

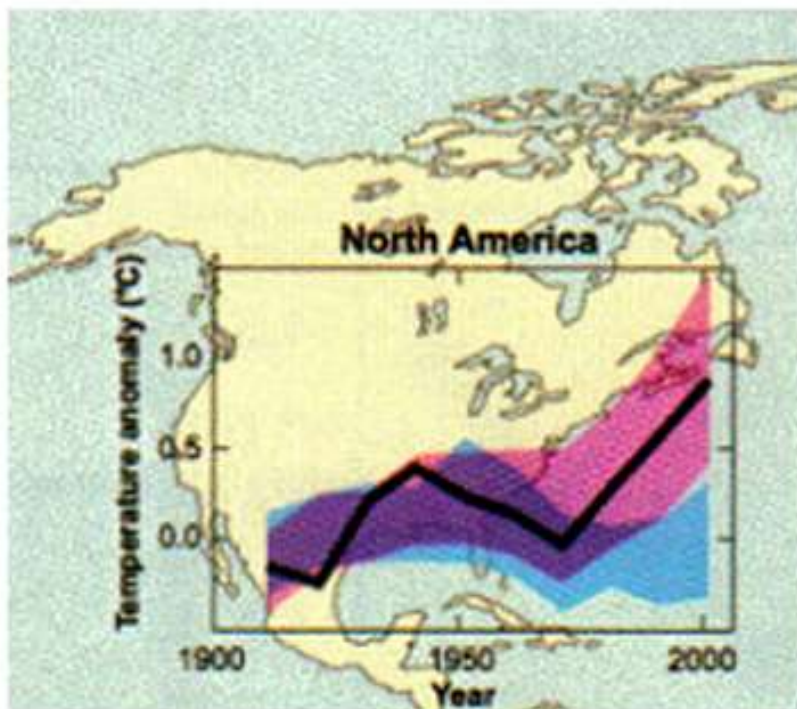
**EXTREME EVENTS
IN A CHANGING CLIMATE
CENTRAL CANADA**

**DRI WORKSHOP
WINNIPEG**

FEBRUARY 7-9, 2011

J.P. (Jim) BRUCE

Global and Continental Temperature Changes

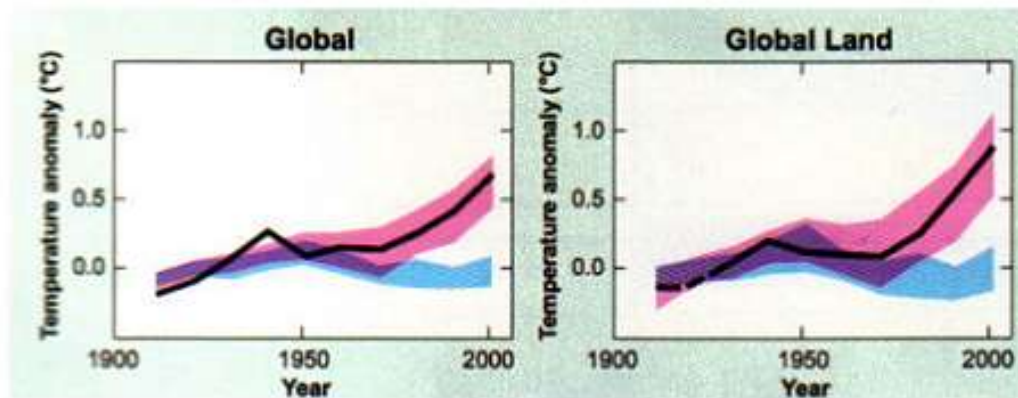


— Observed mean temperature

— Temperatures expected from natural external forcing

— Temperatures expected from greenhouse gas forcing

(IPCC - WG1, 2007)



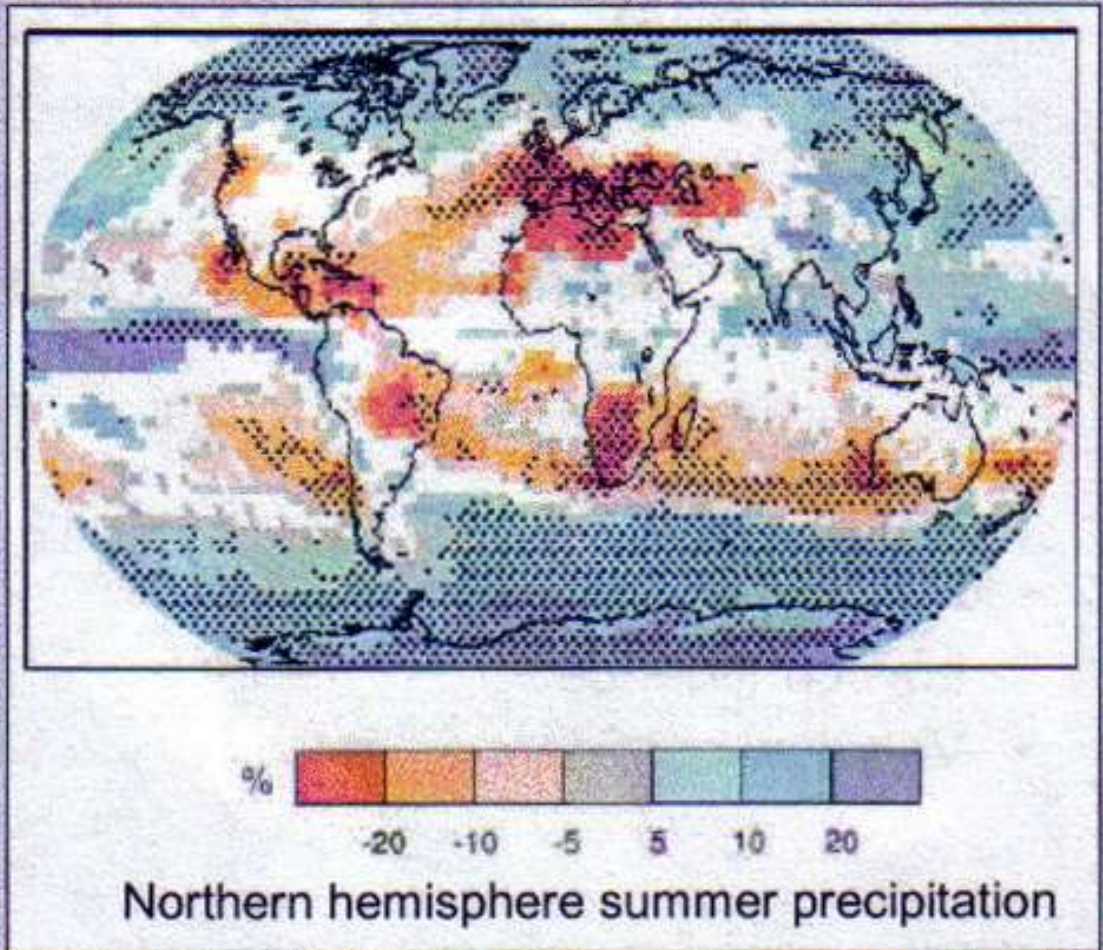
A World of Change: More Rain for Some, Less for Others

Regional changes (+/-)
of up to 20% in average
rainfall

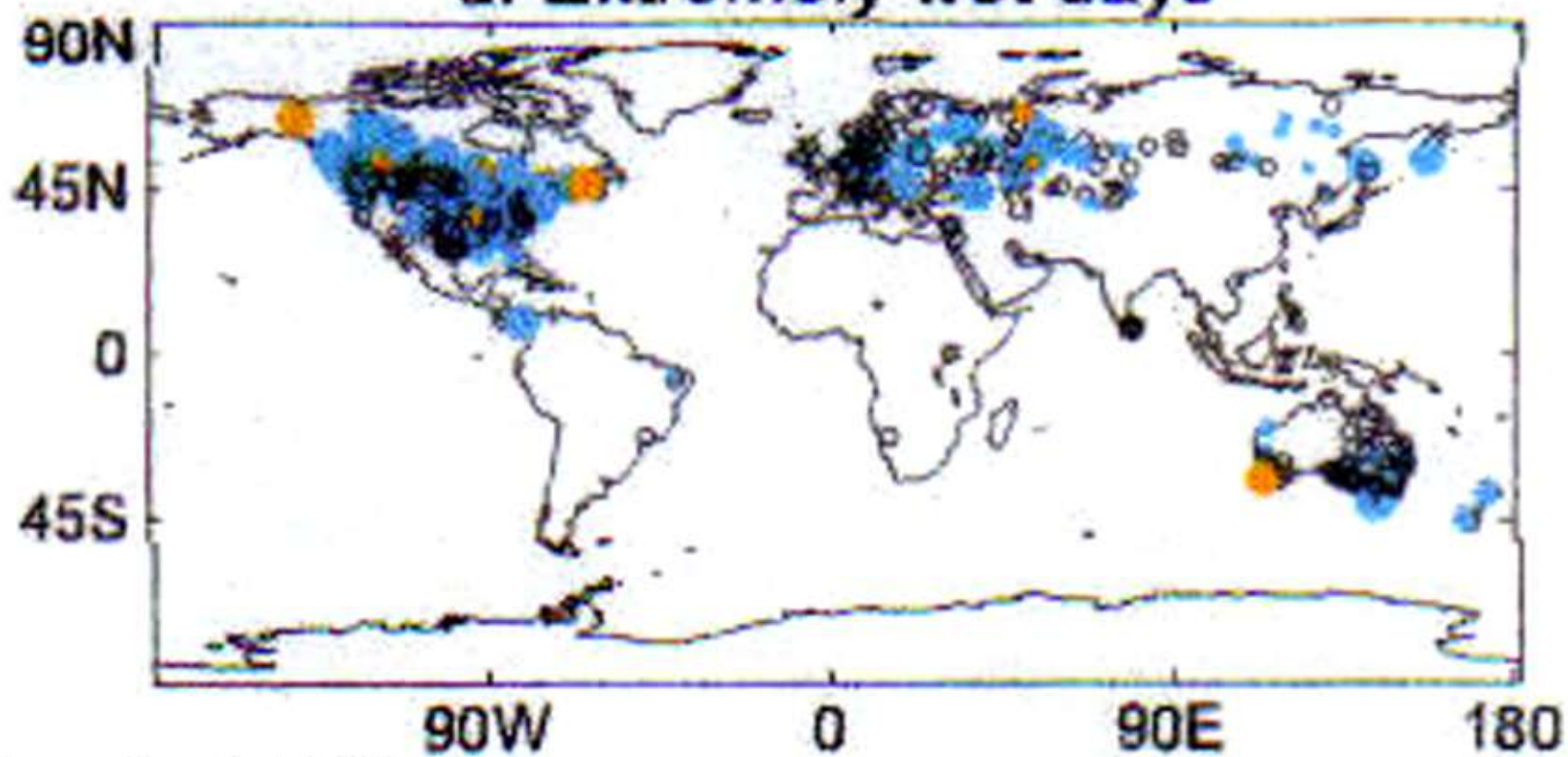
And also.....

- Increases in heavy rainfall (very likely)
- Increases in drought (likely)

(2090s: medium emissions scenario; high confidence in stippled areas)

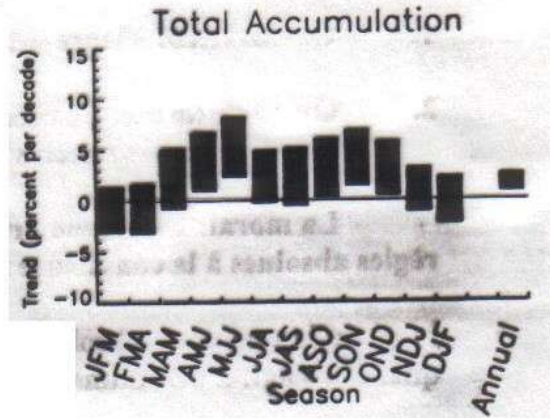
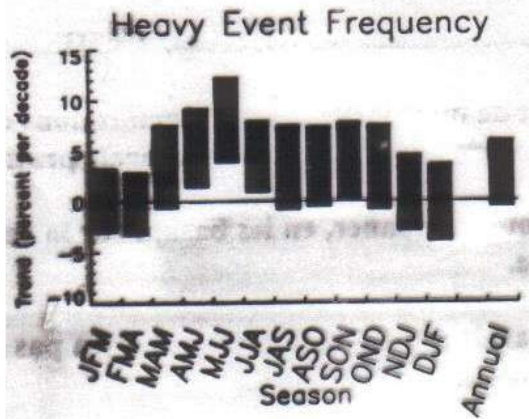
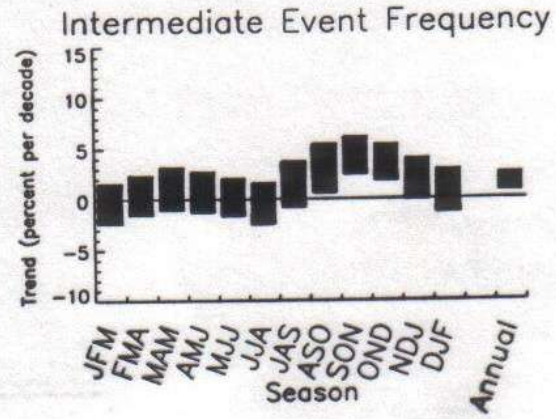
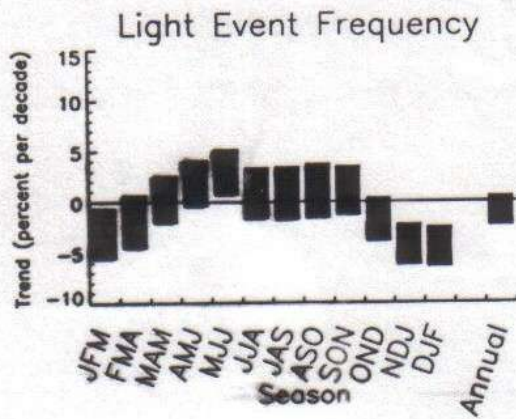


d. Extremely wet days

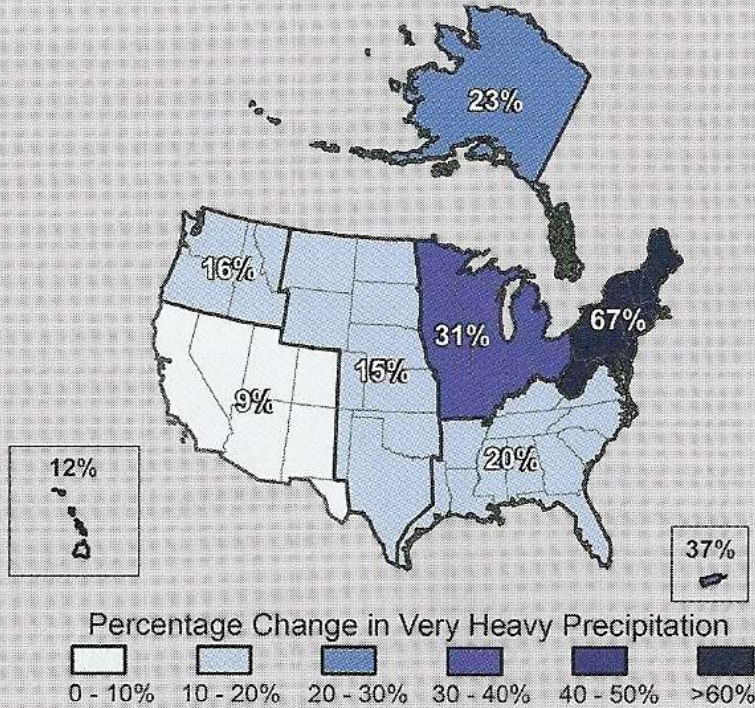


Alexander et al 2005

(SouthEastern Canada)



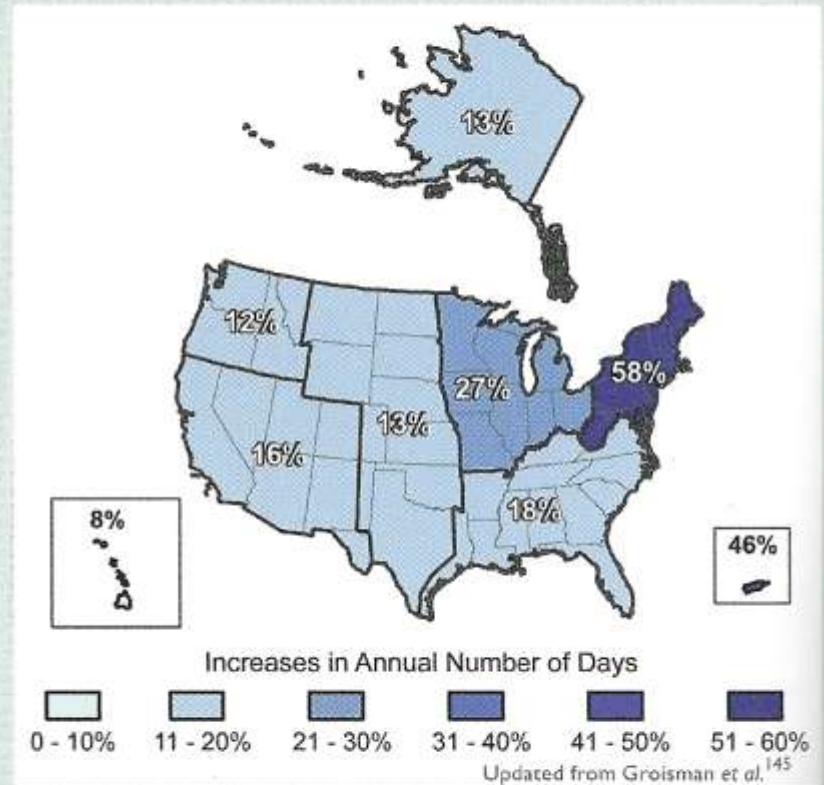
Increases in Amounts of Very Heavy Precipitation (1958 to 2007)



Updated from Groisman et al.¹¹³

The map shows percent increases in the amount falling in very heavy precipitation events (defined as the heaviest 1 percent of all daily events) from 1958 to 2007 for each region. There are clear trends toward more very heavy precipitation for the nation as a whole, and particularly in the Northeast and Midwest.

Increases in the Number of Days with Very Heavy Precipitation (1958 to 2007)



Updated from Groisman et al.¹⁴⁵

The map shows the percentage increases in the average number of days with very heavy precipitation (defined as the heaviest 1 percent of all events) from 1958 to 2007 for each region. There are clear trends toward more days with very heavy precipitation for the nation as a whole, and particularly in the Northeast and Midwest.



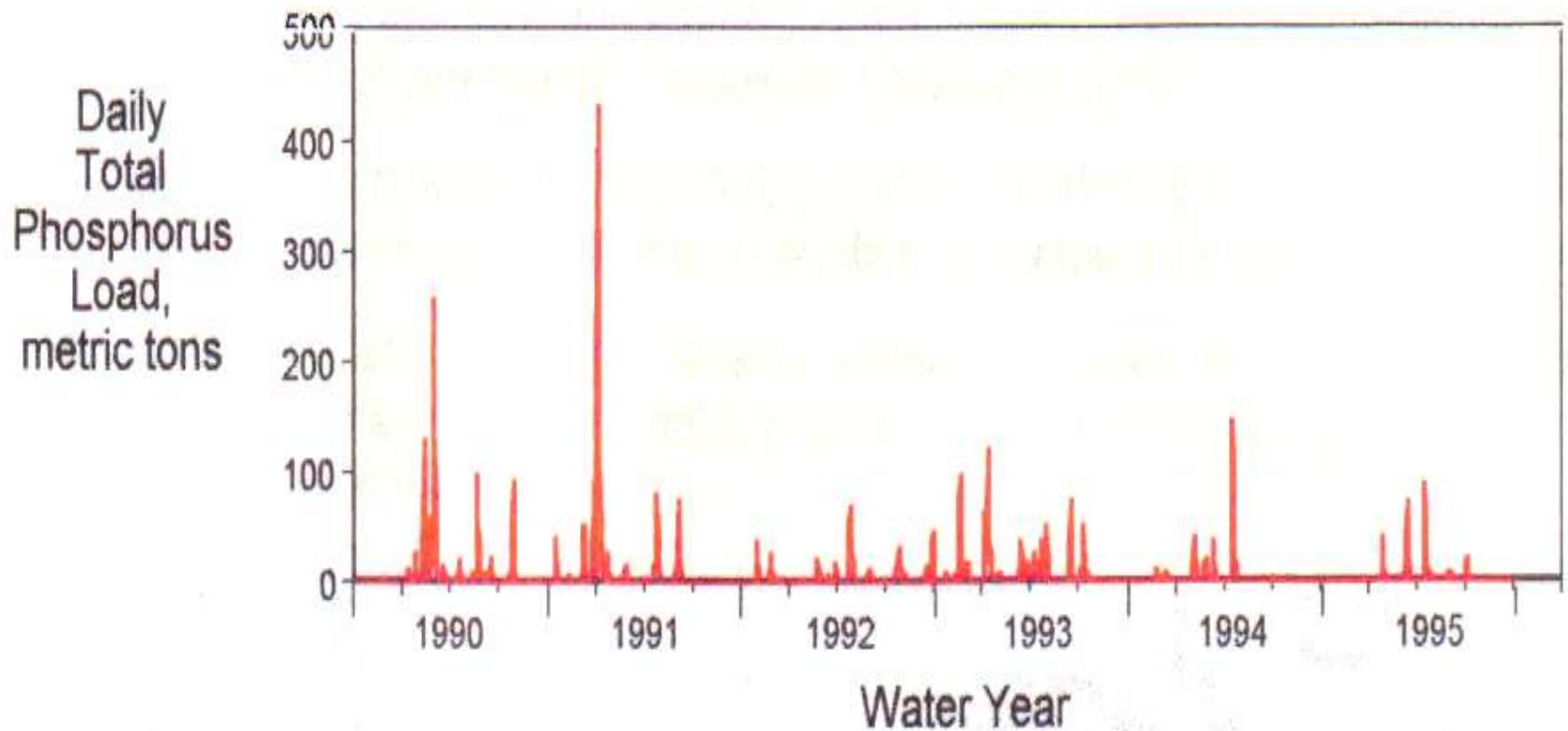
CONSERVATION IMPLICATIONS OF CLIMATE CHANGE: SOIL EROSION AND RUNOFF FROM CROPLAND

A Report from the Soil and Water Conservation Society



Impact of Severe Storms on Lake Erie

Daily Loads of Phosphorus from the Maumee River, Ohio

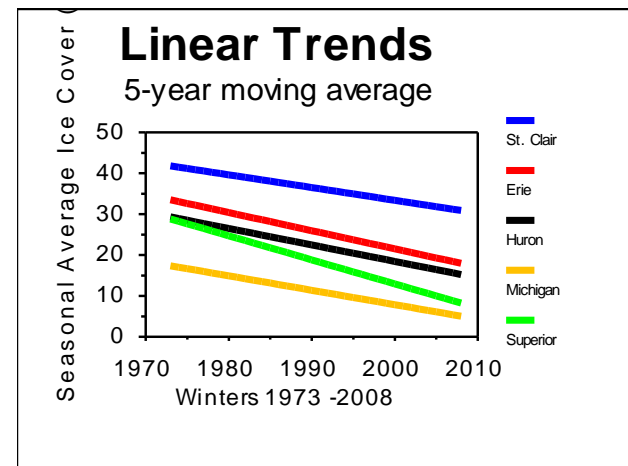
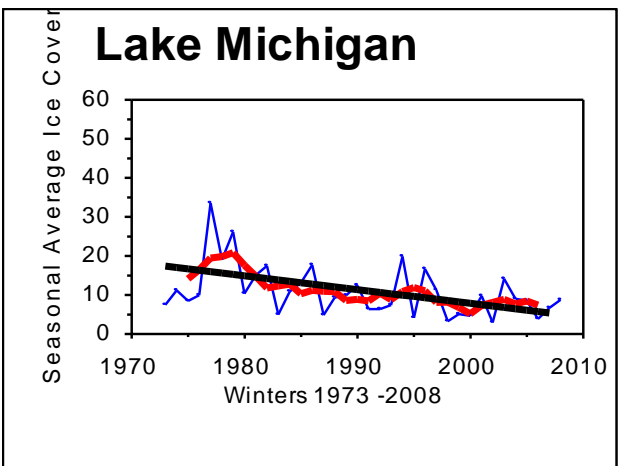
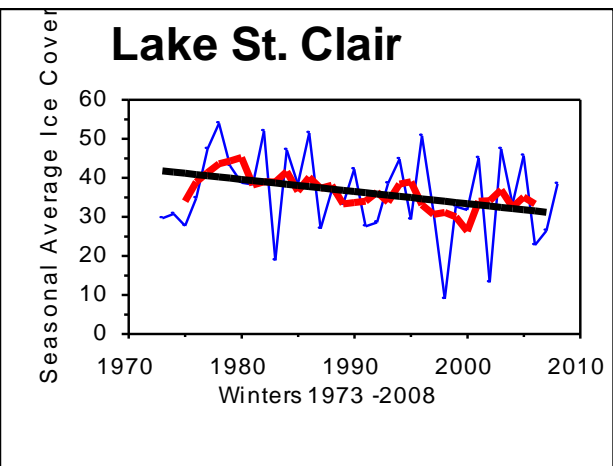
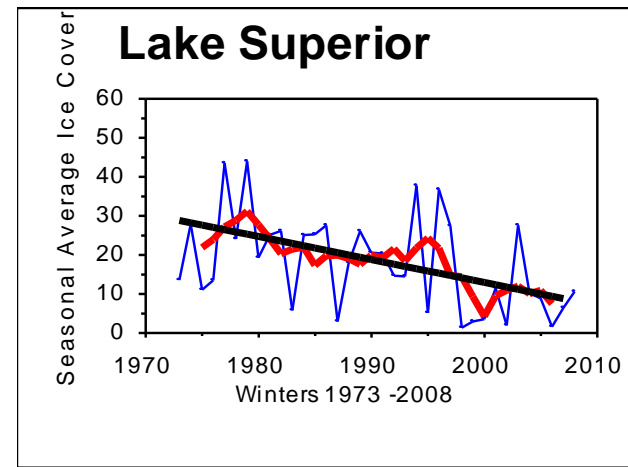
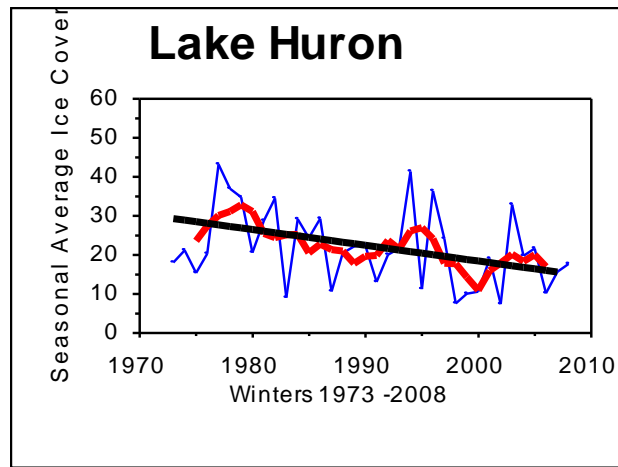
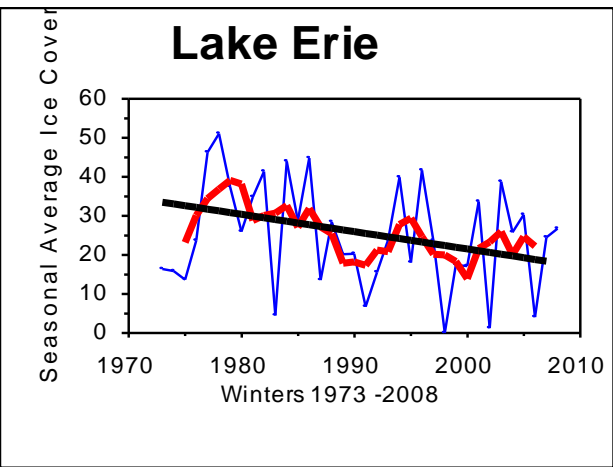


Toronto, August 2005



Pangnirtung 2008





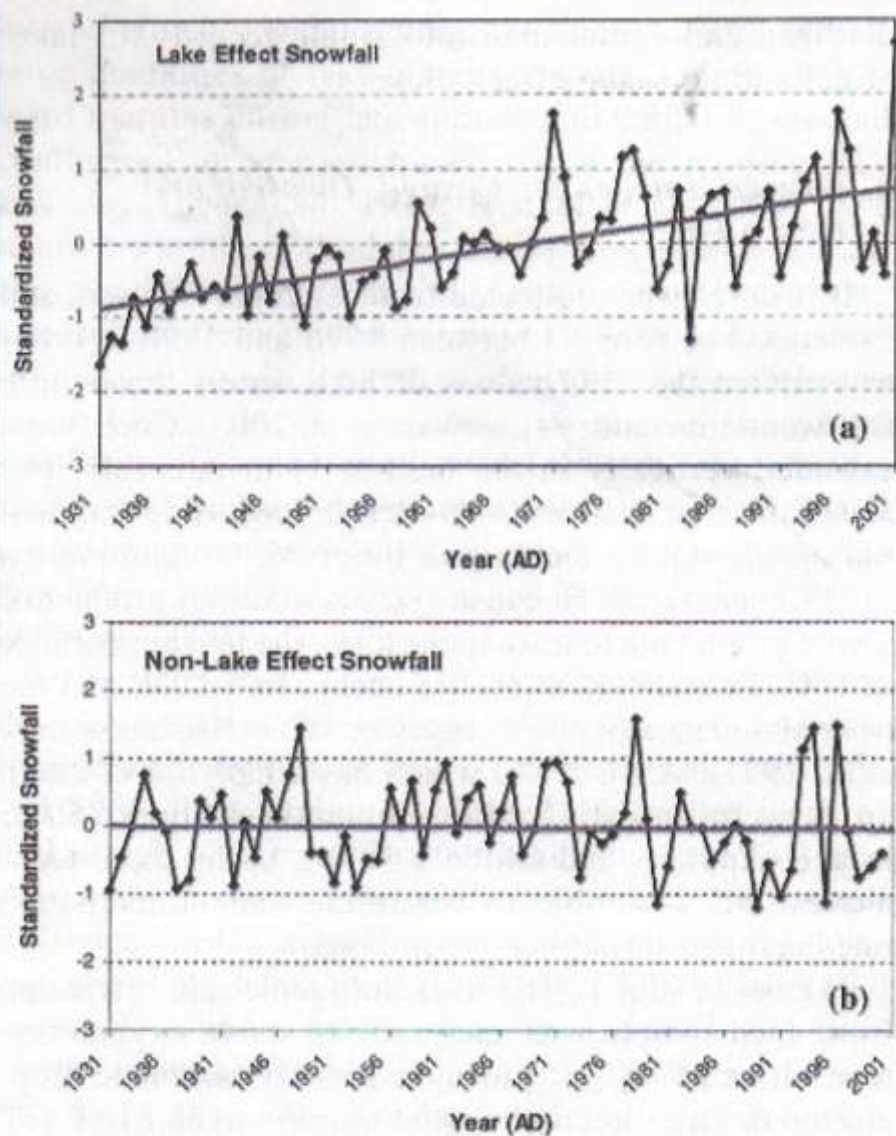
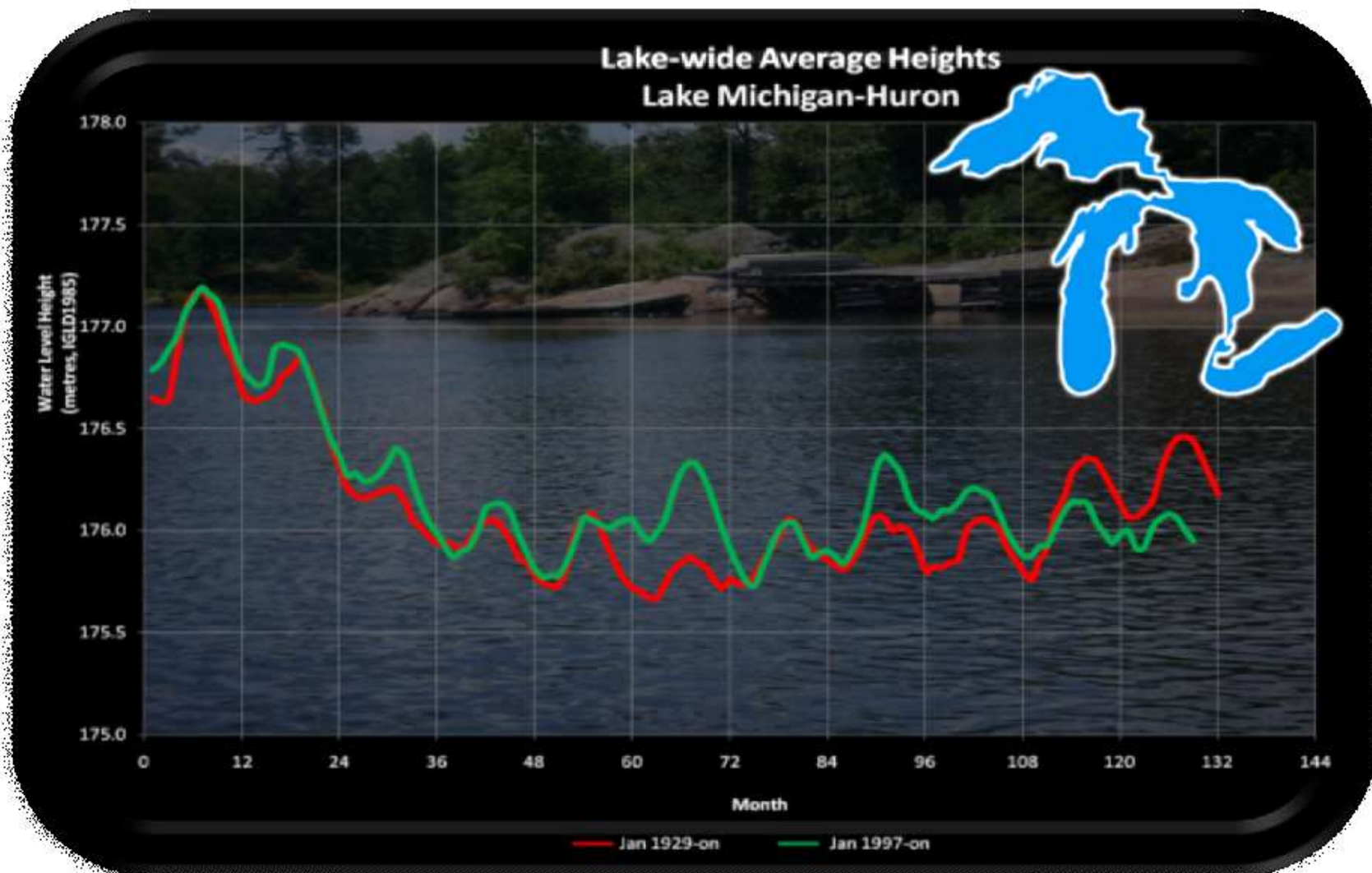


FIG. 3. (a) Composite standardized Oct–Apr total snowfall for lake-effect sites for 1931–2001. The gray line represents the linear trend in snowfall. (b) Same as (a) except for non-lake-effect sites.

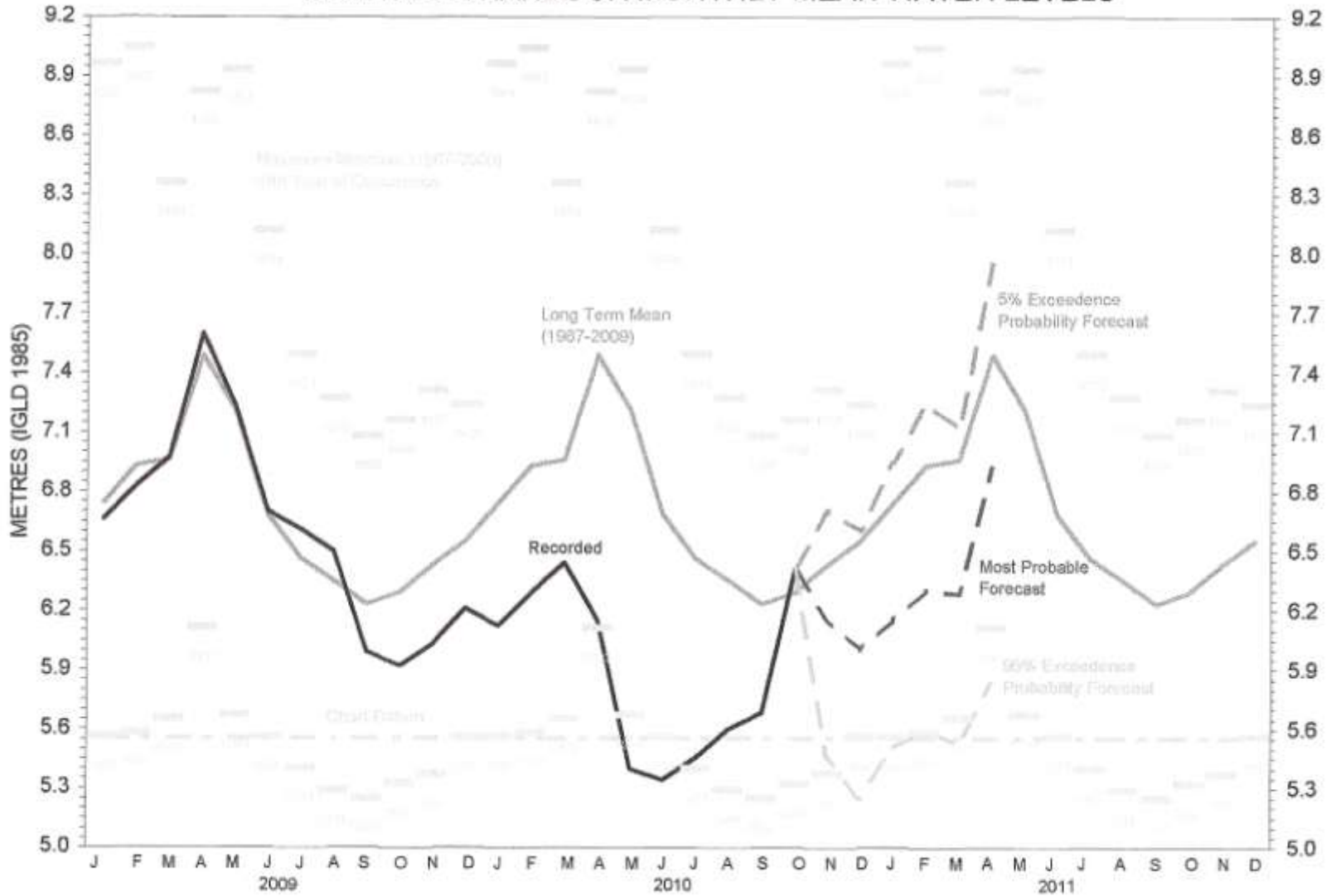
Burnett et al 2003

Current Levels Compared to 1930s

“Dust Bowl Era”



MONTREAL HARBOUR MONTHLY MEAN WATER LEVELS



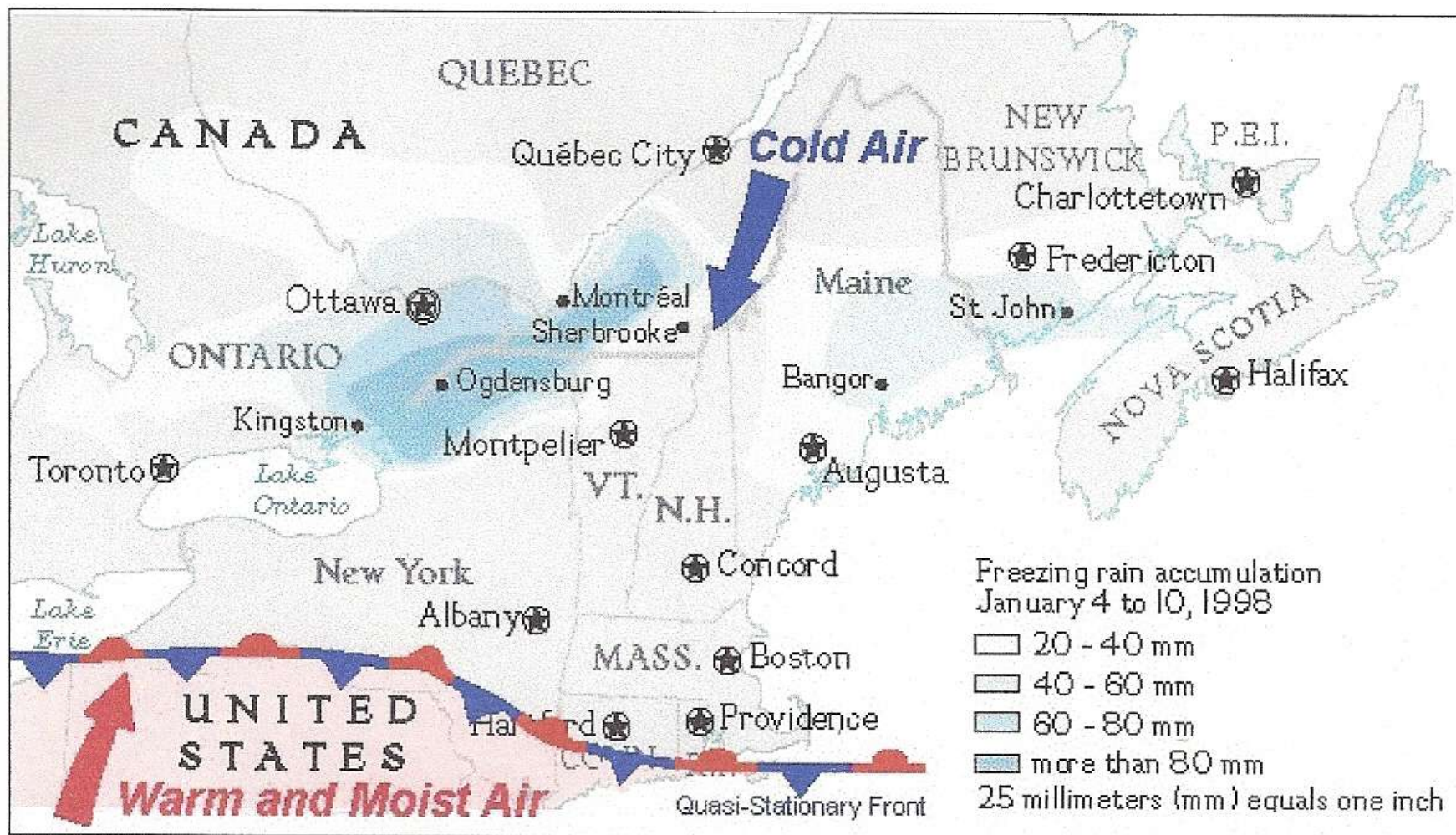


Figure 1: Freezing rain accumulation

Courtesy of the National Geographic Society

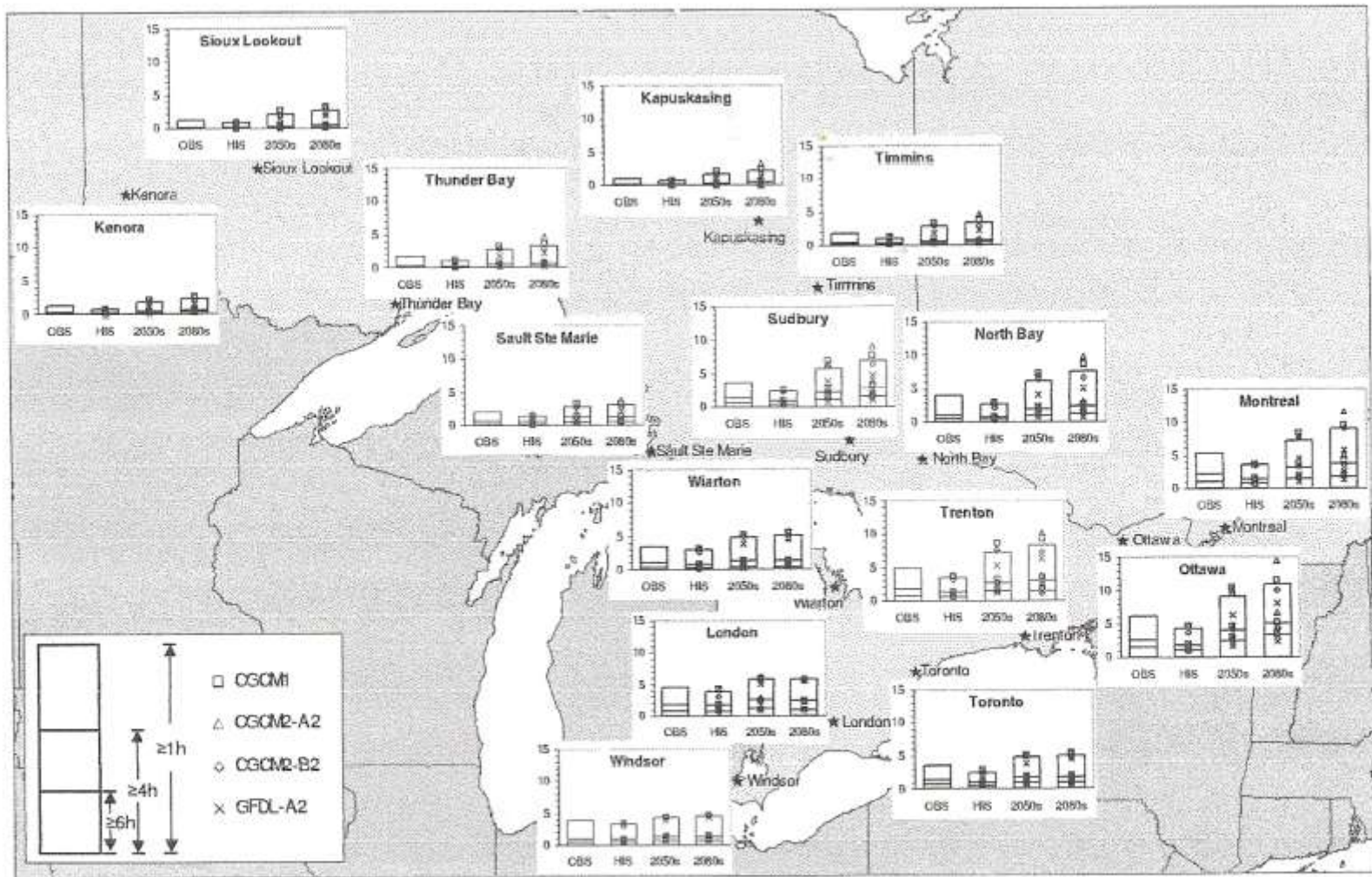


Fig. 5. Mean three-month total number of freezing rain events that occurred ≥ 1 , ≥ 4 , and ≥ 6 h during a day under the current climate during the period December–February, 1961–2000 (the left two bars) and future time periods (2040–2069, 2070–2089) (the right two bars). OBS represents observation and HIS is CGCM historical runs.