Dr. Gillian L. Galford
Research Assistant Professor

617 MAIN STREET, BURLINGTON, VT 05405 USA
PHONE (802) 656-2906 | FAX (802) 656-2995
GUNDIEE@UVM.EDU | WWW.UVM.EDU/GIEE

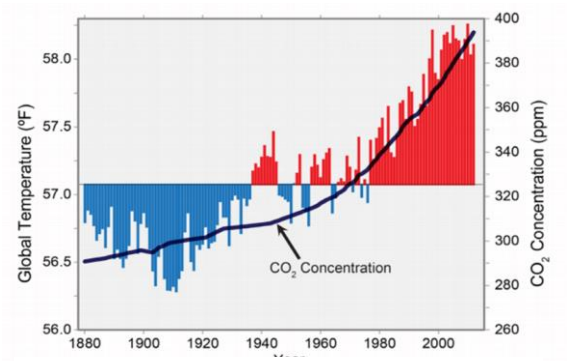


Figure 4. Global atmospheric temperatures have increased as carbon dioxide concentrations have increased due to heat trapping particles, or greenhouse gases, that absorb heat and cause temperatures in the atmosphere to increase (NCA 2014).

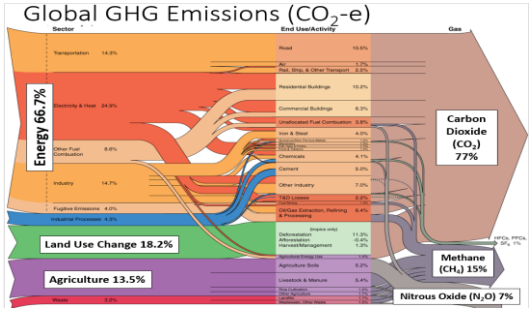
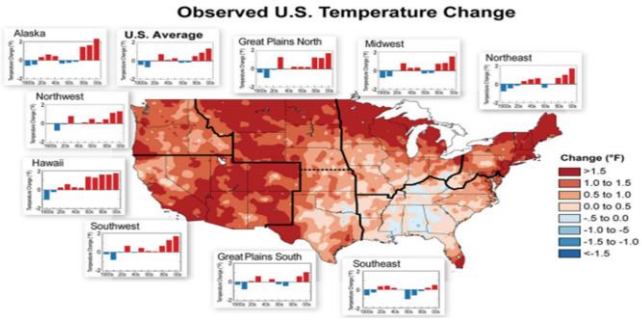


Figure 4. Human sources of greenhouse gases to the atmosphere (WRI, modified by G. Galford). The fossil fuel sources contribute 100-times as much CO_2 as natural point sources such as volcanic eruptions. Advanced radioisotope chemistry allows scientists to pin-point fossil fuel burning as the source of the increasing CO_2 in our atmosphere. There is no debate among the scientific community that a) our global climate is changing and b) that the causes are from human activities. (Cook et al. 2013, IPCC 2014, NCA 2014, VCA 2014).



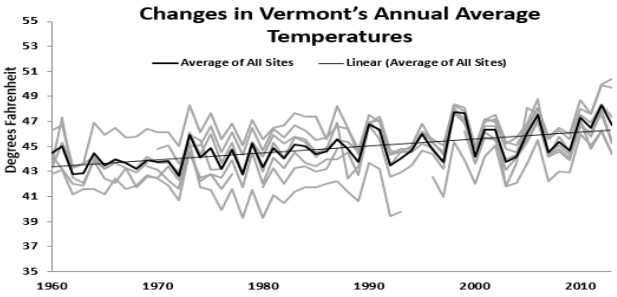
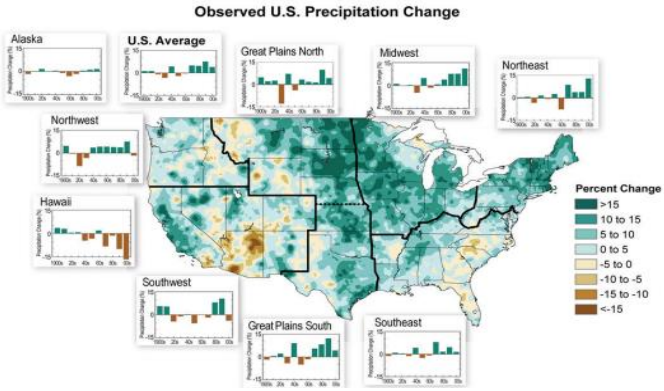


Figure 2. Changes in temperature for the US (left, NCA 2014) and for Vermont (right). Since 1960, average temperature has increased 1.6° F, and since 1990, average temperatures increased 0.9° F. The last decade was the warmest on record, with average temperatures increasing by 0.4° F. All regions within Vermont are experiencing warming, although the changes in temperature are not uniform. Vermont is likely to see greater temperature increases in winter than in summer and in nighttime than in daytime.



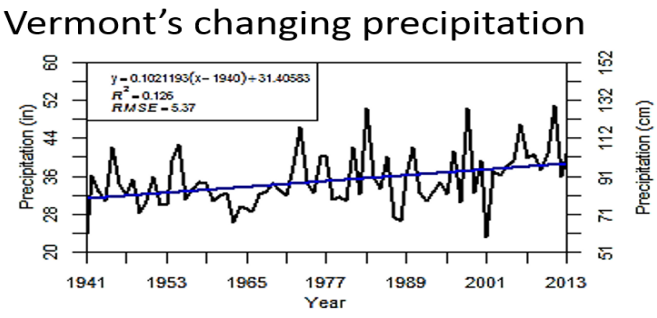


Figure 1. Changes in precipitation for the US (left, NCA 2014) and for Vermont (Burlington NWS station, VCA 2014). Average annual precipitation has increased by 5.9" since 1960.

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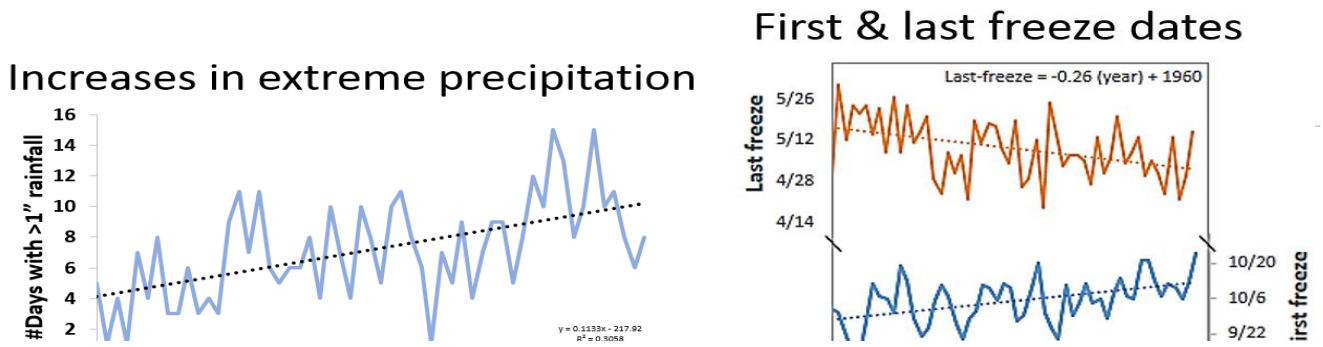


Figure 7. Changes in extreme precipitation (Rutland, VT) and changes in frozen season (Burlington, VT) (VCA 2014). Rainfall records show that heavy rainfall events are becoming more common and pose threats of flooding [Figure 5]. In August 2011, heavy rainfall saturated the ground and, as a result, flooding was widespread when additional rains fell with the arrival of Tropical Storm Irene. Warmer seasonal temperatures are resulting in later "first-fall freeze" and earlier "last-spring freeze". (VCA 2014)

Figure 6. Global temperatures in February 2015 were well above average (NASA GISS 2015), although colder than average in the Northeast compared to the proceeding decade but it would have been average thirty years ago.

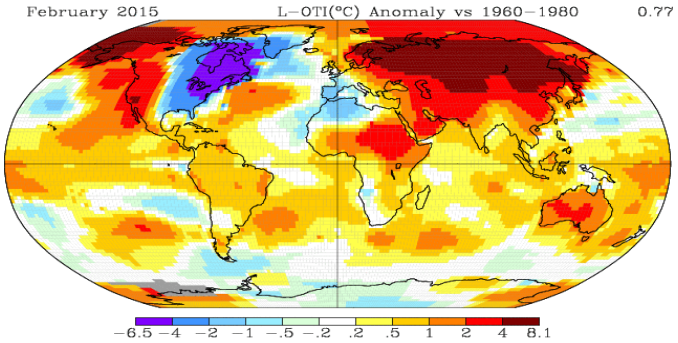


Figure 6. Ray Allan of South Hero has recorded daily weather for the past 45 years. Spring is coming 5-6 day earlier than when he took over the farm in 1968. (VCA 2014)

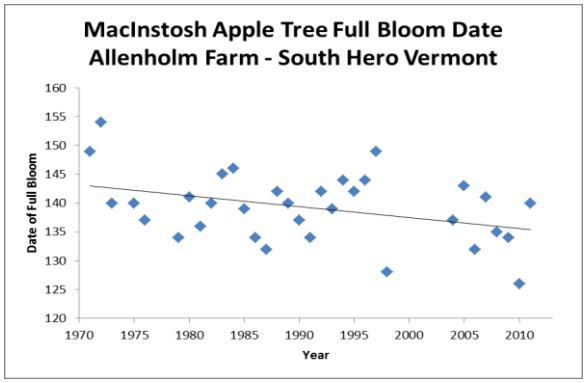
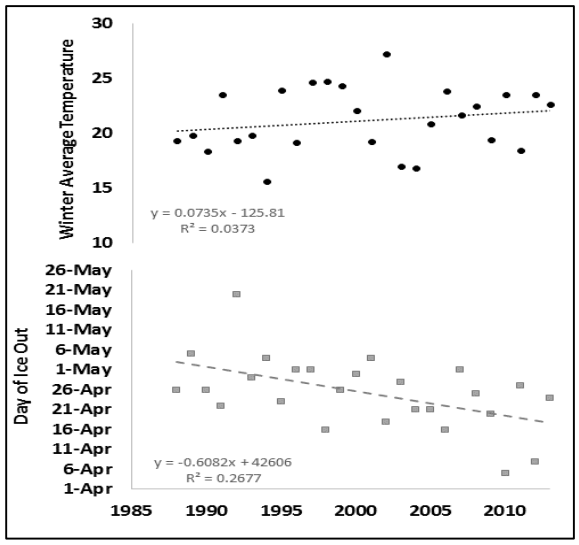


Figure 8. *Joe's Pond Association's Annual Ice Out contest has recorded the date of ice out with incredible precision since the 1988. In West Danville, winter average temperatures have increased. Ice out comes seven days earlier than in the late 1980s (VCA 2014)*



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