

# Travel Time Information

ITS Seminar 2017

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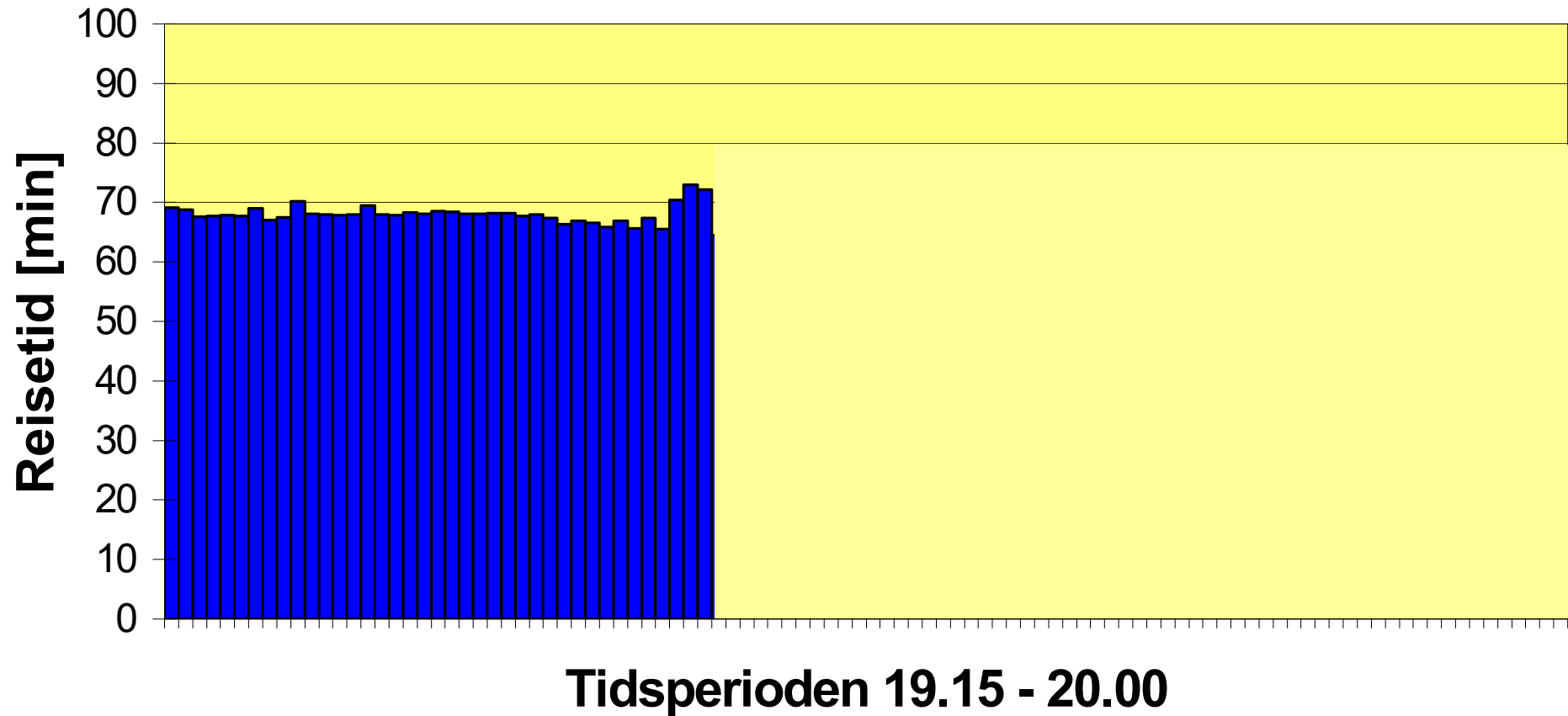
# Why Travel Time?

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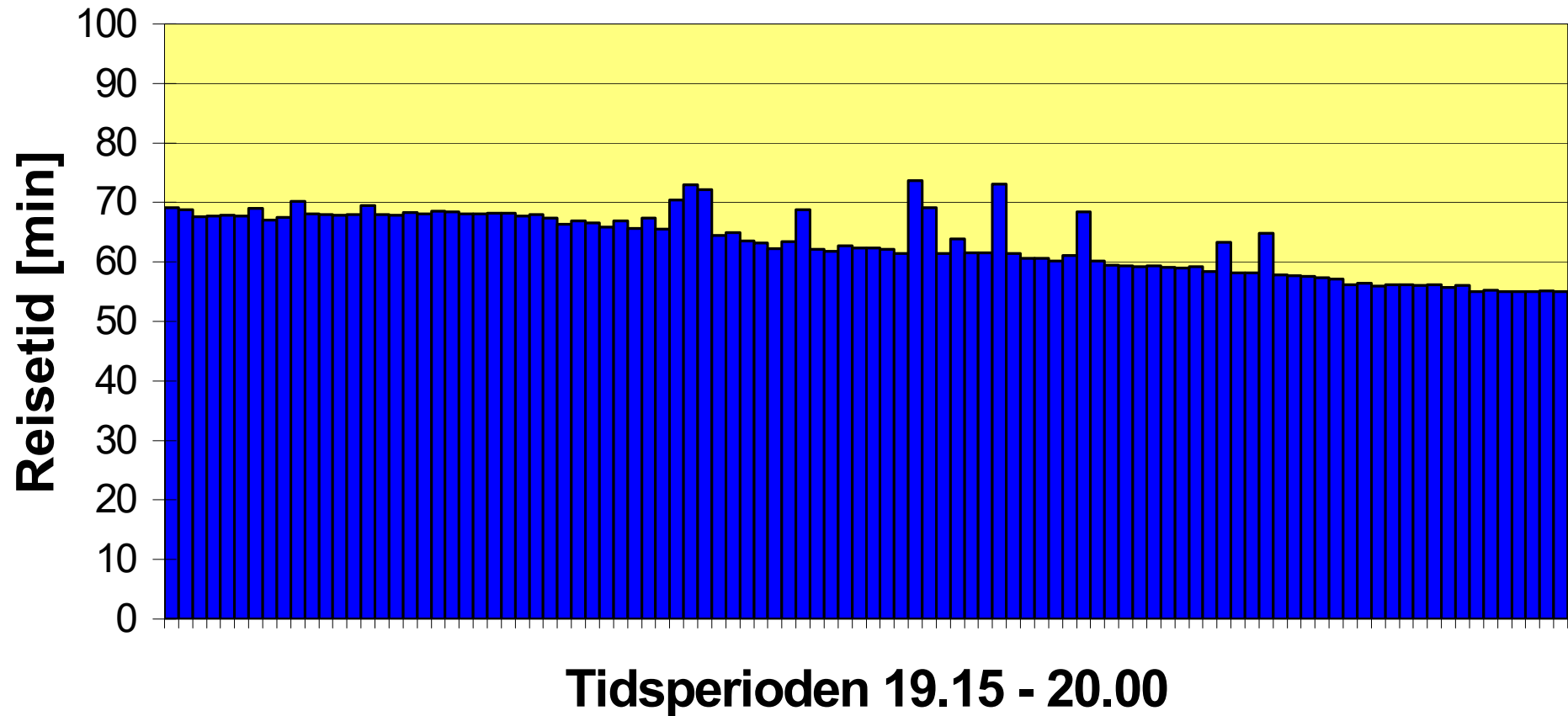
- Traffic Information
- Before – After studies
- Traffic analysis
- Performance Index

# Reisetider for enkeltkjøretøy

## Tønsberg - Sande



# Reisetider for enkeltkjøretøy Tønsberg - Sande



# Average Travel Time

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Vehicle	Time A	Time B
1	15.03.00	15.09.00
2	15.04.10	15.09.10
3	15.04.50	15.11.30
4	15.05.30	15.09.50
5	15.06.30	15.10.40

Average Travel Time 15.05-15.10 ?

# The Travel Time System

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- Technology
- Filtering Algorithms
- Travel time agregation and calculation

# Travel Time – Definitions

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- Registration
- Estimation
- Prediction

# Road sections

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- Main roads in and around some large cities
- Main road between cities in Eastern Norway





# OBU and Antennas



- One antenna in each direction

# Travel Time - Stavanger



**Green** Delay < 20%  
**Yellow** Delay between 20 and 50%  
**Red** Delay > 50%

[www.reisetider.no](http://www.reisetider.no)

# VMS



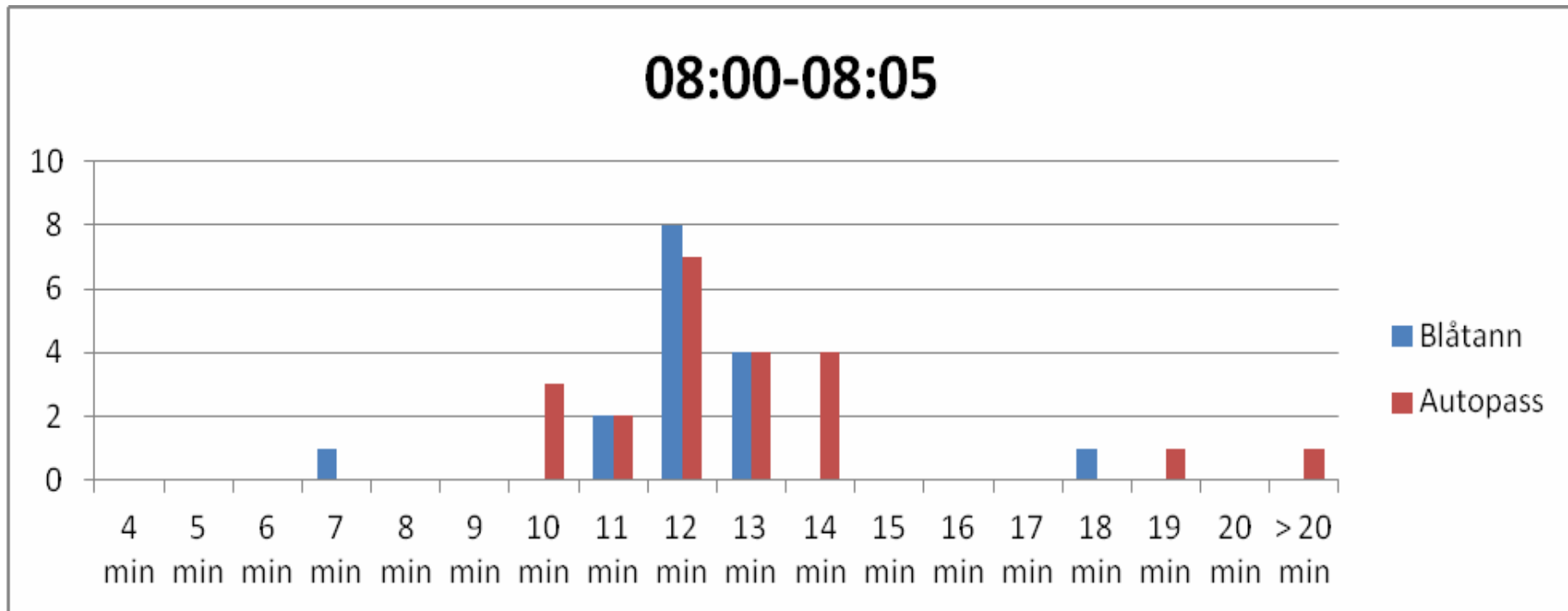


# Test site / Equipment



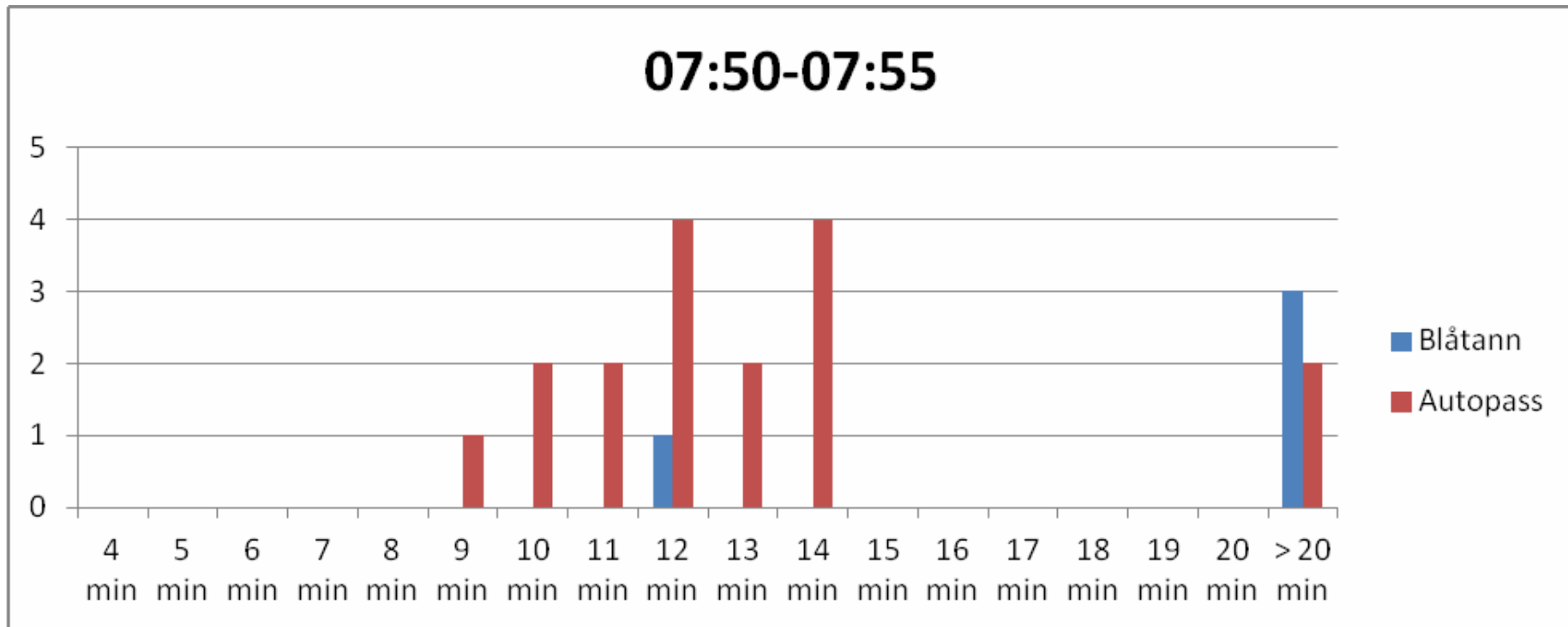
# Test Trondheim – Bluetooth vs AutoPASS

## Number of travel times

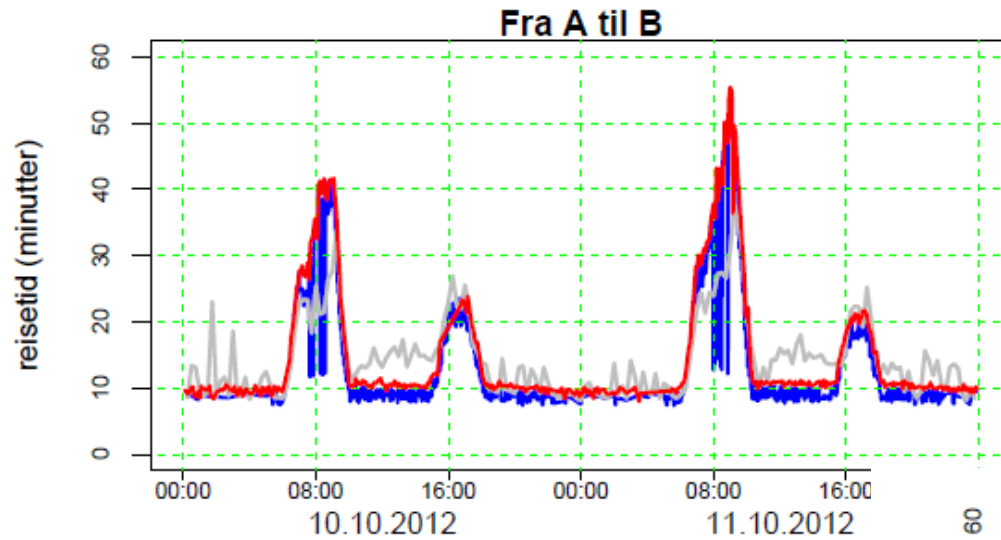


# Test Trondheim – Bluetooth vs AutoPASS

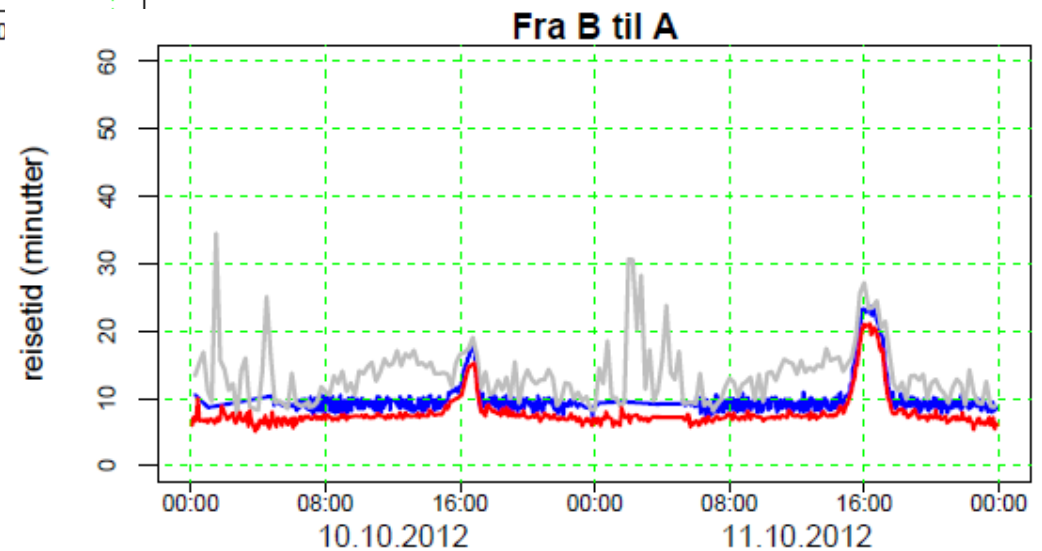
## Number of travel times



# Test Bluetooth Oslo 2012 - Travel Time



- AutoPASS – Mode based
- Bluetooth – Mode based
- Bluetooth – AADI (TrafficNow)



# Test Navigation System Oslo 2015 - Travel Time

Observert trafikk - 2015

Strekning

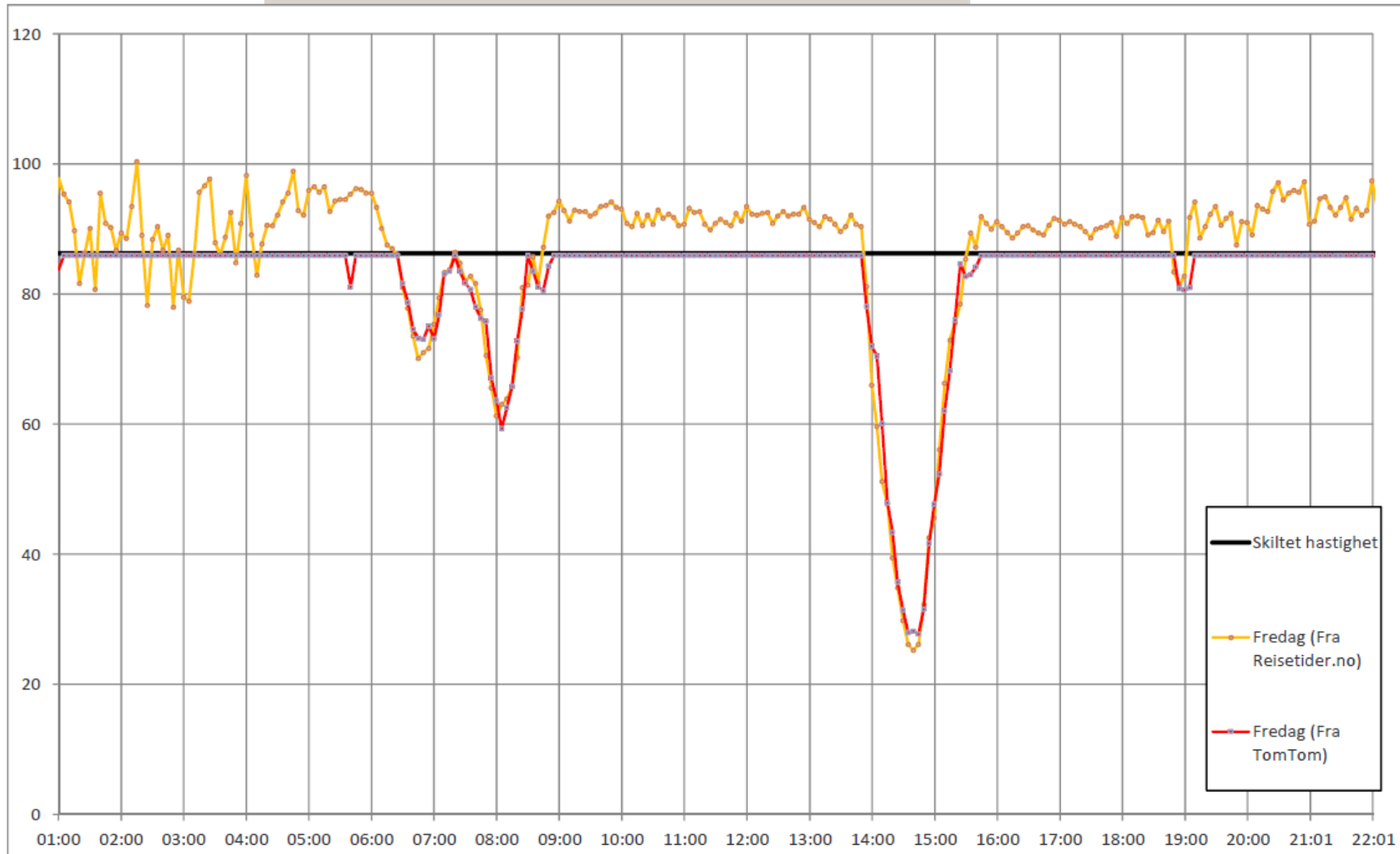
E6

Tusenryd - Ryen

Måned November Fredag 6.11

Gjennomsnittshastighet

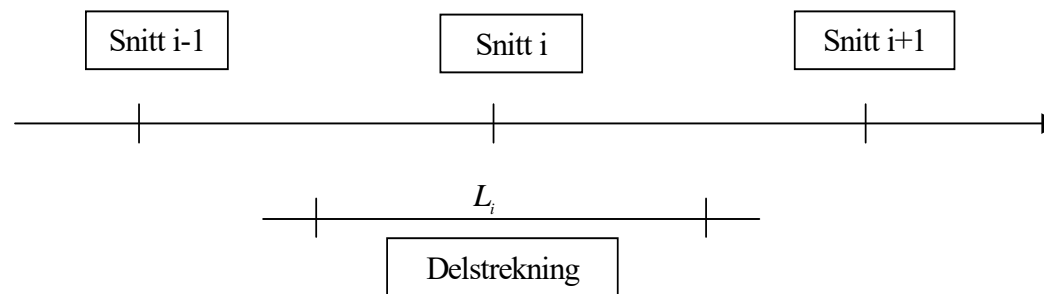
Sammenstilling av data fra Reisetider.no og data fra TomTom-V2





# Estimation

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$$L_i = \frac{1}{2}(L_{i-1,i} + L_{i,i+1})$$

- $L_i$  = Length of subsection  $i$
- $L_{i-1,i}$  = Length of subsection between *snitt i-1* and *snitt i*
- $L_{i,i+1}$  = Length of subsection between *snitt i* and *snitt i+1*

# Speed Definitions

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- Average Point Speed

$$\bar{u}_p = \frac{\sum u_{pi}}{n}$$

- Average Section Speed

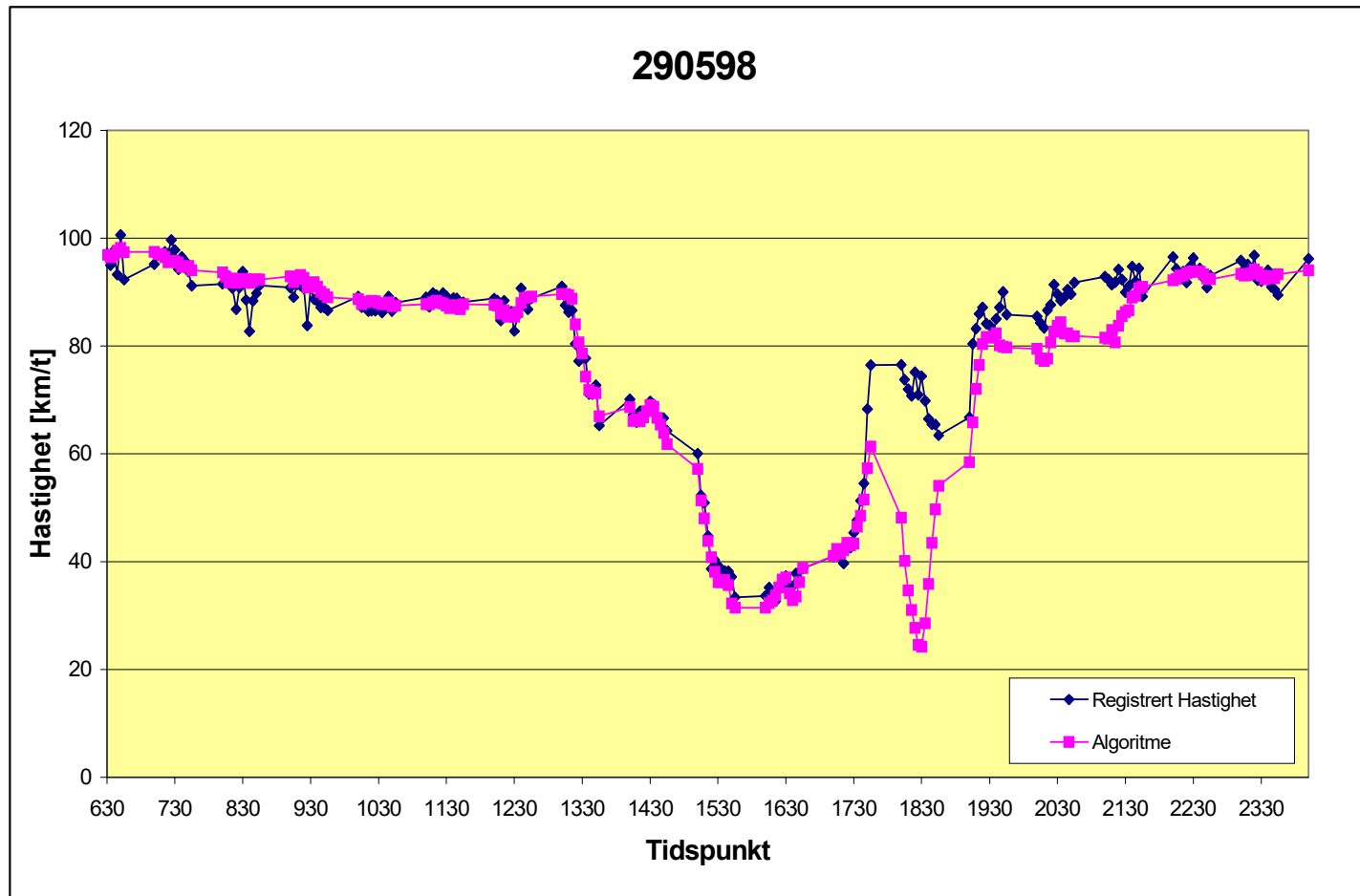
$$\bar{u}_s = \frac{1}{\frac{1}{n} \sum \frac{1}{u_{si}}}$$

$$\bar{u}_s = \frac{d}{\frac{1}{n} \sum t_i}$$

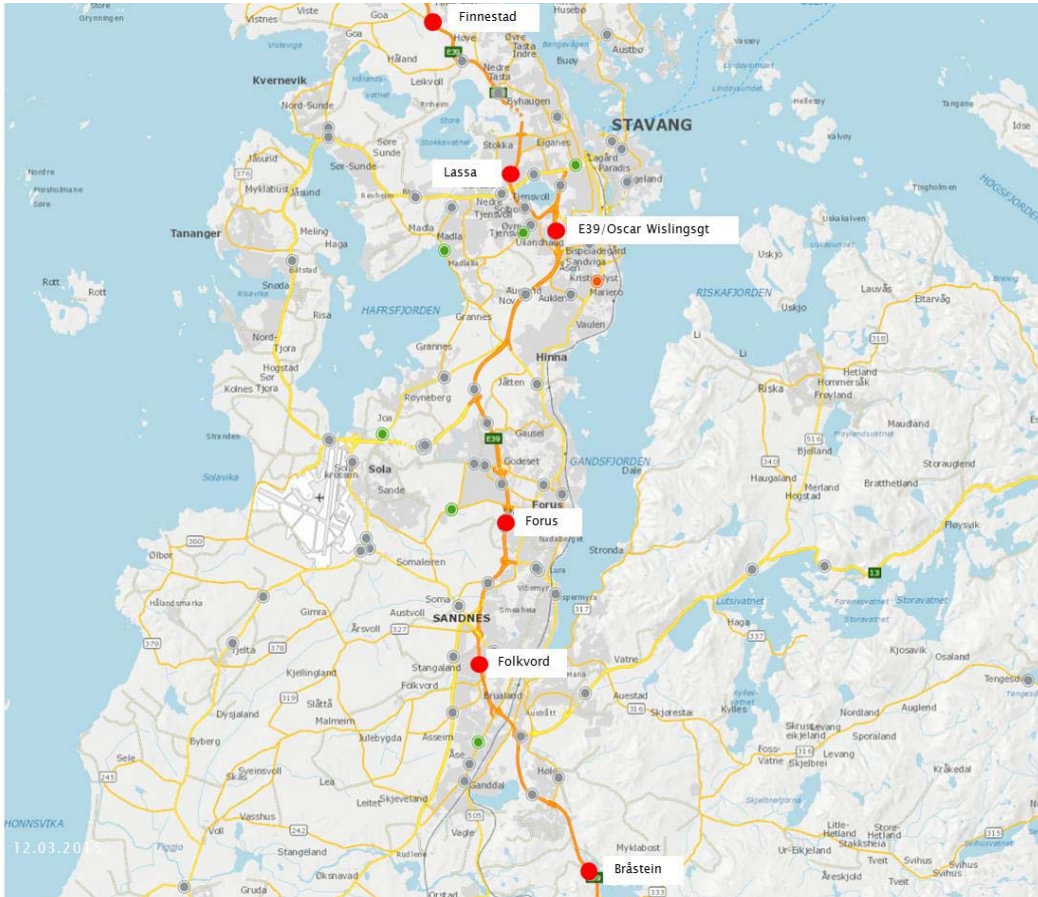
$$t_i = \frac{d}{u_{si}}$$

$$\bar{u}_p = \bar{u}_s + \frac{\sigma_{us}^2}{u_s}$$

# Travel time Estimation



# Travel Time Prediction - Stavanger





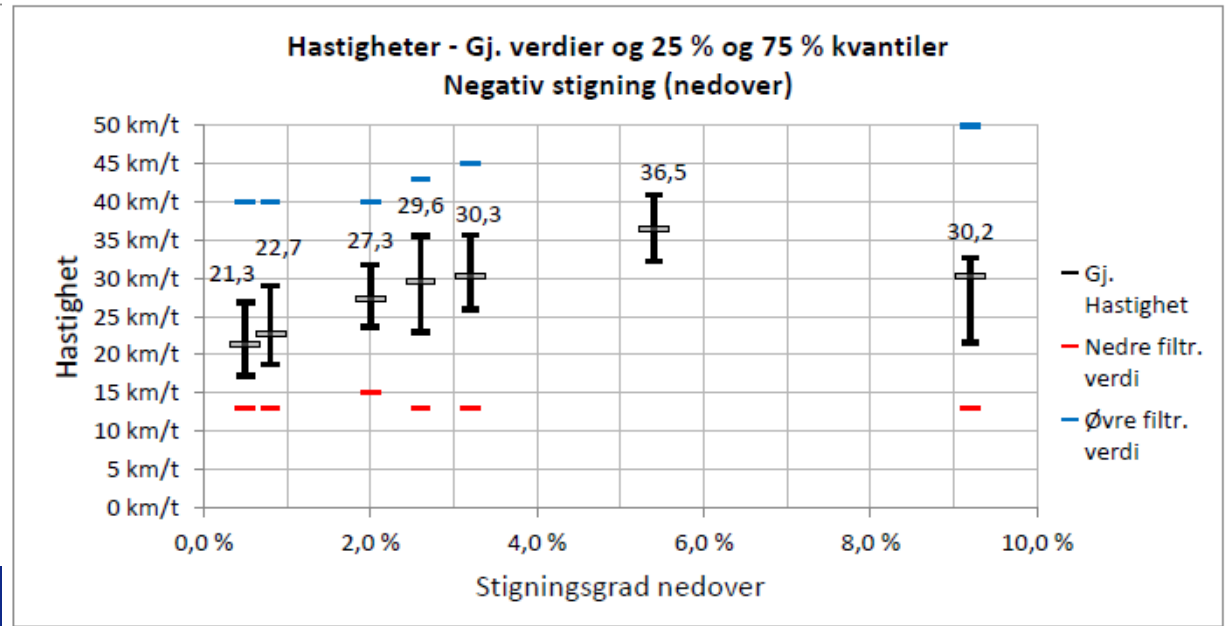
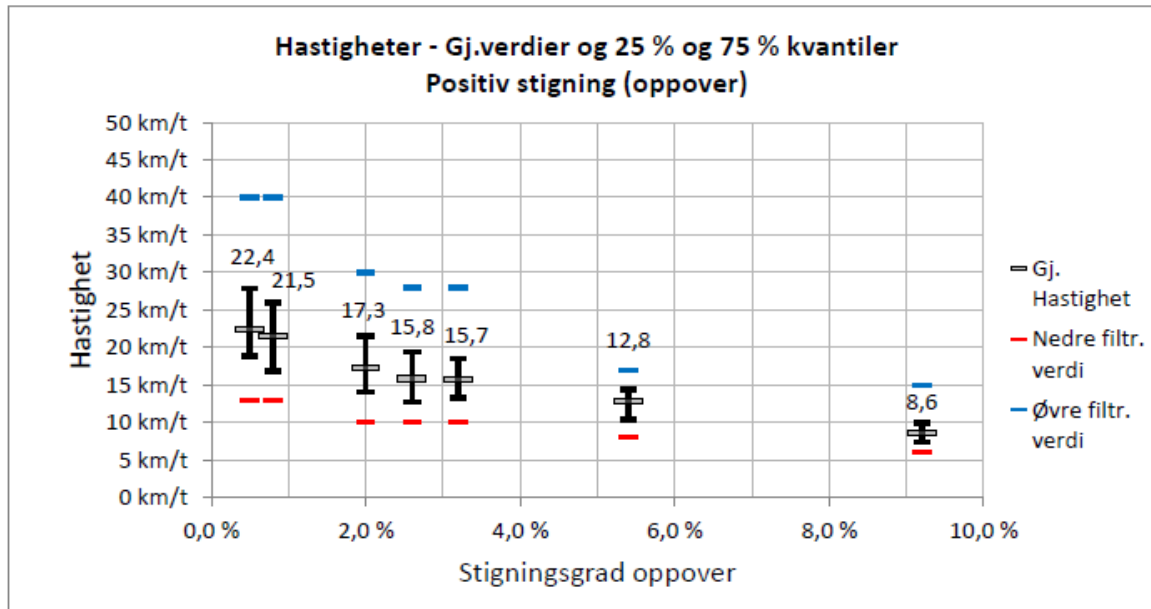
# Bicycle Travel Time

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- Bluetooth and WiFi
- Test of technology and correlation between geometry and speed



# Bicycle Travel Time



# Some Master Thesis

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- 1994 Sturød Are Trafikkstyring på E18 i Vestfold
- 1997 Nyheim Stine Prognosemodell for utvikling av forsinkelse
- 2007 Undheim Ingve Trafikkavvikling på E39
- 2009 Moen Helen Tilfartskontroll på E39
- 2011 Aakre Erlend Evaluering av kvaliteten på trafikkdata
- 2013 Aune Silje R. Reisetid med Blåtann
  
- 2014 Grønlund H og Overå S Reisetider for sykkel - Blåtann og WiFi
  
- 2015 Lunde E og Wolff T Travel time prediction
  
- 2016 Maximilian Böhm Digital based pedestrian counting

# Some Other Projects

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- Gjennomkjøringsandeler - Bymiljøavtaler
- Reisetid for ulike kjøretøytyper – NTP – Fremkommelighetsindikatorer
- Klimagass strategi – Bymiljøavtaler og NTP



# Questions ?

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