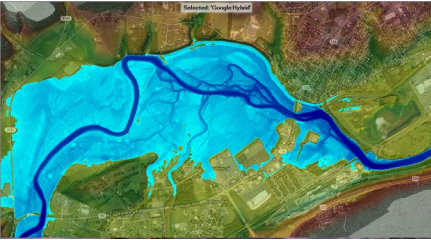


HEC-RAS Improved Hydraulic Modeling/Application Efficiency

Need



Inundation map from HEC-RAS Mapper

With the dramatic increase of vast quantities of digital terrain data from multiple sources, current Corps of Engineer's hydraulic modeling software and tools must be improved to take advantage of this data, and utilize it to make more accurate terrain models for hydraulic analyses. Additionally, the need to produce higher fidelity hydraulic modeling results is paramount to future Corps of Engineer's studies. Future hydraulic studies will be heavily geared towards combined 1D/2D modeling, as well as standalone 2D modeling. Corps of Engineers hydraulic modeling tools must be improved to meet the needs of District/Division engineers, our Federal partners, and our private engineering partners that support USACE on studies and rely on our tools. Finally, we must improve our capabilities to display, visualize, and share our hydraulic model results for a wide range of applications.

Approach

The objectives of this work unit are to improve the efficiency and accuracy of hydraulic modeling within HEC-RAS by increasing and streamlining the capabilities for performing a hydraulic study from start to finish. Areas of the software that will be improved include terrain model development and modifications, improved hydraulic computations, and improved visualization of model results.

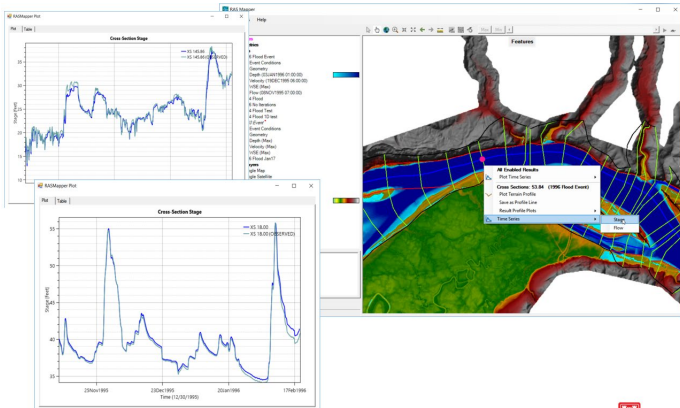
Outcomes

The results of this research will be new versions of HEC-RAS with the following new features/capabilities:

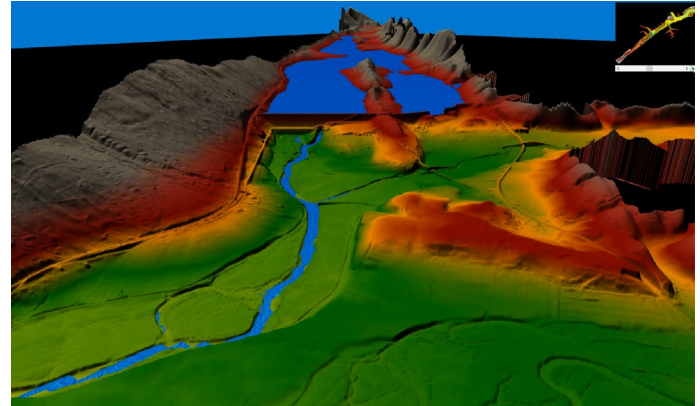
- Improved tools for combining terrain data from multiple sources, with varying levels of accuracy, into a single terrain model for use in hydraulic studies.
- New and improved tools for modifying terrain to reflect existing levees, roads, buildings, and other features, as well as new features to reflect project alternatives.
- Improved mesh generation tools, as well as mesh editing tools. These advancements will greatly increase hydraulic model accuracy and reduce development time.
- New tools for hydraulic model development for both 1D and 2D model setup, directly within HEC-RAS. These capabilities will eliminate the need for HEC-GeoRAS.
- Development of a finite volume solution algorithm for the HEC-RAS 1D computational equation solver. This capability will dramatically improve model stability, thus reducing the time it takes modelers to develop an HEC-RAS model.
- New and improved tools for the calibration and validation of combined 1D/2D flow models. With the increase in use of 2D modeling, and especially combined 1D/2D modeling, new approaches to calibration/validation need to be developed in order to reduce the time it takes to produce a well calibrated hydraulics model.
- New and improved software/tools for visualizing hydraulic model results. New ways to visualize hydraulic model results are needed to improve the modeler's ability to understand the results, improve the model, and then

convey the results in meaningful ways to non-hydraulic engineers. Additionally, new tools are needed to export hydraulic model results to other formats for use by other team members in the planning process.

- HEC-RAS Verification and Validation Document. This document describes tests that are used to verify and validate the HEC-RAS software code. These tests include: analytical and text book data sets; lab experiments, and real world data sets.
- Spatial precipitation and infiltration capabilities. This includes gridded and point gage precipitation data. Three infiltration methods are being added: Deficit constant, SCS, and Green and Ampt.



New Model Calibration Tools in HEC-RAS
Mapper



HEC-RAS 3D Visualization Viewer

More Information

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For more information on FRM R&D, see the ERDC FRM wiki:
https://wiki.erdcdren.mil/Flood_and_Coastal_Storm_Damage_Reduction_Research_Program