

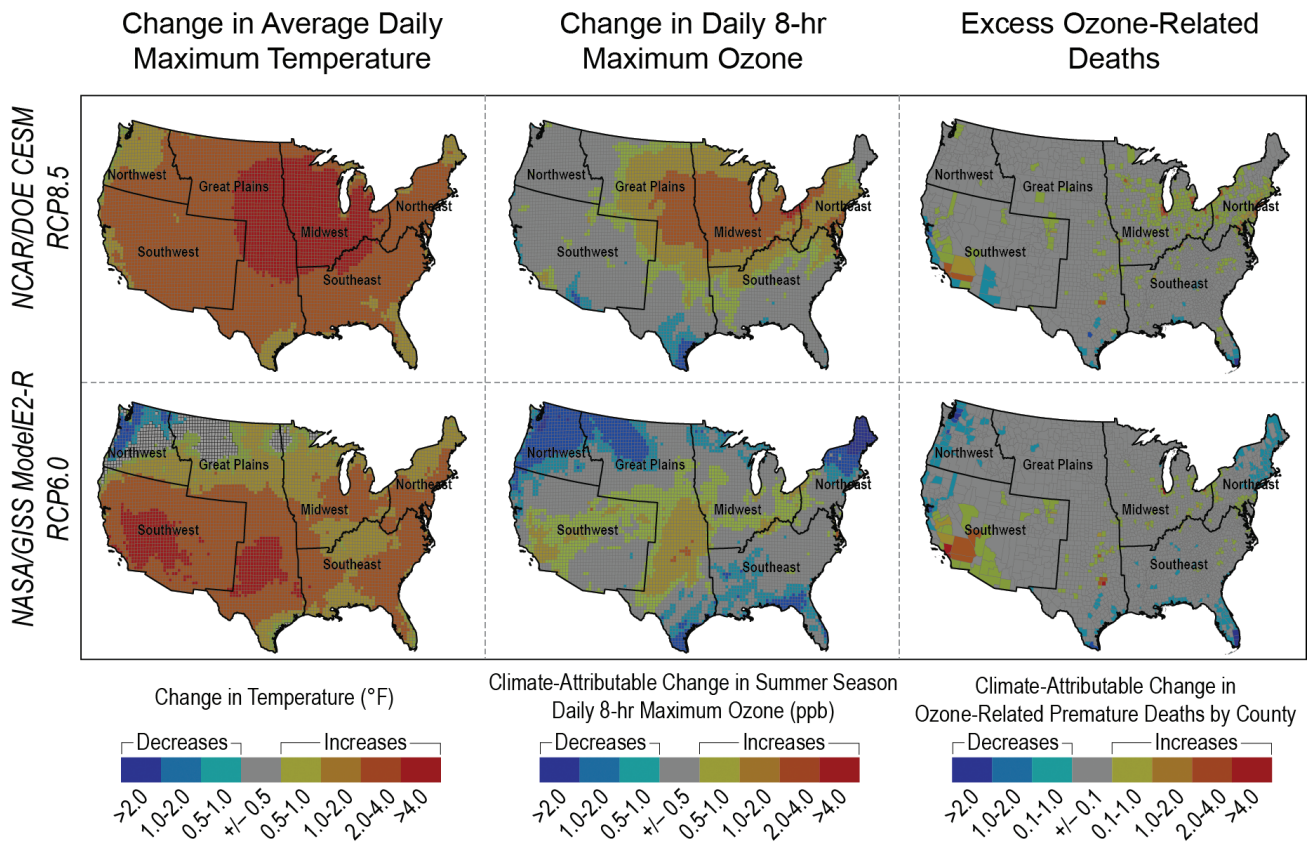


## AIR QUALITY IMPACTS

Changes in the climate affect the air we breathe, both indoors and outdoors. The changing climate has modified weather patterns, which in turn have influenced the levels and location of outdoor air pollutants such as ground-level ozone (O<sub>3</sub>) and fine particulate matter. Increasing carbon dioxide (CO<sub>2</sub>) levels also promote the growth of plants that release airborne allergens (aeroallergens). Finally, these changes to outdoor air quality and aeroallergens also affect indoor air quality as both pollutants and aeroallergens infiltrate homes, schools, and other buildings. Poor air quality, whether outdoors or indoors, can negatively affect the human respiratory and cardiovascular systems. Higher pollen concentrations and longer pollen seasons can increase allergic sensitization and asthma episodes and thereby limit productivity at work and school.



Ragweed pollen frequently triggers hay fever and asthma episodes during the fall.



The air quality response to climate change can vary substantially by region across scenarios. Two downscaled global climate model projections using two greenhouse gas concentration pathways estimate increases in average daily maximum temperatures of 1.8°F to 7.2°F (1°C to 4°C) and increases of 1 to 5 parts per billion (ppb) in daily 8-hour maximum ozone in the year 2030 relative to the year 2000 throughout the continental United States. Unless reductions in ozone precursor emissions offset the influence of climate change, this “climate penalty” of increased ozone concentrations due to climate change would result in tens to thousands of additional ozone-related premature deaths per year, shown here as incidences per year by county (see Ch. 3: Air Quality Impacts). (Figure source: adapted from Fann et al. 2015)<sup>3</sup>



## Exacerbated Ozone Health Impacts

**Key Finding 1:** Climate change will make it harder for any given regulatory approach to reduce ground-level ozone pollution in the future as meteorological conditions become increasingly conducive to forming ozone over most of the United States [*Likely, High Confidence*]. Unless offset by additional emissions reductions of ozone precursors, these climate-driven increases in ozone will cause premature deaths, hospital visits, lost school days, and acute respiratory symptoms [*Likely, High Confidence*].

## Increased Health Impacts from Wildfires

**Key Finding 2:** Wildfires emit fine particles and ozone precursors that in turn increase the risk of premature death and adverse chronic and acute cardiovascular and respiratory health outcomes [*Likely, High Confidence*]. Climate change is projected to increase the number and severity of naturally occurring wildfires in parts of the United States, increasing emissions of particulate matter and ozone precursors and resulting in additional adverse health outcomes [*Likely, High Confidence*].

## Worsened Allergy and Asthma Conditions

**Key Finding 3:** Changes in climate, specifically rising temperatures, altered precipitation patterns, and increasing concentrations of atmospheric carbon dioxide, are expected to contribute to increases in the levels of some airborne allergens and associated increases in asthma episodes and other allergic illnesses [*High Confidence*].



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(Top) Dampness and mold in U.S. homes are linked to approximately 4.6 million cases of worsened asthma. (Left) Wildfires are a major source of airborne particulate matter, especially in the western United States during summer. Climate change has already led to an increased frequency of large wildfires, as well as longer durations of individual wildfires and longer wildfire seasons in the western United States. (Right) Nearly 6.8 million children in the United States are affected by asthma, making it a major chronic disease of childhood.

