

FAST FACTS



On climate and the physical science

1. **Human activities** have warmed the atmosphere, ocean and land, producing widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere.
2. The **scale of recent changes** across the climate system are unprecedented over many centuries to many thousands of years. Many changes are irreversible for centuries to millennia, especially in terms of the ocean, ice sheets and global sea level.
3. Human-induced climate change **affects every region**. There is growing evidence of links to extreme heatwaves, heavy precipitation, droughts and tropical cyclones.
4. Global surface temperature will continue to increase until at least the middle of the century. Unless we make **sharp reductions in greenhouse gas emissions** in coming decades, global warming will exceed 1.5 degrees Celsius, after which climate consequences will be even more severe.
5. The **more the world warms, the greater the changes** in the climate system become. This includes more frequent and intense hot extremes, marine heatwaves, heavy precipitation, agricultural and ecological droughts in some regions, the proportion of intense tropical cyclones, and reductions in Arctic sea ice, snow cover and permafrost.
6. Continued global warming will further **intensify the global water cycle**, making it more variable, and changing monsoon precipitation and the severity of wet and dry events.
7. As carbon dioxide emissions rise, **the ocean and land will be less effective** at absorbing and slowing the accumulation of carbon dioxide in the atmosphere.
8. With further global warming, every region will increasingly experience **changes in the drivers of climatic impacts**. Drivers will be more widespread at 2 degrees Celsius compared to 1.5 degrees Celsius, and even more so at higher levels of warming.
9. Ice sheet collapse, abrupt ocean circulation changes and warming beyond current projections are less likely outcomes but **cannot be ruled out**.
10. Limiting human-induced global warming requires limiting cumulative carbon dioxide emissions, **reaching at least net zero**. Strong reductions in other greenhouse gas emissions such as methane would also be required.
11. Achieving low or very low greenhouse gas emissions would lead within years to **discernible effects on greenhouse gas and aerosol concentrations and air quality**. Discernible differences in global surface temperature would emerge in around 20 years.

Source: Based on findings and projections from the [IPCC's Climate Change 2021: The Physical Science](#).

