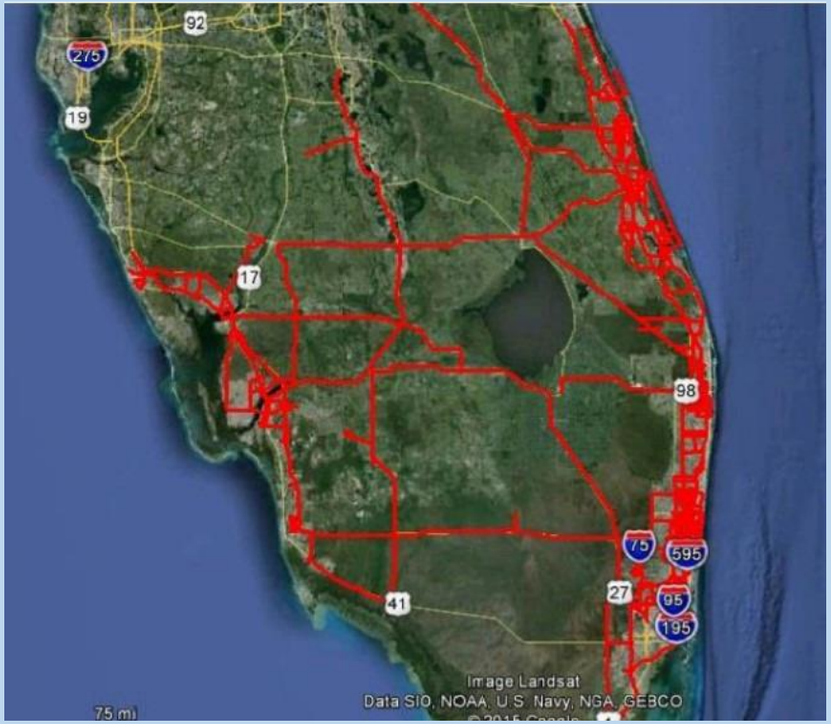
# Florida Petroleum Shipments

CASE STUDY

**Understanding petroleum supply chains for Miami's Port Everglades and businesses in Southern Florida.**



| | |
|---|---|
| **Freight Challenges** | Land Use, Congestion, Last Mile Access |
| **Data Sources Used** | Administrative Records, Global Positioning System, Computer Vision |
| **Analytical Approaches** | Speed, Location, Classification |




**South Florida Tanker Truck Routes**

*Source: Florida SHRP2 C20 Local Freight Data Collection Team, "Port Everglades Petroleum Commodity Flow Pilot Study". Available at: http://fdotd4-shrp2c20.com/blog/project-documents*

## WHAT ARE THE FREIGHT CHALLENGES?

The petroleum product shipments originating from South Florida's Port Everglades traveling to surrounding parts of Florida must share the roads with a large volume of other freight and passenger traffic. As a result, traffic congestion in the Miami region has an impact on the efficiency of petroleum shipments. The congestion includes "last mile" slowdowns on the surface streets that connect Port Everglades to nearby freeways. Another major issue in shipping petroleum is the incompatibility between truckloads of gasoline and diesel on roads and the surrounding land uses, which will challenge the "last mile" access for deliveries even more challenging.

## WHAT WAS THE GOAL OF THE PROJECT?

The Florida Department of Transportation (FDOT) sought to better understand the supply and demand chain for petroleum commodities distributed to South Florida from Port Everglades. Specifically, FDOT sought to quantify petroleum product flows from the Port, and test technologies to identify and track truck and rail tank vehicles.

## WHAT DATA SOURCES WERE USED?

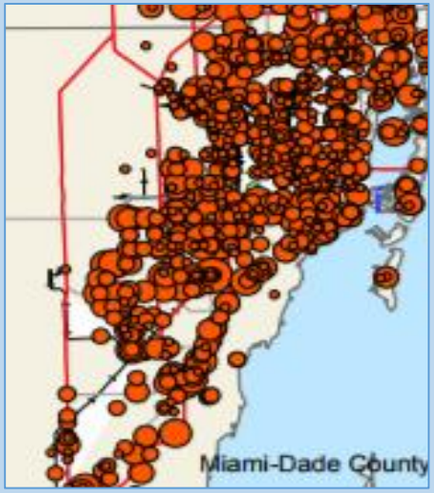
Researchers obtained administrative data on petroleum-related business locations (such as gas stations) from the Florida Department of Revenue, truck GPS records from ATRI, and images collected by Miovision traffic cameras.

## WHAT ANALYTICAL APPROACHES WERE APPLIED?

ATRI's GPS records are a set of billions of time-stamped point observations of hundreds of thousands of trucks' locations and speeds. The truck in ATRI's dataset has a unique identifying number assigned daily and a truck's path through a road network for a day can be determined by querying, mapping, and connecting all GPS points associated with a specific truck ID.

# Florida Petroleum Shipments






**Gasoline Sales Volumes by Destinations**
*Source: Florida SHRP2 C20 Local Freight Data Collection Team, "Port Everglades Petroleum Commodity Flow Pilot Study". Available at: http://fdotd4-shrp2c20.com/blog/project-documents*

**Traffic Camera Image**
*Source: FDOT, Port Everglades Petroleum Commodity Flow Pilot Study. [Online]. Available: http://fdotd4-shrp2c20.com/blog/project-documents*

## Contact Information

Min-Tang Li, Project Manager
Florida Department of Transportation, District 4
Min-Tang.Li@dot.state.fl.us

## WHAT ANALYTICAL APPROACHES WERE APPLIED (Cont.)?

Department of Revenue records were used to map the specific tax parcels of petroleum-related businesses, as well as the volume and value of fuel tax sales. Researchers then isolated the truck trips that started or ended at these specific petroleum-associated parcels. The isolated relevant truck trips could then be mapped to illustrate major corridors and routes for petroleum shipments. A sample map, illustrating gasoline sales volumes by destination is shown on the left above.

In addition to GIS analysis, researchers used machine vision software to analyze images captured by Miovision traffic cameras at 5 locations. Computer vision refers to the automatic analysis of the size, shape, and color of images. In this application, machine vision analysis of FDOT traffic camera feeds was able to classify vehicles based on their size, shape, and identifying markings (like license plates). From this data, researchers were able to identify and count trucks, as well as petroleum-carrying railcars. A sample traffic camera image is shown at left below. This identifying information was used in conjunction with counts of trucks entering and leaving port gates to develop estimates of the count of specific types of petroleum-carrying trucks (tankers vs. dry vans) and railcars leaving Port Everglades.

## WHAT WERE THE RESULTS?

FDOT's project provided an approximate estimate of the magnitude and value of petroleum product flows from Port Everglades to other areas of the state. The project also demonstrated the capacity of emerging data sources to identify and track both trucks and railcars. In terms of best practices, the project shows the value of fusing data from multiple sources. This act of fusing sources provides deeper insights into transportation phenomena than would be possible if each data source was analyzed separately.

## HOW WERE THE RESULTS VISUALIZED OR COMMUNICATED?

The results of this study were communicated through a written report and series of presentations. Visual aids for these materials included a set of maps illustrating petroleum sales volumes and destinations of petroleum products, such as the sample map on the previous page. Other visual aids included maps showing tanker truck routes in the state, which are shown below. Presenting a series of images and maps throughout the final deliverables was helpful because it gave readers greater insight into what information could be derived from each data source used in the study, and how insights from different sources could be fused to gain a higher level of insight into the nature of petroleum flows. For example, truck route maps and petroleum sales maps can show which roads are important distribution corridors for specific areas.