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## Siberian fire ignition caused by the dry lightning activity

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Wildfire activity in Siberia (60E-180E, 55N-80N) has been observed to be more frequent and stronger in recent years. To understand the underlying mechanism of the positive trend in the frequency and strength of wildfire events, especially the role of lightning, we analyzed the relationship among fire ignition, Convective Available Potential Energy (CAPE), precipitation, and lightning flash density over Siberia using observations and reanalysis products for the period 2012–2020. A similar analysis was performed on an ultra-high-resolution (25-km) climate model simulation made with Community Earth System Model version 1.2.2 (CESM) under a greenhouse gas-induced warming scenario. In the observations, we found that while the number of lightning flashes is proportional to CAPE and precipitation, the number of fire ignition is only proportional to CAPE. In particular, we identified a threshold of 3.5 mm/day of precipitation, below which fire ignition occurs more frequently. Our analyses reveal that precipitation plays a role in suppressing fire ignition, but dry lightning with high CAPE and low precipitation effectively cause fire ignitions. In the CESM simulation, we found a robust increase in the number of days with high CAPE (> 700 J/kg) and low precipitation (< 3.5 mm/day), which suggests an increase in the frequency of dry lightning events, and therefore more lightning-induced wildfire events in Siberia.