

## THE IMPACT OF SNOWFALL AMOUNT ON ECOCLIMATE IN SOME AREAS OF ILLINOIS, USA

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### Abstract

Some data on snow and their climate analysis, in the western area of lake Michigan: Case study. The data obtained refer to the stations Chicago, Freeport, Rockford, Kenosha, Aurora, Gary, Joliet, Ottawa, Dixon, Clinton, Dekalb, Kankakee, Pontiac, Peoria, Bloomington.

The climate of the Chicago Area is with cold winters and scattered snowfall in the winter months. The study shows some estimates of snowfall trends over a multi-year period. Data refers to reports from the National Oceanic and Atmospheric Administration National Weather Service, Chicago, IL, 333 West University Drive, Romeoville, IL. The analysis of snow precipitation amount data is based on the application of the mathematical method Excel.

The results show that precipitation values are different over the years. Trends are given by regression equations. For January 1985-2021:  $y = 4.4576x + 1937.5$ ,  $R^2 = 0.0378$ . The tendency of the value of snowfall for the months of January is with a constant 4.4576. In the period Seasonal Snowfall Totals for Chicago from 1884 to 2021:  $y = 2.3353x + 1890.2$ ,  $R^2 = 0.0868$ . The tendency of the value of snowfall for each year period is with a constant 2.3353. The smallest amount of snow precipitation is estimated for the years 1920-1921 with 9.8 inches. The highest amount of snow precipitation is estimated for the years 1978-1979 with 89.7 inch. All result are based on statistical method. Our statewide snowfall records in Illinois start in 1902. There is no long-term trend in snowfall since 1902.

However, some decades were snowier than others, such as the 1910s, 1960s, and 1970s. In fact, the 1970s were the snowiest decade on record with an average snowfall of 27.2 inches. Snowfall amounts dropped steeply with less year to year variability for much of the 1980s and into the early 2000s. However, snowfall amounts in the last 6 winters have been more variable with the winter of 2014 being about as snowy as the late 1970s. The snowiest winter on record was 1979 with 44.5 inches. Here are the 5 snowiest winters on record: 1979 with 44.5 inches; 1978 with 44.4 inches; 1912 with 39.5 inches; 2014 with 39.4 inches; 1960 with 38.6 inches;

Snowfall is accumulated from July 1 of the first year to June 30 of the second year. The second year is used in the plot and table (for example, 2006 refers to the 2005-2006 season, source: state climatologist Illinois).

### Introduction

Snow is an important element of the climate. Many studies on snowfall have been conducted in the USA and Europe. Regardless of the results achieved, studies and trends on snow performance, time and quantity, always remain to be evaluated.

In each case of evaluation are considered the time of snowfall, the amount of snowfall, monthly, annual multi-year period as well as mathematical and statistical methods.

### Material and methods

The analysis of snow precipitation amount data is based on the application of the mathematical method Excel. The results show that precipitation values are different over the years. Trends are given by regression equations.

### Data

The data obtained refer to the stations Chicago, Freeport, Rockford, Kenosha, Aurora, Gary, Joliet, Ottawa, Dixon, Clinton, Dekalb, Kankakee, Pontiac, Peoria, Bloomington. The climate of the Chicago Area is with cold winters and scattered snowfall in the winter months.

The study shows some estimates of snowfall trends over a multi-year period. Data refers to reports from the National Oceanic and Atmospheric Administration National Weather Service, Chicago, IL, 333 West University Drive, Romeoville, IL,

[https://www.weather.gov/lot/Chicago\\_seasonal\\_snow](https://www.weather.gov/lot/Chicago_seasonal_snow).

### RESULTS

After analyzing data, for snowfall November data in Chicago area based at figure 1, results:

- Snow inch for each year at every November it is different, started with 0 inch 1968, 1 inch 1884, 1896, 1902, 1908, 1938, 1944, 1950, 1956, and 3 and 4 inches in 1896, 1968 and maximum inches in 2001 with 12.

After analyzing data, for seasonal snow in Chicago area based at figure 2, results:

- The tendency of the regression equation is positive.
- The coefficient for each year is 2,353.
- The functional bond is weak with  $R^2 = 0.0868$ .

After analyzing data, for smallest and largest snowfall data in Chicago area based at figure 3, results:

- The tendency of the regression equation is almost linear.
- The coefficient for each year is 4.7683.
- The functional bond is weak with  $R^2 = 0.009$ .

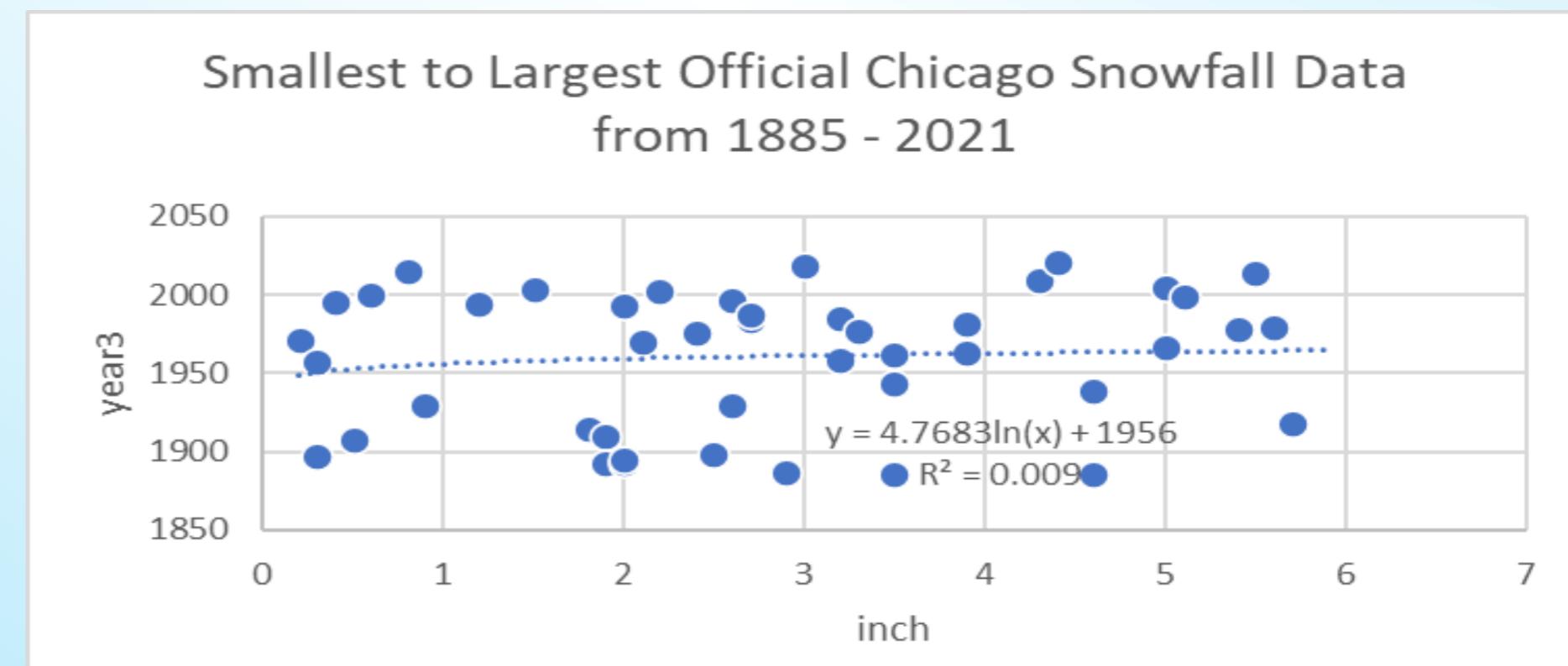


Figure 3. Chicago Monthly Snowfall Amounts, January, Normal 11.3 Inches

### CONCLUSIONS

The analysis of snow precipitation amount data is based on the application of the mathematical method Excel. The results show that precipitation values are different over the years. Trends are given by regression equations. For January 1985-2021:  $y = 4.4576x + 1937.5$ ,  $R^2 = 0.0378$ . The tendency of the value of snowfall for the months of January is with a constant 4.4576. In the period Seasonal Snowfall Totals for Chicago from 1884 to 2021:  $y = 2.3353x + 1890.2$ ,  $R^2 = 0.0868$ . The tendency of the value of snowfall for each year period is with a constant 2.3353. The smallest amount of snow precipitation is estimated for the years 1920-1921 with 9.8 inches. The highest amount of snow precipitation is estimated for the years 1978-1979 with 89.7 inch. All result are based on statistical method.

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**Conflicts of interest.** The authors declare no conflicts of interest.

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