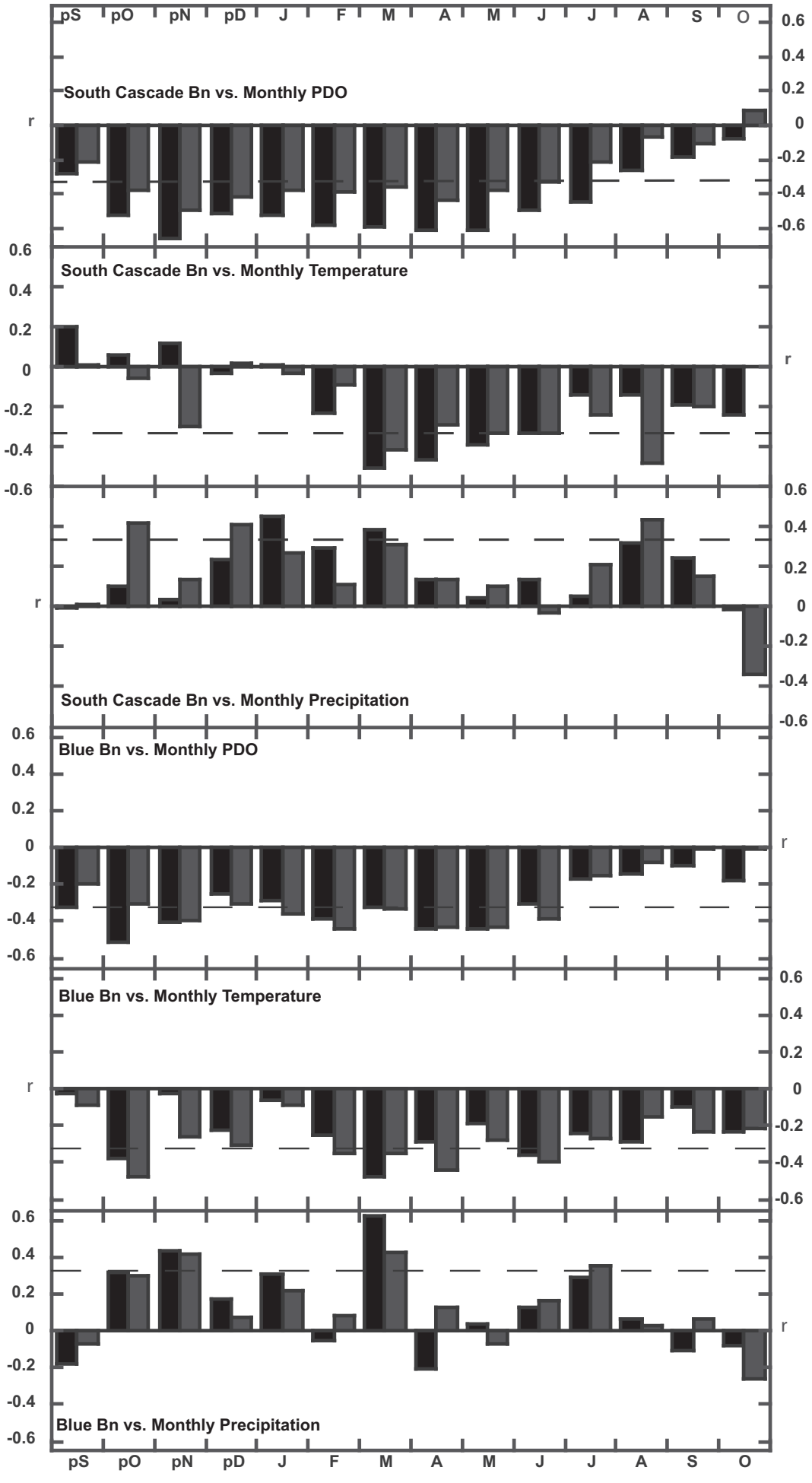
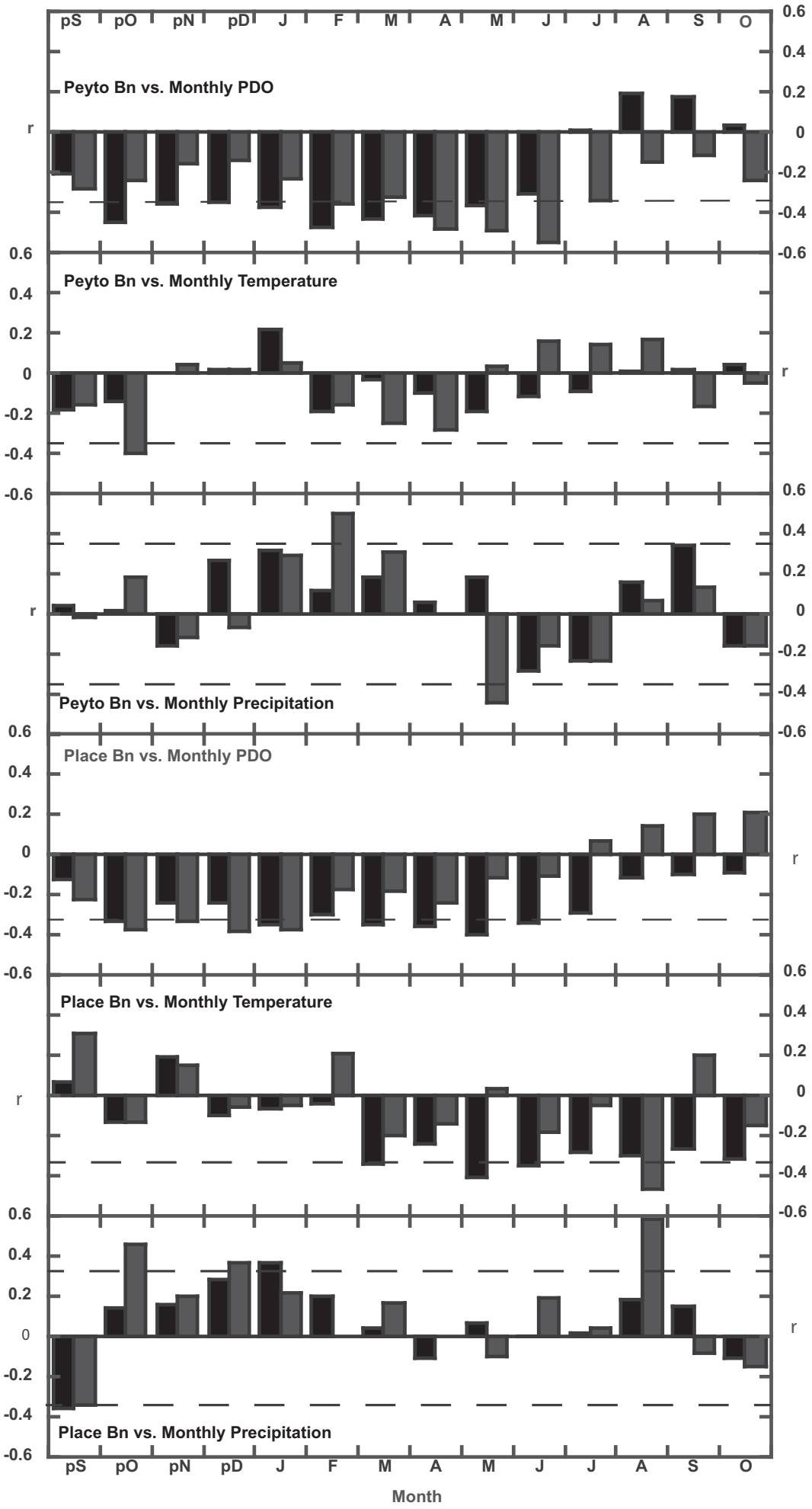
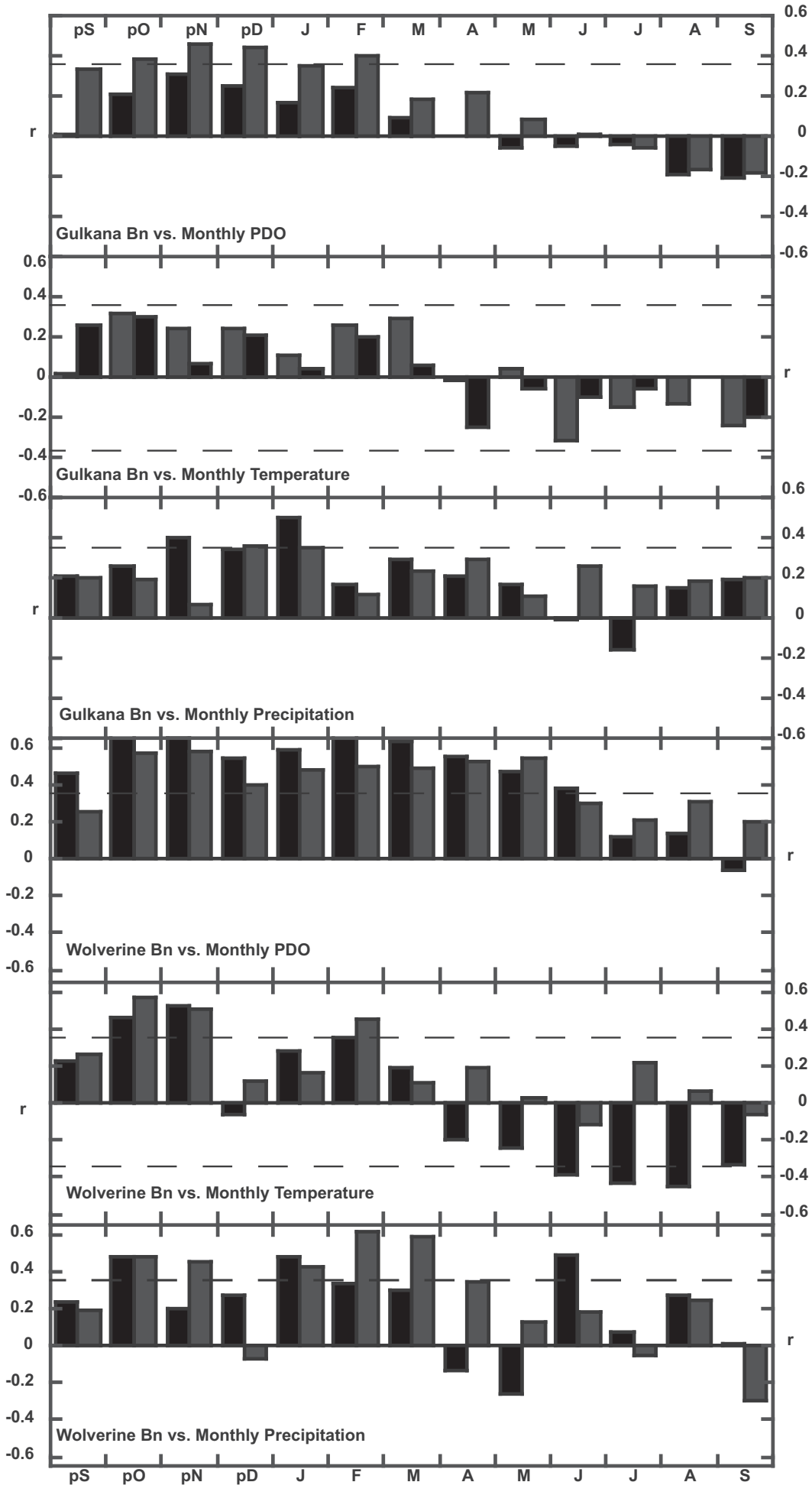
Supplemental Figure 1



Supplemental Figure 2



Supplemental Figure 3



Supplemental Table 1. Calibration and verification statistics for the Blue (1956–1992) and South Cascade (1959–1992) glacier reconstructions. Values are significant at the 95% confidence or higher ($p \leq 0.05$).

	Calibration Statistics				Verification Statistics			
Blue Glacier	**Period**	**F-Value**	**adj. r^2**	**r**	**Period**	**r**	**re**	**ce**
Nest 1 (1584–1992)	1956–1992	46.65	0.73	0.85	1975–1992	0.57	0.27	0.23
Nest 2 (1570–1992)	1956–1992	39.43	0.69	0.84	1975–1992	0.49	0.26	0.21
Nest 3 (1538–1992)	1956–1992	34.92	0.66	0.81	1975–1992	0.4	0.18	0.12
South Cascade Glacier								
Nest 1 (1698–1992)	1957–1992	55.25	0.61	0.79	1975–1992	0.71	0.47	0.28
Nest 2 (1685–1992)	1957–1992	36.86	0.52	0.72	1975–1992	0.64	0.41	0.2
Nest 3 (1580–1992)	1957–1992	25.77	0.43	0.65	1975–1992	0.69	0.48	0.48

Supplemental Table 2

Supplemental Table 2. Calibration and verification statistics for the Place (1965–1991) and Peyto (1965–1991) glacier reconstructions. All values except those in bold are significant at the 95% confidence or higher ($p \leq 0.05$).

	Calibration Statistics				Verification Statistics			
Place Glacier	**Period**	**F-Value**	**adj. r^2**	**r**	**Period**	**r**	**re**	**ce**
Nest 1 (1694–1991)	1965–1991	11.03	0.48	0.69	1984–1997	**0.16**	0.03	****
Peyto Glacier								
Nest 1 (1559–1991)	1965–1991	38.02	0.63	0.78	1979–1991	0.46	0.56	****
Nest 2 (1495–1991)	1965–1991	30.12	0.55	0.73	1979–1991	**0.3**	0.57	****

Supplemental Table 3. Calibration statistics for the Wolverine (1966–1987) and Gulkana (1966–1983) glacier reconstructions. All values are significant at the 95% confidence or higher ($p \leq 0.05$).

	Calibration Statistics			
Wolverine Glacier	**Period**	**F-Value**	**adj. r^2**	**r**
Nest 1 (1694–1991)	1966–1989	29.58	0.6	0.77
Nest 2 (1569–1989)	1966–1989	9.5	0.5	0.7
Gulkana Glacier				
Nest 1 (1697–1983)	1966–1983	24.58	0.77	0.87
Nest 2 (1664–1991)	1966–1983	20.68	0.68	0.82
Nest 3 (1559–1992)	1966–1983	15.11	0.49	0.70

Supplemental Table 4. The top 10 n-yr mass balance events (ranked by Magnitude) for the Blue and South Cascade glacier reconstructions.

Blue Glacier High

Rank	Event	n-yr	Mag.	Int.
1	1569–1641	73	74.58	1.02
2	1742–1764	23	16.78	0.73
3	1861–1883	23	10.93	0.48
4	1696–1709	14	9.64	0.69
5	1806–1815	10	8.50	0.85
6	1950–1990	39	6.39	0.16
7	1545–1559	15	6.11	0.41
8	1915–1927	12	4.90	0.41
9	1781–1789	9	2.76	0.31

SC Glacier High

Rank	Event	n-yr	Mag.	Int.
1	1724–1768	45	23.00	0.51
2	1601–1641	41	20.14	0.49
3	1696–1711	16	13.80	0.86
4	1953–1976	24	12.13	0.51
5	1856–1884	29	10.71	0.37
6	1806–1813	8	7.81	0.98
7	1777–1790	14	2.75	0.20
8	1678–1687	9	2.49	0.28

Blue Glacier Low

Rank	Event	n-yr	Mag.	Int.
1	1927–1950	24	−19.91	−0.83
2	1645–1687	43	−14.72	−0.34
3	1790–1805	16	−14.48	−0.91
4	1816–1860	45	−13.71	−0.30
5	1884–1915	32	−7.93	−0.25
6	1765–1780	16	−7.25	−0.45
7	1556–1568	13	−5.39	−0.41
8	1726–1736	11	−3.57	−0.32
9	1989–1997	9	−3.07	−0.34
10	1712–1721	10	−2.76	−0.28

SC Glacier Low

Rank	Event	n-yr	Mag.	Int.
1	1885–1950	68	−19.64	−0.29
2	1642–1675	34	−15.99	−0.47
3	1580–1600	19	−15.71	−0.83
4	1790–1805	15	−11.24	−0.75
5	1822–1855	34	−10.63	−0.31
6	1977–2005	29	−9.78	−0.34
7	1712–1722	12	−3.07	−0.26
8	1689–1695	7	−2.80	−0.40

Supplemental Table 5

Supplemental Table 5. The top 10 n-yr mass balance events (ranked by Magnitude) for the Place and Peyto glacier reconstructions sorted by magnitude.

Peyto Glacier High					Place Glacier High				
Rank	**Event**	**n-yr**	**Mag.**	**Int.**	**Rank**	**Event**	**n-yr**	**Mag.**	**Int.**
1	1849–1908	60	23.13	0.39	1	1795–1822	28	27.68	0.99
2	1696–1718	23	22.97	1.00	2	1828–1880	52	22.04	0.42
3	1496–1517	22	16.50	0.75	3	1892–1916	25	9.63	0.39
4	1641–1681	41	9.71	0.24	4	1694–1701	8	5.52	0.69
5	1800–1822	23	8.25	0.36	5	1744–1755	12	2.39	0.20
6	1752–1769	8	8.11	1.01	6	1777–1789	13	1.44	0.11
7	1613–1627	15	7.82	0.52					
8	1567–1574	8	6.58	0.82					
9	1967–1976	10	5.59	0.56					
10	1949–1959	11	4.20	0.38					

Peyto Glacier High					Place Glacier Low				
Rank	**Event**	**n-yr**	**Mag.**	**Int.**	**Rank**	**Event**	**n-yr**	**Mag.**	**Int.**
1	1761–1799	40	−24.16	−0.60	1	1912–1952	41	−17.51	−0.43
2	1911–1948	38	−19.67	−0.52	2	1977–1992	16	−9.87	−0.62
3	1575–1600	26	−15.83	−0.61	3	1756–1781	25	−8.97	−0.36
4	1628–1640	13	−10.49	−0.81	4	1881–1890	10	−8.91	−0.89
5	1518–1546	29	−9.50	−0.33	5	1734–1743	10	−8.49	−0.85
6	1825–1844	20	−9.21	−0.46	6	1714–1725	12	−8.33	−0.69
7	1682–1690	9	−8.91	−0.99	7	1791–1800	11	−3.33	−0.30
8	1976–1998	16	−8.83	−0.55					
9	1960–1969	10	−5.01	−0.50					

Supplemental Table 6. The top 10 n-yr mass balance events (ranked by Magnitude) for the Wolverine and Gulkana glacier reconstructions.

Wolverine Glacier High					Gulkana Glacier High				
Rank	**Event**	**n-yr**	**Mag.**	**Int.**	**Rank**	**Event**	**n-yr**	**Mag.**	**Int.**
1	1778–1837	60	40.84	0.68	1	1633–1681	49	41.97	0.86
2	1865–1910	46	33.98	0.74	2	1691–1757	67	34.64	0.52
3	1569–1604	36	10.60	0.29	3	1886–1908	23	11.09	0.48
4	1727–1744	18	10.16	0.56	4	1817–1864	48	14.01	0.29
5	1977–1989	13	6.73	0.52	5	1776–1800	25	6.52	0.26
6	1757–1773	17	5.45	0.32					
7	1615–1622	8	3.28	0.41					
8	1842–1852	11	3.22	0.29					
9	1647–1657	11	2.65	0.24					
10	1634–1642	9.00	2.26	0.25					

Wolverine Glacier Low					Gulkana Glacier Low				
Rank	**Event**	**n-yr**	**Mag.**	**Int.**	**Rank**	**Event**	**n-yr**	**Mag.**	**Int.**
1	1911–1975	65	−50.90	−0.78	1	1975–2009	44	−22.35	−0.51
2	1658–1727	70	−29.77	−0.43	2	1594–1629	36	−13.45	−0.37
3	1851–1864	14	−9.01	−0.64	3	1842–1850	9	−2.99	−0.33
4	1624–1633	10	−6.92	−0.69	4	1865–1885	21	−6.39	−0.30
5	1989–1998	11	−5.94	−0.54	5	1758–1775	22	−5.42	−0.25
6	1745–1756	12	−5.31	−0.44					
7	1643–1648	6	−4.95	−0.82					
8	1838–1844	7	−4.62	−0.66					
9	1605–1614	10	−1.68	−0.17					

Supplemental Table 7. References for the chronologies utilized in modeling and the dominate climate signals examined in the respective studies.

Site	Literature Reference	Dominate Climate Signal(s)
Gulkana Glacier[1]		
1. Caribou Creek, AK	Davi et al., 2003	Temp.
2. Moose Pass, AK	Schweingruber et al., 1991	Temp.
3. Pine Pass	Schweingruber et al., 1991	Temp.
4. Mount Rainier, WA	Peterson and Peterson, 2001	Temp., Snowpack, Pacific Variability
Wolverine Glacier		
5. Hawkins Hill, AK	Davi et al., 2003	Temp., Pacific Variability
6. Tebenkof, AK	Wilson et al., 2006	Temp., Pacific Variability
7. Beasley Creek, AK	Wilson et al., 2006	Temp., Pacific Variability
8. Beartrack Cove, AK	This study	Temp., Snowpack, Pacific Variability
Peyto Glacier		
9. Caribou Creek, AK	Davi et al., 2003	Temp.
10. Miners Well, AK	Wilson et al., 2006	Temp.
11. Cordova Eyak Mountain, AK	Wilson et al., 2006	Temp.
12. Wolverine Glacier, AK	Wilson et al., 2006	Temp.
13. Sheridan Mountain, OR	Peterson and Peterson, 2001	Temp., Snowpack, Precip.
Place Glacier		
14. Pavilion Mountain, BC	Wilson and Luckman, 2003	Temp.
15. Park Mountain, BC	Wilson and Luckman, 2003	Temp.
16. Meadow Mountain, BC	Wilson and Luckman, 2003	Temp.
17. Lytton, BC	Watson and Luckman, 2004	Precip.
18. Big White, BC	Wilson and Luckman, 2003	Temp.
South Cascade Glacier		
16. Meadow Mountain, BC	Wilson and Luckman, 2003	Temp.

19. Kokanee Glacier, BC	Wilson and Luckman, 2003	Temp.
20. Hoh Lake, WA	Peterson and Peterson, 2001	Temp., Snowpack, Precip., Pacific Variability
21. Mt. Hood, OR	Peterson and Peterson, 2001	Temp., Snowpack, Precip., Pacific Variability
22. Mt. Jefferson, OR	Peterson and Peterson, 2001	Temp., Snowpack, Precip., Pacific Variability

Blue Glacier

21. Mount Cain, BC	Laroque and Smith, 1999	Temp., Snowpack, Precip.
20. Hoh Lake, WA	Peterson and Peterson, 2001	Temp., PDO, Snow pack, Precip.
22. Lake Minotaur, WA	Peterson and Peterson, 2001	Temp., PDO, Snowpack, Precip.
23. Mount Rainier, WA	Peterson and Peterson, 2001	Temp., PDO, Snowpack, Precip.
21. Mt. Hood, OR	Peterson and Peterson, 2001	Temp., PDO, Snowpack, Precip.

[1)] AK = Alaska, USA, WA = Washington, USA, OR = Oregon, USA, BC = British Columbia, Canada

References

Davi, N., Jacoby, G., Wiles, G., 2003. Boreal temperature variability inferred from maximum latewood density and tree-ring width data, Wrangell Mountain region, Alaska. Quaternary Research 60, 252–262.

Mayo, L., Trabant, D., March, R., 2004. A 30-year record of surface mass balance (1966–95), and motion and surface altitude (1975–95) at Wolverine Glacier, Alaska. U.S. Geological Survey Open-File Report 1069.

Schweingruber, F., Briffa, K., Jones, P., 1991. Yearly maps of summer temperatures in Western Europe from A.D. 1750 to 1975 and Western North America from 1600 to 1982. Plant Ecology 92, 5–71.

Wilson, R., Luckman, B., 2003. Dendroclimatic reconstruction of maximum summer temperatures from upper tree-line sites in Interior British Columbia. The Holocene 13, 853–863.