Introduction

Winters in Vermont are known to be both cold and snowy, two important factors for its ski industry. However, due to impacts caused by global climate change, many weather norms have been altered drastically in recent years. Global temperatures have risen about 2 degrees Fahrenheit since the pre-Industrial era of 1880-1900 (noaa.gov). Global temperatures, from 1880-2020, are presented against 20th century averages in Figure 1. Given this data, there is a clear pattern change that has occurred over the last 100 years. This change has complex influences on other weather patterns. Climate change has also accounted for a significant uptick in extreme weather events: many parts of the world are seeing record heat waves, heavy precipitation, tropical storm activity, and flooding.

In the United States, these patterns have contributed to higher annual precipitation and temperatures (epa.gov). Figure 2 shows 30-year average temperatures (from 1901-2020) compared to the 20th century average (over a 10-year sliding window). Here it is clearly seen that each 30-year period becomes progressively warmer in the continental U.S. Figure 3 shows 30-year average precipitation (from 1901-2020) compared to 20th century averages. These patterns are less obvious, with recent trend being higher-than-average precipitation across the eastern half of the country. As is the case on the global scale, the U.S. has also seen a complex relationship between changing temperatures and resulting weather patterns.

Vermont has not been immune to these changes: the average winter temperature has increased by more than 4 degrees Fahrenheit in the last 50 years, with spring arriving two weeks earlier and winter arriving one week later (compared to 1960). Annual precipitation has also increased by nearly seven inches over the past 50 years (healthvermont.gov).

<https://earthobservatory.nasa.gov/features/GlobalWarming/page3.php#:~:text=As%20the%20Earth%20moved%20out,ice%2Dage%2Drecovery%20warming>.

<https://www.climate.gov/news-features/understanding-climate/climate-change-global-temperature#:~:text=Earth's%20temperature%20has%20risen%20by,0.18%C2%B0%20C)%20per%20decade>.

<https://www.weather.gov/btv/historicalSnow>