FY21 RSM IPR
Flume Studies to Validate the ISSDOTv2 Code under Multiple Flow Scenarios and Conditions

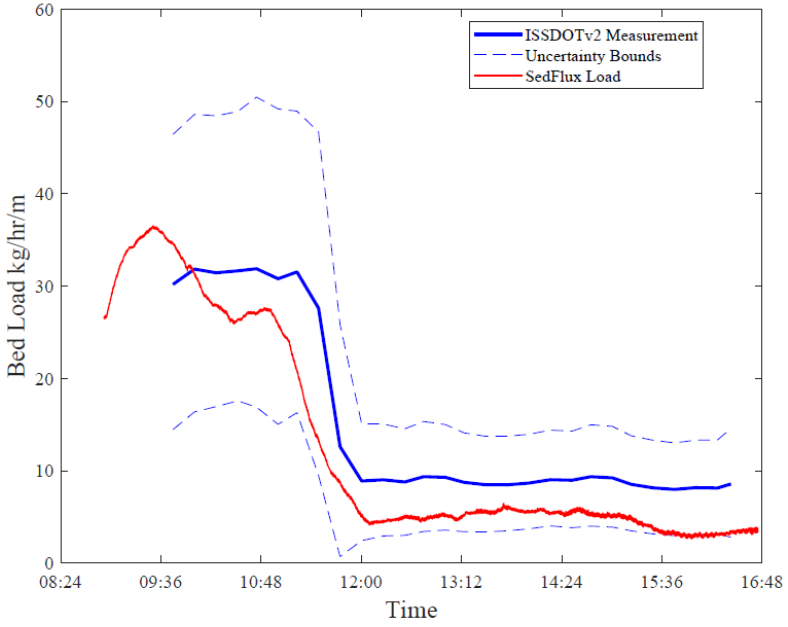
Tate McAlpin, David Abraham, and Keaton Jones

BLUF: The ISSDOTv2 method provides a means to measure bed-load transport in large, sand bed rivers. This study collected additional data to further validate the ISSDOT methodology/code using flume experiments conducted at the National Sedimentation Laboratory. The uncertainty in the method results was also determined and documented during this project.

Challenge/Objectives

- Validate the ISSDOTv2 Methodology
- Quantify Uncertainty in the ISSDOTv2 Results
- Document ISSDOTv2 Methodology and Uncertainty

Approach: Perform flume studies at the National Sedimentation Laboratory to validate the ISSDOTv2 code for steady/unsteady conditions in bed load.



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District/Other USACE PDT Members

Mr. Tate McAlpin, Dr. David Abraham, and Mr. Keaton Jones (CHL)

Dr. Daniel Wren and Dr. Roger Kuhnle (USDA National Sedimentation Laboratory)

Dr. Clinton Willson and Dr. Kory Konsoer (Louisiana State University)

Leveraging/Collaborative Opportunities

National Sedimentation Laboratory (NSL) – Dr. Wren and Dr. Kuhnle's labor provided by NSL. They bring a wealth of experience in flume experiments and knowledge of bedform evolution/migration.

Louisiana State University (LSU) – Dr. Willson and Dr. Konsoer are experts in sediment transport measurements and processes.

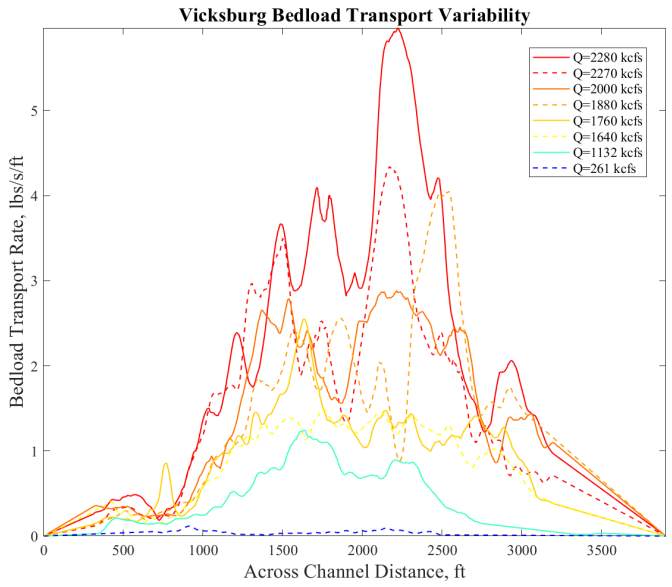
Stakeholders/Partners

National Sedimentation Laboratory (NSL)

U.S. Geological Survey (USGS)

Federal Interagency Sedimentation Project (FISP)

Several USACE Districts (St. Paul, Kansas City, Vicksburg, Omaha, New Orleans, Walla Walla, Albuquerque, and Louisville)



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Accomplishments/Deliverables

- Validated the ISSDOTv2 method to flume measurements
- Quantified the uncertainty in the ISSDOTv2 method
- Submission of “Bed-Load Validation for ISSDOTv2” methodology paper to the Journal of Hydraulic Engineering
- Submission of “Detailed Bed Topography and Sediment Load Measurements for Two Stepdown Flows in a Laboratory Flume” paper to the International Journal of Sediment Research
- Draft Version of “Uncertainty in the ISSDOTv2 Method” for a planned submission to the Journal of Hydraulic Engineering
- Improved collaborative opportunities with the USDA National Sedimentation Laboratory, Louisiana State University, and the USGS

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Potential usage of ISSDOTv2 Results:

- **Improved Sediment Budgets** – Previous efforts either neglected the bedload or assumed the bedload as a percentage of the suspended load. Now we can do better.

- **Development of Bed-Load Rating Curves** – Measurements at various flows provide an opportunity to determine a bedload vs discharge relationship for both bedload predictions and hindcasts.

- **Determine Habitat Suitability** – Has been utilized to evaluate suitable/unsuitable endangered mussel habitat.

- **Numerical Model Validation** – Has been utilized to quantify the accuracy of numerical model predictions of bed-load transport.

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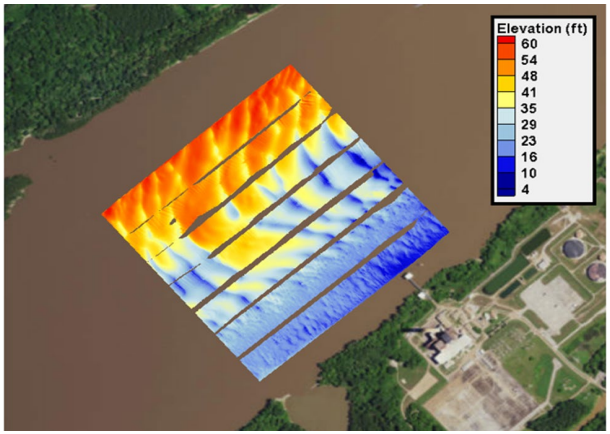

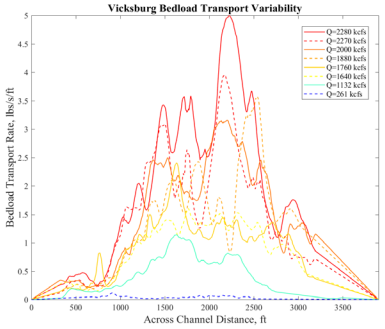

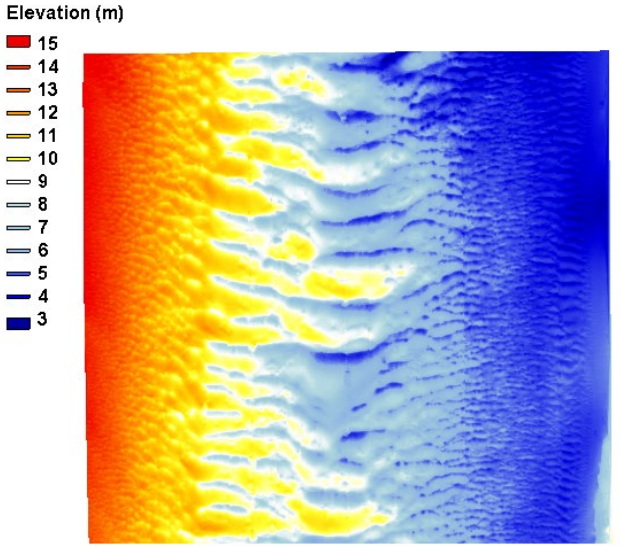

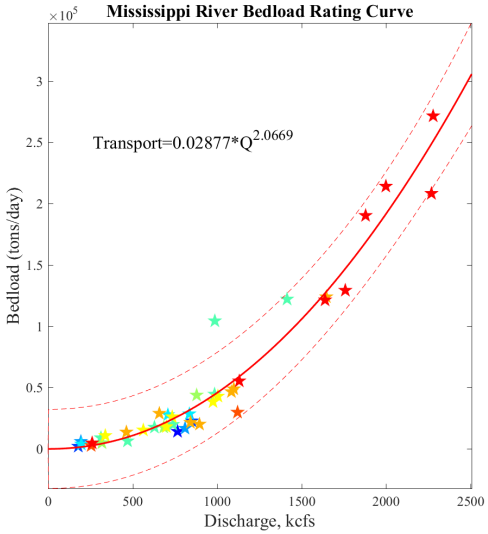

Questions???