

# Prediction and Scenario-based Traffic management (POST2) – Speed and Flow Day-Types in Network: does the data type matter?

David Gundlegård (LiU), **Matej Cebecauer (KTH)**, Erik Jenelius (KTH),  
Clas Rydergren (LiU), Rasmus Ringdahl (LiU), Wilco Burghout (KTH),  
Anna Danielsson (LiU)

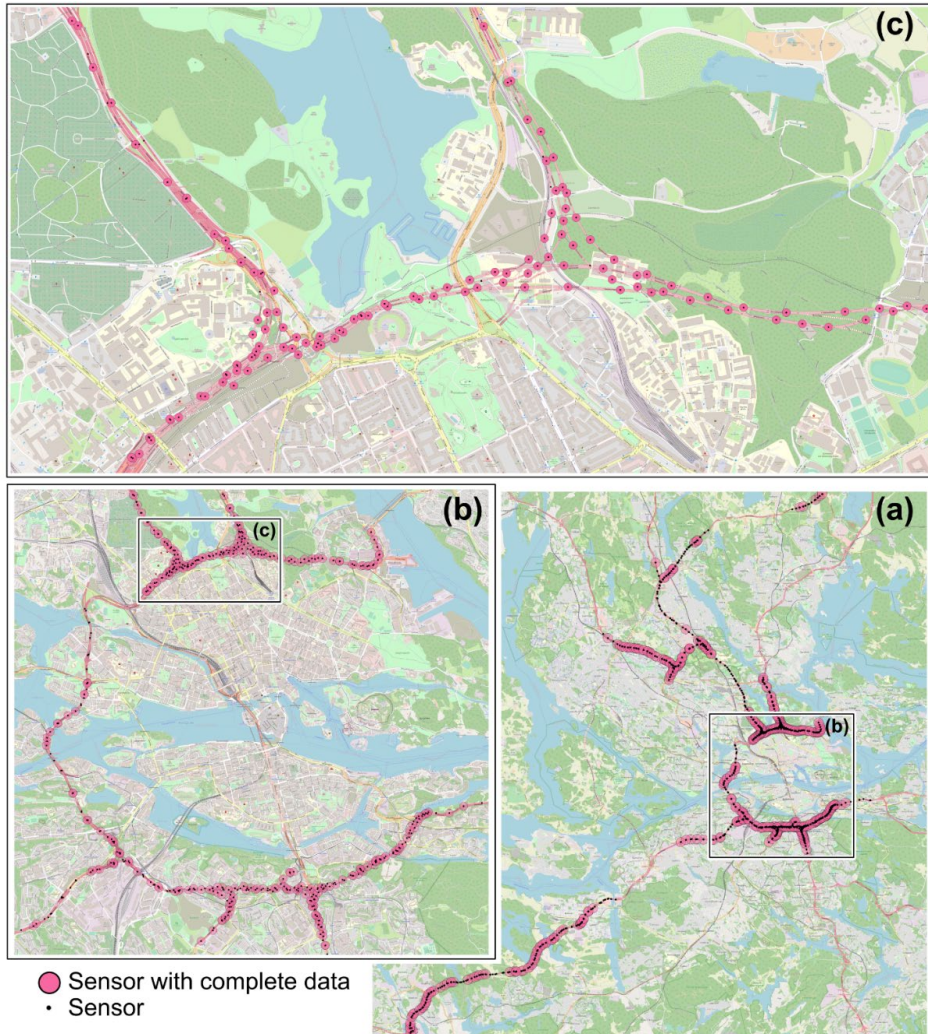
Trafik Stockholm, TrV STRESS  
Sweco, UC Berkeley

[matej.cebecauer@abe.kth.se](mailto:matej.cebecauer@abe.kth.se)

# Outline

- Case study
- Day-types
- Speed-flow data types interchangeability

# Case study



- **499** sensors at highways
- All days 2017 for clustering and training
- All days 2018 for evaluation

# Day-types

Group of days with similar attributes

- Calendar-based day-types
- Data-driven day-types considering traffic observations.

## Application:

- Scenario-based traffic management
- Understanding network-wide patterns
- Basis for prediction

### Calendar-based

7 clusters

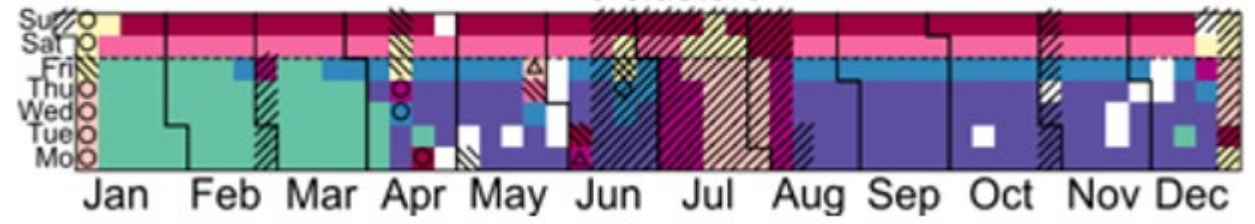


// School holidays   \ Public holidays   \* Midsummer   O Special days or de facto holiday   Δ Bridging day

### Flows

k-mean

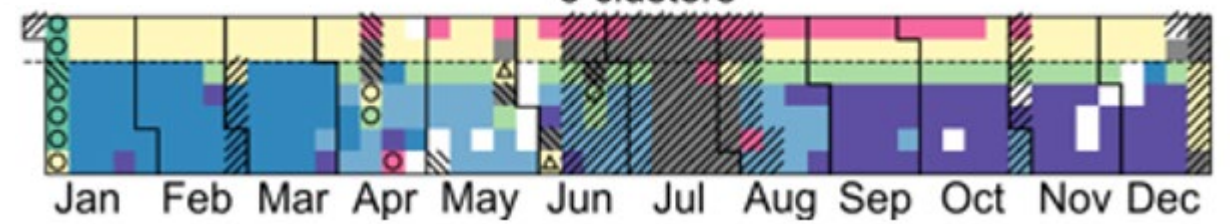
8 clusters



### Speeds

k-mean

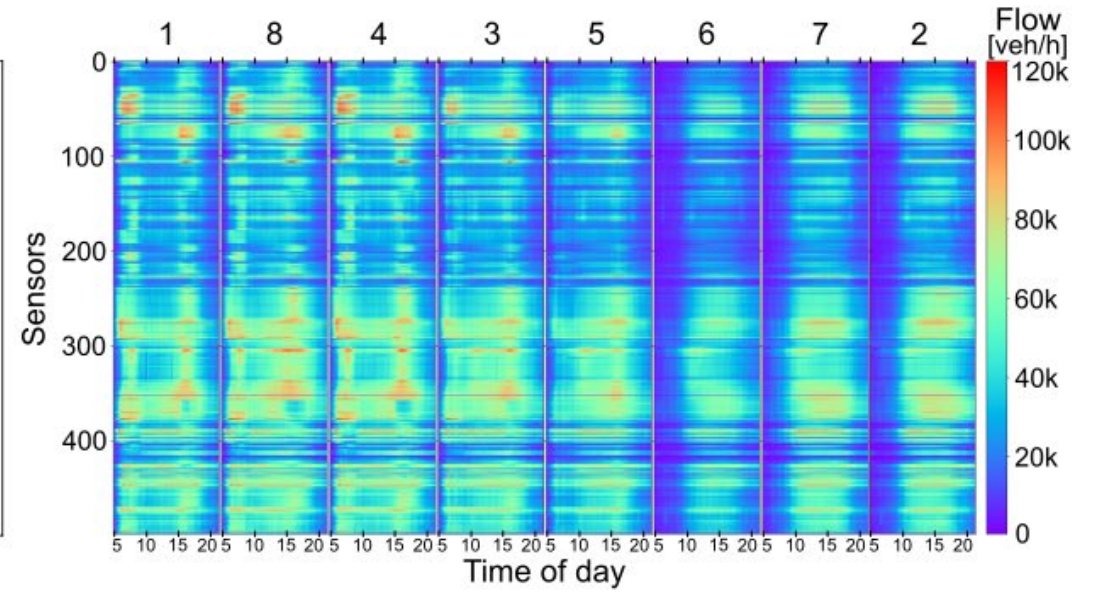
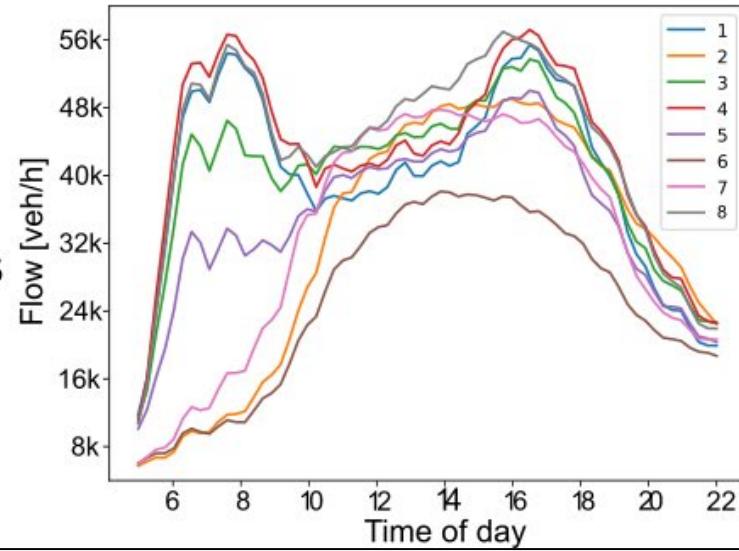
8 clusters



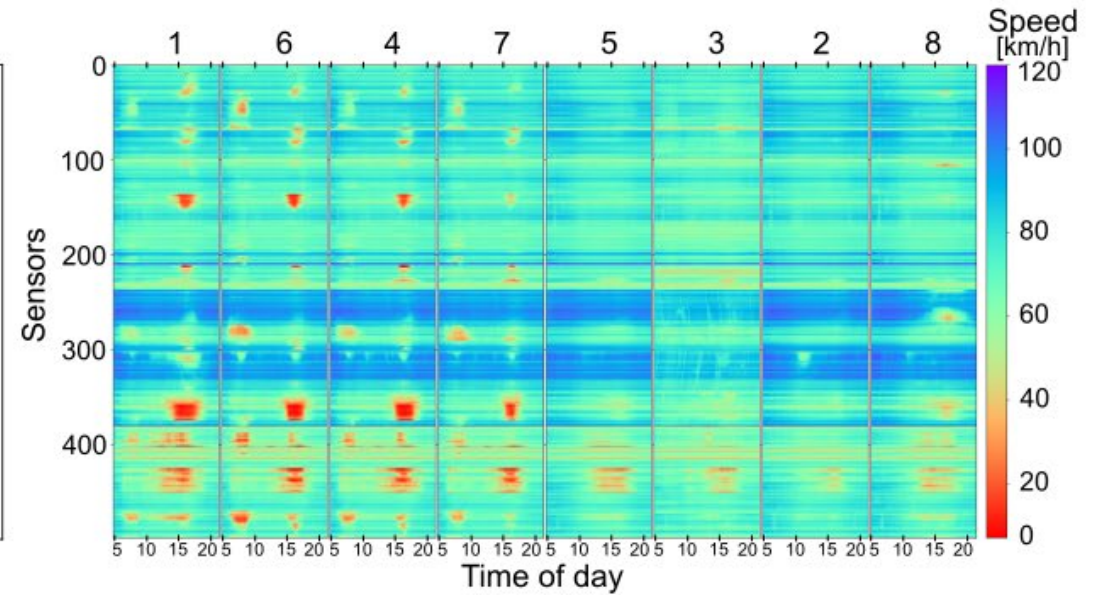
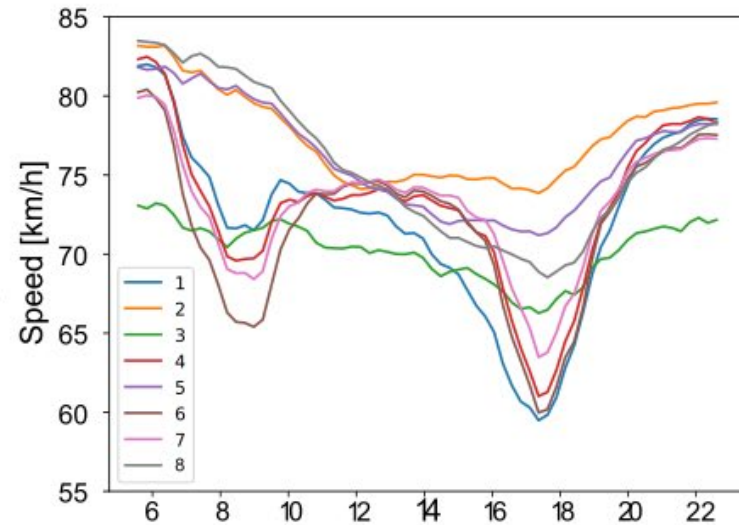


# Day-type centroids

Flow-based  
flow centroids



Speed-based  
speed centroids



# Speed-flow data types interchangeability

## Short-term prediction application

1. Classification of the new day to one of day-type groups
  - calendar
  - centroids and speed or flow observations
2. Prediction
  - Two models
    - simple (day-types centroids as basis for prediction)
    - and a bit less simple (day-types + exponential smoothing)

## Interchangeability study

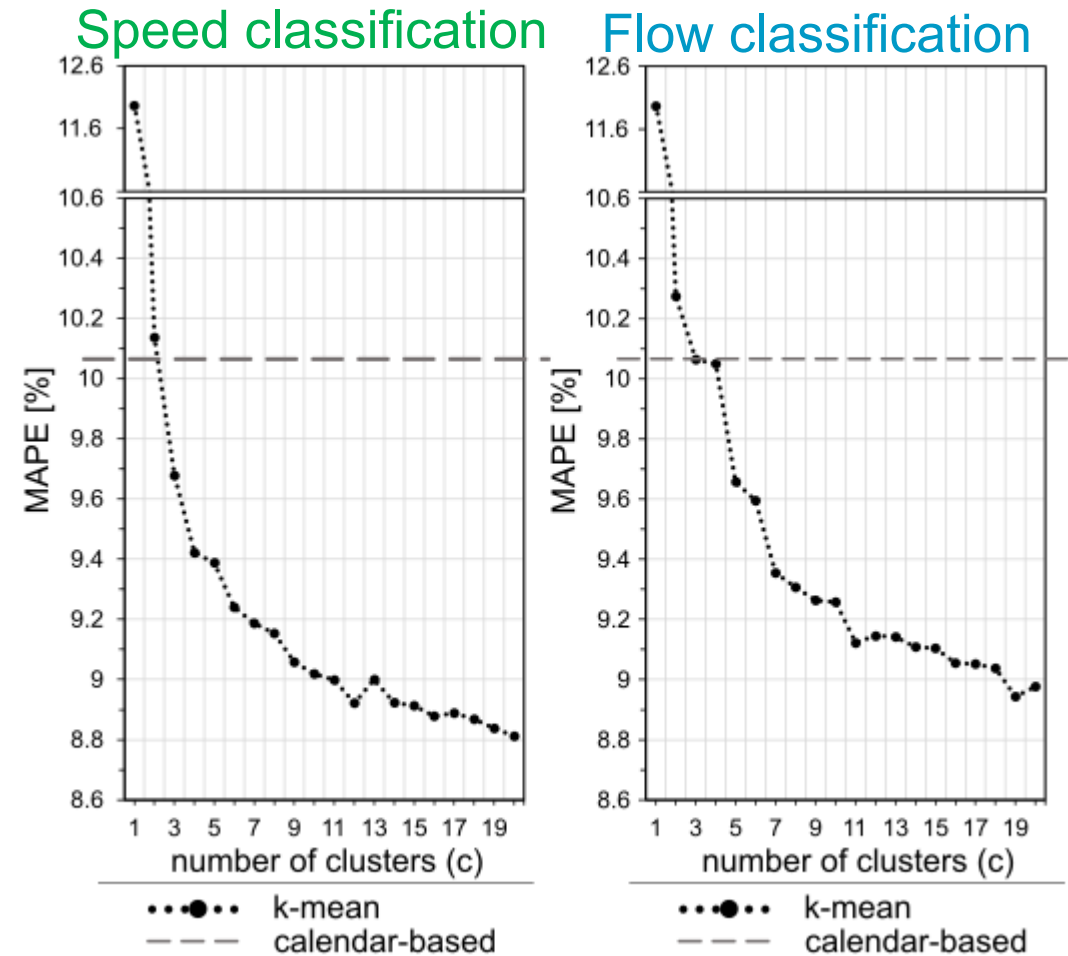
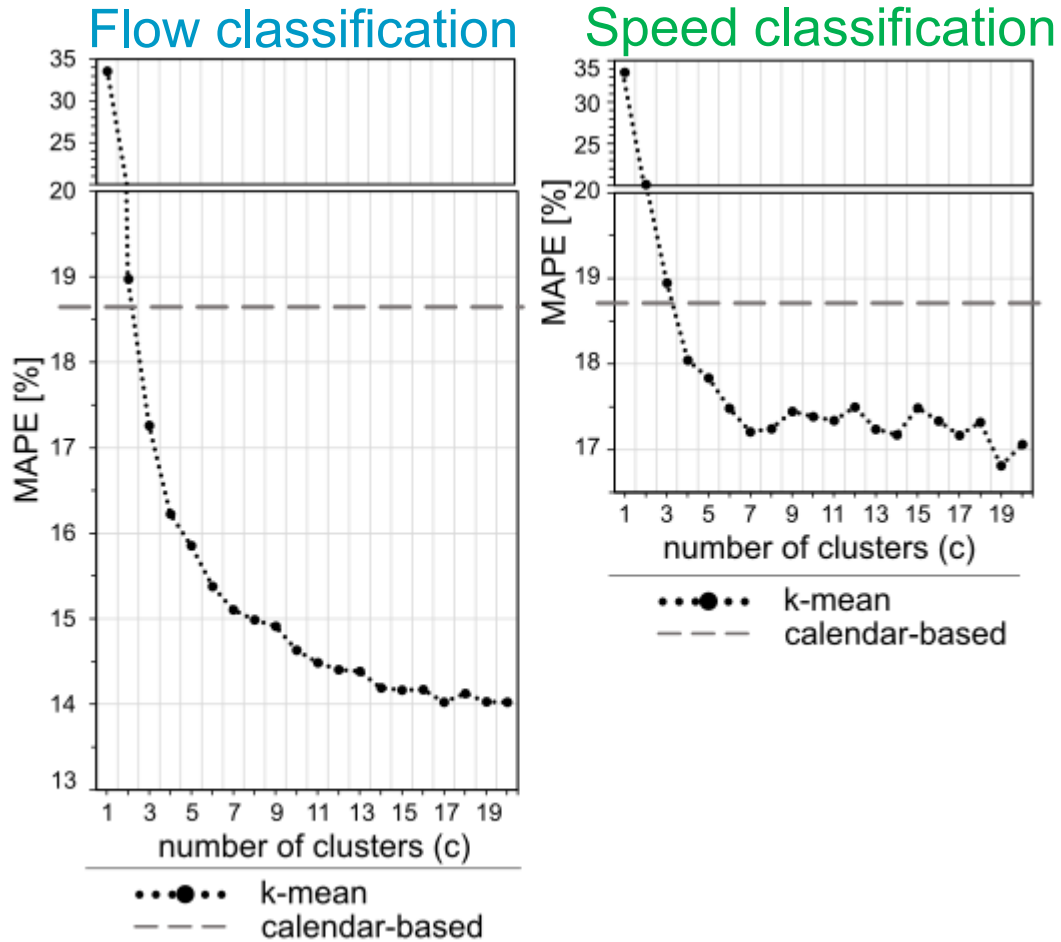
- How effective can be flow (demand) prediction, when day-type cluster is assigned to a new day by speed observations? or vice versa

# Speed-flow data types interchangeability

Day-type centroids historical mean

## Flow prediction

## Speed prediction



# Speed-flow data types interchangeability

Day-type centroids historical mean + exponential smoothing

## Flow prediction

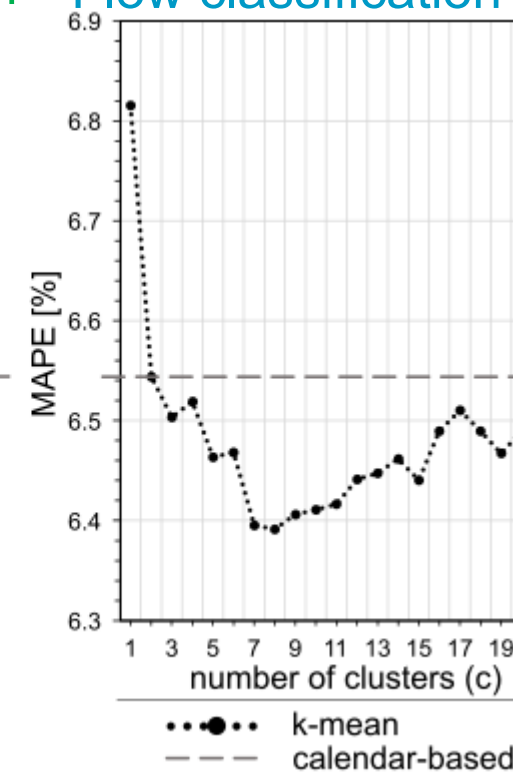
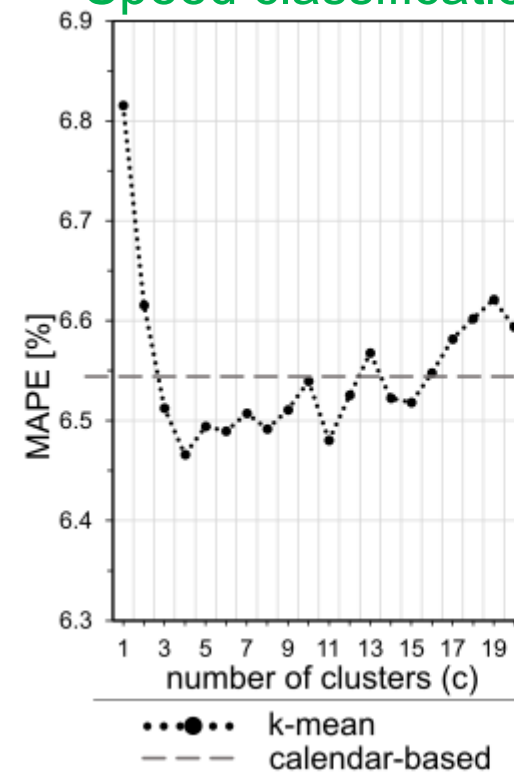
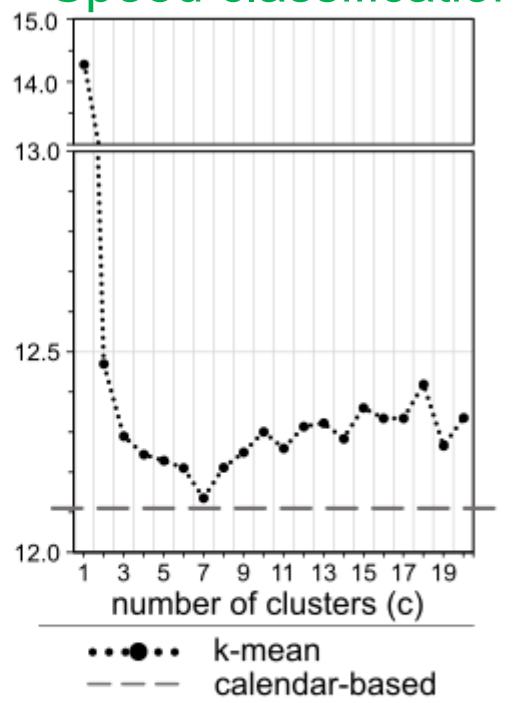
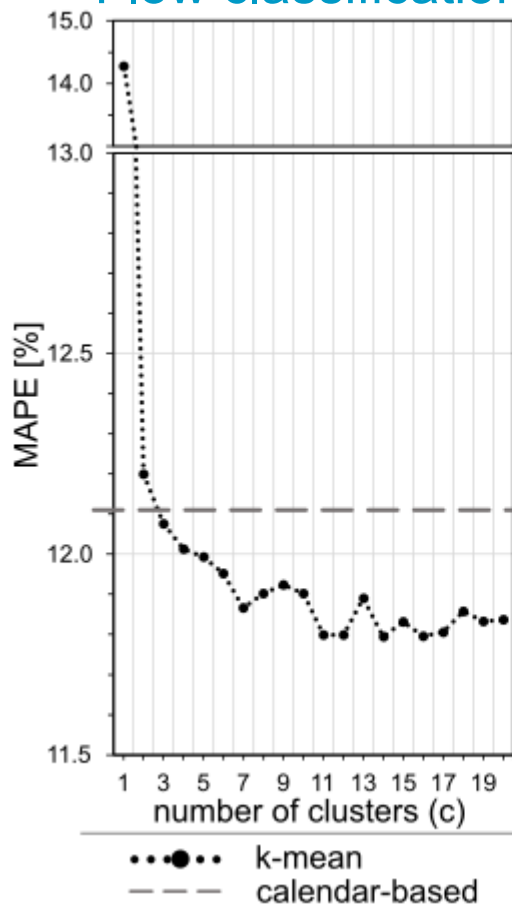
## Speed prediction

### Flow classification

### Speed classification

### Speed classification

### Flow classification





# Summary

- Day-type clustering improves prediction
- Flow based clustering works better, even when predicting speeds
- With more advanced prediction, clustering method matters less

## References:

Cebecauer, M., D., Jenelius, E., Gundlegård, D. and Burghout, W., [Revealing day-types in transport networks using traffic data clustering with external validation criteria](#), submitted to Transportation Research Part C: Emerging Technologies.

Cebecauer, M., D., Jenelius, E., Gundlegård, D. and Burghout, W., Similarity and interchangeability of flow and speed data for transport network day-type clustering and prediction, work in progress

# Prediction and Scenario-based Traffic management (POST2) – Speed and Flow Day-Types in Network: does the data type matter?

David Gundlegård (LiU), **Matej Cebecauer (KTH)**, Erik Jenelius (KTH),  
Clas Rydergren (LiU), Rasmus Ringdahl (LiU), Wilco Burghout (KTH),  
Anna Danielsson (LiU)

[matej.cebecauer@abe.kth.se](mailto:matej.cebecauer@abe.kth.se)