

# Lake effect snow in areas east of lake ontario and lake erie



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The effect of lake effect snowfall has increasingly been felt by residents of cities east side of Lakes Ontario and Lake Erie. Areas surrounding these great lakes can attest to the fact that amount of snowfall each year increases causing devastating damages to the livelihood of city residents in Buffalo, Rochester Watertown and Syracuse. These effects are felt more by these areas since they lie on the leeward sides. During winter days, the snow surface can raise to as high as 1200cm. In such extreme cases, recreational activities, schooling agriculture and other economic activities have been profoundly incapacitated (Rosenfeld, 2000).

The major explanation that has been underpinned to increased lake effect snowfall is global warming caused by emissions of green gases. This paper makes a summary of the proposed project which is an analysis of the lake effect snowfall in cities east side of lakes Ontario and lake Erie, by outlining the various data and methodology's, interpretation tools and reasons why the steps will be crucial to achieving objectives of this proposed research.

## Introduction

The scientific explanation behind snowfall production is a clearly understood topic at least to most scientists; however, the lake effect snow that happens over great lakes in the USA remains a mystery. However, " Numerous studies have found a strong correlation between the strength of lake-effect snow and the degree to which the wind changes direction with height in the lower atmosphere. Thus, the minimizations of directional wind `shear` is considered to be an excellent predictor of LES snowfall rates and intensity. In general, when we think about wind direction and lake-effect snow, the first thing that comes to mind is fetch and how it affects lake-effect snow.

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Assuming that there is sufficient number of cases, one may examine how other variables affect lake-effect snow when fetch remains the same. An example is studying how wind speed affects snowfall for a given fetch. The purpose of this project is to establish the extent of lake effect snow in Lake Erie and Ontario and its effect to Metropoliation Buffalo and Rochester along with the eastern cities on the eastern end of Lake Ontario.

Background study.

The scientific explanations advanced about lake effect snow is cold air masses that originate from Canada have low water content which is warmed up and moistened as it passes over the Great lakes thereby creating lower atmospheric instability and upward motion. As a result, friction between the down winds land surfaces, upslope flow of winds cause boundary layer turbulence, and hence the LES (Dewey 1979). Lake effect snow is used to describe snowfall that occurs during the winter months and falls due to the mixture of cold air and warm air from lakes as winds cross over water masses of the great lakes. (Niziol, 1987) The manifestation of this contact between cold occurs in localized manner.

This is because the snowfalls are not wind driven. Thus, it is possible to find clear skies in one area surrounding great lakes and another covered with heavy snow downpour. It is crucial for residents of area surrounding great lakes to be able to predict when a snow burst is likely to strike. Although nature can be difficult to predict, climatologic have made some headways into techniques useful for prediction purposes say. Studying synoptic scale weather pattern, study of temperature of water surfaces wind direction and speed changes in wind direction with height and so on.

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The visible effect of these IES is heavy snowfall in surrounding areas of Lake Erie and Lake Ontario. In winter periods, the areas around these great lakes can experience a one-day snowfall of up to 175 cm deep or 300cm on a p of five days. In extreme cases 1200 cm, deep snow has been reported in areas like New York (Dewey, 1979). Wintertime in these areas is often a disaster due to the dramatic results of lake effect snowfall. Meteorologists have expressed concern over increase of lake effect snowfall in areas surrounding Lake Erie and Lake Ontario. Leather et al (1996) proposes that 30% to 60% of the increased instance of lake enhance snowfall increase has accrued from increased frequency of synoptic weather that is conducive for lake effect snowfall in cities east of Lake Ontario and Lake Erie.

However, the proposal advanced by leather is elusive because it does not submit the reason behind the rise of synoptic weather in the first place. As seen in the formation of lakes effect lakes have a profound influence an adding to the amount of snow fall lake Ontario is a huge water mass and he warm air that rises and the moisture content from it also contributes to rise in lake effect snowfall. In order to evaluate the extent of the effect of lake effect snow in cities east of Lake Ontario and Lake Erie it is important to have sufficient data to support it

#### Data and methodology

This project focuses on the areas east of Lake Ontario and Erie as well as Buffalo and Rochester. In order to get the relevant data, a sample of 300 metrological stations located in these areas will be used. The stations for the sample will be ones that have weather records dating back to 30 to 40 years ago. The records must be accurate and documented on a monthly basis.  
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The methodology of data collection shall be interviews with residents of cities around great lakes east of Lake Ontario and Lake Erie. The purpose behind interviewing them is to get a feel of how they experience the dramatic effects of lake snow effect.

The sample selection methodology will be selective meaning only resident who have lived in the cities for more than 30 years. The meteorological departments will be chosen in each city east of the lakes Ontario and Erie because different cities experience lake effect snowfalls at varied degree. Data collected by the NOAA will be considered. Recordings of wind speeds collected in the past 30-40 years will also be crucial. On average snow effect, snow occurs during months of November through to April. The frequency of snowfall has increased while the rainfall frequency has declined in the past 30 years dating back to 1970 through to 2001.

The data from NOAA also shows that the intensity of snowfall has risen owing to the increased events of precipitation. Data will be from meteorological stations and key components that will be looked for are total cold season snowfall values collected over the period stated, statistic on the negative impacts of increased lake effect snowfall in areas east side of lake Ontario and lake Erie, documented changes in weather climate and precipitation speed and so on. Evaluation of the data will use simple arithmetic methods such as mean modes standard deviations correlation and variance.

These evaluations will help to better interpret the results and findings from the research. For instance, mean temperature throughout a month relationship between snowfall and temperature average snowfall

experienced during autumn and winter days, deviation of temperatures from recorded mean temperatures.

The mode will equally help to determine the frequency of a heavy lake effect snowfall over a 5-year interval in order to see if there is any consistent pattern followed by the lake effect snowfalls. In order to establish to correlation between increase in temperatures water vaporization and the increase in lake effect snowfall in east cities of Lake Ontario and Lake Erie, models such as regression model ANOVA models CHI-SQ, students T distribution techniques will be utilized. These models will come in handy when measuring my analysis degree of accuracy at significant confidence levels. A time series of the occurrence of changes in weather and lake effect snowfall will be observed.

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