RIVER INFORMATION SERVICES ENTERPRISE™

Enhancing U.S. Inland Waterways Operations Through Information Sharing

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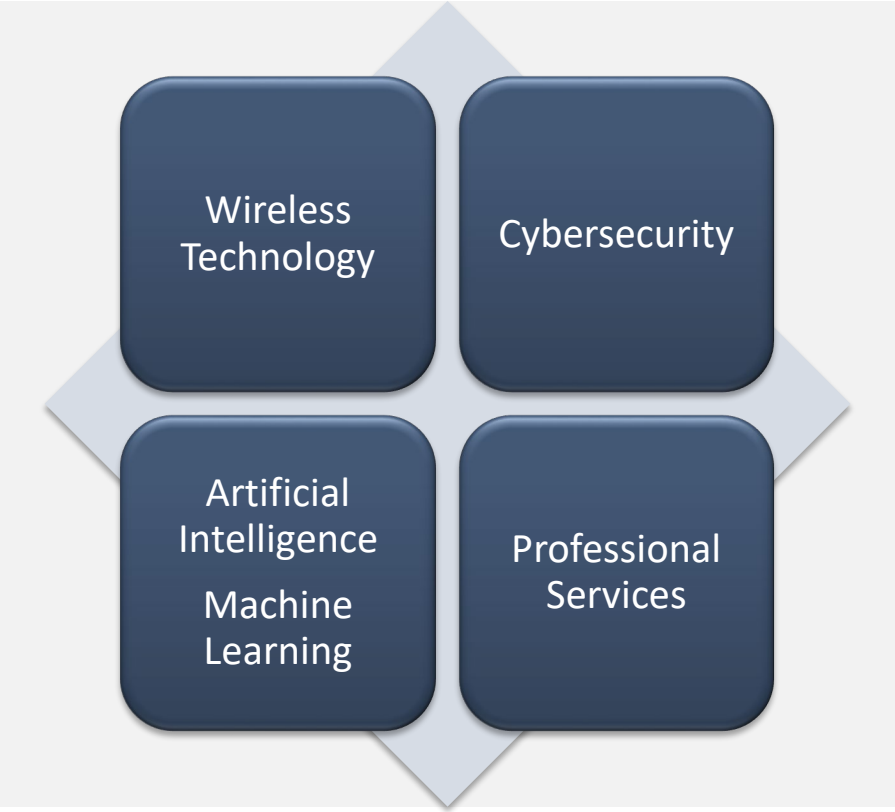
Technical Solutions



2020 U.S. SBA San Diego District Business Growth in Technology Industry Award

- Founded in 2010
- San Diego, CA
- Minority Owned, VOSB, SDB, SDVOSB
- DCAA-approved Accounting System
- Advanced certifications in Program Management, Systems Engineering, Cybersecurity, Contract Administration, and Test & Evaluation
- NIST SP 800-171 Compliant

The U.S. Inland Waterways

U.S. inland waterways are important part of the USA transportation network

- Over 25,000 miles of navigable rivers
- Access to the Gulf of Mexico for 38 states
- Movement of over 1 billion tons of freight valued at over $110 billion
- Fleet of 5,500 tugboats and towboats and more than 31,000 barges

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Challenges in the Marine Industry

- Multiple data sources with no common framework or analytics
- River information technologies exist as disconnected systems
- Hand-written reports are still prevalent in the industry
- Key variables for voyage planning are still calculated based on experience and “guesstimation”
- Vessels carrying certain dangerous cargo difficult to identify

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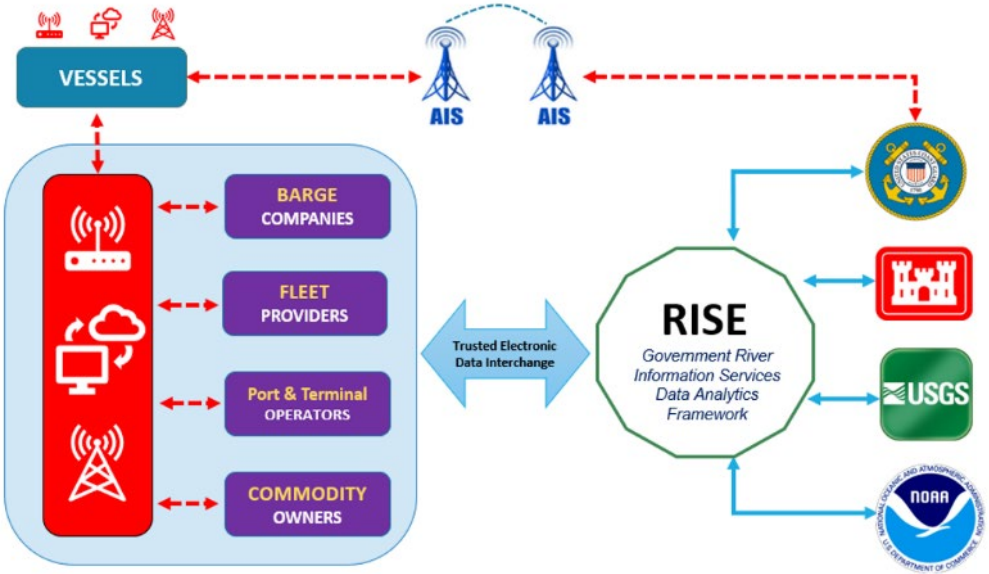
Out-performed by other transportation modalities despite better value

- Commodity owners seeking synchronize intermodal transport solutions to keep cost down
- Both Rail and Ground Transportation Industry have developed large bank of metrics and decision tools for commodity owners to make m supply chain transport decisions
- Marine Transportation lacks quantified metrics to compete at same level

Our Solution RISE™



- RISE is a state-of-the-art information-sharing solution for users of the U.S. inland waterways
- Collects, analyzes and disseminates relevant river information in near-real time
- Collaborative effort between US Army Corps of Engineers (USACE), Trabus Technologies, USGS, NOAA, DHS S&T, USCG, other federal agencies, and the marine industry to enhance navigation, safety and security

More About PRISE™

- Uses predictive analytics and artificial intelligence to calculate optimal use of manpower, resources and equipment
- Assures timely, secured and accurate data/information interchange
- Adaptable user interface options (end user defined, web, iOS and Android) so our customers can operate without interruptions

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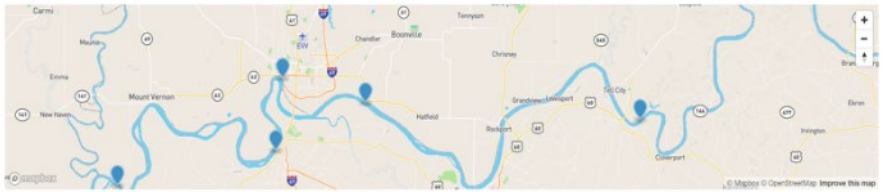
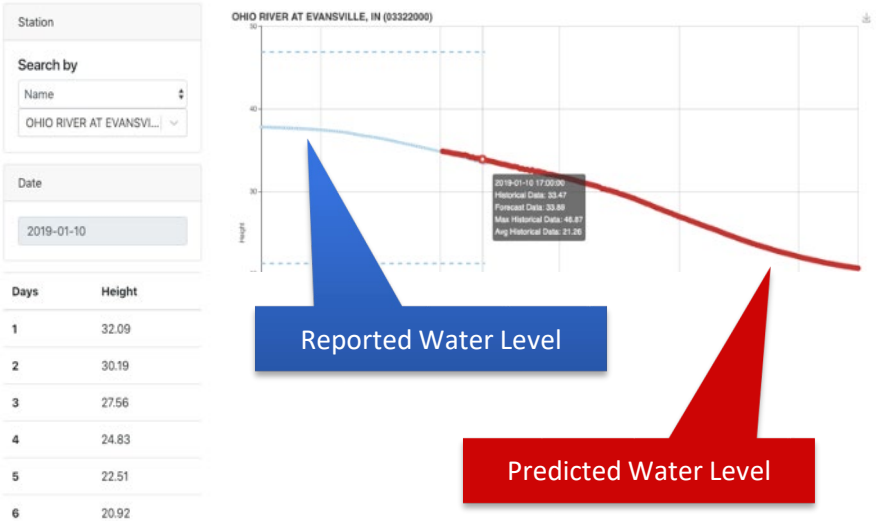
Technology Features

- Standards Driven + Compatible
  - Employs existing XML, JSON, X12 Marine Transportation Standards data format and schemas
- Data Analytics
  - Leverages data and empowers users to make smarter decisions
  - Maximizes performance by providing valuable insights into assets, drivers, customers, and more
- Information Assurance
  - Supports Need-to-Know and Right-to-Share while ensuring confidentiality, integrity and availability
  - Embraces a trusted electronic data supply chain

Environment Prediction Services





- Accurately predicts water levels with a confidence factor of 85-92% out to 12-days using machine learning using combination of stream gage and precipitation data. Soil moisture and snow melt data currently being added to improve accuracy
- In process of adding crowd sourcing real-time weather and water quality data from vessels operating on rivers
- Maximizes barge loading and commodity transport logistics by reducing environmental uncertainty in supply chain decision-making

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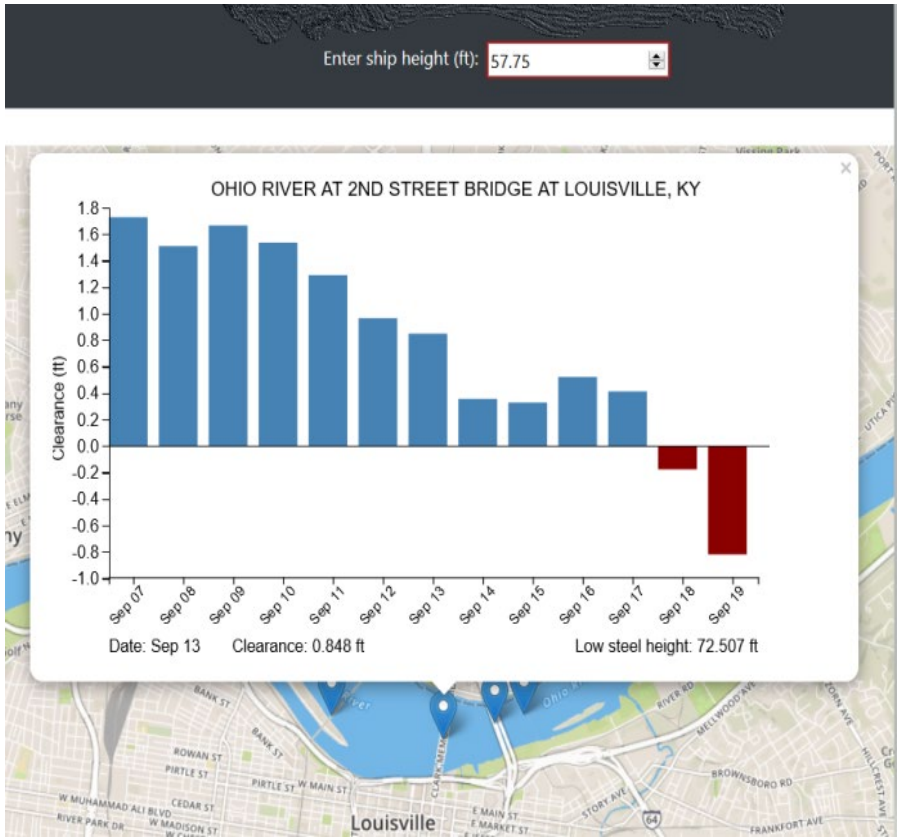
Bridge Air Gap Prediction Tool



- U.S. Coast Guard, U.S. Geological Survey, and USACE identified 10 bridges prone to accidents in U.S. inland waterways
- Currently data analytics do not exist to predict bridge clearance in planning river transit of tows
- Applied machine learning in combination of bridge height reference data, barge load optimization, and environmental data to predict bridge clearance to avoid bridge strikes

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RISE Summary

- Universal framework to assure timely, secured and accurate information sharing of marine transportation information and river information services
- Pubic Cloud environment to collect massive amounts of data, conduct predictive analytics, and develop solutions to support different stakeholders
- Resilient cybersecurity infrastructure that assures timely, secured, and accurate data and information interchange with less vulnerability to cyber-attack

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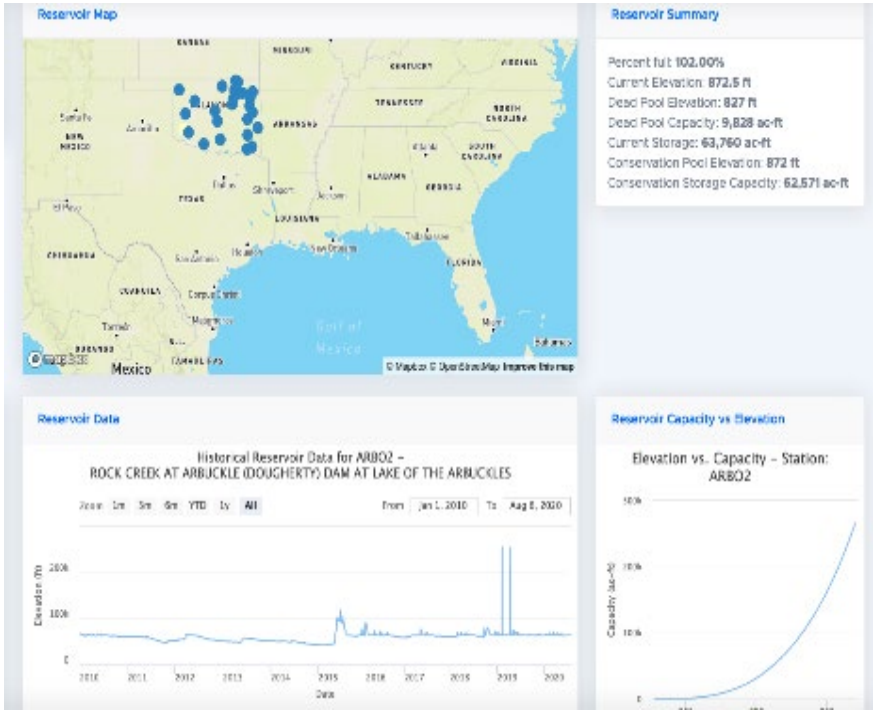
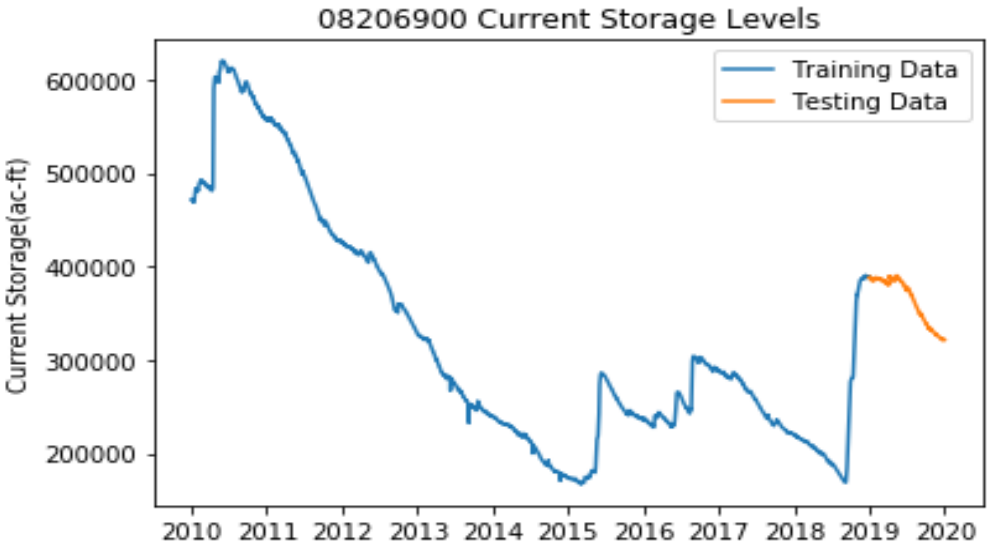
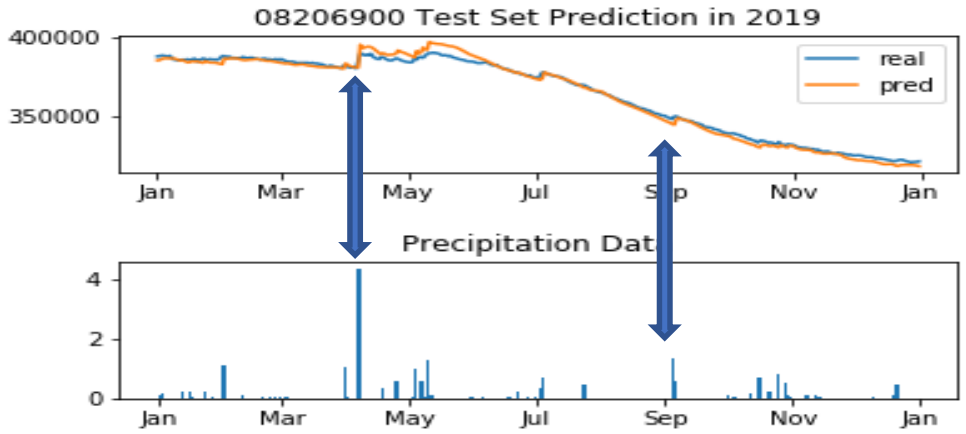
DRIPS
Drought and Reservoir Information and Prediction System



- Water Reservoir Information System
  - Consolidates data (flood pool, conservation pool/dead pool elevations), EAC surveys, current elevation levels
- Interactive Reservoir Editor
  - Expands reservoir network coverage to under-represented areas and to small-storage reservoirs
- Predictive Analytics to Forecast Reservoir Levels
  - Apply Data Science Techniques to Develop Rain Events and Reservoir Response Correlations
  - Applies AI Algorithms to predict when a reservoir will run out under drought conditions

DRIPS Testing





- Example I Run
  - Hind-cast model
  - Sommerville Lake, TX
  - Trained on 2010-2018 data
  - Predicted 2019 values
- Predictive model responded to nearby major rain events
- Model accuracy tracked with actual observations

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Storm Surge Live Tracker

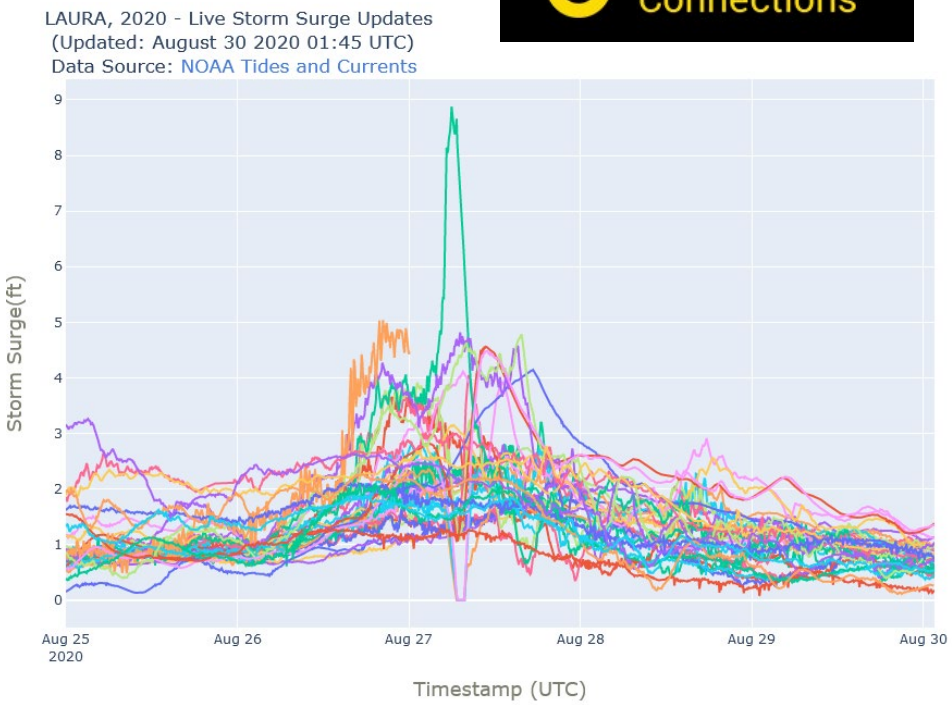
EYE ON THE STORM

Hurricane Laura intensifies; 'catastrophic' wind and storm surge expected

The impacts could be more severe than those of Hurricane Rita in 2005, which caused seven direct deaths and an estimated $25.2 billion in damage.

By Jeff Masters, Ph.D. | Wednesday, August 26, 2020

YALE Climate Connections



- "… Laura's storm surge can be tracked using the Trabus Technologies Storm Surge Live Tracker or the NOAA Tides and Currents page for Laura."

- TRABUS' Storm Surge Live Tracker has a national audience through Jeff Masters' hurricane blog.

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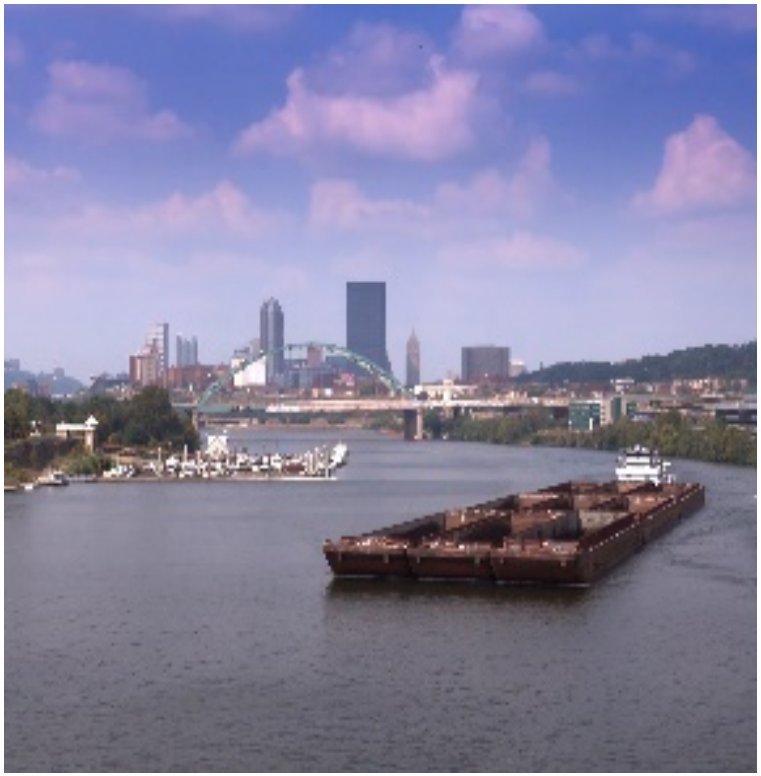
Points of Contact



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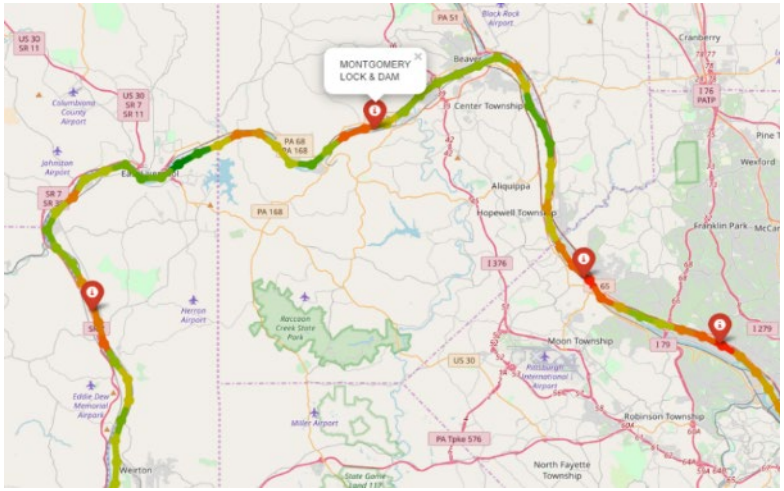
Travel Time Predictions



- Provides historical average hourly speeds
- Applies machine learning in combination of AIS, marine industry movement operating reports, environmental data, and lock status information to forecast traffic congestion levels at locks and other river locations
- Dynamic voyage time calculations for tows throughout transit

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