

**Pearl River Delta**  
**Regional Air Quality Monitoring Network**

**A Report of Monitoring Results**  
**for the Period between December 2005 and June 2006**

**Report Number** : **PRDAIR-2006-1**

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**Approved by** : **Pearl River Delta Air Quality  
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**Security Classification** : **Unrestricted**

## **Purpose of the Report**

**This report provides the monitoring results from the Pearl River Delta Regional Air Quality Monitoring Network measured between December 2005 and June 2006.**

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# 1. Introduction to the Pearl River Delta Regional Air Quality Monitoring Network

The Pearl River Delta (PRD) Regional Air Quality Monitoring Network (the Network) jointly established by the Guangdong Provincial Environmental Protection Monitoring Centre (GDEMC) and the Environmental Protection Department of the HKSAR (HKEPD) came into operation on 30 November 2005.

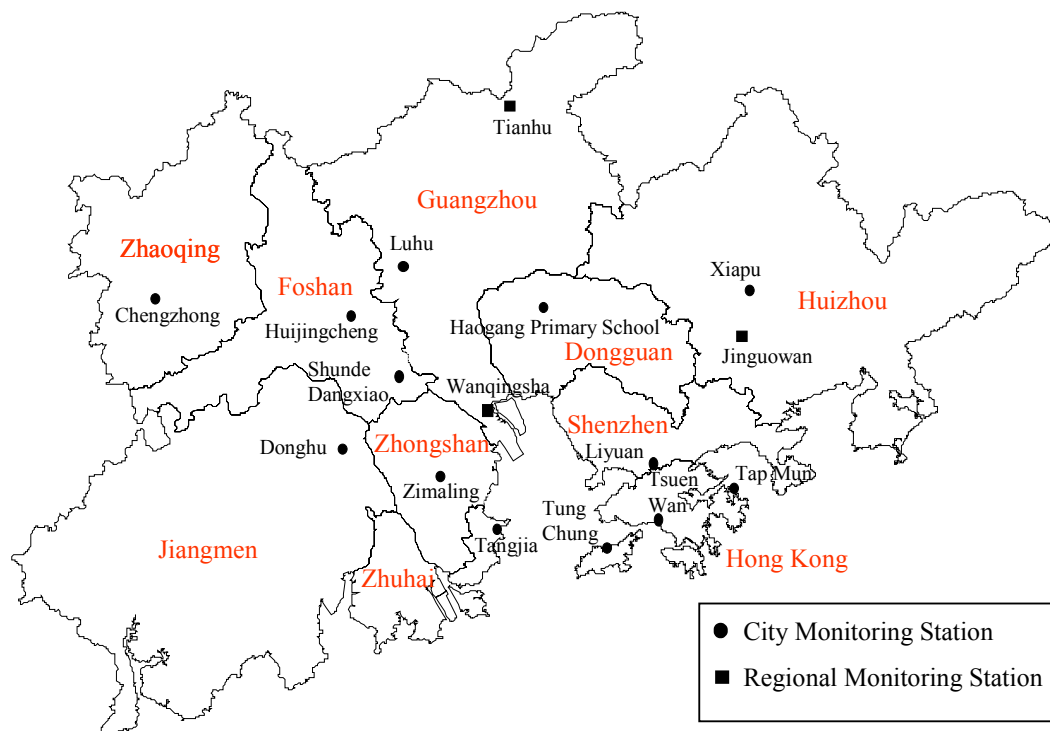
The Network comprises 16 automatic air quality monitoring stations (see Figure 1) in the PRD region. Ten of these stations are operated by the Environmental Protection Monitoring Centres of individual cities in Guangdong while 3 located in Hong Kong are operated by the HKEPD. The remaining 3 regional stations in the Network are operated by the GDEMC. The objectives of the Network are to :

- provide accurate air quality data that can help the Guangdong Provincial and HKSAR governments appraise the air quality situation and air pollution problems in the PRD and formulate appropriate control measures;
- evaluate the effectiveness of the air pollution control measures through long-term monitoring;
- provide the public with information on the air quality of various places in the region.

To ensure the air quality monitoring results attain a high degree of precision and accuracy, the two governments have jointly developed a quality system and established a set of Standard Operational Procedures on Quality Assurance and Quality Control of the PRD Air Quality Monitoring System for Hong Kong and Guangdong (QA/QC Operating Procedures). The design and operation of the Network fully comply with the requirements of the QA/QC Operating Procedures.

All stations are installed with equipment to measure the concentrations of respirable suspended particulate (PM<sub>10</sub> or RSP), sulphur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>) and ozone (O<sub>3</sub>).

**Annexes A and B** set out, respectively, the site information of the monitoring stations in the Network and the methods used for measuring air pollutant concentrations.



**Figure 1 : Location of the Pearl River Delta Regional Air Quality Monitoring Stations**

## **2. Operation of the Network**

During the period between December 2005 and June 2006, the Network had generally been in smooth operation except the monitoring station at Haogang Primary School in Dongguan where some of its monitoring parameters were affected by equipment upgrading works. For all the other monitoring stations, the data capture rates of various monitoring parameters had stayed high, averaging 94%.

To provide the public in both Guangdong and HKSAR with information about air quality in different parts of the PRD region on a daily basis, the GDEMC and HKEPD started to publish daily air quality report of the Network in the form of Regional Air Quality Index (RAQI) on the Internet from 30 November 2005. RAQI is issued at 4pm every day.

### **2.1 Quality Control (QC) and Quality Assurance (QA) Activities**

To ensure that air quality data from the monitoring stations are of high degree of precision and accuracy, the two agencies have carried out, in full, the agreed QA/QC activities, including the zero/span checks, precision checks, dynamic calibration, etc. in the Network in accordance with the QA/QC Operating Procedures.

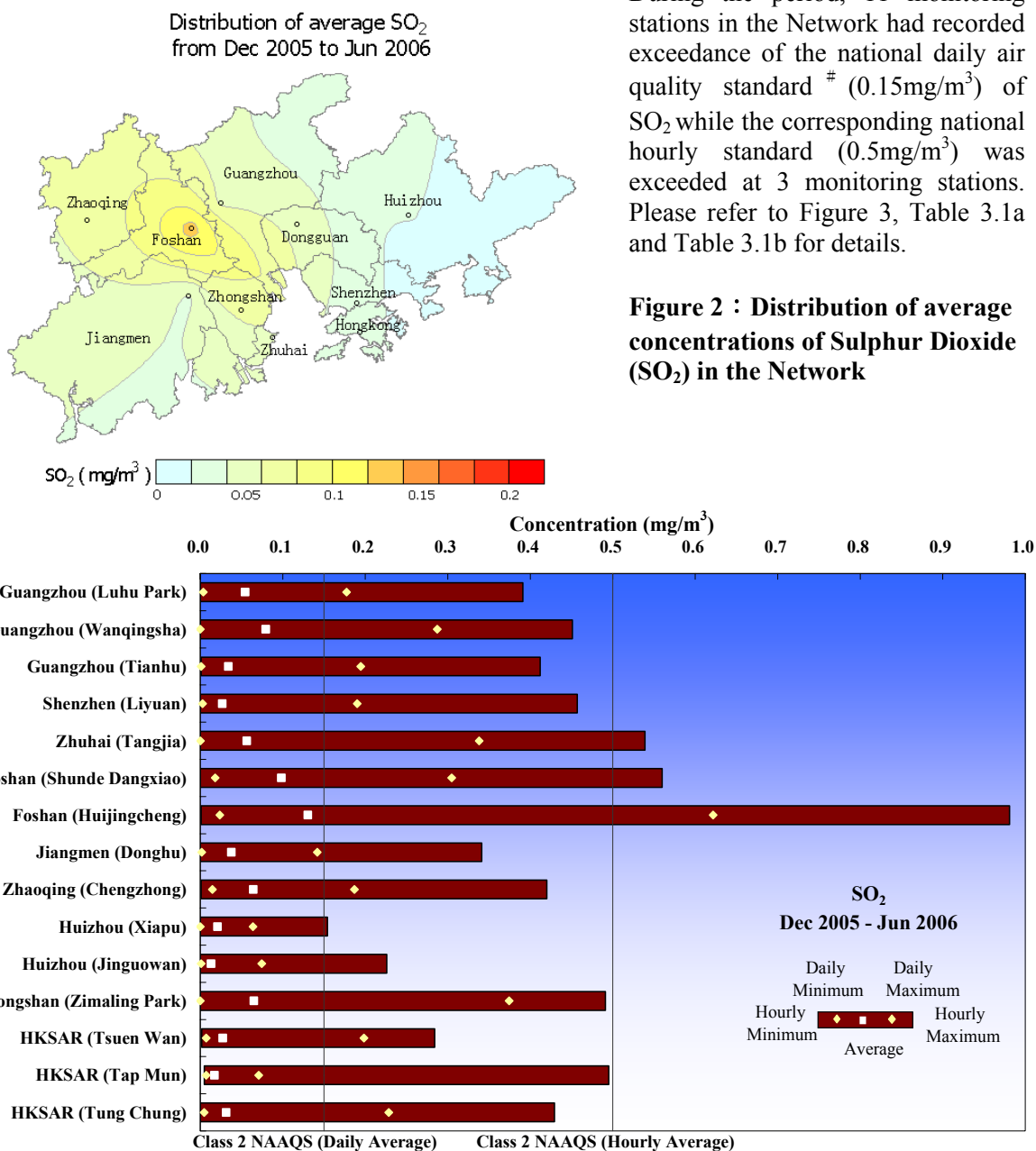
To ensure the operation of the Network is in continued compliance with the QA/QC requirements, the GDEMC and HKEPD have jointly set up the Guangdong-Hong Kong Quality Management Committee for the PRD Regional Air Quality Monitoring Network (the Quality Management Committee) to review the set-up and technical issues of the Network, QA/QC procedures and compliances and data dissemination system on a quarterly basis. The Quality Management Committee will also conduct system audit once a year to evaluate the effectiveness of the quality management system. An audit report will be prepared based on the findings of audit, which will set out the deficiencies and corrective measures to be taken.

### 3. Statistical Analysis of Pollutant Concentrations

#### 3.1 Sulphur Dioxide (SO<sub>2</sub>)

SO<sub>2</sub> comes mainly from the combustion of sulphur-containing fossil fuel. Its major sources of emissions include power plants, fuel combustion plants, vehicles and marine vessels. Apart from the impact on human respiratory system, SO<sub>2</sub> also contributes to acid rain and can be oxidized in the air to form sulphate which has significant impact on the level of respirable suspended particulates (PM<sub>10</sub>) and visibility in the whole region.

The overall averages of SO<sub>2</sub> for the period from December 2005 to June 2006 measured at various monitoring stations ranged from 0.013 mg/m<sup>3</sup> to 0.13 mg/m<sup>3</sup>. As shown in Figure 2, the average levels of SO<sub>2</sub> at the north-western part of PRD and the Pearl River Estuary region were in general higher than those of other areas. Table 3.1c summarises the averages of SO<sub>2</sub> at various stations.



During the period, 11 monitoring stations in the Network had recorded exceedance of the national daily air quality standard # (0.15mg/m<sup>3</sup>) of SO<sub>2</sub> while the corresponding national hourly standard (0.5mg/m<sup>3</sup>) was exceeded at 3 monitoring stations. Please refer to Figure 3, Table 3.1a and Table 3.1b for details.

**Figure 2 : Distribution of average concentrations of Sulphur Dioxide (SO<sub>2</sub>) in the Network**

**Figure 3 : The minimum, maximum and average concentrations of Sulphur Dioxide (SO<sub>2</sub>) measured by individual monitoring stations**

# National Standard refers to Class 2 of the “National Ambient Air Quality Standards (GB 3095 – 1996 – revised version)” [NAAQs], which are applicable to residential, mixed commercial/residential, cultural, industrial and village areas.

**Table 3.1 a : The monthly maxima and minima of hourly averages of Sulphur Dioxide****[Class 2 National Ambient Air Quality Standards NAAQS (Hourly) : 0.5mg/m<sup>3</sup>]**

Month	Dec 2005		Jan 2006		Feb		Mar		Apr		May		Jun		Exceed- -ance Hours	Exceed- -ance Rate
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
Guangzhou (Luhu Park)	0.007	0.260	0.006	0.391	0.005	0.379	0.001	0.339	0.000	0.250	0.001	0.263	0.003	0.266	0	0.00%
Guangzhou (Wanqingsha)	0.016	0.405	0.011	0.339	0.007	0.451	0.012	0.401	0.005	0.362	0.001	0.303	0.000	0.241	0	0.00%
Guangzhou (Tianhu)	0.009	0.086	0.010	0.244	0.010	0.315	0.010	0.269	0.003	0.412	0.003	0.177	0.001	0.245	0	0.00%
Shenzhen (Liyuan)	0.006	0.142	0.003	0.182	0.003	0.288	0.000	0.457	0.002	0.177	0.000	0.194	0.000	0.288	0	0.00%
Zhuhai (Tangjia)	0.002	0.381	0.000	0.367	0.000	0.440	0.010	0.539	0.000	0.281	0.000	0.392	0.000	0.139	1	0.02%
Foshan (Shunde Dangxiao)	0.021	0.523	0.017	0.471	0.000	0.560	0.001	0.503	0.017	0.468	0.006	0.307	0.002	0.196	4	0.08%
Foshan (Huijingcheng)	0.036	0.981	0.021	0.747	0.025	0.817	0.018	0.647	0.008	0.402	0.005	0.365	0.001	0.261	70	1.56%
Jiangmen (Donghu)	0.012	0.248	0.003	0.219	0.007	0.259	0.004	0.341	0.000	0.140	0.000	0.182	0.001	0.206	0	0.00%
Zhaoqing (Chengzhong)	0.014	0.350	0.010	0.196	0.009	0.248	0.001	0.420	0.001	0.222	0.017	0.286	0.010	0.365	0	0.00%
Huizhou (Xiapu)	0.000	0.092	0.004	0.111	0.001	0.116	0.001	0.122	0.000	0.154	0.000	0.108	0.000	0.077	0	0.00%
Huizhou (Jinguowan)	0.005	0.066	0.003	0.226	0.003	0.103	0.004	0.119	0.002	0.149	0.001	0.132	0.000	0.047	0	0.00%
Dongguan (Haogang)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zhongshan (Zimaling Park)	0.014	0.447	0.002	0.424	0.006	0.351	0.002	0.491	0.000	0.308	0.000	0.331	0.001	0.165	0	0.00%
HKSAR (Tsuen Wan)	0.007	0.149	0.005	0.136	0.004	0.255	0.004	0.284	0.002	0.150	0.006	0.166	0.006	0.179	0	0.00%
HKSAR (Tap Mun)	0.005	0.495	0.005	0.153	0.005	0.161	0.005	0.243	0.005	0.120	0.005	0.135	0.006	0.067	0	0.00%
HKSAR (Tung Chung)	0.004	0.166	0.005	0.175	0.000	0.429	0.000	0.286	0.004	0.150	0.004	0.246	0.003	0.257	0	0.00%

**Table 3.1 b : The monthly maxima and minima of daily averages of Sulphur Dioxide****[Class 2 NAAQS (Daily) : 0.15 mg/m<sup>3</sup>]**

Month	Dec 2005		Jan 2006		Feb		Mar		Apr		May		Jun		Exceed- -ance Hours	Exceed- -ance Rate
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
Guangzhou (Luhu Park)	0.017	0.124	0.018	0.177	0.008	0.164	0.009	0.136	0.009	0.096	0.004	0.104	0.034	0.100	4	2.0%
Guangzhou (Wanqingsha)	0.065	0.190	0.029	0.197	0.016	0.202	0.035	0.287	0.012	0.138	0.014	0.143	0.000	0.106	16	7.7%
Guangzhou (Tianhu)	0.011	0.066	0.015	0.143	0.010	0.086	0.011	0.091	0.005	0.194	0.003	0.072	0.001	0.104	2	1.0%
Shenzhen (Liyuan)	0.020	0.064	0.009	0.061	0.009	0.098	0.010	0.190	0.004	0.070	0.005	0.049	0.003	0.039	1	0.5%
Zhuhai (Tangjia)	0.031	0.190	0.001	0.190	0.007	0.168	0.025	0.338	0.006	0.118	0.001	0.169	0.000	0.048	13	6.5%
Foshan (Shunde Dangxiao)	0.040	0.305	0.031	0.303	0.039	0.248	0.018	0.285	0.048	0.208	0.026	0.129	0.021	0.106	35	17.3%
Foshan (Huijingcheng)	0.063	0.622	0.039	0.371	0.043	0.301	0.036	0.335	0.059	0.259	0.024	0.146	0.032	0.125	62	31.3%
Jiangmen (Donghu)	0.020	0.139	0.010	0.101	0.011	0.096	0.009	0.142	0.002	0.062	0.002	0.075	0.002	0.056	0	0.0%
Zhaoqing (Chengzhong)	0.023	0.187	0.018	0.144	0.015	0.140	0.020	0.184	0.017	0.157	0.033	0.164	0.018	0.176	11	5.5%
Huizhou (Xiapu)	0.000	0.032	0.009	0.046	0.002	0.051	0.006	0.064	0.004	0.064	0.002	0.035	0.002	0.026	0	0.0%
Huizhou (Jinguowan)	0.008	0.040	0.006	0.074	0.004	0.047	0.005	0.070	0.003	0.064	0.003	0.035	0.001	0.021	0	0.0%
Dongguan (Haogang)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zhongshan (Zimaling Park)	0.059	0.206	0.007	0.199	0.012	0.173	0.007	0.375	0.000	0.145	0.002	0.149	0.002	0.075	13	7.0%
HKSAR (Tsuen Wan)	0.019	0.046	0.007	0.059	0.007	0.084	0.007	0.198	0.009	0.056	0.007	0.058	0.010	0.048	1	0.5%
HKSAR (Tap Mun)	0.014	0.071	0.007	0.036	0.008	0.034	0.010	0.042	0.008	0.029	0.007	0.030	0.007	0.025	0	0.0%
HKSAR (Tung Chung)	0.015	0.074	0.014	0.103	0.005	0.133	0.009	0.229	0.005	0.069	0.006	0.072	0.005	0.102	1	0.5%

**Table 3.1 c : The monthly averages and overall averages of Sulphur Dioxide**

Month	Dec 2005	Jan 2006	Feb	Mar	Apr	May	Jun	Overall Average
Guangzhou (Luhu Park)	0.046	0.067	0.061	0.061	0.049	0.035	0.062	0.054
Guangzhou (Wanqingsha)	0.114	0.091	0.104	0.100	0.059	0.054	0.032	0.079
Guangzhou (Tianhu)	0.029	0.041	0.030	0.030	0.051	0.021	0.035	0.034
Shenzhen (Liyuan)	0.038	0.028	0.036	0.033	0.020	0.016	0.016	0.027
Zhuhai (Tangjia)	0.092	0.054	0.072	0.082	0.030	0.041	0.015	0.056
Foshan (Shunde Dangxiao)	0.132	0.102	0.114	0.123	0.099	0.057	0.057	0.098
Foshan (Huijingcheng)	0.186	0.127	0.139	0.189	0.131	0.062	0.064	0.130
Jiangmen (Donghu)	0.066	0.038	0.050	0.055	0.021	0.016	0.018	0.038
Zhaoqing (Chengzhong)	0.070	0.061	0.050	0.073	0.056	0.074	0.064	0.064
Huizhou (Xiapu)	0.018	0.027	0.023	0.021	0.026	0.016	0.014	0.021
Huizhou (Jinguowan)	0.019	0.015	0.015	0.013	0.015	0.009	0.006	0.013
Dongguan (Haogang)	--	--	--	--	--	--	--	--
Zhongshan (Zimaling Park)	0.111	0.061	0.086	0.087	0.039	0.052	0.022	0.065
HKSAR (Tsuen Wan)	0.030	0.025	0.036	0.029	0.026	0.025	0.022	0.027
HKSAR (Tap Mun)	0.026	0.018	0.018	0.018	0.016	0.013	0.011	0.017
HKSAR (Tung Chung)	0.041	0.039	0.043	0.038	0.021	0.022	0.016	0.031

Remark : 1. All concentration units are in milligrams per cubic metre.

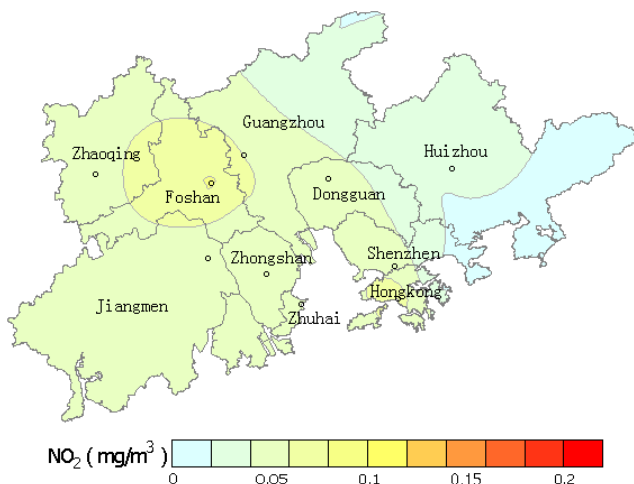
2. "--" denotes lack of data due to equipment upgrading works.

### 3.2 Nitrogen Dioxide (NO<sub>2</sub>)

Nitrogen Dioxide (NO<sub>2</sub>) is mainly formed as a result of the oxidization of nitrogen oxide (NO) emitted in the process of combustion. Its major emission sources include power stations, vehicles, industrial combustion plants, etc. Apart from the impact on human respiratory system, NO<sub>2</sub> also contributes to acid rain and can be oxidized in the air to form nitrate which has significant impact on the level of particulates and visibility in the region.

The overall averages of NO<sub>2</sub> for the period from December 2005 to June 2006 measured at various monitoring stations ranged from 0.014 mg/m<sup>3</sup> to 0.084 mg/m<sup>3</sup>. During the period, 11 monitoring stations in the Network had recorded exceedance of the national daily standard (0.12 mg/m<sup>3</sup>) of NO<sub>2</sub> while the corresponding national hourly standard (0.24 mg/m<sup>3</sup>) was exceeded at 8 monitoring stations. Please refer to Figures 4 and 5 as well as Tables 3.2a to 3.2c for details.

Distribution of average NO<sub>2</sub> from Dec 2005 to Jun 2006



NO<sub>2</sub> while the corresponding national hourly standard (0.24 mg/m<sup>3</sup>) was exceeded at 8 monitoring stations. Please refer to Figures 4 and 5 as well as Tables 3.2a to 3.2c for details.

Figure 4 : Distribution of average concentrations of Nitrogen Dioxide (NO<sub>2</sub>) in the Network

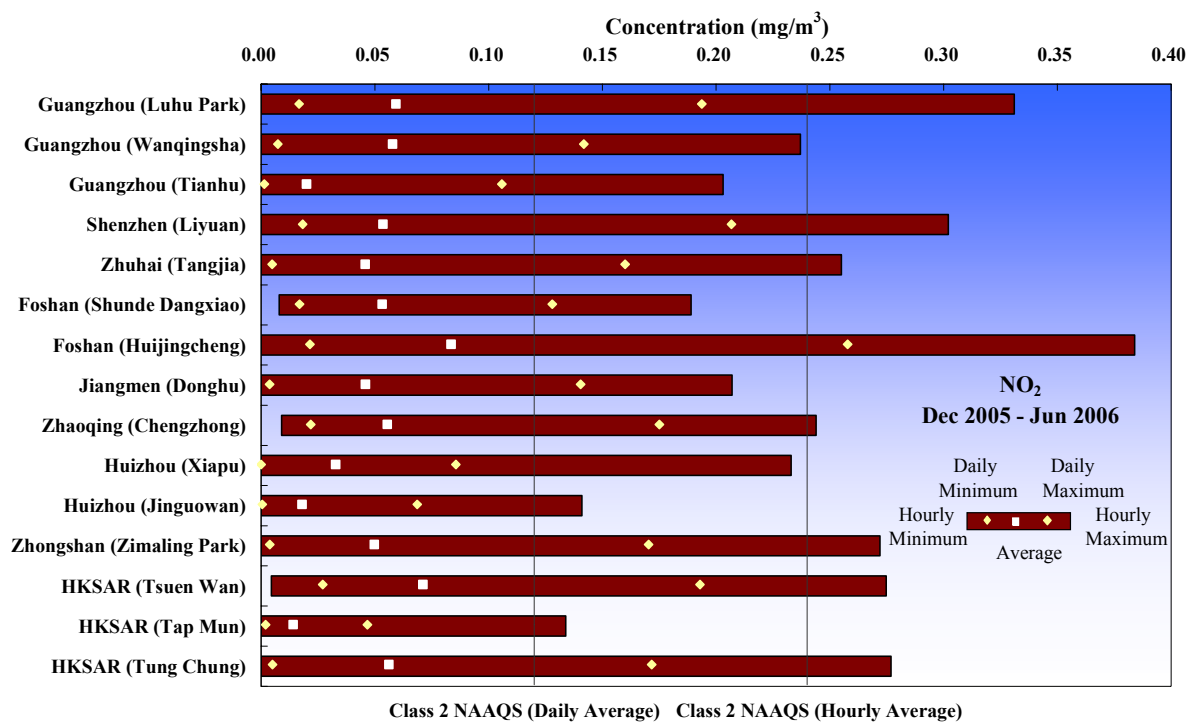


Figure 5 : The minimum, maximum and average concentrations of Nitrogen Dioxide (NO<sub>2</sub>) measured by individual monitoring stations

**Table 3.2 a : The monthly maxima and minima of hourly averages of Nitrogen Dioxide****[Class 2 NAAQS (Hourly) : 0.24mg/m<sup>3</sup>]**

Month	Dec 2005		Jan 2006		Feb		Mar		Apr		May		Jun		Exceed- -ance Hours	Exceed- -ance Rate
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
Guangzhou (Luhu Park)	0.016	0.277	0.018	0.331	0.000	0.266	0.002	0.249	0.011	0.161	0.010	0.139	0.009	0.113	15	0.31%
Guangzhou (Wanqingsha)	0.020	0.221	0.015	0.159	0.018	0.191	0.014	0.237	0.003	0.192	0.001	0.145	0.000	0.159	0	0.00%
Guangzhou (Tianhu)	0.002	0.043	0.002	0.203	0.001	0.182	0.001	0.138	0.002	0.142	0.000	0.067	0.001	0.134	0	0.00%
Shenzhen (Liyuan)	0.008	0.208	0.007	0.294	0.004	0.302	0.000	0.290	0.003	0.185	0.003	0.163	0.005	0.158	20	0.40%
Zhuhai (Tangjia)	0.005	0.255	0.000	0.176	0.011	0.219	0.011	0.232	0.000	0.111	0.000	0.120	0.001	0.143	1	0.02%
Foshan (Shunde Dangxiao)	0.018	0.189	0.016	0.176	0.011	0.153	0.012	0.148	0.010	0.130	0.008	0.140	0.009	0.108	0	0.00%
Foshan (Huijingcheng)	0.000	0.384	0.017	0.380	0.023	0.294	0.015	0.366	0.019	0.252	0.014	0.216	0.016	0.221	61	1.36%
Jiangmen (Donghu)	0.019	0.207	0.015	0.181	0.012	0.157	0.000	0.205	0.002	0.162	0.001	0.152	0.000	0.139	0	0.00%
Zhaoqing (Chengzhong)	0.012	0.244	0.012	0.240	0.015	0.193	0.009	0.200	0.013	0.206	0.016	0.122	0.015	0.165	2	0.04%
Huizhou (Xiapu)	0.000	0.152	0.002	0.233	0.004	0.133	0.004	0.118	0.009	0.182	0.000	0.092	0.005	0.091	0	0.00%
Huizhou (Jinguowan)	0.005	0.080	0.004	0.141	0.007	0.118	0.004	0.116	0.004	0.093	0.002	0.106	0.000	0.057	0	0.00%
Dongguan (Haogang)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zhongshan (Zimaling Park)	0.014	0.243	0.001	0.187	0.013	0.194	0.010	0.272	0.003	0.183	0.002	0.139	0.000	0.182	5	0.12%
HKSAR (Tsuen Wan)	0.017	0.265	0.018	0.202	0.016	0.248	0.013	0.275	0.018	0.181	0.005	0.179	0.010	0.176	13	0.26%
HKSAR (Tap Mun)	0.002	0.115	0.000	0.072	0.000	0.114	0.006	0.134	0.000	0.081	0.000	0.093	0.000	0.085	0	0.00%
HKSAR (Tung Chung)	0.015	0.215	0.011	0.179	0.009	0.228	0.009	0.277	0.000	0.172	0.001	0.215	0.000	0.201	5	0.10%

**Table 3.2 b : The monthly maxima and minima of daily averages of Nitrogen Dioxide****[Class 2 NAAQS (Daily) : 0.12 mg/m<sup>3</sup>]**

Month	Dec 2005		Jan 2006		Feb		Mar		Apr		May		Jun		Exceed- -ance Hours	Exceed- -ance Rate
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
Guangzhou (Luhu Park)	0.030	0.179	0.028	0.194	0.027	0.158	0.028	0.131	0.017	0.102	0.018	0.046	0.017	0.056	15	7.4%
Guangzhou (Wanqingsha)	0.039	0.136	0.025	0.125	0.031	0.123	0.042	0.142	0.013	0.082	0.012	0.082	0.007	0.096	8	4.1%
Guangzhou (Tianhu)	0.005	0.031	0.005	0.106	0.003	0.055	0.003	0.076	0.003	0.080	0.001	0.038	0.002	0.050	0	0.0%
Shenzhen (Liyuan)	0.030	0.122	0.028	0.116	0.018	0.128	0.025	0.207	0.021	0.107	0.020	0.094	0.024	0.080	5	2.4%
Zhuhai (Tangjia)	0.031	0.124	0.022	0.111	0.025	0.117	0.031	0.160	0.010	0.073	0.005	0.053	0.005	0.033	5	2.4%
Foshan (Shunde Dangxiao)	0.038	0.128	0.031	0.127	0.025	0.091	0.029	0.097	0.017	0.078	0.018	0.080	0.019	0.065	3	1.5%
Foshan (Huijingcheng)	0.022	0.258	0.028	0.205	0.037	0.158	0.039	0.181	0.034	0.130	0.036	0.099	0.032	0.116	34	17.3%
Jiangmen (Donghu)	0.038	0.140	0.025	0.092	0.023	0.101	0.024	0.120	0.011	0.069	0.014	0.077	0.004	0.069	2	1.0%
Zhaoqing (Chengzhong)	0.023	0.175	0.025	0.142	0.023	0.122	0.022	0.133	0.024	0.120	0.025	0.083	0.024	0.096	7	3.3%
Huizhou (Xiapu)	0.000	0.070	0.010	0.086	0.012	0.052	0.012	0.064	0.017	0.065	0.016	0.046	0.021	0.045	0	0.0%
Huizhou (Jinguowan)	0.009	0.036	0.008	0.066	0.011	0.046	0.007	0.069	0.006	0.040	0.007	0.043	0.000	0.024	0	0.0%
Dongguan (Haogang)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zhongshan (Zimaling Park)	0.038	0.141	0.020	0.107	0.022	0.111	0.026	0.170	0.008	0.098	0.009	0.082	0.004	0.075	6	3.2%
HKSAR (Tsuen Wan)	0.051	0.128	0.041	0.113	0.043	0.152	0.042	0.193	0.046	0.106	0.031	0.093	0.027	0.101	4	1.9%
HKSAR (Tap Mun)	0.005	0.036	0.003	0.022	0.002	0.022	0.012	0.035	0.003	0.047	0.002	0.024	0.003	0.033	0	0.0%
HKSAR (Tung Chung)	0.052	0.112	0.036	0.130	0.021	0.145	0.030	0.172	0.006	0.090	0.008	0.098	0.005	0.096	7	3.4%

**Table 3.2 c : The monthly averages and overall averages of Nitrogen Dioxide**

Month	Dec 2005	Jan 2006	Feb	Mar	Apr	May	Jun	Overall Average
Guangzhou (Luhu Park)	0.076	0.084	0.078	0.065	0.050	0.030	0.027	0.059
Guangzhou (Wanqingsha)	0.086	0.061	0.070	0.073	0.043	0.038	0.028	0.058
Guangzhou (Tianhu)	0.011	0.027	0.020	0.022	0.023	0.012	0.023	0.020
Shenzhen (Liyuan)	0.069	0.056	0.057	0.062	0.047	0.041	0.041	0.054
Zhuhai (Tangjia)	0.070	0.047	0.060	0.070	0.034	0.021	0.014	0.046
Foshan (Shunde Dangxiao)	0.076	0.058	0.055	0.062	0.041	0.042	0.037	0.053
Foshan (Huijingcheng)	0.102	0.087	0.086	0.102	0.071	0.066	0.065	0.084
Jiangmen (Donghu)	0.076	0.050	0.056	0.052	0.032	0.034	0.021	0.046
Zhaoqing (Chengzhong)	0.065	0.061	0.055	0.065	0.056	0.044	0.041	0.056
Huizhou (Xiapu)	0.027	0.033	0.029	0.038	0.037	0.033	0.033	0.033
Huizhou (Jinguowan)	0.018	0.020	0.024	0.021	0.018	0.014	0.011	0.018
Dongguan (Haogang)	--	--	--	--	--	--	--	--
Zhongshan (Zimaling Park)	0.077	0.042	0.059	0.068	0.038	0.043	0.022	0.050
HKSAR (Tsuen Wan)	0.087	0.076	0.081	0.078	0.070	0.059	0.046	0.071
HKSAR (Tap Mun)	0.017	0.013	0.012	0.019	0.015	0.011	0.011	0.014
HKSAR (Tung Chung)	0.084	0.068	0.068	0.068	0.039	0.040	0.025	0.056

Remark : 1. All concentration units are in milligrams per cubic metre.

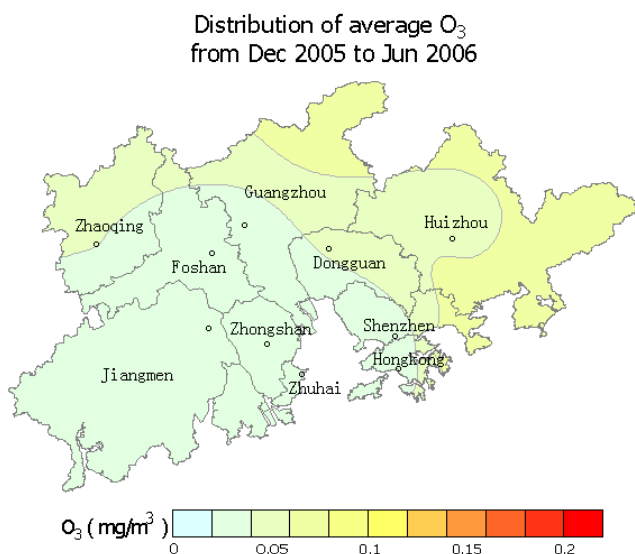
2. "--" denotes lack of data due to equipment upgrading works.

### 3.3 Ozone (O<sub>3</sub>)

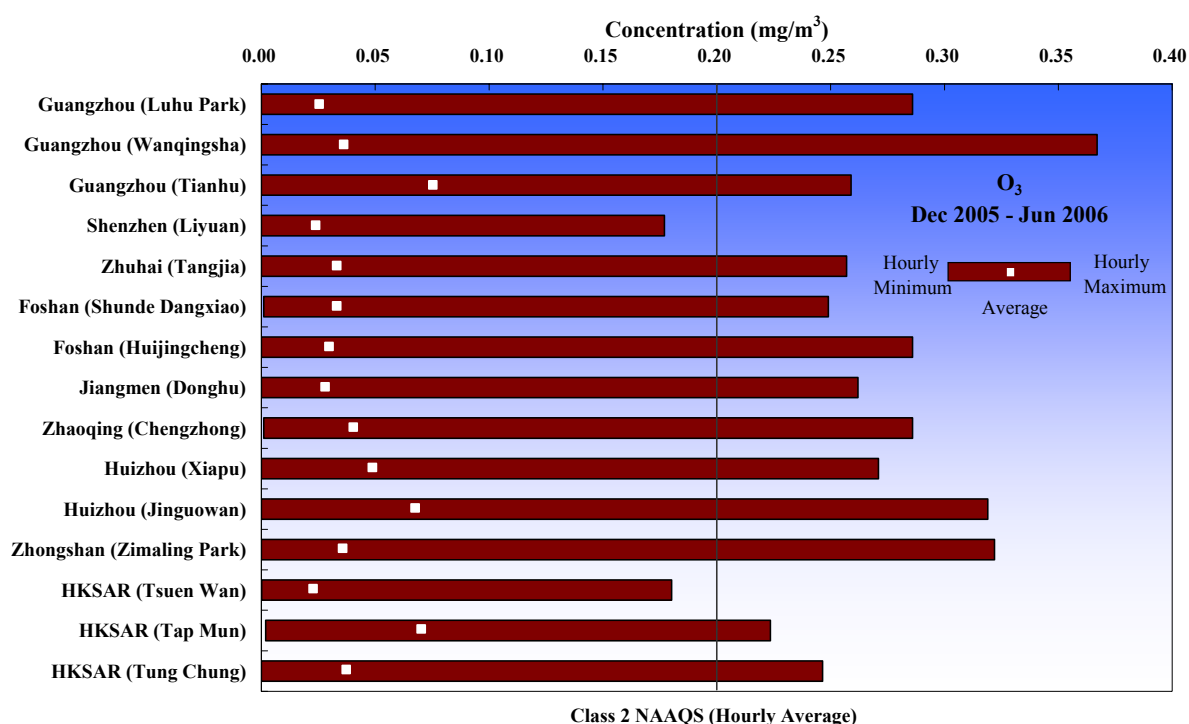
Ozone (O<sub>3</sub>) is not directly emitted from emission sources. It is formed by the photochemical reaction of oxygen, NO<sub>x</sub> and volatile organic compounds (VOCs) in the air under sunlight, and is the main component of photochemical smog. Ozone can cause irritation to the eye, nose and throat. At elevated levels, O<sub>3</sub> can increase a person's susceptibility to respiratory diseases, and aggravate pre-existing respiratory diseases such as asthma.

The precursors (NO<sub>x</sub> and VOCs) of O<sub>3</sub> mainly originate from pollution sources in urban areas. However, as it usually takes several hours for O<sub>3</sub> to be formed and rise to its peak level, and O<sub>3</sub> and its precursors can be transported to areas downwind of their sources, concentrations of O<sub>3</sub> in rural areas are often higher than in the urban areas. During the period from December 2005 to June 2006, the highest average O<sub>3</sub> concentrations were recorded at stations in rural areas, including Tianhu of Guangzhou, Tap Mun of Hong Kong and Jinguowan of Huizhou. During that

period, 13 monitoring stations in the Network had recorded exceedance of the national hourly standard (0.2 mg/m<sup>3</sup>) of ozone. Please refer to Figures 6 and 7 as well as Tables 3.3a to 3.3c for details.



**Figure 6 : Distribution of average concentrations of Ozone (O<sub>3</sub>) in the Network**



**Figure 7 : The minimum, maximum and average concentrations of Ozone (O<sub>3</sub>) measured by individual monitoring stations**

**Table 3.3 a : The monthly maxima and minima of hourly averages of Ozone**

[Class 2 NAAQS (Hourly) : 0.2mg/m<sup>3</sup>]

Month	Dec 2005		Jan 2006		Feb		Mar		Apr		May		Jun		Exceed- -ance Hours	Exceed- -ance Rate
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
Guangzhou (Luhu Park)	0.000	0.206	0.000	0.139	0.000	0.250	0.000	0.235	0.000	0.180	0.000	0.286	0.000	0.266	18	0.37%
Guangzhou (Wanqingsha)	0.001	0.367	0.001	0.215	0.001	0.196	0.001	0.240	0.001	0.257	0.001	0.314	0.000	0.317	38	0.80%
Guangzhou (Tianhu)	0.031	0.206	0.004	0.223	0.005	0.172	0.004	0.255	0.002	0.259	0.004	0.210	0.000	0.257	43	0.94%
Shenzhen (Liyuan)	0.000	0.157	0.000	0.105	0.000	0.177	0.000	0.153	0.000	0.163	0.000	0.144	0.000	0.177	0	0.00%
Zhuhai (Tangjia)	0.000	0.257	0.000	0.138	0.009	0.216	0.000	0.206	0.000	0.156	0.000	0.216	0.000	0.121	13	0.31%
Foshan (Shunde Dangxiao)	0.007	0.208	0.006	0.200	0.008	0.249	0.004	0.224	0.002	0.241	0.003	0.220	0.001	0.226	19	0.40%
Foshan (Huijingcheng)	0.000	0.180	0.004	0.263	0.000	0.286	0.000	0.254	0.001	0.268	0.002	0.251	0.002	0.258	25	0.55%
Jiangmen (Donghu)	0.000	0.146	0.000	0.131	0.002	0.214	0.001	0.171	0.002	0.185	0.002	0.262	0.000	0.234	12	0.26%
Zhaoqing (Chengzhong)	0.008	0.177	0.004	0.139	0.005	0.193	0.005	0.173	0.002	0.186	0.001	0.200	0.001	0.286	6	0.13%
Huizhou (Xiapu)	0.000	0.160	0.002	0.215	0.002	0.226	0.000	0.177	0.000	0.271	0.002	0.263	0.003	0.235	17	0.35%
Huizhou (Jinguowan)	0.013	0.177	0.004	0.267	0.002	0.257	0.000	0.273	0.000	0.319	0.003	0.212	0.001	0.209	24	0.51%
Dongguan (Haogang)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zhongshan (Zimaling Park)	0.000	0.322	0.000	0.251	0.000	0.222	0.000	0.172	0.000	0.207	0.000	0.261	0.000	0.183	22	0.55%
HKSAR (Tsuen Wan)	0.001	0.092	0.001	0.077	0.000	0.061	0.001	0.122	0.002	0.128	0.003	0.180	0.003	0.082	0	0.00%
HKSAR (Tap Mun)	0.003	0.201	0.005	0.182	0.006	0.223	0.003	0.184	0.003	0.179	0.002	0.206	0.002	0.170	6	0.12%
HKSAR (Tung Chung)	0.000	0.174	0.000	0.120	0.003	0.160	0.000	0.148	0.002	0.138	0.002	0.246	0.001	0.095	8	0.16%

**Table 3.3 b : The monthly maxima and minima of daily averages of Ozone**

Month	Dec 2005		Jan 2006		Feb		Mar		Apr		May		Jun	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Guangzhou (Luhu Park)	0.010	0.084	0.002	0.055	0.002	0.055	0.000	0.059	0.002	0.053	0.003	0.091	0.003	0.095
Guangzhou (Wanqingsha)	0.010	0.102	0.003	0.075	0.003	0.080	0.002	0.067	0.004	0.093	0.008	0.113	0.006	0.086
Guangzhou (Tianhu)	0.057	0.153	0.025	0.161	0.028	0.105	0.041	0.133	0.027	0.158	0.043	0.118	0.025	0.106
Shenzhen (Liyuan)	0.003	0.064	0.000	0.045	0.003	0.066	0.002	0.080	0.001	0.068	0.001	0.065	0.001	0.037
Zhuhai (Tangjia)	0.008	0.072	0.002	0.063	0.013	0.088	0.000	0.086	0.000	0.067	0.007	0.099	0.005	0.038
Foshan (Shunde Dangxiao)	0.010	0.090	0.009	0.065	0.010	0.096	0.006	0.061	0.007	0.081	0.010	0.083	0.007	0.066
Foshan (Huijingcheng)	0.005	0.071	0.005	0.078	0.003	0.073	0.002	0.061	0.010	0.089	0.007	0.092	0.007	0.066
Jiangmen (Donghu)	0.010	0.062	0.004	0.068	0.005	0.079	0.003	0.059	0.004	0.068	0.009	0.101	0.002	0.069
Zhaoqing (Chengzhong)	0.027	0.097	0.010	0.079	0.013	0.083	0.013	0.073	0.011	0.077	0.014	0.088	0.007	0.108
Huizhou (Xiapu)	0.026	0.104	0.017	0.073	0.016	0.106	0.003	0.091	0.013	0.091	0.013	0.098	0.012	0.081
Huizhou (Jinguowan)	0.050	0.119	0.024	0.099	0.033	0.135	0.023	0.119	0.022	0.112	0.020	0.112	0.019	0.093
Dongguan (Haogang)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zhongshan (Zimaling Park)	0.003	0.079	0.000	0.056	0.001	0.085	0.000	0.086	0.001	0.088	0.008	0.122	0.008	0.064
HKSAR (Tsuen Wan)	0.005	0.058	0.003	0.046	0.003	0.034	0.004	0.071	0.005	0.059	0.005	0.074	0.004	0.038
HKSAR (Tap Mun)	0.021	0.134	0.024	0.105	0.027	0.124	0.031	0.133	0.022	0.134	0.014	0.128	0.017	0.099
HKSAR (Tung Chung)	0.002	0.078	0.000	0.067	0.010	0.092	0.007	0.097	0.005	0.081	0.013	0.102	0.008	0.048

**Table 3.3 c : The monthly averages and overall averages of Ozone**

Month	Dec 2005	Jan 2006	Feb	Mar	Apr	May	Jun	Average
Guangzhou (Luhu Park)	0.040	0.023	0.027	0.016	0.017	0.030	0.023	0.025
Guangzhou (Wanqingsha)	0.046	0.033	0.041	0.026	0.035	0.042	0.031	0.036
Guangzhou (Tianhu)	0.101	0.077	0.069	0.072	0.073	0.077	0.056	0.075
Shenzhen (Liyuan)	0.035	0.020	0.028	0.029	0.023	0.022	0.011	0.024
Zhuhai (Tangjia)	0.041	0.035	0.046	0.028	0.029	0.031	0.018	0.033
Foshan (Shunde Dangxiao)	0.041	0.034	0.039	0.027	0.029	0.037	0.025	0.033
Foshan (Huijingcheng)	0.035	0.030	0.029	0.019	0.028	0.037	0.029	0.030
Jiangmen (Donghu)	0.032	0.031	0.036	0.025	0.021	0.033	0.017	0.028
Zhaoqing (Chengzhong)	0.055	0.039	0.047	0.033	0.034	0.043	0.032	0.040
Huizhou (Xiapu)	0.062	0.046	0.056	0.042	0.049	0.052	0.034	0.049
Huizhou (Jinguowan)	0.088	0.067	0.073	0.071	0.066	0.066	0.038	0.068
Dongguan (Haogang)	--	--	--	--	--	--	--	--
Zhongshan (Zimaling Park)	0.039	0.030	0.034	0.027	0.042	0.044	0.034	0.036
HKSAR (Tsuen Wan)	0.034	0.018	0.015	0.030	0.021	0.028	0.012	0.023
HKSAR (Tap Mun)	0.088	0.069	0.081	0.081	0.064	0.067	0.042	0.070
HKSAR (Tung Chung)	0.048	0.028	0.039	0.041	0.038	0.041	0.027	0.037

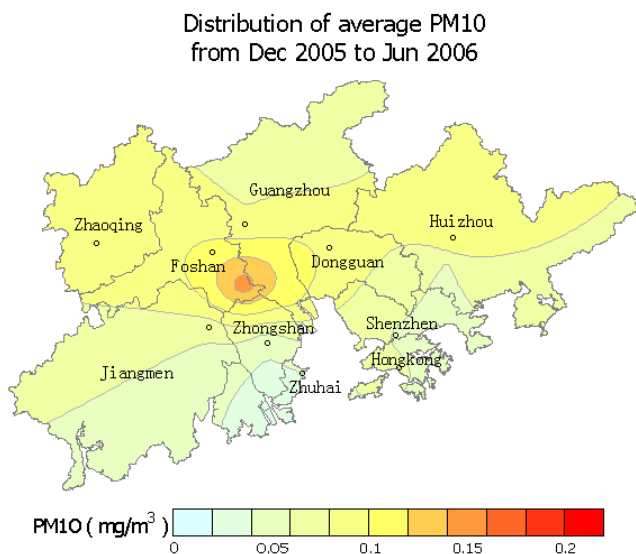
Remark : 1. All concentration units are in milligrams per cubic metre.

2. "--" denotes lack of data due to equipment upgrading works.

### 3.4 Respirable Suspended Particulates (PM<sub>10</sub>)

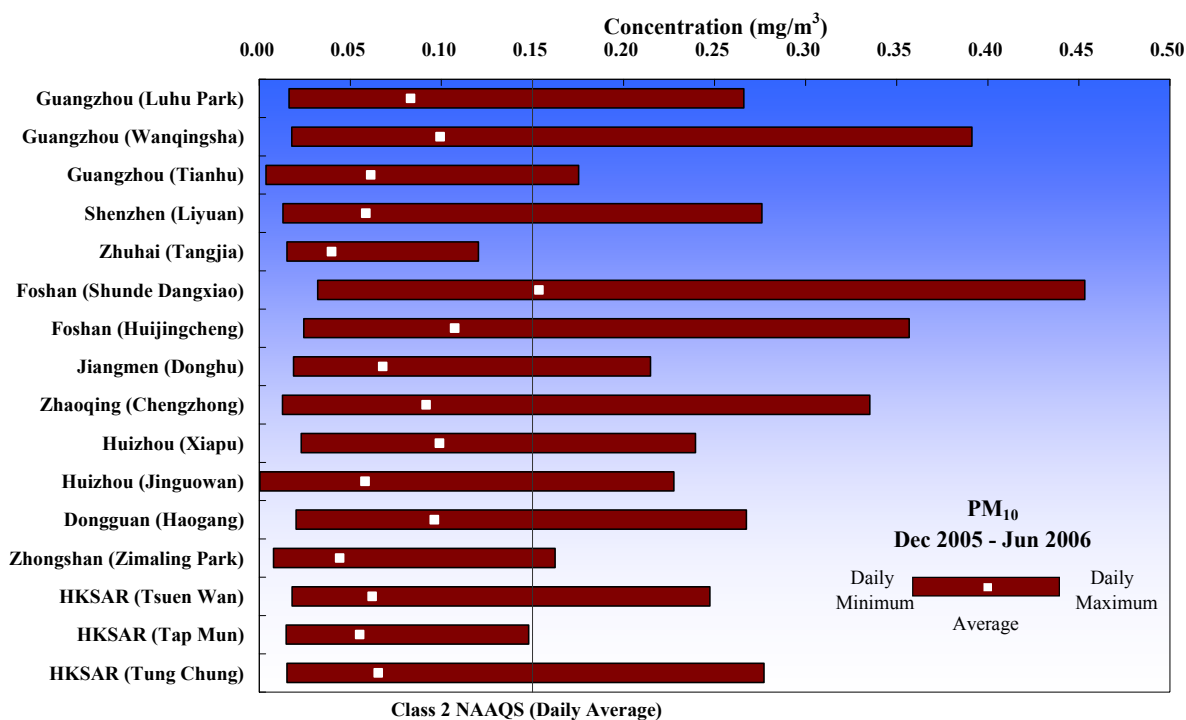
The respirable suspended particulates (PM<sub>10</sub>) in the atmosphere come from a great variety of emission sources, such as power plants, vehicles, cement and pottery manufacturing, fugitive dust, etc, while some are products of oxidization of gaseous pollutants in the air (e.g., sulphate formed from oxidation of SO<sub>2</sub>) or photochemical reactions. PM<sub>10</sub> can penetrate deeply into human lungs and cause impact on human respiratory system. Finer particles in PM<sub>10</sub> have significant effect on visibility.

The overall averages of PM<sub>10</sub> for the period from December 2005 to June 2006 measured at various monitoring stations ranged from 0.04mg/m<sup>3</sup> to 0.154mg/m<sup>3</sup>. As shown in Figure 8, the average levels of PM<sub>10</sub> in the central and northern parts of PRD were generally higher than those in the coastal areas in the south.



the coastal areas in the south. All monitoring stations except Tangjia and Tap Mun had recorded exceedance of the national daily standard (0.15mg/m<sup>3</sup>) of PM<sub>10</sub>. Please refer to Figure 9, Tables 3.4a to 3.4c for details.

**Figure 8 : Distribution of average concentrations of Respirable Suspended Particulates (PM<sub>10</sub>) in the Network**



**Figure 9 : The minimum, maximum and average concentrations of Respirable Suspended Particulates (PM<sub>10</sub>) measured by individual monitoring stations**

**Table 3.4 a : The monthly maxima and minima of hourly averages of Respirable Suspended Particulates**

Month	Dec 2005		Jan 2006		Feb		Mar		Apr		May		Jun	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Guangzhou (Luhu Park)	0.015	0.353	0.013	0.346	0.004	0.344	0.002	0.307	0.001	0.255	0.003	0.160	0.012	0.138
Guangzhou (Wanqingsha)	0.048	0.482	0.000	0.422	0.016	0.378	0.000	0.530	0.000	0.462	0.000	0.297	0.000	0.208
Guangzhou (Tianhu)	0.006	0.196	0.001	0.353	0.000	0.227	0.000	0.254	0.000	0.279	0.000	0.165	0.000	0.174
Shenzhen (Liyuan)	0.011	0.296	0.006	0.198	0.006	0.295	0.000	0.380	0.000	0.170	0.001	0.219	0.000	0.172
Zhuhai (Tangjia)	0.002	0.217	0.004	0.155	0.005	0.162	0.002	0.180	0.000	0.123	0.000	0.121	0.001	0.179
Foshan (Shunde Dangxiao)	0.047	0.599	0.041	0.565	0.045	0.489	0.016	0.564	0.043	0.547	0.000	0.264	0.000	0.213
Foshan (Huijingcheng)	0.030	0.468	0.020	0.444	0.010	0.373	0.018	0.432	0.026	0.558	0.000	0.264	0.000	0.221
Jiangmen (Donghu)	0.000	0.234	0.000	0.253	0.000	0.319	0.000	0.330	0.000	0.375	0.000	0.347	0.000	0.212
Zhaoqing (Chengzhong)	0.000	0.462	0.000	0.561	0.000	0.391	0.000	0.563	0.000	0.396	0.000	0.266	0.000	0.234
Huizhou (Xiapu)	0.041	0.393	0.013	0.376	0.007	0.279	0.011	0.401	0.000	0.491	0.002	0.180	0.000	0.187
Huizhou (Jinguowan)	0.000	0.228	0.000	0.189	0.001	0.291	0.000	0.311	0.000	0.334	0.000	0.189	0.000	0.224
Dongguan (Haogang)	0.003	0.429	0.000	0.323	0.004	0.402	0.000	0.563	0.000	0.374	0.000	0.247	0.000	0.281
Zhongshan (Zimaling Park)	0.001	0.250	0.004	0.262	0.000	0.182	0.002	0.254	0.004	0.231	0.001	0.113	0.001	0.128
HKSAR (Tsuen Wan)	0.025	0.280	0.013	0.222	0.011	0.304	0.008	0.305	0.010	0.161	0.006	0.223	0.008	0.135
HKSAR (Tap Mun)	0.031	0.199	0.013	0.152	0.009	0.226	0.010	0.218	0.013	0.175	0.009	0.116	0.008	0.081
HKSAR (Tung Chung)	0.034	0.328	0.012	0.260	0.011	0.281	0.006	0.343	0.014	0.159	0.005	0.213	0.009	0.153

**Table 3.4 b : The monthly maxima and minima of daily averages of Respirable Suspended Particulates**

[Class 2 NAAQS (Daily) : 0.15 mg/m<sup>3</sup>]

Month	Dec 2005		Jan 2006		Feb		Mar		Apr		May		Jun		Exceed- -ance Hours	Exceed -ance Rate
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
Guangzhou (Luhu Park)	0.041	0.264	0.030	0.252	0.016	0.266	0.016	0.168	0.019	0.198	0.017	0.077	0.032	0.094	27	13.2%
Guangzhou (Wanqingsha)	0.075	0.320	0.047	0.291	0.036	0.261	0.035	0.391	0.029	0.201	0.024	0.124	0.018	0.111	33	15.6%
Guangzhou (Tianhu)	0.030	0.160	0.009	0.175	0.004	0.131	0.004	0.168	0.006	0.160	0.010	0.074	0.012	0.093	7	3.3%
Shenzhen (Liyuan)	0.049	0.120	0.022	0.107	0.018	0.155	0.016	0.276	0.018	0.112	0.016	0.091	0.013	0.059	2	1.0%
Zhuhai (Tangjia)	0.027	0.118	0.024	0.082	0.019	0.071	0.022	0.120	0.021	0.062	0.015	0.044	0.016	0.091	0	0.0%
Foshan (Shunde Dangxiao)	0.095	0.400	0.078	0.453	0.074	0.302	0.066	0.417	0.081	0.349	0.038	0.142	0.032	0.116	95	47.3%
Foshan (Huijingcheng)	0.053	0.322	0.048	0.261	0.041	0.233	0.039	0.260	0.054	0.357	0.032	0.122	0.024	0.123	44	22.0%
Jiangmen (Donghu)	0.037	0.157	0.019	0.140	0.030	0.153	0.022	0.187	0.020	0.215	0.023	0.111	0.020	0.094	7	3.4%
Zhaoqing (Chengzhong)	0.052	0.335	0.015	0.284	0.017	0.184	0.023	0.319	0.013	0.236	0.022	0.127	0.017	0.121	37	18.0%
Huizhou (Xiapu)	0.068	0.222	0.048	0.202	0.023	0.184	0.033	0.217	0.033	0.239	0.024	0.103	0.044	0.116	29	14.4%
Huizhou (Jinguowan)	0.040	0.142	0.023	0.134	0.011	0.154	0.017	0.228	0.011	0.139	0.013	0.089	0.000	0.045	2	1.0%
Dongguan (Haogang)	0.047	0.252	0.029	0.228	0.025	0.235	0.020	0.267	0.029	0.168	0.032	0.105	0.033	0.110	35	17.8%
Zhongshan (Zimaling Park)	0.040	0.160	0.015	0.139	0.014	0.099	0.012	0.162	0.013	0.081	0.008	0.059	0.009	0.040	3	1.6%
HKSAR (Tsuen Wan)	0.062	0.133	0.030	0.120	0.025	0.154	0.021	0.247	0.022	0.127	0.018	0.087	0.020	0.064	2	0.9%
HKSAR (Tap Mun)	0.056	0.134	0.025	0.108	0.020	0.110	0.019	0.148	0.021	0.142	0.020	0.086	0.015	0.042	0	0.0%
HKSAR (Tung Chung)	0.078	0.164	0.031	0.161	0.026	0.179	0.024	0.277	0.020	0.111	0.018	0.089	0.015	0.076	6	2.9%

**Table 3.4 c : The monthly averages and overall averages of Respirable Suspended Particulates**

Month	Dec 2005	Jan 2006	Feb	Mar	Apr	May	Jun	Average
Guangzhou (Luhu Park)	0.110	0.107	0.097	0.101	0.068	0.041	0.051	0.083
Guangzhou (Wanqingsha)	0.162	0.105	0.117	0.126	0.079	0.059	0.044	0.099
Guangzhou (Tianhu)	0.079	0.074	0.062	0.065	0.062	0.038	0.045	0.061
Shenzhen (Liyuan)	0.084	0.052	0.062	0.079	0.061	0.042	0.029	0.058
Zhuhai (Tangjia)	0.058	0.039	0.039	0.044	0.034	0.028	0.035	0.040
Foshan (Shunde Dangxiao)	0.220	0.179	0.176	0.217	0.164	0.063	0.057	0.154
Foshan (Huijingcheng)	0.124	0.115	0.110	0.140	0.134	0.066	0.058	0.107
Jiangmen (Donghu)	0.091	0.066	0.070	0.084	0.066	0.056	0.040	0.068
Zhaoqing (Chengzhong)	0.158	0.117	0.076	0.118	0.076	0.045	0.044	0.092
Huizhou (Xiapu)	0.131	0.107	0.096	0.115	0.107	0.061	0.074	0.099
Huizhou (Jinguowan)	0.086	0.059	0.066	0.065	0.060	0.040	0.028	0.058
Dongguan (Haogang)	0.138	0.105	0.106	0.113	0.084	0.059	0.056	0.096
Zhongshan (Zimaling Park)	0.080	0.046	0.053	0.054	0.033	0.027	0.018	0.044
HKSAR (Tsuen Wan)	0.087	0.062	0.072	0.078	0.058	0.043	0.033	0.062
HKSAR (Tap Mun)	0.084	0.059	0.061	0.067	0.056	0.035	0.024	0.055
HKSAR (Tung Chung)	0.104	0.072	0.079	0.082	0.051	0.041	0.026	0.065

Remark : 1. All concentration units are in milligrams per cubic metre.

### 3.5 Monthly Variations of Pollutant Concentrations

Figure 10 shows the variations in monthly averages of major pollutants (SO<sub>2</sub>, NO<sub>2</sub>, O<sub>3</sub>, and PM<sub>10</sub>) recorded by the Network from December 2005 to June 2006. The overall concentrations of most pollutants were generally higher in winter, and reduced in June as summer approached. The overall concentrations of pollutants were fairly high in March, which could be attributed to the frequent occurrence of stagnant air stream during the month. That notwithstanding, the monthly variations in concentrations of pollutants may change from year to year. Long-term monitoring is thus required before a general pattern can be concluded.

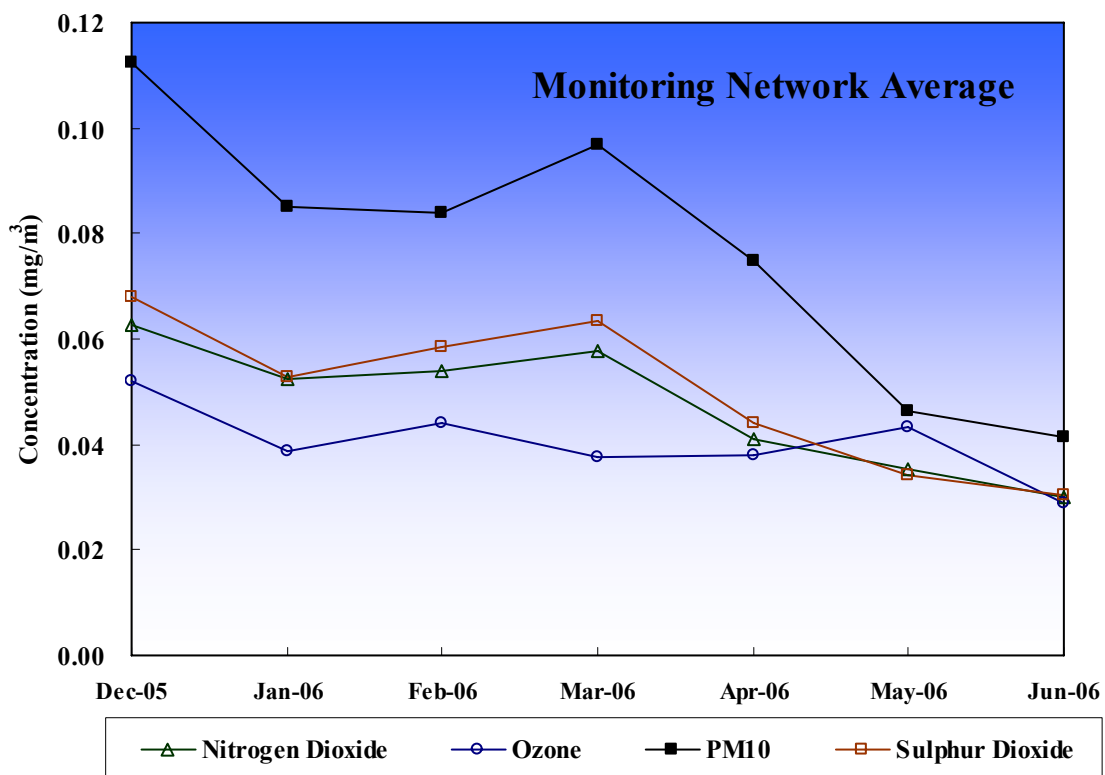


Figure 10 : Monthly variations of average pollutant concentrations measured by the Network

## 4. Statistical Analysis of the Regional Air Quality Index (RAQI)

The two governments started reporting the RAQI from 30 November 2005 to provide the public with information about the air quality in different parts of the PRD region.

The RAQI is a composite indicator of the aggregate level of four major regional air pollutants, namely sulphur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>) and respirable suspended particulates (PM<sub>10</sub>). The higher the index value, the higher the regional air pollution levels. The RAQI is divided into five grades. Details are as follows :

Grade	Regional Air Quality Index (RAQI) value <sup>#</sup>	Air Quality Condition in the Monitored Area
I	0 – 1	Concentrations of all pollutants are well within Class 2 of the National Ambient Air Quality Standards (NAAQS)
II	1 – 2	Concentrations of all pollutants are generally within Class 2 NAAQS
III	2 – 3	Concentrations of individual pollutants may approach or exceed Class 2 NAAQS
IV	3 – 4	Class 2 NAAQS is generally exceeded
V	>4	Air Quality Standards are significantly exceeded

The formula for calculating the RAQI is as follows:

$$I_c = \sum_{i=1}^4 \frac{C_i}{R_i}$$

where  $I_c$  stands for the RAQI, an indicator of the aggregate pollution level of four air pollutants, namely, SO<sub>2</sub>, NO<sub>2</sub>, O<sub>3</sub> and PM<sub>10</sub>. With respect to SO<sub>2</sub>, NO<sub>2</sub> and PM<sub>10</sub>,  $C_i$  means the daily average concentration while  $R_i$  represents the daily average concentration limit of the corresponding pollutants as specified in Class 2 NAAQS. With respect to O<sub>3</sub>,  $C_i$  means the highest hourly average of a day while  $R_i$  represents the 1-hour average concentration limit in Class 2 NAAQS (refer to Class 2 NAAQS (GB 3095 – 1996) revised version).

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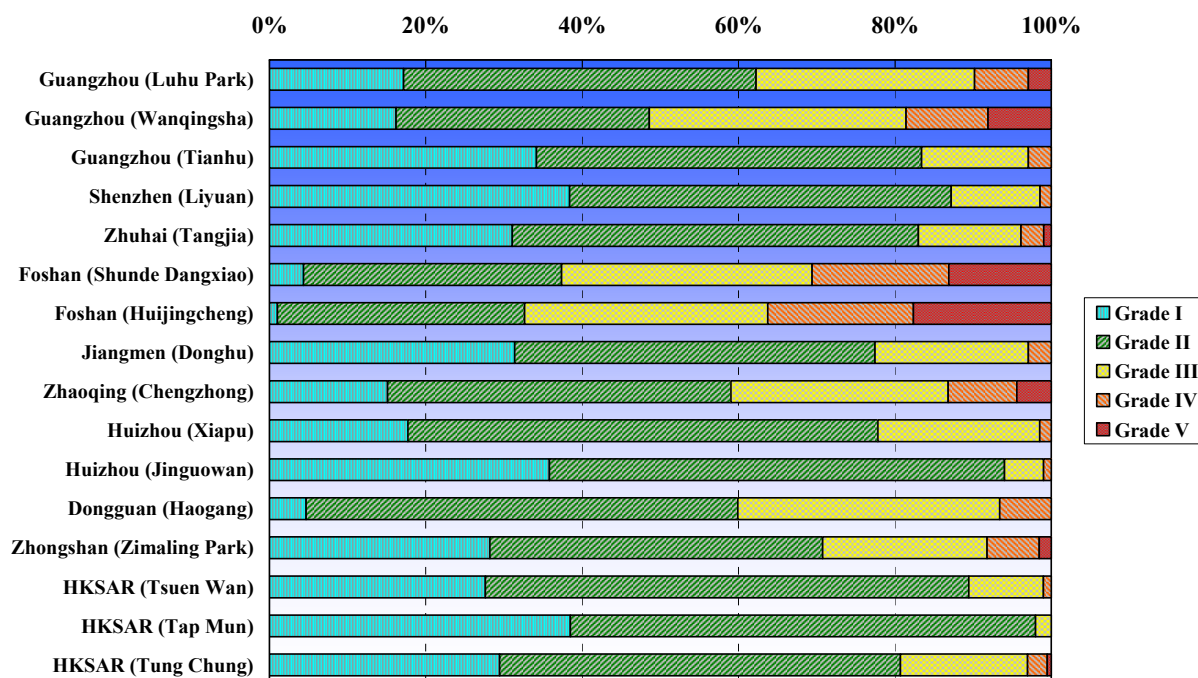
<sup>#</sup> The upper limits of the range of Grades I, II, III and IV of the RAQI are inclusive.

## 4.1 Statistics on RAQI Grades

Table 4.1a and Figure 11 show statistics on the RAQI grades of all monitoring stations in the Network measured between December 2005 and June 2006.

**Table 4.1 a : Statistics on RAQI grades of individual monitoring stations**

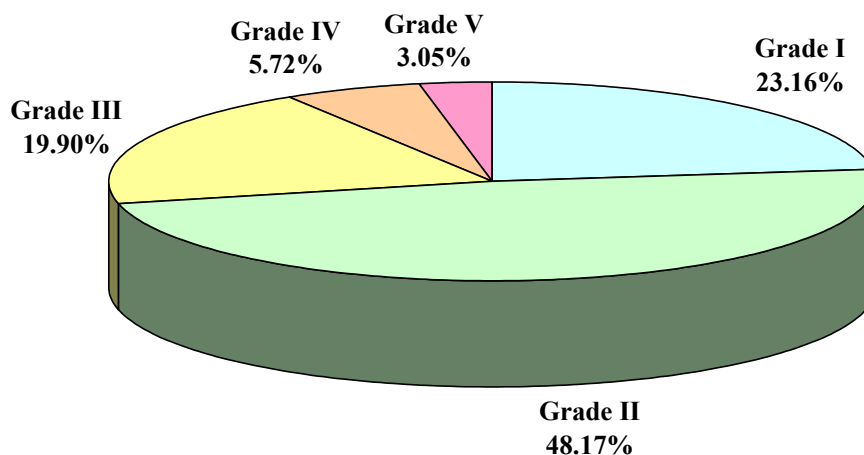
Monitoring Stations	Distribution of RAQI grades measured between December 2005 and June 2006 (%)					Number of effective days
	Grade I	Grade II	Grade III	Grade IV	Grade V	
Guangzhou (Luhu Park)	17.16	45.10	27.94	6.86	2.94	204
Guangzhou (Wanqingsha)	16.19	32.38	32.86	10.48	8.10	210
Guangzhou (Tianhu)	34.15	49.27	13.66	2.93	0.00	205
Shenzhen (Liyuan)	38.39	48.82	11.37	1.42	0.00	211
Zhuhai (Tangjia)	31.07	51.94	13.11	2.91	0.97	206
Foshan (Shunde Dangxiao)	4.37	33.01	32.04	17.48	13.11	206
Foshan (Huijingcheng)	1.04	31.61	31.09	18.65	17.62	193
Jiangmen (Donghu)	31.37	46.08	19.61	2.94	0.00	204
Zhaoqing (Chengzhong)	15.12	43.90	27.80	8.78	4.39	205
Huizhou (Xiapu)	17.73	60.10	20.69	1.48	0.00	203
Huizhou (Jinguowan)	35.82	58.21	4.98	1.00	0.00	201
Dongguan (Haogang)	4.72	55.19	33.49	6.60	0.00	212
Zhongshan (Zimaling Park)	28.21	42.56	21.03	6.67	1.54	195
HKSAR (Tsuen Wan)	27.64	61.81	9.55	1.01	0.00	199
HKSAR (Tap Mun)	38.50	59.50	2.00	0.00	0.00	200
HKSAR (Tung Chung)	29.44	51.27	16.24	2.54	0.51	197



**Figure 11 : Stacked column chart of RAQI grades of individual monitoring stations**

Figure 12 shows the overall distribution of different RAQI grades based on the statistics obtained at all monitoring stations in the Network. Nearly half of the overall RAQI values (48.17%) measured in the Network are in Grade II level while the rest are mainly in Grade I (23.16%) and Grade III (19.90%) levels. Values within Grade IV and V levels account for 5.72% and 3.05% respectively.

**Distribution of RAQI Grades  
(December 2005 - June 2006)**

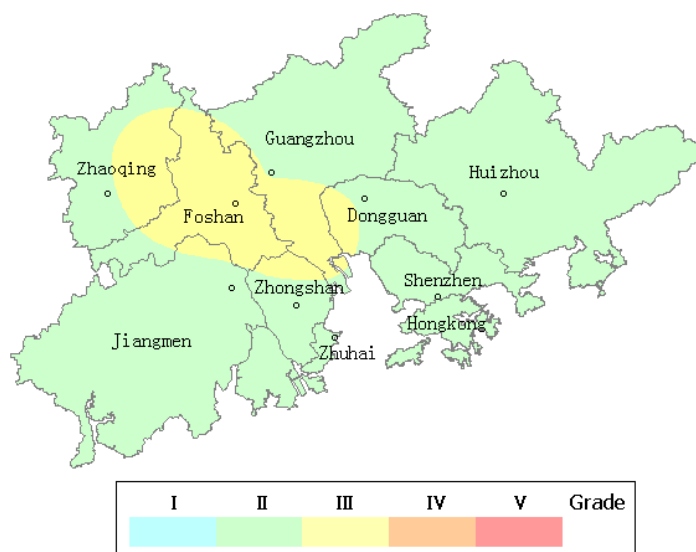


**Figure 12 : Distribution of RAQI grades in the Network**

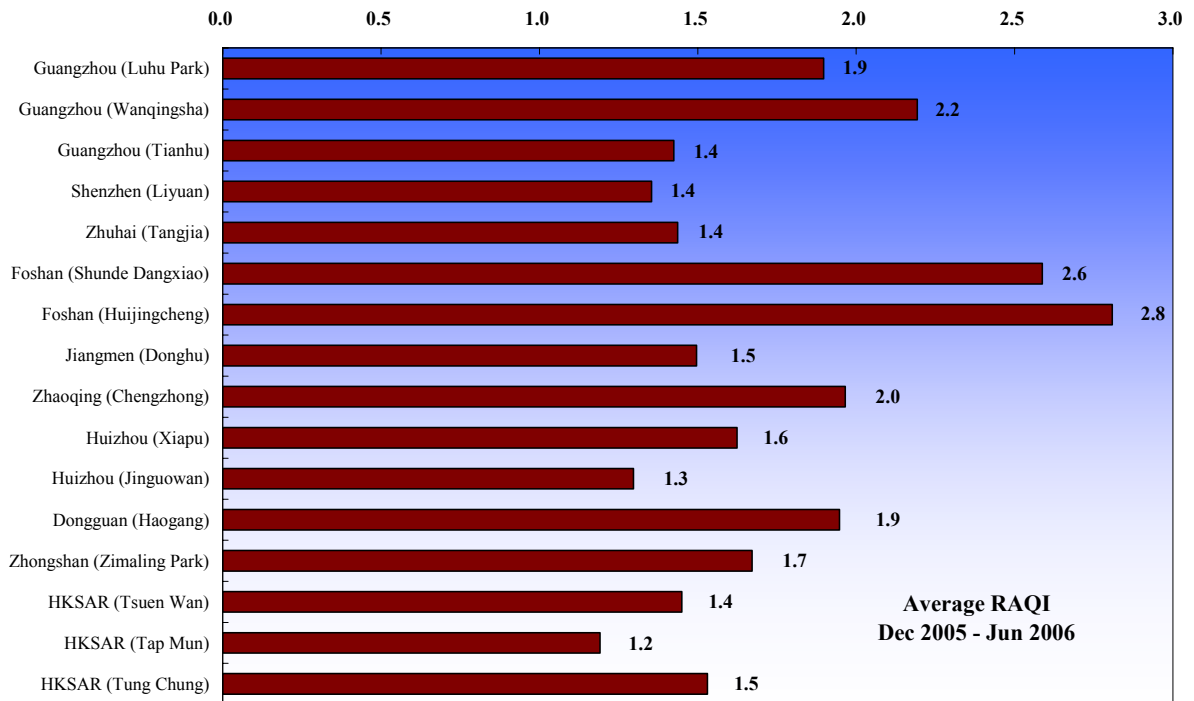
#### 4.2 Spatial Distribution of Average RAQI Grades

Figure 13 shows the spatial distribution of different RAQI grades based on the average values measured between December 2005 and June 2006. It can be seen from the figure that average RAQI values measured in most of the areas in the PRD region were in Grade II while the average values in the middle part of the region (Foshan) were in Grade III. Please refer to Figure 14 for average RAQI values measured at various monitoring stations in the Network.

**Distribution of average RAQI in PRD  
from Dec 2005 to Jun 2006**



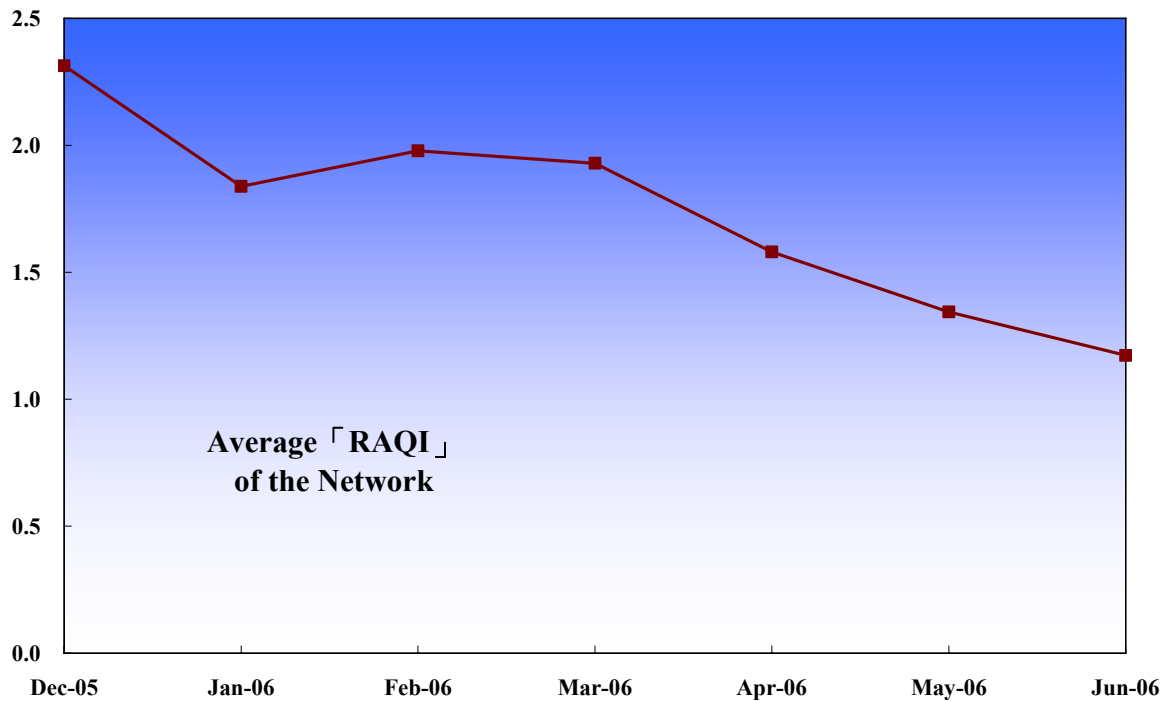
**Figure 13 : Spatial distribution of average RAQI grades in the Network**



**Figure 14 : The average RAQI of individual monitoring stations**

### 4.3 Monthly Variations of Average RAQI

Figure 15 shows the monthly variations in the RAQI average values measured within the Network between December 2005 and June 2006. Monthly variations in the RAQI average values are generally in line with the variations in pollutant concentrations (see Figure 10).



**Figure 15 : Monthly variations in average RAQI**

### Annex A : Site Information of Monitoring Stations

Monitoring Stations	Address	AreaType	Sampling Height (Above P.D.)	Above Ground	Date Commenced Operation
Guangzhou (Luhu Park)	Inside Jufong Garden of Luhu Park (Big yard, No. 11 Luhu Park)	City	30m	9m	1993
Guangzhou (Wanqingsha)	Wanqingsha Secondary School, Nansha	Mixed educational/commercial and residential/industrial	13m	12m	Oct 04
Guangzhou (Tianhu)	Tianhu Park, Conghua City	Background : rural	251m	13m	Oct 04
Shenzhen (Liyuan)	Shennan Zhong Road, Shenzhen City	City	38m	12m	Sep 97
Zhuhai (Tangjia)	Building No. 1, Rong Yuan, Zhongshan University, Tangjia, Zhuhai City	Mixed educational/commercial and residential/industrial	24m	19m	Jan 03
Foshan (Shunde Dangxiao)	Roof-top of Educational Building, Foshan City Communist Party Shunde	Tourist and cultural/educational	27m	17m	Oct 99
Foshan (Huijingcheng)	No. 127, Fenjiang Nan Road, Chancheng Area	Urban: mixed residential/commercial/industrial	24m	14m	Feb 00
Jiangmen (Donghu)	Inside Donghu Park, Jiangmen City	City	17.5m	5m	Nov 01
Zhaoqing (Chengzhong)	No. 17, Qintian Road, Zhaoqing City	Urban: mixed residential/commercial	21m	16m	Jun 01
Huizhou (Xiapu)	No. 4 Xiabuhengjiang Road No. 3, Huicheng Area	Urban: commercial	49m	20m	Dec 99
Huizhou (Jinguowan)	Jinguowan Ecological Farm, Huizhou City	Residential	77m	8m	Oct 04
Dongguan (Haogang)	Haogang Primary School, NanchengQu, Dongguan City	Mixed residential/commercial/industrial	18 m	14m	1998
Zhongshan (Zimaling Park)	Zimaling Park, Zhongshan City	Mixed residential/commercial	45 m	7m	Aug 02
HKSAR (Tsuen Wan)	60 Tai Ho Road, Tsuen Wan	Urban: mixed residential/commercial/industrial	21m	17m	Aug 88
HKSAR (Tap Mun)	Tap Mun Police Station	Background: rural	26m	11m	Apr 98
HKSAR (Tung Chung)	6 Fu Tung Street, Tung Chung	New Town: residential	28m	21m	Apr 99

## **Annex B : Methods Used in Measuring Air Pollutant Concentration**

<b>Pollutants</b>	<b>Measuring Principles</b>
Sulphur Dioxide	UV fluorescence/ Differential Optical Absorption Spectroscopy
Nitrogen Dioxide	Chemiluminescence/ Differential Optical Absorption Spectroscopy
Ozone	UV absorption/ Differential Optical Absorption Spectroscopy
Respirable Suspended Particulate	Oscillating microbalance (TEOM) BETA particulate monitor