

Reconstructing past lake levels in the Lake Superior Basin

by

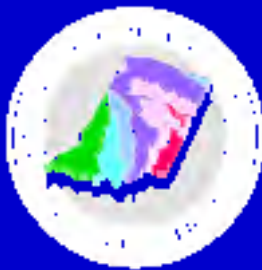
Todd A. Thompson
Indiana Geological Survey
Indiana University
Bloomington, IN 47405-2208
tthomps@indiana.edu

with contributions from

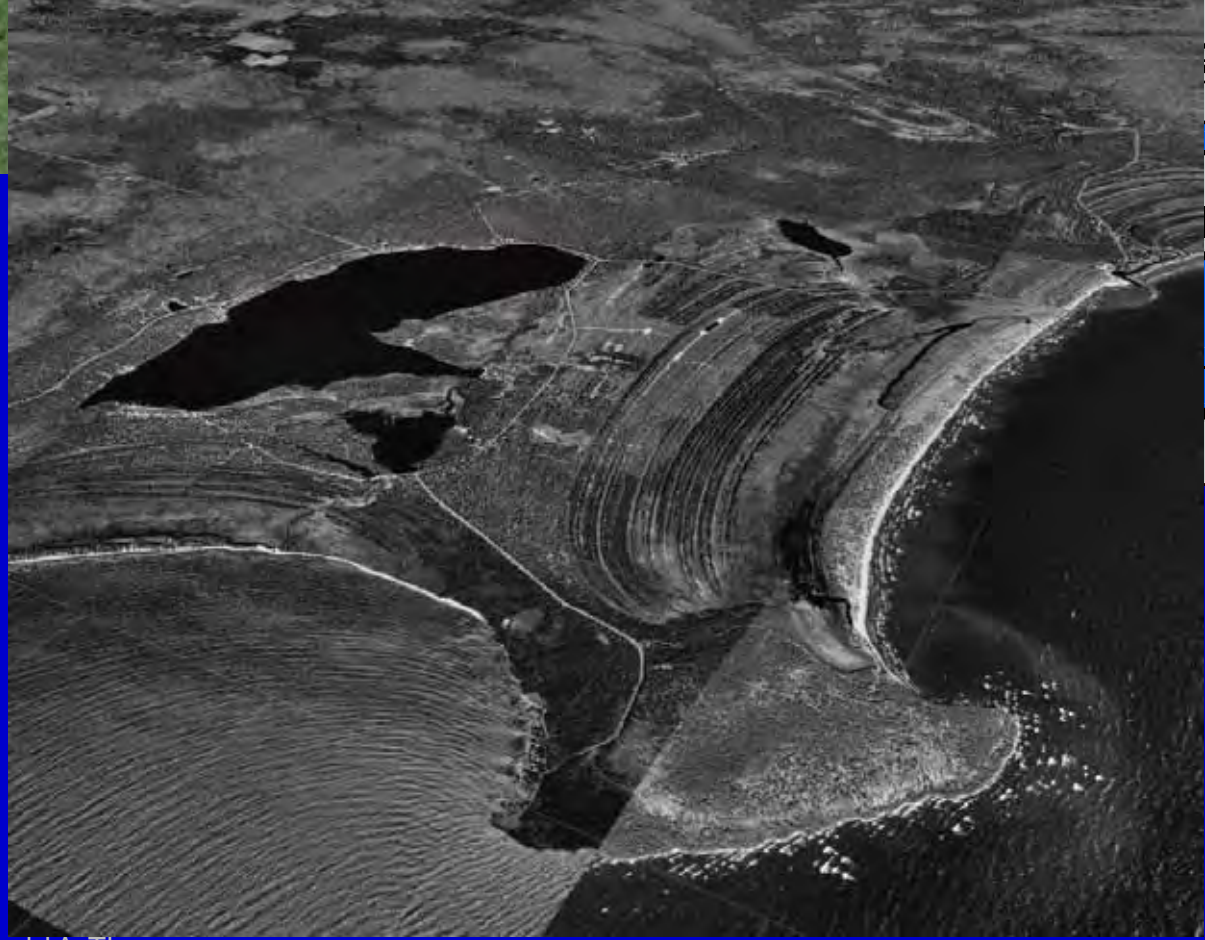
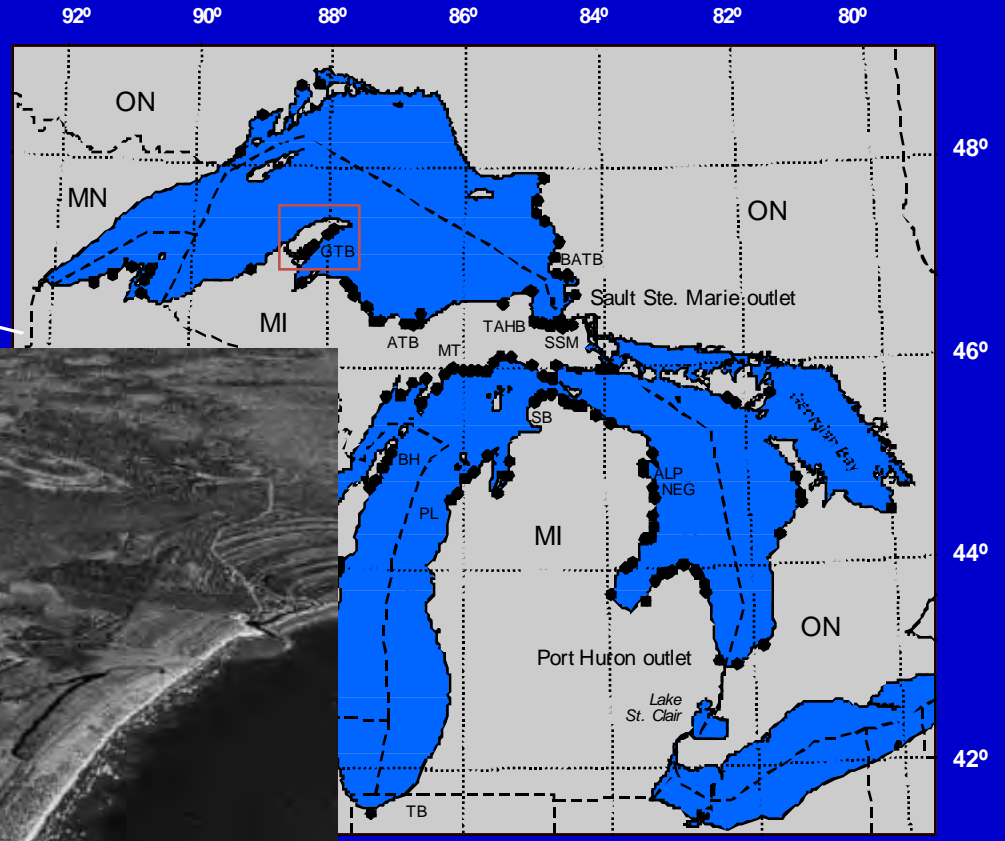
John W. Johnston
University of Waterloo

and

Steve J. Baedke
James Madison University

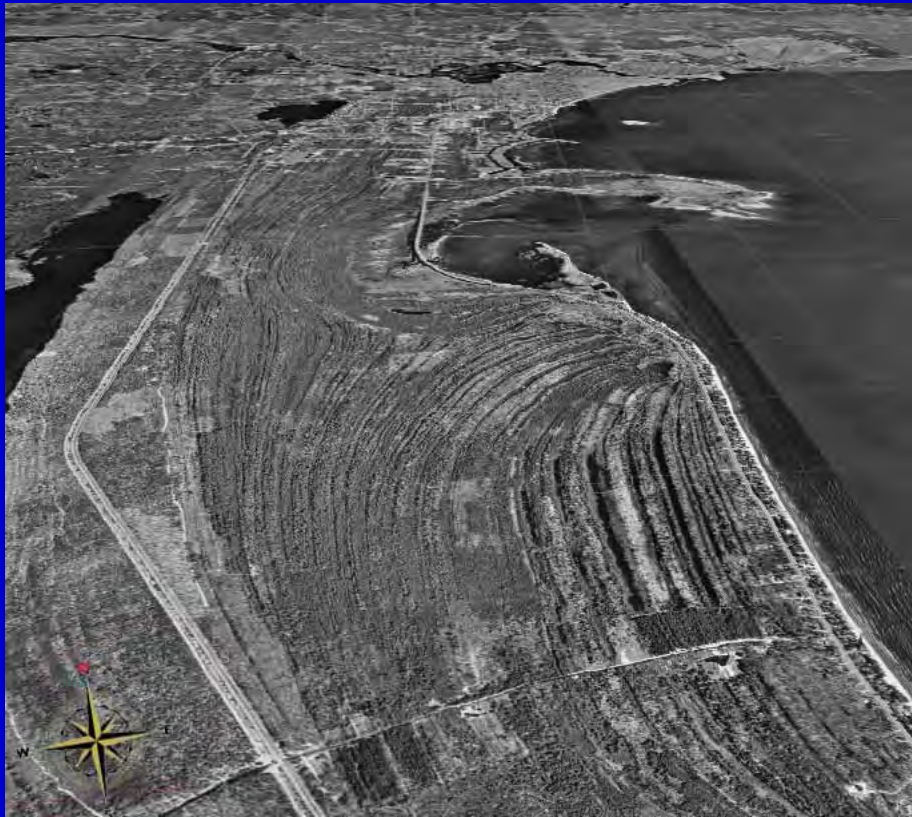


Strandplains of beach ridges

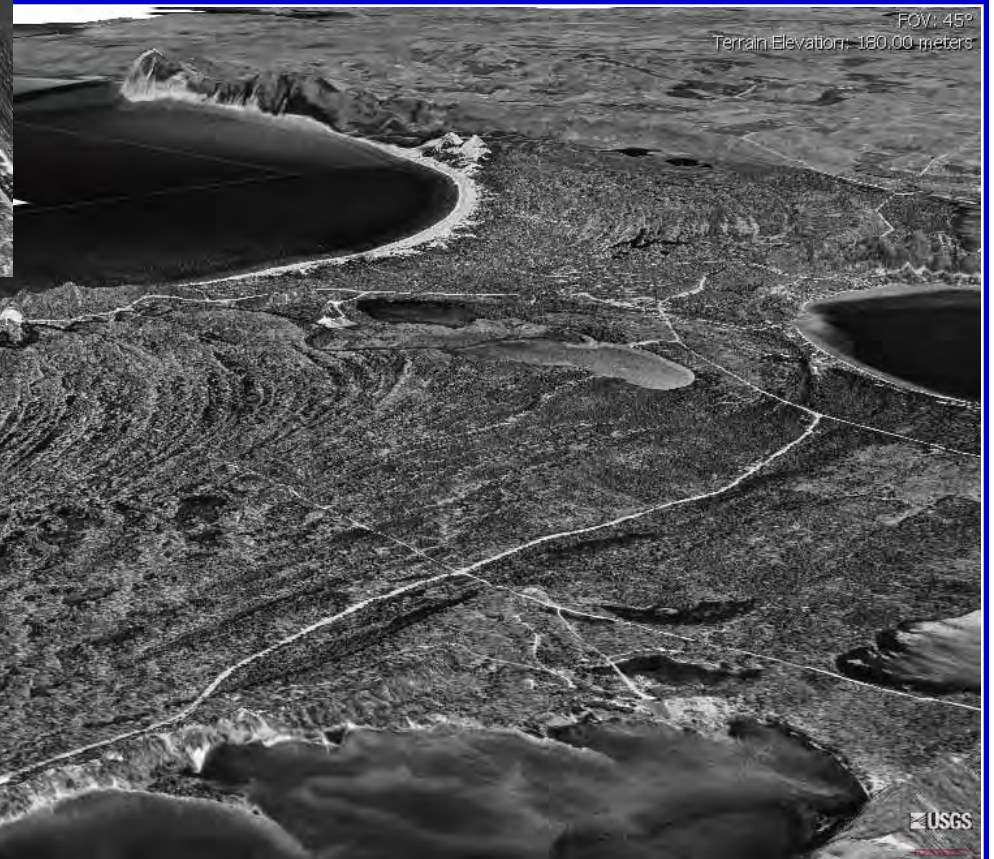


Grand Traverse Bay

Upper Great Lakes Strandplains



Alpena, MI



SBDNL, MI

Tahquamenon Bay, MI

Upper Great Lakes Strandplains



Grand Traverse
Bay, MI



Vibracoring



Tahquamenon Bay



Indiana Dunes

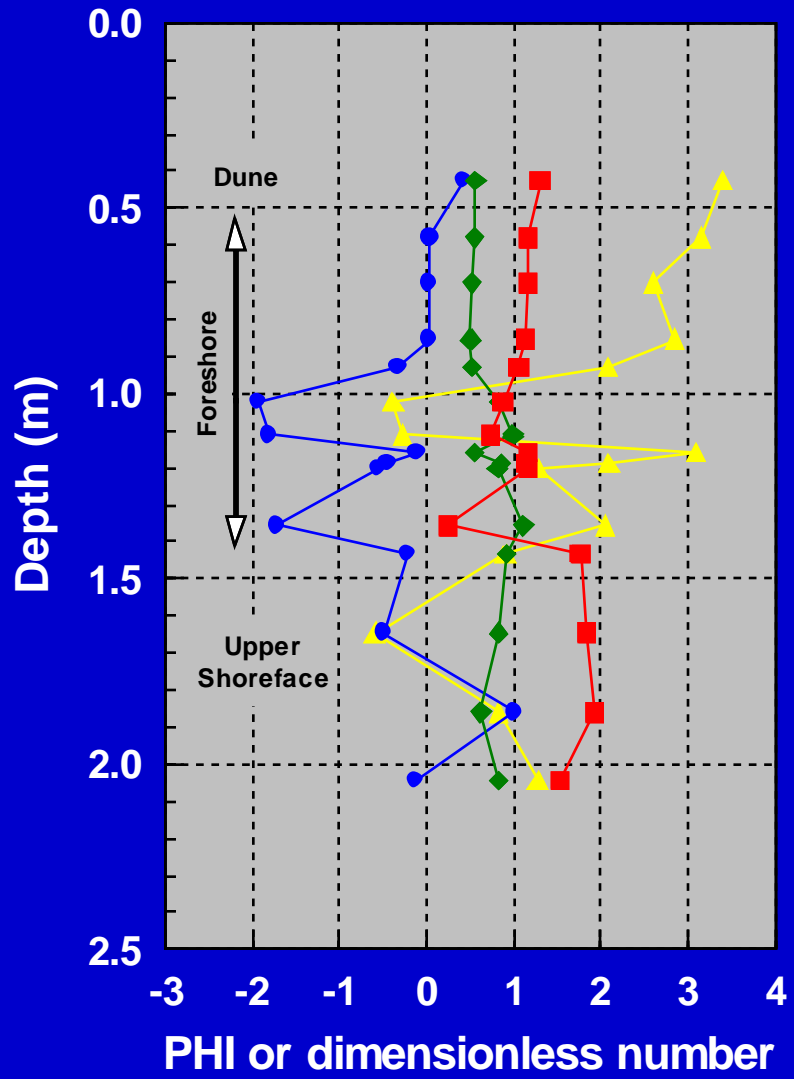


Tahquamenon Bay

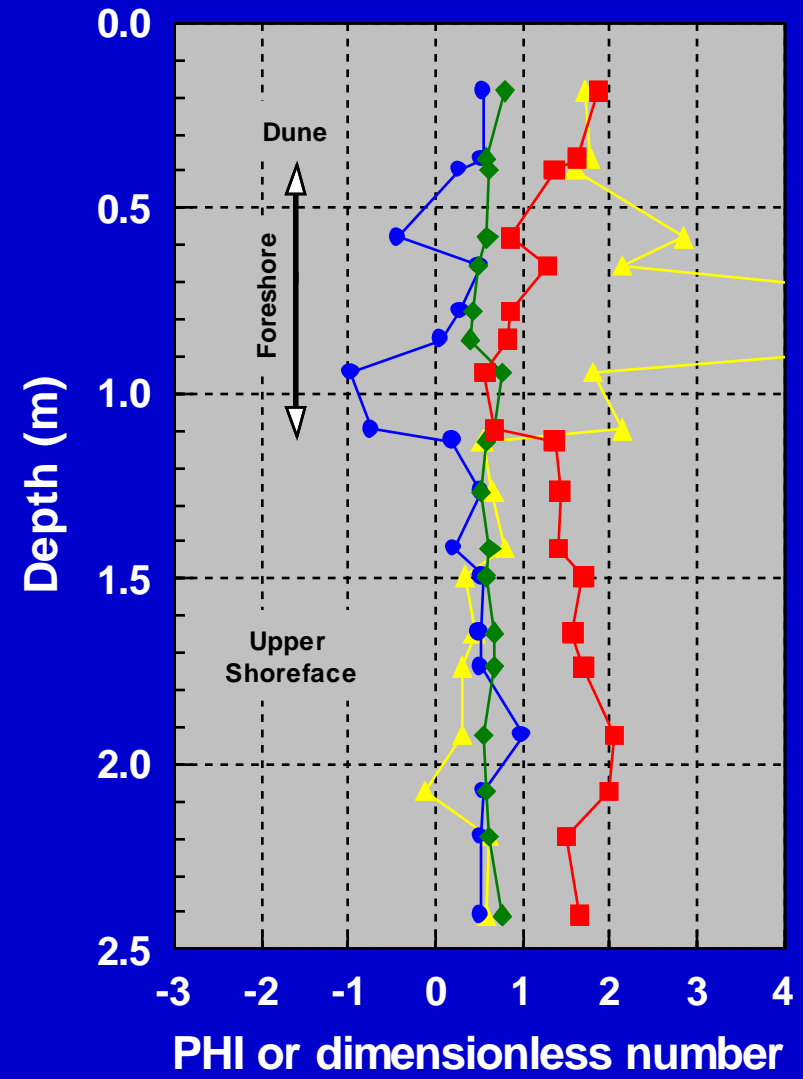
Vertical grain-size distribution Tahquamenon Bay

- Mean
- ◆ Sorting
- C. one-%tile
- ▲ Skewness

Core 906



Core 951



Peat coring and OS Ling

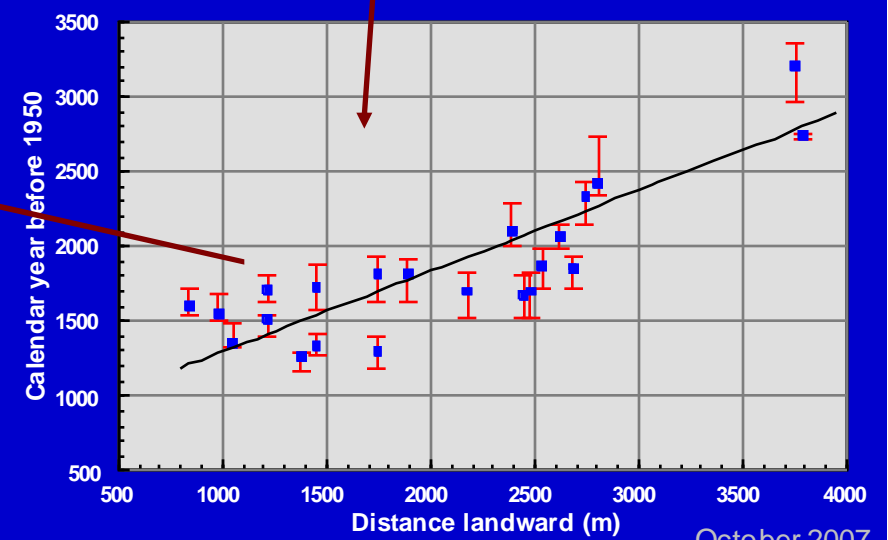
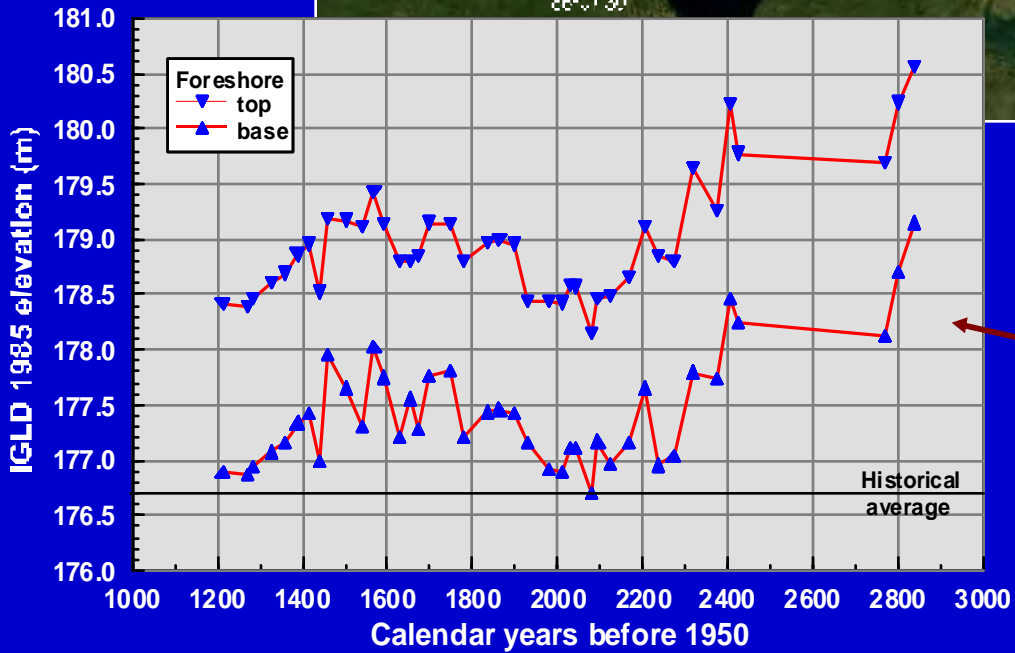
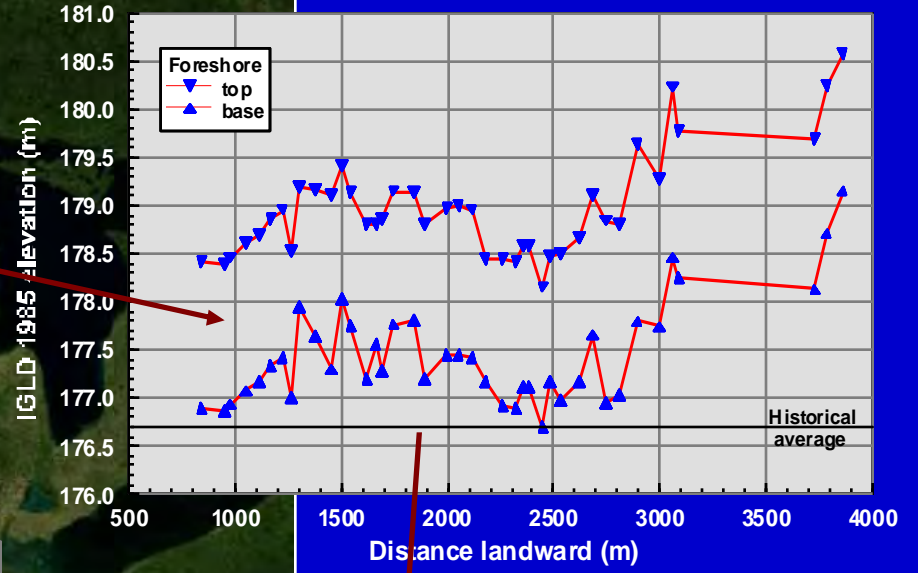
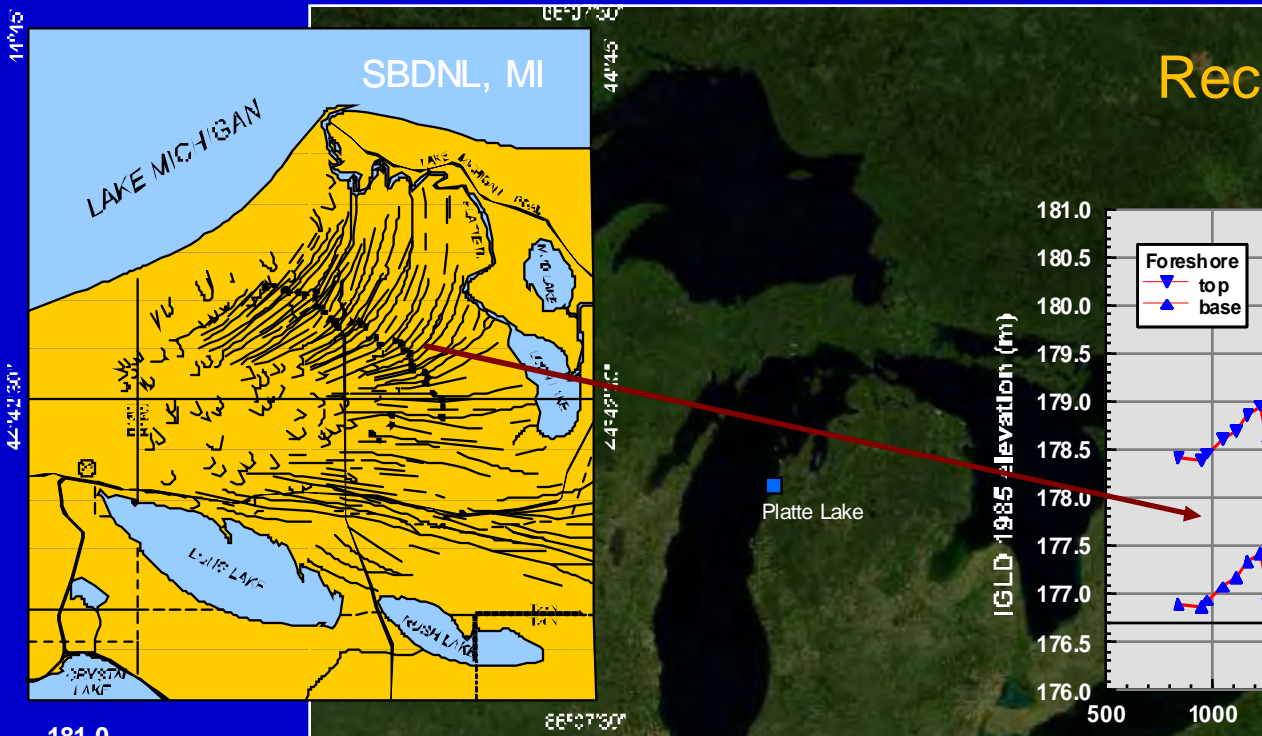
Tahquamenon Bay



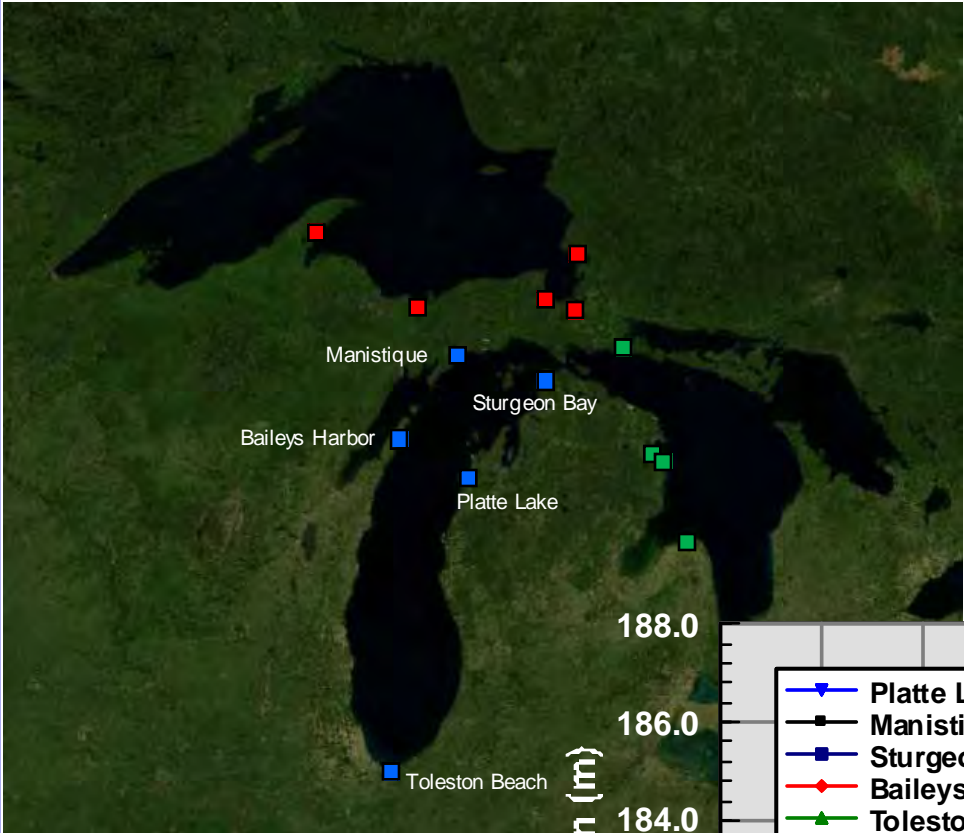
Au Train Bay



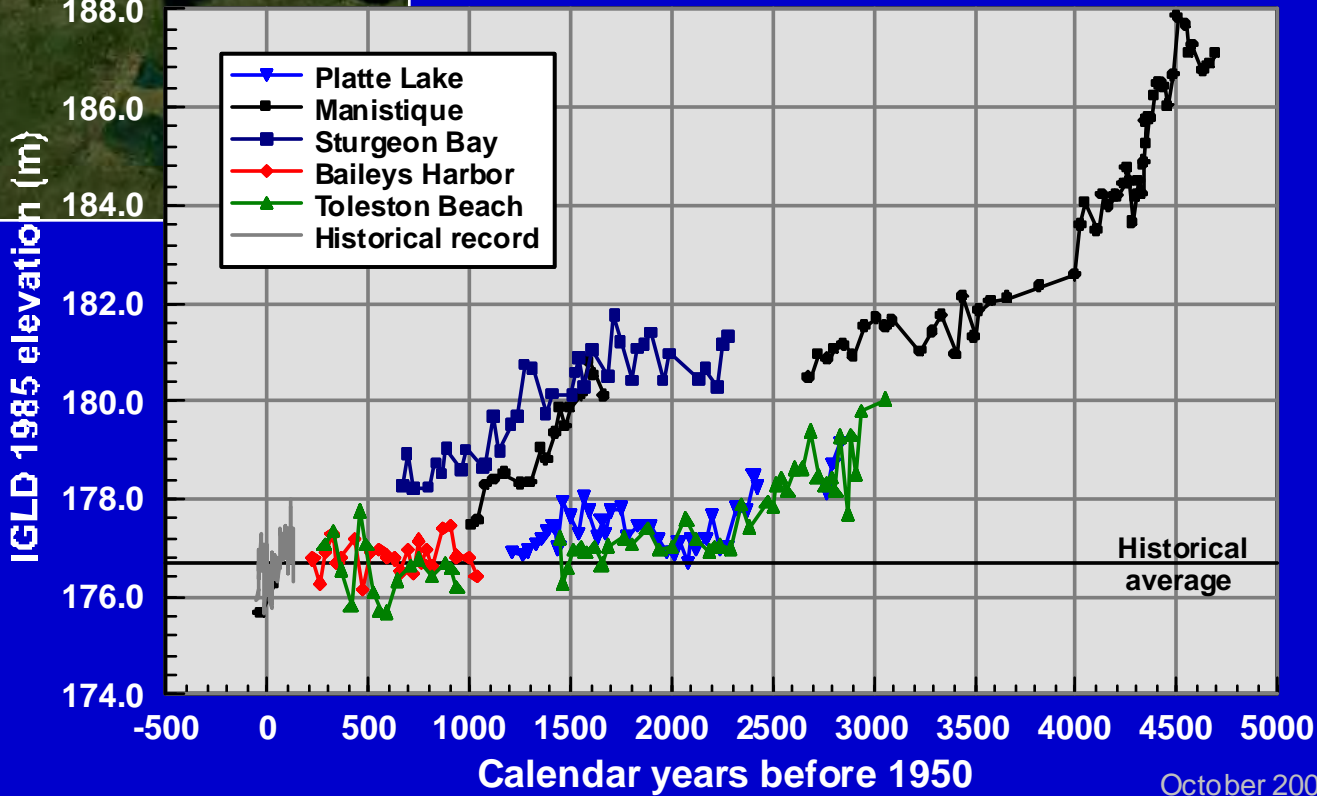
Reconstructing lake level



Relative hydrographs

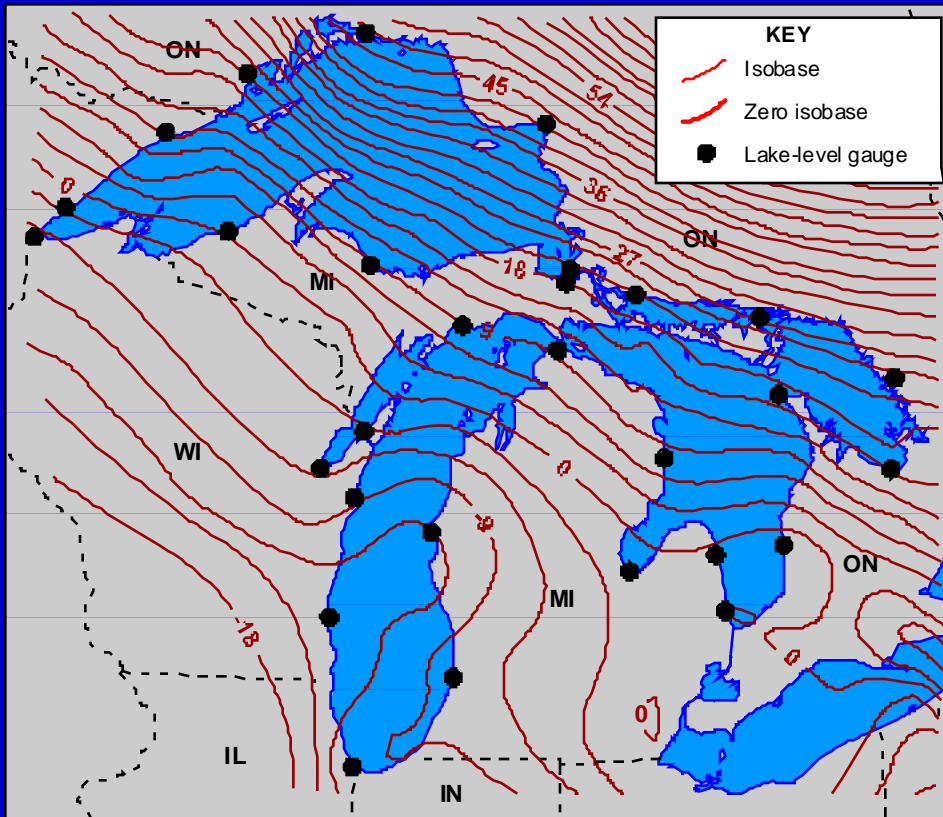


Upper Great Lakes

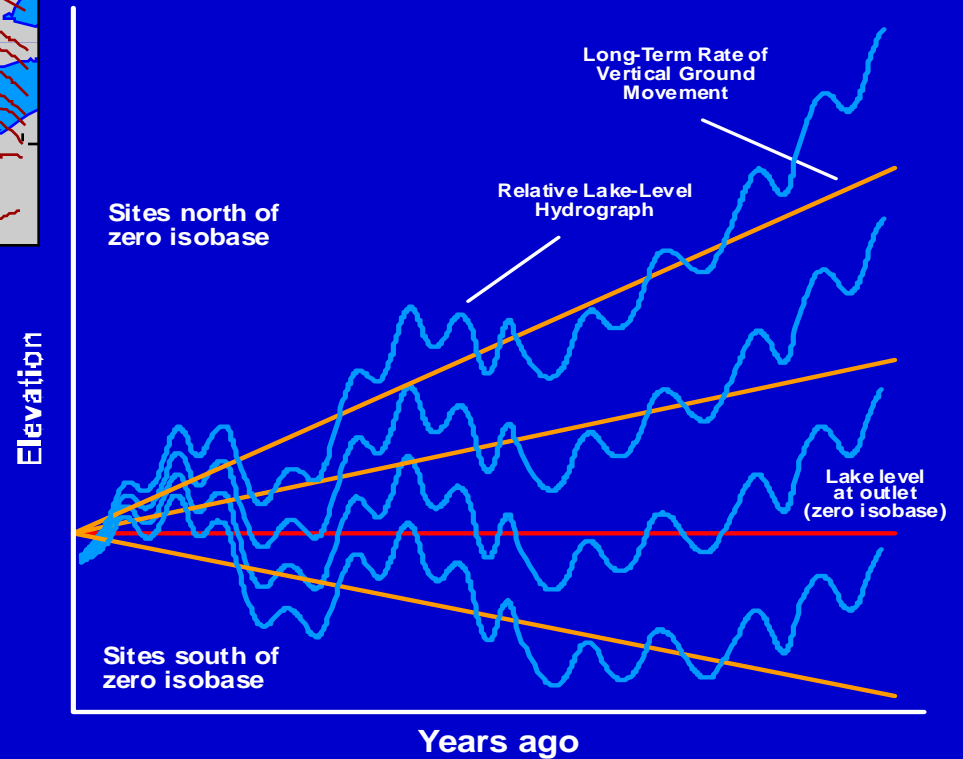


Vertical ground movement and relative lake levels

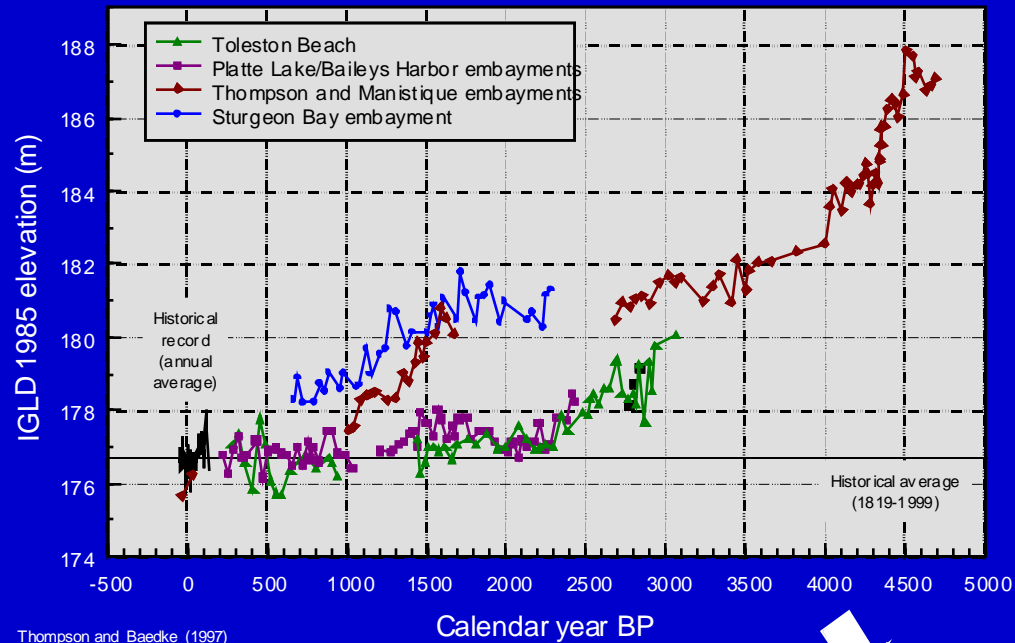
Rebound Scenario for Lakes Michigan and Huron



Mainville and Craymer (2005)



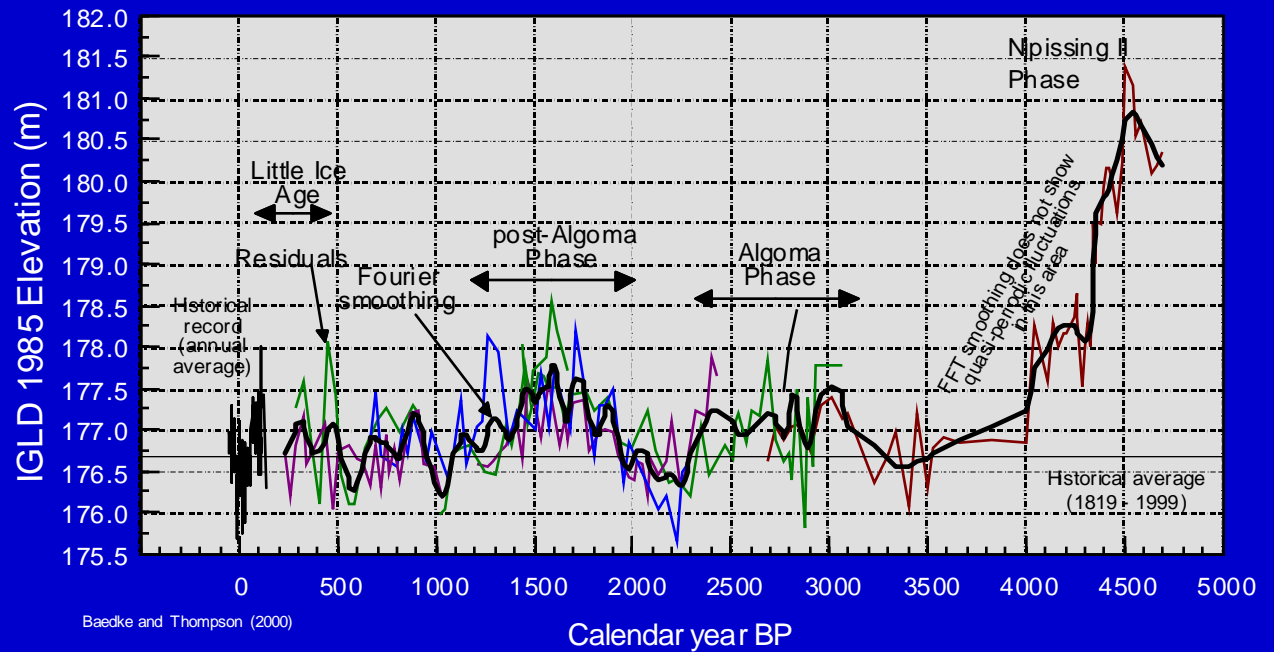
Lake M/H Late Holocene lake level



Relative LL hydrographs

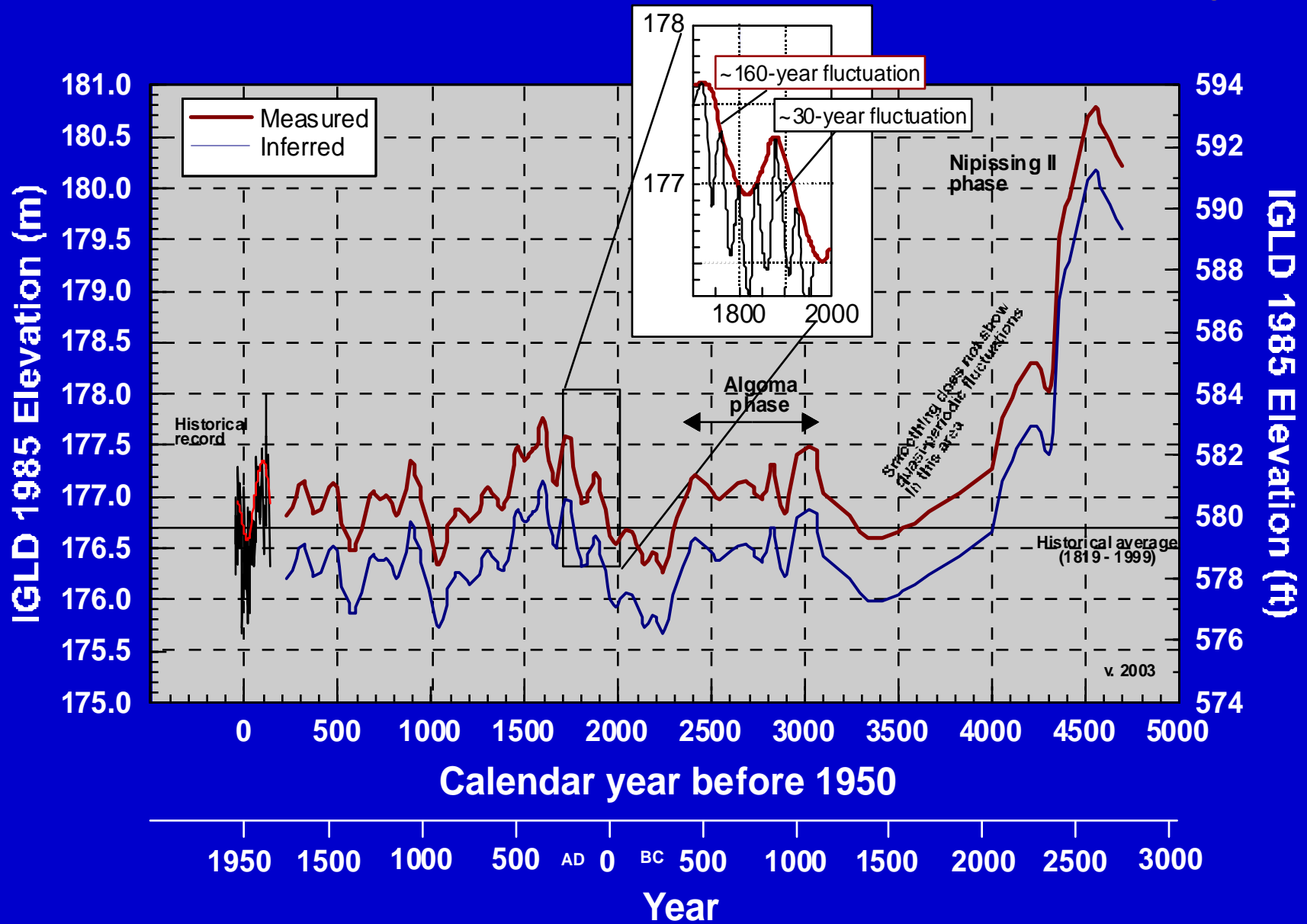
Thompson and Baedke (1997)
And Baedke and Thompson (2000)

Residual LL hydrograph



Baedke and Thompson (2000)

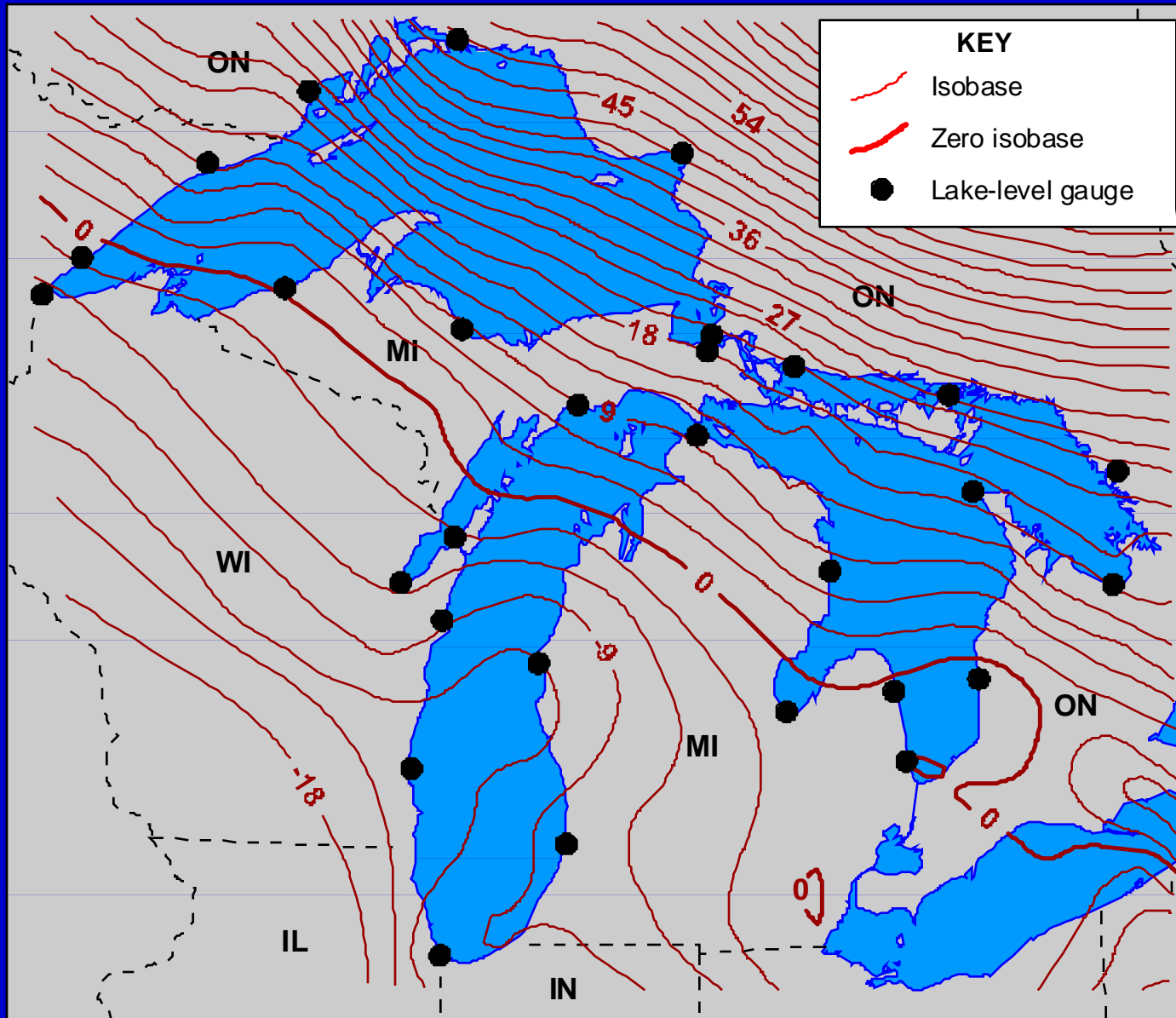
Late Holocene lake level Lake Michigan/Huron



Lake Superior
Au Train Bay

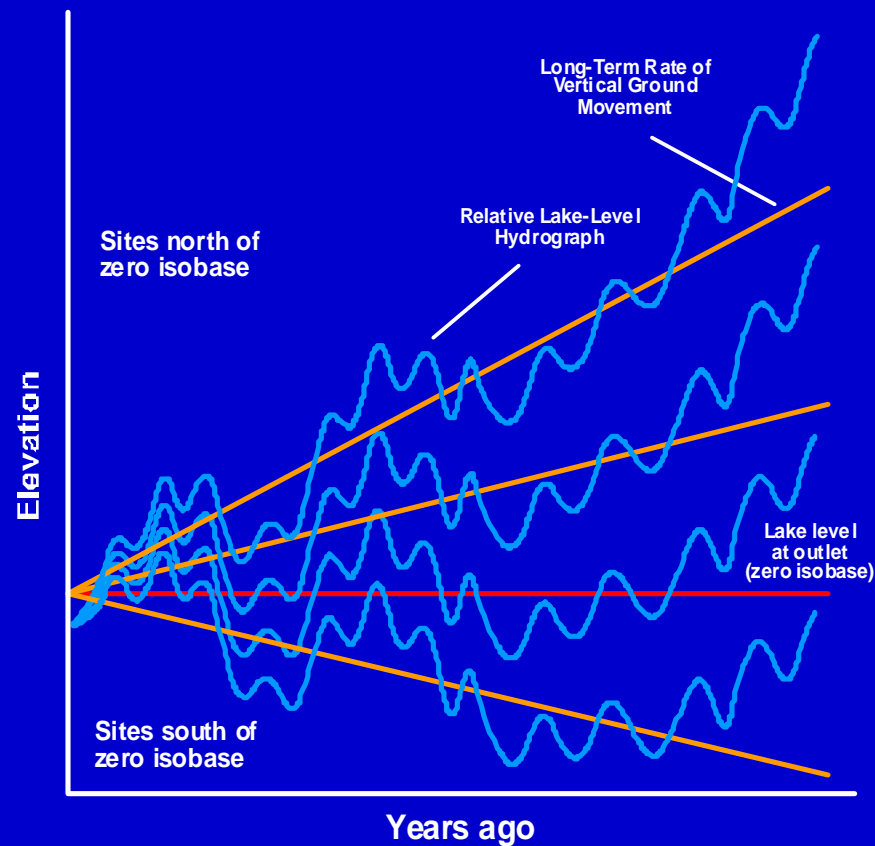


Vertical ground movement

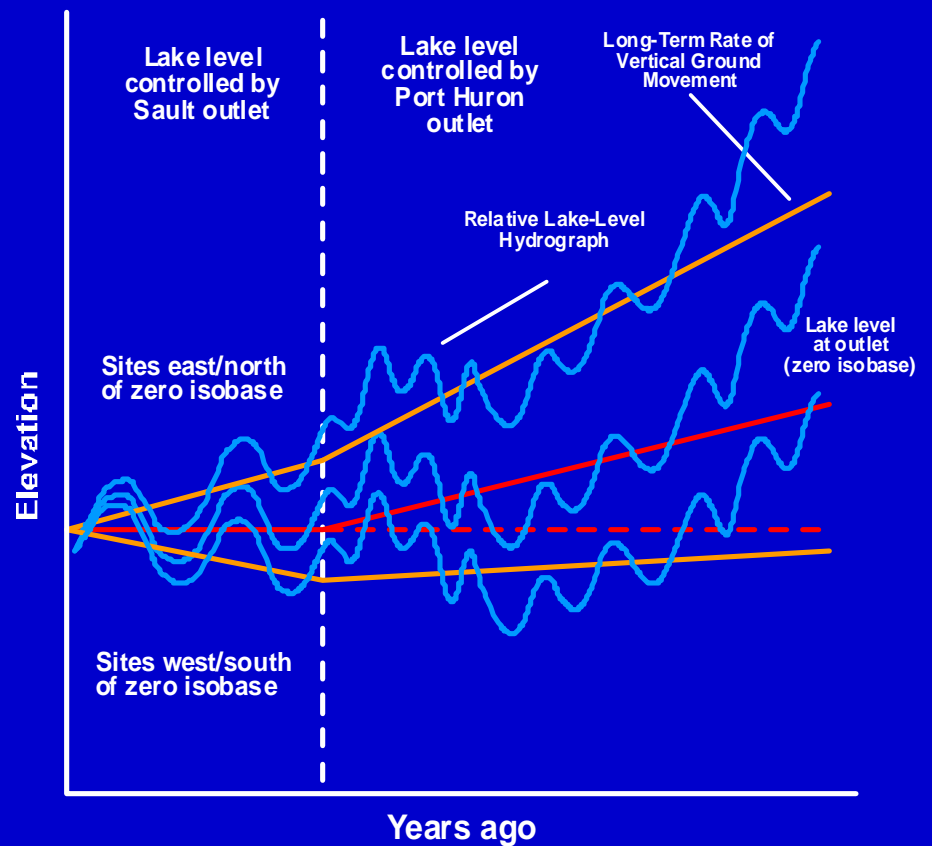


Relative lake level and rebound scenarios for the Upper Great Lakes

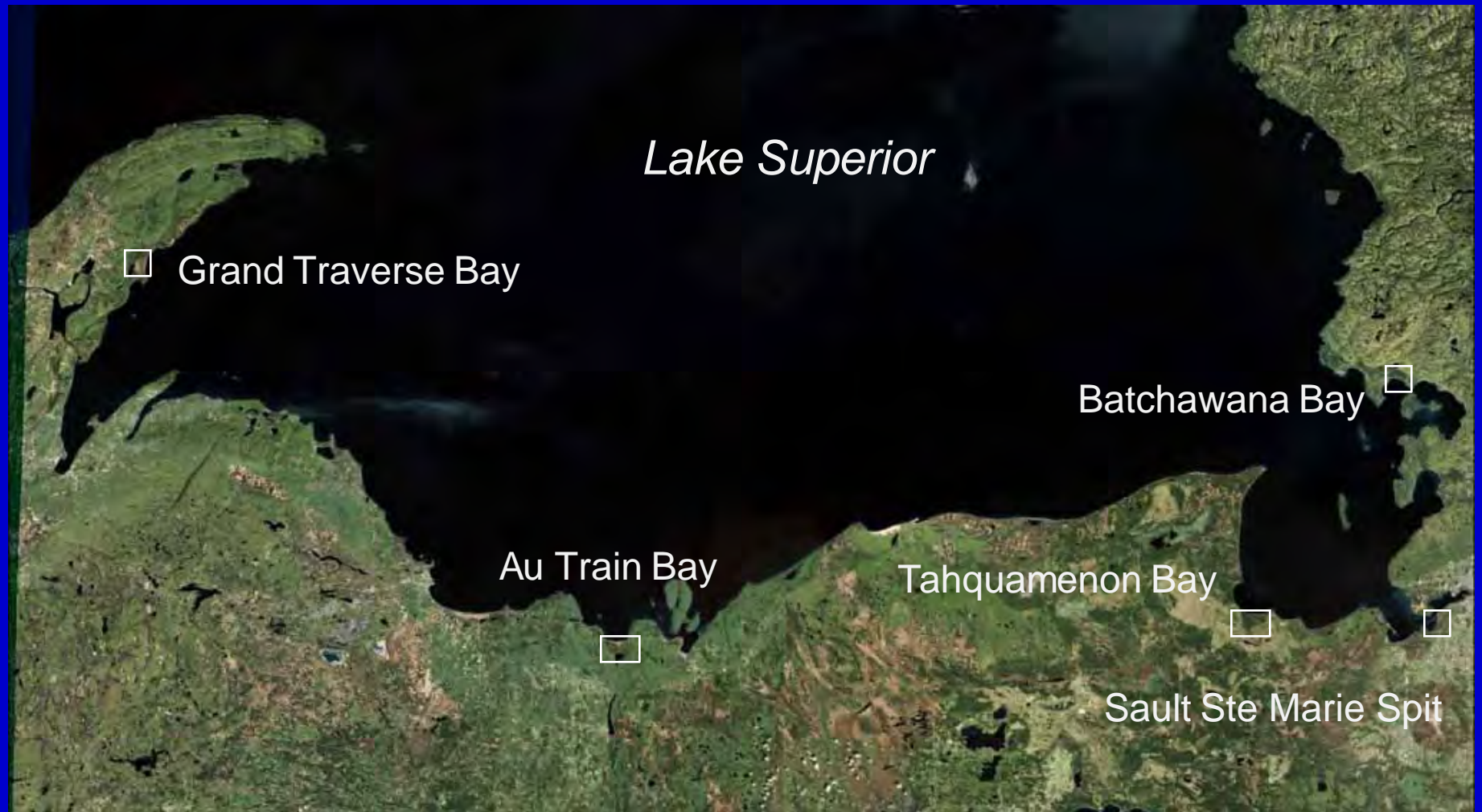
Lakes Michigan and Huron



Lake Superior

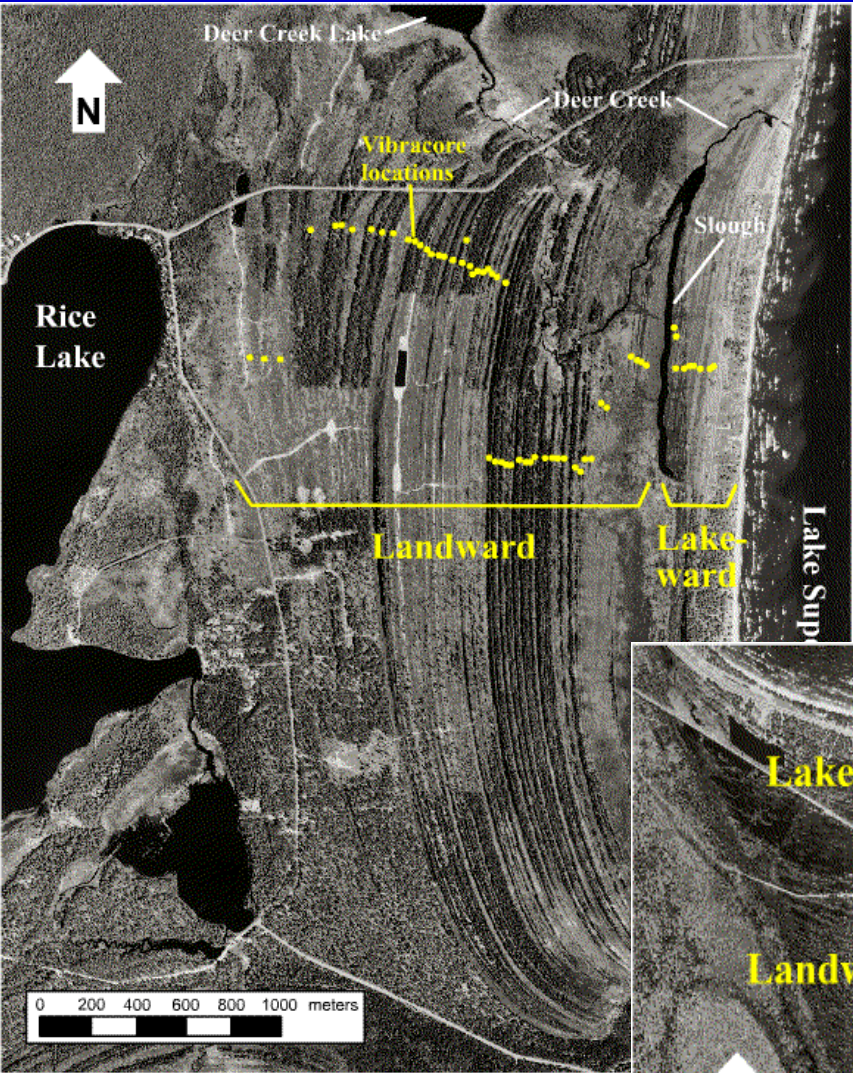


Lake Superior study areas

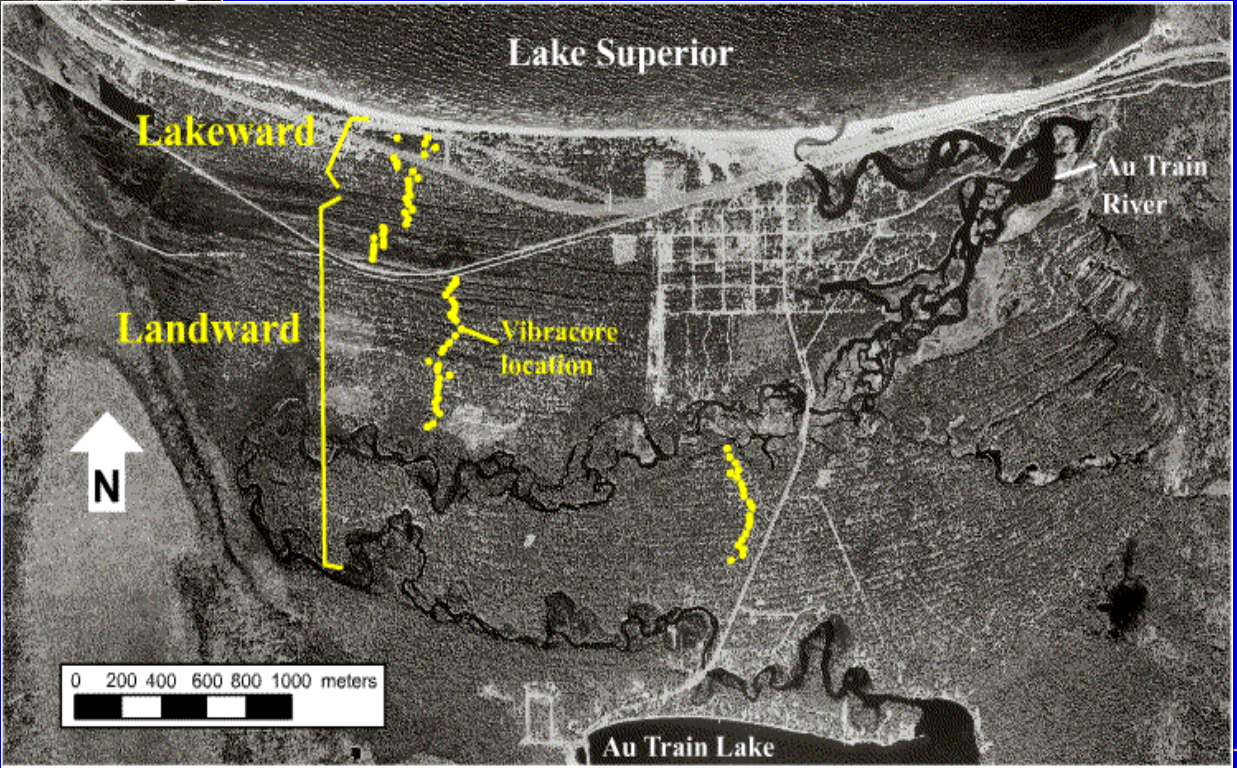


Strandplain geomorphology

Grand Traverse Bay

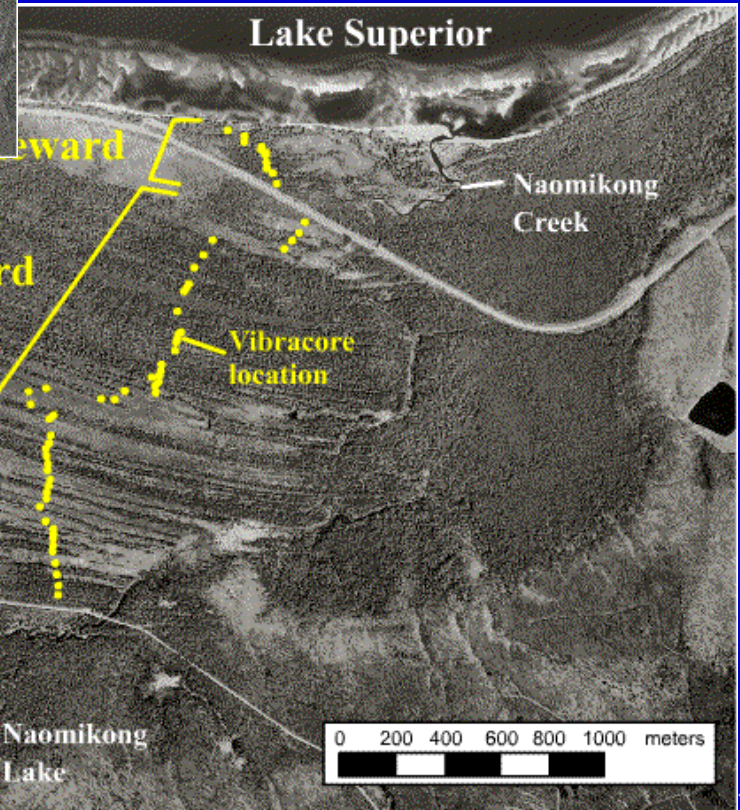
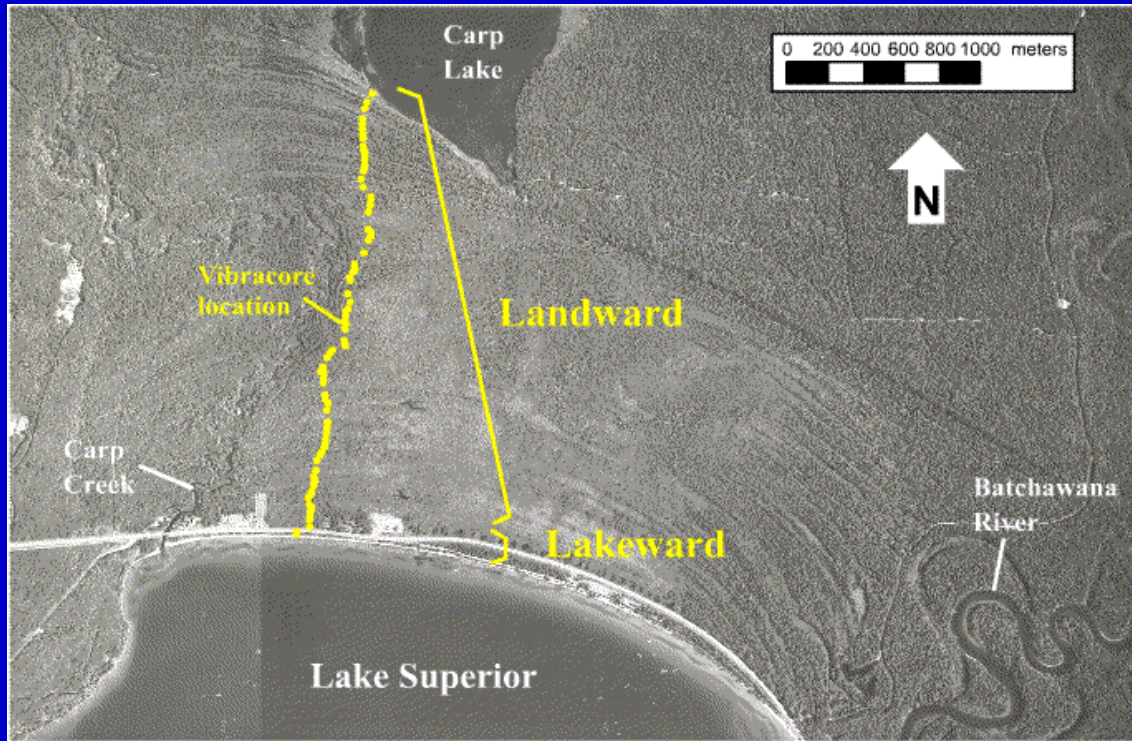


Au Train Bay



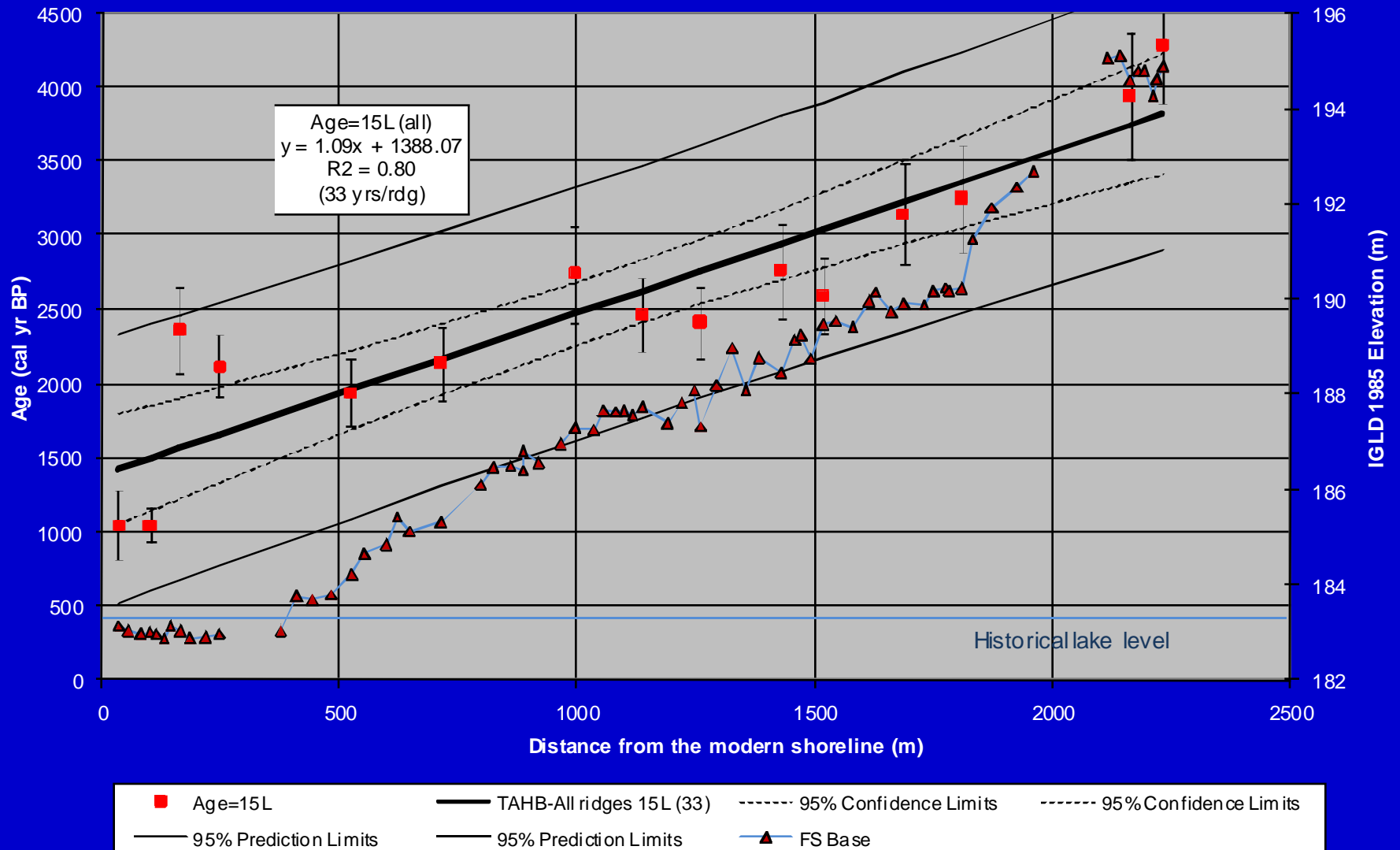
Strandplain geomorphology

Batchawana Bay, ON



Tahquamenon Bay

Foreshore elevations and OSL ages Tahquamenon Bay



Foreshore elevations and OSL ages Grand Traverse Bay



Conclusions

- Relict shorelines (beach ridges) can be used to reconstruct past lake-level changes and isostatic adjustments in the Lake Superior basin
- An extreme high stand occurred 4,500 years ago
- Lake Superior completely separated from Lakes Michigan and Huron about 1,200 to 1,400 years ago
- Two quasi-periodic lake-level variations of approximately 30- and 160- year duration occur in the pre-separation parts of the hydrographs

