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Improving Safety, Mobility & Transportation Through Connected Vehicle Data



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Introductions



Bethany Haslam
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Wejo



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Wejo

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About Wejo

Founded in
2014

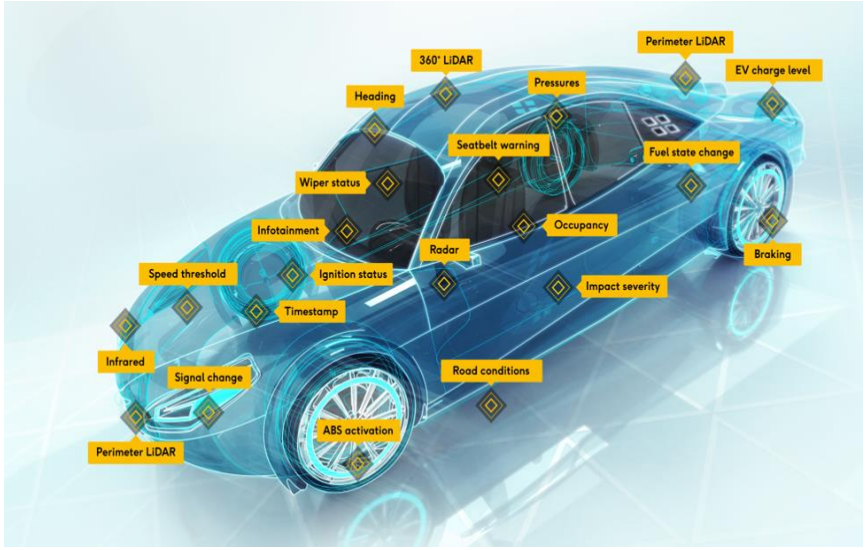
Employees
250+

17
Agreements with automotive manufacturers and Tier 1 partners globally in the pipeline

13.7M
unique active vehicles

489B
total miles curated

Wejo collects more data per day than the major US Stock Exchanges



33+1
Pending and granted Patents for proprietary platform and data science IP

17.2B
data points ingested per day, circa **482k** per second

76.8M
journeys analyzed per day

Selected awards and accolades

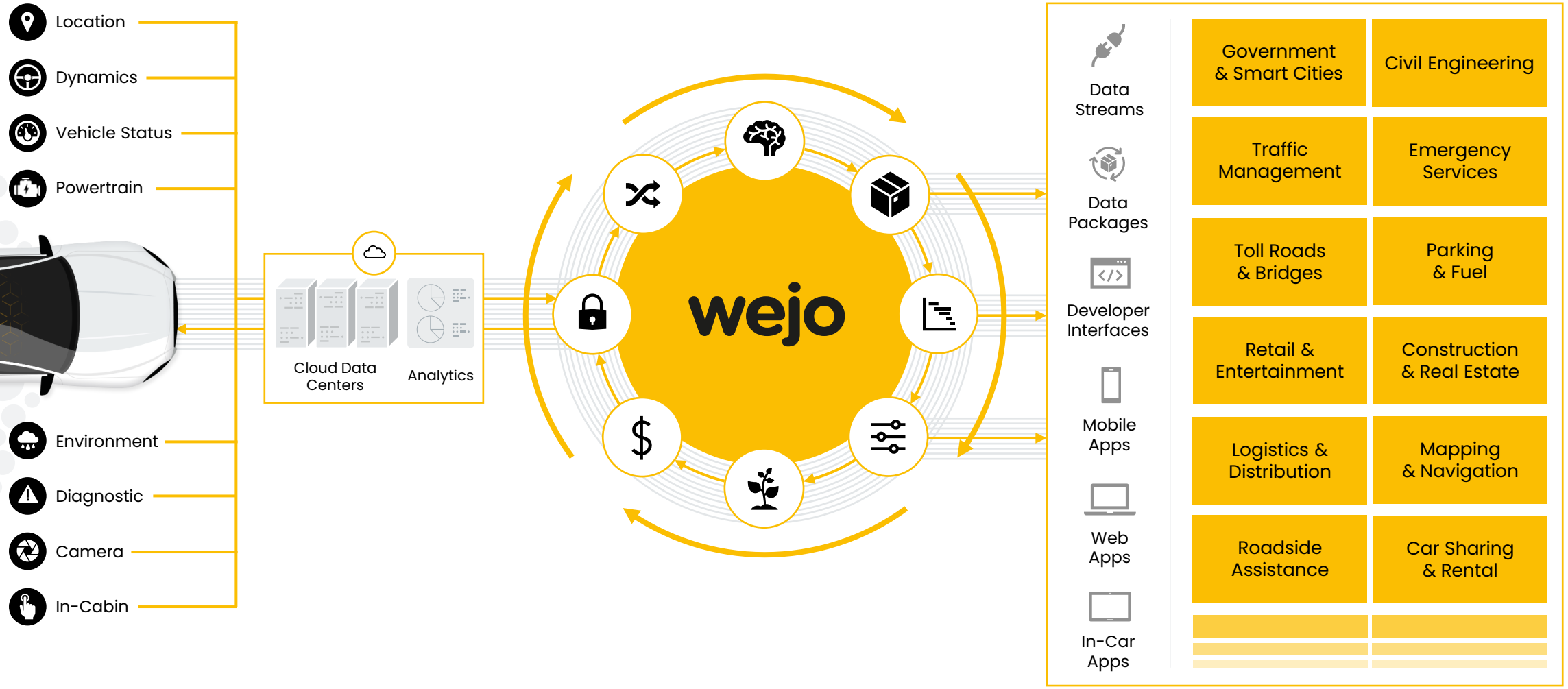
Sunday Times Virgin Atlantic Fast Track 100

Future Digital Awards, Juniper Research 2019

Frost & Sullivan Best Practices Award 2019

Future Fifty by Tech Nation

Wejo's model drives successful outcomes across verticals



Key metrics of Connected Vehicle Data

High-accuracy | 3 meters accuracy

Accurate to 3 meters, which helps identify highway lanes and parking spots, giving high confidence in traffic locations representative to the road network



Volume | Over 12 million US connected vehicles

High volume of journeys tracked: 1.3 billion per month providing coverage across the entire of the US in 95% of all roads over a calendar month.



High-frequency | 3 second capture rate

1 to 3 second data capture rate with a Service Level Agreement (SLA) that 95% of the data is delivered within 60 seconds



Historica | Data from October 2019

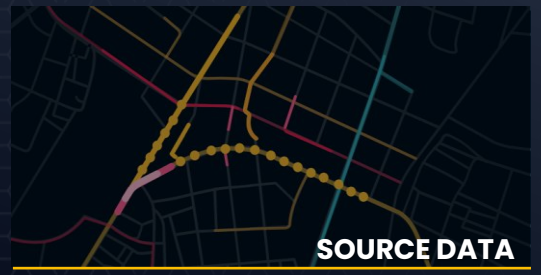
Data from historical events gives insights about incident hotspots, harsh breaking or acceleration, speeding and more supporting studies of historical patterns





Source Data

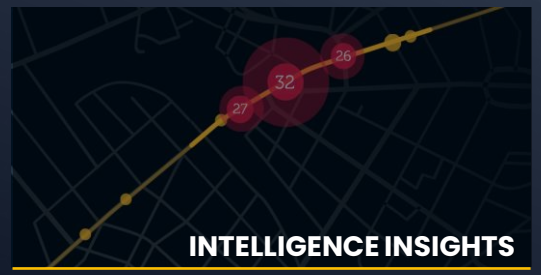
Products and Services



VEHICLE MOVEMENTS

DRIVING EVENTS

Source data taken directly from the vehicle and provided to the end user. Typically delivered in JSON or Parquet file format or through Moonshadow's DB4IoT

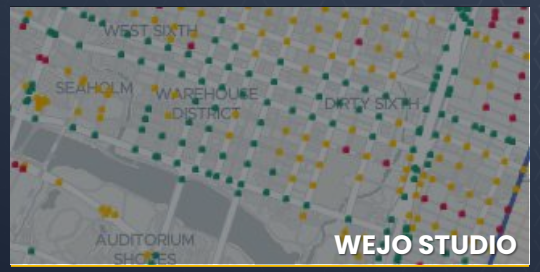


HISTORIC TRAFFIC PATTERNS

JOURNEY INTELLIGENCE

REAL TIME TRAFFIC INTELLIGENCE

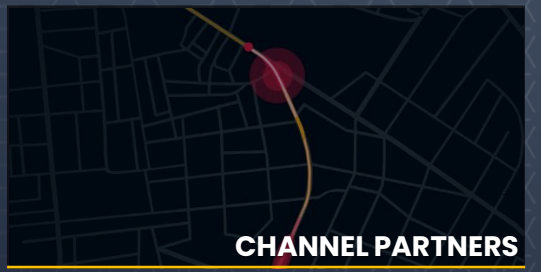
Aggregated data reports to understand traffic and journeys across the United States road network. Typically delivered in CSV, via API or through ESRI's ArcGIS



INTERSECTION **PERFORMANCE**

JOURNEY **INTELLIGENCE**

Wejo's SaaS platform providing access to a multitude of insights derived from millions of connected-vehicles.



esri — wejo PARTNER PROGRAM

Moonshadow — wejo PARTNER PROGRAM

waycare — wejo PARTNER PROGRAM

iteris — wejo PARTNER PROGRAM

Wejo's data delivered through one of your current preferred solutions, enabling multi-source analysis.

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Vehicle Movement is the solution that provides the real-time origin, destination, speed, and traffic distribution insight required to improve traffic flow and reduce congestion.

TRAFFIC MANAGEMENT
Real-time visibility to incidents enables near instant decision making mitigating the impact of the situation and the potential subsequent rolling disruption to the rest of the system.

SPEED ZONE MANAGEMENT
Manage critical speed zones especially near work sites and schools. Gain instant visibility when slowdowns in the system occur. Improve traffic flow through improved speed management.

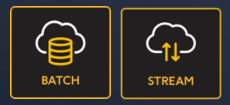
JOURNEY DISTRIBUTION
Gain greater understanding of the origin and destination of vehicles across the network. Improve insight into the impact traffic has on areas where infrastructure requires improvement or replacement.

REAL-TIME SAFETY MONITORING
Support your Vision Zero and other safety initiatives through near time visibility to safety issues. Achieve your vision of a highway system without serious injuries or fatalities.



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VEHICLE MOVEMENTS



CORE ATTRIBUTES

Name	Description
Data Point ID	Unique identifier for an individual captured datapoint
Journey ID	Unique identifier for individual vehicle's movements through to an ignition off event happening
Date and Time	Timestamp captured for each datapoint. (ISO8601). Including UTC off-set
Latitude	The North-South positioning of the vehicle on the Earth's surface
Longitude	The East-West positioning of the vehicle on the Earth's surface
Speed	The speed in kilometers per hour that the vehicle was travelling at the time datapoint was captured
Heading	The direction that the vehicle was heading at the time the datapoint was captured
Ignition Status	The ignition status as the time the datapoint was captured

OPTIONAL ATTRIBUTES

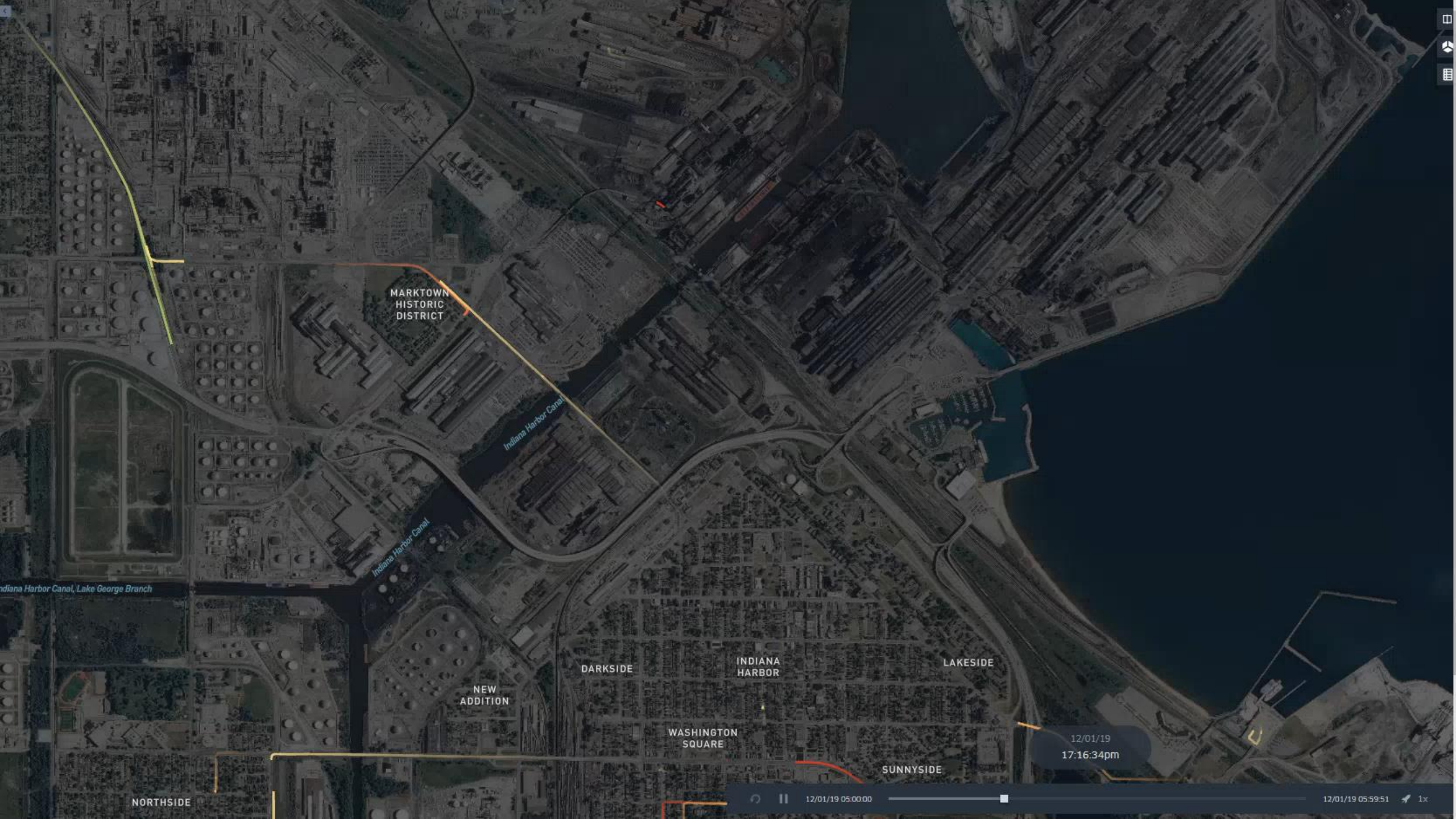
Name	Description
Geohash	Representation of a square on the Earth's surface
Zip Code	The zip or postal code in which the vehicle was located at the time of datapoint capture
State / Region Code	The region/state code in which the vehicle was located at the time of datapoint capture
Country Code	The country in which the vehicle was located at the time of datapoint capture
Vehicle Type ID	An identifier for the category of vehicle including body type, fuel type and model year.

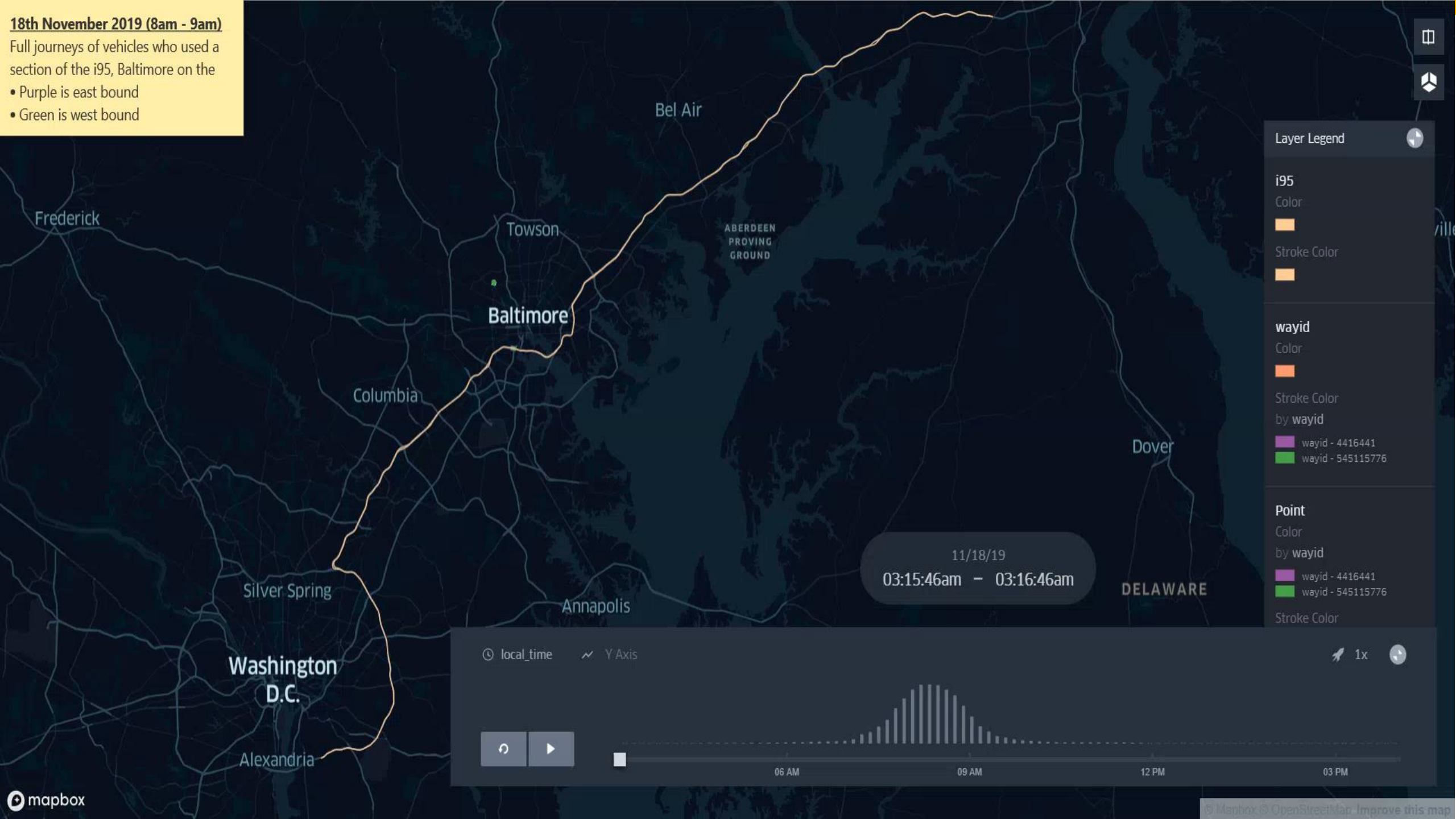
DELIVERY FORMATS AND METHODS

The data is available in JSON or Parquet file format and compression such as GZip or Snappy are available. Batches are available daily, weekly or monthly and can be received via Amazon® Web Services, Google® Cloud, SFTP, or API.

Vehicle Movements is the trajectory of a vehicle's journey from ignition on to ignition off. This data is captured up to every 3 seconds with an accuracy of 3-metres for each GPS datapoint.

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MARKTOWN
HISTORIC
DISTRICT
Indiana Harbor Canal
Indiana Harbor Canal
Indiana Harbor Canal, Lake George Branch
DARKSIDE
INDIANA
HARBOR
LAKESIDE
NEW
ADDITION
WASHINGTON
SQUARE
SUNNYSIDE
NORTHSIDE
12/01/19
17:16:34pm
12/01/19 05:00:00
12/01/19 05:59:51
1x

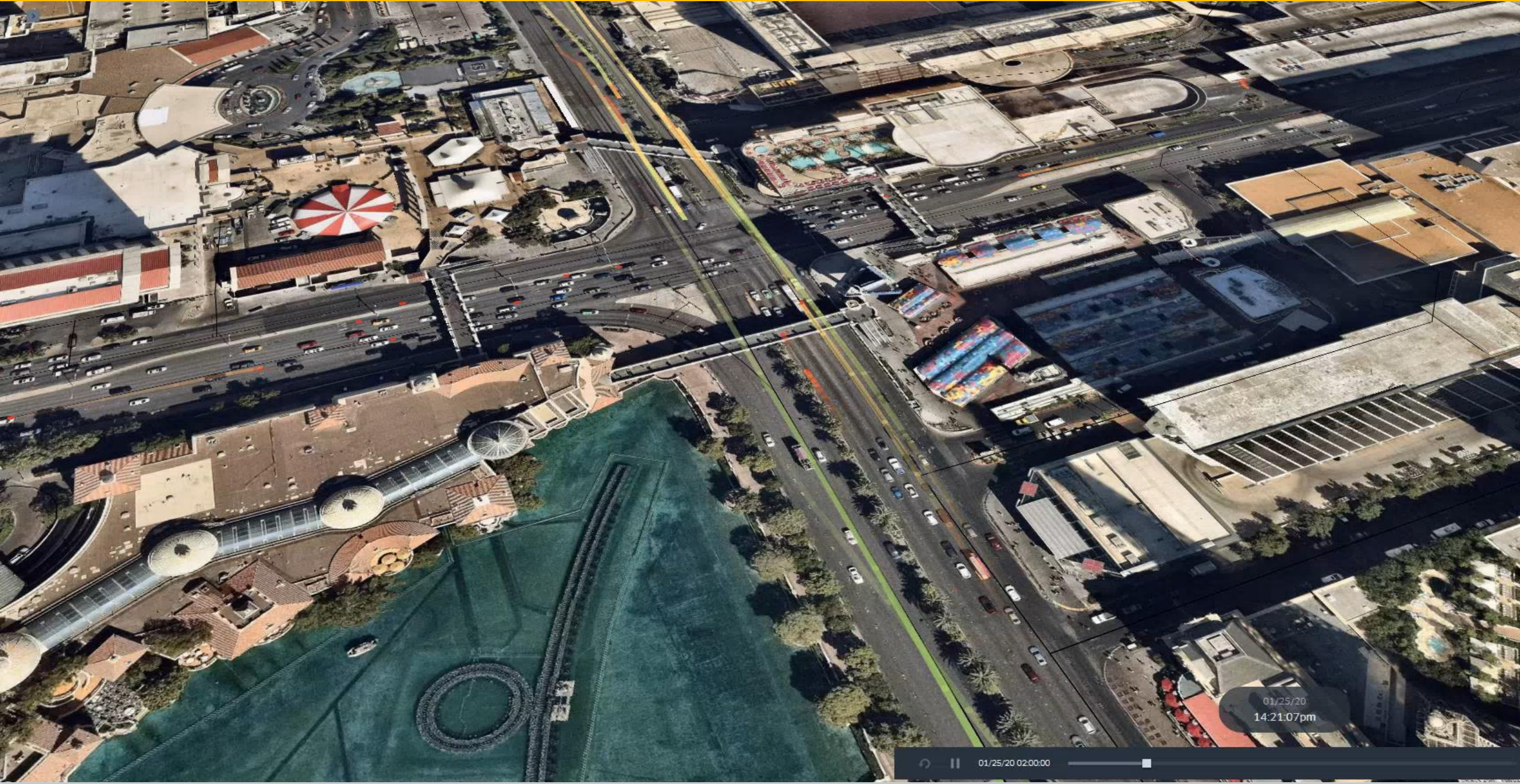

18th November 2019 (8am - 9am)
Full journeys of vehicles who used a section of the i95, Baltimore on the
• Purple is east bound
• Green is west bound
Bel Air
Frederick
Towson
ABERDEEN PROVING GROUND
Baltimore
Columbia
Dover
Silver Spring
Annapolis
DELAWARE
Washington D.C.
Alexandria
11/18/19
03:15:46am – 03:16:46am
Layer Legend
i95
Color
Stroke Color
wayid
Color
Stroke Color
by wayid
wayid - 4416441
wayid - 545115776
Point
Color
by wayid
wayid - 4416441
wayid - 545115776
Stroke Color
local_time
Y Axis
1x
06 AM
09 AM
12 PM
03 PM
mapbox



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Freeway incident

0 Speed x



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Las Vegas Strip Intersection

0 Speed x

Driving Events is the out-of-the-box solution that provides the data necessary to monitor segment speed, travel times, and congestion

INCIDENT AVOIDANCE
Understand where potentially dangerous driving behaviors regularly occur utilizing **hard braking** to determine when safety measures should be implemented

WEATHER CONDITIONS
Understand and identify areas of flooding or severe precipitation with access to unique **window wiper** and **external temperature data**

VEHICLE OCCUPANCY
Understand vehicle occupancy levels utilizing **seatbelt status data** to understand true vehicle occupancy levels in HOV lanes

WORK ZONE SAFETY
Monitor driving behaviour in and around work zones by leveraging **hard braking** and **hard acceleration data**, keeping construction workers safe

PARKING INFRASTRUCTURE
Determine car park utilization and understand and prioritize if, where and when to build new infrastructure utilizing vehicle **ignition status**



Lane-level visibility ensures that you are equipped with the right data to react immediately if needed.

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DRIVING EVENTS



Driving Events refers to the trigger of specific events that occur within the vehicle between ignition on and ignition off.

CORE ATTRIBUTES

Name	Description
Data Point ID	Unique identifier for an individual captured datapoint
Journey ID	Unique identifier for individual vehicle's movements through to an ignition off event happening
Date and Time	Timestamp captured for each datapoint. (ISO8601). Including UTC off-set
Latitude & Longitude	The North-South and East-West positioning of the vehicle on the Earth's surface.
Speed	The speed in kilometers per hour that the vehicle was travelling at the time datapoint was captured
Heading	The direction that the vehicle was heading at the time the datapoint was captured
Ignition Status	The ignition status as the time the datapoint was captured
Event Type	An identifier for the type of recorded event (see Event Type section)

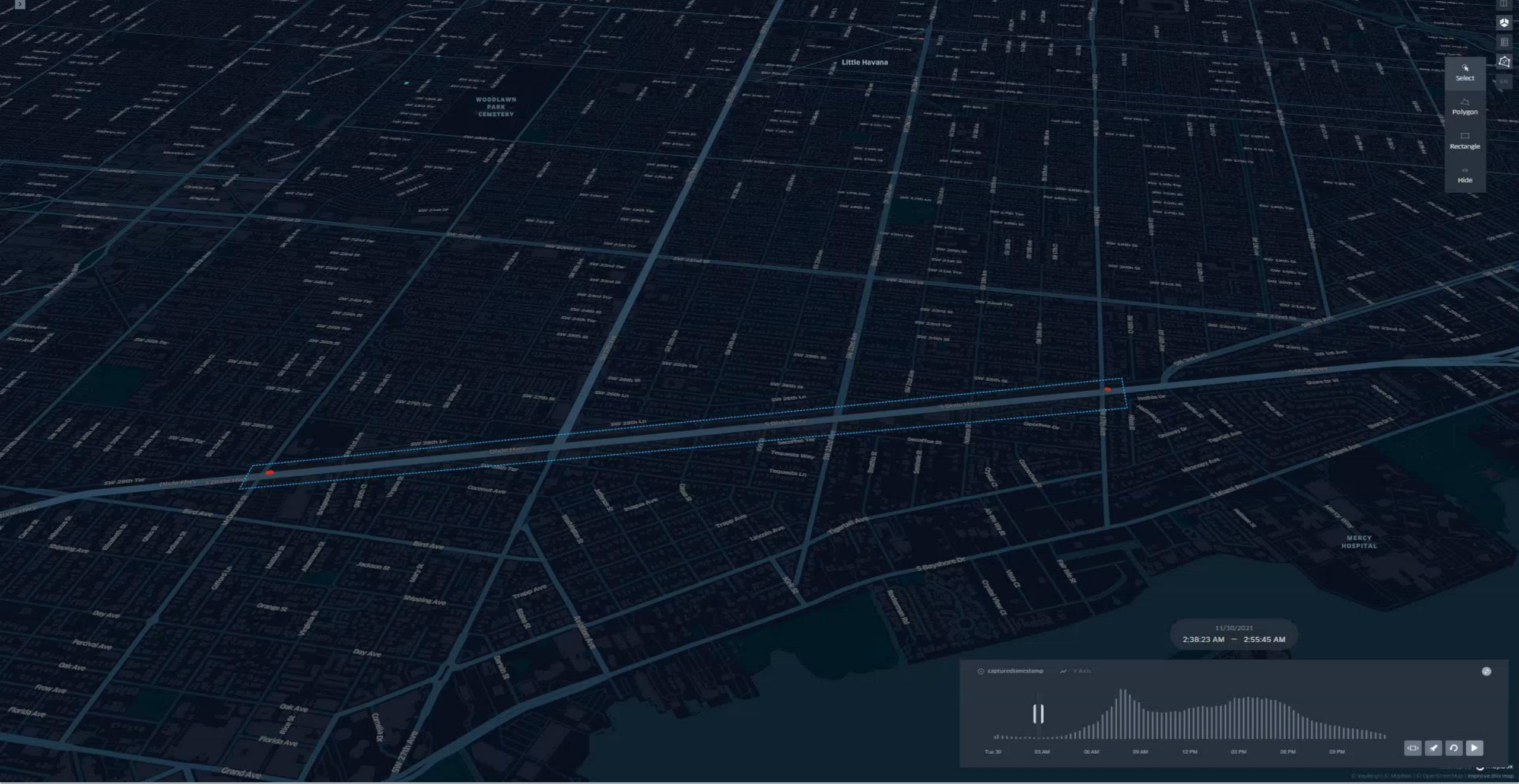
DELIVERY FORMATS AND METHODS

The data is available in JSON or Parquet file format and compression such as GZip or Snappy are available. Batches are available daily, weekly or monthly and can be received via Amazon® Web Services, Google® Cloud, SFTP, or API.

EVENT TYPES

Name	Description
Journey	Detected Journey Start and Journey End
Parking Brake Change	Unique identifier for individual vehicle's movements through to an ignition off event happening
Seatbelt Change	Detected Seat Belt Latched or Unlatched for Driver or Front Passenger
Seatbelt Warning	Activation or deactivation of Seat Belt Warning for Driver or Front Passenger
Occupancy Change	Detected occupancy change in Driver or Front Passenger seat (Occupied or Unoccupied)
Door Change	Detection of Door Opened or Closed, with applicable location (Front Left or Right, Rear Left or Right, Trunk, Hood)
Signal Change	Activation or deactivation of Left or Right Turn Signal
Lights Change	Activation or deactivation of Low/High Beam, Fog, Brake, or Parking Lights
Acceleration Change	Detection of Harsh Braking or Harsh Acceleration
Speed Threshold Change	When speed exceeds 80mph, or drops back to below 80mph
Wiper State Change	Wipers Activated or Deactivated, with wiper speed/interval
Fuel Level State Change	When specific Fuel Levels (75%, 50%, 25%, 10%, 5%) are reached
Anti-lock Braking System Change	Detection of activated ABS
Autonomous Emergency Braking Change	Detection of activated Autonomous Emergency Braking
Electronic Stability Status Change	Activation or deactivation of Electronic Stability System (traction control)
Horn Change	Activation of Horn

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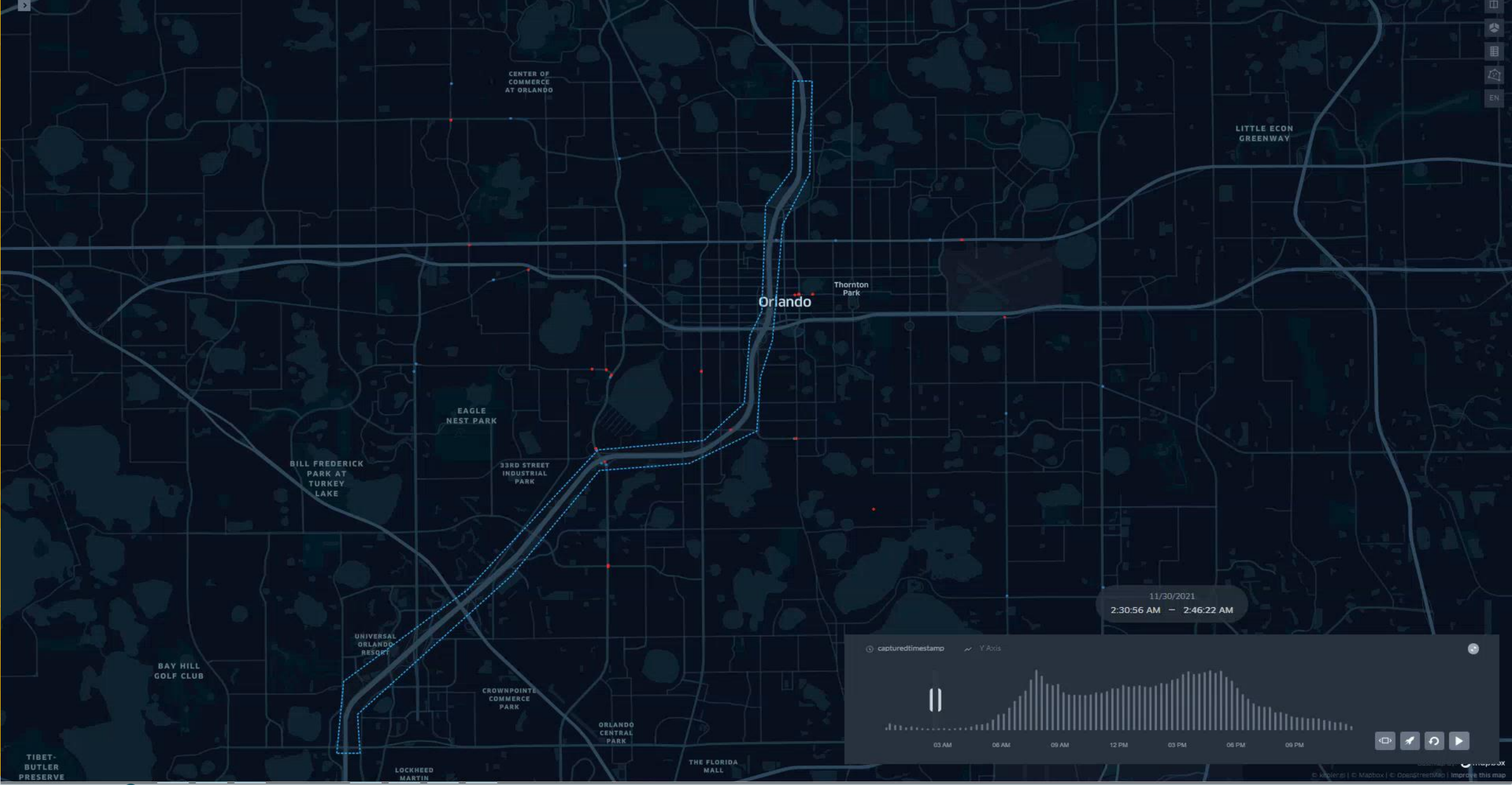


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US Route 1, Miami

Harsh braking

Harsh Acceleration



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I-4, Orlando

Harsh braking

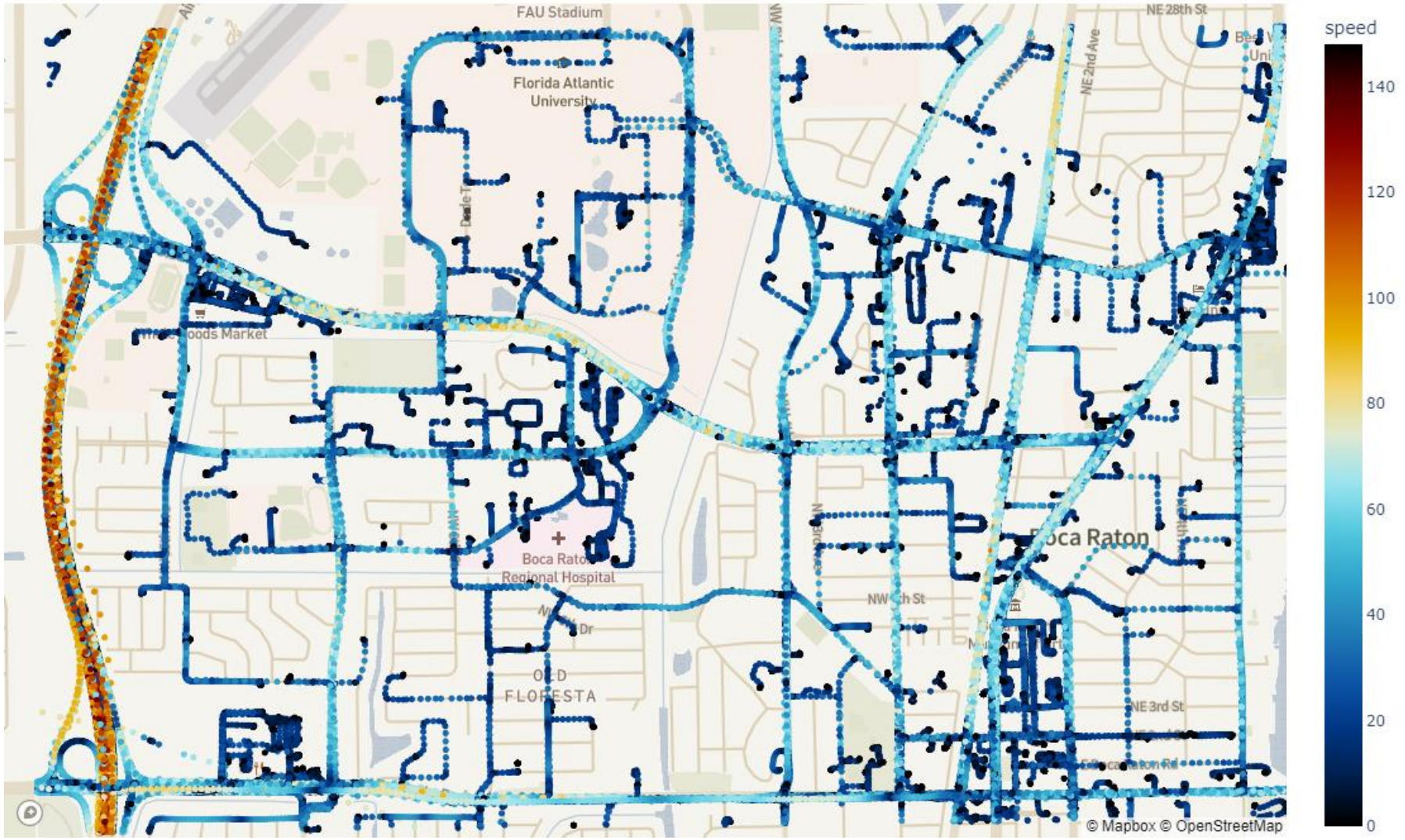
Harsh Acceleration



Use Cases & Case Studies

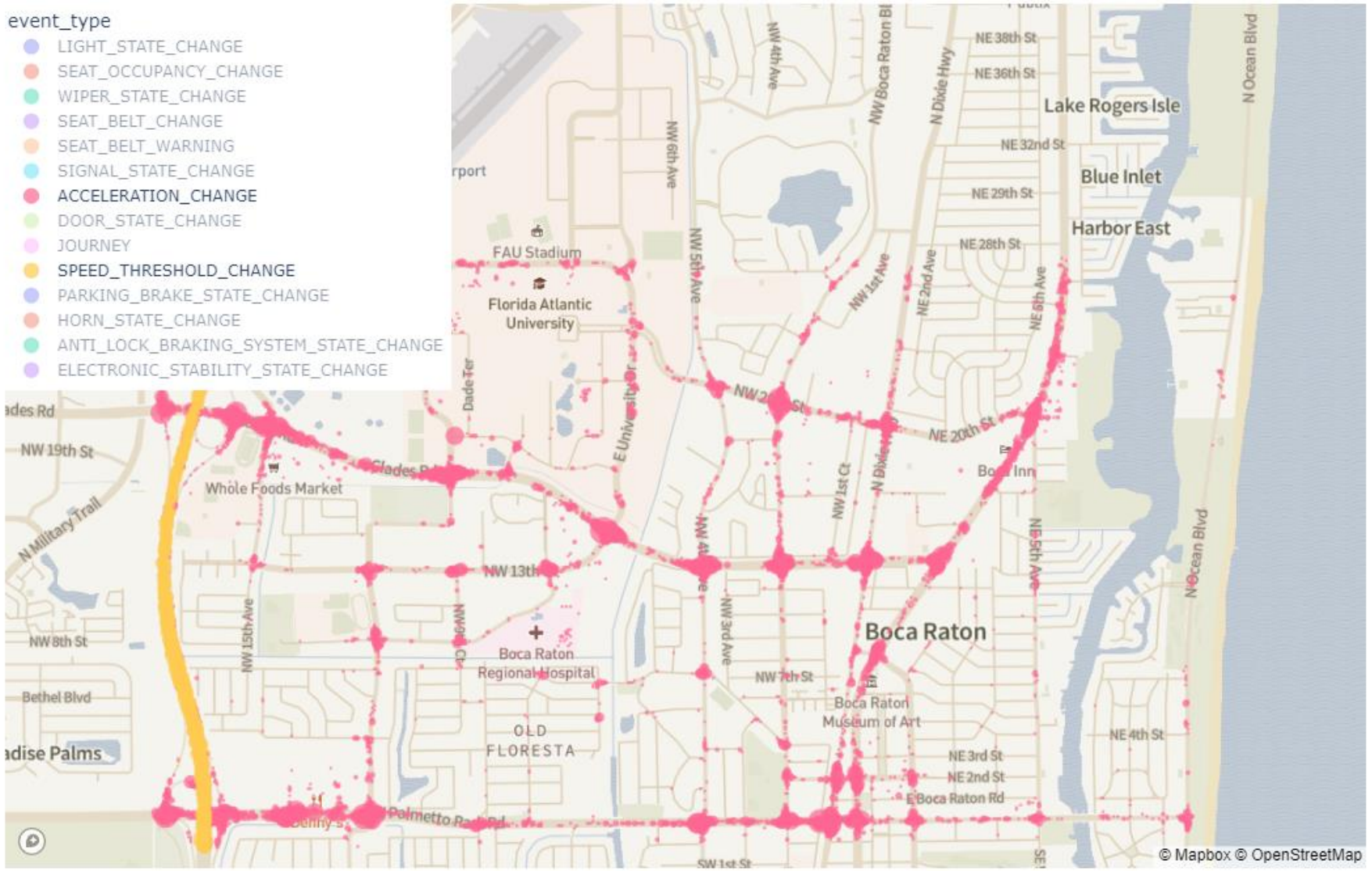
Florida Atlantic University Visuals

Vehicle Movements



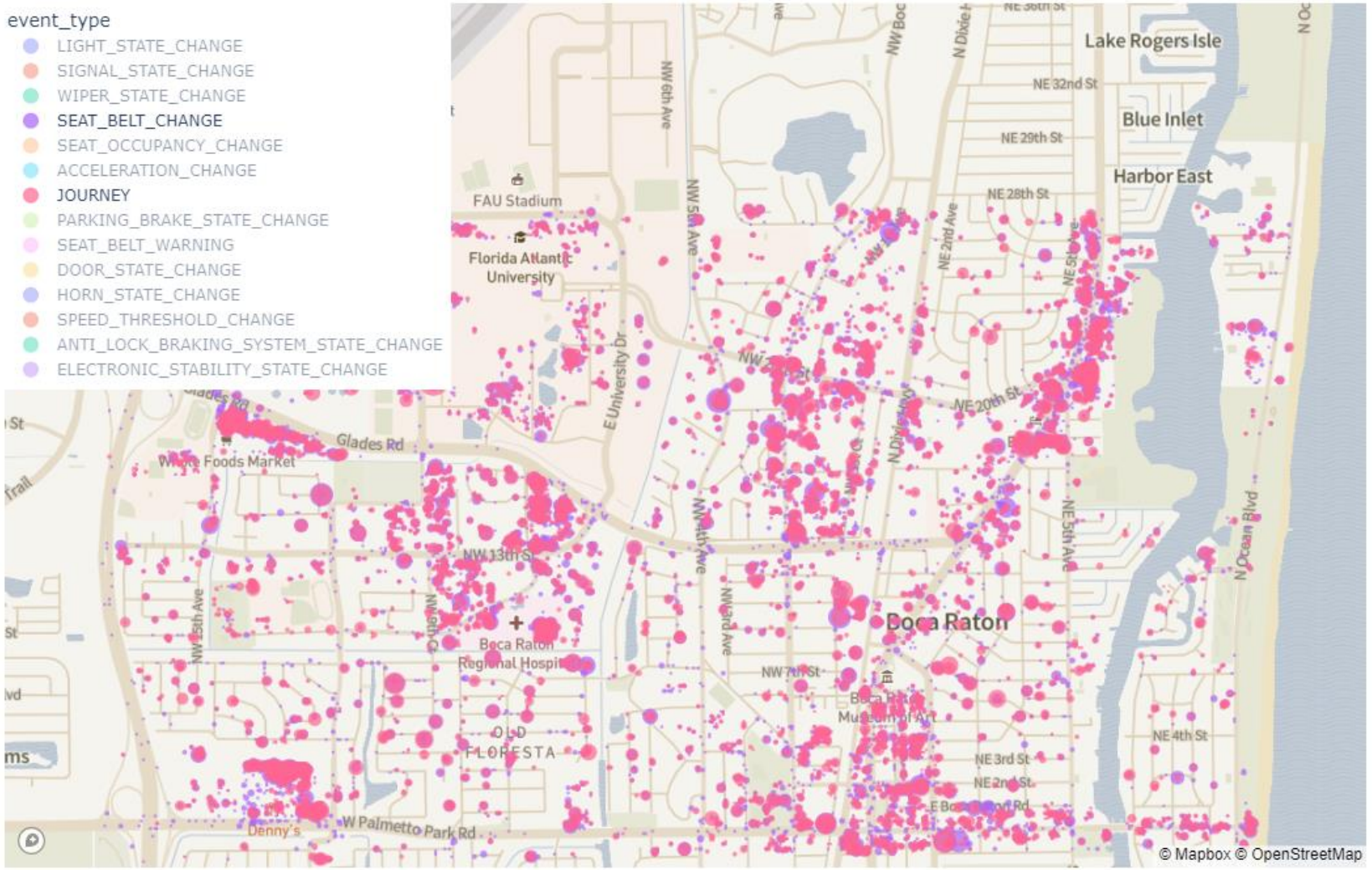
Florida Atlantic University Visuals

Driving Events



Florida Atlantic University Visuals

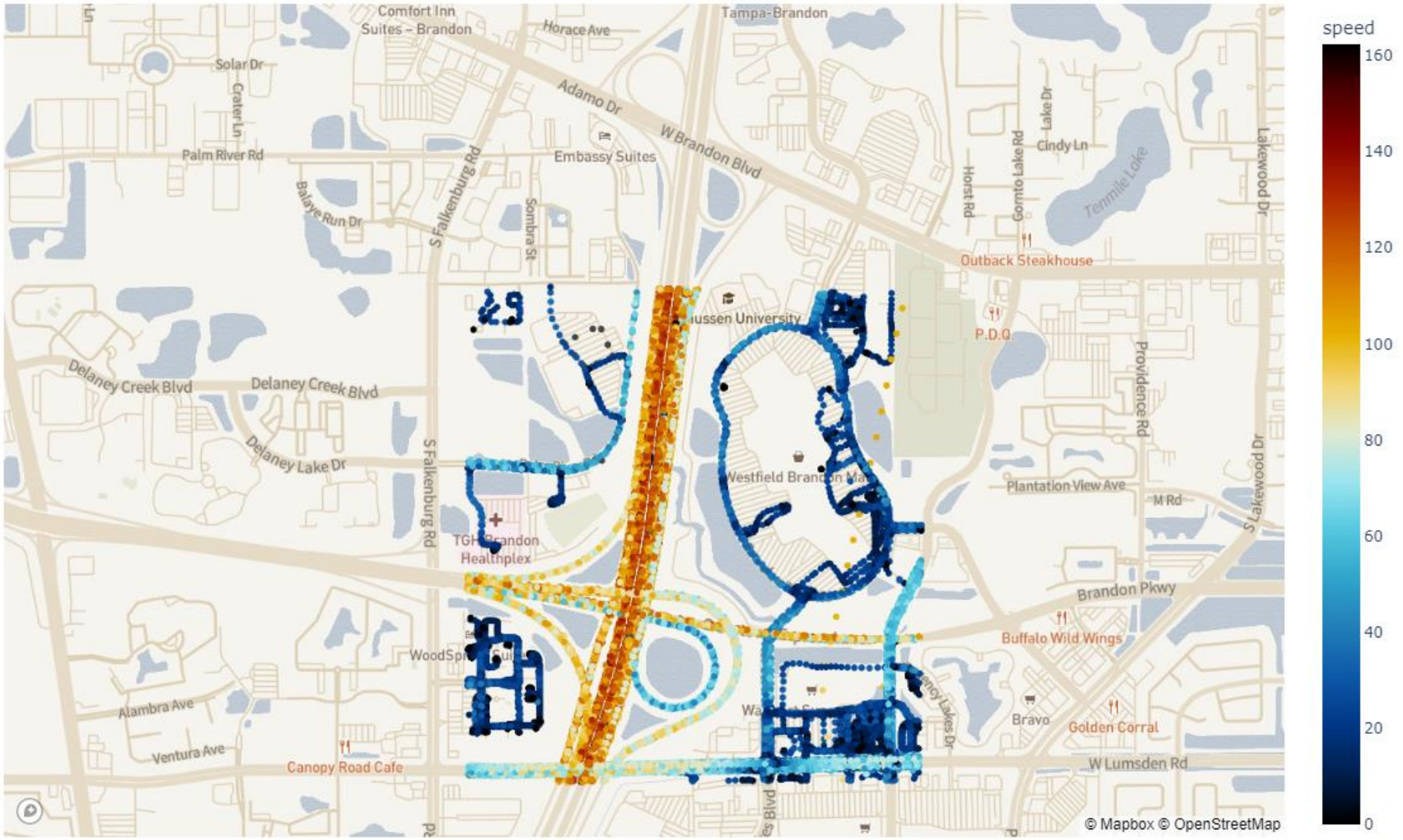
Driving Events



Evacuation Use Case & Visuals

Hurricane Ian: September 28, 2022

- To keep our data cost down on pulling this report, all visuals are only the first 100,000 rows of data points and are thus not a 100% sample.
- Each dot is representing a datapoint which we receive every 3 seconds.
- The colours of each datapoint represent the exact vehicle speed (kph) at the time. Dark red = high speed, Dark blue = very low speed/complete stop
- Traffic is flowing at fairly high speeds, and moving efficiently. We can see a build up of congestion and slower speeds in residential areas & on/off ramps.



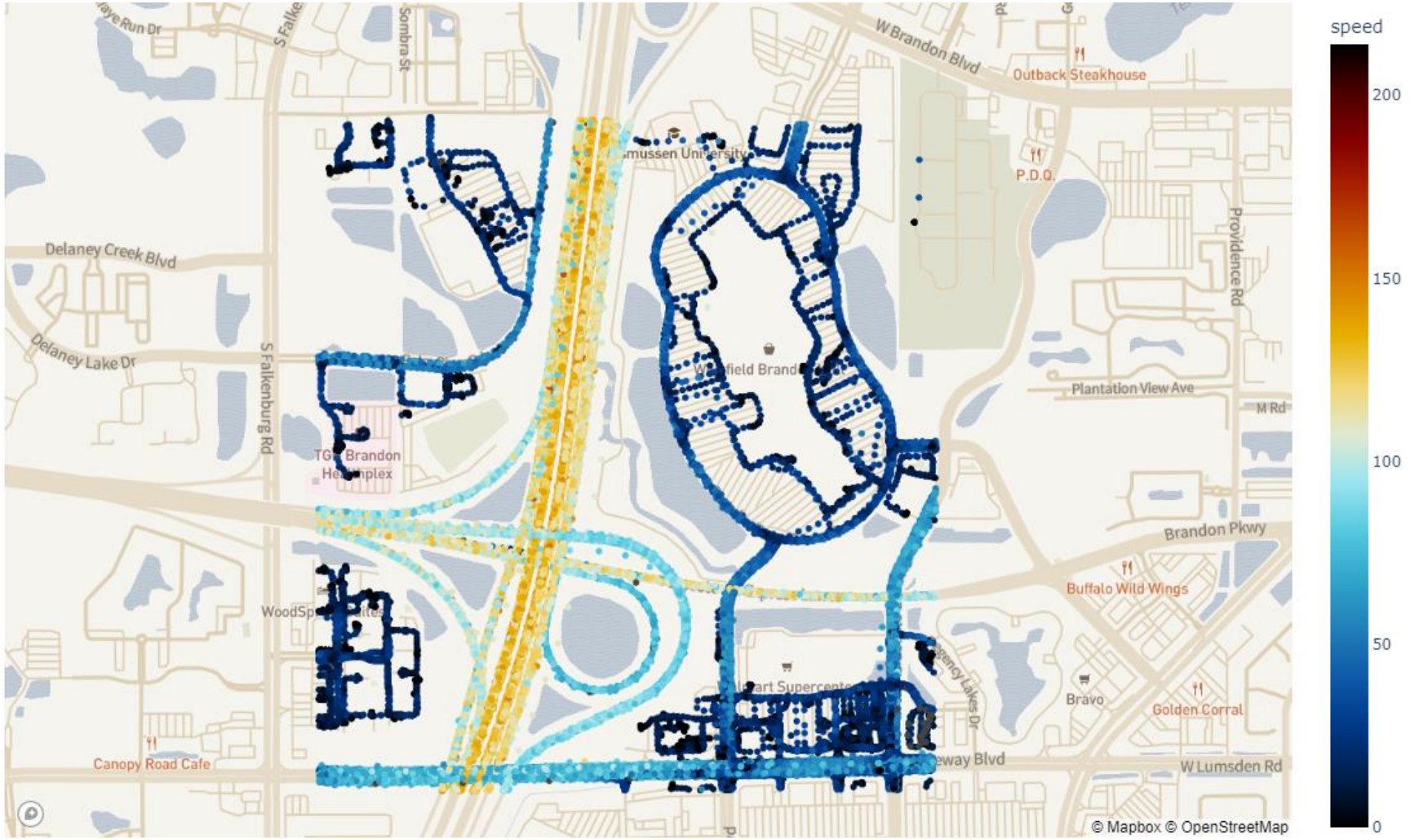
Vehicle Journeys: 2,019

Evacuation Use Case & Visuals

Hurricane Ian: September 29, 2022

- Slow speeds & congestion shown on the on/off ramps onto the main interstate evacuating Tampa. In comparison from data taken the day prior we can see more traffic is ensuing as people evacuate.

Vehicle Journeys: 5,552



Evacuation Use Case & Visuals

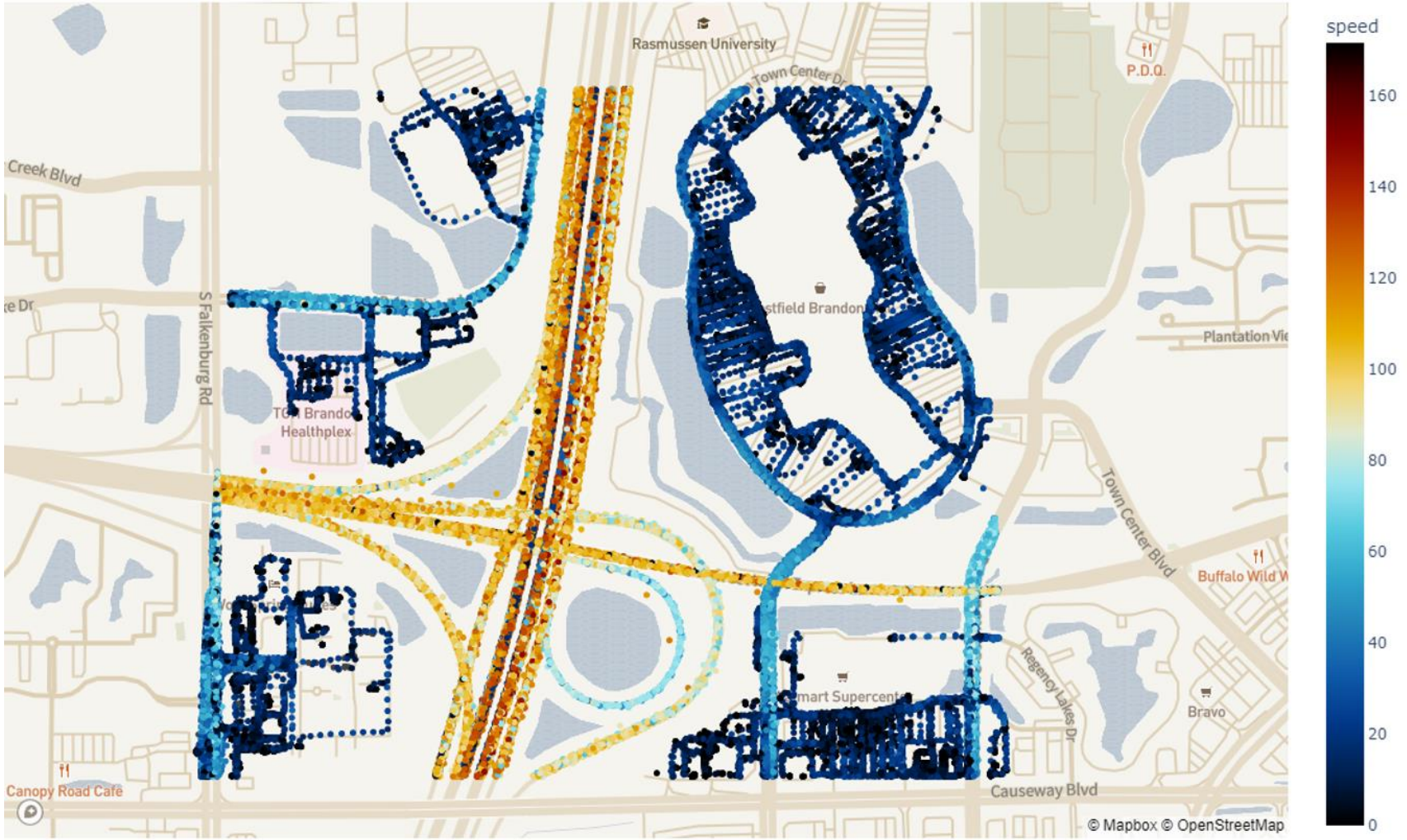
Hurricane Ian: September 30, 2022

- As you can see, during the evacuation, various people evacuated to nearby shopping centres for safety, as you can see lots of completely parked vehicles. Interesting to see the places people fled to for cover from the storm.

- High speeds on the inner lanes of the interstate, and congestion clearly building up on the routes out of Tampa.

- You can visually see the difference in journeys & road activity between the same snapshot over the three days 28/29/30th September.

Vehicle Journeys: 13,329

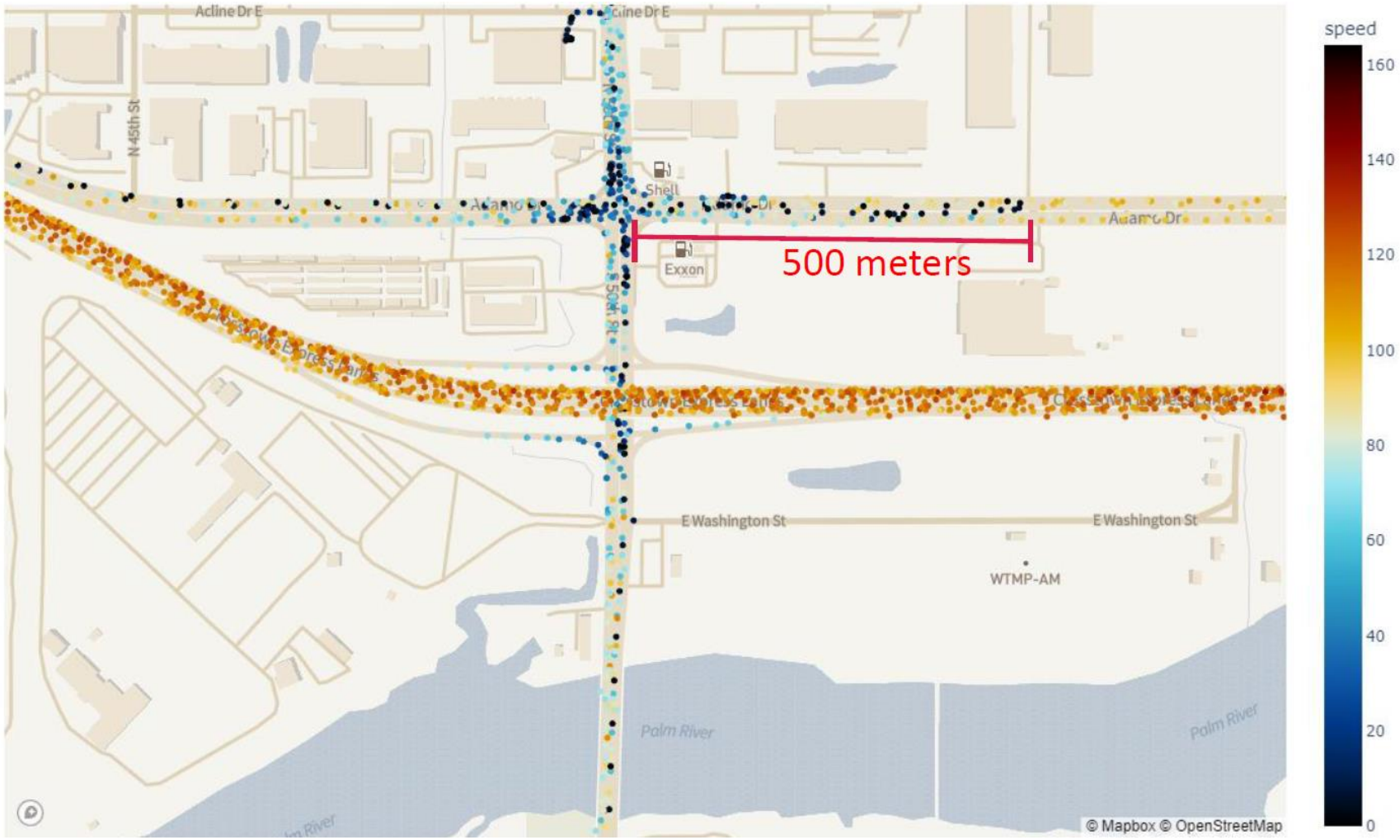


Evacuation Use Case & Visuals

Hurricane Ian: September 29, 2022

- You can see a queue build up here from an intersection, slow speeds turning into slightly higher speeds.

- This level of ‘point granularity’ is not
available via other vendors.
This means DOT’s can do more in-depth
signal studies.



Crash analysis with Wejo data: Insights gathered

Crash analysis

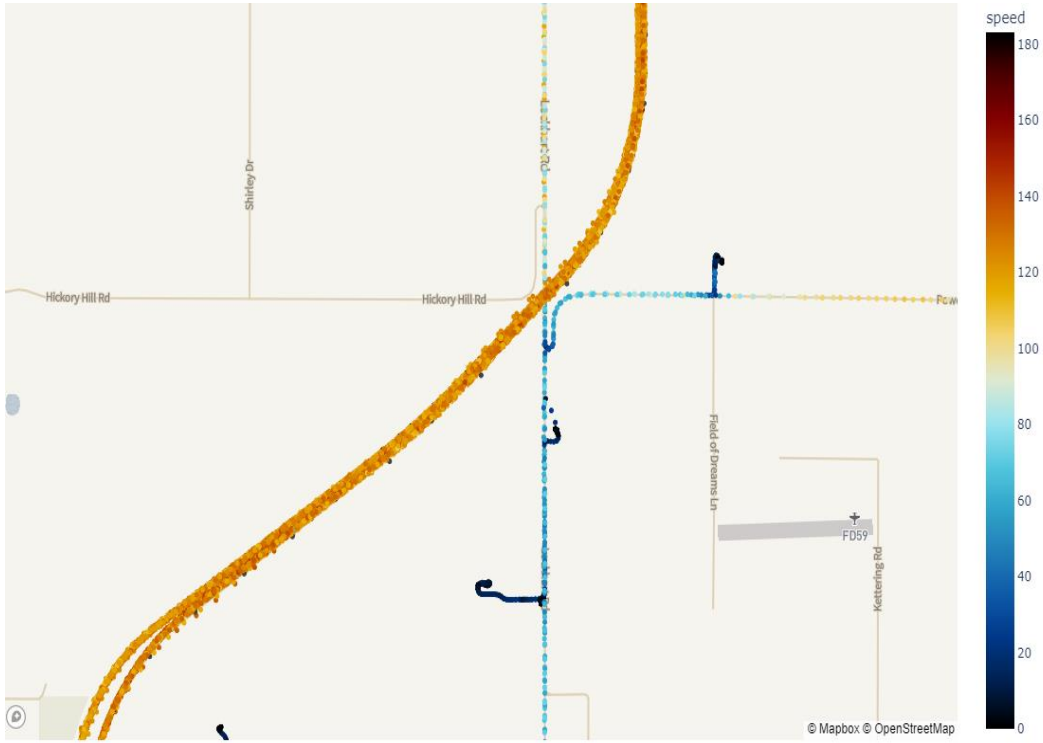
- Florida highway was blocked by thousands of beer cans after a crash with five semi-trailers.

- All lanes were closed after the semi-trailer carrying the beer crashed into trucks parked on the side of the road.

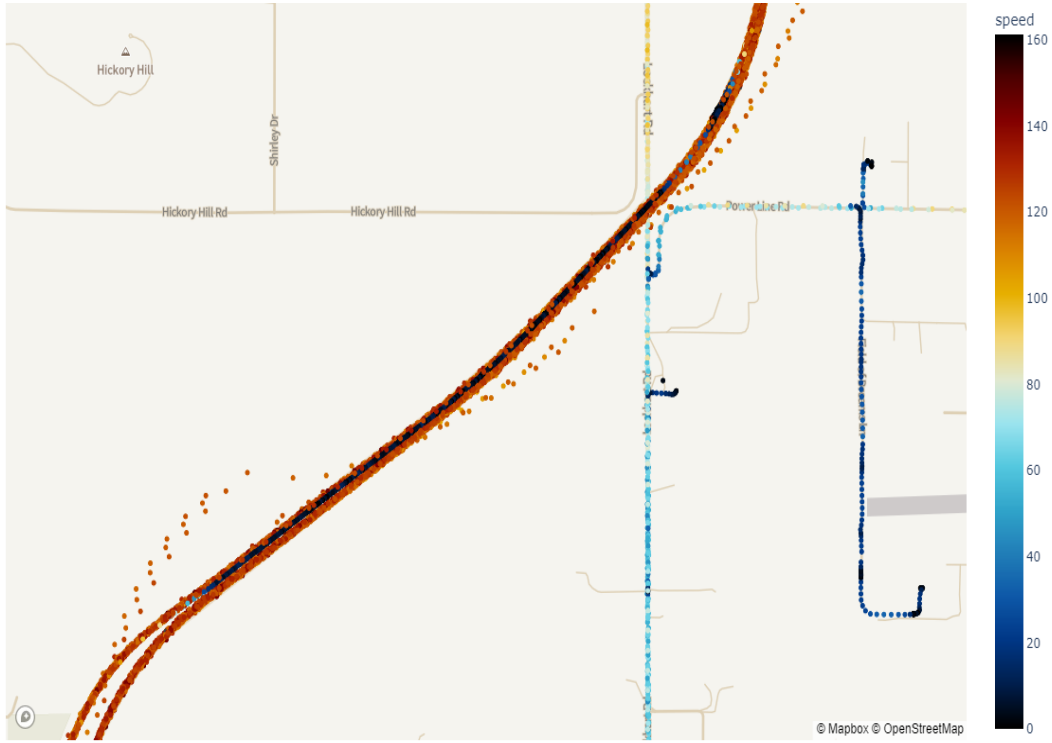


Crash analysis with Wejo data: Insights gathered

Tuesday, September 20 | Normal conditions

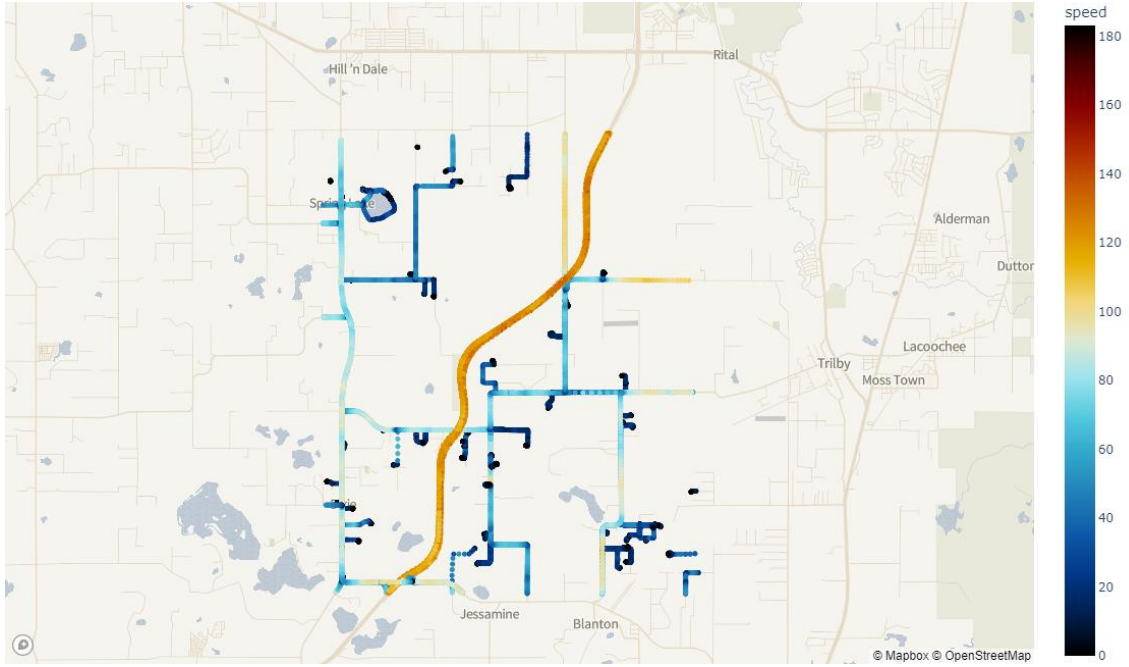


Wednesday, September 21st | Day of the crash

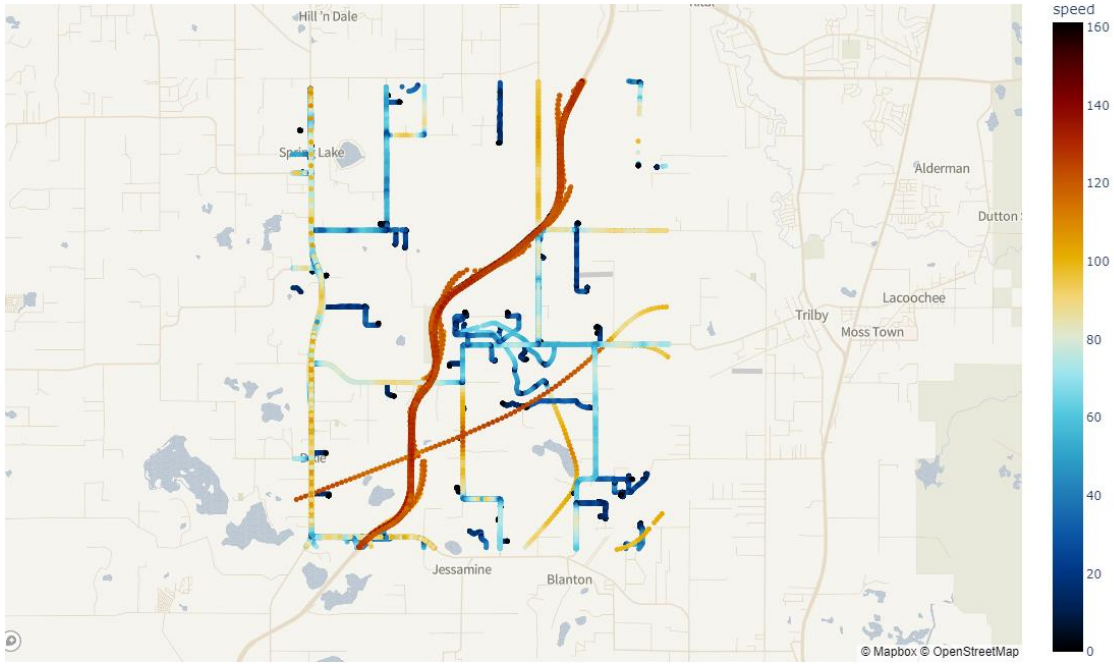


Crash analysis with Wejo data: Insights gathered

Tuesday, September 20 | Normal conditions



Wednesday, September 21st | Day of the crash



Crash analysis with Wejo data: Insights gathered

Wednesday, September 14 | 1 week before incident

Normal conditions

Vehicle Movements

- Data Points - 370996
- Individual journeys - 2998
- Individual Vehicles - 2183

Driving events

- Data Points - **1855**
- Individual journeys - **230**
- Individual Vehicles - **175**

Wednesday, September 21 | Day of the crash

Vehicle Movements

- Data Points - 395389
- Individual journeys - 2915
- Individual Vehicles - 2143

Driving Events

- Data Points - **9238**
- Individual journeys - **1045**
- Individual Vehicles - **811**

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Wejo Partnerships


















Q&A

Thank you!



Bethany Haslam

Territory Manager,
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Siôn Quayle

Presales Solutions
Consultant
Wejo

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