



US Army Corps
of Engineers

Interpreting the Sedimentary Record: Theory and Field Methods

Great Lakes Maritime Academy, Room 112, at
Northwestern Michigan College - Great Lakes Campus
715 E. Front Street at Barlow Avenue
Traverse City, MI

16-20 August 2010

Presented By:

U.S. Army Corps of Engineers, Detroit District
Great Lakes Hydraulics and Hydrology Office
With Support from the Great Lakes Commission



16 AUGUST (Monday) – Glacial Sediment

- 9:00 – 9:30 Introduction
Class overview
Great Lakes Tributary Modeling Program
(Jim Selegean
USACE – Detroit District)
- 9:30 – 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) – Informal gathering to eat, drink and get to know your classmates. (833 East Front Street, Traverse City, MI 49684, (800) 634-4401)

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17 AUGUST (Tuesday) – Fluvial and Pond Sediment

8:00 – 10:00 Introduction to Fluvial and Pond Sediment

(Faith Fitzpatrick
USGS, Madison)

10:00 – 10:15 BREAK

10:15 – 12:15 Identification of Fluvial and Pond Sediment

- Fluvial Features
- Field identification
- Depositional Environment
- Information gleaned from this sediment
- Misc field tests/methods

(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

- Visit Boardman Pond Drawdown
 - Tributary delta
 - Impoundment delta
 - Floodplain

(Faith Fitzpatrick
USGS, Madison, WI)

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18 AUGUST (Wednesday) – Terraces and Aeolian Sediment

- 8:00 – 10:00 Introduction to Terraces and Aeolian Sediment (Kevin Kincare
US Geological Survey)
- 10:00 – 10:15 BREAK
- 10:15 – 11:15 Identification of Terraces (Kevin Kincare
US Geological Survey)
- Geomorphology
 - Terrace types and significance
 - Field identification
 - Depositional Environment
 - Sediments and bedding types
 - Misc field tests/methods
- 11:15 - 12:15 Identification of Aeolian Sediment (Kevin Kincare
US Geological Survey)
- Geomorphology
 - Aeolian deposit types and significance
 - Field identification
 - Depositional Environment
 - Sediments and bedding types
 - Misc. field tests/methods
- 12:15 – 1:00 LUNCH while traveling to field site
- 1:00 – 6:00 Interpret Terraces/Aeolian Sediments in the Field (Kevin Kincare
US Geological Survey)
- Visit Manistee River terrace sites
 - Visit aeolian sand sites
 - Visit quiz site

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19 AUGUST (Thursday) – Modern Sediment Sources and Sinks

8:00 – 9:00 Sources of Sediment

(Jim Selegean
USACE – Detroit District)

Sediment Production

- Raindrops and entrainment
- Benefits of a closed forest/vegetation
- Incision and channel evolution
- Dam removal

Constructing a Sediment Budget

- Sources (bank erosion, overland runoff)
- Sinks
- Data sets
- Corps guidance

Generalizations about urban, agricultural and forested watersheds

Historical sediment supplies (Pre-European settlement to present)

9:00 – 10:00 Sediment: The Good and the Bad

(Travis Dahl
USACE – Detroit District)

The influence of sediment on:

- Fish and benthic invertebrates
- Flooding, erosion, stream stability
- Dams and “hungry water”

The importance of soil on:

- Rates of production
- Rates of denudation

10:00 – 10:15 BREAK

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19 AUGUST (Thursday) – CONTINUED

10:15 – 11:15 Chronostratigraphic Techniques

- Applications
- Short-lived vs. Long-lived Isotopes (Cs^{137} , Pb^{210} and C^{14})
- Optically Stimulated Luminescence (OSL)

(Faith Fitzpatric
USGS, Madison, WI)

11:15 – 12:00 Overview of Field Site

(Jim Selegean
USACE – Detroit District)

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

1:00 – 6:00 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.

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20 AUGUST (Friday) – Dendrochronology and Dendrogeomorphology

8:30 – 9:30 Use of Vegetation in Fluvial Geomorphology (Mark Riedel, Baird and Associates)
• Background
• When to use dendrochronology and what can it tell you

9:30 – 9:45 BREAK

9:45 – 10:45 Dendrochronology Methods and Interpreting Growth Patterns/Rings (Mark Riedel, Baird and Associates)

10:45 – 11:00 BREAK

11:00 – 12:00 Examples (Mark Riedel, Baird and Associates)
• Nemadji River, MN – Reconstructing fluvial history and land forms
• Trinity River, TX – Quantifying short and mid-term river stability and morphologic behavior

END OF CLASS