



Supplement of

Two types of North American droughts related to different atmospheric circulation patterns

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Supplementary Material

S1 | “Dust Bowl”-type droughts

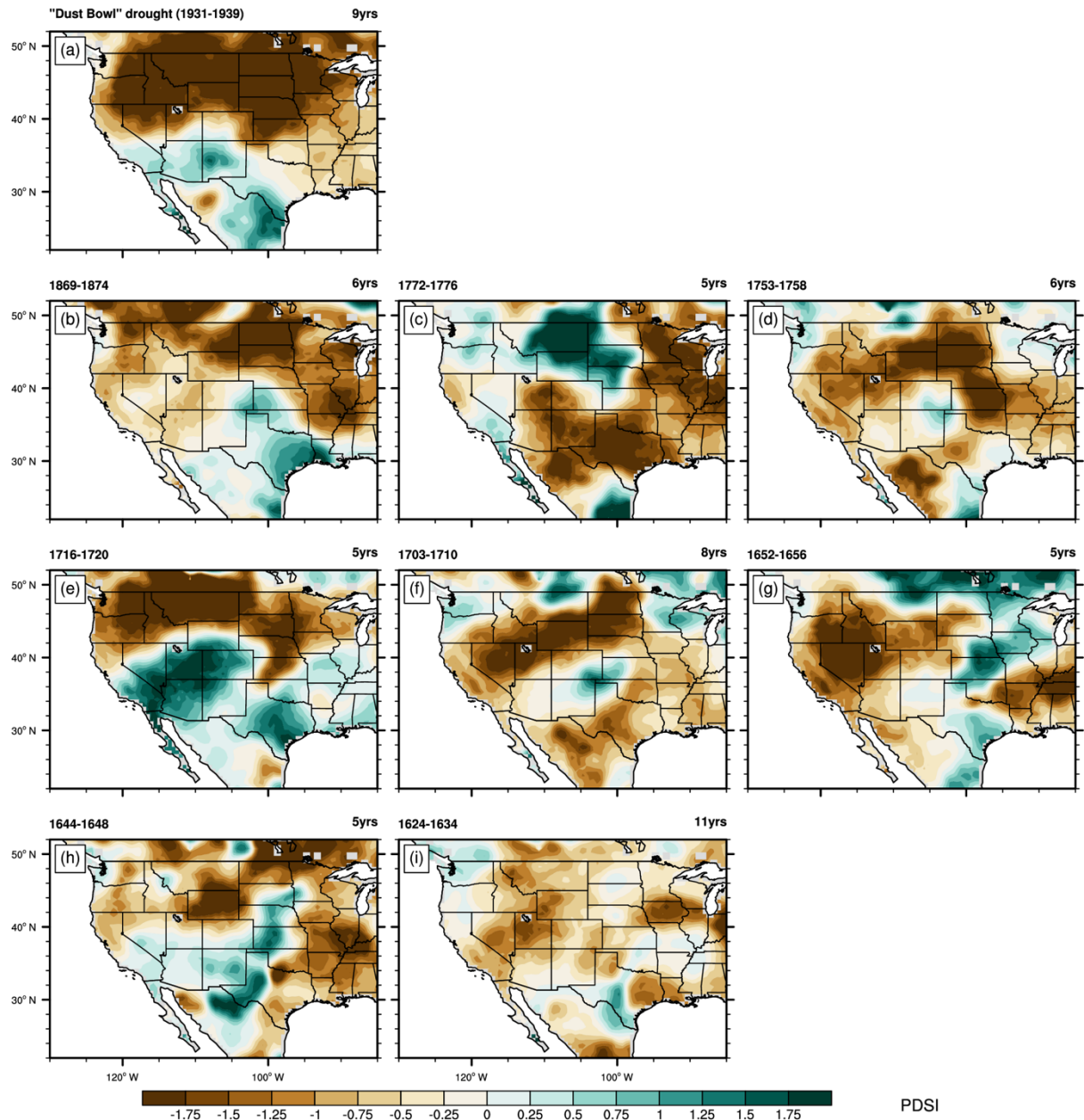


Figure S1. Averaged PDSI values from the LBDav1 for the “Dust Bowl” drought (a) and the eight droughts classified as “Dust Bowl”-type droughts (b-i).

S2 | 1950s-type droughts

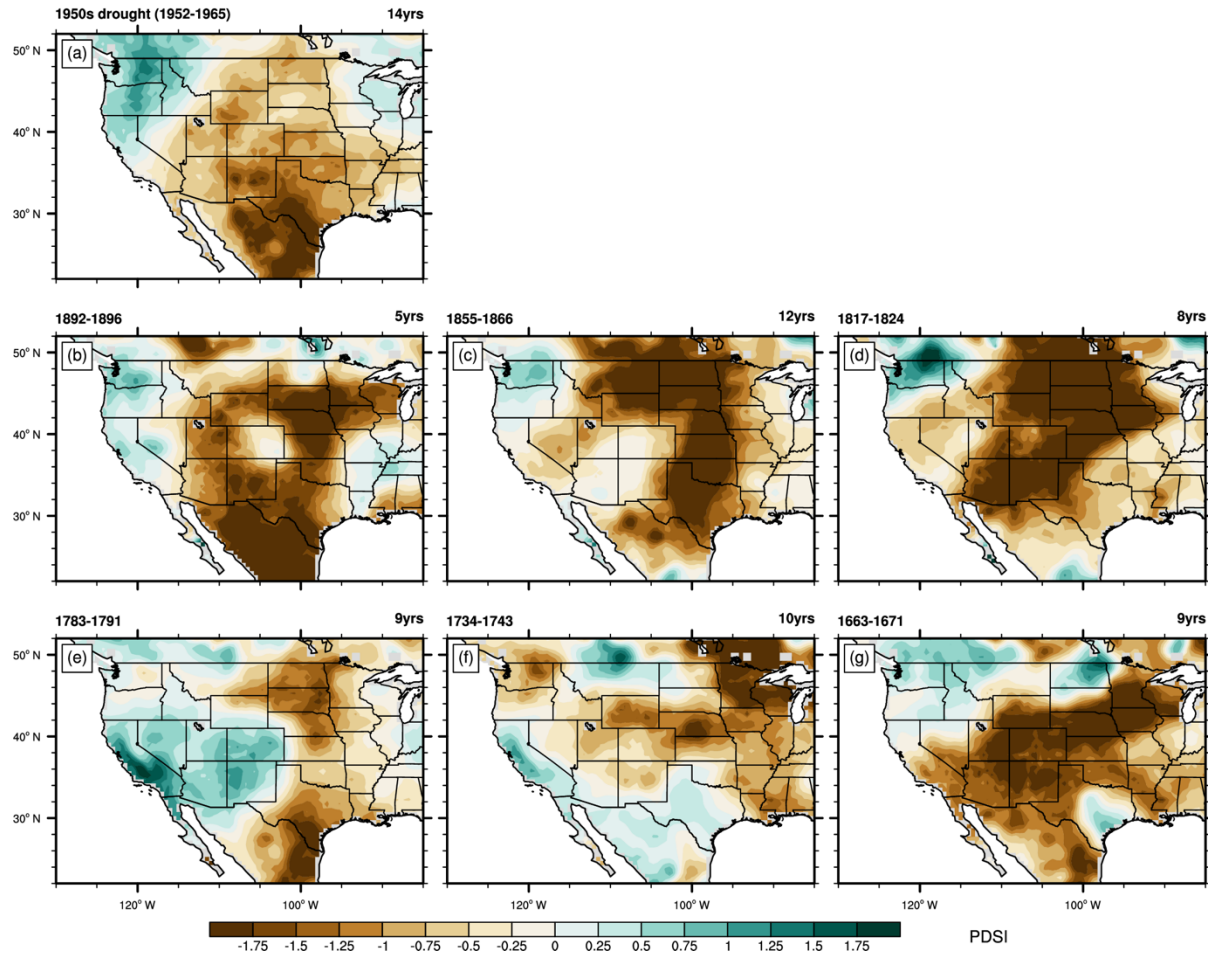


Figure S2. Averaged PDSI values from the LBDav1 for the 1950s drought (a) and the six droughts classified as 1950s-type droughts (b-g).

S3 | Drought clustering: ward

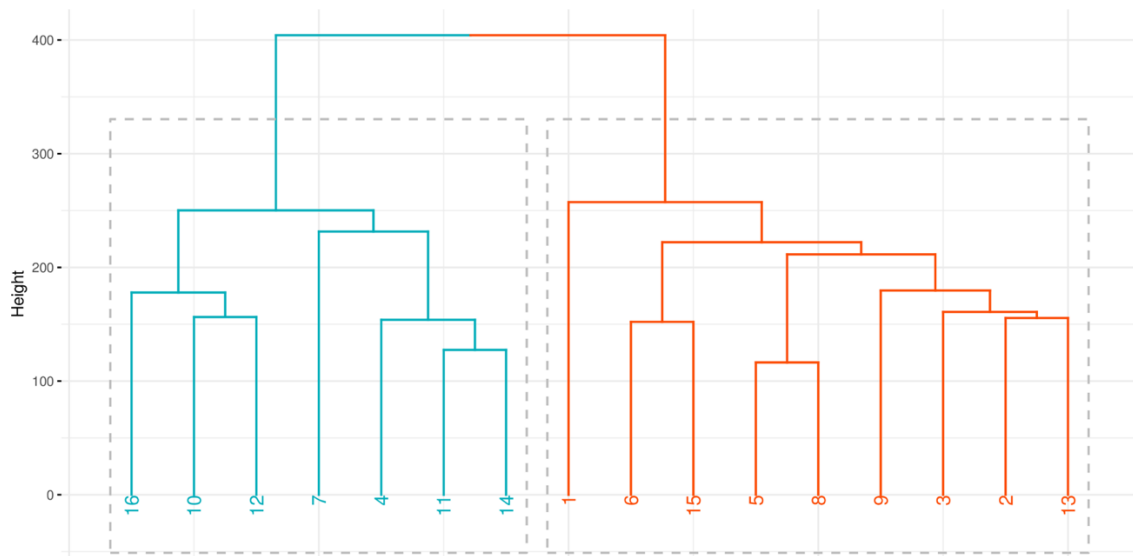


Figure S3. First two principal components of the hierarchical clustering based on the ward method of PDSI values for the 16 drought periods.

S4 | Drought clustering: combined approach k-means & ward

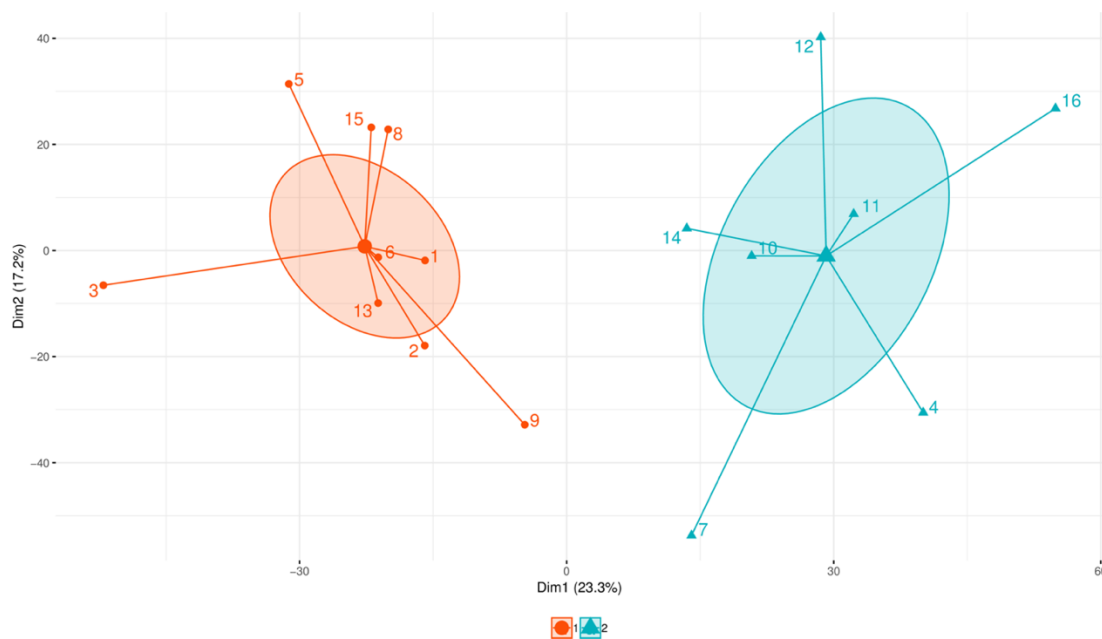


Figure S4. First two principal components of PDSI values for the 16 drought periods based on the k-means clustering approach with prescribed cluster centers (defined by the previous experiment with the ward method).

S5 | Correlation of the Turn-of-the-century drought

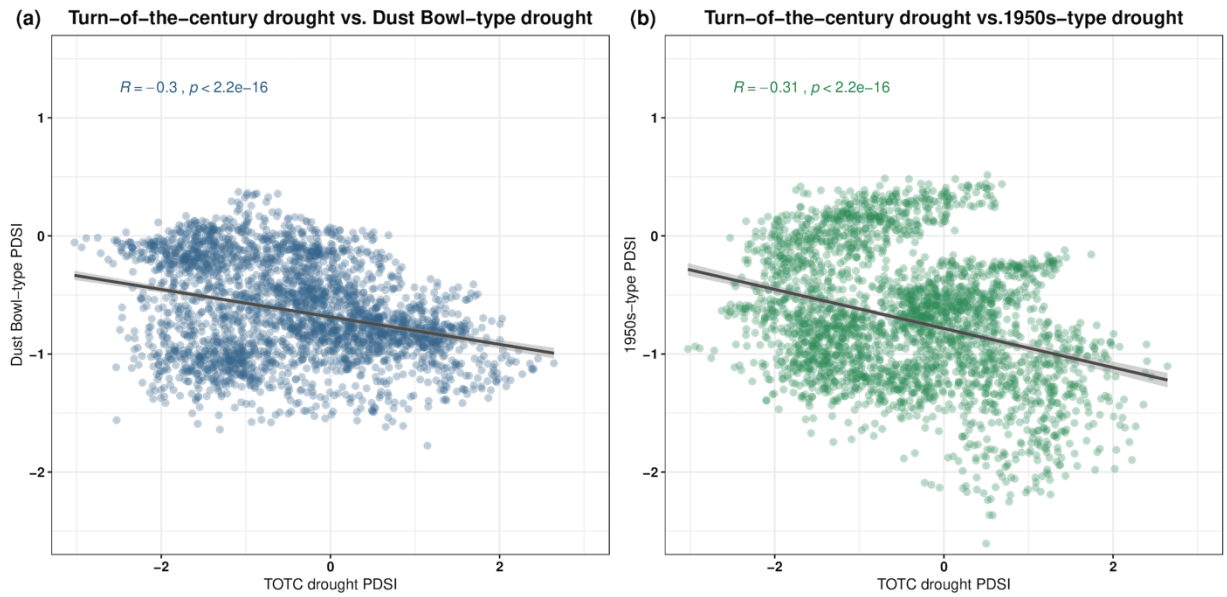


Figure S5. Correlations (Pearson) between the turn-of-the-century drought and the “Dust Bowl”-type drought (a) and between the turn-of-the-century drought and the 1950s-type drought respectively (b). Each point depicts a grid box.

S6 | SLP composites

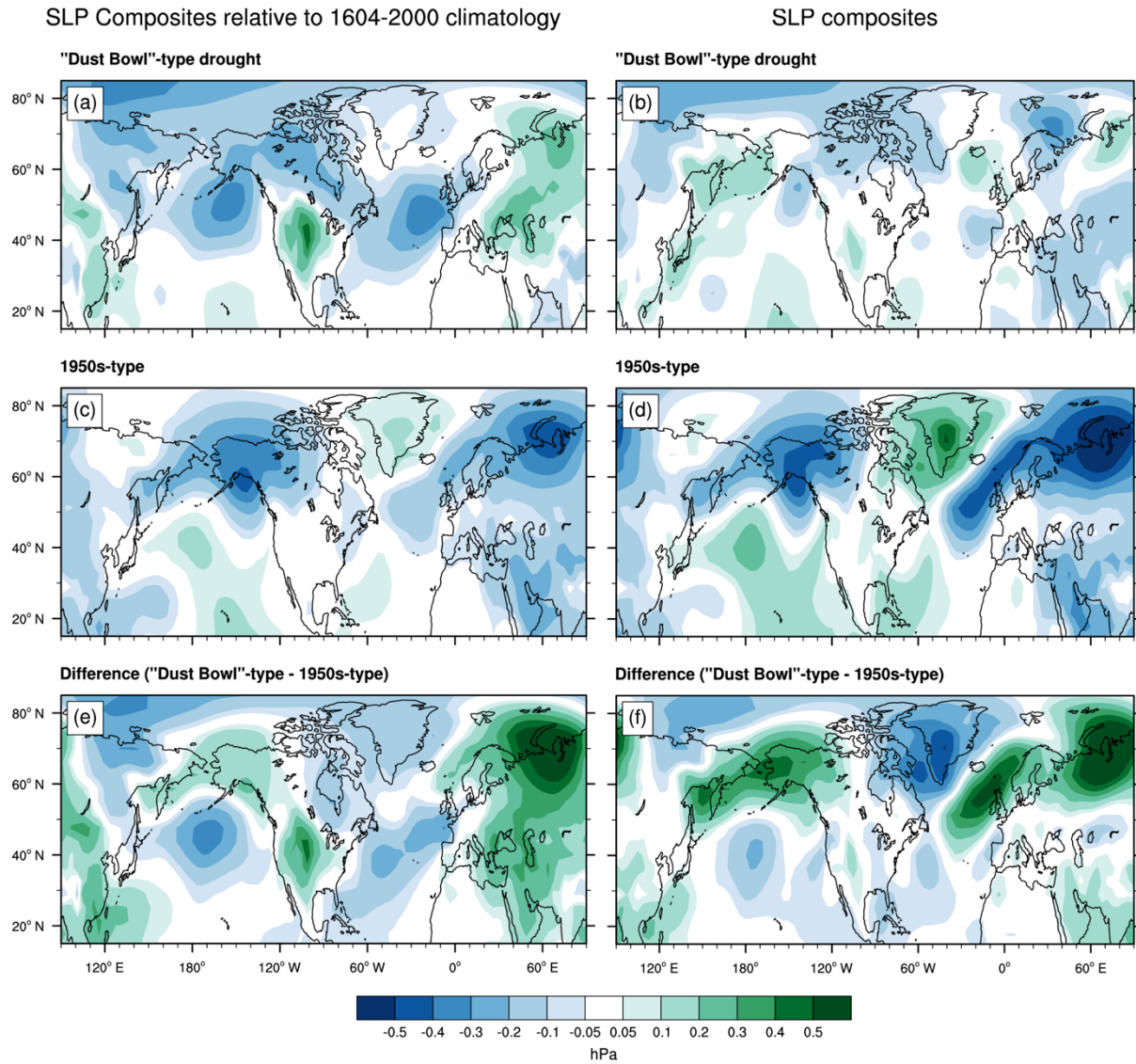
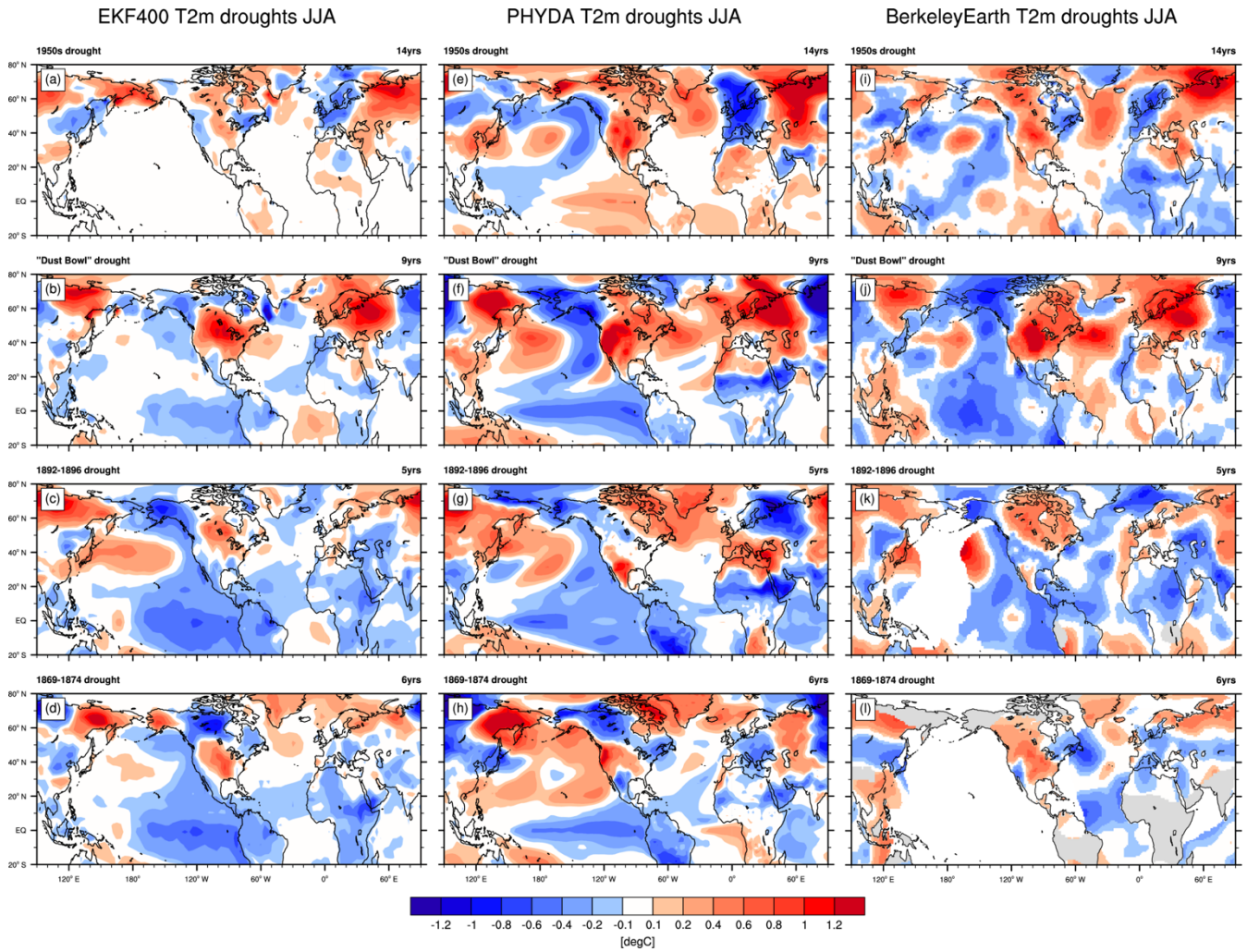


Figure S6. SLP composites relative to the 1604-2003 long-term mean (**a, c, e**) and the composites relative to the 5yrs periods prior and after the drought (**b, d, f**). The top row depicts the SLP composites of the “Dust Bowl”-type droughts, the middle row the 1950s-type droughts and the bottom row the difference between the two drought types.

S7 | Surface temperature composites



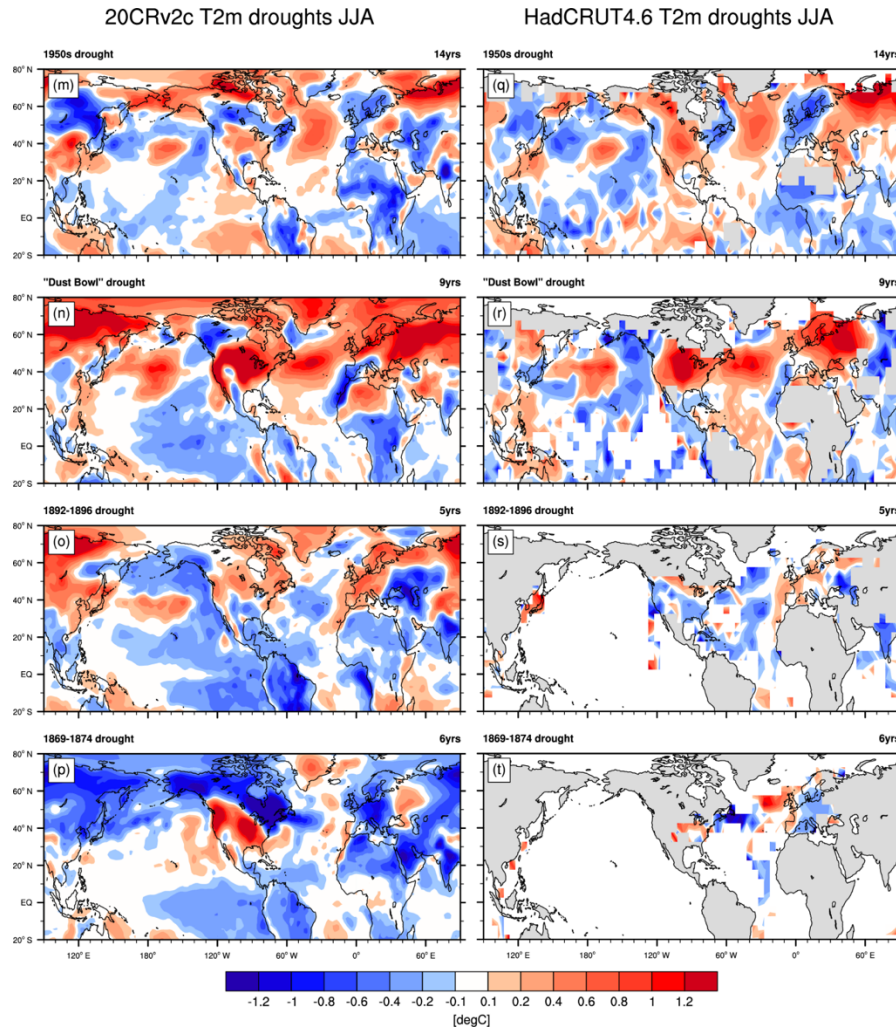


Figure S7. Surface temperature composites in five different datasets for the latest four droughts, the 1950s drought (top row), the "Dust Bowl" drought (second row), the 1892-1896 drought (third row) and the 1869-1874 drought (bottom row). The T2m of the two paleo reconstructions EKF400 (a-d) and PHYDA (e-h) are shown as well as the surface air temperature from the observational products Berkeley Earth (i-l) and HadCRUT6.4 (q-t) and additionally, the T2m from the 20CRv2c reanalysis (m-p).

Table S1| Comparison of Fye et al. (2003) and our study

Table S1. Comparison of our clustering approach with the droughts found by Fye et al. (2003). “Dust Bowl”-type droughts are marked with dark shading, 1950s-type droughts with light shading. Overlapping droughts were attributed to each other.

Fye et al. (2003)	Our study	N drought years	Cluster
1946-1958	1952-1965	14	2
1929-1940	1931-1939	9	1
1897-1904 ⁺			
	1892-1896	5	2
1870-1883	1869-1874	6	1
1855-1865	1855-1866	12	2
1841-1848			
1818-1824	1817-1824	8	2
1805-1814			
	1783-1791	9	2
1772-1782	1772-1776	5	1
1752-1760*	1753-1758	6	1
1752-1757*			
1728-1744	1734-1743	10	2
	1716-1720	5	1
1703-1712	1703-1710	8	1
1663-1672	1663-1671	9	2
	1652-1656	5	1
	1644-1648	5	1
1626-1634*	1624-1634	11	1
1622-1628*			

⁺ Given the 5-yr moving average used in the definition, these droughts might be considered the same.

* These two droughts overlap in Fye et al. (2003).