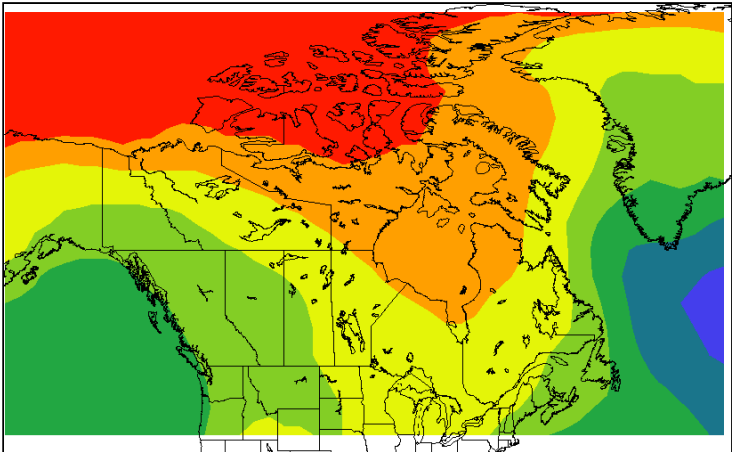
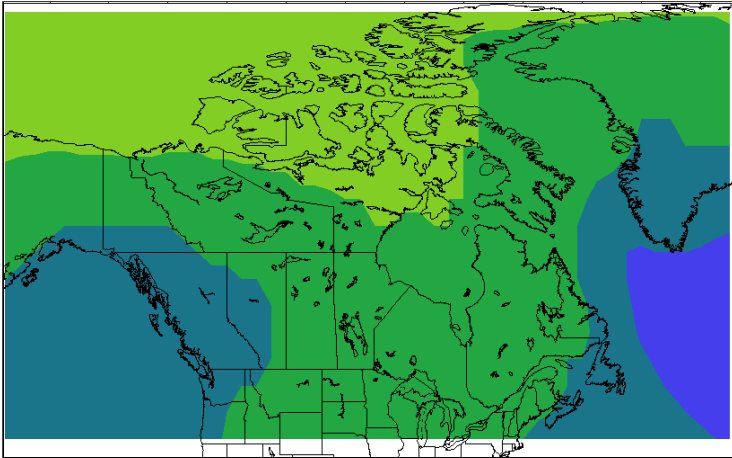


The New 2013 IPCC Assessment: What Climate Changes are Coming?



May 2013
Neil Comer
Senior Climatologist,
Risk Sciences International

Adjunct,
University of Prince Edward Island
University of Toronto-Scarborough

Information Overload



Arctic Ice Melting at ‘amazing speed’, scientists find
Globally, 9 of 10 Warmest Years on Record Occurred Since 2000

Climate Science: Time to raft up

Extreme Weather Events Forecast Storm over Climate Change Denial

2012 On Track to be Worst Wildfire Year on Record

Forest Mortality and Climate Change: The Big Picture

Next Generation of Advanced Climate Models Needed, Says New Report

Droughts are Pushing Trees to the Limit

Hotter Temperatures Link Climate Change to Tree Mortality

Ice Loss Shifts Arctic Cycles

Forests worldwide near tipping-point from drought

Arctic Sea Ice Reaches Lowest Extent Ever Recorded

But we do know...

- Climate change is already happening
- It will continue even if we stop emitting pollutants today
- Climate models show agreement in the direction of change (although the amount varies)
- In spite of all the news of ‘climate change deniers’, in the scientific community there is near-consensus
- Media likes conflict – so deniers get ‘*better airplay*’

Notably:

“Only Two Percent of Canadians Deny Climate Change”

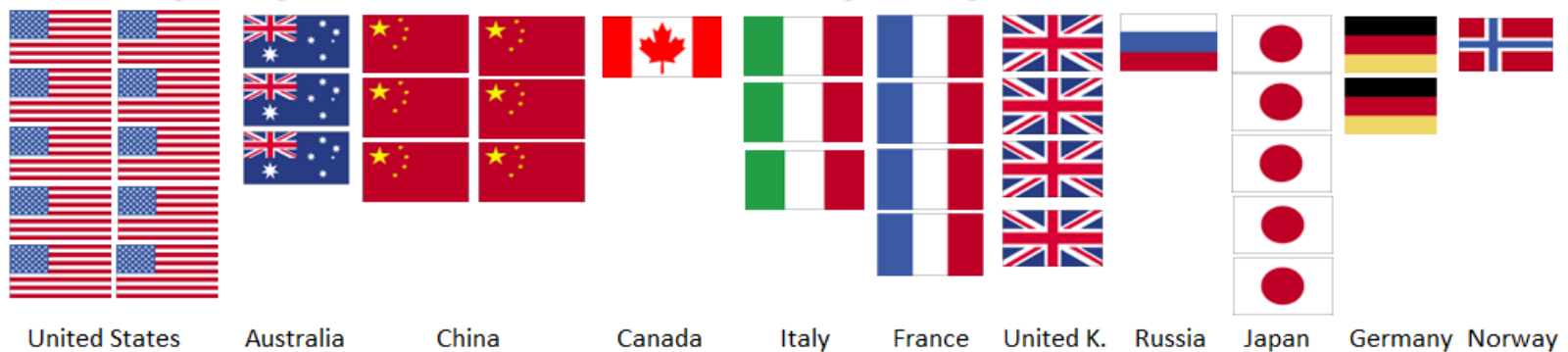
Insightrix Research, Inc., 2012

The new IPCC Assessment (AR5):

- AR4 (2007) 24 Global Climate Models (GCMs) available



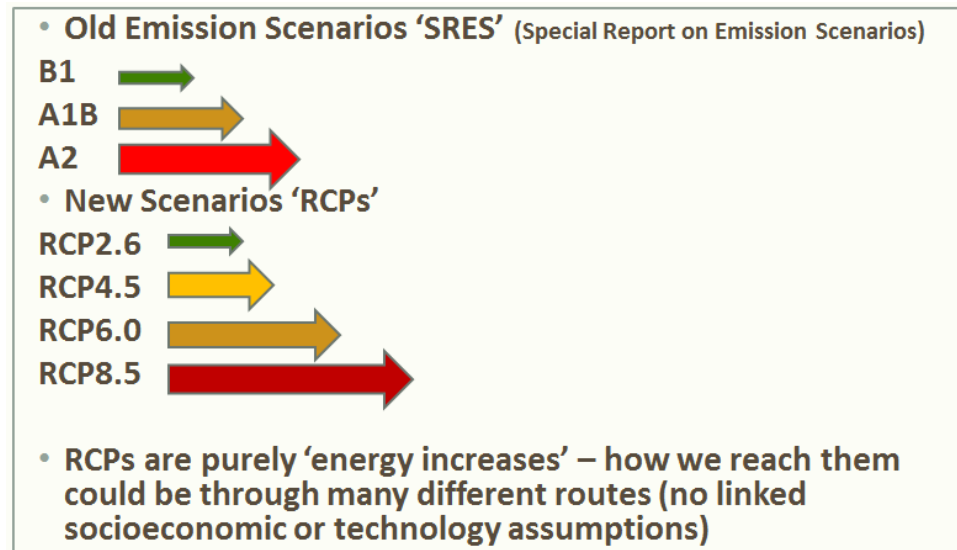
- AR5 (2013) 40 Global Climate Models (GCMs) available



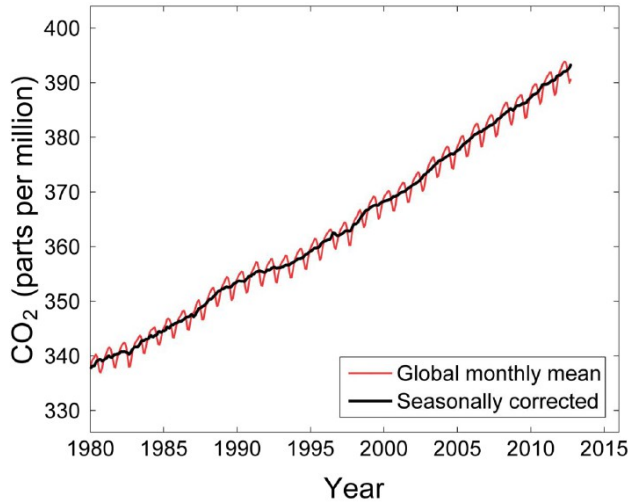
So.. many models available

Other than the models themselves, what else affects our projections?

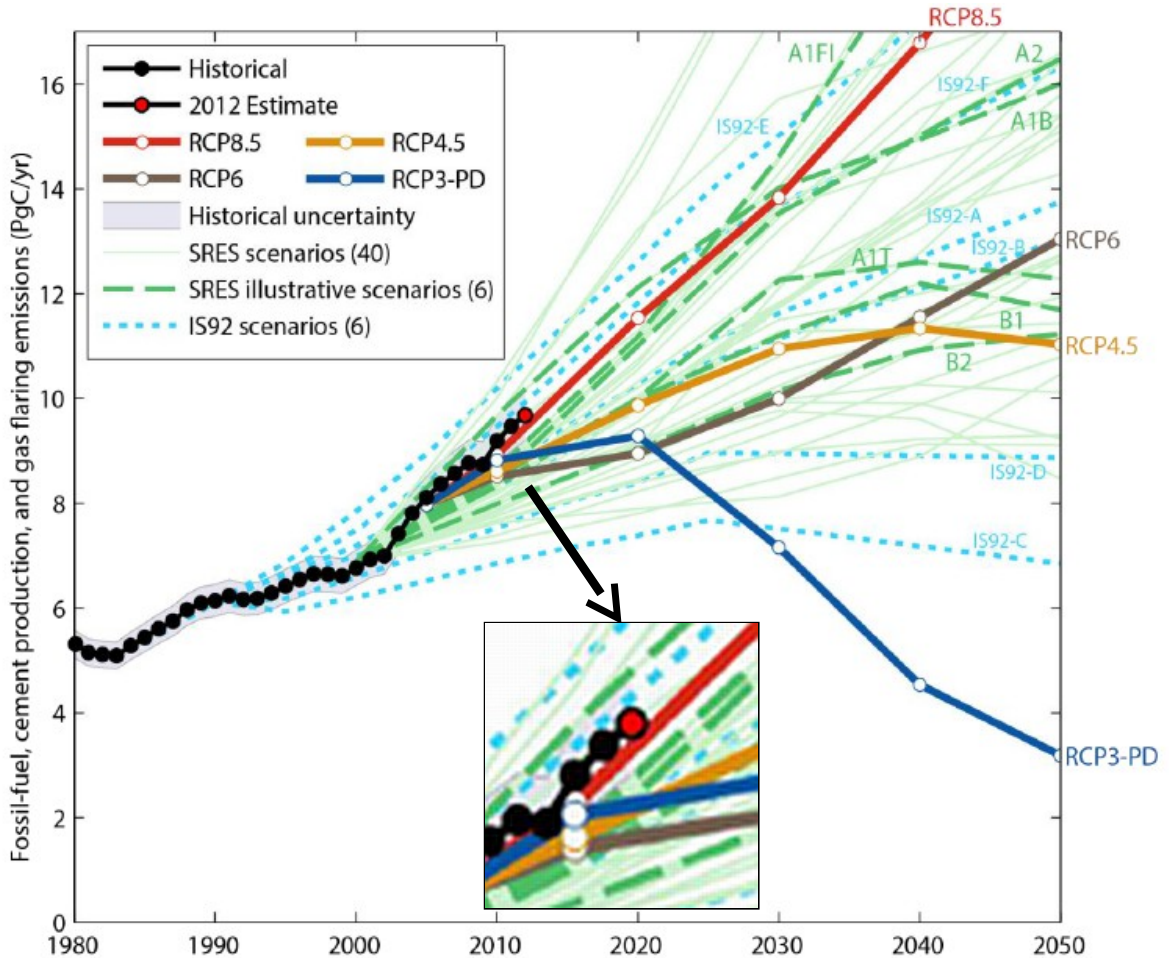
- Old Emission Scenarios ‘SRES’ (B1, A1B, A2)
“Special Report on Emissions Scenarios”
- New Scenarios in AR5 - to ‘RCPs’ (2.6, 4.5, 6, 8.5)
“Representative Concentration Pathways”



What path are we on?



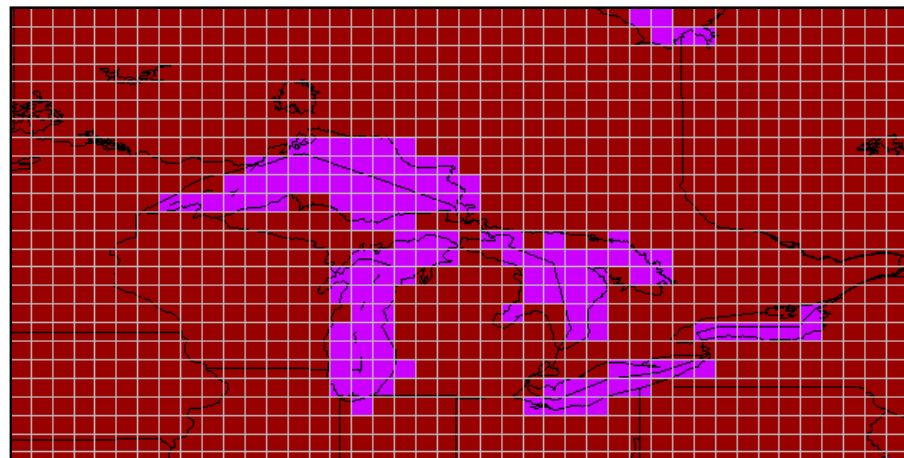
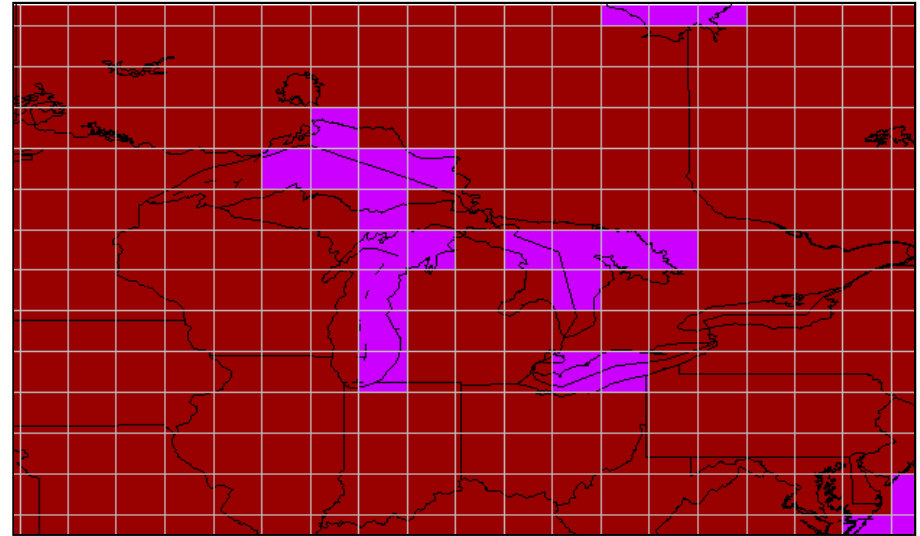
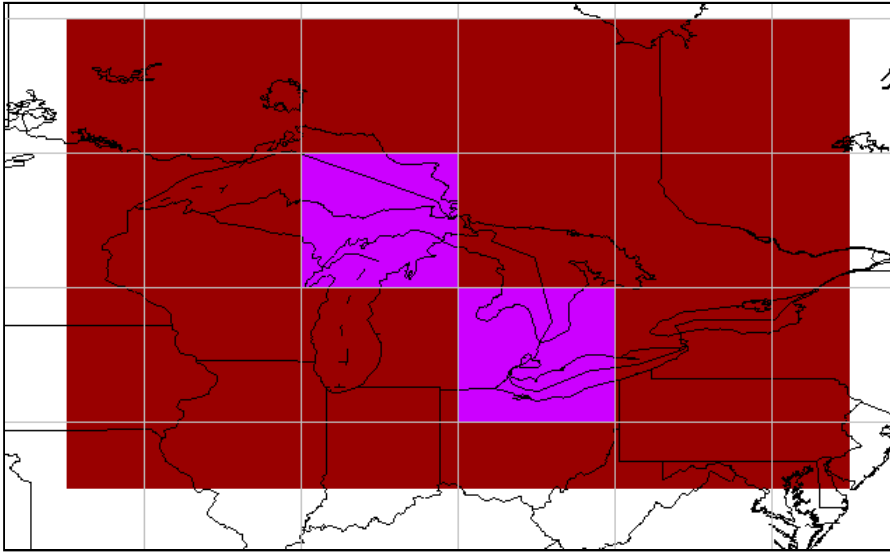
Source: NOAA/ESRL (Earth System Research Laboratory)



Le Quere et al, 2012.

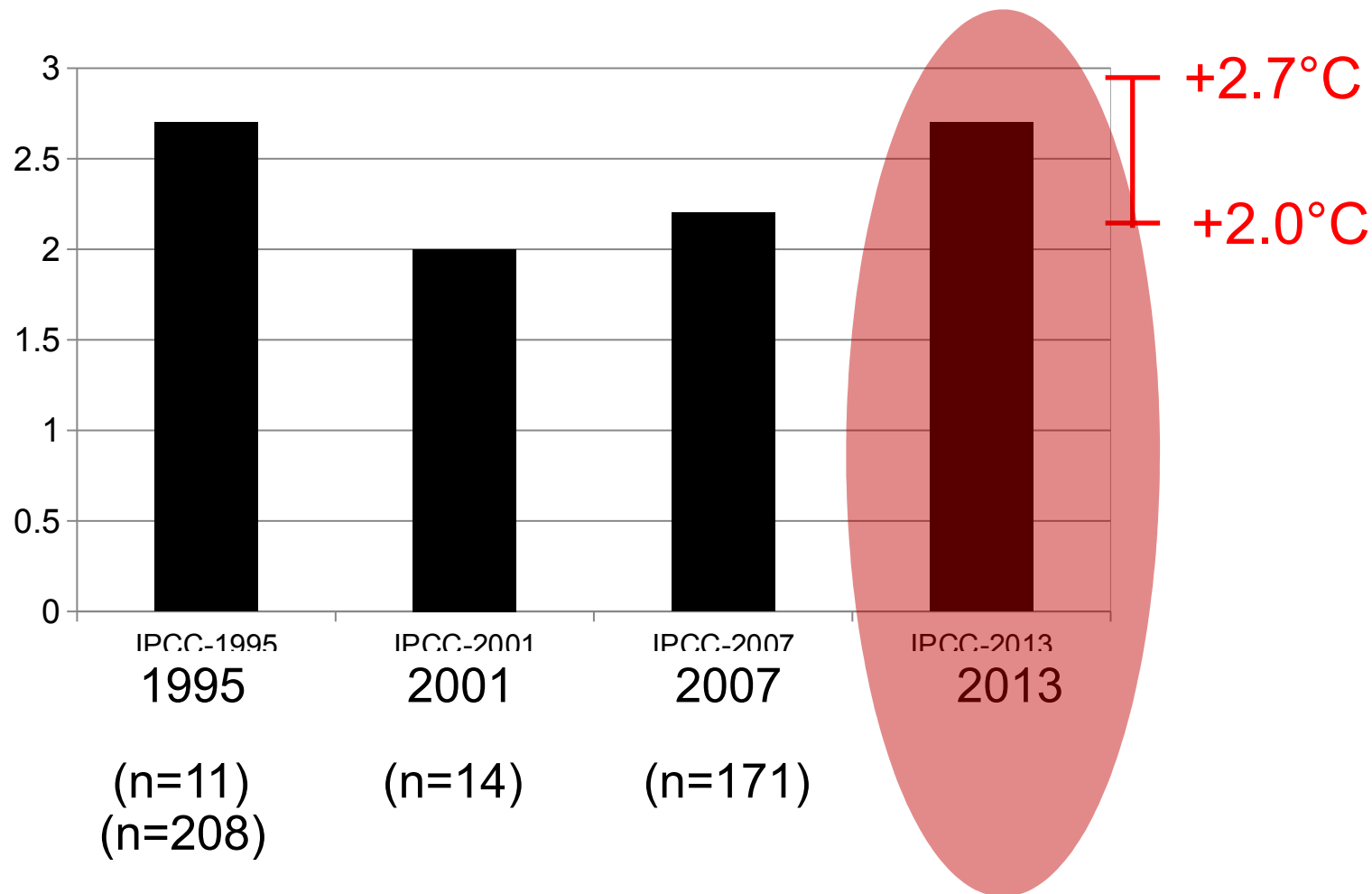
...appears the highest

Model Resolution Improving: Great Lakes

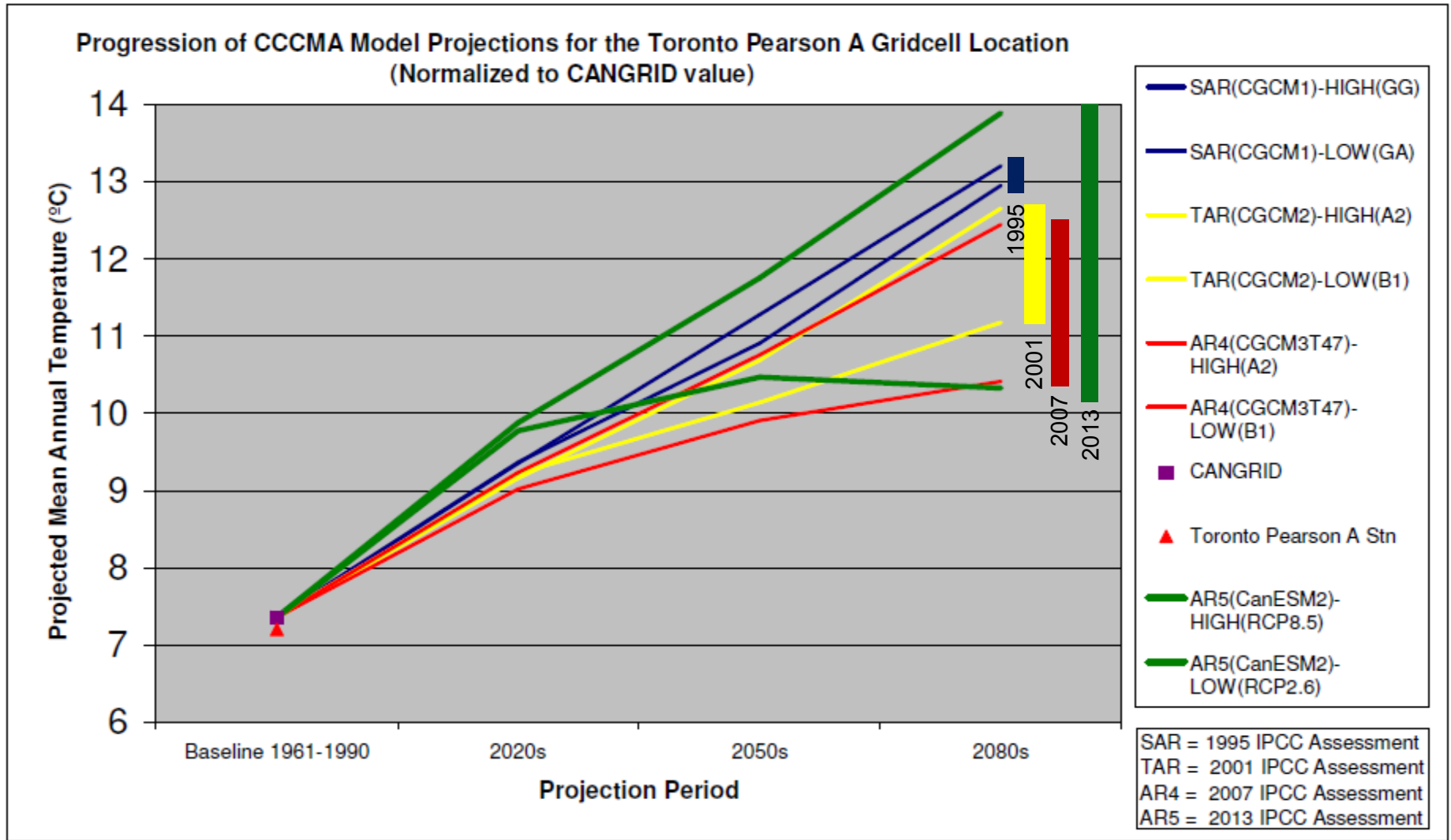


IPCC Model Projections over the years...

Temperature change in 2050s, central Ontario (1971-2000 baseline)

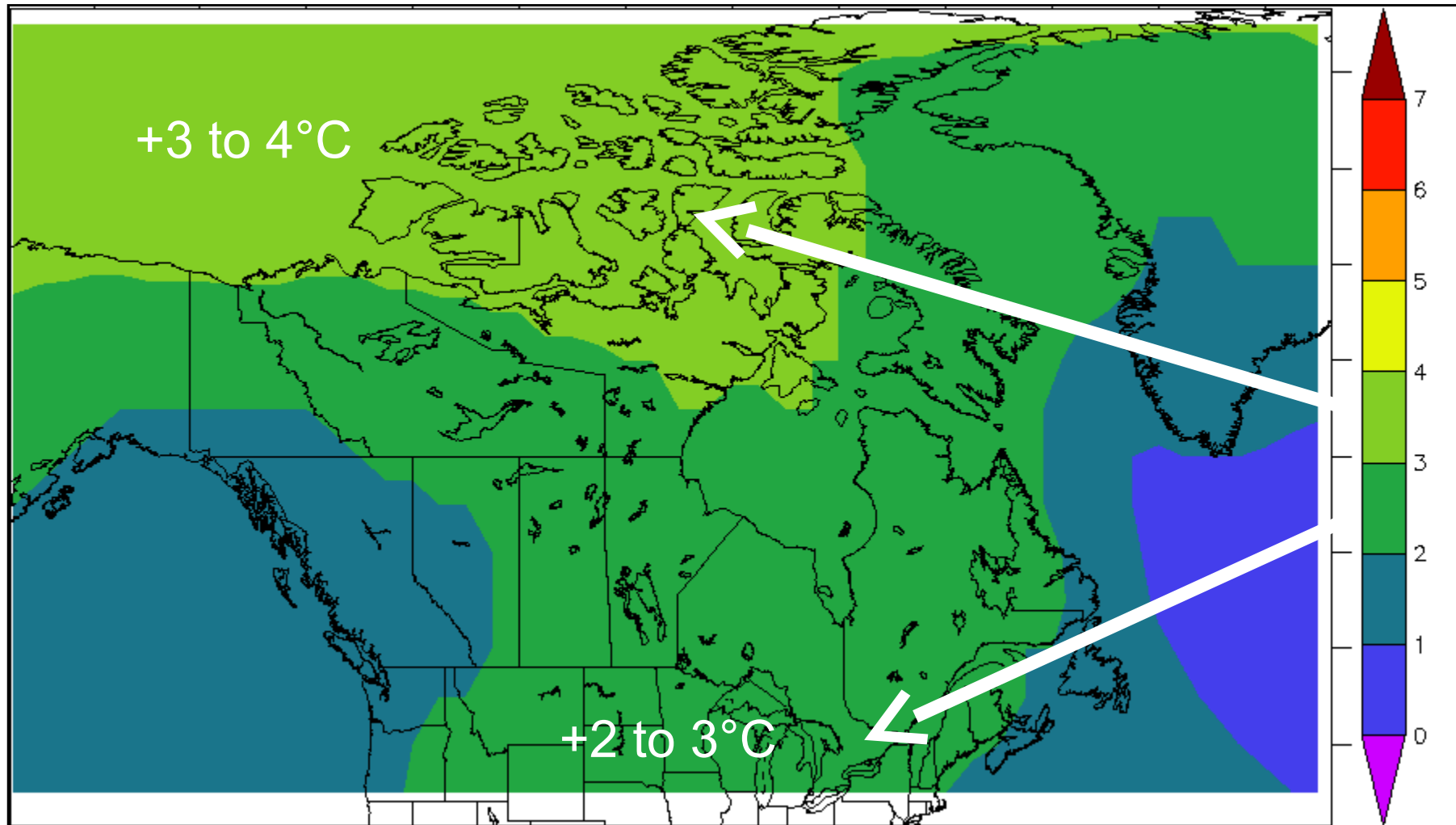


EC - CCCma - IPCC Assessments since 1995:

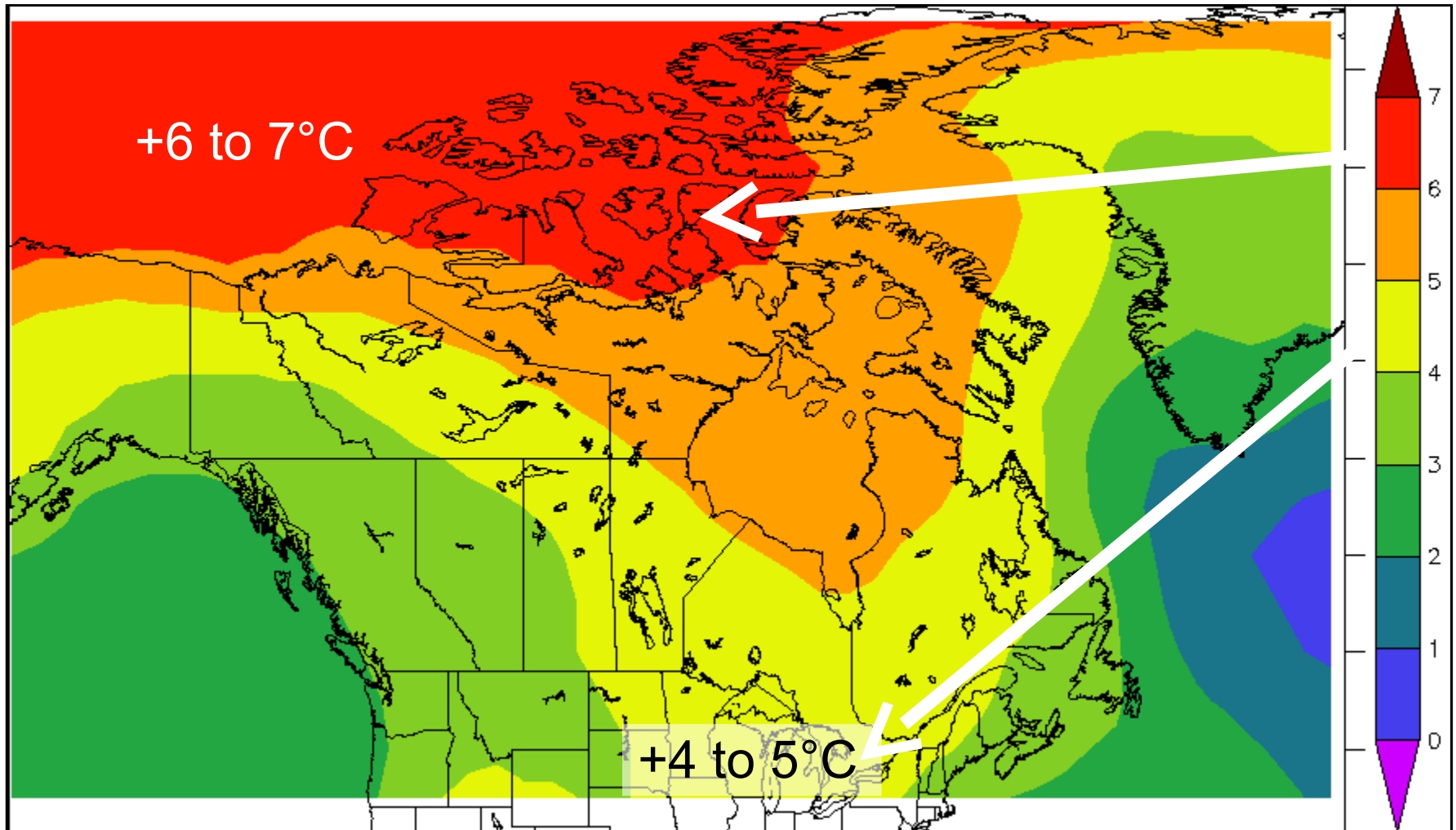


- Average historically similar – range increasing

Change in Annual Temperature 2050s from now



Change in Annual Temperature 2080s from now



Seasonal Changes – Orangeville Example

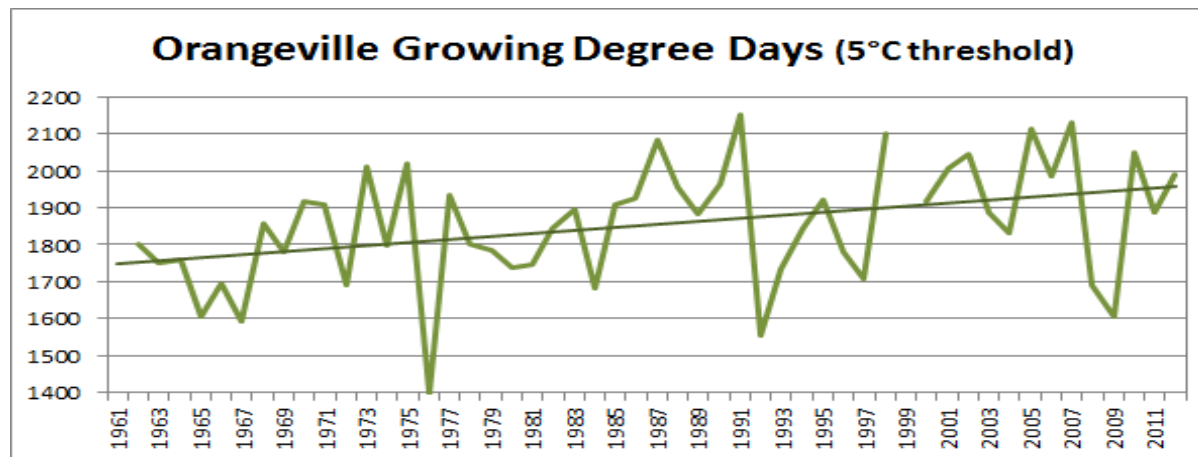
- Warmer in all seasons, greatest increase in winter

°C	annual	winter	spring	summer	autumn
1971-2000	6.1	-6.6	5.0	18.1	7.8
2020s	7.3 ± 0.3	-5.2 ± 0.5	6.2 ± 0.5	19.3 ± 0.4	9.0 ± 0.3
2050s	8.7 ± 0.6	-3.5 ± 0.8	7.5 ± 0.8	20.7 ± 0.7	10.3 ± 0.5
2080s	10.6 ± 1.0	-1.6 ± 1.2	9.2 ± 1.1	22.6 ± 1.3	12.1 ± 0.9

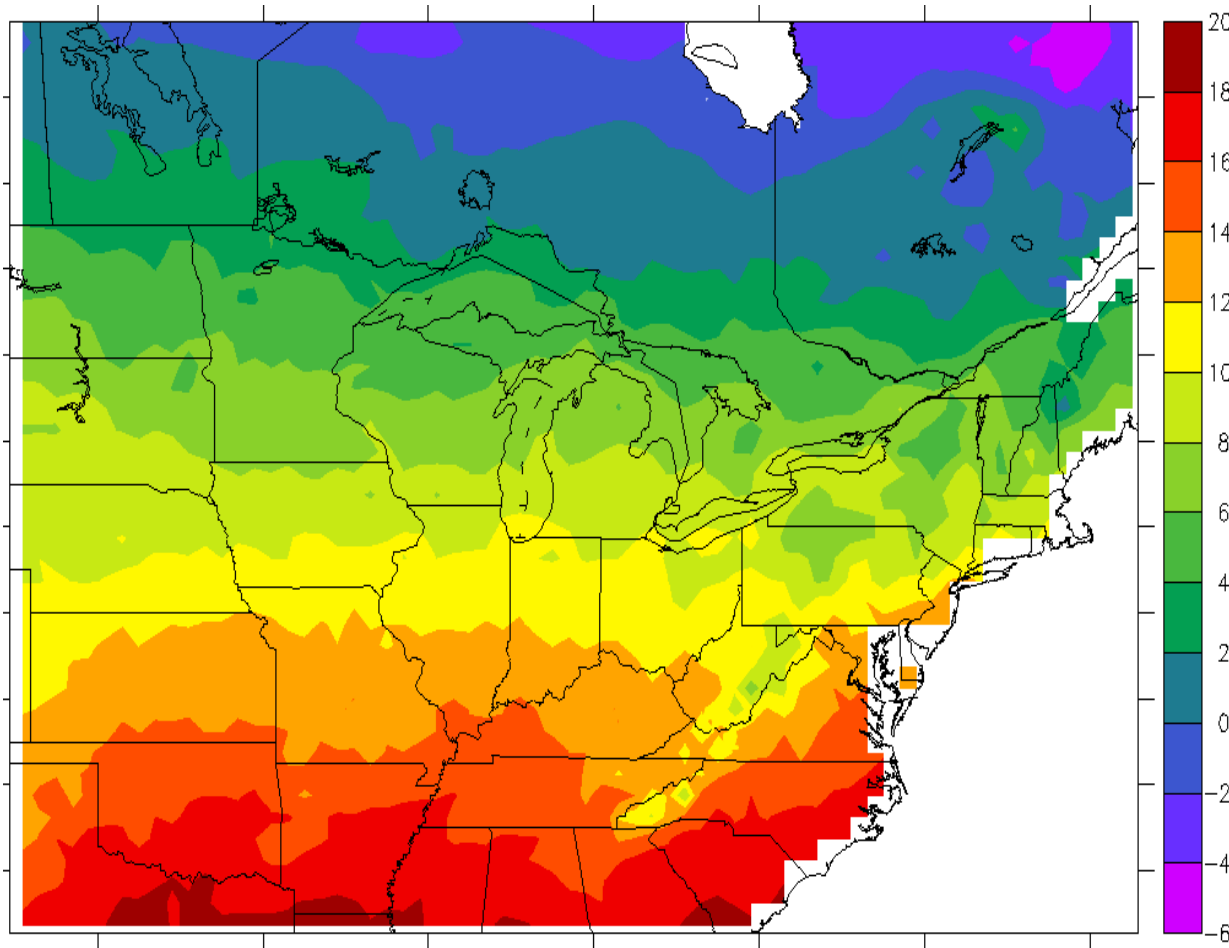
- Wetter in all seasons but summer, more dry periods, more intense events

mm	annual	winter	spring	summer	autumn
1971-2000	888.9	184.7	212.9	254.8	236.5
2020s	913.5 ± 28.6	193.3 ± 7.6	220.8 ± 12.0	258.3 ± 14.0	240.5 ± 15.7
2050s	944.1 ± 44.2	207.7 ± 9.5	232.5 ± 17.6	252.1 ± 24.2	249.5 ± 18.4
2080s	973.9 ± 78.4	220.7 ± 15.7	251.6 ± 29.5	245.5 ± 42.0	253.2 ± 27.4

Source: Canadian Climate Change Scenarios Network, all-model ensemble, AR4, A2



Climate Analogs?



“What location now has an annual temperature Southern Ontario is projected to have in the 2050s?”

Kentucky

Conclusions:

- Climate change is already affecting us
- Our best adaptation measures require the best science
- Improved models give us greater detail
- New IPCC projections are arriving
- We appear to be on the 'high' projection route based upon our greenhouse gas emissions so far
- Climate change will have significant impacts on current species, invasives, and pests
- Perhaps looking at problems to our south is an indication

ncomer@risksciences.com