A STUDY ON THE EFFECTS OF TRAFFIC ENFORCEMENT ON THE TRAFFIC ACCIDENTS OCCURRENCE IN JAPAN

HAMAOKA, Hidekatsu (Akita University)
MORIMOTO, Akinori (Utsunomiya University)

This presentation is one of the results of the research projects in IATSS (International Association of Traffic and Safety Science)

http://www.iatss.or.jp/en/

Background

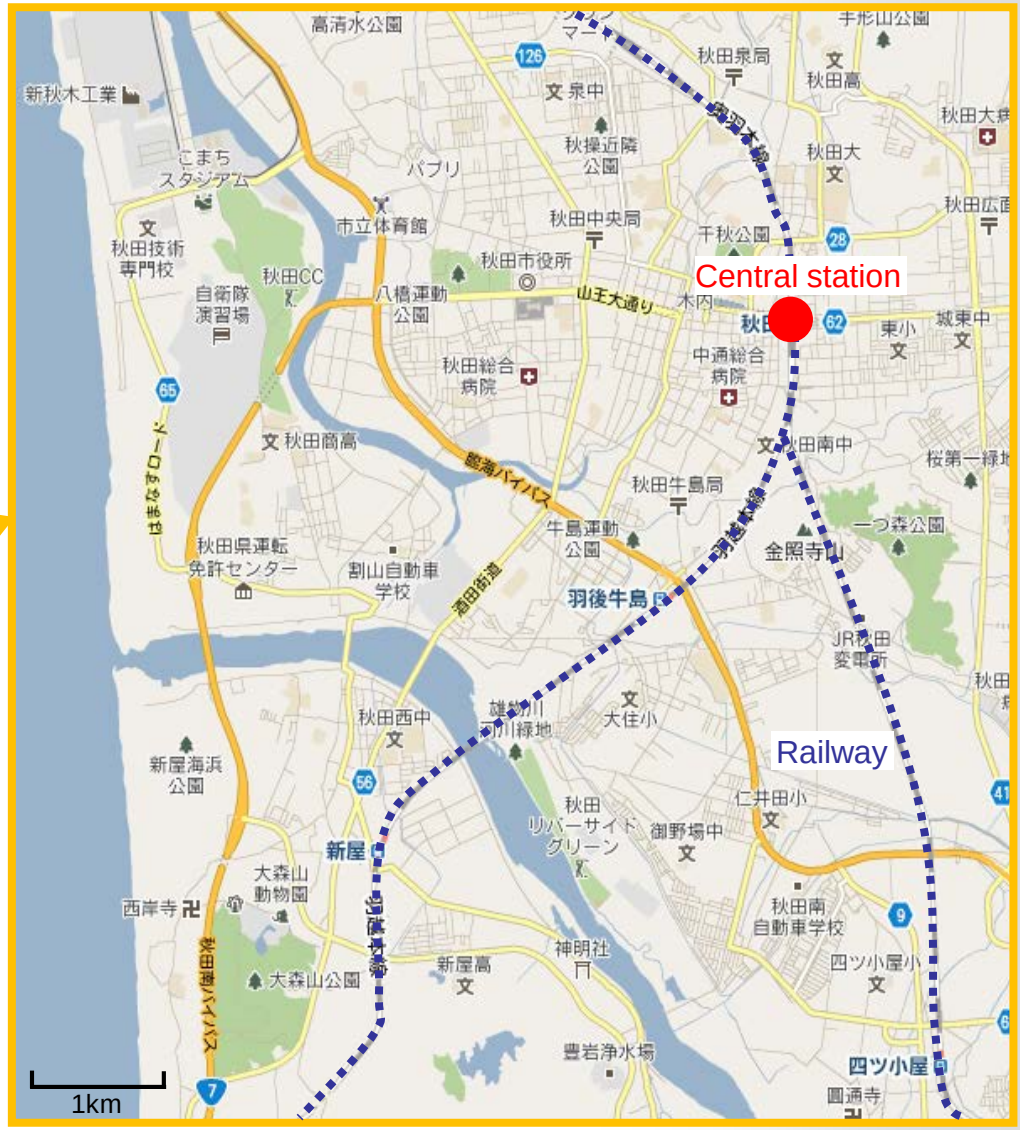
- Number of traffic accidents is decreasing in Japan
  - Improvement of road and traffic environments
  - Strengthening of traffic enforcement
    - Increasing penalties for drunk driving: up to ¥500,000 ($5,000)
- However, it is not cleared how to conduct traffic enforcement in an effective way
  - what time, where, what kind of traffic enforcement, what kind of method (stationary, mobile), etc …
- Policemen have much difficulty in conducting traffic enforcement
  - What kind of traffic enforcement is the best to reduce the number of fatal accident to keep the yearly target?
  - Policemen are questioning especially at the year-end

Objective

- Clarify the influence of traffic enforcement on traffic accident occurrence
  - Comparison analysis of traffic enforcement data and traffic accident data
  - Area analysis to consider desirable traffic enforcement
- Conduct a survey to understand characteristics of speed change by the traffic enforcement
  - To evaluate the effect of traffic enforcement, dummy traffic enforcement was conducted
  - Evaluate the effect of traffic enforcement for speeding
  - Measure the speed change by the traffic enforcement

Research Area

- Akita City
  - Northern part of Japan
  - Snowy region
  - Population: 300,000

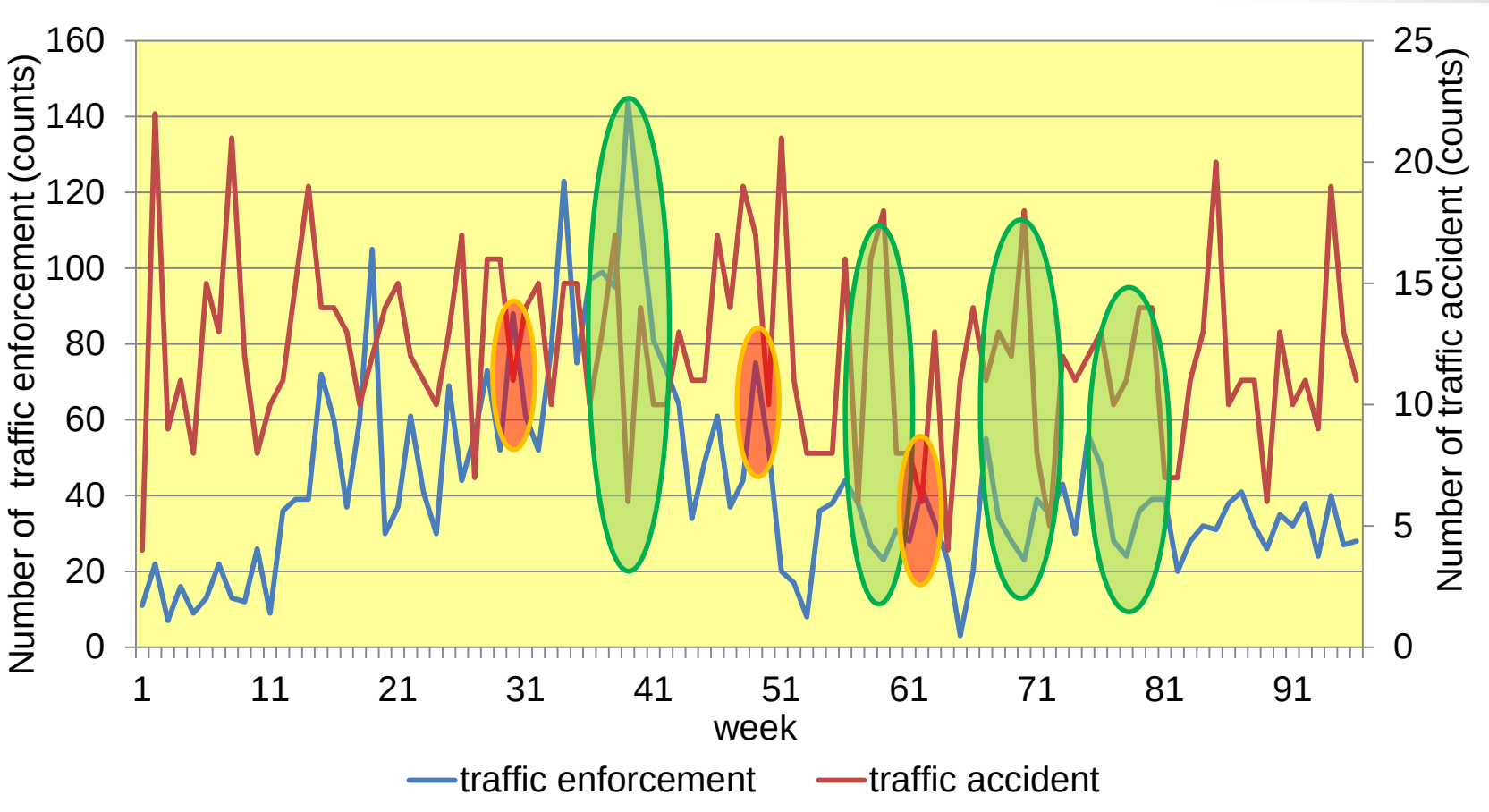


Data

- Traffic enforcement data and traffic accident data were collected in Akita City
  - Duration: January 2009 to October 2010
  - Area: Akita Central Police Station (Akita City)
  - Number of traffic enforcement data: 4,160
    - speeding, red light running, failure to stop, drunk driving
  - Number of traffic accident data: 1,175
    - Rear-end collision, crossing conflict, right-turning, pedestrian

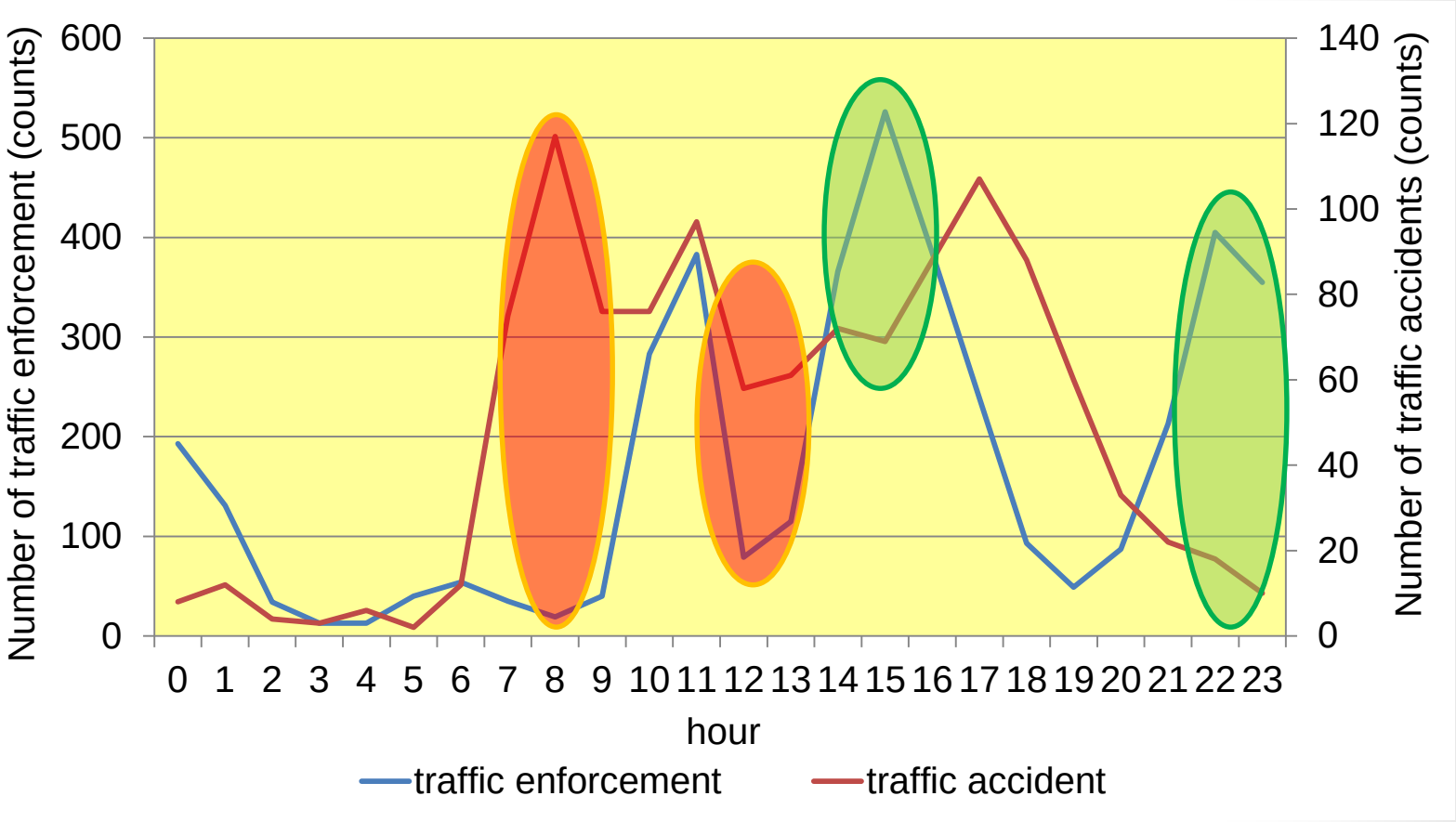
- The number of traffic enforcement is larger than the number of traffic accident
  - The number of severe situation is small
  - Satisfy the Heinrich's law?

Comparison of both data by week



- Both distributions have opposiong trend
- This relationship could be considered that traffic enforcement brings good effect

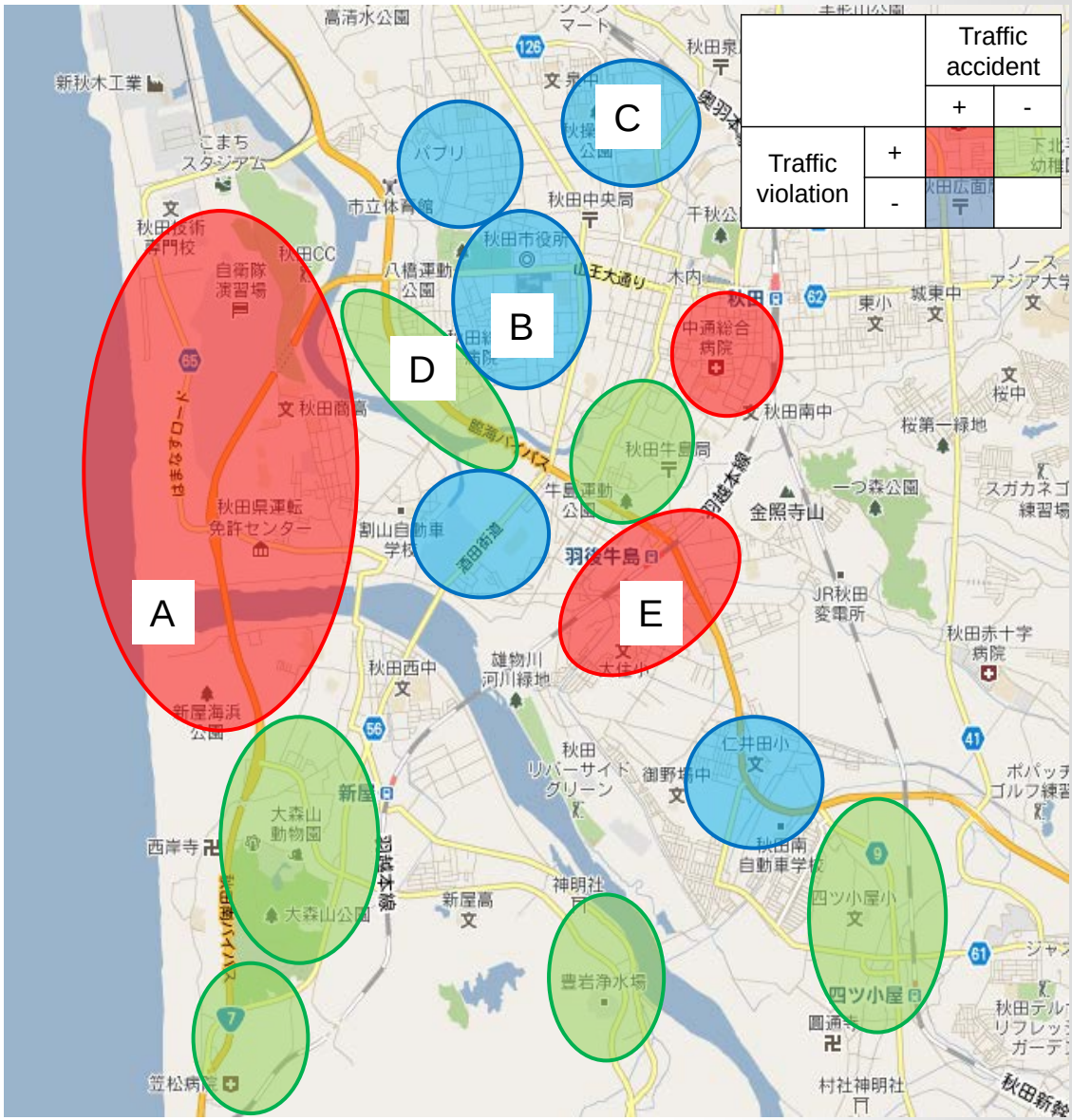
Comparison of both data by hour



- Existence of large gap between both distributions at some hours
- Needs more traffic enforcement around 8 am and 12 pm
- Needs less traffic enforcement around 3 pm and 10 pm

Result of area analysis

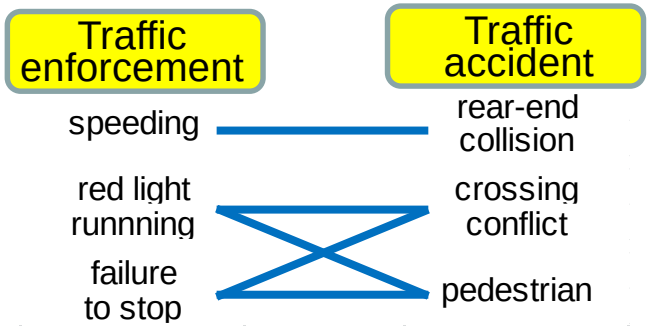
- Divided into 29 areas
- Grouping by the avg. of traffic enforcement and traffic accident
- Characteristics
  red: suburban area near the station
  green: trunk road
  blue: residential area
- Enable to suggest good information to consider the location of traffic enforcement



Characteristics of data in each area

- Analyze the relationship between traffic accident and traffic enforcement in detail
  - Both traffic accident and traffic enforcement were classified by the type
- Strong relationship between traffic accident and traffic enforcement
  - Area A was selected for the survey

Relationship between traffic enforcement and accident



Detailed classification for both data

		traffic enforcement			traffic accident		
		red light running	failure to stop	speeding	rear-end collision	crossing conflict	pedestrian
A	Suburban	**351**	**277**	**681**	**34**	**32**	**6**
B	bussiness district	46	57	0	**33**	**32**	**8**
C	residential area	12	57	0	20	**28**	1
D	residential area with trunk road	0	**148**	0	**37**	**42**	0
E	residential area	0	**208**	0	0	0	**6**

Red box shows the top 5 area

Outline of the survey

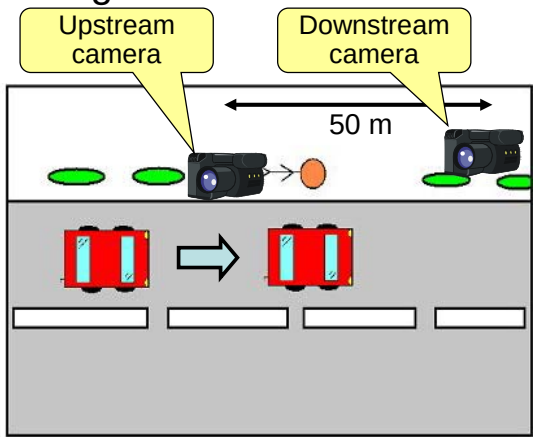
- 3 location were selected
- Dummy camera was set to find the effect of traffic enforcement
- Concealed camera was set to record the usual speed

Date	Nov. 6 to 25, 2010
Survey site	Experienced speed enforcement (A, B) Inexperienced speed enforcement (C)
Method	Video recording
Recording time	2 hours in each survey first 1 hour: concealed last 1 hour: unconcealed
Objective vehicle	Free-flow vehicle (5 second time headway)

Setting of recording cameras

	Upstream camera (unconcealed)	Downstream camera (concealed)
First 1 hour	-----	camera 1
Last 1 hour	camera 3	camera 2

Configuration of two cameras



Upstream camera
(showing dummy radar gun)

Speed difference by the traffic enforcement

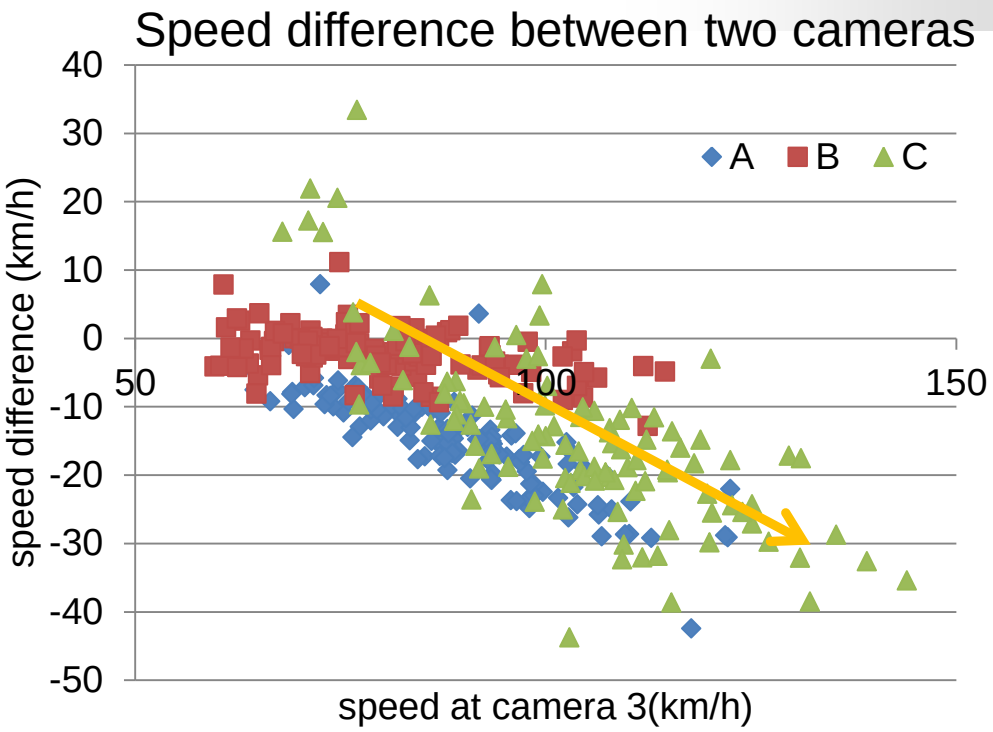
- Analyze the speed change by the dummy camera
- Compare the speed at camera 3 and 2 (same car)
- Confirm speed reduction for all locations
  - Especially for A and C (those have higher speed)

Cameras used for this analysis

	Upstream camera (unconcealed)	Downstream camera (concealed)
First 1 hour		camera 1
Last 1 hour	camera 3	camera 2

Average speed in each cameras

Location	Average speed		Difference
	camera 3	camera 2	
A	89.8	74.3	15.5
B	79.9	77.5	2.4
C	104.1	90.6	13.5



Effect of the traffic enforcement

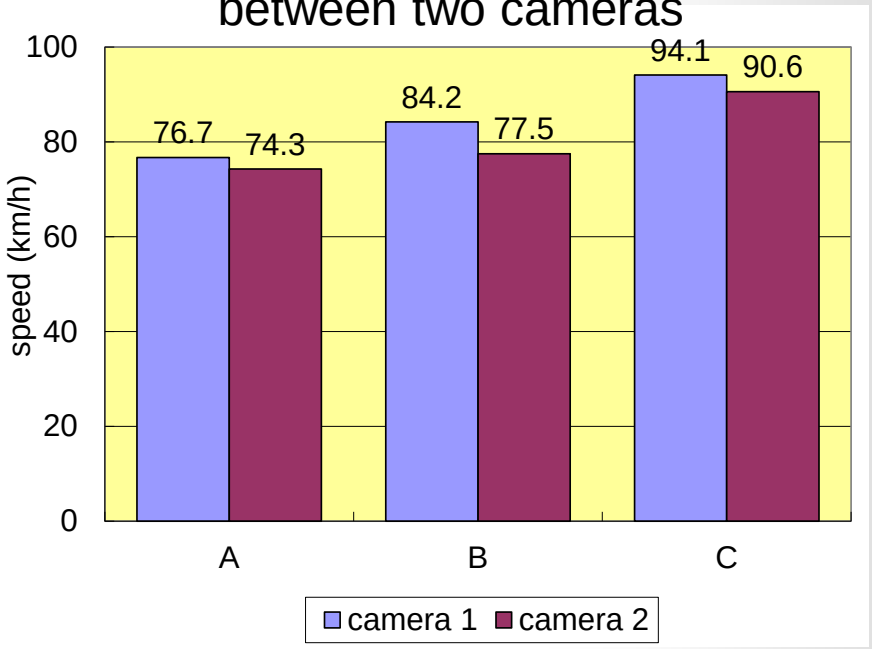
- Compare the speed between camera 1 and 2
  - This speed reduction could show the effect by the (dummy) traffic enforcement
- Speed reduction was shown for each locations, while effect of it was not high

Cameras used for this analysis

	Upstream camera (unconcealed)	Downstream camera (concealed)
First 1 hour		camera 1
Last 1 hour	camera 3	camera 2

Average speed in each cameras

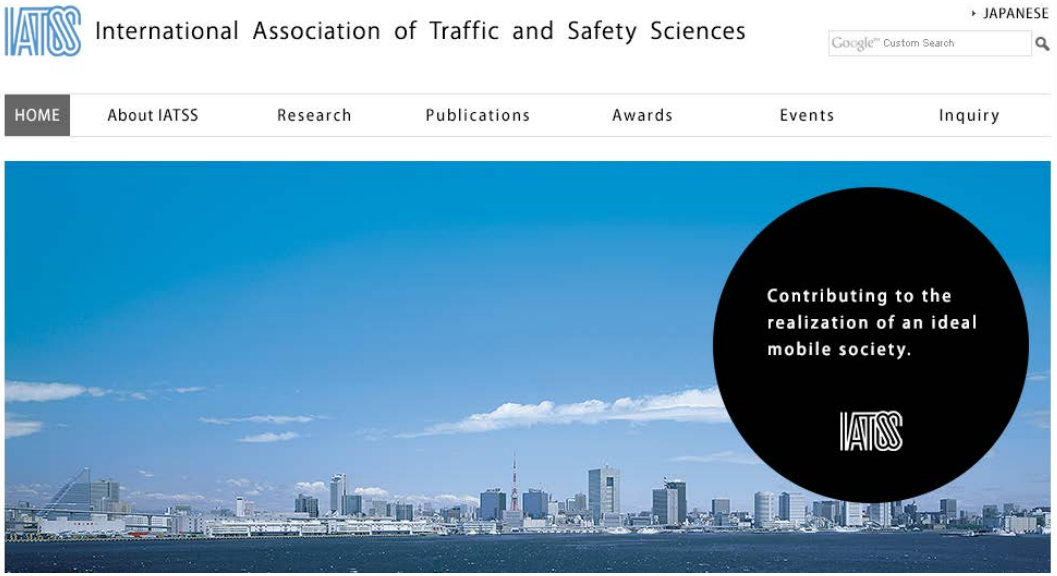
Location	Average speed		Difference
	camera 1	camera 2	
A	76.7	74.3	2.4
B	84.2	77.5	6.7
C	94.1	90.6	3.5



Conclusion

- Importance to consider the effective traffic enforcement measure by considering the characteristics of the traffic accidents
- Two kinds of analyses were conducted
  - Data analysis of traffic enforcement and accidents
    - Both distributions have opposite relationship
    - Importance to match both distributions
  - Drivers' behavior analysis by the dummy enforcement
    - Dummy speeding camera could lowering driving speed
    - Effect of this camera was not high (around 5 km/h)
- Still remain an important issue to analyze how to conduct effective traffic enforcement

Thank you very much for your attention!



International Association of Traffic and Safety Sciences