Carbon budget of Finnish forests 1920-2002

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Outline

1. Introduction
2. Method
3. Results for Finland 1922-2002
4. Conclusions

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Introduction

Why?

- The forest carbon sinks were included in the Kyoto Protocol
- Carbon sinks can be credited
- Kyoto Protocol created need for reliable and transparent estimates of carbon budgets of forests

What was done?

- Forest carbon stock and stock changes were estimated (trees, understorey and soils) for Finland based on NFI (national forest inventory) data and models
- Uncertainties are identified related to assessment of forest carbon budget
- Methods used in forest carbon balance assessment were developed and improved

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Introduction

Integrated method to estimate forest carbon budget

We integrated:

- forest inventory data
- biomass models / BEF
- biomass turnover

e.g.

stem volume
↓
biomass of a foliage
↓
foliage litter
↓
foliage litter input to soil

- soil decomposition model

Application:

- Finland 1922 - 2002

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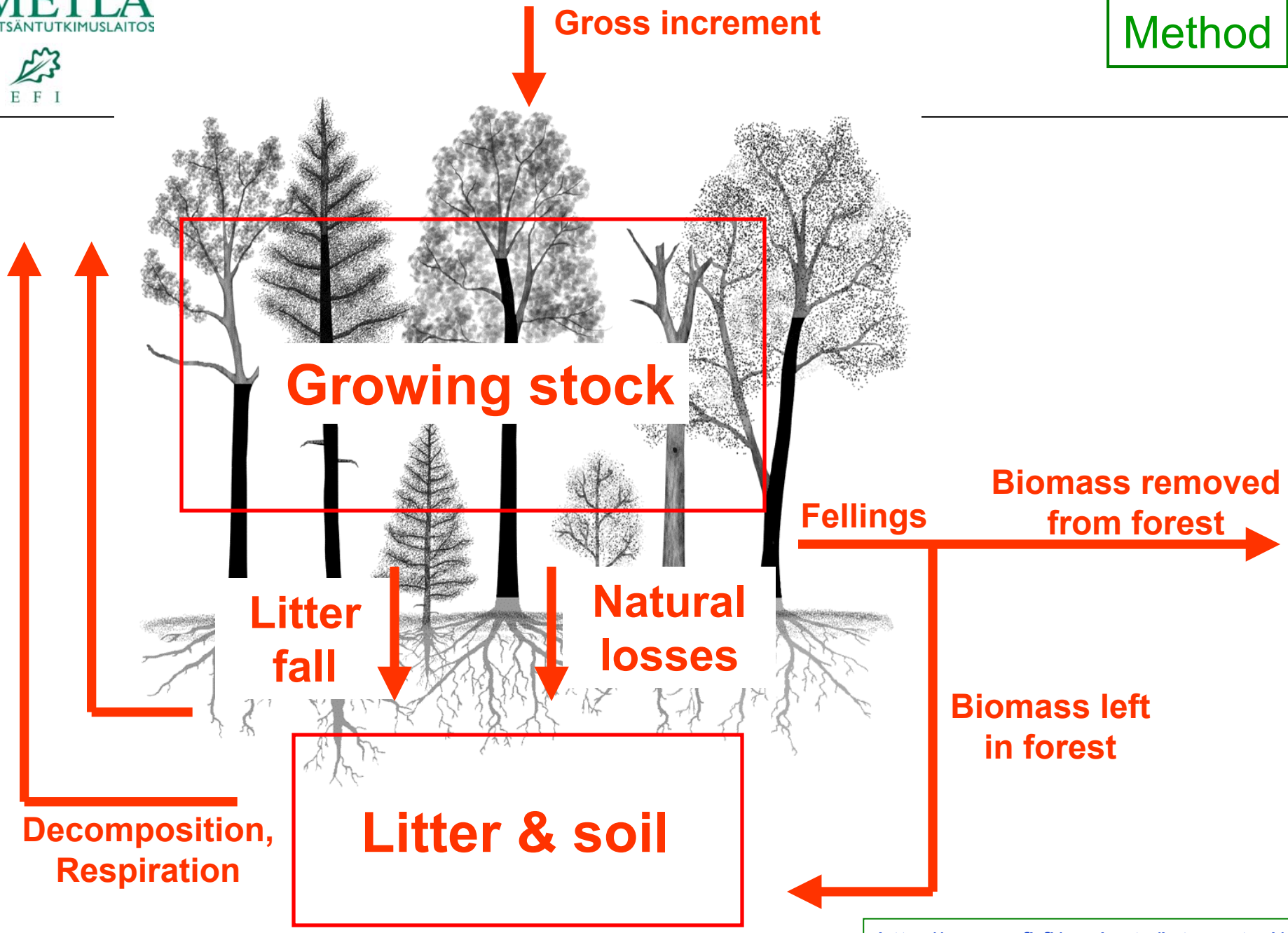
Method



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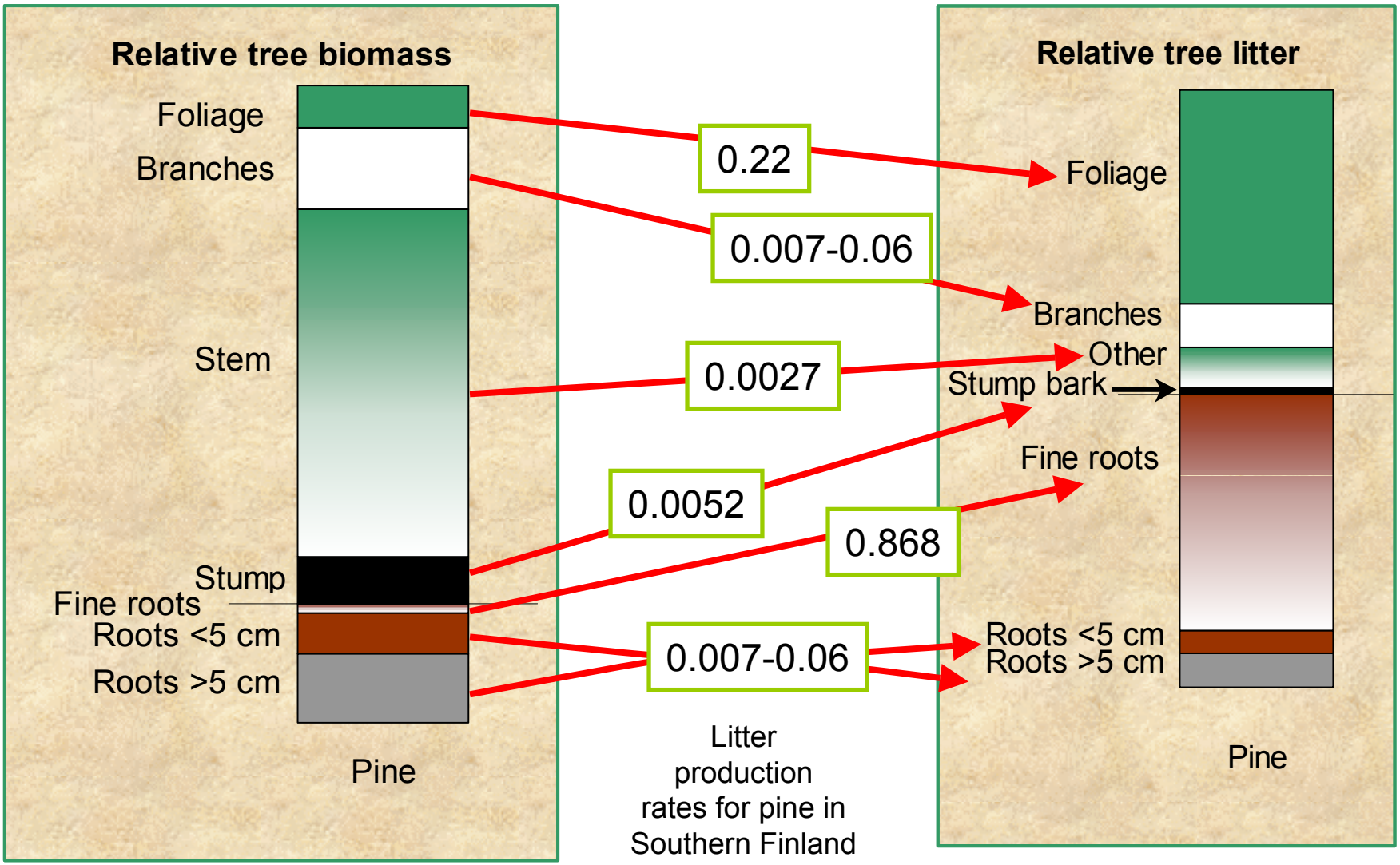
Litter production of standing trees

Method



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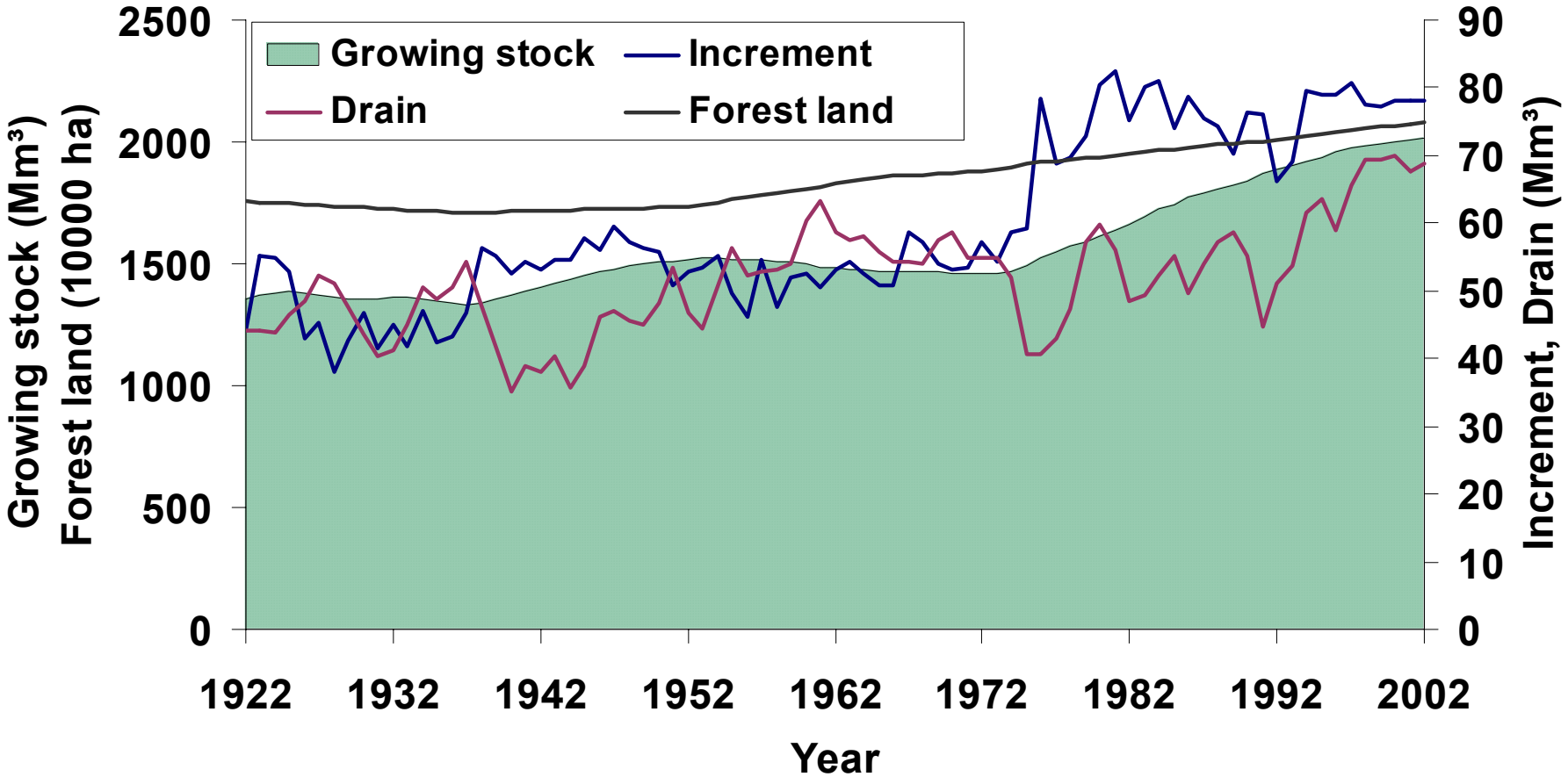
Forest balance in Finland

Results



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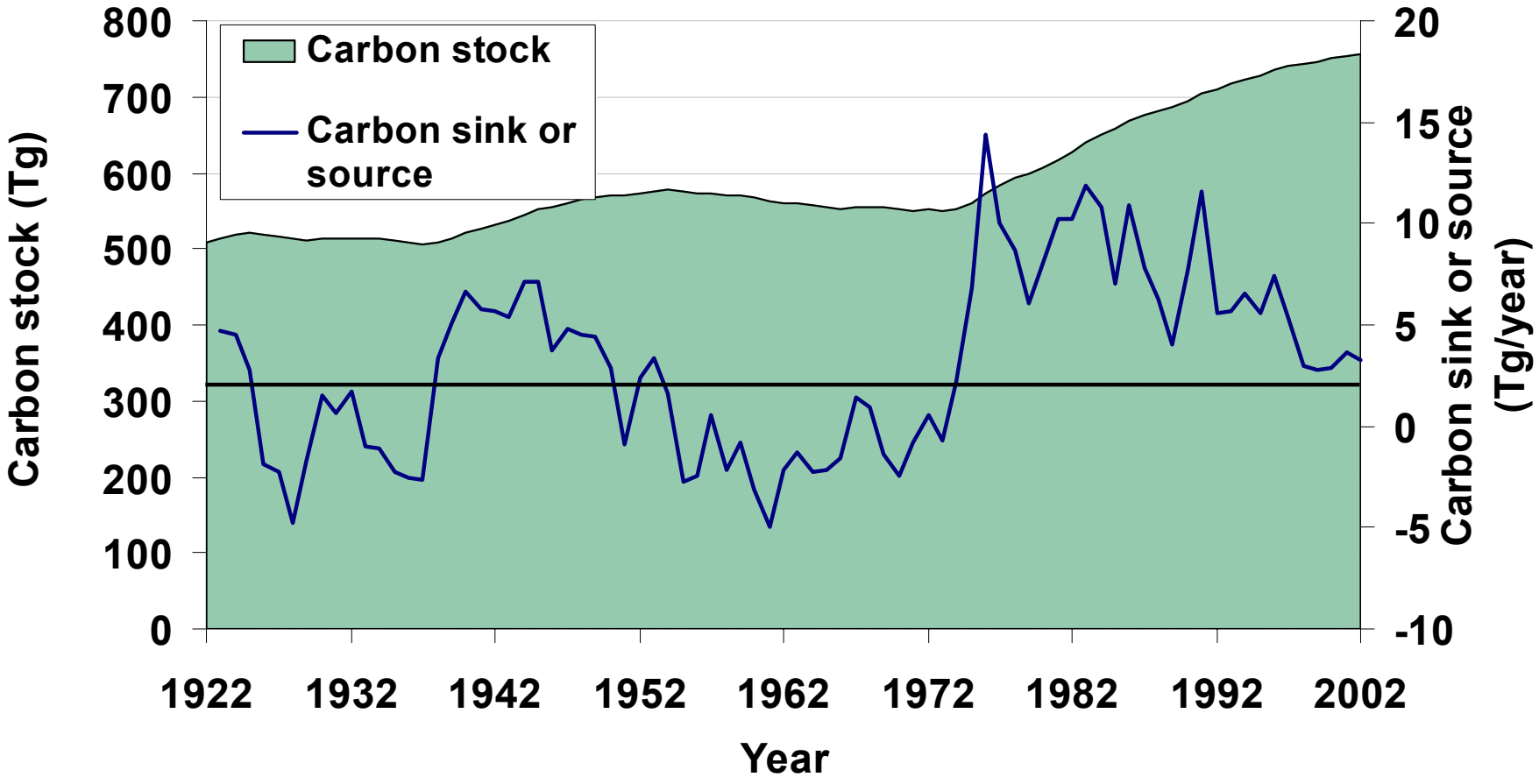
Carbon stock and carbon sink of trees

Results



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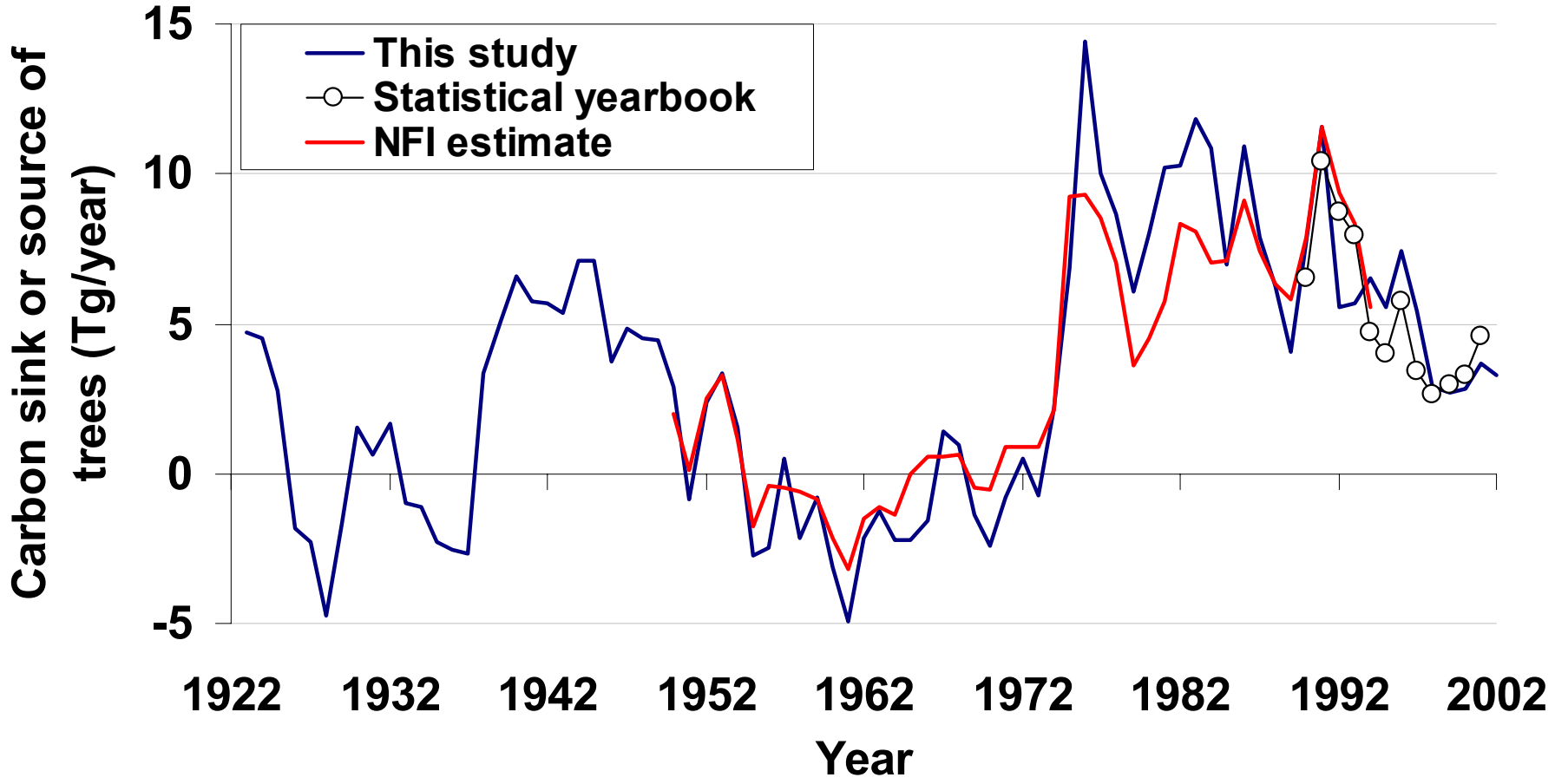
Carbon sink of trees, different methods



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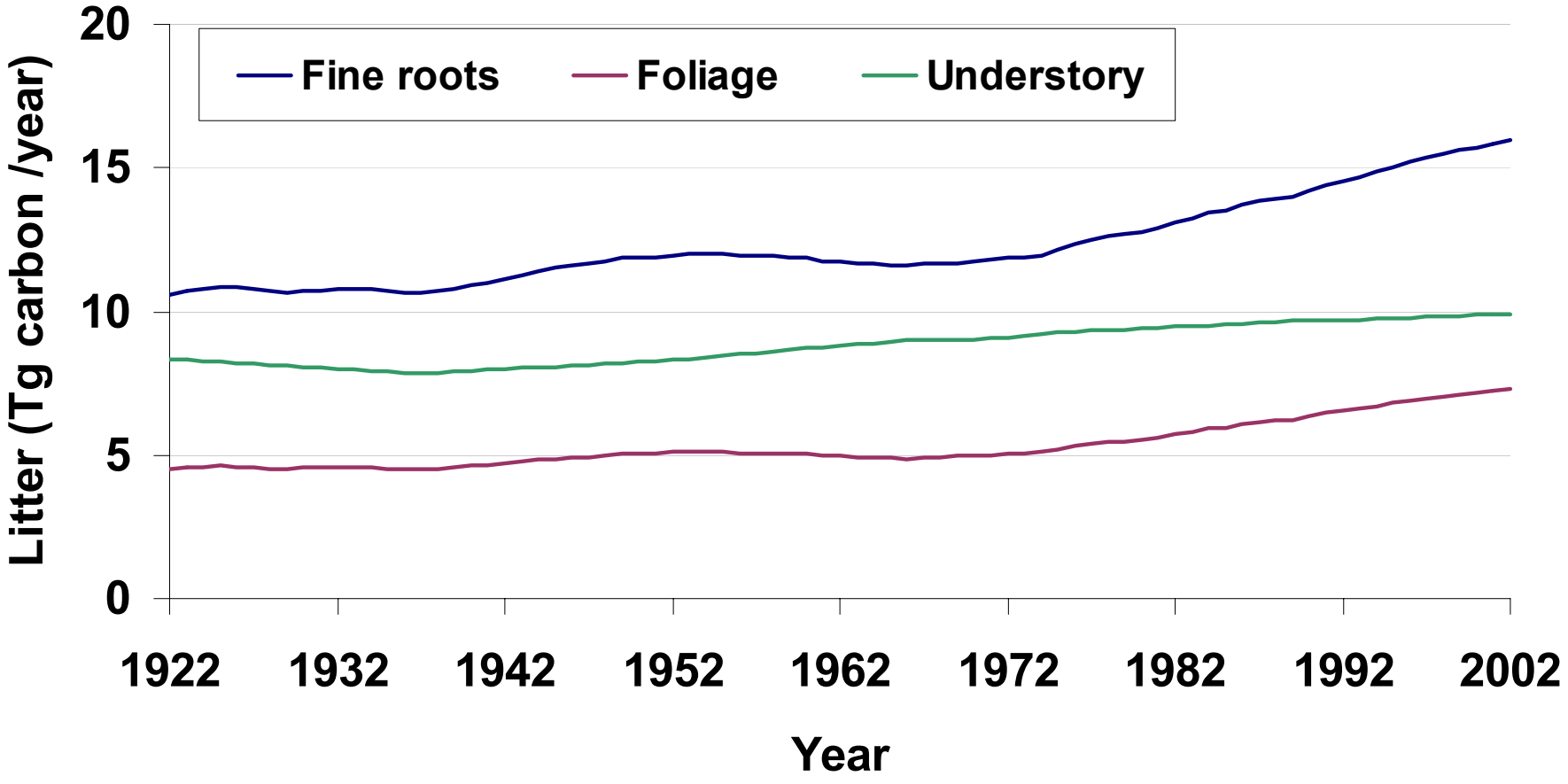
Litter production, major components

Results



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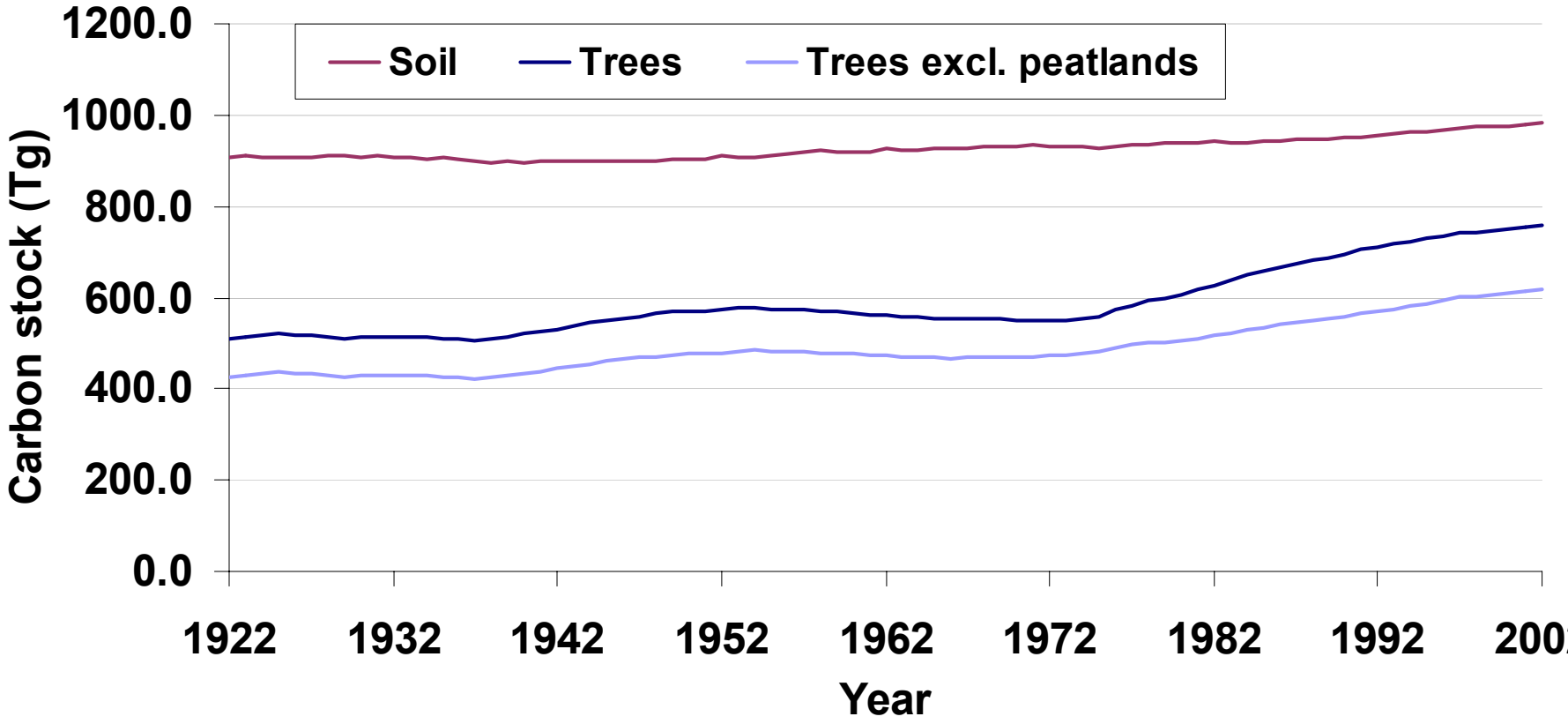
Carbon stock of soil

Results



Tg C	Mha	kg C m^{-2}	Reference
981	16.1	6.1	This study
1040	14.4	7.2	Kauppi et al. 1997
1109	17.8	6.2	Liski & Westman 1997
1315	19.9	6.6	- ” -

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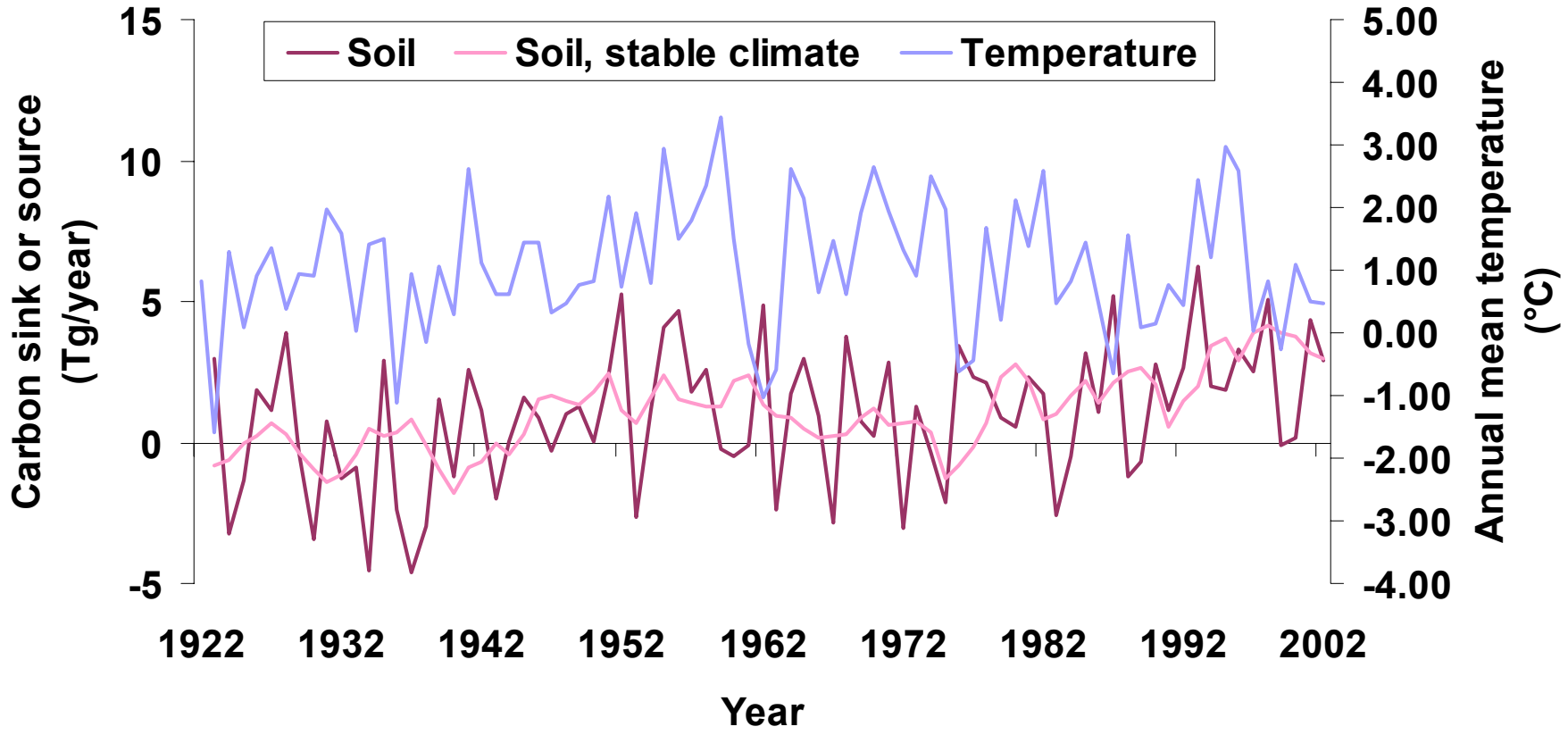
Carbon balance of soil

Results



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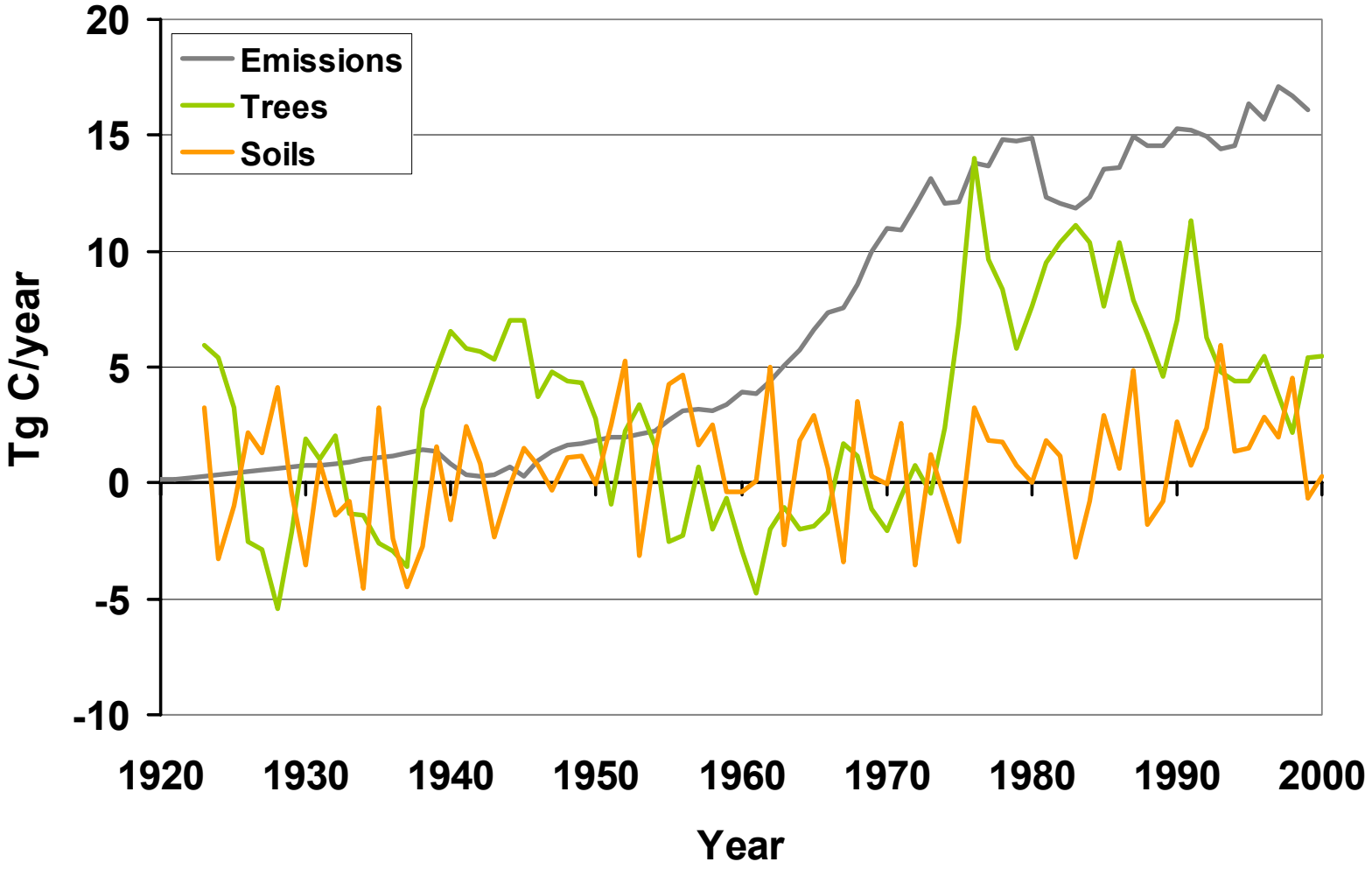
Fossil carbon emissions and forest carbon sinks

Results



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Conclusions

About results:

- Carbon stock of trees 8 % larger vs. previous estimate
- Carbon sink of trees more variable between years, average of 3 Tg C per year
- Changes in soil carbon estimated, average of 0.9 Tg C per year
- Soil contributes significantly to the carbon balance of Finnish forests
- Carbon balance of soil highly variable

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