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A new age of urban mobility research

WM-AIR
CLEAN AIR SCIENCE FOR
THE WEST MIDLANDS

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WP# 2, Urban Mobility & Vehicular Emission



Telematics Data



Real-world emission measurements



Real-world noise measurements



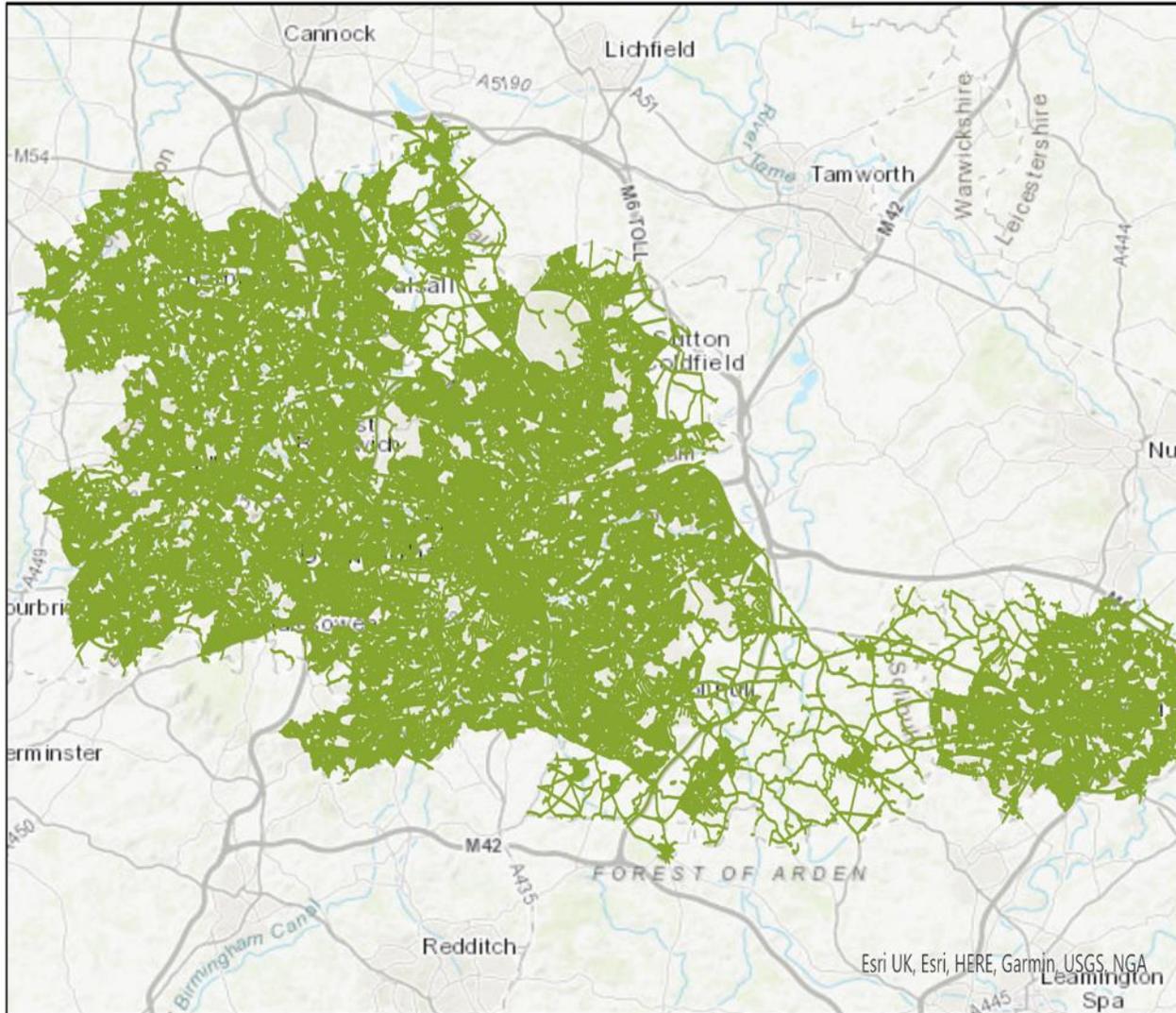
ANPR cameras

GeoSpatial and Temporal Mapping of Urban Mobility
(GeoSTMUM)

Mobility



Telematics data to deepen our understanding of urban mobility



Understanding driving behaviour in along a route or within an area

The request was to understand:

- 1) Speed and Acceleration
- 2) Proportion of time spent:
 - idling
 - Accelerating/decelerating
 - Cruising
 - Braking



Established Approach

- Previous studies derived these quantities by first constructing 'driving cycles'.
- Driving cycle is a speed-time dataset that is constructed such as to be considered characteristic of the area or vehicle.
- GNSS data from handful of vehicles, driven around the route or area by volunteers or the investigators.
- These data effectively chopped-and-shifted to create a representative driving cycle.

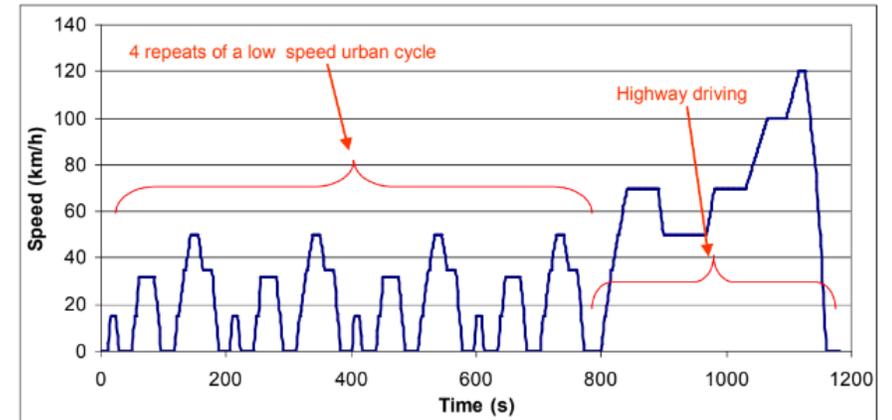
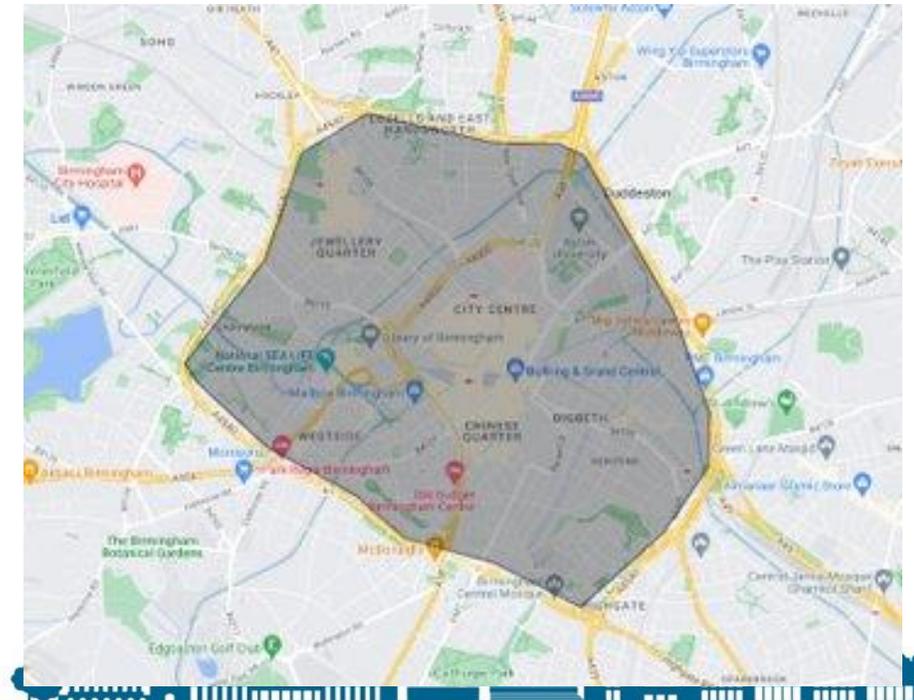


Figure 1: An example of a stylised cycle – the NEDC.



Telematics Approach

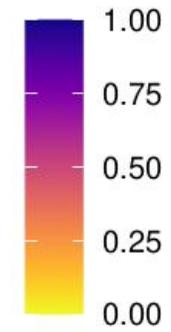
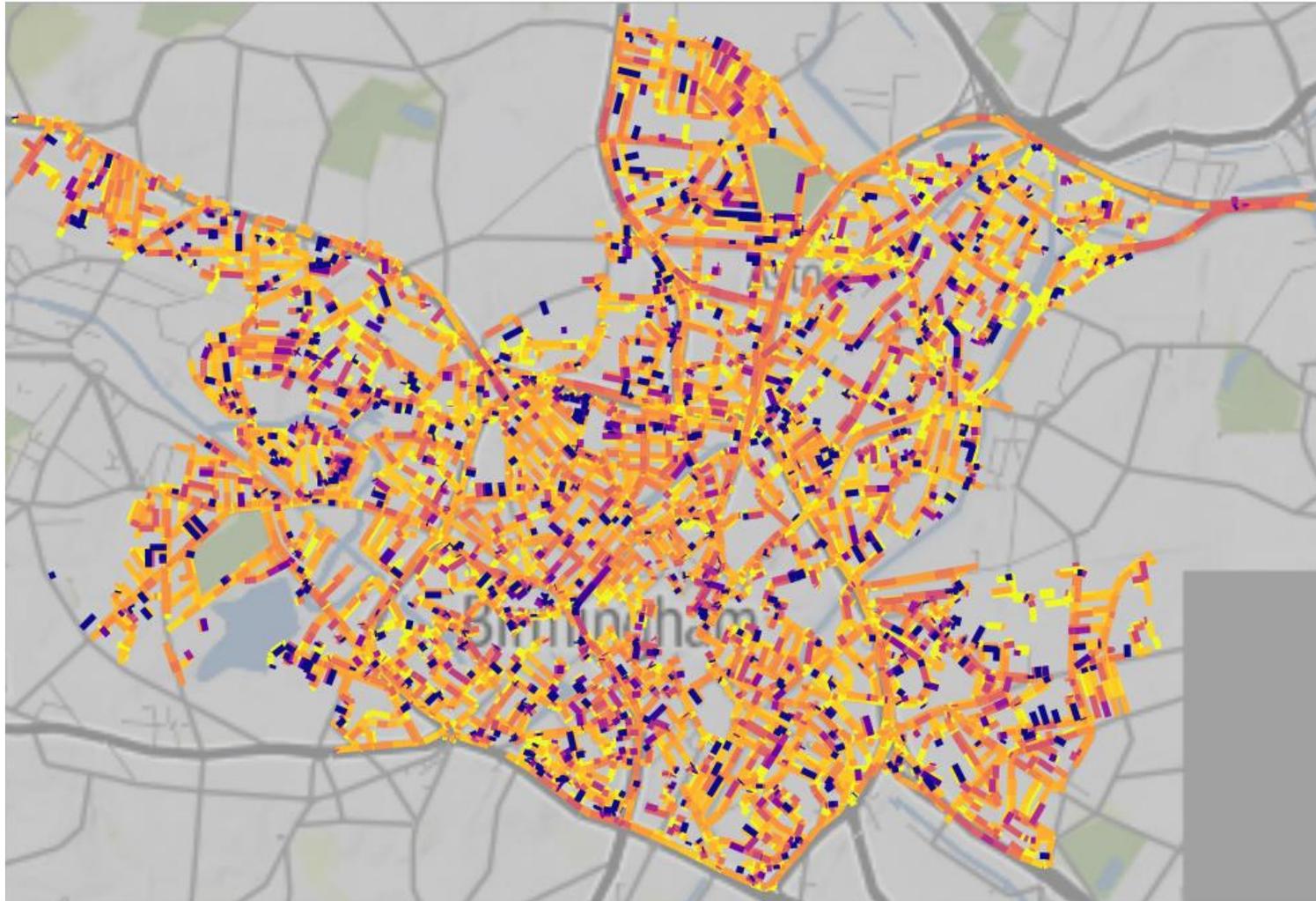
Initially, we considered using telematics data to construct the driving cycles.

However, the big advantage of telematics data is the spatial coverage.

We can calculate the desired quantities over every road and at high spatial resolution, do not need an a priori decision on location.

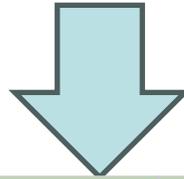


% Time Spent Cruising in Birmingham Ladywood

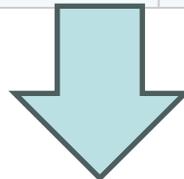


Congestion Metrics from Meta Data

Name	Brand	Start_Time	End_Time	Duration_Total	Duration_Moving	Duration_Stationary
Joe Smith	InsureMyCar	10.00 23/10/23	10.11 23/10/23	650	400	250
Felix Gept	Chamberlain	10.05 23/10/24	10.25 23/10/24	1200	1000	200



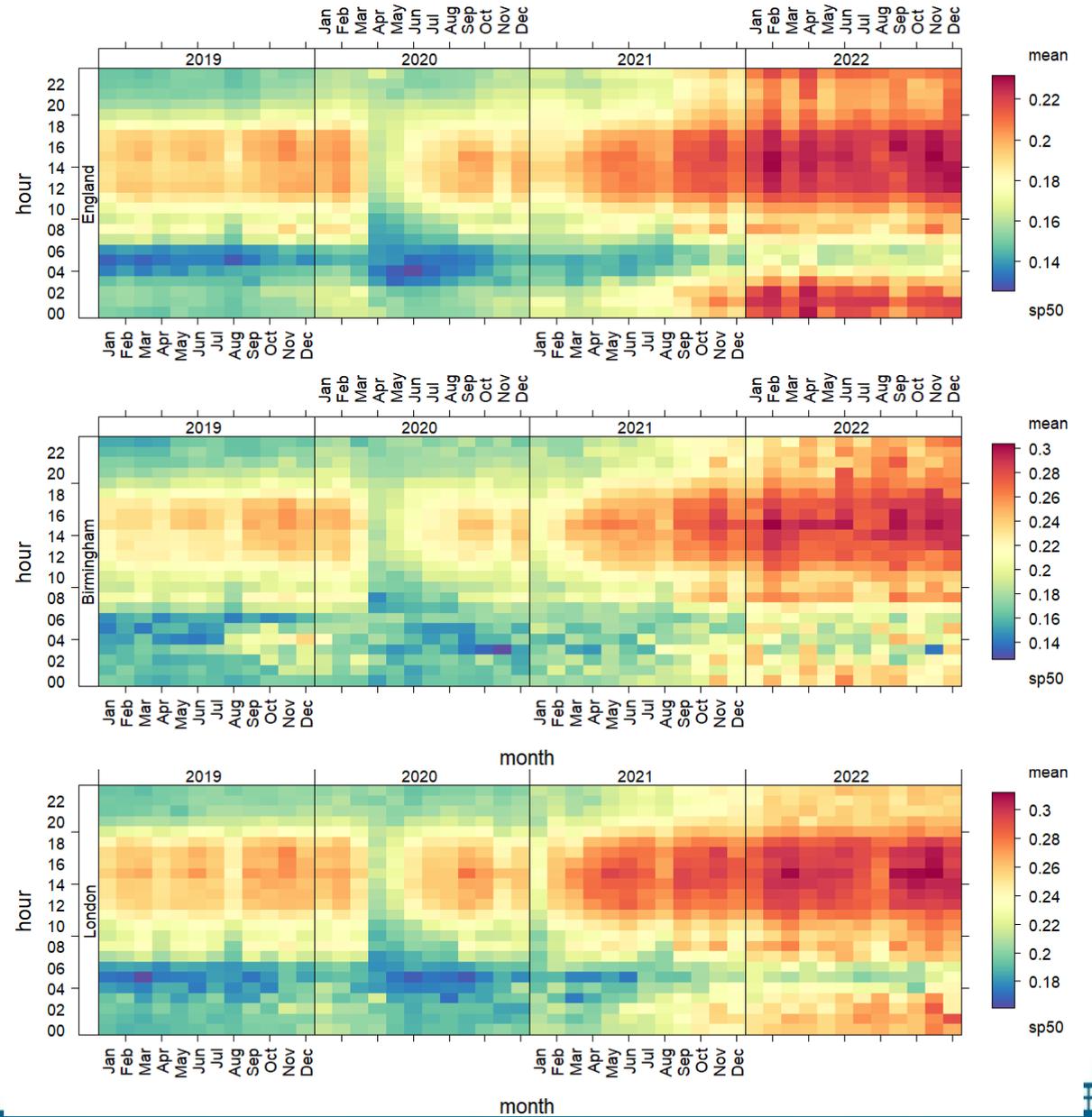
Journey Distance	Proportion of stationary Time
2 km	38%
10 km	17%



Statistics of time spent stationary by distance for five UK cities



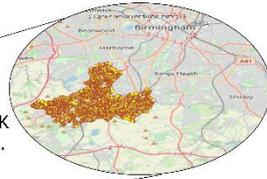
Traffic congestion pattern in Post-COVID era!



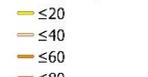
Spatial and Temporal Mapping of Urban Mobility, Transport Environment



Northfield, Birmingham, UK
Mondays, 9:00-11:00 A.M.
2016



Fuel Consumption (g/km)



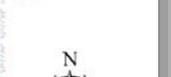
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Exhaustive emission of NOx in
Edgbaston, Birmingham, UK,
9-11, Mondays, 2016



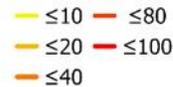
NOx Emission, (g/veh)



Percent Time of Braking
(PcTBr) in Northfield,
Birmingham, UK
9-11 A.M. Mondays, 2016



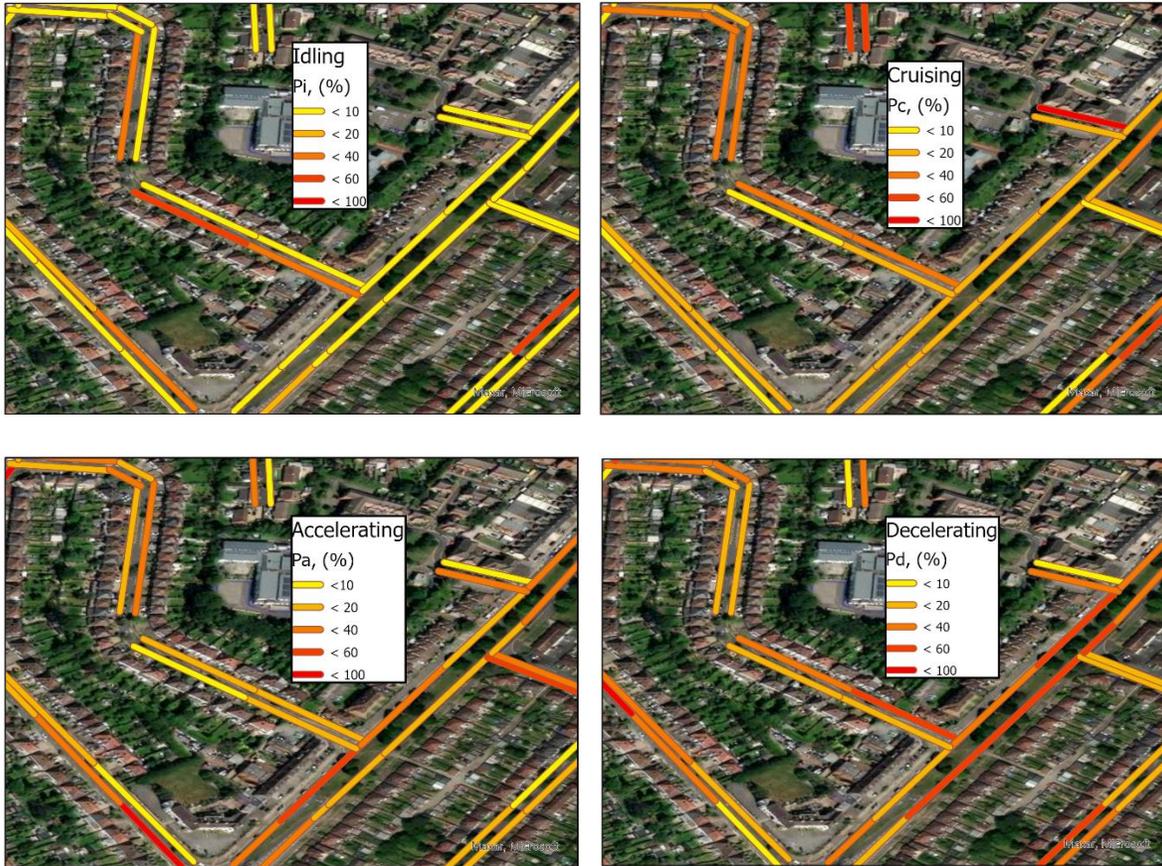
PcTBr (%)



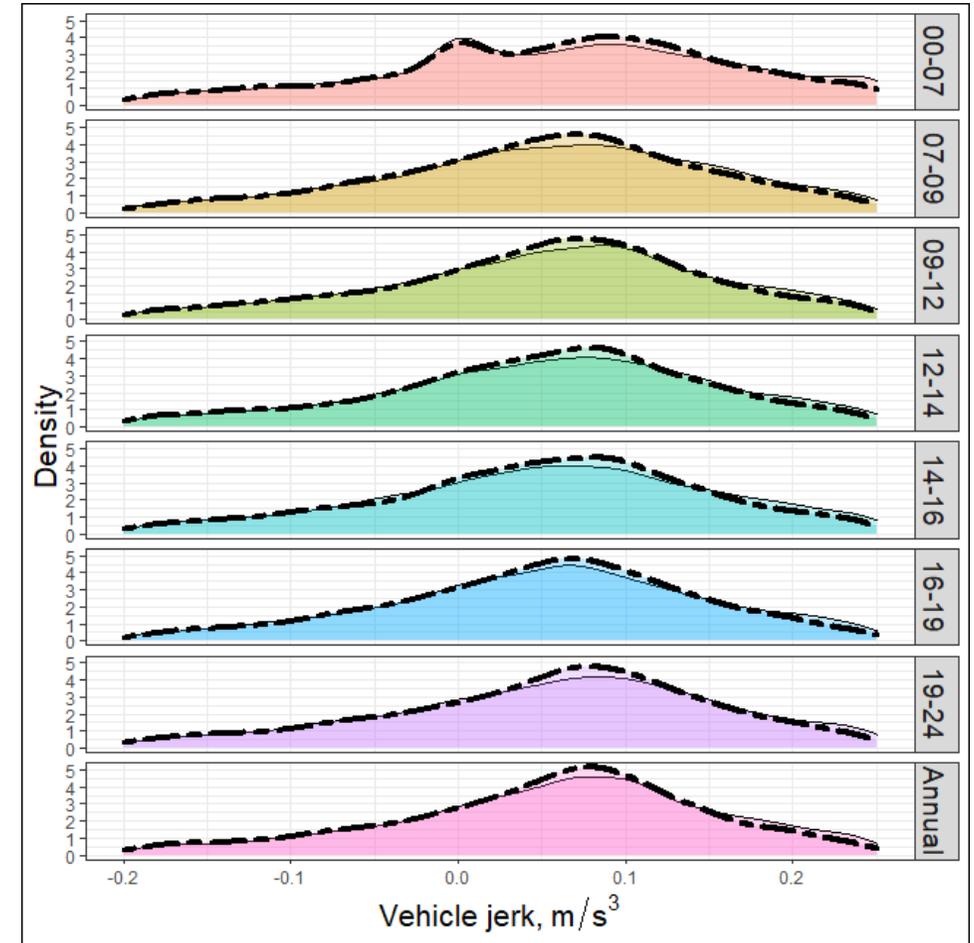
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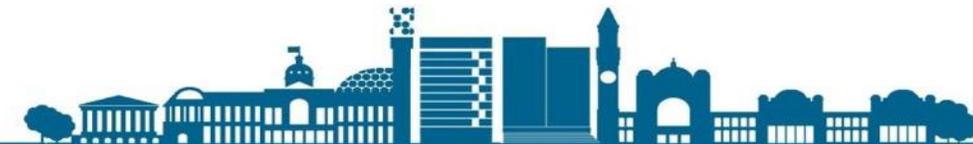
Spatial and Temporal Mapping of Urban Mobility, Driving behaviour



The spatial distribution of the driving behaviour characteristics over a small areas of the city of Birmingham in the UK for Mondays 16:00-19:00 2018. The labelling of spatial characteristics of the maps have been removed for the rationale given in the text.



Aggressive driving



**THANK
YOU!**

