



Detailed Analysis of Climate Trends in the Northern Tier of Vermont from 2000-2014

Nasser Abdel-Fatah, Tania Bacchus PhD

Johnson State College



Introduction

The various Intergovernmental Panel on Climate Change (IPCC) reports focused on global climate change scenarios. However, the general public are more concerned by local and regional changes that may develop within the global context (IPCC, 2014). Microclimate analyses allow an evaluation of what is happening in our region as it relates to the larger question of global changes. The purpose of this project was to evaluate weather data for the St. Johnsbury area (STJ) from 2000 to 2014. This data was processed into monthly, seasonal, and yearly data. Once this individual station evaluation was complete, the results were compared to other stations in the northern tier of Vermont: Johnson (JSC), Burlington (BTV), and Morrisville (MVL), (shown by the location map in Figure 1).

Materials and Methods

Weather statistics for the St. Johnsbury station were accessed from the National Climate Data Center (www.ncdc.noaa.gov). This data was compiled into different tables and graphs (hourly/daily, monthly, seasonal, and yearly data) using Microsoft Excel. The next part of this research focused on the comparison of processed weather data (compiled by previous RACC investigators) from three other stations: Burlington, Johnson, and Morrisville. Figure 2 shows the comparison data for the St. Johnsbury station for the month of December from 2000-2014.

Results

Figure 3 shows the number of storm events that were above average for St. Johnsbury. This graph highlights:

- that in most recent years, 2000-2009, had the greatest number of events above average with eight events.
- from 1970 to 2009 an increase in event frequency occurred.

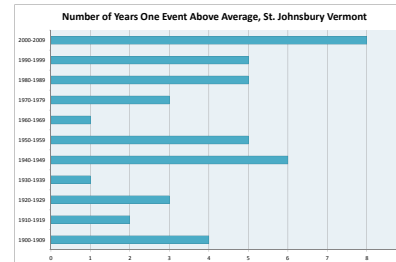


Figure 3. Number of events above average for STJ from 1900-2009.

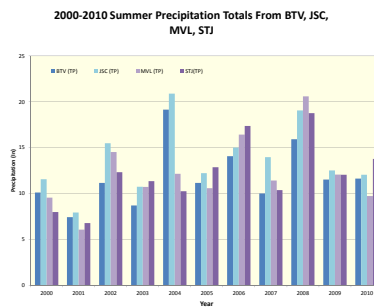


Figure 4. 2000-2010 Summer Precipitation totals across all four stations.

Figure 4 shows the yearly summer precipitation profile across the four stations (2000-2010). This graph shows:

- across the four station BTV and MVL received the least amount of precipitation while, JSC and STJ had the greater precipitation totals.
- overall, 2004 and 2008 showed the greatest amount of precipitation.
- since 2000, there is a trend of increasing precipitation totals for the summer season.

Conclusion

Despite yearly variations, there has been an overall increase in storm events have been occurring in the most recent years. Additionally, general precipitation amounts appear to be on the increase. As winter average temperatures becoming cooler (see Figure. 6) and an increase in precipitation totals both in the winter and summer season. These results are consistent with the IPCC predictions (IPCC, 2014).

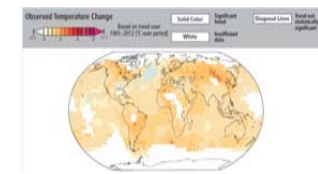


Figure 6. Observed Temperature change. (IPCC, 2014).

Figure 5 shows winter average temperatures and precipitation totals comparisons for the St. Johnsbury (2000-2015). This graph shows:

- from 2000-2009 there has been a trend of colder temperatures had occurred.
- from 2003-2009 we have seen an increase winter precipitation totals started to increase.
- 2008 had the greatest precipitation totals at 11.49 inches.
- 2002 had the highest winter average temperatures at 31.77°F.

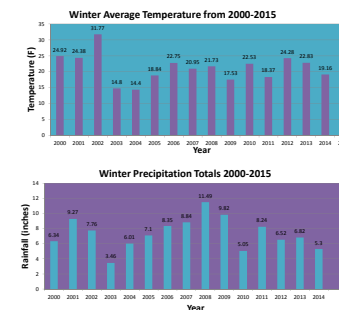


Figure 5. 2000-2014 winter average and precipitation for St. Johnsbury.



Figure 1. Image of Vermont with location of each weather station compared. (Geology, 2015).

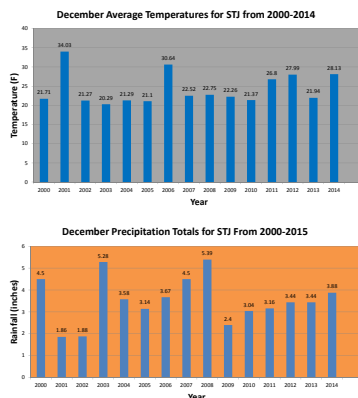


Figure 2. Comparison of STJ from 2000-2014, showing both Temperature and Precipitation Totals for December.

Citations

Geology, 2015. Vermont Map Collection. Geology.com. Retrieved on February 2015, from: <http://geology.com/state-map/vermont.shtml>.
 IPCC, 2014: Summary for policymakers. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1-32.

Acknowledgments

I would like to thank Dr. Tania Bacchus for being my mentor through this process; providing me knowledge and support to do this project. Thank you to Laurence Hayes, the Fairbanks Museum, the National Climate Data Center, Ashley Fortin and Brittany McCarthy for providing me with information to complete this project, Melissa Segal for working with the St. Johnsbury historical data. And Thank you Johnsons State College, RACC, CWDD and the NSF for there funding of this project. For further information please contact:
 Nasser.Abel-Fatah@jsc.edu or:
 Tania.Bacchus@jsc.edu