The Effects of Climate Variation on Radial Tree Growth in the Colorado Front Range

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Introduction
The purpose of this project was to examine the radial tree growth of different tree stands of Engelmann Spruce (Picea engelmannii) on Niwot ridge, Colorado to see how their growth rate has changed in response to changes in temperature and precipitation. Another goal was to update the existing chronologies for the area established in 1994.

The sites selected (MRS7 and BL6) are characterized by varying precipitation, temperature, and topography to assess variation in tree growth in different settings.

Methods

![Image](https://example.com/image1)

Figure 1: The Niwot Ridge research Area

**Figure 9:** The core sample is then sanded using a power sander with the help of statistical tests and datelines plots in the PAST program and then checked in WinDENDRO.

**Figure 10:** The dry mounted cores are examined and measured on a program called WIN-TRIM.

**Figure 11:** The age trend is then removed by fitting the data to a 3rd order cubic curve after which the completed time series were made using usual mean values.

**Figure 12:** Correlations between monthly temperature means and tree ring width index computed over period 1896-2013

**Figure 13:** Correlations between monthly precipitation sums and tree ring width index computed over period 1895-2013

**Table 1:** A short summary of the tree dynamics sampled

<table>
<thead>
<tr>
<th>Site</th>
<th>Number of trees cored</th>
<th>Mean age</th>
<th>Mean ring width</th>
<th>Mean sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRS7</td>
<td>22</td>
<td>292</td>
<td>0.432 mm</td>
<td>0.179</td>
</tr>
<tr>
<td>BL6</td>
<td>21</td>
<td>231</td>
<td>0.650 mm</td>
<td>0.186</td>
</tr>
</tbody>
</table>

Conclusions

The ring width chronologies were found to be consistent with past measurements through crossdating.

Comparisons of ring chronologies to temperature show a negative correlation between ring width and temperature.

Comparisons of ring width chronologies to precipitation show largely negative correlations.

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References

Figures 16, and 17 were created using data from the PRISM climate group.