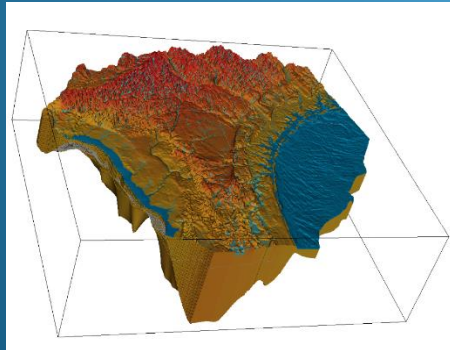


Planned Updates for NFSEG v1.1



March 29, 2017



Internal review identified several areas for focusing improvement efforts:

- Improve model stability and run times
- Test simplification of river and stream representation
- Selected spring improvements/updates
- Improve SAS head sims in poorly or excessively well drained areas
- Correct point recharge in closed basins
- HSPF improvements
- Conduct additional uncertainty analysis

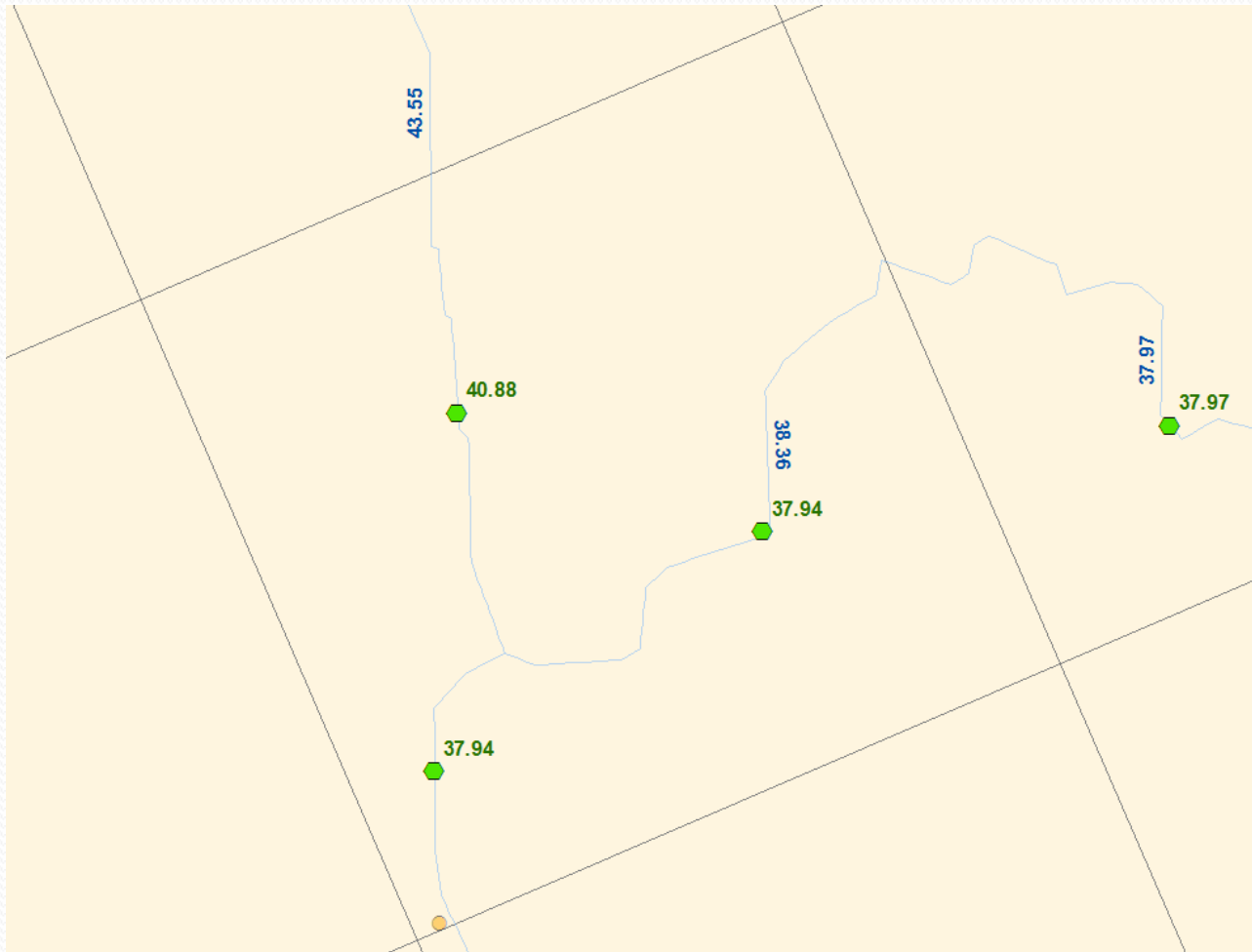


Updates for NFSEG Version 1.1

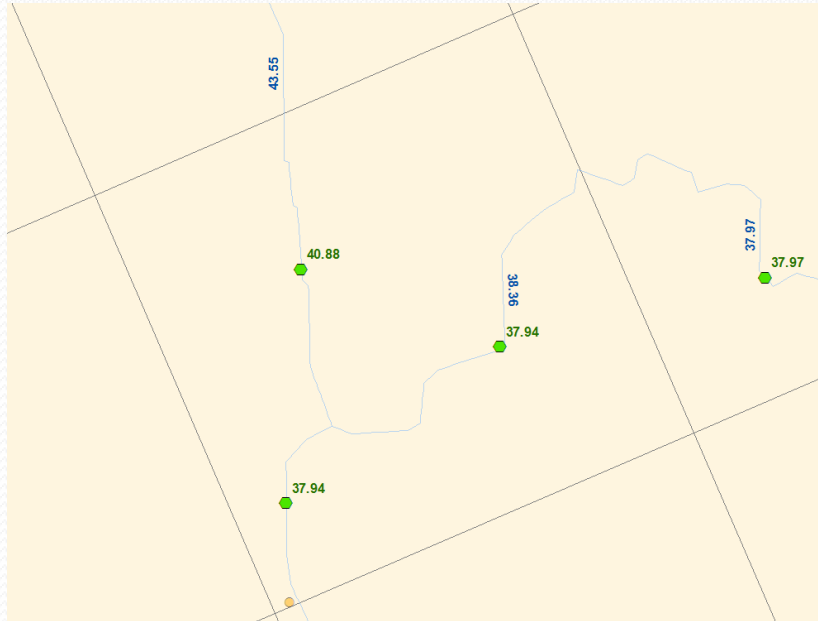
- Updates/recalibrate HSPF
- Updates to river and stream representation
 - Simplification (one RIV feature per cell)
 - Updated Drain Package elevations
 - Simplification of parameterization
- Improve SAS heads
- MNW2 update
- Improve history match at selected springs
- Add Crescent Springs and Rock Sink Springs
- Additional baseflow evaluation for selected reaches
- Closed-basin recharge
- Additional uncertainty analysis



Simplification of River and Drain Packages



River and Drain Package Changes



- One feature per cell per BC type
- May have improved model stability (convergence of numerical solution)
- Performed additional checking and improvements of stage changes along flowpaths (Drain and River Package)
- Coastal Drain elevations updated to use same source DEM as flowline features



Simplification of Conductance Parameterization

NFSEG v1.0:

$$C_{RIV} = c_i \frac{K_{aquifer} * l_{flowline} * w_{flowline}}{l_{flowpath}}$$

NFSEG v1.1 (testing):

$$C_{RIV} = c_i * l_{flowline} * w_{flowline}$$

where:

C_{RIV} is the conductance of a given River Package feature

c_i is a subwatershed-specific scaling factor

$K_{aquifer}$ is the hydraulic conductivity of the grid cell associated with the River Package feature

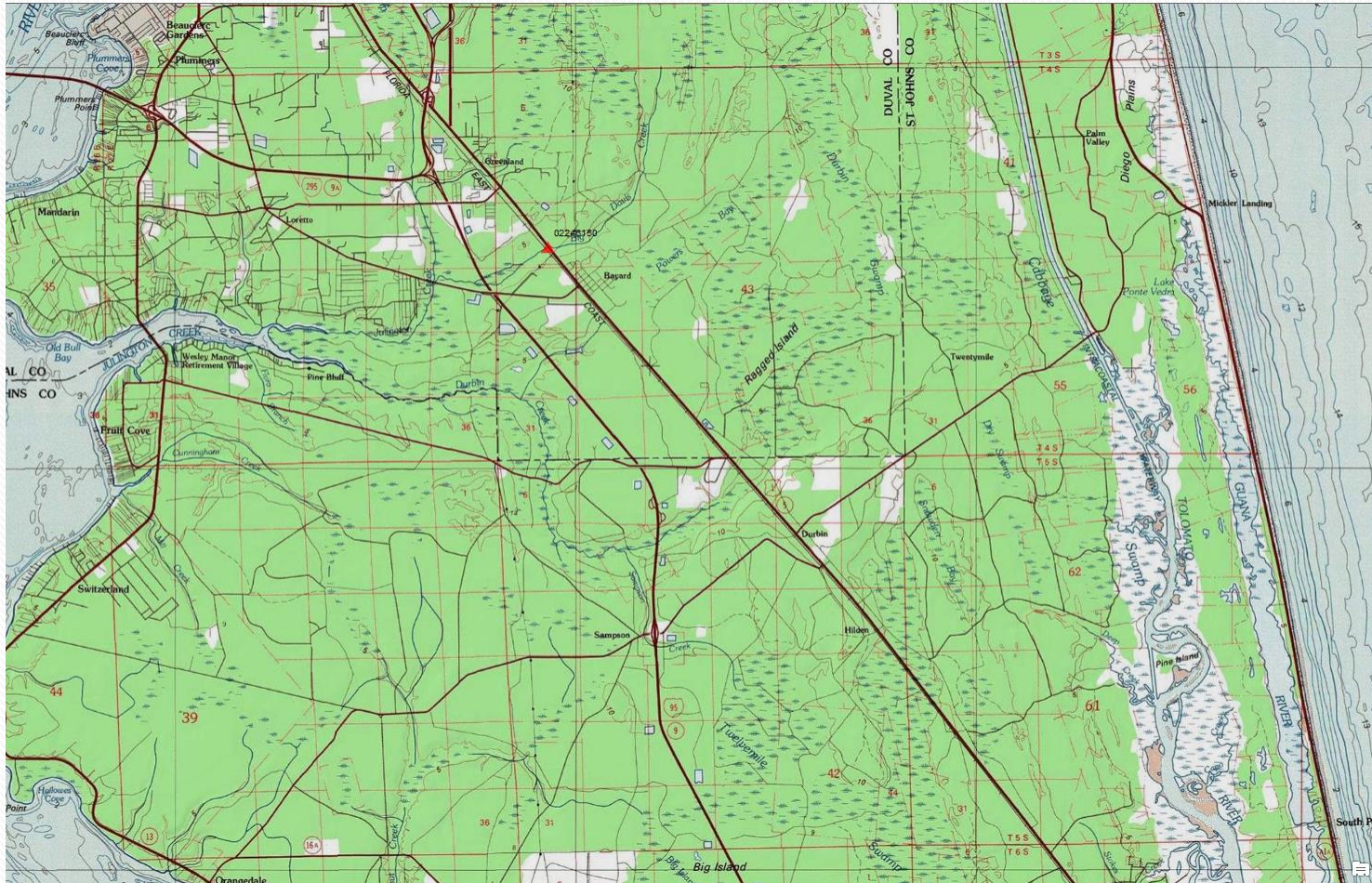
$l_{flowline}$ length of NHDPlus flowline feature

$w_{flowline}$ estimated width of flowline feature

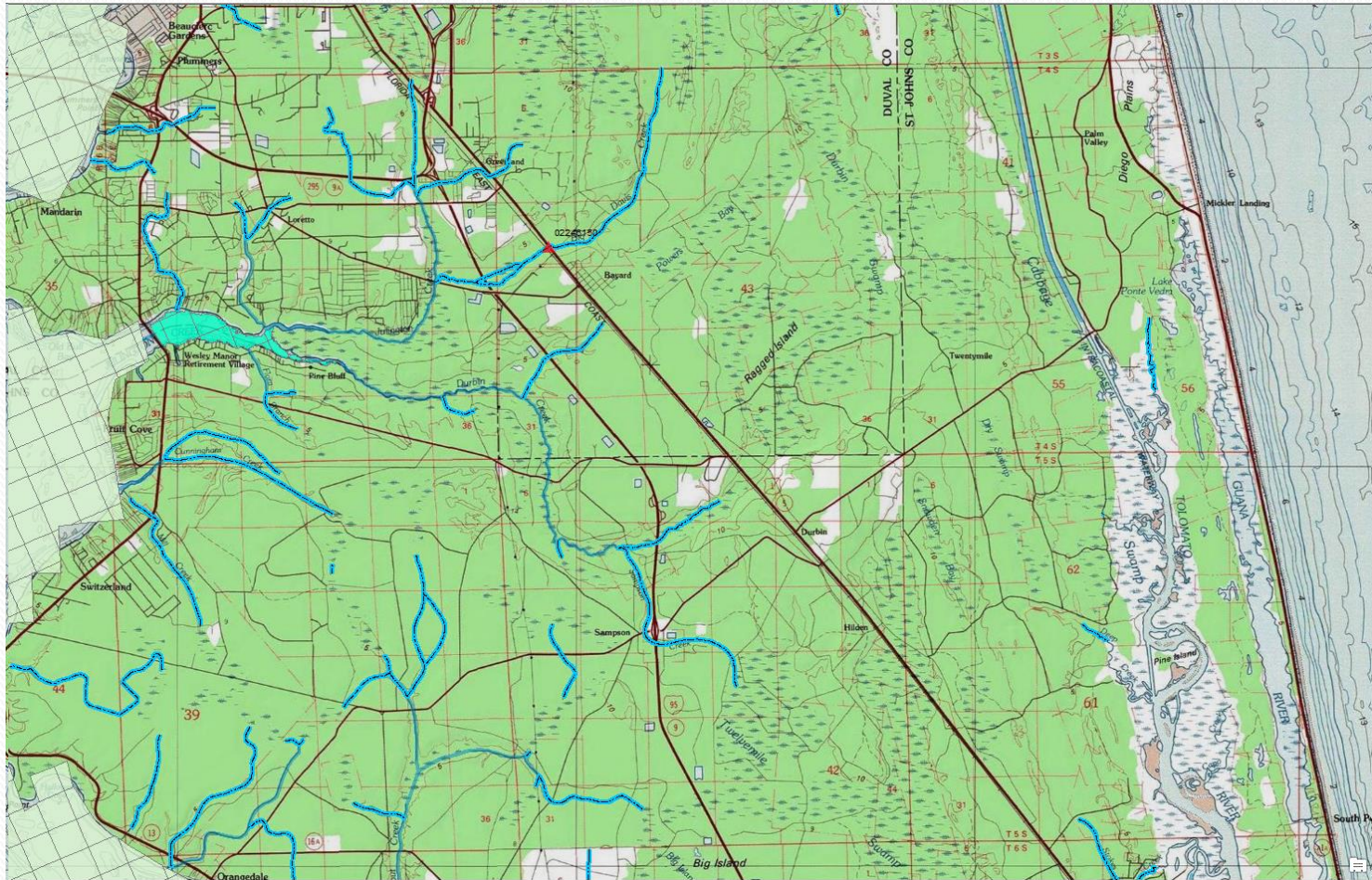
$l_{flowpath}$ assumed flow path length



Addition of surface drainage detail



Addition of surface drainage detail

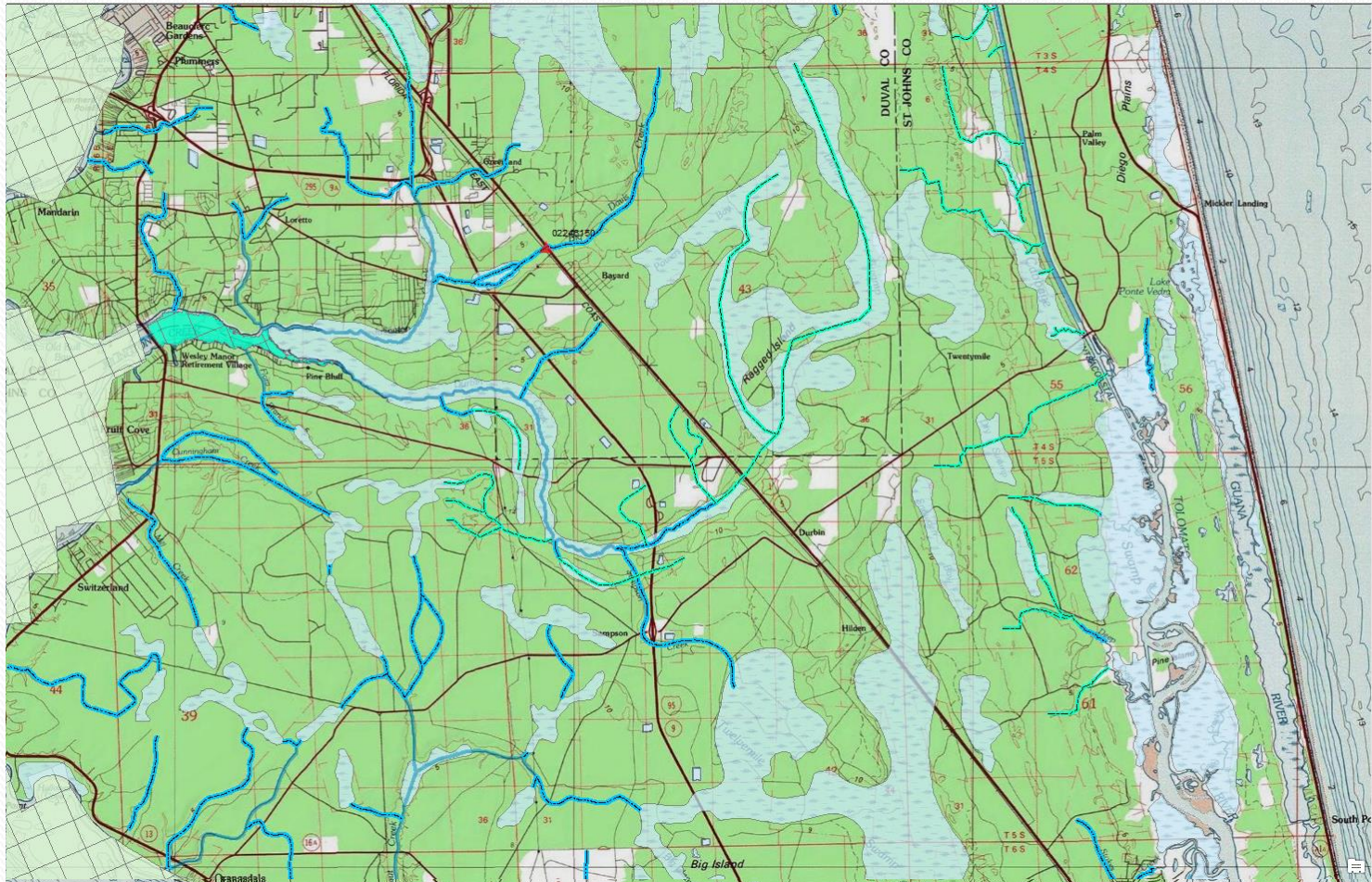


This topographic map depicts the St. Johns River watershed area. The river is shown flowing from the north towards the south, eventually emptying into the Gulf of Mexico. Key features include:

- Geographic Labels:** Locations such as Big Island, St. Johns River, and various creeks (e.g., Little St. Johns Creek, Middle St. Johns Creek) are labeled.
- Topography:** Contour lines indicate elevation, with higher elevations (up to 100 feet) shown in the northern and western parts of the map.
- Infrastructure:** Major roads, including US Highway 90 and various state roads, are marked with red and black lines.
- Land Use:** The map shows a mix of forested areas (green), agricultural land (light green), and developed areas (brown and grey).
- Water Bodies:** In addition to the St. Johns River, other water bodies like Lake Pinckney and various smaller ponds are visible.



Addition of surface drainage detail



Addition of SAS Synthetic Water Levels

- Applied to areas in which the water table was judged to be either too high or too low;
- Areas in which it was judged to be too low were mainly wetlands with simulated depth to water table in excess of 6 feet. Grid cells were judged to be comprised predominantly of wetlands in cases in which the percentage of wetlands was 70% or greater based on the National Wetlands Inventory Wetlands Map (<https://www.fws.gov/wetlands/data/Mapper.html>);
- The water table was estimated typically as being within 5 feet of land surface in cases of wetlands;

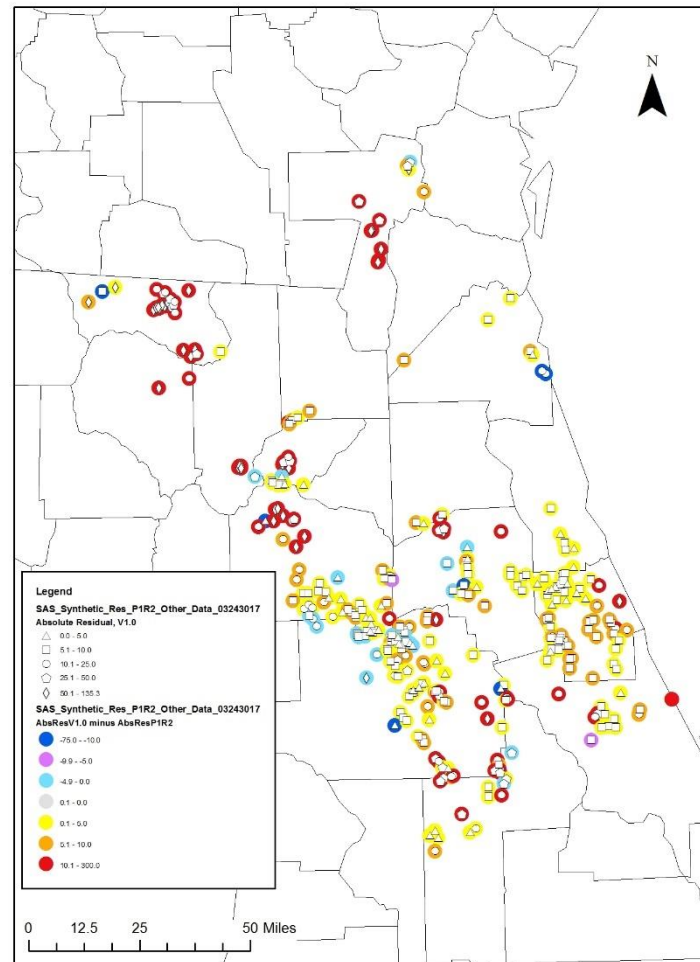


Addition of SAS Synthetic Water Levels (con't)

- In cases in which the simulated water table is above land surface, a preferred estimate was determined based on nearby wetland/surface-water features or regression equations developed for limited areas;
- Typically, points were added for this problem only in cases of limited or no surface-water runoff. As discussed previously, the solution in cases of under-represented surface-water drainage was to add drains.



Synthetic Water-Table Points—Current Residuals and Comparison to V1 Residuals



Synthetic Water-Table Points (P1R2 Residuals)

