

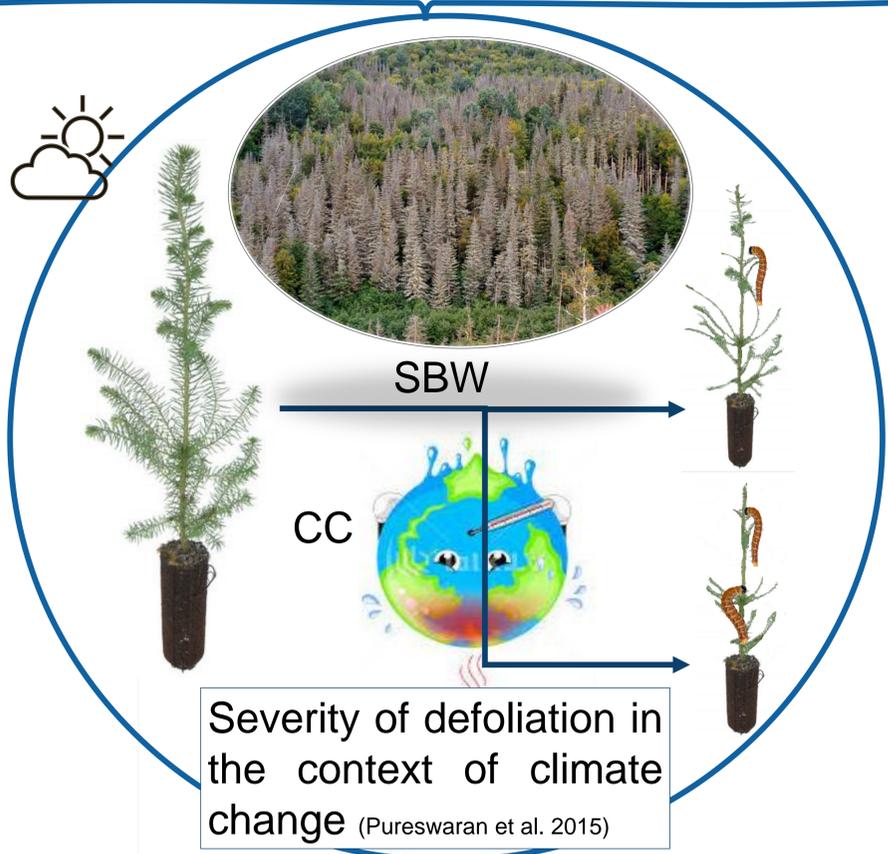
The mystery of tree-rings regarding climate and insect outbreak interactions: A methodological challenge

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Context

- Boreal and northern temperate zone of Quebec
- Natural disturbances
- Insect outbreak
- Spruce budworm (SBW)
- Defoliation
- Black spruce (*Picea mariana*)



Dendroecological data

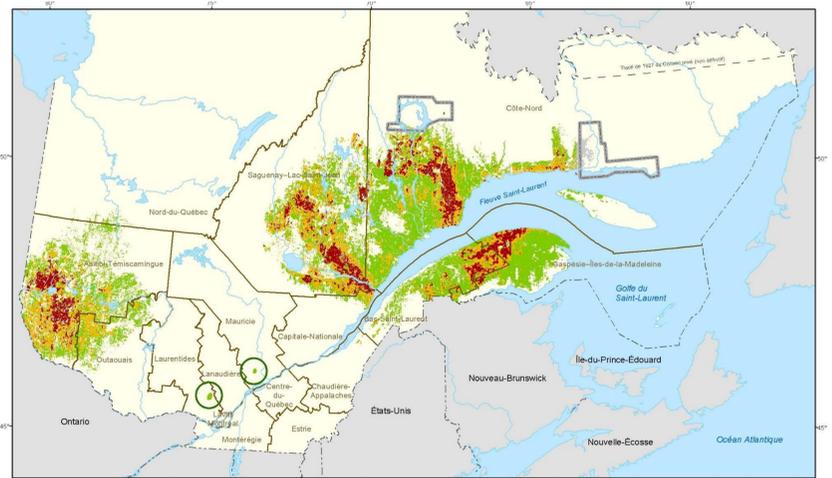
- Biggest data base of black spruce in Quebec for the last century
- Cross dated 5500 black spruce trees (age \geq 100 years)

The mystery : narrow tree rings caused by an insect (H)



Defoliation survey (MFFP)

The defoliation map (2020) of Quebec produced by MFFP



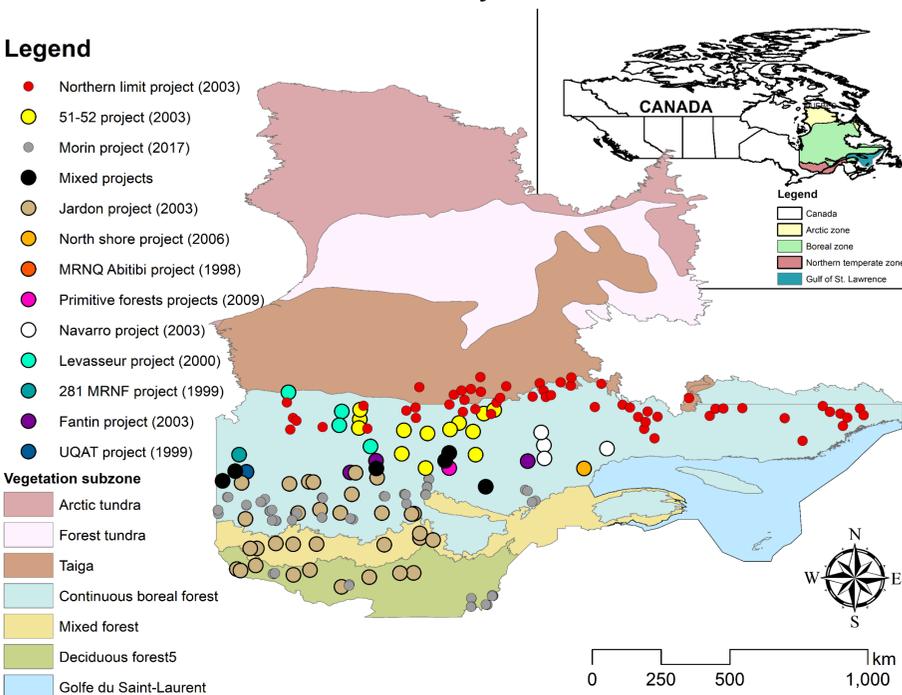
Objectives

- Evaluate the influence of climatic parameters on the severity and the spread of the SBW outbreak
- Analyze the SBW outbreak in black spruce during the last century to better understand the effect of defoliation and climate change

Methodology

Study area

The location of study sites in Quebec



Climatic datasets

- Interpolation using BioSIM

Modeling

- Interaction effect of SBW and climatic parameters on the defoliation of black spruce

Novelty

- Spatial & temporal range, data, & approaches

Contribution

- Provides a new parameter to predict the dynamism of SBW impact over periods
- Contribute to obtain a general trend in the range and severity of future outbreak periods, which is crucial for managing boreal forests under climate change.

References

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- Navarro, L.; Morin, H.; Bergeron, Y.; Girona, M.M. Changes in spatiotemporal patterns of 20th century spruce budworm outbreaks in eastern Canadian boreal forests. *Front. Plant Sci.* 2018, 9, 1905–1920.
- Pureswaran, D. S.; Grandpré, L. De; Paré, D.; Taylor, A.; Barrette, M.; Morin, H.; Régnière, J.; Kneeshaw, D. D. Climate-induced changes in host tree-insect phenology may drive ecological state-shift in boreal forest. *Ecology* 2015, 96(6), 1480–1491.

