**Supplementary data**



**Supplementary Figure 1.** Diurnal time courses of air temperature (Tair), relative humidity (RH), vapor pressure deficit (VPD), and stomatal conductance (*g*s) on four dates during the 2002 growing season. Stomatal conductance values are means of three branches on each of three uninfected and infected trees.

**Supplementary Table 1.** Daytime climate conditions (0630-1930 h) and precipitation during the growing season (DOY 121-274) in 1999 and 2002.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Year | Tair  (ºC) | RH  (%) | VPD  (kPa) | Precipitation  (cm) |
| 1999 | 17.1 | 60.6 | 0.77 | 21.3 |
| 2002 | 17.6 | 60.8 | 0.79 | 16.0 |

**Supplementary Table 2.** Pearson’scorrelation coefficients (top values) and significance levels (bottom values) of the relationships between ring widths and climate variables: minimum and maximum temperature, precipitation, and Palmer drought severity index (PDSI) for uninfected (**A**) and infected (**B**) trees. Bolded values are significant at P≤0.05; n=13-17 trees.

**(A)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Infected** | Period | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| Min temperature | 1895-1950 | -0.16 | 0.12 | **0.34** | 0.19 | -0.20 | -0.20 | -0.19 | -0.08 | -0.09 | 0.07 | 0.07 | -0.18 |
| 0.24 | 0.36 | **0.01** | 0.17 | 0.14 | 0.13 | 0.16 | 0.54 | 0.51 | 0.63 | 0.60 | 0.20 |
| 1951-2010 | 0.17 | **0.31** | 0.10 | -0.13 | -0.03 | 0.05 | -0.02 | 0.14 | 0.00 | -0.03 | 0.23 | 0.05 |
| 0.18 | **0.02** | 0.45 | 0.34 | 0.82 | 0.72 | 0.86 | 0.30 | 0.98 | 0.85 | 0.08 | 0.69 |
| 1895-2010 | 0.03 | **0.21** | **0.20** | 0.01 | -0.09 | -0.03 | -0.06 | 0.07 | -0.02 | 0.02 | 0.17 | -0.05 |
| 0.77 | **0.02** | **0.03** | 0.93 | 0.32 | 0.78 | 0.52 | 0.43 | 0.79 | 0.86 | 0.06 | 0.57 |
| Max temperature | 1895-1950 | -0.20 | 0.14 | 0.28 | -0.01 | -0.04 | -0.11 | -0.17 | -0.12 | 0.01 | -0.05 | -0.19 | -0.21 |
| 0.15 | 0.29 | 0.36 | 0.92 | 0.76 | 0.40 | 0.21 | 0.38 | 0.97 | 0.73 | 0.15 | 0.13 |
| 1951-2010 | 0.21 | 0.24 | 0.12 | -0.26 | -0.14 | **-0.28** | -0.16 | 0.01 | -0.14 | 0.02 | 0.13 | 0.04 |
| 0.11 | 0.06 | 0.35 | 0.05 | 0.27 | **0.03** | 0.22 | 0.96 | 0.30 | 0.85 | 0.30 | 0.76 |
| 1895-2010 | 0.05 | **0.06** | **0.15** | -0.06 | -0.03 | **-0.14** | -0.16 | -0.07 | -0.14 | -0.12 | -0.05 | -0.08 |
| 0.78 | **0.03** | **0.04** | 0.12 | 0.29 | **0.03** | 0.10 | 0.75 | 0.50 | 0.97 | 0.91 | 0.46 |
| Precipitation | 1895-1950 | 0.00 | 0.00 | -0.01 | 0.20 | -0.08 | 0.20 | **0.27** | -0.10 | 0.05 | 0.22 | 0.15 | -0.24 |
| 0.99 | 0.97 | 0.94 | 0.13 | 0.58 | 0.14 | **0.04** | 0.48 | 0.71 | 0.10 | 0.29 | 0.08 |
| 1951-2010 | 0.05 | 0.01 | -0.20 | 0.04 | 0.02 | 0.08 | 0.12 | -0.05 | -0.06 | -0.27 | 0.20 | 0.04 |
| 0.72 | 0.93 | 0.12 | 0.79 | 0.88 | 0.53 | 0.37 | 0.72 | 0.65 | 0.04 | 0.13 | 0.77 |
| 1895-2010 | 0.04 | 0.00 | -0.11 | 0.11 | -0.03 | 0.14 | 0.18 | -0.06 | -0.02 | -0.07 | 0.17 | -0.09 |
| 0.68 | 0.97 | 0.25 | 0.25 | 0.74 | 0.14 | 0.05 | 0.56 | 0.87 | 0.49 | 0.07 | 0.34 |
| PDSI | 1895-1950 | 0.02 | -0.02 | -0.03 | 0.12 | 0.06 | 0.17 | 0.20 | 0.10 | 0.04 | 0.17 | 0.15 | 0.01 |
| 0.87 | 0.88 | 0.81 | 0.39 | 0.66 | 0.21 | 0.14 | 0.44 | 0.75 | 0.22 | 0.27 | 0.93 |
| 1951-2010 | 0.12 | 0.09 | 0.00 | 0.16 | 0.15 | 0.20 | 0.19 | 0.19 | 0.15 | 0.00 | 0.17 | 0.12 |
| 0.35 | 0.48 | 0.98 | 0.22 | 0.25 | 0.12 | 0.15 | 0.16 | 0.25 | 0.99 | 0.18 | 0.34 |
| 1895-2010 | 0.09 | 0.06 | 0.00 | 0.15 | 0.12 | **0.19** | **0.20** | 0.16 | 0.11 | 0.07 | 0.17 | 0.08 |
| 0.31 | 0.55 | 0.99 | 0.11 | 0.20 | **0.04** | **0.03** | 0.09 | 0.22 | 0.44 | 0.07 | 0.37 |

**(B)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Uninfected** | Period | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| Min temperature | 1895-1950 | -0.13 | 0.17 | **0.34** | 0.07 | -0.11 | -0.23 | **-0.40** | -0.14 | -0.17 | 0.06 | 0.09 | -0.11 |
| 0.33 | 0.21 | **0.01** | 0.59 | 0.40 | 0.09 | **0.00** | 0.30 | 0.22 | 0.64 | 0.49 | 0.44 |
| 1951-2010 | 0.15 | **0.28** | 0.10 | 0.00 | -0.03 | 0.06 | 0.14 | 0.24 | 0.09 | 0.00 | 0.14 | -0.05 |
| 0.24 | **0.03** | 0.47 | 0.98 | 0.80 | 0.64 | 0.29 | 0.07 | 0.48 | 0.99 | 0.29 | 0.70 |
| 1895-2010 | 0.00 | 0.17 | 0.17 | 0.03 | -0.08 | -0.07 | -0.08 | 0.06 | -0.01 | 0.02 | 0.10 | -0.07 |
| 1.00 | 0.07 | 0.08 | 0.76 | 0.40 | 0.47 | 0.41 | 0.54 | 0.94 | 0.81 | 0.31 | 0.44 |
| Max temperature | 1895-1950 | -0.08 | 0.14 | 0.17 | -0.08 | -0.03 | -0.02 | **-0.32** | -0.13 | -0.12 | -0.18 | -0.19 | -0.12 |
| 0.57 | 0.29 | 0.20 | 0.58 | 0.85 | 0.88 | **0.02** | 0.36 | 0.37 | 0.18 | 0.15 | 0.39 |
| 1951-2010 | 0.20 | 0.05 | 0.16 | -0.09 | -0.02 | -0.18 | -0.04 | -0.01 | -0.12 | -0.07 | 0.08 | -0.04 |
| 0.12 | 0.68 | 0.23 | 0.49 | 0.86 | 0.16 | 0.76 | 0.95 | 0.35 | 0.60 | 0.53 | 0.78 |
| 1895-2010 | 0.05 | 0.06 | 0.15 | -0.06 | -0.03 | -0.14 | -0.16 | -0.07 | -0.14 | -0.12 | -0.05 | -0.08 |
| 0.61 | 0.52 | 0.10 | 0.51 | 0.75 | 0.12 | 0.10 | 0.45 | 0.14 | 0.21 | 0.63 | 0.42 |
| Precipitation | 1895-1950 | 0.10 | 0.15 | 0.10 | 0.24 | -0.08 | 0.06 | 0.20 | -0.08 | 0.18 | **0.33** | 0.13 | -0.18 |
| 0.46 | 0.28 | 0.48 | 0.08 | 0.57 | 0.67 | 0.15 | 0.55 | 0.17 | **0.01** | 0.33 | 0.18 |
| 1951-2010 | -0.01 | 0.19 | -0.22 | 0.09 | -0.04 | 0.00 | 0.14 | -0.07 | 0.05 | -0.08 | 0.20 | 0.02 |
| 0.93 | 0.14 | 0.09 | 0.50 | 0.78 | 0.98 | 0.30 | 0.60 | 0.71 | 0.57 | 0.12 | 0.87 |
| 1895-2010 | 0.01 | 0.17 | -0.09 | 0.13 | -0.04 | 0.02 | 0.16 | -0.09 | 0.11 | 0.06 | 0.17 | -0.07 |
| 0.92 | 0.07 | 0.36 | 0.16 | 0.64 | 0.87 | 0.09 | 0.34 | 0.23 | 0.49 | 0.07 | 0.46 |
| PDSI | 1895-1950 | 0.09 | 0.10 | 0.12 | 0.25 | 0.08 | 0.12 | 0.14 | 0.13 | 0.13 | 0.23 | 0.17 | 0.07 |
| 0.52 | 0.47 | 0.40 | 0.06 | 0.56 | 0.39 | 0.32 | 0.35 | 0.34 | 0.09 | 0.21 | 0.60 |
| 1951-2010 | 0.19 | 0.25 | 0.10 | 0.16 | 0.12 | 0.13 | 0.14 | 0.14 | 0.11 | 0.04 | 0.15 | 0.12 |
| 0.14 | 0.06 | 0.44 | 0.22 | 0.35 | 0.31 | 0.27 | 0.30 | 0.39 | 0.74 | 0.25 | 0.36 |
| 1895-2010 | 0.12 | 0.17 | 0.08 | 0.15 | 0.07 | 0.09 | 0.11 | 0.10 | 0.09 | 0.09 | 0.13 | 0.07 |
| 0.20 | 0.06 | 0.41 | 0.11 | 0.45 | 0.34 | 0.26 | 0.28 | 0.31 | 0.33 | 0.16 | 0.45 |

**Supplementary Table 3.** Pearson’scorrelation coefficients (top values) and significance levels (bottom values) of the relationships of Δ13Ccell and δ18Ocell with growing season (DOY 121-274) mean diurnal (0630-1930 h) climate variables: air temperature (Tair), relative humidity (RH), vapor pressure deficit (VPD), and total growing season precipitation for the period 1980-2010; n=6.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Condition |  | Tair | RH | Precipitation | VPD |
| Uninfected | Δ13Ccell | -0.64  0.03 | 0.57  0.05 | 0.17  0.60 | -0.63  0.03 |
| Infected | Δ13Ccell | 0.13  0.68 | -0.07  0.83 | -0.05  0.88 | 0.09  0.79 |
| Uninfected | δ18Ocell | -0.16  0.62 | -0.13  0.70 | -0.22  0.50 | 0.01  0.99 |
| Infected | δ18Ocell | 0.23  0.48 | -0.44  0.15 | -0.32  0.31 | 0.37  0.23 |