HEC-RAS Mapper
Results Visualization

Eric Tichansky P.E., CFM
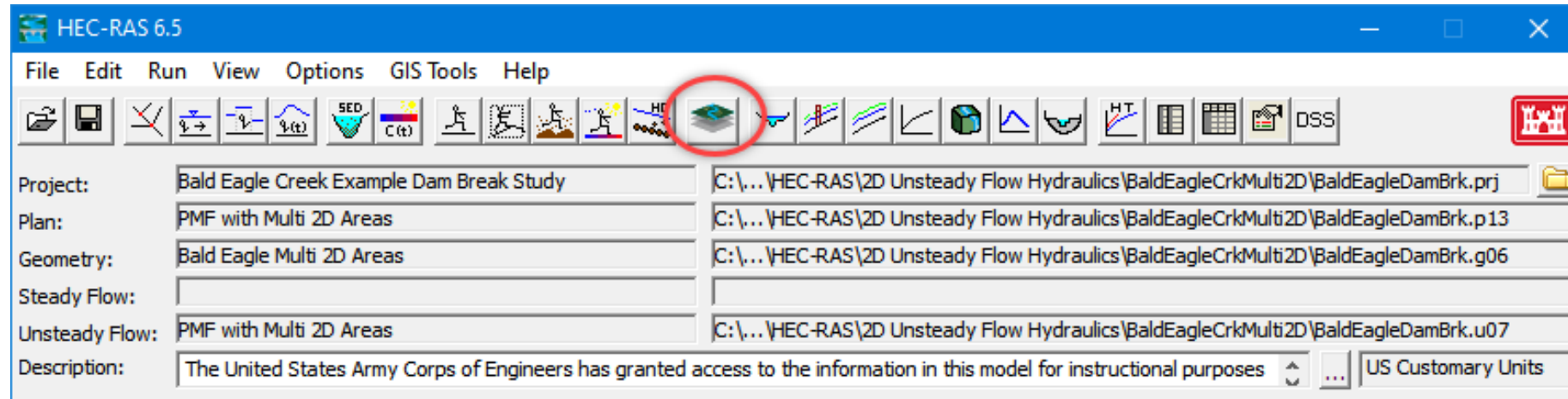Cameron Ackerman, P.E., D.WRE

USACE, Institute for Water Resources, Hydrologic Engineering Center

Overview

- How do we visualize RAS results?

- How do we debug our model?

- How do we compare different plans?

HEC-RAS Mapper

Layers List

- Profile Lines
- Geometries
- Results
- Map Layers
- Terrains

Selected Layer: Depth

☑ **Features**
- ☐ Profile Lines
☑ **Geometries**
- ⊞ ☐ Grid 50ft
- ⊞ ☐ grid200ft
- ⊟ ☑ Grid400ft
  - ⊞ ☑ Rivers ————
  - ⊞ ☑ Cross Sections ————
  - ☐ *Storage Areas*
  - ⊞ ☑ 2D Flow Areas ————
  - ⊞ ☐ *Bridges/Culverts*
  - ⊞ ☐ *Inline Structures*
  - ⊞ ☐ Lateral Structures
  - ⊞ ☑ *SA/2D Connections* ---------
  - ⊞ ☐ *Pump Stations*
  - ☑ *BC Lines* ————
  - ⊞ ☐ Manning's n
  - ⊞ ☐ *Infiltration*
  - ⊞ ☐ *Percent Impervious*
  - ☐ *Reference Points*
  - ☐ *Errors*
- ⊞ ☐ **Event Conditions**
☑ **Results**
- ⊟ ☑ Grid 50ft
  - ⊞ ☐ Event Conditions
  - ⊞ ☐ Geometry
  - ☑ Depth (02JAN1900 02:45:00) ▰▰▰
  - ☐ Velocity (02JAN1900 05:00:00)
  - ☐ WSE (02JAN1900 00:00:00)
  - ☐ Inundation Boundary (Max Value_0) 🖫
  - ☐ Depth (Max) 🖫
- ⊞ ☐ Grid 200ft
- ⊞ ☑ Grid 400ft
☑ **Map Layers**
- ⊟ ☐ LandCover
  - ☑ *Classification Polygons*
- ⊞ ☐ VOD_LC
- ☐ Google Satellite
☑ **Terrains**
- ☐ Terrain
- ☑ TerrainWithChannel ▰▰▰

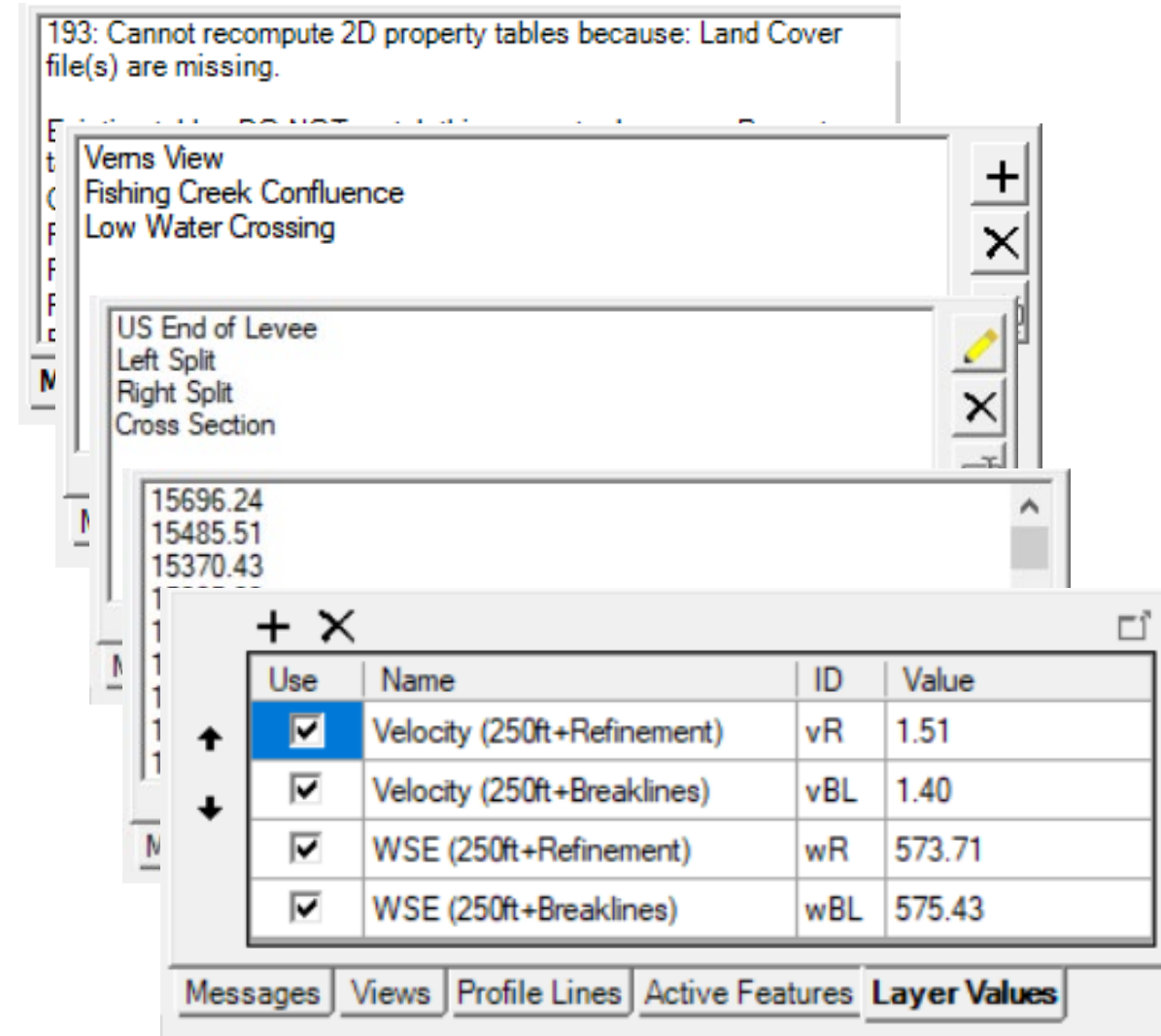Symbology is shown to the right of any checked layers.

The selected layer is highlighted in magenta.

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Status Area

- Messages – What just happened
- View – Quickly zoom to predefined areas
- Profile Lines – Access results at specific locations
- Active Features – Quick access to features in layer
- Layer Values – Watch values for multiple results

Profile Lines

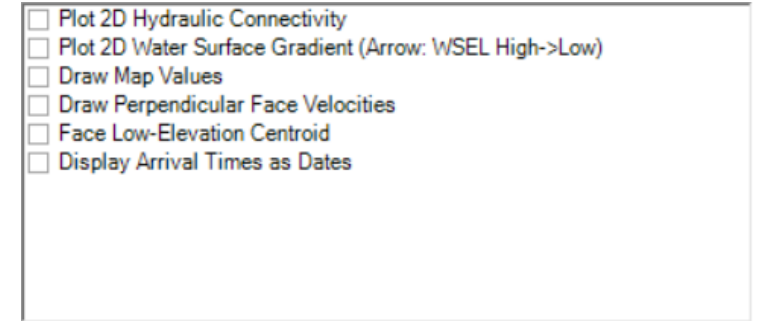- User-defined/editable features

Active Features

Watch Layer Values

Web Imagery

Plot Options

- Terrain

- Depth, WSE

- River, Cross Sections
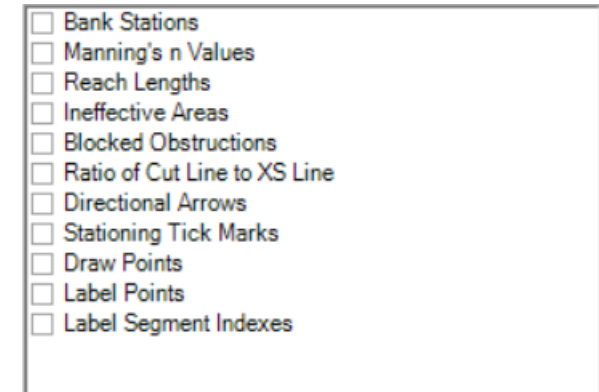
Results Mapping

- Dynamic Mapping – on-the-fly mapping
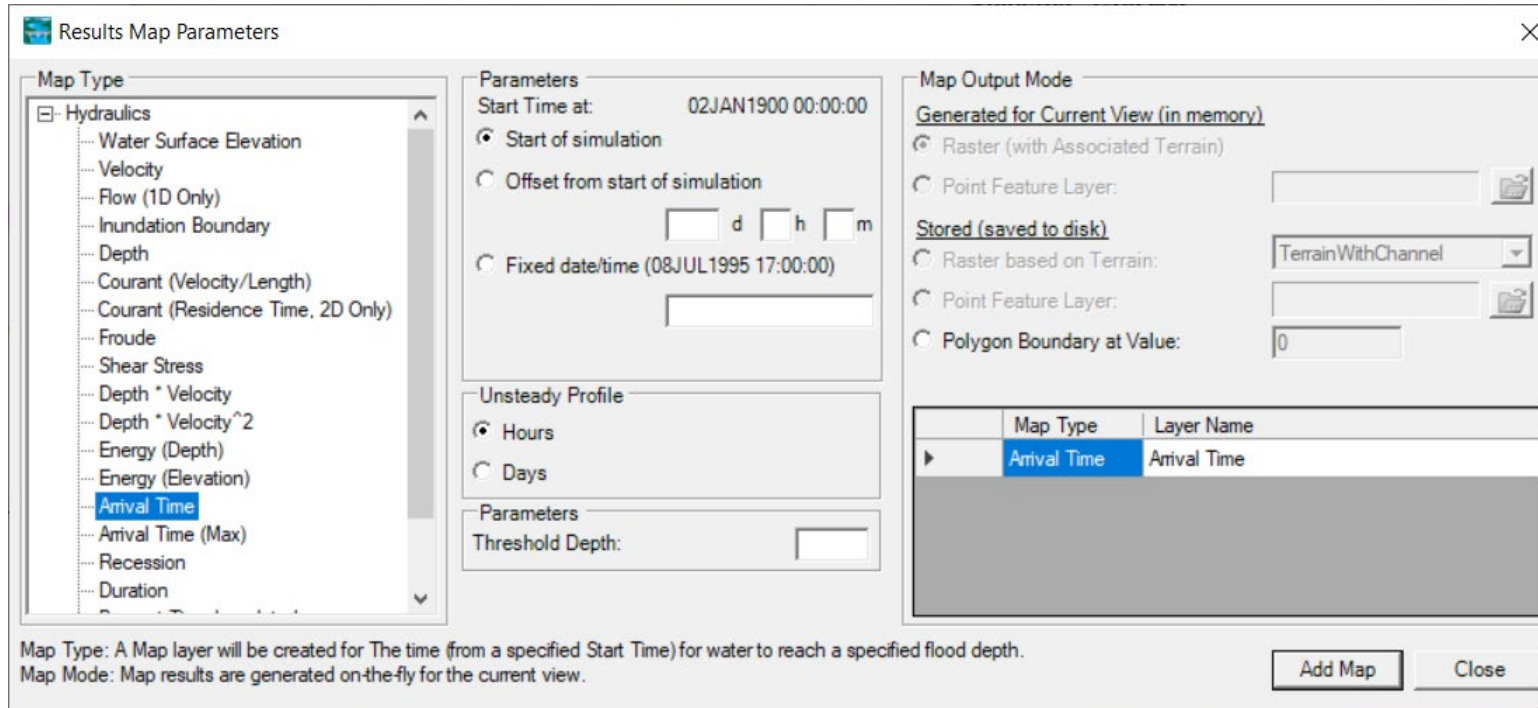 - Animation of results without waiting
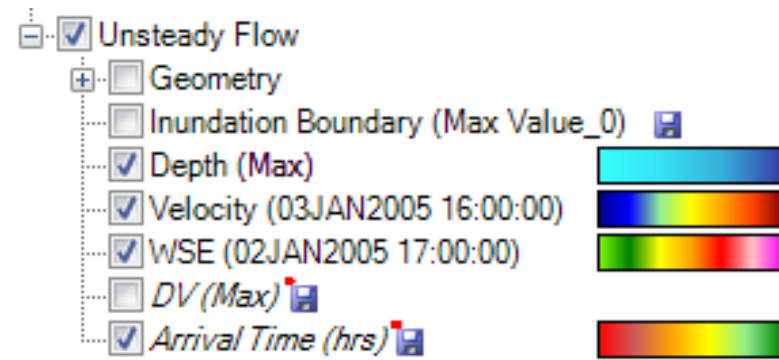
- Stored Maps – results written to file

  ✳ = There was a problem reading data

Results Mapping

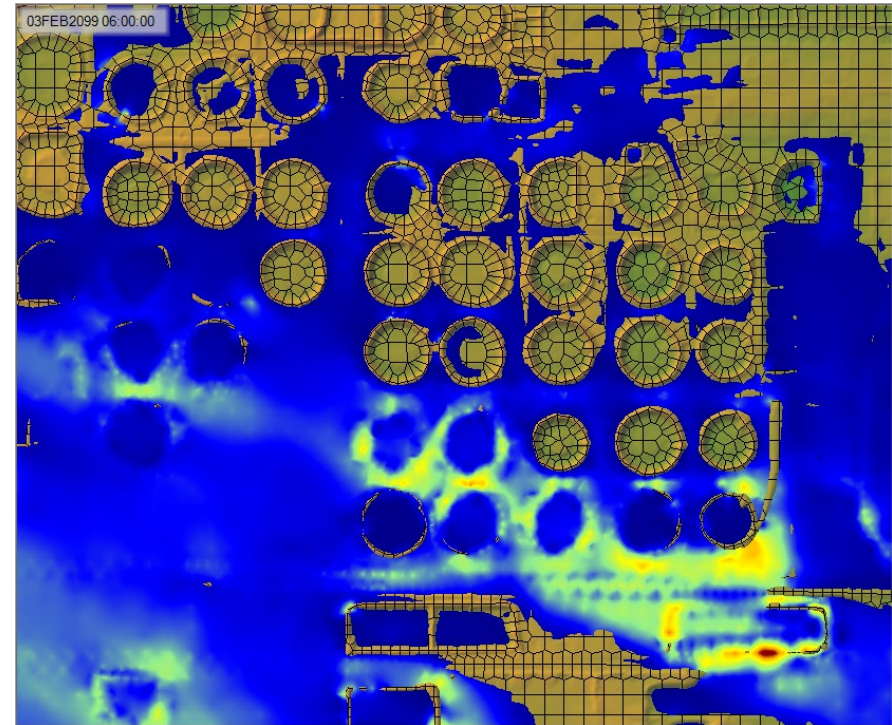Map Type | Profile/Parameter | Mode

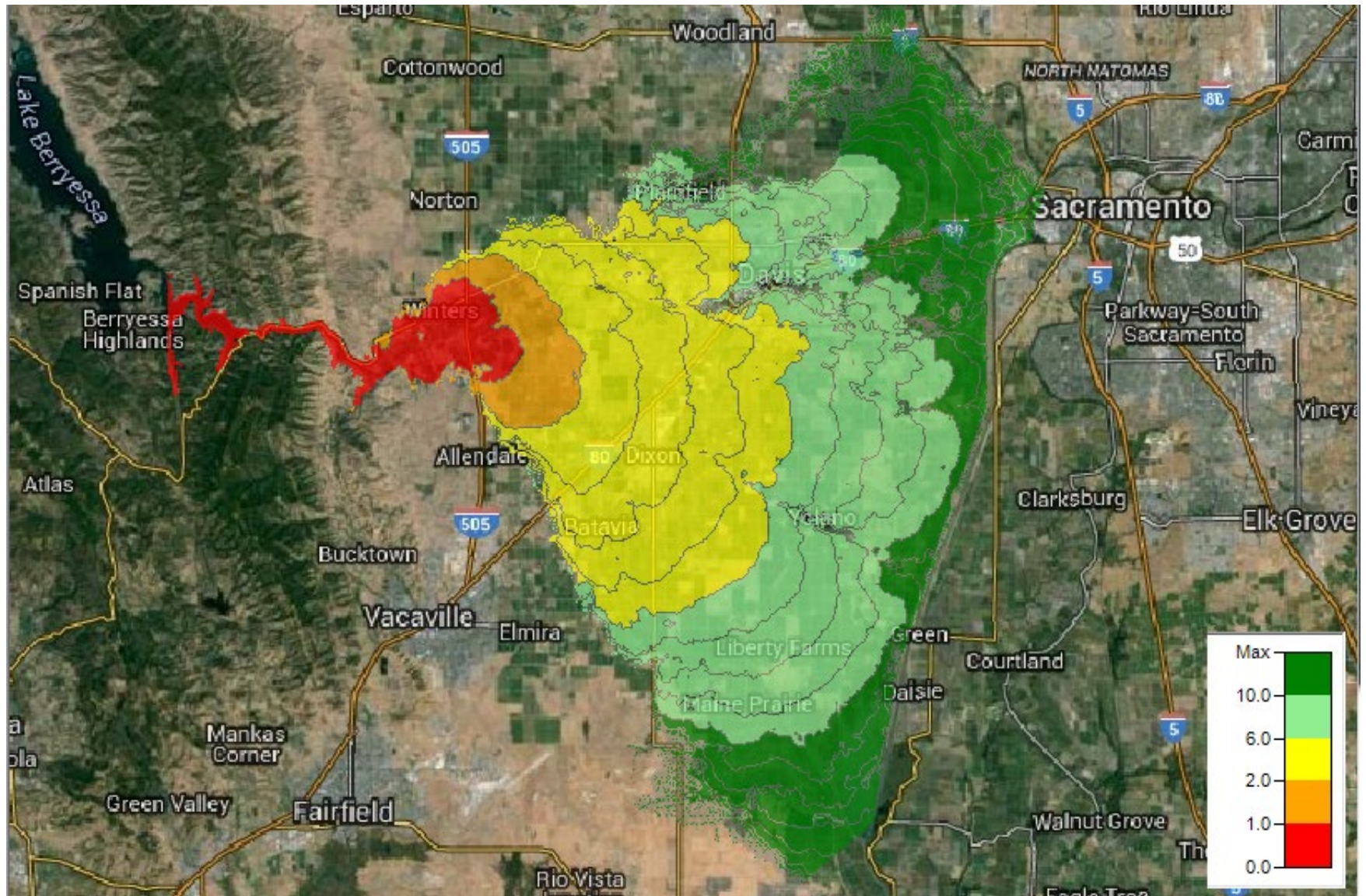Default maps: Depth, Water Surface Elevation, Velocity
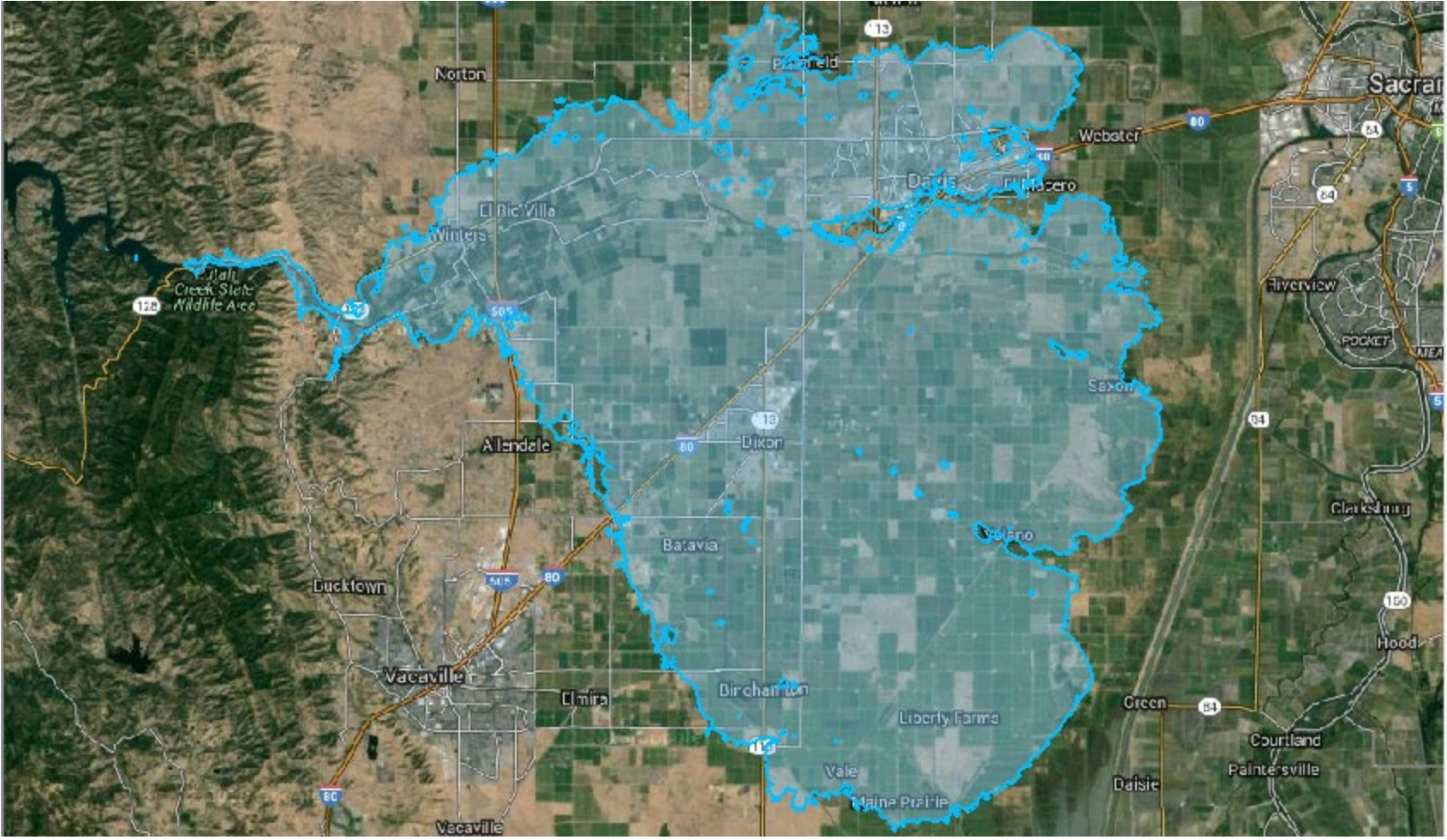
Example Maps

- Depth
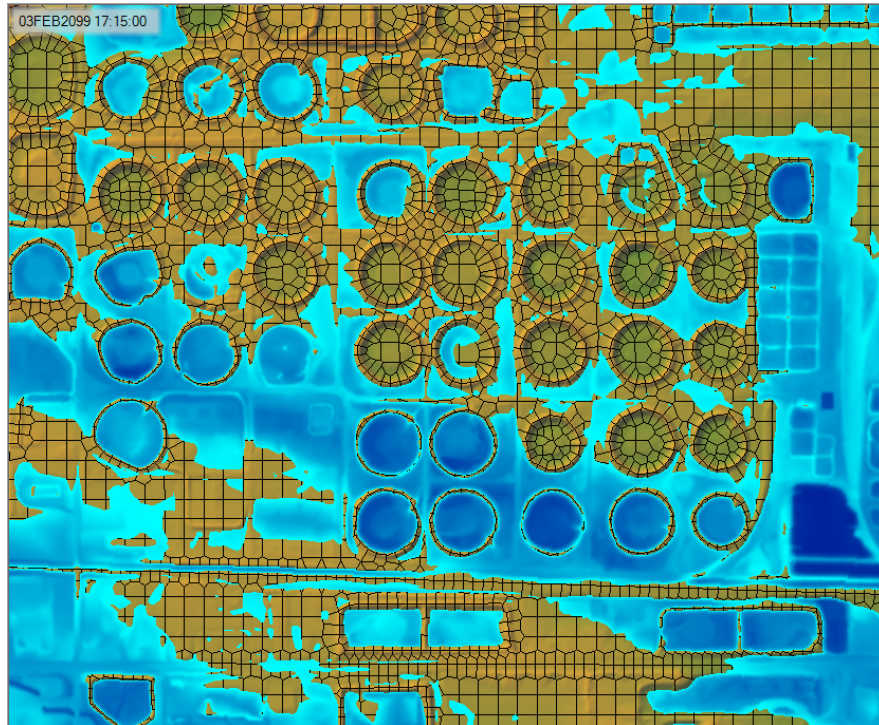
- Velocity

Arrival Time

Hazard Mapping
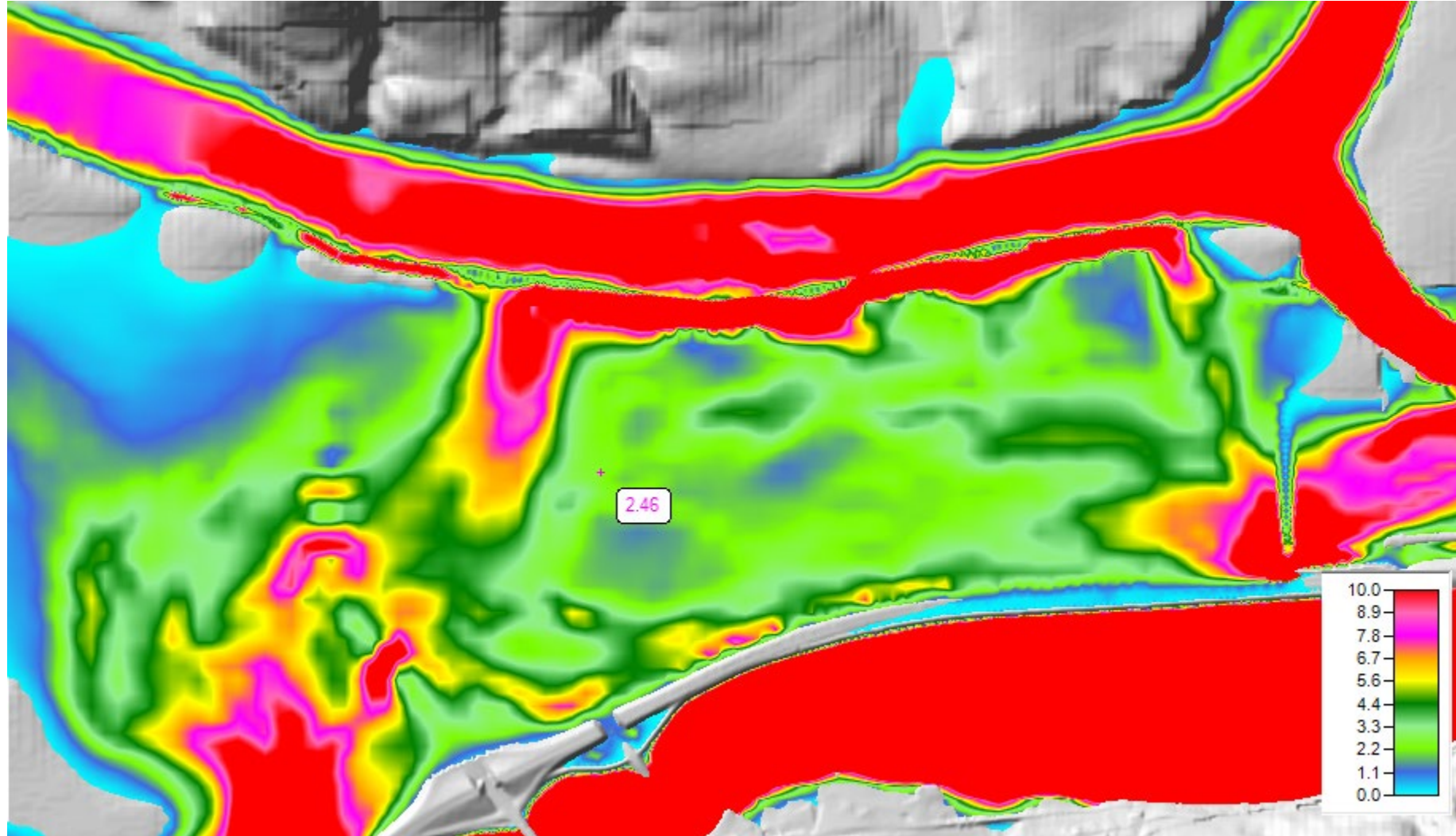
Inundation Boundary

RAS Mapper Courant Number Map
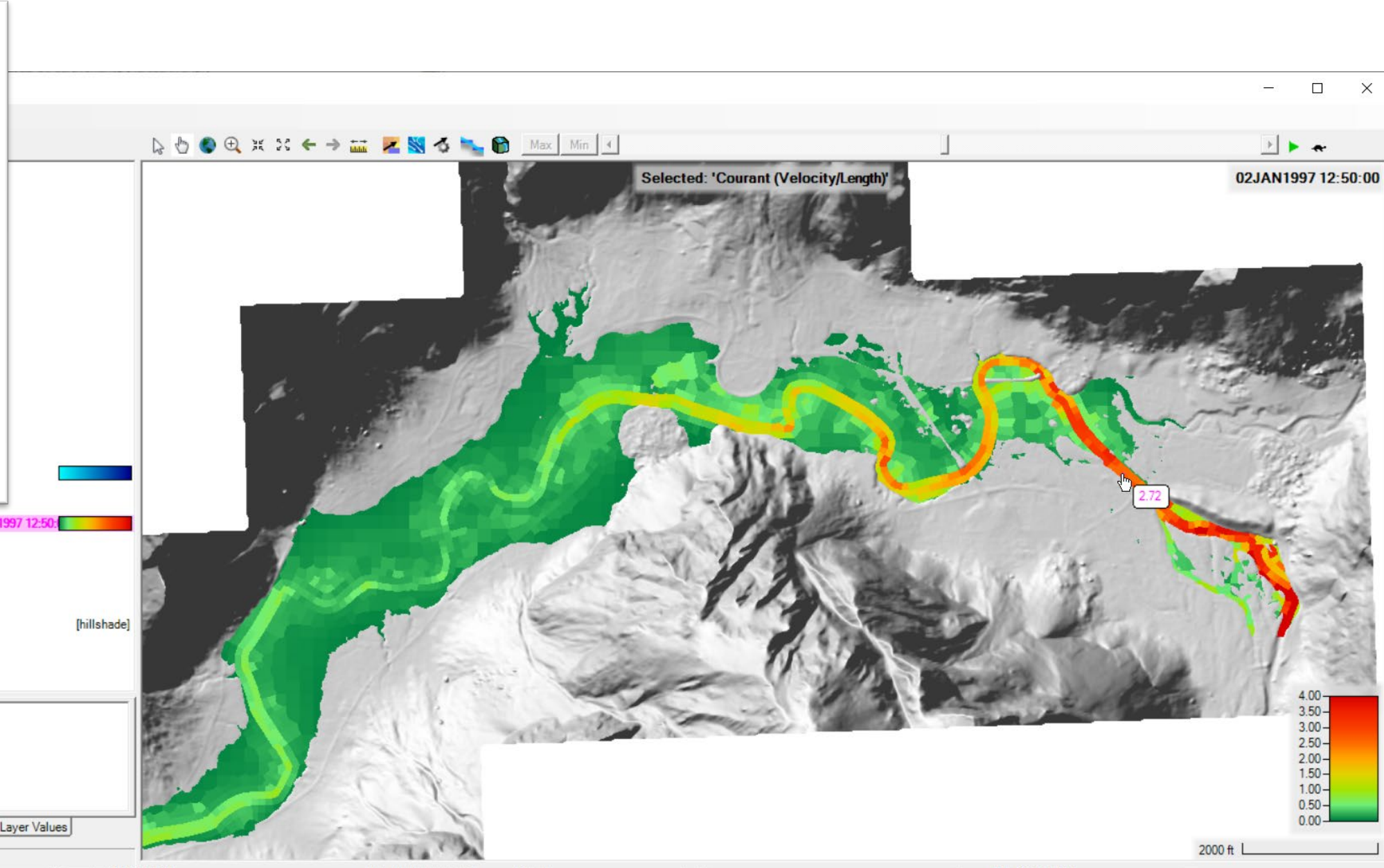
Maximum Water Surface Error
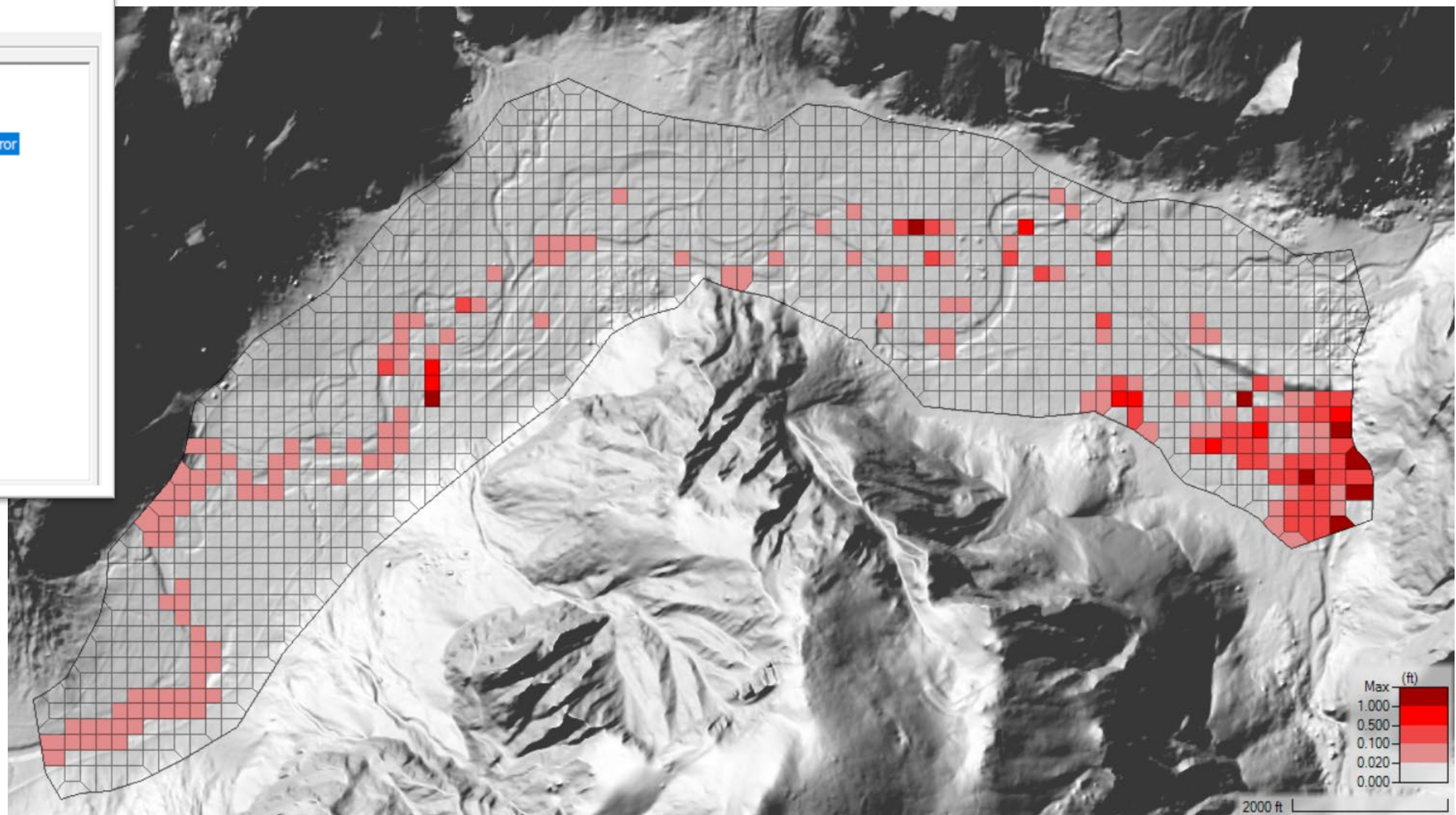
Hydraulic Connectivity (2D)

- Hydraulic connectivity from mesh
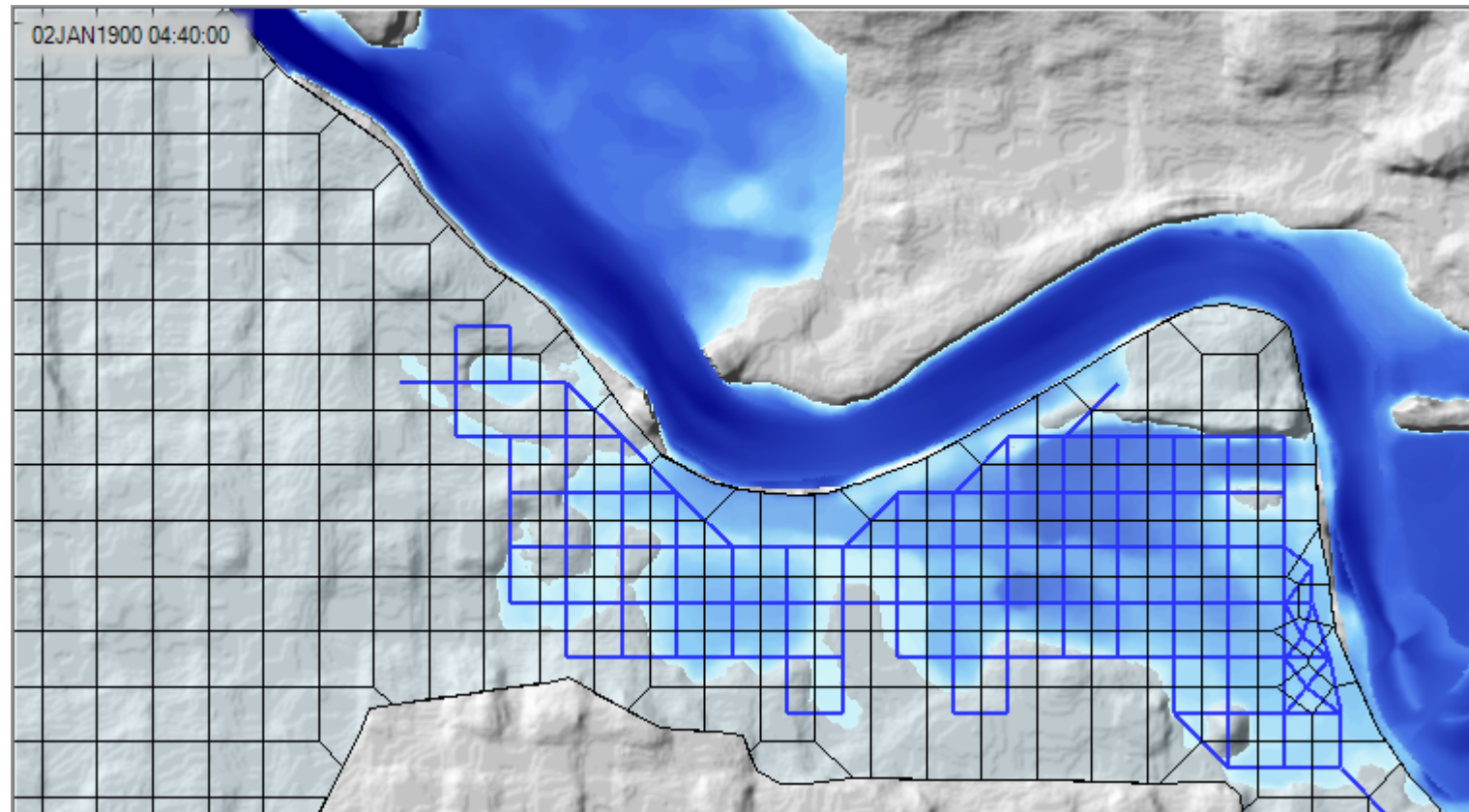
Map Types – Dynamic vs Stored

- Dynamic: Computed on-the-fly
  - Smooth: Computes to screen-resolution
  - Doesn't use disk space
- Stored: Computed to terrain resolution
  - Stored to disk
  - Faster rendering for slow map types
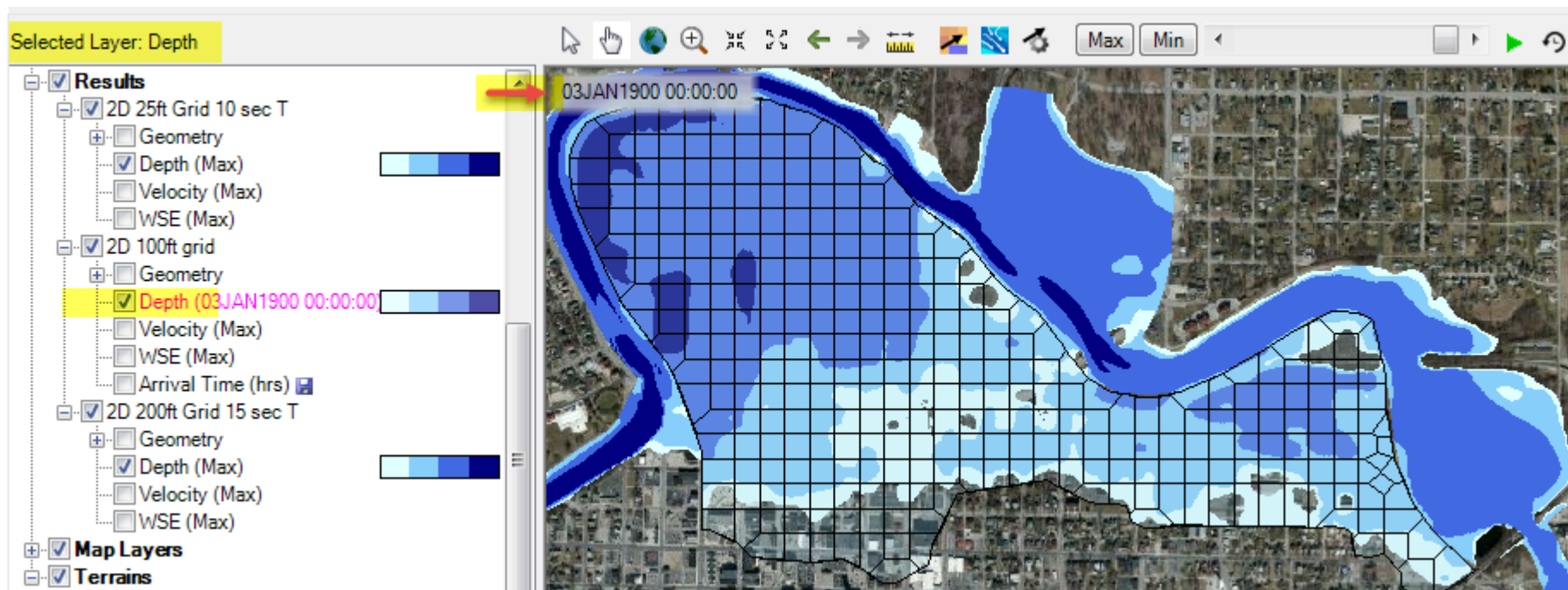
Dynamic vs Stored Results

- Dynamic results plot values for the current pyramid level. Boundaries are defined based on interpolation.

- Stored results have a single value per cell.
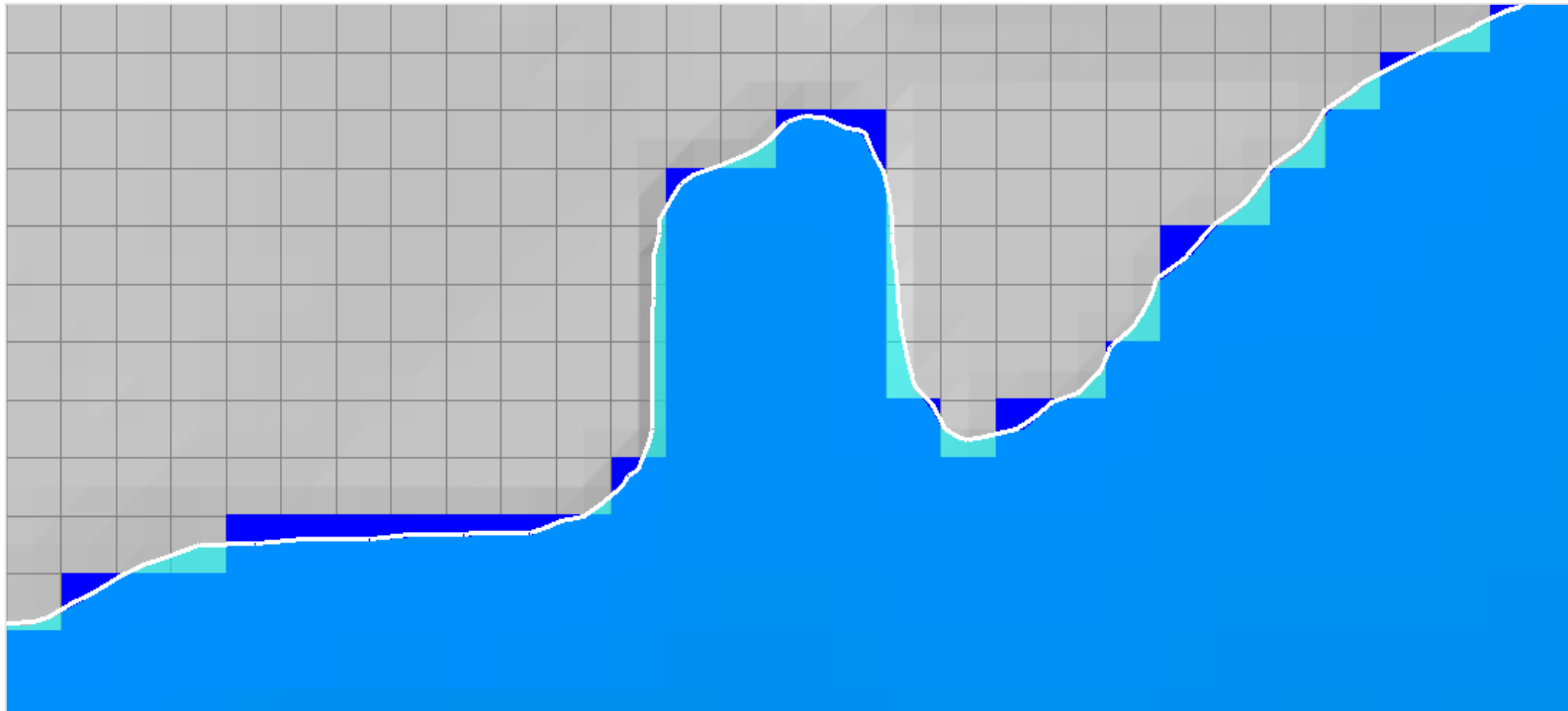
Dynamic Mapping

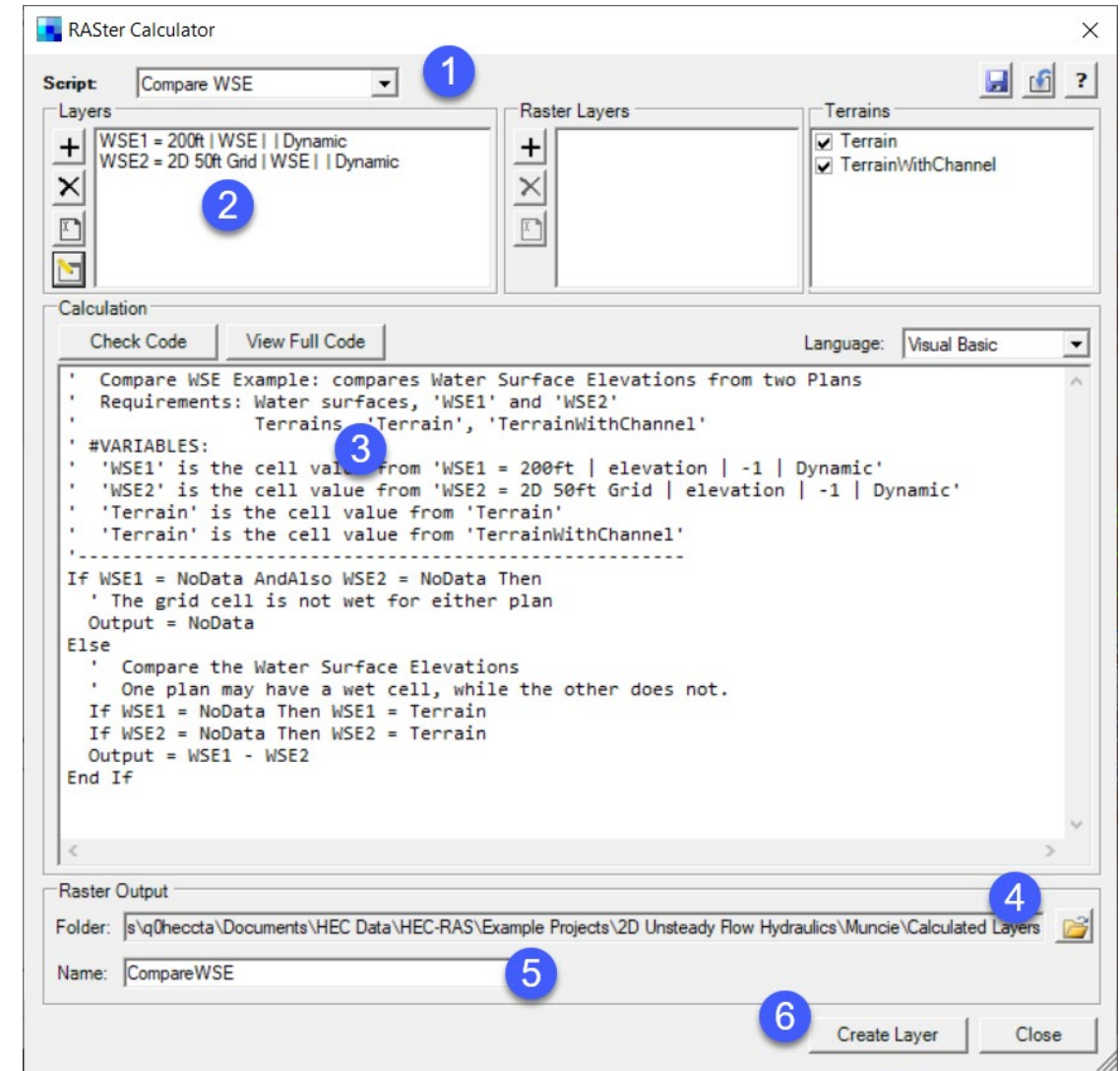- Animation Toolbar – works on selected layer or group and syncs the timestep

Dynamic Mapping - Animation

Calculated Layer

- RASter Calculator
- Custom scripting code to use multiple results
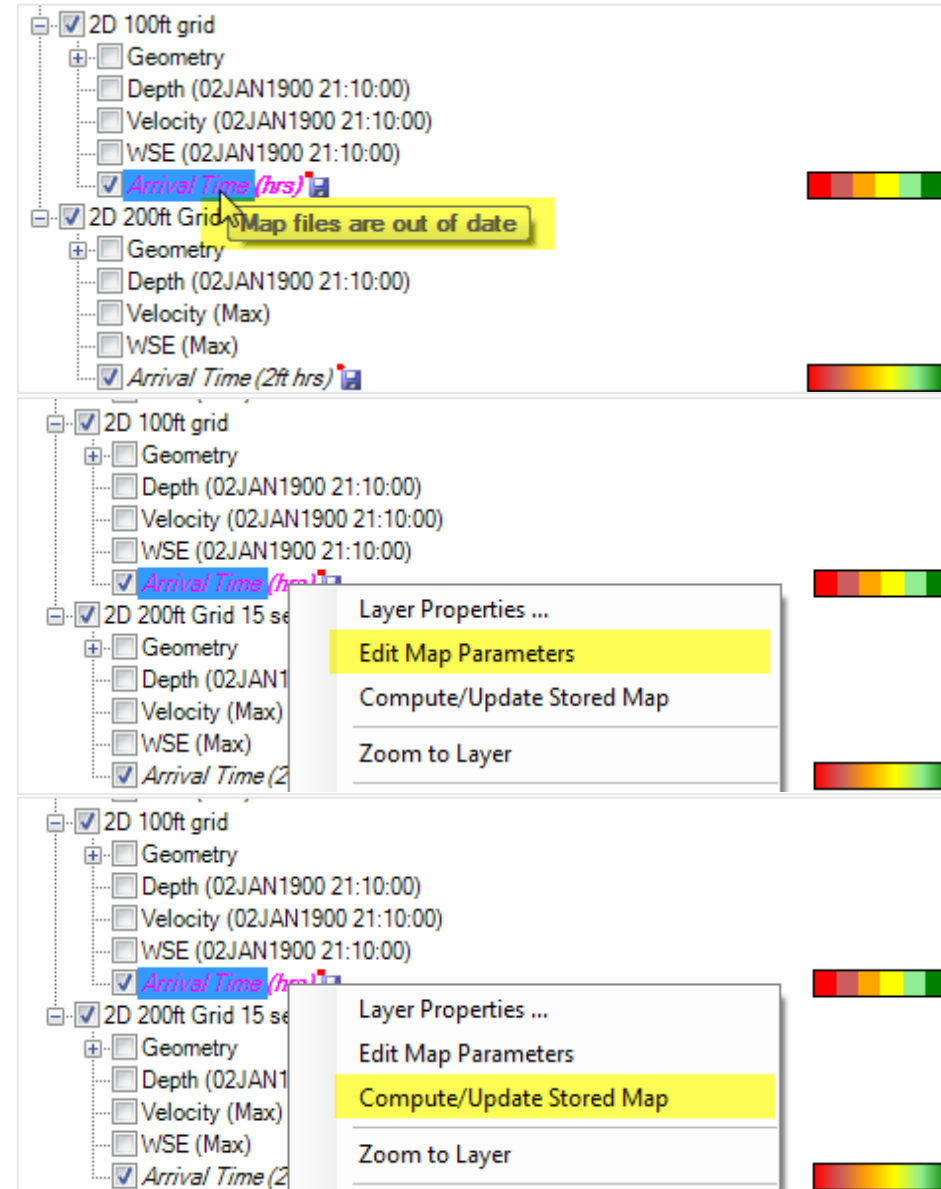- Works with RAS Results and Terrains
- Works with Rasters on disk

Stored Maps

- Map status message on cursor tool tip

Right-click options:

- Edit Map Parameters

- Compute Map

Results Layer Properties
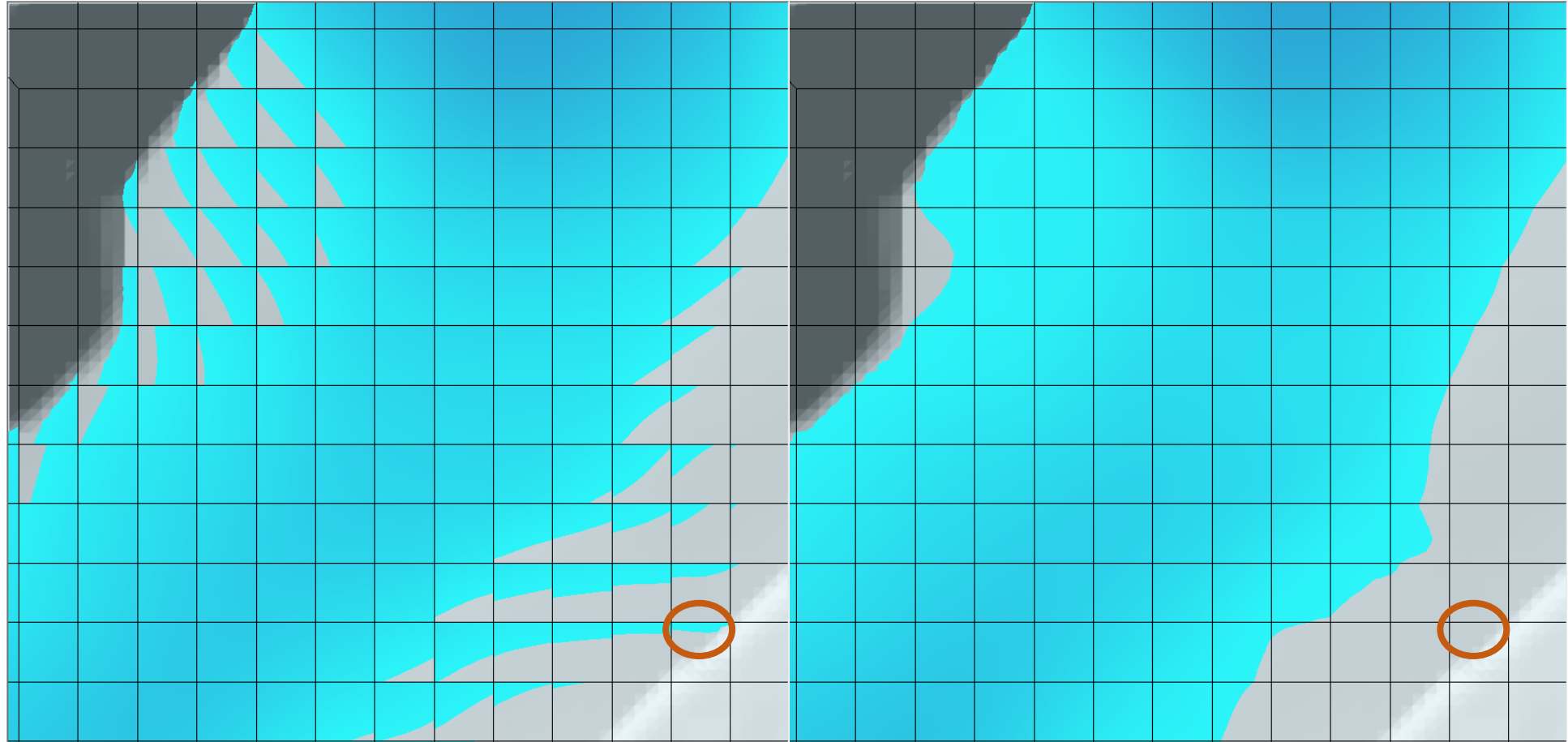
Results Visualization

2D Render Mode Options
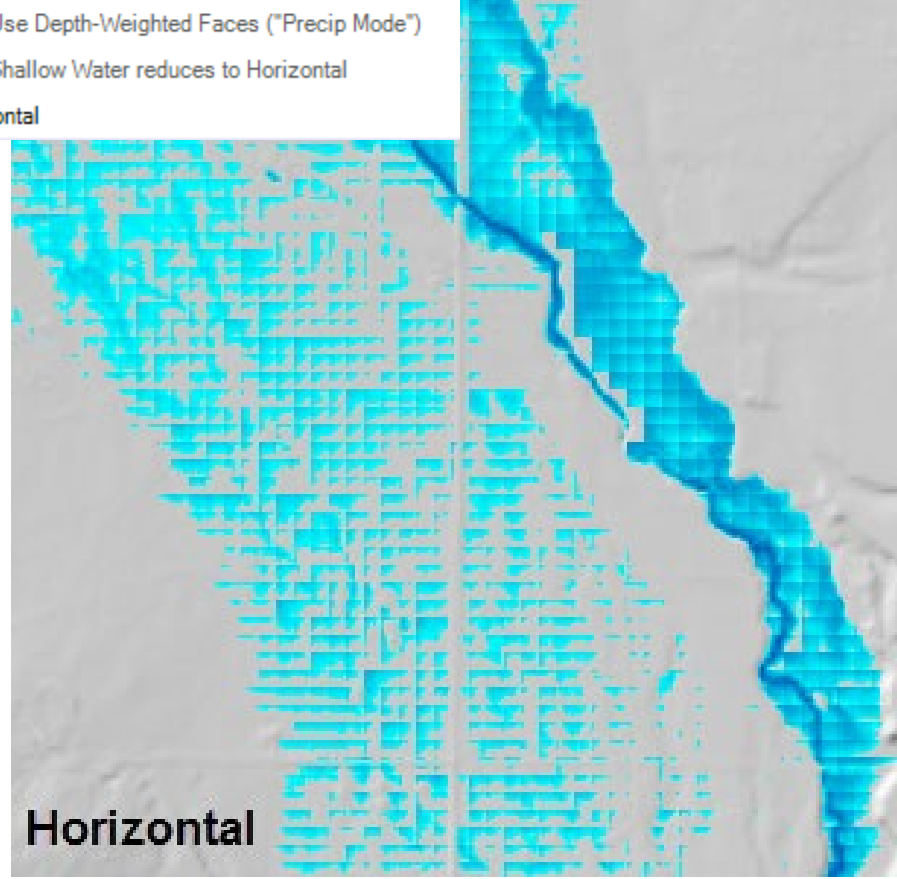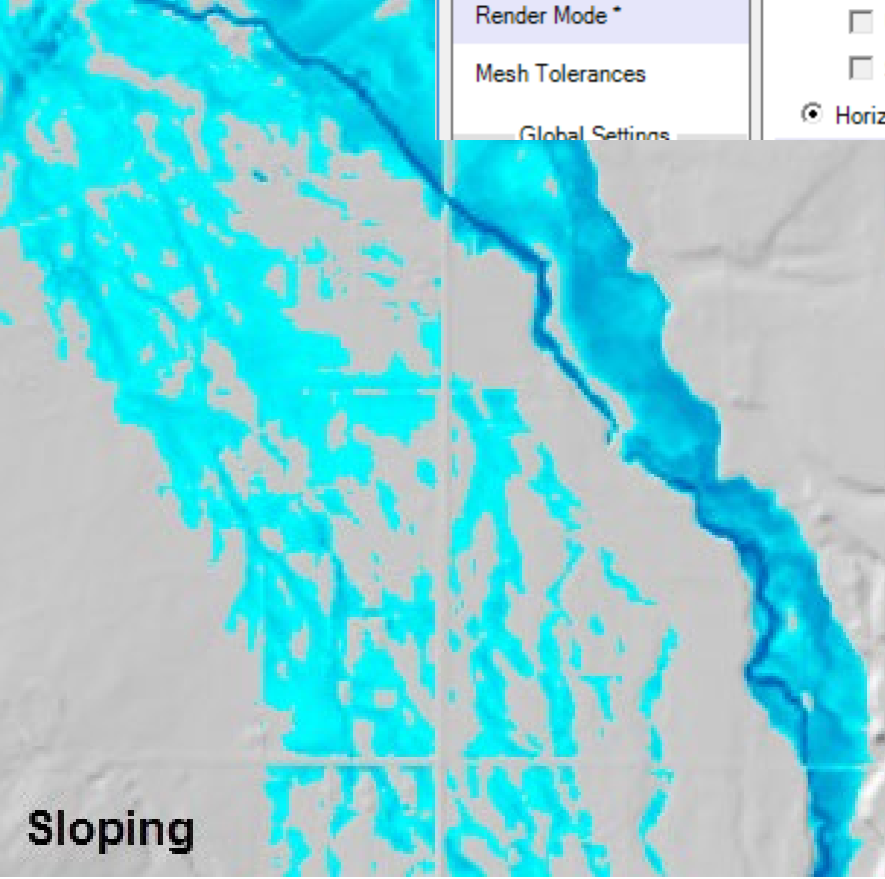
Results Interpolation

- Render mode options allow for interpolation of water surface elevation values or plotting values at the cell centers.
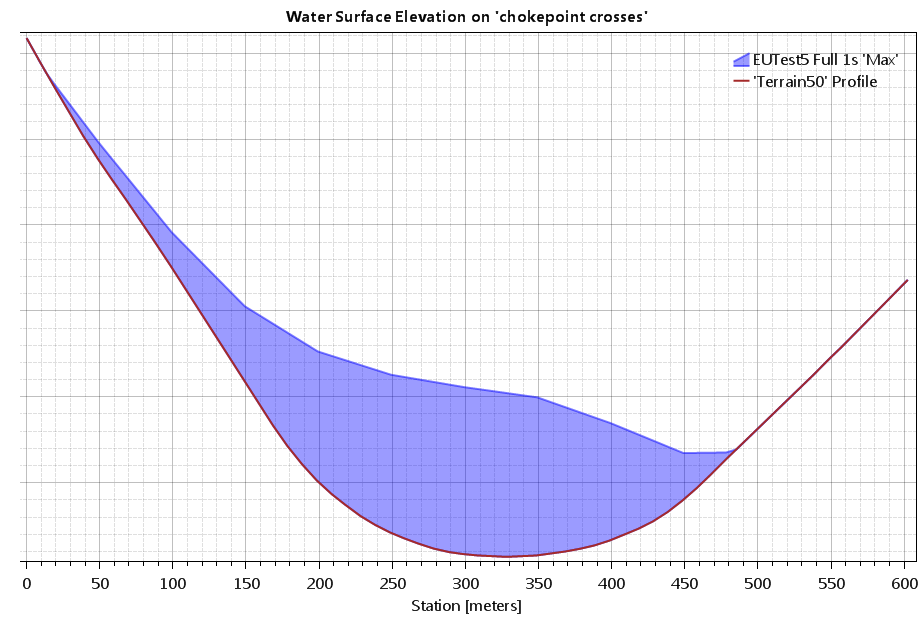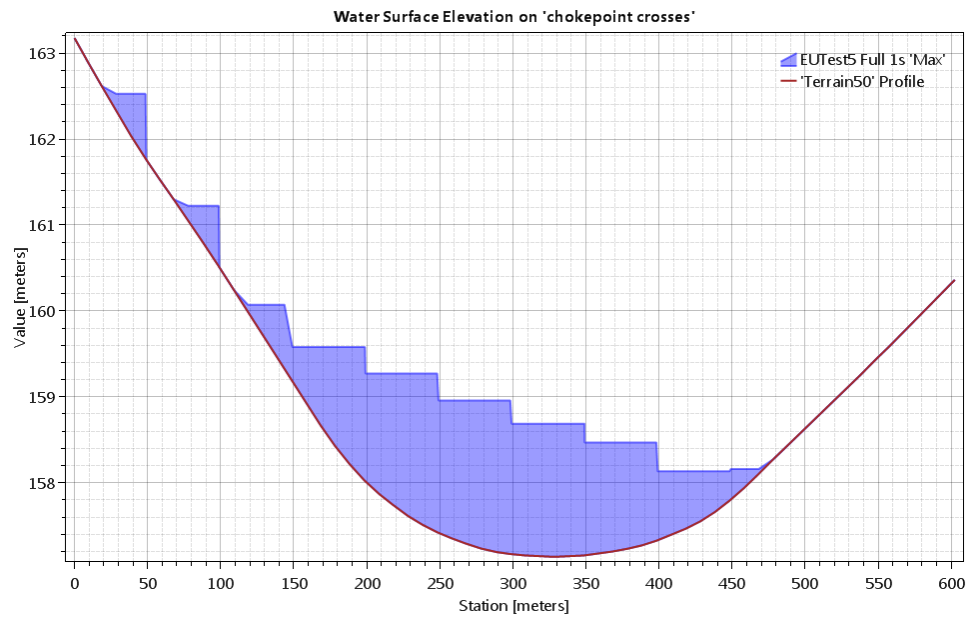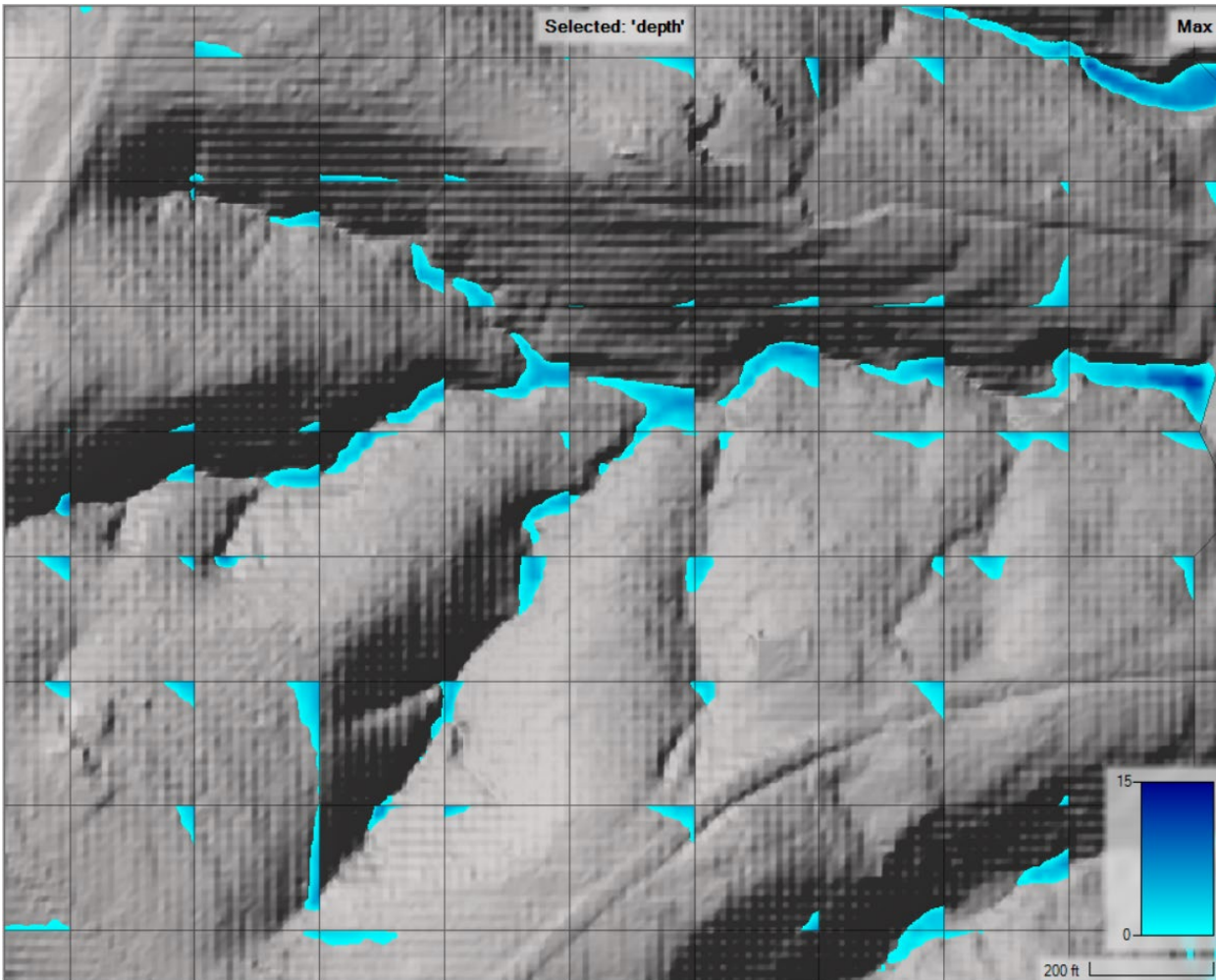
Horizontal vs Sloping Surface
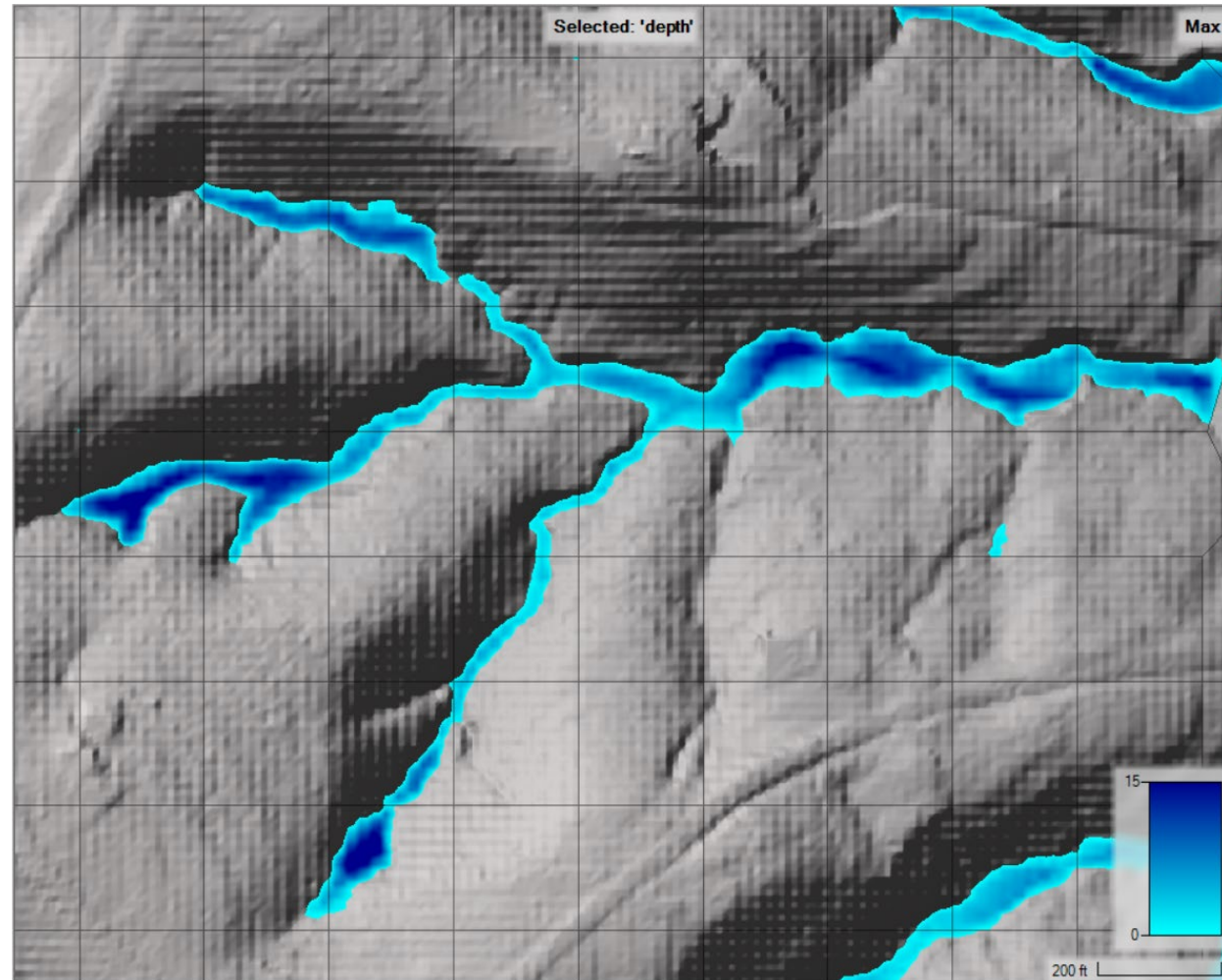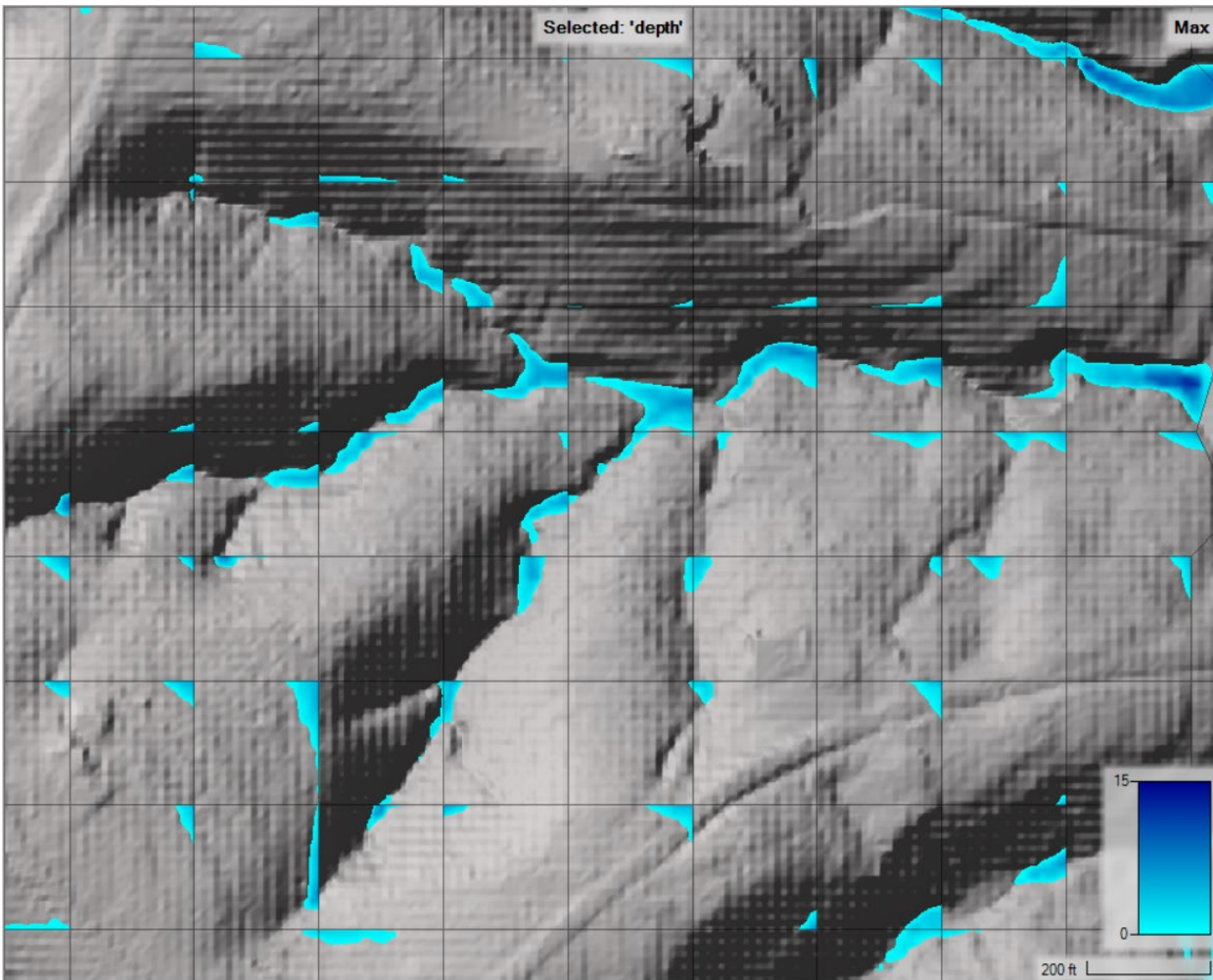
Horizontal vs Sloping Surface
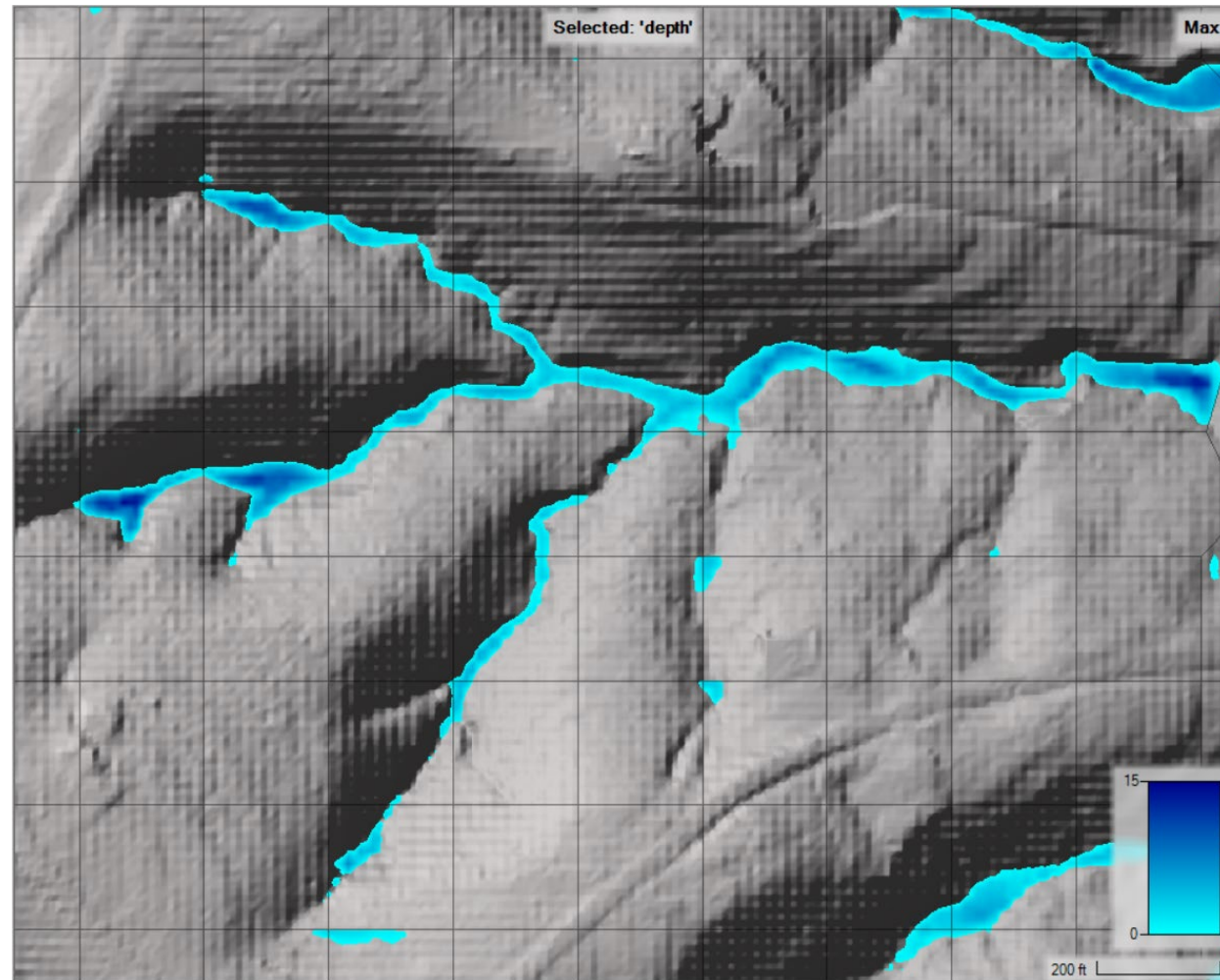
Sloping Surface Errors
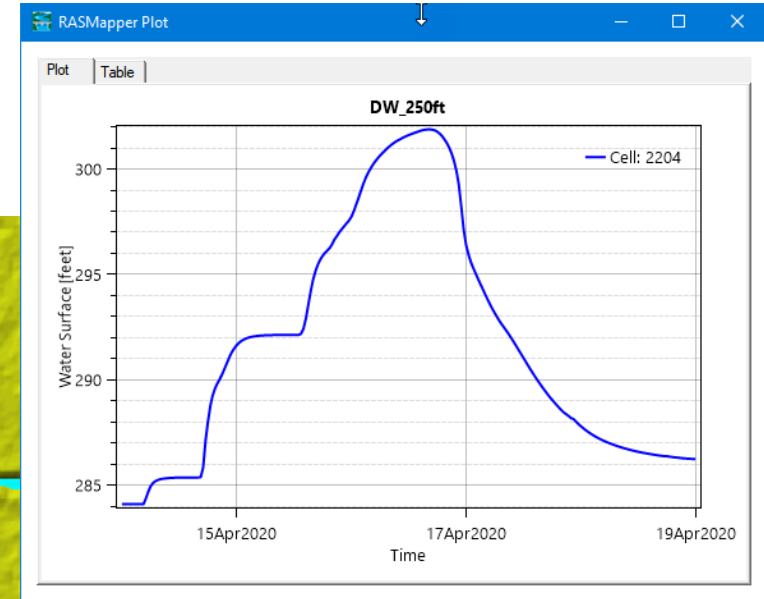

Horizontal

Sloping

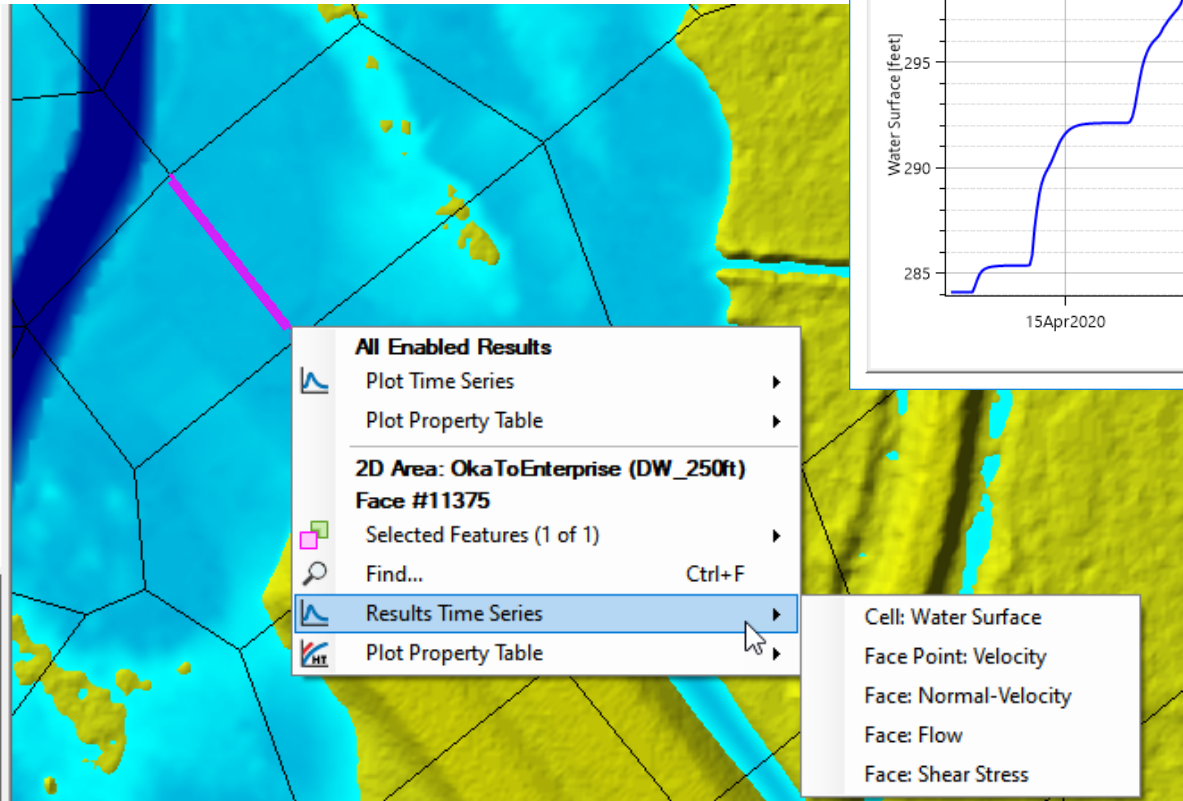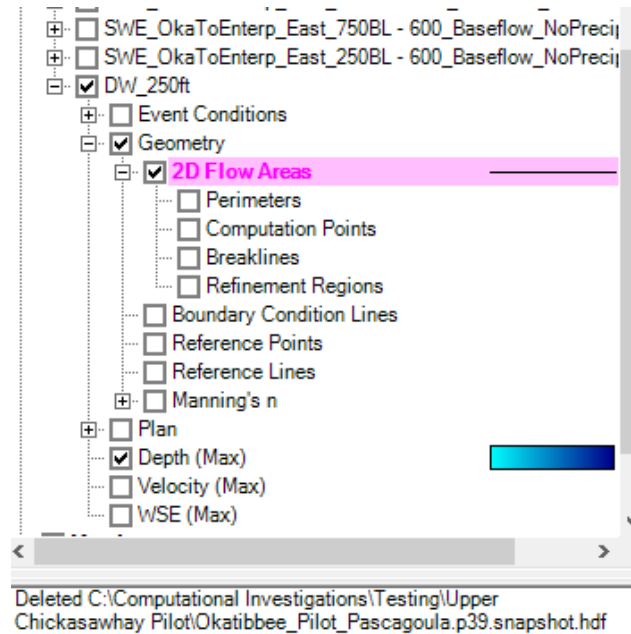# Sloping Surface Errors

Horizontal

Precip Mode
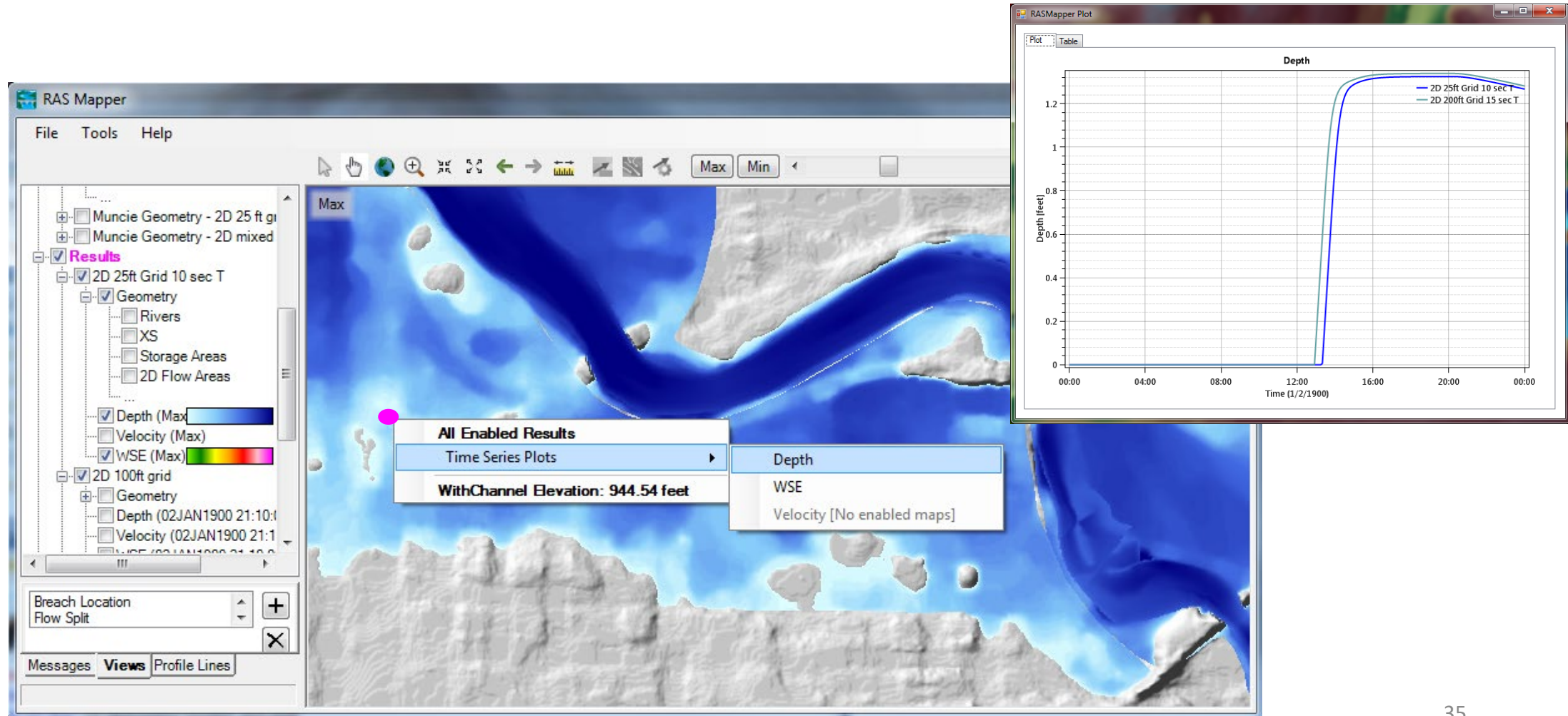
Results Time Series - Computed

- Queries compute engine results for geometry element
  - 2D Cells
  - 2D Faces
  - 1D Elements

Results Time Series - Interpolated

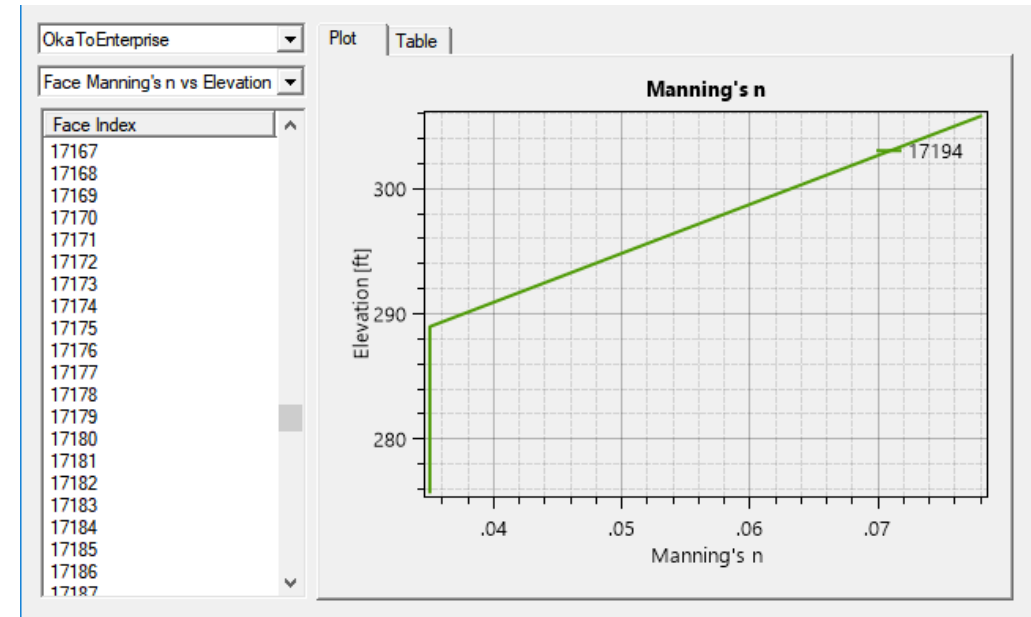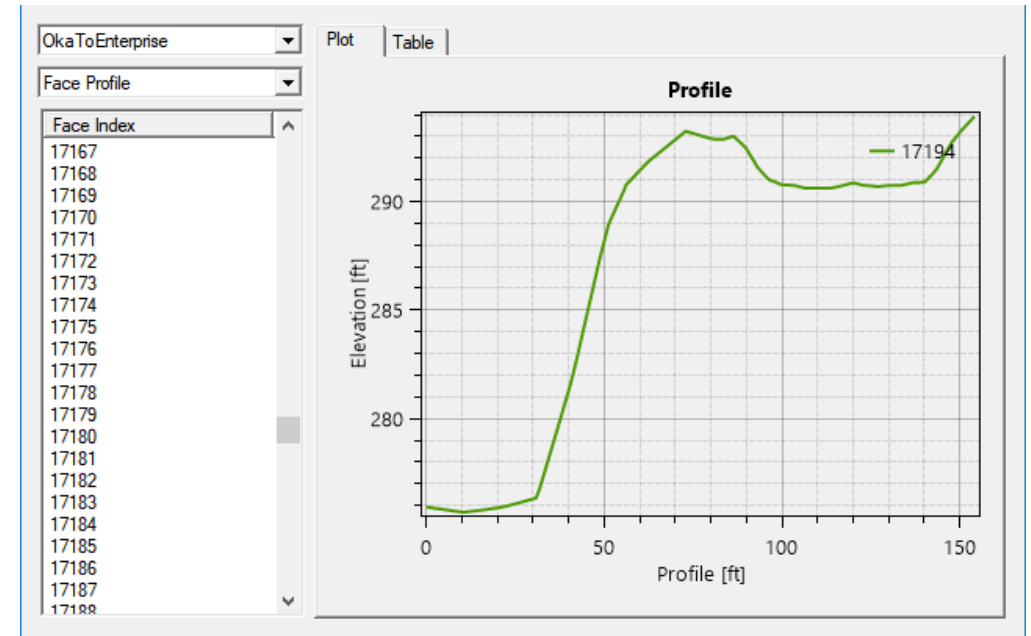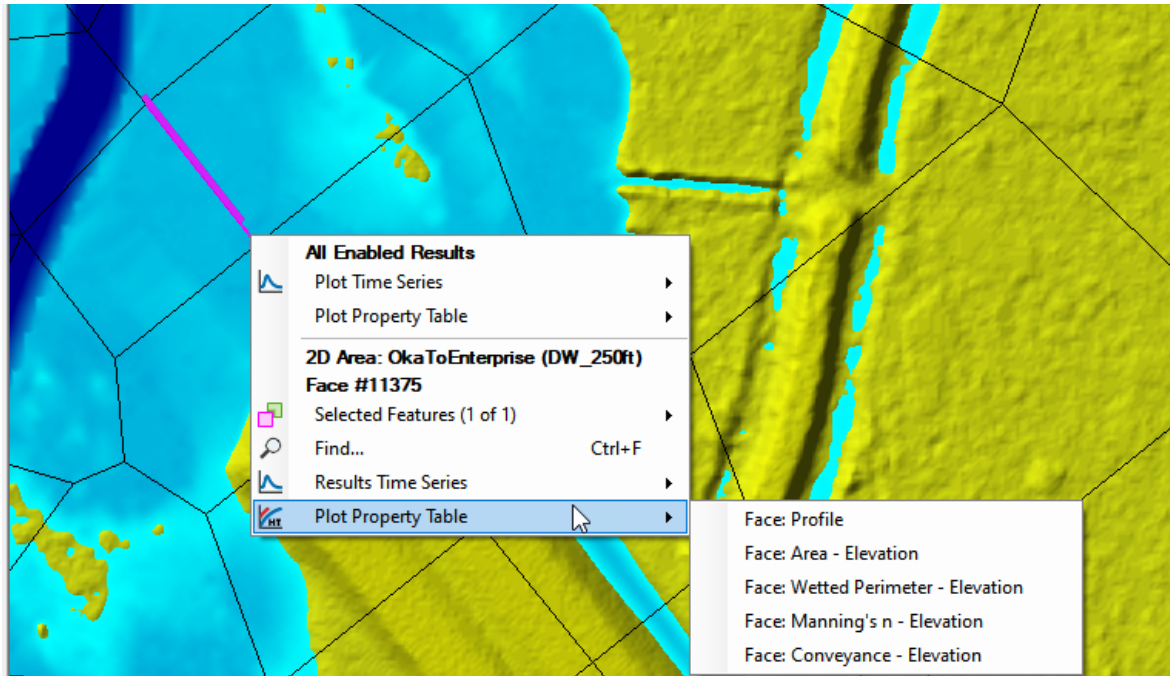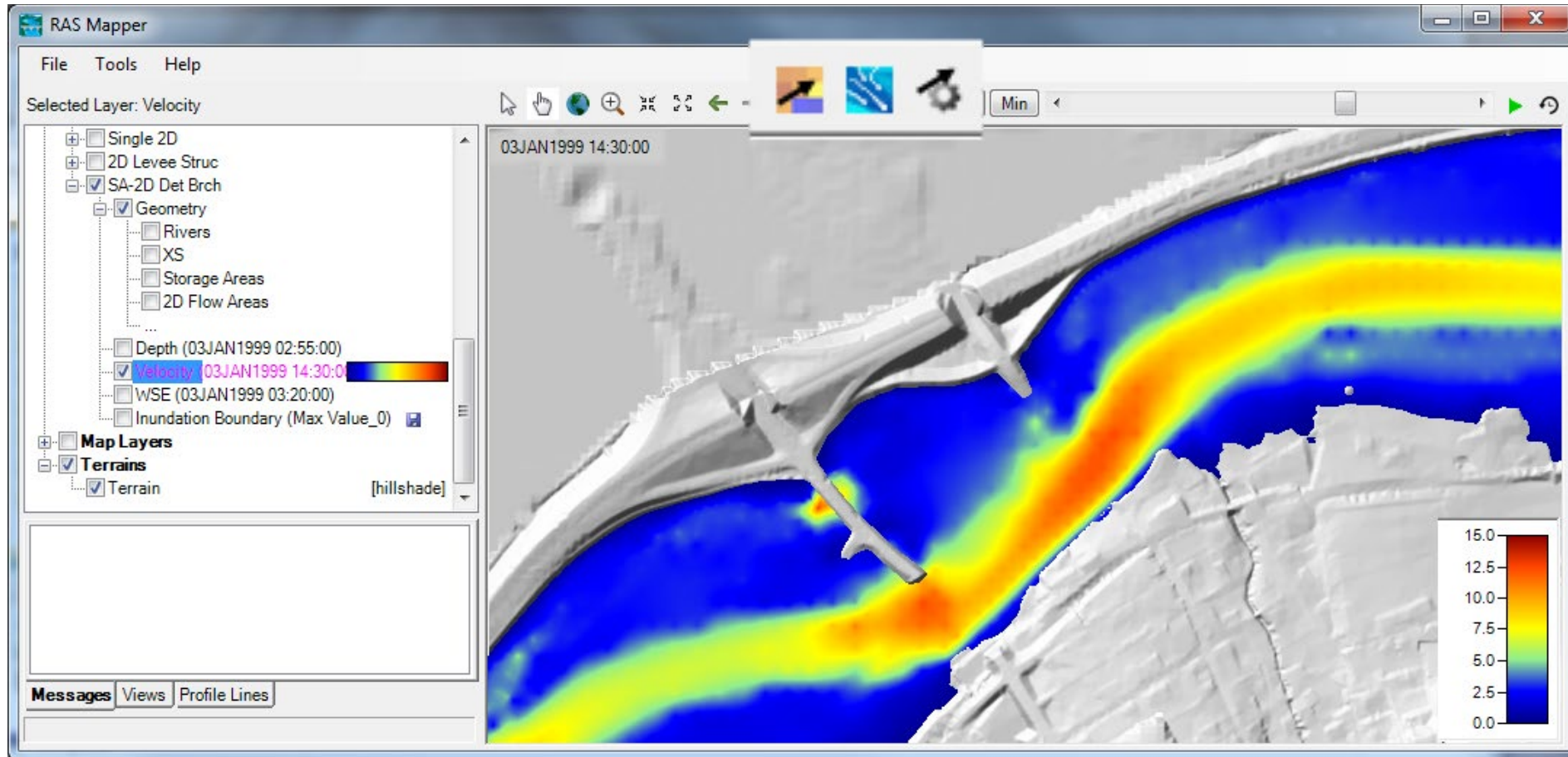- Queries interpolated results any at any point in domain

2D Flow Area Properties

- Hydraulic Properties

Velocity Results

Velocity Arrows
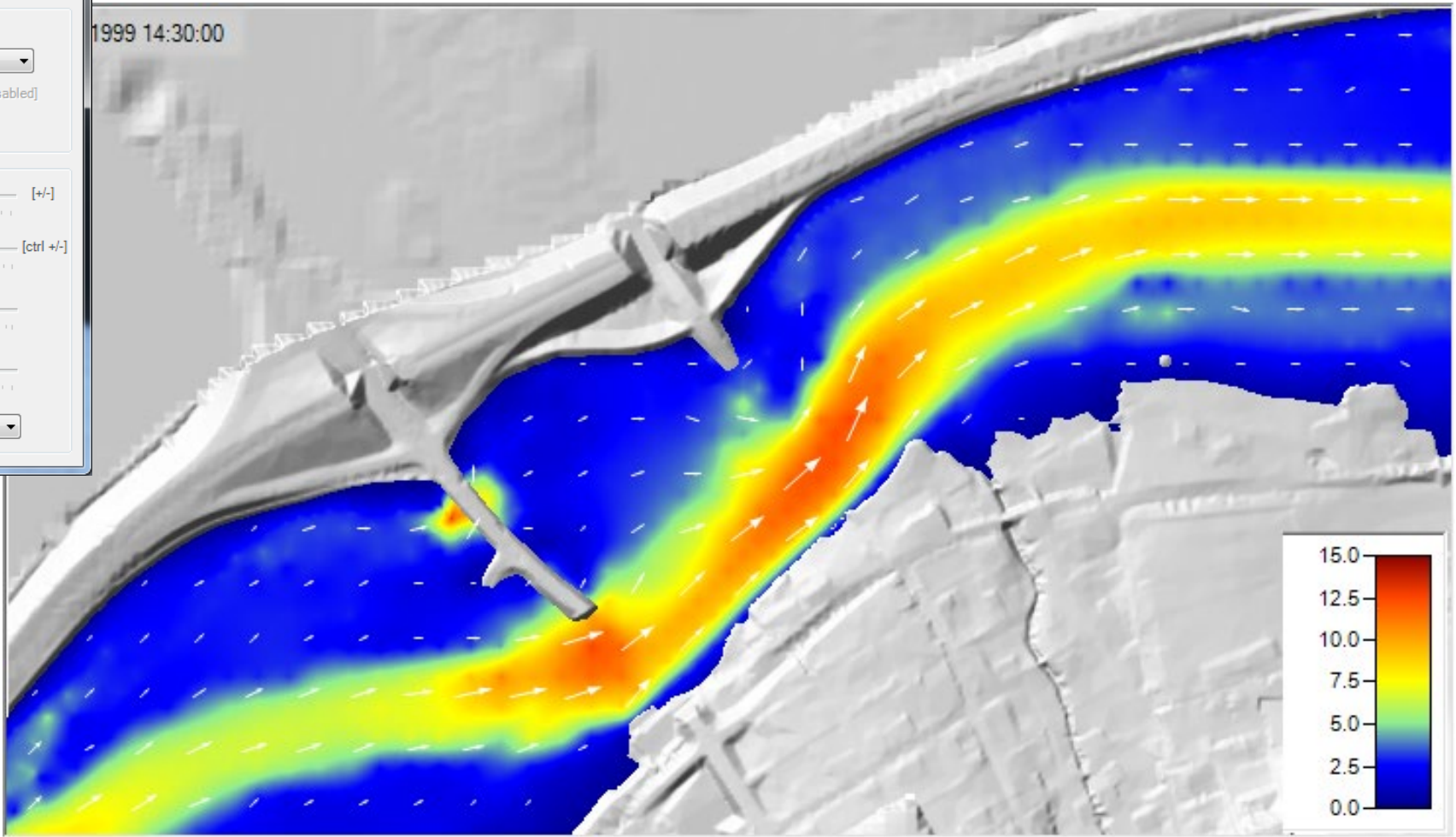
Velocity Tracing
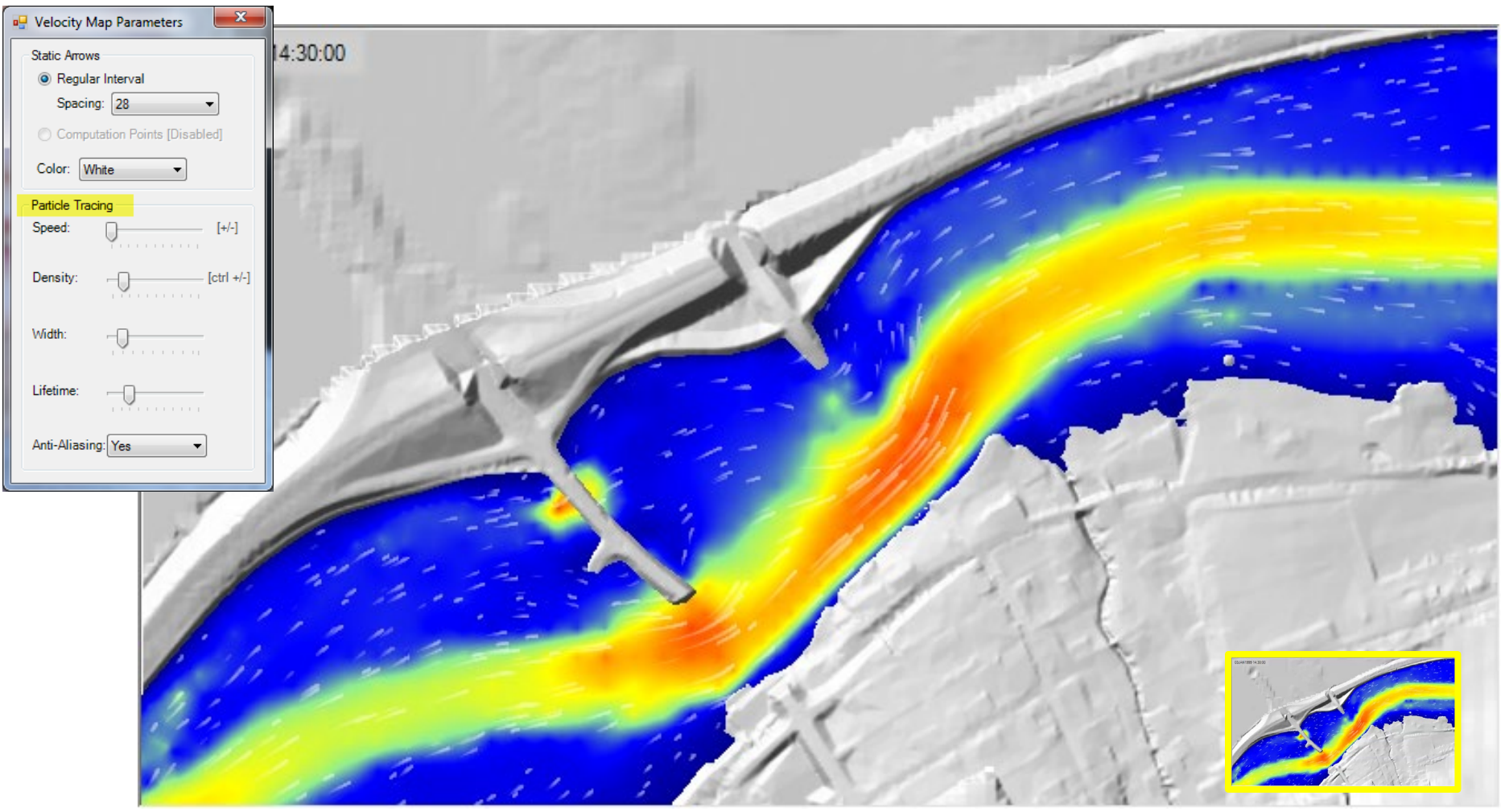
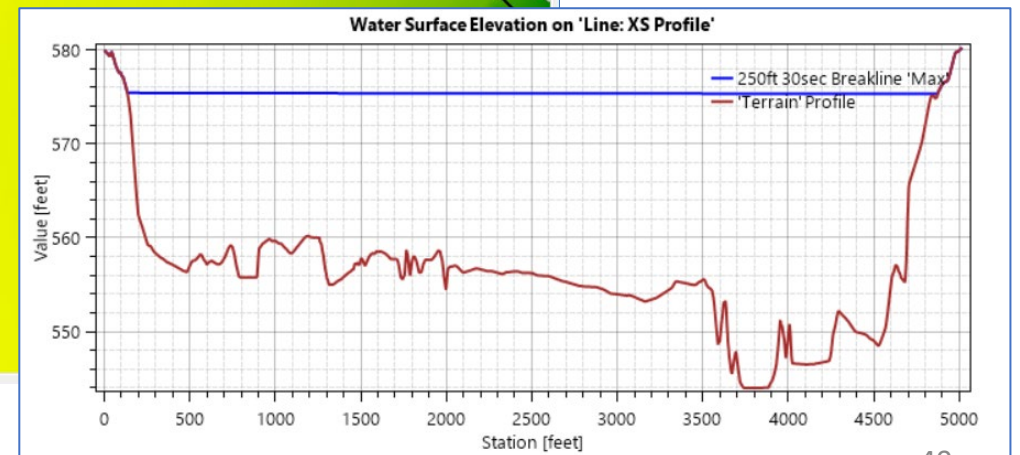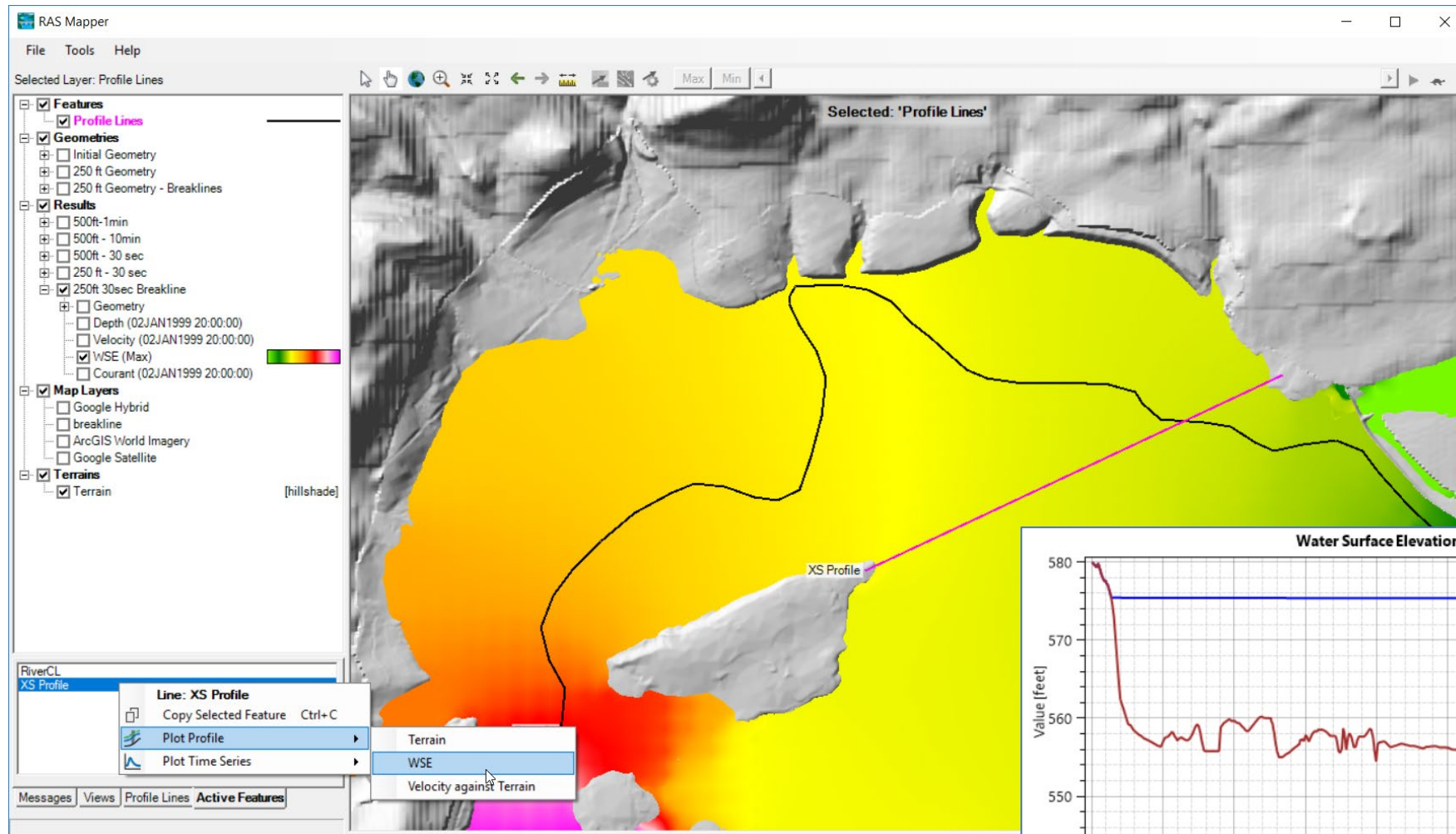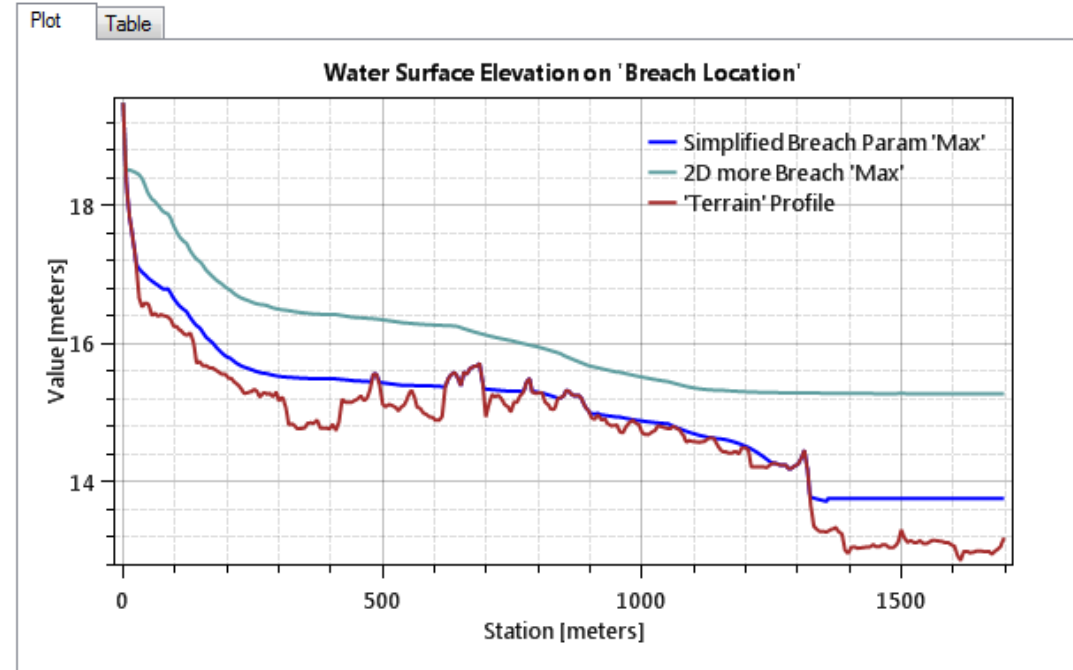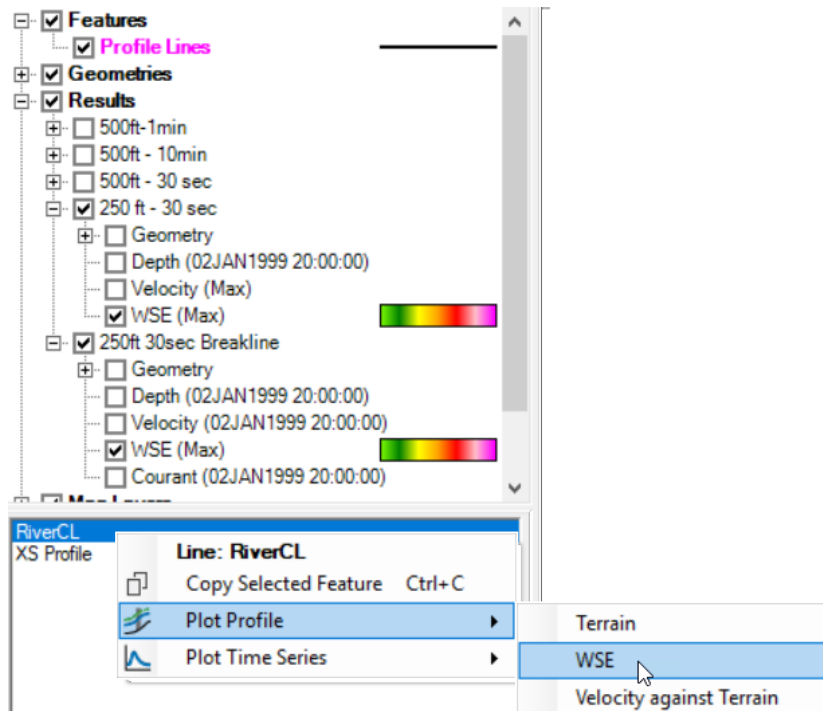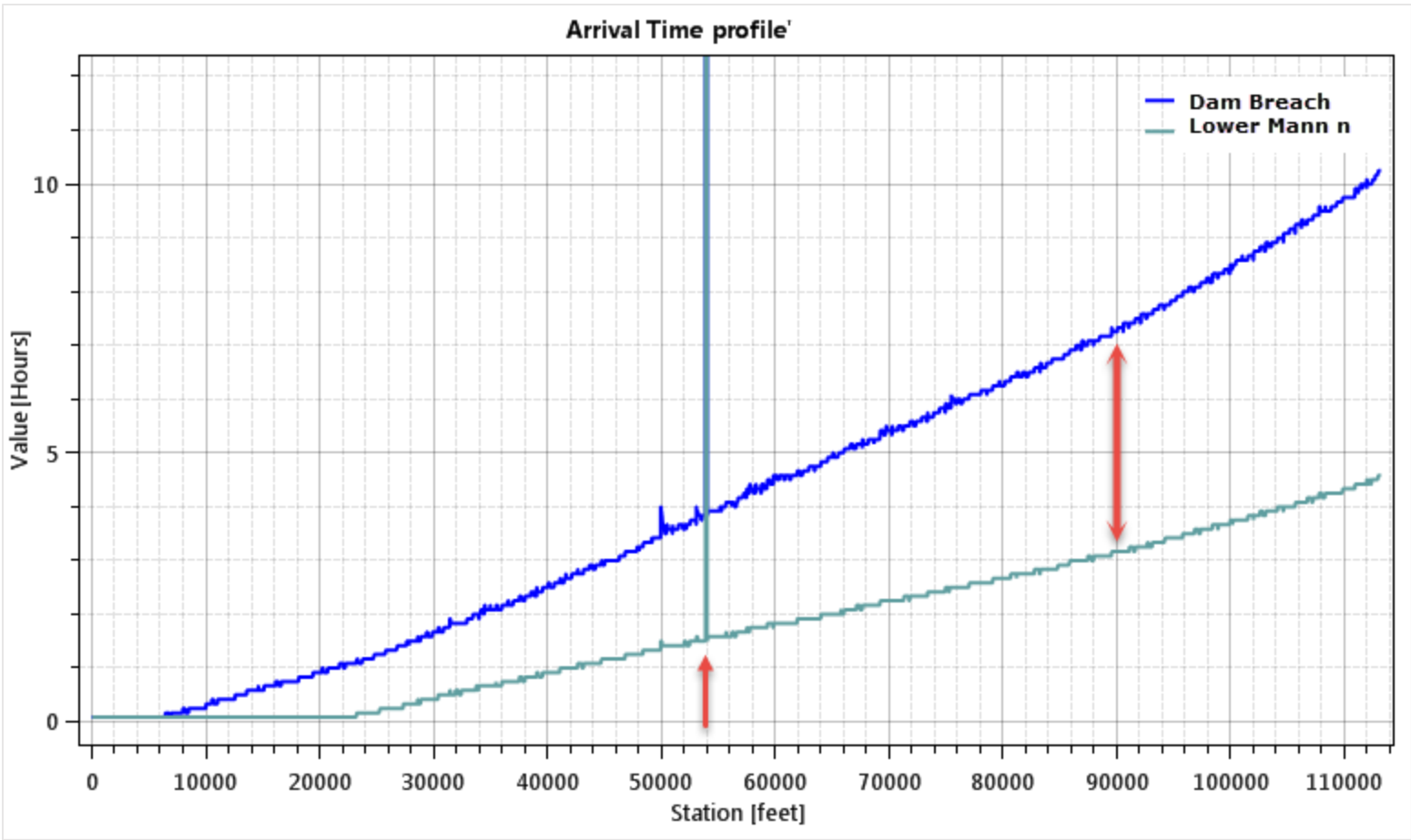# Profile Lines

Profile Line - Comparison

- Turn on multiple result maps
- Choose a Profile (i.e. 'Max')
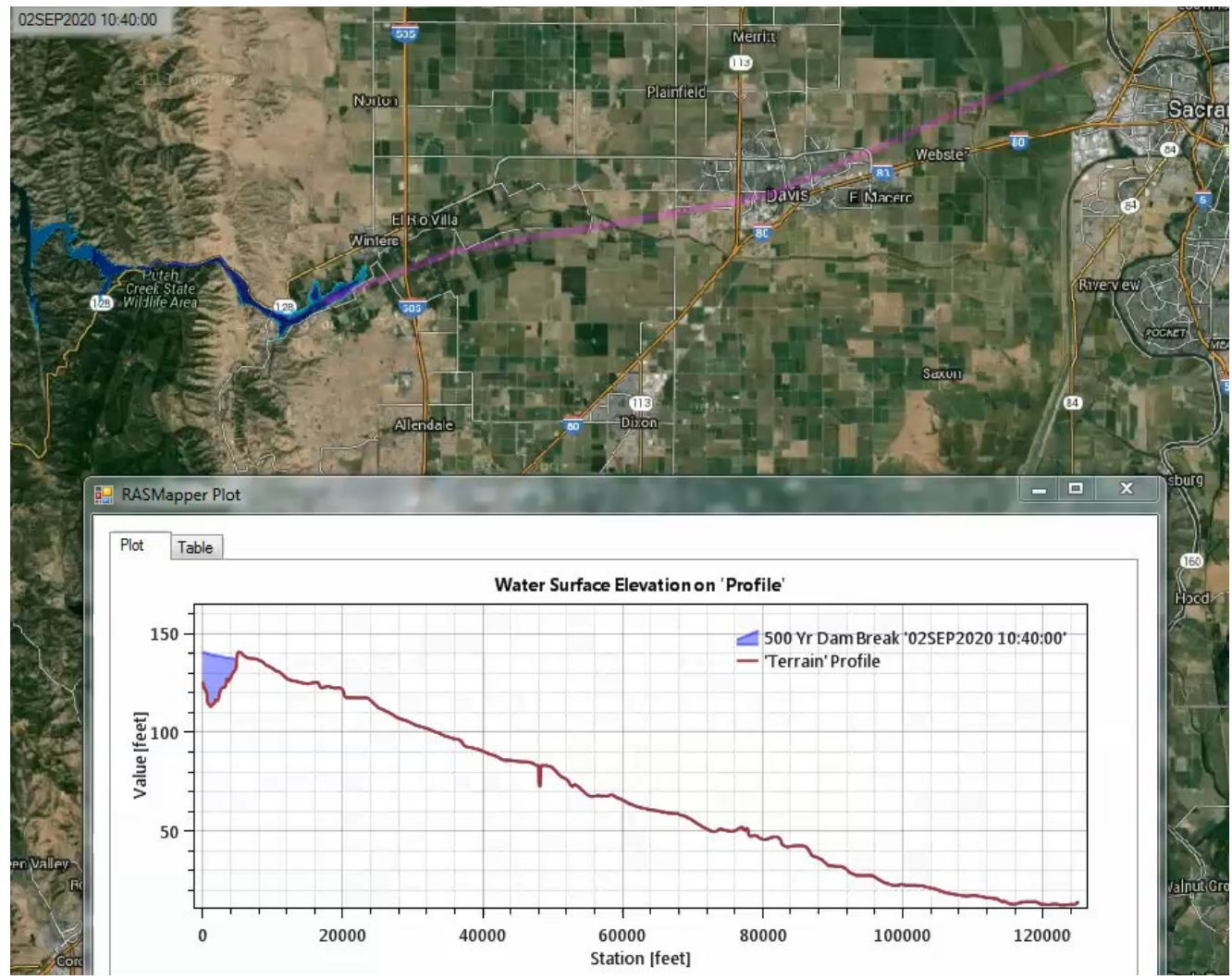- Choose **Plot Time Series** or **Plot Profile**
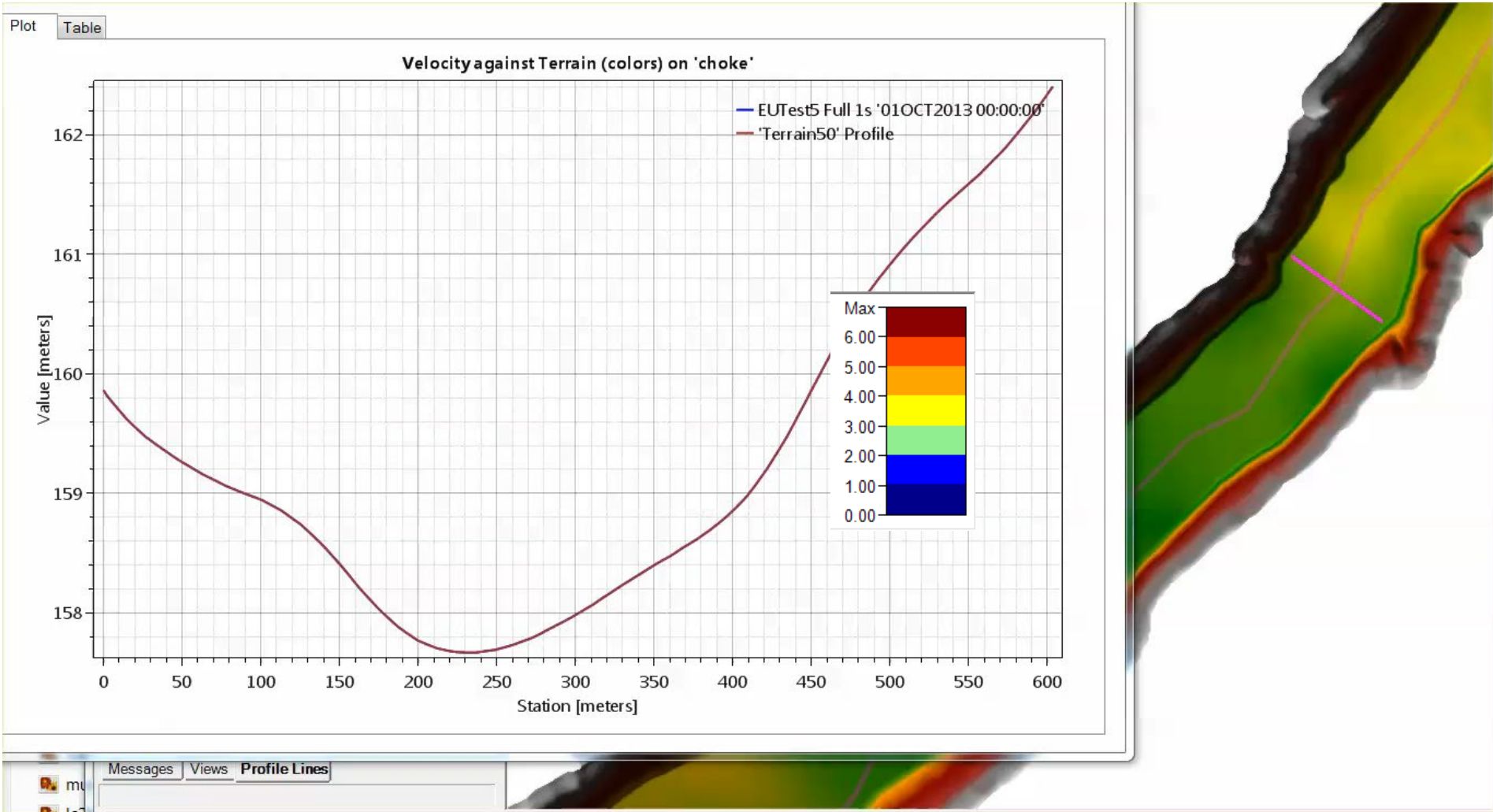
Profile Lines - Comparison

Arrival Time profile
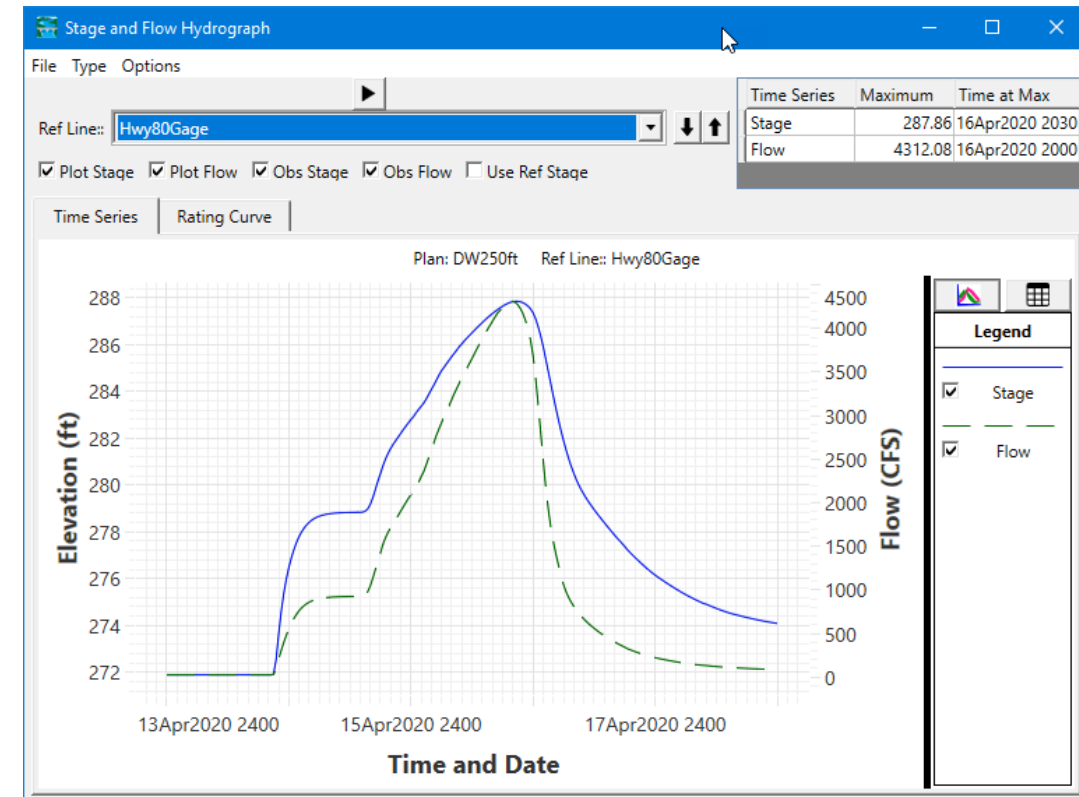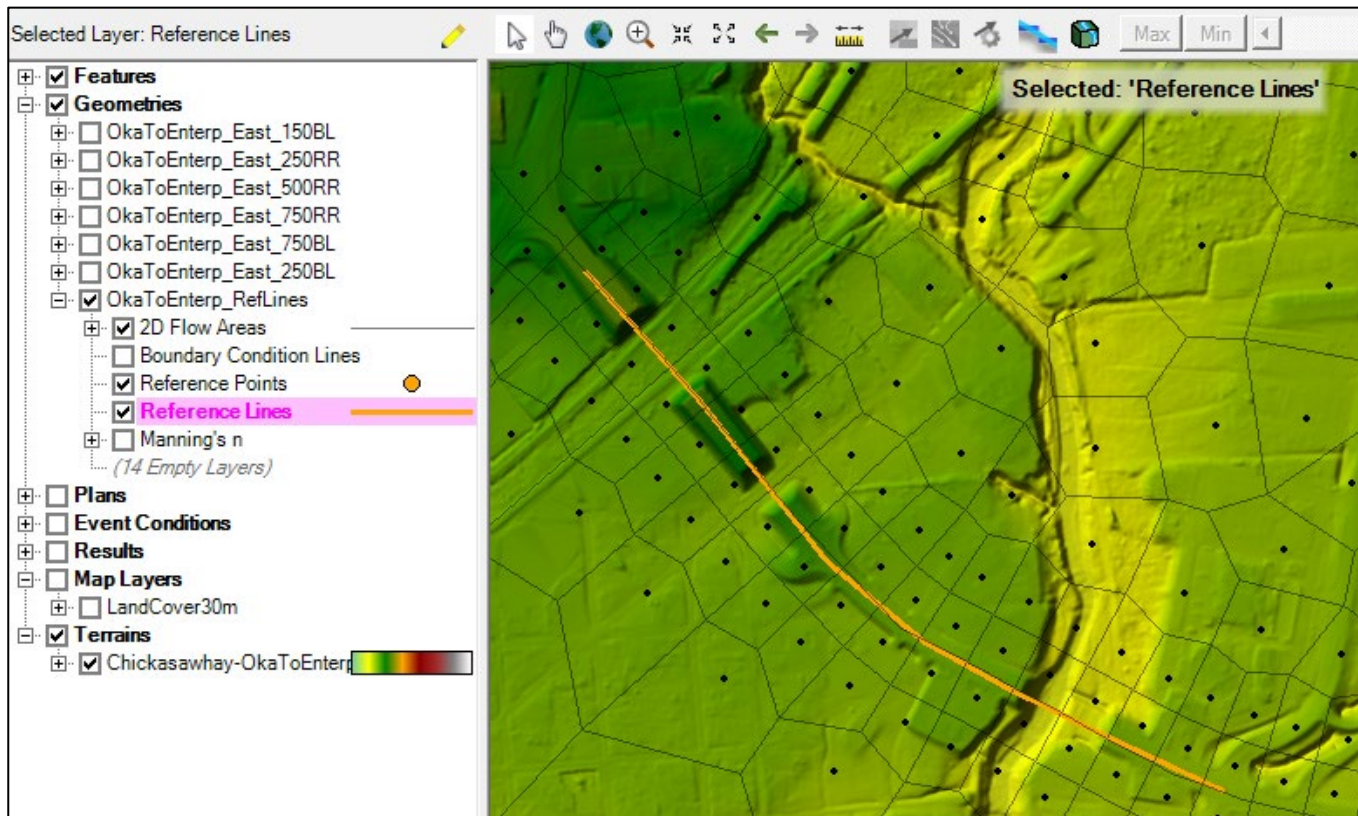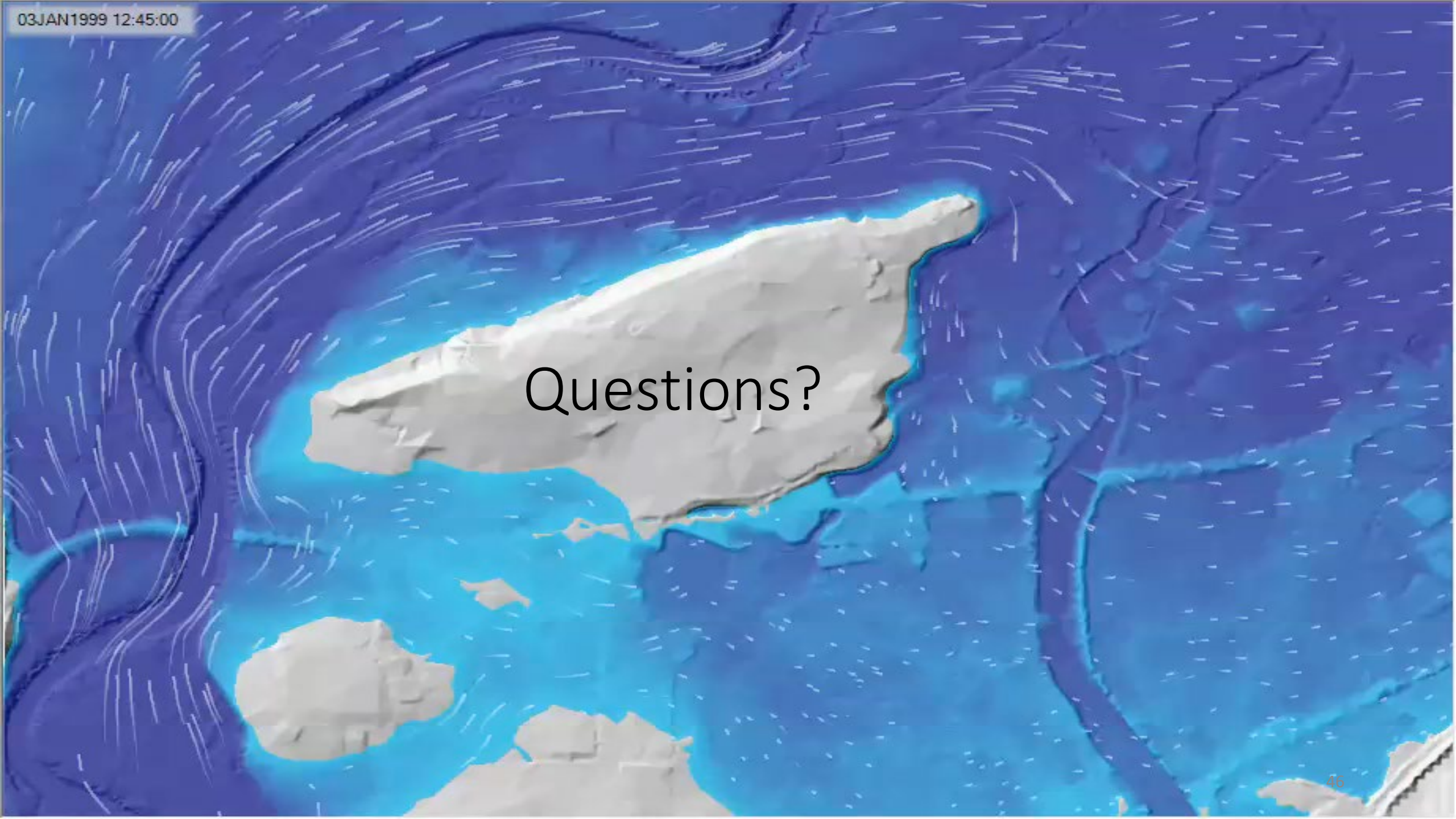
Profile Lines + Spatial Results

Profile Lines – Velocity

Reference Lines + Points

- Compile results from compute engine for multiple cells
- Defined in geometry
- Results profile and time series

03JAN1999 12:45:00

Questions?