Case studies of probe speed data

Presentation · August 2019
DOI: 10.13140/RG.2.2.36566.98887

1 author:

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61 PUBLICATIONS   **198** CITATIONS

SEE PROFILE

Some of the authors of this publication are also working on these related projects:

Project   Feasibility of using floating car speed data in road safety management View project

Project   Understanding and Improving Safe System Intersection Performance View project

Case studies of probe speed data

Based on presentations & projects by Chris Jurewicz

using 2015-2017 HERE and TomTom data

2021 UPDATE: Probe (aka. floating car) data improved significantly since 2017. It continues to be evaluated by transport agencies for a wide range of applications, including safety.

TAC investigations

Primary Strategic Objectives:

1. Monitor trends in speeds across the network to assist in managing the State Road Safety Strategy.

2. Provide input into speed management programs such as speed limit setting.

3. Evaluate the effectiveness of broad programs and local deployments of speed management programs and speed enforcement.

Secondary Strategic Objectives:

4. Provide relevant data to assist police in improving driver compliance with speed limits.

5. Provide information on speeds related to crash and incident patterns.

6. Understand driver speed behaviour.
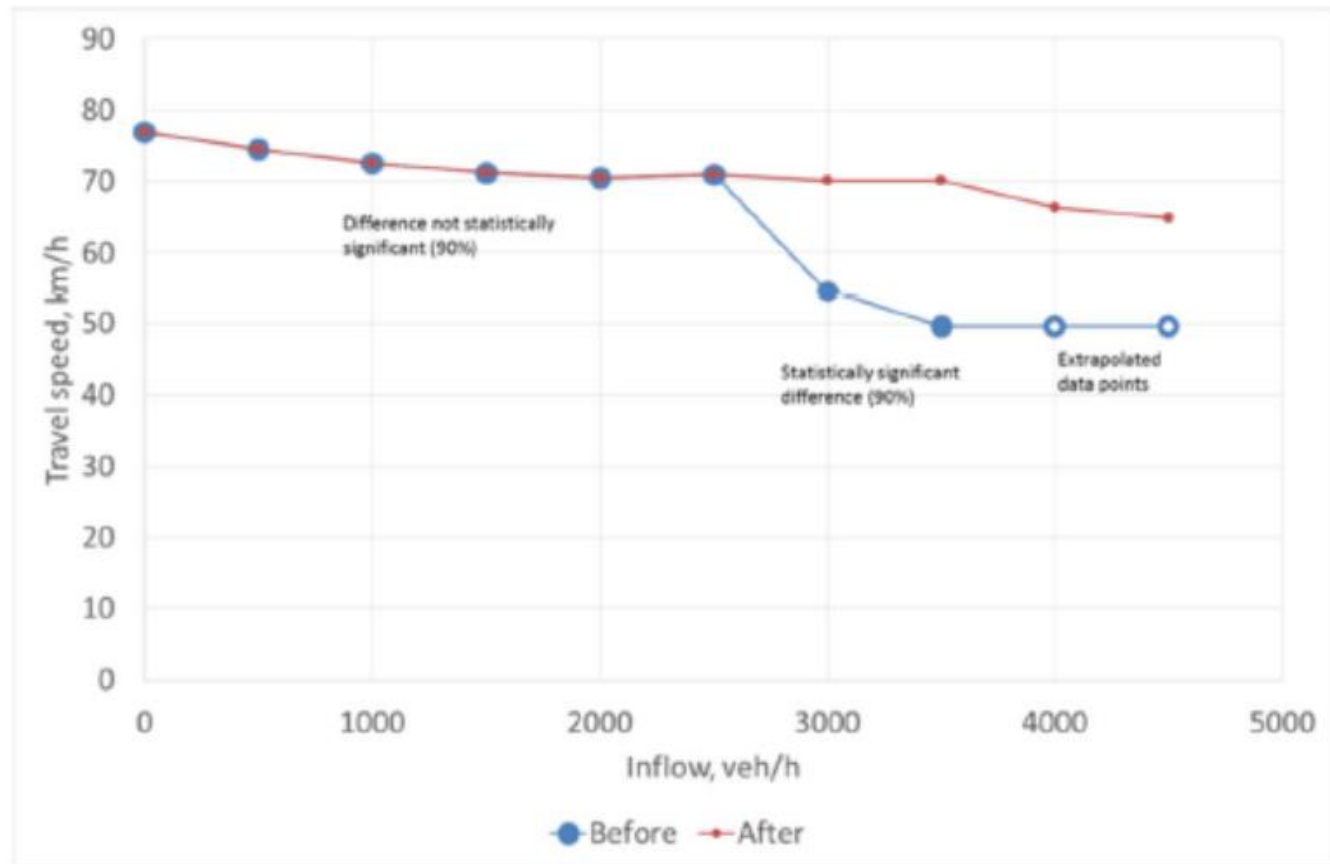
Early probe data use case 1
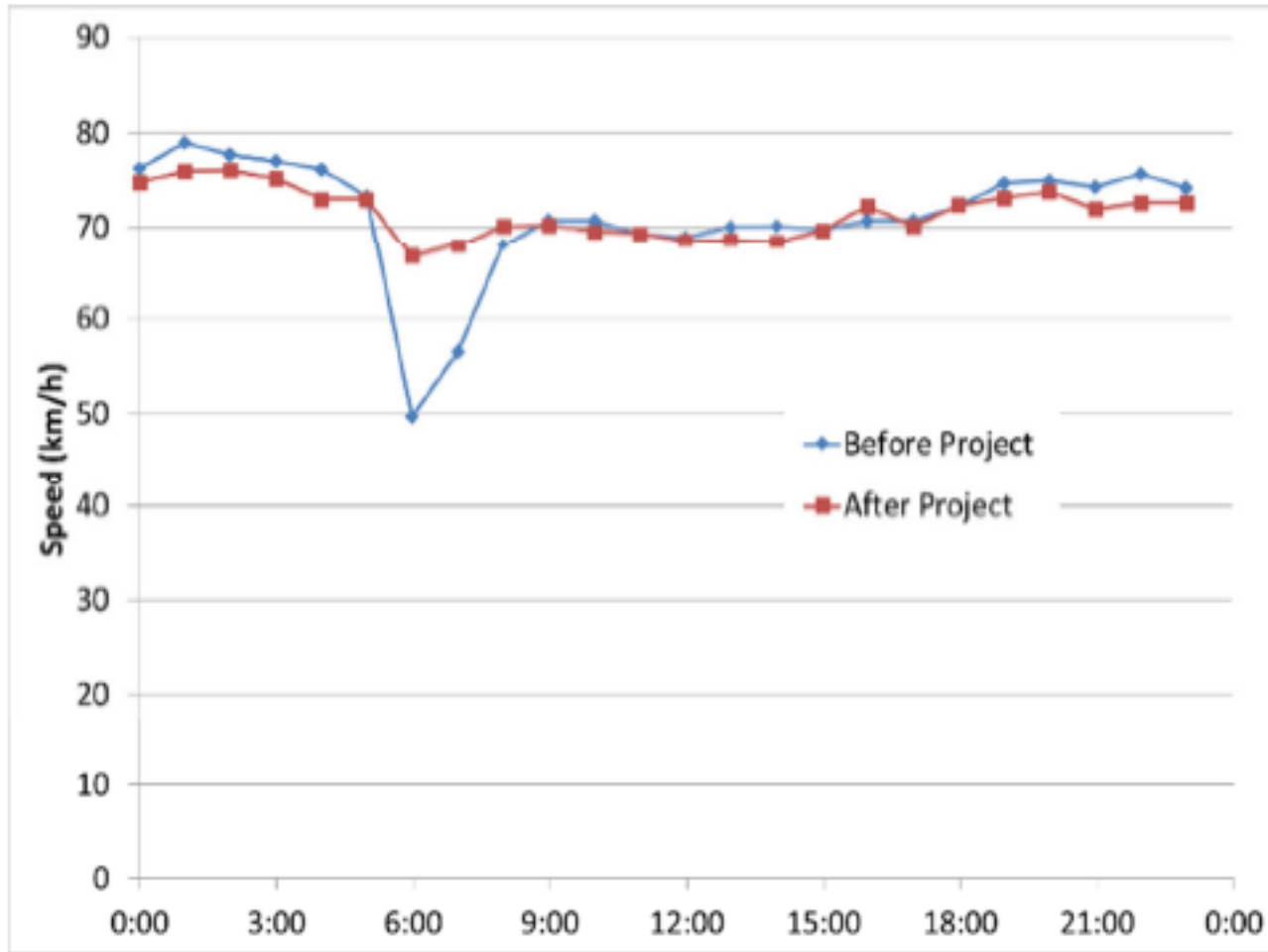
Travel speed on the Pacific Mwy segment, before and after the off-ramp widening project (Qld)
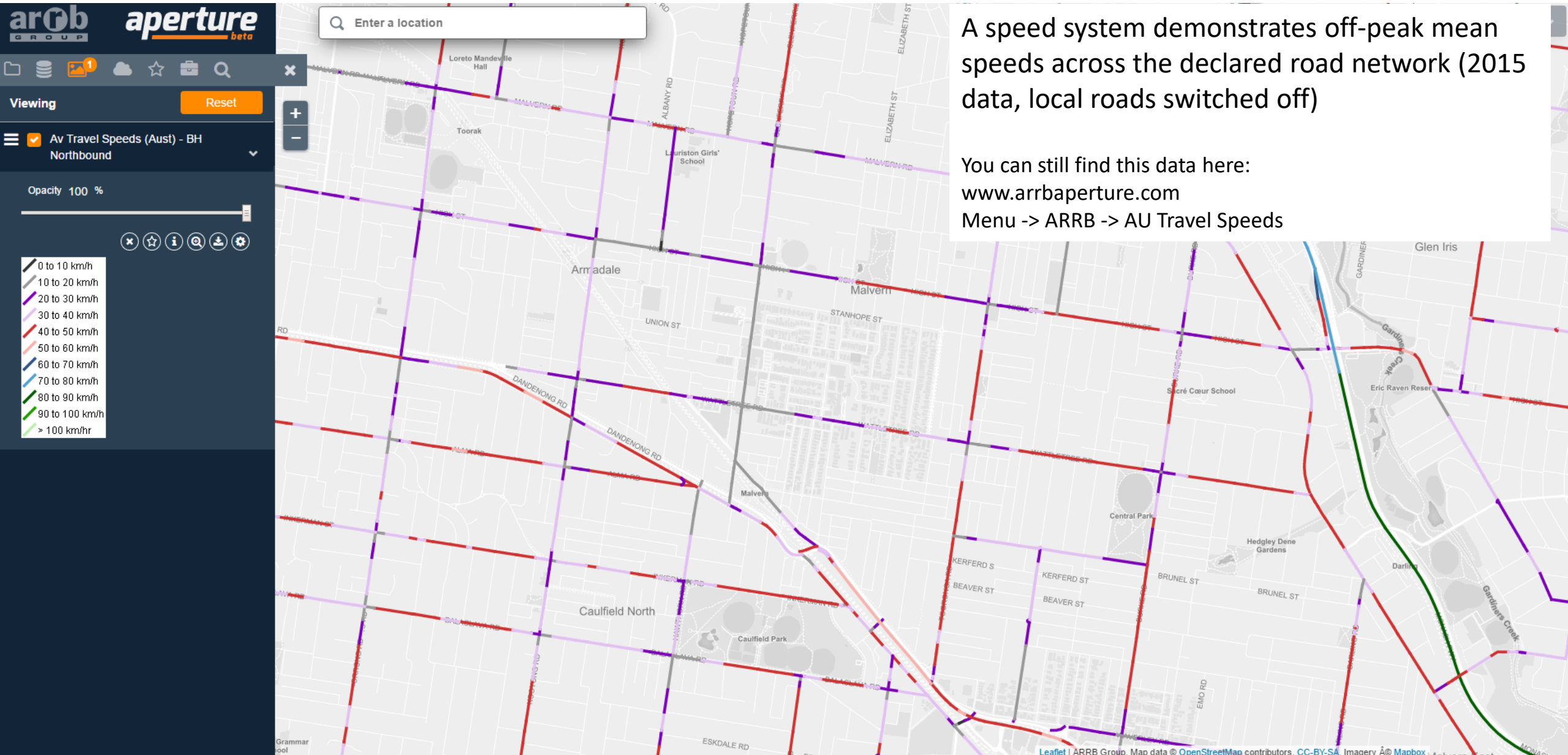Source: Espada and Inglis (2015)

Demonstrates ability to measure before/after changes in speeds due to an intervention.

Early probe data use case 2

Speed and congestion relationship of the Pacific Mwy segment, before and after the off-ramp widening project (Qld)
Source: Espada and Inglis (2015)

Early probe data use case 3

A speed system demonstrates off-peak mean speeds across the declared road network (2015 data, local roads switched off)

You can still find this data here:
www.arrbaperture.com
Menu -> ARRB -> AU Travel Speeds

Preliminary validation of probe speeds vs. point-speeds (2017)

Comparison of hourly mean speeds averaged across all 80 km/h locations
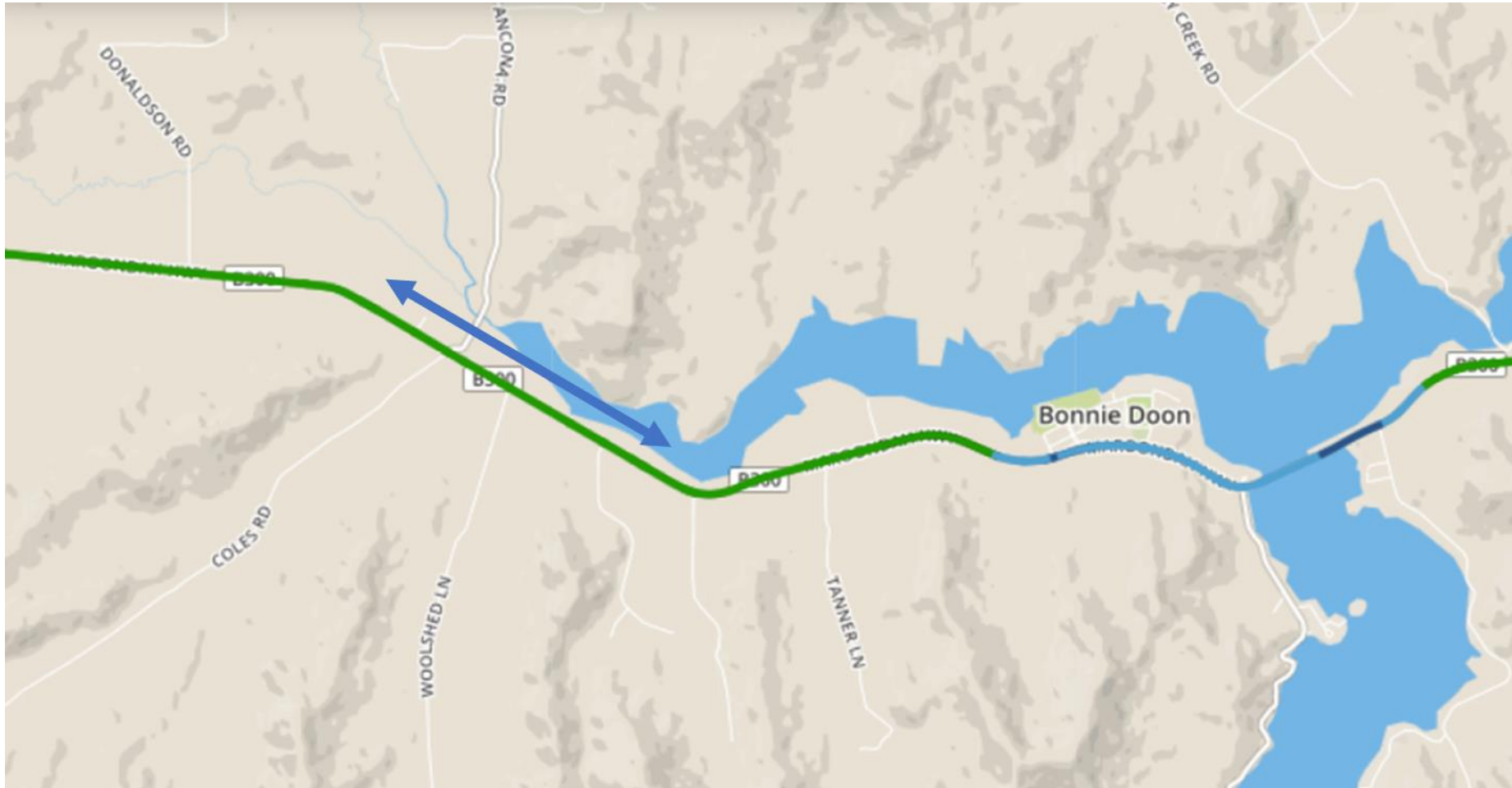Systemic difference observed
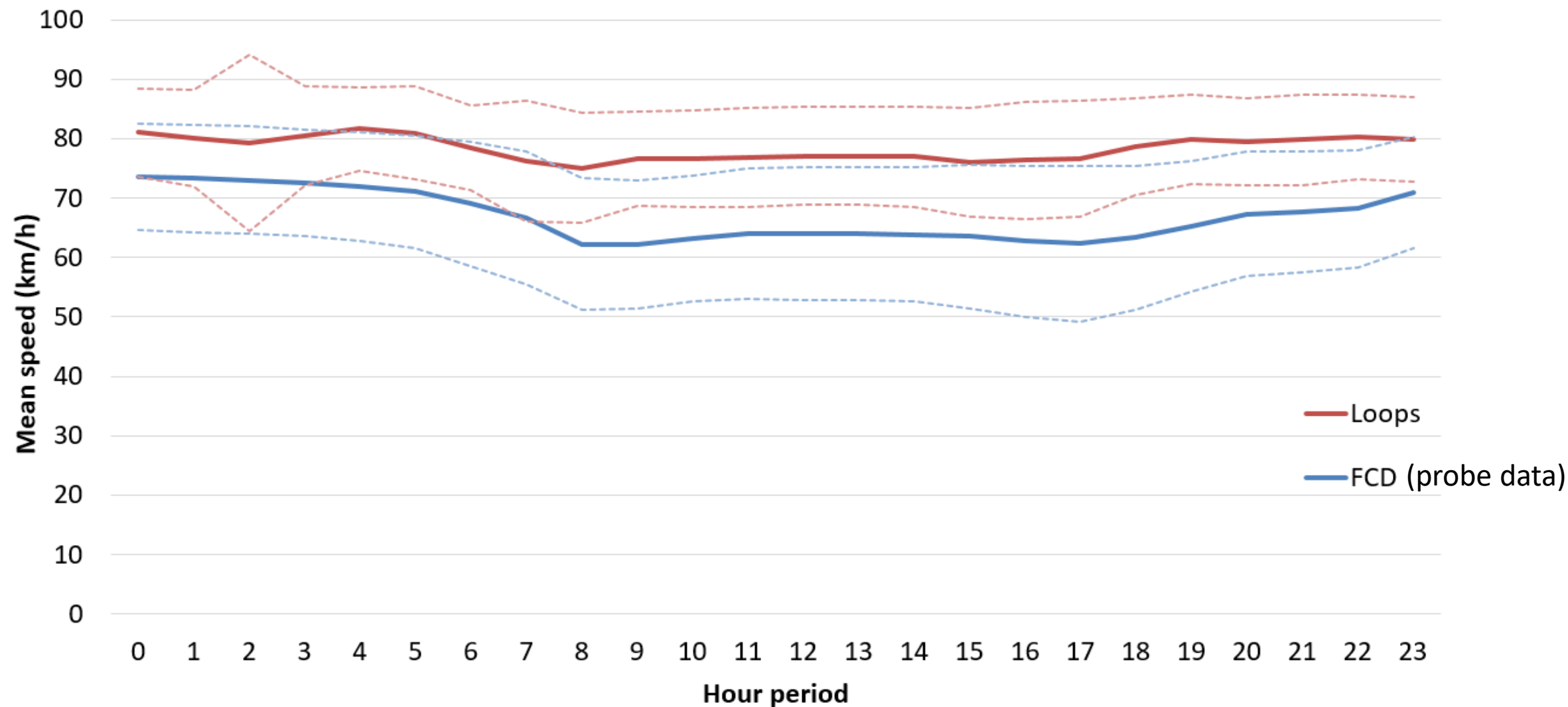
Additional analysis of probe speed data

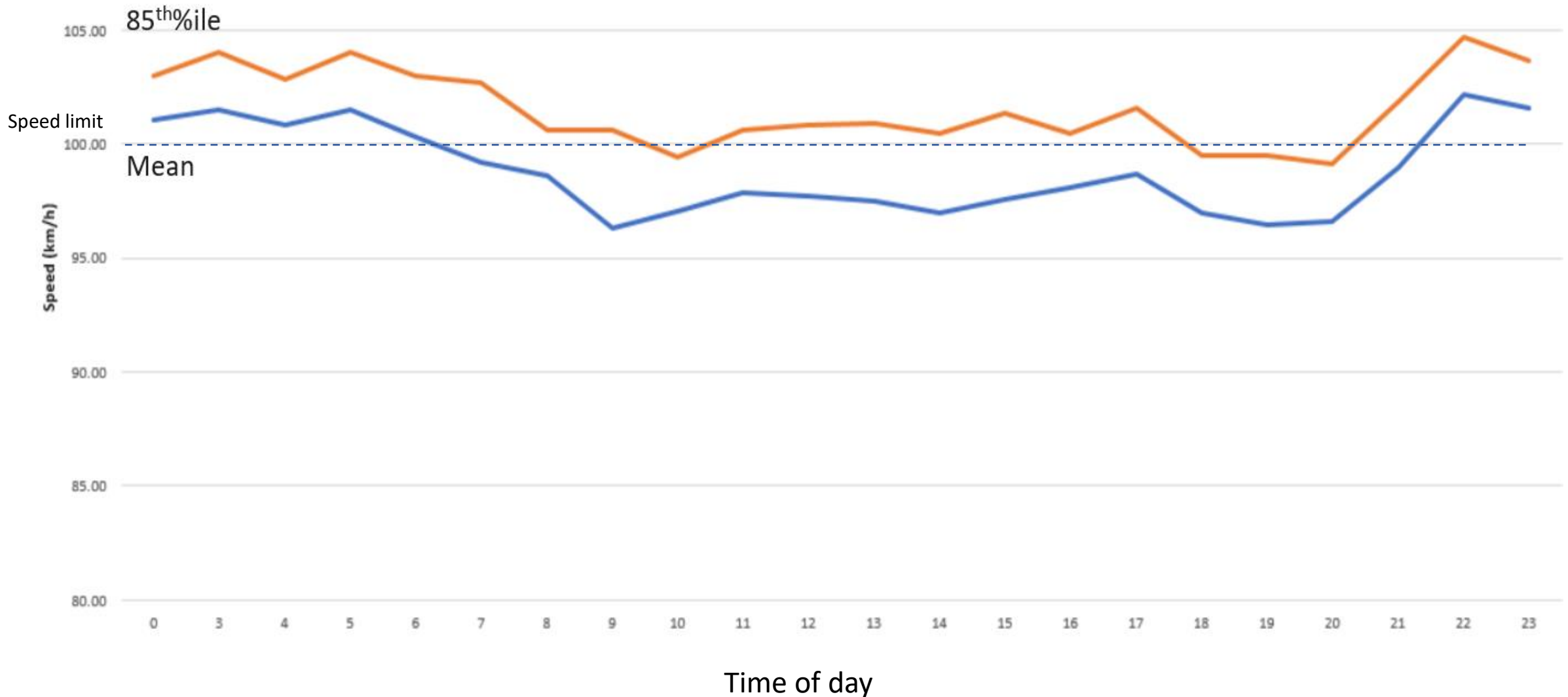**Time analysis of speed KPIs**
Maroondah Hwy, west of Bonnie Doon
1 July 2016 - 23 March 2017

Potential probe speeds use cases – enforcement

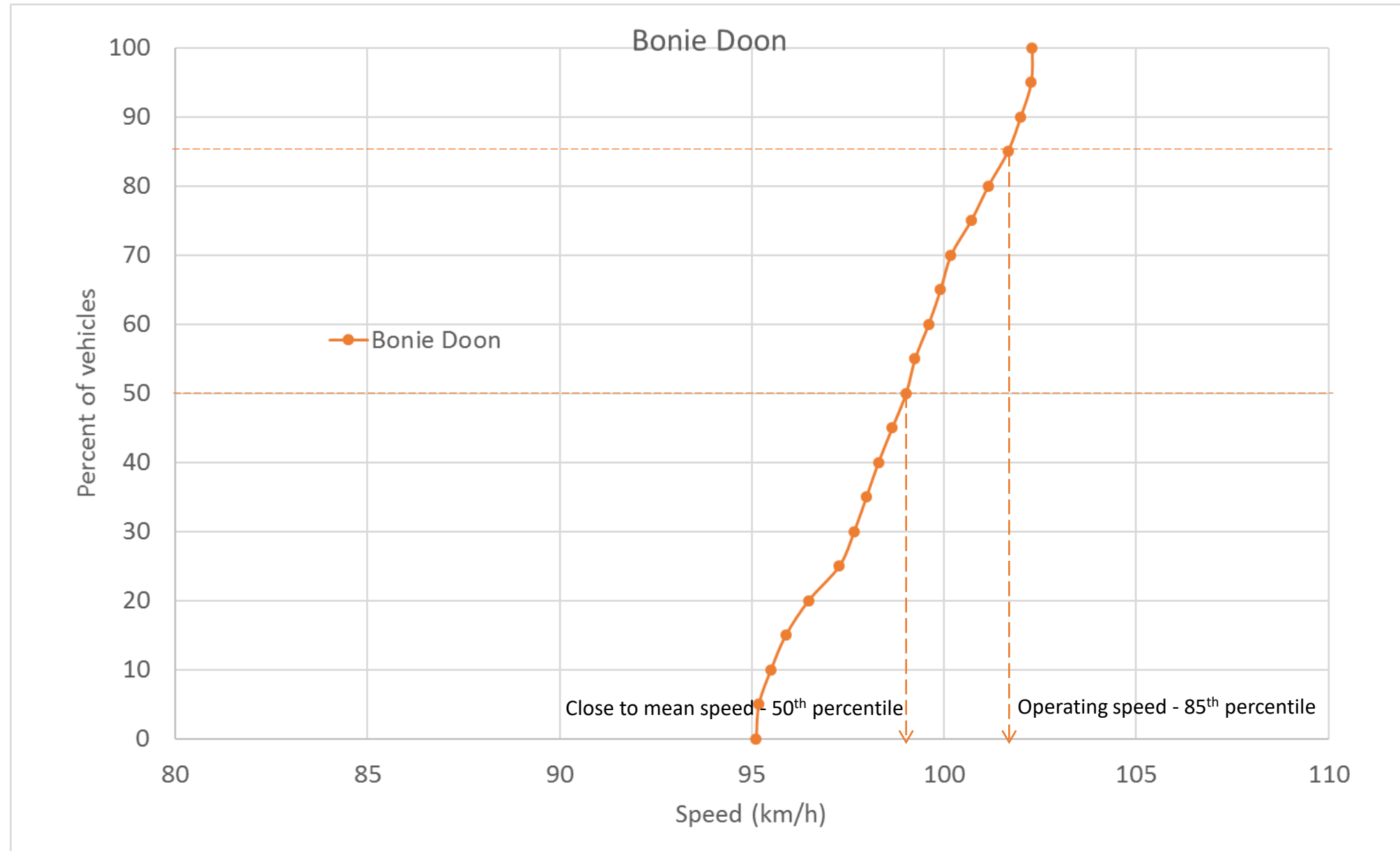Mean and 85th percentile hourly speeds for the Bonie Doon link

Percentiles

Note:

Rather free-flowing

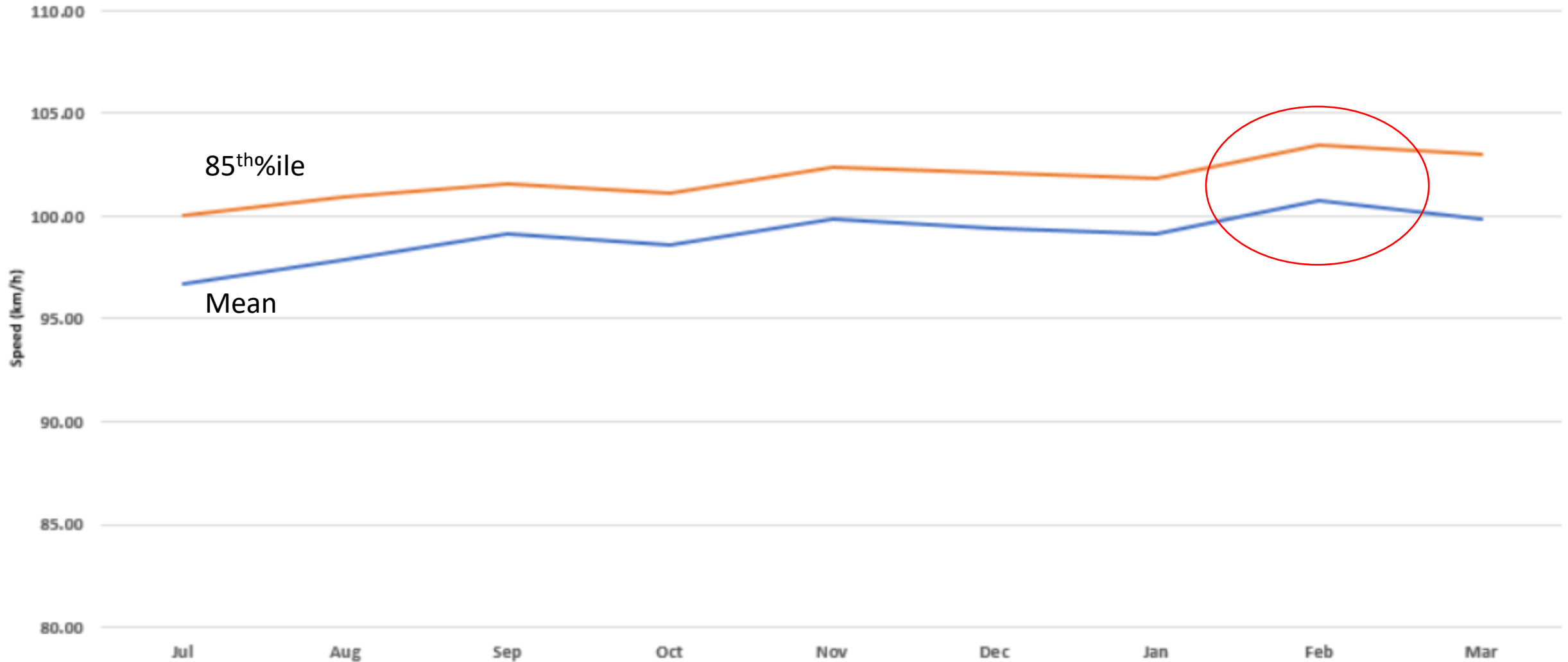Could be used as a test!

Bonie Doon

Percent of vehicles vs Speed (km/h)

Close to mean speed - 50th percentile
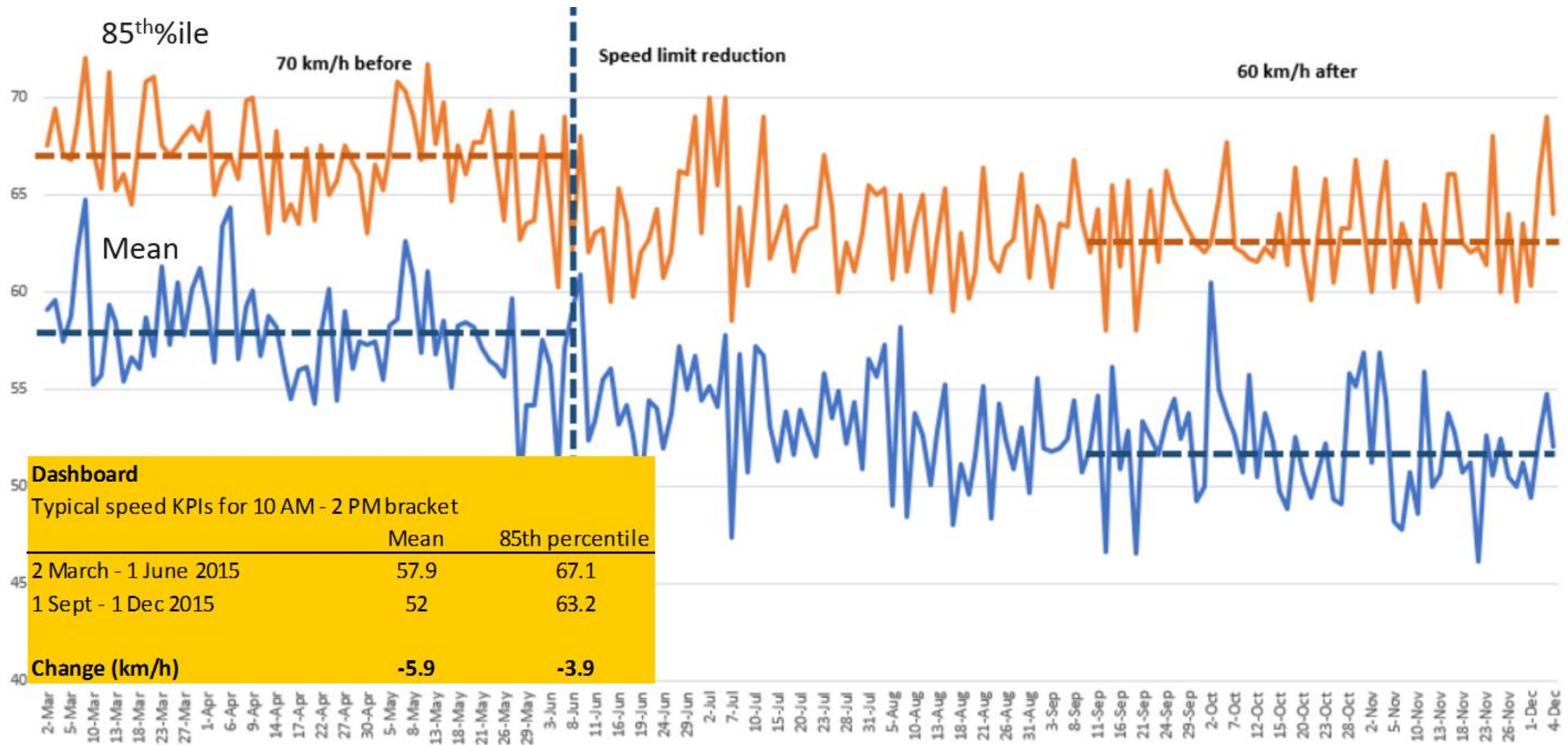
Operating speed - 85th percentile

Additional analysis of probe speed data
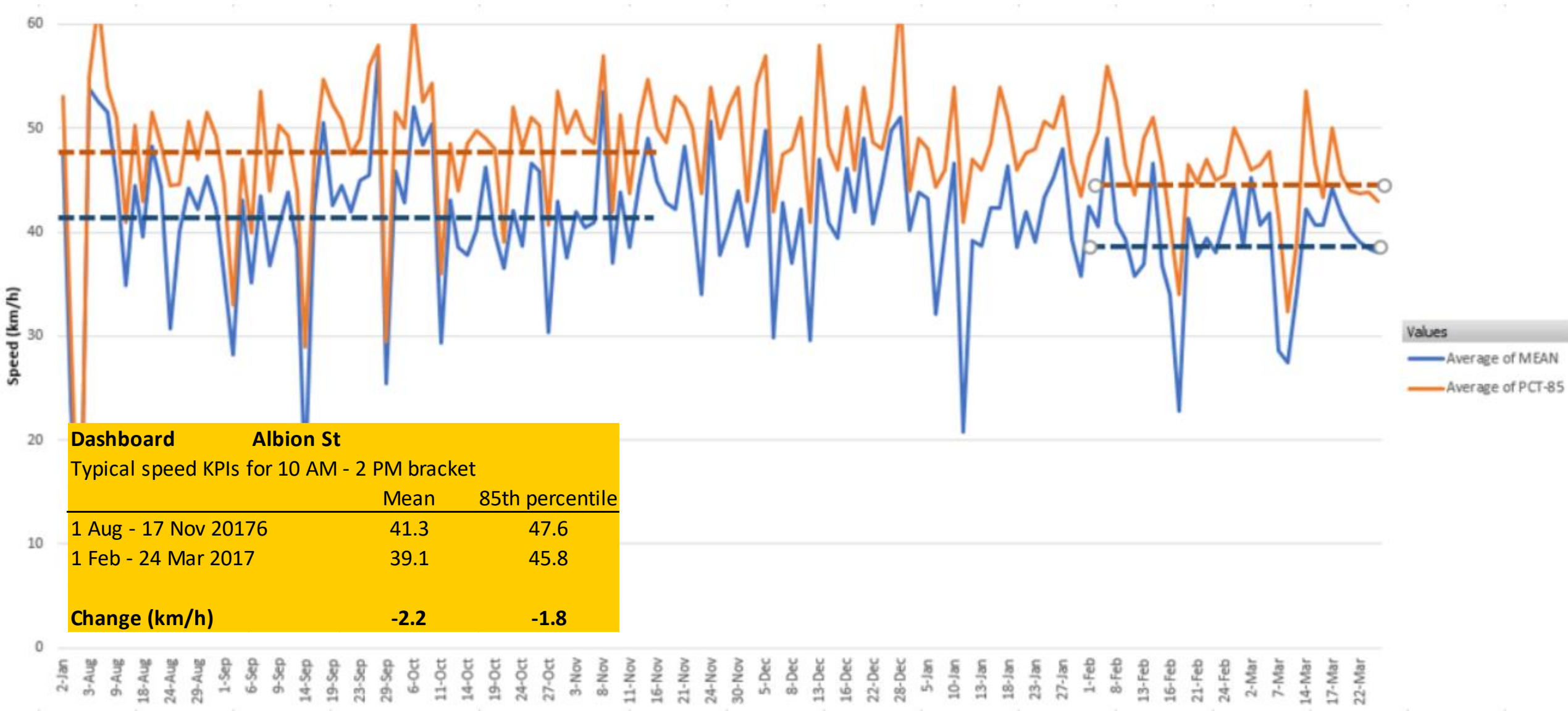
Seasonal speed changes – a holiday period problem?

Potential probe speeds use cases – evaluation 1

Bell St speed limit reduction, March-October 2015

Potential probe speeds use cases – evaluation 2

Albion St, Brunswick East, speed limit reduction from 60 to 40 km/h in geometrically constrained conditions

Dashboard	Albion St	
Typical speed KPIs for 10 AM - 2 PM bracket		
	Mean	85th percentile
1 Aug - 17 Nov 20176	41.3	47.6
1 Feb - 24 Mar 2017	39.1	45.8
Change (km/h)	-2.2	-1.8

Values
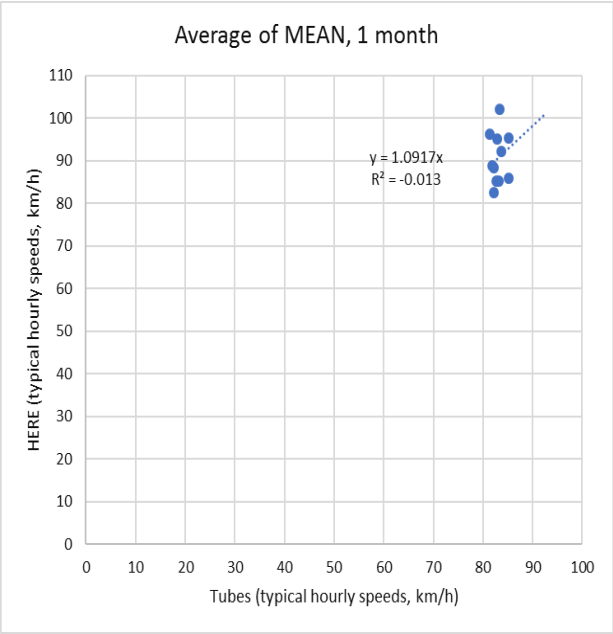— Average of MEAN
— Average of PCT-85

Additional analysis of distribution
Albion St, Brunswick East, speed limit reduction from 60 to 40 km/h in geometrically constrained conditions
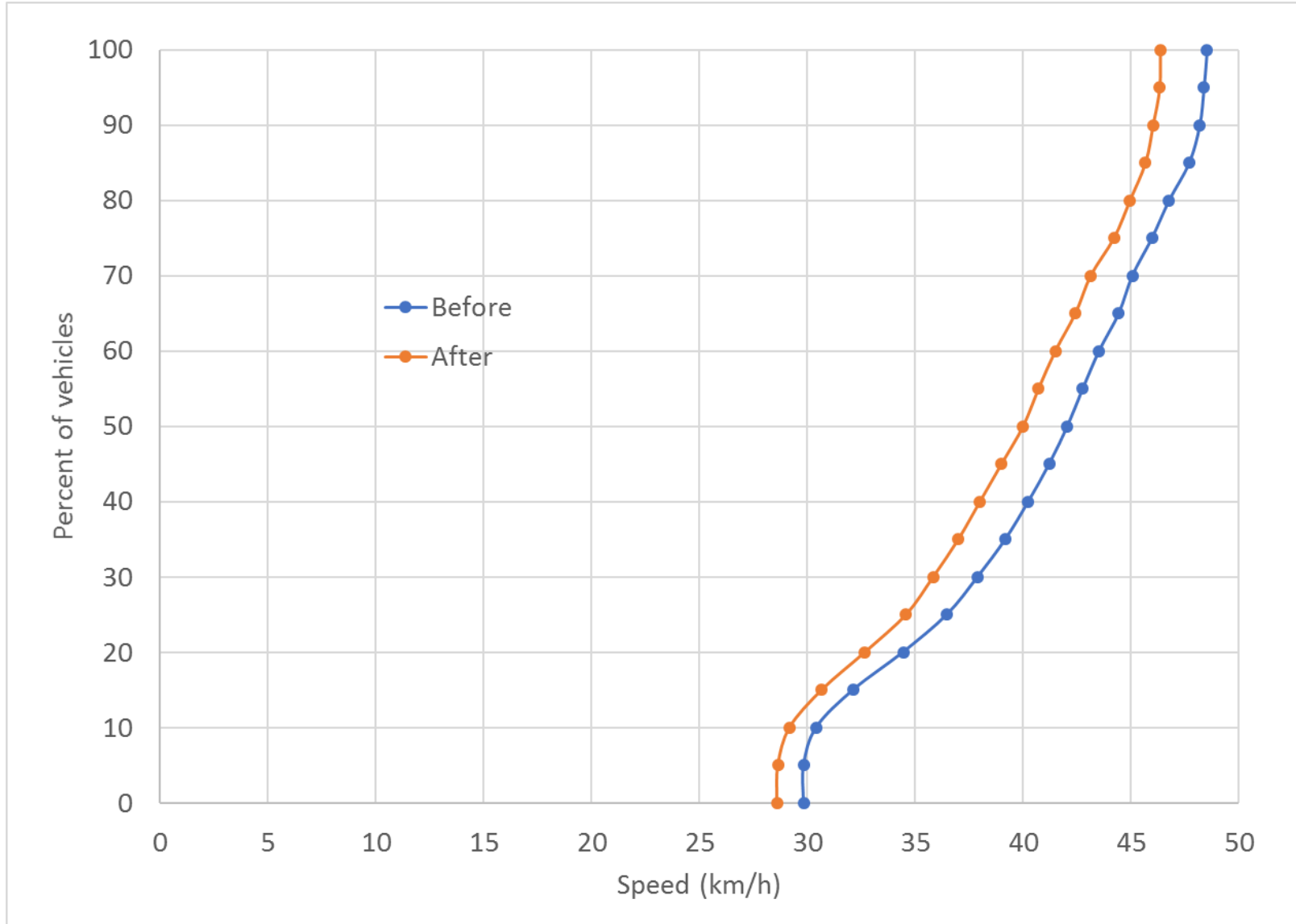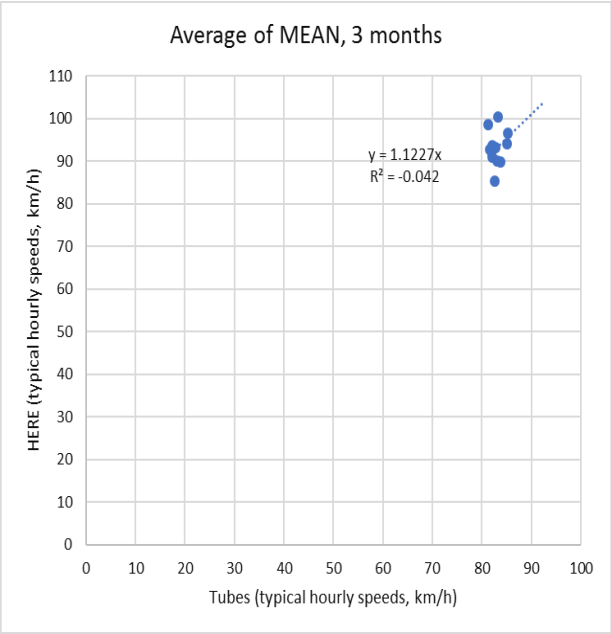
Demonstration of the effect of probe collection period – Paynesville Rd rural road site

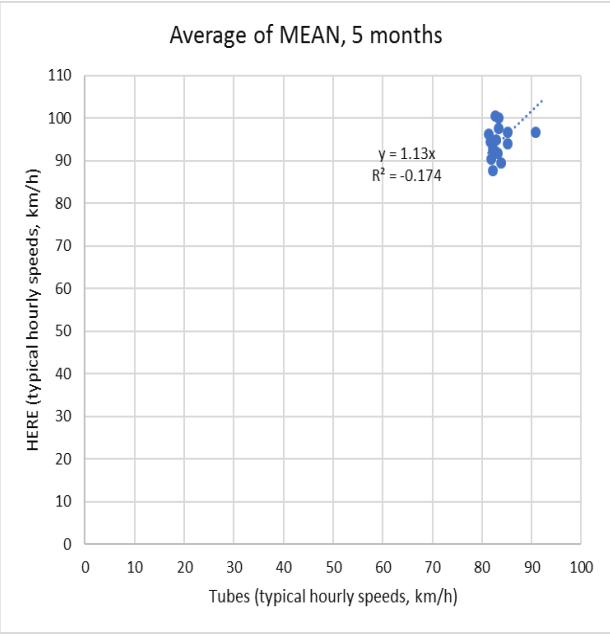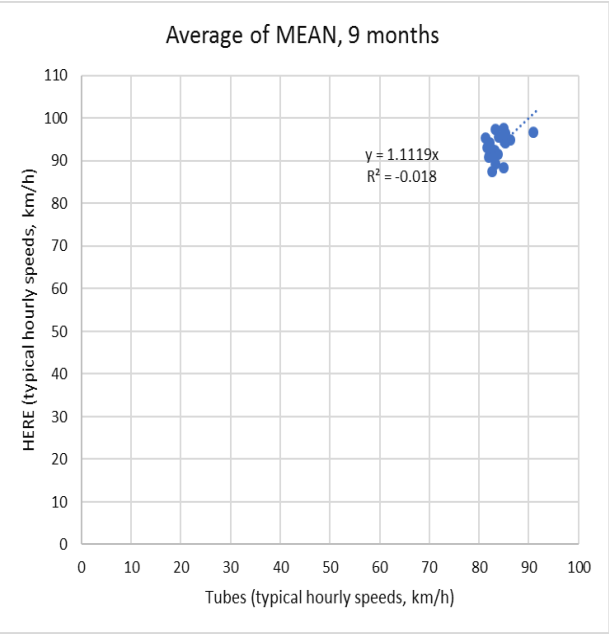| 1 month	3 months	5 months	9 months

With longer probe data collection period, it gradually converges towards the mean measured with tube counters (AADT est. 800 vpd, probe data from 2017)

Future potential – speed effects of geometric changes at a roundabout

- Urban roundabout was upgraded resulting in geometric changes

- Roundabout was segmented into very short TomTom links (15-45 m), high traffic volumes

- Geometry of some links was tightened (more curved), some become less tight, other remained the same after the upgrade

- Probe data showed speeds dropped when geometry became tighter, and increased when straightened

- Probe data algorithms excluded stopping vehicles, only flowing traffic

- Might be useful in evaluating designs before crash data is available

PM Peak speeds only - before-after analysis (Dec 2015 vs. Nov 2017, no controls)

Link name	Avg speed difference	t-value	p-value	Geometry change
Mickleham North approach	0.32	-0.57032	0.57	Same
Mickleham North departure	-1.63	4.086085	0.00	Same
Melrose South approach	-5.38	10.60621	0.00	Tighter
LT from Melrose south	-7.43	3.603235	0.00	Tighter
Melrose South departure	0.68	-1.79773	0.07	Same
Broadmeadows South approach	-5.41	5.543378	0.00	Tighter
Broadmeadows South departure	-0.05	0.049004	0.96	Same
Melrose North approach	-0.52	0.671085	0.50	Tighter
Melrose North departure	3.67	-4.95292	0.00	Less tight
N quadrant circ lane	-3.47	5.566984	0.00	Tighter
NE quadrant circ lane	1.19	-3.25161	0.00	Same
SE quadrant circ lane	0.73	-1.10272	0.27	Less tight
S quadrant circ lane	-0.82	2.332733	0.02	Less tight
SW circulating lane	-1.18	3.838971	0.00	Less tight

AvgSpeed change		
Tighter	-4.44	km/h
Same	0.10	km/h
Less tight*	0.60	km/h

* most were circulating lanes where it is hard to tell - used by multiple movements

One departure was made less tight with noticeable increase in speeds

Future steps

- Understand and document probe speed uses & limitations in specific use cases.

- Develop new practice, e.g.: probe speeds calibration, technical guidance.

- Create user-friendly system for speed monitoring and evaluations anywhere.

- Work with data providers to include pedestrian and cyclist data.

- Potential to develop new generation of speed-safety performance models.