



# Evaluation of Floating Car Data Systems by Field Trials

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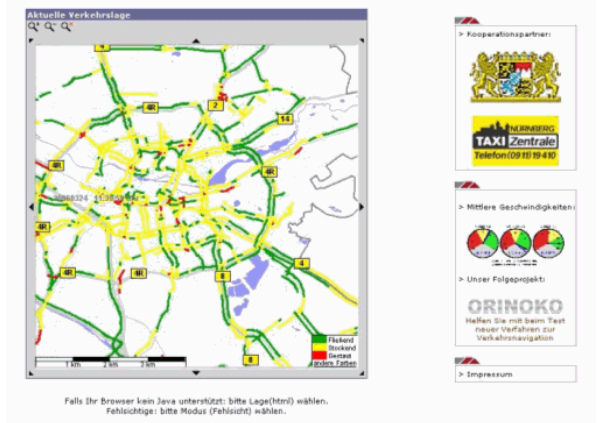
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# Floating Car Data (FCD) from Taxis

## Two research projects

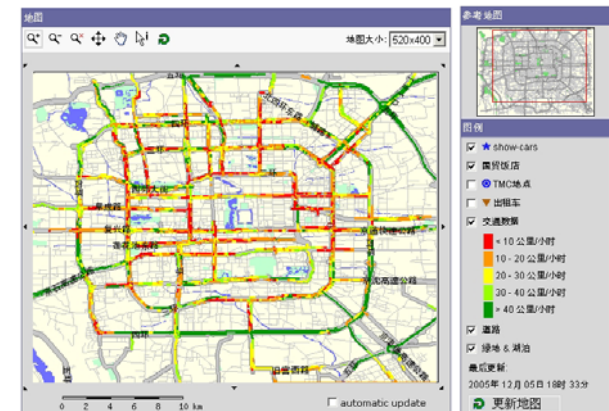
### ➤ ORINOKO

- founded by German government
- optimizing traffic management for urban corridors
- FCD from 700 taxis in Nuremberg
- position reporting interval:  $\approx 30$  sec



### ➤ DYNASTY

- founded by European commission
- bringing TMC to China
- FCD from 2000 taxis in Beijing/China
- position reporting interval:  $\approx 20$  sec



# Accuracy of FCD approach

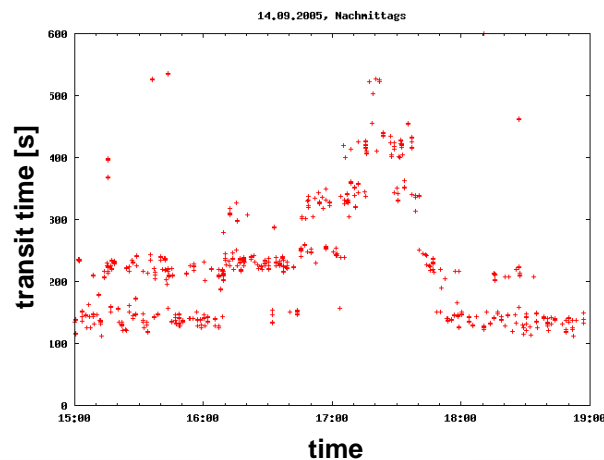
## An open field of research

- causes of inaccuracy in FCD systems
  - statistical bias due to low sampling rate
  - positioning error due to GPS inaccuracy, wrong map matching
  - misinterpretation (jam ↔ rest)
  - time delay between measurement and publication of derived traffic information
  
- two FCD usages, two field trials:
  - (1) travel time estimation (addressed in ORINOKO)
  - (2) incident detection (addressed in DYNASTY)

# Travel time estimation (1)

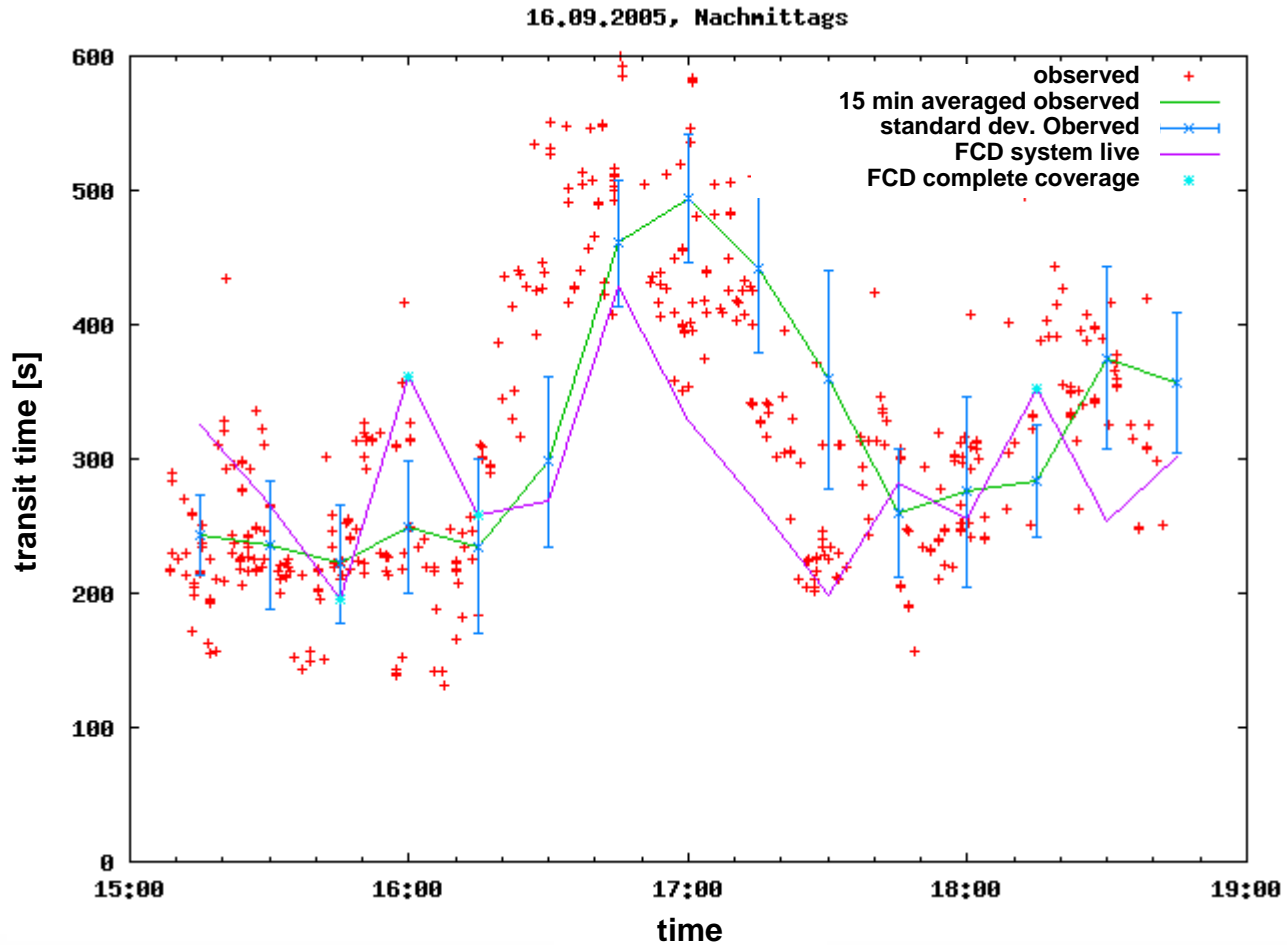
## Field trial

- travel time observation by license plate recognition
- Regensburger-, Hain-, Münchener Strasse,  $\approx 2$  km
- 2005, Sep. 13<sup>th</sup> and 14<sup>th</sup> outbound
- 2005, Sep. 15<sup>th</sup> and 16<sup>th</sup> inbound
- 7–11 a.m. and 3–7 p.m.
- bi-modal transit time distribution



# Travel time estimation (1)

## Results of field trial



# Travel time estimation (1)

## Results

- measurement campaign delivered good reference dataset
- multimodal distribution of transit times. Reason: signalized intersections
- high standard deviation (about. 45 sec) of individual travel times

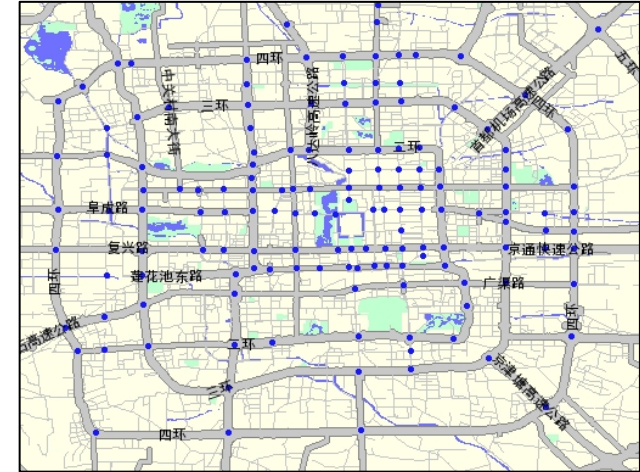
## Quality Taxi FCD

- estimated travel times mostly inside variation limit of observed transit times
  - variation coefficient individual travel times to 15 min average: 19,4%
  - variation coefficient Taxi FCD estimation to 15 min average : 17,7%
- incident detection at given penetration ( $\approx 0.7$  %) with stochastic time delay
- not suitable as stand-alone sensor for traffic light optimization

# Incident detection (2)

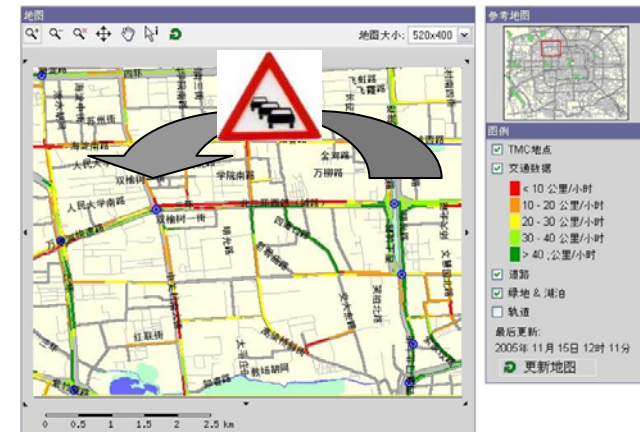
## Field trial

- self-defined TMC location table →
- creation of TMC messages
- broadcasted by a Beijing radio station
- about 100 messages simultaneously



## Measurement campaign:

- one probe vehicle using 2nd and 3rd ring road (freeway)
- one day , 6 a.m. to 8 p.m.
- comparison of observed incidents with TMC

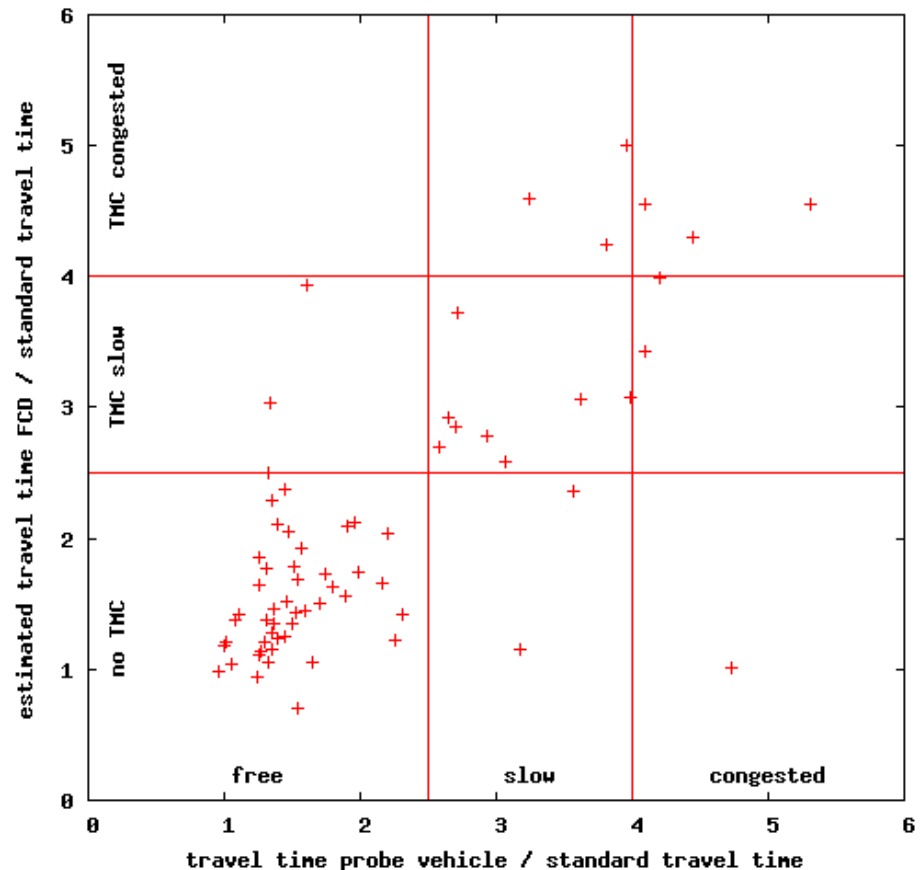


# Incident detection (2)

## Results

19 incidents observed,  
there from ...

- 11 reported correctly
  - 5 reported imprecisely
  - 3 not reported
  - + 2 wrong TMC
- 
- satisfying result ...
  - ... but test not very significant; more extensive reference data needed





# Conclusions

- Taxi FCD is a valuable traffic sensor for urban regions
- travel time information on a low-cost basis
- reporting frequency should be less than 120 sec
- penetration crucial for accuracy and time delay
- for traffic management purposes a high penetration (>1%) or combination with other sensors needed

