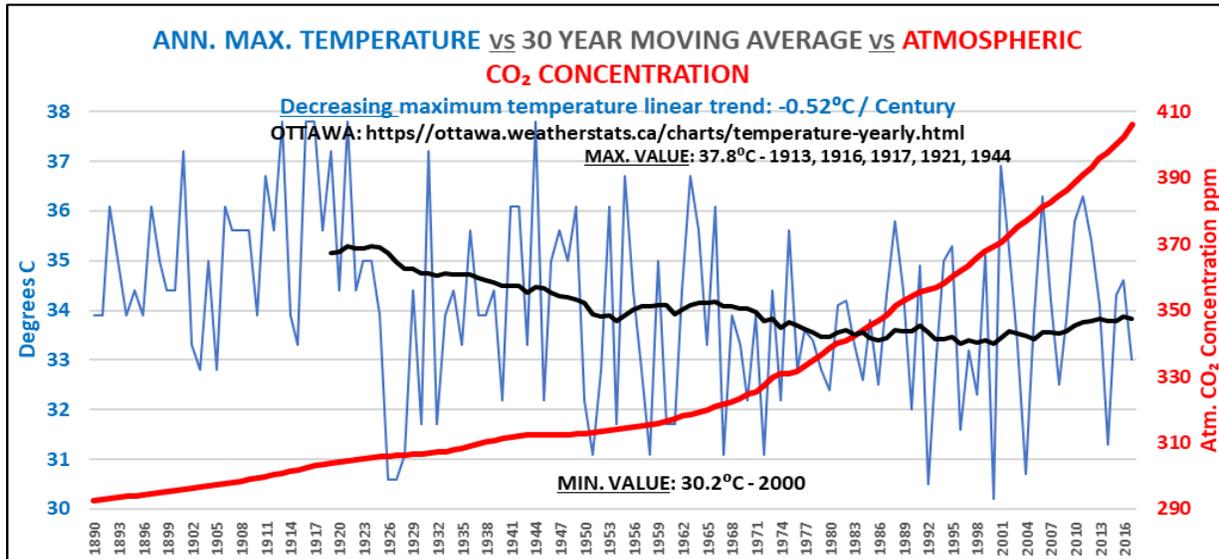


# ONTARIO EXTREME WEATHER EVENT TRENDS IN PICTURES

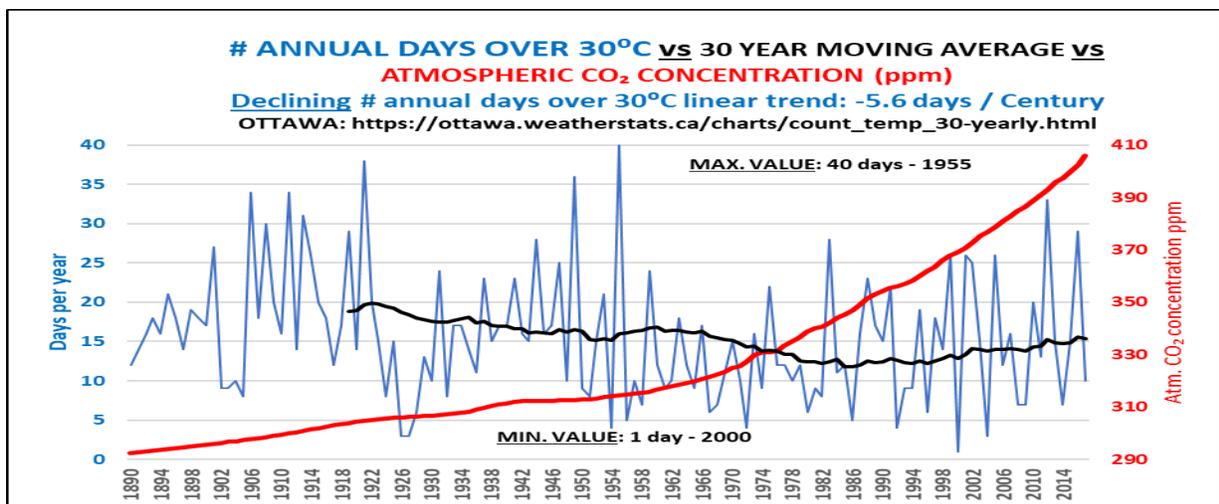
We often hear in the media that **extreme weather events** in Ontario have become **more frequent and more severe** due to anthropogenic carbon dioxide (CO<sub>2</sub>) emissions from fossil fuels. Let's look at the historical physical evidence for that claim starting with annual maximum temperature:



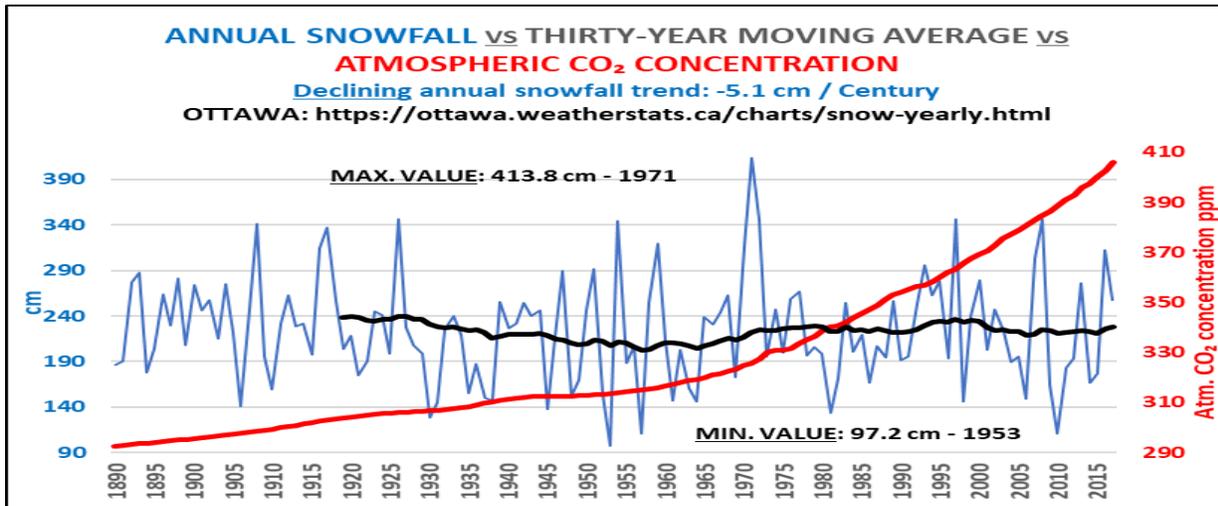
Ottawa is used as an example because **Environment and Climate Change Canada (ECCC)** provides detailed continuous data dating back to 1890. Other Ontario locations with a shorter record show similar trends. What does this chart tell us?

Between 1890 and 2017 atmospheric CO<sub>2</sub> concentration rose from 292 to 406 parts per million (ppm), an **increase** of 39%. In the same period the 30-year average annual maximum Ottawa temperature (black line) **declined**. A 30-year average is generally thought of as indicating 'climate' rather than 'weather' shown by the more erratic swings during shorter periods. One can readily see that Ottawa experienced more extreme maximum temperatures in the early part of the last century than recently.

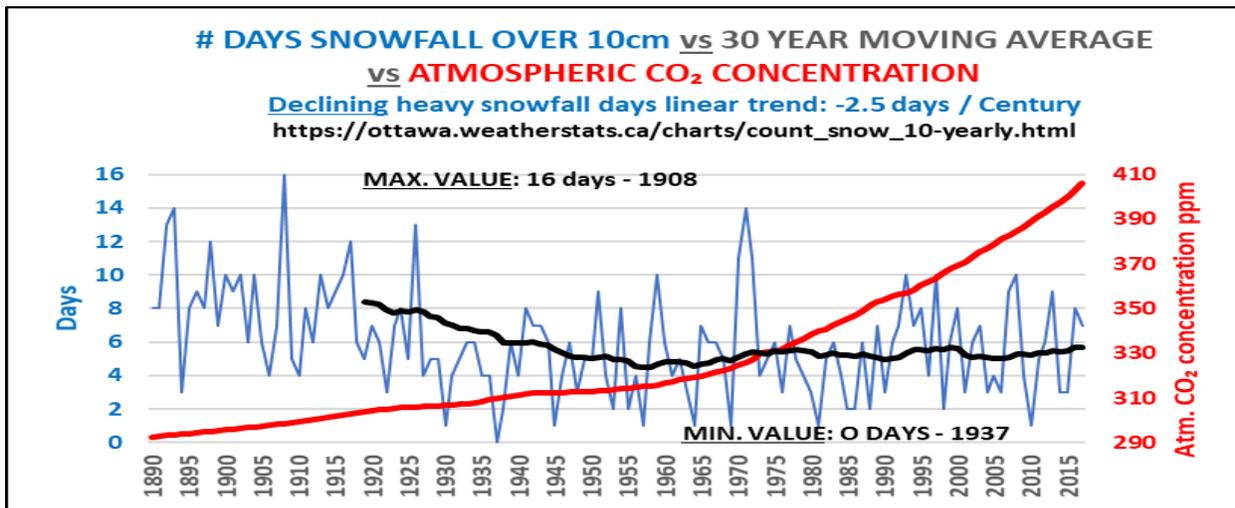
Not only do we have more moderate highs today, we also have **fewer hot days over 30°C**:



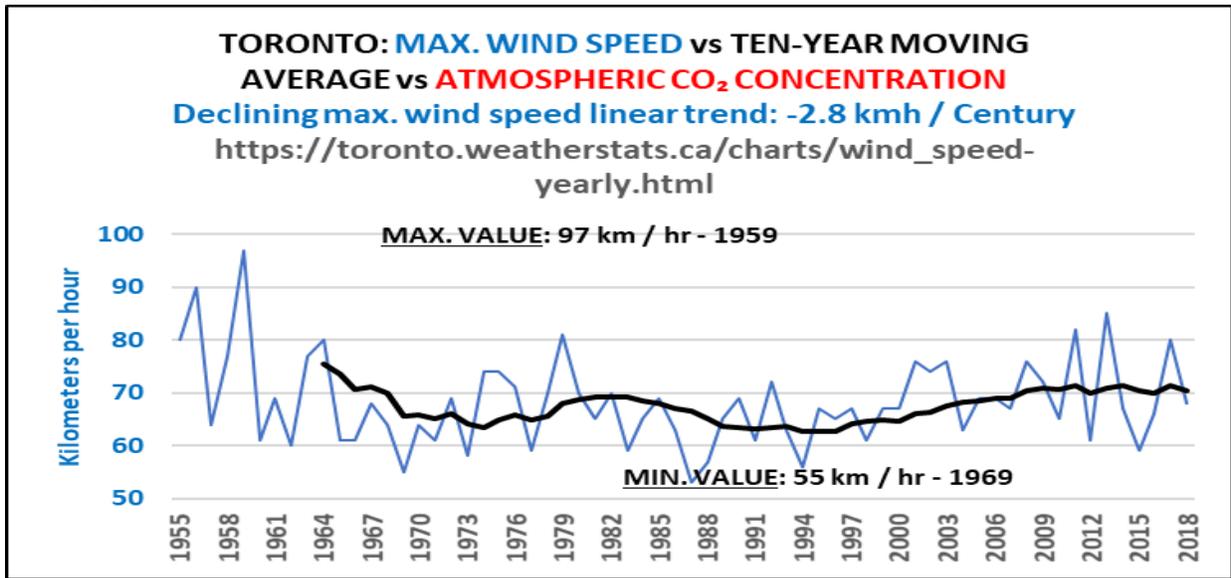
Annual snowfall has declined:



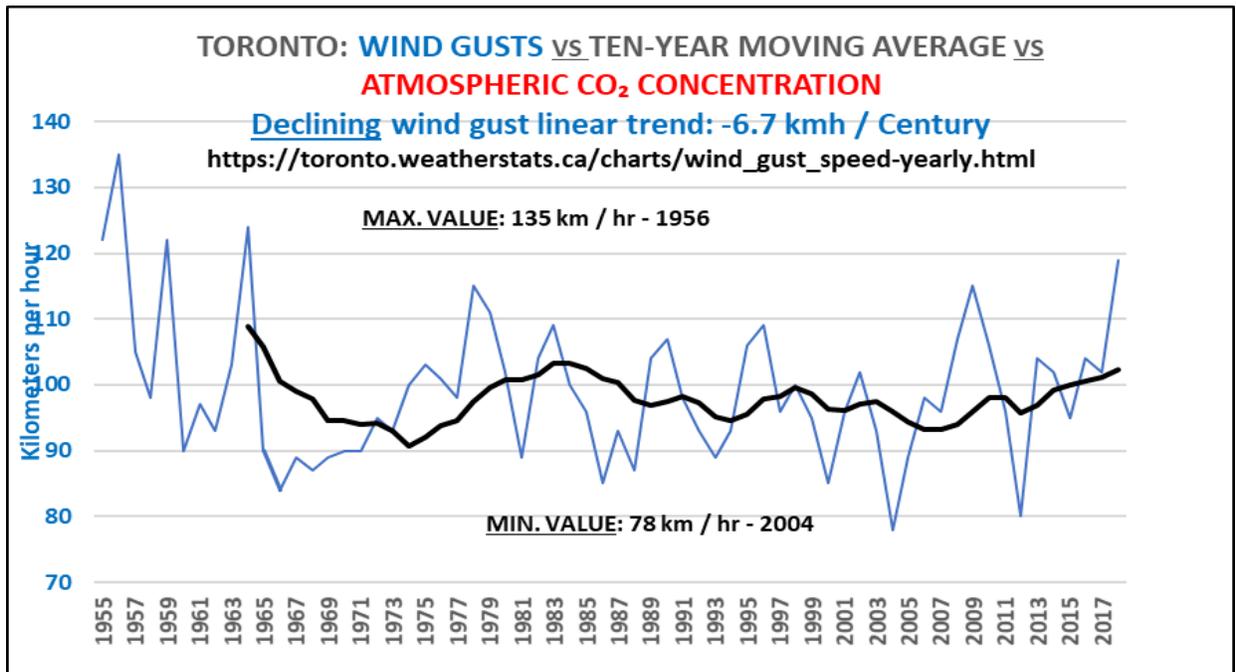
There are fewer heavy daily snowfalls over 10 centimeters.



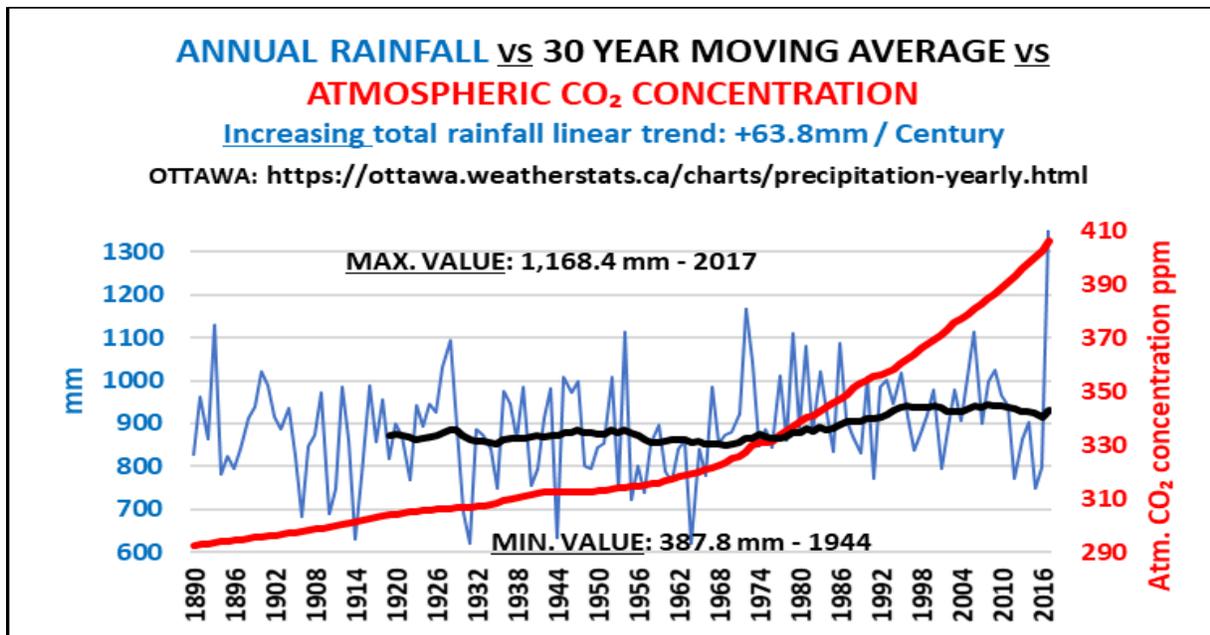
Wind speeds are down:



Wind gusts are also less severe:



**Precipitation** is a more complex topic – heavy rain and snow events are frequently highly localized and often unmeasured unless they take place over a weather station. Ottawa shows an **increasing annual rainfall trend** and set an all-time recorded high last year whereas Toronto had a fairly average 2017 for total annual rainfall.



**Short-term heavy rain events** causing costly urban flooding are frequently cited as ‘proof’ of ‘climate change.’ Often the root cause of flooding is increased building density and paving for roads and driveways.

**Robert J. Muir, M.A.Sc., P.Eng.** has done extensive work recently in reviewing latest research on the topic. His conclusion based on peer-reviewed science and opinions ECCC and other relevant authorities: In recent decades there has been no statistically significant change in extreme rainfall events in Ontario. Here are a few of his sources:

**Trends in Canadian Short-Duration Extreme Rainfall:** Including an Intensity–Duration–Frequency Perspective, Environment Canada, Atmosphere Ocean 2014: indicates “no detectable trend signal” across Canada and no regional increases in Ontario.

<https://drive.google.com/open?id=0B9bXiDM6h5ViVks2eEQ0WF9tSkU>

**Precipitation Intensities for Design of Buried Municipal Infrastructure,** Yi Wang, University of Guelph, Ph.D Thesis 2014: identifies 24 significant increases and 41 significant decreases.

<http://www.cityfloodmap.com/2017/09/less-extreme-ontario-rainfall.html>

Short duration frequent rainfall shows no change in Southern Ontario IDF Design Intensities - No change in averages suggests no change in extremes, Muir, 2018. This analysis of

Environment and Climate Change Canada's IDF statistics from 1990 to the current Version 2.3 Engineering Climate Datasets shows no change in 2-year to 10 year 5-minute to 2-hour rainfall.

<http://www.cityfloodmap.com/2018/01/short-duration-frequent-rainfall-show.html>

**Long-term precipitation trends** would likely be reflected in [Great Lakes water levels](#). There is **no** correlation with 'climate change' in this comprehensive hundred-year lake level history.

### **CONCLUSIONS:**

In spite of steadily increasing CO<sub>2</sub> levels there is no evidence of recent adverse trend changes in the majority of 'extreme' weather characteristics monitored by *Environment and Climate Change Canada*. Contrary to frequent media reports **most impactful extreme weather events in Ontario have become more benign**. A few other events show no significant trends.

Almost all of the data displayed above may be found on this informative government [website](#). The information is comprehensive, uncontested and easily understood. Why does the press routinely ignore this readily accessible evidence? Is this proof of extreme incompetence or a deliberate effort to mislead the public? Take your pick - my money is on the latter!

Pav Penna

Georgetown,

March, 2018