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Shifting patterns of mild weather in response to projected radiative forcing

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Traditionally, climate change research has focused on changes in mean climate (e.g. global mean temperature, sea level rise, glacier melt) or change in extreme events (e.g. hurricanes, extreme precipitation, droughts, heat waves, wild fires). Though extreme events have the potential to disrupt society, extreme conditions are rare by definition. In contrast, mild weather occurs frequently and many human activities are built around it. Examples of such activities include football games, dog walks, bike rides, and outdoor weddings, but also activities of direct economic impact, e.g. construction work, infrastructure projects, road or rail transportation, air travel, and landscaping projects. Absence of mild weather impacts society in various way, understanding current and future mild weather is therefore of high scientific interest.

We present a global analysis of mild weather based on simple and relatable criteria and we explore changes in mild weather occurrence in response to radiative forcing. A high-resolution global climate model, GFDL HiFLOR, is used to allow for investigation of local features and changes. In response to RCP4.5, we find a slight global mean decrease in the annual number of mild days projected both in the near future (-4 d/yr, 2016-2035) and at the end of this century (-10 d/yr, 2081-2100). Projected regional and seasonal redistributions of mild days are substantially greater. Tropical regions are projected to see large decreases, in the mid-latitudes small increases in the number of mild days are projected. Mediterranean climates are projected to see a shift of mild weather away from the local summer to the shoulder seasons. These changes are larger than the interannual variability of mild weather caused by El Niño-Southern Oscillation. Finally, we use reanalysis data to show an observed global decrease in the recent past, and we verify that these observed regional changes in mild weather resemble the projections.