Modeling Future Snow and Ice Accumulation in the Rocky Mountains under climate warming

IS THE GLOBAL CLIMATE CHANGING?
What the sceptics say:
"There is no convincing evidence..."
**OCEAN SURFACE TEMPERATURES**

![OCEAN SURFACE TEMPERATURES](image)

**Daily Max Air Temps 1950-98**

- Strong spatial
- Seasonal structure

Atmosphere-Ocean 38, 395-429

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**GLACIER RETREAT**

Reichert et al (2002): 20th century glacier retreat is too large (by a factor of ~2) to be due to natural climate variability

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**Kilimanjaro**

- 5000+ m African Volcano
- Glacial cover since 11000 years BP
- 1912-2000 lost 80% of the ice area
- Ice disappears around 2015

Source: Thompson et al, Science, 10-18-2002
Glacier National Park
- 150+ glaciers in 1850s
- 37 today
- Ice mass decline > 90%
- All gone in a few decades


GLACIER RETREAT
Who should care?
- St. Mary Basin water users
- Milk River basin water users
- International Joint Commission

ARE HUMAN ACTIVITIES RESPONSIBLE FOR CLIMATE WARMING?

Michael Mann’s Hockey Stick
Based on:
- Tree rings
- Corals
- Calibrated historical records

Objective
What will be the overall change in Oldman Basin snow water equivalent under climate change?

Global Circulation Models say increased precipitation in winter for our region implies we have no problem
unfortunately we do

Science
nature

What is wrong with the weather?
Oldman Basin spring snow water equivalent declines 40% by 2020-50