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Anthropogenic forcing inconsistently exacerbates global drought

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Untangling the impact of anthropogenic forcing on drought is particularly essential for climate change mitigation. Previous studies have indicated that anthropogenic forcing exacerbates drought, raising concerns about global drought evolution, yet little is known about the impact of anthropogenic forcing on drought evolution through anthropogenic greenhouse gases (GHGs) and aerosol (AER). We integrated standardized precipitation evapotranspiration index (SPEI) data under different experiments to study drought development with Coupled Model Intercomparison Project Phase 6 (CMIP6) global climate models (GCMs). Subsequently, we conducted sensitivity analyses to quantify the changes in drought sensitivity to anthropogenic greenhouse gas (DSG) and aerosol (DSA) from 1900 to 2014. Our findings reveal different effects of AER and GHGs on drought trends during three periods. Specifically, GHGs slightly increased global drought severity in the early 20th century. Conversely, from 1956 to 1982, the drought-mitigating effects of AER surpassed the drought-enhancing effects of GHGs, and the global was humidified. Then, from 1982 to 2014, the trends of increasing DSG and decreasing DSA suggest that an important global shift is taking place. GHG re-emerged as the primary driver, thus leading to increased drought severity. Taken together, these findings elucidate how anthropogenic forcing impacts global drought severity through drought-enhancing effects of GHGs and drought-mitigating effects of AER, which provides new insights into understanding the risk of anthropogenic impacts on global drought.