

UNIBO ON BIKE: SCIENCE, TECHNOLOGY AND POLICY FOR CYCLING

Utilizzo dei dati GPS per la ricostruzione del comportamento di scelta dei ciclisti *Prof. Ing. Federico Rupi*

AULA DEI POETI - PALAZZO HERCOLANI
BOLOGNA, 8/5/2019



Previous researches based on:

- SP surveys
- artificial laboratories simulating a traffic environment (non-naturalistic setting)

Now: RP GPS data



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- Partecipa
- Premi
- Dona
- Come funziona
- Work Challenge
- School Challenge
- Aderisci

Dinami città Metropolitana

Scarica la app gratuita e inizia.



GPS points 55,414,934

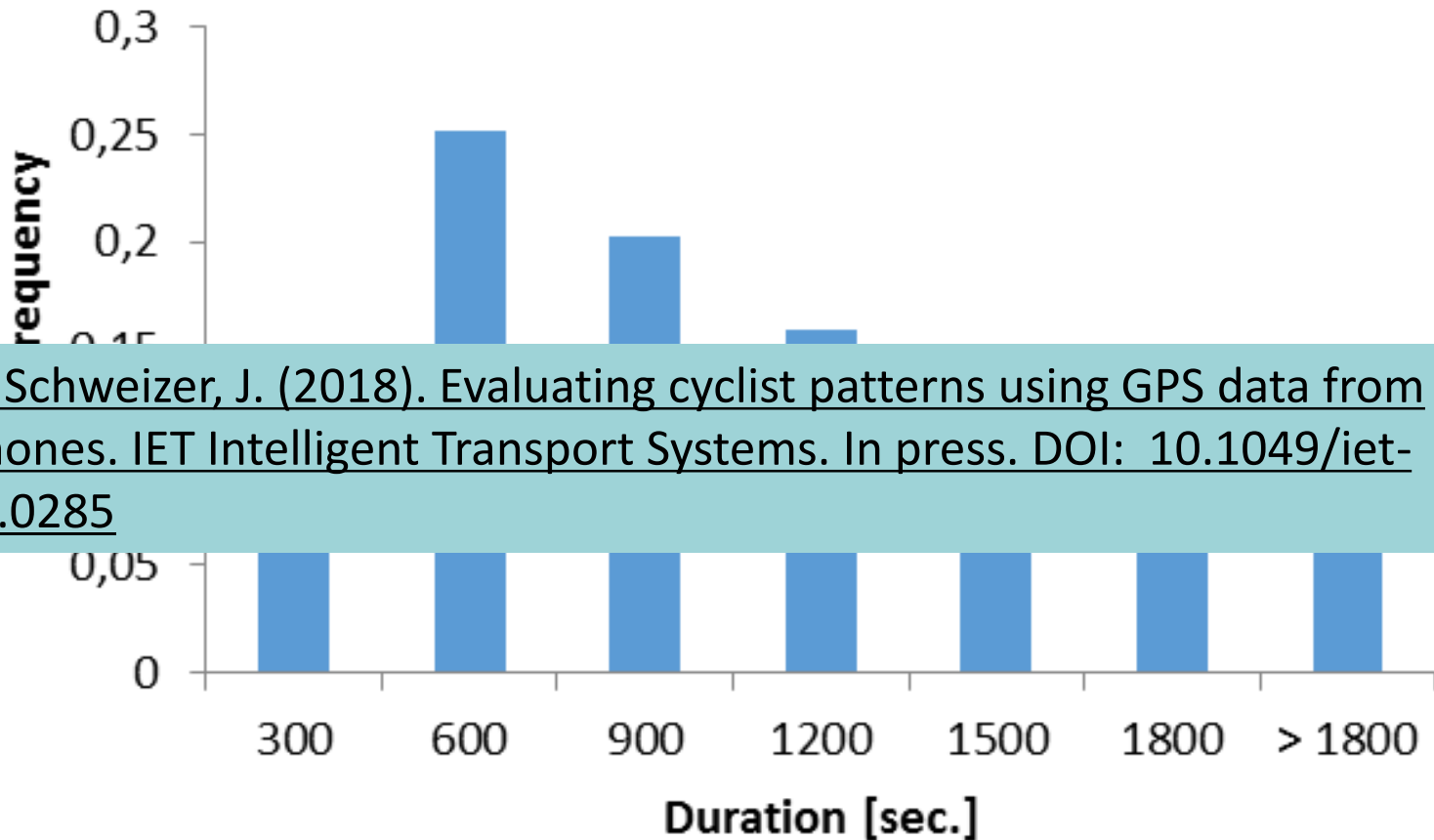
Trips 239,806



Objectives

- to characterize cyclists' trips
- to estimate absolute **bicycle flows** in all Bologna and to identify major bicycle **routes**
- to estimate cyclists **OD matrix**
- to identify where cyclists are **forced** to make **deviations**
- to identify **junctions** where cyclists lose most time
- to explore the relation between GPS-observed route choice made by cyclists and various road **network attributes**

cyclists trips characterization



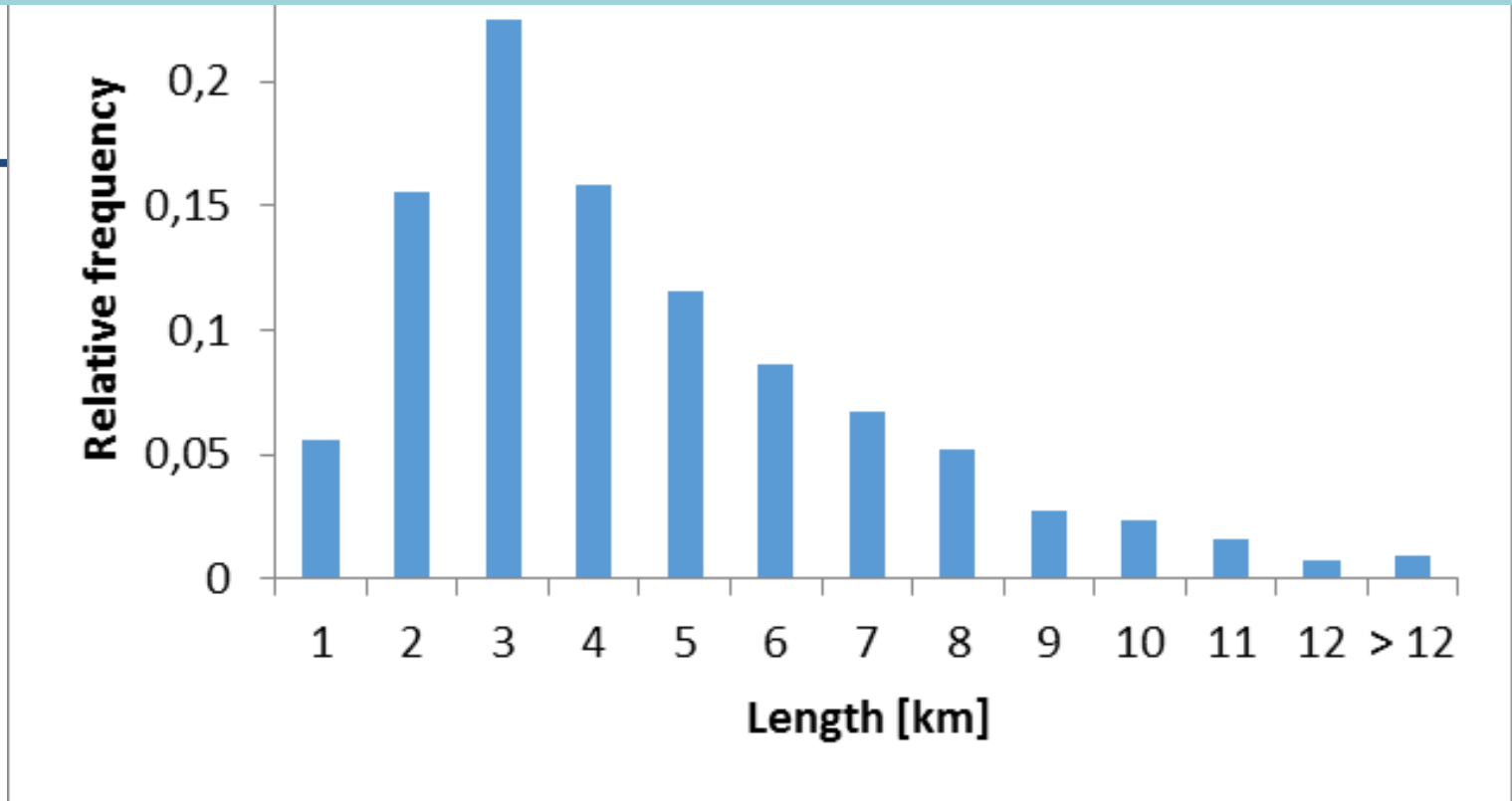
Rupi, F., Schweizer, J. (2018). Evaluating cyclist patterns using GPS data from smartphones. IET Intelligent Transport Systems. In press. DOI: 10.1049/iet-its.2017.0285

Average **duration** = 16 min

Deviation standard = 10 min

Duration > 30 min 7%

Rupi, F., Schweizer, J. (2018). Evaluating cyclist patterns using GPS data from smartphones. IET Intelligent Transport Systems. In press. DOI: [10.1049/iet-its.2017.0285](https://doi.org/10.1049/iet-its.2017.0285)

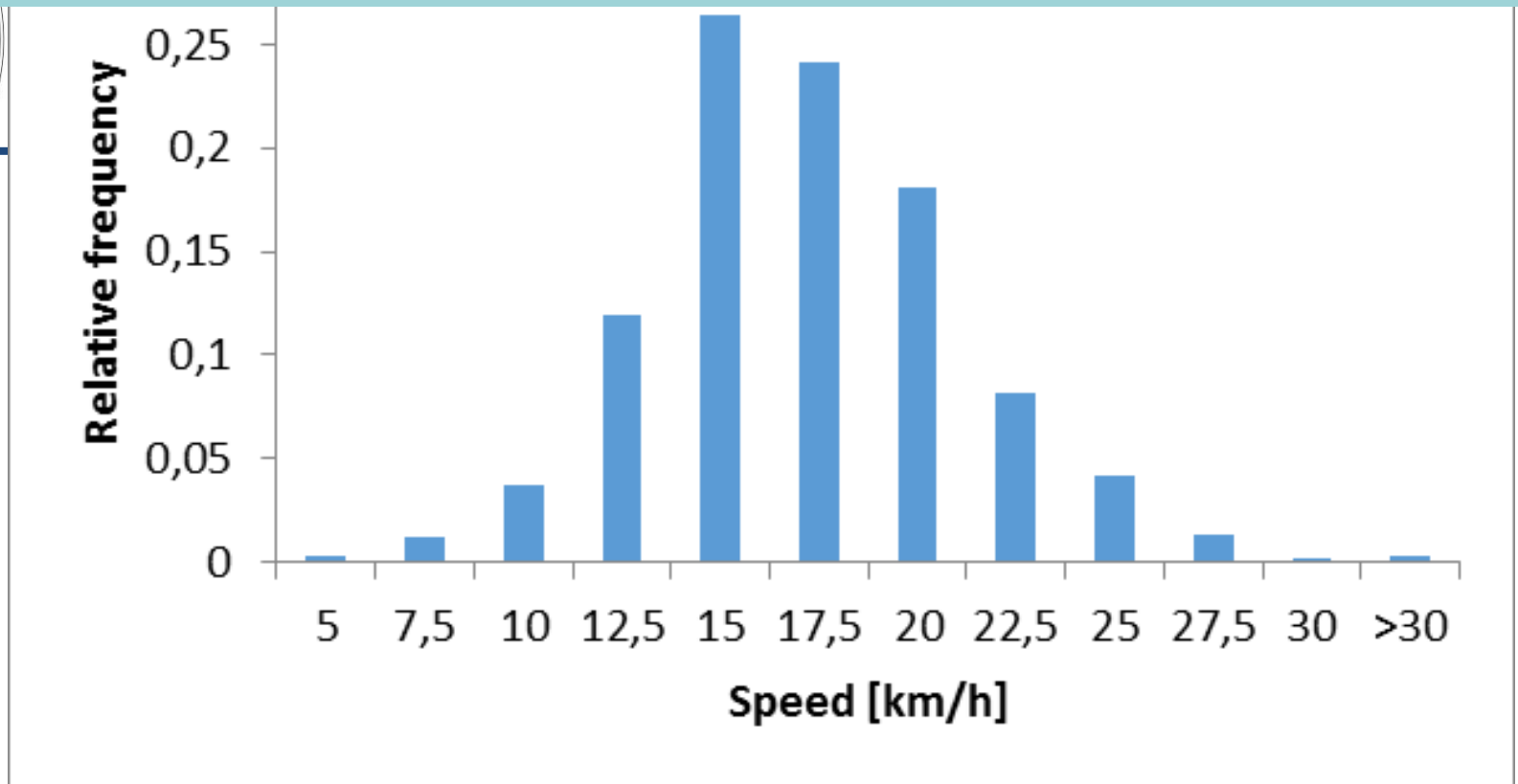


Average **length** = 4.03 km (F = 15% lower than M)

Deviation standard = 2.65 km

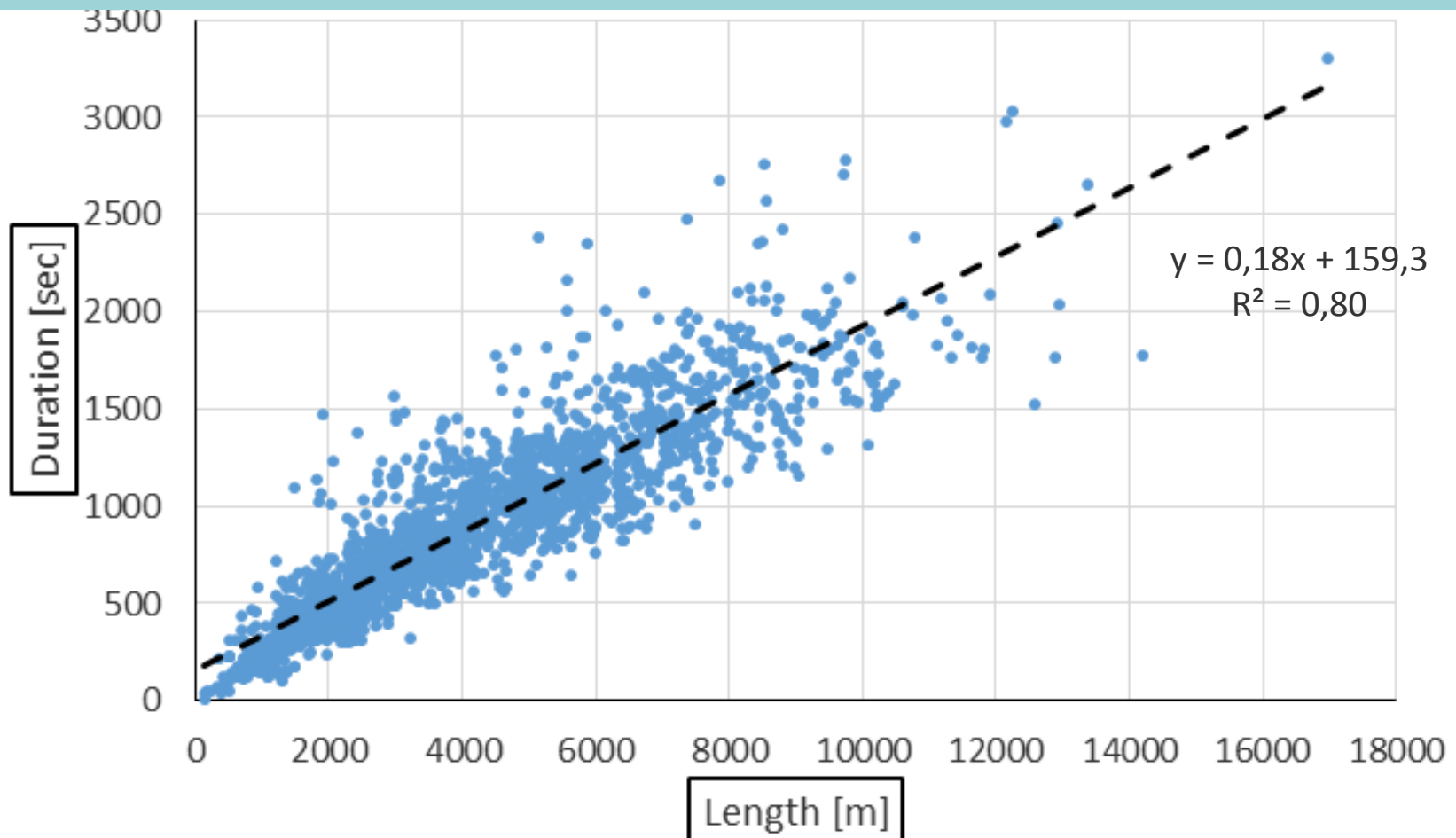
Length > 5 km 29%

Rupi, F., Schweizer, J. (2018). Evaluating cyclist patterns using GPS data from smartphones. IET Intelligent Transport Systems. In press. DOI: [10.1049/iet-its.2017.0285](https://doi.org/10.1049/iet-its.2017.0285)



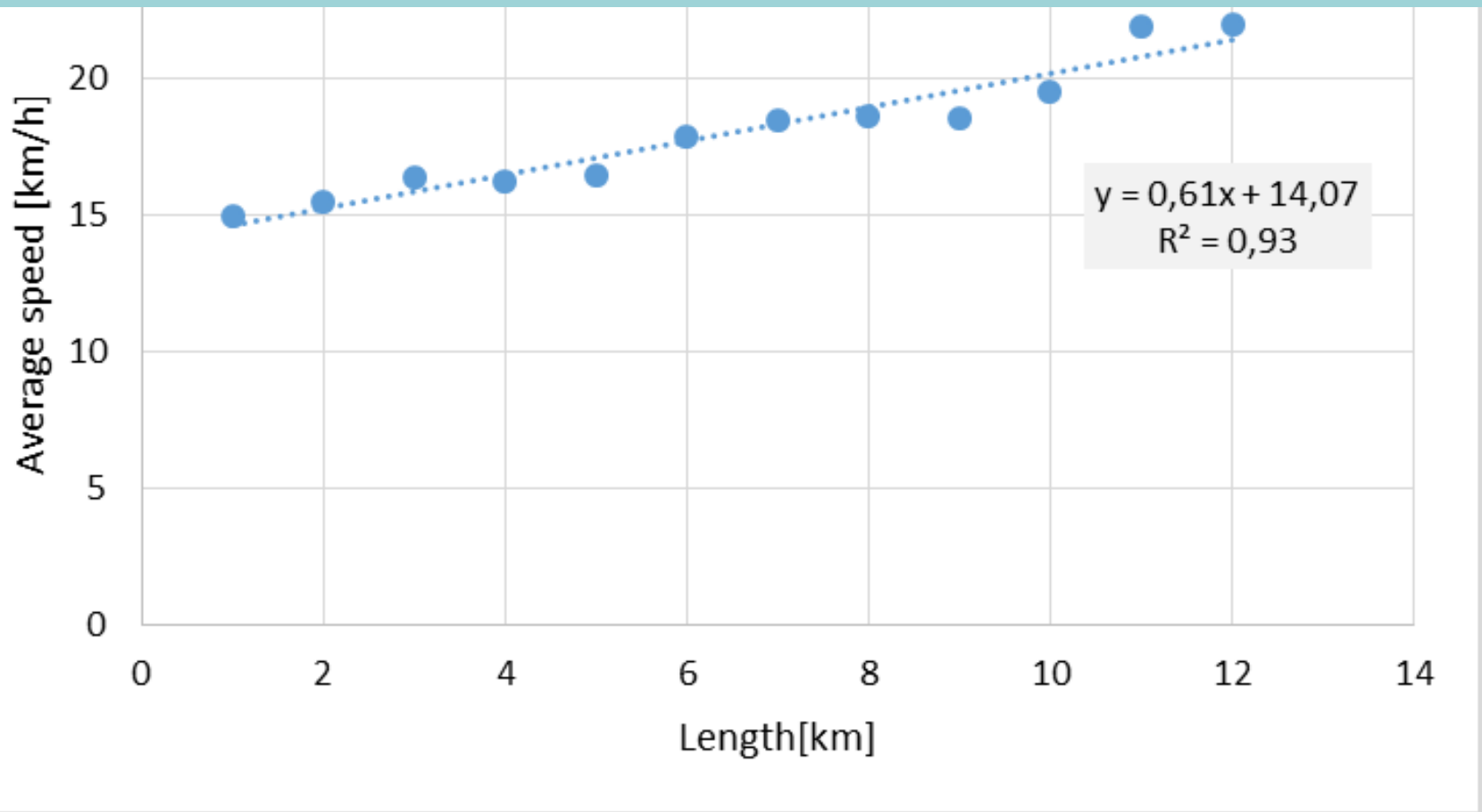
Average **speed** = 16 km/h (F = 11% lower than M)
Deviation standard = 4 km/h
Speed > 10km/h 95%

Rupi, F., Schweizer, J. (2018). Evaluating cyclist patterns using GPS data from smartphones. IET Intelligent Transport Systems. In press. DOI: 10.1049/iet-its.2017.0285



No congestion!

Rupi, F., Schweizer, J. (2018). Evaluating cyclist patterns using GPS data from smartphones. IET Intelligent Transport Systems. In press. DOI: [10.1049/iet-its.2017.0285](https://doi.org/10.1049/iet-its.2017.0285)



Time Budget



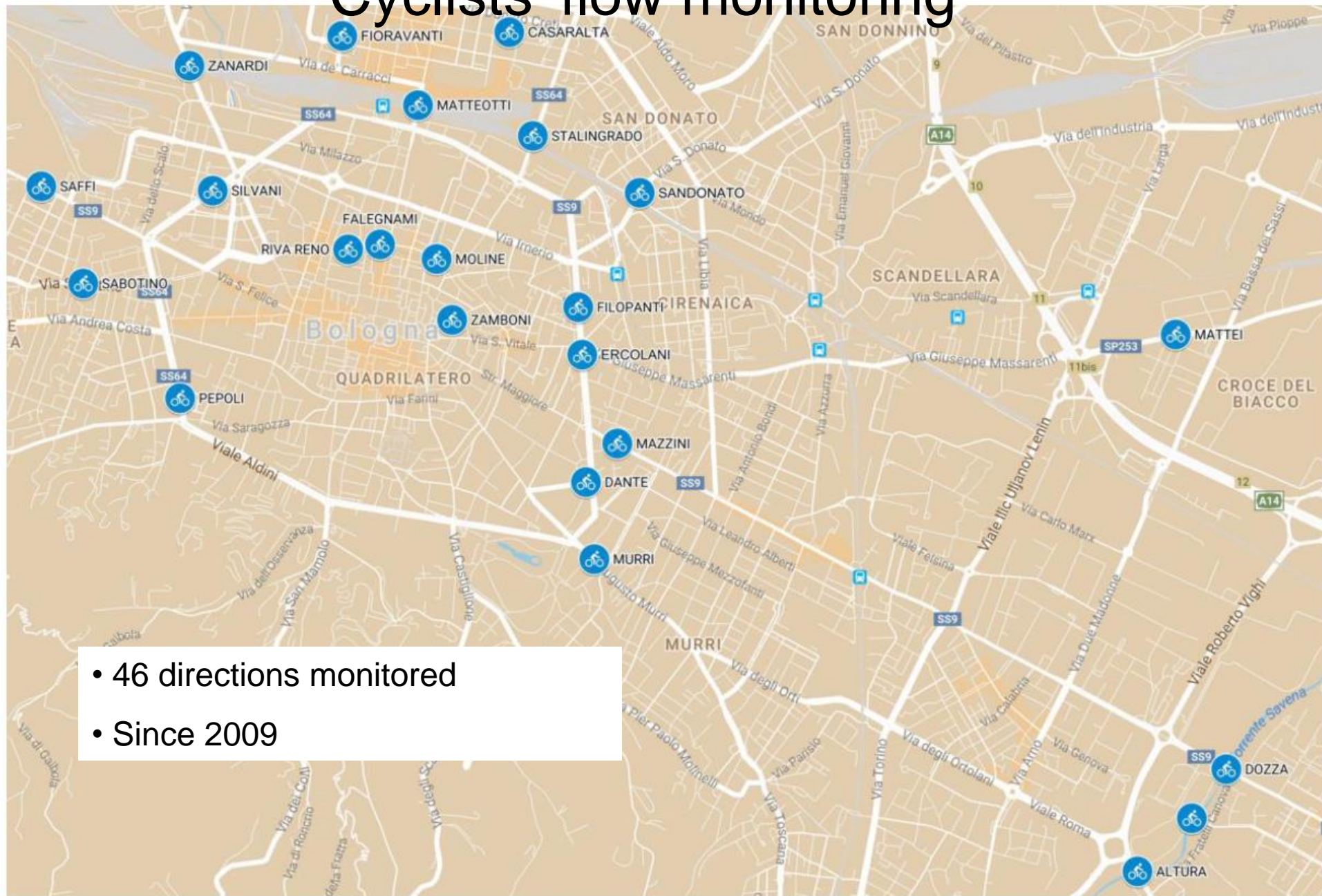
Crowdsourced cyclists represent a small portion of all cyclists



Consistency between the flows obtained from the map matched GPS data and the real observed flows?

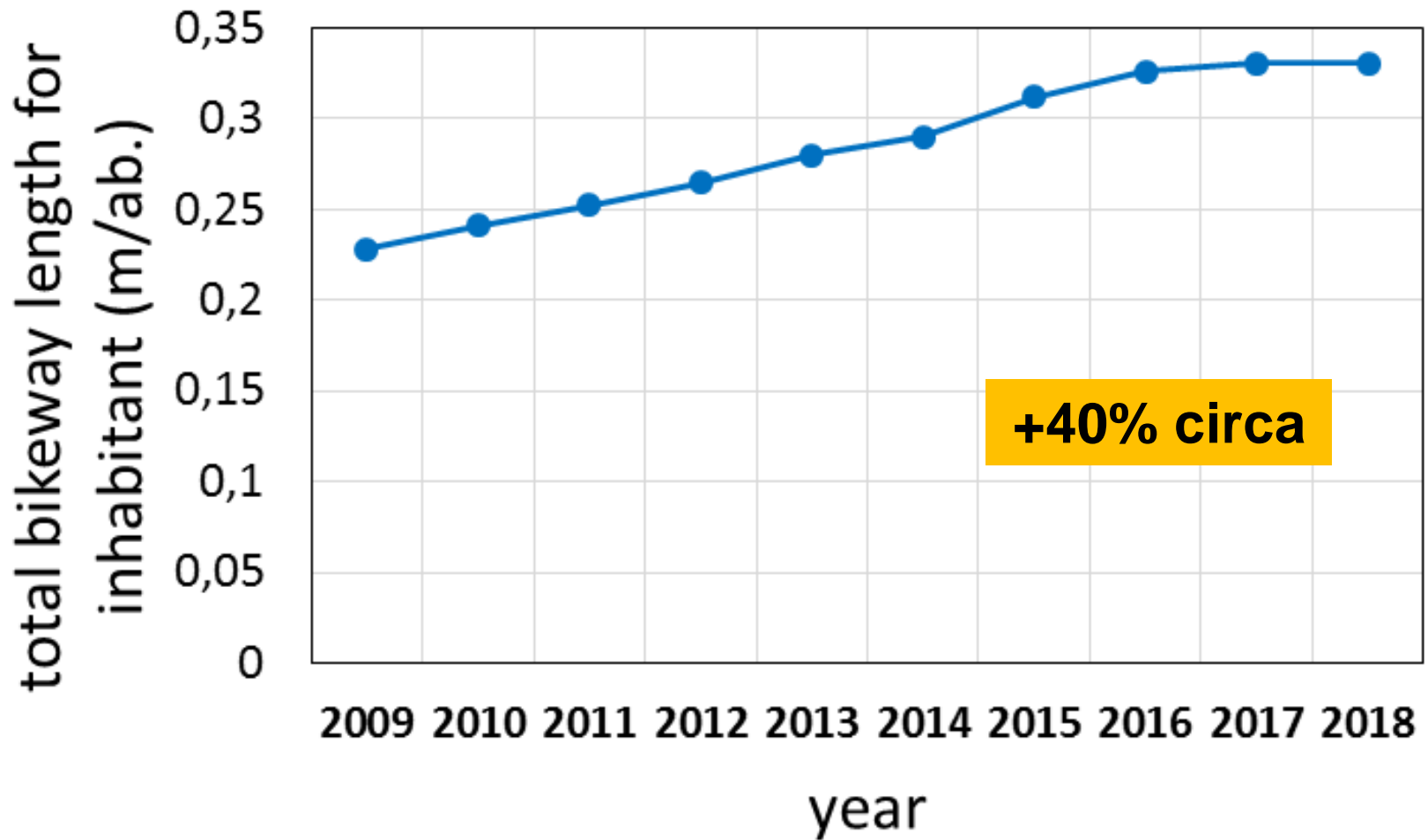
Method which combines bicycle counts at a few main road sections with area covering GPS traces

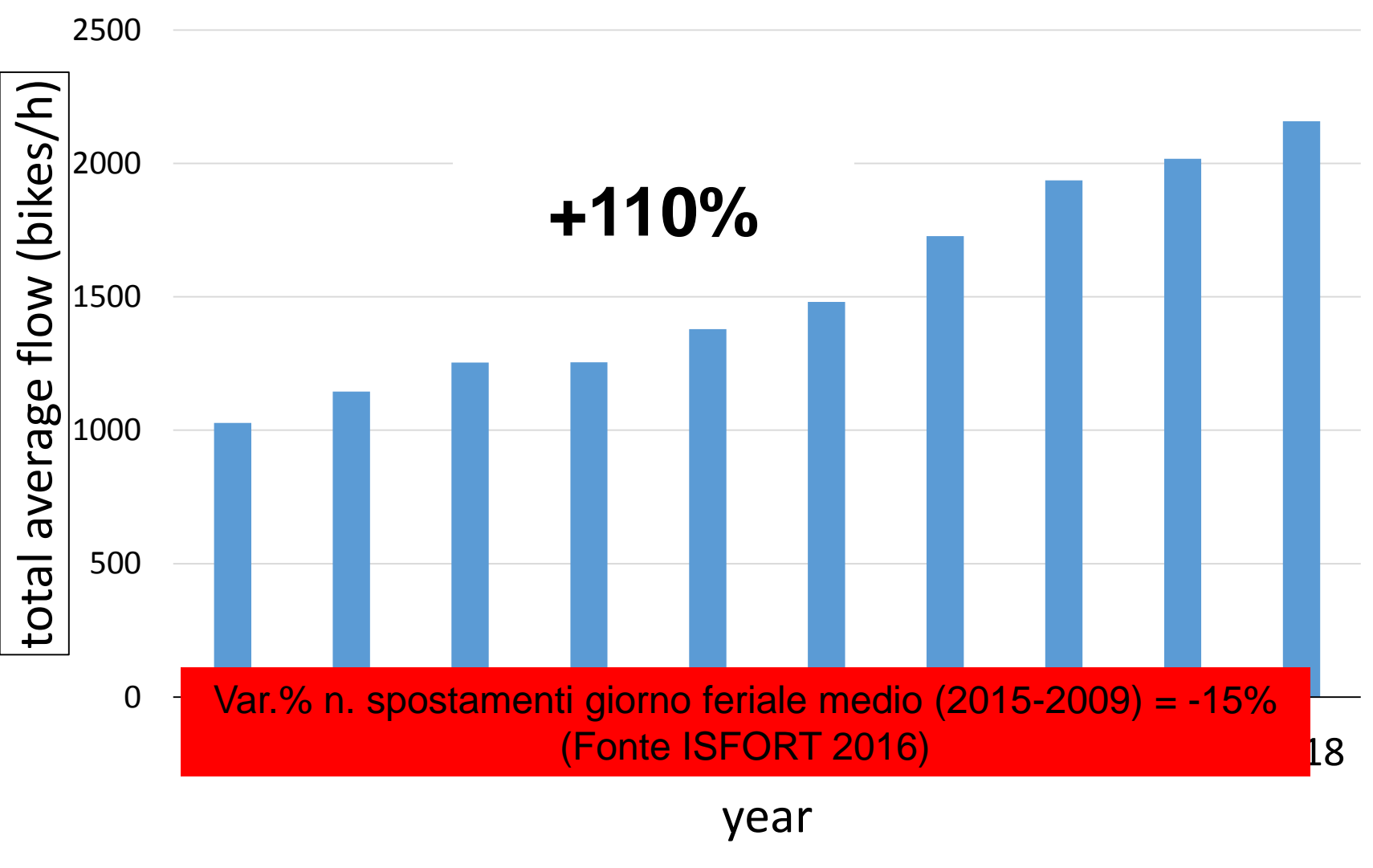
Cyclists' flow monitoring



- 46 directions monitored
- Since 2009

Bikeway length for inhabitant

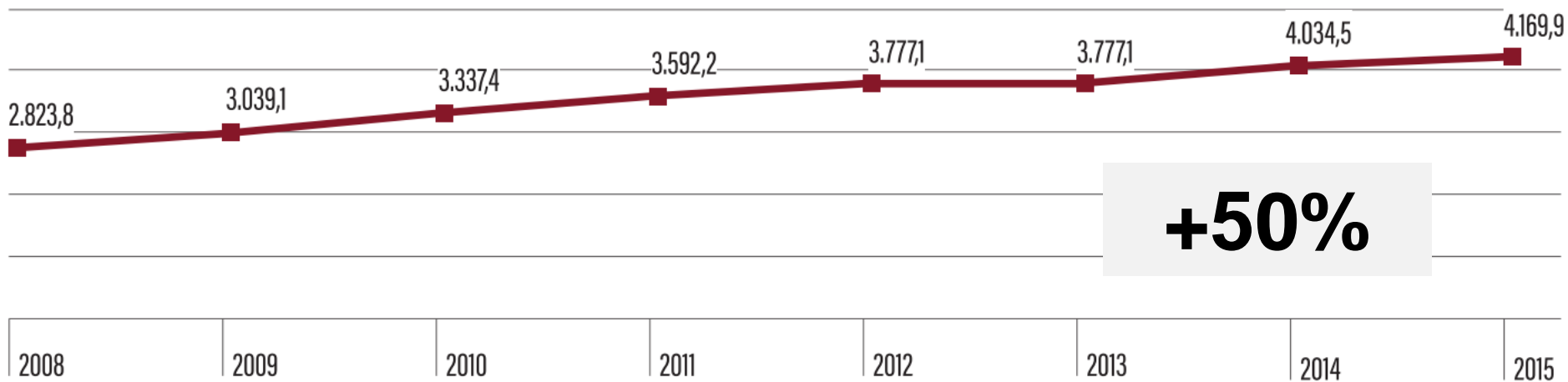






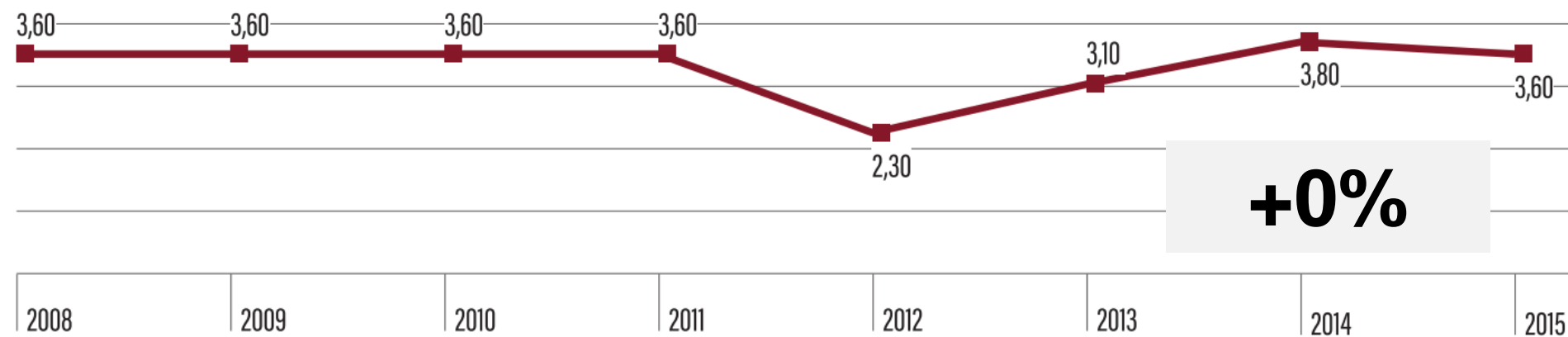
Legambiente Report (2017)

PISTE CICLABILI (KM DI CICLABILI NEL COMUNI CAPOLUOGO - ANNI 2008-2015)

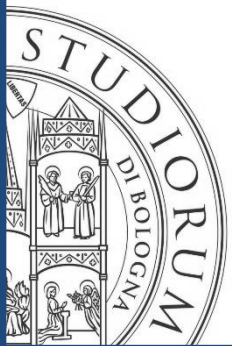


Fonte: Istat³

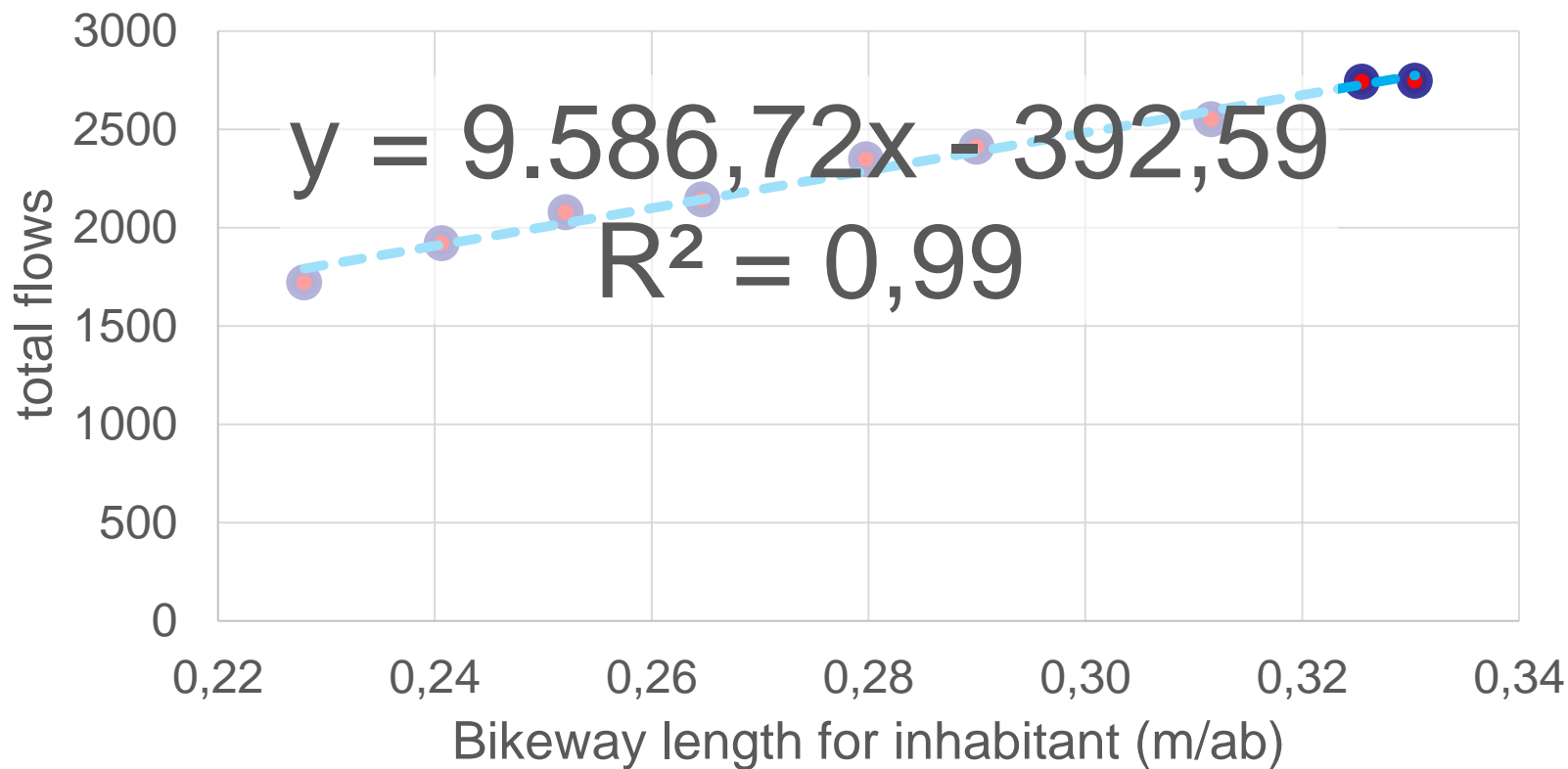
CICLABILITÀ URBANA (PERCENTUALE DEI SPOSTAMENTI IN BICI SUL TOTALE DEGLI SPOSTAMENTI - ANNI 2008-2015)

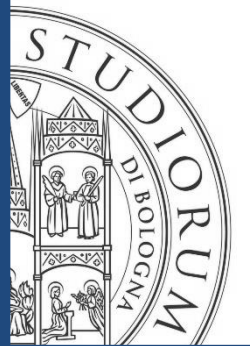


Fonte: Isfort⁴

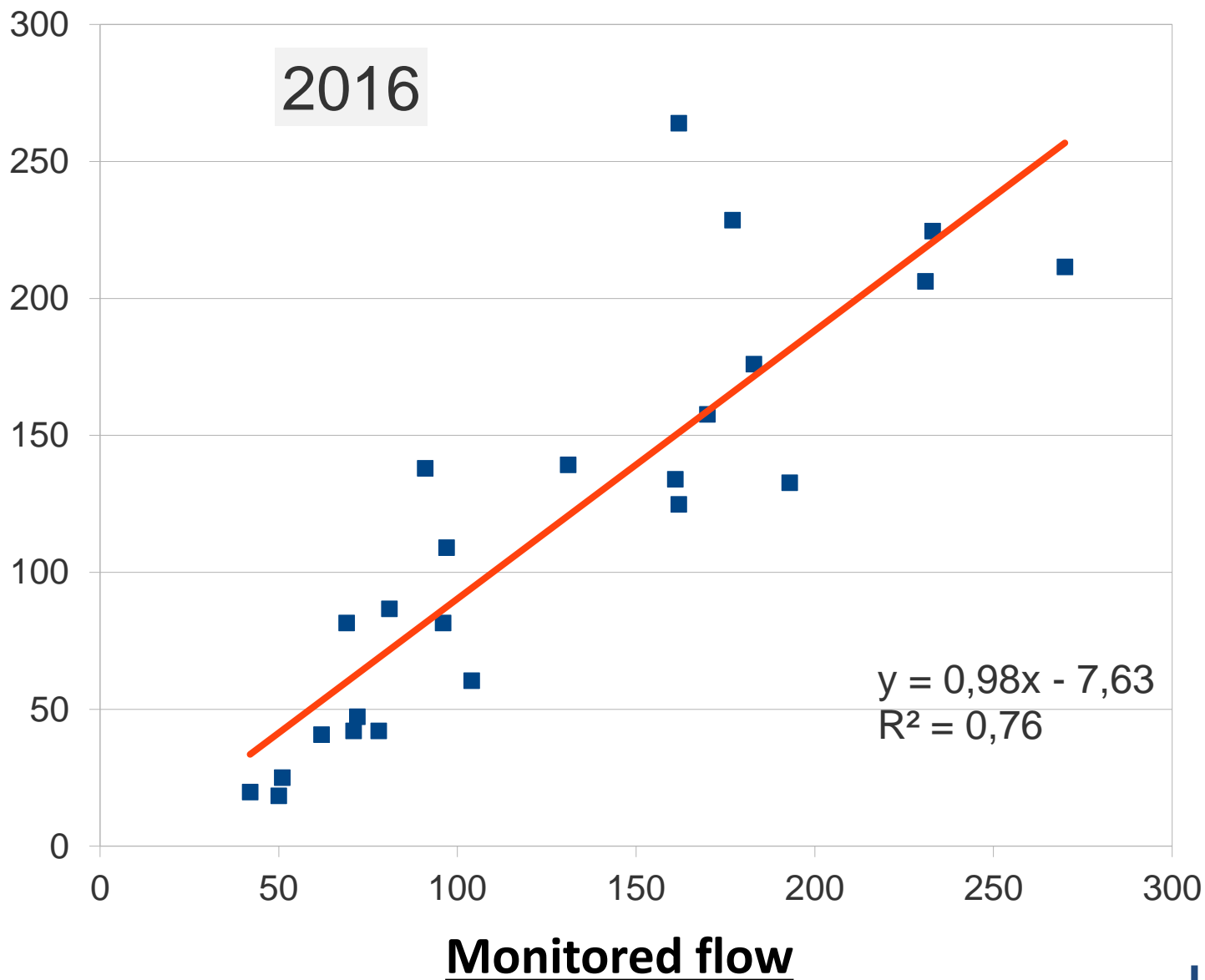


Total flows (since 2009)



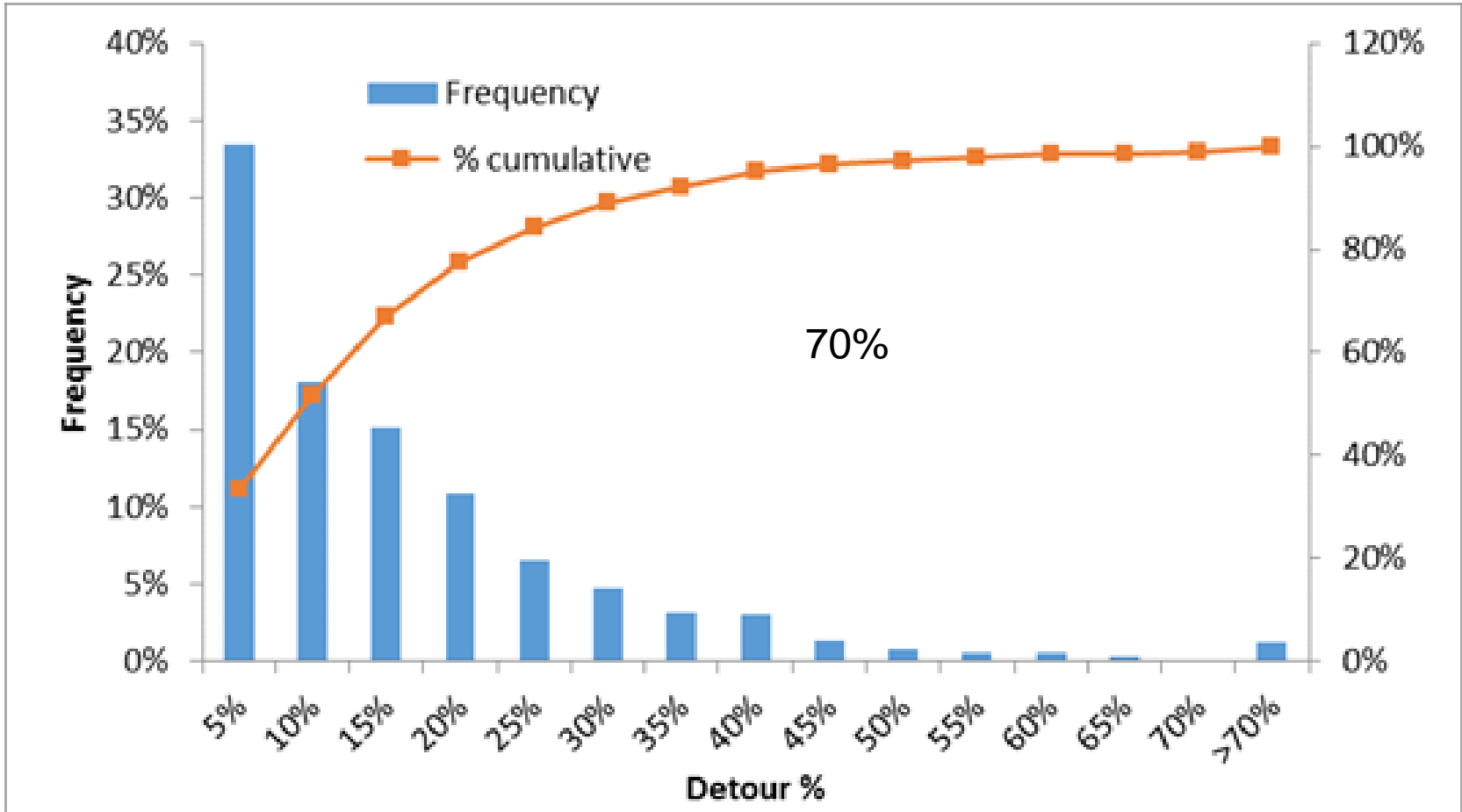


Mapmatching flow

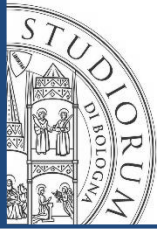




Route choice factors



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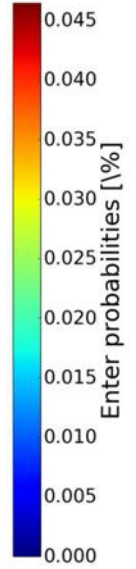
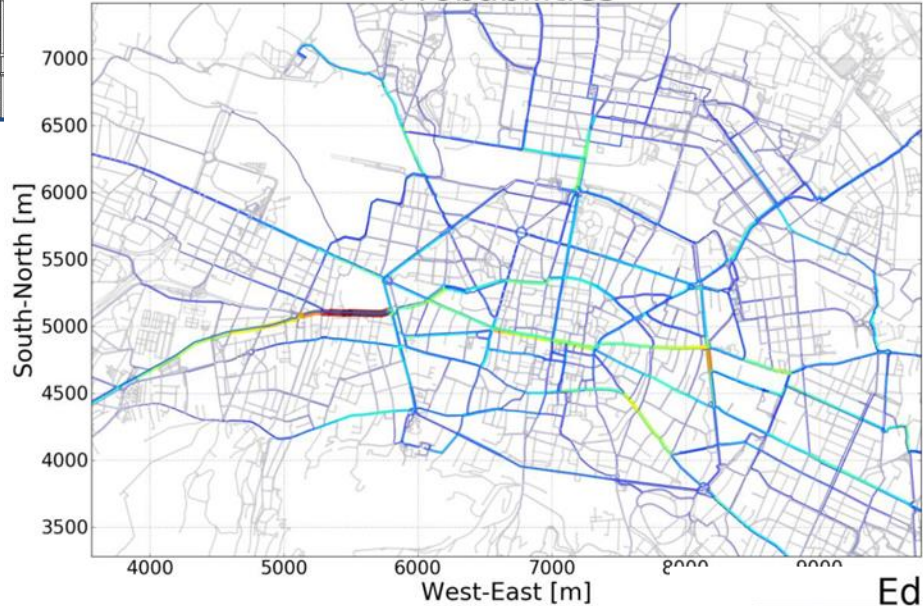
Share of used link types comparing chosen routes and shortest routes

Link type	% in chosen routes	% in shortest routes
Exclusive access road (cycleway)	26%	19%
Mixed reserved access road (bus lane, sidewalk)	25%	22%
Low priority road	82%	65%

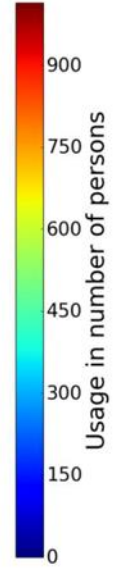
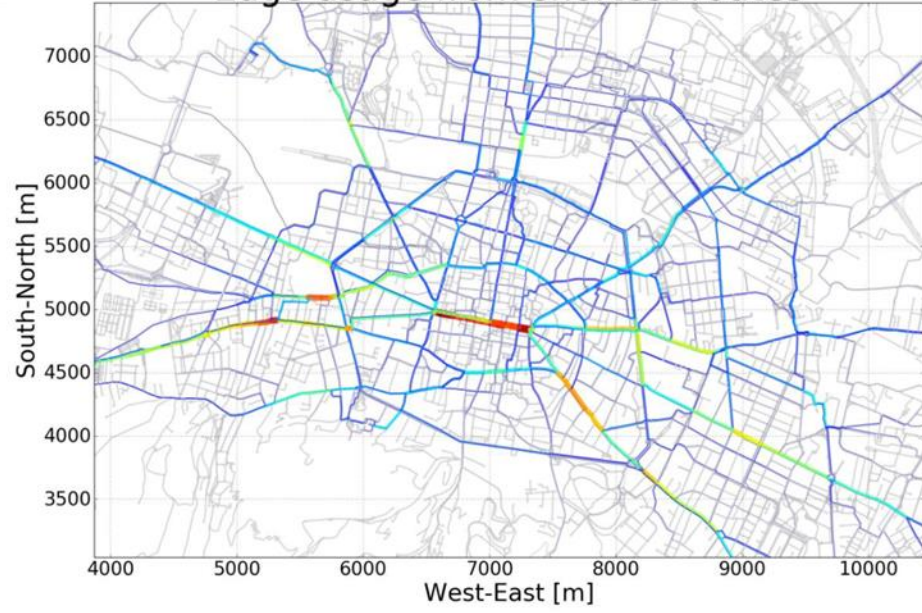
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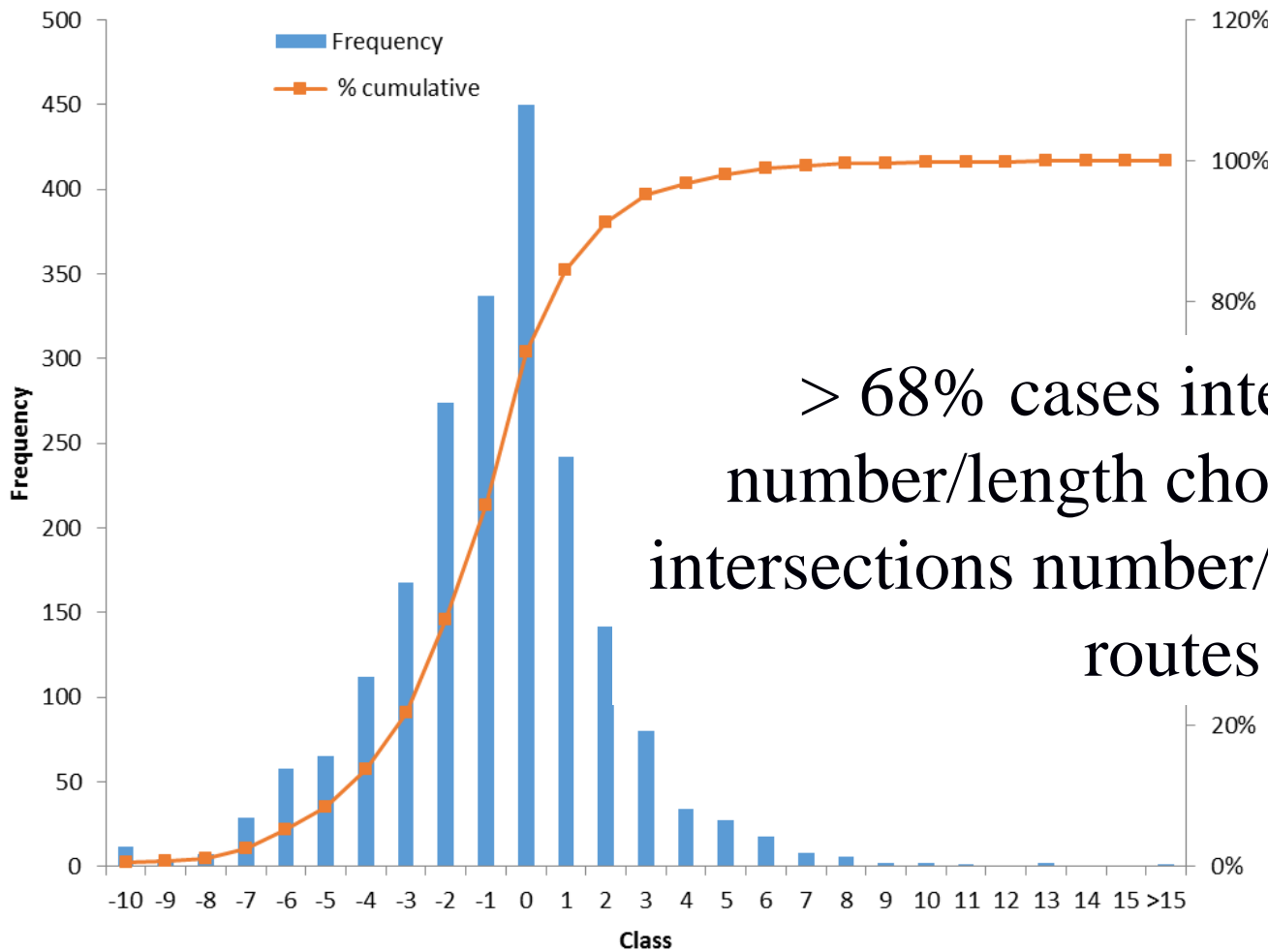
Probabilities



Edge usage from shortest routes

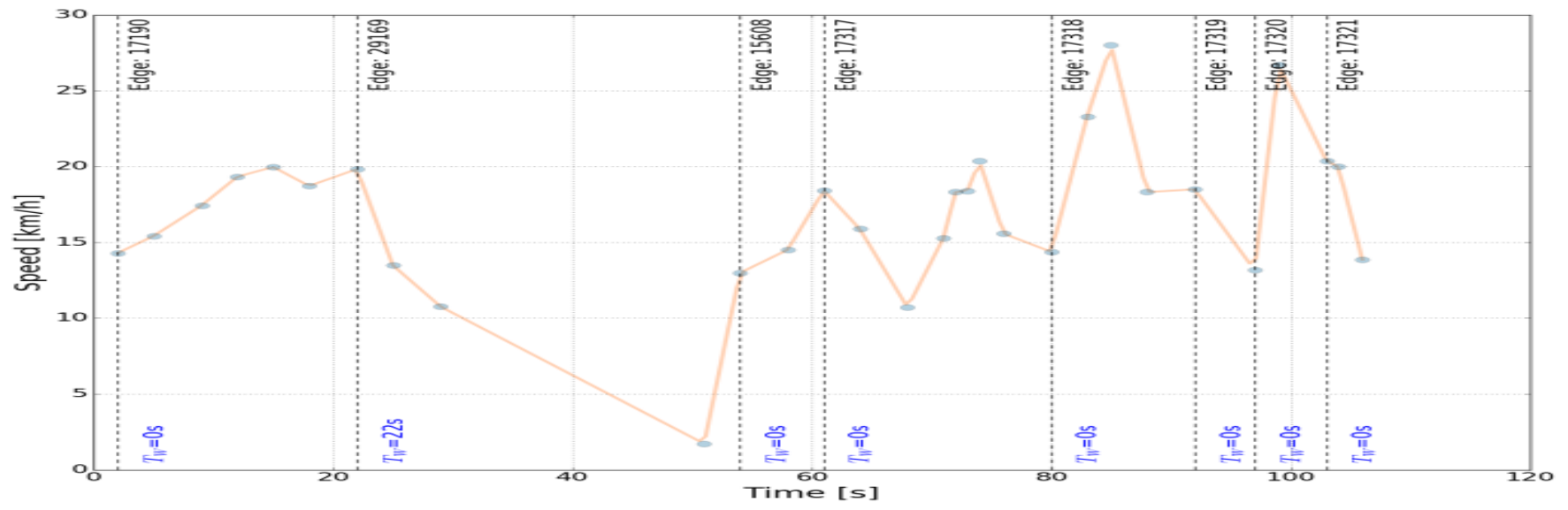
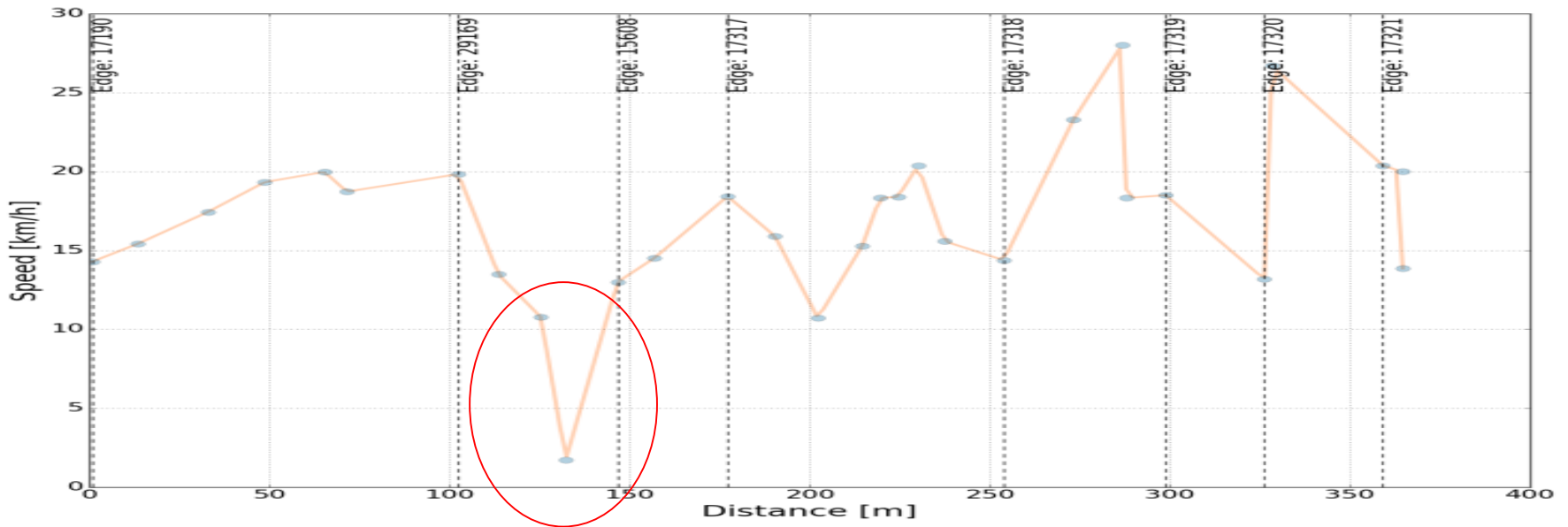


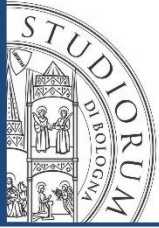
Route choice factors: intersections number



> 68% cases intersections number/length chosen routes < intersections number/length shortest routes

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- F Rupi, J Schweizer (2018). Evaluating cyclist patterns using GPS data from smartphones. *IET Intelligent Transport Systems* 12 (4), 279-285



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