1   Table S1. Tree distances from the plot center.

Tree	Distance to plot center (m)
1	1.2
2	0.7
6	3.8
8	3.4
9	8.5
10	2.9
12	6.7
20	5.4
27	10.2
28	5.6

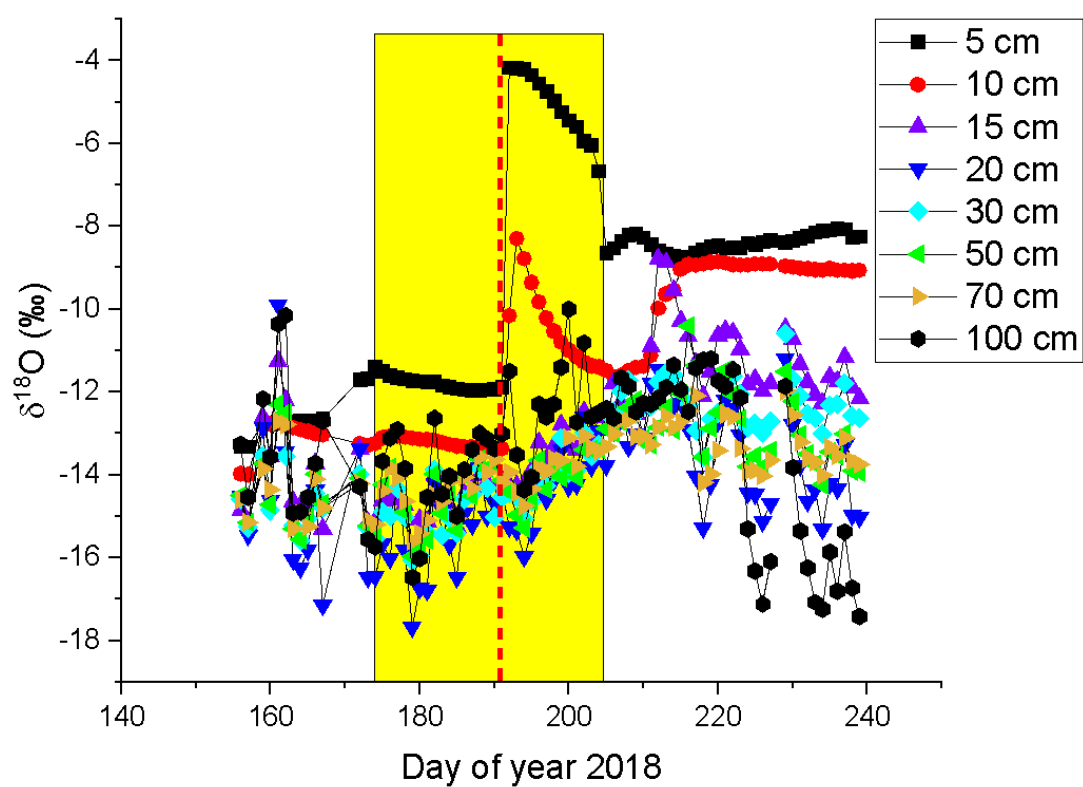
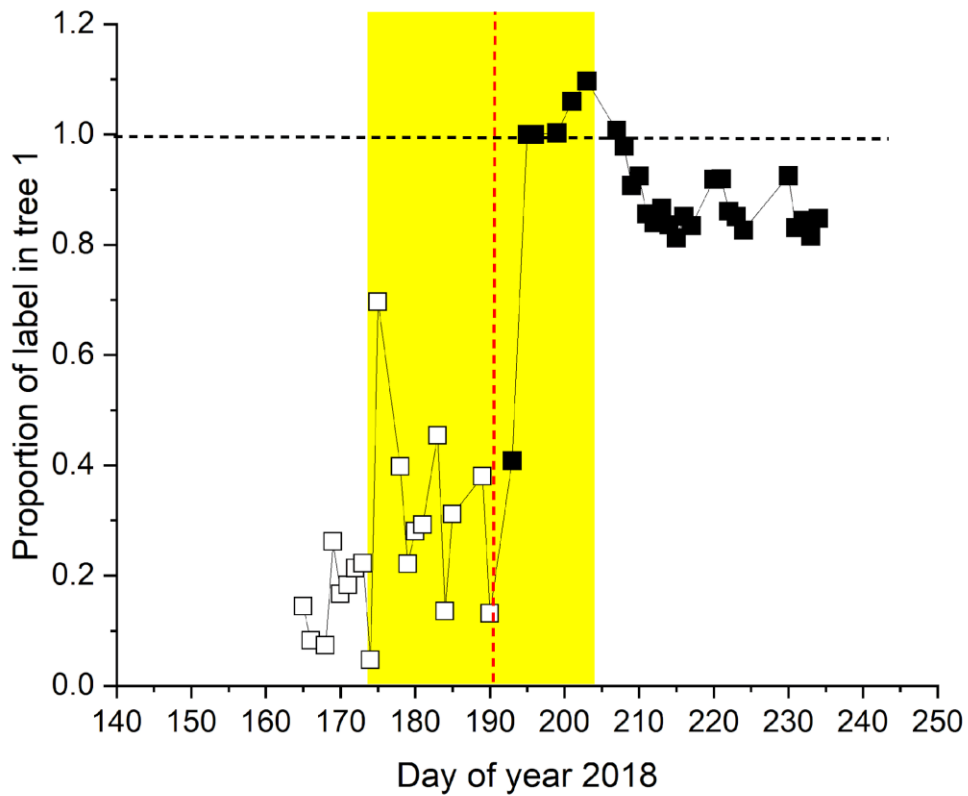



Fig. S1. $\delta^{18}O$ of soil water at all depths. Yellow bar is the drought period and vertical red line is the date of labeling.

17

18   Fig. S2. Proportion of xylem label in tree 1, the most heavily labeled tree in the study. Points

19   before the labeling occurred (at the vertical red line) are unfilled. Because the label appeared

20   first in tree 1, the label was initially all in that tree. As the other trees were labeled, the

21   proportion fell and stabilized.

22

23

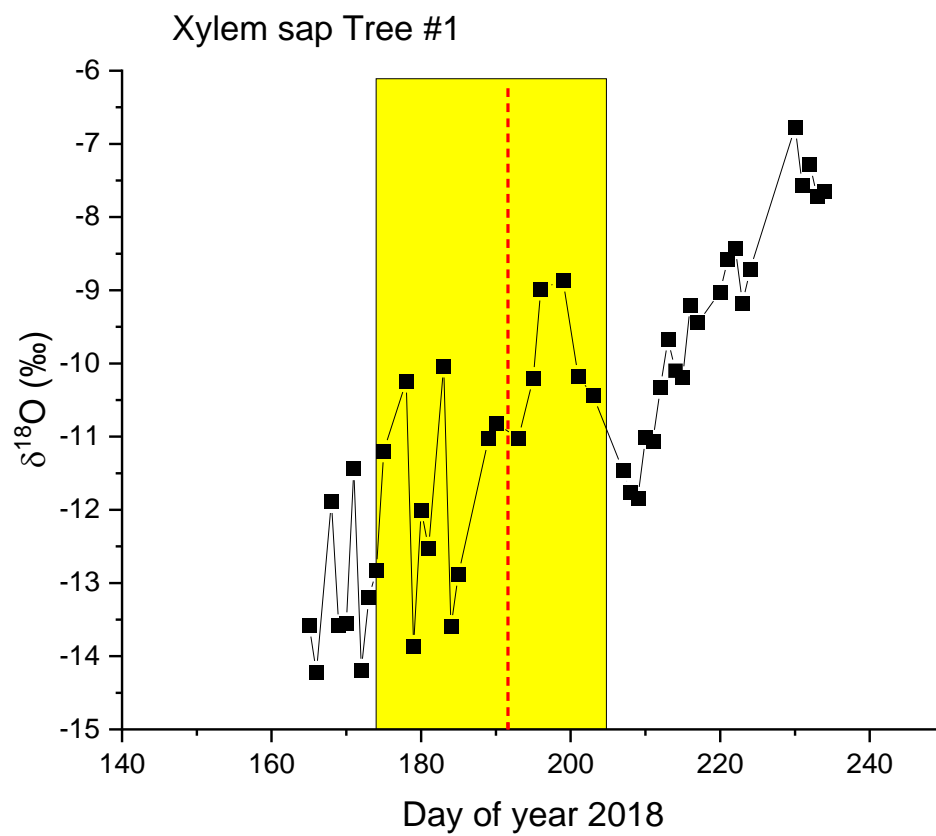
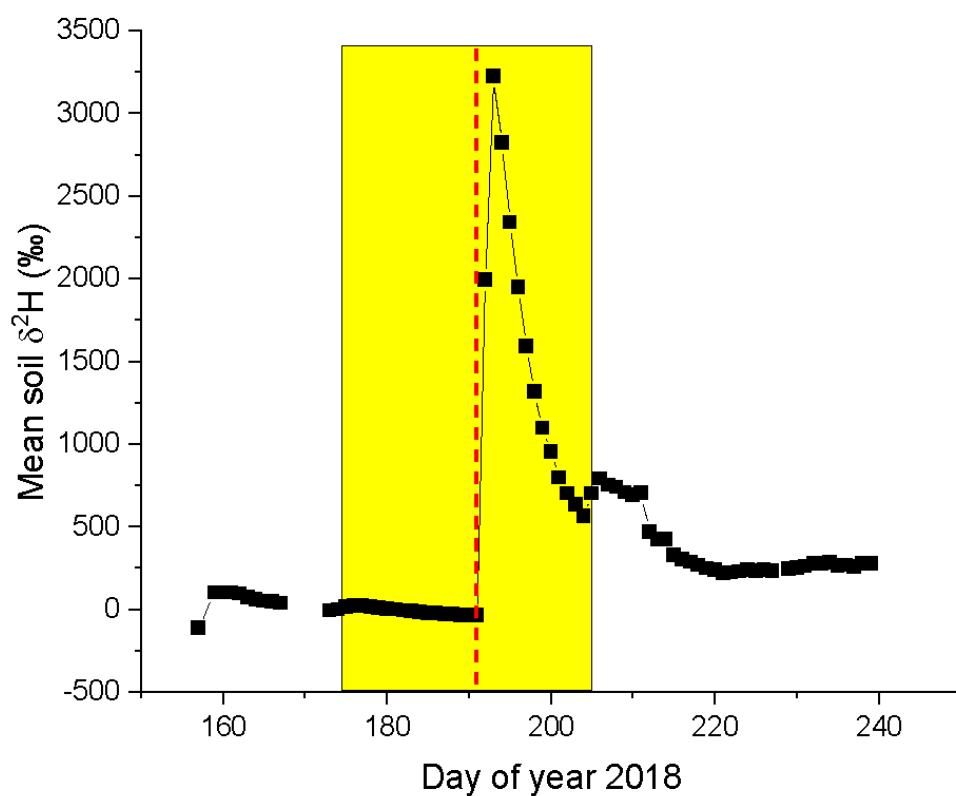
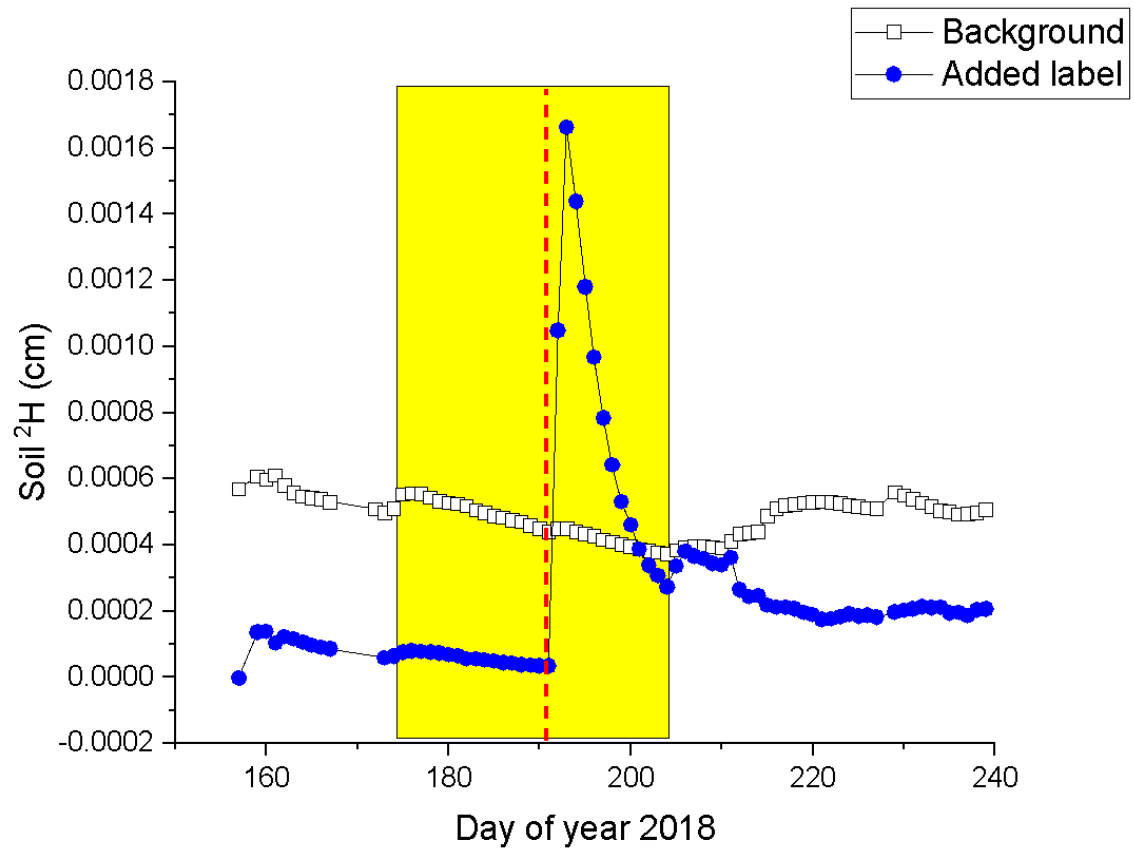



Figure S3. Xylem water $\delta^{18}O$ of tree 1, which was heavily labeled with δ^2H. The yellow box shows

the drought period and the dashed red vertical line shows the labeling date.

26

27

28   Fig. S4. Volume-weighted mean δ²H of soil water over all depths to 60 cm. The yellow box

29   shows the drought period and the vertical red line shows the labeling date.

30

31   Fig. S5. Total amount of soil ^{2}H derived from natural abundance via the lc d-excess and δ^{18}O vs.

32   that added in the label. The drought is shown as the yellow box and the labeling date is shown

33   as a vertical red line. The labeling was sufficient to rise above the background, but it was rapidly

34   diluted afterward.

35