## Frequently Asked Questions

More information including the data use policy, list of participants, and list of data contributors can be found at the following website: https://arcticdata.io/reconciling-historical-and-contemporary-trends-in-terrestrial-carbon-exchange-of-the-northern-permafrost-zone/

**Who is leading this synthesis?**

This activity has workshops funded by the Arctic Data Center under the umbrella of syntheses organized by the Permafrost Carbon Network, www.permafrostcarbon.org

**Who is participating in this synthesis?**

The group leading this synthesis is composed of people from a variety of research institutes in the USA, Canada, Europe, Japan and Korea. A full list of participants is included on our website. Our intention is to create a network of data producers that work together to integrate data across this region. Participation in this synthesis is open to the full community; please contact the organizers if you would like to become involved.

**What are the goals of this synthesis?**

This synthesis has three main goals. We will:

1. Reconcile two past C flux syntheses (Belshe et al. 2013; McGuire et al. 2012) and bring to completion a non-summer (winter, spring, fall) season flux synthesis (Natali et al. in review) to create a new, comprehensive database that incorporates multiple C flux measurement techniques (chambers, eddy covariance towers).
2. Merge contemporary data with the historic syntheses so that C dynamics for the permafrost zone can be reported as close to the present time as data processing allows.
3. Provide a framework (protocols+code) for seasonal and annual gap-filling across multiple C flux measurement techniques to facilitate the addition of new permafrost zone C flux data as they become available. This framework will allow the dataset to be updated on an annual basis, and thus be incorporated into important communication outlets like NOAA's Arctic Report Card.

*References*

Belshe, E. F., Schuur, E. A. G. & Bolker, B. M. Tundra ecosystems observed to be CO2 sources due to differential amplification of the carbon cycle. *Ecology Letters* **16**, 1307-1315, doi: 10.1111/ele.12164 (2013).

McGuire, A. *et al.* An assessment of the carbon balance of Arctic tundra: comparisons among observations, process models, and atmospheric inversions. *Biogeosciences* **9**, 3185-3204, doi:10.5194/bg-9-3185-2012 (2012).

**Will I be a co-author on studies following from this synthesis activity?**

Everyone who contributed to the database will be a co-author on the dataset archived with Arctic Data Center (citable with a unique DOI). Further offers of co-authorship depend on whether data is shared under Tier One or Tier Two as described in the data use policy. In case of a synthesis using both Tier One and Tier Two data, all data should be treated as Tier Two.

The immediate intentions for this dataset are to conduct a time-series analysis to evaluate how NEE has changed over the past decades. This will occur in the course of 2019 and everyone who has contributed data will be invited as a manuscript co-author.

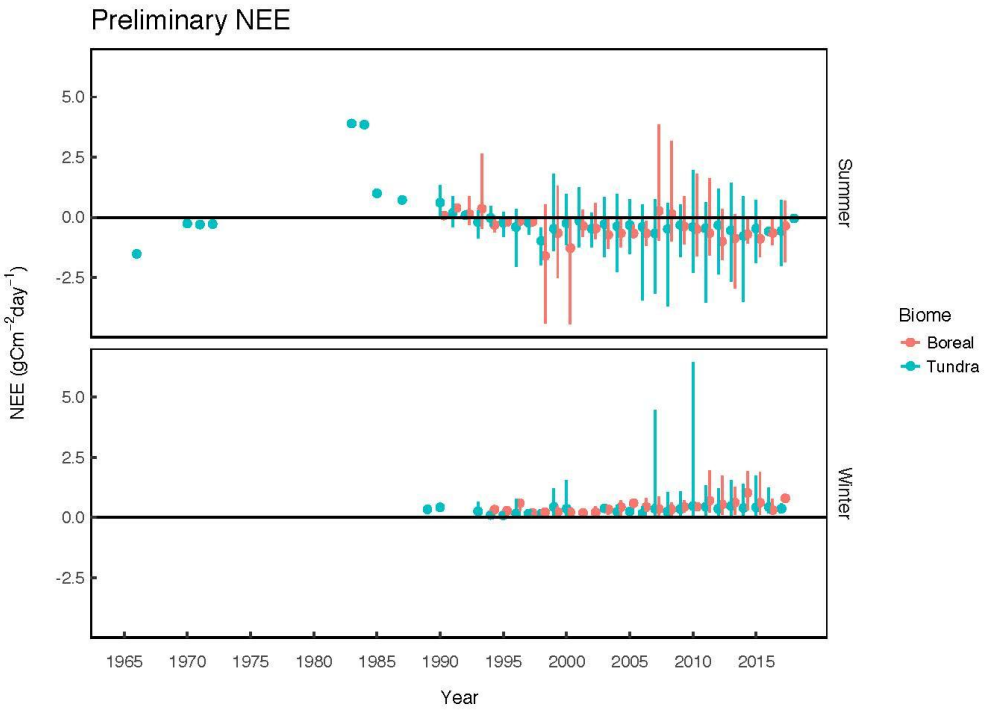


Figure 1: Preliminary mean NEE with max/min ranges from multiple high-latitude sites over the years by season and biome. This graph contains data contributed by 9 Oct 2018.

In addition, we will invite everyone who submitted data to participate on other publications that follow from this synthesis.
We will accept new data contributions until November 30th 2018. After this date we will check the data for errors and consistency, conduct some preliminary analysis, and send updates to data contributors.

**Where will the database be hosted?**

The completed dataset will be hosted by the Arctic Data Center, www.arcticdata.io

**What type of data is used in the synthesis?**

We invite whole-ecosystem, net ecosystem CO2 exchange measurements (NEE) made with either clear chambers or eddy covariance techniques from the entire permafrost zone, including permafrost and non-permafrost boreal and arctic ecosystems. Data should be submitted in aggregated form as cumulative NEE, ideally at monthly intervals. If monthly is not possible we are happy to accept aggregated time intervals anywhere from 2-weeks to growing season/non-growing season.

**How does this activity differ from others, like Fluxnet?**

The goal of this synthesis activity is to build a community-contributed data set that will make it easier to evaluate the state of the Arctic CO2 balance. To this end we ask individual site PIs to contribute aggregated NEE data to create a long time series for carbon fluxes with as much spatial representation

across the Arctic-Boreal Region as possible. We do not seek to replace current online repositories such as Fluxnet, but aim to be complementary. We only ask for data aggregated to a two-week period or longer, and also include chamber fluxes and not just eddy covariance data.

**How do I join this activity and submit data?**

We will accept new data contributions until November 30th 2018. You can participate by entering your data in the relevant excel sheet for chambers or for towers and send it to us at marguerite.mauritz -at- nau.edu and ted.schuur -at- nau.edu. If you are reading this later and are interested, please contact us. Data sheets and instructions can be found here:
https://drive.google.com/drive/folders/1TtbjlHuB3oVQo8wwrhNrD3UJTMExXGPw?usp=sharing

**What kind of data is required?**

We invite people to contribute as much flux data, and metadata, as possible. The desired core variables include NEE and some basic site information. Variables are listed in the excel sheet used for data submission. These variables are color-coded as ‘compulsory’, ‘important’ and ‘nice to have’ to indicate their importance.

**What are the terms of use of this database?**

We will follow the same basic policy as established by Fluxnet, where site PI’s can share their data under Tier One or Tier Two access, as described in the data use policy . The Arctic Data Center will manage data access, where Tier One is open and follows a fair use policy, while Tier Two is more restricted.

**How should the database be acknowledged?**

The data will be archived with the Arctic Data Center and will be issued a DOI. All contributors will be listed as authors on the dataset, and the DOI will be citeable.

# DATA USE POLICY

This data use policy has been adapted from the data use policy that has been put in place for the FLUXNET2015 Dataset. The Arctic CO2 Synthesis Dataset 2018—and its data policy—are designed to facilitate synthesis activities involving a large number of sites. All studies should acknowledge the Arctic CO2 Synthesis Dataset and also follow Tier One and Tier Two data policies as appropriate for the sites they use—see tier details and acknowledgment text below. Studies limited to a single region or relatively small number of sites should follow the data policy of the relevant regional network.

## TIER ONE

**Tier One** data are open and free for scientific and educational purposes and their use will follow the fair use policy, stated here. Data users describe the intended use of the data when they fill out the data-download form; this intended-use statement will be emailed to the data producer(s) and posted on the Arctic Data Center website (https://arcticdata.io). The fair use policy dictates that (1) data producers are informed of who uses the data and for what purpose (which can be satisfied by the aforementioned mechanism) and (2) that proper acknowledgment and citations are given to all data used in a peer reviewed publication, via the following protocols: The data citation will be either a per-site DOI that is provided with the data download or a citation of a publication for each site. Every publication should use the standard acknowledgment given below. It is requested that every publication specify each site used with their unique ID, data-years used, data DOI (in preparation), and brief acknowledgment for funding (if provided by a site PI) in the text or supplementary material. Finally, all data providers should be informed of forthcoming publications.

## TIER TWO

**Tier Two** data are from producers who are currently unable to share their data in an open manner. All terms are the same as for Tier 1 above **except that in addition data producers must have opportunities to collaborate and consult with data users**. Data users describe the intended use of the data when they fill out the data-download form; this intended-use statement will be emailed to the data producer(s) and posted on the Arctic Data Center website (https://arctidata.io). Data users who intend to publish research using Tier Two data must (1) have an up-to-date research description in the intended-use statement that is posted at (https://arcticdata.io) and (2) contact the data providers (email list is provided with data download) when you begin research that could lead to a publication. Citations and Acknowledgments in publications follow the protocol for Tier One. As a guideline to interaction between data users and providers, data providers have a responsibility to respond within three weeks of the initial request for interest in collaboration, and must be given at least, and respond within, three weeks to contribute to analysis and manuscript after the first draft is completed. Substantive contributions result in co-authorship.

**IMPORTANT:** (1) Data from a single site may be designated as Tier 1 or Tier 2 by year (i.e., some years can be Tier 1 and some Tier 2). (2) In case of a synthesis using both Tier 1 and Tier 2 data, all data should be treated as Tier 2.

### Standard acknowledgment

This work used a dataset of Chamber and Eddy Covariance NEE flux data extracted from published literature included in previous syntheses (McGuire, Belshe, Virkkala, Natali) and unpublished data contributions. These data were compiled with funding from the Arctic Data Center and are archived at the Arctic Data Center.