Interpreting the Sedimentary Record:
Theory and Field Methods
U.S. Army Corps of Engineers, Detroit District
Great Lakes Hydraulics and Hydrology Office
28 July to 1 August 2014
Traverse City, MI

28 JULY (Monday) – Glacial Sediment

8:00 – 8:30	Introduction Class overview Great Lakes Tributary Modeling Program	(Jim Selegean, USACE – Detroit District)
8:30 – 10:30	Identification of Glacial Sediment • Glacial (till) • Glaciofluvial (outwash) • Glaciolacustrine (bedded sands, silts and clays)	(Grahame Larson, MSU Geology Dept.)
10:30 – 10:45	BREAK	
10:45 – 12:00	Identification of Glacial Sediment (continued) • Glacial (till) • Glaciofluvial (outwash) • Glaciolacustrine (bedded sands, silts and clays)	(Grahame Larson, MSU Geology Dept.)
12:00 – 1:00	LUNCH while traveling to field site	
1:00 – 6:00	Interpret Glacial Sediments in the Field • Glacial (till) • Glaciofluvial (outwash) • Glaciolacustrine (bedded sands, silts and clays)	(Grahame Larson, MSU Geology Dept.)
≥ 7:00	Icebreaker at hotel (Bayshore Resort).	

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29 JULY (Tuesday) – Fluvial and Pond Sediment

8:00 – 8:45	Fluvial Environments and Features • Fluvial • Lacustrine/Pond • Man-made	(Faith Fitzpatrick, USGS, Madison, WI)
8:45 – 9:30	Field Identification	(Faith Fitzpatrick, USGS, Madison, WI)
9:30 – 10:00	Soils	(Faith Fitzpatrick, USGS, Madison, WI)
10:00 – 10:15	BREAK	
10:15 – 11:15	Reconstructing Alluvial and Lacustrine Sed. Environments • Pre-field Characterization • Field Methods • Laboratory Methods	(Faith Fitzpatrick, USGS, Madison, WI)
11:15 – 12:15	Examples	(Faith Fitzpatrick, USGS, Madison, WI)
12:15 – 1:00	LUNCH while traveling to field site	
1:00 – 6:00	Interpret Fluvial/Pond Sediments in the Field • Deltas • Channels • Floodplains • Buried soils • Terraces	(Faith Fitzpatrick, USGS, Madison, WI)

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30 JULY (Wednesday) – Sediment Budgets, Tracers and Bedload

8 - 9:00 Sediment Budgets (Dr. Mark Riedel, Wisconsin DNR)

- What is a sediment budget
- Steps in developing a sediment budget
- Challenges - data comparability, time scales, estimation, etc.
- Example

9:00 - 10:00 Sediment Tracers (Dr. Mark Riedel, Wisconsin DNR)

- Background tracers
- Introduced tracers
- Sediment Budget Example Application

10:00 – 10:15 BREAK

10:15 – 11:15 Quantifying Bed Sediment (Dr. Mark Riedel, Wisconsin DNR)

- Why?
- Methods
- Examples - residence time, pollutant loading

11:15 – 12:15 Dendrochronology (Dr. Mark Riedel, Wisconsin DNR)

- What is it and why is it used?
- Methods
- Examples - sediment budgets, rates of fluvial processes, etc.

12:15 – 1:00 LUNCH while traveling to field site

1:00 – 6:00 Designing sediment tracer field studies (Dr. Mark Riedel, Wisconsin DNR)
(road crossings, riffles, bars, bluffs, etc.)

- Field dendrochrology
- Riverbank survey work to estimate sediment volumes
  - quanitifying via survey
  - erosion pins
- Scour chain site

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31 JULY (Thursday) – Coastal Features and Deposits

8:00 – 9:00 Introduction to the Coastal Depositional System (Todd Thompson, Indiana Geological Survey)
- Controls on Shoreline Sedimentation
- Coastal Process and Littoral Transport
- Shoreline Behavior
- Shoreline Features

9:00 – 10:00 Identification of Coastal Facies (Todd Thompson, Indiana Geological Survey)
- Types
- Characteristics

10:00 – 10:15 BREAK

10:15- 11:15 Coastal Sequences (Todd Thompson, Indiana Geological Survey)
- Transgressive
- Regressive/Aggradtional

11:15 – 12:15 Chronostratigraphic Techniques (John Johnston, University of Toronto)
- Applications
- Short-lived vs. Long-lived Isotopes (Cs^{137}, Pb^{210} and C^{14})
- Optically Stimulated Luminescence (OSL)

12:15 – 1:00 LUNCH while traveling to field site

1:00 – 6:00 Interpret Features in the Field (Todd Thompson, John Johnston)
- Visit modern Peterson Beach
- Visit Platte Lake strandplain
- Demonstrate vibracoring

≥8:00 Sediment Transport Movie Night (hotel breakfast room)

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1 AUGUST (Friday) – Examining Modern Sediment Sources and Sinks

8:00 – 9:00	Overview of field site	(Jim Selegean, USACE – Detroit District)
9:00 – 9:30	Travel to Boardman River	
9:30 – 2:00	Field identification of fluvial sediment sources and sinks and the examination of other items of fluvial significance on Boardman River. Canoes will put in at Ranch Rudolph and take out at Brown Bridge Dam. Trip will pass through impoundment delta and the wedge of incision created by a partial draw-down. We will examine the composition of the point bars, bed and banks and discuss the significance of these features.	