VMT: Project Shiptrack Tool

US Geological Survey

Office of Surface Water

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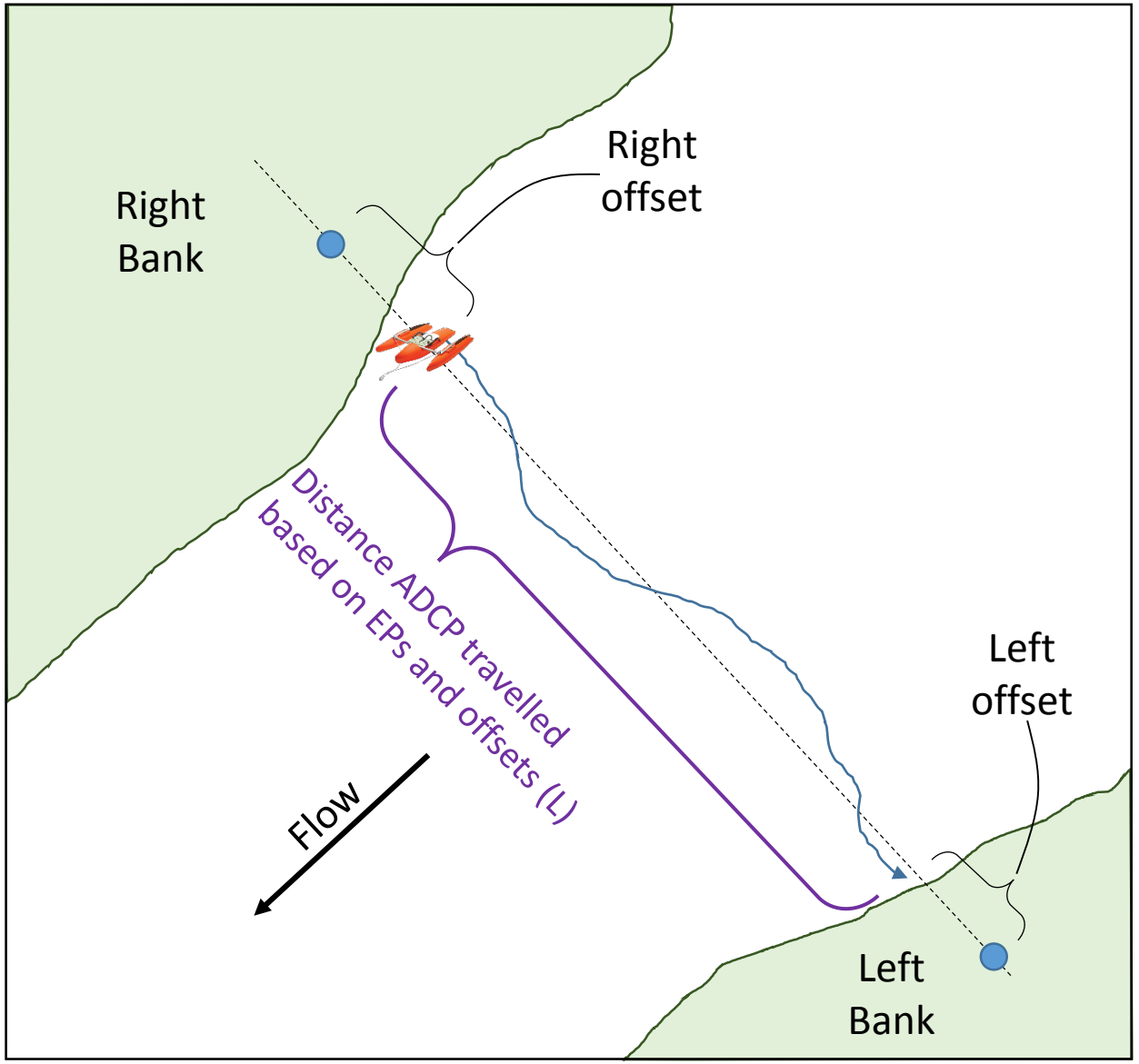
Installation

- Run the “Install_VMTProjectShipTrackTool.exe”
- This software requires the Matlab 64-bit v9 MCR. The self-installer will download and install this dependency if needed.
- You will need elevated rights (UAC) to install this tool

- The tool will install in this default location:
  - C:\Program Files\US Geological Survey\VMTProjectShiptrackTool\application\ExampleData\WabashWhite

Method Explanation

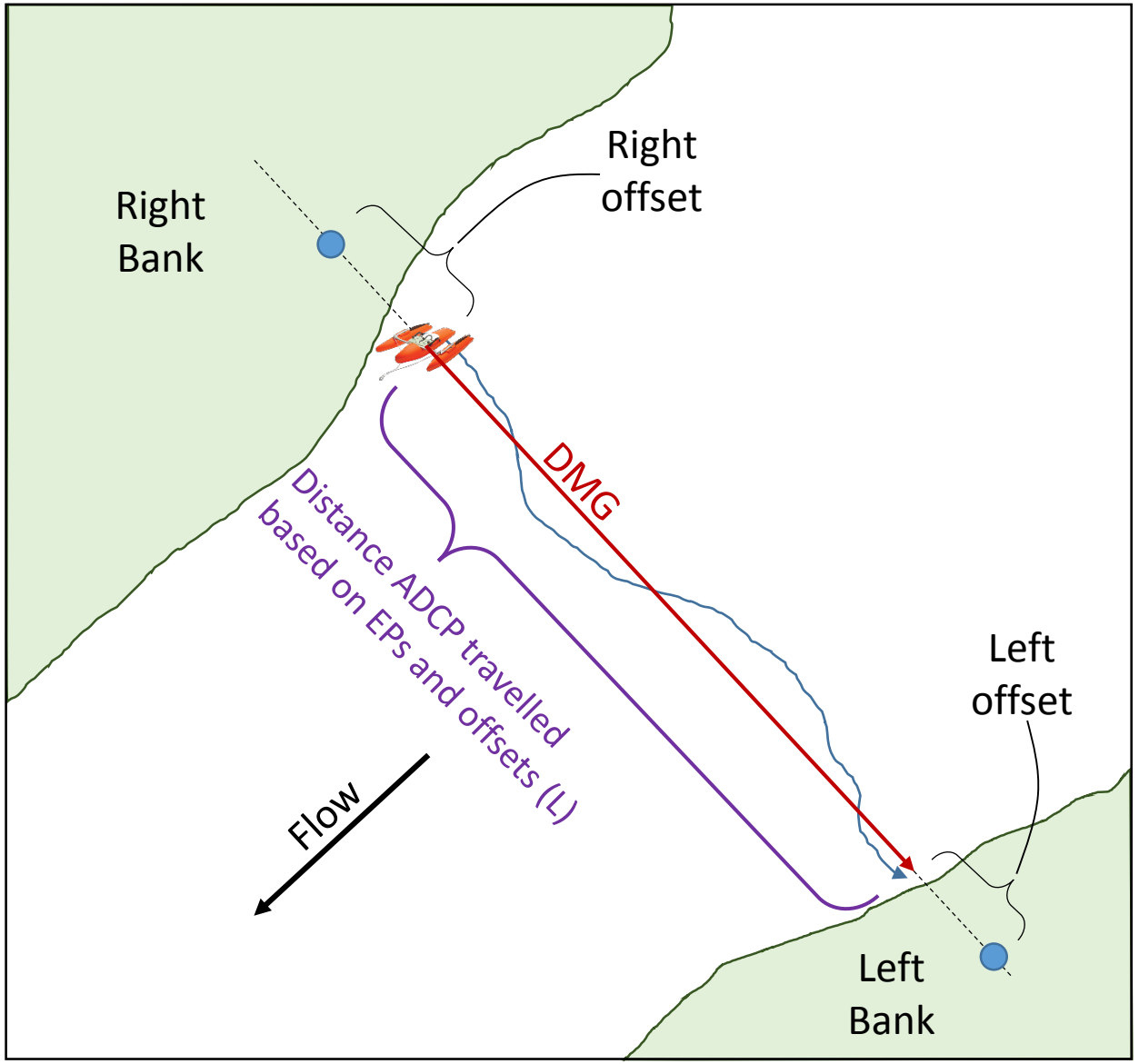
- Projects ADCP bottom track (〜) onto a known line between supplied endpoints (●)
- The user must measure the distance from each endpoint to ADCP at start of each transect (i.e. Right/Left offsets)
- The distance the ADCP should have travelled is computed.



Method Explanation

- The ADCP's actual DMG is compared against the measured distance
- Differences in DMG vs distance represent error in (and/or):
  1. Bottom tracking
  2. Measured offsets
  3. ADCP "navigation" (how the ADCP was pulled/traversed the channel)
- Error is distributed to each ensemble (e) equally along the transect:

$$DMG_{eadj} = L[DMG_e / \max(DMG)]$$

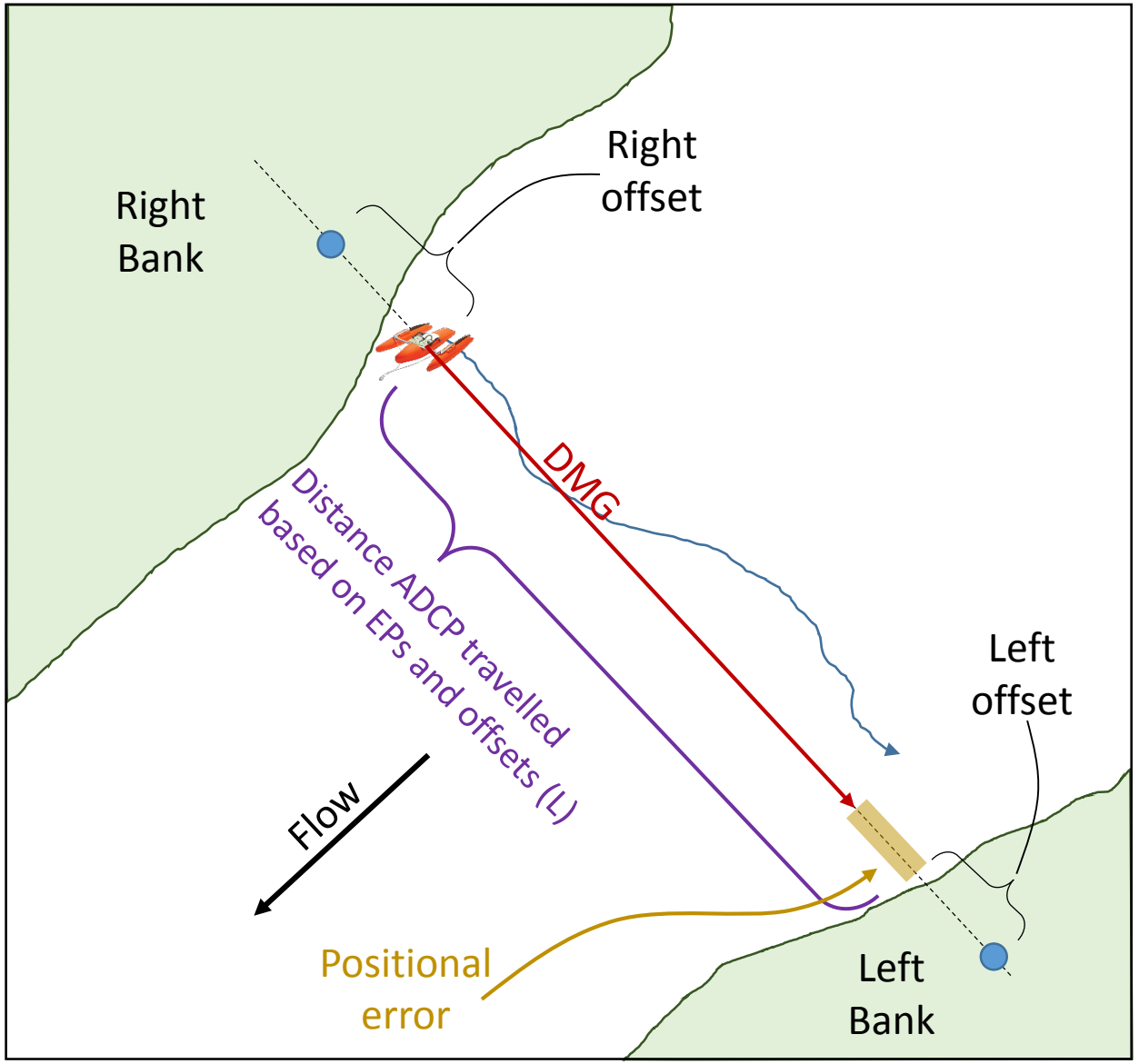


DMG (distance made good—dead reckoning length)
EPs (endpoints)

Method Explanation

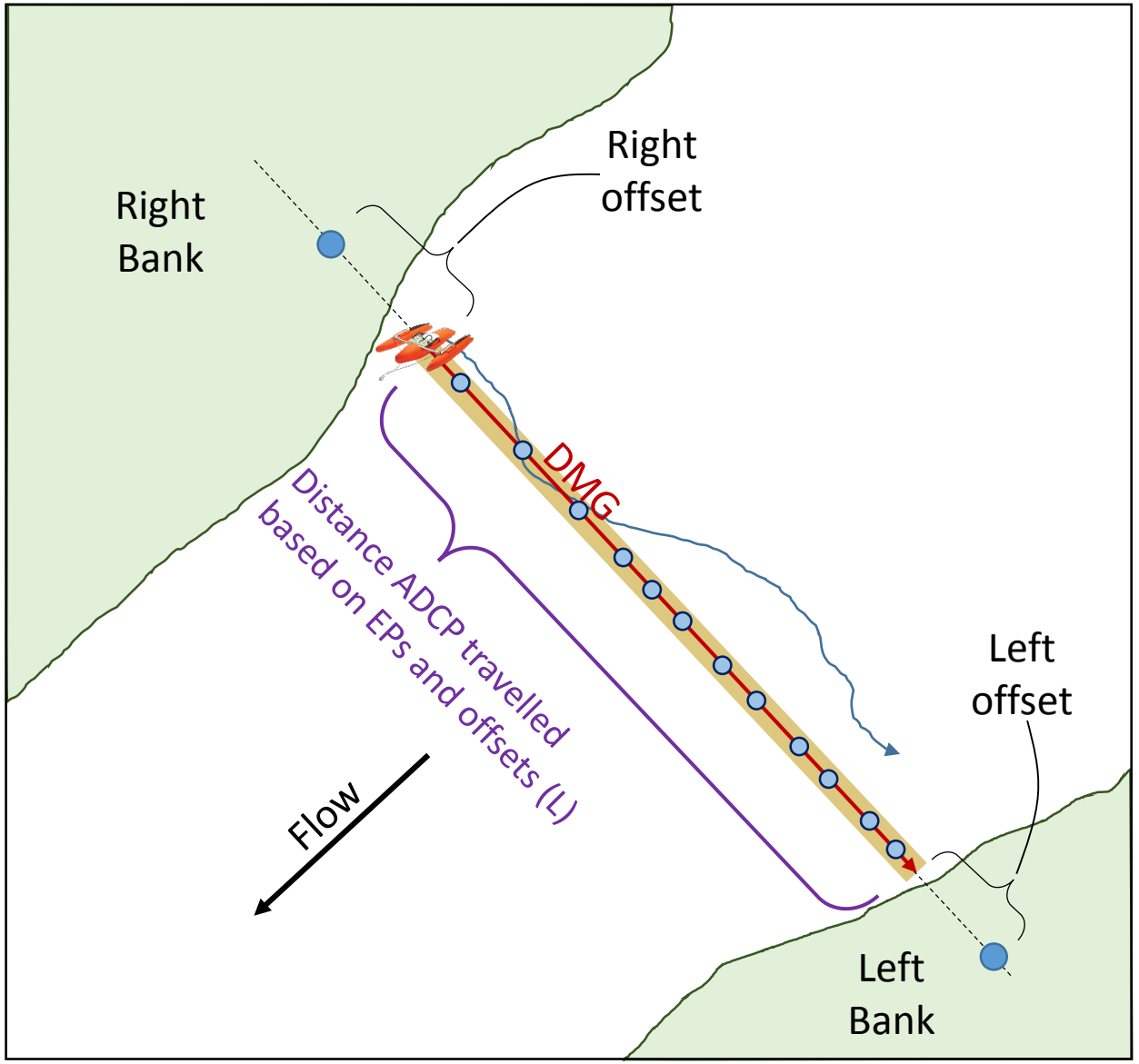
- In cases with moving bed, the DMG will have error

$$DMG_{eadj} = L[DMG_e/\max(DMG)]$$



Method Explanation

- By scaling error and distributing it to each ensemble, the corrected DMG can be recovered
- And new ensemble positions (◦) are computed



Basic Workflow

Endpoint Coords.

Lat/Lon for the LEFT and RIGHT endpoints of the line the user wants ALL ADCP ensembles to be mapped onto

Input File Table

Selected files appear here. The user enters the distance of the ADCP to each endpoint.

User also sets the starting bank For each transect (L/R)

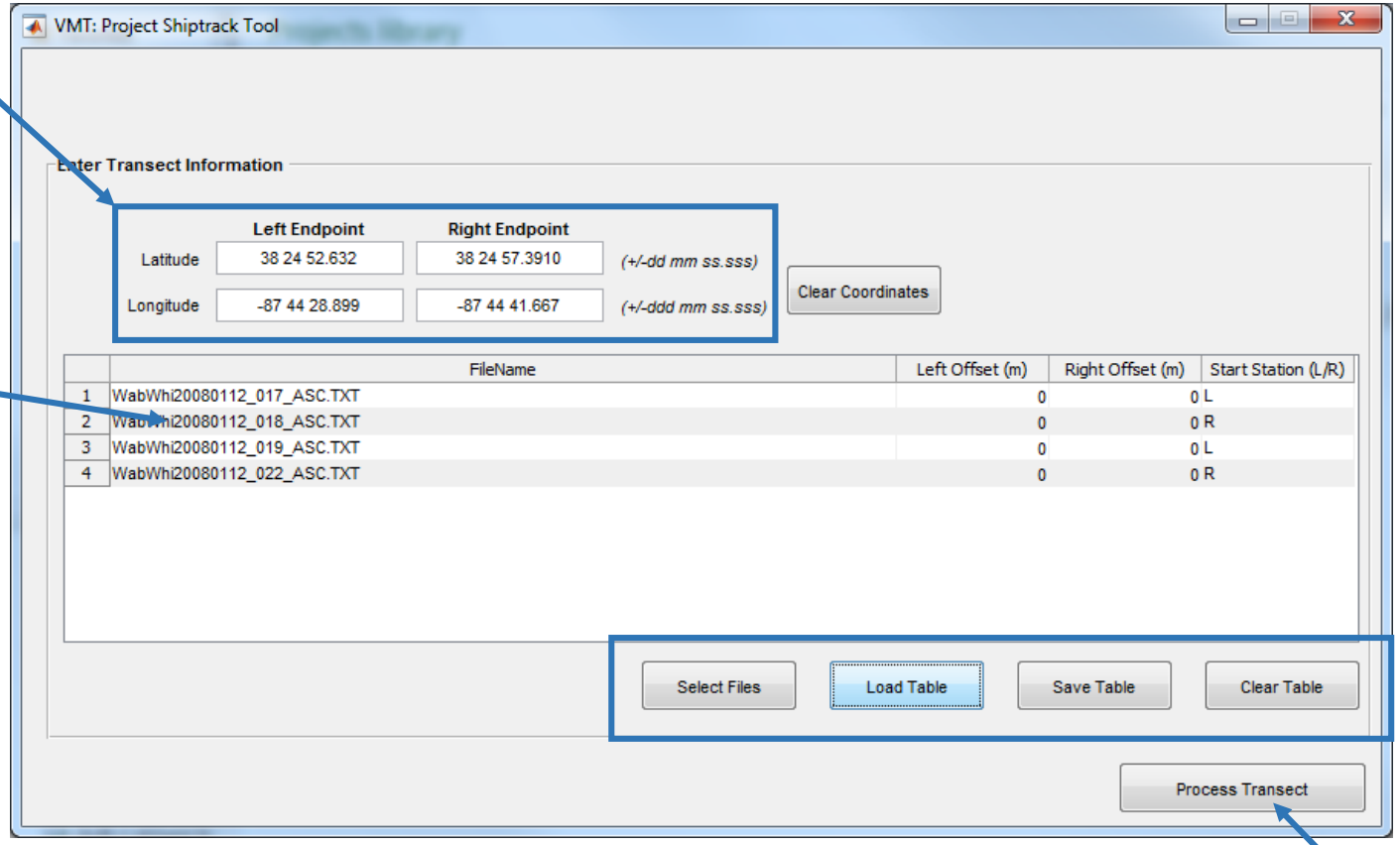


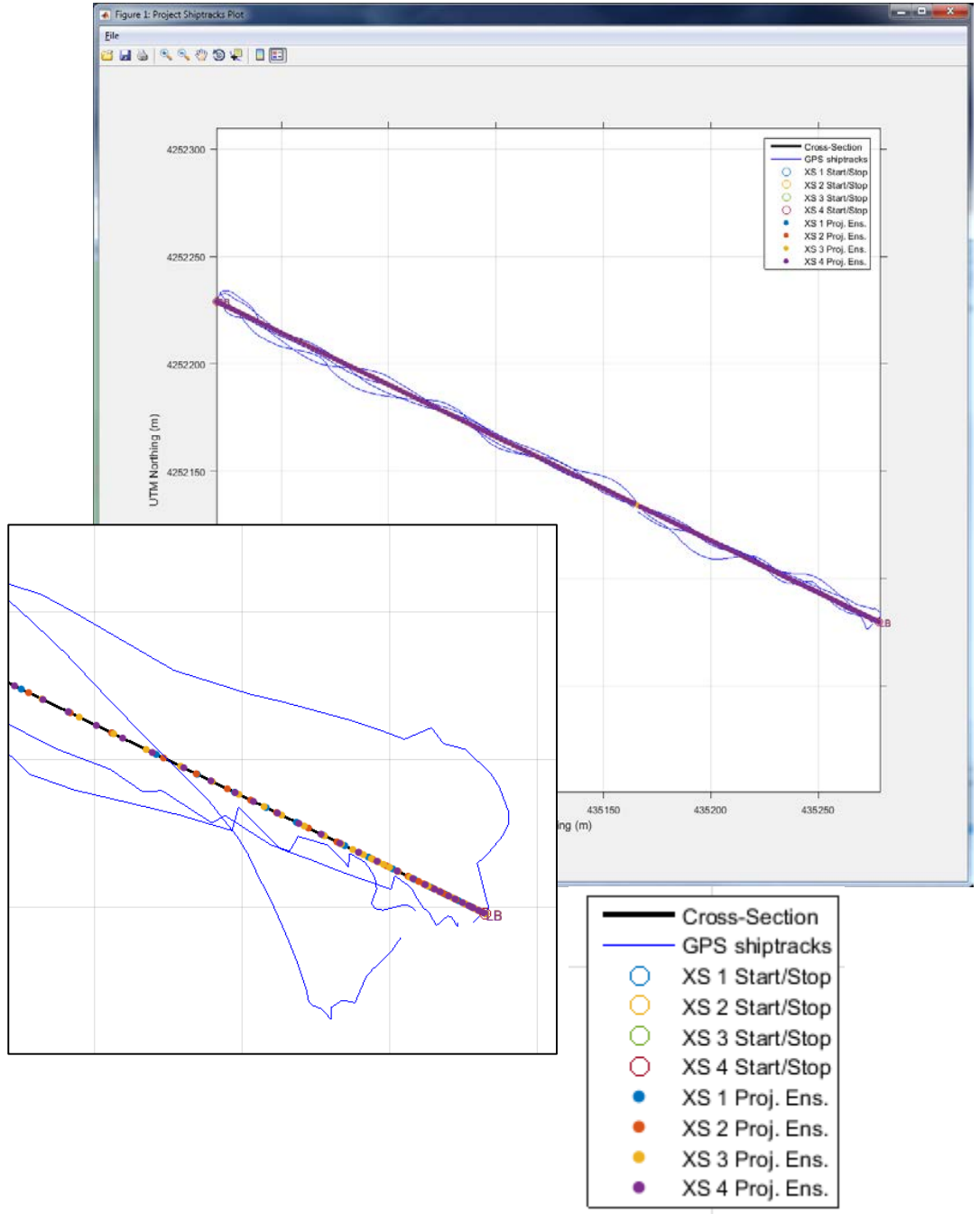
Table functions

Select ADCP ASCII files manually, or load a preformatted Excel Spreadsheet.

Processing button (use when ready to go)

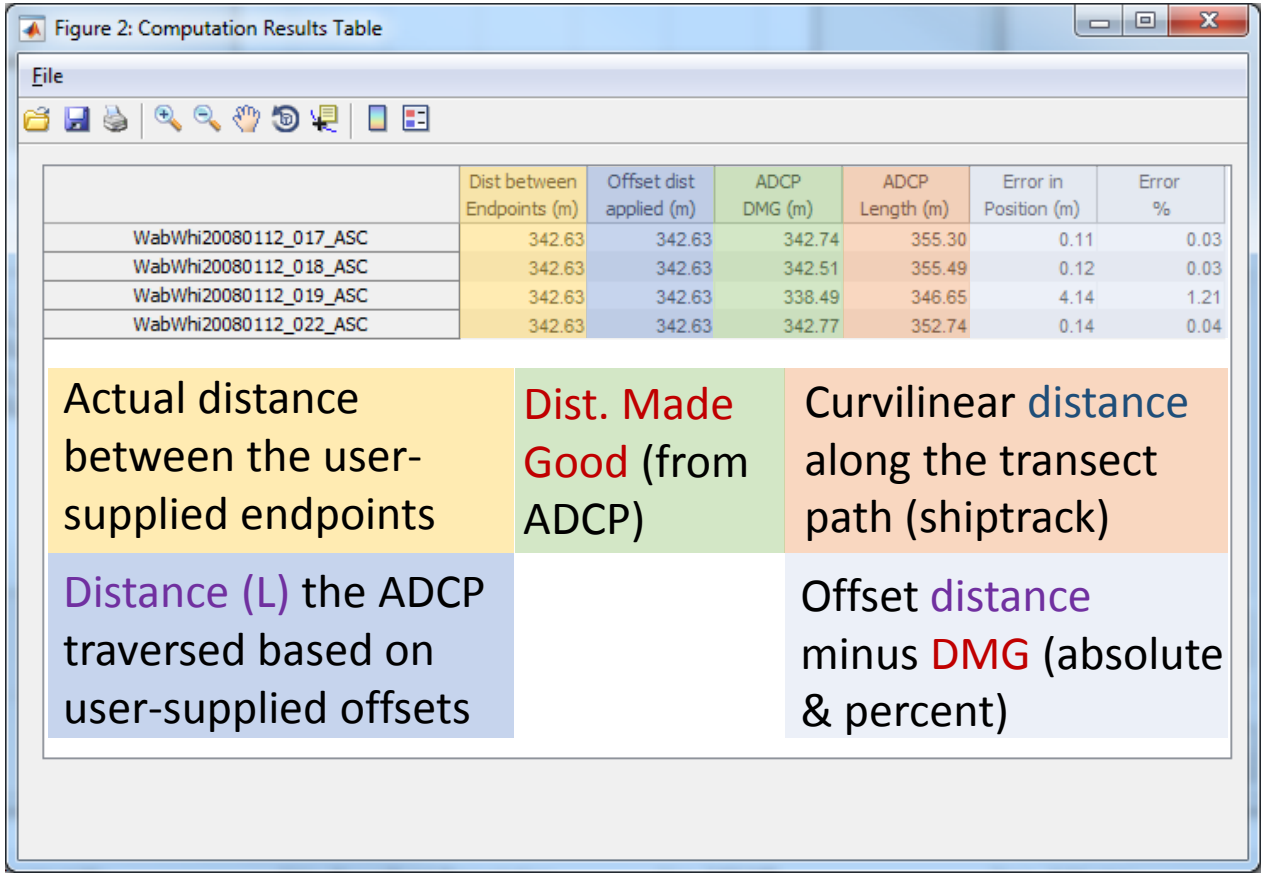
Basic Workflow

- When the Process Transect button is pressed, the tool computed the corrected and geo-rectified ensemble locations for each ensemble (results are plotted)
  - If the ADCP data have GPS locations, the tool will plot the GPS shiptracks (handy for testing)



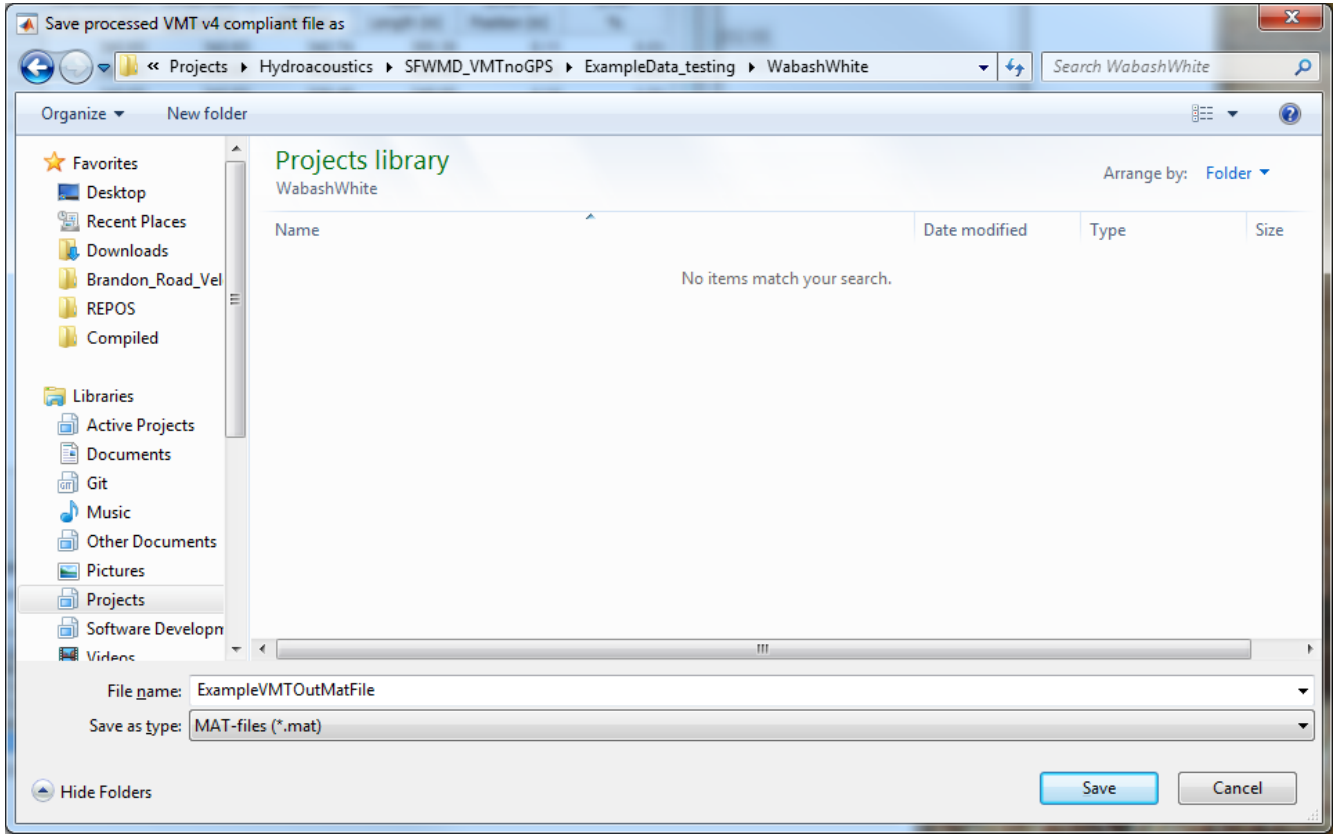
Basic Workflow

- The tool will also report some metrics about how well the projection approach worked
- The reported positional error is an *estimate* of the uncertainty in the projection algorithm for a given dataset
- It's useful to compare the ADCP Length and DMG as well—if the ADCP shiptrack deviates significantly from the line (e.g., from a loose tagline), the ADCP Length will be much greater than the DMG, and less confidence in the projection is advised



Basic Workflow

- The tool will output a VMT v4.xx compliant MAT-file
- This file can be loaded and processed with VMT normally.



EXAMPLE: Wabash White CMB

Confluent meander bend transect. White River on channel left is a sand bedded meander. Sediment transport is high over the point bar. Also, transport in the shear layer should be significant (although this transect is closer to the stagnation zone).

Process Example Data

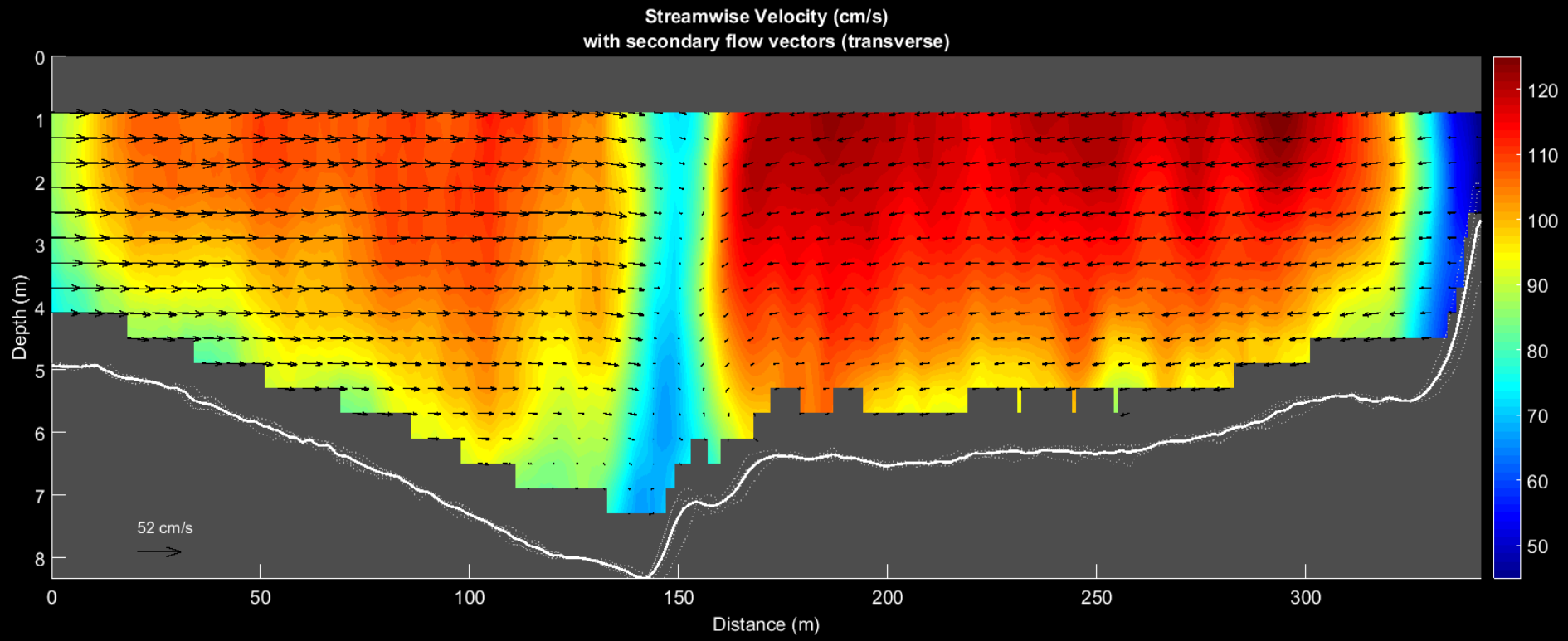
- There are some example data included with the installation of the tool. If you choose the default installation directories, these files are located:

  C:\Program Files\US Geological Survey\VMTProjectShiptrackTool\application\ExampleData\WabashWhite

- If you did change the default file location, be sure to open the “FileList.xlsx” file and edit the data directory path to match the location of the example data.

Figure 3: Mean Cross Section Contour

File Edit View Help



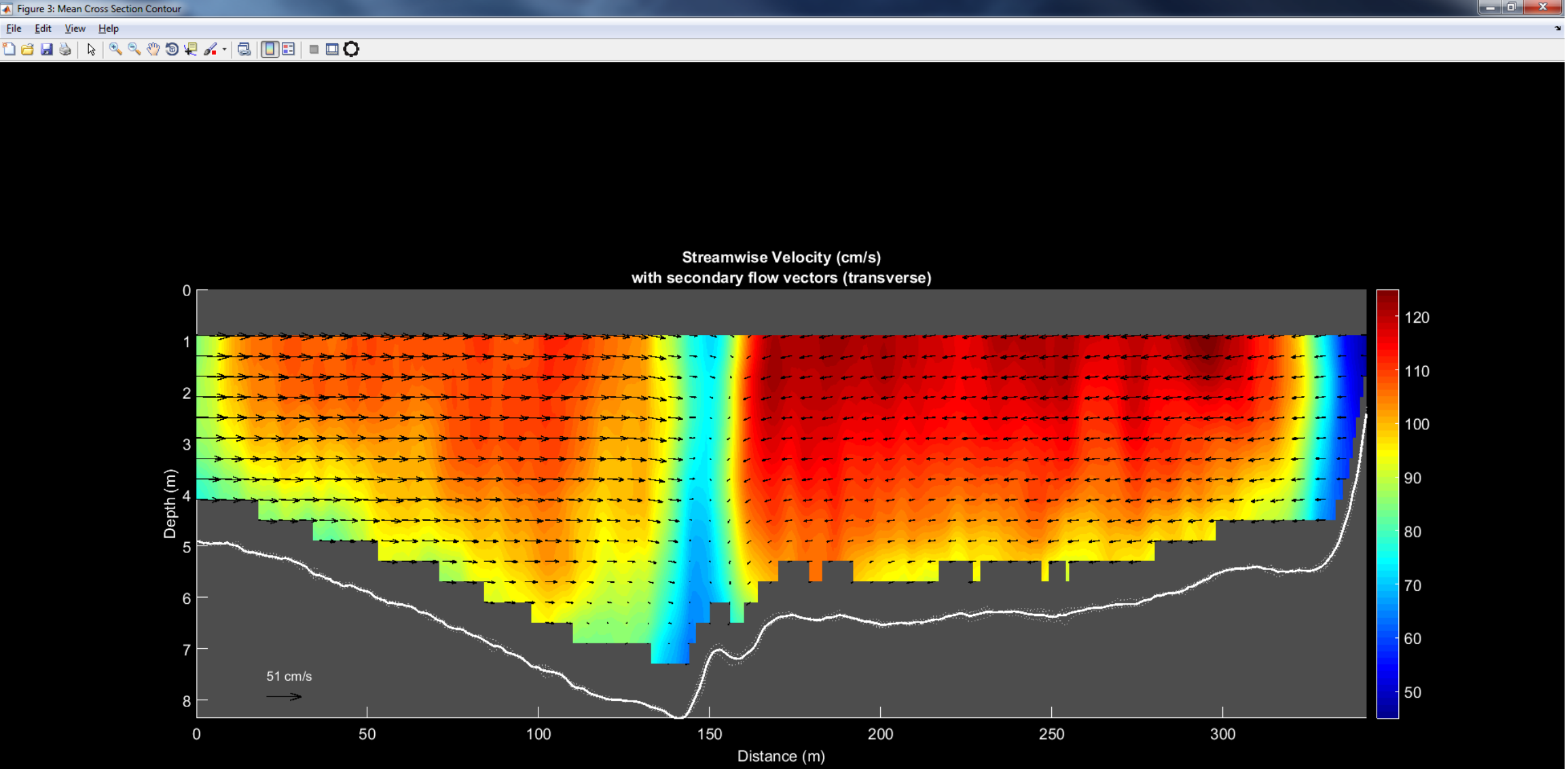
No GPS

Figure 2: Computation Results Table

File

	Dist between Endpoints (m)	Offset dist applied (m)	ADCP DMG (m)	ADCP Length (m)	Error in Position (m)	Error %
WabWhi20080112_017_ASC	342.63	342.63	342.74	355.30	0.11	0.03
WabWhi20080112_018_ASC	342.63	342.63	342.51	355.49	0.12	0.03
WabWhi20080112_019_ASC	342.63	342.63	338.49	346.65	4.14	1.21
WabWhi20080112_022_ASC	342.63	342.63	342.77	352.74	0.14	0.04

Wabash-White

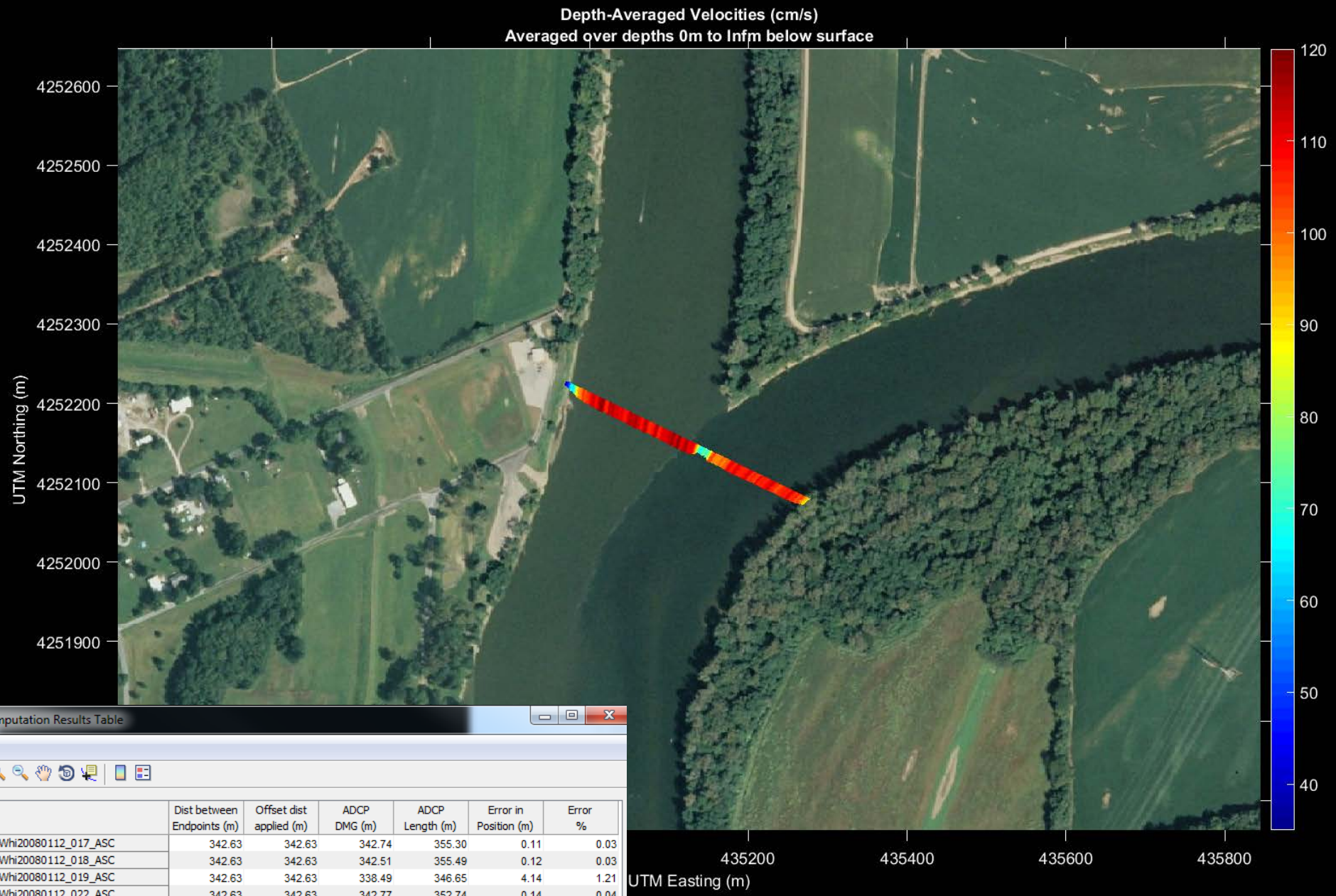


GPS

Wabash-White

Figure 2: Plan View Map

File Edit View Help



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WabWhi20080112_022_ASC	342.63	342.63	342.77	352.74	0.14	0.04

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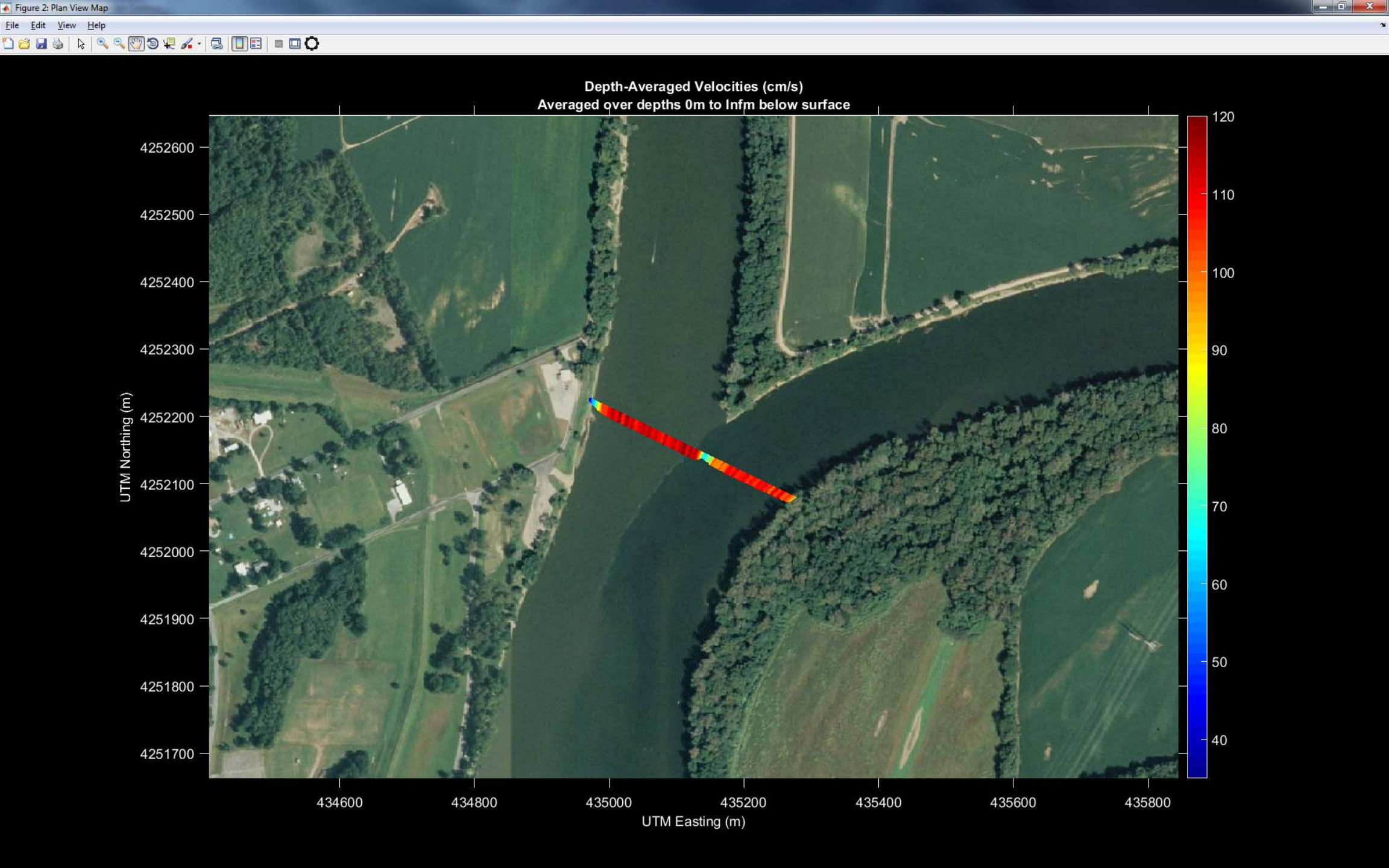
Wabash-White



GPS

Wabash-White