**Table S1. Mapping manual** 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 100 °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 (POD$_1$SPEC) | | |
| --- | --- | --- | --- |
| | Norway Spruce | Birch | Grassland |
| Land cover type | Coniferous | Broadleaf deciduous | Perennial grasslands |
| (Tree) species | Norway spruce | Silver birch | |
| $g_{max}$ | 125 | 240 | 190 |
| $f_{min}$ | 0.1 | 0.1 | 0.1 |
| light_a | 0.006 | 0.004 | 0.011 |
| $T_{min}$ | 0 | 5 | 10 |
| $T_{opt}$ | 20 | 20 | 24 |
| $T_{max}$ | 100 | 100 | 36 |
| $VPD_{max}$ | 0.8 | 0.5 | 1.75 |
| $VPD_{min}$ | 2.8 | 2.7 | 4.5 |
| $\Sigma VPD_{crit}$ | (1000) | (1000) | (1000) |
| $PAW_t$ | - | - | - |
| $SWP_{max}$ | -0.5 | -0.5 | -0.1 |
| $SWP_{min}$ | -1.5 | -1.5 | -1 |
| $f_{O3}$ | - | - | - |
| $A_{start}$_FD | 1 | 100 | 1 |
| $A_{end}$_FD | 365 | 307 | 365 |
| Time window length | | | |
| Leaf dimension (cm) | 1 | 5 | 2 * |
| Canopy height (m) | 20 | 20 | 0.2 |
| $f_{phen\ a}$ | 0.0 | 0.0 | 1 |
| $f_{phen\ b}$ | (1.0) | (1.0) | 1 |
| $f_{phen\ c}$ | 1.0 | 1.0 | 1 |
| $f_{phen\ d}$ | (1.0) | (1.0) | 1 |
| $f_{phen\ e}$ | 0.0 | 0.0 | 1 |
| $f_{phen\ 1\ FD}$ | 20 | 20 | (0.0) |
| $f_{phen\ 2\ FD}$ | (0.0) | (0.0) | (0.0) |
| $f_{phen\ 3\ FD}$ | (0.0) | (0.0) | (0.0) |
| $f_{phen\ 4\ FD}$ | 30 | 30 | (0.0) |
| $LIM_{start\ FD}$ | (0.0) | (0.0) | (0.0) |
| $LIM_{end\ FD}$ | (0.0) | (0.0) | (0.0) |
| $LAI_{min}$ | 5 | 0 | 2 |
| $LAI_{max}$ | 5 | 4 | 3.5 |
| $L_s$ | 1 | 20 | 140 |
| $L_E$ | 1 | 30 | 135 |

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