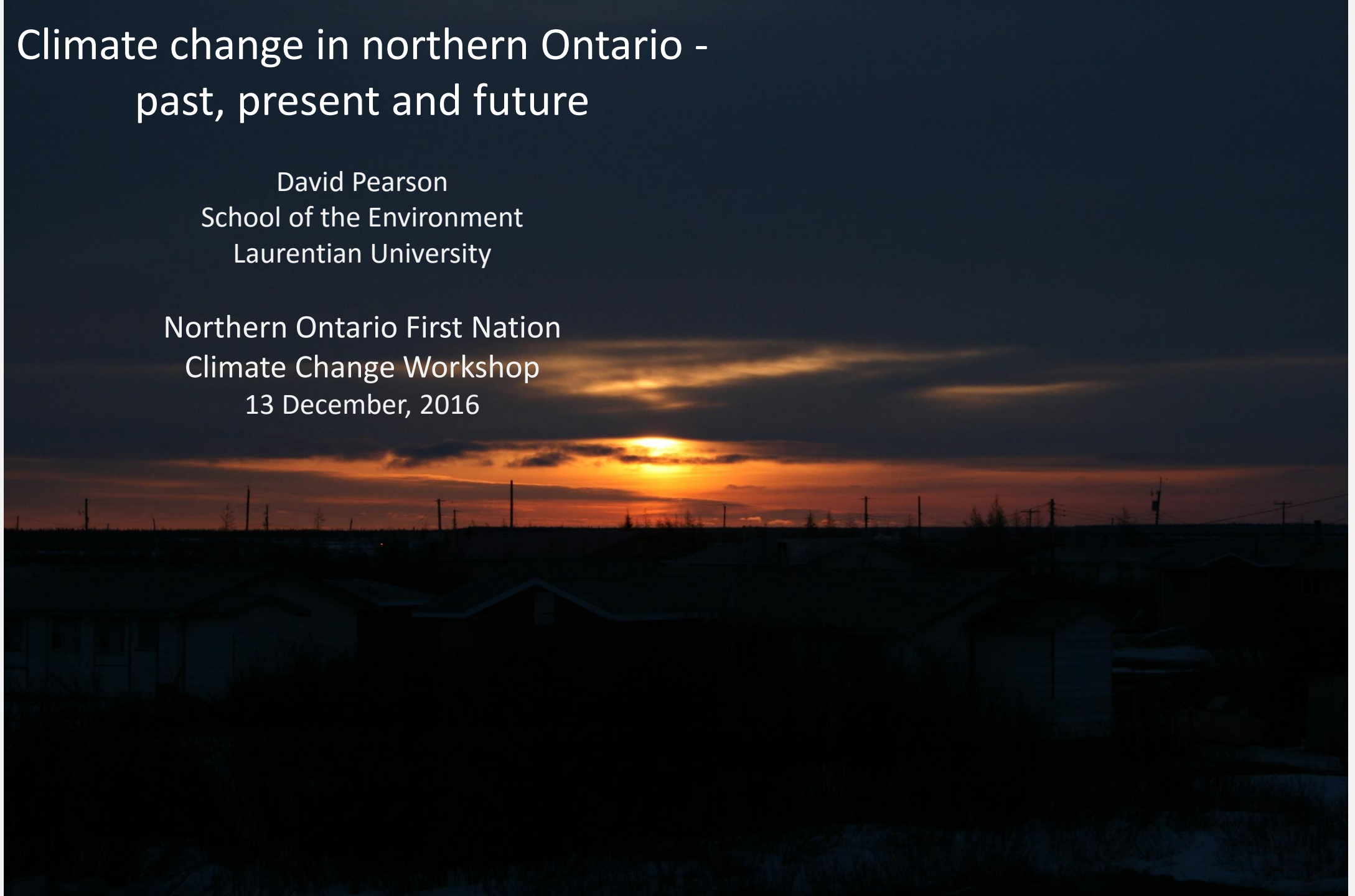
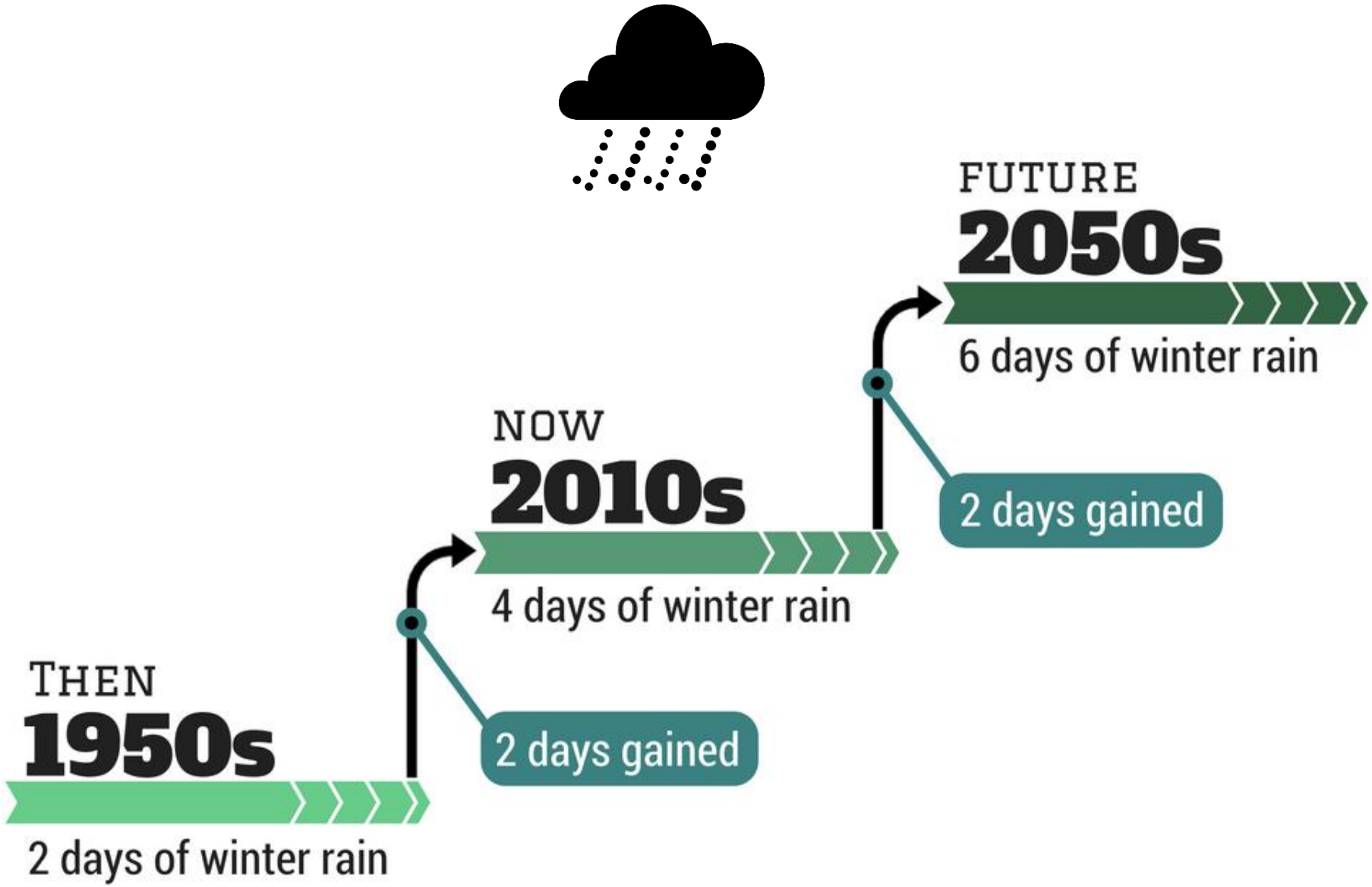
Climate change in northern Ontario - past, present and future

David Pearson
School of the Environment
Laurentian University

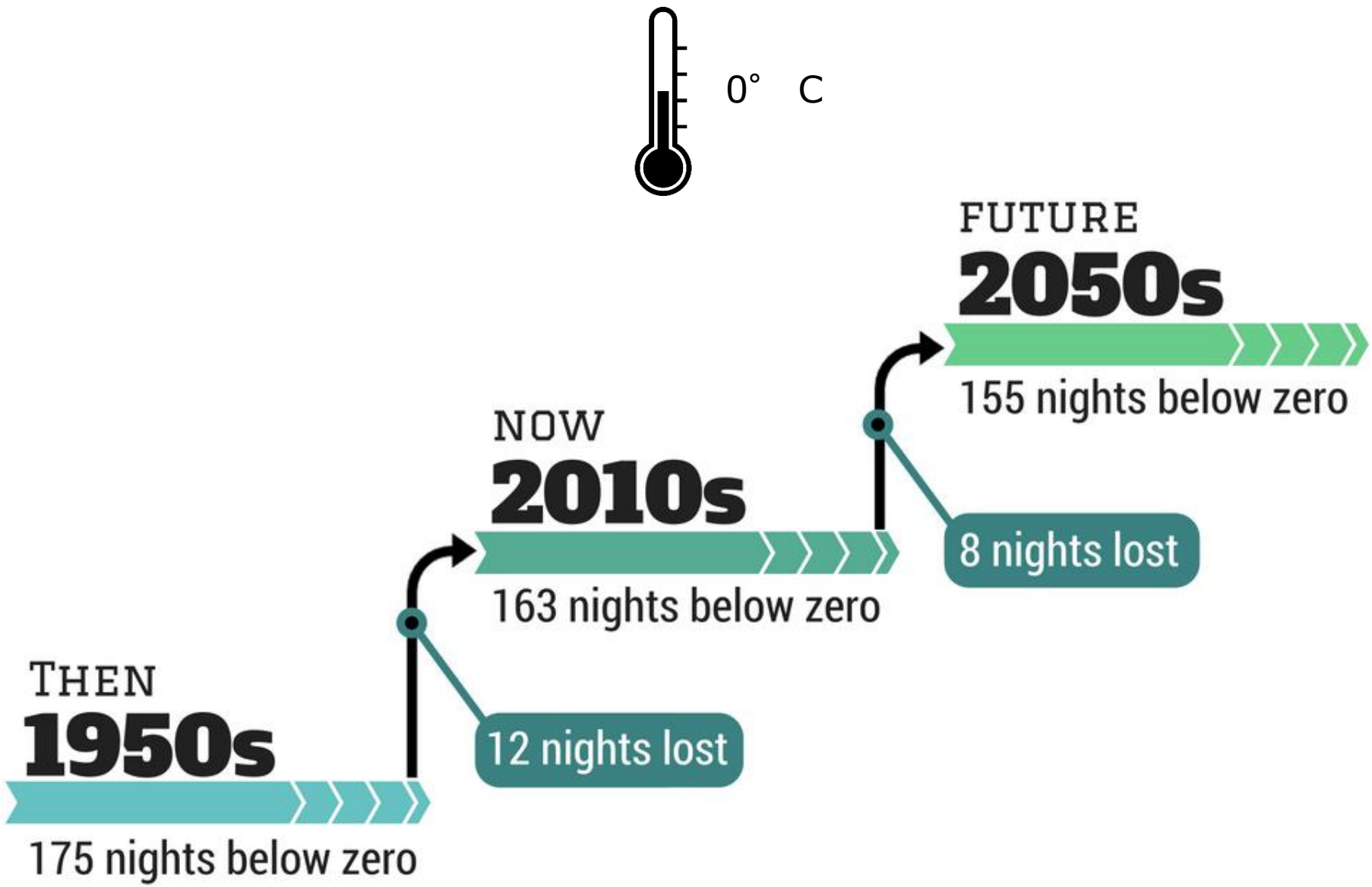
Northern Ontario First Nation
Climate Change Workshop
13 December, 2016



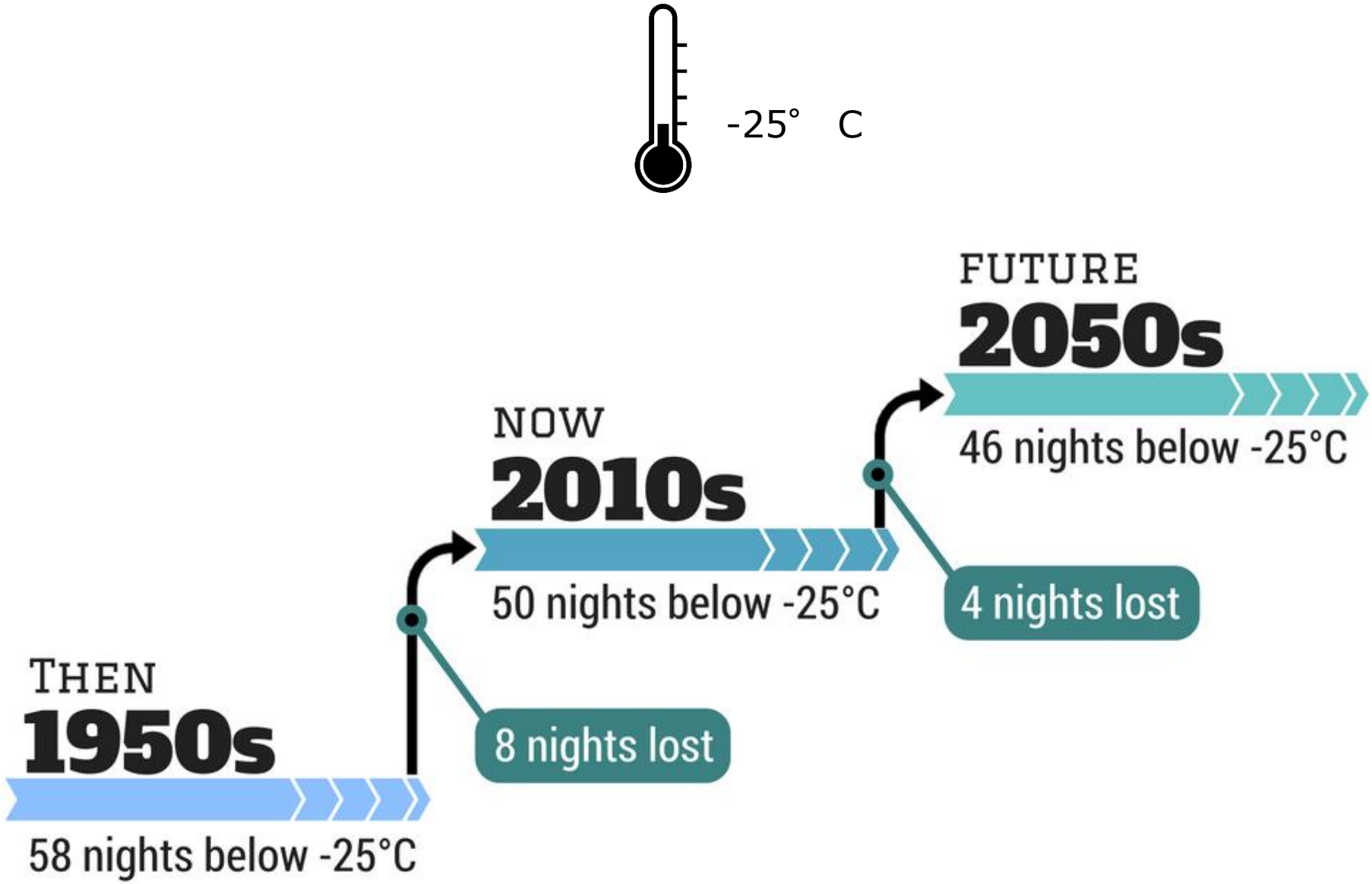
A Lifetime of Wetter Winter Days



A Lifetime of Fewer Cold Nights

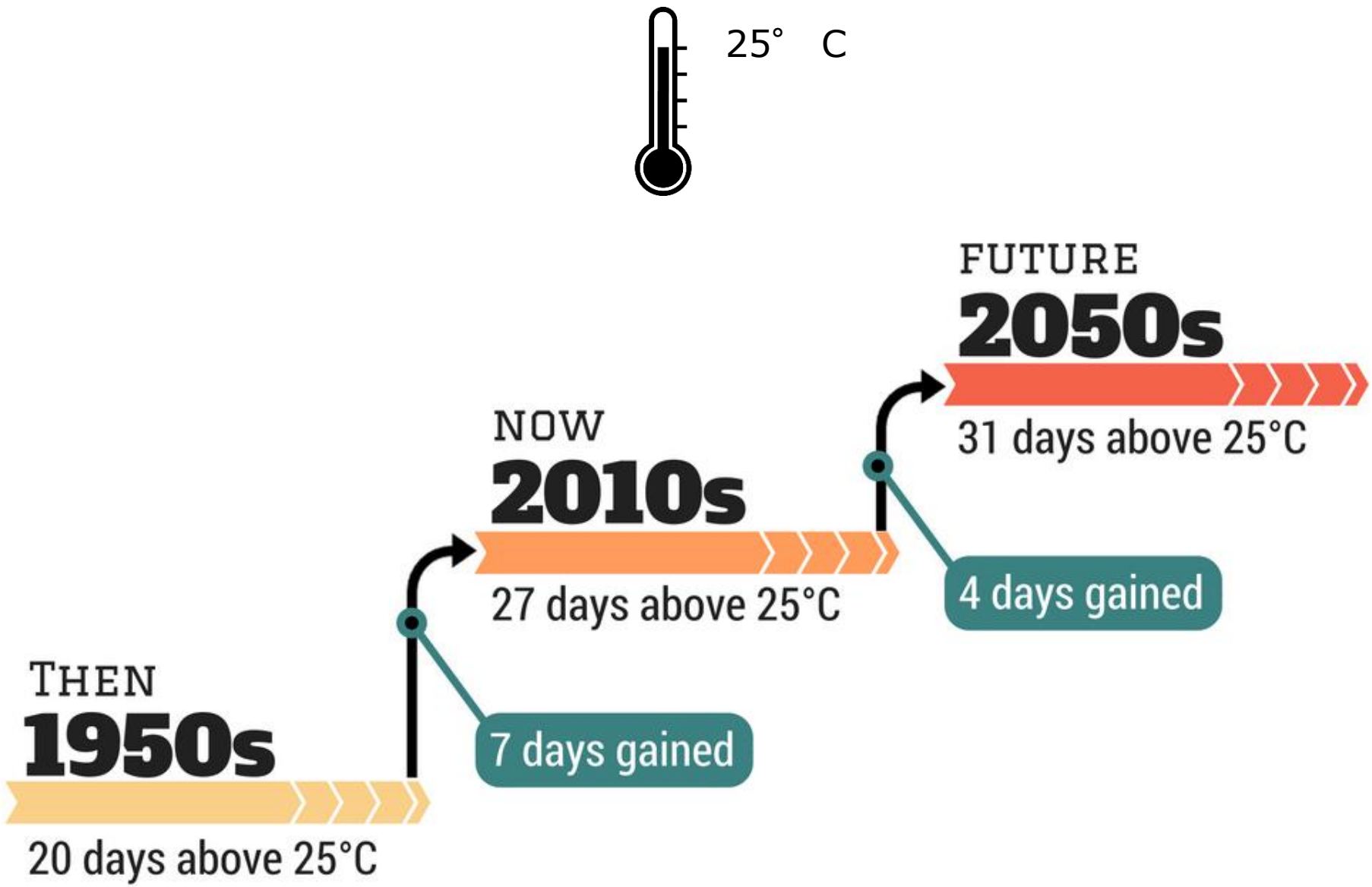


A Lifetime of Fewer Very Cold Nights



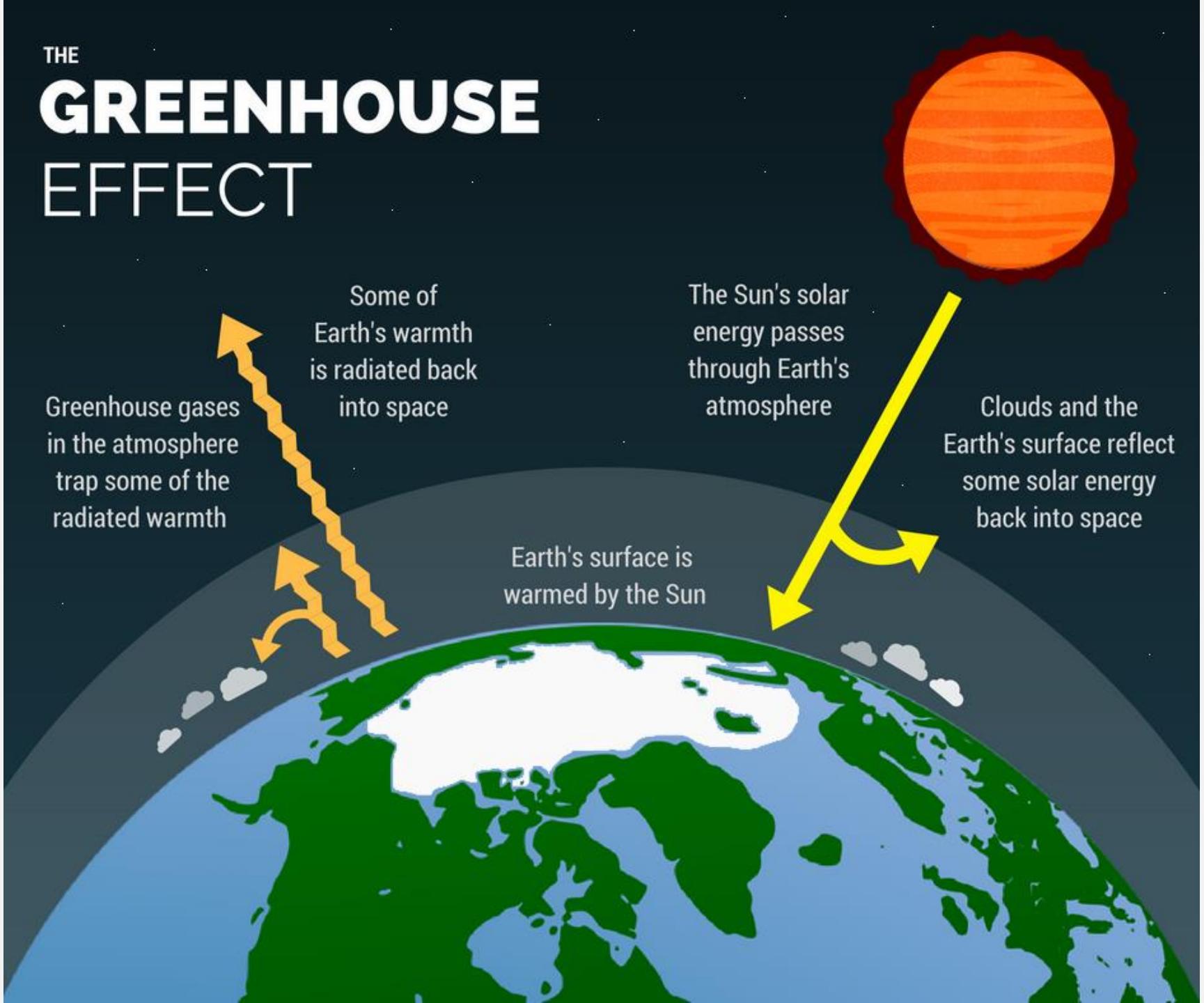

Eabametoong, 10 December, 2009
Xavier Sagutch, Eabametoong FN

A Lifetime of Warmer Summer Days

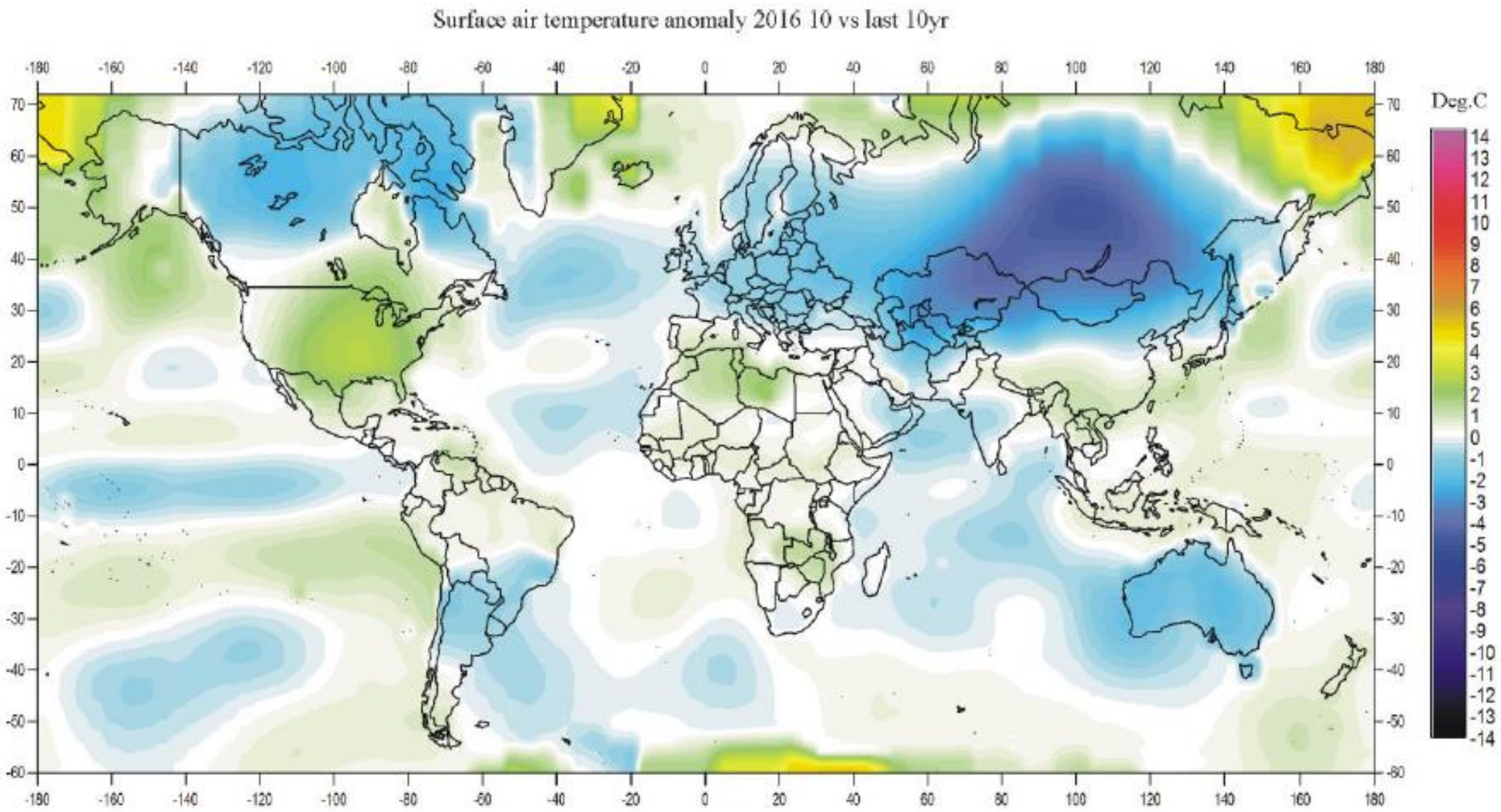


Dense smoke from the Pioneer Road fire east of Fort Hope June 9, 2006. http://www.eabametoong.firstnation.ca/index.php?q=gallery&g2_itemId=7514

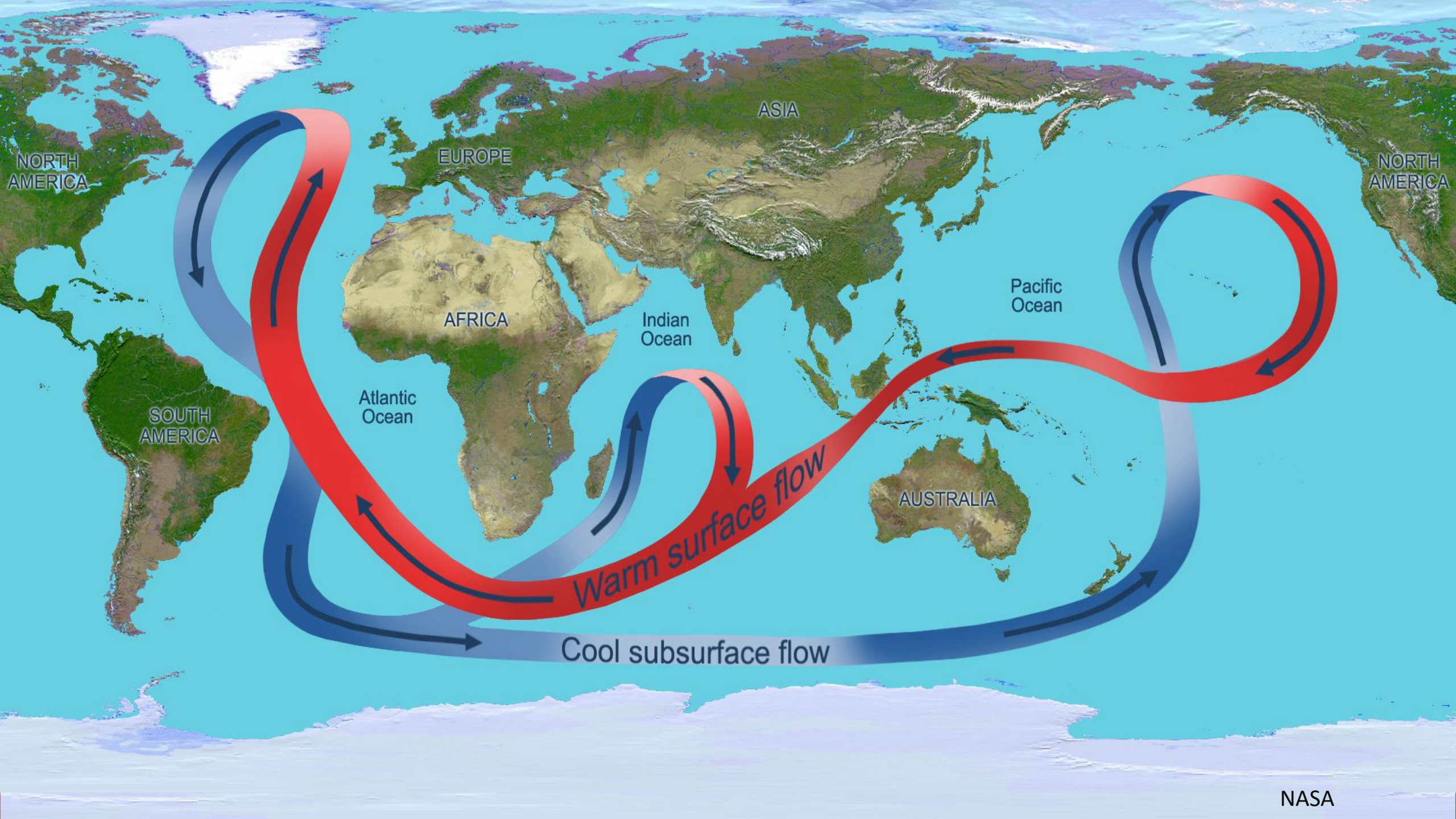

Coal burning power plant,
Shuozhou, Shanxi, China
https://commons.wikimedia.org


THE
GREENHOUSE
EFFECT
Some of Earth's warmth is radiated back into space
The Sun's solar energy passes through Earth's atmosphere
Greenhouse gases in the atmosphere trap some of the radiated warmth
Clouds and the Earth's surface reflect some solar energy back into space
Earth's surface is warmed by the Sun

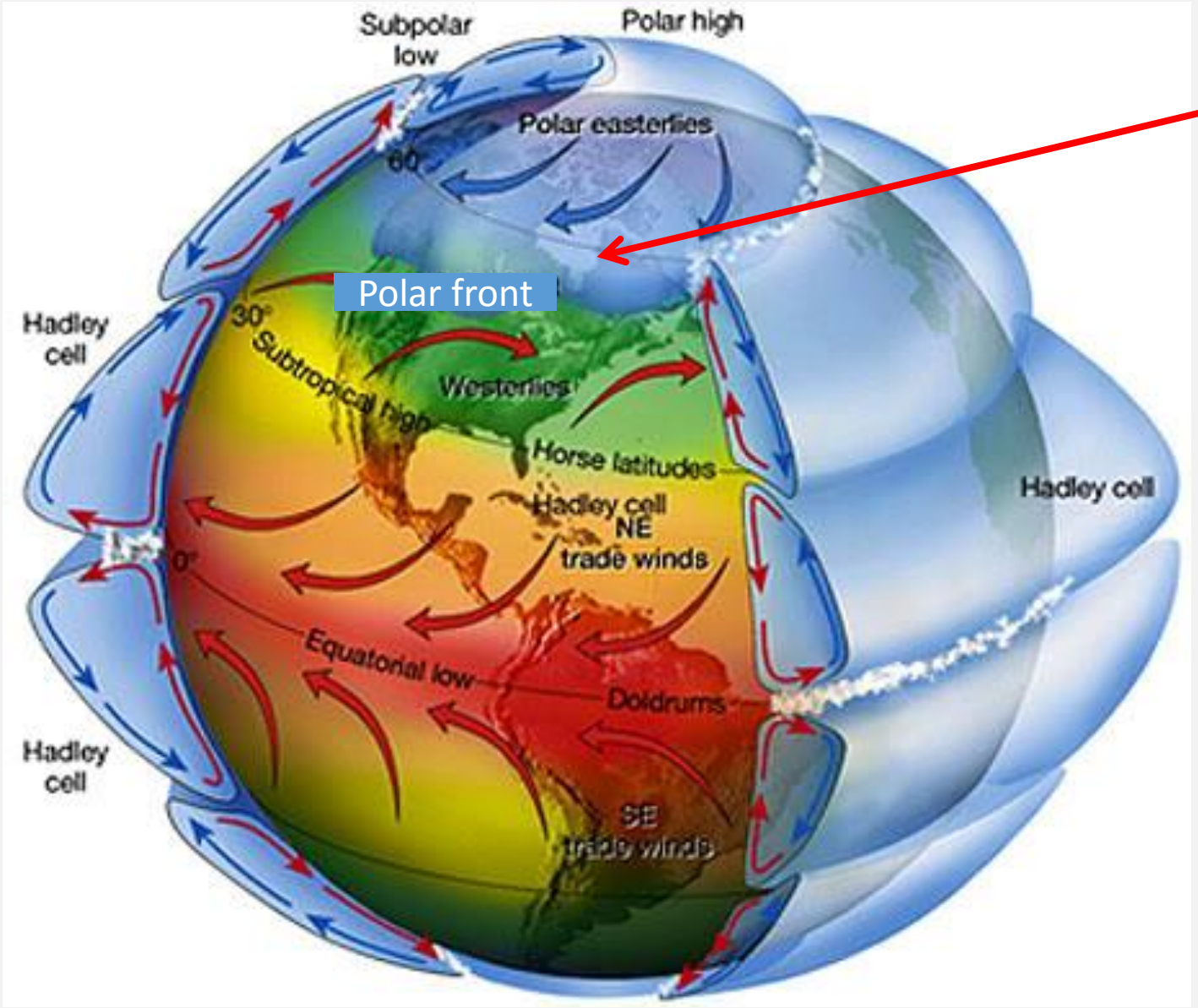
October 2016 global surface air temperature overview



Ole Humlum climate4you.com


NORTH AMERICA
EUROPE
ASIA
NORTH AMERICA
AFRICA
Indian Ocean
Pacific Ocean
Atlantic Ocean
SOUTH AMERICA
AUSTRALIA
Warm surface flow
Cool subsurface flow

NASA



Hudson Bay

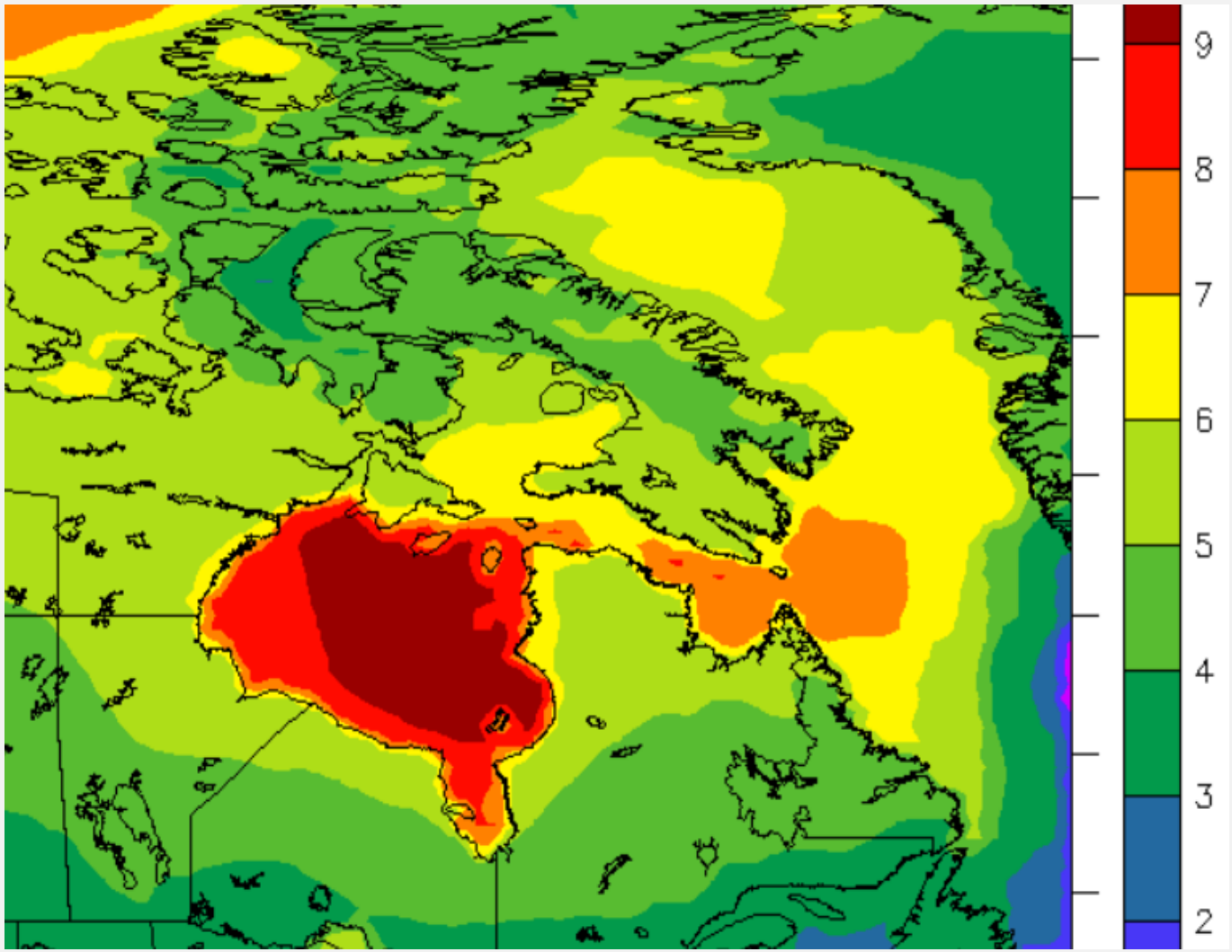
http://serc.carleton.edu/eslabs/hurricanes/index.html

The two faces of Hudson Bay

Reflecting the Sun’s energy

Absorbing the Sun’s energy and warming the breezes over the surrounding land

Projected average winter temperature in northern Canada in the 2050s compared with 1961 - 1990

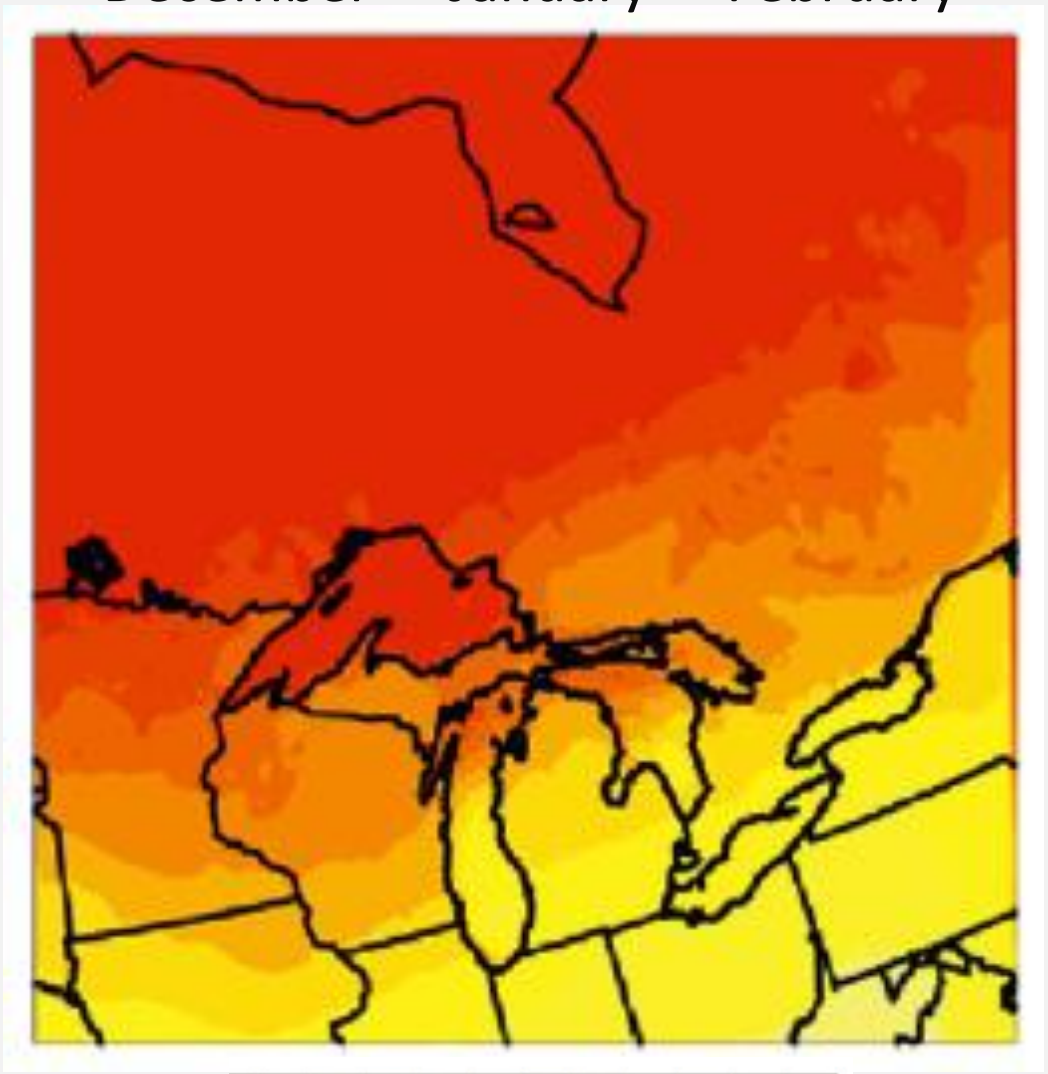


CCCSN Ouranos Consortium

http://www.cccsn.ec.gc.ca/images/ensemblescenarios/ontario-winter-2050s-crcm.png

Projected increase in winter temperature in the 2050s compared with 1979 - 2001

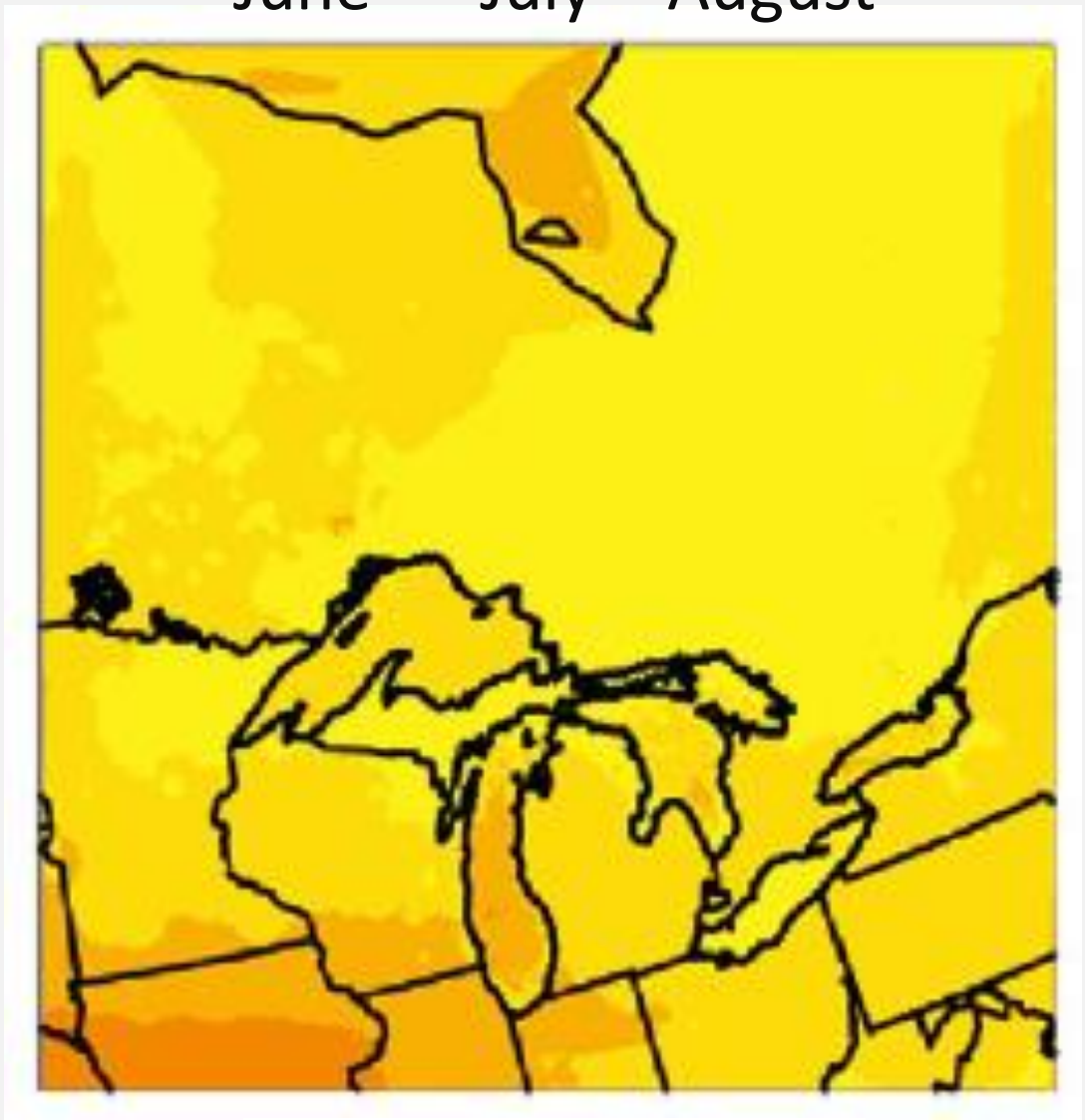
December - January - February



Gula and Peltier,
J. Climate v. 25. Nov. 2012

Projected increase in summer temperature in the 2050s compared with 1979 - 2001

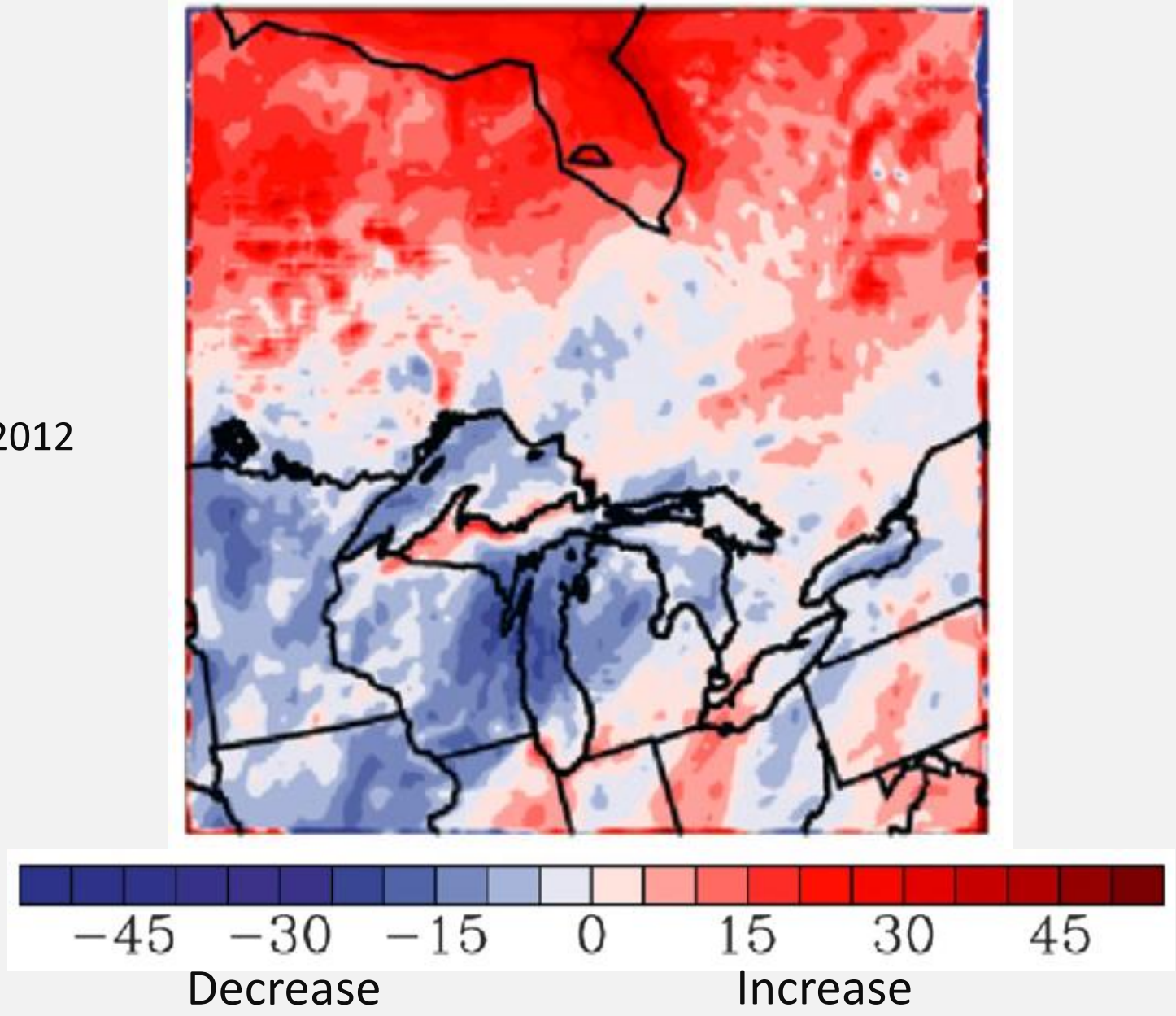
June - July - August



Gula and Peltier,
J. Climate v. 25. Nov. 2012

Change in average snow and rain in winter in the 2050s compared with 1979 - 2001

December - January - February



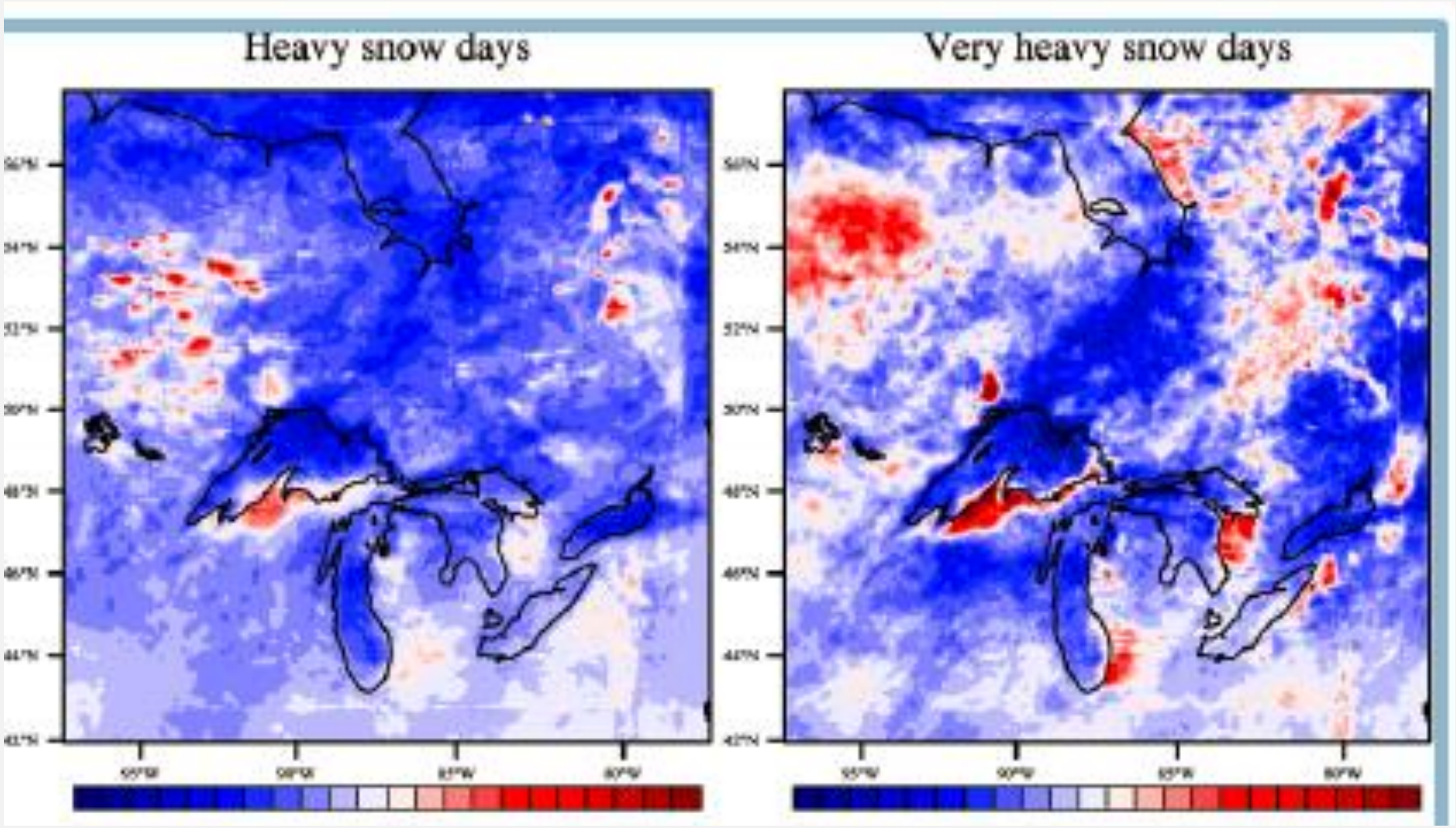
Gula and Peltier,
J. Climate v.25. Nov. 2012

Change in number of days with snow in the 2050s compared with 1971 - 2000

Dick Peltier,
Univ. of Toronto,
Adaptation Canada,
April 14, 2016

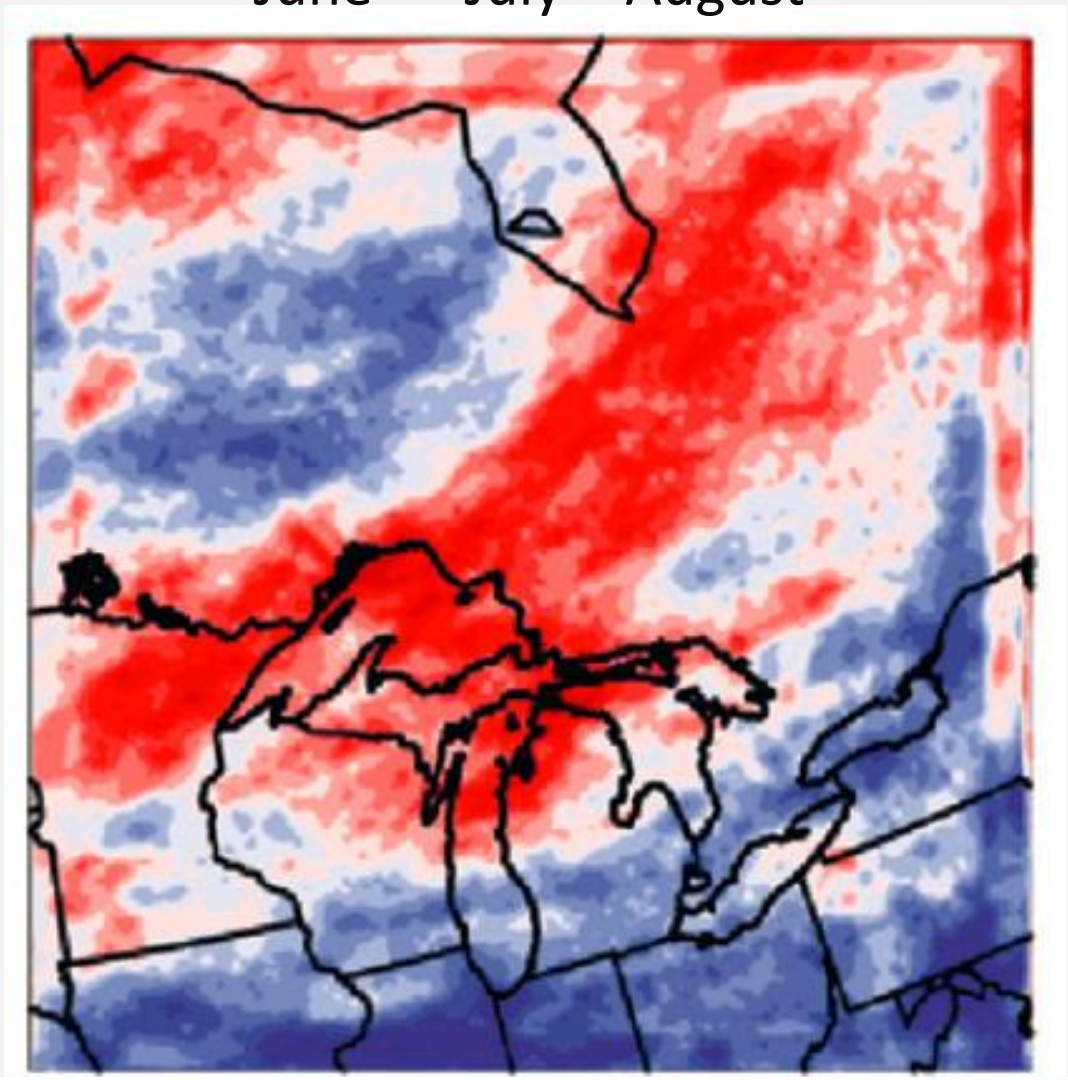
Seasonal Impacts of the Warming Process at Mid-Century.

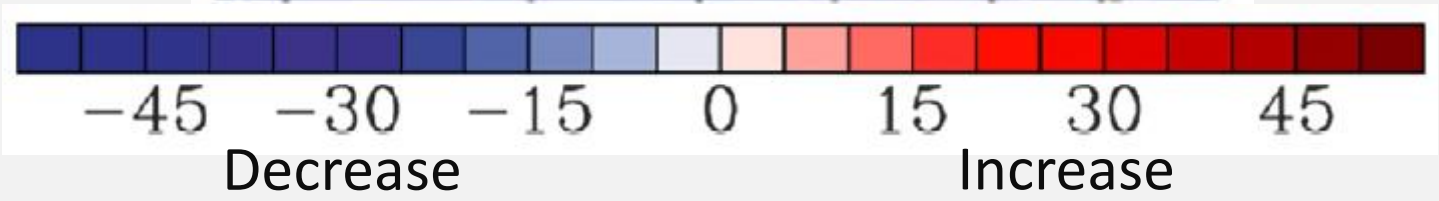
Gula & Peltier,
J. Clim. 2013. OMECC



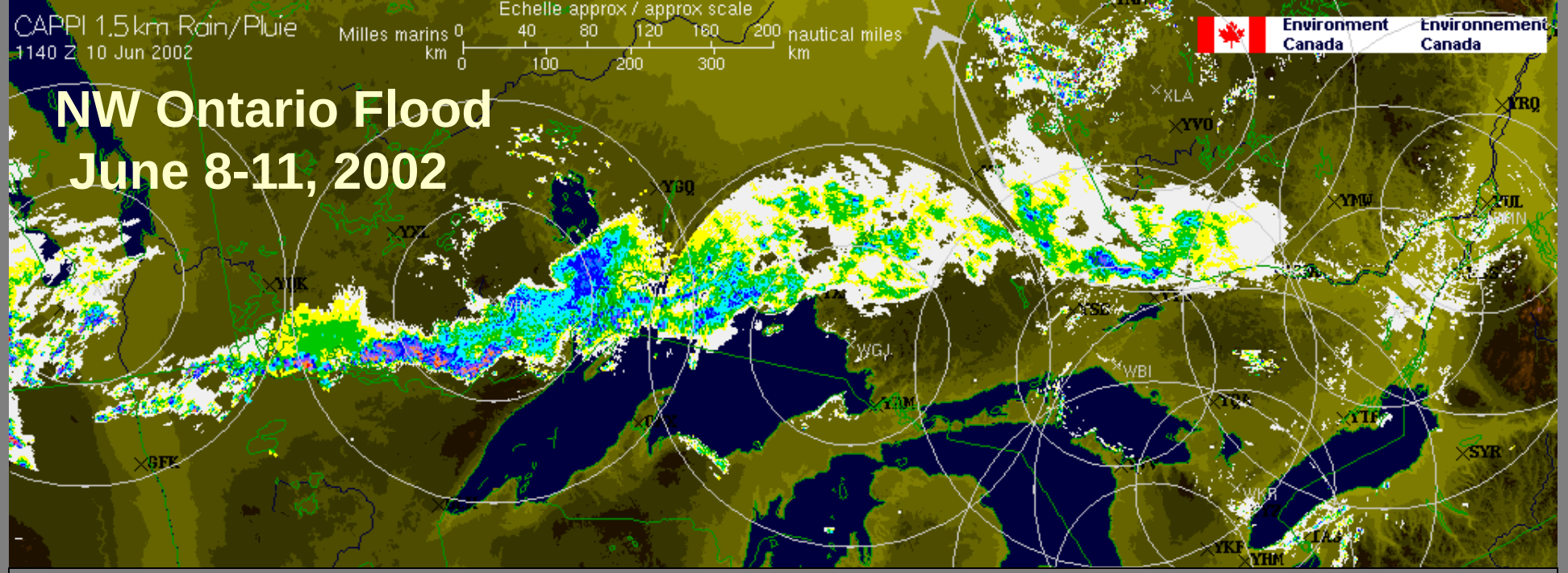
Change in average rainfall in summer in the 2050s compared with 1979 - 2000

June - July - August





Gula and Peltier,
J. Climate v.25. Nov. 2012



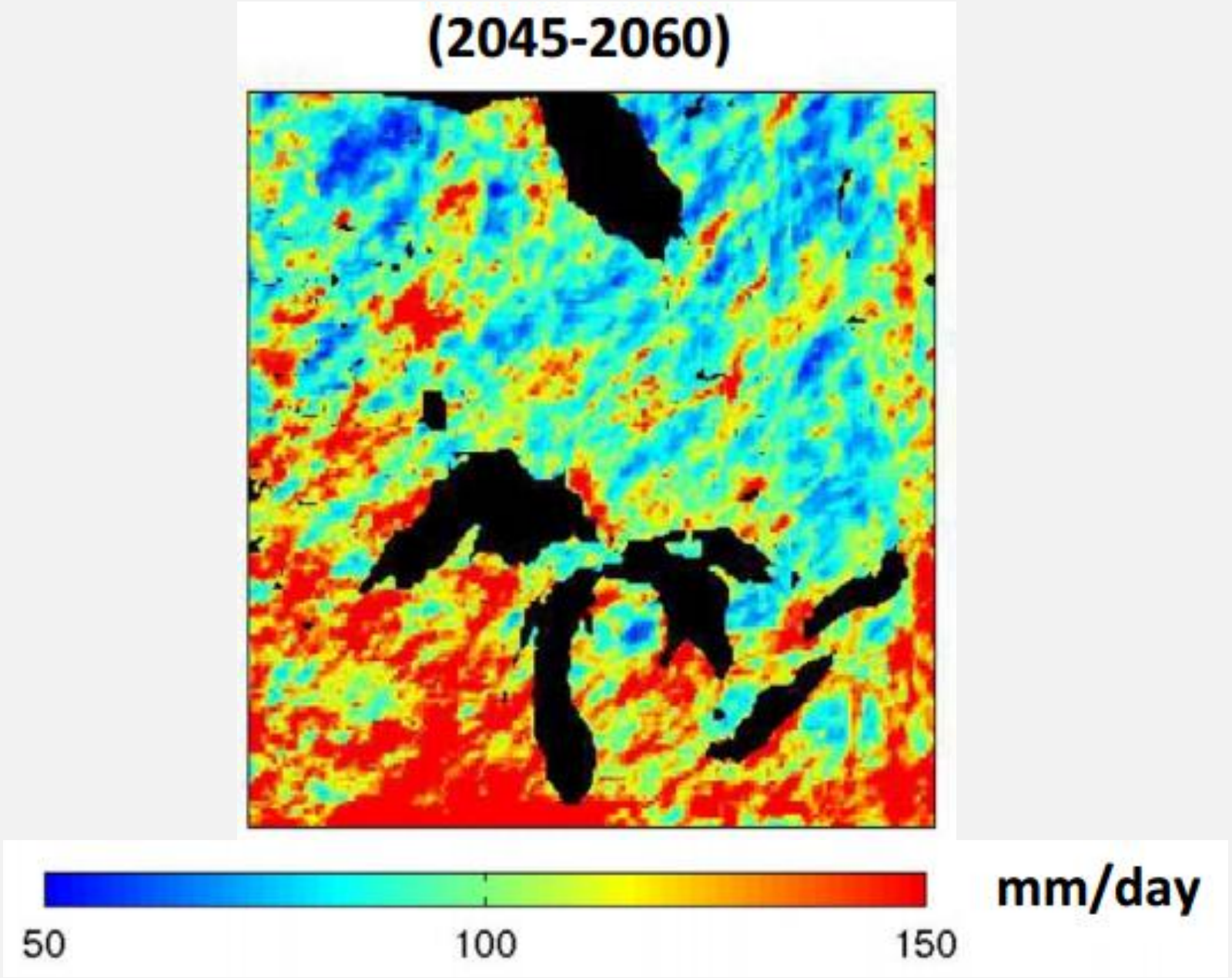
- ~400 mm of rain in 48 hours over NW Ontario region bordering Manitoba and Minnesota
- Rainfall of over 360 mm for small basin area (100 km^2) exceeded current regulatory flood "*Timmins Storm*" by 2 to 3 times for 48 hour period

New "Design Storm" for this area based on this event ???

Future changes in extreme rainfall

Rainfall during extreme events projected to increase by 14% – 29% by 2050

Resulting in a once in 50 year rain event today will occurring every 25 – 15 years in the 2060s



D'Orgeville and Peltier

“The Lowdown on the Meltdown”

Dick Peltier

Bacon and Eggheads breakfast with Houses of Parliament politicians. Ottawa. 29 March, 2012