Hölstein, a forest without rain

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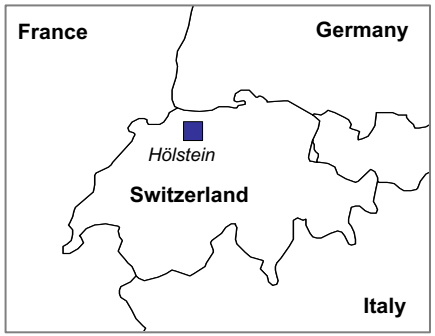
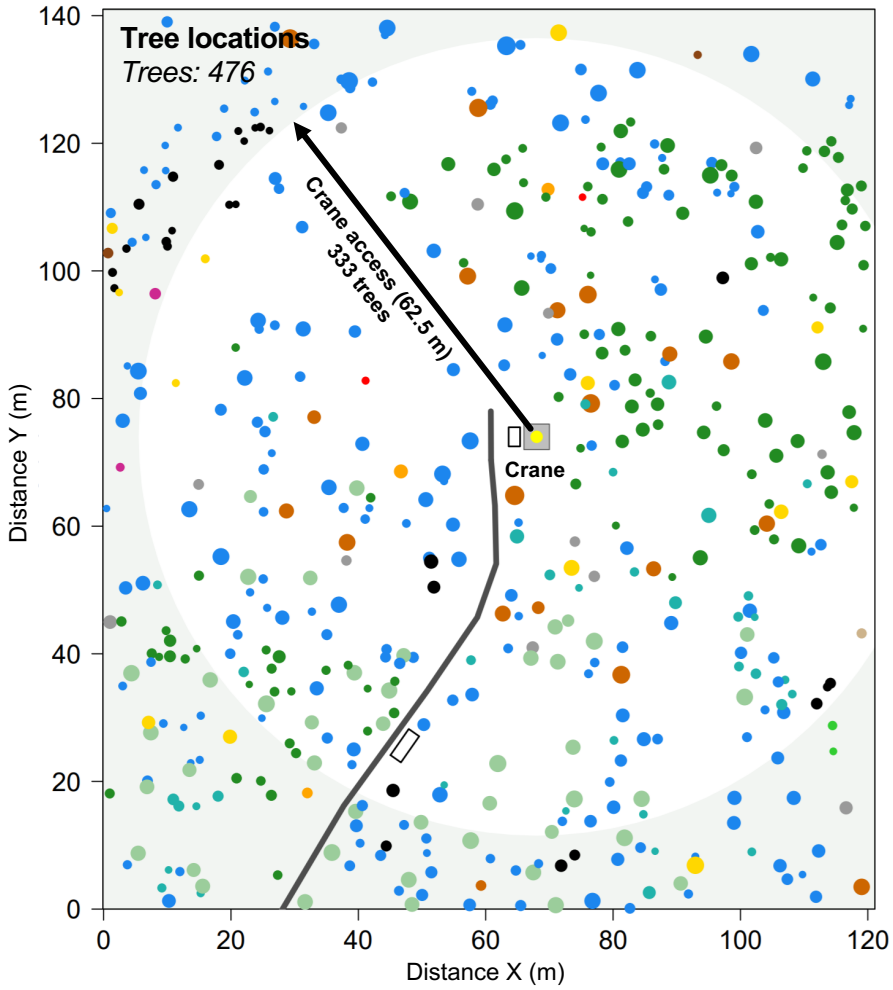
The Site

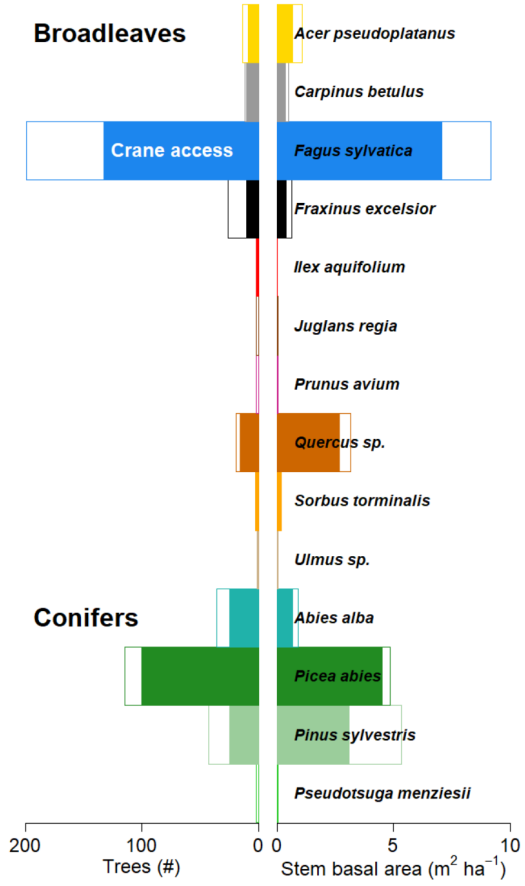


Site	
Area	1.6 ha
Elevation	550 m a.s.l
MAT	9.0 ° C
MAP	1009 mm
Soil	40% clay

Forest	
Trees$_{>10cm}$	476
Species	14
Density	298 trees/ha
Tree age	20-150 years
Height	~35 m

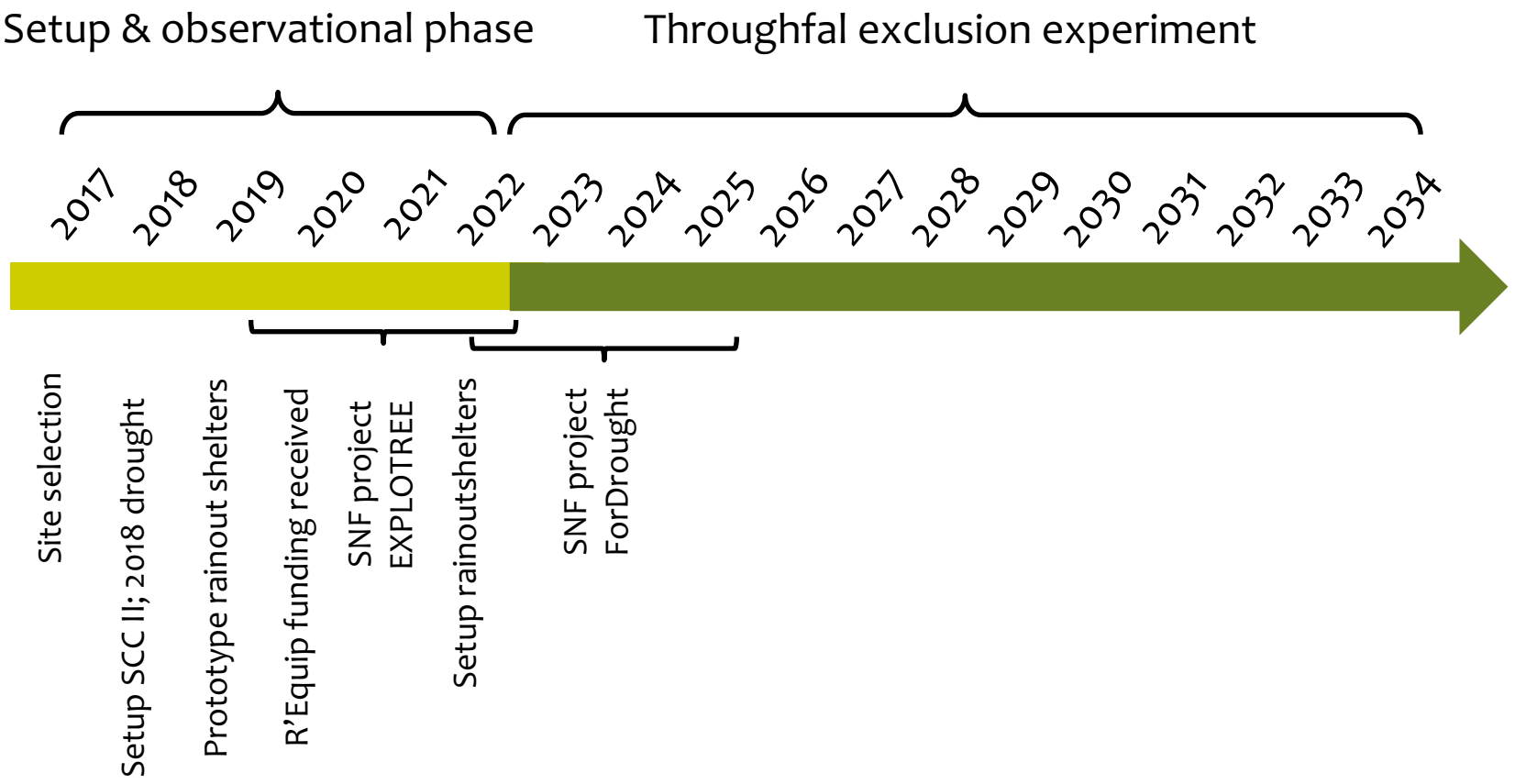
14 Tree Species





The Swiss Canopy Crane II Site

Project phases



Throughfall Exclusion Experiment

Questions

→ What are the drought response strategies of European tree species?

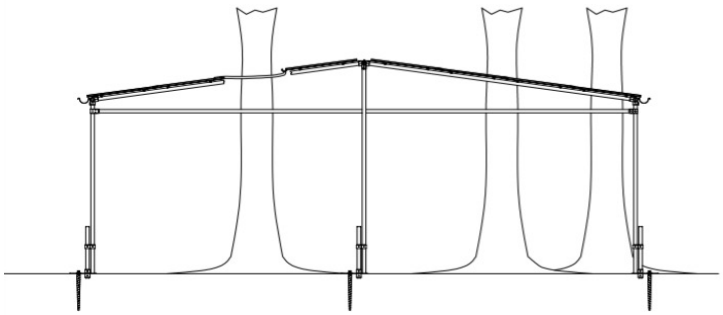
→ What are the trait syndromes that explain the drought response strategy of European tree species?

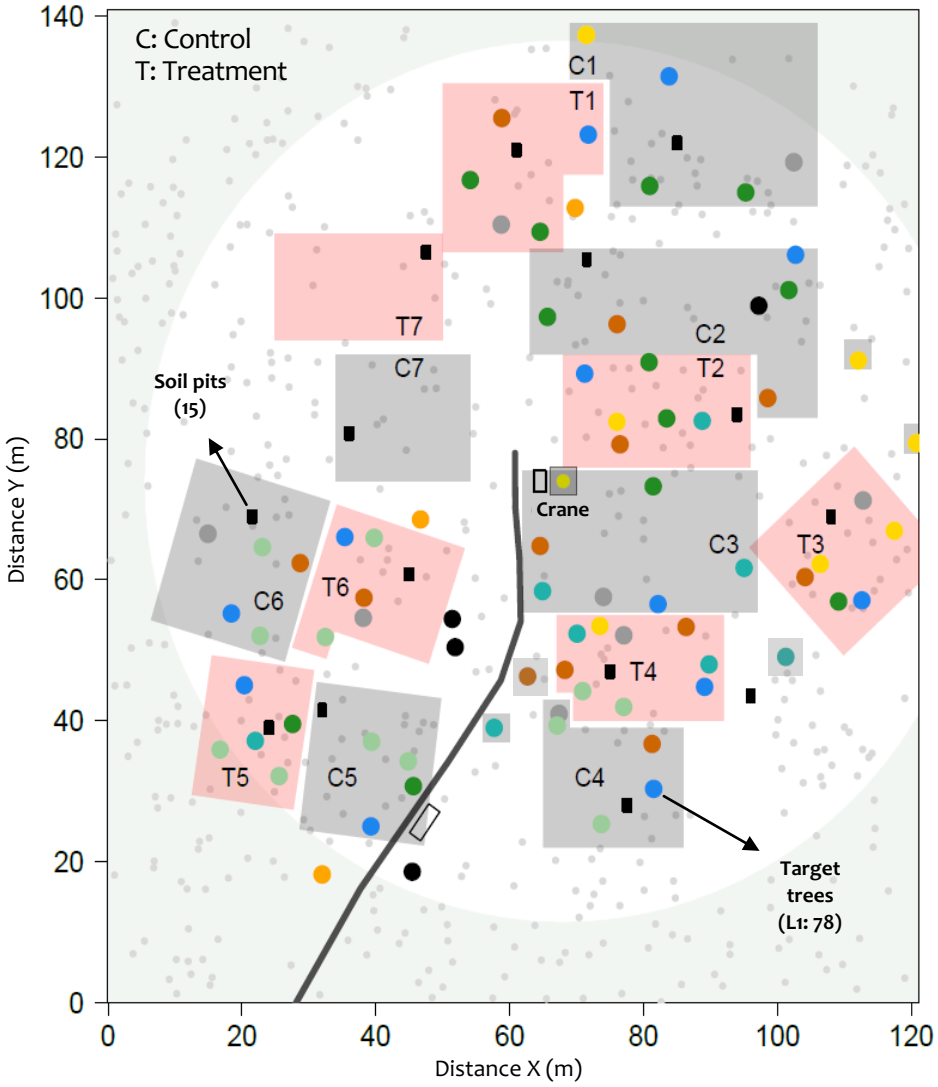
→ Can phenotypic plasticity in these traits allow acclimation to a dryer climate?

Throughfall Exclusion Experiment

Experimental design

- → 7 treatment and control areas
- → 50% precipitation exclusion March – October
- → Total treatment area 3100 m²
- → 7 target species, 78 trees
- → 15 years treatment duration



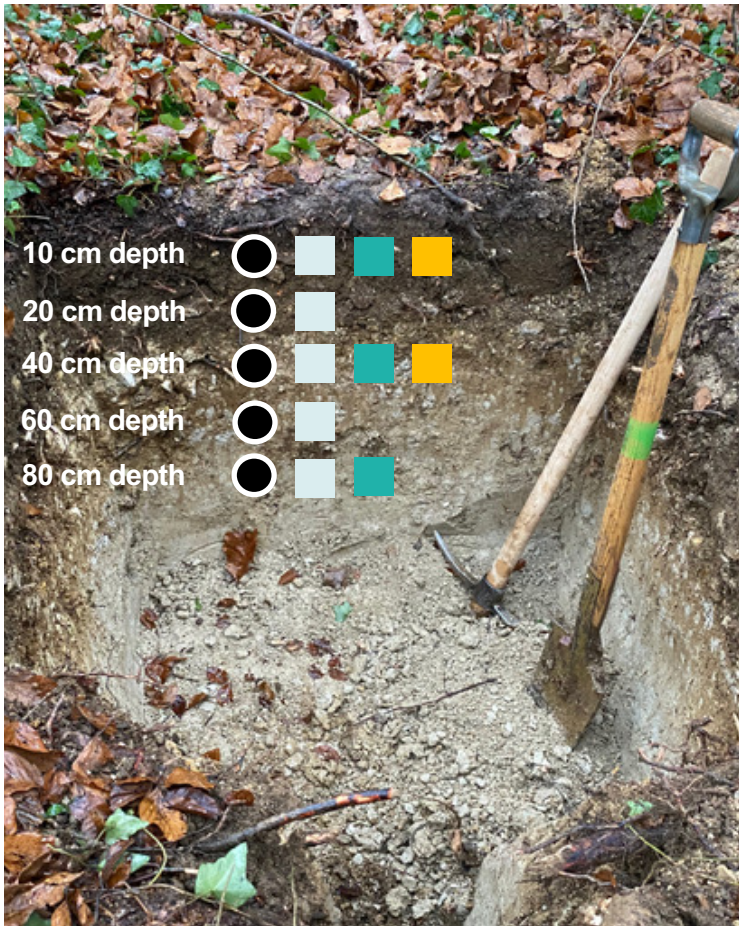


Physiological Measurements

Tree measurements	
Band den.	179 trees
Point den.	88 trees
Sap flow	78 trees
LWP	78 trees
Gas Exchange	78 trees
NSC	78 trees

Soil Measurements

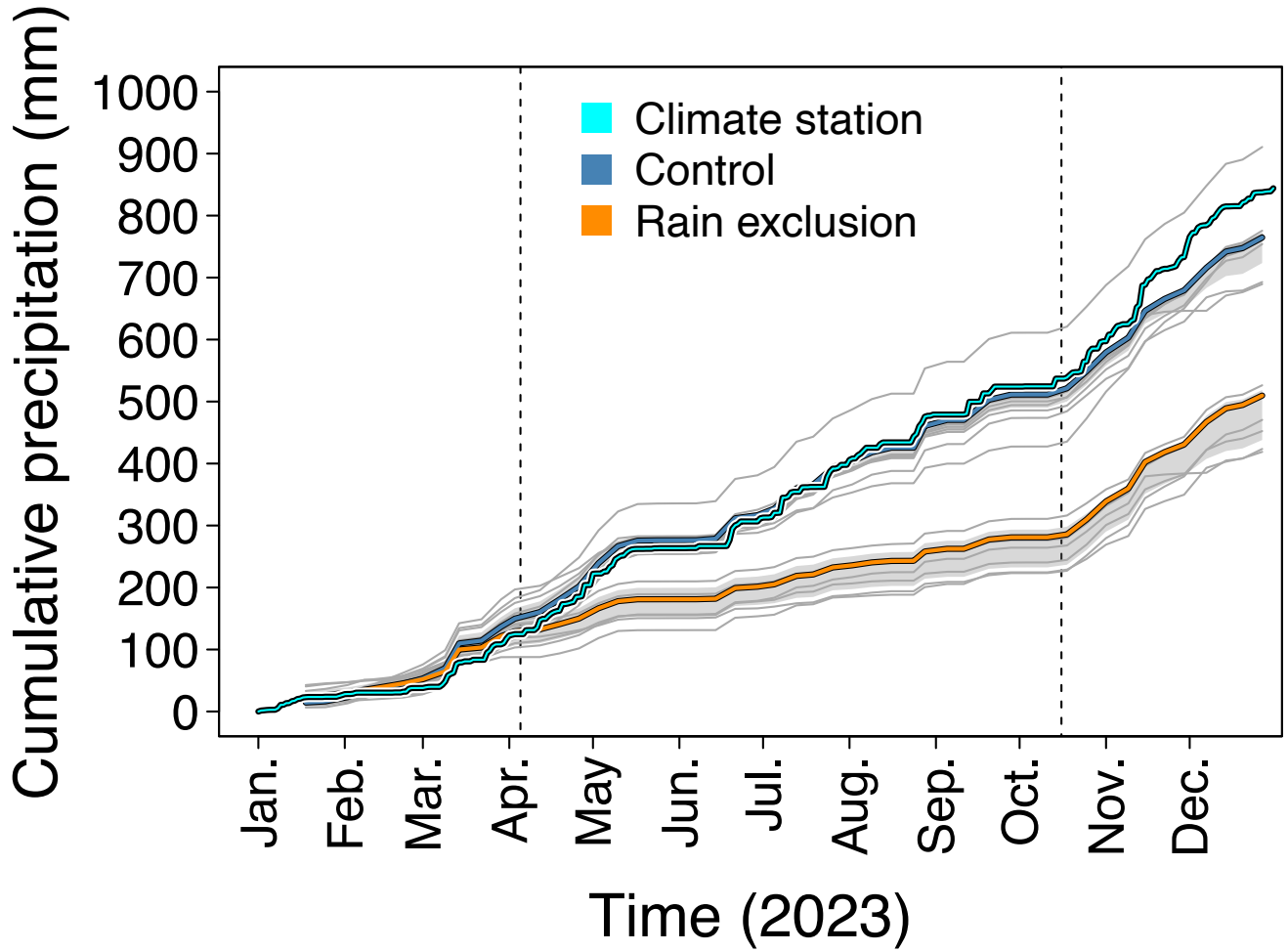
15 Soil pits: (T: 7 & C: 8)



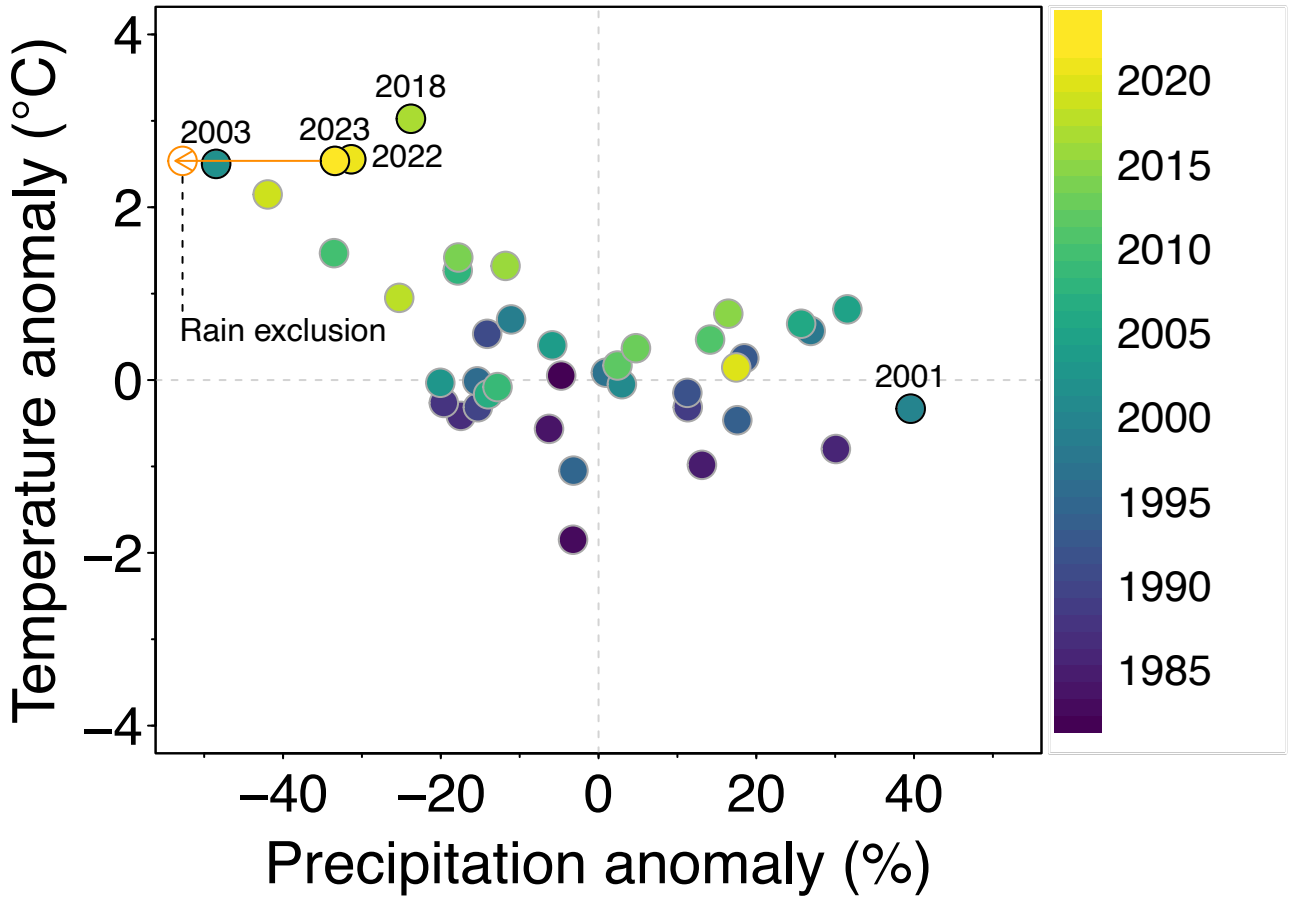
Sensor numbers

Soil variable	Depth (cm)	Control	Treatment	Total
Soil solution	10	16	14	30
(Total: 118)	20	6	8	14
	40	16	14	30
	60	6	8	14
	80	16	14	30
Vol. soil moisture	10	24	21	45
(Total: 135)	40	24	21	45
	80	24	21	45
Soil water potential	10	6	8	14
(Total 21)	40	3	4	7

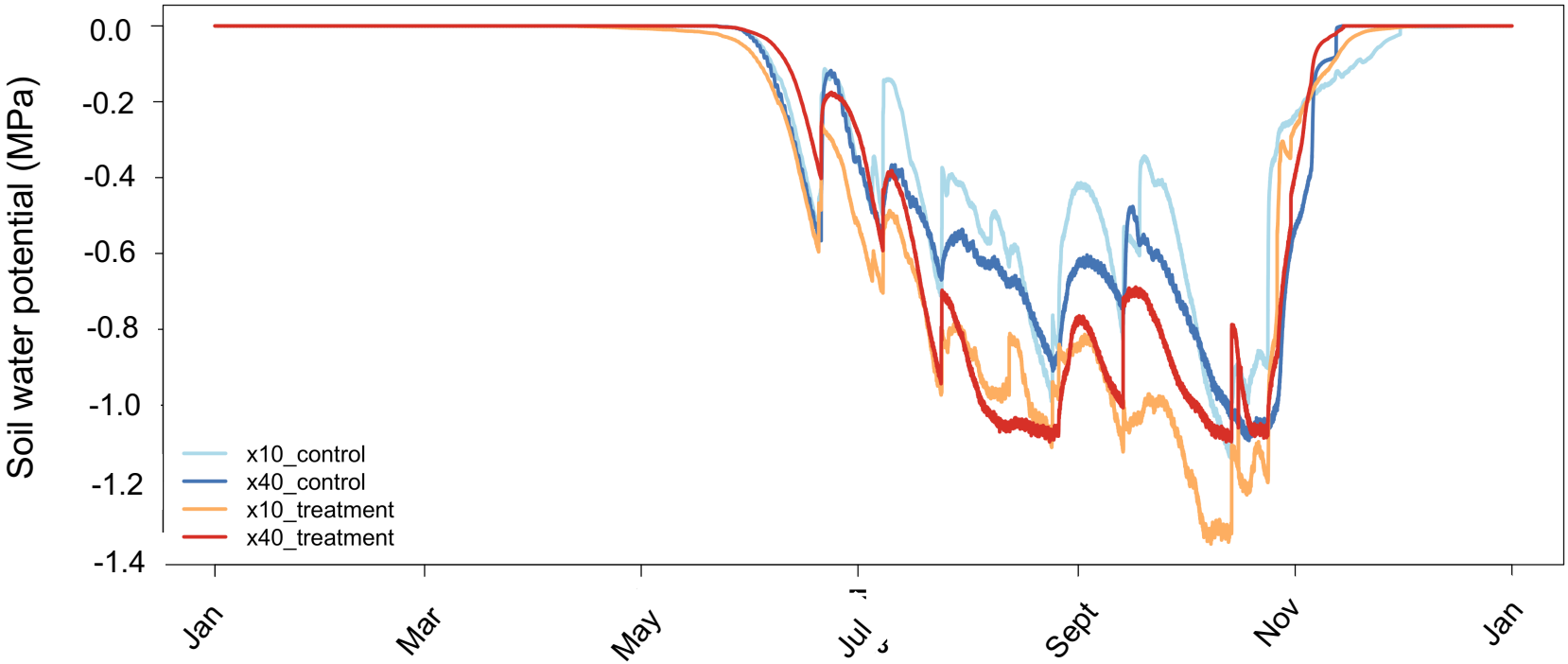
Throughfall Exclusion



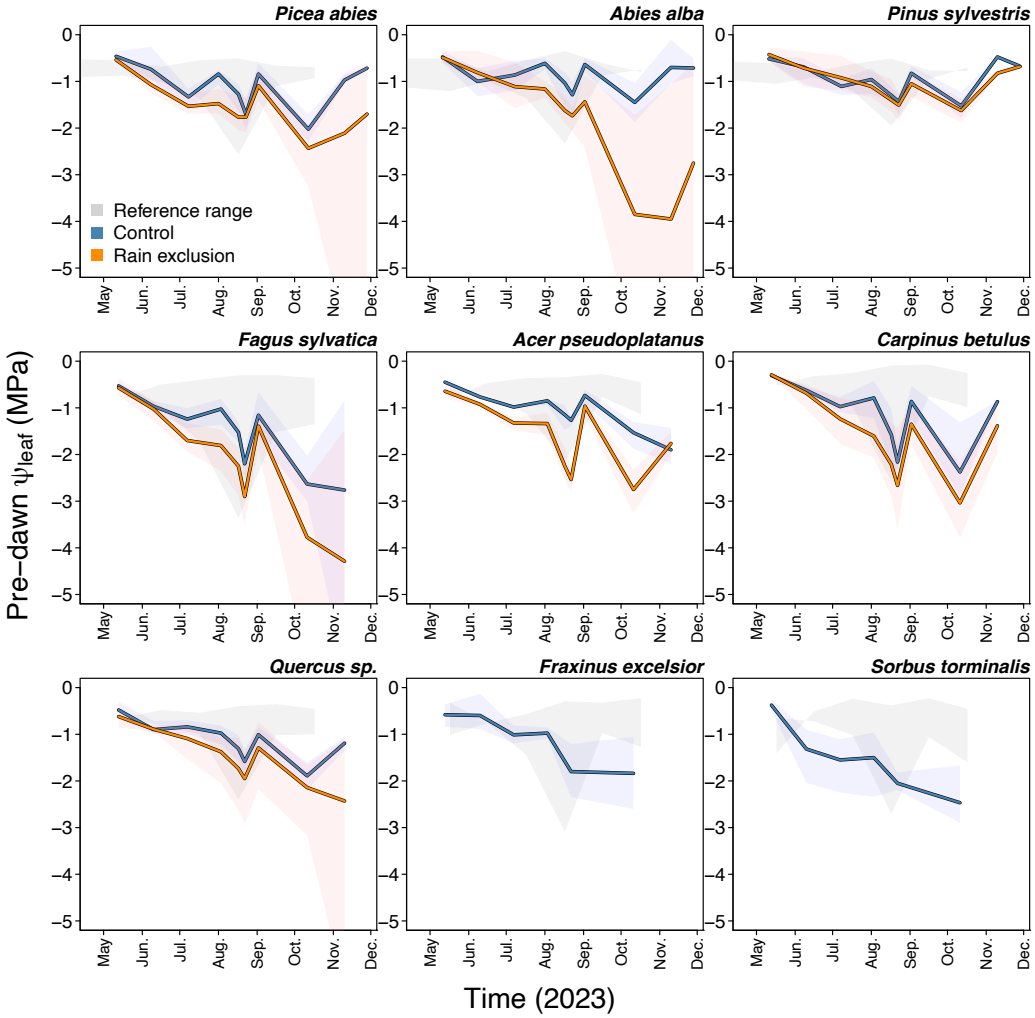
Climate



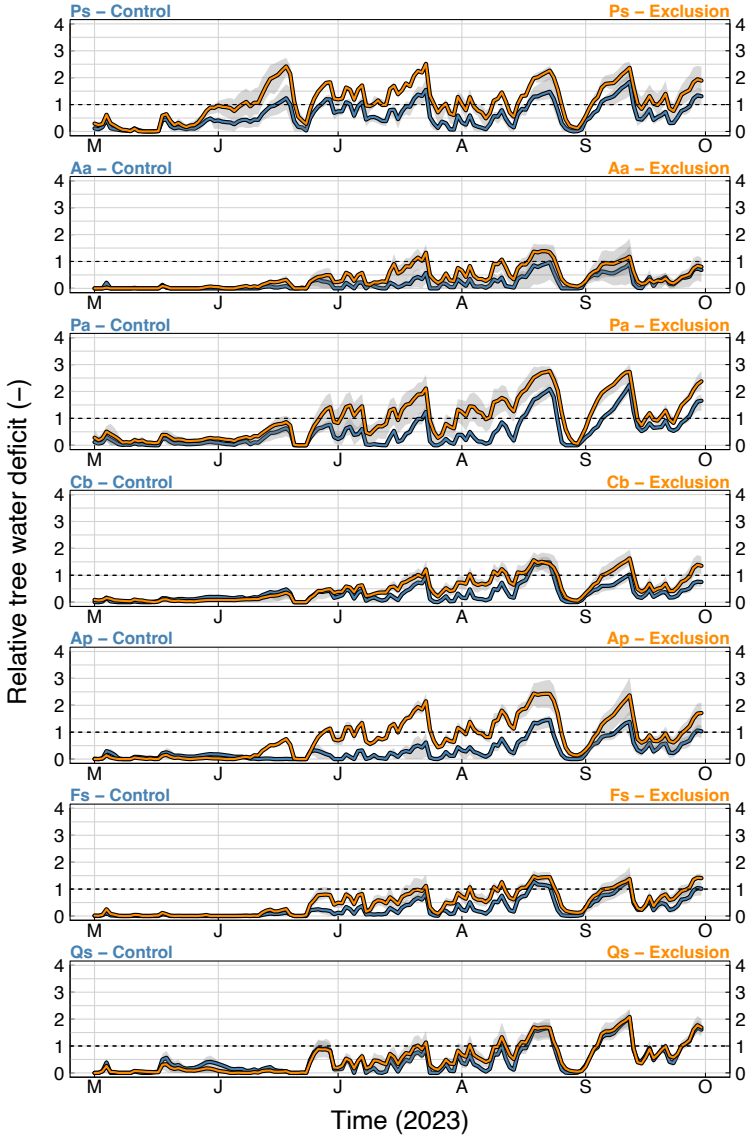
Soil Water Potential



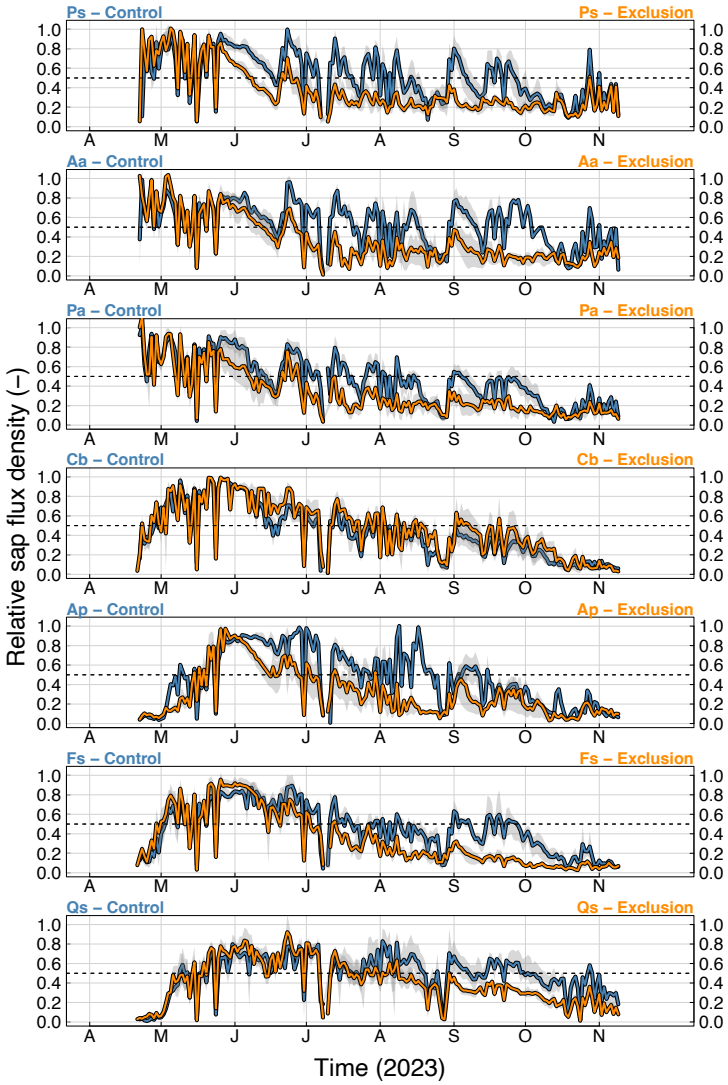
Pre-Dawn Foliar Water Potential



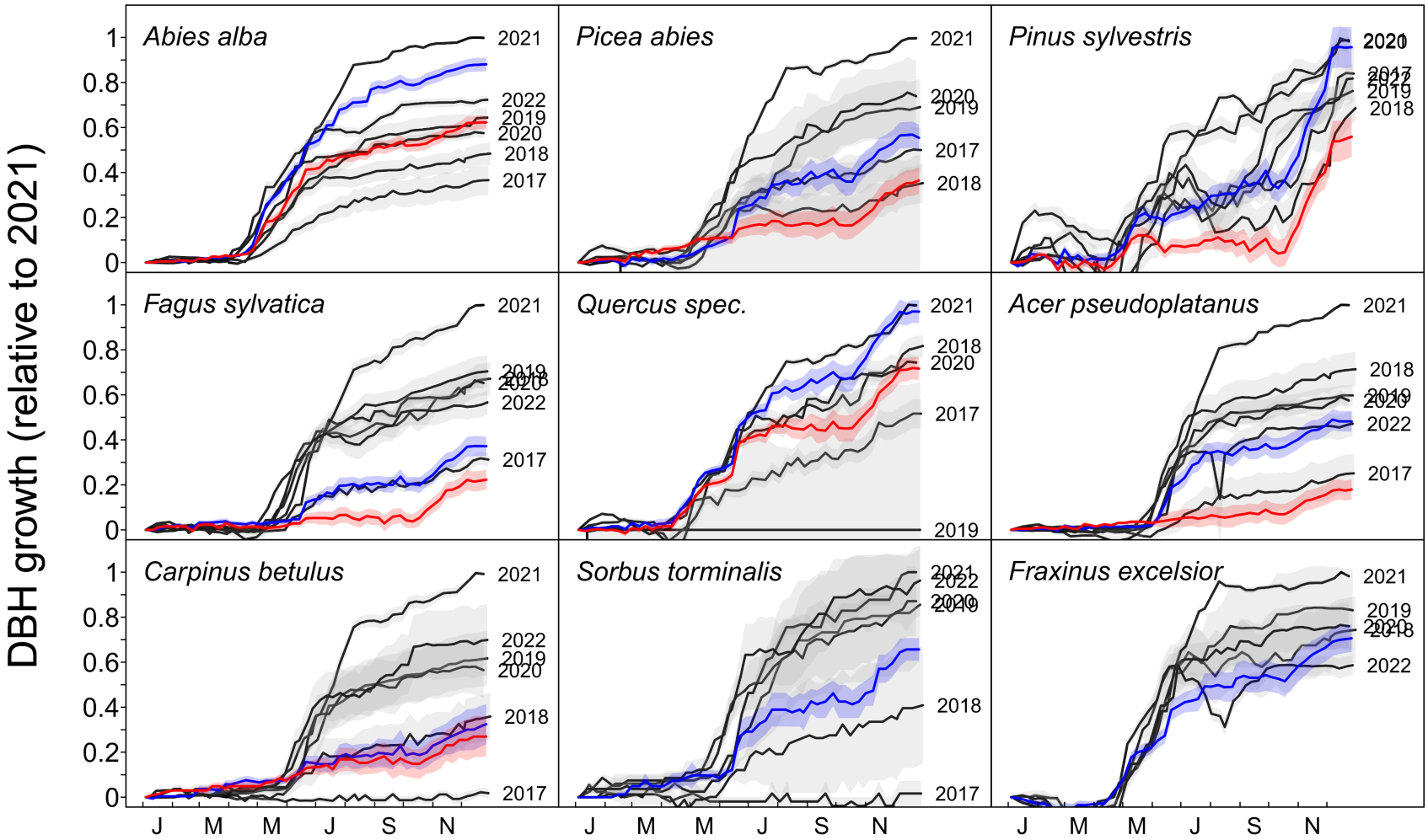
Tree Water Deficit



Sap Flux



Tree Growth



Thank You!

WSL

Amt für Wald

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Bundesamt für Umwelt BAFU

SWISS FOREST LAB

FNSNF
Fonds national suisse
Schweizerischer Nationalfonds
Fondo nazionale svizzero
Swiss National Science Foundation

erc European Research Council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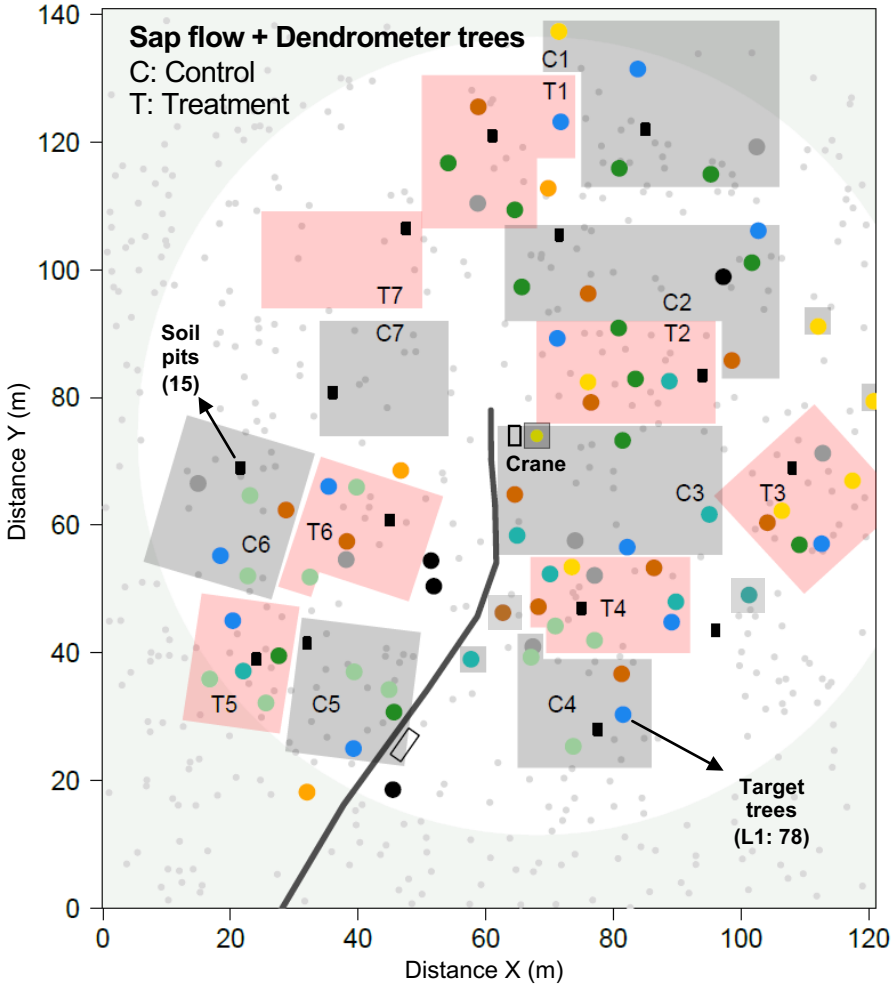
LIEBHERR

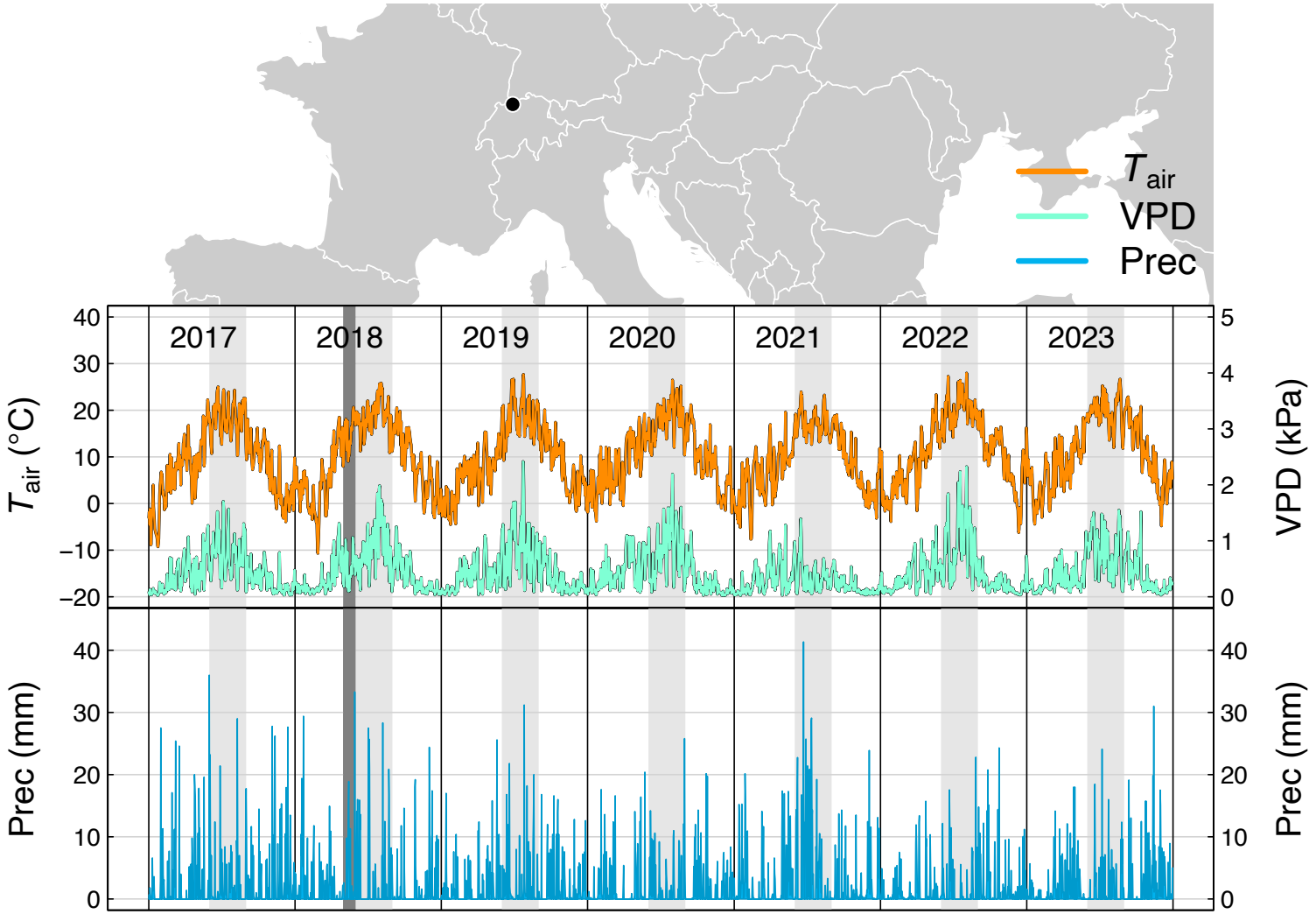
Physiological Measurements



Monitoring trees	Control	Treatment	Ambient	Total
Fagus sylvatica	6*	6*	4**	16
Quercus sp.	6*	6*		12
Carpinus betulus	4*	4*	1**	9
Acer pseudoplatanus	3*	4*	2**	9
Fraxinus excelsior			4*	4
Sorbus torminalis			3*	3
Picea abies	6*	6*	2**	14
Pinus sylvestris	6*	6*		12
Abies alba	4*	4*	1**	9

*Sap flow sensor, point dendrometer, band dendrometer (L1)
**No sap flow sensors installed (L2)

Climate



Climate