

# Illinois Sediment Acoustics

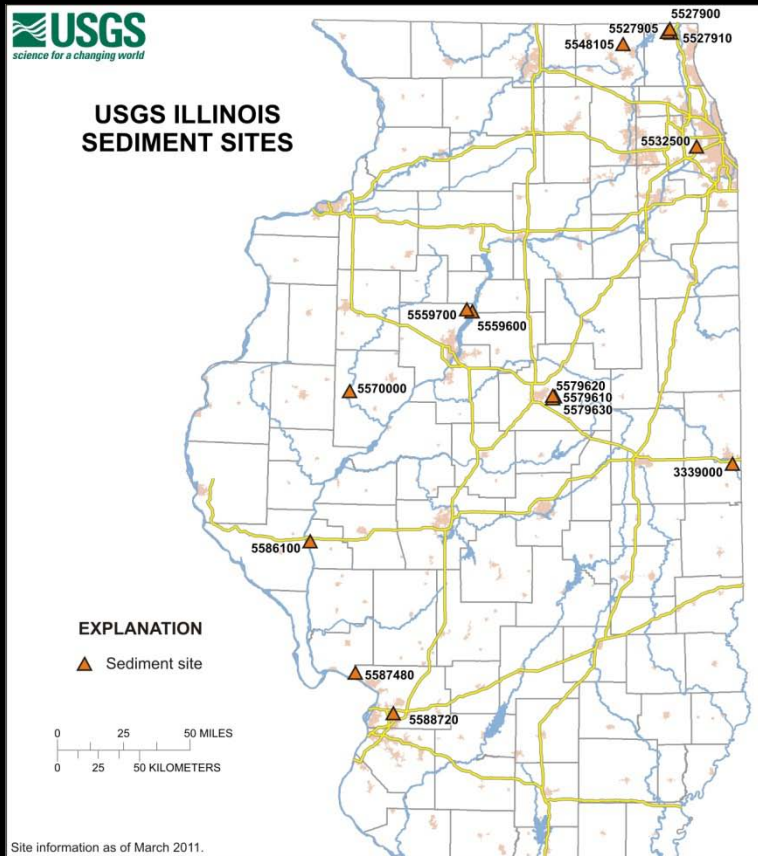
OSW Sediment Hydroacoustic Activities Workshop

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Collaborators: Beaulin, Boldt, Bohall, Bosch, Domanski, Draper, Duncker, Goodwin, Husko, Legg, Lynch, Jackson, Johnson, Johnson, Oberg, Prater, Roseboom, Schrader, Straub, Szupiany

# Illinois Sediment Network Background



- <sup>13</sup>~~15~~ Sediment Gages
- ~~~2,000~~ samples per year
- <sup>5</sup>~~7~~ Cooperators
- <sup>4</sup>~~5~~ Technicians in <sup>2</sup>~~3~~ offices
- Project Oriented
  - Dam Removal
  - Restoration
- OPERATIONAL NOT A RESEARCH focus
  - <sup>4</sup>~~5~~ Sediment Acoustic sites slow addition

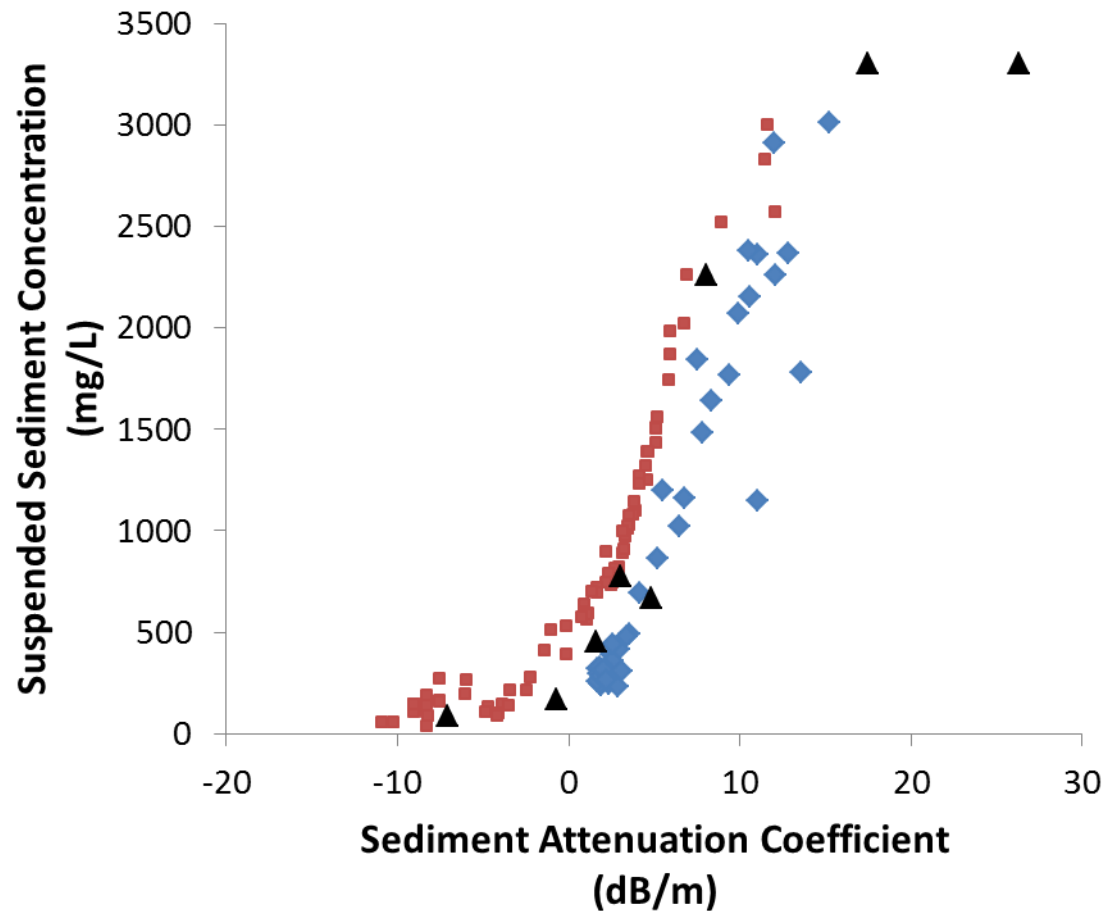
Station Number	Station Name	Station Number	Station Name
03339000	Vermilion River near Danville <sup>1</sup>	05570000	Spoon River at Seville <sup>5</sup>
05527900	North Mill Creek at Hickory Corners <sup>2</sup>	05579610	Kickapoo Creek at 2100 at Bloomington <sup>5</sup>
05527905	Hastings Creek at Lindenhurst <sup>2</sup>	05579620	Kickapoo Creek at Tributary at Bloomington <sup>5</sup>
05527910	North Mill Creek near Milburn <sup>2</sup>	05579630	Kickapoo Creek at Ireland Grove at Bloomington <sup>5</sup>
05532500	Des Plaines River at Riverside <sup>3</sup>	05586100	Illinois River at Valley City <sup>6</sup>
05548105	Nippersink Creek above Wonder Lake <sup>4</sup>	05587480	Piasa creek near Melville <sup>7</sup>
05559600	Illinois River at Chillicothe <sup>3</sup>	05588720	Judy's Branch at Rte 157 near Glen Carbon <sup>8</sup>
05559700	Senachawine Creek near Chillicothe <sup>3</sup>		

**Funding Agency**

<sup>1</sup> Illinois Department of Natural Resources  
<sup>2</sup> Lake County Forest Preserves  
<sup>3</sup> Chicago Corps of Engineers  
<sup>4</sup> Wonder Lake Master Property Owners Association  
<sup>5</sup> Rock Island Corps of Engineers  
<sup>6</sup> IL Environmental Protection Agency  
<sup>7</sup> Lewis and Clark Community College  
<sup>8</sup> St. Louis Corps of Engineers



# Site 1: Predominantly Agricultural Drainage Ditch



**14 mi<sup>2</sup> drainage area**

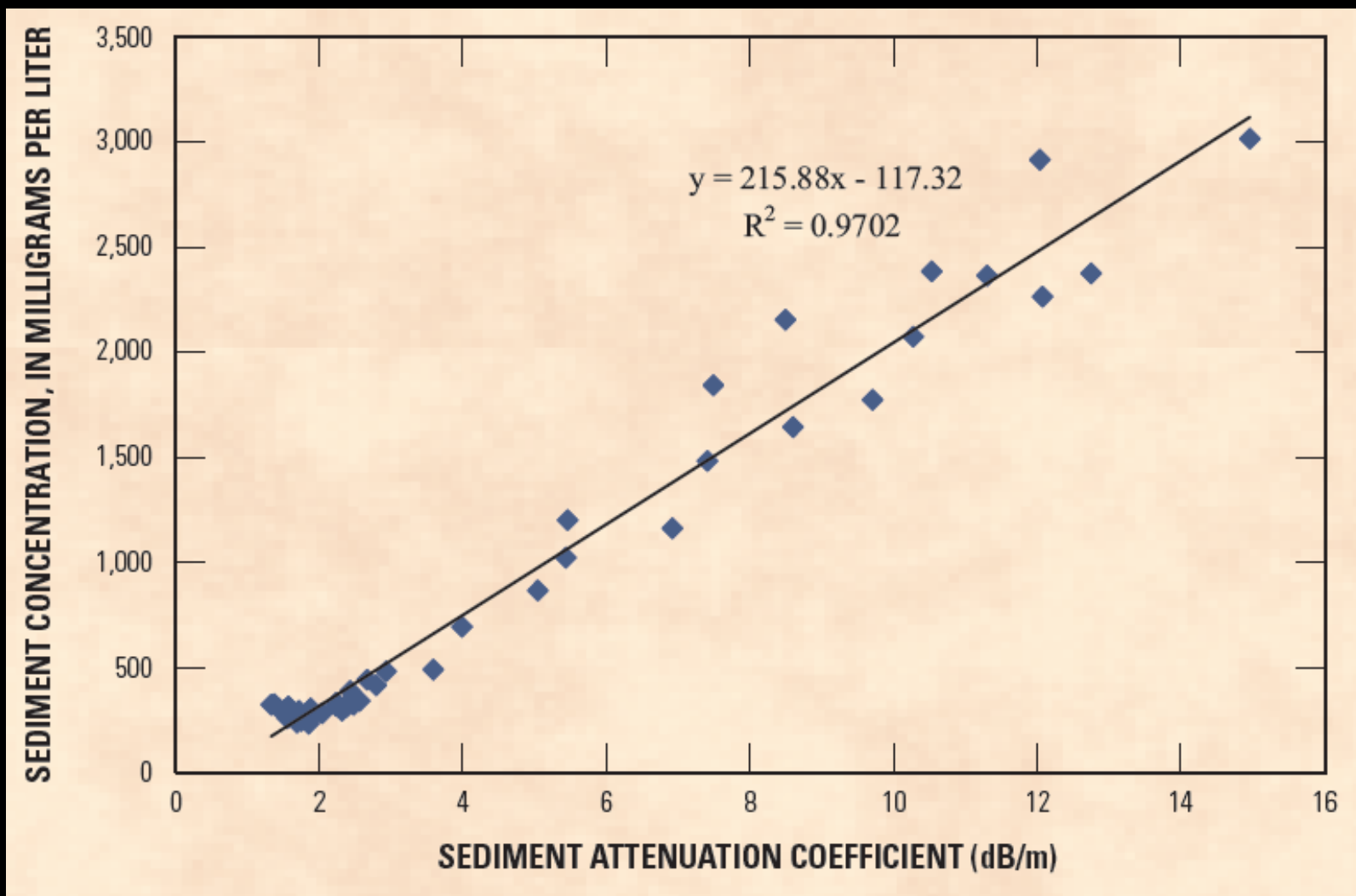
**Up-looker used**

**Nearly 100 % fines  
in suspension**

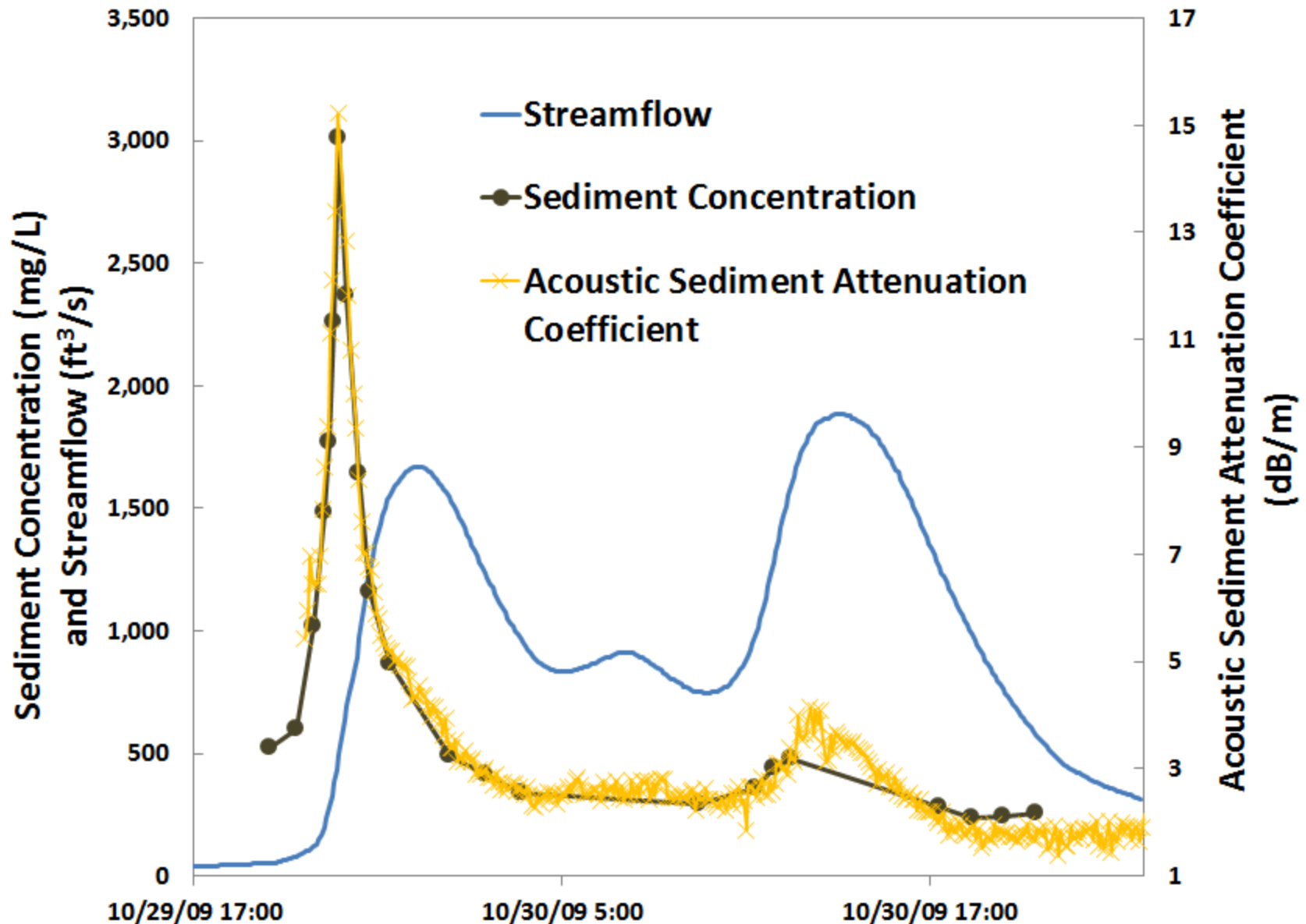
**No near field  
corrections**

# Sediment Concentration and Attenuation Coefficient

## Two October Storms at Kickapoo (05579630)



# Sediment Concentration and Attenuation Coefficient October 2009 Storms at Kickapoo (05579630)





## Site 2:

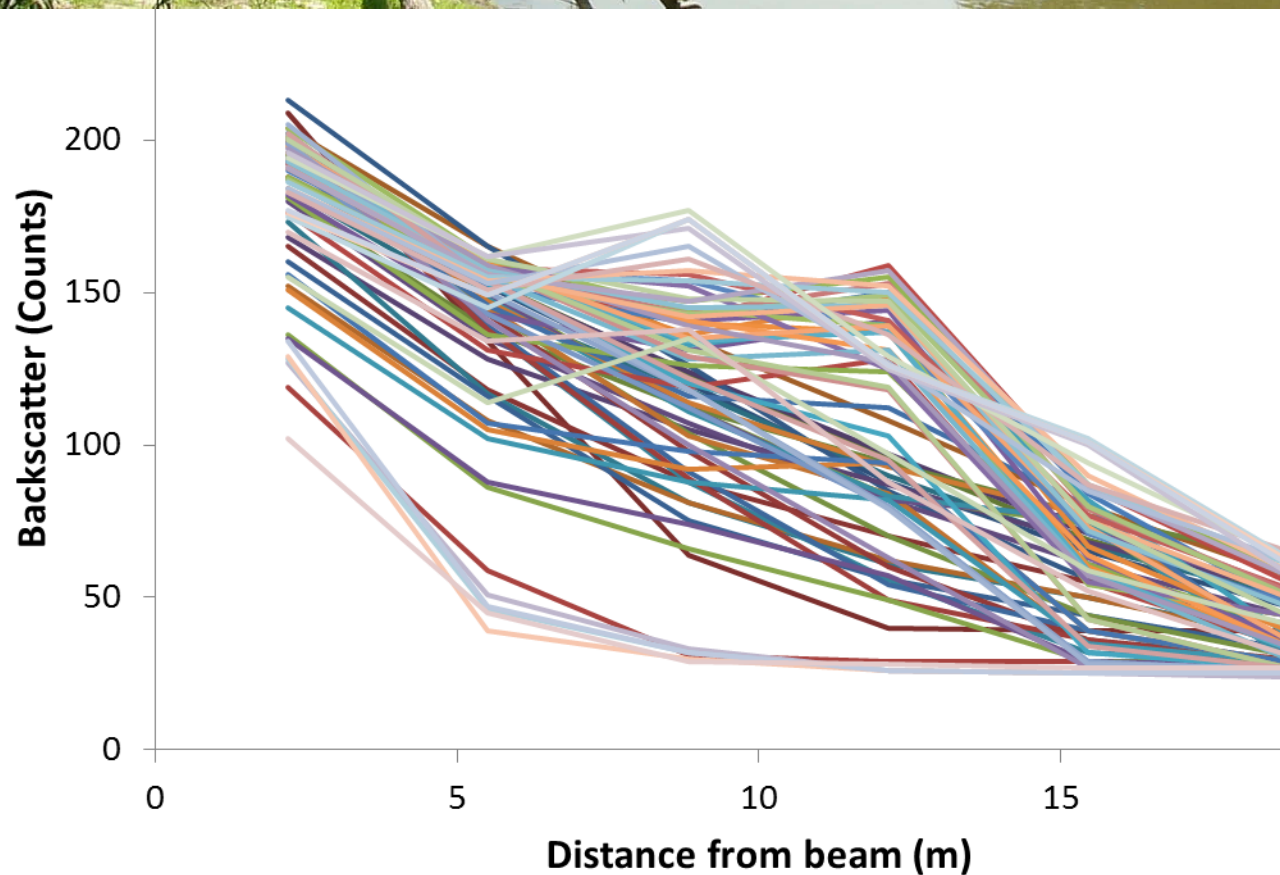
One of the largest contributors of sediment to the Illinois River

1,636 mi<sup>2</sup> drainage area

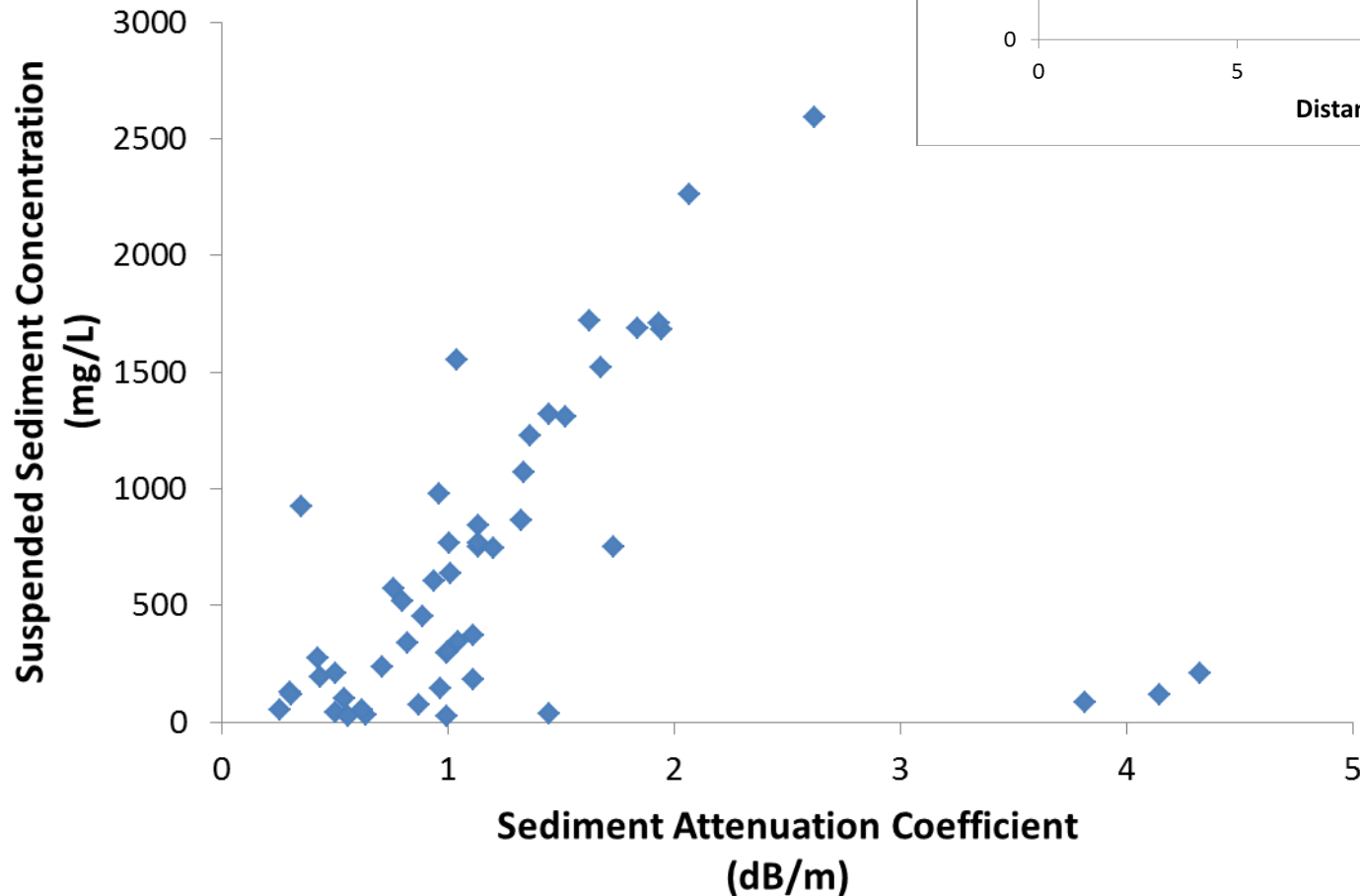
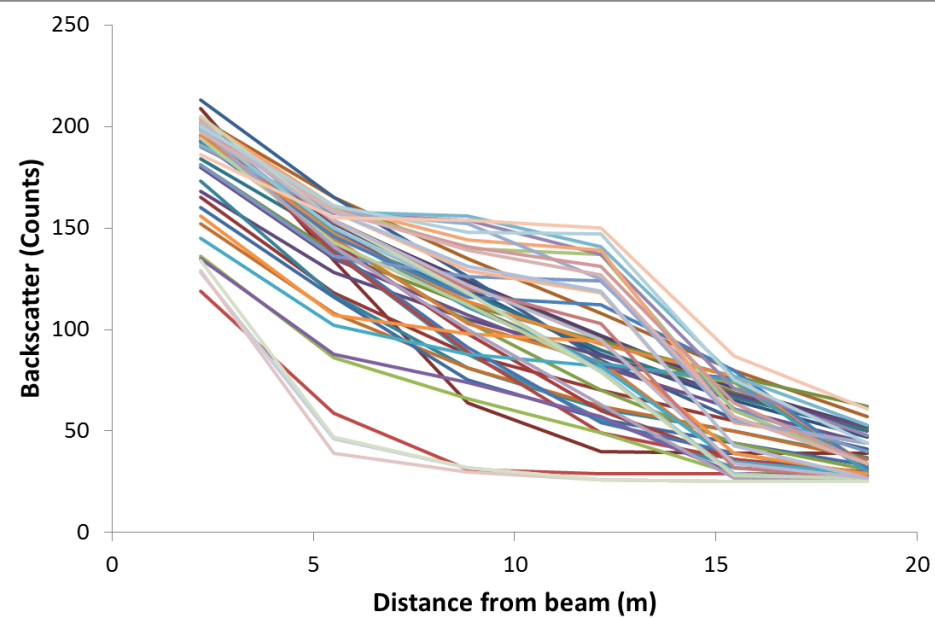
Up to ~25 % sands in suspension

Side-looker: on-going problems with debris on instrument

Wake zone?



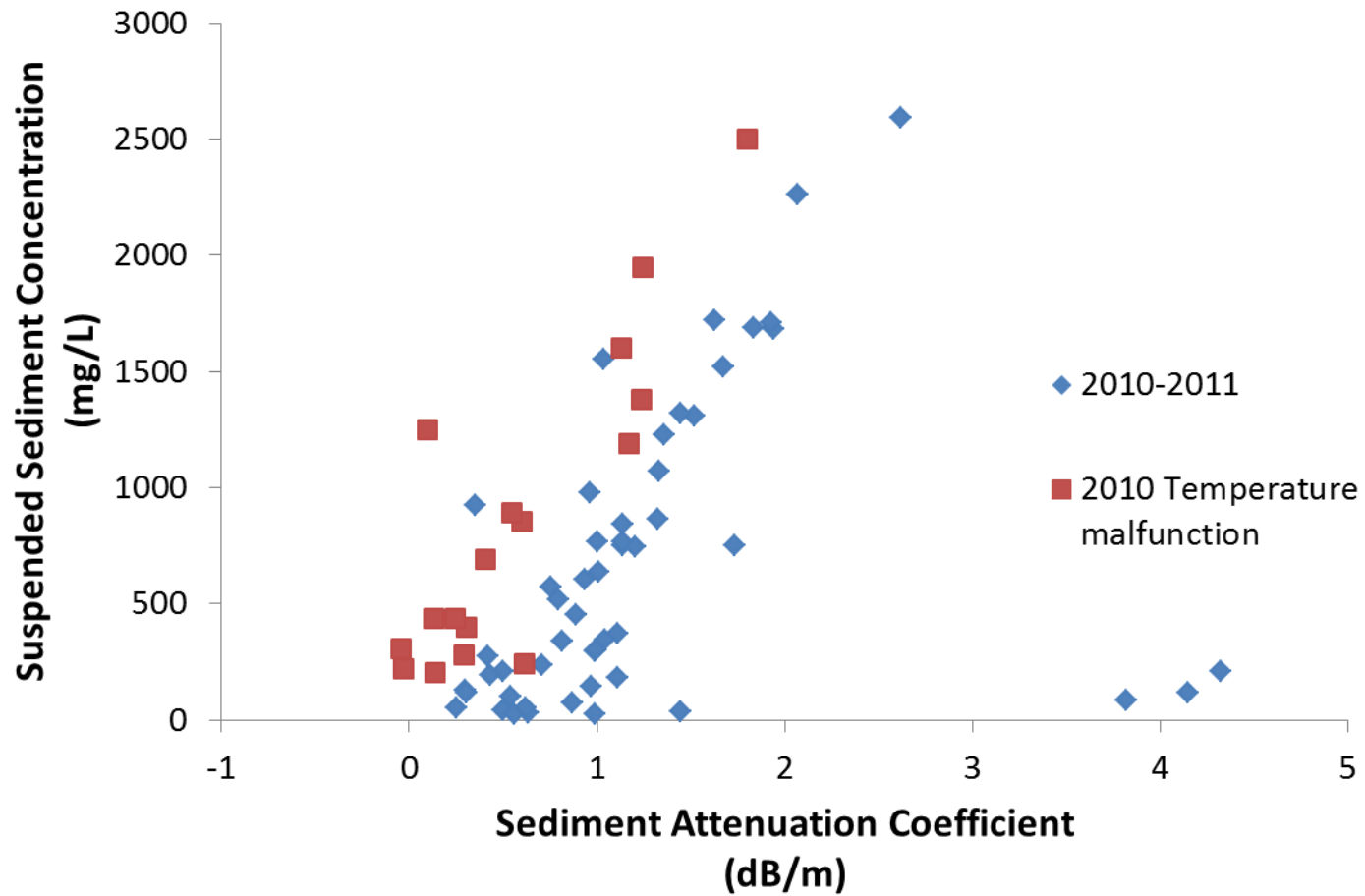
# Partial cleanup of data (negative slopes taken out)



Results with  
only **two cells**  
used

-no near field  
correction

-wake zone?





# LISST-SL Experience and Testing Results in Illinois

FISP Funded 2011-2012



# Typical Bridge Setup



# Software Development

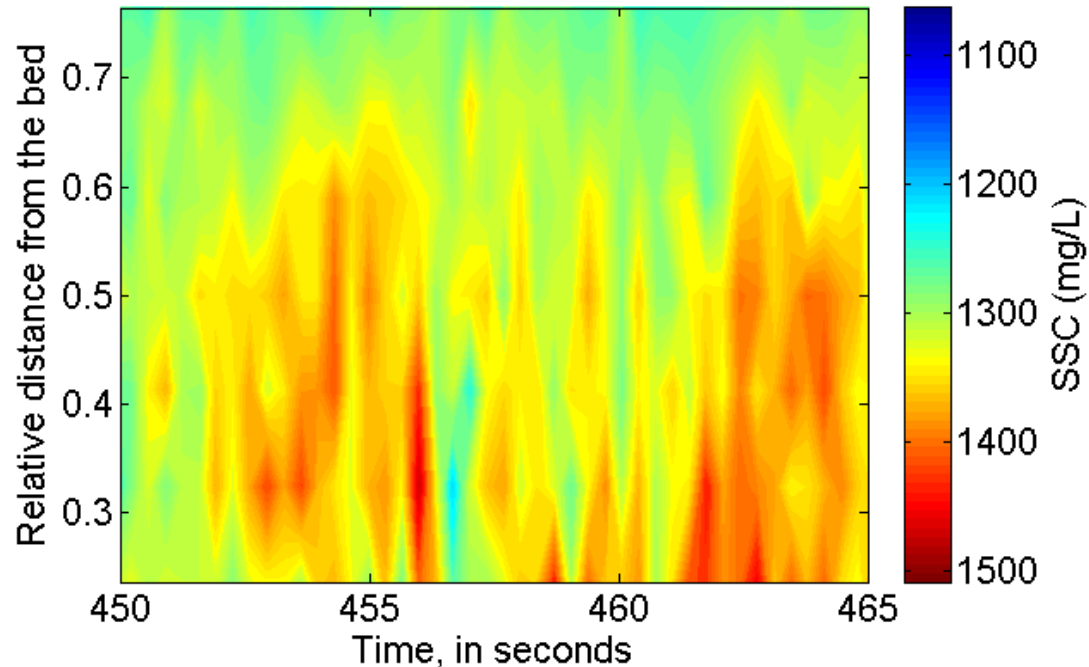
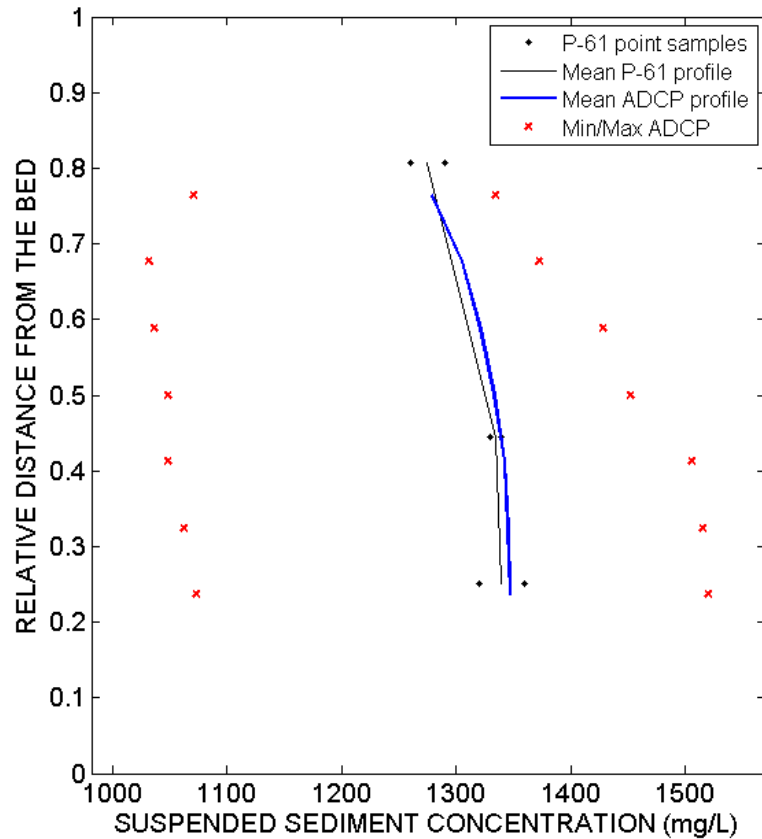
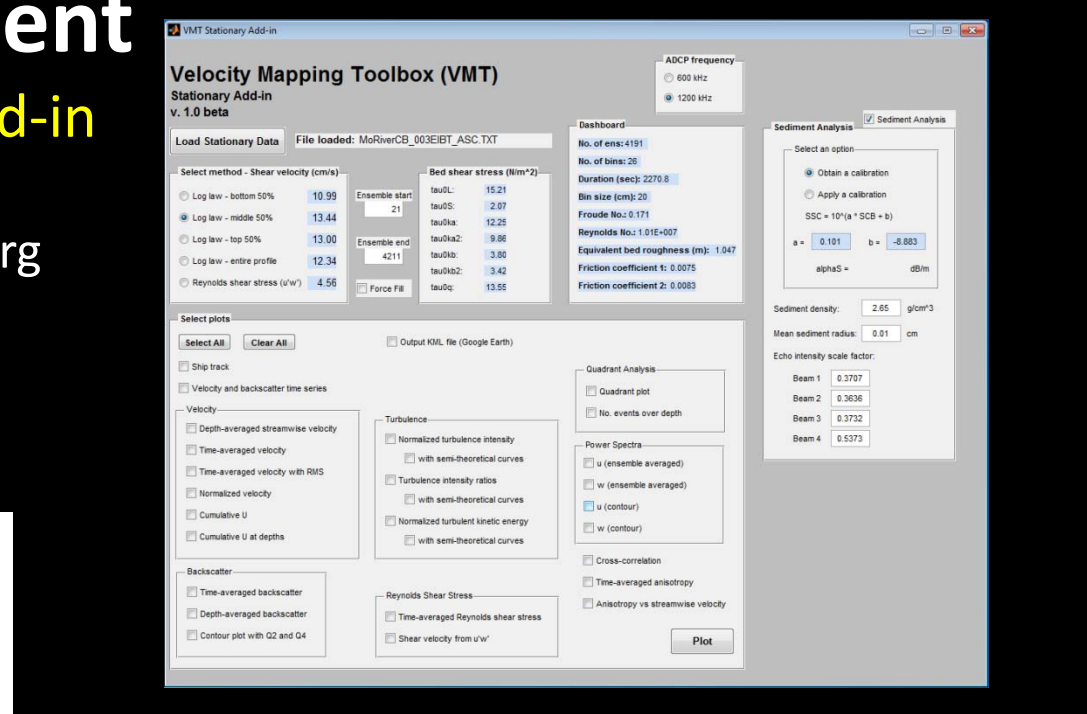
## Beta Sediment Stationary Add-in

by

Boldt, Szupiany, Czuba, and Oberg

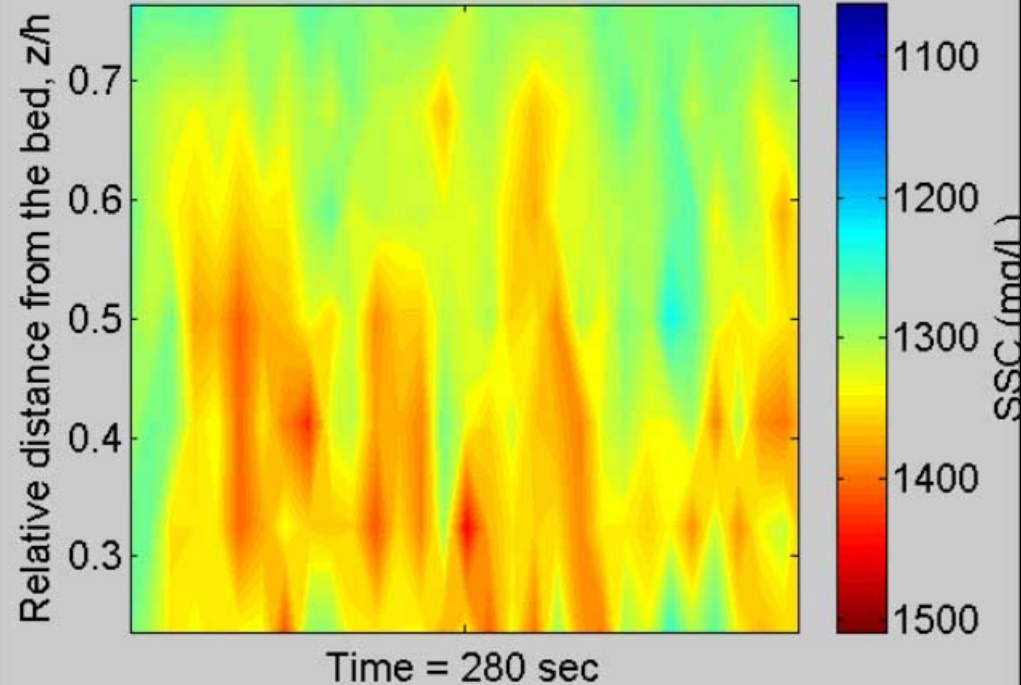
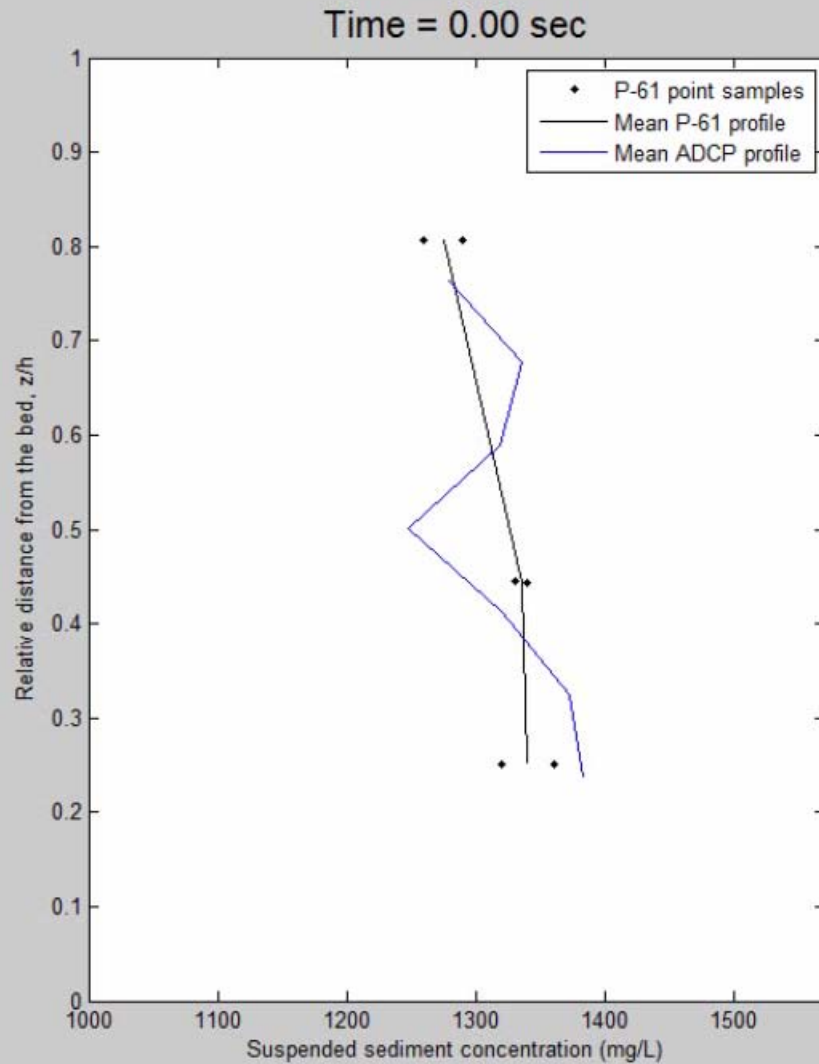
into

VMT by Parsons, Jackson,  
Czuba, Mueller, and Oberg

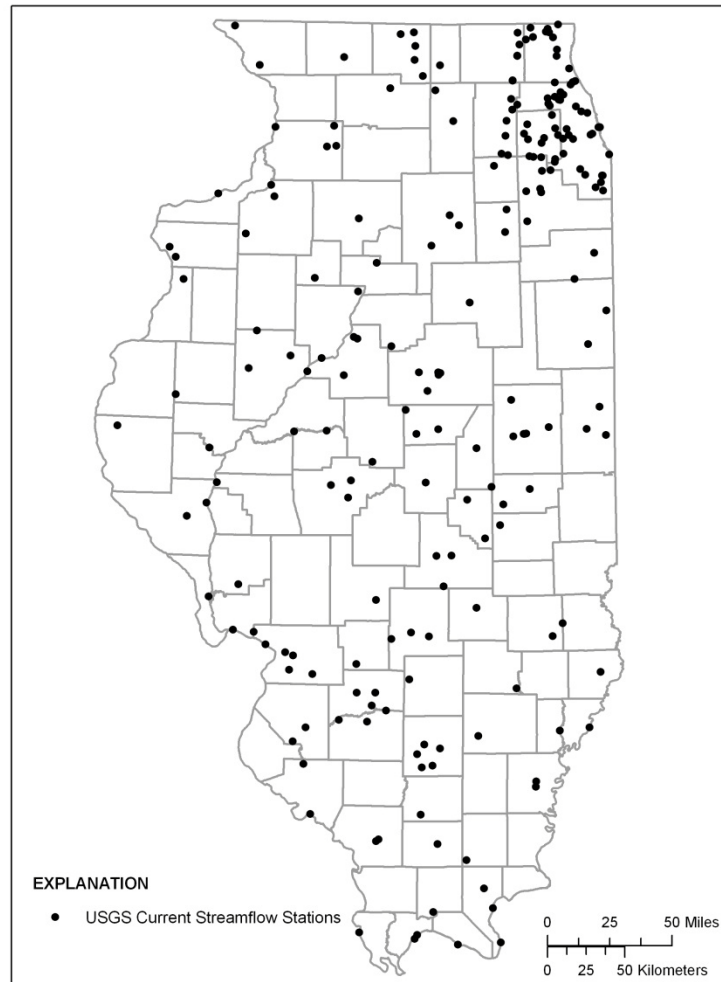




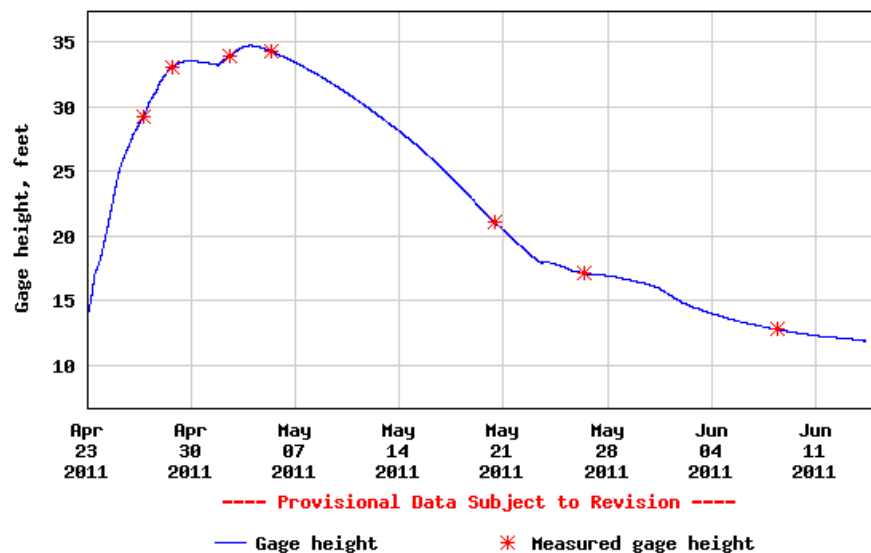
# Beta Add-in Animation



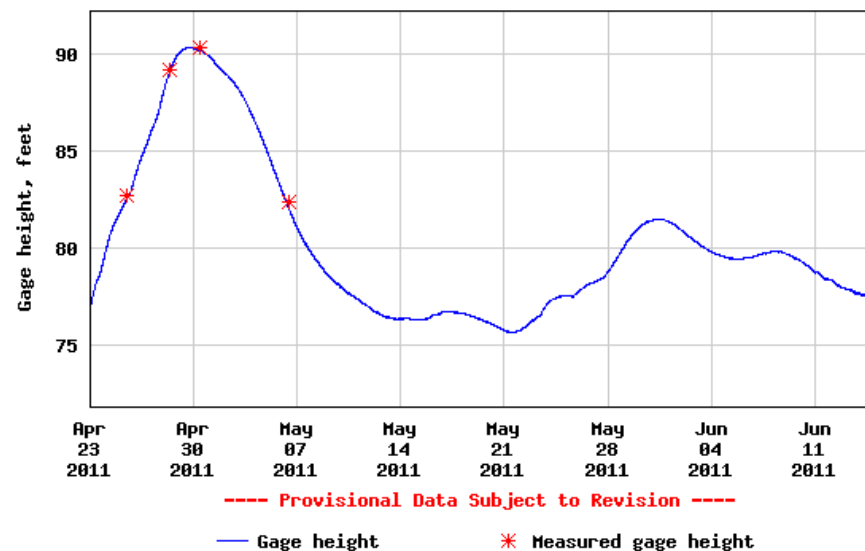
# FUTURE Illinois Sediment Network



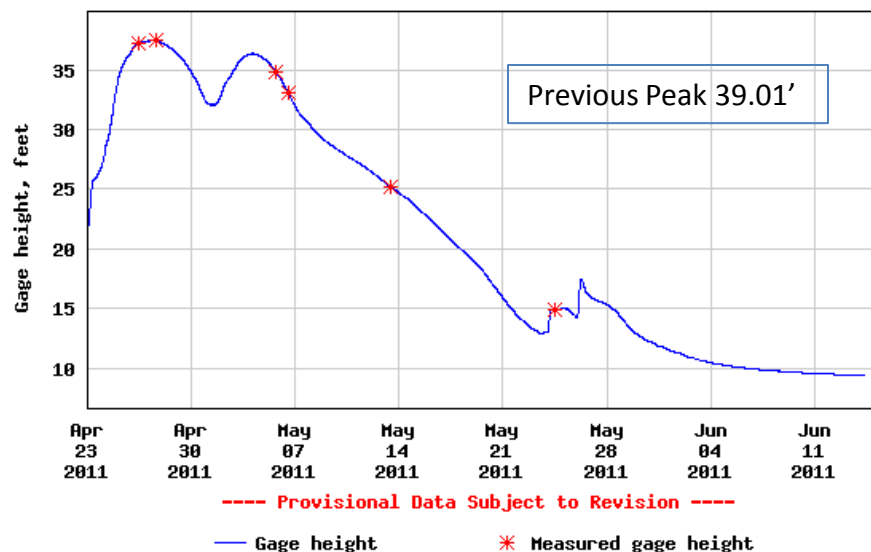
# USGS 05597000 BIG MUDDY RIVER AT PLUMFIELD, IL



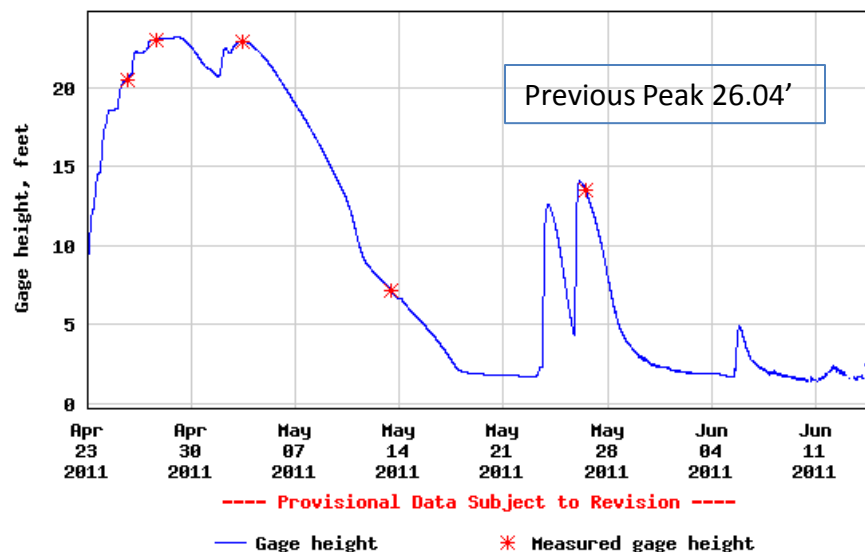
# USGS 05595000 KASKASKIA RIVER AT NEW ATHENS, IL



# USGS 03612000 CACHE RIVER AT FORMAN, IL



# USGS 03378000 BONPAS CREEK AT BROWNS, IL





# Next Steps for OSW?

- Compile data from across the nation/world
- Interim guidelines
  - Three or more iterations emerging
- Verification dataset
  - Utilizing existing index velocity sites
  - $10 \times 10 \times (200 + 200) = \$40,000$

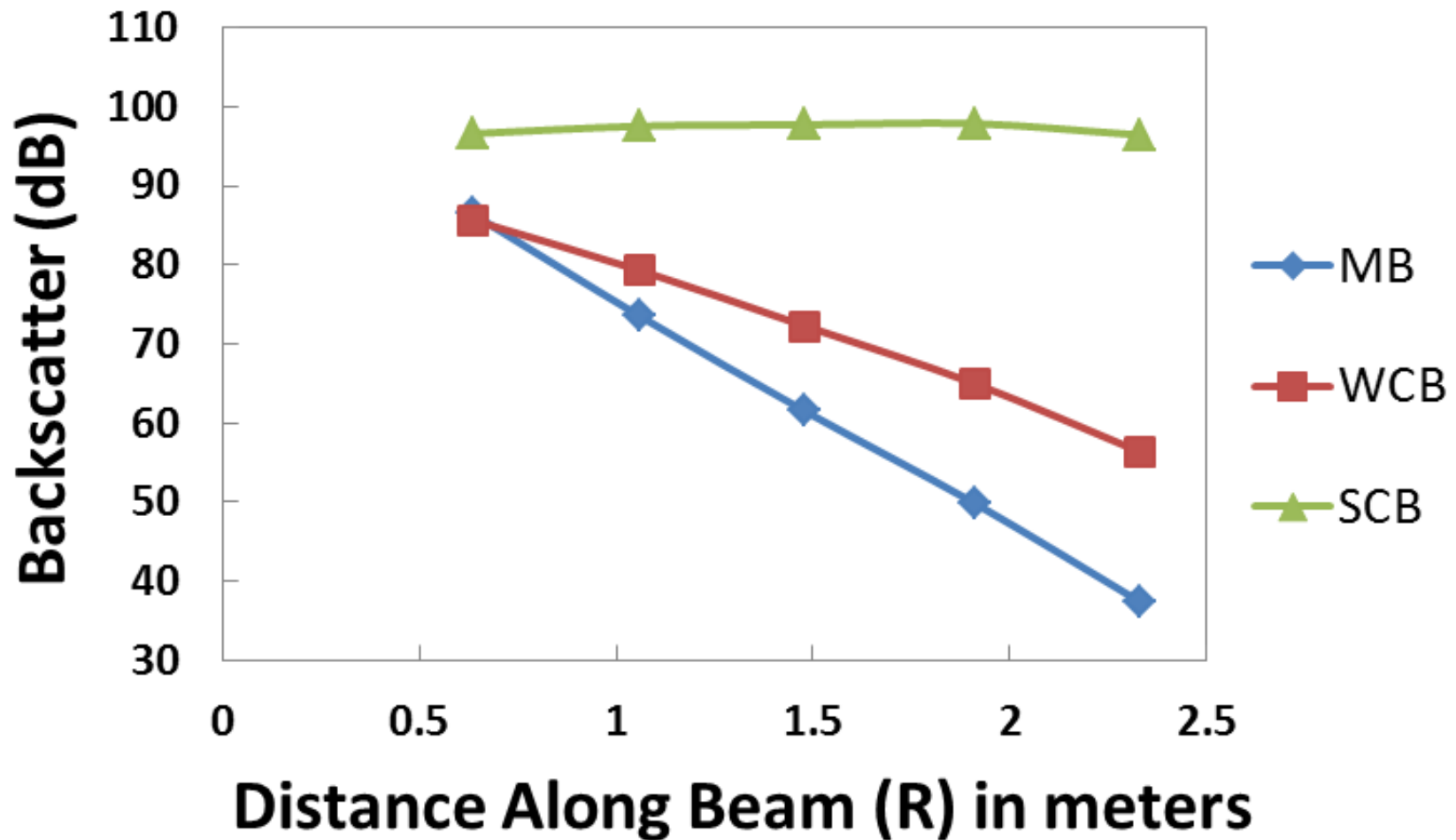


# Additional Complications

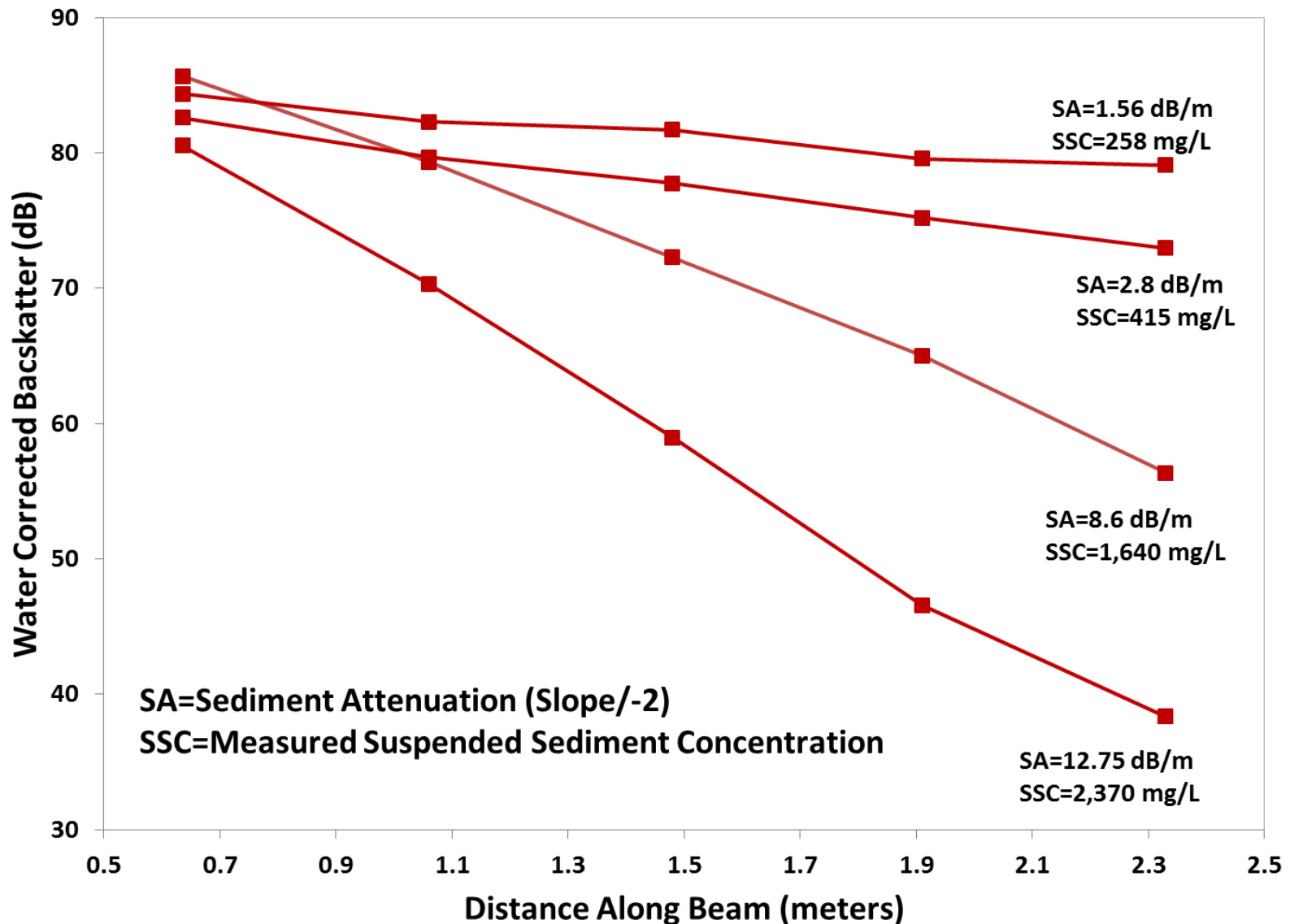
- Setup
- Launches
- Data transmission
- Cables
- Temperature
- Power
- Silting
- Debris



# Measured, and Water and Sediment Corrected Backscatter



# Multiple Water Corrected Backscatter Readings



# The SAME Multiple Readings, but for Sediment Corrected Backscatter

