

CFS Activities Relevant to ABoVE

(Maximum 2 page)

1. Project Title
National tree-ring database to inform projections of Canada's present and future forest growth
2. Investigators (include email). a) Project Lead; b) CFS collaborators, c) external collaborators (individuals/institutions)
Girardin, Martin, research scientist Jagtar Bhatti, research scientist Ted Hogg, research scientist Juha Metsaranta, research scientist Werner Kurz, research scientist
3. Project Description (200 words maximum)
We developed the World's most spatially-extensive network of boreal tree-ring width chronologies, with an unprecedented degree of sampling standardization, to determine the growth responses of Canada' forests to climatic changes. The tree-ring width dataset is based on increment cores sampled within Canada's National Forest Inventory (NFI) plot survey, designed to be representative of the distribution of species and growing conditions in the managed forests of Canada. Samples were processed using standard methods. Five species represent a total of 73% of the samples: black spruce: 44%, Picea glauca: 10%, jack pine: 7%, trembling aspen: 7%, and balsam fir: 6%, with the other 27% of samples distributed amongst 14 additional species. These data were used to examine the aboveground growth responses of Canadian forests to climatic changes over the past ~60 years. We notably examined growth trends prior to and during the satellite era and compare these with trends observed from NDVI datasets. Relationship between gridded tree-ring data and NDVI across boreal Canada were also examined. We also quantified tree growth variability as a function of inter-annual and longer-term changes in summer temperature, soil moisture and atmospheric CO2 concentration.
4. Timelines and current funding (level and source)

A first paper reporting on the black spruce data was published in 2016 in Global Change Biology. Another paper reporting on the entire data and analyses with NDVI was submitted in April 2016. The project is currently being funded by CBFA.

5. Reference (1-2 key publication, website)

Girardin, M.P., Hogg, E.H., Bernier, P.Y., Kurz, W.A., Guo, X.J., Cyr, G. 2015. Negative impacts of high temperatures on growth of black spruce forests intensify with the anticipated climate warming. Global Change Biology, doi: 10.1111/gcb.13072.

Girardin, M.P., Xiao Guo, J., de Jong, R., Kinnard, C., Bernier, P.Y., Raulier, F. 2014. Unusual forest-growth decline in boreal North America covarying with the retreat of Arctic sea ice. Global Change Biology , 20: 851-866.

6. ABoVE question being mainly addressed (please highlight)

1. How are environmental changes affecting critical ecosystem services - natural and cultural resources, human health, infrastructure, and climate regulation - and how are **human societies** responding?
2. What processes are contributing to changes in **disturbance** regimes and what are the impacts of these changes?
3. What processes are controlling changes in the distribution and properties of **permafrost** and what are the impacts of these changes?
4. What are the causes and consequences of changes in the **hydrologic system**, specifically the amount, temporal distribution, and discharge of surface and subsurface water?
5. How are **flora and fauna** responding to changes in biotic and abiotic conditions, and what are the impacts on ecosystem structure and function?
6. How are the magnitudes, fates, and land atmosphere exchanges of **carbon pools** responding to environmental change, and what are the biogeochemical mechanisms driving these changes?

7. Linkages with ABoVE:

- a. Data being collected/generated
- b. Expected key benefits and potential challenges from collaborating with ABoVE
- c. Ongoing and / or interest in future involvement in ABoVE

A The data collection overlap with the targeted study zone of the ABoVe project. No doubt that these data would be useful for them. The key benefits would be in the exchange of data and sharing of new knowledge and development of collaboration. Challenges are in the difficulty of travelling and meeting with people, attending conferences, etc. I would be interested in collaborating in the future (by that I mean an exchange of services, not just providing data for them to analyse without any form of collaboration with CFS).