Supplementary material of

Benchmarking the retrieval of biomass in boreal forest using P-band SAR backscatter with multi-temporal C- and L-band observations

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Petersson's functions [37] for estimating stem biomass, B_s, and branch biomass, B_b [t/ha]:

Variables:

D	-	diameter at breast height including bark in mm
A	-	tree age measured at breast height in years
G	-	five years radial growth measured at breast height in 0.1 mm
SI_s	-	site quality index if tree species is spruce in m
SI_p	-	site quality index if tree species is pine in m
N	-	northing coordinate in Swedish datum RT90 in 0.001°

<u>Branch biomass</u>

For pine:

$$\ln(B_b) = -2.53322 + 1.989129\ ln(D) + 0.387203\ln(G) + 0.105315\ln(A) \qquad (S1)$$

For spruce:

$$\ln(B_b) = -0.718621 + 1.74081\ ln(D) + 0.348379\ln(G) + 0.180503\ln(A) \qquad (S2)$$

For birch:

$$\ln(B_b) = -2.782537 + 2.276815\ ln(D) + 0.228528\ln(G) \qquad (S3)$$

<u>Stem biomass</u>

For pine in case site quality is determined by spruce:

$$\ln(B_s) = -7.674621 + 3.155671\ln(D{+}25) - 0.002197\ D + 0.084427\ln(G) - 0.002665\ G + 0.253227\ \ln(A) + 0.028478\ SI_s + 0.000008342\ N \qquad (S4)$$

For pine in case site quality is determined by pine:

$$\ln(B_s) = -7.674621 + 3.155671\ln(D{+}25) - 0.002197\ D + 0.084427\ln(G) - 0.002665\ G + 0.253227\ \ln(A) + 0.031435\ SI_p + 0.000008342\ N \qquad (S5)$$

For spruce in case site quality is determined by spruce:

$$\ln(B_s) = -6.839310 + 3.578450\ln(D{+}25) - 0.003042\ D +0.093033\ln(G) - 0.002763\ G + 0.111347\ \ln(A) + 0.012148\ SI_s + 0.000020194\ N \qquad (S6)$$

For spruce in case site quality is determined by pine:

$$\ln(B_s) = -6.839310 + 3.578450\ln(D{+}25) - 0.003042\ D + 0.093033\ln(G) - 0.002763\ G + 0.111347\ \ln(A) + 0.011586\ SI_p + 0.000020194\ N \qquad (S7)$$

For birch in case site quality is determined by spruce:

$$\ln(B_s) = -3.091932 + 2.479648 \ln(D+7) + 0.243747 \ln(A) + 0.022185 \, SI_s \tag{S8}$$

For birch in case site quality is determined by pine:

$$\ln(B_s) = -3.091932 + 2.479648 \ln(D+7) + 0.243747 \ln(A) + 0.022955 \, SI_p \tag{S9}$$