Environment Canada Imaging Cover Page

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Toronto Temperature Trend

1780–1978

by

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Very often climatologists are asked, "Are We Heading Into Another Ice Age". Depending on the person asked, there are numerous answers to this question and many theories as to why we are or are not on the verge of an Ice Age.

One of the major problems in solving this mystery is the short length of temperature records for any one location in the world. In Canada the longest period of continuous temperature records are those for Toronto, Ontario. This record covers the period 1840 to the present. There are no Canadian records that extend back into the 18th century, however in the United States of America, New Haven, Connecticut has temperature records going back to 1780. Over the past century, Beatrice, Ontario has been a rural climatological observing station and has continuous temperature records dating back to 1878.

In order to arrive at a Temperature Trend for Toronto for the period 1780–1978 the validity of the temperature records was first confirmed. This was done by comparing, where possible, the data with that of stations in the same proximity. Once this was accomplished the next step was to graph the temperature data for the three stations to determine if a general similarity in the temperature trend was visible. It was noted that over the period 1840–1875, Toronto and New Haven were generally consistent and Toronto and Beatrice were similar for the period 1878–1978 except for the urban effect which became markedly apparent after 1900 with the Toronto data.

Once it was confirmed that these data were as reliable as could be expected, Toronto and New Haven annual mean temperatures were averaged for the period 1841–1860. The difference between the two sites was -2.8°C and this difference was fairly consistent over the period. This value was then used to adjust the New Haven data to estimate temperatures for Toronto for the period 1780–1841. The observed data at Toronto can be considered to be the best values available without adjustment.

Data for Toronto and Beatrice were then compared to determine the increase in temperature at Toronto due to urban effect. Prior to 1900 the urban effect was minimal and the difference between Toronto and Beatrice was running around 3.0°C. From 1900 to 1978 the urban effect increased steadily until the late 1970s difference is 4.6°C. A smoothed correction was then applied to the Toronto data beginning with -0.1°C in 1900 and increasing to -1.6°C in 1978.

After the adjustments were completed five year moving means were calculated and credited to the median year. The resulting data were then plotted on the attached graph to show an approximate "true" temperature trend for the past 200 years in central southern Ontario.

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TORONTO TEMPERATURE TREND
1780–1978
5 YEAR RUNNING MEAN
(CREDITED TO MEDIAN YEAR)