Transferability of birch biomass models across geographical regions

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Objective

- **To explore the effects of using biomass models outside their target area.**
  - Geographical area
  - Tree size range

Tested models

Reference	Region	Species	Altitude	Number of trees[a]	Tree *dbh* (mm)	
					Mean	Range
Current study	South of Norway	*Betula pubescens*	750-950	80	78	28-215
Snorrason & Einarson (2006)	Iceland	*Betula pubescens*		43-52		21-298[b]
Korsmo (1995)	Southeast of Norway	*Betula pendula*	Below 200	34-88		10-130
Marklund (1988)	Sweden	*Betula* spp.	20-570	242		0-360
Bylund & Norell (2001)	North of Sweden	*Betula pubescens* spp. *czerepanovii*	385-400	28-49		6-160[c]
Claesson et al. (2001)	North of Sweden	*Betula* spp.	20-220	14-66		10-100
Dahlberg et al. (2004)	North of Sweden	*Betula pubescens* spp. *czerepanovii*	379-672	46	103	6-318
Opdahl (1987)	Southeast of Norway	*Betula pubescens*	800	133	40	10-80

[a] Number of trees varies between models for different biomass components.
[b] Diameter 0.5 m above ground.
[c] Diameter at ground level.

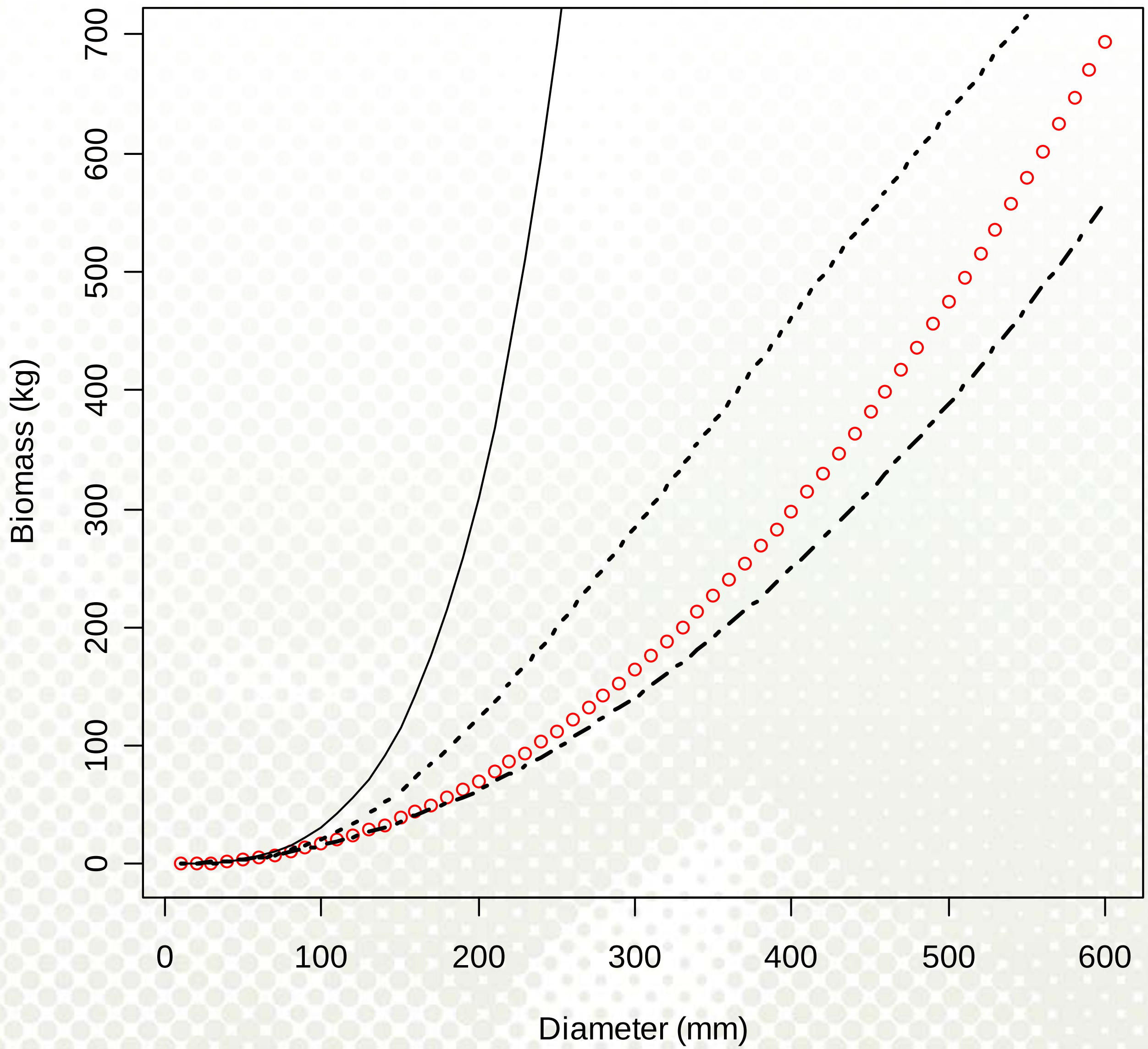
Performed tests

- Models for tree crown and stem biomass and total aboveground biomass
- All models were applied to a dataset of 80 mountain birches
- Differences between predicted and observed values were calculated
- Mean differences and variability of the differences were reported.

Results – Stem biomass

Model	N	Mean difference (kg)	Mean difference (%)
Stem			
Snorrason & Einarson (2006)	49	**0.05 (2.4)**	**0.39**
Korsmo (1995)	80	13.84 (38.2)	115.42
Marklund (1988)1	80	3.37 (9.2)	28.09
Marklund (1988)2	80	–1.31 (3.0)	–10.91
Bylund & Norell (2001)	49	3.70 (7.4)	21.94
Claesson et al. (2001)	80	–1.61 (3.9)	–13.43
Dahlberg et al. (2004)1	80	**–0.61 (3.7)**	**–5.05**
Dahlberg et al. (2004)2	80	**0.42 (3.5)**	**3.50**

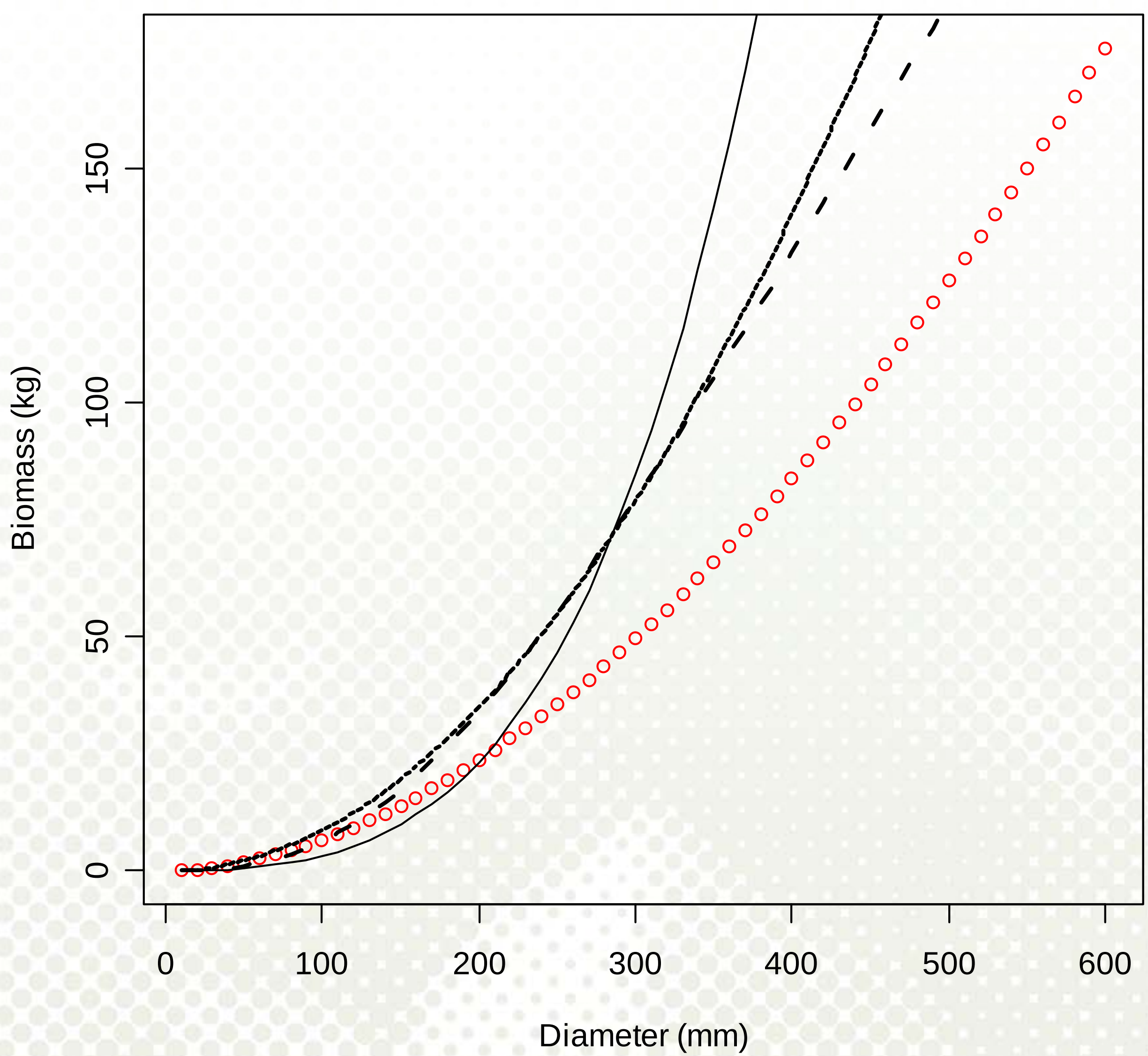
Stem biomass models



Results – Tree crown biomass

Model	N	Mean difference (kg)	Mean difference (%)
Tree crown			
Korsmo (1995)	80	–1.48 (2.5)	–30.61
Marklund (1988)	80	**–0.17 (2.6)**	**–3.57**
Bylund & Norell (2001)	49	3.09 (3.4)	63.98
Claesson et al. (2001)	80	2.62 (5.07)	54.24
Dahlberg et al. (2004)1	80	2.35 (3.1)	48.65
Dahlberg et al. (2004)2	80	3.09 (4.1)	63.98

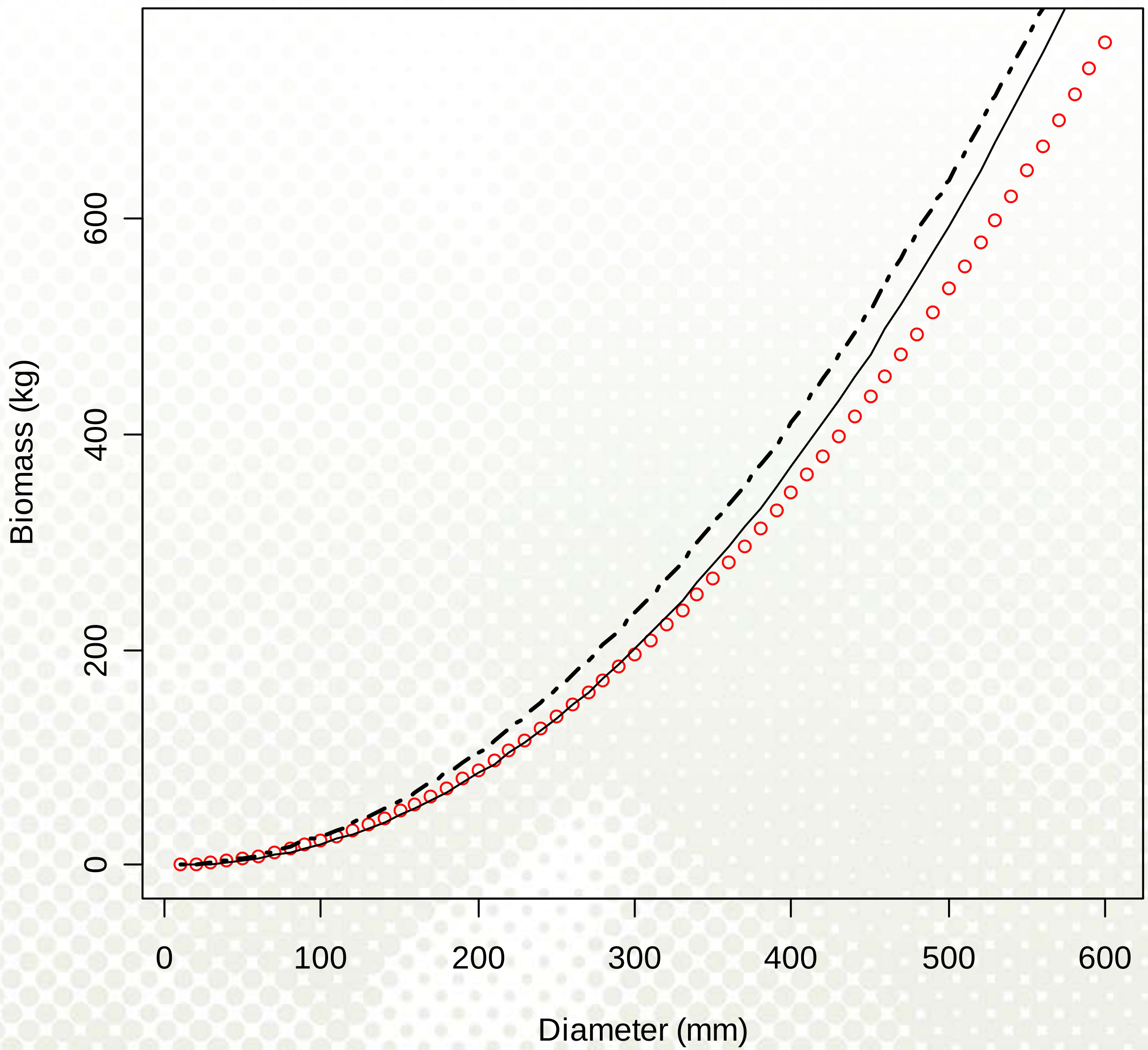
Tree crown biomass models



Results – Total aboveground biomass

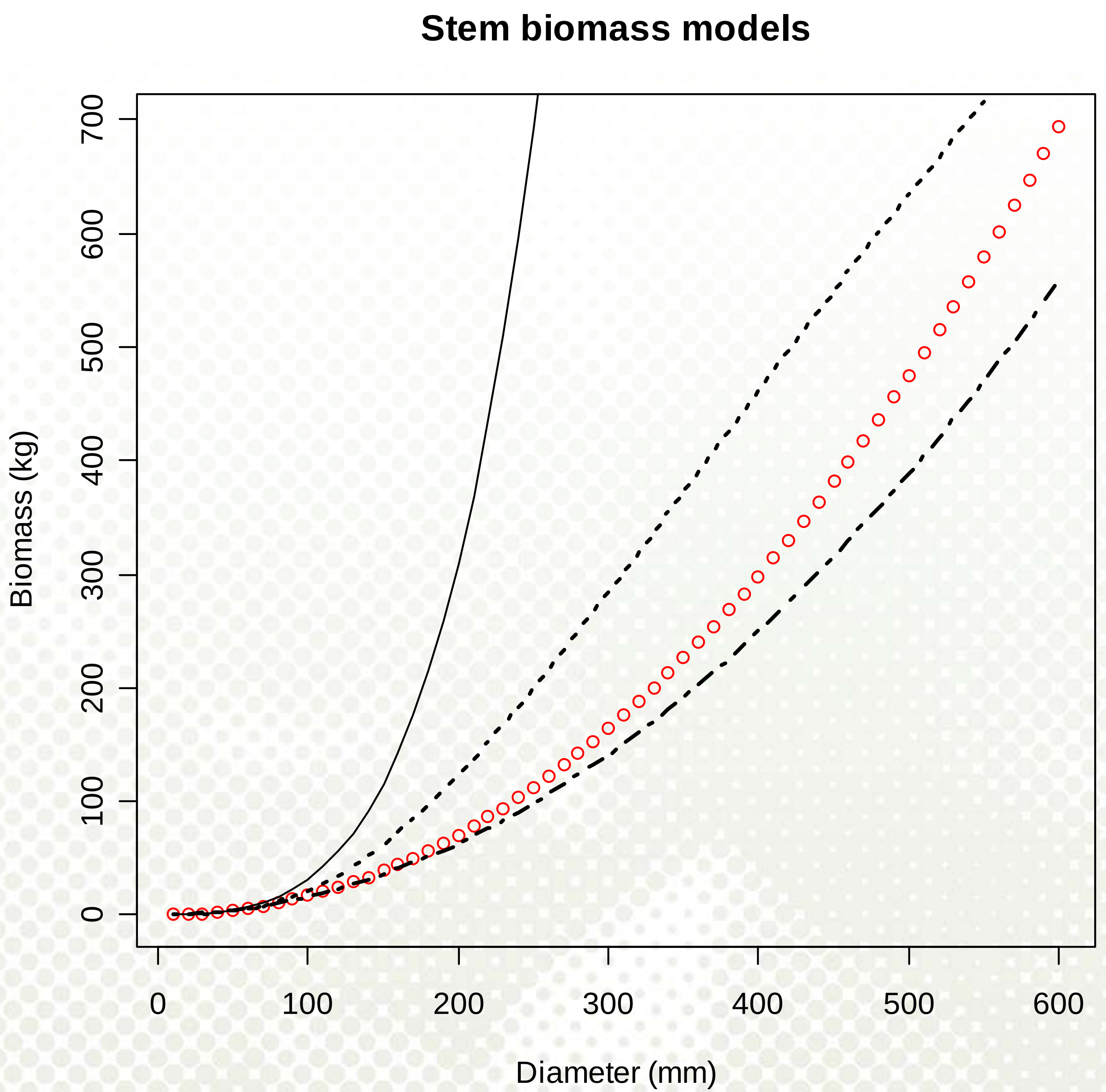
Model	N	Mean difference (kg)	Mean difference (%)
Total aboveground			
Snorrason & Einarson (2006)	49	**0.28 (4.7)**	**1.67**
Bylund & Norell (2001)	49	12.59 (19.8)	–106.39
Dahlberg et al. (2004)1	80	2.56 (5.3)	15.25
Dahlberg et al. (2004)2	80	4.38 (6.9)	26.07
Opdahl (1987)	80	–2.80 (5.6)	–16.66

Total aboveground biomass models



Conclusions

- Utilization of “alien” models are sometimes necessary in lack of regional ones.
- Choice of model should be done after considering how well the model development data correspond to the properties of the area we are predicting for.
- Largest differences were detected when the model development data comprised only small trees
- Change estimates can be affected if for example the distribution of tree sizes changes.


Stem biomass models
Biomass (kg)
0
100
200
300
400
500
600
700
0
100
200
300
400
500
600
Diameter (mm)