Experimental Freeze-down of tundra soils

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DATA SET OVERVIEW:
This data set contains results from an experiment analyzing the effects of freezing on soil nutrient and microbial dynamics. Specifically the experiment assessed a) the rate at which soil freezes (does it matter if it has time to acclimate at near-freezing temperatures?), and b) the final temperature of freezing (-2° vs. -20° C). Measurements included microbial respiration, biomass, nutrient mineralization, and release of soluble/extractable organic C&N.

DATA COLLECTION AND PROCESSING:
Soil Samples were collected from the Toolik Lake Long Term Ecological Station Research plots for moist acidic tussock tundra and shrub tundra sites. Soil samples were taken during the growing season and returned to the laboratory. They were equilibrated at +4º C for 5 days and then treated to one of the following experimental treatments:

1. Control: sampled at end of equilibration phase
2. Acclimated: cooled (1 º/day for three days) to +1 and maintained there for 5 days.
3. Slow freeze: Acclimated at +1 for 5 days, and then frozen to -2 C and incubated for 2 weeks.
4. Fast freeze: Frozen rapidly from +4 to -2 C and incubated for 2 weeks
5. Deep freeze: Frozen rapidly from +4 to -20 C and incubated for 2 weeks.

Soils were incubated at the final temperature in sealed jars and respired CO2 measured. At the end of incubation, samples were analyzed for inorganic N pools, extractable organic C and N, microbial biomass by substrate induced respiration.

Inorganic N pools: extracted with K₂SO₄ (0.5 M; 1:5 extraction). Analyzed for NH₄⁺ and NO₃⁻ colorimetrically (NH₄⁺ by acidification and diffusion into a pH indicator solution; NO₃⁻ by Cadmium reduction and Griess Ilosvay reaction).

Extractable organic C and N (EOC/EON): the same extracts analyzed on Shimadzu organic C/N analyzer.

Microbial biomass: The Substrate induced respiration index of microbial biomass was used. Yeast extract is added to a soil slurry and the rate of respiration is measured over 6 hours. This is an index of the overall size of the microbial biomass.
DATA FORMAT:

Data is in EXCEL spreadsheet.

Page 1: Extractable C & N; Fumigated & extracted C & N; microbial C & N flush
Page 2 Pivot table averages by soil type and time
Page 3 Averages of each treatment.

DATA REMARKS:

All values are the output of lab-based chemical analysis and are rigorously established against known standards. Each sheet has a column with flag values to explain any limitations or issues with particular values.