Calibrating HETEROFOR- a spatially explicit, process-based model to track carbon dynamics in the Balsam Fir-White Birch forest under future climatic projections

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Context

In the mixed boreal zone of Quebec (Sapinière à bouleau blanc domain), climate change is anticipated to induce a northward migration of broadleaf tree habitats, progressively encroaching upon the ecological niche presently inhabited by conifers.

Simulation studies have forecasted a decline in forest carbon in this area, primarily linked to the loss of softwood.

Partial cut is being investigated as a climate-smart approach to limit the regeneration of broadleaf species, as opposed to the BaU Clear-cut practice, which is believed to exacerbate the situation.

Conducting process-based simulations to assess the short- and long-term dynamics of carbon is crucial for understanding the adaptability of these silvicultural practices within each bioclimatic domain under climate change projections.

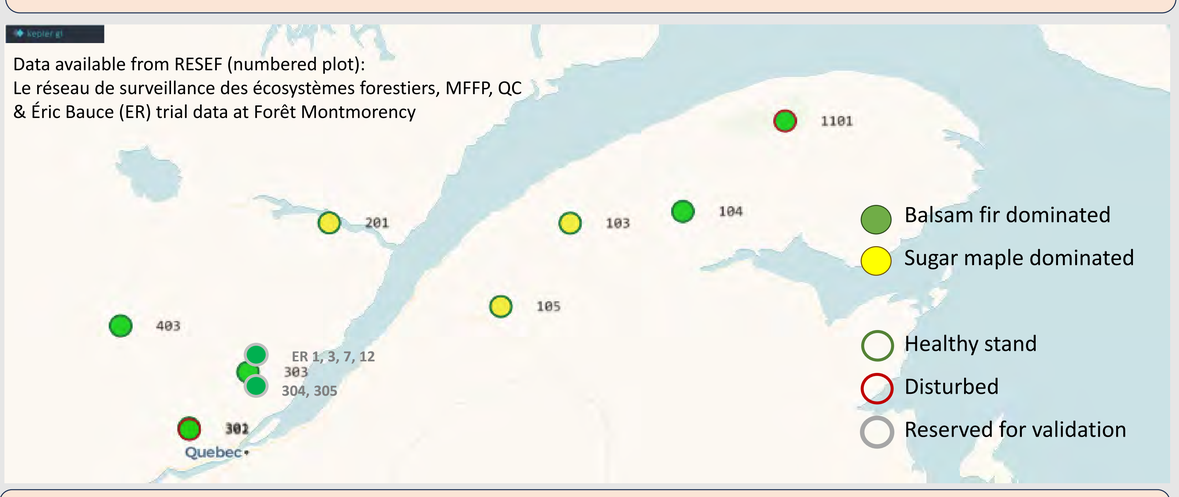
Research Objectives

CHAPTER 1 : Calibration and validation
HETEROFOR- a process-based, spatially explicit, climate sensitive model, adjusted to irregular forest stands

CHAPTER 2 : Carbon dynamics simulation
Test climate-smart strategies in the short-and-long term, and compare ecosystem carbon dynamics and net productivity

CHAPTER 3 : Harvested-Wood Products
Track carbon storage in HWPs, and account of market substitution of wood products

Site Map



Chapter 1.2 :Tree growth calibration results

Figure: Crown diameter vs DBH – Observed vs fitted curve (10 years)

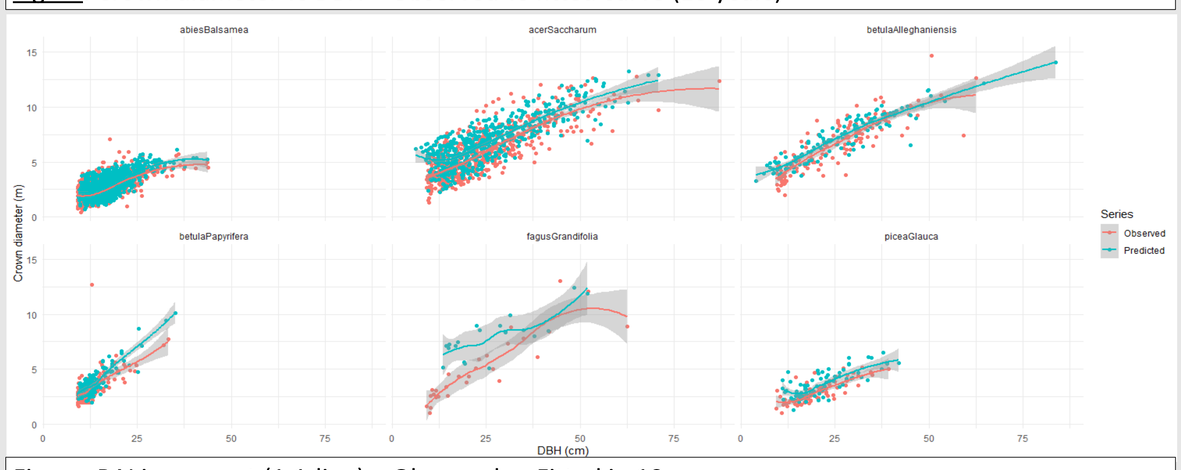
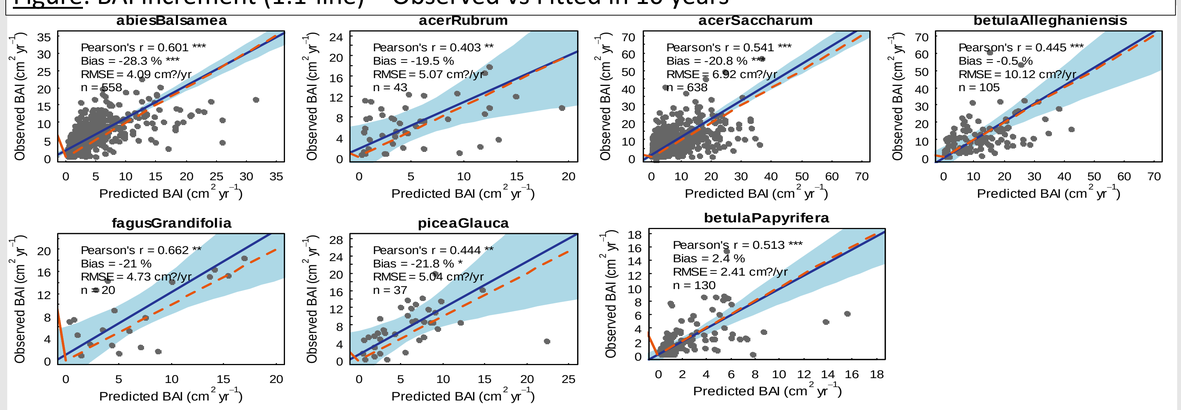


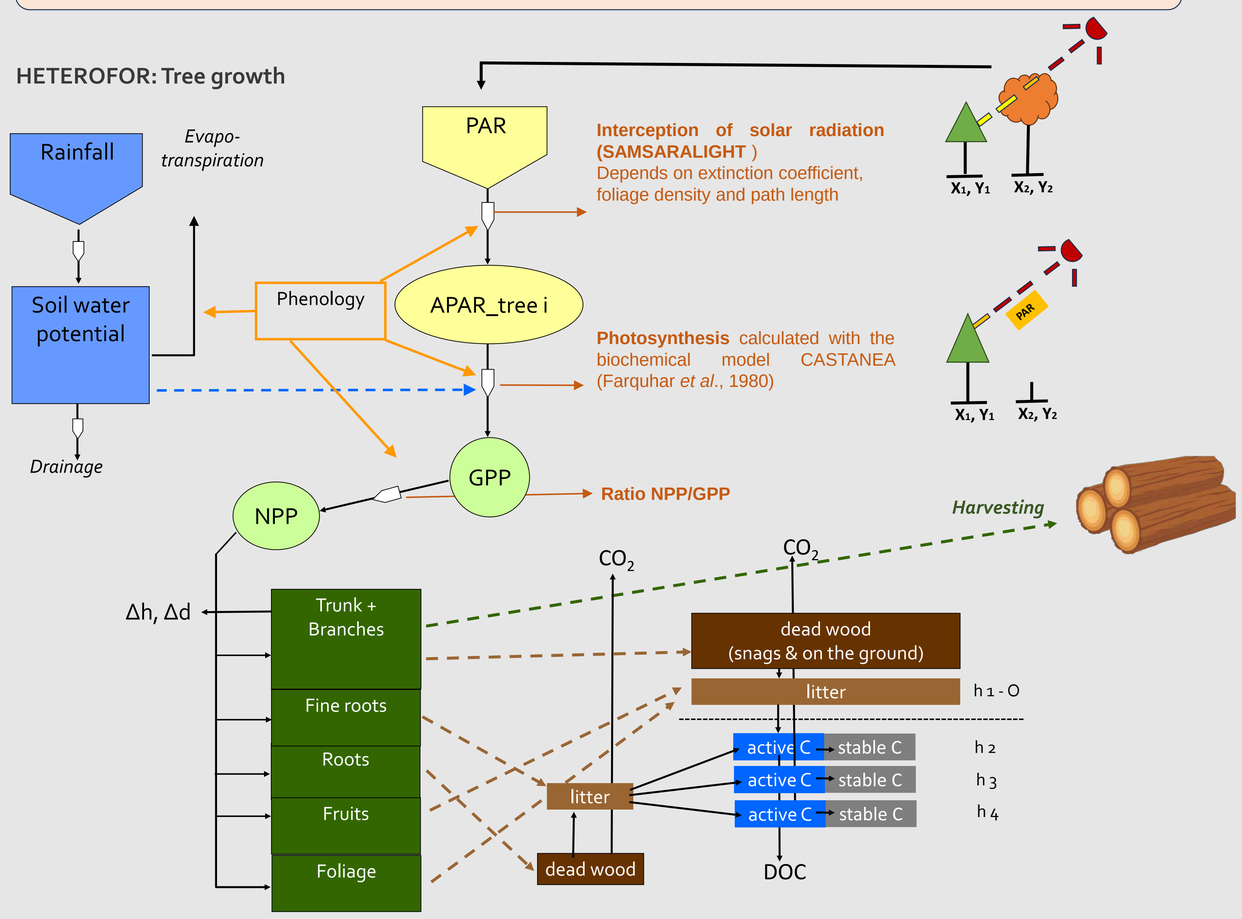
Figure: BAI increment (1:1-line) – Observed vs Fitted in 10 years



Acknowledgements

Thanks to Arthur Guignabert and Mathieu Jonard for their extensive support in model calibration; Rock Ouimet & Rosaile Frisko (DRF) for the RESEF data, and Stephane Tremblay (DRF) for the FM data.

Chapter 1 :Modelling Framework



Chapter 1.3 :Recruitment & mortality calibration

Fig. A) Observed vs Predicted sapling recruitment in short-term (10 years)

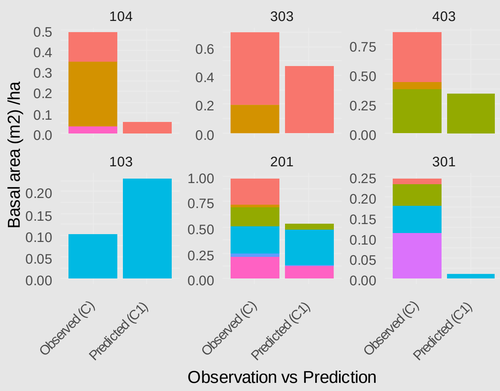


Fig. B) Observed vs Predicted mortality in trees in short-term (10 years)

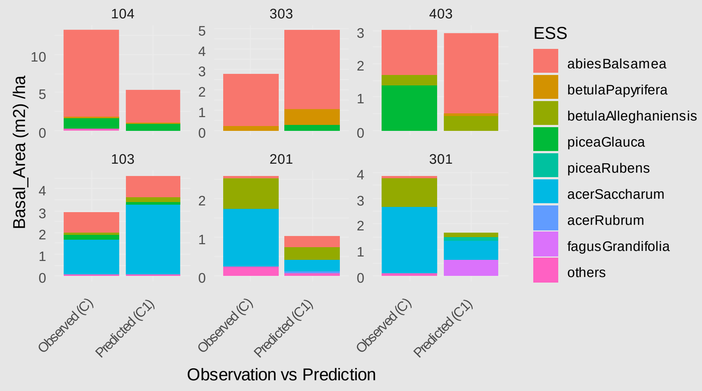
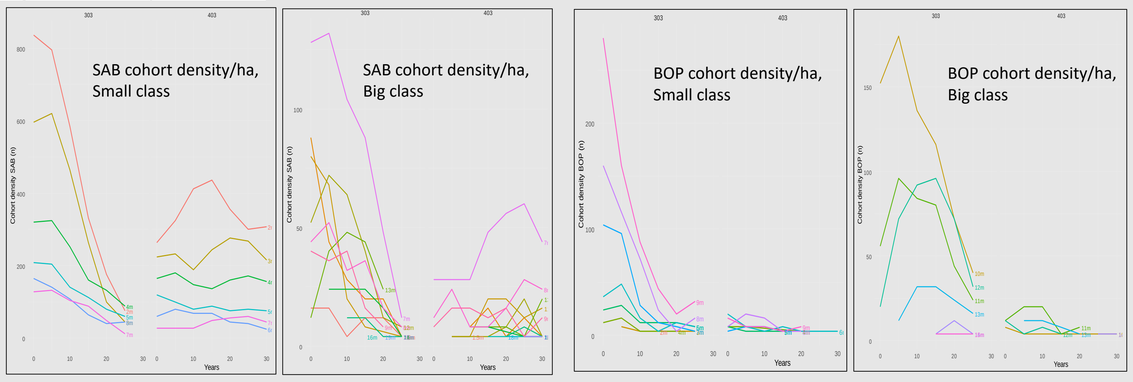


Fig: Understanding seedling Cohort density dynamics over time in SAB and BOP to improve mortality and regenerations predictions



Chapter 2 :Carbon dynamics simulations

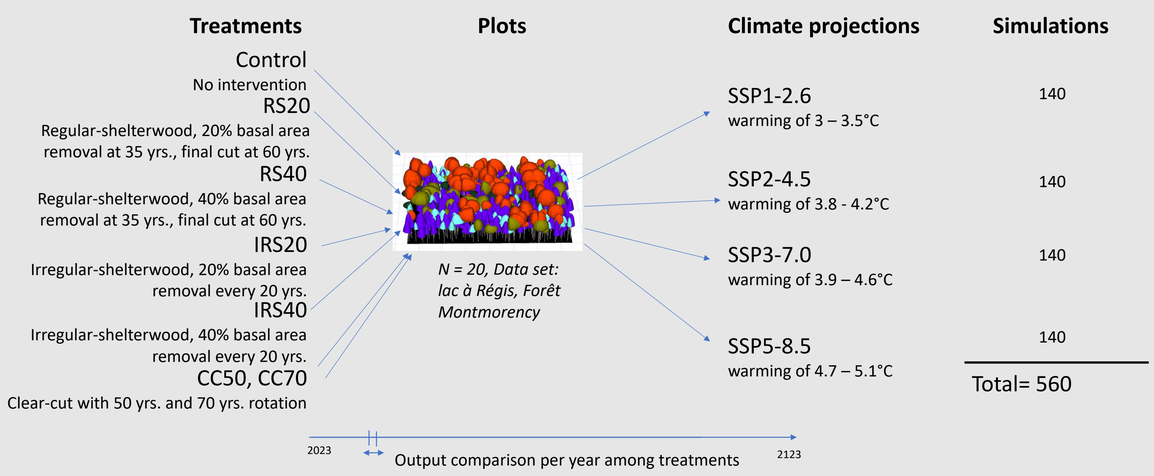



Figure: Forest Management Scenarios for Long-term Simulation