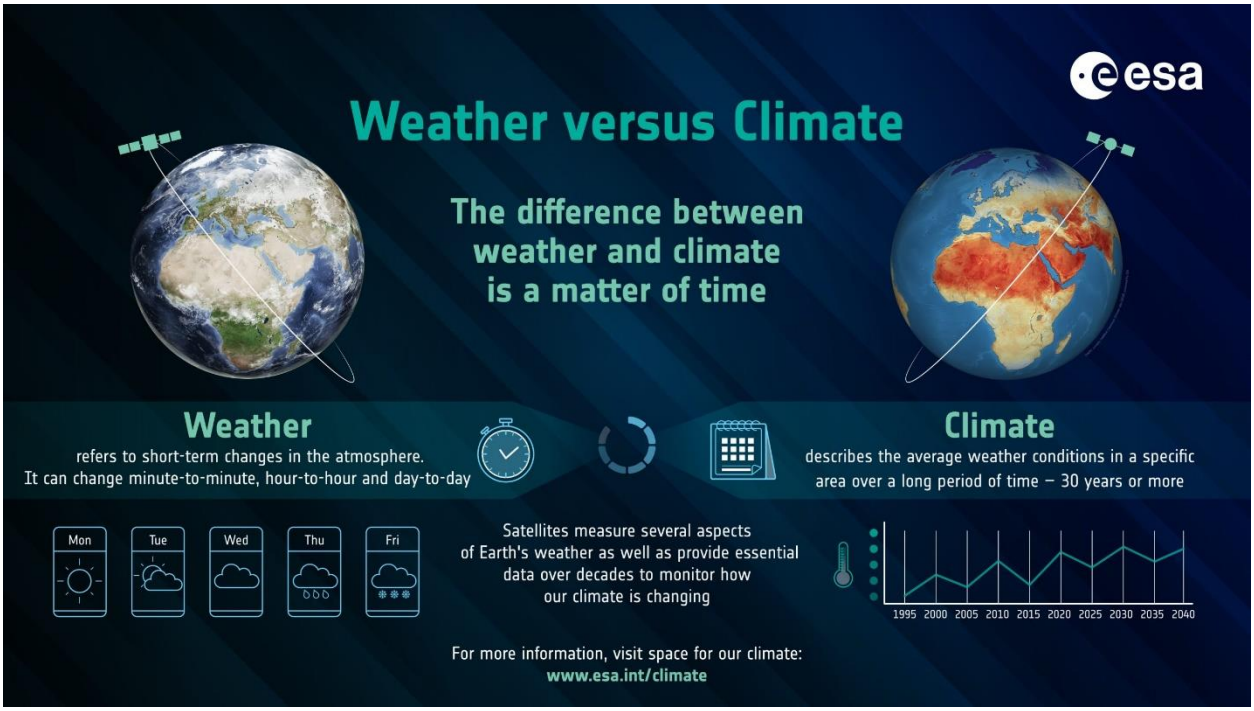
Climate at a Glance: Weather vs. Climate



Infographic Courtesy of the European Space Agency (ESA)

Key Takeaways:

- The World Meteorological Organization (WMO) defines climate as "…the average weather conditions for a particular location and over a long period of time."[1]
- To create a climate record, 30 years of weather data is averaged to create a "normal" climate expectation for a location or region.
- What we experience on a day-to-day basis are weather events, not climate events.

Short Summary:

According to the WMO,[2]

> Climate, sometimes understood as the "average weather," is defined as the measurement of the mean and variability of relevant quantities of certain variables (such as temperature, precipitation or wind) over a period of time, ranging from months to thousands or millions of years. The classical period is 30 years, as defined by the World Meteorological Organization (WMO). Climate in a wider sense is the state, including a statistical description, of the climate system.

Given that climate is a mathematically defined statistical description of average weather over 30 years, it cannot "drive" daily weather events as there is no physical mechanism for such a thing. Weather can

be highly variable on a daily, weekly, or even yearly basis – one day it might be sunny with afternoon thunderstorms and the next it's cold and snowing.

The University of Colorado University Corporation for Atmospheric Research (UCAR) stated this about natural climate variability.[3]

> Worldwide, the average global temperature is rarely exactly the same from year to year. One year might be cooler than the year before, even though the long-term trend shows increasing temperature over time due to climate change. There are many reasons for climate variability, including natural fluctuations like the ENSO (El Nino Southern Oscillation). Scientists are currently researching the impact that climate change has on variability.

University of Colorado Climatologist Dr. Roger Pielke, Jr. had this to say about the most recent United Nations Intergovernmental Panel on Climate Change (IPCC) AR6 report:[4,5]

"[I]t is simply incorrect to claim that on climate time scales the frequency or intensity of extreme weather and climate events has increased for: flooding, drought (meteorological or hydrological), tropical cyclones, winter storms, thunderstorms, tornadoes, hail, lightning or extreme winds (so, storms of any type)."

The IPCC AR6 report, Chapter 11, *Weather and Climate Extreme Events in a Changing Climate*, provides conclusions, summarized in Figure 1, illustrating the fact that severe weather events cannot be detected as increasing nor attributed to human caused climate change:

Weather Event	**Detection**	**Attribution**
Increased Flooding	No	No
Increased Meteorological Drought	No	No
Increased Hydrological Drought	No	No
Increased Tropical Cyclones	No	No
Increased Winter Storms	No	No
Increased Thunderstorms	No	No
Increased Hail	No	No
Increased Lightning	No	No
Increased Extreme Winds	No	No

Figure 1. Summary table showing lack of weather event attribution from Chapter 11 of the IPCC AR6 report.[6]

No evidence exists that any specific weather event is directly driven by so-called man-made climate change from increased carbon dioxide in Earth's atmosphere. Even the IPCC's summary of the state of global climate science makes no such attribution.

References:

1. Definition of Climate, *World Meteorological Organization*, accessed 2/19/22, https://public.wmo.int/en/our-mandate/climate
2. FAQS - Climate, *World Meteorological Organization*, accessed 2/19/22, https://public.wmo.int/en/about-us/frequently-asked-questions/climate
3. Climate Variability, *University Corporation for Atmospheric Research,* accessed 2/20/22, https://scied.ucar.edu/learning-zone/how-climate-works/climate-variability
4. How to Understand the New IPCC Report: Part 2, Extreme Events, *Dr. Roger Pielke Jr.,* accessed 2/21/22, https://rogerpielkejr.substack.com/p/how-to-understand-the-new-ipcc-report-1e3
5. *IPCC*, Sixth Assessment Report, Working Group 1: The Physical Science Basis, accessed 2/21/22, https://www.ipcc.ch/report/ar6/wg1/#FullReport
6. Weather and Climate Extreme Events in a Changing Climate, *IPCC,* Sixth Assessment Report, Working Group 1: The Physical Science Basis, Chapter 11, accessed 2/22/22, https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Chapter11.pdf

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