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DATA SNOW TRENDS IN THE ILLINOIS STATE

H Mankolli[1*], S Dursun[6], M Hoxhalli[1]

[1]Independent Environment Researcher, Chicago, Illinois, USA;*
[2]Konya Technical University, Environmental Engineering Department, Konya, Turkey;

Email: hysenmankolli@yahoo.com;

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ABSTRACT

The Chicago area there are in the south-eastern of Lake Michigan in the north of Illinois State with climatic influences from Lake Michigan. 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).

Key words: data snow, trends, 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

Study area

The study area is considered the Central Illinois State Area, also called the Chicago area. This area includes over 17 counties. This area is under the influence of Lake Michigan. Figure1 shows Chicago area, IL,collected data set.

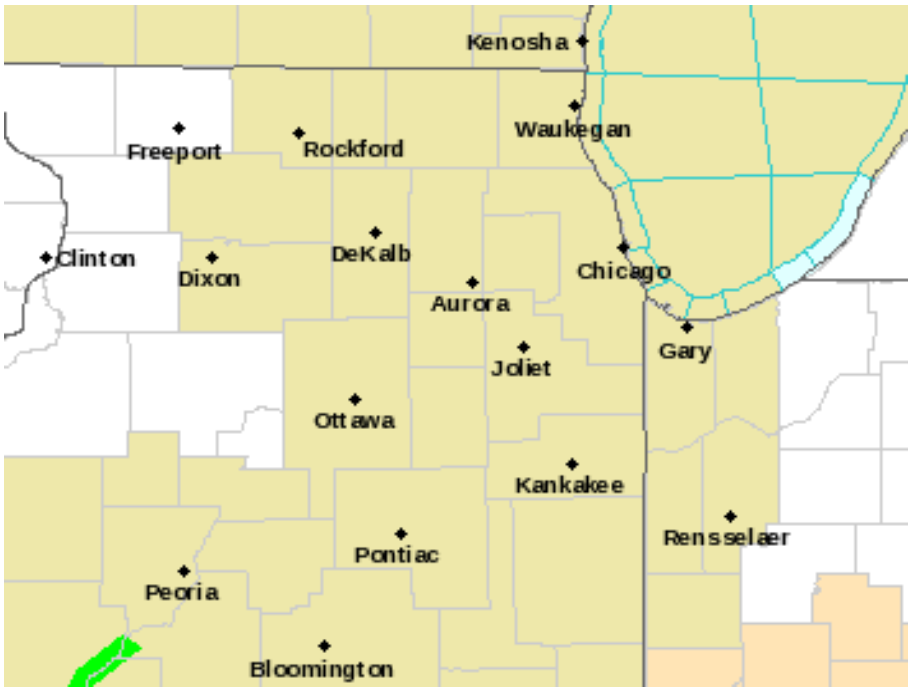

Figure1. Chicago area, IL,collected data set
Source: https://www.weather.gov/lot/

Method

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.

All datas gived by the tables.

Table 1. Seasonal Snowfall Totals for Chicago from 1884 to present, July through June.

Snow depth	year		year	Snow depth	year		year	Snow depth	year		year
9.8	1920	-	1921	29.4	1968	-	1969	42.4	1979	-	1980
11.5	1921	-	1922	29.6	1997	-	1998	42.6	1987	-	1988
12.0	1936	-	1937	29.8	1941	-	1942	42.7	1962	-	1963
14.3	1948	-	1949	30.1	1928	-	1929	43.2	1953	-	1954
18.0	1898	-	1899	30.1	2012	-	2013	43.3	1975	-	1976
18.2	1901	-	1902	30.3	1999	-	2000	43.7	1909	-	1910
18.9	1924	-	1925	30.4	1910	-	1911	44.4	1893	-	1894
19.0	1912	-	1913	31.0	1939	-	1940	45.0	1896	-	1897
19.0	1914	-	1915	31.1	2001	-	2002	45.2	1934	-	1935

19.8	2011	-	2012	31.2	2015	-	2016	45.2	1942	-	1943
20.0	1957	-	1958	31.3	1956	-	1957	46.8	1971	-	1972
20.6	1905	-	1906	31.5	1892	-	1893	46.9	1992	-	1993
21.5	1922	-	1923	32.1	1887	-	1888	47.2	1894	-	1895
21.6	1890	-	1891	32.2	1919	-	1920	48.8	2020	-	2021
21.7	1889	-	1890	32.2	1954	-	1955	48.9	1907	-	1908
22.7	1888	-	1889	32.9	1927	-	1928	49.0	1983	-	1984
23.4	1952	-	1953	32.9	1972	-	1973	49.5	2018	-	2019
23.5	1990	-	1991	33.5	1891	-	1892	50.7	2014	-	2015
23.7	1916	-	1917	33.8	1949	-	1950	50.9	1885	-	1886
23.8	1926	-	1927	33.8	1989	-	1990	50.9	1959	-	1960
23.9	1945	-	1946	33.9	1938	-	1939	50.9	1998	-	1999
23.9	1995	-	1996	34.0	1904	-	1905	52.2	1974	-	1975
24.0	1943	-	1944	34.1	1946	-	1947	52.3	1925	-	1926
24.1	1994	-	1995	34.2	1902	-	1903	52.5	1940	-	1941
24.5	1988	-	1989	34.2	1937	-	1938	52.7	2008	-	2009
24.6	1931	-	1932	34.8	2019	-	2020	53.6	1895	-	1896
24.8	2003	-	2004	34.9	1944	-	1945	54.0	1884	-	1885
24.9	1965	-	1966	35.0	1980	-	1981	54.1	1976	-	1977
25.4	1933	-	1934	35.2	1963	-	1964	54.2	2009	-	2010
26.0	2005	-	2006	35.6	2006	-	2007	54.4	1950	-	1951
26.1	1915	-	1916	36.1	2017	-	2018	57.9	2010	-	2011
26.1	2016	-	2017	36.8	1897	-	1898	58.2	1929	-	1930
26.2	1986	-	1987	36.8	1899	-	1900	58.3	1973	-	1974
26.3	1955	-	1956	37.9	1970	-	1971	58.9	1961	-	1962
26.4	1908	-	1909	38.1	1947	-	1948	59.3	1981	-	1982
26.6	1982	-	1983	39.1	1984	-	1985	59.5	1903	-	1904
27.2	1930	-	1931	39.2	2000	-	2001	59.5	1964	-	1965
27.6	1923	-	1924	39.4	2004	-	2005	60.3	2007	-	2008
28.1	1932	-	1933	39.6	1911	-	1912	64.1	1917	-	1918
28.2	1913	-	1914	39.8	1935	-	1936	66.4	1951	-	1952
28.4	1967	-	1968	40.5	1886	-	1887	68.4	1966	-	1967
28.4	1991	-	1992	40.6	1996	-	1997	77.0	1969	-	1970
28.6	2002	-	2003	40.7	1960	-	1961	82.0	2013	-	2014
28.8	1918	-	1919	40.9	1900	-	1901	82.3	1977	-	1978
29.0	1985	-	1986	41.0	1958	-	1959	89.7	1978	-	1979
29.3	1906	-	1907	41.8	1993	-	1994				

US Dept of Commerce, National Oceanic and Atmospheric Administration National Weather Service, Chicago, IL,333 West University Drive, Romeoville, IL

Table 2. Chicago Monthly Snowfall Amounts November, Normal 1.8 inches.
Smallest to Largest Official Chicago Snowfall Data from 1885 - 2020

Snow inch	**year**	**Snow inch**	**year**	**Snow inch**	**year**

0.0	1999	0.5	1884	2.2	1903
0.0	2001	0.5	1888	2.3	1925
0.0	2009	0.5	1902	2.5	1887
0.0	2010	0.5	1918	2.5	1894
T	1890	0.5	1935	2.6	1886
T	1897	0.5	1957	2.6	1949
T	1899	0.6	1919	2.7	1937
T	1904	0.6	1932	2.8	1906
T	1905	0.6	1936	2.8	2014
T	1909	0.6	2008	3.0	1907
T	1913	0.7	1885	3.3	1997
T	1914	0.7	1915	3.6	1981
T	1923	0.7	1945	3.7	2019
T	1928	0.7	1958	3.8	1969
T	1934	0.7	1960	3.8	1986
T	1946	0.7	2020	3.9	1926
T	1948	0.8	1892	3.9	1989
T	1952	0.8	1964	3.9	1995
T	1963	0.8	1968	4.2	1896
T	1965	0.8	1976	4.3	1942
T	1973	0.9	1908	4.7	2002
T	1984	0.9	1988	4.8	1996
T	1990	0.9	2013	4.9	1927
T	1994	1.0	1924	5.1	1974
T	2003	1.0	1944	5.1	1980
T	2011	1.0	1983	5.1	2004
T	2012	1.0	1987	5.2	1941
T	2016	1.1	1900	5.5	1972
0.1	1916	1.1	1985	5.7	1954
0.1	1929	1.2	1910	5.9	1955
0.1	2000	1.2	1911	6.2	1947
0.1	2017	1.2	1967	6.3	1977
0.2	1922	1.2	1971	6.6	1959
0.2	1931	1.2	1991	6.8	1891
0.2	1938	1.3	1889	7.0	1950
0.2	1943	1.3	1920	7.1	1978
0.2	1992	1.4	1933	7.5	1893
0.2	1993	1.5	1917	7.6	1953
0.2	1998	1.5	1956	10.8	1975
0.3	1970	1.5	1966	11.2	2015
0.3	2007	1.6	1921	12.7	2018
0.4	1912	1.6	1961	14.3	1951
0.4	1939	1.7	1930	14.5	1895

0.4	1962	1.8	1898	14.8	1940
0.4	1982	1.9	2005		
0.4	2006	2.1	1979		

Source: US Dept of Commerce, National Oceanic and Atmospheric Administration National Weather Service, Chicago, IL,333 West University Drive, Romeoville, IL

RESULTS

After analyzing datas, 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 in1896, 1968 and maximum inches in 2001 with 12.

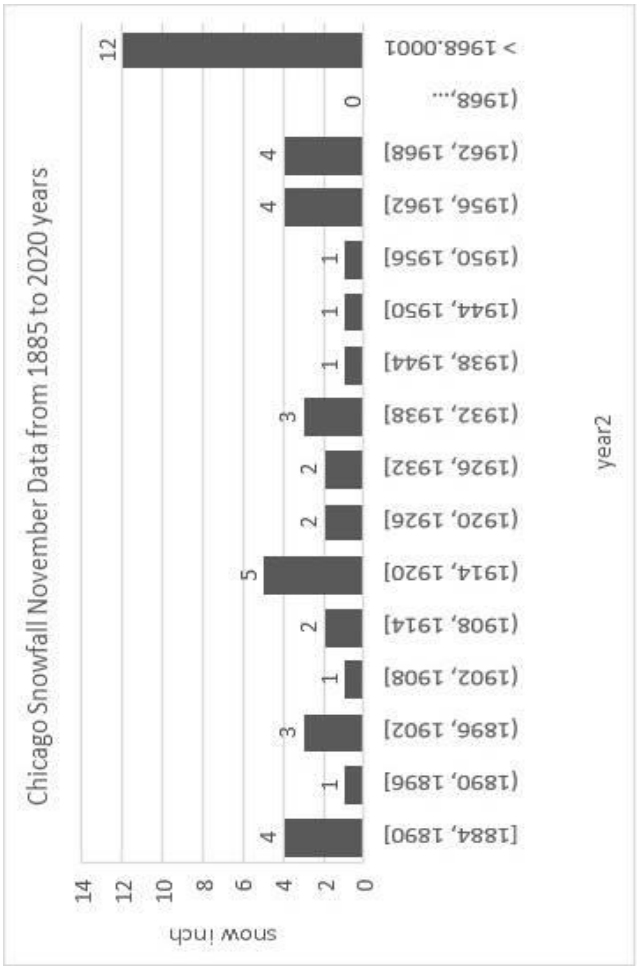

Figure 1. Chicogo Snowfall data.

After analyzing datas, 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 R2 = 0.08.

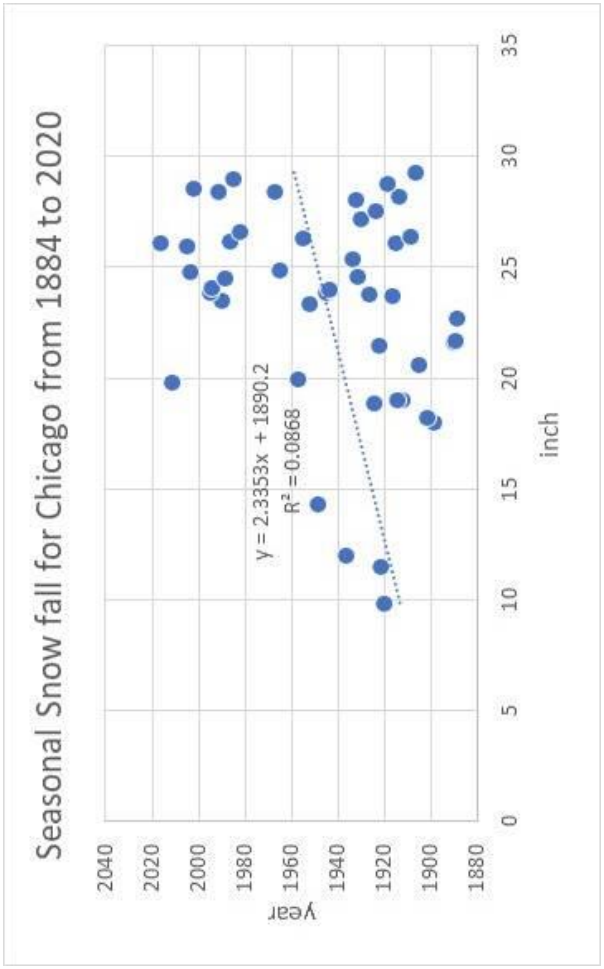

Figure 2.Snow fall regression equation.

After analyzing datas, 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 R2 = 0.009.

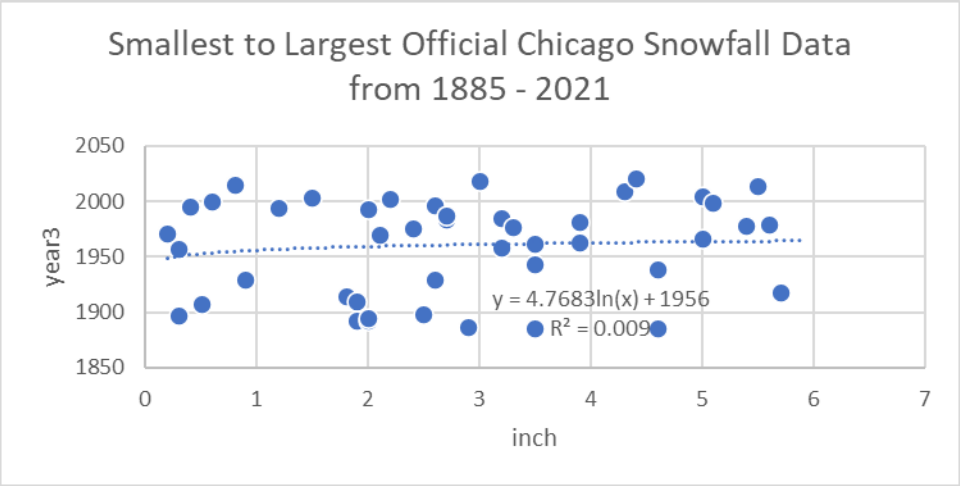

Figure 3. Chıcago Monthly Snowfall Amounts, January, Normal 11.3 İnches

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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