TRA
TRANSPORT RESEARCH ARENA
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POSTER SESSION

A critical assessment of Athens Traffic Restrictions using multiple data sources

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INTRODUCTION

Urban transportation policies throughout Europe have evolved dramatically during the last decades. In particular, traffic in Athens has been steadily increasing from the onset of motorization in the 1960's till 2008 and the global economic crisis. A remarkable reduction of private car use during the first years of the recession and a rebound in traffic from 2017 followed, leading to 2019 when traffic closely resembled pre-2009 levels. The COVID-19 pandemic and the respective lockdowns resulted in additional fluctuations in car traffic, accompanied by a significant reduction of public transport use.

DATA COLLECTION

For the purpose of the analysis, traffic volume and speed data from 79 measurement stations (each consisting of one to three inductive loop detectors) from the Traffic Management Centre of Athens were examined. 46 of the selected measurement stations are located outside and 33 inside ATR area.

In order to further investigate the impact of ATR on road traffic conditions, an indicator reflecting the level of congestion (i.e. Congestion Index) in the vicinity of each measurement station was developed. In addition, to understand whether the effects of the reinstatement of ATR on road traffic were associated with a respective effect on the use of public transport, data on the use of the Athens Metro system inside ATR were exploited. Ticket validations from Athens public transport operator OASA S.A. were analyzed for 13 metro stations within the ATR area.

METHODOLOGY

The classification method developed is twofold: (1) as speed decreases, congestion increases and (2), for volume - speed pairs reflecting neither free flow, nor congestion, lower congestion indexes are assigned for higher traffic volumes (up to a maximum level). This classification assigns an index ranging from 0 (free flow - green color) to 1,5 (extreme congestion - red color) to each speed - volume pair, which can subsequently be plotted on top of the fundamental diagram, as presented in Figure 1.
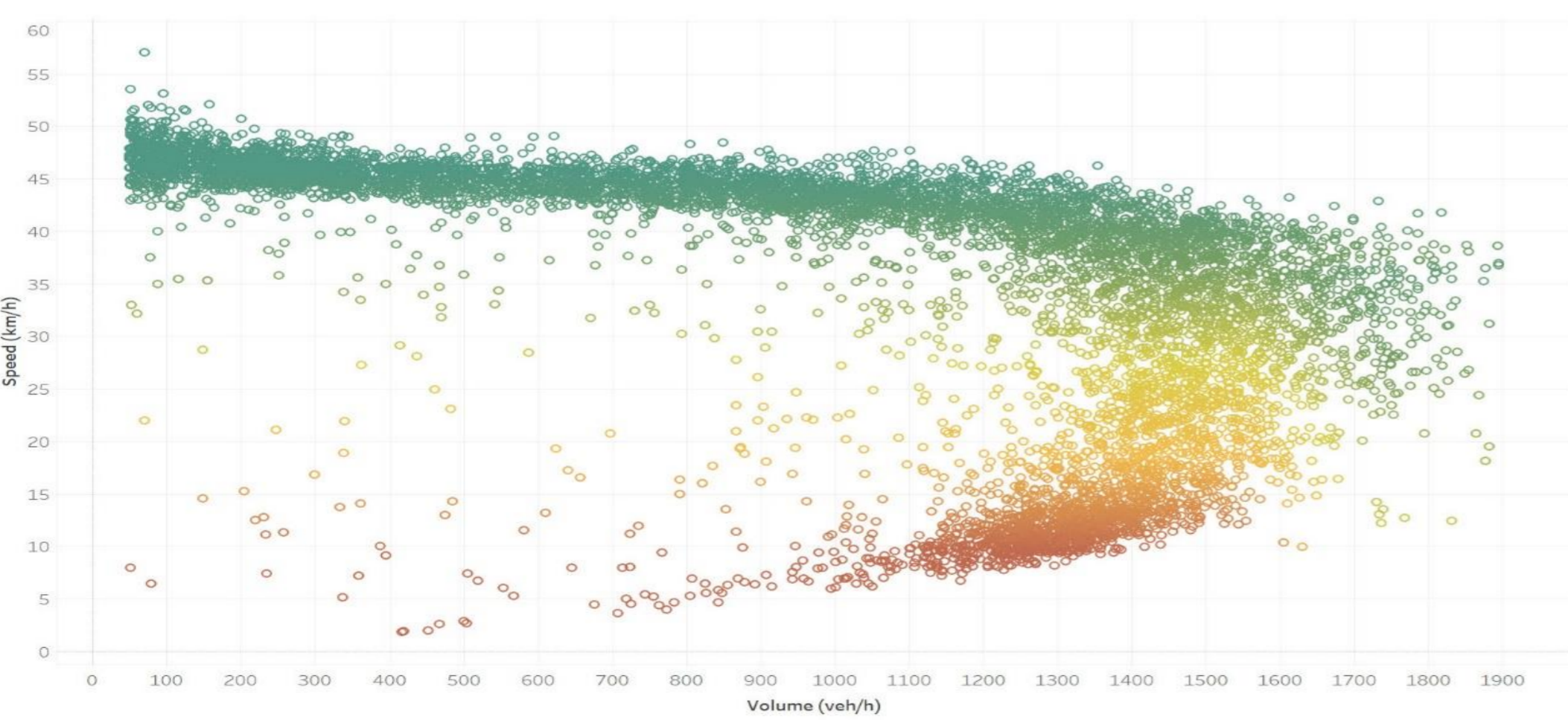

Figure 1: Classification of speed - volume pairs based on the developed Congestion Index

RESULTS

The evolution of the total traffic demand inside and outside ATR does not seem to suggest a fundamental redistribution of traffic due to the reinstatement of the measure on 24 October 2021. Figure 2 shows the evolution of the total daily traffic demand (7-day moving average) inside and outside ATR, from October till December 2021.
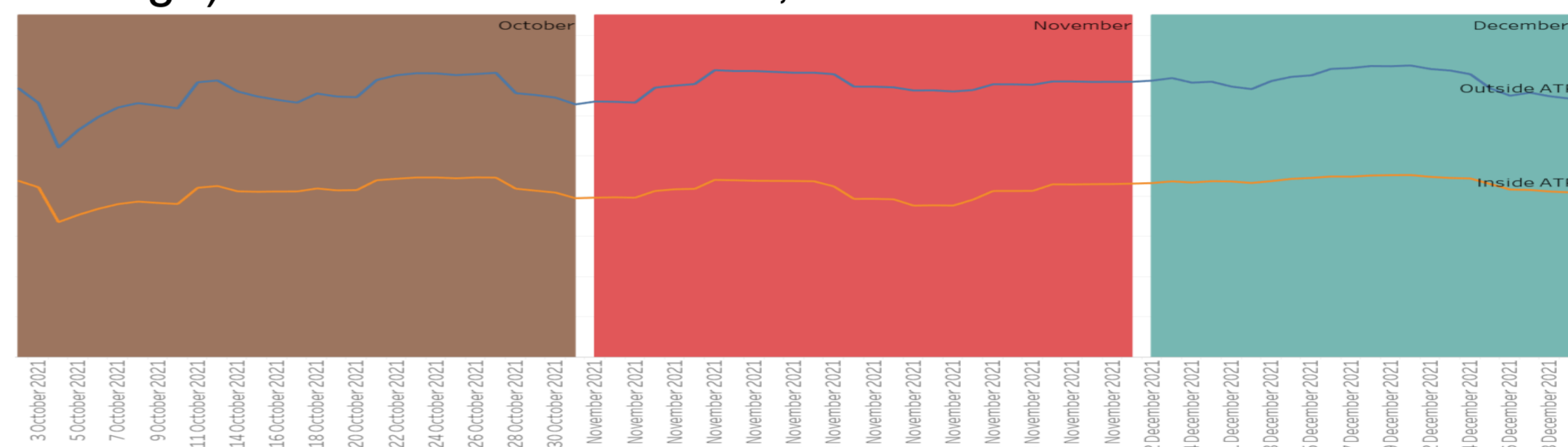

Figure 2: Evolution of road traffic demand in Athens (vehicles / day - 7 day moving average)

An increase in weekly average speeds inside ATR can be observed starting from week 44, compared to the first three weeks of October. Outside ATR the difference on traffic speeds between the baseline (weeks 41-43) and the rest of the time period was smaller.
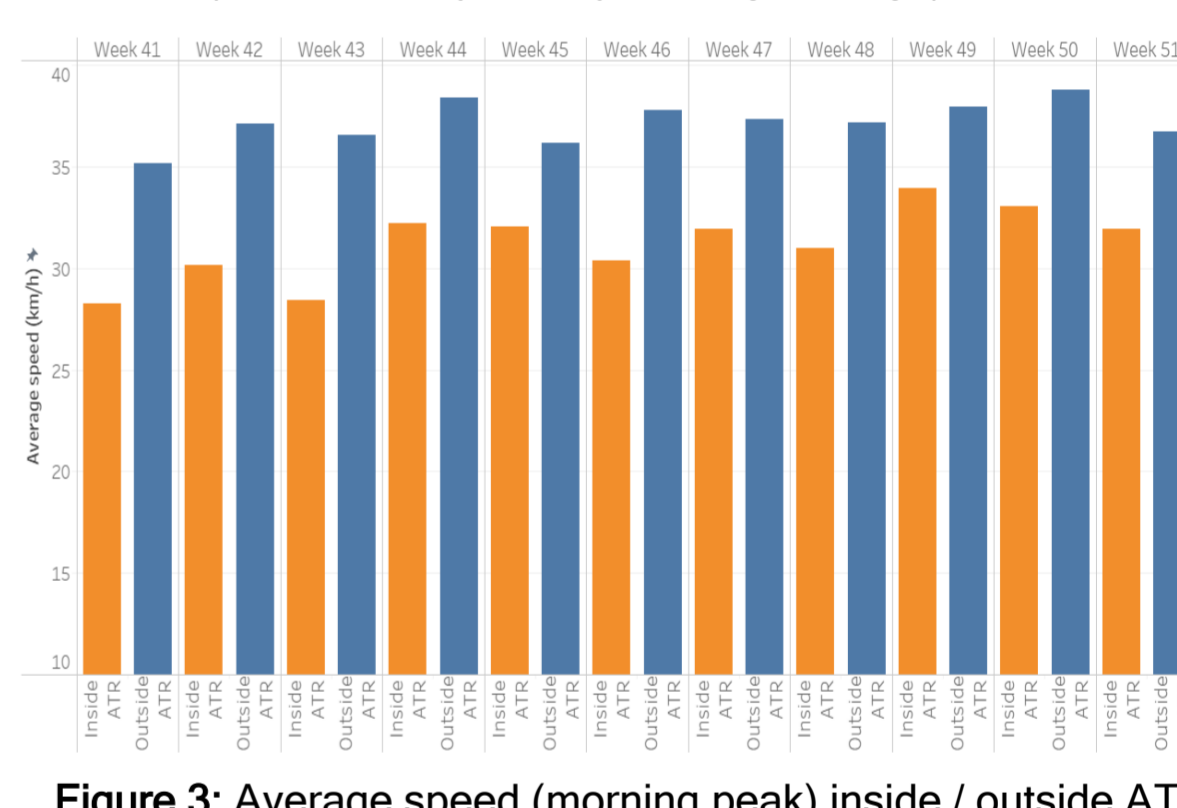

Figure 3: Average speed (morning peak) inside / outside ATR

Inside and outside ATR, the results are concordant with the speed observations, with the congestion index being notably lower on weeks 44-46 compared to weeks 41-43. Ticket validations in metro stations inside ATR were significantly as compared to the period before the reinstatement of the measure.
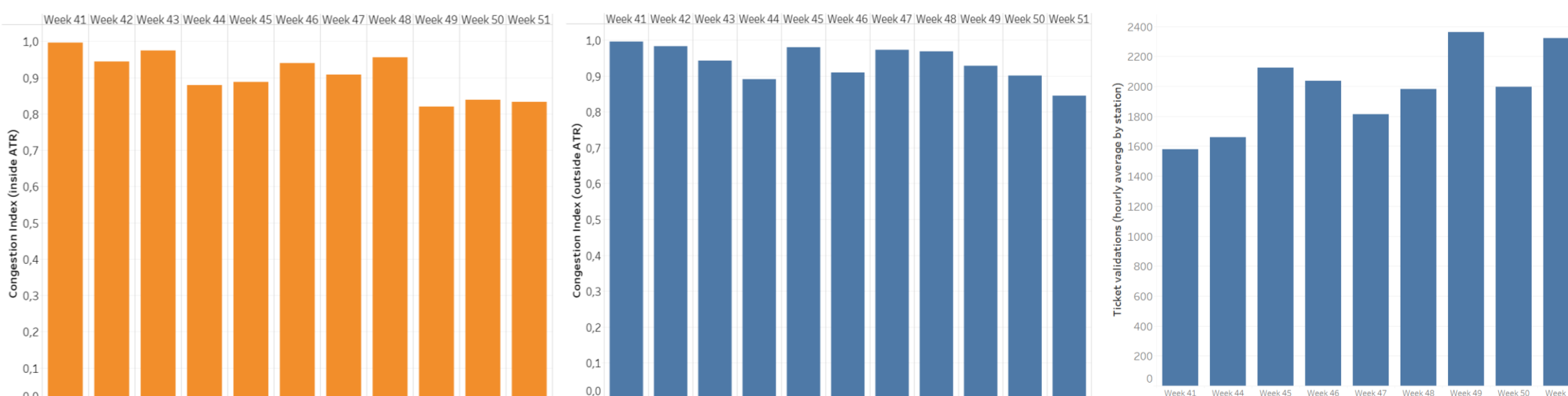

Figure 4: Congestion Index (morning peak) inside (left)/ outside (right) ATR

Figure 5: Metro ticket validations inside ATR

CONCLUSIONS

The reinstatement of the restrictions contributed to the increase in metro ridership inside ATR. Reduced congestion, resulting to higher speeds within the examined network can potentially lead to reduced road safety, especially for vulnerable road users. Less congestion can probably lead to an overall reduction in emissions from traffic, contributing to the city's transport sustainability goals.