

Global Monitoring Division

Observatories, Sampling Networks and Measurement Programs



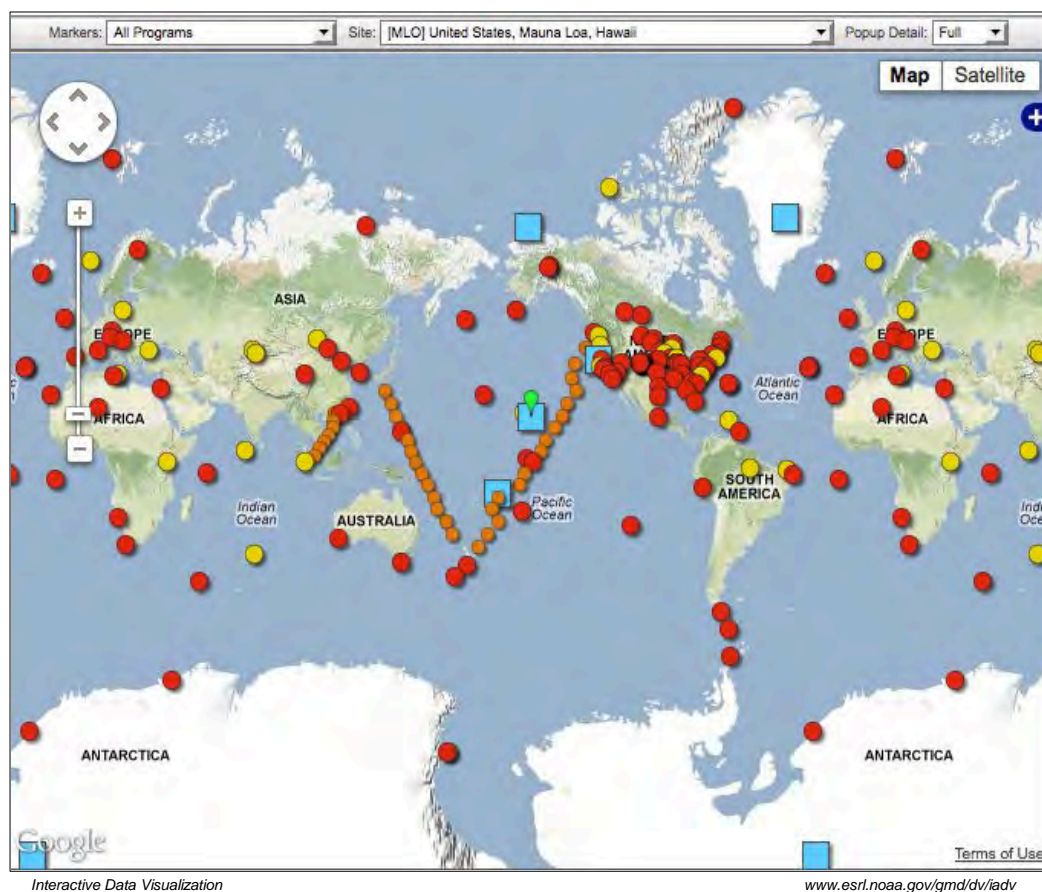
Contents:

- Maps
- Measurements Programs
- Measurement Locations
- Barrow Observatory
- Summit Observatory
- Trinidad Head Observatory
- Mauna Loa Observatory
- South Pole Observatory

GMD Sampling Sites and Measurement Program Summary

Global Monitoring Division
NOAA Earth System Research Laboratory
Boulder, Colorado

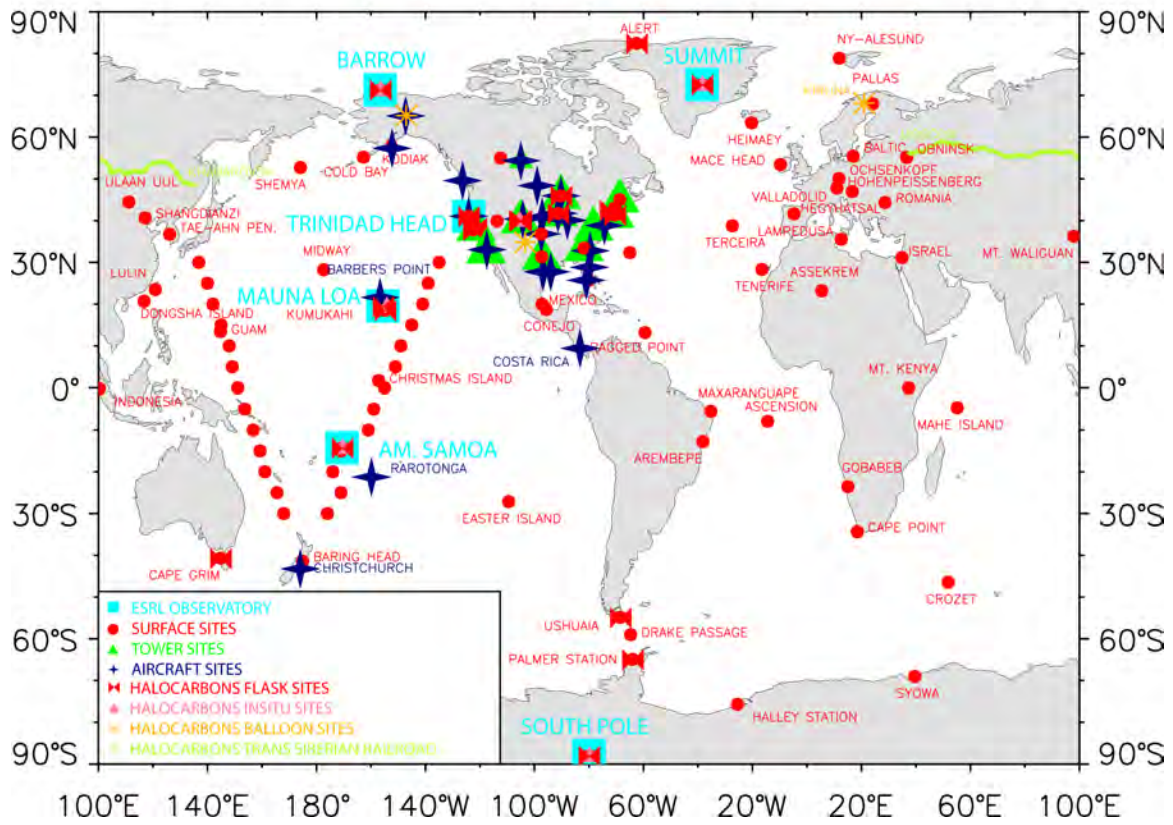
GMD Measurement Locations



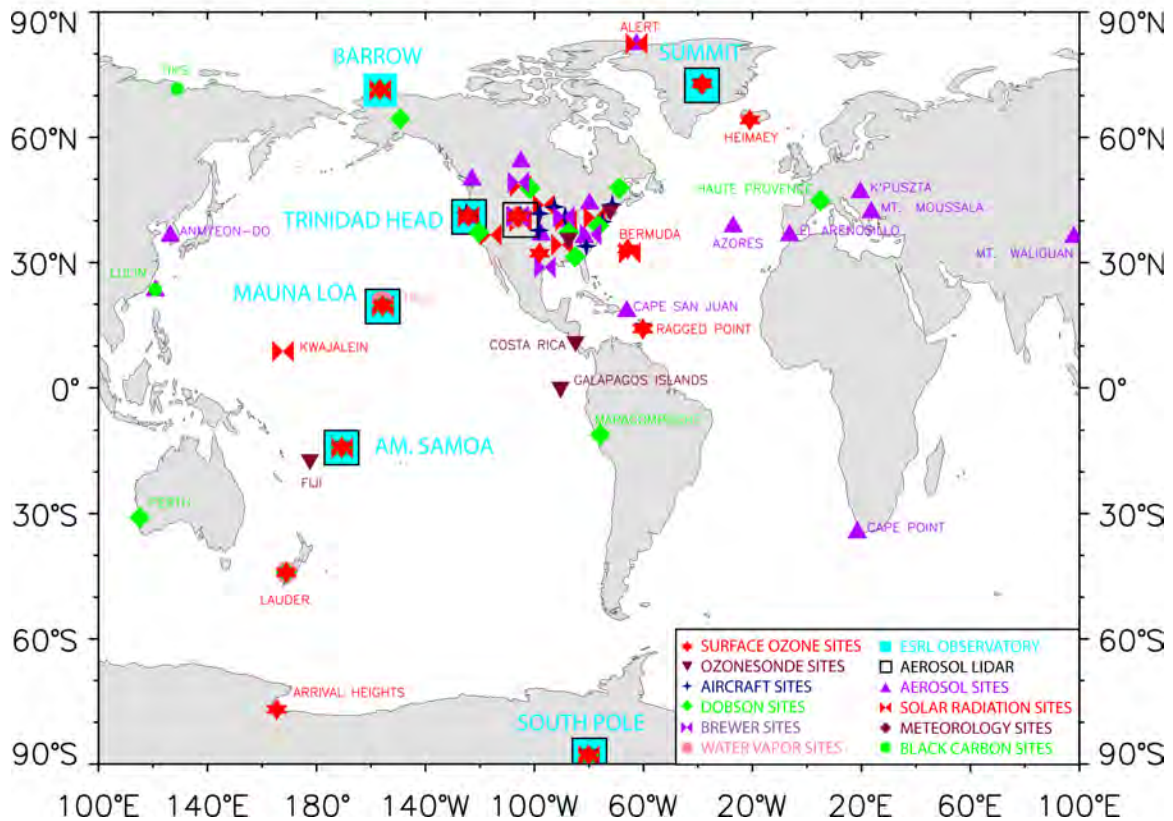
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NOAA ESRL Carbon Cycle and Halocarbon Gases



NOAA ESRL Aerosols, Solar Radiation, Meteorology, Black Carbon, and Ozone



Global Monitoring Division, ESRL, Boulder, Colorado

Measurement	United States and Territories	International
Aerosol - Particles	Surface, Continuous Measurements	Surface, Continuous Measurements
Absorption, scattering, and particle number at most sites. Additional measurements, e.g., cloud condensation nuclei, aerosol hygroscopicity and/or chemical composition at some sites.	Barrow, Alaska Bondville, Illinois Boone, North Carolina Cape Cod, Massachusetts (campaign) Cape San Juan, Puerto Rico Lamont, Oklahoma Mauna Loa, Hawaii <i>Point Reyes, California (campaign, closed)</i> Steamboat Springs, Colorado Trinidad Head, California Tutuila, American Samoa (particle number only)	Alert, Canada Anmyeon-do, Korea <i>Azores, Portugal (campaign, closed)</i> <i>Black Forest, Germany (campaign, closed)</i> Cape Point, South Africa East Trout Lake, Canada Egbert, Canada Gosan, South Korea K'puszta, Hungary Mazagon, Spain Mt. Lulin, Taiwan Mt. Moussala, Bulgaria Mt. Waiguan, China <i>Nainital, India (campaign, closed)</i> South Pole, Antarctica (United States) Summit, Greenland Whistler, Canada
Aerosol - Lidar	Vertical Profiles	Vertical Profiles
Aerosol light scattering verses altitude.	Boulder, Colorado (stratosphere) (weekly) Mauna Loa, Hawaii (stratosphere) (weekly) Trinidad Head, California (troposphere) (daily) Tutuila, American Samoa (stratosphere) (weekly)	South Pole, Antarctica (United States) (troposphere) (daily) Summit, Greenland (stratosphere & troposphere) (daily)
Aerosol - Black Carbon	Surface, Continuous	Surface, Continuous
	Barrow, Alaska Mauna Loa, Hawaii	Mt. Lulin, Taiwan South Pole, Antarctica (United States) Summit, Greenland Tiksi, Russia
Carbon Cycle Gases	Surface, Continuous	Surface, Continuous
(Species listed →)	Barrow, Alaska (CO ₂ , CH ₄ , CO) Martha's Vineyard, Massachusetts (CO ₂) (offshore platform) Mauna Loa, Hawaii (CO ₂ , CH ₄ , CO) Mt. Bachelor, Oregon (CO ₂) Tutuila, American Samoa (CO ₂)	South Pole, Antarctica (United States) (CO ₂) Chersky, Russia (CH ₄)
Carbon Cycle Gases	Tall Tower, Continuous	Tall Tower, Continuous
(Species listed →)	Argyle, Maine (CO ₂ , CO) Beech Island, South Carolina (CO ₂ , CO) Erie, Colorado (CO ₂ , CO), Moody, Texas (CO ₂ , CO) Mt. Bachelor, Oregon (CO ₂ , CO) Park Falls, Wisconsin (CO ₂ , CH ₄ , CO) Shenandoah, Virginia (CO ₂ , CO) Walnut Grove, California (CO ₂ , CH ₄ , CO) West Branch, Iowa (CO ₂ , CO)	
Carbon Cycle Gases	Airborne, Light Aircraft (Bi-weekly)	Airborne, Light Aircraft (Bi-weekly)
(Flask Samples) Species Measured In Carbon Cycle Flasks: CO ₂ , CH ₄ , CO, H ₂ , N ₂ O, SF ₆ , ¹³ C in CO ₂ , ¹⁸ O in CO ₂ , ¹³ C in CH ₄ , CH ₃ D, plus CFC-11, -12, -113, -115 HCFC-22, -141b, -142b CH ₃ CCl ₃ , CCl ₄ , CH ₂ Cl ₂ , CHCl ₃ , C ₂ Cl ₄ HFC-134a, -152a, -365mfc, -227ea, HFC-143a, -125, -32 Halon 1211, -1301, -2402. CH ₃ Br, CH ₃ Cl, CH ₃ I N ₂ O, SF ₆ , COS CH ₂ Br ₂ , CHBr ₃ C ₂ H ₂ , C ₃ H ₈ , n-C ₄ H ₁₀ , n-C ₅ H ₁₂ , iC ₅ H ₁₂ , C ₆ H ₆	<i>Beaver Crossing, Nebraska (closed)</i> <i>Bondville, Illinois (closed)</i> <i>Bradgate, Iowa (closed)</i> Briggsdale, Colorado Cape May, New Jersey Central Alaska (CRV) - (periodic NASA campaign) Charleston, South Carolina Dahlen, North Dakota <i>Fairchild, Wisconsin (closed)</i> <i>Harvard Forest, Massachusetts (closed)</i> Homer, Illinois Isles of Shoals, New Hampshire Kodiak USCG, Alaska <i>Oahu, Hawaii (closed)</i> <i>Oglesby, Illinois (closed)</i> Park Falls, Wisconsin Poker Flat, Alaska Ponca City, Oklahoma <i>Rowley, Iowa (closed)</i> Sinton, Texas Trinidad Head, California West Branch, Iowa West Lafayette, Indiana (INFLUX campaign)	East Trout Lake, Canada Estevan Point, Canada Raratonga, Cook Islands <i>Ulaanbaatar, Mongolia (closed)</i>
Carbon Cycle Gases	Ship Sampling, Carbon Cycle Flasks	Ship Sampling, Carbon Cycle Flasks
(Flask Samples) Species Measured In Carbon Cycle Flasks: CO ₂ , CH ₄ , CO, H ₂ , N ₂ O, SF ₆ , ¹³ C in CO ₂ , ¹⁸ O in CO ₂ , ¹³ C in CH ₄ , CH ₃ D		<i>Antarctic Ocean, Chinese Ship, annual (on hold)</i> Drake Passage Transect (every 6 weeks) <i>Eastern Pacific Transect, monthly (on hold)</i> <i>North Atlantic, Norway (Ship M), weekly (closed)</i> Western Pacific Cruise (annual) <i>Western Pacific Transect, monthly (on hold)</i>

Global Monitoring Division, ESRL, Boulder, Colorado		
Measurement	United States and Territories	International
Carbon Cycle Gases	Surface, Weekly Flasks	Surface, Weekly Flasks
Species Measured In Carbon Cycle Flasks: CO ₂ , CH ₄ , CO, H ₂ , N ₂ O, SF ₆ , ¹³ C in CO ₂ , 18O in CO ₂ , ¹³ C in CH ₄ , CH ₃ D plus Volatile Organic Compounds: ethane, n-hexane, propane, propene methyl-chloride, ethene, i-pentane, n-pentane i-butane, n-butane in a subset of flasks.	Barrow, Alaska Cape Kumukahi, Hawaii Cold Bay, Alaska Key Biscayne, Florida Lamont, Oklahoma Mauna Loa, Hawaii <i>Martha's Vineyard, Massachusetts (closed)</i> Midway Island, Pacific Niwot Ridge, Colorado (daily flasks) Park Falls, Wisconsin (daily and weekly) <i>Point Arena, California (closed)</i> Shemya Island, Alaska Trinidad Head, California Tutuila, American Samoa Wendover, Utah	Alert, Canada <i>Amsterdam Island, France (closed)</i> <i>Arembepe, Brazil (closed)</i> Ascension Island, United Kingdom Assekrem, Algeria <i>Baltic Sea, Poland (closed)</i> Baring Head, New Zealand <i>Bird Island, United Kingdom (closed)</i> <i>Black Sea, Romania (closed)</i> <i>Bukit Kototabang, Indonesia (funding hold) - Reopening Mar2013</i> Cape Grim, Australia <i>Cape Meares, Oregon (closed)</i> Cape Point, South Africa Christmas Island, Kiribati <i>Conejo, Mexico (closed)</i> Crozet Island, Indian Ocean Dongsha Island, Taiwan <i>Dwejra Point, Gozo (closed)</i> Easter Island, Chile Gobabeb, Namibia <i>Grifon, North Carolina (closed)</i> Guam, Marianas Islands Halley Station, Antarctica (United Kingdom) Hegyhatsal, Hungary Heimaey, Iceland Hohenpeissenberg, Germany <i>Kaashidhoo, Maldives (closed)</i> <i>Lac La Biche, Canada (closed)</i> Lampedusa, Italy Mace Head, Ireland Mahe Island, Seychelles Maxaranguape, Brazil <i>McMurdo Station, Antarctica (closed)</i> <i>Mould Bay, Canada (closed)</i> <i>Mt. Kenya, Kenya (closed)</i> Mt. Lulin, Taiwan Mt. Waliguan, China Ny-Alesund, Svalbard <i>Obrninsk, Russia (closed)</i> <i>Ocean Station C, United States (closed)</i> <i>Ocean Station M, Norway (closed)</i> Ochsenkopf, Germany <i>Olympic Peninsula, Washington (closed)</i> Palmer Station, Antarctica (United States) <i>Plateau Assy, Kazakhstan (closed)</i> Ragged Point, Barbados Sammaltunturi, Finland <i>Sary Takum, Kazakhstan (closed)</i> Sede Boker, Israel Shangdianzi, China Sierra Negra Volcano, Mexico <i>South China Sea, China (closed)</i> South Pole, Antarctica (United States) <i>St. Croix, Virgin Islands (closed)</i> <i>St. David's Head, Bermuda (closed)</i> Summit, Greenland Syowa, Antarctica (Japan) Tae-ahn Peninsula, South Korea Tenerife, Canary Islands Terceira, Azores Tierra Del Fuego, Argentina Tiksi, Russia Tudor Hill, Bermuda Ulaan Uul, Mongolia Valladolid, Spain
Carbon Cycle Gases	Surface, Tower Flasks	Surface, Tower Flasks
Species Measured In Carbon Cycle Flasks: CO ₂ , CH ₄ , CO, H ₂ , N ₂ O, SF ₆ , ¹³ C in CO ₂ , 18O in CO ₂ , ¹³ C in CH ₄ , CH ₃ D, plus CFC-11, -12, -113, -115 HCFC-22, -141b, -142b CH ₃ CCl ₃ , CCl ₄ , CH ₂ Cl ₂ , CHCl ₃ , C ₂ Cl ₄ HFC-134a, -152a, -365mfc, -227ea, HFC-143a, -125, -32 Halon 1211, -1301, -2402. CH ₃ Br, CH ₃ Cl, CH ₃ I N ₂ O, SF ₆ , COS CH ₂ Br ₂ , CHBr ₃ C ₂ H ₂ , C ₃ H ₈ , n-C ₄ H ₁₀ , n-C ₅ H ₁₂ , i-C ₅ H ₁₂ , C ₆ H ₆	Argyle, Maine Beech Island, South Carolina Central Alaska (CRV) Erie, Colorado Moody, Texas (daily flasks) Mt. Bachelor, Oregon Mt. Wilson, California Park Falls, Wisconsin (daily and weekly) Sutro, California Walnut Grove, California West Branch, Iowa	

Global Monitoring Division, ESRL, Boulder, Colorado		
Measurement	United States and Territories	International
Halocarbon Network	Surface, Weekly High Pressure Flasks	Surface, Weekly High Pressure Flasks
Species Measured In Halocarbon Flasks CFC-11, -12, -113, -115 HCFC-22, -141b, -142b CH ₃ CCl ₃ , CCl ₄ , CH ₂ Cl ₂ , CHCl ₃ , C ₂ Cl ₄ HFC-134a, -152a, -365mfc, -227ea, -143a, -125, -32 Halon 1211, -1301, -2402 CH ₃ Br, CH ₃ Cl, CH ₃ I, COS N ₂ O, SF ₆ , CH ₂ Br ₂ , CHBr ₃ C ₂ H ₂ , C ₃ H ₈ , n-C ₄ H ₁₀ , n-C ₅ H ₁₂ , iC ₅ H ₁₂ , C ₆ H ₆ <i>Species in blue are measured less frequently than weekly</i>	Barrow, Alaska Cape Kumukahi, Hawaii Harvard Forest, Massachusetts Mauna Loa, Hawaii Niwot Ridge, Colorado Park Falls, Wisconsin Trinidad Head, California Tutuila, American Samoa	Alert, Canada (weekly) Cape Grim, Australia (weekly) Mace Head, Ireland (weekly) Mt Waiguan, China (weekly) Negev Desert, Israel (bi-weekly) Palmer, Antarctica (United States) (bi-weekly) South Pole, Antarctica (United States) (bi-weekly) Summit, Greenland (bi-weekly) <i>Tierra del Fuego, Chile (closed)</i>
Halocarbon Species	Surface, Continuous Measurements	Surface, Continuous Measurements
N ₂ O, SF ₆ , CFC-11, CFC-12 CFC-113, halon-1211, CHCl ₃ , CH ₃ CCl ₃ , CCl ₄ , (all but Summit: HCFC-22, HCFC-142b, COS, CH ₃ Cl (Summit: CO, H ₂ , CH ₄)	Barrow, Alaska Mauna Loa, Hawaii Niwot Ridge, Colorado Tutuila, American Samoa	South Pole, Antarctica (United States) Summit, Greenland
Halocarbon Species	Surface, Tower Flasks	Surface, Tower Flasks
Measured In Carbon Cycle Flasks CFC-11, -12, -113, -115 HCFC-22, -141b, -142b CH ₃ CCl ₃ , CCl ₄ , CH ₂ Cl ₂ , CHCl ₃ , C ₂ Cl ₄ HFC-134a, -152a, -365mfc, -227ea, -143a, -125, -32 Halon 1211, -1301, -2402 CH ₃ Br, CH ₃ Cl, CH ₃ I, COS CH ₂ Br ₂ , CHBr ₃ C ₂ H ₂ , C ₃ H ₈ , n-C ₄ H ₁₀ , n-C ₅ H ₁₂ , iC ₅ H ₁₂ , C ₆ H ₆	Argyle, Maine Beech Island, South Carolina Central Alaska (CRV) Erie, Colorado <i>Martha's Vineyard, Massachusetts (closed)</i> Moody, Texas Mt. Bachelor, Oregon Mt. Wilson, California Park Falls, Wisconsin Sutro, California Walnut Grove, California West Branch, Iowa West Lafayette, Indiana (INFLUX campaign)	
Halocarbon Species	Airborne, Light Aircraft, Bi-weekly	Airborne, Light Aircraft, Bi-weekly
Measured In Carbon Cycle Flasks CFC-11, -12, -113, -115 HCFC-22, -141b, -142b CH ₃ CCl ₃ , CCl ₄ , CH ₂ Cl ₂ , CHCl ₃ , C ₂ Cl ₄ HFC-134a, -152a, -365mfc, -227ea, -143a, -125, -32 Halon 1211, -1301, -2402 CH ₃ Br, CH ₃ Cl, CH ₃ I, COS CH ₂ Br ₂ , CHBr ₃ C ₂ H ₂ , C ₃ H ₈ , n-C ₄ H ₁₀ , n-C ₅ H ₁₂ , iC ₅ H ₁₂ , C ₆ H ₆	<i>Beaver Crossing, Nebraska (closed)</i> <i>Bondville, Illinois (closed)</i> <i>Bradgate, Iowa (closed)</i> Briggsdale, Colorado Cape May, New Jersey Central Alaska (CRV) - (periodic NASA campaign) Charleston, South Carolina Dahlen, North Dakota <i>Fairchild, Wisconsin (closed)</i> <i>Harvard Forest, Massachusetts (closed)</i> Homer, Illinois Isles of Shoals, New Hampshire Kodiak USCG, Alaska <i>Oahu, Hawaii (closed)</i> Park Falls, Wisconsin Poker Flat, Alaska Ponca City, Oklahoma <i>Rowley, Iowa (closed)</i> Sinton, Texas Trinidad Head, California West Branch, Iowa West Lafayette, Indiana (INFLUX campaign)	East Trout Lake, Canada Estevan Point, Canada Raratonga, Cook Islands <i>Ulaanbaatar, Mongolia (closed)</i>
Halocarbon Missions	Airborne, Large Balloons and Aircraft	Airborne, Large Balloons and Aircraft
Balloon Measurements: CH ₄ , H ₂ , CO, N ₂ O, SF ₆ , CH ₃ CCl ₃ , CCl ₄ , halon-1211, CHCl ₃ , CFC-11, -12, -113, Aircraft: Above list plus PAN, HFC-134a, COS, CS ₂ HCFC-22, -141b, -142b CH ₃ Br, CH ₃ I Periodic aircraft, from flasks (HIPPO 1-5 only): CFC-11, -12, -113, -115 HCFC-22, -141b, -142b CH ₃ CCl ₃ , CCl ₄ , CH ₂ Cl ₂ , CHCl ₃ , C ₂ Cl ₄ HFC-134a, -152a, -365mfc, -227ea, -143a, -125, -32 Halon 1211, -1301, -2402. CH ₃ Br, CH ₃ Cl, CH ₃ I, COS CH ₂ Br ₂ , CHBr ₃ C ₂ H ₂ , C ₃ H ₈ , n-C ₄ H ₁₀ , n-C ₅ H ₁₂ , iC ₅ H ₁₂ , C ₆ H ₆	Barbers Point, Hawaii (aircraft, periodic) Edwards, California (aircraft, periodic) Fairbanks, Alaska (aircraft/balloons, periodic) Ft. Sumner, New Mexico (balloon, periodic) HIPPO 1-5, Jan2009-Aug2011 (NSF aircraft, global) locati American Samoa Anchorage, Alaska Arvada, Colorado Barrow, Alaska Cold Bay, Alaska Honolulu, Hawaii Kona, Hawaii Houston, Texas (aircraft, periodic) Key West, Florida (aircraft, periodic) Kennedy Space Center, Florida, (aircraft, periodic)	Christchurch, New Zealand (aircraft, periodic) COBRA (aircraft, Canada and United States) HIPPO 1-5, Jan2009-Aug2011 (NSF aircraft, global) locations: Christchurch, New Zealand Darwin, Australia Easter Island, Chile Honiara, Australia Papeete, Tahiti Raratonga, Cook Islands Saipan, North Mariana Islands San Jose, Costa Rica Sand Island, Midway Islands Kiruna, Sweden (balloon, periodic) San Jose, Costa Rica (aircraft)
Halocarbon Species	Unmanned Aircraft Systems (UAS)	Unmanned Aircraft Systems (UAS)
CH ₄ , H ₂ , CO, N ₂ O, SF ₆ , CHCl ₃ , CFC-11, -12, RH Halon-1211, O ₃ , H ₂ O, T	Alaska Mission California Mission Gray Butte, California (Altair, test phase) Western U.S. (Altair, wildfires, periodic)	GloPac (aircraft, Arctic & Pacific) ATTREX (aircraft, Pacific and Indian Oceans)

Global Monitoring Division, ESRL, Boulder, Colorado

Measurement	United States and Territories	International
Ozone	Surface, In Situ, Continuous	Surface, In Situ, Continuous
	Barrow, Alaska Erie, Colorado Mauna Loa, Hawaii Moody, Texas Niwot Ridge, Colorado Trinidad Head, California Tutuila, American Samoa Weaverville, California	McMurdo, Antarctica (United States) Lauder, New Zealand Ragged Point, Barbados South Pole, Antarctica (United States) Summit, Greenland Tudor Hill, Bermuda <i>Westman Island, Iceland (closed)</i> Tiksi, Russia Pico, Azores, Portugal
Ozone	Total Column Ozone	Total Column Ozone
	Barrow, Alaska (Dobson) Bismarck, North Dakota (Dobson) Bondville, Illinois (Brewer) *** Boulder, Colorado (Dobson)** Caribou, Maine (Dobson) Fairbanks, Alaska (Dobson)** Fort Peck, Montana (Brewer)** Hanford, California (Dobson) Houston, Texas (Brewer) Mauna Loa, Hawaii (Dobson)** Nashville, Tennessee (Dobson) Niwot Ridge (Brewer)** Raleigh, North Carolina (Brewer)** Table Mountain, Colorado (Brewer)** <i>Tallahassee, Florida (Dobson) (closed)</i> Tutuila, American Samoa (Dobson) Wallops Island, Virginia (Dobson)	Lauder, New Zealand** (Dobson) Haute Provence, France** (Dobson) Maracampoche, Peru (Dobson) (cooperative) Perth, Australia** (Dobson) South Pole, Antarctica (United States) (Dobson) ** Also conduct Umkehr profiles that give ozone concentrations in 8 successive layers within the sounding twice per day. ***Also conduct Umkehr profile measurements that yield ozone concentrations in 10 successive layers at sunrise and sunset.
Ozone Profiles	Balloonborne Ozonesondes, Weekly	Balloonborne Ozonesondes, Weekly
	Barrow, Alaska (periodic campaigns) Boulder, Colorado Houston, Texas (periodic campaigns) Huntsville, Alabama Mauna Loa, Hawaii Narragansett, Rhode Island (monthly) Trinidad Head, California (seasonal) Tutuila, American Samoa	Galapagos Islands, Ecuador San Jose, Costa Rica South Pole, Antarctica (United States) Summit, Greenland Suva, Fiji Watuokosek, Indonesia - East Java Ha Noi, Vietnam La Reunion, Reunion Island
Ozone Profiles	Light Aircraft, Weekly Profiles	Light Aircraft, Weekly Profiles
	<i>Beaver Crossing, Nebraska (closed)</i> <i>Bondville, Illinois (closed)</i> <i>Bradgate, Iowa (closed)</i> Briggsdale, Colorado Cape May, New Jersey Charleston, South Carolina <i>Fairchild, Wisconsin (closed)</i> Homer, Illinois Isles of Shoals, New Hampshire <i>Oglesby, Illinois (closed)</i> <i>Ponca City, Oklahoma</i> <i>Rowley, Iowa (closed)</i> Trinidad Head, California <i>West Branch, Iowa (closed)</i>	Estevan Point, Canada <i>Ulaanbaatar, Mongolia (closed)</i>
Water Vapor Profiles	Balloonborne Water Vapor Profiles	Balloonborne Water Vapor Profiles
	Boulder, Colorado (1980 to present) Ft. Sumner, New Mexico (periodic campaigns) Hilo, Hawaii (2010 to present) Houston, Texas (campaign 2011) Table Mountain, California (campaign 2009)	Lauder, New Zealand (2004 to present) Kunming, China (campaign 2012)
Surface Radiation Budget	SURFRAD Continuous Measurements	SURFRAD Continuous Measurements
Downwelling short wave and long wave radiation, albedo, aerosol optical depth, direct beam and diffuse radiation. UV and UVB radiation, photosynthetically active radiation, and T, RH, WS, WD, P	Bondville, Illinois Desert Rock, Nevada Fort Peck, Montana Goodwin Creek, Mississippi Penn State, Pennsylvania Sioux Falls, South Dakota Table Mountain, Colorado	
Surface Solar Energy	ISIS Continuous Measurements	ISIS Continuous Measurements
Downwelling solar total, direct beam and diffuse radiation plus UVB total	Albuquerque, New Mexico Bismarck, North Dakota Hanford, California Madison, Wisconsin Salt Lake City, Utah Seattle, Washington Sterling, Virginia	
Radiation Key: BSRN = Baseline Surface Radiation Network; GAW = Global Atmosphere Watch; SURFRAD = US National Surface Radiation Network; ISIS = Integrated Surface Irradiance Study		

Global Monitoring Division, ESRL, Boulder, Colorado

Measurement	United States and Territories	International
Surface Radiation Budget Downwelling short wave and long wave radiation, albedo, aerosol optical depth, direct beam and diffuse radiation and UV radiation, and T, RH, WS, WD, P	BSRN Continuous Measurements Barrow, Alaska Boulder, Colorado Erie, Colorado Mauna Loa, Hawaii Trinidad Head, California Tutuila, American Samoa	BSRN Continuous Measurements Kwajalein, Marshall Islands* Prospect Hill, Bermuda* South Pole, Antarctica (United States)* Alert, Canada Alice Springs, Australia Cabauw, Netherlands Cambourne, United Kingdom Carpentras, France Cocos Island, Australia <i>DeAar, South Africa (closed)</i> Dome Concordia, Antarctica (with ISAC, Italy) Eureka, Canada Florianopolis, Brazil Fukuoka, Japan Ilorin, Nigeria Ishigakijima, Japan Izana, Spain Lerwick, United Kingdom Lindenberg, Germany Mt. Waliguan, China (GAW) Neumayer, Antarctica (Germany) Ny Alesund, Svalbard Palaiseau, France Payerne, Switzerland Regina, Canada Sede Boker, Israel Sumatrak, Indonesia (GAW) Summit, Greenland Syowa, Antarctica (Japan) Tamanrasset, Algeria Tateno, Japan Tiksi, Russia Toravere, Estonia Xianghe, China
Surface UV Radiation	UV Continuous Bondville, Illinois Boulder, Colorado Fort Peck, Montana Houston, Texas Mauna Loa, Hawaii Niwot Ridge, Colorado Raleigh, North Carolina Table Mountain, Colorado	UV Continuous McMurdo, Antarctica (United States) South Pole, Antarctica (United States) Palmer, Antarctica (United States)
Radiation Key: BSRN = Baseline Surface Radiation Network; GAW = Global Atmosphere Watch; SURFRAD = US National Surface Radiation Network; ISIS = Integrated Surface Irradiance Study		
Meteorology	Surface, Continuous Measurements	Surface, Continuous Measurements
Wind Propeller Anemometer	Barrow, Alaska (10 m) <i>Boulder, Colorado (10 m) (closed)</i> Mauna Loa, Hawaii (10 and 38 m) Trinidad Head, California (10 m) Tutuila, American Samoa (19 m)	Alert, Canada (SEARH Project) South Pole, Antarctica (United States) (2, 10, and 30 m) Summit, Greenland (12 m)
Meteorology	Surface, Continuous Measurements	Surface, Continuous Measurements
Barometric Pressure Pressure transducer	Barrow, Alaska <i>Boulder, Colorado (closed)</i> Mauna Loa, Hawaii Trinidad Head, California Tutuila, American Samoa	Alert, Canada (SEARH Project) South Pole, Antarctica (United States) Summit, Greenland
Meteorology	Surface, Continuous Measurements	Surface, Continuous Measurements
Ambient Temperature Aspirated platinum resistance probes	Barrow, Alaska (3 and 16 m) <i>Boulder, Colorado (2 and 10 m) (closed)</i> Mauna Loa, Hawaii (2, 9, and 37 m) Trinidad Head, California (2 and 10 m) Tutuila, American Samoa (2 and 19 m)	Alert, Canada (SEARH Project) South Pole, Antarctica (United States) (2, 10, and 30 m) Summit, Greenland (2 and 8 m)
Meteorology	Surface, Continuous Measurements	Surface, Continuous Measurements
Dewpoint Temperature Hygrothermometers and relative humidity probes	Barrow, Alaska (3 m) <i>Boulder, Colorado (2 m) (closed)</i> Mauna Loa, Hawaii (2 m) Trinidad Head, California (2 m) Tutuila, American Samoa (2 m)	Alert, Canada (SEARH Project) South Pole, Antarctica (United States) (2 m) Summit, Greenland (2 m)
Meteorology	Surface, Continuous Measurements	Surface, Continuous Measurements
Precipitation Tipping bucket	<i>Boulder, Colorado (closed)</i> Mauna Loa, Hawaii Tutuila, American Samoa	

* GMD Operated

Cooperative Programs co-located at Baseline Observatories (79 Total Projects)		February 2013
Global Monitoring Division, ESRL, Boulder, Colorado		
American Samoa Measurement Program	Home Institution	Websites
Persistent Organic Pollutants	Environment Canada	https://www.ec.gc.ca/rs-mn/default.asp?lang=En&n=22D58893-1
CFC-11, CFC-12,	NASA/AGAGE	http://agage.eas.gatech.edu/
CFC-113, CCl ₄ , CH ₃ CCl ₃ ,	NASA/AGAGE	http://agage.eas.gatech.edu/
CH ₄ , N ₂ O, CHCl ₃	NASA/AGAGE	http://agage.eas.gatech.edu/
Medusa	NASA/AGAGE	http://agage.eas.gatech.edu/
AARDVARK	Princeton University	On Hold
CO ₂ , ¹³ C, N ₂ O (flask)	Scripps Institution of Oceanography	http://scrippsco2.ucsd.edu/
O ₂ /N ₂	Scripps Institution of Oceanography	http://scrippsco2.ucsd.edu/
Hydrocarbons	University of California, Irvine	http://www.physsci.uci.edu/~rowlandblake/research_atmos.html
Aerosol Chemistry Filters	University of Miami	On Hold
Barrow, Alaska Measurement Program	Home Institution	Websites
460	Air Force	Not Applicable
DOE/ARM	Department of Energy	http://www.arm.gov/sites/nsa.stm
Persistent Organic Pollutants	Environment Canada	http://www.msc-smc.ec.gc.ca/gaps/
N. Kurita Isotopic H ₂ O	Japan - JAMSTEC	http://www.jamstec.go.jp/rigc/e/
Climate Reference Network (CRN)	NOAA/NESDIS/NCDC	http://www.ncdc.noaa.gov/oa/climate/uscrn/
POES Satellite downlink	NOAA/NESDIS	http://www.oso.noaa.gov/poes/
POES Satellite uplink	NOAA/NESDIS	http://www.oso.noaa.gov/poes/
Aerosols filter	NOAA Pacific Marine Environmental Laboratory	http://www.pmel.noaa.gov/
CO ₂ Flux	San Diego State University	http://gcrg.sdsu.edu/?p=149
CO ₂ , ¹³ C, N ₂ O (flask)	Scripps Institution of Oceanography	http://scrippsco2.ucsd.edu/
O ₂ /N ₂	Scripps Institution of Oceanography	http://scrippsco2.ucsd.edu/
SoumiNet GPS	UNAVCO	http://www.souminet.ucar.edu/support/
Snow Cover Camera	University of Alaska, Fairbanks	http://www.iarc.uaf.edu/en/realtime-monitors
Black Carbon	University of California, Davis	http://delta.ucdavis.edu/index.htm
Hydrocarbons	University of California, Irvine	http://www.physsci.uci.edu/~rowlandblake/research_atmos.html
Precip gauge	USDA/Snow Survey	http://www.ak.nrcs.usda.gov/snow/
Geomagnetics	USGS	http://geomag.usgs.gov/observatories/barrow/
Mauna Loa, Hawaii Measurement Program	Home Institution	Websites
Radon	ANSTO	http://www.ansto.gov.au/
CMB radiation	ASIAA-AMIBA	http://amiba.asiaa.sinica.edu.tw/
UV	Colorado State University/USDA	http://uvb.nrel.colostate.edu/UVB/
¹³ C/ ¹² C and ¹⁸ O/ ¹⁶ O in CO ₂	CSIRO	http://www.csiro.au/
Persistent Organic Pollutants	Environment Canada	http://www.msc-smc.ec.gc.ca/gaps/
GPS Testbed	FAA/Stanford University	http://aa.stanford.edu/about/control.php
Winds	Ground winds	http://groundwinds.sr.unh.edu/
Volcano Activity	Hawaii Volcano Observatory	http://hvo.wr.usgs.gov/maunaloa/
Communications	HPA	http://www.hpa.edu/
Column O ₃	MSC Canada	http://exp-studies.tor.ec.gc.ca/e/ozone/ozonecanada.htm
AERONET Photometers	NASA Goddard Space Flight Center	http://aeronet.gsfc.nasa.gov/
pyranometer	NASA Goddard Space Flight Center	http://atmospheres.gsfc.nasa.gov/climate/
Stratospheric O ₃ & Temp Profiles	NASA Jet Propulsion Laboratory	http://tmf-web.jpl.nasa.gov/
Water vapor	Naval Research Labs	http://www.nrl.navy.mil/
Solar Spectra	NCAR FTS	http://www.acd.ucar.edu/irwg/
Carbon monoxide	NOAA Air Resources Lab	www.arl.noaa.gov
Hg ⁰ , Hg ⁺² , Hg ^p	NOAA Air Resources Lab	www.arl.noaa.gov
Particulates	NOAA Air Resources Lab	www.arl.noaa.gov
Surface O ₃ , and SO ₂	NOAA Air Resources Lab	www.arl.noaa.gov
Meteorology	NOAA Earth System Research Lab (GSD)	http://gpsmet.noaa.gov/
Meteorology	NOAA National Weather Service	http://www.prh.noaa.gov/hnl/
Rainfall at Kulani Mauka site	NOAA National Weather Service	http://www.prh.noaa.gov/hnl/
Climate Reference Network (CRN)	NOAA/NESDIS/NCDC	http://www.ncdc.noaa.gov/oa/climate/uscrn/
Seismic activity	NOAA Pacific Tsunami Warning Center	http://ptwc.weather.gov/
BrO	NOAA and NIWA	http://www.niwa.co.nz/
NO ₂	NOAA and NIWA	http://www.niwa.co.nz/
UV	NOAA and NIWA	http://www.niwa.co.nz/
CO ₂ , ¹³ C, N ₂ O	NIES	http://www.nies.go.jp/index.html
Video Surveillance	Pohakuloa Training Area Range Surveillance System	http://cnic.navy.mil/PMRF/index.htm
CO ₂ (continuous)	Scripps Institution of Oceanography	http://scrippsco2.ucsd.edu/
CO ₂ , ¹³ C, N ₂ O (flask)	Scripps Institution of Oceanography	http://scrippsco2.ucsd.edu/
O ₂ /N ₂	Scripps Institution of Oceanography	http://scrippsco2.ucsd.edu/
CO ₂ /CH ₄	SIO – Earth Networks Center for Climate Research	http://www.earthnetworks.com/OurNetworks/
Aerosol Chemistry	University of California, Davis	http://vista.cira.colostate.edu/improve/
Long transport of Aerosols	University of California, Davis - Delta group	http://delta.ucdavis.edu/projects.htm
Water isotope	University of Colorado, Boulder	http://climate.colorado.edu/
Variable Young Star Survey	University of Hawaii - Institute for Astronomy	http://www.ifa.hawaii.edu/~reipurth/VYSOS/Home.html
Corrosion Project	University of Hawaii, Manoa	http://www.hawaiiicorrosionlab.org/index.htm
Stratospheric ozone	University of New Hampshire/NIWA	http://www.astro.umass.edu/~fcrao/
Seismometer	USGS	http://hvo.wr.usgs.gov/
Filter Radiometer/PMOD	World Radiation Center	http://www.pmodwrc.ch/worcc/
South Pole Measurement Program	Home Institution	Websites
¹³ C/ ¹² C and ¹⁸ O/ ¹⁶ O in CO ₂	CSIRO	http://www.csiro.au/
¹³ CO ₂ , CH ₄ , CO, H ₂ , N ₂ O	CSIRO	http://www.csiro.au/
Brewer - Ozone	Environment Canada	http://es-ee.tor.ec.gc.ca/e/ozone/ozone.htm
AERONET Photometers	NASA Goddard Space Flight Center	http://aeronet.gsfc.nasa.gov/
MPLNET Cloud Profiling	NASA Goddard Space Flight Center	http://mplnet.gsfc.nasa.gov/
NIPR All Sky Camera	National Institute of Polar Research (Japan)	http://www.nipr.ac.jp/english/polar-research.html
CO ₂ , ¹³ C, N ₂ O (flask)	Scripps Institution of Oceanography	http://scrippsco2.ucsd.edu/
O ₂ /N ₂	Scripps Institution of Oceanography	http://scrippsco2.ucsd.edu/
Oxygen Isotopes	Scripps Institution of Oceanography	http://scrippsco2.ucsd.edu/
Trinidad Head, California Measurement Program	Home Institution	Websites
AERONET Photometers	NASA/Goddard Space Flight Center	http://aeronet.gsfc.nasa.gov/
MPLNET Cloud Profiling	NASA/Goddard Space Flight Center	http://mplnet.gsfc.nasa.gov/

Global Monitoring Division, ESRL, Boulder, Colorado

U.S. State and Territory	International Country and Ocean	International Country and Ocean
<i>Key: (1), (2) ... denote the separate sites or sample locations in a state/territory/country/ocean basin.</i>		
Alabama (1)	Algeria (2)	<i>(continuation of column to the left)</i>
Alaska (8)	Antarctic Circumpolar (Chinese) (24)	Kiribati (1)
American Samoa (2)	Antarctica (7)	Korea (South) (3)
California (7)	Argentina (1)	La Reunion Island, Indian Ocean (1)
Colorado (7)	Ascension Island (1)	Marshall Islands (1)
Florida (3)	Australia (6)	Mexico (1)
Hawaii (6)	Azores (Portugal) (2)	Midway Islands (1)
Illinois (2)	Barbados (1)	Mongolia (1)
Indiana (1)	Bermuda (2)	Namibia (1)
Iowa (1)	Brazil (2)	Netherlands (1)
Maine (2)	Canada (8)	New Zealand (3)
Massachusetts (3)	Canary Islands (1)	Nigeria (1)
Midway Island (1)	Easter Island (Chile) (1)	Pacific Ocean Aircraft (2)
Mississippi (1)	China (4)	Peru (1)
Montana (1)	Cook Islands (1)	Russia (3)
Nebraska (2)	Costa Rica (1)	Saipan, North Mariana Islands (1)
Nevada (1)	Crozet Island, Indian Ocean (1)	Seychelles (1)
New Hampshire (1)	Drake Passage Ships (6)	South Africa (1)
New Jersey (1)	Eastern Pacific Ships (15)	Spain (3)
New Mexico (2)	Ecuador (Galapagos Islands) (1)	Svalbard (1)
North Carolina (2)	Estonia (1)	Sweden (1)
North Dakota (2)	Fiji (1)	Switzerland (1)
Oklahoma (2)	Finland (1)	Tahiti (1)
Oregon (1)	France (2)	Taiwan (2)
Pennsylvania (1)	Germany (3)	United Kingdom (2)
Puerto Rico (1)	Greenland (1)	Vietnam (1)
Rhode Island (1)	Guam (1)	Western Pacific Ships (13)
South Carolina (2)	Hungary (2)	
South Dakota (1)	Iceland (2)	
Tennessee (1)	Indian Ocean Aircraft (1)	
Texas (3)	Indonesia (3)	
Utah (2)	Ireland (2)	
Virginia (3)	Israel (1)	
Washington (1)	Italy (1)	
Wisconsin (2)	Japan (3)	
<i>(continued, column right, top)</i>		
SITE TOTALS		
Number of U.S. states operating in = 35		
Total Number of all U.S. state locations = 78		
Number of foreign countries operating in = 61		
Total Number of all foreign locations = 161		
TOTAL NUMBER OF ALL GLOBAL SITES (U.S. + Foreign) IN OPERATION = 239		



About Barrow

- [BRW Home Page](#)
- [Live Webcam](#)
- [Current Weather](#)

Site Information

- [Site Summary](#)
- [Photo Gallery](#)
- [Barrow Personnel](#)
- [Request Coop Project](#)

Data

- [Barrow Data Files](#)
- [Data Visualization](#)
- [Halocarbon Figures](#)
- [Barrow Publications](#)

Barrow, Alaska, United States [BRW]



Location

- » Country: United States
- » Latitude: 71.3230° North
- » Longitude: 156.6114° West
- » Elevation: 11.00 masl
- » Time Zone: Local Time + 9.0 hour(s) = UTC

Contact

- » Contact Name: [Matthew Martinsen](#)
- » Address: Barrow Observatory
P.O. Box 888
Barrow, Alaska, 99723, United States
- » Phone: (907) 852-6500
- » Fax: (907) 852-4622

Data

- » [Available datasets](#)
- » [Data visualization](#)
- » [Clustered summary of BRW Trajectories](#)
- » [Photo Gallery](#)

Description

Barrow Observatory, established in 1973, is located near sea level 8 km east of Barrow, Alaska at 71.32 degrees north. This facility is manned year around by 2 engineers/scientists who often commute to work in winter on snow machines. Due to its unique location, dedicated and highly trained staff, excellent power and communications infrastructure, the Barrow Observatory is host to numerous cooperative research projects from around the world.

BRW is located so that it receives minimal influence from anthropogenic effects. It is about 8 km northeast of the village of Barrow and has a prevailing east-northeast wind off the Beaufort Sea. It is attended at least 5 days a week for routine inspection and maintenance of the instrumentation. In addition, the National Weather Service (NWS) maintains a weather observing facility in Barrow. Although the measurements at Barrow are made over open tundra, there are large lagoons and a number of lakes in the vicinity, and the Arctic Ocean is less than 3 km northwest of the site. Because of its proximity to these bodies of water and the fact that the prevailing winds are off the Beaufort Sea, BRW is perhaps best characterized as having an Arctic maritime climate affected by variations of weather and sea ice conditions in the Central Arctic.

GMD Projects at Barrow, Alaska

Carbon Cycle Surface Flasks

Parameter	Formula	First Sample Date	Status
Carbon Dioxide	CO ₂	1971-05-03	Ongoing
Methane	CH ₄	1983-04-06	Ongoing
Carbon Monoxide	CO	1988-07-24	Ongoing
Molecular Hydrogen	H ₂	1988-07-24	Ongoing
Nitrous Oxide	N ₂ O	1997-05-07	Ongoing
Sulfur Hexafluoride	SF ₆	1997-05-02	Ongoing
Carbon-13/Carbon-12 in Carbon Dioxide	d ¹³ C (CO ₂)	1990-01-22	Ongoing
Oxygen-18/Oxygen-16 in Carbon Dioxide	d ¹⁸ O (CO ₂)	1990-02-05	Ongoing
Carbon-13/Carbon-12 in Methane	d ¹³ C (CH ₄)	1998-01-03	Ongoing
D/H in Methane	dD (CH ₄)	2005-04-01	Terminated - 2009-10-30
Methyl Chloride	CH ₃ Cl	2005-05-20	Ongoing
Benzene	C ₆ H ₆	2007-02-16	Ongoing
toluene	C ₇ H ₈	2007-02-16	Ongoing

ethane	C ₂ H ₆	2005-05-20	Ongoing
ethene	C ₂ H ₄	2005-06-10	Ongoing
propane	C ₃ H ₈	2005-05-20	Ongoing
propene	C ₃ H ₆	2005-06-10	Ongoing
i-butane	i-C ₄ H ₁₀	2005-06-10	Ongoing
n-butane	n-C ₄ H ₁₀	2005-06-10	Ongoing
i-pentane	i-C ₅ H ₁₂	2005-05-20	Ongoing
n-pentane	n-C ₅ H ₁₂	2005-06-10	Ongoing
n-hexane	n-C ₆ H ₁₄	2005-05-20	Ongoing
wind speed	ws	1992-07-10	Ongoing
wind direction		1992-07-10	Ongoing
ambient temperature		2004-08-21	Terminated - 2004-09-13
isoprene	C ₅ H ₈	2007-02-16	Ongoing

Carbon Cycle In Situ Observatory

Parameter	Formula	First Sample Date	Status
Carbon Dioxide	CO ₂	1973-07-24	Ongoing
Methane	CH ₄	1986-01-29	Ongoing
Carbon Monoxide	CO	1991-09-11	Ongoing

HATS Flask Sampling

Parameter	Formula	First Sample Date	Status
HFC-134a	CH ₂ FCF ₃	1994-11-25	Ongoing
HCFC-22	CHF ₂ Cl	1992-04-08	Ongoing
Methyl Chloride	CH ₃ Cl	1994-04-15	Ongoing
HCFC-142b	CH ₃ CF ₂ Cl	1992-04-08	Ongoing
Halon-1211	CBrClF ₂	1992-02-14	Ongoing
methyl bromide	CH ₃ Br	1994-01-26	Ongoing
HCFC-141b	CH ₃ CCl ₂ F	1993-01-07	Ongoing
CFC-113	CCl ₂ FCClF ₂	1992-02-14	Ongoing
dichloromethane	CH ₂ Cl ₂	1994-04-15	Ongoing
tetrachloroethylene	C ₂ Cl ₄	1993-12-11	Ongoing
carbonyl sulfide	COS	2000-03-25	Ongoing
HFC-152a	CH ₃ CHF ₂	2000-08-03	Ongoing
Halon 1301	CF ₃ Br	2004-02-14	Ongoing
Halon 2402	CBrF ₂ CBrF ₂	1995-02-25	Ongoing
Methyl Chloroform	CH ₃ CCl ₃	1992-04-08	Ongoing

HATS In Situ Observatory

Parameter	Formula	First Sample Date	Status
Nitrous Oxide	N ₂ O	1998-06-15	Ongoing
Sulfur Hexafluoride	SF ₆	1998-06-15	Ongoing
HCFC-22	CHF ₂ Cl	1998-11-06	Ongoing
CFC-12	CCl ₂ F ₂	1998-06-15	Ongoing
Methyl Chloride	CH ₃ Cl	1998-08-26	Ongoing
HCFC-142b	CH ₃ CF ₂ Cl	1998-06-15	Ongoing
Halon-1211	CBrClF ₂	1998-06-15	Ongoing
CFC-113	CCl ₂ FCClF ₂	1998-06-15	Ongoing
carbon tetrachloride	CCl ₄	1998-06-15	Ongoing
Methyl Chloroform	CH ₃ CCl ₃	1998-06-17	Ongoing
CFC-11	CCl ₃ F	1998-06-15	Ongoing

Aerosol Surface, Continuous Measurements

Parameter	Formula	First Sample Date	Status
Light Scattering Coefficient	σ _{sp}	1976-05-07	Ongoing
Light Absorption Coefficient	σ _{ap}	1988-01-01	Ongoing
Particle Number Concentration	N _t	1976-05-07	Ongoing
Aerosol Chemical Composition		1998-01-01	Ongoing
Cloud condensation nucleus number concentration	N _{ccn}	2007-01-01	Ongoing
Aerosol Hygroscopic Growth	f(RH)	2007-01-01	Ongoing
Aerosol Size Distribution	n(D)	2007-01-01	Ongoing

Radiation In-Situ Observatory

Parameter	Formula	First Sample Date	Status
Direct Beam		1976-01-01	Ongoing
Shortwave Global		1976-01-01	Ongoing
Diffuse		1995-07-05	Ongoing
Reflected Shortwave		1985-01-01	Ongoing
Downward Longwave		1993-04-20	Ongoing
Upward Longwave		1993-04-20	Ongoing

Surface Ozone

Parameter	Formula	First Sample Date	Status
Ozone	O ₃	1973-03-14	Ongoing

Dobson Total Ozone

Parameter	Formula	First Sample Date	Status
Total Ozone	O ₃	1973-07-29	Ongoing

Trajectories

Meteorology

Parameter	Formula	First Sample Date	Status
Wind Speed 10 Meters	ws	1973-02-17	Ongoing
Wind Direction 10 Meters	wd	1973-02-17	Ongoing
Barometric Pressure	bar_press	1976-01-01	Ongoing
Relative Humidity (RH)	rh	1976-01-01	Ongoing
Temperature 2 Meters	temp_2m	1976-01-01	Ongoing
Temperature 10 Meters	temp_10m	1994-04-14	Ongoing
Precipitation Intensity	precip	1976-01-01	Ongoing

**About Summit**

- [Summit Home Page](#)
- [Live Camera](#)
- [Current Weather](#)

Site Information

- [Science Outlook](#)
- [Site Summary](#)
- [Photo Gallery](#)
- [Personnel](#)

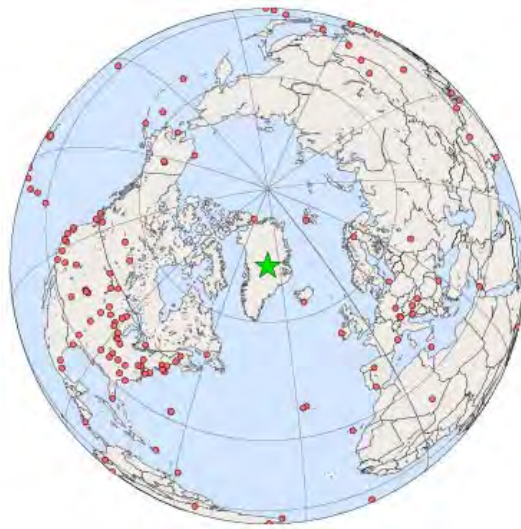
Data

- [Summit Data Files](#)
- [Ozonesonde Profiles](#)
- [Halocarbon Figures](#)
- [Data Figures \(IADV\)](#)
- [Summit Publications](#)

External Links

- [NSF GEOSummit](#)
- [NSF Polar Programs](#)
- [Summitcamp.org](#)
- [CH2MHill Polar Services](#)

Summit, Greenland [SUM]

**Location**

- » Country: Greenland
- » Latitude: 72.5962° North
- » Longitude: 38.422° West
- » Elevation: 3209.54 masl
- » Time Zone: Local Time + 2.0 hour(s) = UTC

Data

- » [Available datasets](#)
- » [Data visualization](#)
- » [Clustered summary of SUM Trajectories](#)

Cooperating Agencies

- National Science Foundation Office of Polar Programs

Description

The Greenland Environmental Observatory (GEOSummit) on the summit of the Greenland Ice Sheet (72°N, 38°W, 3200 m.a.s.l.) was established by the U.S. National Science Foundation (NSF) and the Danish Commission for Scientific Research in Greenland to provide year-round, long-term measurements for monitoring and investigations of the Arctic environment. The multidisciplinary facility is home to several year-round investigations as well as numerous seasonal campaigns which take advantage of the unique location of the observatory. GEOSummit provides investigators ease of access to the highest site north of the Arctic circle. Since 1989, when the GISP II ice-coring activities began, the site has hosted numerous atmospheric and glaciological investigations. Following two trial winter over periods (1997-1998, and 2000-2002), the NSF Long Term Observatory (LTO) program committed funding to maintain year-round measurements of key baseline variables of climate change at the site. In addition, several programs funded through European agencies have a year-round presence at the site.

The Summit website is at <http://www.geosummit.org/>

GMD Projects at Summit**Carbon Cycle Surface Flasks**

Parameter	Formula	First Sample Date	Status
Carbon Dioxide	CO ₂	1997-06-23	Ongoing
Methane	CH ₄	1997-06-23	Ongoing
Carbon Monoxide	CO	1997-06-23	Ongoing
Molecular Hydrogen	H ₂	1997-06-23	Ongoing
Nitrous Oxide	N ₂ O	1997-06-23	Ongoing
Sulfur Hexafluoride	SF ₆	1997-06-23	Ongoing
Carbon-13/Carbon-12 in Carbon Dioxide	d ¹³ C (CO ₂)	1997-06-23	Ongoing
Oxygen-18/Oxygen-16 in Carbon Dioxide	d ¹⁸ O (CO ₂)	1997-06-23	Ongoing
Carbon-13/Carbon-12 in Methane	d ¹³ C (CH ₄)	2010-04-27	Ongoing
Methyl Chloride	CH ₃ Cl	2004-10-18	Ongoing
Benzene	C ₆ H ₆	2006-07-17	Ongoing
toluene	C ₇ H ₈	2006-07-17	Ongoing

ethane	C ₂ H ₆	2004-10-18	Ongoing
ethene	C ₂ H ₄	2004-11-15	Ongoing
propane	C ₃ H ₈	2004-10-18	Ongoing
propene	C ₃ H ₆	2004-10-18	Ongoing
i-butane	i-C ₄ H ₁₀	2004-10-18	Ongoing
n-butane	n-C ₄ H ₁₀	2004-10-18	Ongoing
i-pentane	i-C ₅ H ₁₂	2004-10-18	Ongoing
n-pentane	n-C ₅ H ₁₂	2004-10-18	Ongoing
n-hexane	n-C ₆ H ₁₄	2004-10-18	Ongoing
wind speed	ws	1997-06-23	Ongoing
wind direction		1997-06-23	Ongoing
ambient temperature		2004-05-10	Terminated - 2004-08-09
isoprene	C ₅ H ₈	2006-07-17	Ongoing

HATS Flask Sampling

Parameter	Formula	First Sample Date	Status
HFC-134a	CH ₂ FCF ₃	2004-06-20	Ongoing
HCFC-22	CHF ₂ Cl	2004-06-20	Ongoing
Methyl Chloride	CH ₃ Cl	2004-06-20	Ongoing
HCFC-142b	CH ₃ CF ₂ Cl	2004-06-20	Ongoing
Halon-1211	CBrClF ₂	2004-06-20	Ongoing
methyl bromide	CH ₃ Br	2004-06-20	Ongoing
CFC-113	CCl ₂ FCClF ₂	2004-06-20	Ongoing
dichloromethane	CH ₂ Cl ₂	2004-06-20	Ongoing
tetrachloroethylene	C ₂ Cl ₄	2009-03-10	Ongoing
carbonyl sulfide	COS	2004-06-20	Ongoing
HFC-152a	CH ₃ CHF ₂	2004-06-20	Ongoing
Halon 2402	CBrF ₂ CBrF ₂	2009-03-10	Ongoing
Methyl Chloroform	CH ₃ CCl ₃	2004-06-20	Ongoing

HATS In Situ Observatory

Parameter	Formula	First Sample Date	Status
Nitrous Oxide	N ₂ O	2007-07-16	Ongoing
Sulfur Hexafluoride	SF ₆	2007-07-16	Ongoing
CFC-12	CCl ₂ F ₂	2007-07-16	Ongoing
Halon-1211	CBrClF ₂	2007-07-16	Ongoing
CFC-113	CCl ₂ FCClF ₂	2007-07-16	Ongoing
carbon tetrachloride	CCl ₄	2007-07-16	Ongoing
Methyl Chloroform	CH ₃ CCl ₃	2007-07-16	Ongoing
CFC-11	CCl ₃ F	2007-07-16	Ongoing

Radiation In-Situ Observatory

Parameter	Formula	First Sample Date	Status
Direct Beam		2006-05-28	Ongoing
Shortwave Global		2006-05-28	Ongoing
Diffuse		2006-05-28	Ongoing
Reflected Shortwave		2006-05-28	Ongoing
Downward Longwave		2006-05-28	Ongoing
Upward Longwave		2006-05-28	Ongoing

Surface Ozone

Parameter	Formula	First Sample Date	Status
Ozone	O ₃	2000-06-01	Ongoing

Ozonesonde

Trajectories

Meteorology

Parameter	Formula	First Sample Date	Status
Wind Speed 10 Meters	ws	2008-06-25	Ongoing
Wind Direction 10 Meters	wd	2008-06-25	Ongoing
Barometric Pressure	bar_press	2008-06-25	Ongoing
Relative Humidity (RH)	rh	2008-08-15	Ongoing
Temperature 2 Meters	temp_2m	2008-06-26	Ongoing
Temperature 10 Meters	temp_10m	2008-08-15	Ongoing

Black Carbon



About Trinidad Head

- [THD Home Page](#)
- [Current Weather](#)

Site Information

- [Site Summary](#)
- [Photo Gallery](#)
- [Personnel](#)
- [Request Coop Project](#)

Data

- [Trinidad Head Data Files](#)
- [Data Visualization](#)
- [Trinidad Head Publications](#)

Trinidad Head, California, United States [THD]



Location

- » Country: United States 
- » Latitude: 41.0541° North
- » Longitude: 124.151° West
- » Elevation: 107.00 masl
- » Time Zone: Local Time + 8.0 hour(s) = UTC

Contact

- » Contact Name: Mike Ives
- » Address: HSU Marine Lab
570 Ewing St
Trinidad Head, California, 95570,
United States
- » Phone: (707) 826-3705
- » Fax: (707) 826-3682

Data

- » [Available datasets](#)
- » [Data visualization](#)
- » [Clustered summary of THD Trajectories](#)
- » [Photo Gallery](#)

Cooperating Agencies

- [Scientific Aviation, Inc](#)

Description

Located on a point jutting into the ocean along the remote north coast of California, Trinidad Head is ideally suited for atmospheric measurements. Much of the time the site experiences baseline conditions, but it also allows for the monitoring of regionally influenced air, affected mainly by forested lands, but to a lesser extent, air having a small urban influence. An instrument trailer was installed in April 2002 allowing measurements of aerosols, surface ozone, radiation, and flask sampling for halocarbons and carbon cycle gases. Bi-weekly airborne vertical profile measurements of carbon cycle gases are collected in flasks above and upwind of Trinidad Head. GMD's measurements will provide a continuous baseline of pollution and climate forcing agents in air entering the U.S. Further plans include installing a GCMS for measuring PAN, hydrocarbons, and certain halocarbons. Additional measurements will be included as the Observatory matures. Already, at this location, Scripps Institution of Oceanography is operating two in situ instruments, one as part of the Advanced Global Atmospheric Gases Experiment (AGAGE), the other for measuring changes in atmospheric oxygen concentrations.

GMD Projects at Trinidad Head, California

Carbon Cycle Surface Flasks

Parameter	Formula	First Sample Date	Status
Carbon Dioxide	CO ₂	2002-04-19	Ongoing
Methane	CH ₄	2002-04-19	Ongoing
Carbon Monoxide	CO	2002-04-19	Ongoing
Molecular Hydrogen	H ₂	2002-04-19	Ongoing

Nitrous Oxide	N ₂ O	2002-04-19	Ongoing
Sulfur Hexafluoride	SF ₆	2002-04-19	Ongoing
Carbon-13/Carbon-12 in Carbon Dioxide	d ¹³ C (CO ₂)	2002-04-30	Ongoing
Oxygen-18/Oxygen-16 in Carbon Dioxide	d ¹⁸ O (CO ₂)	2002-04-25	Ongoing
Methyl Chloride	CH ₃ Cl	2004-10-07	Ongoing
Benzene	C ₆ H ₆	2004-10-07	Ongoing
toluene	C ₇ H ₈	2007-01-17	Ongoing
ethane	C ₂ H ₆	2004-10-07	Ongoing
ethene	C ₂ H ₄	2004-10-07	Ongoing
propane	C ₃ H ₈	2004-10-07	Ongoing
propene	C ₃ H ₆	2004-10-07	Ongoing
i-butane	i-C ₄ H ₁₀	2004-10-07	Ongoing
n-butane	n-C ₄ H ₁₀	2004-10-07	Ongoing
i-pentane	i-C ₅ H ₁₂	2004-10-07	Ongoing
n-pentane	n-C ₅ H ₁₂	2004-10-07	Ongoing
n-hexane	n-C ₆ H ₁₄	2004-10-07	Ongoing
wind speed	ws	2002-04-19	Ongoing
wind direction		2002-04-19	Ongoing
ambient temperature		2004-08-20	Terminated - 2004-09-22
isoprene	C ₅ H ₈	2004-10-07	Ongoing

Carbon Cycle Airborne Flasks

Parameter	Formula	First Sample Date	Status
Carbon Dioxide	CO ₂	2003-09-02	Ongoing
Methane	CH ₄	2003-09-02	Ongoing
Carbon Monoxide	CO	2003-09-02	Ongoing
Molecular Hydrogen	H ₂	2003-09-02	Ongoing
Nitrous Oxide	N ₂ O	2003-09-02	Ongoing
Sulfur Hexafluoride	SF ₆	2003-09-02	Ongoing
Carbon-13/Carbon-12 in Carbon Dioxide	d ¹³ C (CO ₂)	2003-10-08	Ongoing
Oxygen-18/Oxygen-16 in Carbon Dioxide	d ¹⁸ O (CO ₂)	2003-10-08	Ongoing
HFC-134a	CH ₂ FCF ₃	2004-11-12	Ongoing
HCFC-22	CHF ₂ Cl	2004-11-12	Ongoing
CFC-12	CCl ₂ F ₂	2004-11-12	Ongoing
Methyl Chloride	CH ₃ Cl	2004-11-12	Ongoing
CFC-114 and CFC-114a (combined)	CFC-114 and CFC-114a (combined)	2004-11-12	Ongoing
HCFC-142b	CH ₃ CF ₂ Cl	2004-11-12	Ongoing
Halon-1211	CBrClF ₂	2004-11-12	Ongoing
methyl bromide	CH ₃ Br	2004-11-12	Ongoing
CFC-11 (ion 101)	CCl ₃ F (ion 101)	2004-11-12	Ongoing
HCFC-141b	CH ₃ CCl ₂ F	2004-11-12	Ongoing
methyl iodide	CH ₃ I	2004-11-12	Ongoing
CFC-113	CCl ₂ FCClF ₂	2004-11-12	Ongoing
dichloromethane	CH ₂ Cl ₂	2004-11-12	Ongoing
chloroform	CHCl ₃	2004-11-12	Ongoing
methyl chloroform (ion 97)	CH ₃ CCl ₃	2004-11-12	Ongoing
carbon tetrachloride	CCl ₄	2004-11-12	Ongoing
dibromomethane	CH ₂ Br ₂	2004-11-12	Ongoing
tetrachloroethylene	C ₂ Cl ₄	2004-11-12	Ongoing
bromoform	CHBr ₃	2004-11-12	Ongoing
Benzene	C ₆ H ₆	2004-11-12	Ongoing
carbonyl sulfide	COS	2004-11-12	Ongoing
HFC-152a	CH ₃ CHF ₂	2004-11-12	Ongoing
HCFC-124	CHClFCF ₃	2004-11-12	Ongoing

carbonyl disulfide	CS ₂	2004-11-12	Ongoing
Sample Pressure	press	2007-06-09	Terminated - 2010-06-20
propane	C ₃ H ₈	2007-06-09	Ongoing
n-butane	n-C ₄ H ₁₀	2007-06-09	Ongoing
i-pentane	i-C ₅ H ₁₂	2007-06-09	Ongoing
n-pentane	n-C ₅ H ₁₂	2007-06-09	Ongoing
ambient temperature		2003-09-02	Ongoing
ambient pressure		2004-01-22	Ongoing
relative humidity		2003-09-02	Ongoing
Halon 1301	CF ₃ Br	2007-06-09	Ongoing
Halon 2402	CBrF ₂ CBrF ₂	2007-06-09	Ongoing
HFC-143a	CH ₃ CF ₃	2007-06-09	Ongoing
HCFC-227ea	CF ₃ CHFCF ₃	2007-06-09	Ongoing
HFC-365mfc	CH ₃ CF ₂ CH ₂ CF ₃	2007-06-09	Ongoing
CFC-115	CClF ₂ CF ₃	2007-06-09	Ongoing
HFC-125	CHF ₂ CF ₃	2007-06-09	Ongoing
CFC-13	CClF ₃	2007-06-09	Ongoing
Chloroethane	CH ₃ CH ₂ Cl	2007-06-09	Ongoing
HFC-23	CHF ₃	2007-06-09	Ongoing
Perfluoropropane	C ₃ F ₈	2008-03-22	Ongoing
Acetylene	C ₂ H ₂	2008-03-22	Ongoing
HFC-32	CH ₂ F ₂	2009-04-04	Ongoing
HFC-134	CHF ₂ CHF ₂	2009-04-04	Ongoing

HATS Flask Sampling

Parameter	Formula	First Sample Date	Status
HFC-134a	CH ₂ FCF ₃	2002-02-26	Ongoing
HCFC-22	CHF ₂ Cl	2002-03-06	Ongoing
Methyl Chloride	CH ₃ Cl	2002-03-06	Ongoing
HCFC-142b	CH ₃ CF ₂ Cl	2002-02-26	Ongoing
Halon-1211	CBrClF ₂	2002-02-26	Ongoing
methyl bromide	CH ₃ Br	2002-03-06	Ongoing
HCFC-141b	CH ₃ CCl ₂ F	2002-02-26	Ongoing
CFC-113	CCl ₂ FCClF ₂	2002-02-26	Ongoing
dichloromethane	CH ₂ Cl ₂	2002-03-06	Ongoing
tetrachloroethylene	C ₂ Cl ₄	2002-03-06	Ongoing
carbonyl sulfide	COS	2002-04-03	Ongoing
HFC-152a	CH ₃ CHF ₂	2002-02-26	Ongoing
Halon 1301	CF ₃ Br	2004-02-26	Ongoing
Halon 2402	CBrF ₂ CBrF ₂	2004-02-26	Ongoing
Methyl Chloroform	CH ₃ CCl ₃	2002-02-26	Ongoing

Aerosol Surface, Continuous Measurements

Parameter	Formula	First Sample Date	Status
Light Scattering Coefficient	σ _{sp}	2002-01-01	Ongoing
Light Absorption Coefficient	σ _{ap}	2002-01-01	Ongoing
Particle Number Concentration	N _t	2002-01-01	Ongoing
Aerosol Chemical Composition		2002-01-01	Terminated - 2005-01-01
Aerosol Hygroscopic Growth	f(RH)	2002-01-01	Terminated - 2006-01-01

Radiation In-Situ Observatory

Parameter	Formula	First Sample Date	Status
Direct Beam		2002-04-10	Ongoing
Shortwave Global		2002-04-10	Ongoing
Diffuse		2002-04-10	Ongoing
Downward Longwave		2003-05-20	Ongoing

Surface Ozone

Parameter	Formula	First Sample Date	Status
Ozone	O ₃	2002-04-18	Ongoing

Ozonesonde

Ozonesonde

Trajectories

Aerosol Airborne, Light Aircraft

Lidar

Meteorology

Parameter	Formula	First Sample Date	Status
Wind Speed 10 Meters	ws	2007-01-01	Ongoing
Wind Direction 10 Meters	wd	2007-01-01	Ongoing
Barometric Pressure	bar_press	2007-09-19	Ongoing
Temperature 2 Meters	temp_2m	2007-09-19	Ongoing
Temperature 10 Meters	temp_10m	2007-09-19	Ongoing
Precipitation Intensity	precip	2007-10-31	Ongoing

Ozone Airborne



About Mauna Loa

- [Mauna Loa Home](#)
- [About Us](#)
- [Staff](#)
- [Visiting and Tours](#)
- [Live Cameras](#)
- [Current Weather](#)

Site Information

- [Site Locations](#)
- [Site Summary](#)
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Research

- [Programs](#)
- [General Information](#)

Data

- [Data Links](#)
- [Mauna Loa Data Files](#)
- [Mauna Loa Publications](#)
- [Data Figures](#)
- [Halocarbon Figures](#)

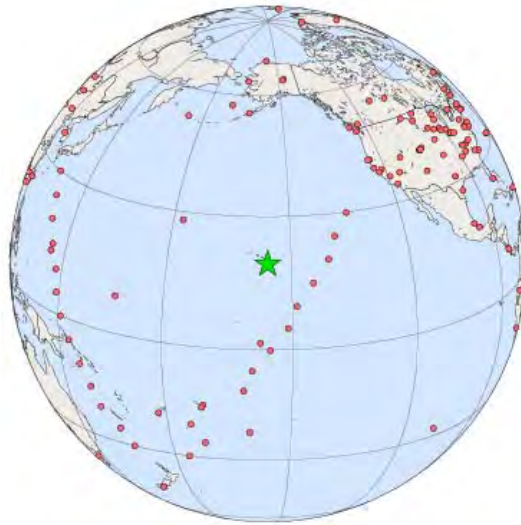
Outreach

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- [Science Fair Awards](#)
- [Earth Day Fairs](#)
- [School Visits](#)
- [Frequently Asked Questions](#)

Web Museum

- [Events](#)
- [Past Projects](#)
- [Publications](#)
- [White Dog Legend](#)

Mauna Loa, Hawaii, United States [MLO]



Location

- » Country: United States 
- » Latitude: 19.5362° North
- » Longitude: 155.5763° West
- » Elevation: 3397.00 masl
- » Time Zone: Local Time + 10.0 hour(s) = UTC

Contact

- » Contact Name: [John Barnes](#)
- » Address: NOAA - Mauna Loa Observatory
1437 Kilauea Ave. #102
Hilo, Hawaii, 96720, United States
- » Phone: (808)933-6965
- » Fax: (808)933-6967

Data

- » [Available datasets](#)
- » [Data visualization](#)
- » [Clustered summary of MLO Trajectories](#)
- » [Photo Gallery](#)

Description

Mauna Loa Observatory is located on the Island of Hawaii at an elevation of 3397 m on the northern flank of Mauna Loa volcano at 200 north. Established in 1957, Mauna Lao Observatory has grown to become the premier long-term atmospheric monitoring facility on earth and is the site where the ever-increasing concentrations of global atmospheric carbon dioxide were determined. The observatory consists of 10 buildings from which up to 250 different atmospheric parameters are measured by a complement of 12 NOAA/ESRL and other agency scientists and engineers.

GMD Projects at Mauna Loa, Hawaii

Carbon Cycle Surface Flasks

Parameter	Formula	First Sample Date	Status
Carbon Dioxide	CO ₂	1969-08-20	Ongoing
Methane	CH ₄	1983-05-06	Ongoing
Carbon Monoxide	CO	1989-07-07	Ongoing
Molecular Hydrogen	H ₂	1989-07-07	Ongoing
Nitrous Oxide	N ₂ O	1997-05-09	Ongoing
Sulfur Hexafluoride	SF ₆	1997-05-09	Ongoing
Carbon-13/Carbon-12 in Carbon Dioxide	d ¹³ C (CO ₂)	1990-01-12	Ongoing
Oxygen-18/Oxygen-16 in Carbon Dioxide	d ¹⁸ O (CO ₂)	1990-01-12	Ongoing
Carbon-13/Carbon-12 in Methane	d ¹³ C (CH ₄)	1998-01-02	Ongoing
D/H in Methane	dD (CH ₄)	2005-04-06	Terminated - 2009-11-03
Methyl Chloride	CH ₃ Cl	2005-08-10	Ongoing
Benzene	C ₆ H ₆	2007-01-10	Ongoing
toluene	C ₇ H ₈	2007-01-10	Ongoing

ethane	C ₂ H ₆	2005-08-10	Ongoing
ethene	C ₂ H ₄	2005-08-10	Ongoing
propane	C ₃ H ₈	2005-08-10	Ongoing
propene	C ₃ H ₆	2005-08-10	Ongoing
i-butane	i-C ₄ H ₁₀	2005-08-10	Ongoing
n-butane	n-C ₄ H ₁₀	2005-08-10	Ongoing
i-pentane	i-C ₅ H ₁₂	2005-10-12	Ongoing
n-pentane	n-C ₅ H ₁₂	2005-08-10	Ongoing
n-hexane	n-C ₆ H ₁₄	2005-08-10	Ongoing
wind speed	ws	1992-07-01	Ongoing
wind direction		1992-07-01	Ongoing
ambient temperature		1992-11-27	Terminated - 2004-09-22
isoprene	C ₅ H ₈	2007-01-10	Ongoing

Carbon Cycle In Situ Observatory

Parameter	Formula	First Sample Date	Status
Carbon Dioxide	CO ₂	1974-05-17	Ongoing
Methane	CH ₄	1987-04-03	Ongoing
Carbon Monoxide	CO	1992-05-29	Ongoing

HATS Flask Sampling

Parameter	Formula	First Sample Date	Status
HFC-134a	CH ₂ FCF ₃	1994-11-07	Ongoing
HCFC-22	CHF ₂ Cl	1991-12-30	Ongoing
Methyl Chloride	CH ₃ Cl	1993-08-30	Ongoing
HCFC-142b	CH ₃ CF ₂ Cl	1992-02-10	Ongoing
Halon-1211	CBrClF ₂	1991-12-30	Ongoing
methyl bromide	CH ₃ Br	1993-08-30	Ongoing
HCFC-141b	CH ₃ CCl ₂ F	1992-12-28	Ongoing
CFC-113	CCl ₂ FCClF ₂	1991-12-30	Ongoing
dichloromethane	CH ₂ Cl ₂	1994-01-18	Ongoing
tetrachloroethylene	C ₂ Cl ₄	1993-11-22	Ongoing
carbonyl sulfide	COS	2000-03-13	Ongoing
HFC-152a	CH ₃ CHF ₂	1995-03-13	Ongoing
Halon 1301	CF ₃ Br	2004-03-08	Ongoing
Halon 2402	CBrF ₂ CBrF ₂	1995-03-13	Ongoing
Methyl Chloroform	CH ₃ CCl ₃	1991-12-30	Ongoing

HATS In Situ Observatory

Parameter	Formula	First Sample Date	Status
Nitrous Oxide	N ₂ O	1998-11-28	Ongoing
Sulfur Hexafluoride	SF ₆	1998-11-28	Ongoing
HCFC-22	CHF ₂ Cl	1998-11-28	Ongoing
CFC-12	CCl ₂ F ₂	1999-05-02	Ongoing
Methyl Chloride	CH ₃ Cl	1999-04-23	Ongoing
HCFC-142b	CH ₃ CF ₂ Cl	1998-11-28	Ongoing
Halon-1211	CBrClF ₂	1998-11-28	Ongoing
CFC-113	CCl ₂ FCClF ₂	1998-11-28	Ongoing
carbon tetrachloride	CCl ₄	1998-11-28	Ongoing
Methyl Chloroform	CH ₃ CCl ₃	1998-11-28	Ongoing
CFC-11	CCl ₃ F	1999-06-25	Ongoing

Aerosol Surface, Continuous Measurements

Parameter	Formula	First Sample Date	Status
Light Scattering Coefficient	σ _{sp}	1974-01-01	Ongoing
Light Absorption Coefficient	σ _{ap}	1990-01-01	Ongoing
Particle Number Concentration	N _t	1974-01-01	Ongoing

Radiation In-Situ Observatory

Parameter	Formula	First Sample Date	Status
Direct Beam		1976-01-01	Ongoing
Shortwave Global		1976-01-01	Ongoing
Diffuse		1976-01-01	Ongoing
Downward Longwave		1993-10-31	Ongoing

Surface Ozone

Parameter	Formula	First Sample Date	Status
Ozone	O ₃	1973-09-20	Ongoing

Dobson Total Ozone

Parameter	Formula	First Sample Date	Status
Total Ozone	O ₃	1957-12-01	Ongoing

Trajectories

Lidar

Meteorology

Parameter	Formula	First Sample Date	Status
Wind Speed 10 Meters	ws	1977-01-01	Ongoing
Wind Direction 10 Meters	wd	1977-01-01	Ongoing
Barometric Pressure	bar_press	1977-01-01	Ongoing
Relative Humidity (RH)	rh	1977-01-01	Ongoing
Temperature 2 Meters	temp_2m	1977-01-01	Ongoing
Temperature 10 Meters	temp_10m	1993-11-02	Ongoing
temperature Top	temp_top	1993-11-02	Ongoing
Precipitation Intensity	precip	1987-01-01	Ongoing

Dobson Umkehr Ozone

Parameter	Formula	First Sample Date	Status
Ozone	O ₃	1963-12-26	Ongoing



About American Samoa

- Samoa Home
- Current Weather

Site Information

- Site Location
- Site Summary
- Station Personnel
- Observatory Cooperatives
- Request Coop Project

Samoa Photos

- Photo Gallery
- Time-Lapse Movie

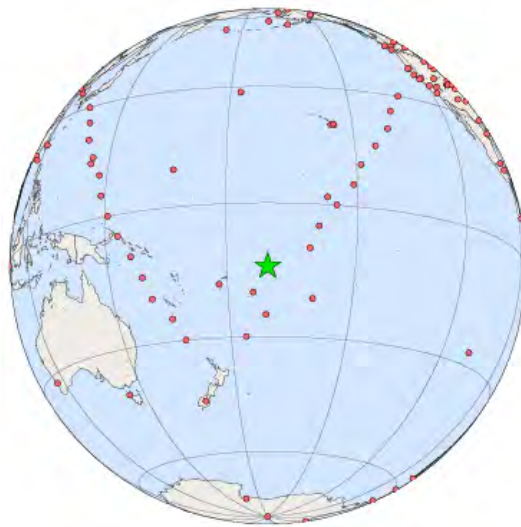
Samoa Tour

- Daily Commute
- Main Grounds
- Hudson Building
- Observatory Rooftop
- Bluesky Tower
- Stairway & Point


Data

- Samoa Data Files
- Data Figures
- Halocarbon Figures
- Samoa Publications

Tutuila, American Samoa [SMO]



Location

- » Country: American Samoa 
- » Latitude: 14.2474° South
- » Longitude: 170.5644° West
- » Elevation: 42.00 masl
- » Time Zone: Local Time + 11.0 hour(s) = UTC

Contact

- » Contact Name: [Christina Hammock](#)
- » Address: NOAA Samoa Observatory
P.O. Box 2568
Pago Pago, Cape Matatula, 96799,
American Samoa
- » Phone:
- » Fax:

Data

- » [Available datasets](#)
- » [Data visualization](#)
- » [Clustered summary of SMO Trajectories](#)
- » [Photo Gallery](#)

Description

The Samoa Observatory is located on the northeastern tip of Tutuila island, American Samoa, on a ridge overlooking the South Pacific Ocean. Established in 1974 on a 26.7 acre site, the observatory is the fourth of the ESRL/GMD Baseline Observatories. Since it

GMD Projects at Tutuila

Carbon Cycle Surface Flasks

Parameter	Formula	First Sample Date	Status
Carbon Dioxide	CO ₂	1973-08-27	Ongoing
Methane	CH ₄	1983-04-23	Ongoing
Carbon Monoxide	CO	1988-09-22	Ongoing
Molecular Hydrogen	H ₂	1989-03-17	Ongoing
Nitrous Oxide	N ₂ O	1997-05-07	Ongoing
Sulfur Hexafluoride	SF ₆	1997-05-07	Ongoing
Carbon-13/Carbon-12 in Carbon Dioxide	d ¹³ C (CO ₂)	1990-01-04	Ongoing
Oxygen-18/Oxygen-16 in Carbon Dioxide	d ¹⁸ O (CO ₂)	1994-09-22	Ongoing
Carbon-13/Carbon-12 in Methane	d ¹³ C (CH ₄)	1998-01-06	Ongoing
D/H in Methane	dD (CH ₄)	2005-03-28	Terminated - 2009-09-11
Methyl Chloride	CH ₃ Cl	2006-01-19	Ongoing
Benzene	C ₆ H ₆	2007-01-16	Ongoing
toluene	C ₇ H ₈	2007-01-16	Ongoing
ethane	C ₂ H ₆	2005-05-12	Ongoing
ethene	C ₂ H ₄	2005-05-12	Ongoing

propane	C ₃ H ₈	2005-05-12	Ongoing
propene	C ₃ H ₆	2005-05-12	Ongoing
i-butane	i-C ₄ H ₁₀	2005-05-12	Ongoing
n-butane	n-C ₄ H ₁₀	2005-05-12	Ongoing
i-pentane	i-C ₅ H ₁₂	2005-05-12	Ongoing
n-pentane	n-C ₅ H ₁₂	2005-05-12	Ongoing
n-hexane	n-C ₆ H ₁₄	2005-05-12	Ongoing
wind speed	ws	1992-07-06	Ongoing
wind direction		1992-07-06	Ongoing
ambient temperature		2004-08-10	Terminated - 2004-09-07
isoprene	C ₅ H ₈	2007-01-16	Ongoing

Carbon Cycle In Situ Observatory

Parameter	Formula	First Sample Date	Status
Carbon Dioxide	CO ₂	1976-01-01	Ongoing

HATS Flask Sampling

Parameter	Formula	First Sample Date	Status
HFC-134a	CH ₂ FCF ₃	1994-11-29	Ongoing
HCFC-22	CHF ₂ Cl	1991-11-26	Ongoing
Methyl Chloride	CH ₃ Cl	1993-11-09	Ongoing
HCFC-142b	CH ₃ CF ₂ Cl	1992-02-11	Ongoing
Halon-1211	CBrClF ₂	1991-12-30	Ongoing
methyl bromide	CH ₃ Br	1993-11-09	Ongoing
HCFC-141b	CH ₃ CCl ₂ F	1993-01-14	Ongoing
CFC-113	CCl ₂ FCClF ₂	1991-12-30	Ongoing
dichloromethane	CH ₂ Cl ₂	1994-01-12	Ongoing
tetrachloroethylene	C ₂ Cl ₄	1993-12-15	Ongoing
carbonyl sulfide	COS	2000-03-07	Ongoing
HFC-152a	CH ₃ CHF ₂	2000-08-09	Ongoing
Halon 1301	CF ₃ Br	2007-01-12	Ongoing
Halon 2402	CBrF ₂ CBrF ₂	1995-02-13	Ongoing
Methyl Chloroform	CH ₃ CCl ₃	1991-11-26	Ongoing

HATS In Situ Observatory

Parameter	Formula	First Sample Date	Status
Nitrous Oxide	N ₂ O	1999-01-03	Ongoing
Sulfur Hexafluoride	SF ₆	1999-01-03	Ongoing
HCFC-22	CHF ₂ Cl	1999-05-28	Ongoing
CFC-12	CCl ₂ F ₂	1999-01-03	Ongoing
Methyl Chloride	CH ₃ Cl	1999-01-29	Ongoing
HCFC-142b	CH ₃ CF ₂ Cl	1999-01-03	Ongoing
Halon-1211	CBrClF ₂	1999-01-03	Ongoing
CFC-113	CCl ₂ FCClF ₂	1999-01-03	Ongoing
carbon tetrachloride	CCl ₄	1999-01-03	Ongoing
Methyl Chloroform	CH ₃ CCl ₃	1999-01-03	Ongoing
CFC-11	CCl ₃ F	1999-01-03	Ongoing

Aerosol Surface, Continuous Measurements

Parameter	Formula	First Sample Date	Status
Light Scattering Coefficient	σ _{sp}	1977-01-01	Terminated - 1991-01-01
Particle Number Concentration	N _t	1977-01-01	Ongoing

Radiation In-Situ Observatory

Parameter	Formula	First Sample Date	Status
Direct Beam		1976-01-01	Ongoing
Shortwave Global		1976-01-01	Ongoing

Diffuse		1995-08-21	Ongoing
Downward Longwave		1999-08-06	Ongoing

Surface Ozone

Parameter	Formula	First Sample Date	Status
Ozone	O ₃	1975-12-14	Ongoing

Dobson Total Ozone

Parameter	Formula	First Sample Date	Status
Total Ozone	O ₃	1975-12-18	Ongoing

Ozonesonde

Trajectories

Lidar

Meteorology

Parameter	Formula	First Sample Date	Status
Wind Speed 10 Meters	ws	1976-01-21	Ongoing
Wind Direction 10 Meters	wd	1976-01-21	Ongoing
Barometric Pressure	bar_press	1976-01-09	Ongoing
Relative Humidity (RH)	rh	1976-01-06	Ongoing
Temperature 2 Meters	temp_2m	1976-01-05	Ongoing
Temperature 10 Meters	temp_10m	2007-06-11	Ongoing
Precipitation Intensity	precip	1976-01-01	Ongoing

**About South Pole**

- [South Pole Home](#)
- [Live Camera](#)
- [Current Weather](#)

Site Information

- [Site Summary](#)
- [South Pole Overview](#)
- [Atmospheric Research Observatory \(ARO\)](#)
- [Amundsen-Scott Station](#)
- [The Dome](#)

South Pole Photos

- [South Pole Photo Gallery](#)
- [Time-Lapse Movies](#)

South Pole Ozone

- [South Pole Ozone Hole](#)
- [NOAA Ozone Page](#)

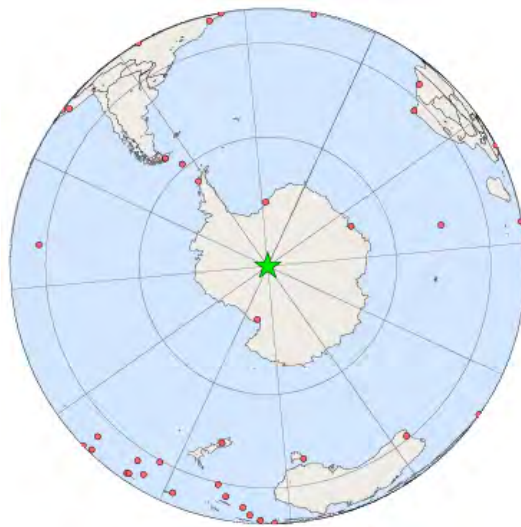
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- [U.S. Antarctic Program](#)
- [International Polar Year](#)
- [United States IPY Portal](#)
- [IGY History](#)
- [NOAA Corps](#)
- [South Pole Personnel](#)

Data

- [Data Files](#)
- [Data Visualization](#)
- [Halocarbon Figures](#)
- [South Pole Publications](#)

South Pole, Antarctica, United States [SPO]

**Location**

- » Country: [United States](#)
- » Latitude: 89.98° South
- » Longitude: 24.8° West
- » Elevation: 2810.00 masl
- » Time Zone: Local Time + -12.0 hour(s) = UTC

Contact

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Data

- » [Available datasets](#)
- » [Data visualization](#)
- » [Clustered summary of SPO Trajectories](#)
- » [Photo Gallery](#)

Cooperating Agencies

- National Science Foundation

Description

The South Pole Observatory (SPO) is one of the six atmospheric baseline observatories for NOAA

GMD Projects at South Pole, Antarctica**Carbon Cycle Surface Flasks**

Parameter	Formula	First Sample Date	Status
Carbon Dioxide	CO ₂	1975-02-09	Ongoing
Methane	CH ₄	1983-02-20	Ongoing
Carbon Monoxide	CO	1993-04-01	Ongoing
Molecular Hydrogen	H ₂	1993-04-01	Ongoing
Nitrous Oxide	N ₂ O	1997-01-16	Ongoing
Sulfur Hexafluoride	SF ₆	1997-01-16	Ongoing
Carbon-13/Carbon-12 in Carbon Dioxide	d ¹³ C (CO ₂)	1993-03-28	Ongoing
Oxygen-18/Oxygen-16 in Carbon Dioxide	d ¹⁸ O (CO ₂)	1993-03-28	Ongoing
Carbon-13/Carbon-12 in Methane	d ¹³ C (CH ₄)	1998-01-01	Ongoing
D/H in Methane	dD (CH ₄)	2005-02-11	Terminated - 2009-09-24
Methyl Chloride	CH ₃ Cl	2005-01-28	Terminated - 2011-01-08
Benzene	C ₆ H ₆	2006-11-22	Terminated - 2011-01-08
toluene	C ₇ H ₈	2006-12-01	Terminated - 2011-01-08

ethane	C ₂ H ₆	2005-02-11	Terminated - 2011-01-08
ethene	C ₂ H ₄	2005-01-28	Terminated - 2011-01-08
propane	C ₃ H ₈	2005-01-28	Terminated - 2010-12-24
propene	C ₃ H ₆	2005-01-28	Terminated - 2011-01-08
i-butane	i-C ₄ H ₁₀	2005-04-01	Terminated - 2010-12-24
n-butane	n-C ₄ H ₁₀	2005-02-15	Terminated - 2011-01-08
i-pentane	i-C ₅ H ₁₂	2005-03-04	Terminated - 2011-01-08
n-pentane	n-C ₅ H ₁₂	2005-01-28	Terminated - 2011-01-08
n-hexane	n-C ₆ H ₁₄	2005-01-28	Terminated - 2011-01-08
wind speed	ws	1992-01-16	Ongoing
wind direction		1992-01-16	Ongoing
isoprene	C ₅ H ₈	2006-11-22	Terminated - 2011-01-08

Carbon Cycle In Situ Observatory

Parameter	Formula	First Sample Date	Status
Carbon Dioxide	CO ₂	1975-11-25	Ongoing

HATS Flask Sampling

Parameter	Formula	First Sample Date	Status
HFC-134a	CH ₂ FCF ₃	1994-03-03	Ongoing
HCFC-22	CHF ₂ Cl	1992-07-04	Ongoing
Methyl Chloride	CH ₃ Cl	1995-10-18	Ongoing
HCFC-142b	CH ₃ CF ₂ Cl	1992-07-04	Ongoing
Halon-1211	CBrClF ₂	1992-07-04	Ongoing
methyl bromide	CH ₃ Br	1995-10-18	Ongoing
HCFC-141b	CH ₃ CCl ₂ F	1993-01-09	Ongoing
CFC-113	CCl ₂ FCClF ₂	1992-07-04	Ongoing
dichloromethane	CH ₂ Cl ₂	1995-10-18	Ongoing
tetrachloroethylene	C ₂ Cl ₄	1993-02-08	Ongoing
carbonyl sulfide	COS	2000-05-15	Ongoing
HFC-152a	CH ₃ CHF ₂	1995-10-18	Ongoing
Halon 1301	CF ₃ Br	2004-02-01	Ongoing
Halon 2402	CBrF ₂ CBrF ₂	1995-10-18	Ongoing
Methyl Chloroform	CH ₃ CCl ₃	1992-07-04	Ongoing

HATS In Situ Observatory

Parameter	Formula	First Sample Date	Status
Nitrous Oxide	N ₂ O	1998-01-30	Ongoing
Sulfur Hexafluoride	SF ₆	1998-01-30	Ongoing
HCFC-22	CHF ₂ Cl	1998-01-30	Ongoing
CFC-12	CCl ₂ F ₂	1998-01-30	Ongoing
Methyl Chloride	CH ₃ Cl	1999-07-02	Ongoing
HCFC-142b	CH ₃ CF ₂ Cl	1998-01-30	Ongoing
Halon-1211	CBrClF ₂	1998-01-30	Ongoing
CFC-113	CCl ₂ FCClF ₂	1998-01-30	Ongoing
carbon tetrachloride	CCl ₄	1998-01-30	Ongoing
Methyl Chloroform	CH ₃ CCl ₃	1998-01-30	Ongoing
CFC-11	CCl ₃ F	1998-01-30	Ongoing

Aerosol Surface, Continuous Measurements

Parameter	Formula	First Sample Date	Status
Light Scattering Coefficient	σ _{sp}	1979-01-01	Ongoing
Particle Number Concentration	N _t	1974-01-01	Ongoing

Radiation In-Situ Observatory

Parameter	Formula	First Sample Date	Status
Direct Beam		1976-01-01	Ongoing

Shortwave Global		1976-01-01	Ongoing
Diffuse		1995-11-10	Ongoing
Reflected Shortwave		1985-01-01	Ongoing
Downward Longwave		1993-11-21	Ongoing
Upward Longwave		1993-11-21	Ongoing

Surface Ozone

Parameter	Formula	First Sample Date	Status
Ozone	O ₃	1975-01-23	Ongoing

Dobson Total Ozone

Parameter	Formula	First Sample Date	Status
Total Ozone	O ₃	1963-12-04	Ongoing

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Trajectories

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Meteorology

Parameter	Formula	First Sample Date	Status
Wind Speed 10 Meters	ws	1975-02-21	Ongoing
Wind Direction 10 Meters	wd	1975-02-21	Ongoing
Barometric Pressure	bar_press	1977-01-01	Ongoing
Relative Humidity (RH)	rh	1977-03-29	Ongoing
Temperature 2 Meters	temp_2m	1977-01-01	Ongoing
Temperature 10 Meters	temp_10m	1994-01-22	Ongoing
temperature Top	temp_top	1994-01-22	Ongoing
Precipitation Intensity	precip	1980-12-30	Ongoing

Antarctic UV