



Environment
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Heat Alert and Response Systems in Canada

Development of Climate
Information Systems for Heat
Health Early Warning Workshop
Chicago, Illinois
July 28-30
Sharon Jeffers – Meteorological
Service of Canada

Status

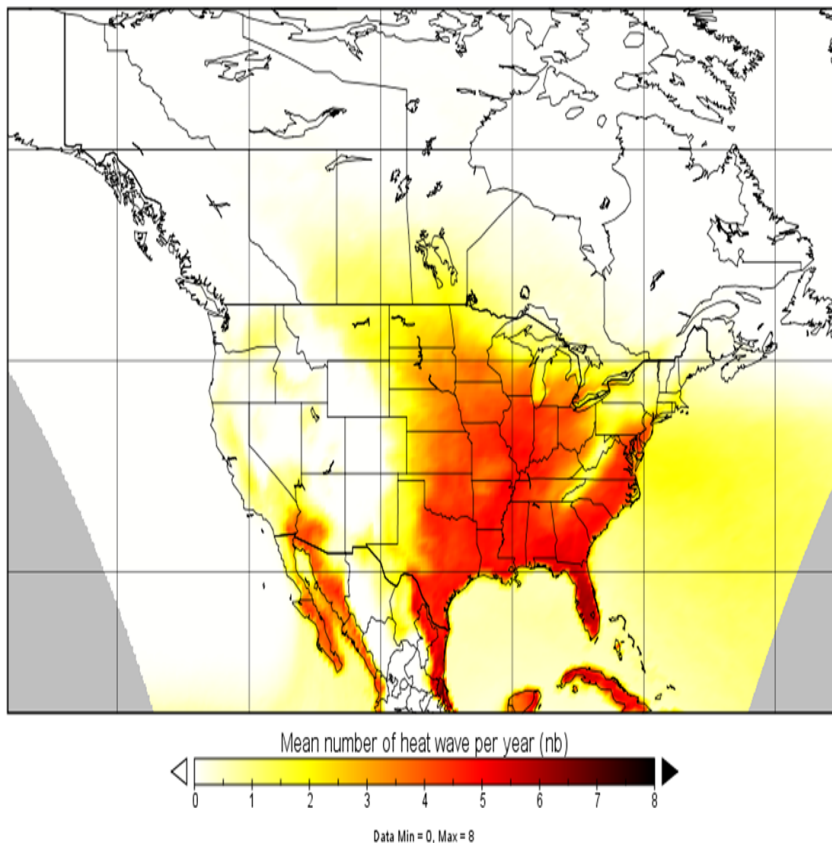
- Heat Alert and Response Systems are either being piloted or are in place in:
 - British Columbia (Lower Fraser Basin)
 - Alberta
 - Manitoba
 - Ontario
 - Quebec
 - New Brunswick (Fredericton)

Status

- The various heat warning systems across the country are based on health partner requirements, epidemiology and climate.
- The land mass of Canada is the second largest in the world. We face the challenge of dealing with urban heat islands in the large population centres in the south, to small widely scattered, but highly vulnerable populations in the North.
- Environment Canada and Health Canada are involved at a Federal level to bring cohesion to heat alerting in Canada while insuring regional differences and needs are respected.

Number of heat waves (2071-2100, i.e. 2080s)

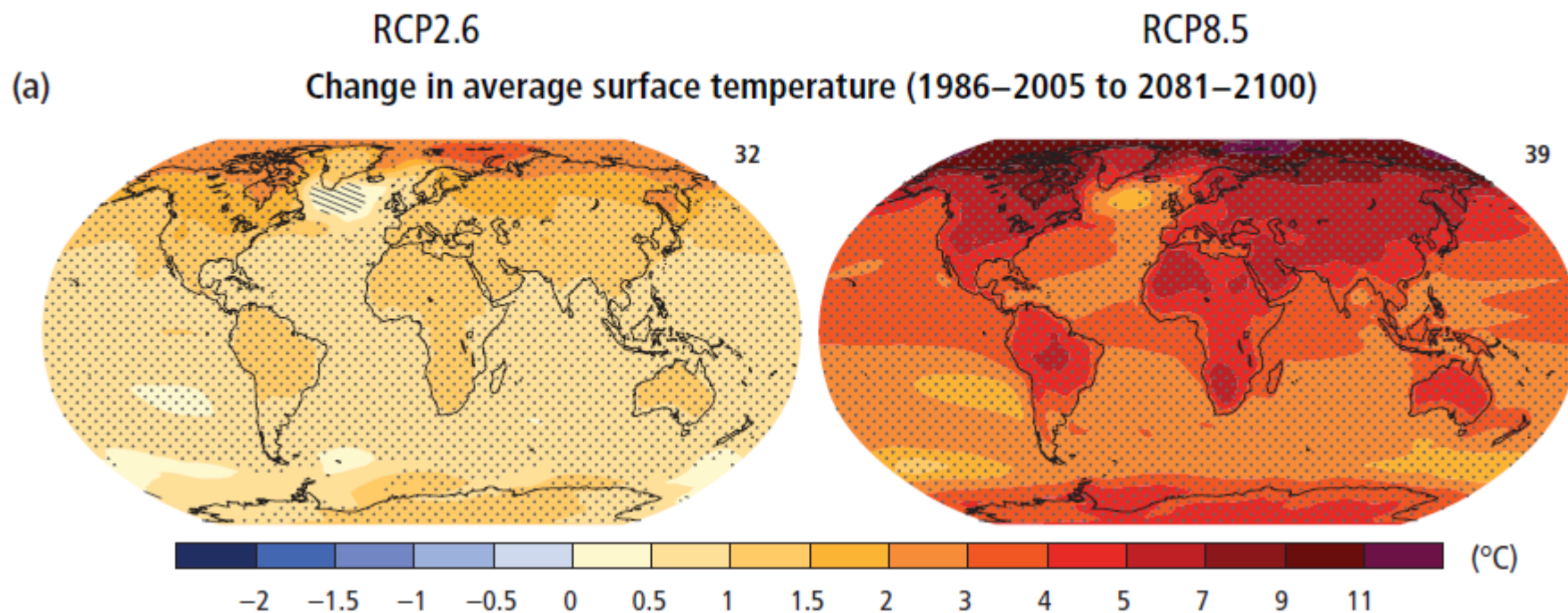
Mean number of heat waves per year - Average values from 2071-2100



- Ensemble mean values from 6 different Regional Climate Models (0.44°) from Canada, USA and Europe participating to the CORDEX project (<http://www.cordex.org/>)
- Heat wave definition using joint occurrence of daily:
 $T_{\min} \geq 20^\circ\text{C}$
 $T_{\max} \geq 33^\circ\text{C}$
and Humidex ≥ 40
(all) over at least 3 days from May to September

IPCC, 2014: Climate Change 2014: Synthesis Report

Change in average surface temperature based on multi-model mean projections for 2081–2100 relative to 1986–2005 under the RCP2.6 (left) and RCP8.5 (right) scenarios.



HARS Commonalities

- In Alberta, Manitoba, Ontario and Quebec, there are different criteria for different regions of the provinces that have been determined using epidemiological and climate analyses
- Levels of Severity (Alberta, Ontario)
 - There is a necessity to escalate communications as the heat event continues
 - There are lower thresholds set, which allow agencies to intervene with at risk populations sooner

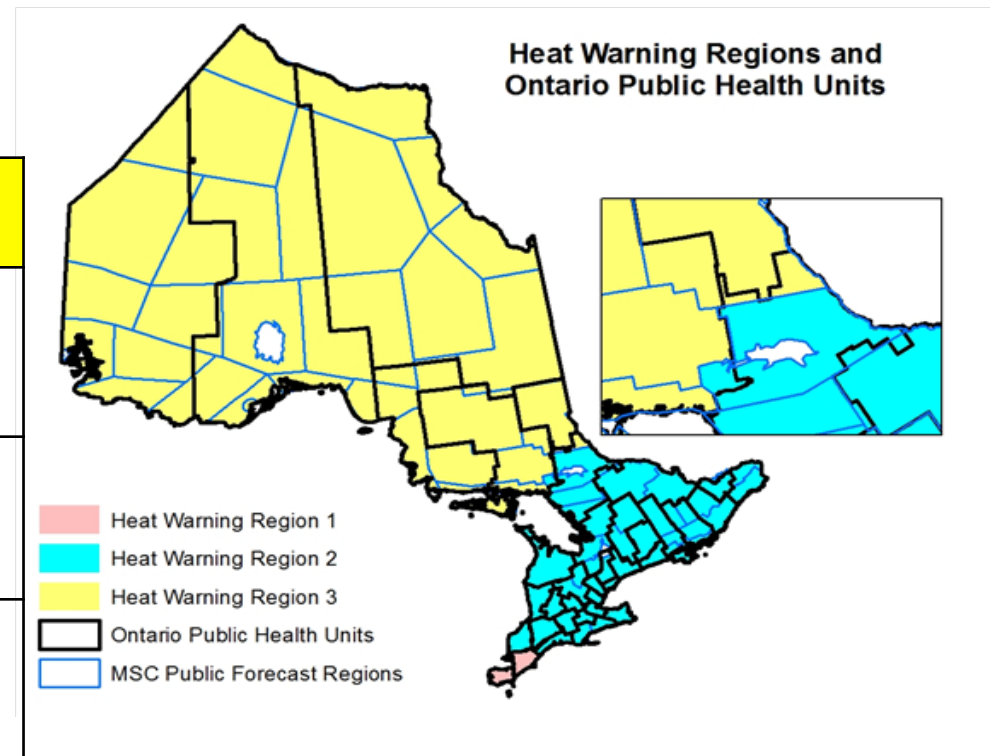
HARS Commonalities

- Prediction-driven (all 6 provinces)
 - No longer have to wait for the event to start, can be forecast based (although this was a hard sell with our public health partners)
 - Based on Timely Notification of the heat event, we can now have early mobilization by agencies to reduce heat health risks
- Health Evidence Basis for Severity Levels (all 6 provinces)
 - Persistence of heat events dictates level of severity (Alberta and Ontario)
 - Largely max temperature-based (humidex or overnight lows)
- Multi-stakeholder

Ontario HARS Warnings and Support

- Three climatic regions with different criteria, with one seamless risk communication

Heat Warning Region	Condition	Duration
Region 1	*Tmax ≥ 31°C and Tmin ≥ 21°C <u>OR</u> Humidex ≥ 42	2+ days
Region 2	Tmax ≥ 31°C and Tmin ≥ 20°C <u>OR</u> Humidex ≥ 40	2+ days
Region 3	Tmax ≥ 29°C and Tmin ≥ 16°C <u>OR</u> Humidex ≥ 36	2+ days



Some details for Ontario

- Issue a Special Weather Statement for the first one day event of the season (discretion to issue for out of season events as well)
- Issue a heat warning if two consecutive days of meeting the warning criteria are met
- If the event is forecast to last three days, PHUs can issue an Extreme Heat Alert
- Our Warning Preparedness Meteorologists issue Early Notification to the PHUs in the different zones up to the time the warning is issued (3-4 days)
- For the current event in the Golden Horseshoe, they also issued an additional notice about the length of the event as it will be at least three days long



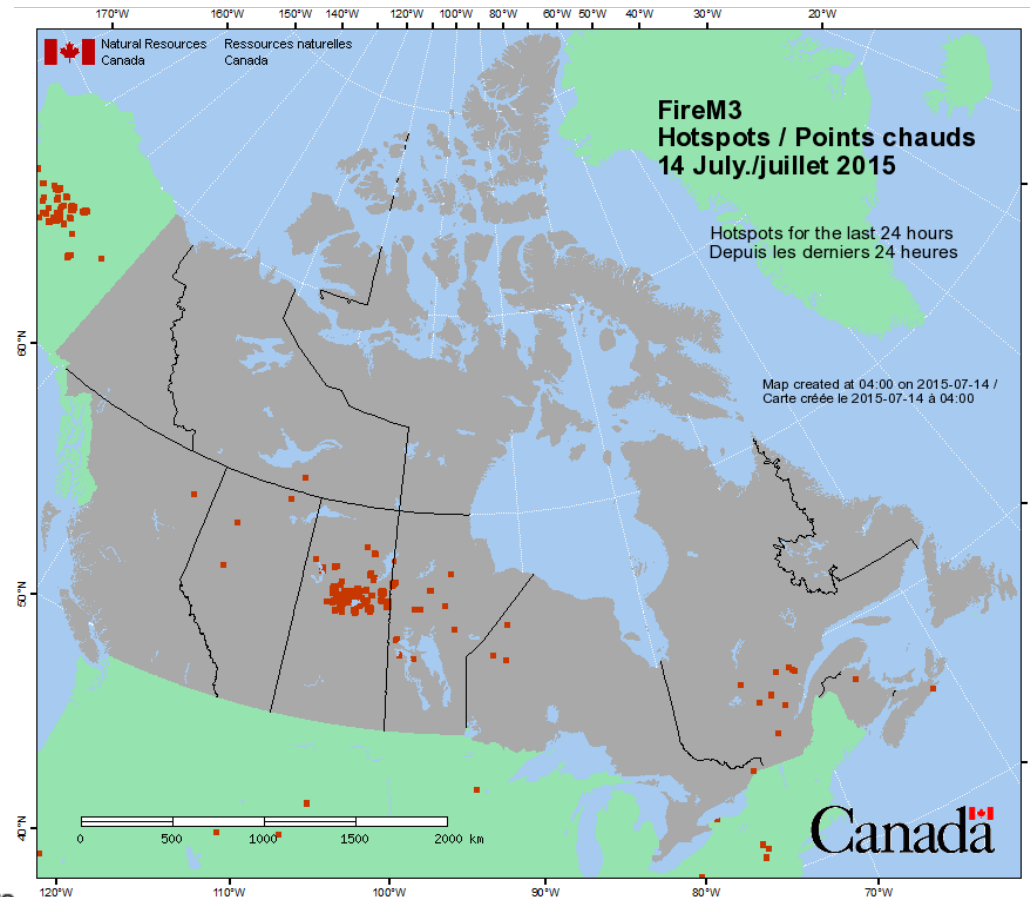
The Role of GIS – WISDOM and SUPRÊME

- Geographical Information Systems (GIS) developed in Québec and Ontario with multiple information layers including:
 - Health situational awareness data
 - Weather situational awareness data
 - Dynamic Heat island models (using temperature sensors located in representative neighborhoods), that show how the heat islands evolve with time.
 - Deprivation indices
 - Neighborhoods with higher percentages of the vulnerable population, etc



What about now?

- This summer has been particularly difficult for Western Canadians, not just because of persistent high temperatures.

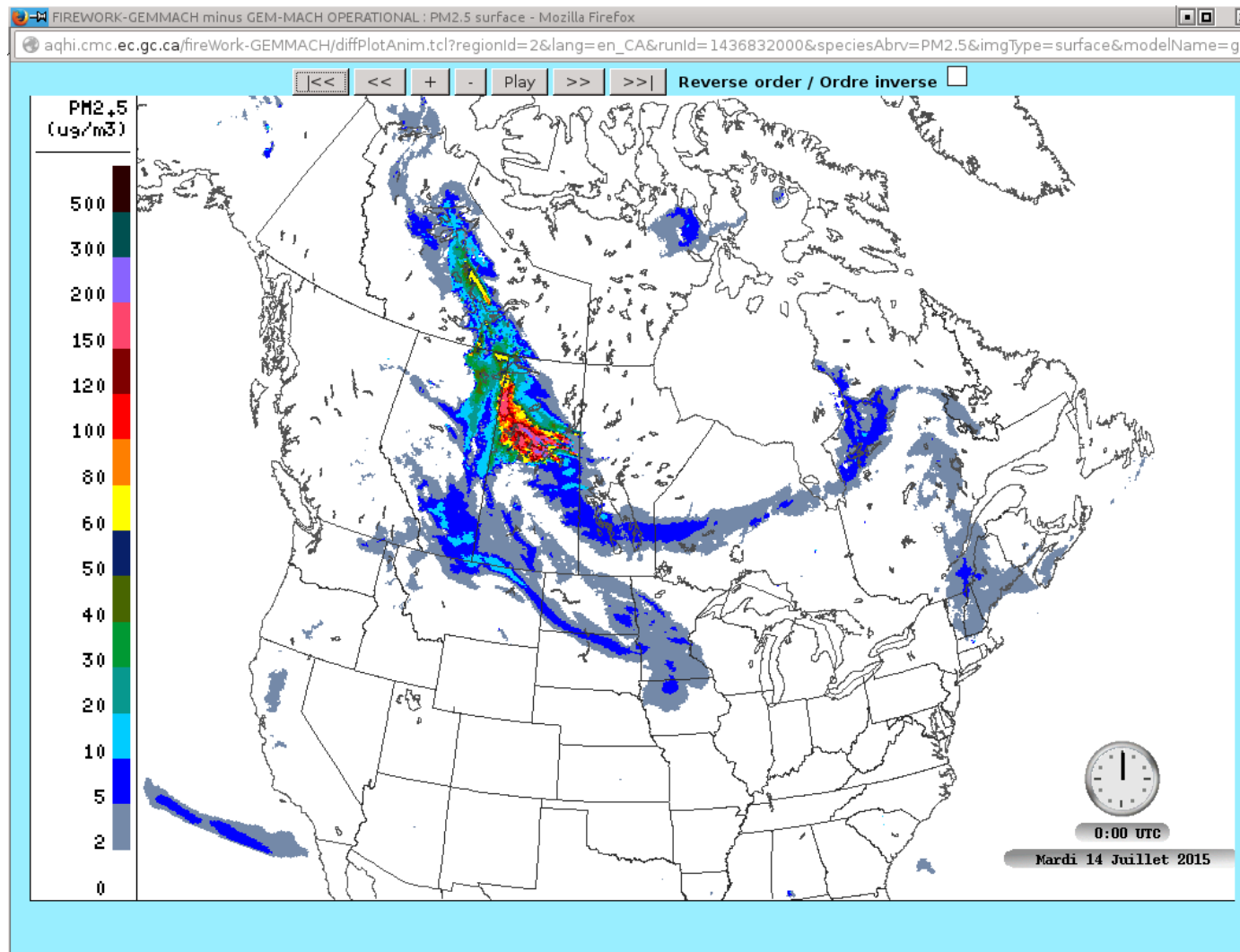


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Forest Fires, heat, drought, community evacuations



Multi Hazard Alerting and Climate Forecasts

- We currently have air quality issues (forest fires), heat issues, and community evacuations in Western Canada
- All of the above are public health issues, and are occurring at the same time
- Our climate models have been predicting a hot dry summer in western Canada since this winter
- We have reasonable confidence in this scenario because of the link between the climate predictions and El Nino
- What could we have done differently in 2015, if we had used the existing climate models as a planning tool?



PAN AM and Para Pan AM games

- WISDOM GIS provided to all Pan AM PHUs
- Meso scale monitoring network in place, which is giving us neighborhood scale weather variables,
- 50 additional automated land mesonet stations along with Black Globe temperature sensors, UV monitors and ultra fine particulate matter road side sensors.
- Mens Bronze medal soccer match – several people (spectators) treated for heat stroke (anecdotal) – Airport Tmax – 29.4C humidex 35
- On-site monitor – Tmax 31.9C, Black globe temperature was 39.4, WBGT 25.4, Humidex of 37



Additional Requirements

Need:

- multi-hazard alerting
- monitoring representative of where people live
- coherent risk communications from all government departments, one voice with one message
- New evidence based triggers accounting for multiple health endpoints and areas which are relatively unpopulated
- Don't forget Cold Health Effects .. Greater mortality risk in Canada
- Evaluation
 - Real-time with syndromic surveillance and post season

Most importantly, we need a multi-disciplinary approach to build a common understanding of the problem and how to address it.

Dave Henderson - EC

Louise Bussièrès – EC

Phillipe Gachon – Université du Québec à
Montréal (UQAM)

Thank you
Merci beaucoup

