

Supplementary Material

Functions, spatial-scale representation and monitoring items of different type of monitoring stations in the PRD regional 3-D network

Type	Spatial Representation (km)	Functions	Observables
Background	1000	<ul style="list-style-type: none"> ➤ Indicate the background air quality in a less affected anthropogenic activities ➤ Reflect the air quality characteristics at spatial scale of 1000 km ➤ Evaluate the effectiveness of control measures implemented at regional or national level 	Currently comprising of SO ₂ , NO-NO ₂ -NO _x , O ₃ , CO, PM ₁₀ , PM _{2.5} and meteorological parameters ^a ; will progressively introduce visibility, light absorption and scattering of particulate matters, acid deposition, VOCs, GHGs, inorganic and organic components of particulate matters
Supersites	100	<ul style="list-style-type: none"> ➤ Investigate regional complex air pollution phenomenon, formation processes and mechanism ➤ Investigate the synergistic effects between ecosystem and health ➤ Reflect and characterize the air quality at spatial scale of 100km ➤ Serve as a nurturing ground and capacity building on monitoring experience of advance instrumentation technique development, QA/QC, etc. ➤ Evaluate the effectiveness of control measures at regional scale 	SO ₂ , NO/NO _x /NO ₂ , NO/NO _y , CO, O ₃ , H ₂ O ₂ , CH ₄ , NMHC, VOC, PAN, ATOF/MS, PM ₁ -PM _{2.5} -PM ₁₀ , physical properties (e.g., size, distribution) and chemical (inorganic and organic species) components of PM _{2.5} and PM ₁₀ , EC/OC, light scattering and absorption of particulate matters, LIDAR, wind profiles, J(NO ₂)-J(O ₃), visibility, MOUDI and meteorological parameters ^a
Rural	10–100	<ul style="list-style-type: none"> ➤ Assess the compliance of air quality at rural scale ➤ Reflect and characterize the air quality at spatial scale from several km to 100 km ➤ Evaluate the effectiveness of control measures a more local scale 	SO ₂ , NO/NO ₂ /NO _x , O ₃ , PM ₁₀ , meteorological parameters ^a
Regional	10–100	<ul style="list-style-type: none"> ➤ Assess the compliance of regional air quality ➤ Reflect the air pollution characteristics at regional scale ➤ Evaluate the effectiveness of control measures in regional scale 	SO ₂ , NO/NO ₂ /NO _x , CO, O ₃ , PM ₁₀ , PM _{2.5} , PM ₁ , NMHC, black carbon, visibility, meteorological parameters ^a
Urban	1–10	<ul style="list-style-type: none"> ➤ Assess the air quality at a densely populated area ➤ Reflect the air pollution characteristics at a more local scale between 1 km and 10 km ➤ Evaluate the effectiveness of control measures in urban cities 	SO ₂ , NO/NO ₂ /NO _x , O ₃ , PM ₁₀ , PM _{2.5} , visibility, meteorological parameters ^a
Roadside	0.01–0.1	<ul style="list-style-type: none"> ➤ Assess air quality at high traffic flow volume ➤ Reflect and characterize the air quality at micro-scale from 10 m to 100 m 	SO ₂ , NO/NO ₂ /NO _x , O ₃ , PM ₁₀ , PM _{2.5} , visibility, meteorological parameters ^a
Special purpose	On a need basis	<ul style="list-style-type: none"> ➤ Based on air quality management needs, special purpose monitoring shall include complex air quality monitoring such as acid deposition, sandstorm, photochemical air pollution, regional haze, GHGs, toxic substances such as heavy metals 	On a need basis

^a Meteorological parameters include temperature, relative humidity, wind direction and speed, solar radiation, rainfall, etc.

Abbreviations

ATOF/MS - Aerosol Time of Flight/Mass Spectrometer

CH₄ - methane

CO - carbon monoxide

EC/OC - elemental carbon/organic carbon

GHGs - greenhouse gases

H₂O₂ - hydrogen peroxide

J(NO₂) - photolysis frequency of nitrogen dioxide

J(O₃) - photolysis frequency of ozone

LIDAR - Light Detection and Ranging

MOUDI - Micro-Orifice Uniform Deposition Impactors

NMHC - non-methane hydrocarbon

NO/NO₂/NO_x/NO_y - nitrogen monoxide/nitrogen dioxide/nitrogen oxides/total reactive nitrogen

O₃ - ozone

PAN - peroxyacyl nitrates

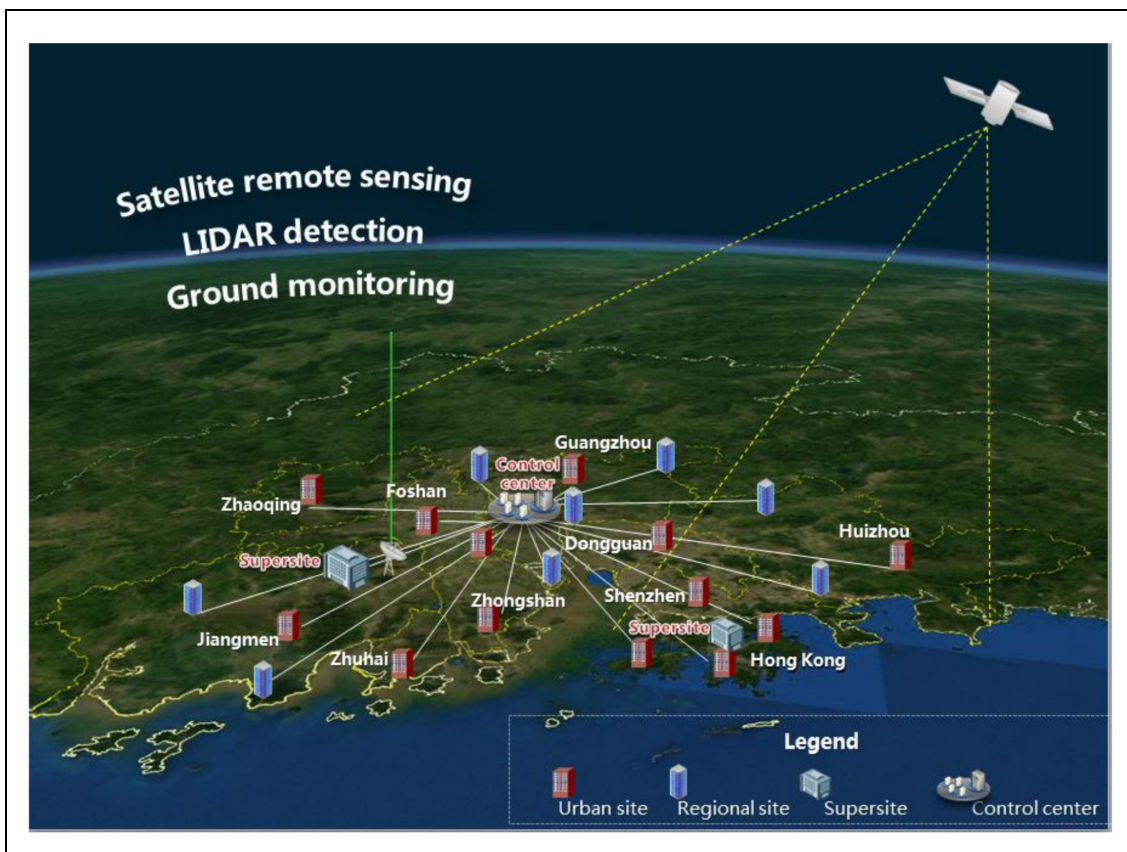
PM₁ - particulate matter with aerodynamic diameter of up to 1 micrometer

PM_{2.5} - particulate matter with aerodynamic diameter of up to 2.5 micrometer

PM₁₀ - particulate matter with aerodynamic diameter of up to 10 micrometer

SO₂ - sulfur dioxide

VOC - volatile organic compound



The PRD 3-dimensional monitoring network set-up