

@article{Jong2026,

abstract = {Rapid reductions in greenhouse gas (GHG) concentrations are increasingly included in scenarios used to project the full range of possible future climate changes, yet the response of regional climate extremes to such reductions remains highly uncertain. Here, we assess projected changes in extreme precipitation over the Northeast US under an aggressive overshoot mitigation pathway (SSP5-3.4OS), simulated by the fully-coupled 25 km Geophysical Fluid Dynamics Laboratory (GFDL) Seamless system for Prediction and Earth system Research (SPEAR) climate model. In this scenario, hypothetical mitigation efforts are introduced starting in 2041, with net-negative GHG emissions achieved by the late 21st century. The frequency of extreme precipitation over the Northeast US increases through mid-century under higher radiative forcing but begins to decline following the sharp reductions in GHG concentrations. However, the rate of decrease exhibits pronounced seasonality. In the warm season, extreme precipitation frequency begins to decline shortly after GHG drawdown begins, returning by 2100 to levels comparable to those of the early 21st century. In the cold season, on the other hand, the response is delayed; the frequency of extreme precipitation continues rising for roughly a decade after the peak global mean warming and exhibits hysteresis behavior. By 2100, cold-season extremes only then return to mid-century levels. This delayed response in the cold season is spatially heterogeneous, suggesting that major metropolitan areas in the Northeast—with dense populations and vulnerable infrastructure—may experience different seasonal changes in response to the same climate migration efforts. These results highlight the benefit of climate mitigation in reducing extreme precipitation events, but also the complexity of regional climate responses, which can be modulated by seasonality, local-scale effects, and other factors.},

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