**Soil Organic Carbon Degradation during Incubation, Barrow, Alaska, 2012**

**Review and follow the current NGEE Data and Fair-Use Policies prior to using these data (**[**http://ngee-arctic.ornl.gov/content/ngee-arctic-data-management-policies-and-plans**](http://ngee-arctic.ornl.gov/content/ngee-arctic-data-management-policies-and-plans)**).**

**Summary:**

This dataset provides information about soil organic carbon decomposition during soil incubation studies. The soil cores were collected in 2012 from a low-center polygon (Area A) in the NGEE Arctic Study area, Barrow, Alaska, and were incubated in the laboratory at different temperatures for up to 60 days. Transformations of soil organic carbon were characterized by UV and FT-IR spectroscopic analyses, and small organic acids in water-soluble carbons were quantified by ion chromatography during the incubation (Herndon et al., 2015). There are 4 comma-separated (.csv) files provided with this data set.

**Please use this citation to reference the data:**

Herndon, E.M., Z. Yang, B. Gu. 2016. **Soil Organic Carbon Degradation during Incubation, Barrow, Alaska, 2012**. Next Generation Ecosystem Experiments Arctic Data Collection, Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, Oak Ridge, Tennessee, USA. Data set accessed at <http://dx.doi.org/10.5440/1168992>

**Please use this citation for the related publication:**

Herndon, E.M., Yang, Z., Bargar, J. et al. 2015. **Geochemical drivers of organic matter decomposition in arctic tundra soils.** Biogeochemistry 126: 397.

<http://dx.doi.org/10.1007/s10533-015-0165-5>

**Related data sets:**

**For more detailed soil properties of the cores used in these incubations, please refer to:**

Taniya RoyChowdhury, Elizabeth Herndon, Tommy Phelps, Baohua Gu, Dwayne Elias, Liyuan Liang, David Graham. 2014. Soil Physicochemical Characteristics from Ice Wedge Polygons, Barrow, Alaska, Ver. 1. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, Oak Ridge, TN, U.S.A. Dataset accessed at <http://dx.doi.org/10.5440/1109232>

Ziming Yang, Stan D. Wullschleger, Liyuan Liang, David E. Graham, Baohua Gu. Organic Carbon Transformation and Mercury Methylation in Tundra Soils from Barrow, Alaska. 2016. Next Generation Ecosystem Experiments Arctic Data Collection, Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, Oak Ridge, Tennessee, USA. Data set accessed at <http://dx.doi.org/10.5440/1235032>

**Data Characteristics:**

There are 4 comma-separated (.csv) files provided with this data set.

**Cores used in these incubations:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Core** | **Easting\_m** | **Northing\_m** | **Longtitude** | **Latitude** | **Elevation\_m** |
| NGADG0005 | 585566.096 | 7910494.188 | -156.6109924 | 71.281601 | 5.2600002 |
| NGADG0009 | 585563.144 | 7910496.304 | -156.6109924 | 71.281601 | 5.1100001 |
| NGADG0017 | 585572.967 | 7910489.012 | -156.6100006 | 71.2815018 | 5.1399999 |

**Data Dictionary:**

|  |  |  |
| --- | --- | --- |
| **Filename : Soil\_organic\_acids\_data\_20161219.csv** | | |
|  |  | “Zero” Value Note: For organic acids, when the reported value is zero (0.00), the measured value was considered undetectable. |
| **Column\_name** | **Units** | **Description** |
| CORE\_ID |  | NGEE Arctic core identifier: NGADG0005, NGADG0009, and NGADG0017 |
| SAMPLE\_ID |  | NGEE Arctic sample identifier |
| REGION |  | North Slope |
| LOCALE |  | Barrow |
| SITE |  | Intensive Site 1 |
| AREA |  | A |
| POSITION |  | Microtopography: Ridge, Trough, or Center |
| HORIZON |  | Mineral or Organic layer |
| INCUBATION\_TEMP | deg C | -2, 4, or 8 |
| ORGANIC\_ACID |  | Formate, Acetate, Propionate, or Butyrate |
| DAY\_0 | umol\_C\_g-1\_SOC | Concentration of the respective organic acid at start of incubation – as umole of carbon per gram of soil organic carbon. |
| DAY\_30 | umol\_C\_g-1\_SOC | Concentration of the respective organic acid after Day 30 of incubation – as umole of carbon per gram of soil organic carbon. |
| DAY\_60 | umol\_C\_g-1\_SOC | Concentration of the respective organic acid after Day 60 of incubation – as umole of carbon per gram of soil organic carbon. |

|  |  |  |
| --- | --- | --- |
| **Filename : Soil\_organic\_carbon\_FTIR\_data\_20161219.csv** | | |
|  |  |  |
| **Column\_name** | **Units** | **Description** |
| CORE\_ID |  | NGEE Arctic core identifier |
| SAMPLE\_ID |  | NGEE Arctic sample identifier |
| REGION |  | North Slope |
| LOCALE |  | Barrow |
| SITE |  | Intensive Site 1 |
| AREA |  | A |
| POSITION |  | Microtopography: Ridge, Trough, or Center |
| HORIZON |  | Mineral or Organic layer |
| INCUBATION TEMPERATURE | deg\_C | -2, 4, or 8 |
| EXTRACTED\_FRACTION |  | water\_soluble |
| DAYS |  | Days of extraction: 0, 30, 60 |
| 649.9 | IR\_wavenumber\_cm-1 | Column heading is the Wavelength\_nm (2 nm resolution) and value is IR\_wavenumber\_cm-1 |
| … |
| 4001.63 |

|  |  |  |
| --- | --- | --- |
| **Filename : Soil\_organic\_carbon\_UV\_data\_20161219.csv** | | |
|  |  |  |
| **Column\_name** | **Units** | **Description** |
| CORE\_ID |  | NGEE Arctic core identifier |
| SAMPLE\_ID |  | NGEE Arctic sample identifier |
| REGION |  | North Slope |
| LOCALE |  | Barrow |
| SITE |  | Intensive Site 1 |
| AREA |  | A |
| POSITION |  | Microtopography: Ridge, Trough, or Center |
| HORIZON |  | Mineral or Organic layer |
| PRE\_OR\_POST\_INCUBATION |  | Extraction timing |
| EXTRACTED\_FRACTION |  | water\_soluble |
| INCUBATION\_TEMP | deg\_C | -2 or 8 |
| DAYS |  | Days of extraction: 0, 30, 60 |
| Data column: 190 | Absorptivity\_L mmol C-1 m-1 | Column heading is Wavelength\_nm (1 nm resolution) and value is Absorptivity\_L mmol C-1 m-1 |
| … |
| Data column: 1100 |

|  |  |  |
| --- | --- | --- |
| **Filename : Soil\_organic\_carbon\_data\_20161219.csv** | | |
|  |  |  |
| **Column\_name** | **Units** | **Description** |
| CORE\_ID |  | NGEE Arctic core identifier |
| REGION |  | North Slope |
| LOCALE |  | Barrow |
| SITE |  | Intensive Site 1 |
| AREA |  | A |
| POSITION |  | Microtopography: Ridge, Trough, or Center |
| HORIZON |  | Mineral or Organic layer |
| TOTAL\_SOC | mmol g-1 | Total soil organic carbon |
| WSC | µmol g-1 | Water soluble carbon |

**Data Acquisition Materials and Methods:**

Soil sampling and processing, soil microcosm incubations, and analytical techniques are described in detail in Herndon et al., 2015.

Additional analyses of these soil samples are described in Yang et al., 2016

**References:**

Roy Chowdhury, T., Herndon, E.M., Phelps, T.J., Elias, D.A., Gu, B.H., Liang, L.Y., Wullschleger, S.D., Graham, D.E., 2015. Stoichiometry and temperature sensitivity of methanogenesis and CO2 production from saturated polygonal tundra in Barrow, Alaska. Global Change Biology 21, 722e737.

Yang, Ziming, Stan D. Wullschleger, Liyuan Liang, David E. Graham, Baohua Gu. 2016. **Effects of warming on the degradation and production of low-molecular-weight labile organic carbon in an Arctic tundra soil.** Soil Biology and Biochemistry, Volume 95, Pages 202-211, ISSN 0038-0717, <http://dx.doi.org/10.1016/j.soilbio.2015.12.022>.

Herndon, Elizabeth M., Ziming Yang, John Bargar, Noemie Janot, Tom Z. Regier, David E. Graham, Stan D. Wullschleger, Baohua Gu, and Liyuan Liang. 2015. Geochemical drivers of organic matter decomposition in arctic tundra soils. Biogeochemistry 126: 397. <http://dx.doi.org/10.1007/s10533-015-0165-5>

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