

SIRWEC

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**New results for analyzing and modelling of weather impact
on local traffic flow under the WOLKE project**

by

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R&D Project “WOLKE”

(= Weather-related calibration of traffic models for optimized traffic control)

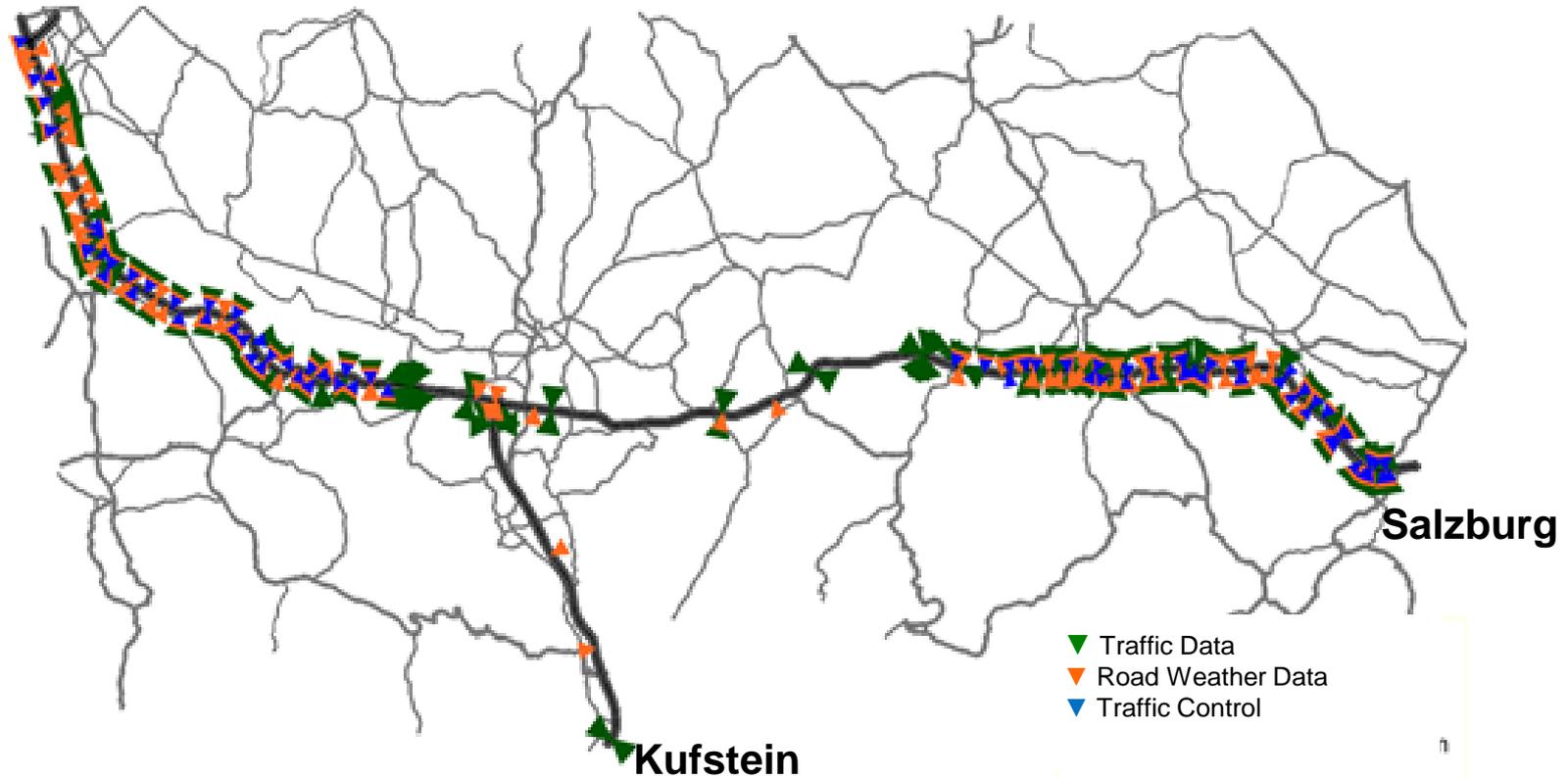
Project Partners:

- **AIT Austrian Institute of Technology, Vienna (Austria)**
- **VOR / ITS Vienna Region (Austria)**
- **UBIMET GmbH, Vienna (Austria)**
- **PTV AG Vienna, Karlsruhe, Munich (Germany)**
- **University of Stuttgart, Department for Transportation planning and traffic engineering, Stuttgart (Germany)**
- **ZVM Centre of Traffic Management of the Bavarian Highway Directorate, Munich**
- **micKS MSR GmbH, Oberstdorf**

Duration: January 2011 – June 2013 (30 month)

Pilot Area for local Road Weather influence on Traffic Flow

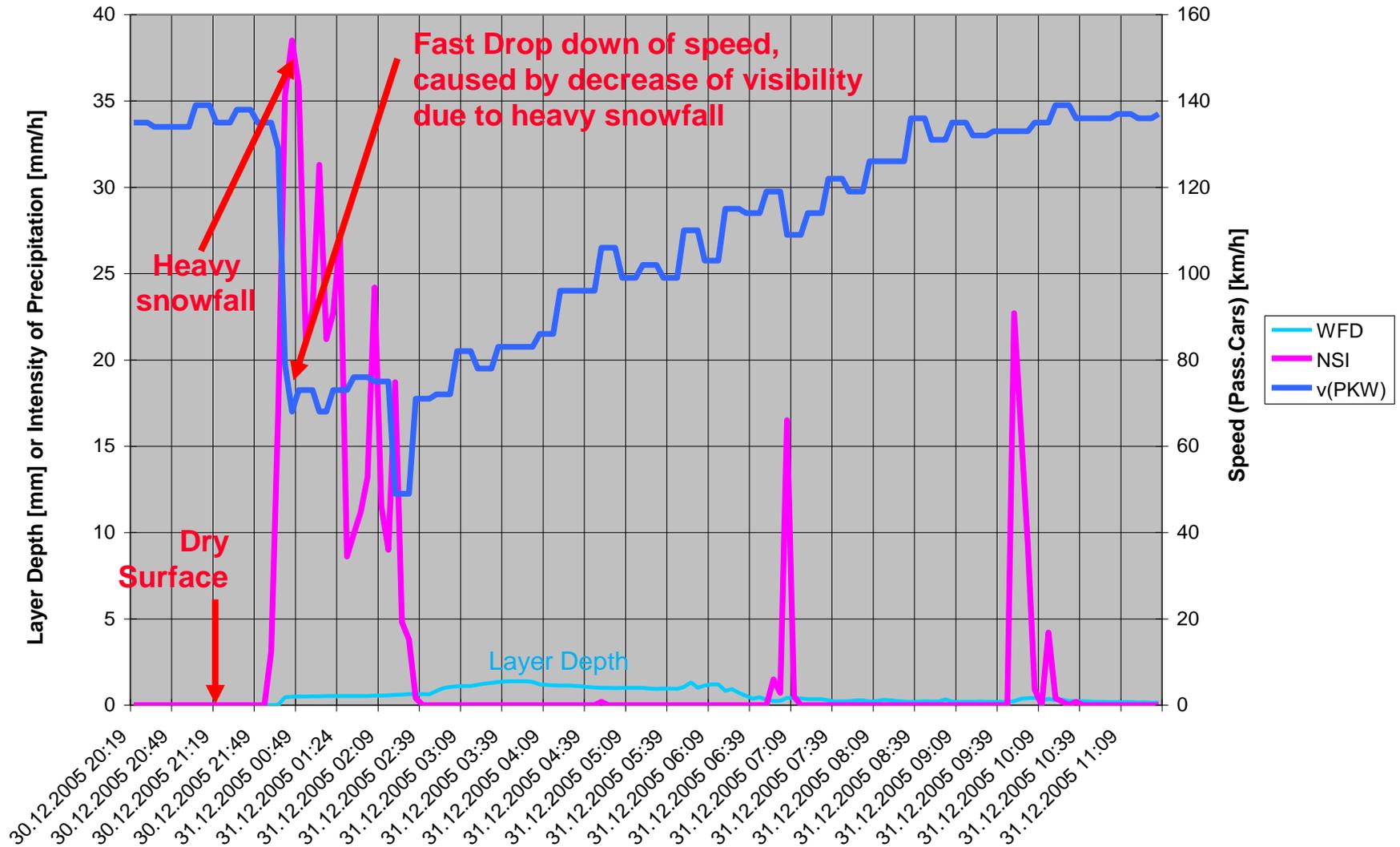
Munich



About 30 cross sections available with 1 minute interval Traffic data
and road weather data

Available Data Period: January 2008 until March 2012

Example for impact of heavy snowfall on traffic speed

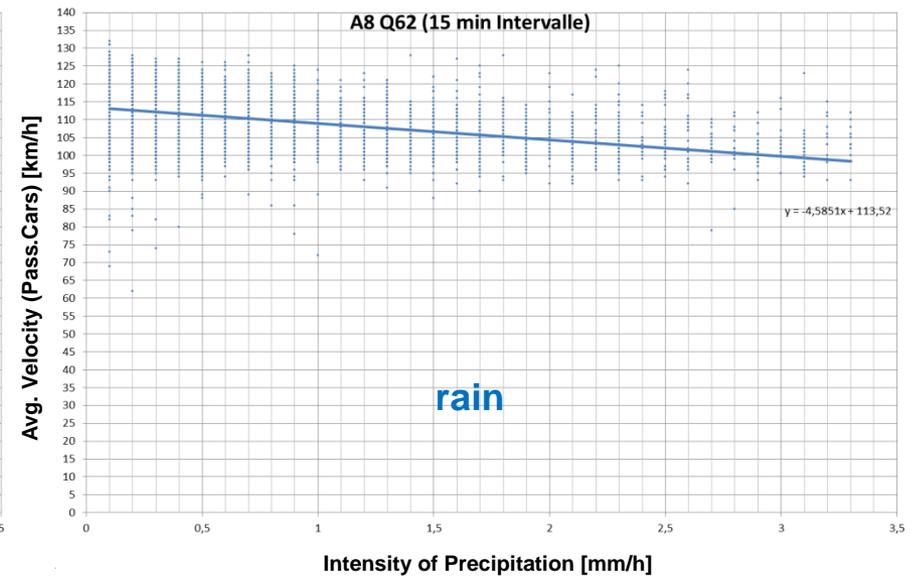
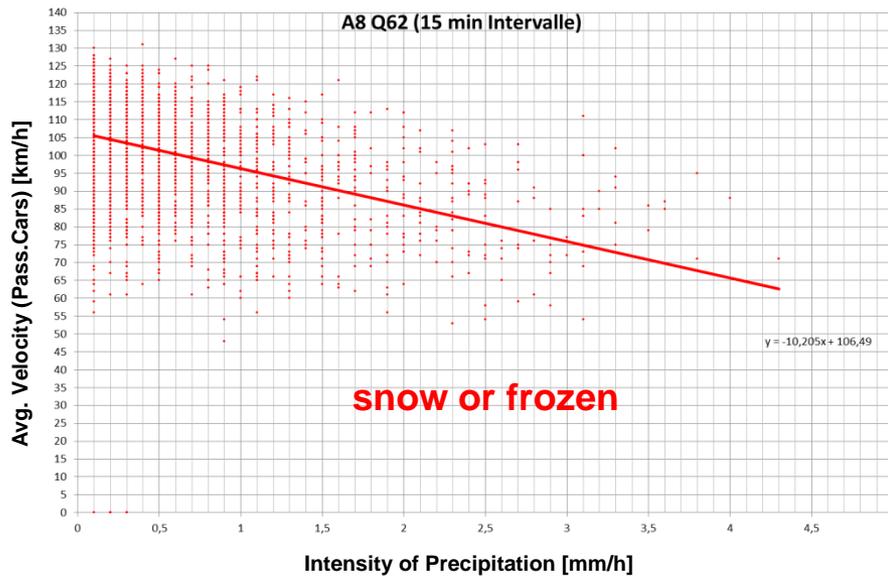


Finding relevant influencing road weather variables

Analyzing correlation between different weather variables and traffic speed under different aggregation intervals.

Best suitable interval: 15 minutes

Example: impact of precipitation intensity on car speed

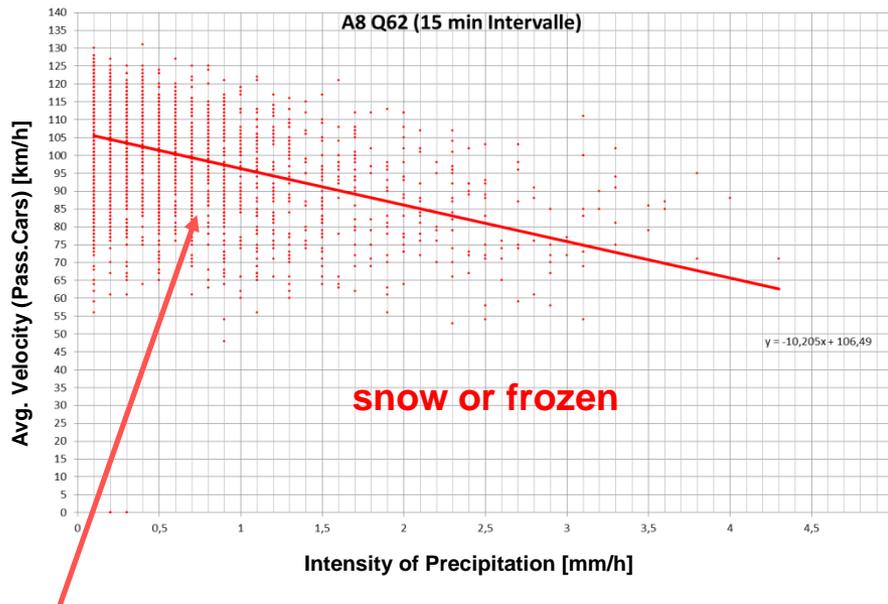


Finding relevant influencing road weather variables

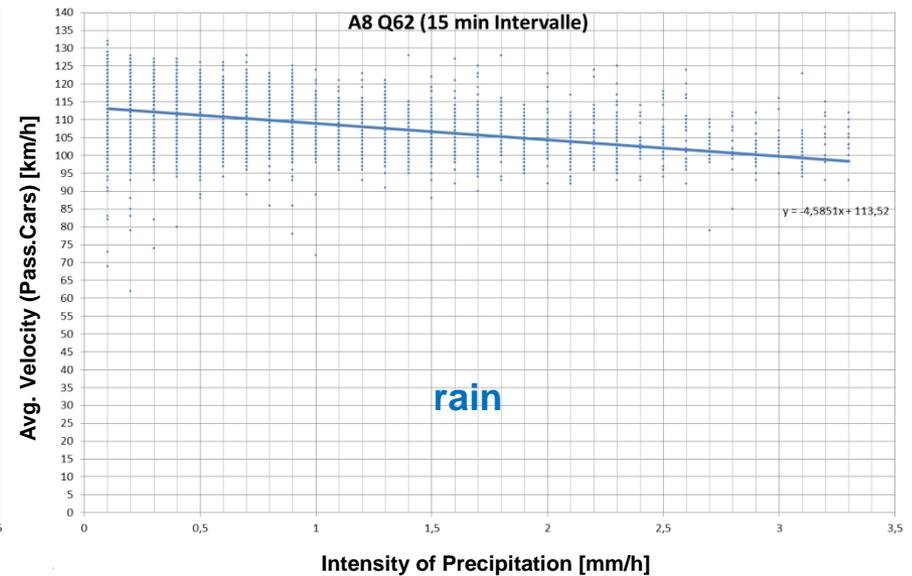
Analyzing correlation between different weather variables and traffic speed under different aggregation intervals.

Best suitable interval: 15 minutes

Example: impact of precipitation intensity on car speed



High variances to be expected



What most significant influencing variables could be found?

Road Weather Variables to be considered:

- ✓ Intensity of Precipitation
- ✓ Type of precipitation
(could be approximated by using Wet Bulb Temperature)
- ✓ Wet Bulb Temperature
(derived from Air Temperature and Humidity)
- ✓ Road Surface Temperature
- ✓ Water Layer Thickness
(could be approximately derived from precipitation by using a water layer model)

Road Section Properties to be considered:

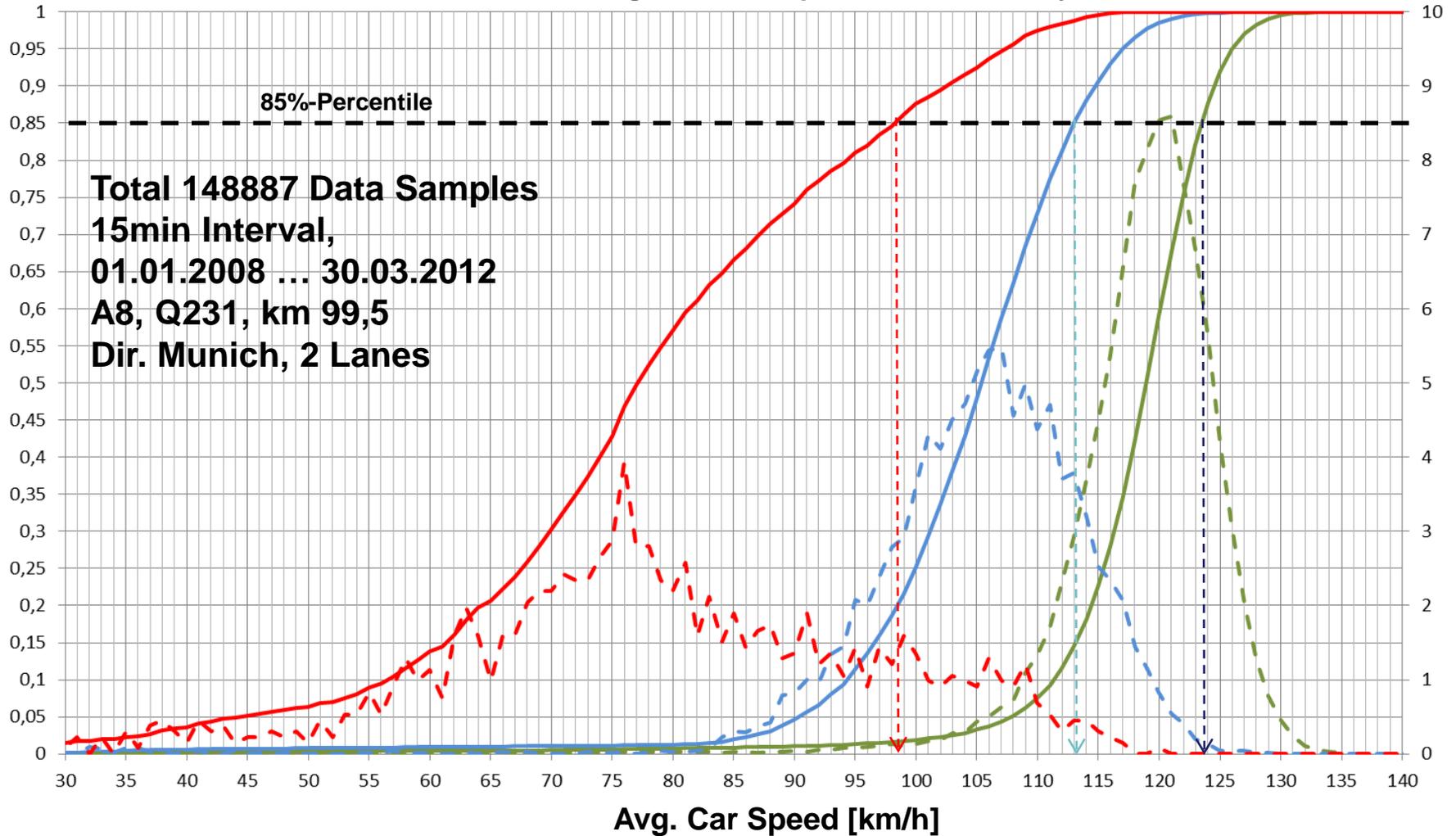
- ✓ Number of Lanes
- ✓ Curve Radius
- ✓ Transversal and Longitudinal Slope
- ✓ Stopping Sight Distance (constructive)

Used Classes for Road Weather Condition

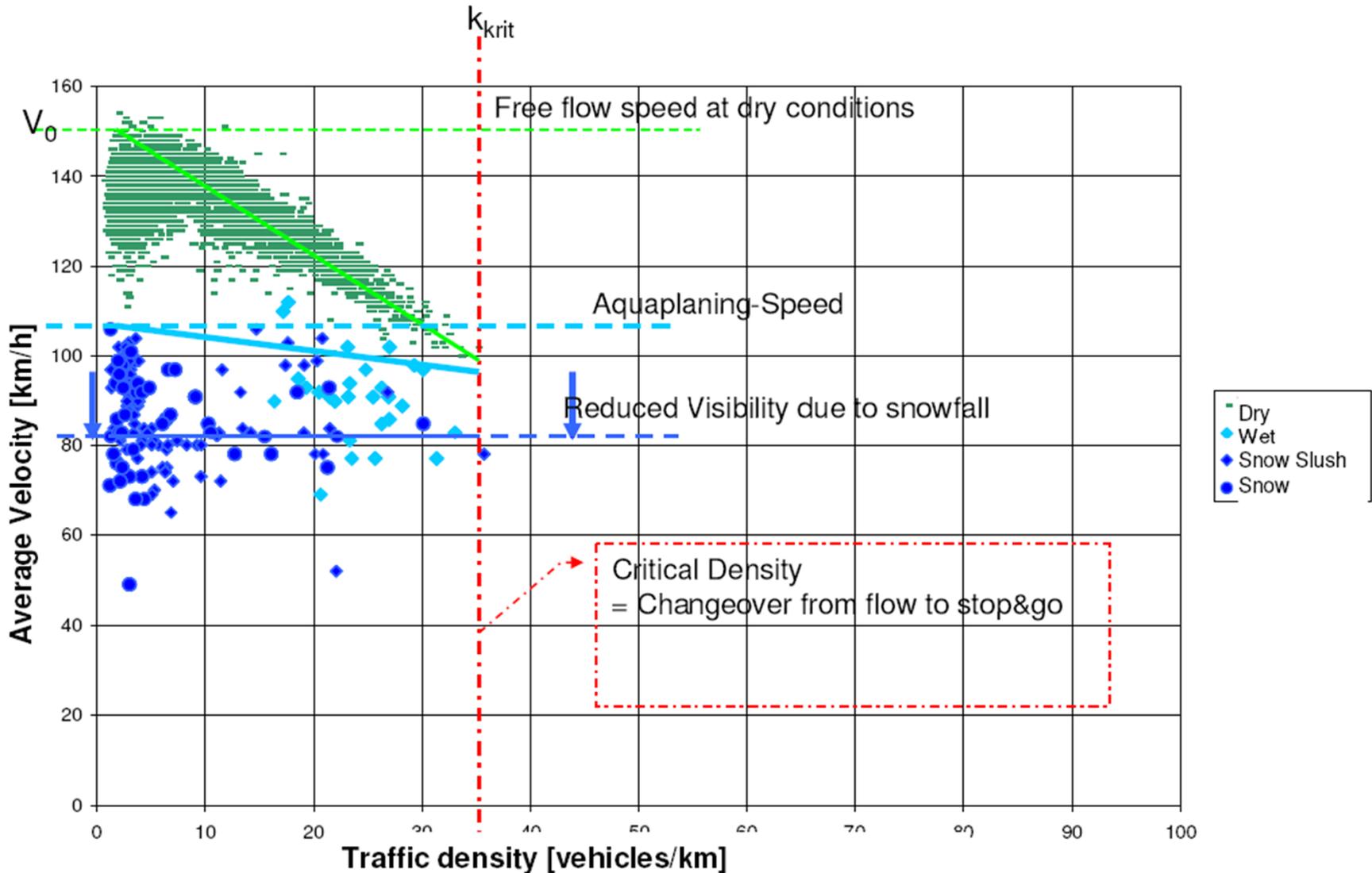
Class	Description	Summary Group Class	Type of Precipitation	Intensity of precipitation	Wet Bulb Temperature	Road Surface Temperature
(enum)	(enum)	(enum)	(enum)	(mm/h)	(°C)	(°C)
1	dry	Dry	no	0	*	*
2	wet road / rain	Wet	rain	< 0,5	>= 0	> - 2
3	slippery road / rain		rain	< 0,5	>= 0	<= - 2
4	wet road / medium rain		rain	>= 0,5	>= 0	> - 2
5	slush / snow	Snow/Ice	snow	< 0,5	< 0	> - 2
6	snowy road / snow		snow	< 0,5	< 0	<= - 2
7	slush / medium snow		snow	>= 0,5; < 3,5	< 0	> - 2
8	snowy road / medium snow		snow	>= 0,5; < 3,5	< 0	<= - 2
9	slush / heavy snow		snow	>= 3,5	< 0	> - 2
10	snowy road / heavy snow		snow	>= 3,5	< 0	<= - 2

DF_Dry DF_Wet DF_Snow H_Dry H_Wet H_Snow

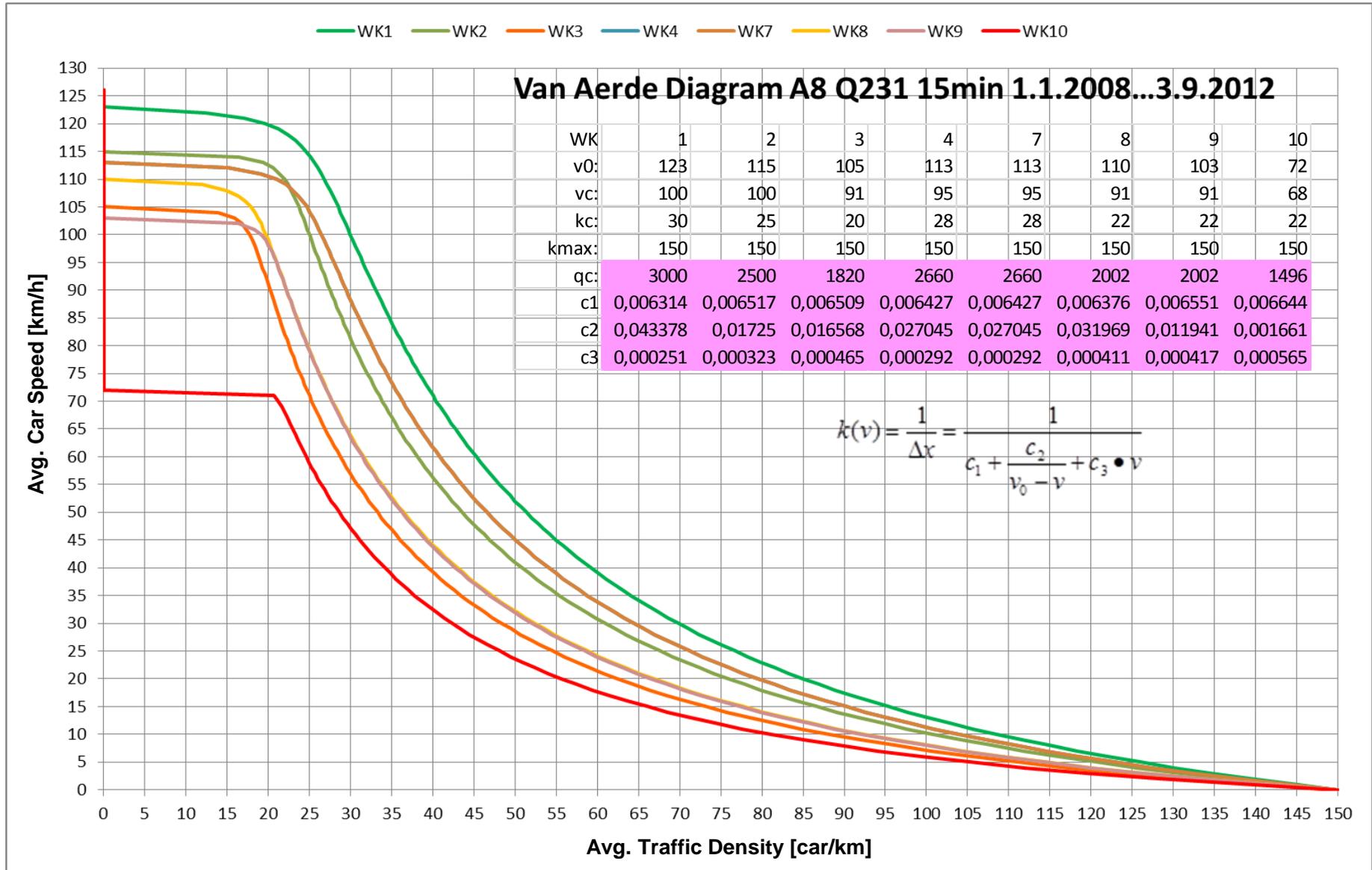
Distribution Function and Histogram of Car Speed due to summary Weather Class



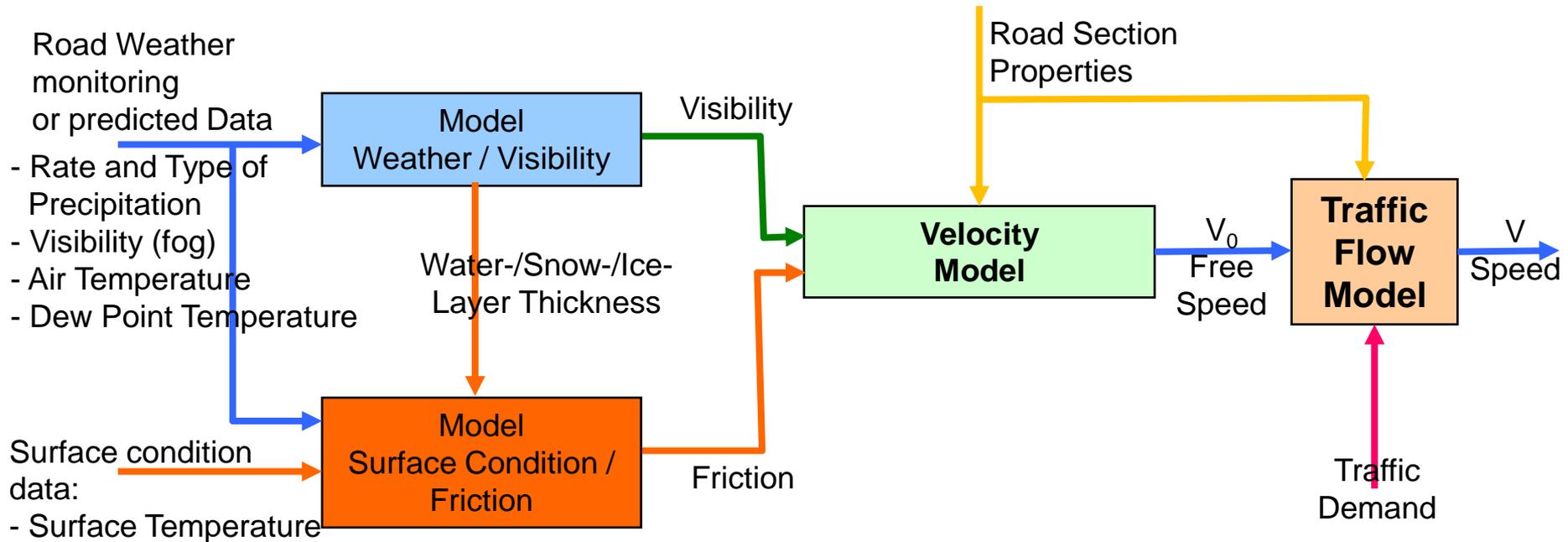
Analysis of Traffic Speed/Density Relation due to Road Surface Conditions



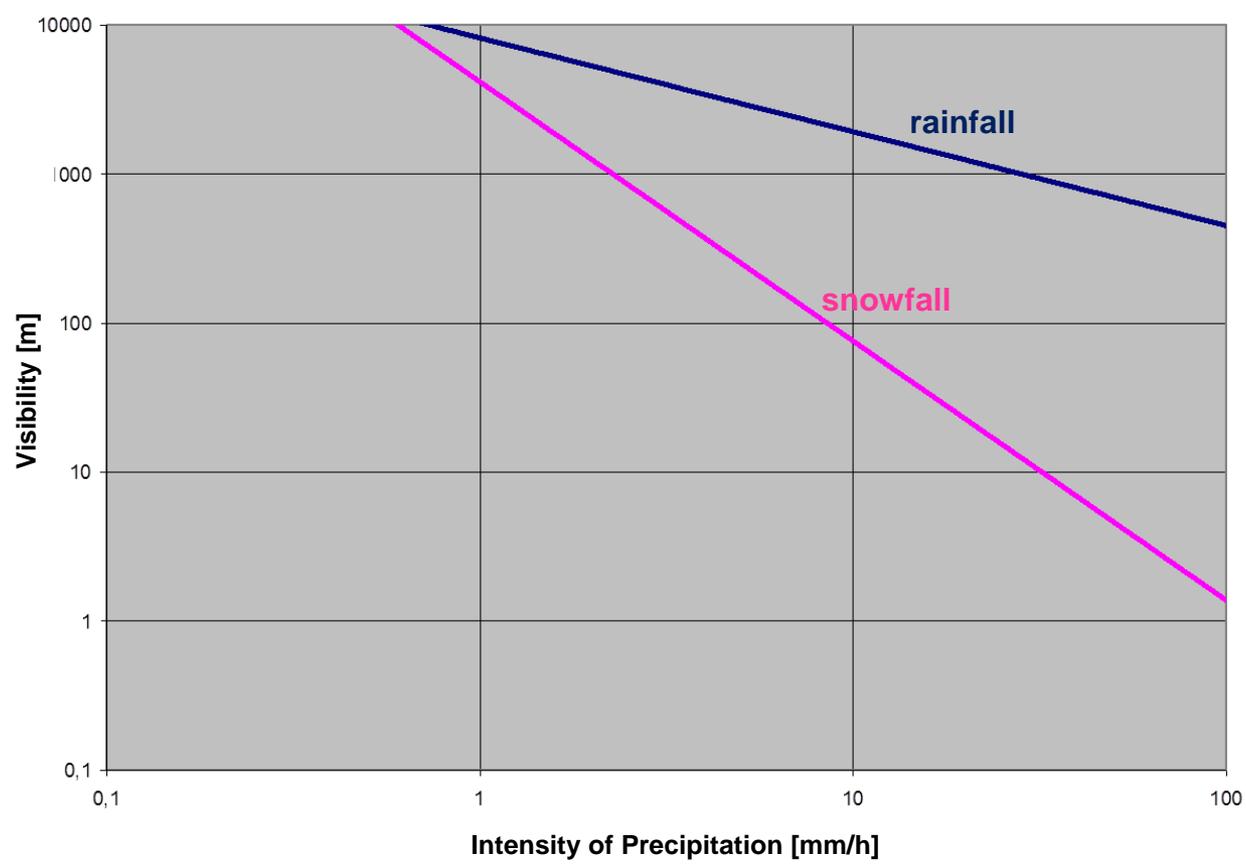
Parameter Estimation of van Aerde equation



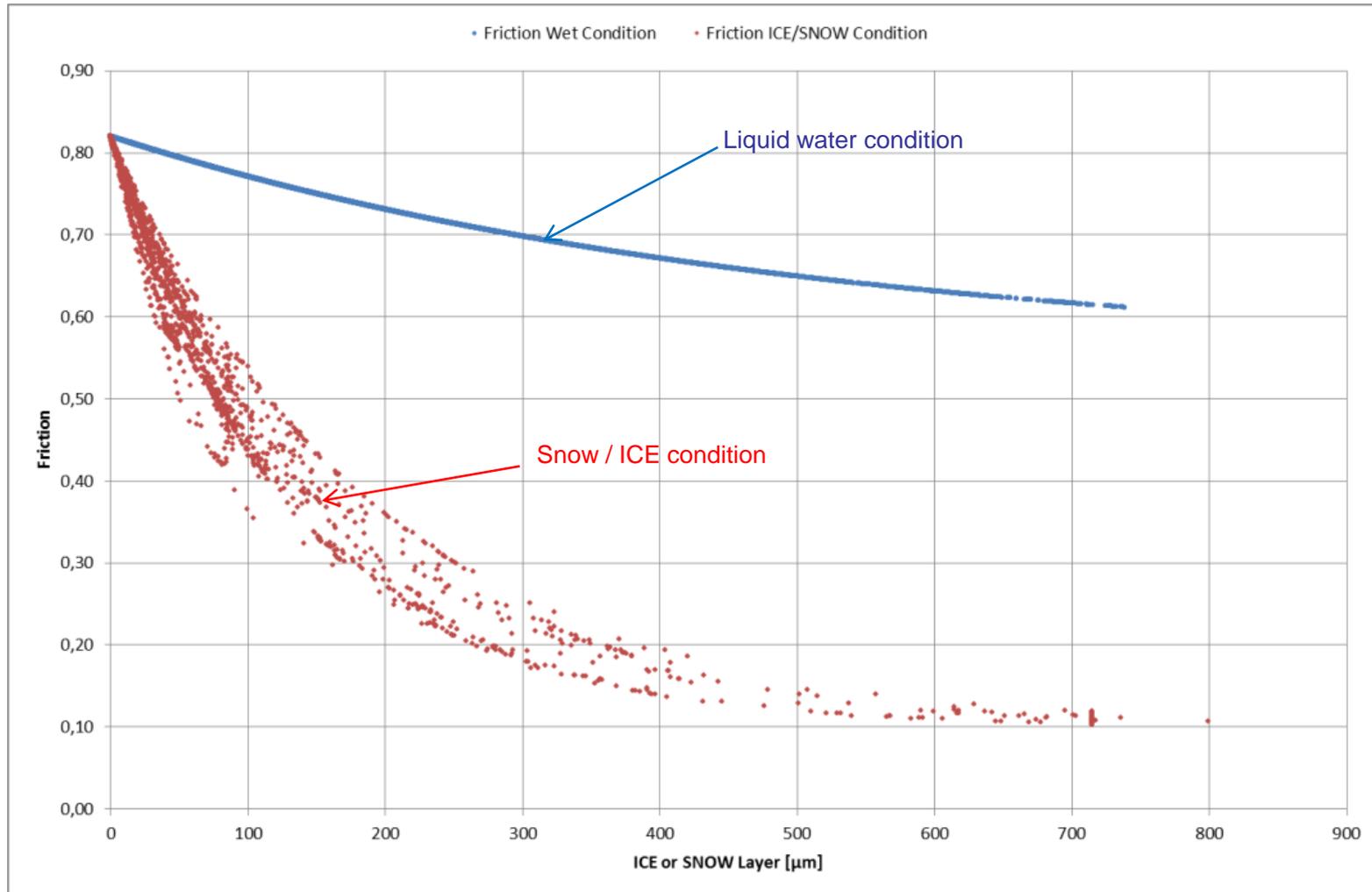
Structure of the Free Flow Speed model



Modelling visibility due to Precipitation

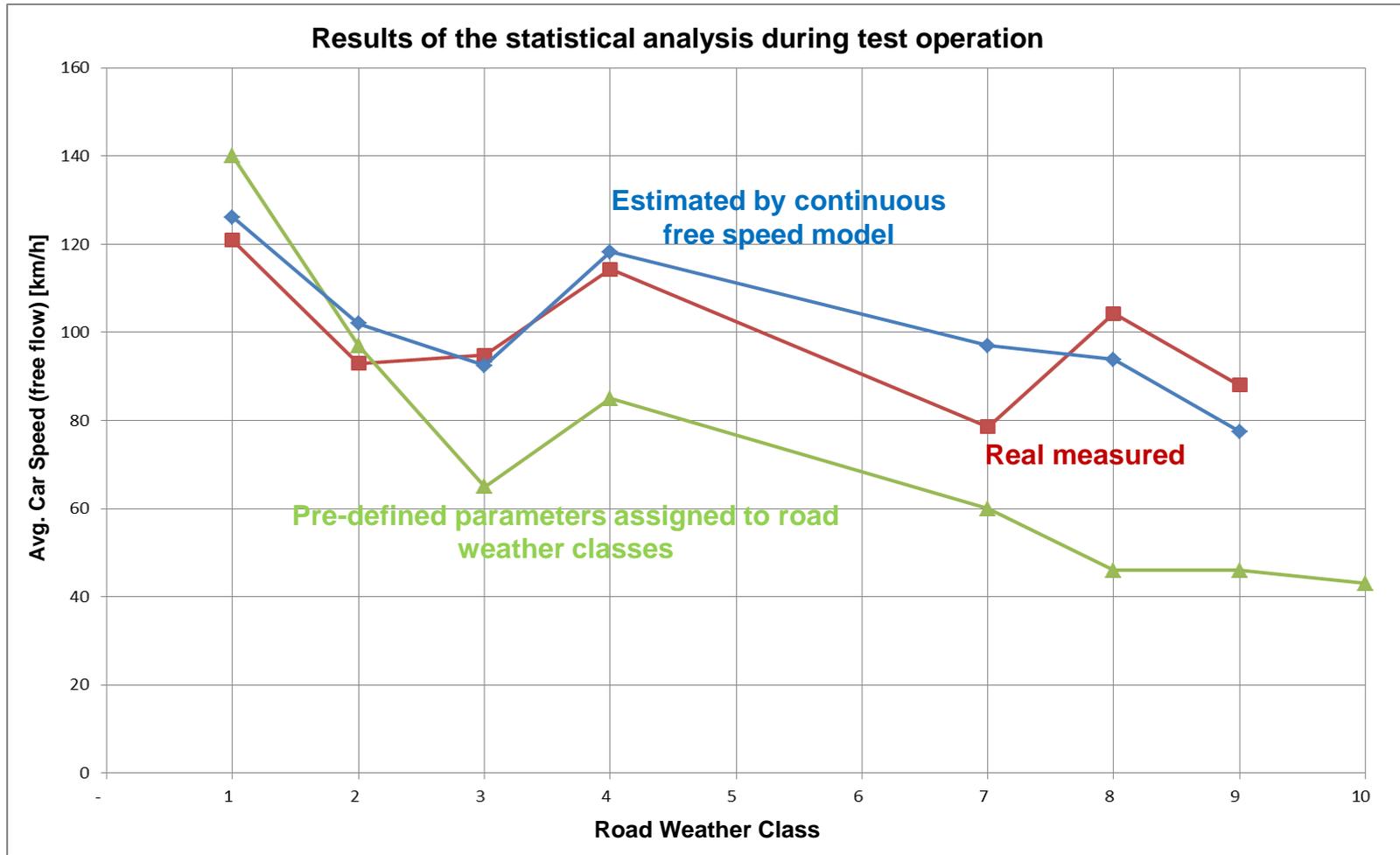


Modelling Tire Friction due to Water-, Snow- and Ice-Layer Thickness



Proof of the concept

Evaluation of Test Operation from Dec. 2012 until March 2013



Thank you very much
for your attention!

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