SUPPLEMENTARY MATERIALS

**Stand inventory and tree biomass measurements**

Table S1. Site- and fraction-specific allometry equations

| | | Coefficients of equation y (Biomass) = a * DBH ^ b | | $R^2$ | Number of sampled trees |
|---|---|---|---|---|---|
| **Site ID** | **Biomass** | **a** | **b** | | |
| **TB** | B_needles | 0.0569 | 0.9203 | 0.757 | 15 |
| | B_trunk | 0.0369 | 2.6460 | 0.962 | |
| | B_total AG | 0.1082 | 2.1772 | 0.981 | |
| | | | | | |
| **TN** | B_needles | 0.0059 | 2.0018 | 0.978 | 9 |
| | B_trunk | 0.0427 | 2.8193 | 0.999 | |
| | B_total AG | 0.0543 | 2.7437 | 0.999 | |
| | | | | | |
| **TS** | B_needles | 0.000006 | 5.5139 | 0.987 | 7 |
| | B_trunk | 0.0345 | 3.0303 | 0.960 | |
| | B_total AG | 0.0233 | 3.2688 | 0.980 | |
| | | | | | |
| **TV** | B_needles | 0.0045 | 2.6312 | 0.996 | 9 |
| | B_trunk | 0.0640 | 2.4667 | 0.9999 | |
| | B_total AG | 0.0395 | 2.7809 | 0.998 | |
| | | | | | |
| **KD L.g.** | B_needles | 0.0704 | 1.7934 | 0.688 | 7 |
| | B_trunk | 0.0716 | 2.3744 | 0.979 | |
| | B_total AG | 0.0187 | 2.8742 | 0.999 | |

**Statistical analyses**

Table S2. Statistical significances of the linear mixed model testing the effects of active layer thickness and time (Julian day in the season) on element concentrations and isotopic composition.

| | Biomass | Productivity | N (%) | P(%) | K (%) | N:P ratio | d13C | d15N | N-needle-pool | P-needle-pool | K-needle-pool |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| Active layer depth (ALD) | <0.001 | <0.001 | 0.03 | 0.04 | n.s. (0.39) | <0.008 | n.s. (0.088) | n.s. (0.085) | 0.029 | 0.026 | 0.021 |
| Time (Julian Day) | n.d. | - | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | n.s .(0.88) | n.d. | n.d. | n.d. |
| ALD x Time | n.d. | - | n.s. (0.15) | <0.001 | <0.001 | <0.001 | 0.002 | <0.001 | n.d. | n.d. | n.d. |