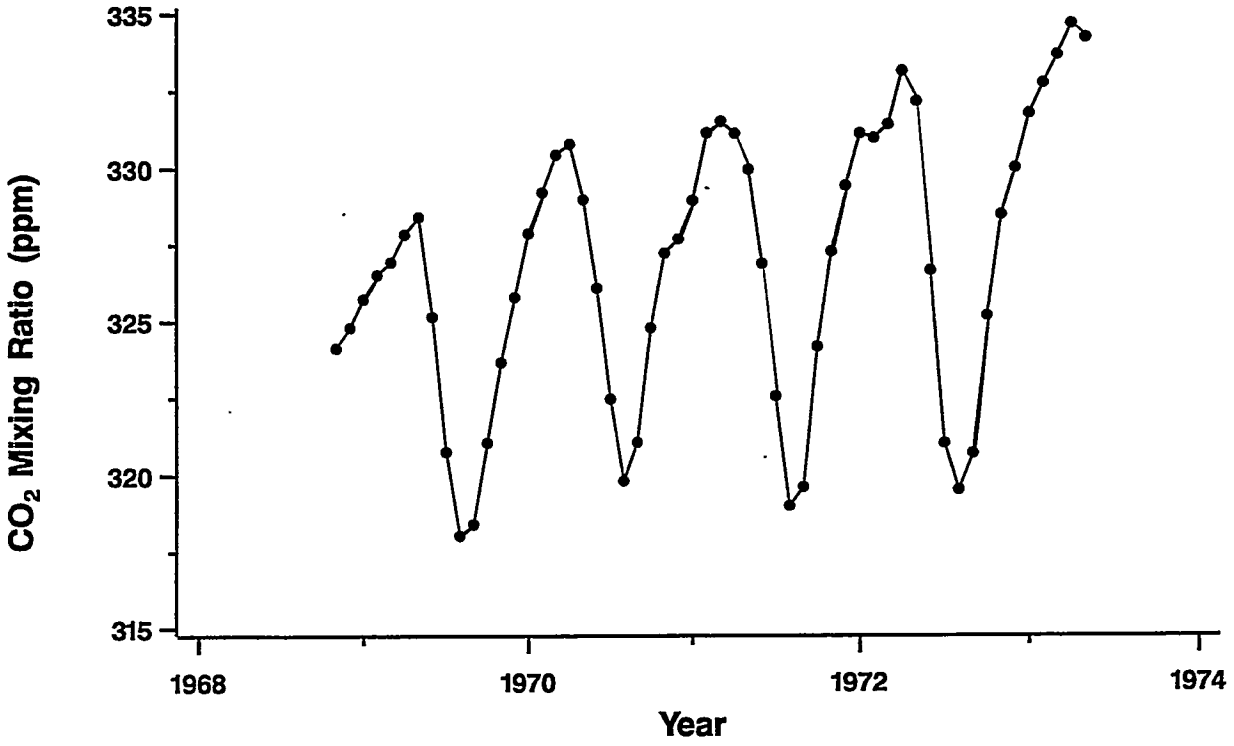
Monthly atmospheric CO_2 mixing ratios from the South Pole.



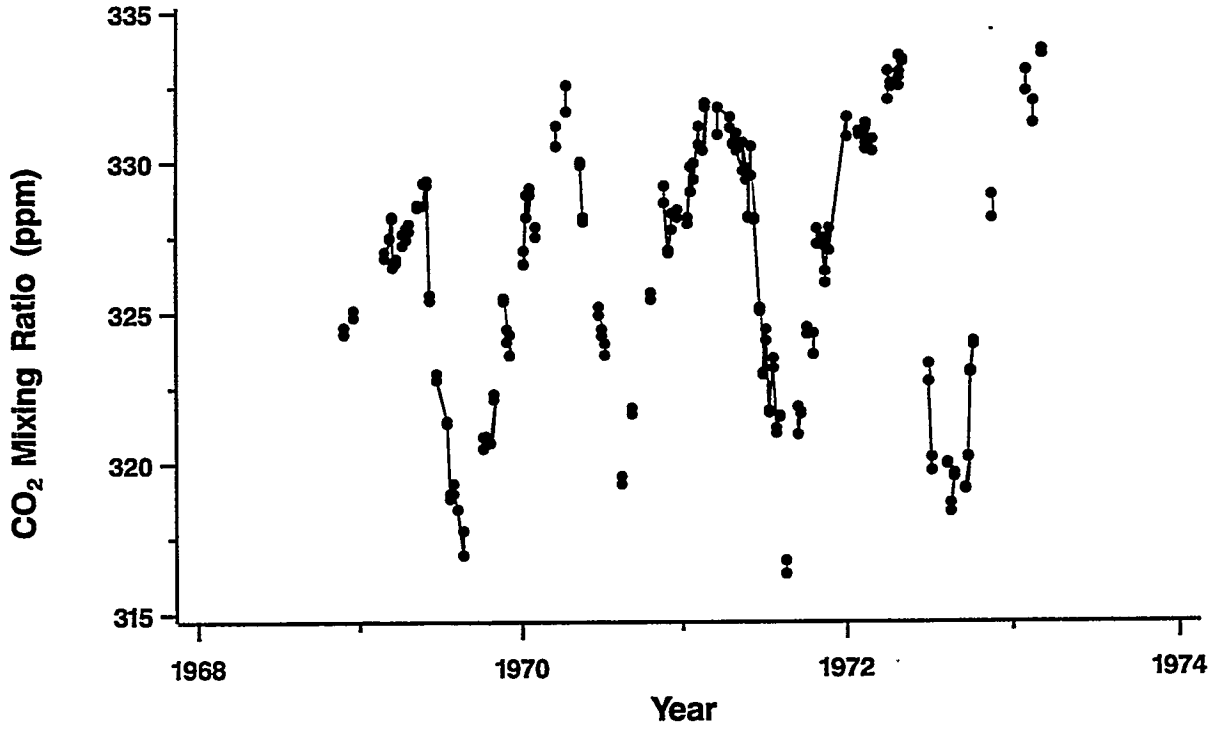
Background atmospheric CO_2 mixing ratios from individual flask air samples for the South Pole. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for the South Pole, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1975	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	329.35	329.88	330.05	330.26	330.49	330.09	-99.99
1976	329.45	329.22	329.19	329.37	329.61	329.78	330.16	330.70	331.16	331.52	331.49	331.07	330.23
1977	330.82	330.67	330.48	330.49	330.65	330.95	331.56	332.50	332.98	332.79	332.49	332.38	331.56
1978	332.43	332.38	332.28	332.61	333.15	333.48	333.86	334.40	334.84	335.31	335.33	334.81	333.74
1979	334.63	334.60	334.47	334.62	335.02	335.24	335.70	336.32	336.38	336.40	336.45	336.19	335.50
1980	335.93	335.87	335.92	336.14	336.44	336.72	337.21	337.71	337.92	338.01	338.01	337.85	336.98
1981	337.65	337.58	337.63	337.84	338.13	338.41	338.90	339.31	339.29	339.24	339.30	339.11	338.53
1982	338.87	338.61	338.46	338.73	338.99	339.07	339.37	339.84	340.13	340.18	340.03	339.81	339.34
1983	339.66	339.53	339.54	339.99	340.43	340.65	341.01	341.52	341.81	341.84	341.83	341.71	340.79
1984	341.58	341.54	341.47	341.44	341.58	341.81	342.18	342.68	343.01	343.07	343.02	342.88	342.19
1985	342.81	342.91	342.84	342.82	343.11	343.39	343.85	344.40	344.58	344.63	344.63	344.51	343.71
1986	344.40	344.16	344.11	344.22	344.43	344.72	345.02	345.55	345.89	345.87	345.81	345.75	344.99
1987	345.71	345.71	345.79	345.96	346.15	346.59	347.11	347.60	348.02	348.20	348.25	348.26	346.95
1988	348.13	347.88	347.93	348.18	348.34	348.59	349.03	349.48	349.72	349.85	349.85	349.78	348.90
1989	349.85	349.81	349.76	349.85	349.97	350.21	350.68	351.15	351.34	351.51	351.81	351.62	350.63
1990	351.03	350.79	350.69	350.96	351.39	351.60	351.94	352.32	352.53	352.68	352.68	352.55	351.76
1991	352.50	352.30	352.25	352.56	352.67	352.89	353.42	353.76	353.83	353.78	353.76	353.76	353.12
1992	353.52	353.11	352.94	353.13	353.51	353.96	354.45	354.87	355.05	355.03	354.96	354.81	354.11
1993	354.51	354.23	354.05	353.98	354.10	354.43	354.89	355.30	355.46	355.46	355.34	355.18	354.74



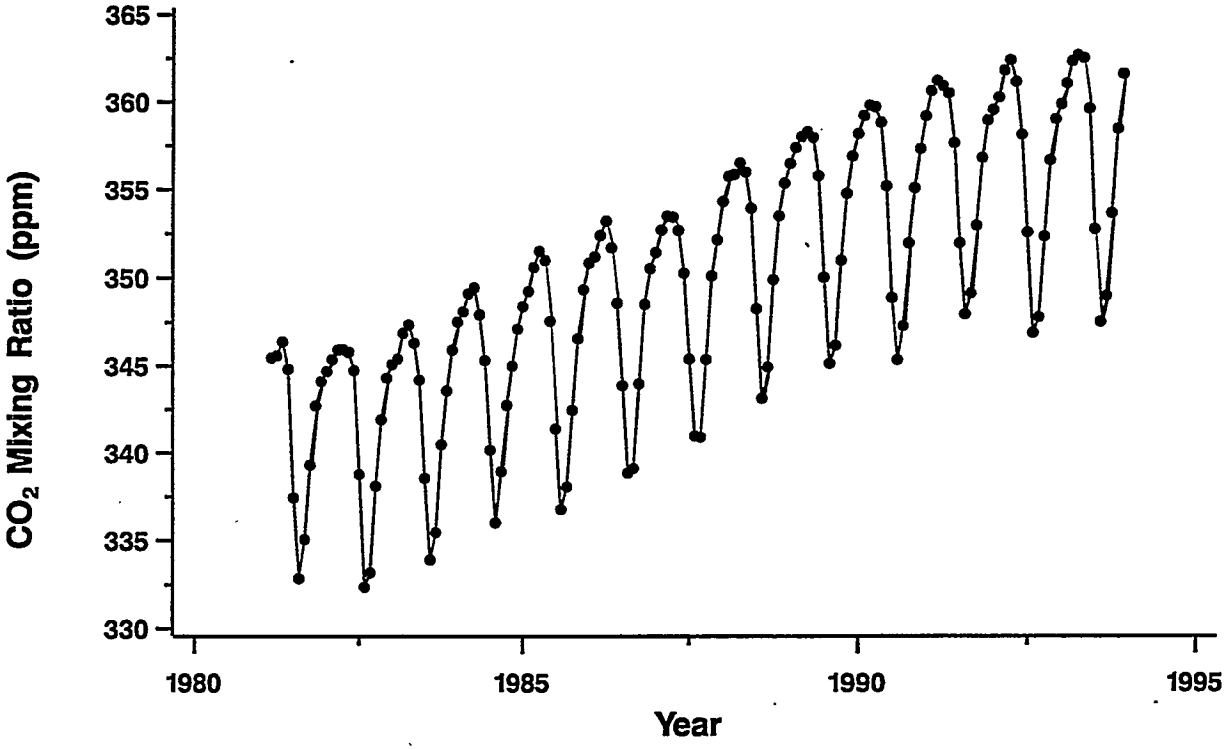
Monthly atmospheric CO_2 mixing ratios from Ocean Station "C".



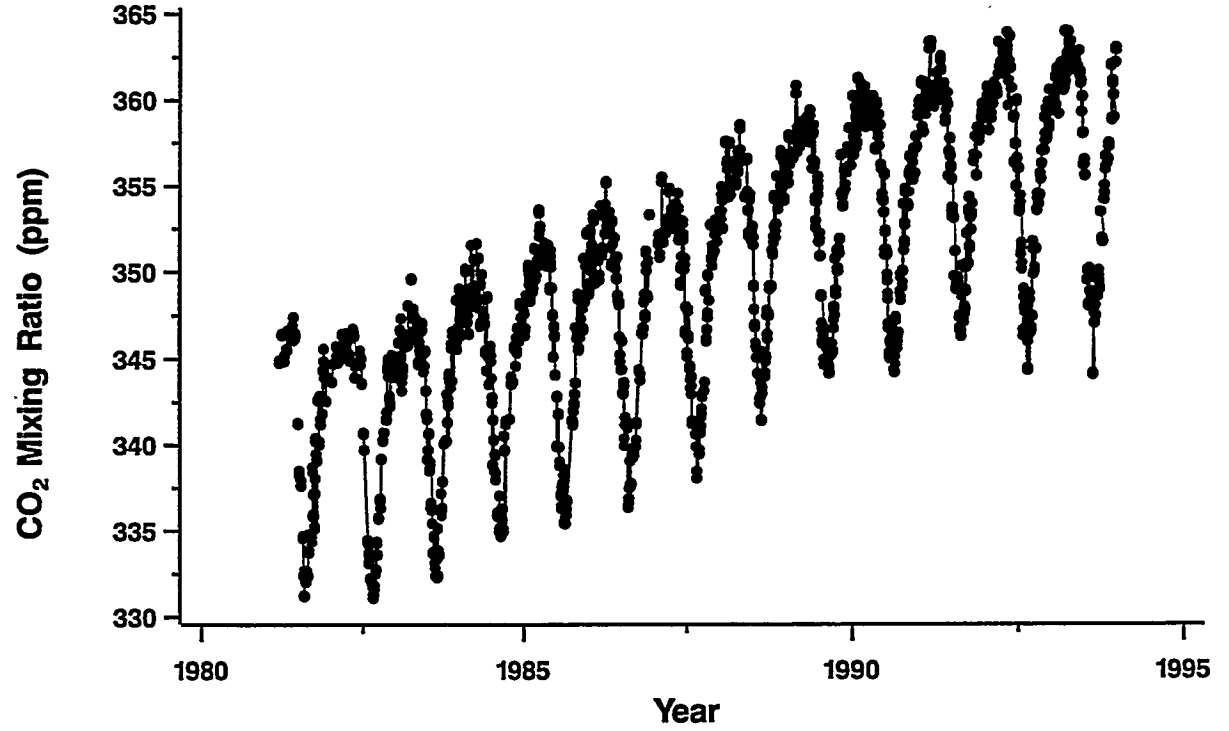
Background atmospheric CO_2 mixing ratios from individual flask air samples for Ocean Station "C". Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Ocean Station "C", expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1968	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	324.13	324.80	-99.99
1969	325.73	326.52	326.94	327.85	328.42	325.15	320.76	318.04	318.41	321.06	323.67	325.79	324.03
1970	327.88	329.22	330.44	330.79	328.99	326.09	322.48	319.82	321.08	324.79	327.23	327.70	326.38
1971	328.96	331.15	331.52	331.13	329.97	326.89	322.57	319.01	319.62	324.18	327.29	329.44	326.81
1972	331.13	330.99	331.42	333.14	332.17	326.66	321.04	319.53	320.71	325.18	328.49	330.02	327.54
1973	331.77	332.75	333.66	334.67	334.22	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99



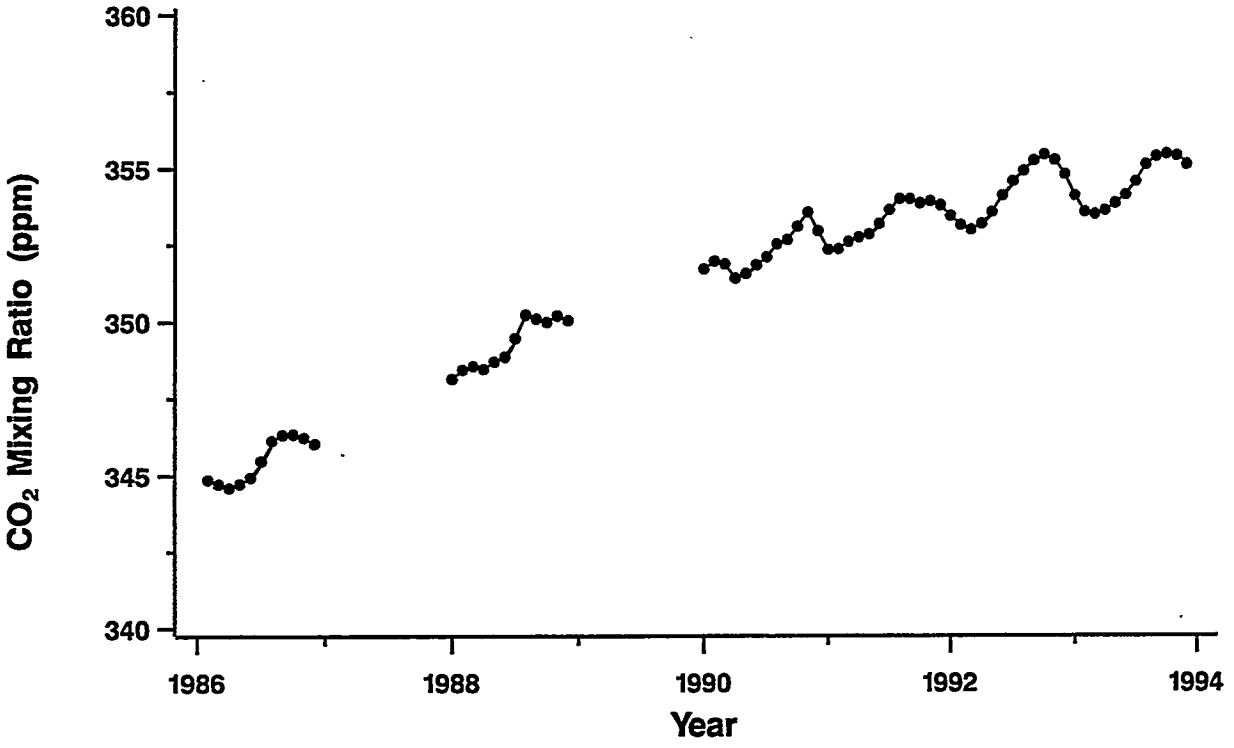
Monthly atmospheric CO_2 mixing ratios from Ocean Station "M".



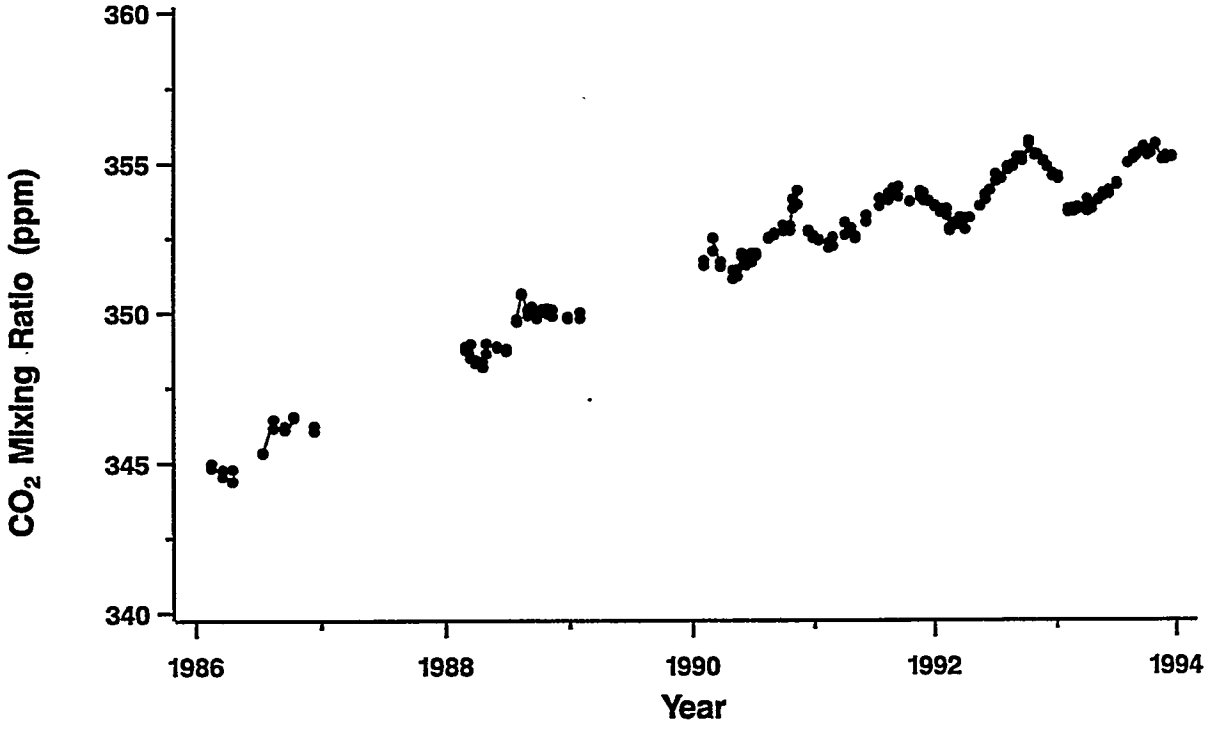
Background atmospheric CO_2 mixing ratios from individual flask air samples for Ocean Station "M". Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Ocean Station "M", expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1981	-99.99	-99.99	345.47	345.60	346.38	344.82	337.44	332.86	335.07	339.33	342.73	344.13	-99.99
1982	344.70	345.38	345.91	345.95	345.79	344.75	338.80	332.37	333.18	338.12	341.94	344.33	341.77
1983	345.10	345.42	346.88	347.35	346.32	344.21	338.57	333.91	335.46	340.51	343.59	345.92	342.77
1984	347.53	348.10	349.12	349.47	347.94	345.33	340.20	336.02	338.95	342.76	345.00	347.12	344.80
1985	348.41	349.26	350.62	351.53	351.02	347.57	341.41	336.78	338.08	342.48	346.57	349.36	346.09
1986	350.87	351.22	352.43	353.23	351.73	348.59	343.89	338.87	339.14	343.99	348.52	350.55	347.75
1987	351.46	352.73	353.52	353.47	352.71	350.30	345.41	341.01	340.94	345.38	350.15	352.18	349.11
1988	354.35	355.78	355.89	356.52	356.02	353.96	348.27	343.16	344.95	349.93	353.53	355.39	352.31
1989	356.51	357.42	358.03	358.32	358.00	355.82	350.06	345.16	346.19	351.02	354.81	356.93	354.02
1990	358.21	359.24	359.81	359.73	358.85	355.23	348.90	345.37	347.30	351.99	355.12	357.35	354.76
1991	359.22	360.66	361.23	360.94	360.52	357.68	351.99	347.97	349.15	352.99	356.84	358.98	356.51
1992	359.58	360.29	361.83	362.41	361.18	358.16	352.60	346.91	347.80	352.37	356.70	359.04	356.57
1993	359.90	361.08	362.36	362.69	362.54	359.64	352.79	347.54	349.02	353.70	358.49	361.63	357.62



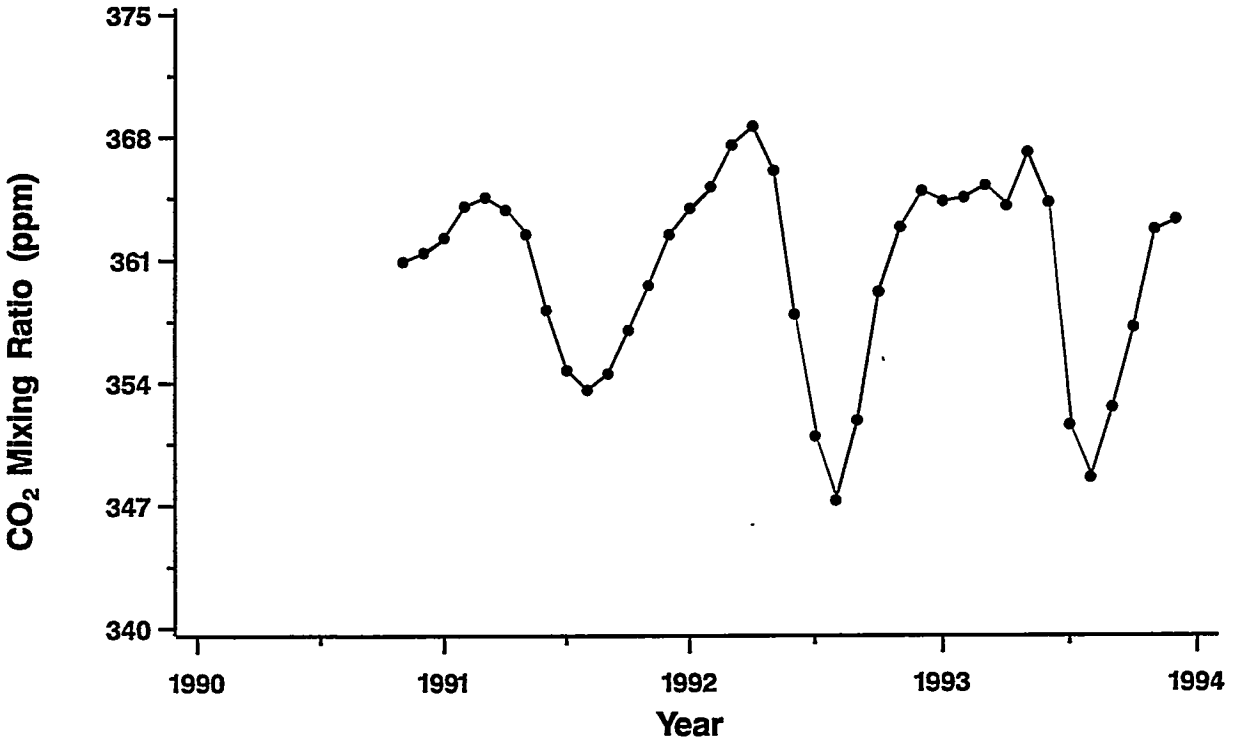
Monthly atmospheric CO_2 mixing ratios from Syowa Station, Antarctica.



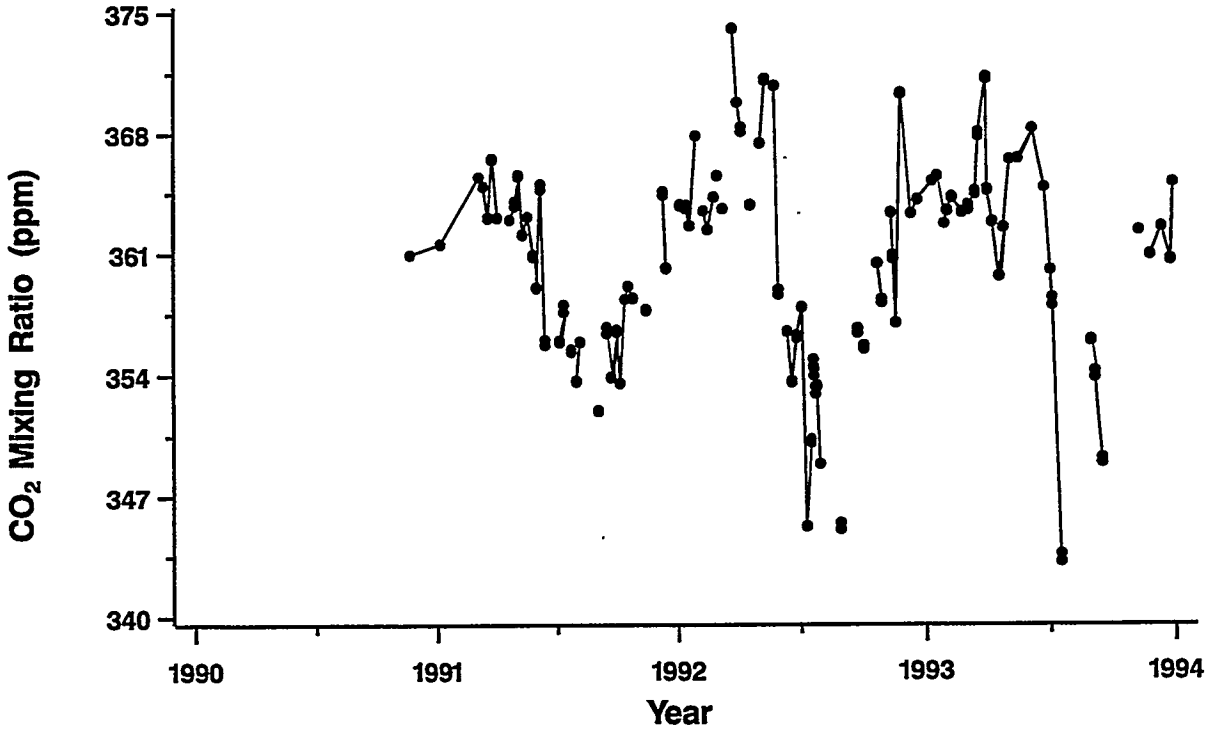
Background atmospheric CO_2 mixing ratios from individual flask air samples for Syowa Station, Antarctica. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Syowa Station, Antarctica, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1986	-99.99	344.86	344.72	344.60	344.73	344.94	345.48	346.14	346.33	346.35	346.24	346.04	-99.99
1987	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99
1988	348.15	348.45	348.57	348.48	348.72	348.88	349.48	350.24	350.11	350.00	350.21	350.06	349.28
1989	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99
1990	351.72	351.97	351.88	351.42	351.57	351.85	352.11	352.53	352.67	353.11	353.57	352.96	352.28
1991	352.35	352.37	352.61	352.75	352.85	353.19	353.64	354.00	354.00	353.86	353.93	353.80	353.28
1992	353.45	353.15	353.00	353.19	353.57	354.11	354.58	354.92	355.26	355.45	355.28	354.81	354.23
1993	354.11	353.58	353.50	353.63	353.86	354.13	354.57	355.13	355.39	355.47	355.41	355.13	354.49



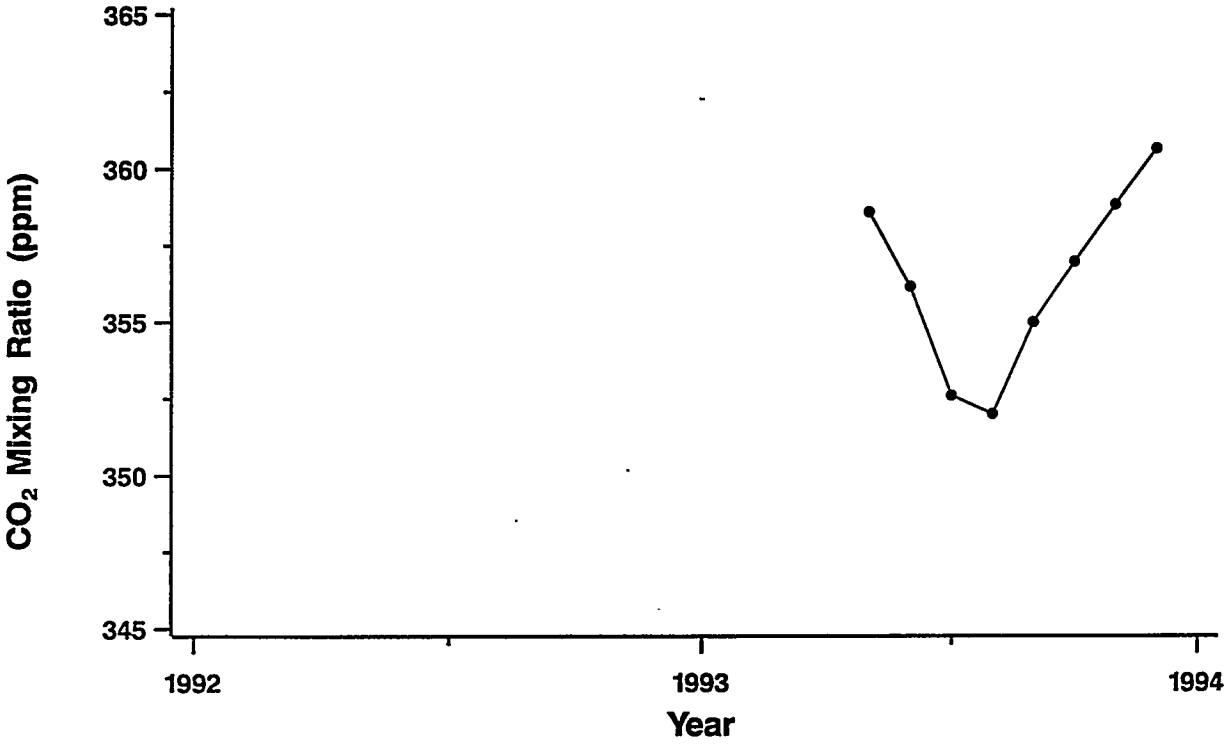
Monthly atmospheric CO_2 mixing ratios from Tae-ahn Peninsula, S. Korea.



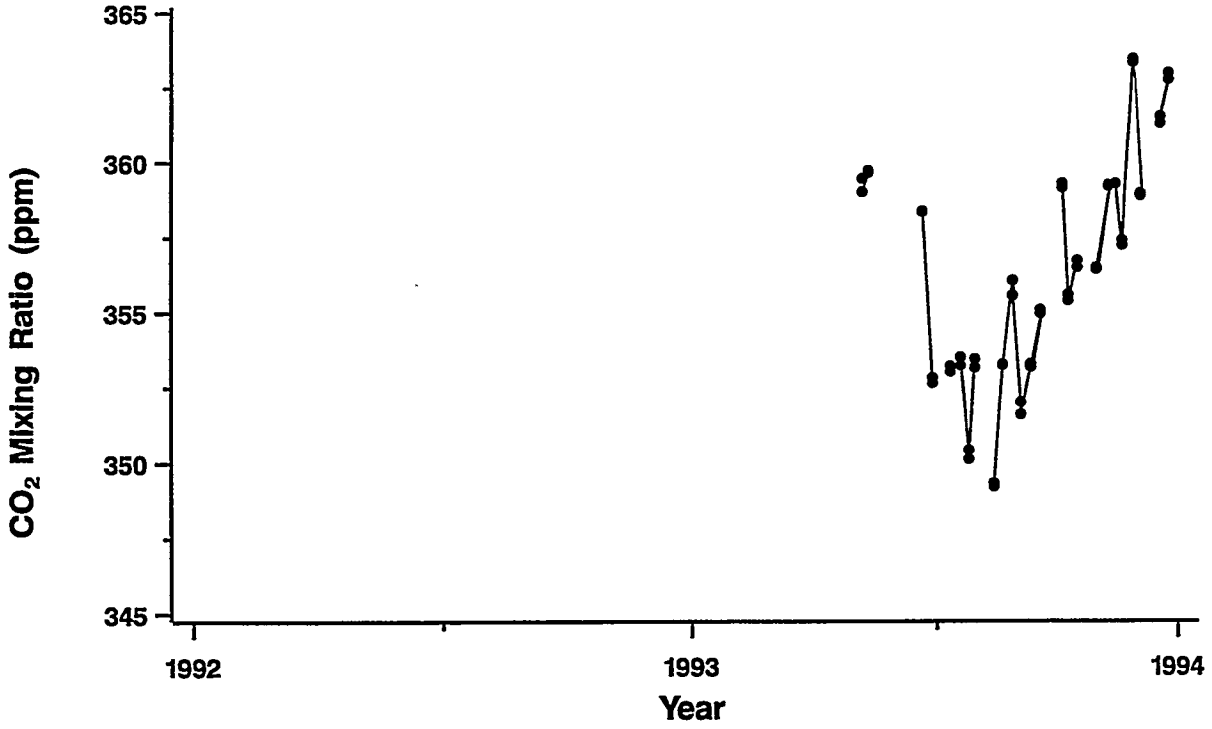
Background atmospheric CO_2 mixing ratios from individual flask air samples for Tae-ahn Peninsula, S. Korea. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Tae-ahn Peninsula, S. Korea, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1990	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	-99.99	360.91	361.42	-99.99
1991	362.27	364.04	364.56	363.85	362.46	358.16	354.74	353.61	354.54	357.01	359.56	362.44	359.77
1992	363.94	365.16	367.53	368.60	366.08	357.91	350.96	347.28	351.87	359.19	362.87	364.90	360.52
1993	364.32	364.53	365.22	364.07	367.11	364.26	351.60	348.59	352.61	357.18	362.74	363.30	360.46



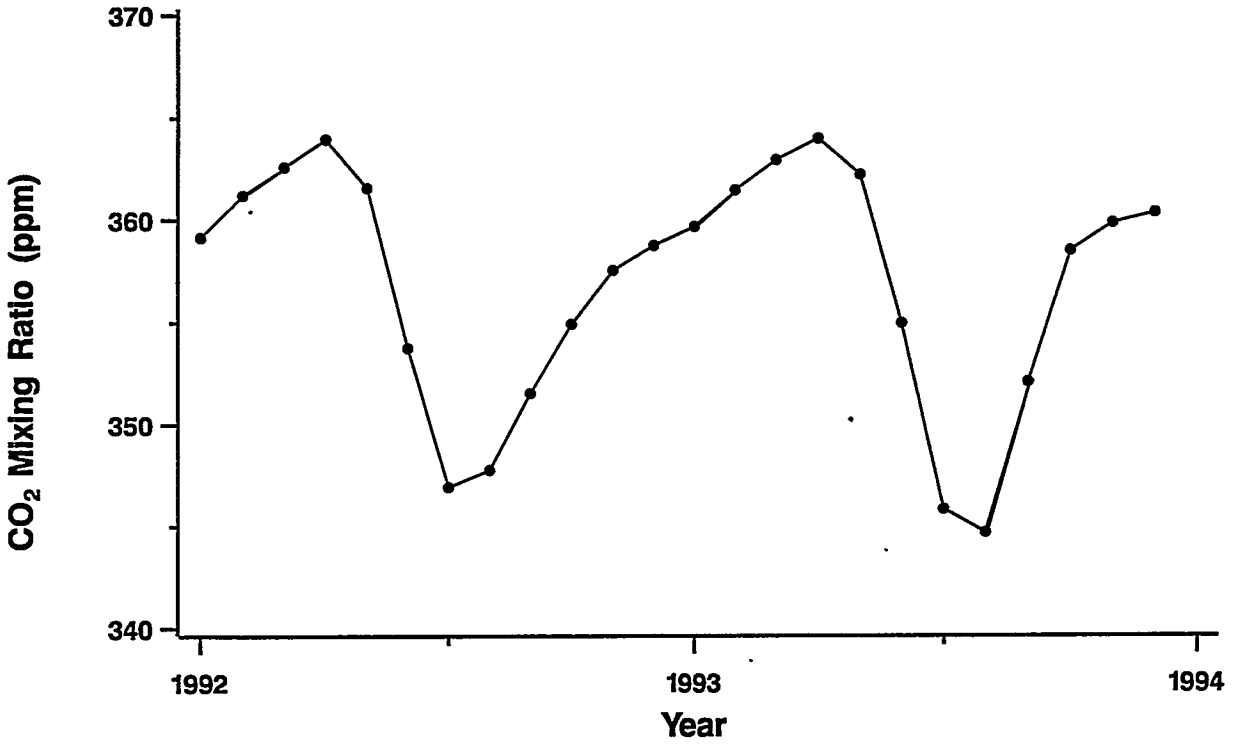
Monthly atmospheric CO_2 mixing ratios from Wendover, Utah, U.S.



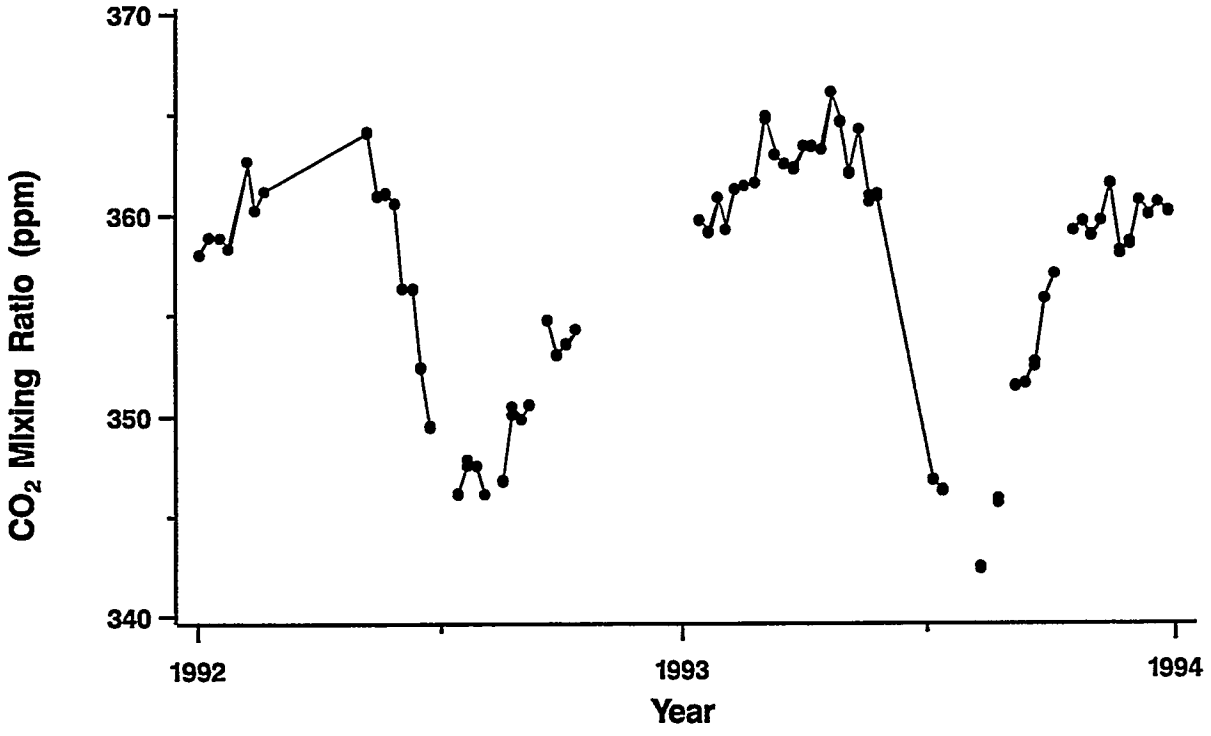
Background atmospheric CO_2 mixing ratios from individual flask air samples for Wendover, Utah, U.S. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Wendover, Utah, U.S., expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1993	-99.99	-99.99	-99.99	-99.99	358.60	356.16	352.61	352.01	354.99	356.98	358.84	360.66	-99.99



Monthly atmospheric CO_2 mixing ratios from Ulaan Uul, Mongolia.



Background atmospheric CO_2 mixing ratios from individual flask air samples for Ulaan Uul, Mongolia. Only measurements satisfying the data selection criteria for background measurements are plotted. Consecutive background measurements are joined by lines. Background measurements interrupted by non-background measurements are not joined by lines.

Monthly atmospheric CO_2 mixing ratios for Ulaan Uul, Mongolia, expressed in parts per million (ppm) and reported in the Scripps Institution of Oceanography X93 manometric mole fraction scale. Annual values were calculated by CDIAC for years with complete records. Missing values are denoted by -99.99.

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Ann
1992	359.14	361.19	362.59	363.95	361.56	353.75	346.93	347.77	351.54	354.92	357.52	358.73	356.63
1993	359.65	361.44	362.92	363.97	362.20	354.95	345.83	344.69	352.08	358.47	359.81	360.31	357.19

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