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## Earth System Research Laboratory (<https://www.esrl.noaa.gov>)

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Summit, Greenland [SUM]





## Location

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

## Data

- » Available datasets (</gmd/dv/data/index.php?site=SUM>)
- » Data visualization (</gmd/dv/iadv/index.php?code=sum>)
- » Publications ([/gmd/publications/search2.php?abstract=Summit Greenland](/gmd/publications/search2.php?abstract=Summit%20Greenland))
- » Personnel (</gmd/dv/site/sum/personnel.html>)
- » Current Weather (</gmd/dv/site/sum/met.html>)

## Cooperating Agencies



» National Science Foundation Office of Polar Programs  
(<http://www.nsf.gov/dir/index.jsp?org=OPP>)

## Description

The Greenland Environmental Observatory (GEOSummit) on the summit of the Greenland Ice Sheet (3200 m above sea level) was established by the U.S. National Science Foundation (NSF) (<http://www.nsf.gov>) 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.

Logistical support at Summit is provided by CH2M HILL Polar Services, under contract to NSF. NOAA has maintained a presence at Summit since the mid 1990s, begun mainly to conduct greenhouse gas measurements, with NOAA and NSF technicians working together to ensure continuity of data. From 2005 to present, NOAA Corps Officers have served as technicians during various phases throughout the year. Beginning in August of 2009, NOAA staff became a year-round permanent addition to the station crew, ensuring the long-term continuity of NOAA data and providing additional scientific support for the site.

The NOAA Summit Atmospheric Baseline Observatory was downgraded from its status as a full "Observatory" to a "Sampling Site" on August 1, 2017. NOAA technician time and cargo intensive projects in the NOAA measurement suite were removed from the site. However, surface ozone monitoring instrumentation, a basic meteorology system, aerosol instrumentation, and halocarbon and greenhouse gas flask sampling capabilities

continue to operate at the site in partnership with the NSF. The downgrade follows a Global Monitoring Division-wide evaluation of scientific goals and global observing network capabilities that resulted in realignment to best meet NOAA's mission and the nation's scientific needs.

All data from Summit are available on the Global Monitoring Division's website: <https://esrl.noaa.gov/gmd/dv/data/index.php?site=sum>

### GMD Projects at Summit

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#### Carbon Cycle Surface Flasks (</gmd/ccgg/flask.php>)

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

Parameter	Formula	First Sample Date	Status
i-pentane	i-C <sub>5</sub> H <sub>12</sub>	2004-10-18	Ongoing
n-pentane	n-C <sub>5</sub> H <sub>12</sub>	2004-10-18	Ongoing
n-hexane	n-C <sub>6</sub> H <sub>14</sub>	2004-10-18	Ongoing
isoprene	C <sub>5</sub> H <sub>8</sub>	2006-07-17	Ongoing
Acetylene	C <sub>2</sub> H <sub>2</sub>	2007-09-24	Ongoing

**HATS Flask Sampling (/gmd/hats/flask/flasks.html)**

Parameter	Formula	First Sample Date	Status
HFC-134a	CH <sub>2</sub> FCF <sub>3</sub>	2004-06-20	Ongoing
HCFC-22	CHF <sub>2</sub> Cl	2004-06-20	Ongoing
CFC-12	CCl <sub>2</sub> F <sub>2</sub>	2010-01-09	Ongoing
Methyl Chloride	CH <sub>3</sub> Cl	2004-06-20	Ongoing
HCFC-142b	CH <sub>3</sub> CF <sub>2</sub> Cl	2004-06-20	Ongoing
Halon-1211	CBrClF <sub>2</sub>	2004-06-20	Ongoing
methyl bromide	CH <sub>3</sub> Br	2004-06-20	Ongoing
CFC-113	CCl <sub>2</sub> FCClF <sub>2</sub>	2004-06-20	Ongoing
dichloromethane	CH <sub>2</sub> Cl <sub>2</sub>	2004-06-20	Ongoing
carbonyl sulfide	COS	2004-06-20	Ongoing
HFC-152a	CH <sub>3</sub> CHF <sub>2</sub>	2004-06-20	Ongoing
Halon 2402	CBrF <sub>2</sub> CBrF <sub>2</sub>	2009-03-10	Ongoing
HFC-227ea	CF <sub>3</sub> CHFCF <sub>3</sub>	2011-05-08	Ongoing
HFC-365mfc	CH <sub>3</sub> CF <sub>2</sub> CH <sub>2</sub> CF <sub>3</sub>	2009-06-08	Ongoing
Methyl Chloroform	CH <sub>3</sub> CCl <sub>3</sub>	2004-06-20	Ongoing
CFC-11	CCl <sub>3</sub> F	2010-01-09	Ongoing

**HATS In Situ Observatory (/gmd/hats/insitu/cats/)**

Parameter	Formula	First Sample Date	Status
Methane	CH <sub>4</sub>	2007-07-01	Ongoing
Carbon Monoxide	CO	2007-07-01	Ongoing
Molecular Hydrogen	H <sub>2</sub>	2007-07-01	Ongoing
Nitrous Oxide	N <sub>2</sub> O	2007-07-16	Ongoing
Sulfur Hexafluoride	SF <sub>6</sub>	2007-07-16	Ongoing
CFC-12	CCl <sub>2</sub> F <sub>2</sub>	2007-07-24	Ongoing
Halon-1211	CBrClF <sub>2</sub>	2007-11-22	Ongoing
CFC-113	CCl <sub>2</sub> FCClF <sub>2</sub>	2007-07-20	Ongoing
chloroform	CHCl <sub>3</sub>	2007-07-01	Ongoing
carbon tetrachloride	CCl <sub>4</sub>	2007-07-20	Ongoing
Methyl Chloroform	CH <sub>3</sub> CCl <sub>3</sub>	2007-07-20	Ongoing
CFC-11	CCl <sub>3</sub> F	2007-07-20	Ongoing

**Aerosol Surface In-Situ (/gmd/aero/net/)**

Parameter	Formula	First Sample Date	Status
Light Scattering Coefficient	$\sigma_{sp}$	2011-01-10	Ongoing
Light Absorption Coefficient	$\sigma_{ap}$	2011-01-10	Ongoing
Particle Number Concentration	N <sub>t</sub>	2011-01-10	Terminated - 2011-07-21

**Radiation In-Situ Observatory (/gmd/grad/field.html)**

Parameter	Formula	First Sample Date	Status
Direct Normal		2006-05-28	Terminated - 2017-04-30
Downwelling Shortwave		2006-05-28	Terminated - 2017-04-30
Diffuse		2006-05-28	Terminated - 2017-04-30

Parameter	Formula	First Sample Date	Status
Upwelling Shortwave		2006-05-28	Terminated - 2017-04-30
Downwelling Longwave		2006-05-28	Terminated - 2017-04-30
Upwelling Longwave		2006-05-28	Terminated - 2017-04-30

**Surface Ozone (/gmd/ozwv/surfoz/)**

Parameter	Formula	First Sample Date	Status
Ozone	O <sub>3</sub>	2000-06-01	Ongoing





**Ozonesonde (/gmd/ozwv/ozsondes/index.html)**

Parameter	Formula	First Sample Date	Status
Ozone	O <sub>3</sub>	2005-02-12	Terminated - 2017-07-25

**Meteorology**

Parameter	Formula	First Sample Date	Status
Wind Speed	ws	2008-06-25	Ongoing
Wind Direction	wd	2008-06-25	Ongoing
Temperature	temp	2008-06-26	Ongoing
Ambient Pressure	press	2008-06-25	Ongoing
Relative Humidity	rh	2008-08-15	Ongoing

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