T8-1
Evaluation of the greenhouse gas budget of terrestrial ecosystems in the Arctic region

- Collaborative paper plan
- Progresses in this FY2011

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Title: Evaluation of the carbon budget of Alaskan terrestrial ecosystems using a process-based model

Co-authored by PI, co-Pis, and participants (JAMSTEC & IARC)

Introduction

Severe global warming is expected to occur in the Arctic region.

Huge amount of carbon is stored as biomass and SOM in the Arctic region.

=> Strong GHG feedback.

But, high uncertainty.

Objectives

Model-based estimation of carbon budget for the Arctic areas

Ping et al. (2008: Nature Geoscience)
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Methods

Terrestrial biogeochemical model

- Carbon + nitrogen cycles
- Greenhouse gas exchange
- Biomass burning etc.

Global simulation: 0.5° x 0.5°

Validation:
Field & RS data
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Results: site-scale validation

Data by Y. Kim (T8-2)

Soil Respiration (mg CO₂/ m²/s)

(using generic boreal forest parameter set + NCEP/NCAR weather)
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Results: regional budget

- Model estimation
- Remote sensing (T6-1: R.Suzuki)
- C budget (NEP)
- AGB
- Remote sensing (GFED; fire emission)
- Fire
- NEP–fire
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Discussion

- Comparison with other approaches
  => top-down (atmospheric inversion; e.g., TransCom)
  => other models (e.g., Trendy models)
  => inventory (U.S. Nat. Rep. on Forest Resources)
  => GCP-RECCAP (LA of N.Am.: Mac Post, ORNL)

- How does this study contribute to the ‘integrated arctic model (T-9)’
  => provide reference data of CO$_2$ budget
  => provide GHG exchange schemes

- Future studies
  => validation by super-site flux data
  => projection based on future climate scenarios