

Table S2: Same as Table 4, but using MUSICA retrieval v2012 instead of v2015 for the 125HR dataset. Results of intercomparison of Eureka PWV measurements, including number of coincidences (N), correlation coefficient (R), slope of the correlation line (m), mean difference (X – Y) and standard deviation of the difference in mm, mean percent difference ( $2 * (X-Y)/(X+Y) * 100\%$ ) and standard deviation of the percent difference. The standard error of the mean (SE) is noted in brackets alongside the standard deviations. The x-axis instruments along the top are "X" in the difference equations; the y-axis instruments along the top are "Y" in the difference equations. Comparisons between 125HR and radiosonde and GRUAN datasets involve smoothing the radiosonde profile using MUSICA averaging kernels, and interpolation to the 125HR retrieval grid prior to integrating the total column.

	125HR (RL)	SPM (OPAL)	E-AERI (OPAL)	P-AERI (OPAL)	MWR (OPAL)	GRUAN (EWS)	RS (EWS)	E-AERI (RL)	SPM (RL)	
125HR (RL)		N = 933 R = 0.97 m = 0.85 2.03 ± 0.79 mm (0.02) 24.42 ± 8.82 % (0.29)	N = 5 R = 1.00 m = 0.68 0.09 ± 0.06 mm (0.03) 5.06 ± 2.89 % (1.29)	N = 256 R = 0.99 m = 0.79 1.26 ± 1.02 mm (0.06) 21.94 ± 7.56 % (0.47)	N = 2000 R = 0.99 m = 0.88 0.93 ± 0.69 mm (0.02) 17.36 ± 20.43 % (0.46)	N = 10 R = 0.99 m = 1.08 -0.26 ± 0.45 mm (0.14) -2.28 ± 10.20 % (3.22)	N = 34 R = 0.99 m = 1.03 -0.21 ± 0.56 mm (0.10) -2.52 ± 8.04 % (1.38)	N = 177 R = 0.99 m = 1.01 -0.01 ± 0.35 mm (0.03) 0.75 ± 4.69 % (0.35)	N = 1137 R = 0.99 m = 1.11 -0.61 ± 0.52 mm (0.02) -8.70 ± 5.90 % (0.17)	125HR (RL)
SPM (OPAL)	N = 953 R = 0.97 m = 1.11 -2.02 ± 0.79 mm (0.08) -24.44 ± 9.00 %		N = 130 R = 0.98 m = 0.97 0.40 ± 0.64 mm (0.06) 3.35 ± 5.16 % (0.45)	N = 2662 R = 0.98 m = 0.90 0.54 ± 0.66 mm (0.01) 4.74 ± 4.96 % (0.10)	N = 9510 R = 0.99 m = 1.01 -0.67 ± 0.60 mm (0.01) -7.34 ± 7.34 % (0.08)	N = 265 R = 0.99 m = 0.97 -0.09 ± 0.67 mm (0.04) -1.55 ± 6.19 % (0.38)	N = 660 R = 0.98 m = 0.94 -0.10 ± 0.65 mm (0.02) -2.16 ± 6.71 % (0.26)	N = 776 R = 0.96 m = 1.01 -2.29 ± 0.69 mm (0.02) -24.88 ± 7.79 %	N = 37,175 R = 0.97 m = 1.24 -2.91 ± 1.05 mm (0.00) -33.58 ± 9.51 %	SPM (OPAL)
E-AERI (OPAL)	N = 5 R = 1.00 m = 1.46 -0.09 ± 0.06 mm (0.03) -5.06 ± 2.89 % (1.29)	N = 121 R = 0.98 m = 0.97 -0.39 ± 0.67 mm (0.06) -3.32 ± 5.18 % (0.47)		N = 0	N = 1191 R = 0.99 m = 1.02 -0.55 ± 0.51 mm (0.01) -41.66 ± 89.37 % (2.59)	N = 167 R = 1.00 m = 0.99 -0.02 ± 0.24 mm (0.02) -2.46 ± 5.93 % (0.46)	N = 172 R = 1.00 m = 1.01 -0.16 ± 0.22 mm (0.02) -6.56 ± 6.25 % (0.48)		N = 55 R = 0.90 m = 1.08 -3.94 ± 0.59 mm (0.08) -33.49 ± 4.79 % (0.64)	E-AERI (OPAL)
P-AERI (OPAL)	N = 272 R = 0.99 m = 1.24 -1.25 ± 1.02 mm (0.06) -21.79 ± 7.65 %	N = 2804 R = 0.98 m = 1.07 -0.54 ± 0.66 mm (0.01) -4.76 ± 4.95 % (0.09)	N = 0		N = 7981 R = 0.99 m = 1.09 0.03 ± 0.50 mm (0.01) 3.96 ± 15.16 % (0.17)	N = 113 R = 0.99 m = 0.94 -0.08 ± 0.24 mm (0.02) -4.89 ± 15.33 % (1.44)	N = 517 R = 1.00 m = 1.01 -0.16 ± 0.28 mm (0.01) -5.65 ± 6.62 % (0.29)	N = 2556 R = 0.99 m = 1.11 -0.27 ± 0.11 mm (0.00) -16.99 ± 5.35 %	N = 2822 R = 0.97 m = 1.26 -2.83 ± 1.26 mm (0.02) -31.34 ± 8.58 %	P-AERI (OPAL)
MWR (OPAL)	N = 1977 R = 0.99 m = 1.12 -0.93 ± 0.70 mm (0.02) -17.39 ± 20.51 % (0.46)	N = 8837 R = 0.99 m = 0.96 0.68 ± 0.60 mm (0.01) 7.75 ± 7.32 % (0.08)	N = 1191 R = 0.99 m = 0.96 0.55 ± 0.51 mm (0.01) 41.66 ± 89.37 % (2.59)	N = 6975 R = 0.99 m = 0.91 0.00 ± 0.49 mm (0.01) -4.66 ± 15.11 % (0.18)		N = 2057 R = 0.99 m = 0.93 0.46 ± 0.78 mm (0.02) 17.29 ± 52.57 % (1.16)	N = 4278 R = 0.99 m = 0.94 0.23 ± 0.59 mm (0.01) 4.78 ± 100.01 % (1.53)	N = 2443 R = 0.99 m = 1.15 -0.71 ± 0.71 mm (0.01) -19.94 ± 14.48 % (0.29)	N = 10,007 R = 0.98 m = 1.23 -1.93 ± 0.98 mm (0.01) -25.50 ± 9.02 % (0.09)	MWR (OPAL)
GRUAN (EWS)	N = 10 R = 0.99 m = 0.91 0.26 ± 0.45 mm (0.14) 2.28 ± 10.20 % (3.22)	N = 265 R = 0.99 m = 1.00 0.09 ± 0.67 mm (0.04) 1.55 ± 6.19 % (0.38)	N = 167 R = 1.00 m = 1.01 0.02 ± 0.24 mm (0.02) 2.46 ± 5.93 % (0.46)	N = 113 R = 0.99 m = 1.04 0.08 ± 0.24 mm (0.02) 4.89 ± 15.33 % (1.44)	N = 2058 R = 0.99 m = 1.05 -0.46 ± 0.78 mm (0.02) -17.25 ± 52.59 % (1.16)		N = 2315 R = 1.00 m = 1.02 -0.17 ± 0.20 mm (0.00) -3.97 ± 4.08 % (0.08)	N = 99 R = 0.98 m = 1.30 -0.27 ± 0.42 mm (0.04) -11.43 ± 14.43 % (1.50)	N = 250 R = 0.98 m = 1.30 -2.65 ± 1.31 mm (0.07) -31.72 ± 9.02 % (0.57)	GRUAN (EWS)
RS (EWS)	N = 34 R = 0.99 m = 0.94 0.21 ± 0.57 mm (0.10) 2.48 ± 8.15 % (1.40)	N = 660 R = 0.98 m = 1.03 0.10 ± 0.65 mm (0.02) 2.16 ± 6.71 % (0.26)	N = 172 R = 1.00 m = 0.99 0.16 ± 0.22 mm (0.02) 6.56 ± 6.24 % (0.48)	N = 517 R = 1.00 m = 0.99 0.16 ± 0.28 mm (0.01) 5.65 ± 6.62 % (0.29)	N = 4278 R = 0.99 m = 1.00 -0.22 ± 0.59 mm (0.01) -4.78 ± 100.01 % (1.53)	N = 2315 R = 1.00 m = 0.98 0.17 ± 0.20 mm (0.00) 3.97 ± 4.08 % (0.08)		N = 157 R = 0.99 m = 1.27 -0.66 ± 1.00 mm (0.08) -10.64 ± 11.37 % (0.91)	N = 742 R = 0.98 m = 1.33 -2.35 ± 1.29 mm (0.05) -28.62 ± 8.88 % (0.32)	RS (EWS)
E-AERI (RL)	N = 182 R = 0.99 m = 0.98 0.01 ± 0.35 mm (0.02) -0.79 ± 4.67 % (0.35)	N = 786 R = 0.96 m = 0.91 2.29 ± 0.69 mm (0.02) 24.90 ± 7.77 % (0.28)		N = 2331 R = 0.98 m = 0.88 0.27 ± 0.10 mm (0.00) 17.09 ± 5.38 % (0.11)	N = 2569 R = 0.99 m = 0.86 0.72 ± 0.70 mm (0.01) 19.95 ± 14.48 % (0.28)	N = 99 R = 0.98 m = 0.74 0.27 ± 0.42 mm (0.04) 11.43 ± 14.88 %	N = 157 R = 0.99 m = 0.78 0.66 ± 1.00 mm (0.08) 10.64 ± 11.37 %		N = 889 R = 0.99 m = 1.12 -0.53 ± 0.48 mm (0.02) -6.68 ± 4.40 % (0.15)	E-AERI (RL)
SPM (RL)	N = 1152 R = 0.99 m = 0.88 0.60 ± 0.55 mm (0.02) 8.65 ± 6.19 % (0.18)	N = 37,306 R = 0.97 m = 0.76 2.91 ± 1.05 mm (0.02) 33.57 ± 9.51 % (0.05)	N = 56 R = 0.90 m = 0.75 3.95 ± 0.58 mm (0.08) 33.56 ± 4.77 % (0.64)	N = 2617 R = 0.97 m = 0.73 2.86 ± 1.25 mm (0.02) 31.31 ± 8.52 % (0.17)	N = 10,732 R = 0.98 m = 0.79 1.94 ± 0.98 mm (0.01) 25.42 ± 9.01 % (0.09)	N = 250 R = 0.98 m = 0.74 2.65 ± 1.31 mm (0.08) 31.72 ± 9.02 % (0.57)	N = 742 R = 0.98 m = 0.73 2.35 ± 1.29 mm (0.05) 28.62 ± 8.88 % (0.32)	N = 867 R = 0.99 m = 0.88 0.54 ± 0.48 mm (0.02) 6.73 ± 4.41 % (0.15)		SPM (RL)
	125HR (RL)	SPM (OPAL)	E-AERI (OPAL)	P-AERI (OPAL)	MWR (OPAL)	GRUAN (EWS)	RS (EWS)	E-AERI (RL)	SPM (RL)	