

Table S1. Parameters used in DO3SE modeling of Boreal species. Values in brackets represent required “dummy” values. A “-” means that this parameter is not required for this species. The T_{\max} value is set at 200 °C to simulate the weak response to high temperatures of Norway spruce and birch trees growing under Northern European conditions (stomatal response is instead mediated by high VPD values).

Parameter Land cover type (Tree) species	Land cover (POD ₁ SPEC)		
	Norway Spruce	Birch	Grassland
	Coniferous Norway spruce	Broadleaf deciduous Silver birch	Perennial grasslands
g_{\max}	125	240	190
f_{\min}	0.1	0.1	0.1
light_a	0.006	0.0042	0.011
T_{\min}	0	5	10
T_{opt}	20	20	24
T_{\max}	200	200	36
VPD _{max}	0.8	0.5	1.75
VPD _{min}	2.8	2.7	4.5
$\Sigma\text{VPD}_{\text{crit}}$	-	-	-
PAW _t	-	-	-
SWC _{max} ^v	15	15	-
SWC _{min} ^v	1	1	-
SWP _{max}	-	-	-0.1
SWP _{min}	-	-	-1
f_{O_3}	-	-	-
$A_{\text{start}}\text{—FD}$	2018: 122 ¹ 2019: 106 ¹	2018: 129 ² 2019: 130 ²	2018: 159 ³ 2019: 161 ³
$A_{\text{end}}\text{—FD}$	2018: 261 ¹ 2019: 274 ¹	2018: 261 ¹ 2019: 274 ¹	2018: 261 ¹ 2019: 274 ¹
Time window length			3
Leaf dimension (cm)	0.8	3.0 +/- 0.5 ⁴	2 *
Canopy height (m)	13.5 +/- 3 ⁵	13.5 +/- 3 ⁵	0.2
$f_{\text{phen a}}$	0.0	0.0	1
$f_{\text{phen b}}$	(1.0)	(1.0)	1
$f_{\text{phen c}}$	1.0	1.0	1
$f_{\text{phen d}}$	(1.0)	(1.0)	1
$f_{\text{phen e}}$	0.0	0.0	1
$f_{\text{phen 1 FD}}$	20	20	20
$f_{\text{phen 2 FD}}$	(200)	(200)	-
$f_{\text{phen 3 FD}}$	(200)	(200)	-
$f_{\text{phen 4 FD}}$	30	30	20
LIM _{start FD}	(0.0)	(0.0)	-
LIM _{end FD}	(0.0)	(0.0)	-
LAI _{min}	3.75 ⁶	0	2
LAI _{max}	3.75 ⁶	3 ⁶	2.625 ⁶
L_s	1	20	140
L_E	1	30	135

* Not given, set to match wheat (grass species) and potato (forb species, including legumes).

¹ Root of quadratic fit of mean on of MODIS (Aqua/Terra) net photosynthesis data for a 1x1 km patch around Svanvik

² Based on temperature data from seNorge.no (5 days-5 degrees rule).

³ One month after snow melt; First snow-free day for weather station Øvre Neiden in Sør-Varanger ([2018](#), [2019](#))

⁴ Measurements by Ane Vollsnes August 2020

⁵ <https://www.nina.no/archive/nina/PppBasePdf/oppdragsmelding/829.pdf> (p. 52); private communication suggests that there might be trees up to 16 m in the area.

⁶ Estimated land use (kartverket.no): 48% grassland, 32.5% deciduous, 12.5% coniferous, 2% urban. Assumed LAI ratios: $f_{\text{con}} = 5/4 \cdot f_{\text{dec}}$; $f_{\text{gras}} = 7/8 \cdot f_{\text{dec}}$; MODIS (Aqua/Terra): $\text{LAI}_{\text{max}} \geq 2.7 \Rightarrow \text{LAI}_{\text{max}}$ as given.