

The Shrinking Canadian Outdoor Hockey Season

I recall winters being longer, primarily from childhood memories of when I started playing and finished playing hockey outdoors. I played hockey outside from November to March unlike kids today who can only play from December to February. I analyzed Québec temperature trends from 1963 to 2013 to confirm childhood memories by using the Climate Time Series browser and Québec weather stations for the past 50 years, which produced an average temperature increase of about 0.1 °C/year for an average temperature increase of 5°C. All of the weather stations across Québec were selected, since I played hockey all over the province, and wanted a provincial temperature increase over the past five decades. Although this will result in a larger geographic variance given the size of the province, the results are still valid given my objective to determine if the length of the overalls outdoor hockey season has shrunk in the past 50 years.



Figure 1: Average Québec Temperature Warming from 1963 to 2013, in °C

Although this results in an increase of just 5°C over 50 years, recall the outdoor temperature hovers just below the freezing point at the start and end of the outdoor hockey season, so a 5°C increase is the difference between a frozen sheet of ice or slush. In the colder mid-winter, an average increase of 5°C won't raise the temperature above the ice melting point. However, it will indeed delay the start of the outdoor hockey season and accelerate its end for an overall shortened hockey season, due to the melting of the outdoor rink ice.

The available temperature data from the weather stations across Québec was plotted, as shown in Figure 2, which shows a definite temperature warming over the past 50 years.

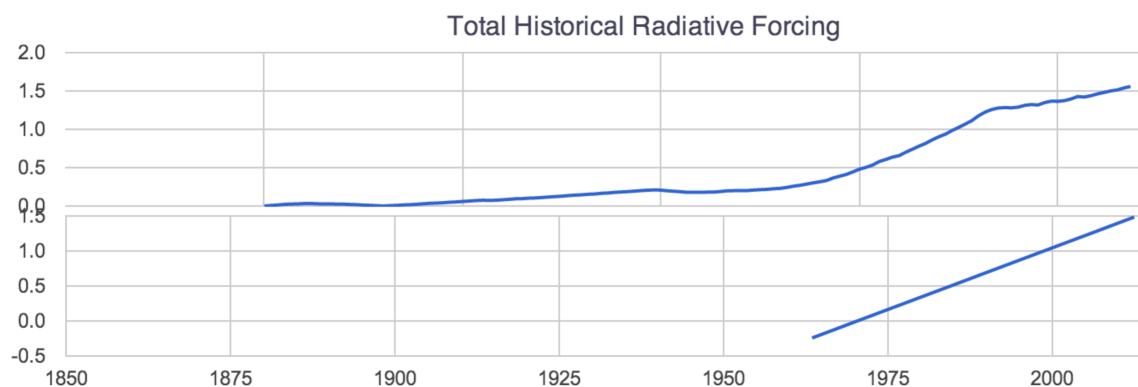


Figure 2: Weather Station Data from 1963 - 2013

The increase in temperature per year from 94 weather stations was compared to models listed below also from 1963 to 2013. Only 27 weather stations had valid data available. There's a variation between model results with an average increase of 0.29°C with a standard deviation of

0.13°C. This annual average temperature increase results in a modeled increase of 14.5°C, which is too high, especially when compared to actual weather station data from across Québec.

BCC-CSM1-1 Historical Composite	0.35°C
BNU-ESM Historical Composite	0.38°C
CanESM2 Historical Composite	0.41°C
CCSM4 Historical Composite	0.37°C
CNRM-CM5 Historical Composite	0.15°C
CSIRO-Mk3-6 Historical Composite	0.21°C
GISS-E2-H Historical Composite	0.21°C
IPSL-CM5A Historical Composite	0.38°C
MIROC-ESM Historical Composite	0.50°C
MRI-CGCM3 Historical Composite	0.19°C
NorESM1-M Historical Composite	0.07°C
Average Annual Increase	0.29°C

Looking to the future, I investigated Ouranos, a consortium of 400 scientists and professionals from different disciplines focusing on climate sciences. They used observed data from 1961 to 1990 to project the mean projected changes in temperature in Québec, show in Figure 3, which shows a increase in temperature from 3°C to 7°C, depending on where one is located in the vast province of Québec. This means that for future generations, the outdoor hockey season will only continue to shrink until only indoor hockey is played in most of the province, due to the lack of available outside ice. As a Canadian whose passion is hockey, this is a very bleak outlook indeed!

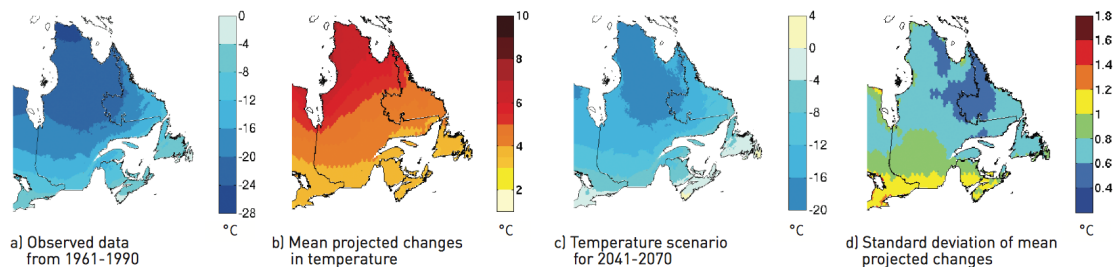


Figure 3: Winter Temperature Scenario in Québec (reference: [OURANOS, 2010](#))

In summary, weather data from across Québec shows a definite increase in temperature from 1963 to 2013, which undoubtedly affected the length of the available outdoor hockey season. Although AR5 models show temperature increases far more pessimistic when compared to actual measured weather station temperature data, and thus could be used by deniers arguing against the reality of climate change, they also show a definite warming trend.

References:

Model URL:

<http://climatemodels.uchicago.edu/timeseries/#DqbBBBBBCBBnCcBBBZBBBCBrHBCBBBCBBBBDDBCBCCBCBBBBBBBBBBBBBBBBBBBBBCBBBBQCBBpEBBCBBBBBBBBNBBBBCBDBHrFD>

OURANOS Projected Temperature Changes in Québec:

http://www.ouranos.ca/media/publication/191_Temperature2011_webEng.pdf