



Where: Auckland, New Zealand

Product: Aeroqual Series 500 PM₁₀/PM_{2.5} Portable Particle Monitor

Installed: September 2017

Result: Very high correlation between portable monitor and higher specification environmental monitor provides users with confidence in data quality

Portable Particle Monitor Co-location Study

The purpose of the study was to understand the correlation and cross-compatibility between Aeroqual's portable Series 500 monitor with dual PM₁₀ / PM_{2.5} sensor head and a higher specification, fixed environmental monitor configured to measure multiple PM fractions, including PM₁₀ and PM_{2.5}.

Two Aeroqual PM₁₀ / PM_{2.5} [Portable Particulate Monitors](#) (Series 500 bases) were installed upside down under a cylindrical weatherproof shelter at a test site on the monitoring fence at Aeroqual head office in Auckland, New Zealand (see figure 1). An Aeroqual [Dust Sentry Pro](#) fixed environmental monitor was installed alongside the Series 500 portable particulate monitors. The instruments and serial numbers are given in table 1.

The portable particulate monitors were connected to a laptop and set to log at one-minute intervals. The instruments were calibrated against the Dust Sentry Pro and then co-located for one week during September 2017. Weather conditions in Auckland were typical for early Spring with humidity in the range 50 to 90% and air temperature between 10°C and 20°C.

Figure 1: Test site



Table 1: Instruments and serial numbers under test

Monitor	Serial number
SH 1	PM Sensor head: 5001-338A
SH 2	PM Sensor head: 5001-33CE
Dust Sentry Pro	Profiler: 10062016-334

Results

The one-minute data was averaged to hourly results over the one-week co-location period. The time series plots are shown in figures 2 and 3. Good agreement is evident between the portable particulate monitors and the Dust Sentry Pro.

Figure 2: Hourly PM_{2.5} data from SH1, SH2 and the Dust Sentry Pro

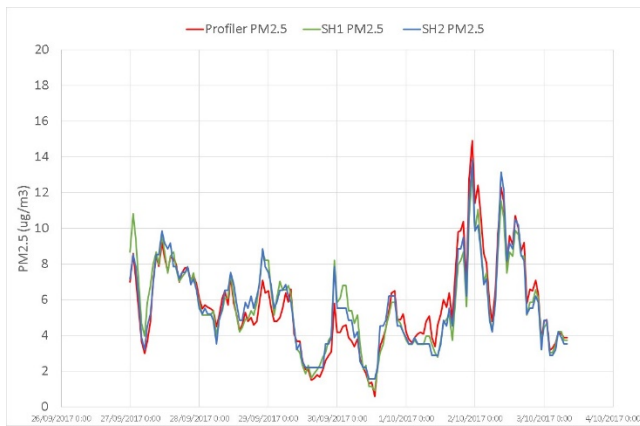
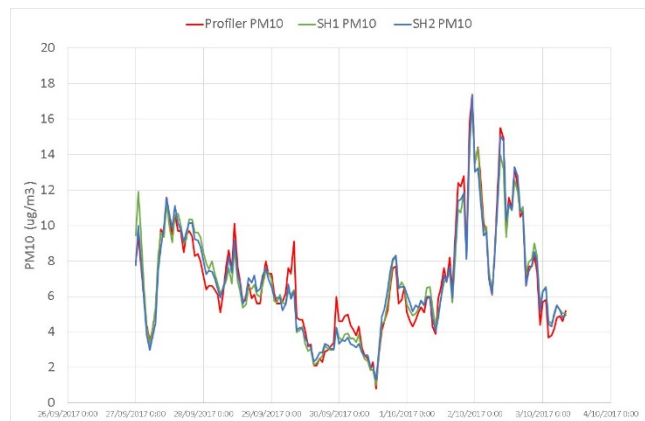


Figure 3: Hourly PM₁₀ data from SH1, SH2 and the Dust Sentry Pro



The correlation coefficients for the linear regression lines from scatter plots between instruments are given in table 2. The intra-sensor head correlation was 0.97 and 0.94 for PM₁₀ and PM_{2.5}, respectively, indicating a very high degree of comparability under the test conditions.

Table 2: Correlation coefficients (r^2) for the instruments

	Correlation coefficient (r^2)	
	PM ₁₀	PM _{2.5}
SH1 vs DP	0.94	0.86
SH2 vs DP	0.95	0.90
SH1 vs SH2	0.97	0.94

The portable sensor head correlations with the Dust Sentry Pro were high despite relatively low particulate concentrations during the test period. PM₁₀ correlations were slightly higher in general than PM_{2.5}. There was a high correlation between the portable sensor monitors and Dust Sentry Pro. This relation indicates a larger range of measurements for PM₁₀ (0-18 µg/m³) versus PM_{2.5} (0-14 µg/m³).