



Causes of the Extraordinary Summer Heat during the 1930s US Dust Bowl

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The climate over much of the US during the 1930s was characterized by extremely hot and dry conditions, often referred to as the “Dust Bowl”. Based on novel observational datasets of climate extremes and century-long reanalysis data, we show that this exceptional summer heat was unrivaled in the 110-year record.

Modeling studies have shown that forcing with observed sea surface temperatures may generate drought conditions over North America, and thus may at least partly explain the Dust Bowl. However, it remains to be answered which mechanisms actually led to the particularly hot conditions.

In agreement with previous studies, we show that summer heat often follows a spring drought. In addition, we show that spring precipitation deficits over the central US are strongly related to atmospheric flow anomalies which suppress the moisture transport from the Gulf of Mexico into the continent. These atmospheric flow anomalies are caused by shifts in the dominating pressure patterns, in particular a northward extension of the Atlantic Subtropical High, related to warm anomalies in the North Atlantic. This suggests there is potential for predictability of summer droughts and heat waves from the combination of both spring-time ocean surface temperatures and atmospheric flow.