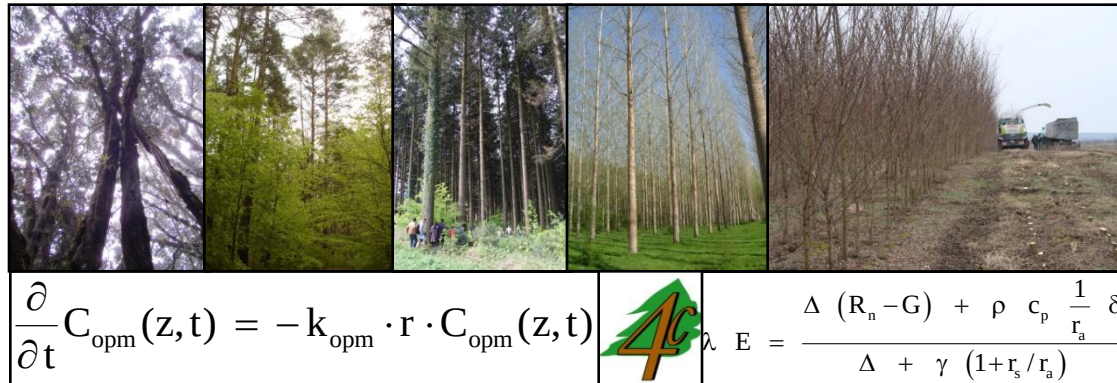


Integrating parameter uncertainty of process-based forest models in assessments of global change impacts on forest productivity

Tales of 1001 computer simulations

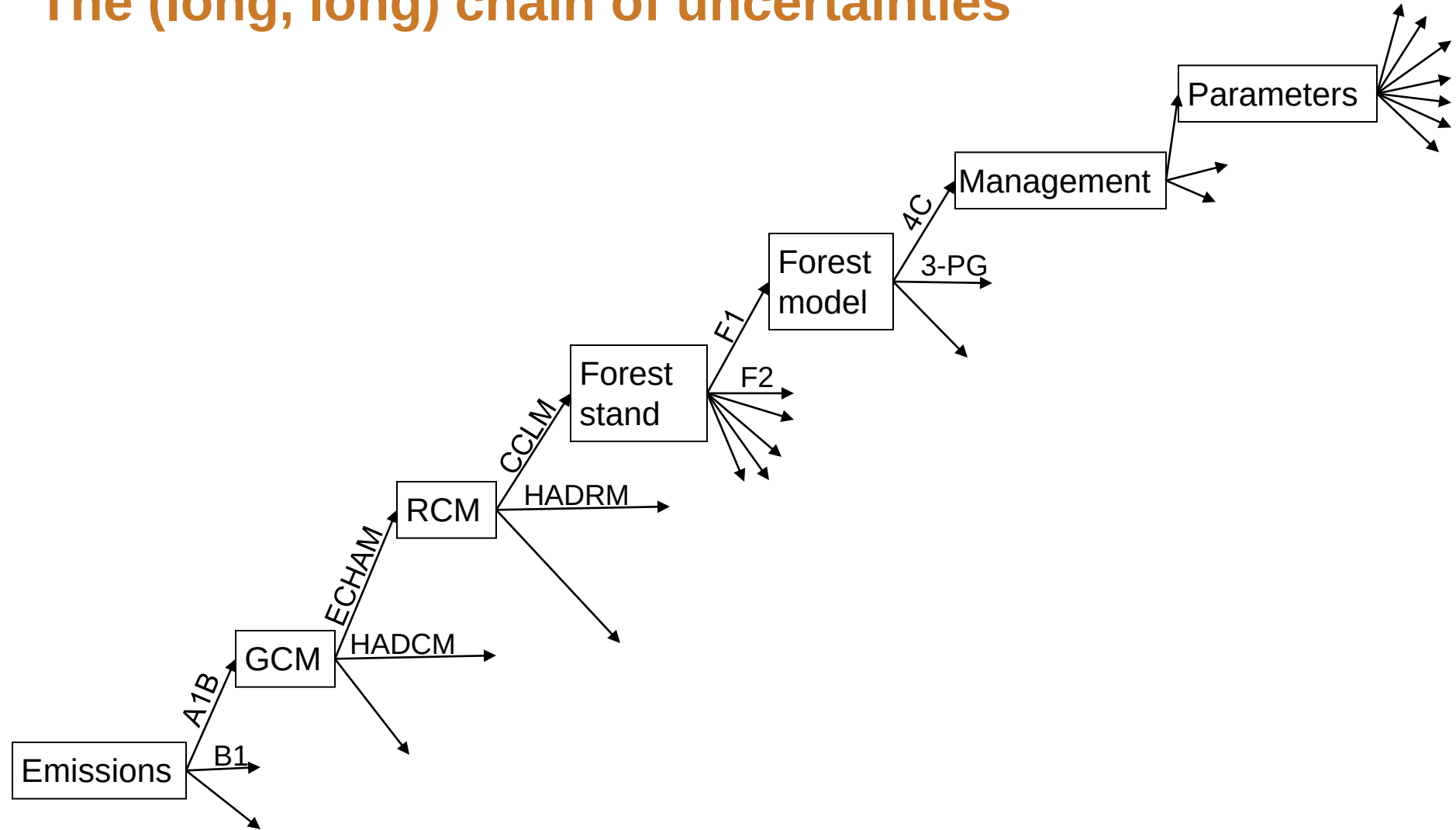


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The (long, long) chain of uncertainties



Objective

To integrate parameter uncertainty into simulations of global change impacts on forest productivity using process-based forest models

- ➔ What error in productivity change estimation are we making by not including parameter uncertainty?
- ➔ Can calibration with NFI data help?
- ➔ (Do we need regional species parameterisations?)

Parameter uncertainty: allocation submodel

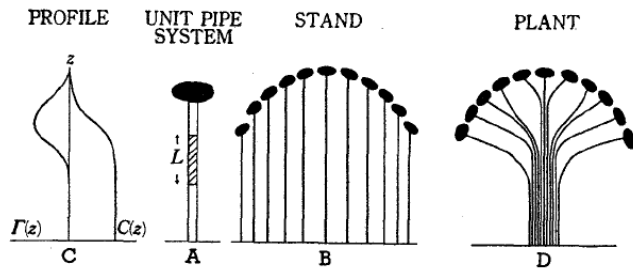


Fig. 5. Diagrammatic representation of the simple pipe model of plant form

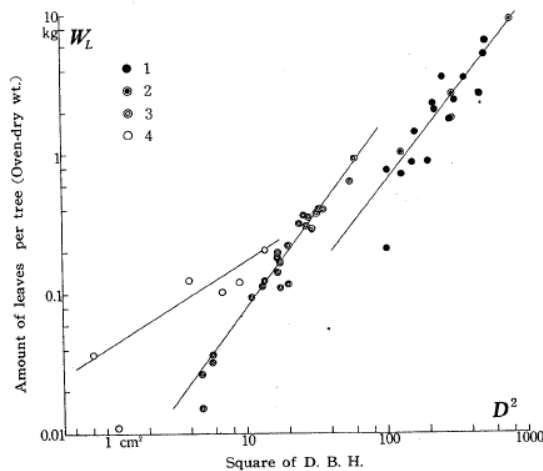
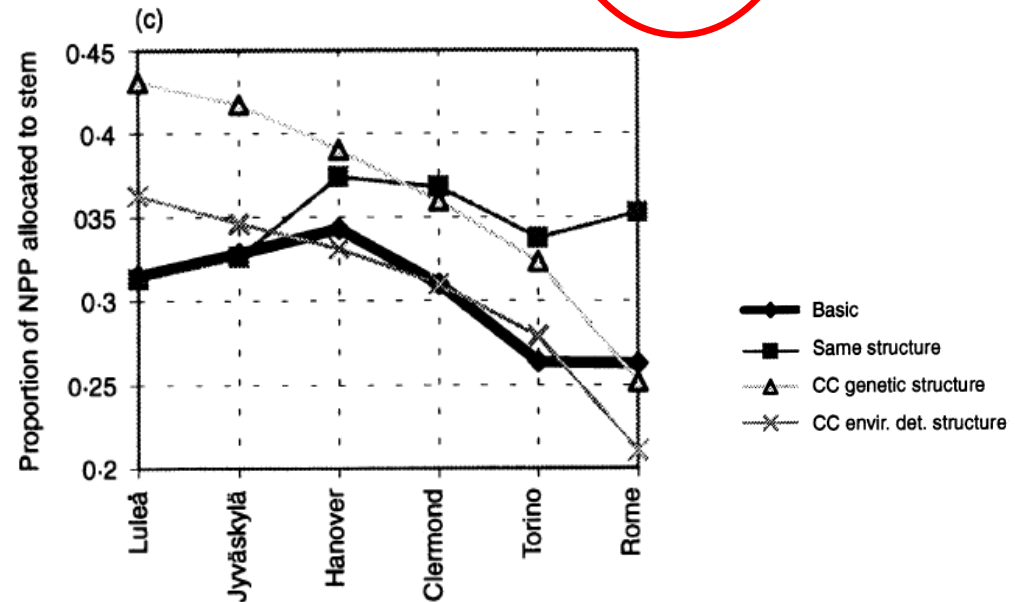


Fig. 5. Allometric relations between the amount of leaves per tree (W_L) and the trunk diameter at breast height (D), as shown by the linear regressions between $\log W_L$ and $\log D^2$, in birch stands of east-central Hokkaido

1) *Betula platyphylla japonica*, 45-years-old stand at Asyoro
2) *B. Maximowiczii*, 43-years-old stand at Nipesotu 3) *B. Ermani*, 18-years-old stand at Simizu 4) *B. Maximowiczii*, 7-years-old stand.

Table 1. Site-specific parameter values of the changing parameters for the six sites on the gradient. All parameters but potential evapotranspiration are changing for each input year

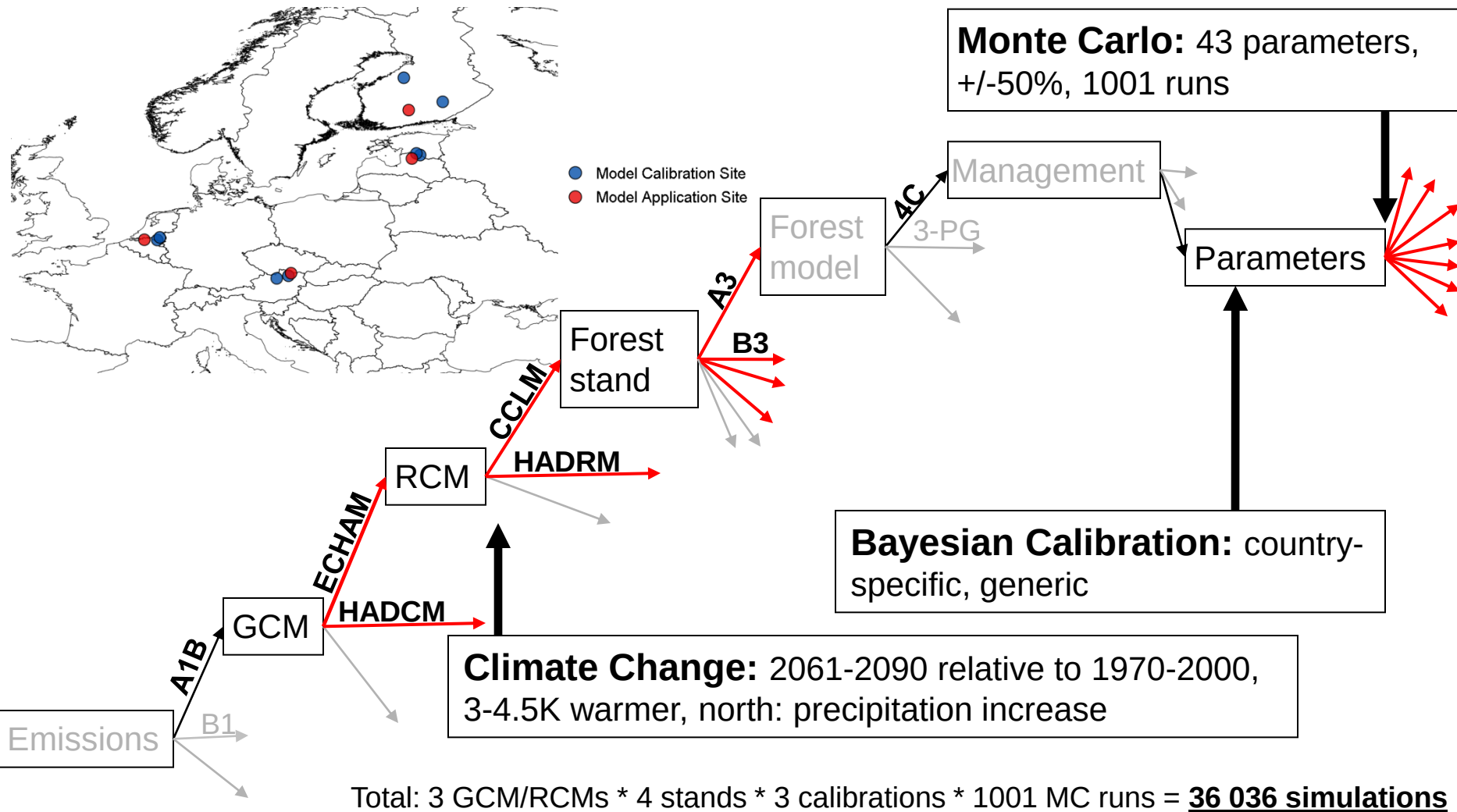
Location	Light extinction effect on photoproduction	Potential gross photoproduction (gCg unshaded needles year ⁻¹)	Foliage per unit stem sapwood (kg m ⁻²)	Relative respiration rate
Rome	-0.26	4.77	957	2.14
Torino	-0.24	4.14	841	1.75
Clermond	-0.25	4.43	754	1.61
Ferrand				
Hanover	-0.27	4.21	619	1.39
Jyväskylä	-0.29	2.99	485	1.00
Luleå	-0.32	2.73	487	0.96



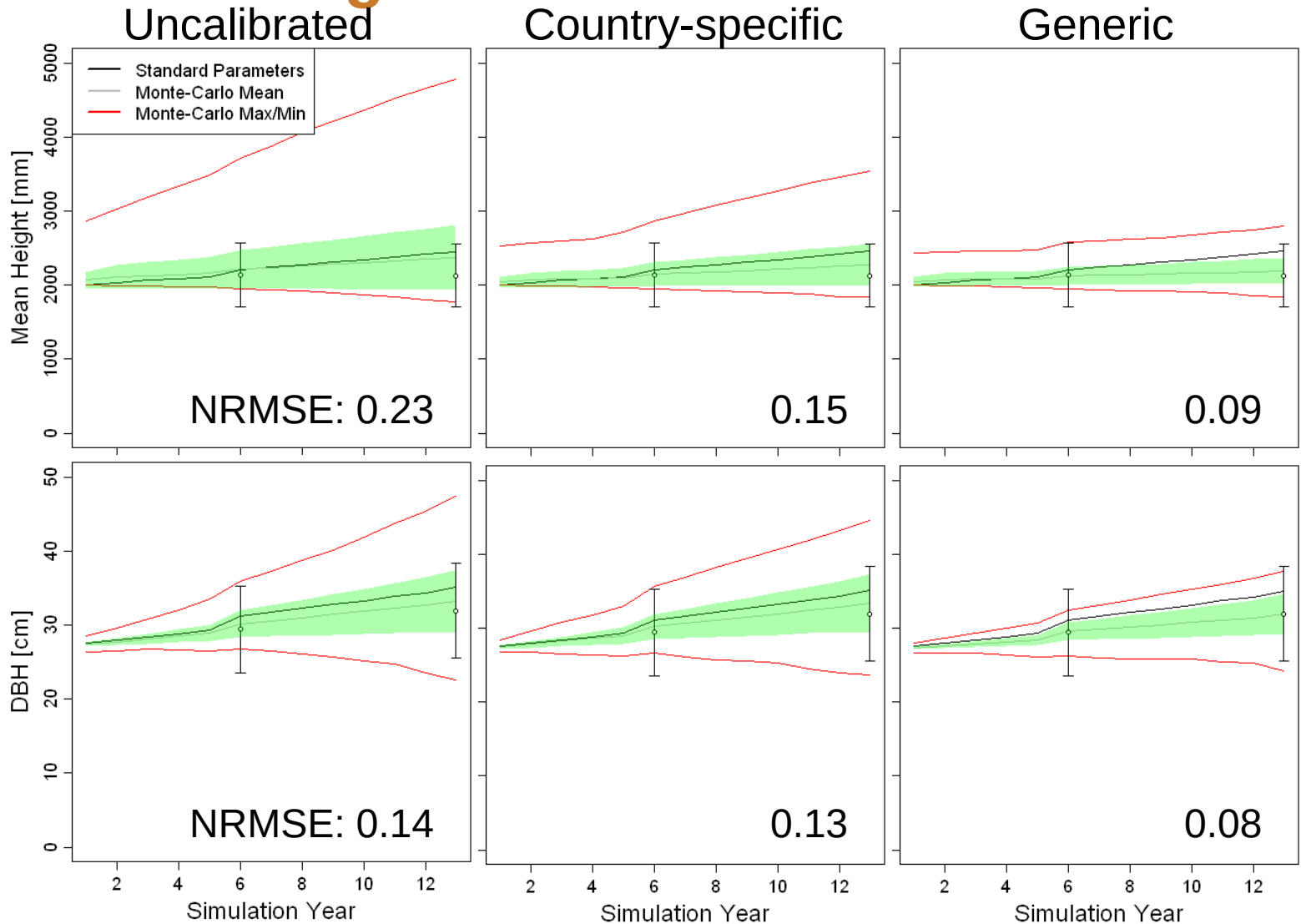
Shinozaki et al. 1962a, b

Berninger & Nikinmaa 1997

The (long, long) chain of uncertainties

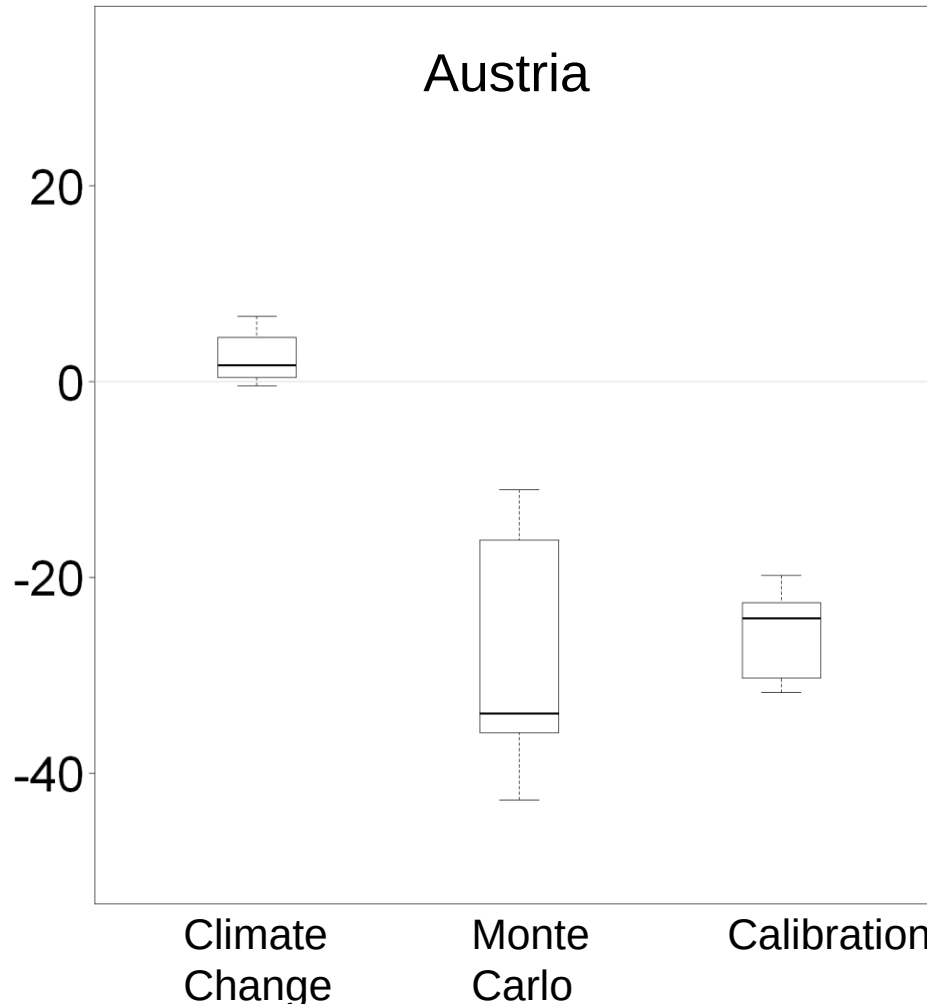


Validation: Belgium



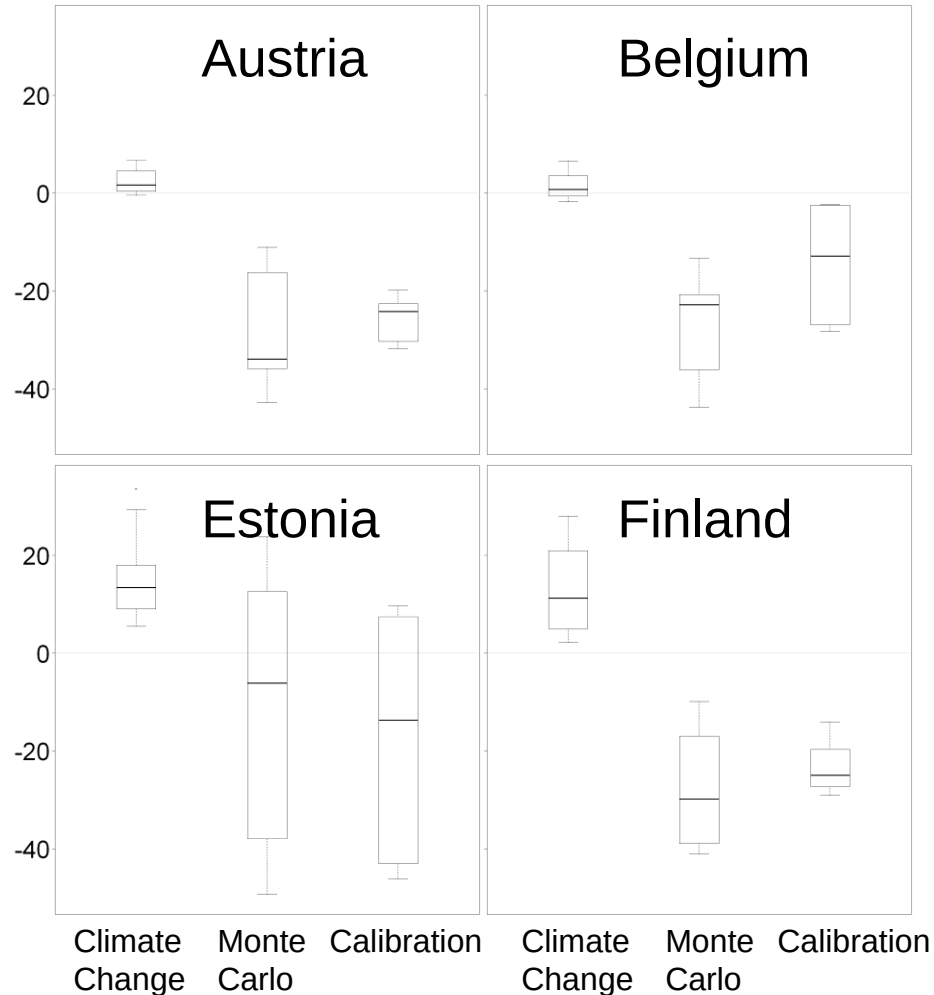
Climate Change, Parameter Uncertainty & Calibration

Change in NPP [%] due to



Climate Change, Parameter Uncertainty & Calibration

Change in NPP [%] due to



Discussion & Conclusion

- Relative changes in NPP vs absolute values
 - ➔ climate change application: talk by Petra Lasch
- Only Monte-Carlo mean considered
 - ➔ analyse distributions
- Bayesian calibration with NFI data improved model performance
 - ➔ limitations (number of data points, prior distribution)
- Regional vs. generic species parameterisations (unequal number of data points)
 - ➔ model-based “provenance” tests?

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Questions & Comments

Thank you!