

# Classification of Snowfall Events in Oneonta, NY from 2002-2012

David Loveless and Dr. Melissa L. Godek, SUNY Oneonta, Department of Earth and Atmospheric Sciences



## Introduction & Goals

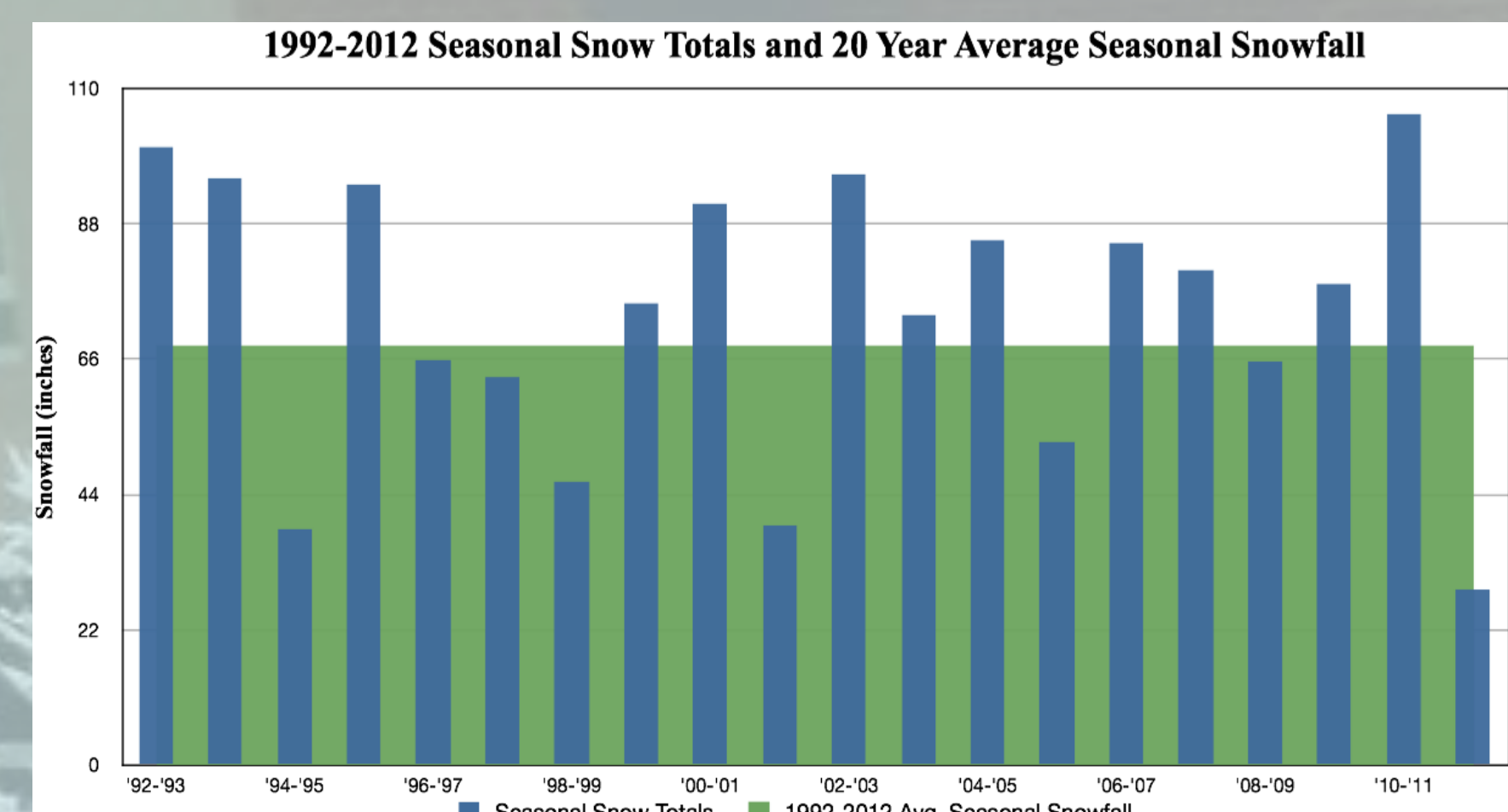
Situated directly between Binghamton and Albany, Oneonta is an interesting location to analyze snowfall. Oneonta is in a unique geographical position allowing for the city to be significantly impacted from a wide variety of snowstorms including Nor'easters, Clippers, and Lake-effect storms. In addition, daily snowfall records have been collected by SUNY Oneonta, dating back to 1982. This is rare for any location outside a major city in NY. Similar to much of the Northeast, Oneonta has a large amount of seasonal variability in snowfall; interestingly enough the highest (2010-2011) and lowest (2011-2012) snowfall totals in the 31 year record came in consecutive years. Oneonta, NY has averaged approximately 68 inches of snow per winter since the 1992-1993 winter and twice has exceeded 100 inches of snow in a season.



### Goals:

- Analyze daily snowfall records for Oneonta, NY over the past decade.
- Identify the storms that occur most frequently.
- Identify the storms that produce the most intense snowfall.
- Look at the impact of climate oscillations on snowfall in Oneonta.

Overall, the patterns found in this research should then be able to improve long-term (90 days) and short-term (days to weeks) winter outlooks for Oneonta and the Central Leatherstocking region.



## Methods & Analysis

→ Daily snowfall records are measured and recorded by SUNY Oneonta.

→ Utilize daily weather maps created by the Hydrologic Prediction Center to observe the synoptic and mesoscale weather conditions on days that resulted in measureable snowfall in Oneonta, NY.

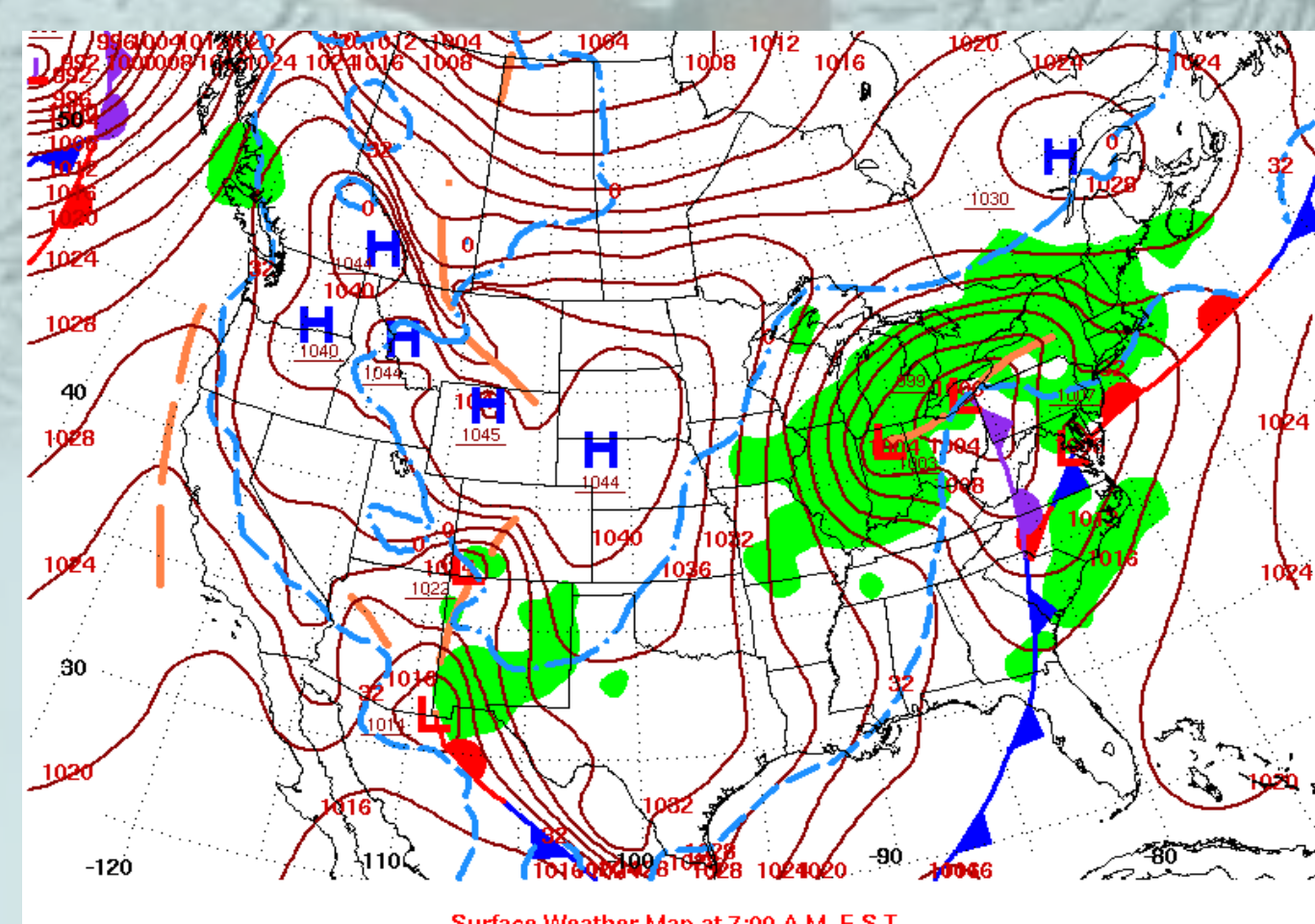
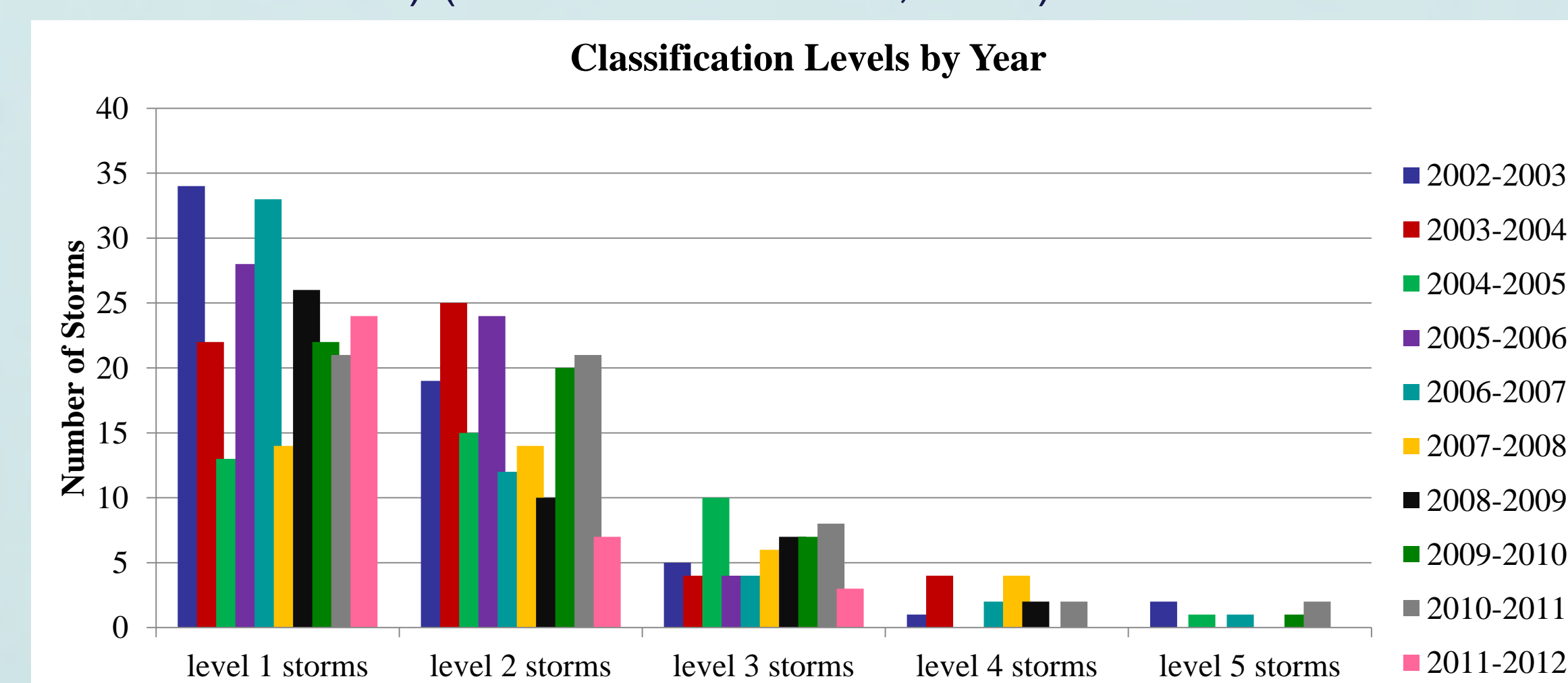
→ Classify each snowfall as a type of storm (Lake-effect, Lake-enhanced, Colorado Low, Colorado Hooker, Alberta Clipper, Coastal Storm).

→ Determine the influence of fronts and low pressure systems that influence the snowfall in Oneonta.

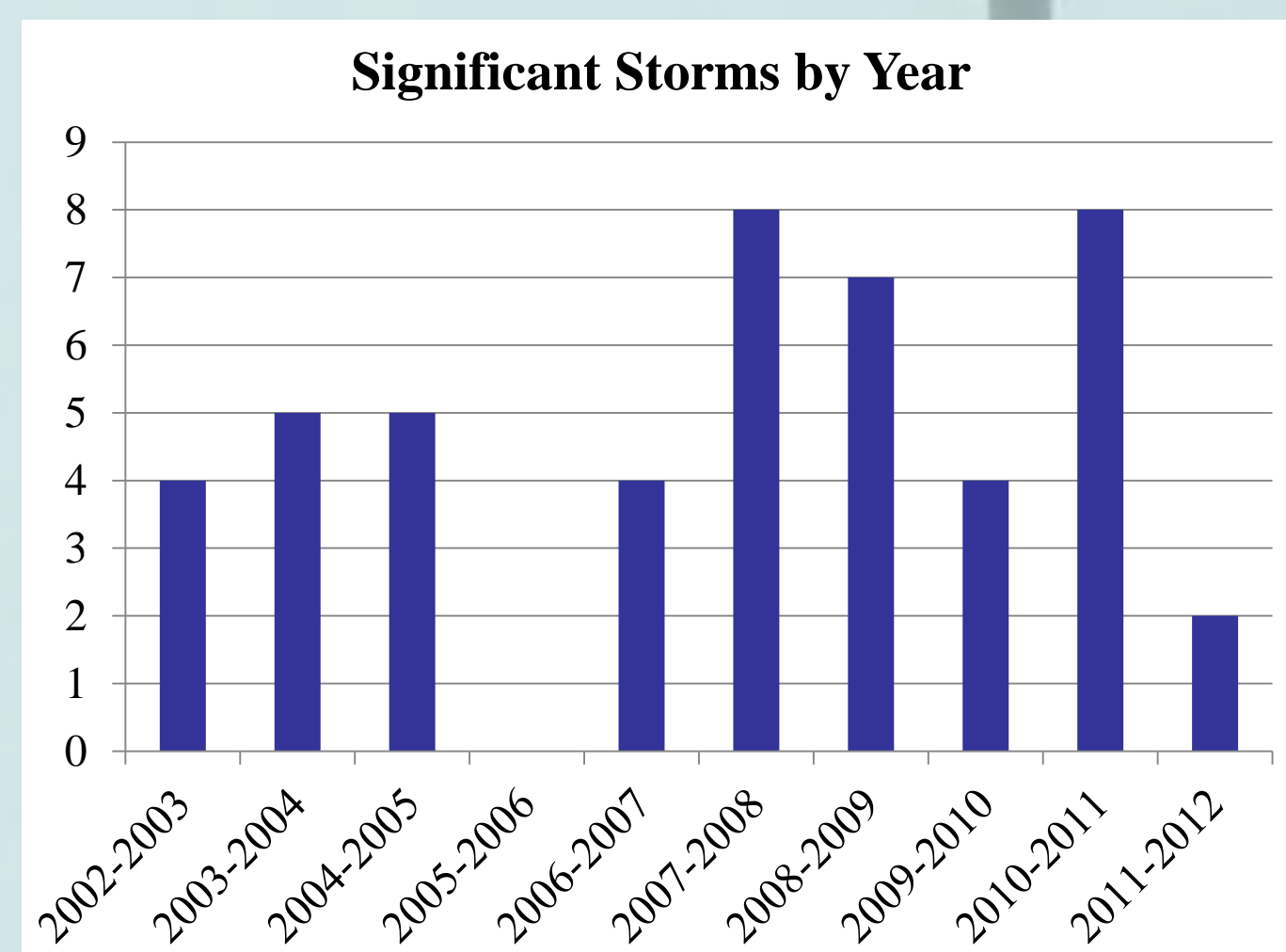
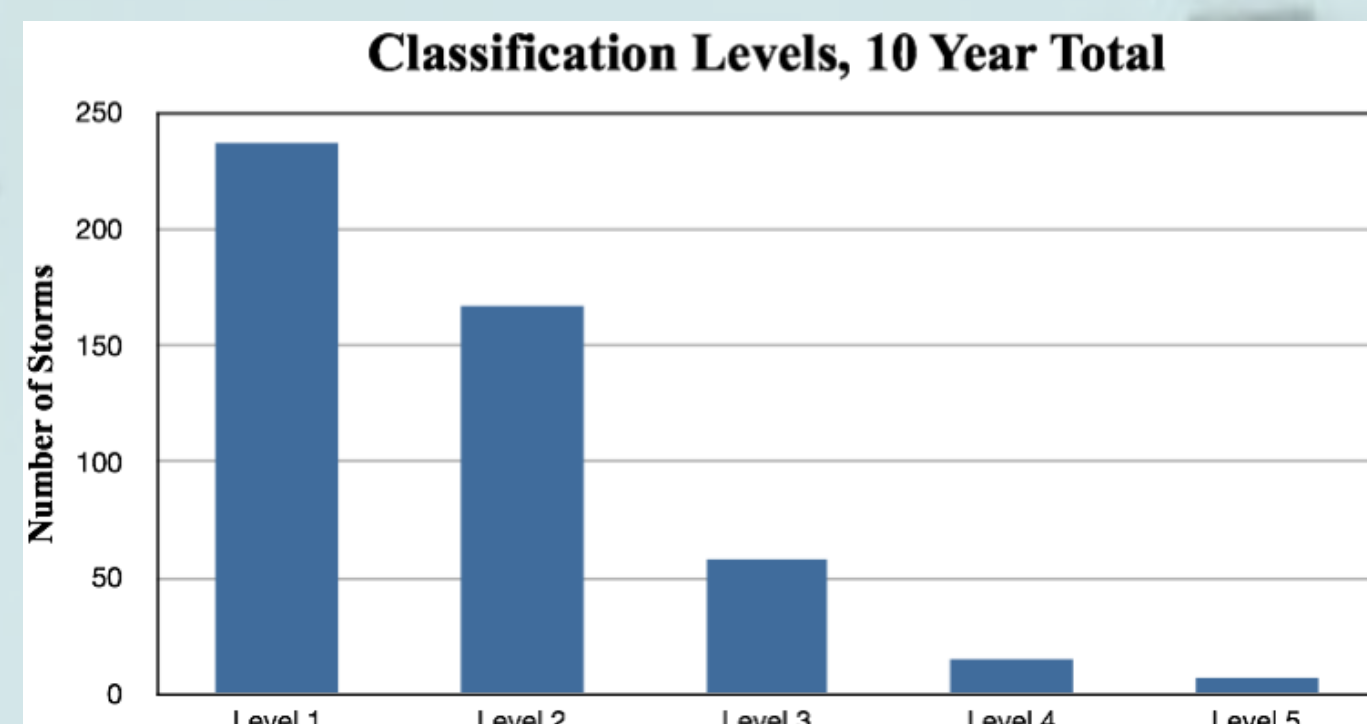
→ Classify each snowfall event into classification levels based on total snowfall for that event:

- Trace < Level 1 ≤ 0.5"
- 0.5" < Level 2 < 2.5"
- 2.5" ≤ Level 3 < 6.0"
- 6.0" ≤ Level 4 < 10"
- 10" ≤ Level 5

→ Determine which storms produced significant snowfall (at least 4.0" of snow) and which storms produced major snowfall (at least 10" of snow) (Kocin and Uccellini, 2004).

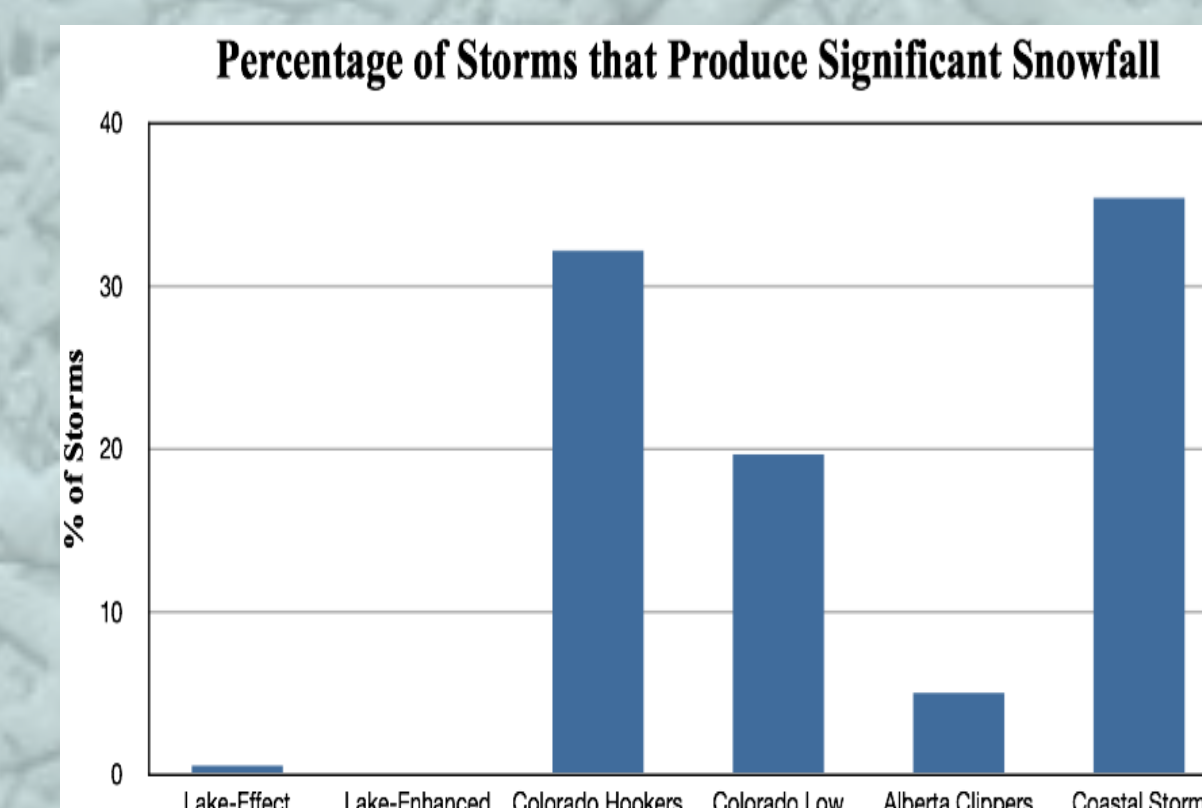
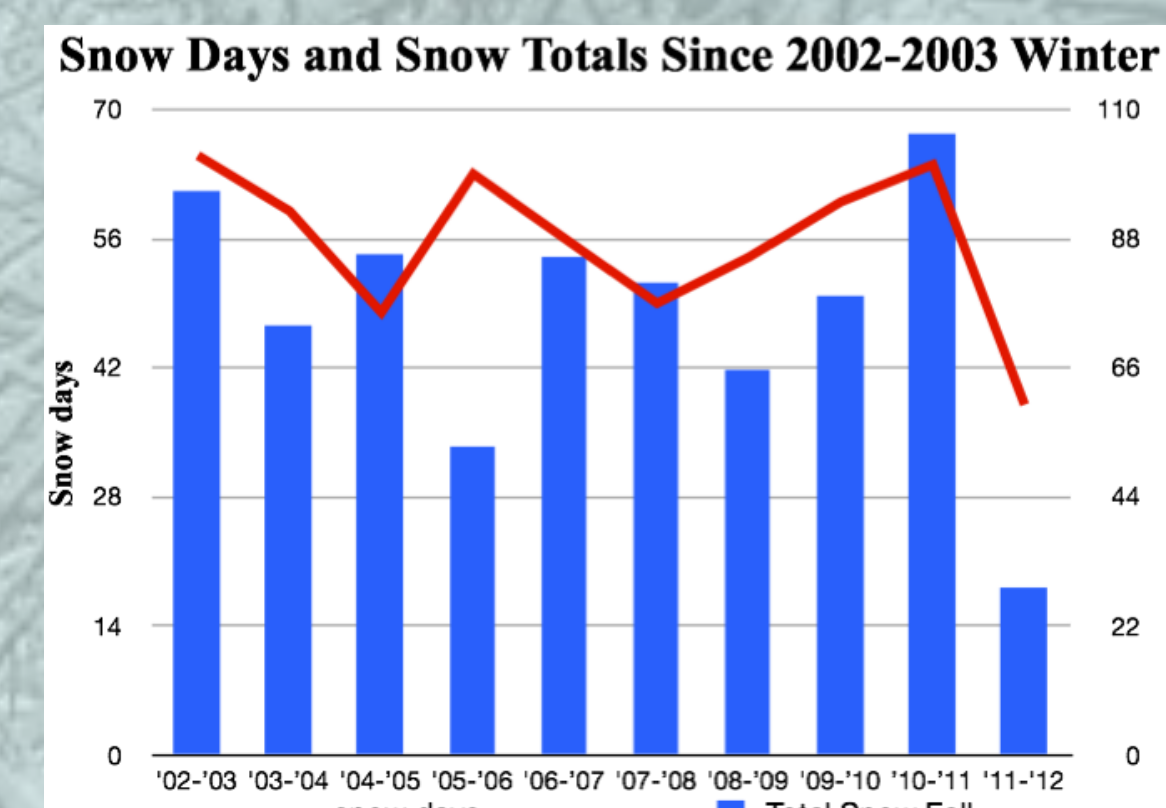
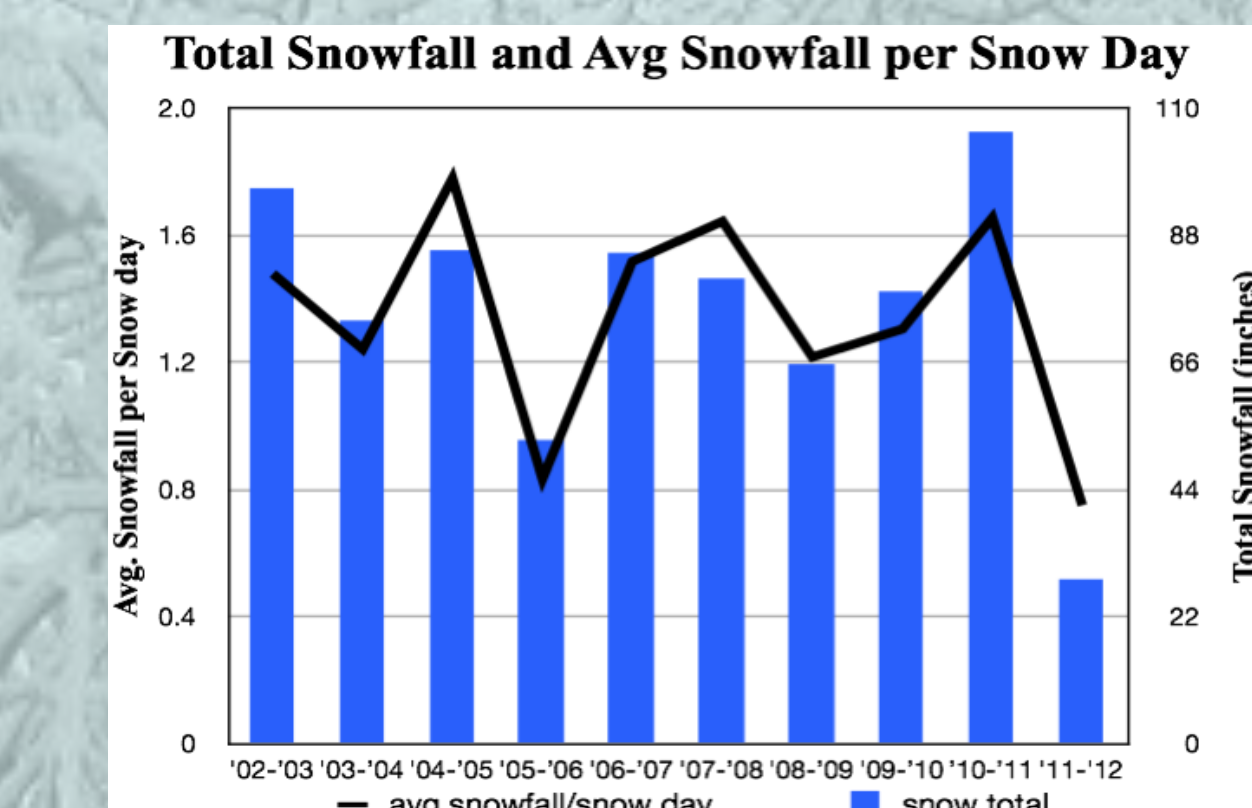
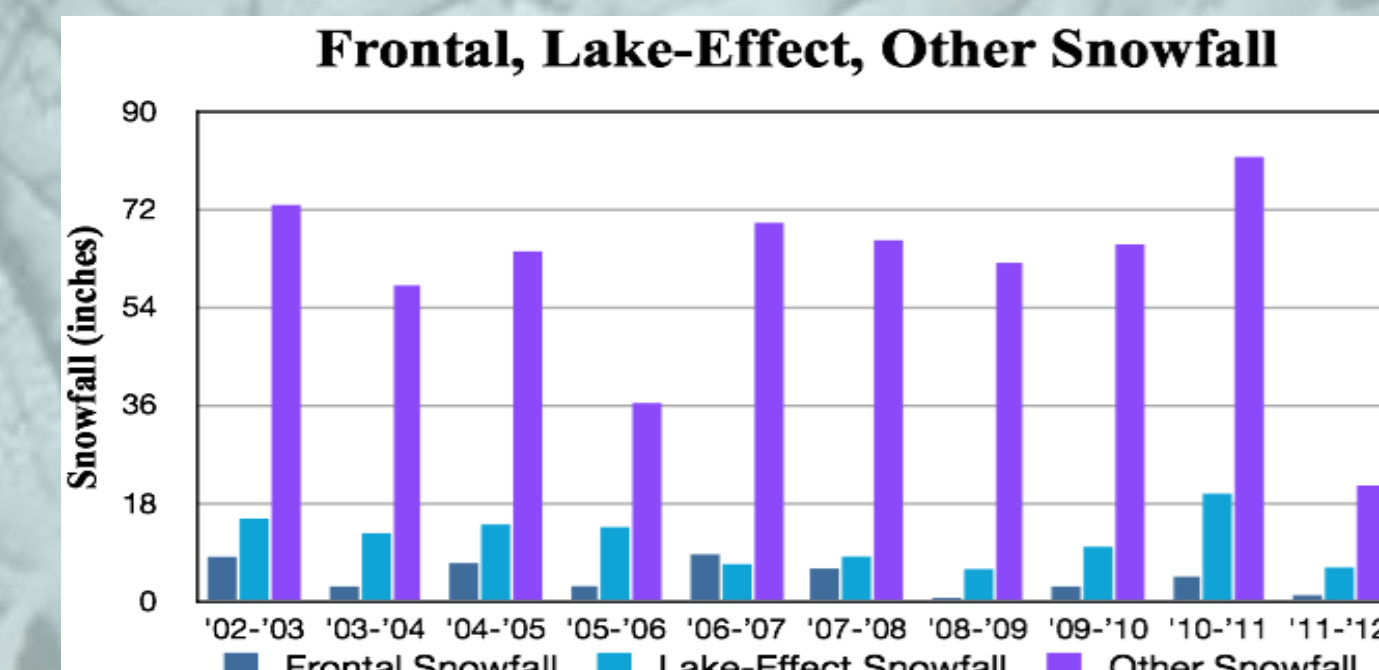
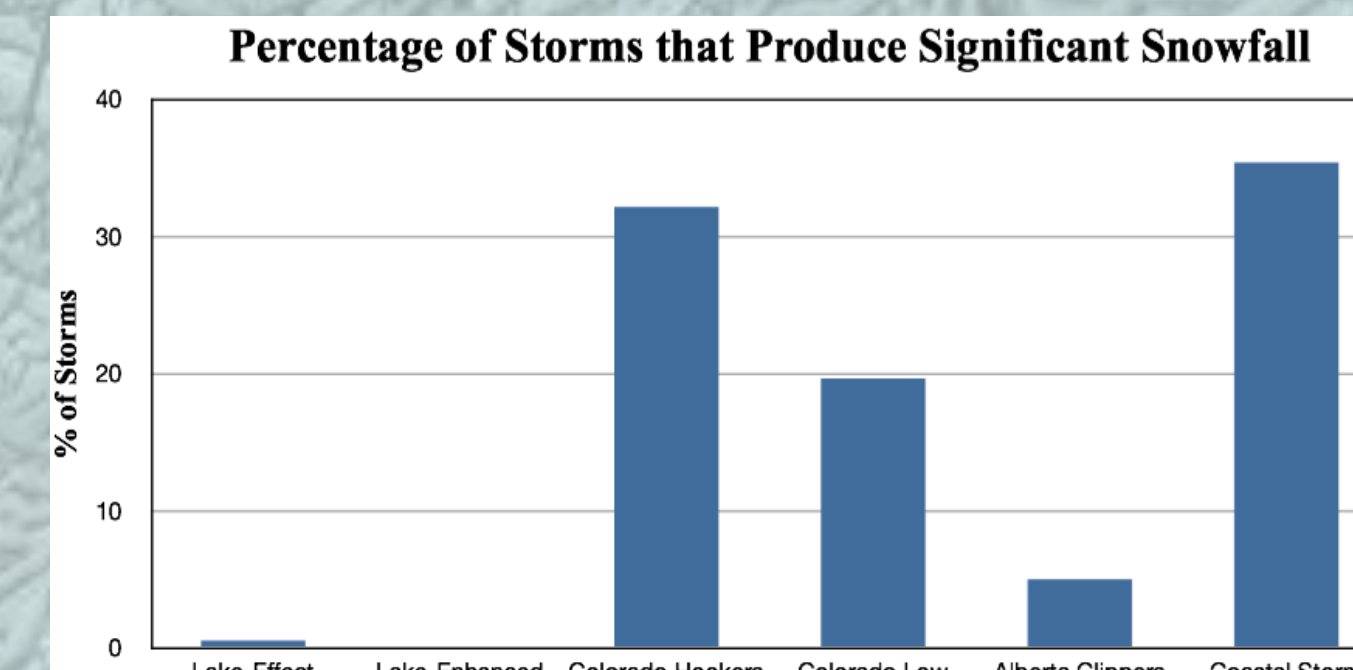
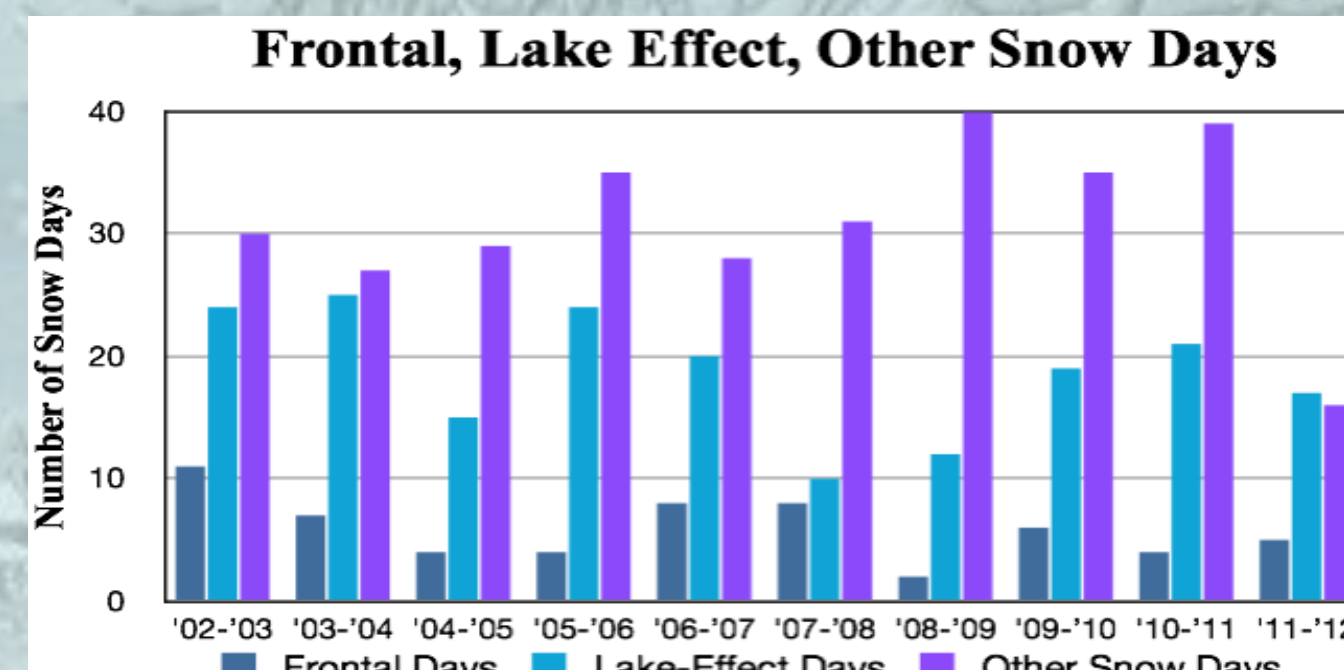


Example of HPC Daily Weather Map (2/2/11)



## Observations & Results

- Lake-effect and lake-enhanced snow are responsible for 50% of the days with measurable snow.
- Lake-effect events are more frequent than lake-enhanced events at a ratio of about 2:1.
- Frontal induced snow occurs about 6 times per year.
- Frontal induced snowfall never produced a significant event.
- Most snowfall in Oneonta is caused by the presence of a low pressure system not solely the presence of a front.
- This is also the primary synoptic set up that produces significant snowfall.
- Lake-effect only produced one significant event during the decade of study.



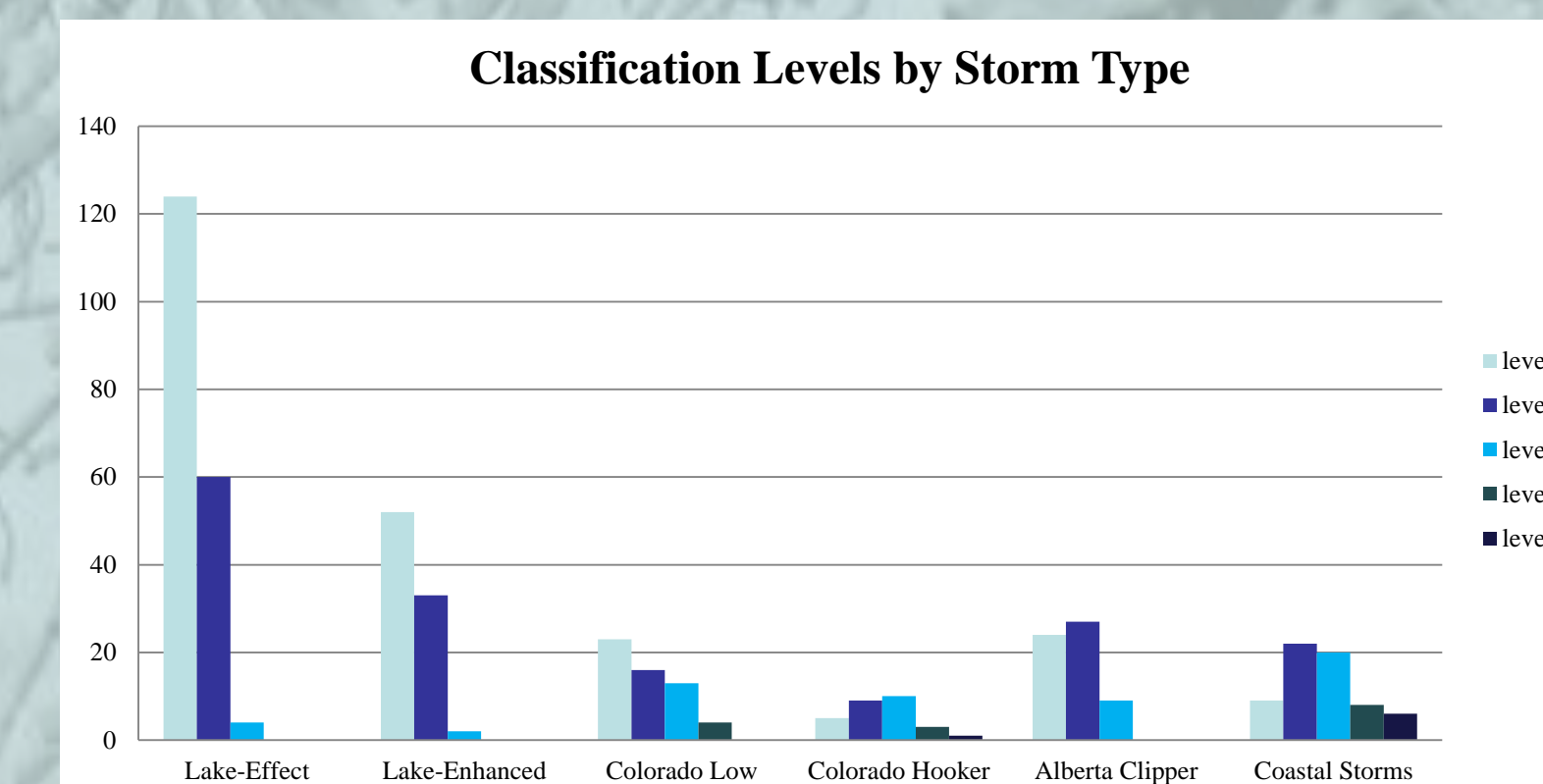
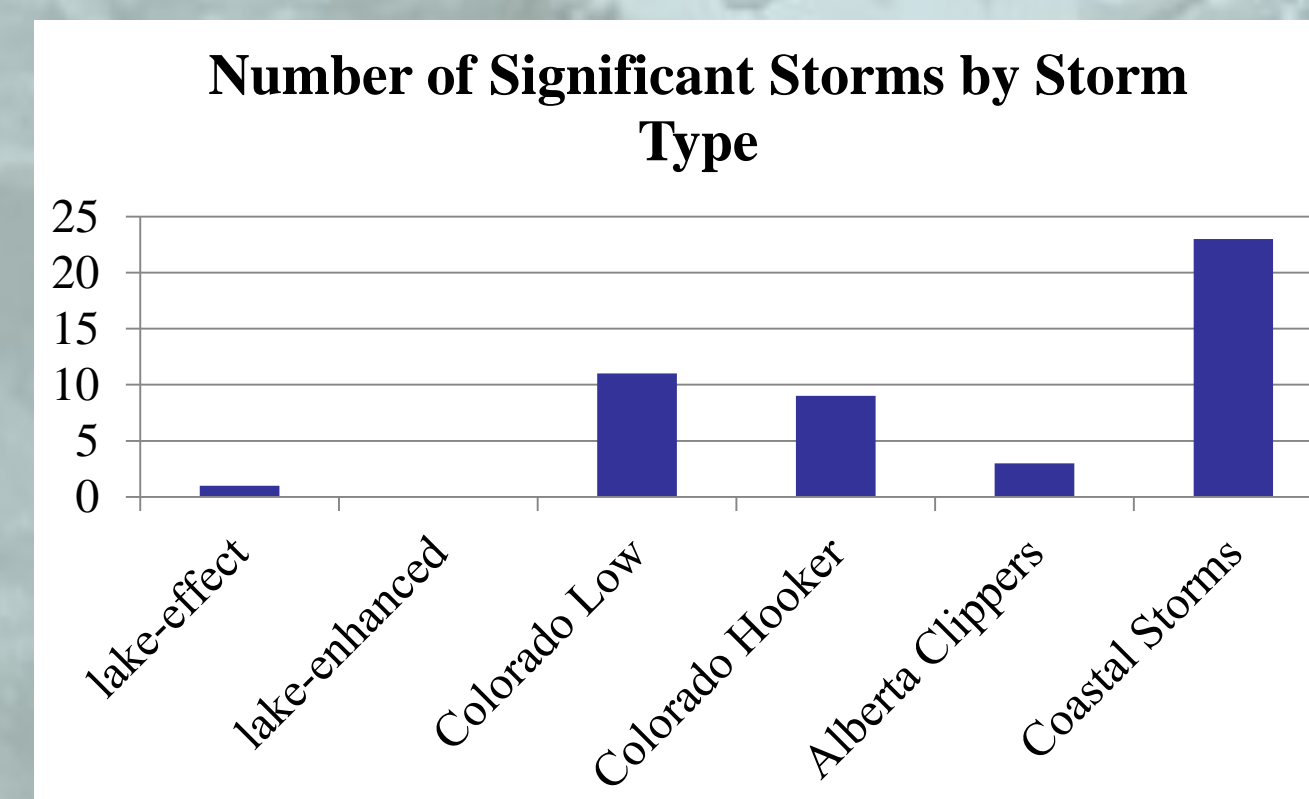
- Total seasonal snowfall does not appear to be related to the amount of snow days in a season.
- The amount of snowfall per snow day has a similar trend to the relative amount of total snowfall in a season.
- This is likely a product of large storms producing a large amount of snow in one day, resulting in higher seasonal snow totals and higher snowfall per snow day averages.

$$\% \text{ Significant} = \frac{\# \text{ of Significant Storms}}{\text{Total Number of Storms}} \times 100$$

- Coastal storms and Colorado Hookers are most likely to produce significant snowfall.
- Clippers are capable of producing significant snowfall, but rarely do.
- Seasons with above average snowfall tend to have a level 5 event associated with them.

## Conclusions & Future Research

- These results will be able to help with future forecasts in the central Leatherstocking Region of New York.
- Forecasters should give very careful consideration to forecasting snow totals over 4" for lake-effect or lake-enhanced events.
- Colorado Hookers do not occur very often but when they do they tend to produce significant snowfall.
- Coastal storms have produced the most significant snowfall events in the last decade in Oneonta.
- Oneonta begins plowing streets when snowfall reaches 2.5" or more. Thus, every storm that has reached level 3 standards, or higher, would require snow to be plowed.
- 17% of all snowfall events in Oneonta require plowing.
- This is about 8 storms per year.



Future research will look at characteristics of each winter from this decade and compare them to the major climate oscillations that impact the northeast United States, such as ENSO, NAO, and PNA. Additionally, if daily weather map archives can be acquired back to 1982, then this analysis can also be extended to include previous decades. Finally, the analysis applied for Oneonta, NY can also be applied to any city that has snowfall records.