

**Geography 3633 Fall 2015**

**Geography of the  
Lake Superior Basin**

**Graham Saunders**

# Graham Saunders

- Australian Weather Bureau
- Environment Canada
- Ministry of Natural Resources
- M.Sc. in Forestry and Climatology
- Teaching at LU since 1995
  - **Designed and proposed Lake Superior course**
  - Climate Change Research – boreal forest
  - Severe Weather adaptation
  - Pricing carbon
- Decades of writing about weather, climate, Lake Superior and related policy issues.

# Introduction to the Lake Superior course

Week	Date	Topic/Event
1	September 15, 17	<p>Introduction and Course Details: planning, marks, seminars, attendance, field trip?, guest speakers, balance of physical/ human topics</p> <p><b>Glacial lakes and the Younger Dryas event</b></p> <p><b>The Study of Lakes and Rivers</b></p>

# Course Objectives

- This is a survey course of Lake Superior, from its geological past to present issues.

# Course Structure

- Lectures
  - Courselink
- ⊗ Attendance
- ⊗ Bulletin Board
- ⊗ Office Hours
- ⊗ email response
- ⊗ Field trip

# Seminars

- A seminar (presentation/poster) will be presented by each student. Another option entails writing policy brief
- Based on research of historical and recent topics
- Commence in week four or five
- 20% of final mark



# Paper and Presentation

- a major paper will be completed by each student
- critical analysis of a topic will be expected
- conference style presentation
- 40% of final mark



# Topics

- **Glacial lakes and the Younger Dryas event**
- Human settlement: Early Palaeo to the Terminal Woodland
- Superior Robinson Treaty
- Company Towns
  
- The Seaway
  
- Weather and Climate of Lake Superior
- Recreation



# The Final Voyage of the Edmund Fitzgerald

Nov. 10

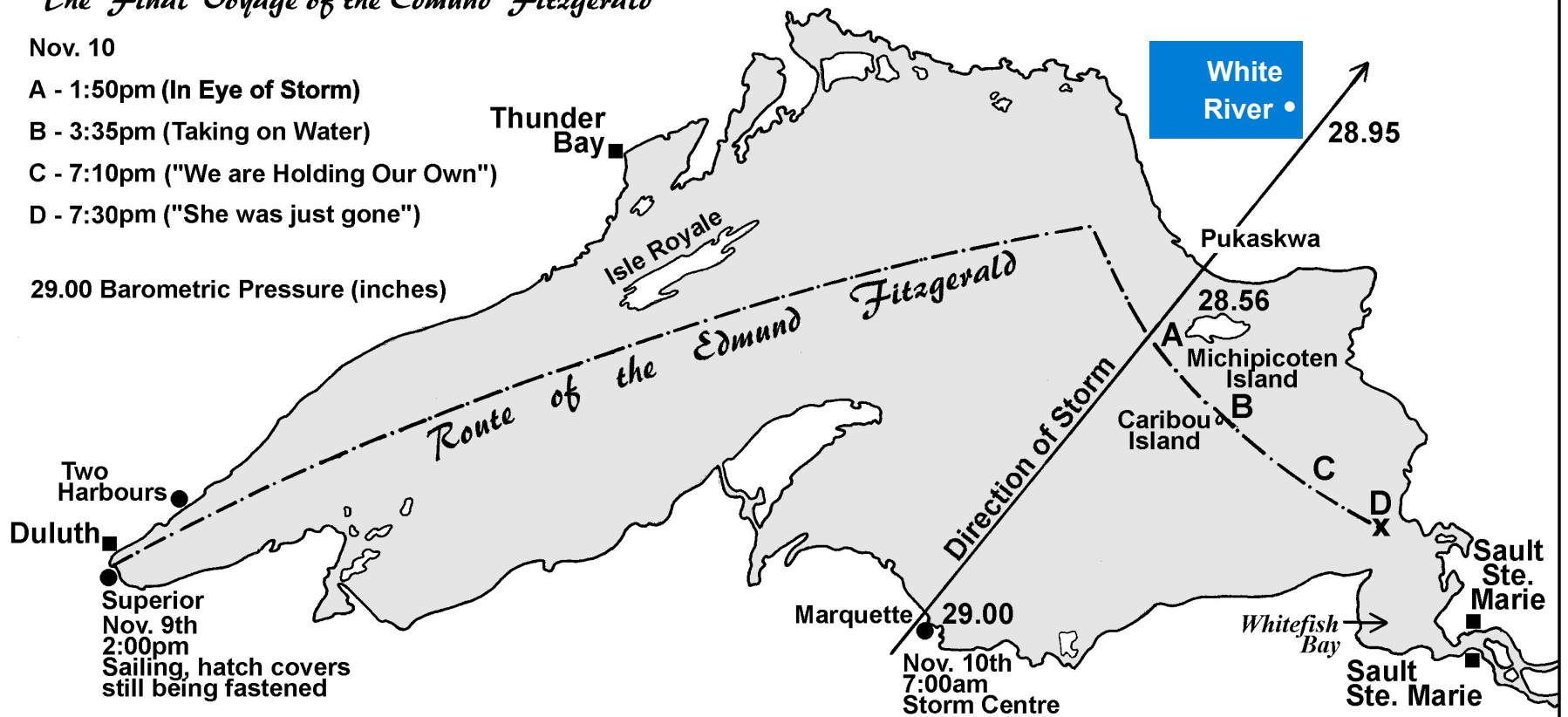
A - 1:50pm (In Eye of Storm)

B - 3:35pm (Taking on Water)

C - 7:10pm ("We are Holding Our Own")

D - 7:30pm ("She was just gone")

29.00 Barometric Pressure (inches)



Superior  
Nov. 9th  
2:00pm  
Sailing, hatch covers  
still being fastened

Nov. 10th  
7:00am  
Storm Centre

# Lake Superior: Early Physical History/Geography



14,000 Years Ago



9,000 Years Ago

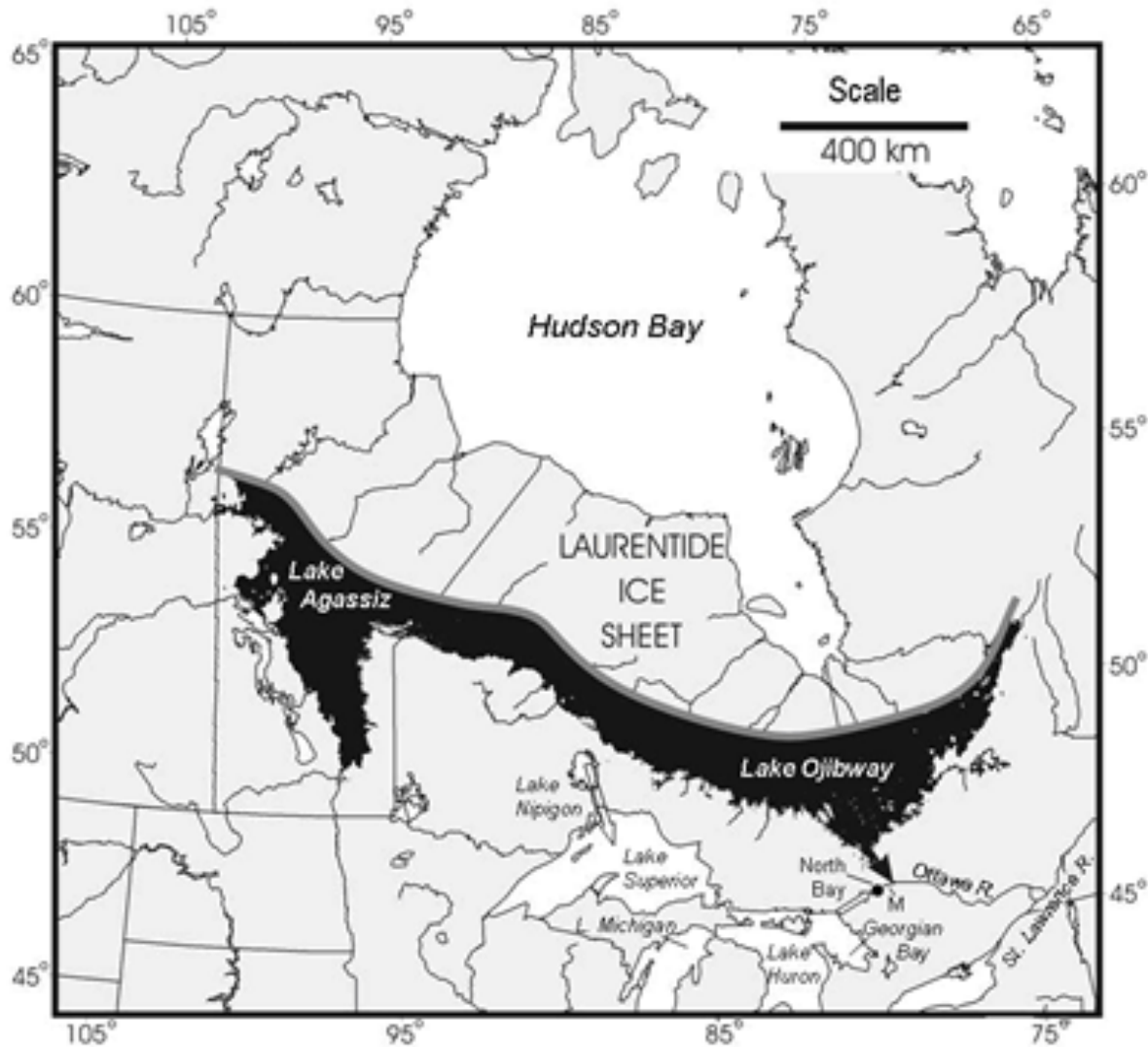


7,000 Years Ago



4,000 Years Ago





**Figure 1:** Paleogeography of the region north of the upper Great Lakes at 7,900 <sup>14</sup>C BP when the combined outflow of Lakes Agassiz and Ojibway was routed to the Ottawa and St. Lawrence river valleys (solid arrow). At this stage the water supply of the Great Lakes was no longer supplemented by inflow from upstream sources, but was supplied by precipitation alone, as at present. Prior to 8,000 <sup>14</sup>C BP, overflow from Lake Agassiz passed into the Lake Nipigon and Lake Superior basins (open arrow). The upper Great Lakes then overflowed the North Bay outlet (open arrow) into the Mattawa River (M) and thence to the Ottawa and St Lawrence river valleys. Adapted from Figure 4p in Teller and Leverington (2004).

# The Younger Dryas

The Younger Dryas is an example of abrupt climate change. About 14,500 years ago, the Earth's climate began to shift from a cold glacial world to a warmer interglacial state. During this transition, temperatures in the Northern Hemisphere suddenly returned to near-glacial conditions

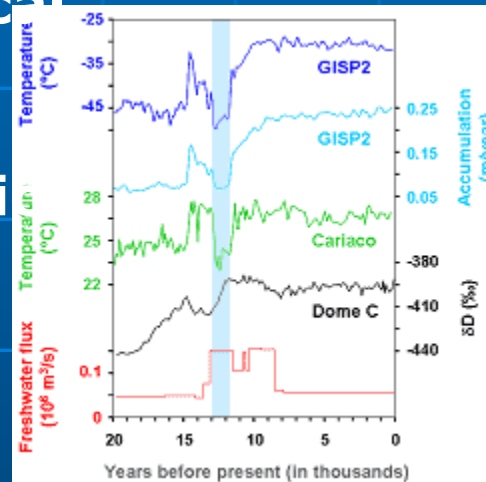


*(Dryas octopetala)*

# Climate changes associated with the Younger Dryas

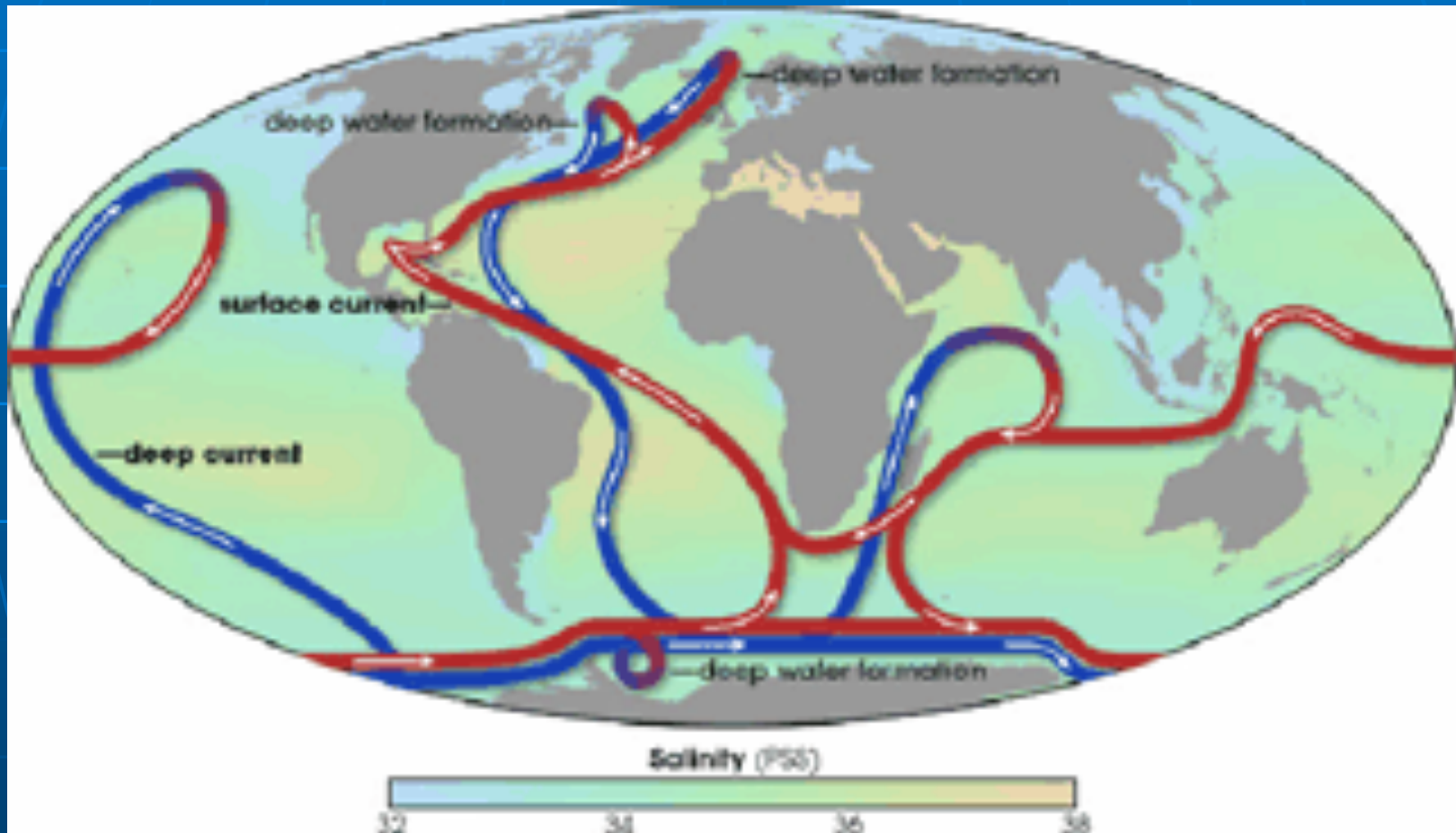
Note light blue bar

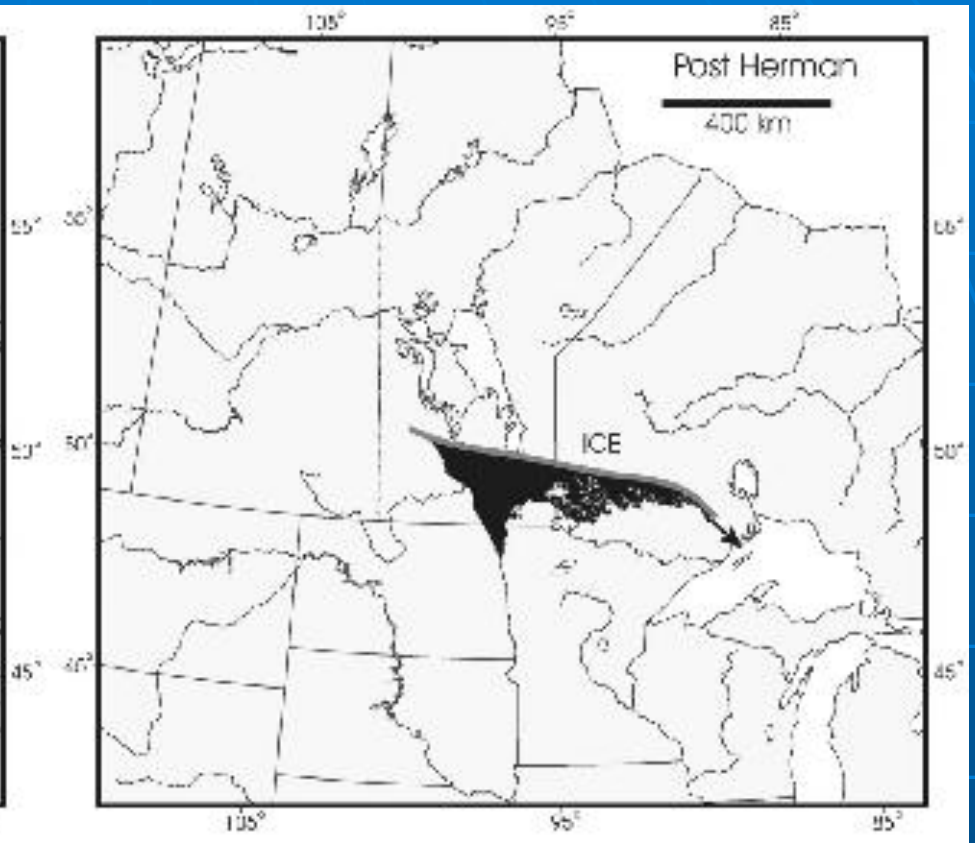
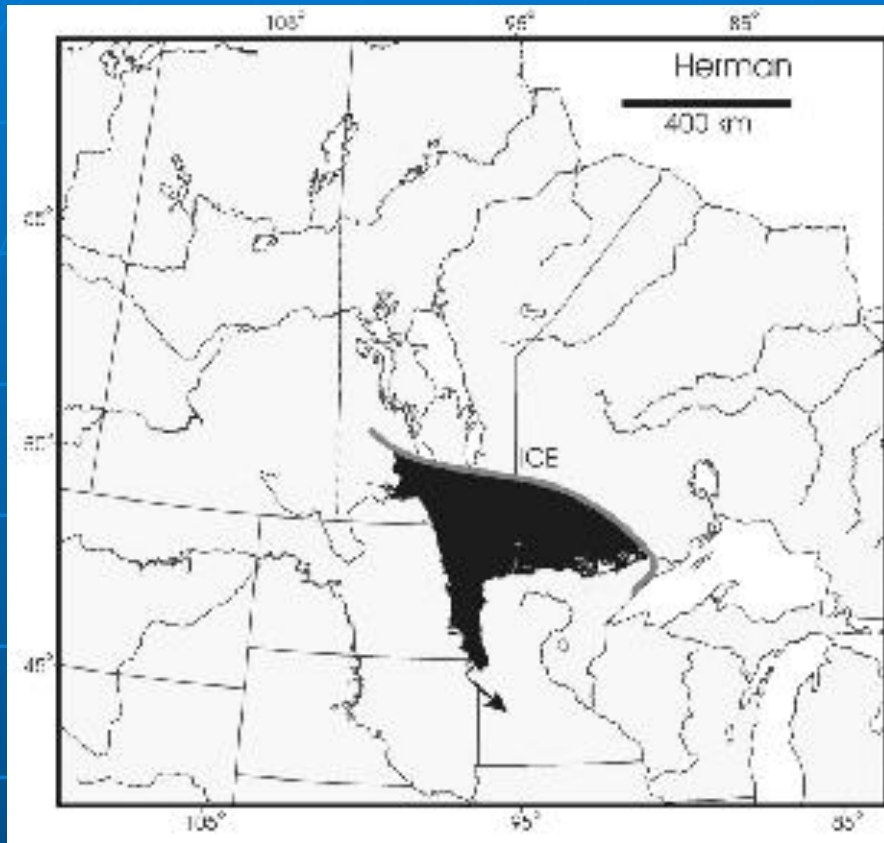
- snow accumulation in Greenland
- cooling in the tropical Cariaco Basin (Venezuela)
- warming in Antarctica
- Flux of meltwater from in the St. Lawrence River



Sources: Alley (2000),  
Lea et al. (2003),  
Licciardi et al. (1999).

# Cause and Effect?





*Figure 1 Lake Agassiz before discharge*

*Figure 2 Lake Agassiz eastward flow*



# Discussion

- Older Dryas (18 to 14.7 BP)
- Followed by the Bølling-Allerød warm period (~14.7 to 12.9 BP)
- whose end is the start of the Younger Dryas

Hence, the end of the Younger Dryas marks the beginning of the Holocene

BUT

“Freshwater Outburst from Lake Superior as a Trigger for the Cold Event 9300 Years Ago”