Plant Residue Decay in Diverse Canadian Soils
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Introduction
Decay of plant residues is tied to many ecosystem functions affecting atmospheric CO2, plant-available nutrients, microbial diversity, soil organic matter quality, among others. The rate of decay, in turn, is governed by a range of management, soil, and environmental variables, some of which may be changing in coming decades.

Objective
To evaluate effects of soil type and climate on plant residue decay and C stabilization in Canadian soils.

Materials and Methods
- 13C-labelled barley residues (10.2 atom%) contained in open-ended cylinders, 10 cm diam. X 15 cm long, inserted 10 cm in soil.
- Annual residue rate: 200 g C m⁻² (3.6 g dry matter/microcosm) 13C-enriched residues added in 2007, unlabelled (12C) residues thereafter. 
- NH₄NO₃ added every spring (40 kg N ha⁻¹).
- Hourly soil temperature was logged throughout the year at each site.

Study sites in Canadian agroecosystems
Site collaborators: B. Zebarth (Fredericton,NB), D. Angers (Levis, Que), R. Beyaert (Delhi, ON), C. Drury (Woodslee,ON), D. McAndrew (Morden,MB), G. Lafond (Indian Head,SK), B. McConkey (Swift Current,SK), R. Purveen (Breton,AB).

Results
Decomposition rate: Recovery of applied residue C declined quickly – roughly half was lost within 1 year – after that the rate of loss slowed

Residue C recovery: After 3 years, the amount of applied 13C remaining ranged from 13 to 28%

Soil temperature control: Most of the difference in observed loss among sites was related to variation in soil temperature

Conclusions
- These findings illustrate the differences in initial decay rates across diverse sites, but suggest that prediction of decay rate can be improved with a simple algorithm based on cumulative thermal units