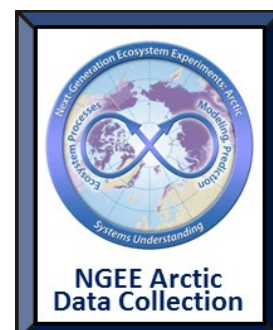


Radiocarbon in CO₂ and Soil Organic Matter from Laboratory Incubations, Utqiagvik (Barrow), Alaska, 2012

NGEE Arctic Record_id: NGA149

Review and follow the current NGEE Data and Fair-Use Policies prior to using these data (<https://ngee-arctic.ornl.gov/data-policies>).



Summary:

Dataset includes $\Delta^{14}\text{C}$ measurements made from soil organic matter and CO₂ from laboratory soil incubations of active layer soils collected in Utqiagvik (Barrow), Alaska in 2012. In addition to $\Delta^{14}\text{CO}_2$, dataset CO₂ production rates and carbon and nitrogen concentrations. Samples were collected from intensive study site 1 areas A, B, and C, and the site 0 and AB transects, from specified positions in high-centered, flat-centered, and low centered polygons.

Please use this citation to reference the data.

Vaughn, L.S., and Torn, M.S. 2018. Radiocarbon in CO₂ and Soil Organic Matter from Laboratory Incubations, Utqiagvik (Barrow), Alaska, 2012. Next Generation Ecosystem Experiments Arctic Data Collection, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tennessee, USA. Dataset accessed on [date] at <http://dx.doi.org/10.5440/1418852>.

Associated Publication

Vaughn, L.J.S., and M.S. Torn. 2019. ^{14}C evidence that millennial and fast-cycling soil carbon are equally sensitive to warming. *Nature Climate Change*, 9, 467–471.
<https://doi.org/10.1038/s41558-019-0468-y>

Data Characteristics

Measurements from 2012 sampling campaign of $\Delta^{14}\text{CO}_2$ from laboratory incubations; $\Delta^{14}\text{C}$ and carbon and nitrogen concentrations from soil organic matter; and CO₂ production rates.

There is 1 comma-delimited data file (.csv) within this dataset.

Not measured, not applicable, and missing values are represented by “NA”.

Data Files:

Radiocarbon_incubation_Barrow_2012_20180209.csv

column_name	units/format	Description
region		North Slope
locale		Barrow
administrative_area		BEO
site		Intensive site 1, Site 0 transect
plot_type		Biogeochemistry
polygon		individual polygon within specified area
position		center, edge, or trough of polygon
type		polygon type (low, flat, or high-centered)
plot_id		The name of the profile or plot from which the sample was collected
easting	m	location in UTM coordinates, zone 4
northing	m	location in UTM coordinates, zone 4
observation_date	yyyy-mm-dd	The date at which the measurement was made, or sample was collected from the field.
sample_date	yyyy-mm-dd	For CO ₂ samples collected from laboratory incubations, the date the sample was collected from the incubation.
sample_name		A unique name for an individual sample to which $\Delta^{14}\text{C}$ measurement corresponds
sample_type		Type of material analyzed. (bulk soil or CO ₂)
temperature	C	Incubation temperature
pretreatment		For soil samples, description of the pretreatment method used to prior to radiocarbon analysis.
incubation_note		If sample underwent a laboratory incubation, provide incubation temperature, incubation duration, and other relevant information
rc_lab		Laboratory code for radiocarbon laboratory. Complete list of past and present laboratory codes can found published in Radiocarbon in November 2011 (http://www.radiocarbon.org/Info/labcodes.html).
layer_top	cm	The top (upper) depth of the layer. The surface of the non-green (i.e. non-living) surface layer is "0". The top of the O-horizon should be 0.
layer_bot	cm	The bottom (lower) depth of the layer.
oc	%	Percent by weight of carbon in an oven-dried soil sample with material >2 mm or 1 cm diameter removed.

column_name	units/format	Description
n_tot	%	Percent by weight of nitrogen (organic and inorganic) in an oven-dried soi sample.
13C	‰	$\delta^{13}\text{C}$ of the sample relative to Pee Dee Belemnite.
14C	‰	$\Delta^{14}\text{C}$ of the sample relative to NBS Oxalic Acid standard.
14C_sigma	‰	$\Delta^{14}\text{C}$ analytical error
fraction_modern		Deviation of the sample from modern. Modern is defined as 95% of the radiocarbon concentration (in AD 1950) of NBS Oxalic Acid standard, ^{13}C -corrected.
fraction_modern_sigma		Fraction modern analytical error
rc_year	YYYY	Year in which radiocarbon analysis was performed on the sample.
14C_age	BP	Uncalibrated radiocarbon age of the sample, as calculated from corrected fraction modern, using the Libby half-life value of 5568 years
14C_age_sigma	BP	Error estimate for the uncalibrated radiocarbon age
CO2_production	mgC gsoil-1 d-1	Average CO2 production rate during the incubation

Example Data Records:

Radiocarbon incubations Barrow 2012.csv

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region,locale,administrative_area,site,plot_type,polygon,position,type,plot_ID,easting,northing
,observation_date,sample_date,sample_name,sample_type,temperature,pretreatment,incubatio
n_note,rc_lab,layer_top,layer_bot,oc,n_tot,13C,14C,14C_sigma,fraction_modern,fraction_mo
dern_sigma,rc_year,14C_age,14C_age_sigma,CO2_production
,,,,,,m,m,yyyy-mm-dd,yyyy-mm-
dd,,,C,,,,cm,cm,%,% ,permil,permil,permil,,,yyyy,BP,BP,mgC gsoil-1 d-1
North Slope,Barrow,BEO,Intensive site
1,Biogeochemistry,A1,Center,Low,A1C,585530.849,7910413.488,2012-08-14,2012-09-
04,A1C 0-7 9/4/12,CO2,5,NA,CO2 produced during 13-day aerobic incubation at 5 degrees
C,CAMS,0,14,NA,NA,-28.7,18.6,3,1.0263,0.003,2013,>Modern,NA,0.00768
North Slope,Barrow,BEO,Intensive site
1,Biogeochemistry,A1,Center,Low,A1C,585530.849,7910413.488,2012-08-14,2012-09-
04,A1C 7-12.5 9/4/12,CO2,5,NA,CO2 produced during 13-day aerobic incubation at 5 degrees
C,CAMS,14,30,NA,NA,-27.9,-141.8,2.8,0.8648,0.0028,2013,1165,30,0.018

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Data Acquisition Materials and Methods

Soil cores for laboratory incubations were collected using manual push corers and held at 5 °C until beginning of incubation. Soils were then divided by horizon, living vegetation was removed from surface layer, and samples were incubated individually in glass jars. Incubations were conducted in 3 sequential periods. In period 1, soils were incubated at 5 °C for 13 days; in period 2, soils were incubated at 10 °C for 16 days; in period 3, soils were incubated at 5 °C for 21 days. CO₂ for radiocarbon analysis was collected at the end of each period into evacuated stainless steel sampling canisters or glass vials. Incubation jars were flushed with CO₂-free air prior to each incubation period. Headspace CO₂ concentrations in incubation jars were not permitted to exceed 20,000 ppm.

For all $\Delta^{14}\text{CO}_2$ measurements, CO₂ was cryogenically purified and reduced to graphite prior to $\Delta^{14}\text{C}$ analysis with accelerator mass spectrometry (AMS). Following incubations, remaining soil organic matter from incubated soils was combusted to CO₂, which was then processed for $\Delta^{14}\text{C}$ as CO₂ from gas samples. $\Delta^{13}\text{C}$ analyses for use in $\Delta^{14}\text{C}$ calculations were performed at the UC Davis Stable Isotope Laboratory.

Data Access:

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