Regional Heat Trends

North America

Global Heat Health Forum – Hong Kong

December 17, 2018

Melissa MacDonald – ECCC

Greg Gust – NWS

Michelle Hawkins – NOAA

Hunter Jones – NOAA

Paul Iniguez – NWS

Bill Merryfield – ECCC

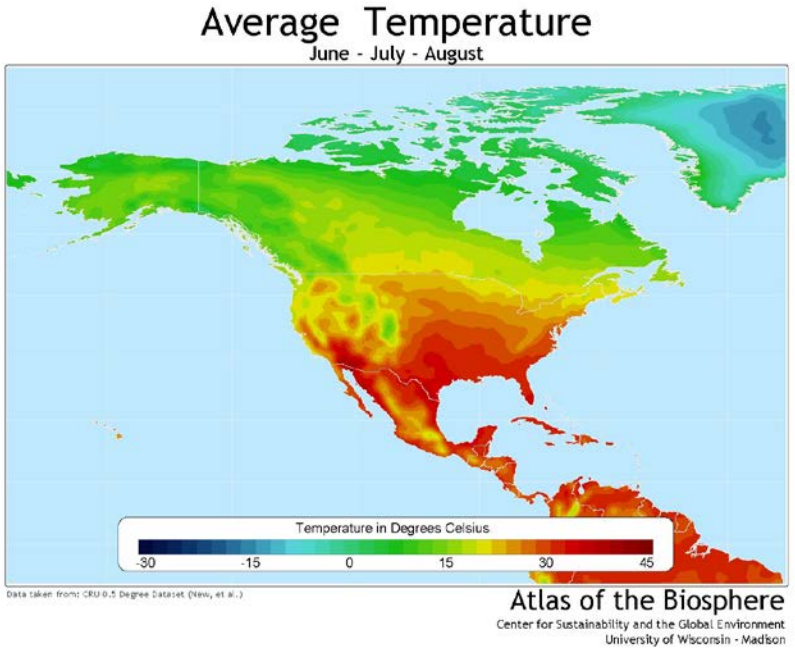
Claude Masse – ECCC

Glenda Saulnier – ECCC

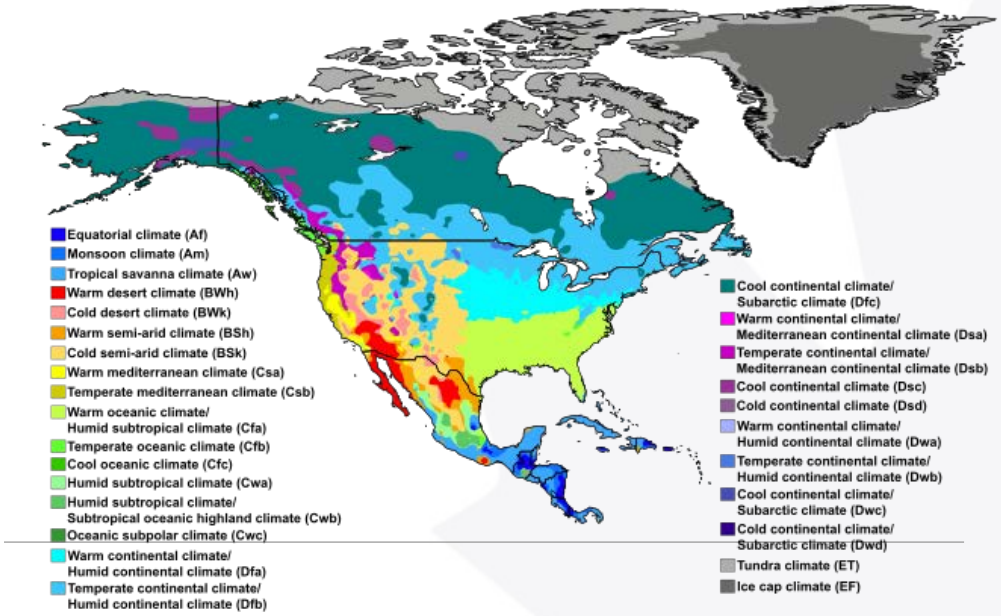
Xuebin Zhang – ECCC

North America's Climate

- NA includes every climate zone!
  - North – subarctic and tundra
  - Leeward Mountain side – Semiarid/Desert
  - Mountains - Highlands
  - Continent – Temperate
  - Prairies/Grassland
  - Warmer the farther south you go
  - Drier the farther west you go
  - Mediterranean West Coast
  - Humid to Temperate Continental East
  - Tropical South East



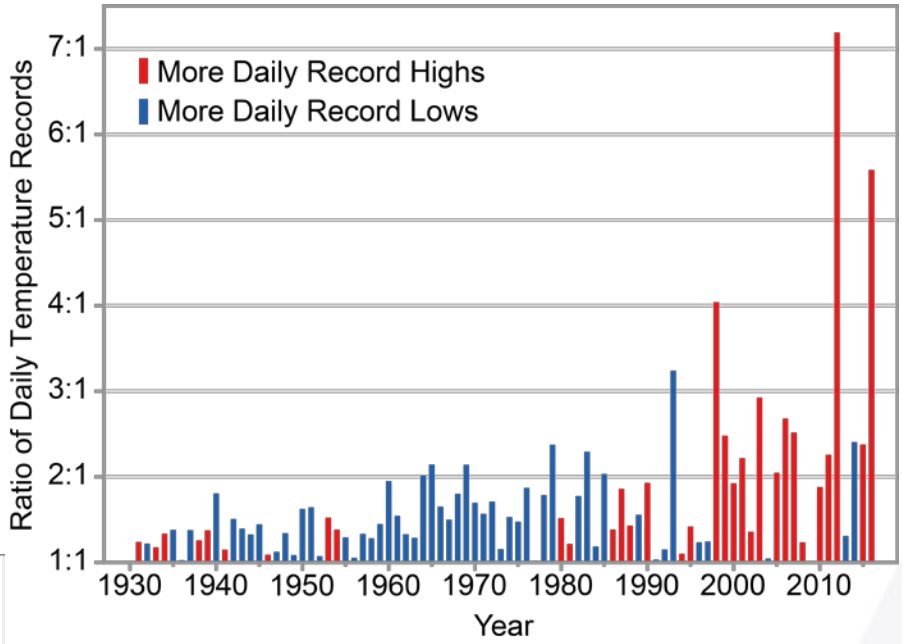
North America map of Köppen climate classification

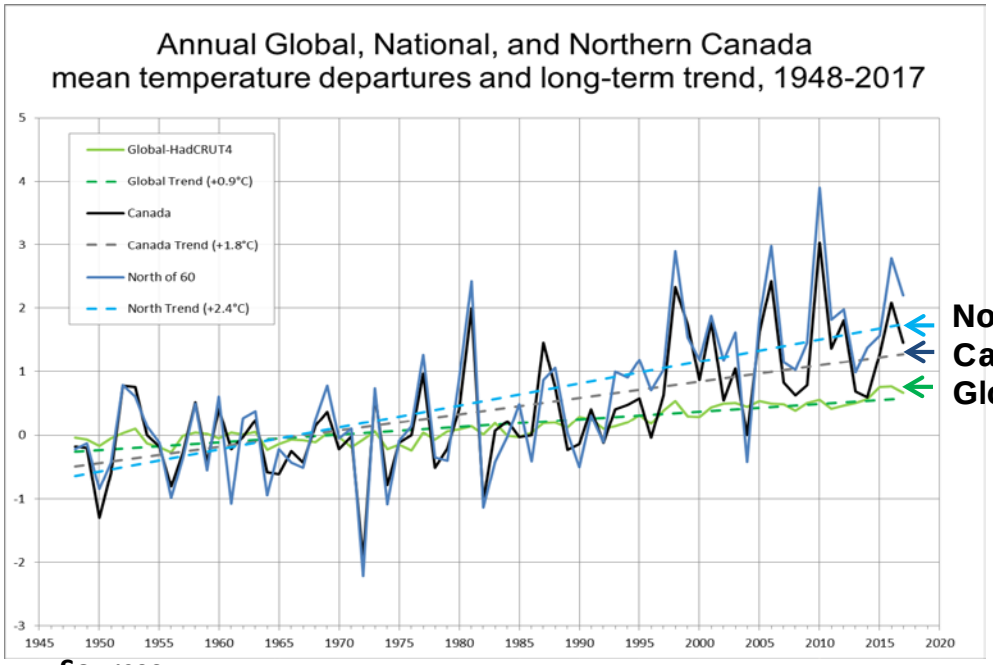


Warming Trends

The continental United States has warmed by 0.7C from 1986-2016 and by 1C since 1895, increases largest in Alaska and smallest in coastal SE (U.S. Global Change 2017).

Source: NOAA/NCEI





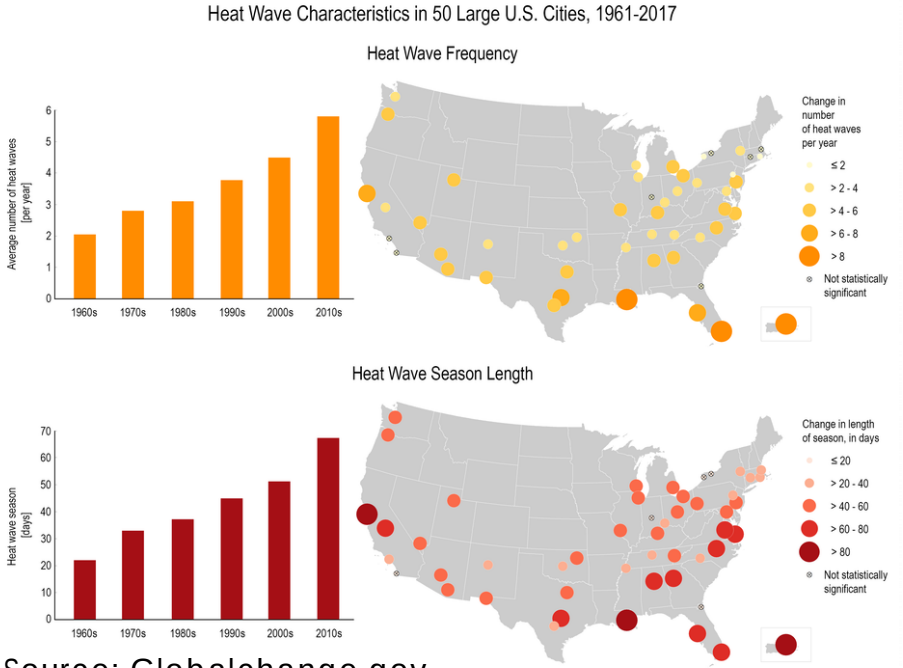
Canada warmed 1.7C from 1950 to 2016, twice the global average with northern Canada warming more quickly than the south (ECCC 2018).

Sources:

Environment and Climate Change Canada (ECCC). 2018. *Changes in temperature*. https://www.canada.ca/en/environment-climate-change/services/climate-change/canadian-centre-climate-services/basics/trends-projections/changes-temperature.html

U.S. Global Change Research Program. 2017. Temperature Changes in the United States - Climate Science Special Report https://science2017.globalchange.gov/chapter/6/

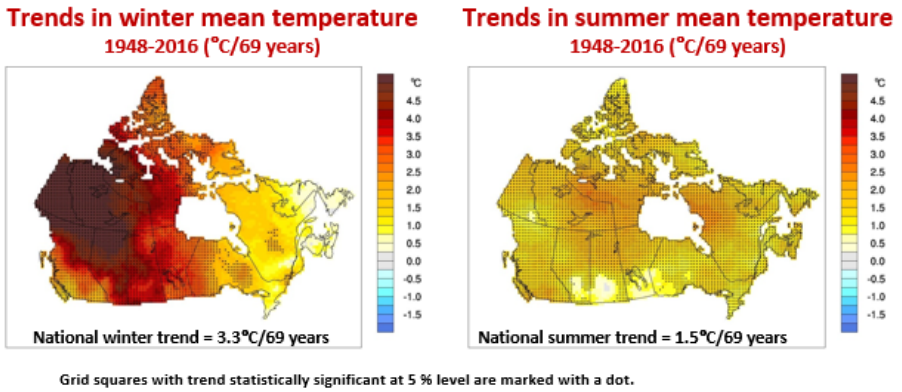
Increased Heat Waves and Heat Events



Source: Globalchange.gov

- Canada's modernized Heat Warning project pulled by need of better alerting capabilities due to increased events.
- 3 significant Canadian events that had heat-related mortality in the past 10 years.
- Winter warming most significant in Canada, extreme cold events still evident.

- Increased Heat Wave frequency
- Longer duration heat events
- Increased early season events
- Larger temperature variations
- Missing Seasons (Spring/Fall)



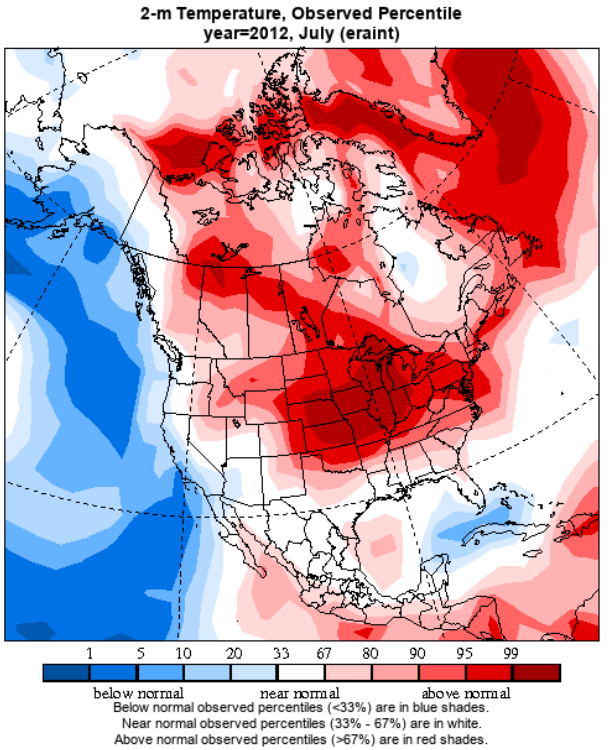
Grid squares with trend statistically significant at 5 % level are marked with a dot.

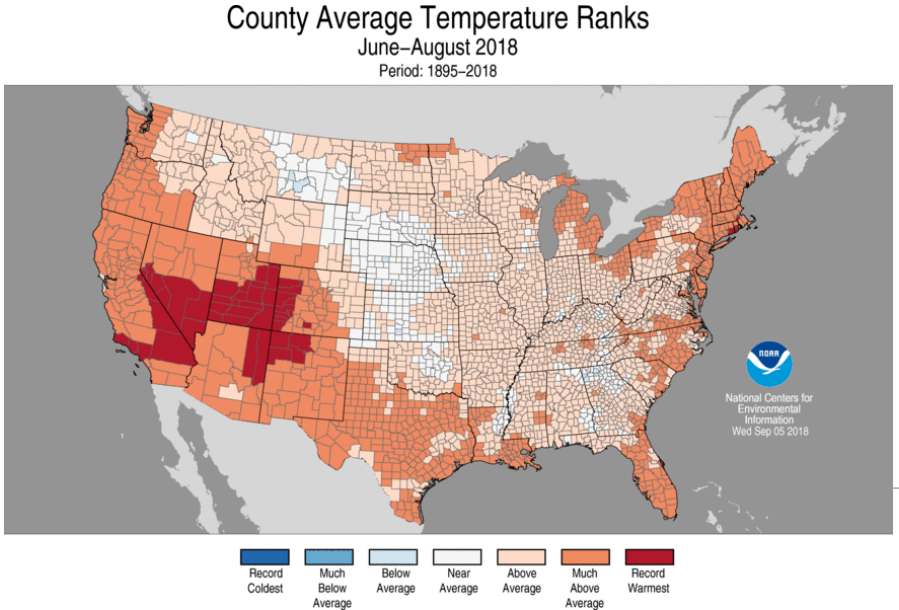
Sources:

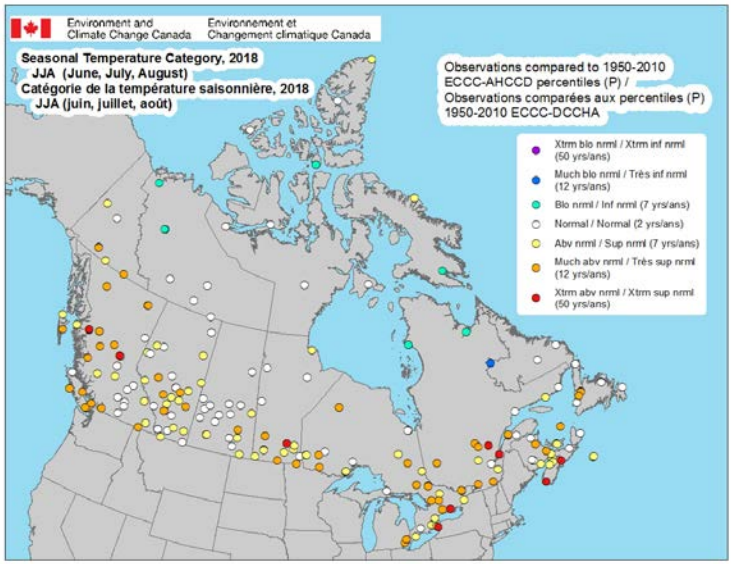
Heat Waves, U.S. Global Change Research Program. 2017. https://www.globalchange.gov/browse/indicators/us-heat-waves.

Recent Heat Events

- 2010 – Northern Hemisphere
- 2011 – US Midwest
- 2012 – Much of North America
- 2015 – Northwest US, BC (duration not intensity causing an issue)
- June 2017 – Southwest US, worst in decades
- 2018 - North America
  - Montreal and area mortality of 70+
  - Ranks within top 5-10 warmest summers (Canada)

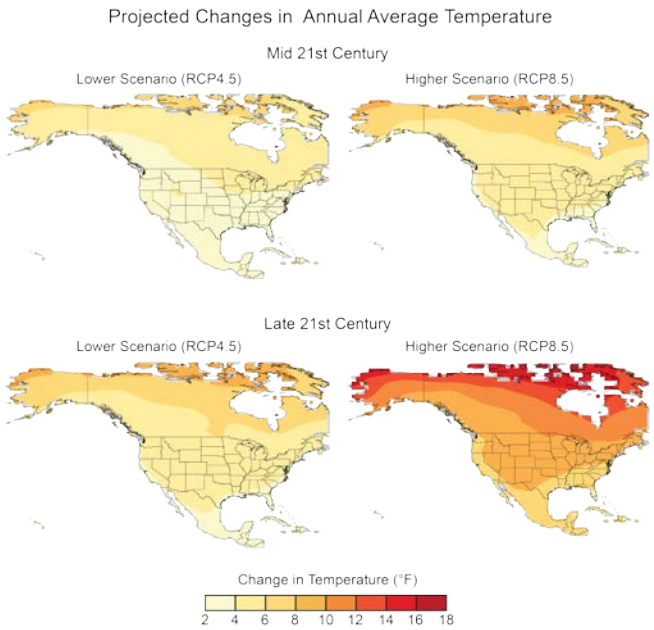






Diagnosing the Issue

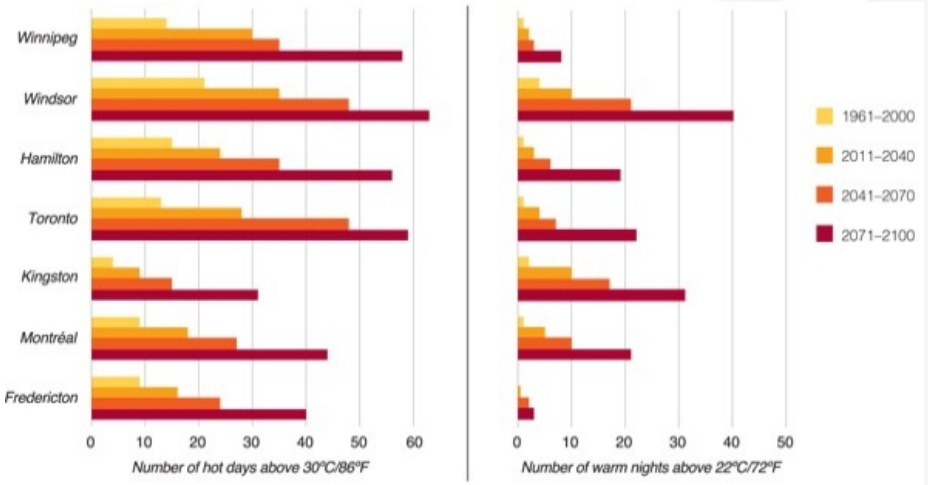
- The IPCC's AR5 concluded it is very likely that human influence contributed to change in frequency and intensity of temp extremes Globally.



- Seasonal forecasting advance ongoing
- Normals comparison more difficult in Climate Change

Other Implications:

- Northern ice melting
- Vector-born diseases
- Drought – Inc/Dec Humidity
- Wildfire and AQ
- Severe Weather
- Infrastructure



Source:

Casati, B., Yagouti, A., & Chaumont, D. (2013). Regional climate projections of extreme heat events in nine pilot canadian communities for public health planning. *Journal of Applied Meteorology and Climatology, 52*(12), 2669-2698. doi:10.1175/JAMC-D-12-0341.1