

Development of World-wide Light-duty Test Cycle

-- Proposal for the threshold vehicle speed of
Low/Middle/High(/extra-High) phase --

Proposed by Japan
(Reviewed by JRC, Mr. Steven and Ms. Ericsson)

DHC group
under GRPE/WLTP informal group
16 May 2011
ACEA, Brussels

1. Proposal for the threshold vehicle speed of Low/Middle/High/(+Extra-High)
2. In-use driving data analysis
3. Study on data conversion threshold
4. Verification of L/M/H
5. Regional weighting
6. Mode construction
7. Next action

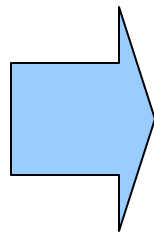
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1. Proposal for the threshold speed of L/M/H/ExH

WLTP-DHC-07-02

It was observed that the less difference of driving characteristics can be obtained on the threshold speed of [60/80/110/~].

Road type
Urban
Rural
Motorway



Phase	Proposed threshold
Low	$V_{max}^* \leq 60$
Middle	$60 \text{ km/h} < V_{max}^* \leq 80$
High	$80 \text{ km/h} < V_{max}^* \leq 110 \text{ km/h}$
Extra-High	$110 \text{ km/h} < V_{max}^*$

*) V_{max} : Maximum vehicle speed of short trip

→ This means that maximum vehicle speed in each test cycle phase will be less than each threshold speed (approximately by several km/h)

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2.1. Overview of in-use data collection

[Amount of in-use driving data by 6 May 2011 Total: Approx. 840,000 km]

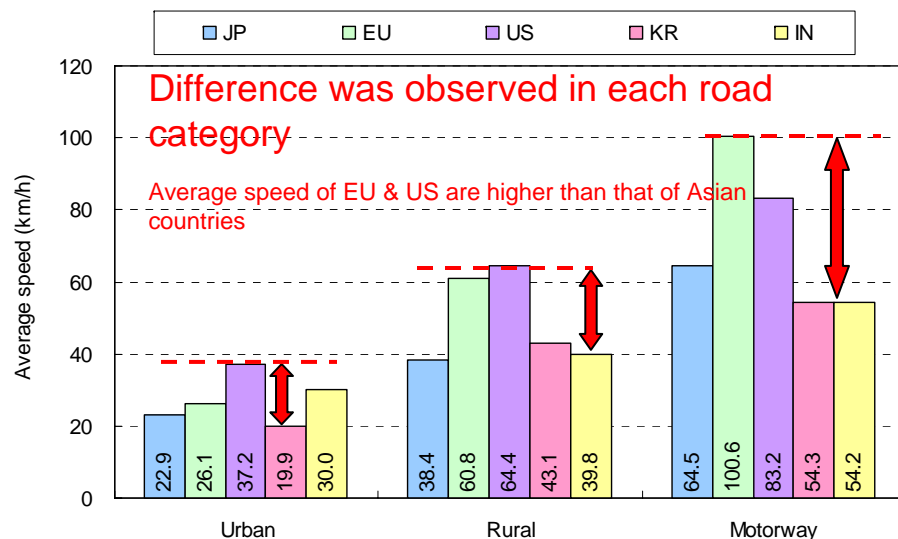
(Unit: km)

Region		Vehicle type	No. of vehicles	Urban	Rural	Motorway	Undefine ^(*)	Total	
Japan (JP)		PC	11	13,605	1,301	10,764		25,670	52,955
		LDCV	13	13,233	1,325	12,727		27,285	
Korea (KR)		PC	6	8,480	6,943	10,610		26,033	34,403
		LDCV	2	2,558	3,261	2,551		8,370	
India (IN)		PC	16	10,174	11,832	18,189		40,195	54,169
		LDCV	4	3,218	3,713	7,042		13,974	
China (CN)		PC	0	0	0	0		0	0
		LDCV	0	0	0	0		0	
USA (US)		PC	156	0	0	0	136,979	136,979	167,852
		LDCV	20	0	0	0	1,334	1,334	
		Chased car	-	7,538	2,365	19,635		29,538	
EU	Belgium (BE)	PC	11	4,986	24,667	21,292		50,945	172,289
		LDCV	0	0	0	0	121,345	121,345	
	Germany (DE)	PC	8	7,865	11,051	4,498		23,414	23,414
		LDCV	0	0	0	0		0	
	Spain (ES)	PC	6	800	729	1,090		2,619	9,666
		LDCV	4	2,815	4,093	140		7,047	
	France (FR)	PC	42	23,568	53,520	31,828		108,916	108,916
		LDCV	0	0	0	0		0	
	Italy (IT)	PC	8	9,827	23,964	23,854		57,646	57,646
		LDCV	0	0	0	0		0	
	Poland (PL)	PC	9	9,438	4,796	413		14,648	14,648
		LDCV	0	0	0	0		0	
	Slovenia (SI)	PC	18	14,662	24,351	9,920		48,934	48,934
		LDCV	0	0	0	0		0	
	Switzerland (CH)	PC	26	6,021	3,763	12,886		22,670	23,619
		LDCV	4	518	57	374		949	
	United Kingdom (UK)	PC	10	7,174	9,750	566		17,491	31,782
		LDCV	12	0	0	0	14,291	14,291	
	Sweden (SE)	PC	5				18,522	18,522	36,950
		LDCV	2				18,428	18,428	

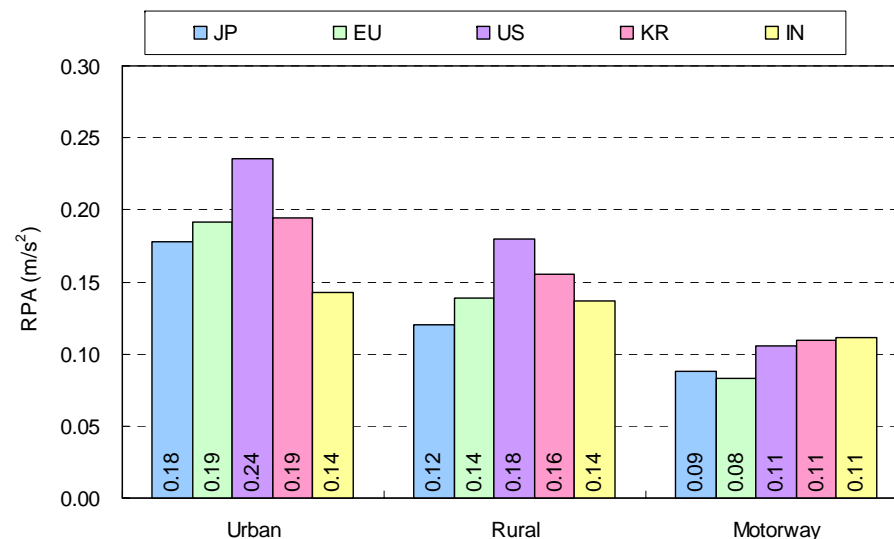
(*) In-use data without road type indication will be combined with database after the determination of the threshold speed of L/M/H phase

2.1. U/R/M analysis – driving characteristics

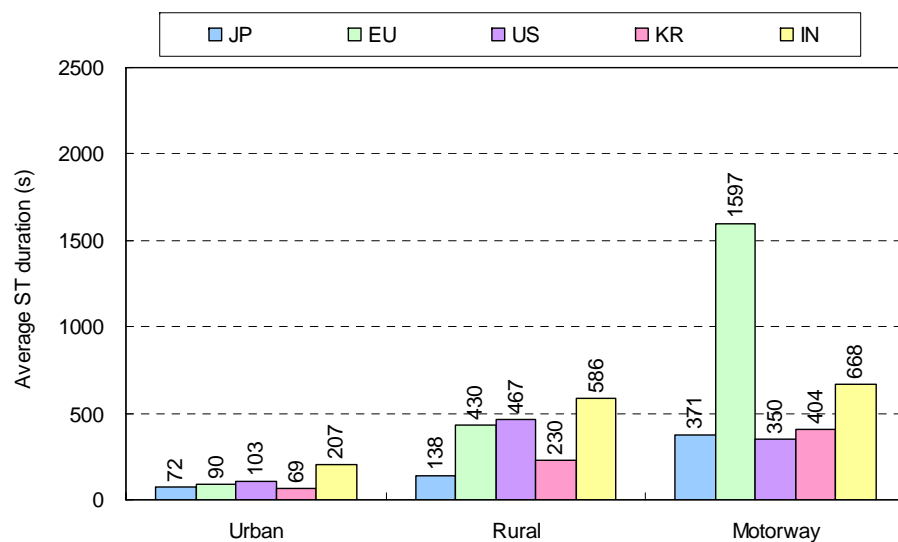
[Average speed]



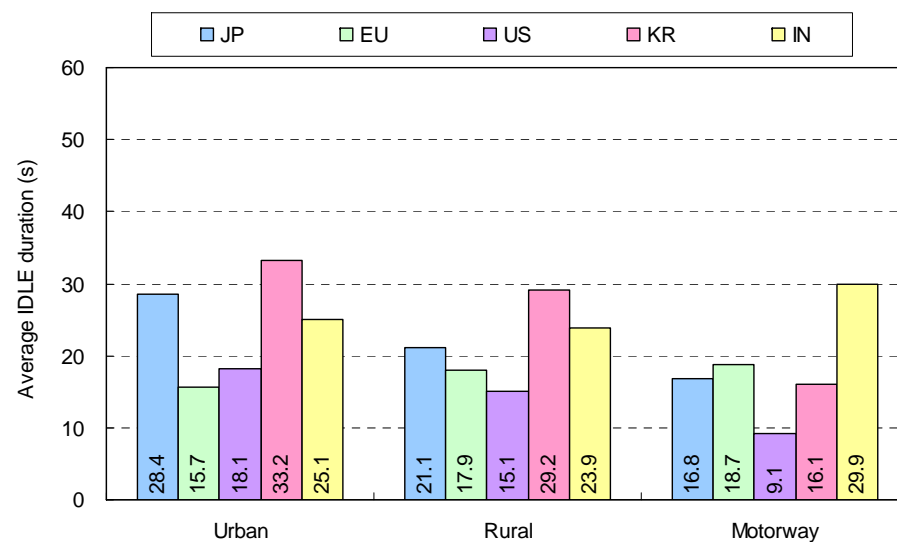
[RPA]



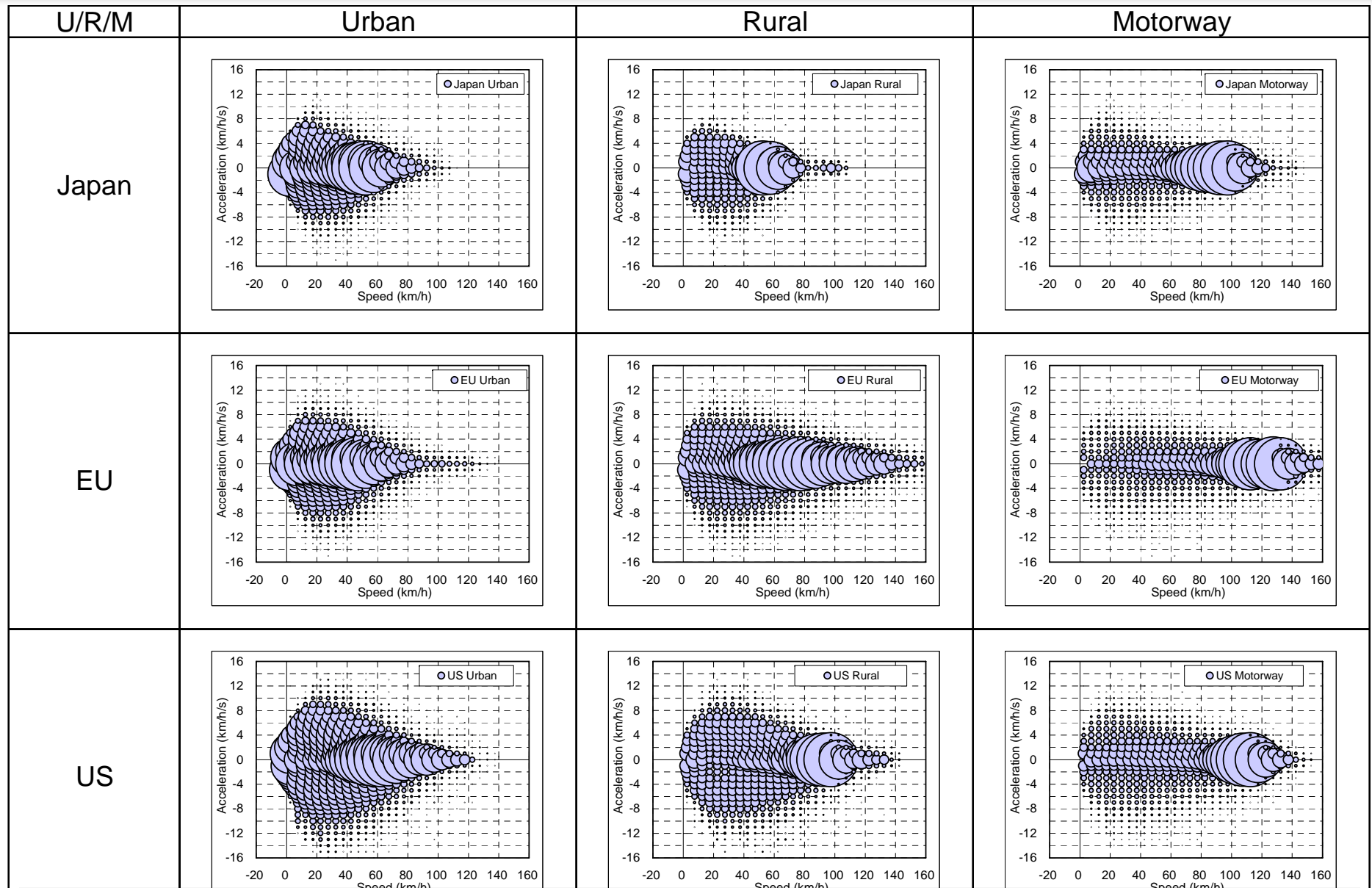
[Average ST duration]



[Average IDLE duration]

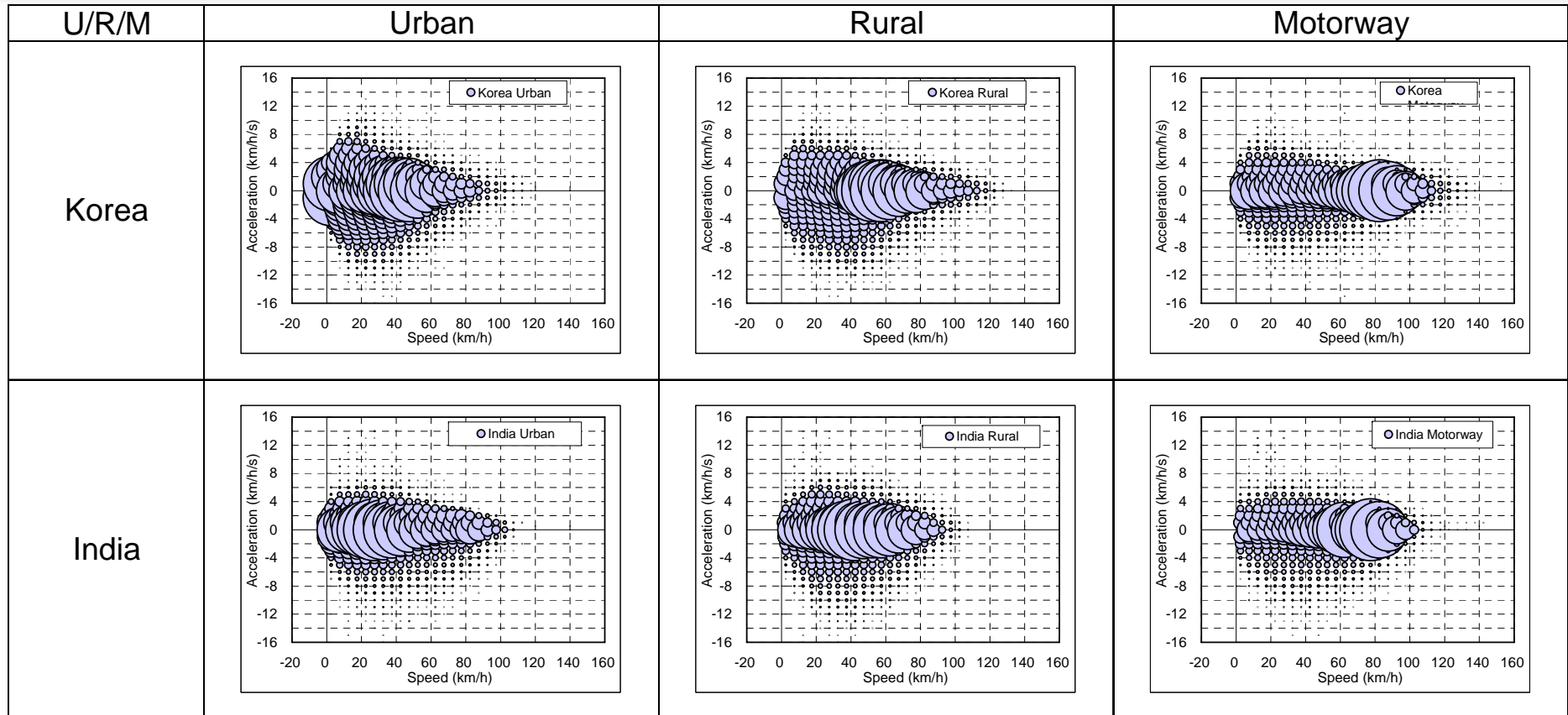


2.2.1. U/R/M analysis – speed acceleration distribution WLTP-DHC-07-02



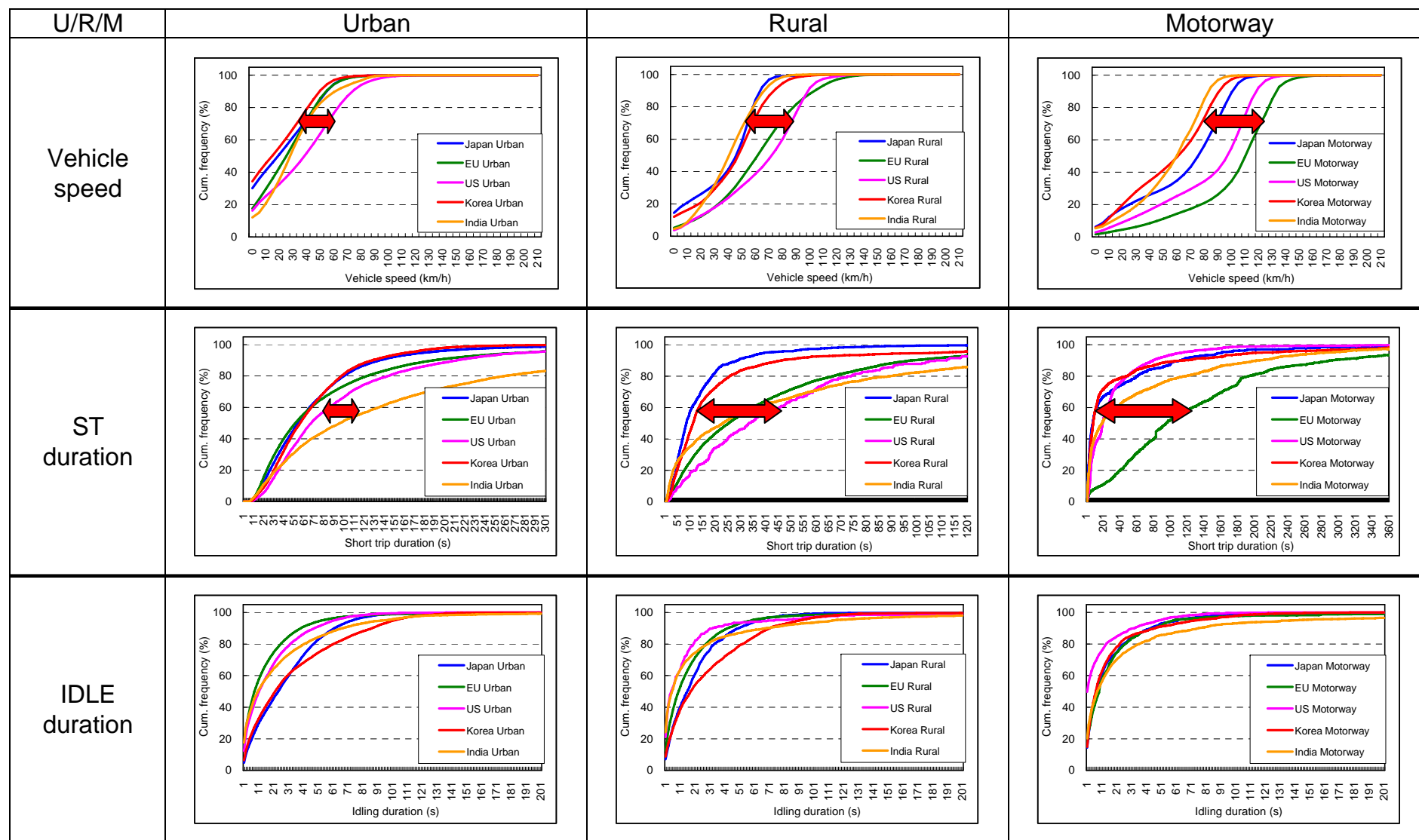
Difference in speed-acceleration distribution was observed in each road category.

2.2.2. U/R/M analysis – speed acceleration distribution



Difference in speed-acceleration distribution was observed in each road category.

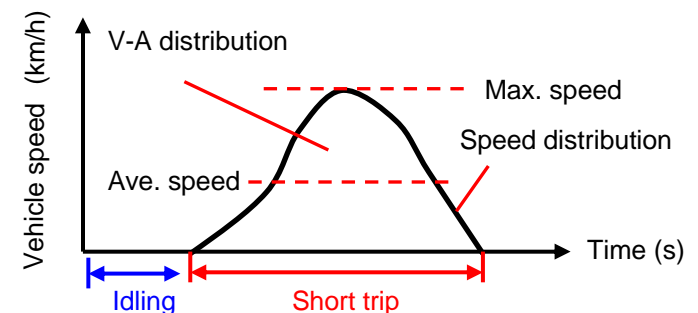
2.3. U/R/M analysis – other distributions



Difference in each distribution was observed in each road category.

2.4. Summary of U/R/M analysis

- It was observed that speed-acceleration distribution/driving characteristics in each region have difference in same road categories.
- It is necessary to convert to L/M/H category in where driving characteristics are less difference in each region.
- Considering the threshold vehicle speed
 - based on similarity of VA distribution
 - based on similarity of V distribution
 - based on similarity of other parameters



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3.1. Study of data conversion

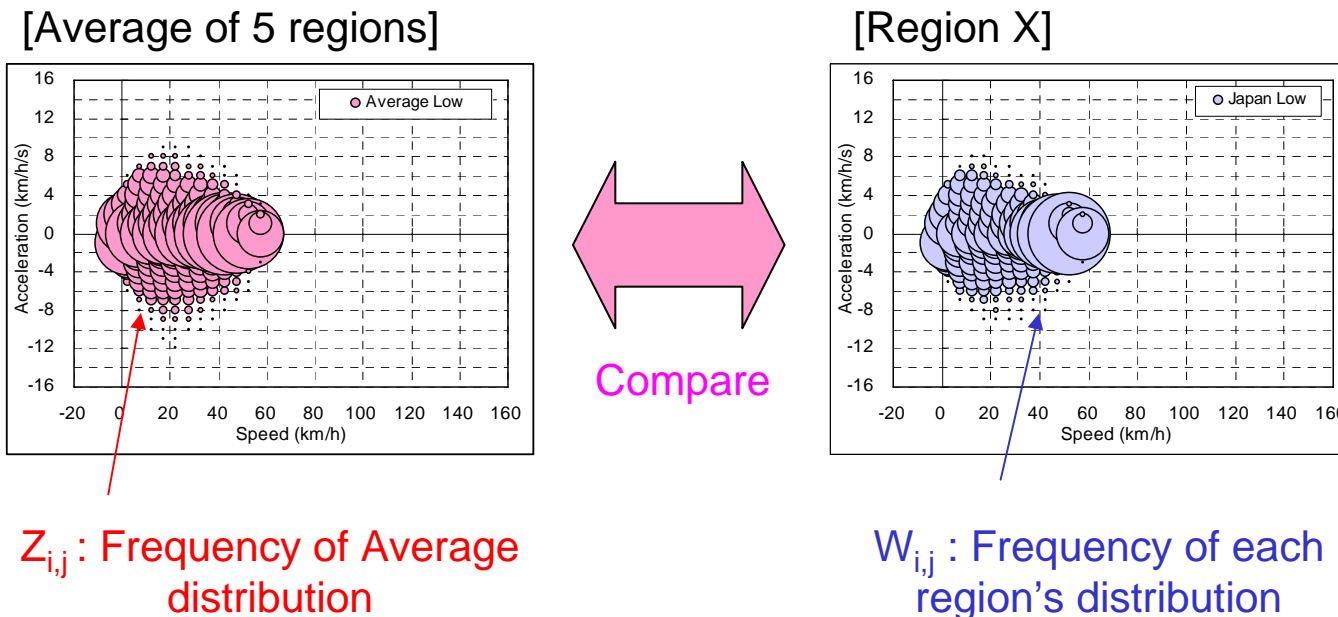
A comparative study was conducted between the following candidate criteria

In order to find appropriate criteria, the in-use driving data were converted to L/M/H according to the following criteria, then distributions and parameters were compared.

No.	ID	Low	Middle	High	ExHigh
1	50/70/100/~	$V_{max} \leq 50$	$50 < V_{max} \leq 70$	$70 < V_{max} \leq 100$	$100 < V_{max}$
2	50/70/110/~	$V_{max} \leq 50$	$50 < V_{max} \leq 70$	$70 < V_{max} \leq 110$	$110 < V_{max}$
3	50/80/110/~	$V_{max} \leq 50$	$50 < V_{max} \leq 80$	$80 < V_{max} \leq 110$	$110 < V_{max}$
4	50/80/120/~	$V_{max} \leq 50$	$50 < V_{max} \leq 80$	$80 < V_{max} \leq 120$	$120 < V_{max}$
5	50/90/110/~	$V_{max} \leq 50$	$50 < V_{max} \leq 90$	$90 < V_{max} \leq 110$	$110 < V_{max}$
6	50/90/120/~	$V_{max} \leq 50$	$50 < V_{max} \leq 90$	$90 < V_{max} \leq 120$	$120 < V_{max}$
7	60/80/110/~	$V_{max} \leq 60$	$60 < V_{max} \leq 80$	$80 < V_{max} \leq 110$	$110 < V_{max}$
8	60/80/120/~	$V_{max} \leq 60$	$60 < V_{max} \leq 80$	$80 < V_{max} \leq 120$	$120 < V_{max}$
9	60/90/110/~	$V_{max} \leq 60$	$60 < V_{max} \leq 90$	$90 < V_{max} \leq 110$	$110 < V_{max}$
10	60/90/120/~	$V_{max} \leq 60$	$60 < V_{max} \leq 90$	$90 < V_{max} \leq 120$	$120 < V_{max}$
11	70/90/110/~	$V_{max} \leq 70$	$70 < V_{max} \leq 90$	$90 < V_{max} \leq 110$	$110 < V_{max}$
12	70/90/120/~	$V_{max} \leq 70$	$70 < V_{max} \leq 90$	$90 < V_{max} \leq 120$	$120 < V_{max}$
13	70/100/120/~	$V_{max} \leq 70$	$70 < V_{max} \leq 100$	$100 < V_{max} \leq 120$	$120 < V_{max}$

3.2.1. Similarity of speed acceleration distribution

- Compare the average speed acceleration distribution with each region's distribution.
- the differences are evaluated by a normalized chi-squared value.



Normalized chi-squared value:

$$\chi^2 = \frac{\sum \left\{ \frac{(W_{i,j} - Z_{i,j})^2}{Z_{i,j}} \right\}}{n_{i,j}}$$

3.2.2 Similarity of speed acceleration distribution

[Normalized chi-squared value]

If the value in column is small, the criteria have similarity between regions.

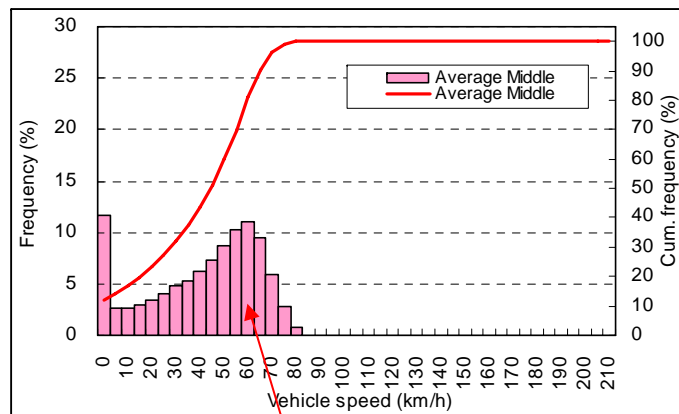
Criteria	Low						Middle						High						ExHigh						Average
	JP	EU	US	KR	IN	AVE	JP	EU	US	KR	IN	AVE	JP	EU	US	KR	IN	AVE	JP	EU	US	KR	IN	AVE	
50/70/100/~	0.02	0.00	0.09	0.02	0.12	0.05	0.05	0.01	0.07	0.03	0.13	0.06	0.02	0.01	0.06	0.01	0.03	0.03	0.04	0.05	0.04	0.03	0.04	0.04	0.043
50/70/110/~	0.02	0.00	0.09	0.02	0.12	0.05	0.05	0.01	0.07	0.03	0.13	0.06	0.02	0.01	0.05	0.01	0.03	0.02	0.03	0.05	0.04	0.03	0.05	0.04	0.042
50/80/110/~	0.02	0.00	0.09	0.02	0.12	0.05	0.03	0.01	0.07	0.02	0.09	0.04	0.03	0.02	0.04	0.01	0.02	0.03	0.03	0.05	0.04	0.03	0.05	0.04	0.040
50/80/120/~	0.02	0.00	0.09	0.02	0.12	0.05	0.03	0.01	0.07	0.02	0.09	0.04	0.03	0.01	0.04	0.02	0.03	0.03	0.03	0.04	0.04	0.05	0.09	0.05	0.042
50/90/110/~	0.02	0.00	0.09	0.02	0.12	0.05	0.03	0.01	0.06	0.01	0.07	0.04	0.05	0.02	0.04	0.02	0.03	0.03	0.03	0.05	0.04	0.03	0.05	0.04	0.040
50/90/120/~	0.02	0.00	0.09	0.02	0.12	0.05	0.03	0.01	0.06	0.01	0.07	0.04	0.05	0.02	0.04	0.02	0.04	0.03	0.03	0.04	0.04	0.05	0.09	0.05	0.042
60/80/110/~	0.03	0.01	0.08	0.02	0.12	0.05	0.04	0.01	0.07	0.01	0.08	0.04	0.03	0.02	0.04	0.01	0.02	0.03	0.03	0.05	0.04	0.03	0.05	0.04	0.039
60/80/120/~	0.03	0.01	0.09	0.02	0.12	0.05	0.04	0.01	0.07	0.01	0.08	0.04	0.03	0.01	0.05	0.02	0.03	0.03	0.03	0.03	0.04	0.05	0.09	0.05	0.042
60/90/110/~	0.03	0.01	0.08	0.02	0.12	0.05	0.04	0.01	0.06	0.01	0.05	0.03	0.05	0.02	0.04	0.02	0.03	0.03	0.03	0.05	0.04	0.03	0.05	0.04	0.039
60/90/120/~	0.03	0.01	0.08	0.02	0.12	0.05	0.04	0.01	0.06	0.01	0.05	0.03	0.05	0.02	0.04	0.02	0.04	0.03	0.03	0.04	0.04	0.05	0.09	0.05	0.041
70/90/110/~	0.03	0.01	0.08	0.02	0.10	0.05	0.02	0.01	0.06	0.01	0.03	0.03	0.05	0.02	0.04	0.02	0.03	0.03	0.03	0.05	0.04	0.03	0.05	0.04	0.037
70/90/120/~	0.03	0.01	0.08	0.02	0.10	0.05	0.02	0.01	0.06	0.01	0.03	0.03	0.05	0.02	0.04	0.02	0.04	0.03	0.03	0.04	0.04	0.05	0.09	0.05	0.039
70/100/120/~	0.03	0.01	0.08	0.02	0.10	0.05	0.02	0.01	0.06	0.01	0.03	0.02	0.05	0.02	0.04	0.03	0.04	0.04	0.03	0.04	0.04	0.05	0.09	0.05	0.040

It was observed that the less difference can be obtained at the threshold speed of [60/80/110/~], [60/90/110/~], [70/90/110/~] and [70/90/120/~].

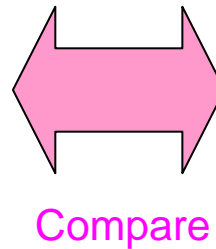
3.3.1. Similarity of speed frequency distribution

- Compare the average speed frequency distribution with each region's distribution.
- Differences are evaluated by a normalized chi-squared value.

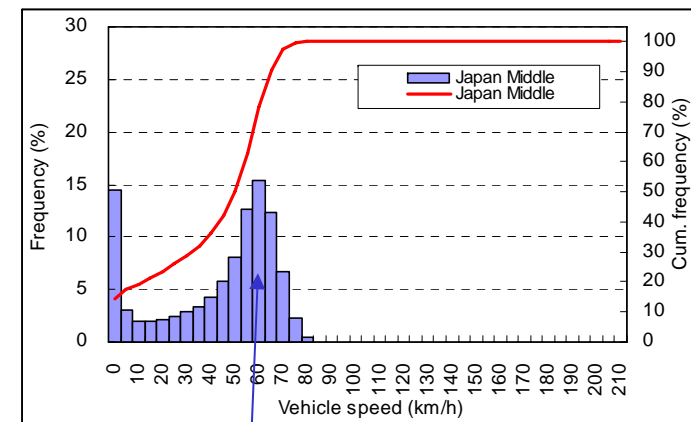
[Average of 5 regions]



Z_i : Frequency of Average distribution



[Region X]



W_i : Frequency of each region's distribution

Normalized chi-squared value:

$$\chi^2 = \sum \left\{ \frac{(W_i - Z_i)^2}{Z_i} \right\} / n_i$$

3.2.2. Similarity of speed frequency distribution

[Normalized chi-squared value]

If the value in column is small, the criteria have similarity between regions.

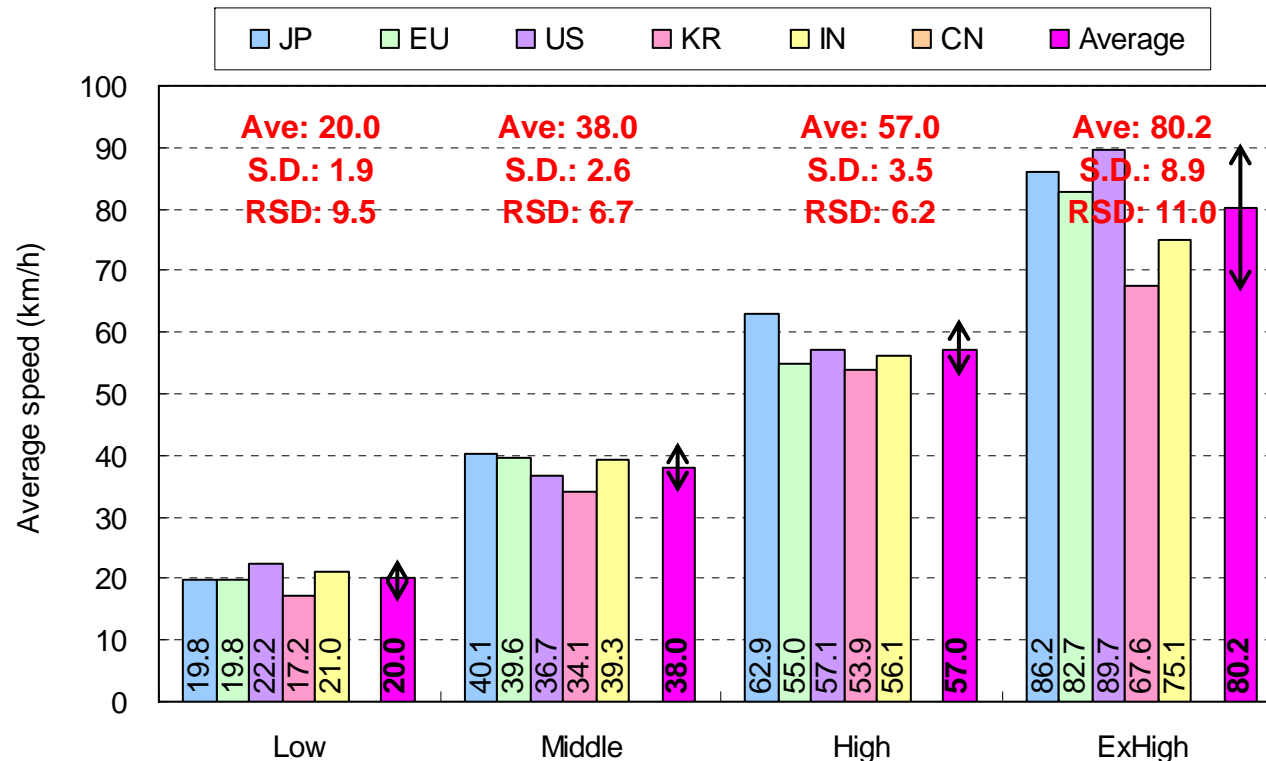
Criteria	Low						Middle						High						ExHigh						Average
	JP	EU	US	KR	IN	AVE	JP	EU	US	KR	IN	AVE	JP	EU	US	KR	IN	AVE	JP	EU	US	KR	IN	AVE	
50/70/100/~	0.34	0.06	0.25	0.22	1.00	0.37	0.75	0.10	0.23	0.53	1.35	0.59	0.38	0.09	0.39	0.06	0.33	0.25	0.61	0.92	0.56	0.44	0.64	0.63	0.462
50/70/110/~	0.34	0.06	0.25	0.22	1.00	0.37	0.75	0.10	0.23	0.53	1.35	0.59	0.31	0.10	0.28	0.15	0.42	0.25	0.38	0.90	0.66	0.47	0.57	0.59	0.453
50/80/110/~	0.34	0.06	0.25	0.22	1.00	0.37	0.48	0.09	0.30	0.35	0.96	0.44	0.69	0.28	0.18	0.11	0.41	0.33	0.38	0.90	0.66	0.47	0.57	0.59	0.434
50/80/120/~	0.34	0.06	0.25	0.22	1.00	0.37	0.48	0.09	0.30	0.35	0.96	0.44	0.66	0.20	0.39	0.18	0.55	0.40	0.59	0.68	0.59	0.75	1.43	0.81	0.503
50/90/110/~	0.34	0.06	0.25	0.22	1.00	0.37	0.46	0.10	0.25	0.23	0.66	0.34	1.06	0.39	0.16	0.19	0.46	0.45	0.38	0.90	0.66	0.47	0.57	0.59	0.440
50/90/120/~	0.34	0.06	0.25	0.22	1.00	0.37	0.46	0.10	0.25	0.23	0.66	0.34	0.91	0.30	0.41	0.26	0.61	0.50	0.59	0.68	0.59	0.75	1.43	0.81	0.505
60/80/110/~	0.44	0.10	0.27	0.36	1.09	0.45	0.54	0.10	0.36	0.16	0.86	0.40	0.69	0.28	0.18	0.11	0.41	0.33	0.38	0.90	0.66	0.47	0.57	0.59	0.446
60/80/120/~	0.44	0.10	0.27	0.36	1.09	0.45	0.54	0.10	0.36	0.16	0.86	0.40	0.66	0.20	0.39	0.18	0.55	0.40	0.59	0.68	0.59	0.75	1.43	0.81	0.516
60/90/110/~	0.44	0.10	0.27	0.36	1.09	0.45	0.53	0.11	0.28	0.10	0.55	0.31	1.06	0.39	0.16	0.19	0.46	0.45	0.38	0.90	0.66	0.47	0.57	0.59	0.453
60/90/120/~	0.44	0.10	0.27	0.36	1.09	0.45	0.53	0.11	0.28	0.10	0.55	0.31	0.91	0.30	0.41	0.26	0.61	0.50	0.59	0.68	0.59	0.75	1.43	0.81	0.518
70/90/110/~	0.52	0.12	0.31	0.37	1.02	0.47	0.36	0.11	0.29	0.06	0.41	0.25	1.06	0.39	0.16	0.19	0.46	0.45	0.38	0.90	0.66	0.47	0.57	0.59	0.440
70/90/120/~	0.52	0.12	0.31	0.37	1.02	0.47	0.36	0.11	0.29	0.06	0.41	0.25	0.91	0.30	0.41	0.26	0.61	0.50	0.59	0.68	0.59	0.75	1.43	0.81	0.505
70/100/120/~	0.52	0.12	0.31	0.37	1.02	0.47	0.38	0.09	0.39	0.06	0.33	0.25	0.92	0.35	0.57	0.45	0.51	0.56	0.59	0.68	0.59	0.75	1.43	0.81	0.521

It was observed that the less difference can be obtained at the threshold speed of [50/80/110/~], [50/90/110/~], [60/80/110/~] and [70/90/110/~].

3.3.1. Similarity of average speed

- Compare the average speed with each region's average speed.
- Differences are evaluated by a Relative standard deviation (RSD).
- $RSD(\%) = \text{Standard Deviation} / \text{Average value} * 100$

[Example]



3.3.2. Similarity of average speed

[Average speed and Relative standard deviation (RSD)]

If the value in column is small, the criteria have similarity between regions.

Criteria	Low						Middle						High						ExHigh						Average RSD
	JP	EU	US	KR	IN	RSD	JP	EU	US	KR	IN	RSD	JP	EU	US	KR	IN	RSD	JP	EU	US	KR	IN	RSD	
50/70/100/~	13.4	15.5	16.2	13.5	17.5	11.4	34.2	32.4	30.9	26.8	32.0	8.9	46.7	49.2	47.0	45.0	49.7	4.0	81.5	77.8	83.0	65.7	65.0	11.6	8.98
50/70/110/~	13.4	15.5	16.2	13.5	17.5	11.4	34.2	32.4	30.9	26.8	32.0	8.9	49.4	51.2	50.7	48.0	50.8	2.6	86.2	82.7	89.7	67.6	75.1	11.1	8.49
50/80/110/~	13.4	15.5	16.2	13.5	17.5	11.4	35.7	35.6	34.1	29.0	35.0	8.3	62.9	55.0	57.1	53.9	56.1	6.2	86.2	82.7	89.7	67.6	75.1	11.1	9.22
50/80/120/~	13.4	15.5	16.2	13.5	17.5	11.4	35.7	35.6	34.1	29.0	35.0	8.3	64.7	58.0	62.3	54.7	56.3	7.1	91.4	87.9	95.0	72.7	65.1	15.6	10.59
50/90/110/~	13.4	15.5	16.2	13.5	17.5	11.4	36.2	38.3	36.8	30.8	37.6	8.3	71.1	58.5	63.2	60.0	61.9	7.8	86.2	82.7	89.7	67.6	75.1	11.1	9.64
50/90/120/~	13.4	15.5	16.2	13.5	17.5	11.4	36.2	38.3	36.8	30.8	37.6	8.3	73.6	62.1	69.2	60.7	62.2	8.5	91.4	87.9	95.0	72.7	65.1	15.6	10.95
60/80/110/~	19.8	19.8	22.2	17.2	21.0	9.5	40.1	39.6	36.7	34.1	39.3	6.7	62.9	55.0	57.1	53.9	56.1	6.2	86.2	82.7	89.7	67.6	75.1	11.1	8.36
60/80/120/~	19.8	19.8	22.2	17.2	21.0	9.5	40.1	39.6	36.7	34.1	39.3	6.7	64.7	58.0	62.3	54.7	56.3	7.1	91.4	87.9	95.0	72.7	65.1	15.6	9.73
60/90/110/~	19.8	19.8	22.2	17.2	21.0	9.5	40.8	42.4	39.4	36.6	42.4	6.0	71.1	58.3	63.2	60.0	61.9	7.9	91.4	87.8	95.0	72.7	65.1	15.6	9.74
60/90/120/~	19.8	19.8	22.2	17.2	21.0	9.5	40.8	42.4	39.4	36.6	42.4	6.0	73.6	61.8	69.2	60.7	62.2	8.6	91.4	87.9	95.0	72.7	65.1	15.6	9.92
70/90/110/~	24.2	23.2	27.0	19.7	23.9	11.0	45.5	46.8	43.1	42.3	46.7	4.6	71.1	58.5	63.2	60.0	61.9	7.8	86.2	82.7	89.7	67.6	75.1	11.1	8.64
70/90/120/~	24.2	23.2	27.0	19.7	23.9	11.0	45.5	46.8	43.1	42.3	46.7	4.6	73.6	62.1	69.2	60.7	62.2	8.5	91.4	87.9	95.0	72.7	65.1	15.6	9.95
70/100/120/~	24.2	23.2	27.0	19.7	23.9	11.0	46.7	49.2	47.0	45.0	49.7	4.0	80.5	66.1	75.2	64.6	65.0	10.2	91.4	87.9	95.0	72.7	65.1	15.6	10.23

It was observed that the less difference can be obtained at the threshold speed of [50/70/100/~], [50/70/110/~], [60/80/110/~] and [70/90/110/~].

3.4. Conclusion < appropriate threshold >

[Similarity]

Criteria	V-A distrib ution	V distributi on	Average speed	Overall
50/70/100/~			good	
50/70/110/~			good	
50/80/110/~		good		
50/80/120/~				
50/90/110/~		good		
50/90/120/~				
60/80/110/~	good	good	good	◎
60/80/120/~				
60/90/110/~	good			
60/90/120/~				
70/90/110/~	good	good	good	○
70/90/120/~				
70/100/120/~	good			

➤ The threshold speed was considered based on 3 methods.

- based on similarity of VA distribution
- based on similarity of V distribution
- based on similarity of parameters

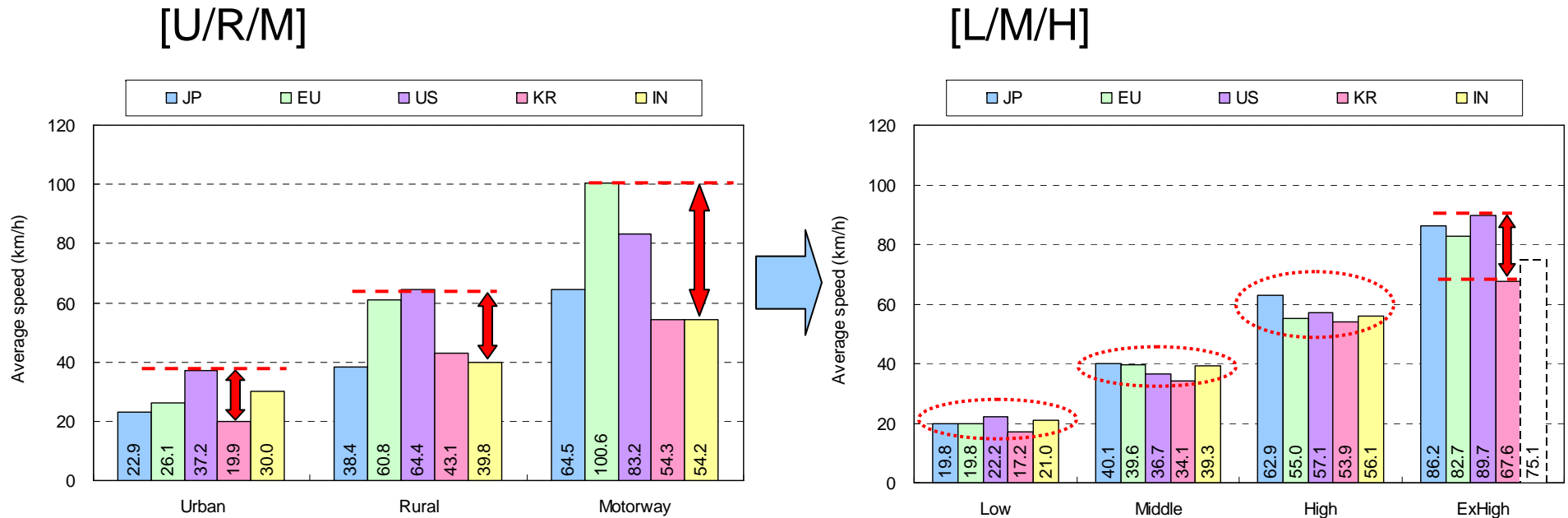
➤ Threshold speed of [60/80/110/~] and [70/90/110/~] are best choice for less difference for all condition. Phase duration balance (refer slide 37) of [60/80/110/~] is better than that of [70/90/110/~].

1. Proposal for the threshold speed of Low/Middle/High/(+Extra-High)
2. In-use driving data analysis
3. Study on data conversion threshold
- 4. Verification of L/M/H**
5. Regional weighting
6. Mode construction
7. Next action

4.1.1. L/M/H analysis @60/80/110/~ – Average speed

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[Average speed]

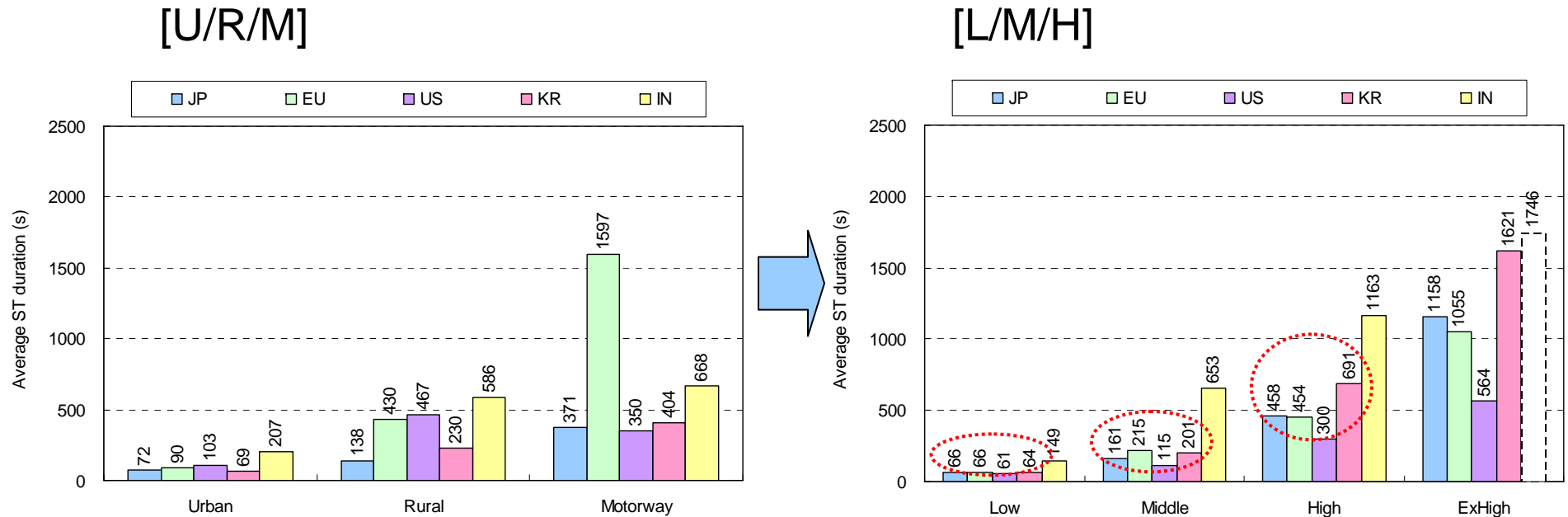


*) Indian extra-high phase data is used as reference because there is few data

Average speed is less difference in L/M/H phase but slight difference in Ex-High phase still exists.

4.1.2. L/M/H analysis @60/80/110/~ – Average ST duration

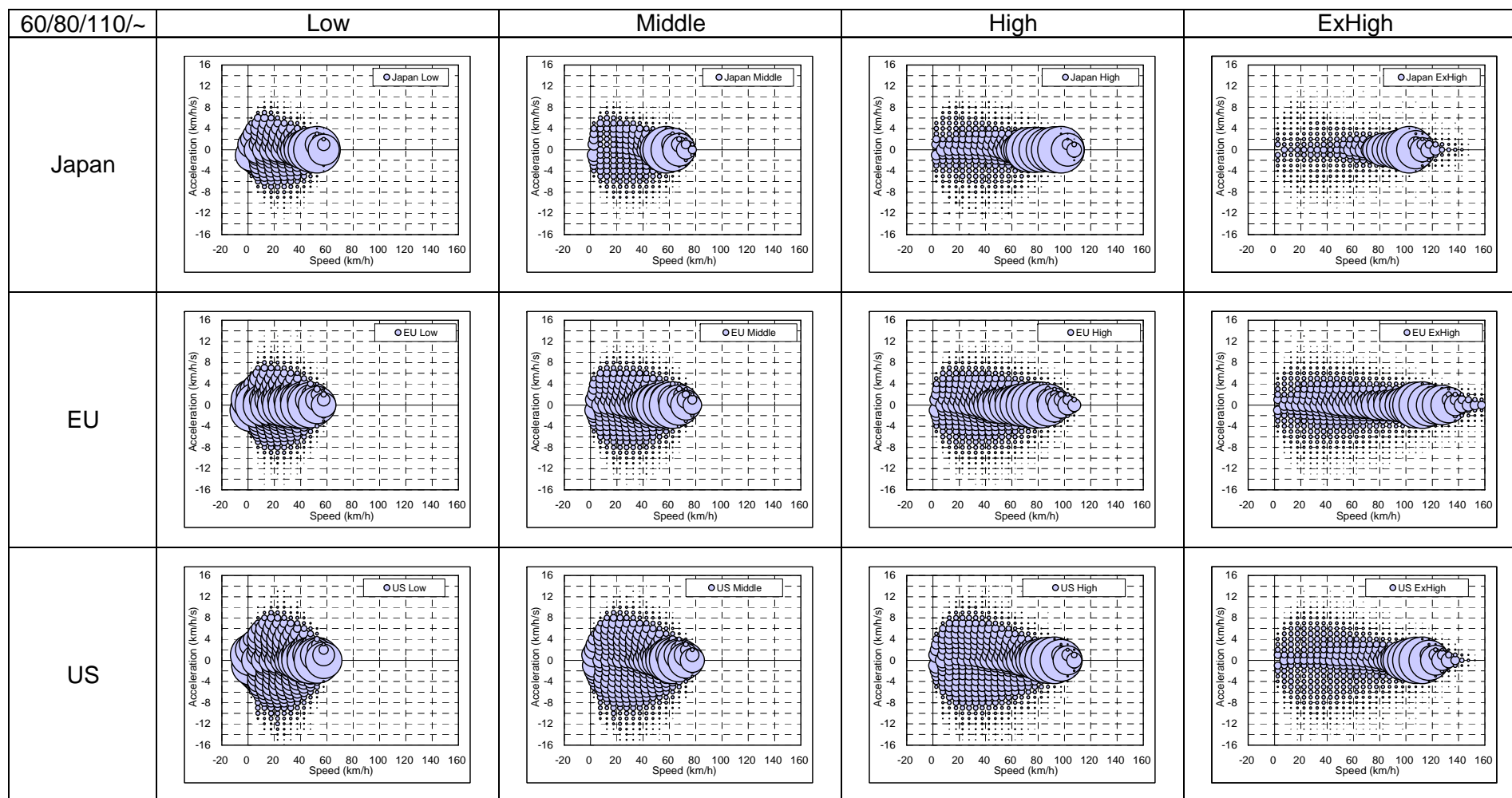
[Average ST duration]



*) Indian extra-high phase data is used as reference because there is few data

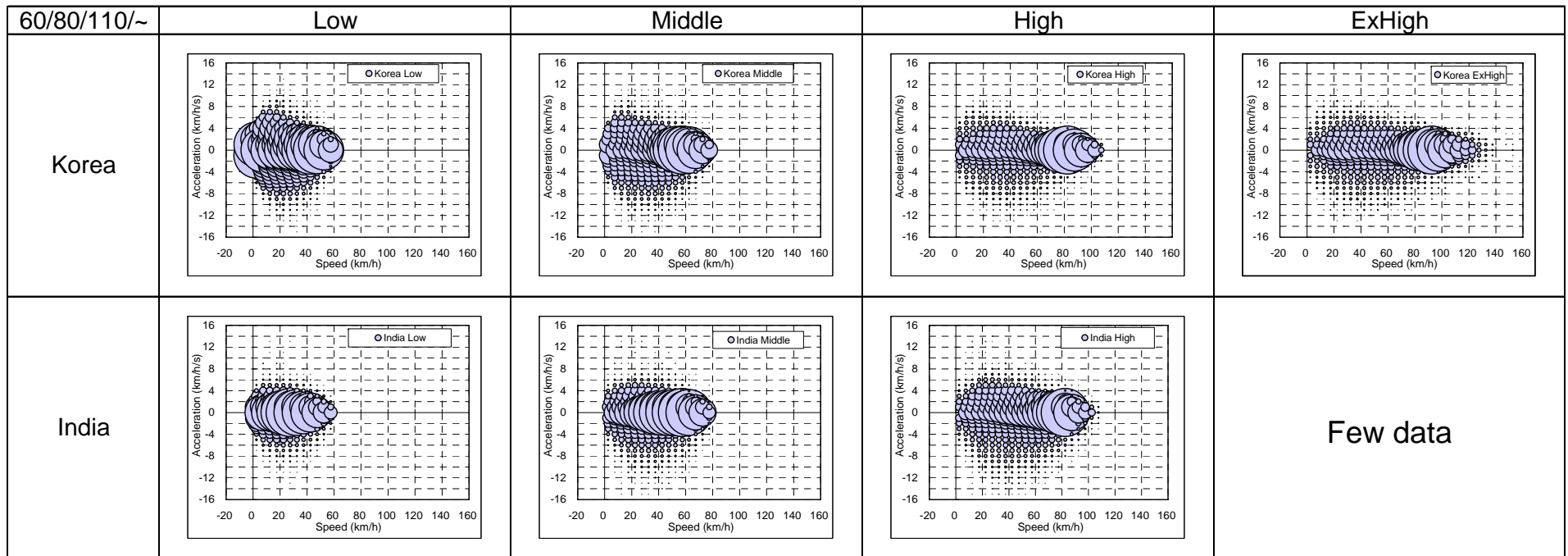
Average short trip duration become closer except India

4.2. L/M/H analysis @60/80/110/~ – speed acceleration distribution



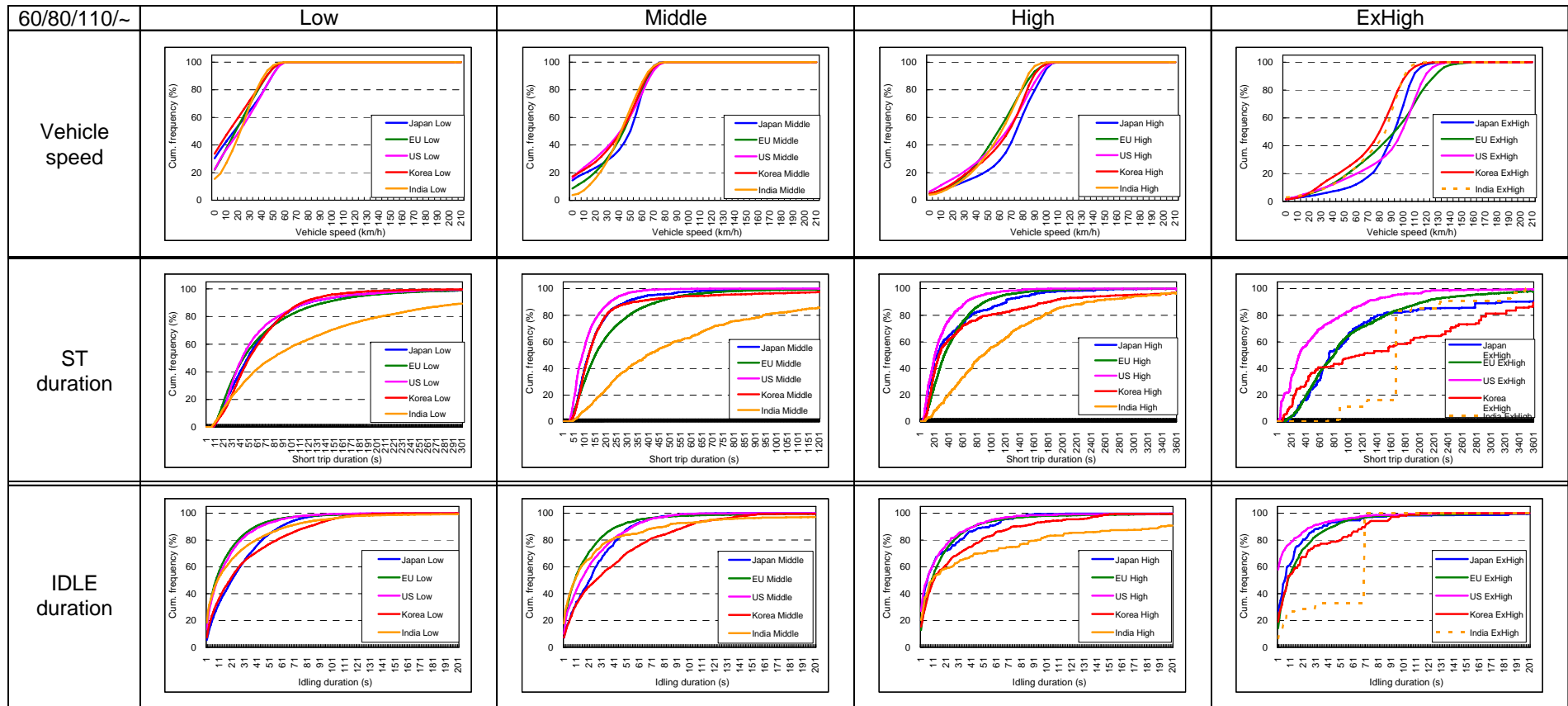
It was confirmed that VA distribution is less difference in L/M phase but slight difference in Extra-High phase still exists.

4.3. L/M/H analysis @60/80/110/~ – speed acceleration distribution



It was confirmed that VA distribution is less difference in L/M/H phase but slight difference in Extra-High phase still exists.

4.4. L/M/H analysis @60/80/110/~ – Other distributions WLTP-DHC-07-02



*) Indian extra-high phase data is used as reference because there is few data

It was confirmed that vehicle speed frequency distribution is less difference in L/M/H phase

4.5. Conclusion of verification of L/M/H

- It was confirmed that each region's driving characteristics and VA distributions comparatively show less difference by converting into Low/Middle/High/Extra-High phase based on threshold speed at 60/80/110/~ km/h.
- Difference in Extra-High phase is still observed among US/EU and other regions.

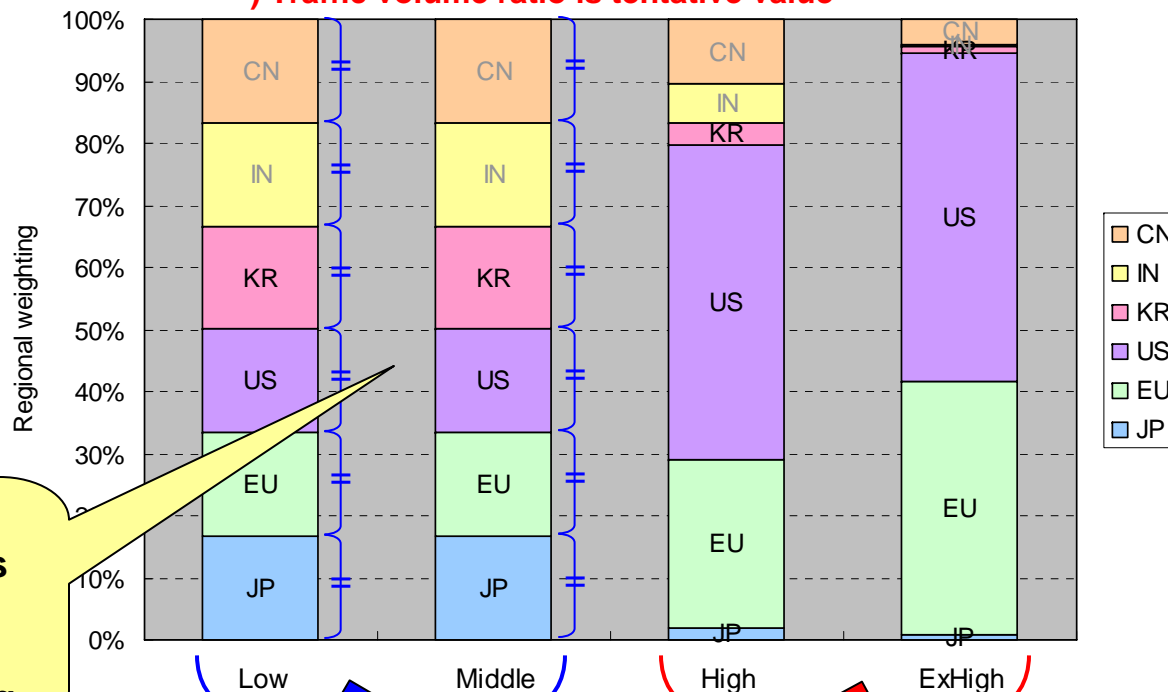
1. Proposal for the threshold speed of Low/Middle/High/(+Extra-High)
2. In-use driving data analysis
3. Study on data conversion threshold
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5.1. Regional weighting for distributions/characteristics WLTP-DHC-07-02

Regional weighting for L/M/H phase is necessary to represent each region driving when developing the unified distributions and harmonized cycle

[Regional weighting for each phase (Image)]

*) Traffic volume ratio is tentative value



Any other recommendations are welcome for more appropriate regional weighting

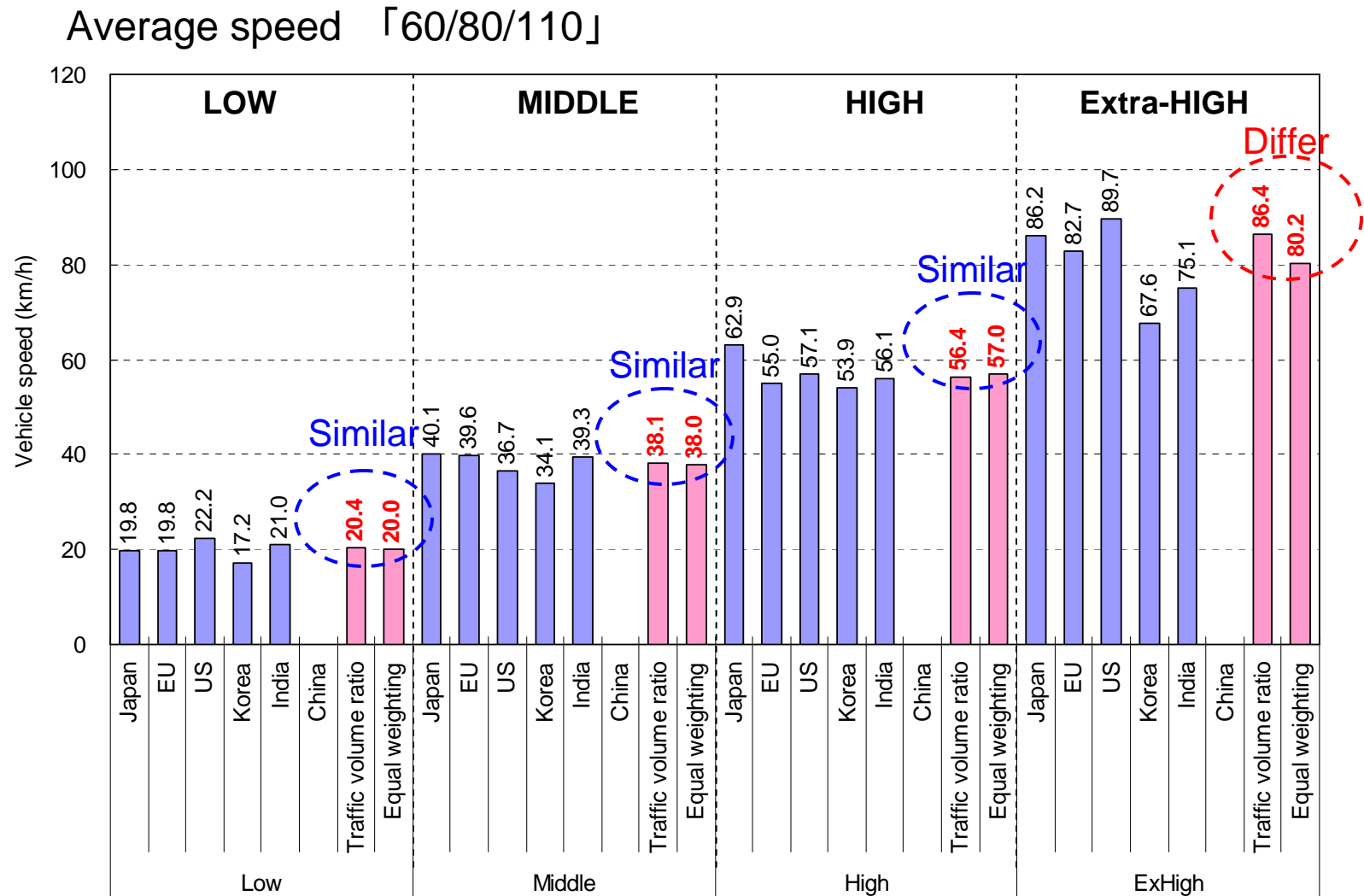
One of recommendations :
equal weighting

Due to same characteristics, apply equal weighting at each region

traffic volume ratio

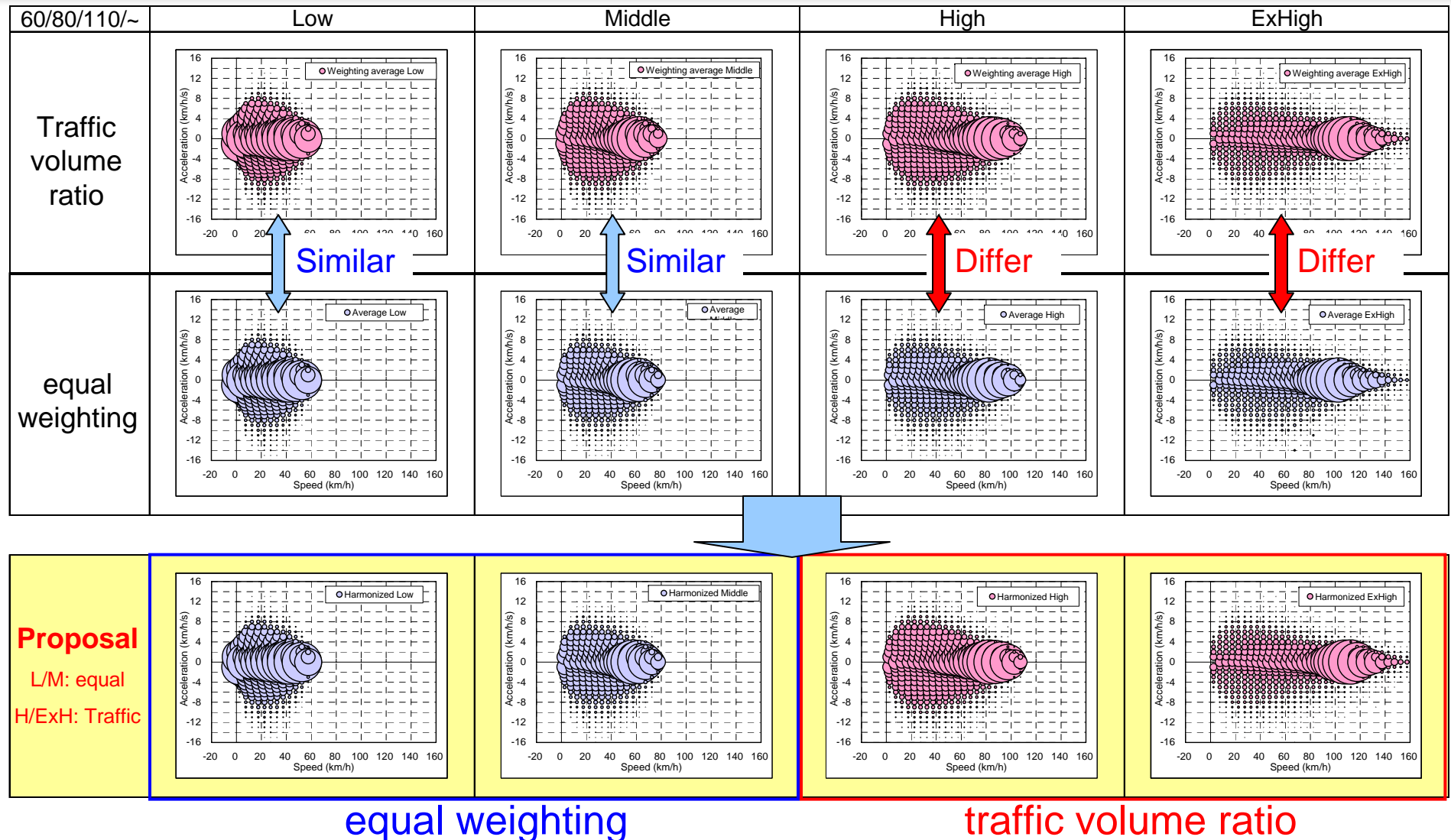
Due to difference characteristics, apply absolute traffic volume ratio at each region

5.2.1. Influence of the Regional weighting



Average speed will be similar in L/M/H phase but slight difference in Extra-High phase will be occurred.

5.2.2. Influence of Regional weighting



Speed acceleration distributions are similar in L/M phase but slight difference in High/Extra-High phase.

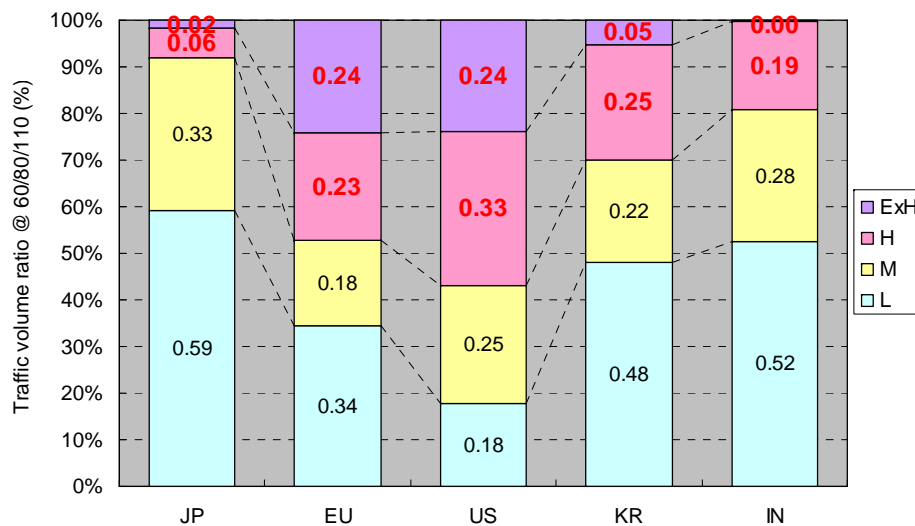
5.3. L/M/H traffic volume ratio @ 60/80/110/~

The unified distributions of High/Extra-High phase should be based on traffic volume.

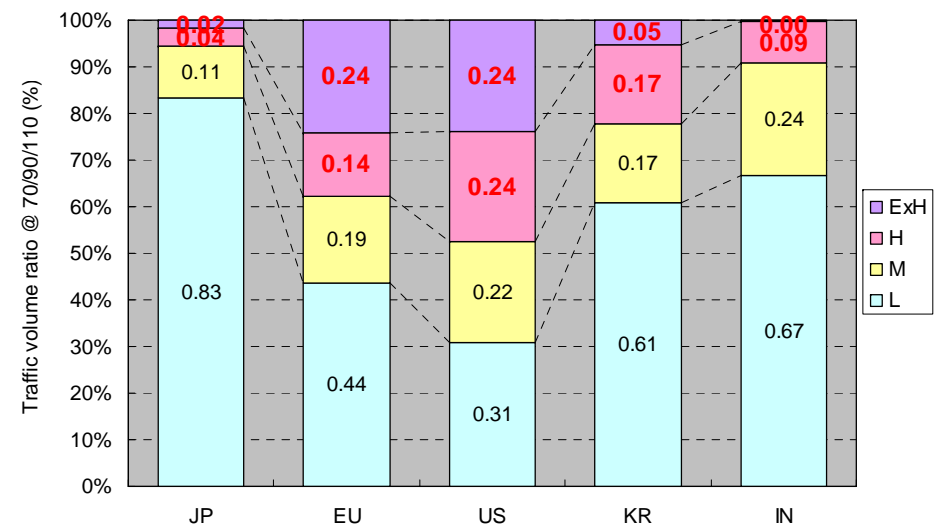
- ✓ Due to the fact that the difference of VA distributions still exists in High/Extra-High phase.
- ✓ Due to the fact that the ratio of High/Extra-High phase of Japan, Korea and India are smaller than EU and US.

[Traffic volume ratio between L/M/H/ExH phase]

[60/80/110/~]



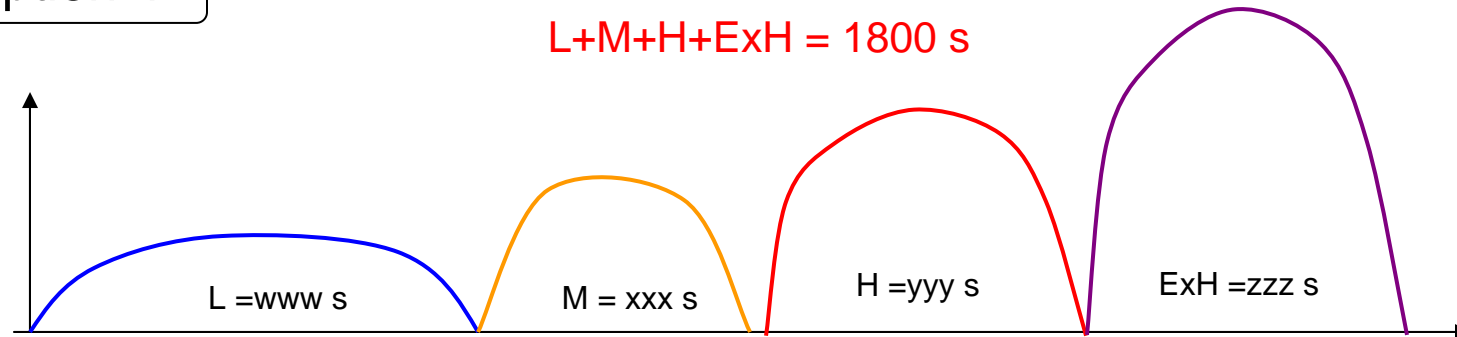
[70/90/110/~]



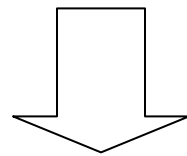
1. Proposal for the threshold speed of Low/Middle/High/(+Extra-High)
2. In-use driving data analysis
3. Study of data conversion
4. Verification of L/M/H
5. Regional weighting
- 6. Mode construction**
7. Next action

6. Mode construction

Option-1

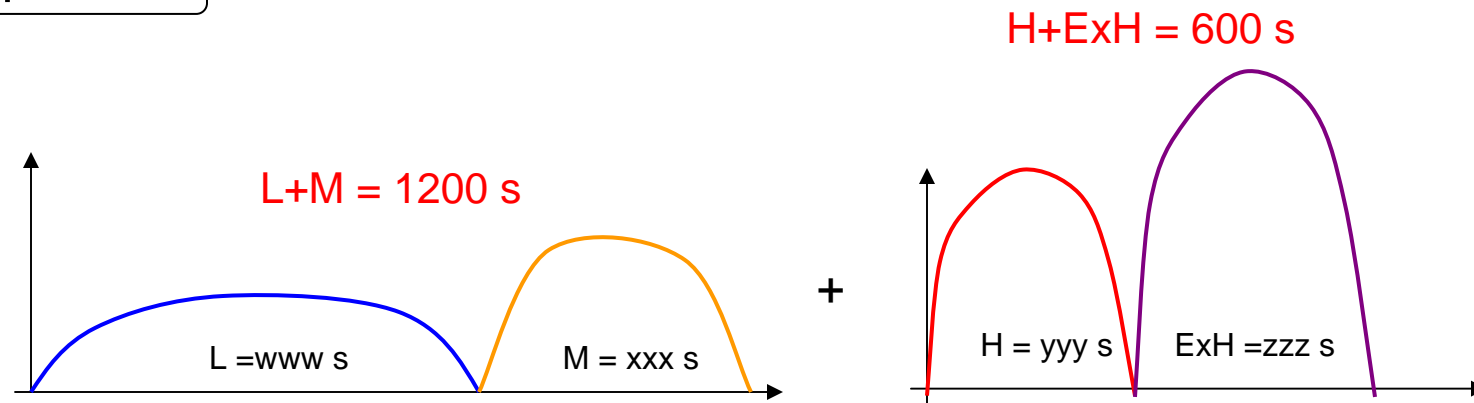


$L : M : H : ExH = \text{based on traffic volume}$



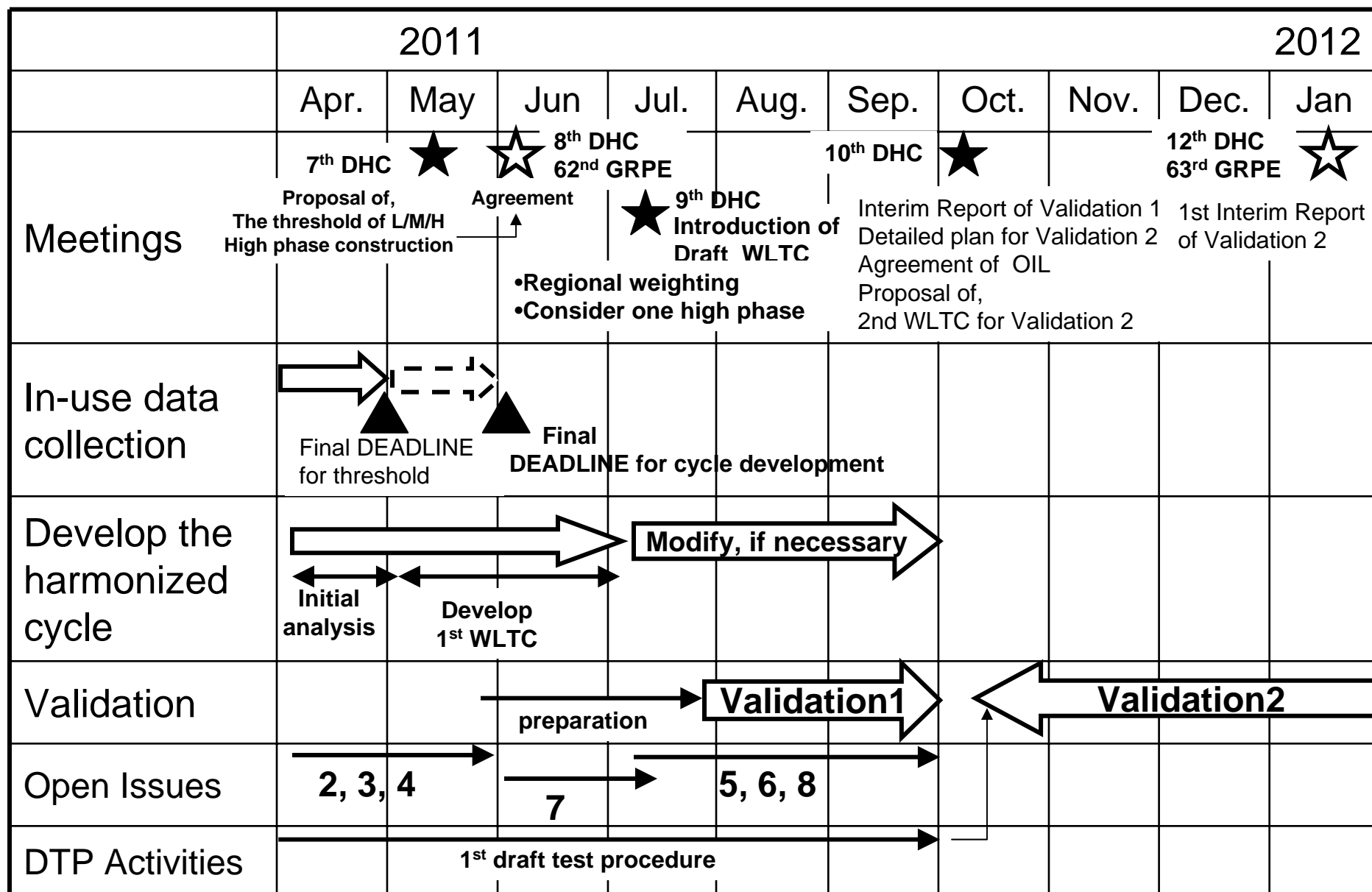
If high phase duration is not enough long for stable sampling, divide into L+M and H+ExH mode construction.

Option-2



1. Proposal for the threshold speed of Low/Middle/High/(+Extra-High)
2. In-use driving data analysis
3. Study of data conversion
4. Verification of L/M/H
5. Regional weighting
6. Mode construction
- 7. Next action**

7. Next Actions



	Issues	Discussion points	Status / Proposed Actions
1	Deadline for submission of driving data	a) India and China requested deadline be extended to May	India has submitted all necessary data and information. Still waiting for China to submit.
2	Regional Weighting when developing the WLTC	a)traffic volume b)same weighting	Expect to have discussion during the 7 th DHC meeting based on the proposal in this slide.
3	Threshold Speed for L/M/H	a)according to DHC-06-03 b)CP's requirement	Expect to get agreement during 7 th DHC meeting based on proposal in this slide.
4	High Phase Cycle Construction (US&EU versus other regions)	a)only ONE unified cycle b)possess TWO types of High phase cycle	Expect to have discussion during the 7 th DHC meeting based on the proposal in this slide.
5	Mode Construction	a) cold start test only b) cold start & hot soak start	Basic agreement in DHC group is b).

	Issues	Discussion points	Proposed Actions
6	Unique Weighting Factor for L/M/H Phase	<ul style="list-style-type: none"> a) harmonized weighting factors b) permit regional weighting factors 	<ul style="list-style-type: none"> a) Is target of Informal Group Consider the possibility to accept b) for only CO2/Fuel consumption
7	Gear Shift Points	<ul style="list-style-type: none"> a) fixed points b) based on vehicle specification c) others 	Ms. Ericsson, Mr. Steven, JRC and JARI work together to finalize the method before developing the 1 st WLTC.
8	How to treat the vehicles which are not able to follow the prescribed cycle	<ul style="list-style-type: none"> a) continue to drive with wide-open-throttle b) exempt the H (or M&H) phase(s) c) others 	Develop the proposal during validation 1 tests.
9	Check the driving profile based on the vehicle characteristic		Analyze the in-use data based on vehicle characteristic (i.e. power to mass ratio)