

Outline

✓ Objectives Materials and **Methods** ✓ Results ✓ Discussion ✓ Conclusions



Objectives

- Tree-ring collections to update and extend existing chronologies and to sample new sites in the Jemez Mountains, northern New Mexico.
- 2. Development of site chronologies for each of the sites.



Objectives

- 3. Study the effect of climate on tree-ring growth
- 4. Develop tree-ring reconstructions of climate over the past several centuries for this region





New and Updated Tree-Ring Sites in the Jemez Mountains, New Mexico, U.S.







Table 1. Site information for northern New Mexico

Site Name	Site	Species	Elevation	Latitude	Longitude	Time Span	1 st	
	Code		(m)				year EPS> 0.85	
Echo Amphitheater	EAU	Pseudotsuga menziesii	2059	36°21'	105°31'W	1515-2007	1652	
Mesa Alta	MEA	Pinus strobiformis	2,525	36° 17'N	106° 37'W	769-2007	1464	
Mesa Alta	MEA	Pseudotsuga menziesii	2,525	36° 17'N	106° 37'W	1522-2007	1625	
Alta Mesa	AMPN ¹	Pinus edulis	2438	36°16'	106° 37'W	1534-2005	1553	
Bear Canyon Middle	BCM	Pinus strobiformis	2,597	35° 55'N	106° 40'W	1568-2007	1640	
Bear Canyon West	BCW	Pinus strobiformis	2561	35° 55'N	106° 41'W	1578-2007	1714	
Bear Canyon West	BCW	Pseudotsuga menziesii	2561	35° 55'N	106° 41'W	1655-2007	1673	
Fenton Lake*	FEN ²	Pinus ponderosa	2,529	35° 53'N	106° 41'W	1304-2007	1539	
Upper Los Alamos	ULA ¹	Pinus ponderosa	2231	35° 52'N	106° 37'W	1659-2005	1675	
Paliza campground	PCG^1	Pinus edulis	2,057	35°42'N	106°38'W	1645-2005	1671	

¹Chronologies were update by Ron Towner ²FEN was updated this year

- Collection and sample preparation
- Detrending
 - Removes age/size trend
- Response function
 - Identifies climate signals used for reconstruction
- Transfer function
 - Reconstructs climate variables

Collection and sample preparation

- During the fall of 2007, 20 living trees were sampled from each site.
- two increment cores were collected from each living tree.
- Samples were collected using the 4.5 mm increment borers.



Collection and sample preparation

• Full cross-sections were taken from stumps, logs, and snags.



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Collection and sample preparation

Samples were finesanded and crossdated using standard dendrochronological techniques (Stokes and Smiley 1996; Swetnam 1985).

The width of each annual ring was measured to the nearest 0.01 mm.



Chronology
Response function
Transfer function
Calibration Verification
Reconstructions



Chronologies

Jemez Chronologies										
	1662	1698	1734	1770	1806	1842	1878	1914	1950	1986
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BCM	****^**	Mpmm	w		$\sim \sim $	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	bpon and	WALM	man
	1662	1698	1734	1770	1806	1842	1878	1914	1950	1986

Chronologies



Chronologies

The lengths of the 10 chronologies range from 349 to 1239 years.



Response Functions



Response function analysis between the chronology and monthly Division 2 precipitation and temperature indicated that October-June was the most appropriate predictand for reconstruction.

This climate response function accounts for 68% of tree-ring width variance.

Calibration Verification





Reconstruction AD 1662-2005



Conclusions

 The technique of dendrochronology is a valuable tool to study past climate variability.

 Tree-ring chronologies from the region showed strong and significant precipitation signal.



