
Sniffer4D Air Pollution Detection & Mapping System

For drones and ground vehicles

Soarability Technologies
www.soarability.tech

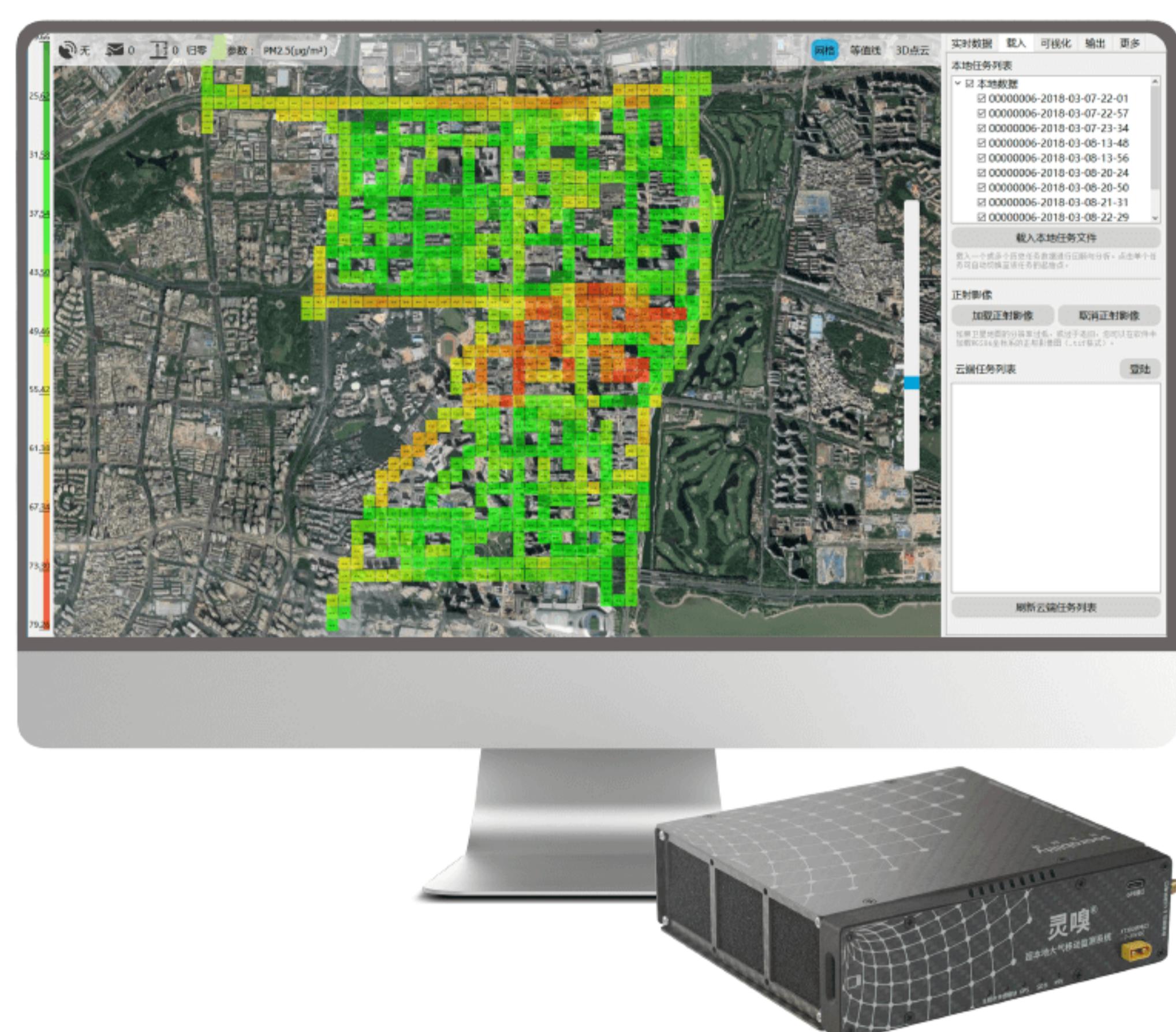


soarability



Sniffer4D Air Pollution Detection & Mapping System

Utilize drones and cars to accurately collect concentration information of various air pollutants and transmit this data back to Sniffer4D Mapper visualization & analysis software in real time. Users can flexibly select one or more parameters to be measured (below) according to different application requirements.



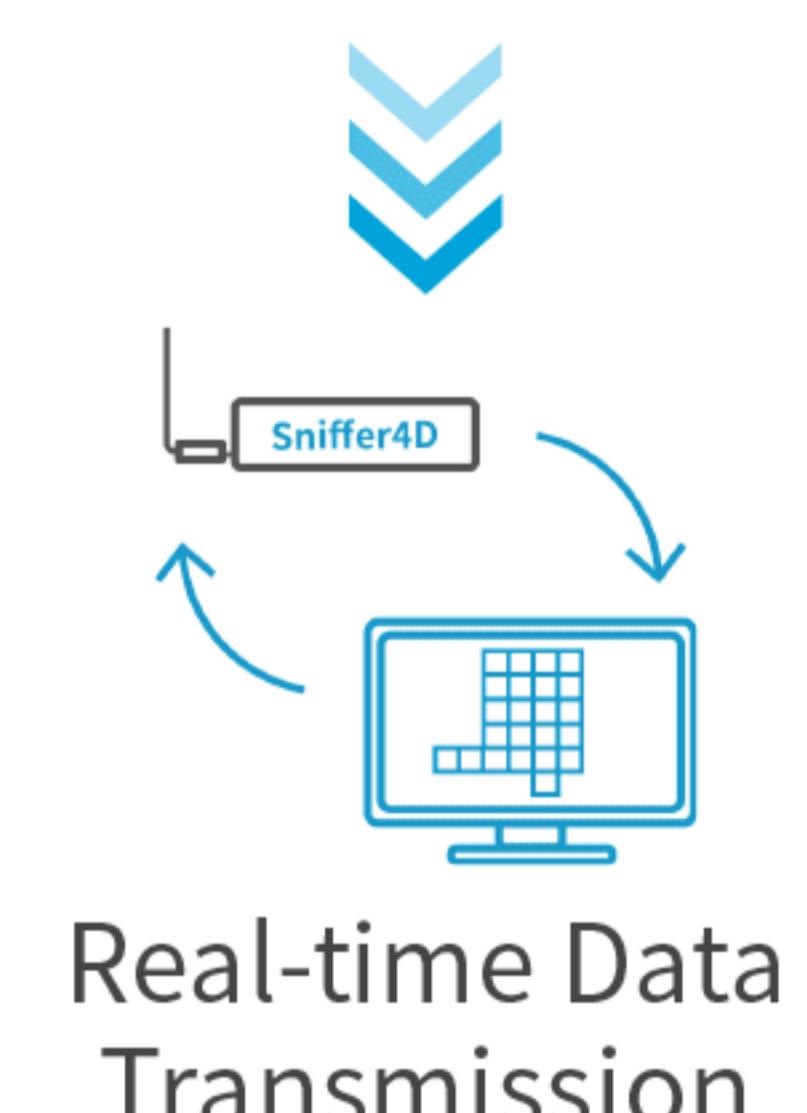
Common Air Pollutants	
Inhalable Particulate Matter (PM2.5 & 10)	High-resolution O ₃ +NO ₂
High-resolution CO	High-resolution NO ₂
Wide-range SO ₂	High-resolution SO ₂
Wide-range Volatile Organic Compounds (VOCs)	Wide-range H ₂ S
Wide-range C _x H _y (flammable gas)	Wide-range H ₂
Total Suspended Particles (TSP/PM100)	Wide-range NH ₃
	Wide-range HCl
	Customized Modules

One-stop Workflow

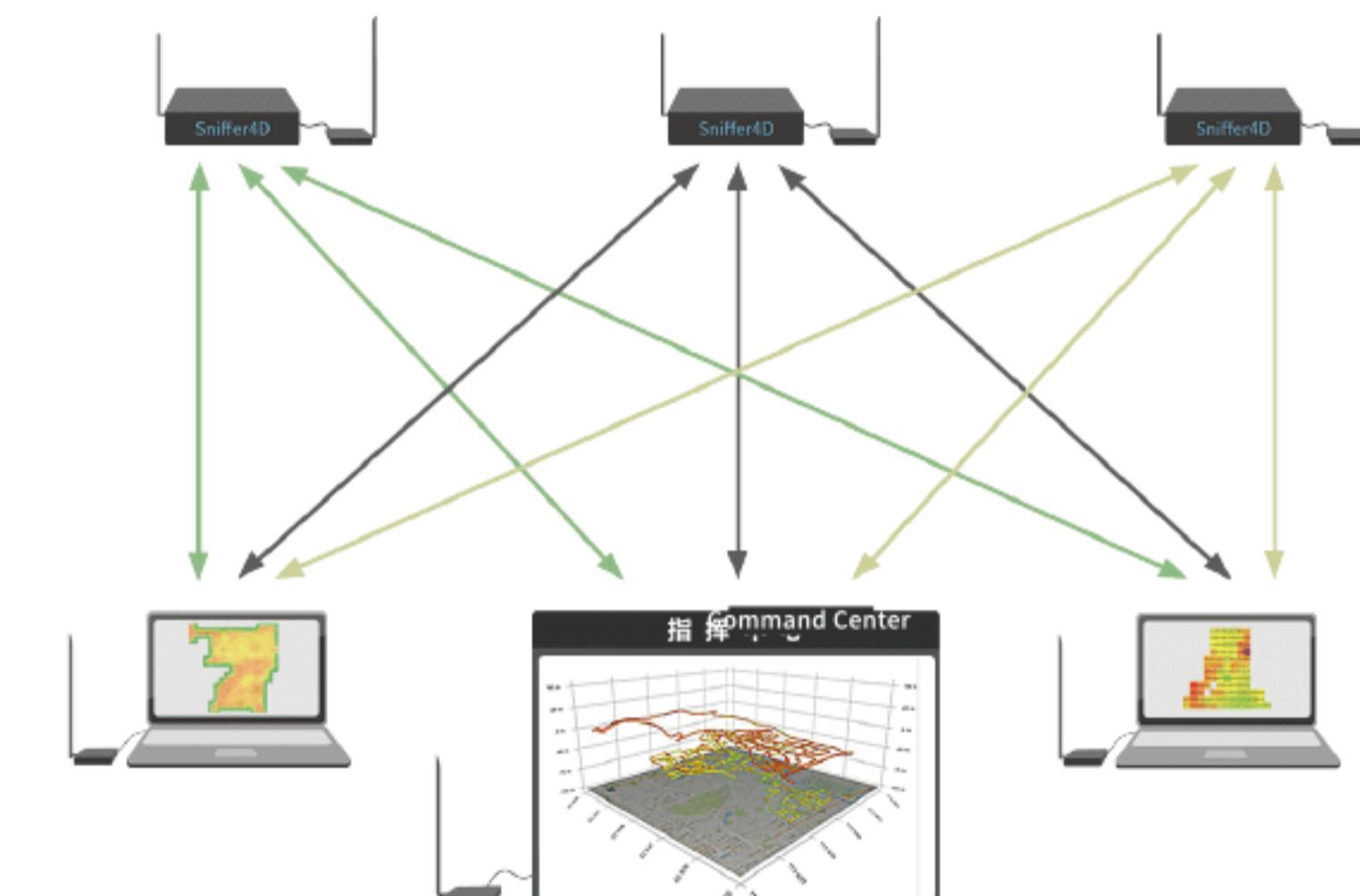
A turnkey solution for data collection, analysis, visualization, reporting and data storage.



Data Collection



The data collected by Sniffer4D is transmitted back to Sniffer4D Mapper analytic software via 4G or radio telemetry in real-time.



Data can be shared to different locations in real time. Mission data files (.s4d) are automatically created and saved so that they can be reviewed later. Users can also share them with others. One-click generation of raw data sheet (CSV), convenient for users to export data into MS Excel, Matlab, and other software for subsequent collation, analysis and interpretation.

► Applications of Sniffer4D

► Environmental Protection

Locating Pollution Sources Routine Environmental Monitoring Environmental Impact Assessment ...

Efficient & Time-saving: Quickly identifies the pollution and locates pollution sources. One drone-mounted Sniffer4D can do the work of more than 60 environmental inspectors according to user feedbacks.

Agile & Covert: Compared with traditional “door-to-door” searching, drone-mounted Sniffer4D is able to obtain emission information without being noticed.

Real-time Actionable Information: The heat maps generated by Sniffer4D Mapper in real time illustrate the 3D distribution of pollution intuitively. The automatically generated mission report indicates key information of the mission including area size, longitude, latitude, average concentration, maximum concentration etc. for decision-making and reporting.

Long-range Data Transmission: The real-time data of multiple Sniffer4Ds in various locations can be transmitted to one or more designated computers (e.g. at command centers or offices).

► Safety

Emergency Response Asset Monitoring Landfill Leakage Detection ...

Reduce Personnel's Risk: Drone-mounted Sniffer4D can remotely monitor the accident site from kilometers away, ensuring the safety of personnel;

Efficient & Flexible: Flexibly choose the scanning area and the parameters to sense, combined with the intuitive heat maps generated by the software, the inspection time can be greatly shortened. The types and diffusion ranges of toxic substances can be determined as soon as possible;

Quick Response: Preheating takes only 10-600 seconds, 80%-90% shorter than like products, which greatly shortened the preparation time and enables the emergency to be responded as soon as possible.

► Scientific Research

Atmospheric Modelling and Verification Air Pollution Formation Mechanism Study Air Quality and Health Study ...

Quantifiable Data Quality: The long-term comparison data of Sniffer4D in both laboratory and outdoor environments enables scientific users to quantify the data quality rigorously. Supporting materials: Calibration Certificates by South China National Center of Metrology; “Long-term Data Correlation Analysis” and “Long-term Data Error Analysis” with scientific-grade super air monitoring stations;

Data Integrity: Breakpoint resume transmission + Onboard SD card backup, ensuring data integrity;

Compatible with Various Vehicles: With its compact size and light weight, Sniffer4D can be easily integrated with various types of drones, cars, airships etc., to easily obtain experimental data in various situations;

Superior Stability: Sniffer4D Mapper is able to run continuously and stably for more than one month, while Sniffer4D is able to operate continuously for no less than six months in a wide temperature and humidity environment, suitable for researches with long experimental periods;

Remote Monitoring: The real-time data of multiple Sniffer4Ds in various locations can be transmitted to one or more designated computers, suitable for collecting samples from various locations;

Automatic Data Recording: No intervention is required, Sniffer4D Mapper can automatically start a mission and save all the data received from Sniffer4Ds, saving labor costs.

Benchmark Customers: Oxford University (UK), Meteorological Institute of Jiangsu Province (China), Jinan University (China), Huazhong University of Science and Technology (China), University of Macau (Macau SAR), Chinese Academy of Sciences Institute of Applied Ecology (China).

► Features & Advantages of Sniffer4D

Designed to be Carried by Moving Vehicles:

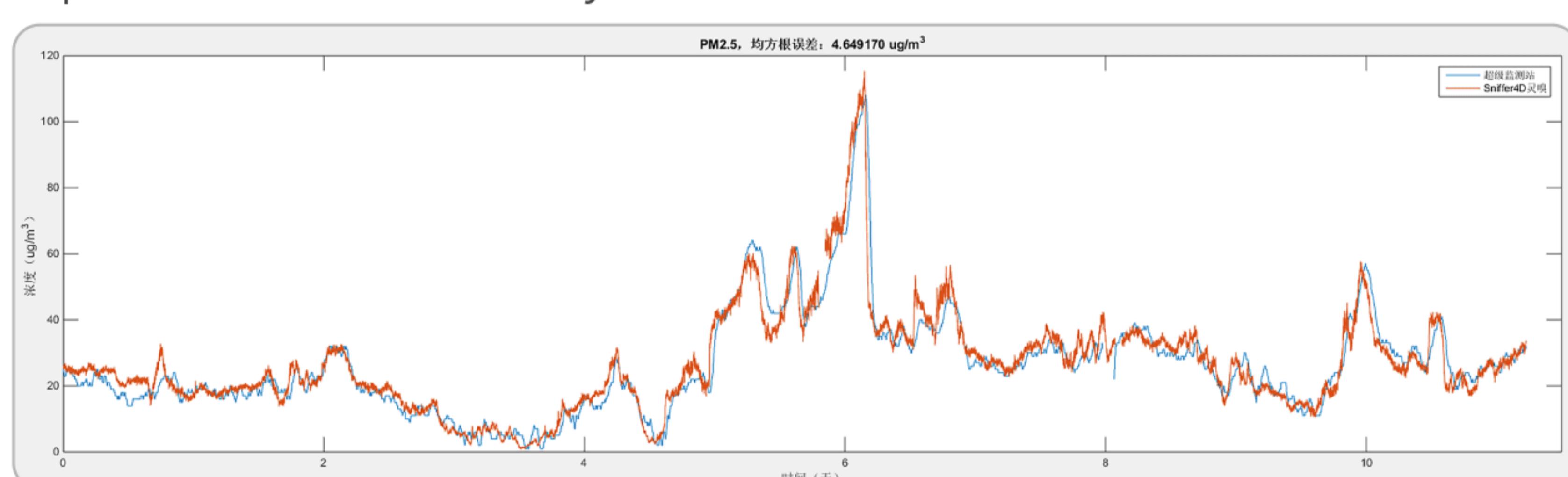
With its compact size, light weight, anti-EMI carbon-fiber casing, internal suspension mechanism, and active ventilation system, Sniffer4D can be easily integrated with drone platforms such as DJI M100, M210, M600Pro, as well as other types of moving vehicles including automobiles.

Highly Flexible Sensor Configuration:

Sniffer4D's innovative modularized hardware design provides users with the flexibility to change combinations of sensing modules to suit different applications (and can replace or add new modules later). During a mission, Sniffer4D is able to simultaneously sense up to 9 air pollutants and particulate matters, and send this data back to Sniffer4D Mapper analytic software in real-time.

High Precision & Accuracy:

Advanced low-noise amplification & sampling circuit, state-of-the-art gas detectors, advanced environmental & zero drift compensation algorithms, contribute to Sniffer4D's excellent data linearity, repeatability, and response time. Contact us for certificates & result comparisons. Users can easily calibrate the device in the software.



High Special Resolution:

Sniffer4D is able to obtain ppb level hyper-local air pollution data at street levels and at various heights, demonstrating the characteristics of distribution and variation in a small area.

Real-time Data Transmission:

Sniffer4D transmits georeferenced and time-stamped air pollution data to Sniffer4D Mapper software in real-time (1Hz) via its telemetry or 4G module. The transmission can be configured as 'one Sniffer4D to multiple PCs', 'multiple Sniffer4D to one PC', and 'multiple Sniffer4Ds to multiple PCs' with unlimited range.

Data Integrity:

When the connection is down temporarily (blocked by buildings or BVR flight) during a mission, Sniffer4D is still able to collect data, and the data collected during the transmission interruption will be retrieved automatically when the connection is re-established; meanwhile, data will be automatically backed up in the SD card for double security.

Short Preheating Time:

Sniffer4D's advanced circuit and algorithm design greatly reduce the preheating stabilization time to 10-600 seconds (depending on the sensor configuration), 80%-90% shorter than like products, which greatly reduces the preparation time.

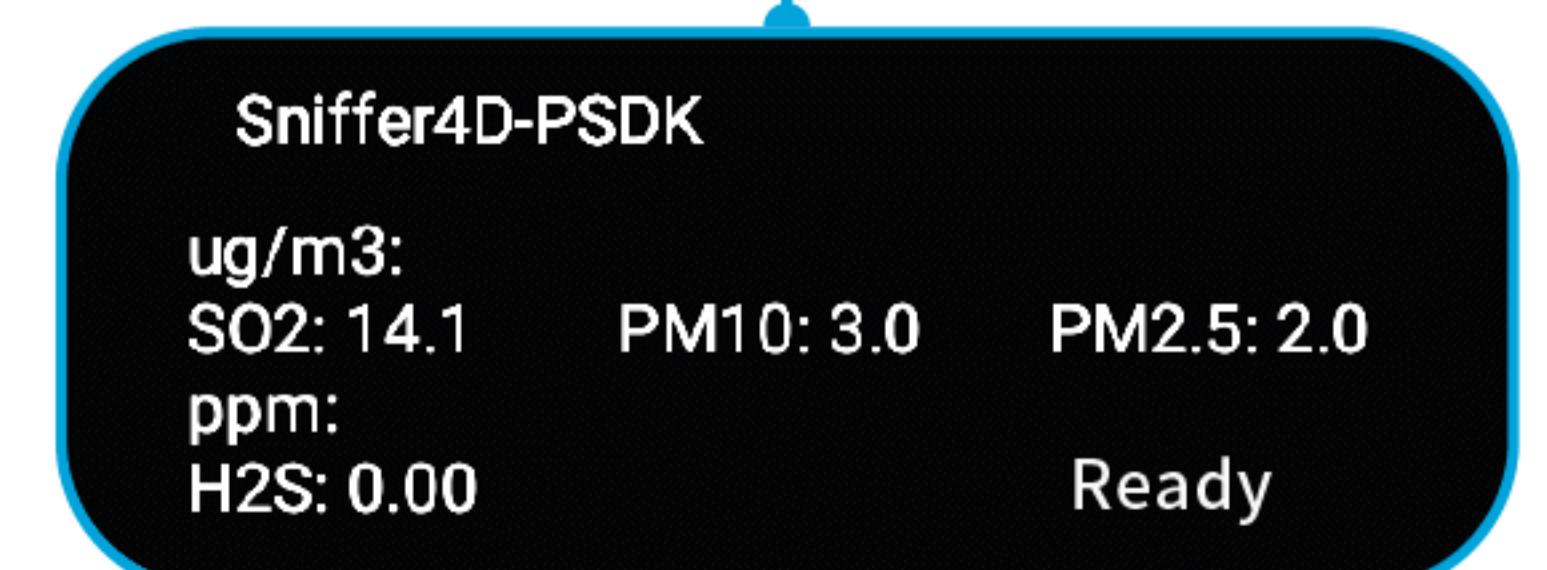
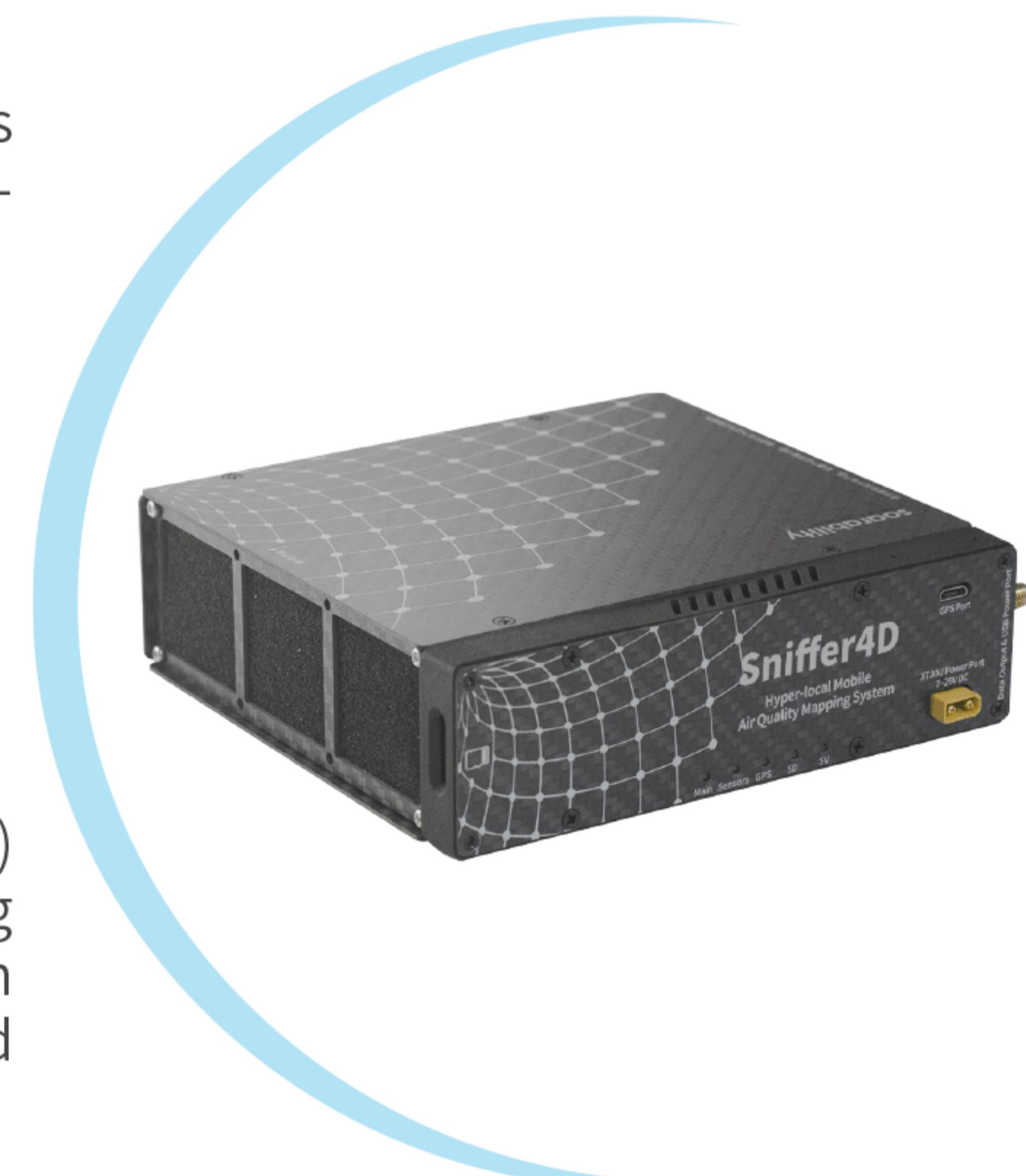
Easy Maintenance and Calibration:

Sniffer4Ds are thoroughly calibrated before delivery to users, so that they work right out of the box. In the calibration panel in Sniffer4D Mapper software, users can check detailed working status of each sensing module inside a Sniffer4D, and adjust the sensitivity (slope) and zero point (intercept) of each sensing module, making maintenance and calibration much easier.

Fully Support DJI Payload SDK:

(Right Figure) Sniffer4D is able to seamlessly integrate with DJI M210 via DJI Payload SDK. Readings from Sniffer4D can be viewed in real-time in DJI PILOT – DJI's official flight control and path planning App.

Contact us for OEM Cooperation.



► Industry Leading Data Visualization and Analytics

Import & Review Historical Data Files

Import DOM/Orthophoto
Import geotagged photos

Real-time 2D Grid Air Pollution Heat Map

Automatic Mission Start for Unattended Operation

Real-time 2D Isoline Air Pollution Heat Map

Real-Time Measurement Values and Time Series Graphs

3 Built-in DemoMissions

Live Working Status of Sniffer4D such as GPS, Relative Altitude and Amount of Data to be Retrieved

Real-time 3D Air Pollution Point Cloud

Automatic Mission Report (PDF) Generation

By: Sniffer4DMapper 1.2.07.22	actName : Organization :							
Time Stamp	Abs.Alt m	Longitude	Latitude	Temperature °C	Humidity %	Pressure Pa	VOCs ppm	SO2 µg/m³
2018/11/29 16:04	0.19837	114.016269	23.0561493	26.274509	43.92157	101897.8125	0.070956	69.0472
2018/11/29 16:04	0.19837	114.01627	23.056149	26.274509	44.313725	101897.8125	0.071718	69.0472
2018/11/29 16:04	0.19837	114.016271	23.0561485	26.274509	44.117645	101897.8125	0.072481	69.0472
2018/11/29 16:04	0.19837	114.016273	23.0561472	26.274509	44.117645	101897.8125	0.073244	69.0472
2018/11/29 16:04	0.473037	114.016275	23.0561457	26.274509	43.92157	101892.9297	0.073244	69.0472
2018/11/29 16:04	0.61037	114.016274	23.056145	26.274509	43.725491	101888.0469	0.074007	69.0583
2018/11/29 16:04	1.29704	114.016274	23.056144	26.274509	43.333332	101883.1641	0.074007	69.0472
2018/11/29 16:04	2.25837	114.016272	23.0561423	26.274509	42.941177	101868.5156	0.073244	69.0583
2018/11/29 16:04	3.76904	114.016271	23.0561405	26.274509	42.745098	101848.9844	0.072481	69.0583
2018/11/29 16:04	5.2797	114.016268	23.0561405	26.274509	42.745098	101829.4453	0.071718	69.0583
2018/11/29 16:04	7.06504	114.016268	23.0561397	26.274509	42.745098	101809.9141	0.070956	69.0583
2018/11/29 16:04	8.85037	114.016267	23.0561421	26.274509	42.549019	101785.5	0.070193	69.0583
2018/11/29 16:04	10.773	114.016267	23.0561441	26.274509	42.549019	101761.0781	0.070193	69.0583
2018/11/29 16:04	12.9704	114.016267	23.0561457	26.274509	42.35294	101736.6641	0.06943	69.0472
2018/11/29 16:04	15.0304	114.016267	23.0561452	26.274509	42.35294	101712.2422	0.06943	69.0472
2018/11/29 16:04	17.2277	114.016264	23.0561443	26.274509	42.35294	101687.8281	0.068667	69.0472
2018/11/29 16:04	19.2877	114.016262	23.0561436	26.274509	42.35294	101658.5313	0.067904	69.0472
2018/11/29 16:04	21.485	114.016261	23.0561447	26.274509	42.156864	101634.1094	0.067141	69.0472
2018/11/29 16:04	24.0944	114.016261	23.0561452	26.274509	42.156864	101604.8125	0.067141	69.0472
2018/11/29 16:04	26.017	114.016261	23.0561453	26.274509	42.156864	101580.3906	0.066378	69.0472
2018/11/29 16:04	27.665	114.016267	23.0561503	26.078432	42.156864	101560.8594	0.065615	68.4367

Export Raw Datasheet (CSV)

Support 'one Sniffer4D to multiple PCs', 'multiple Sniffer4D to one PCs', or 'multiple Sniffer4Ds to multiple PCs' configuration with unlimited transmission range

S4D Mapper

Support 64-Bit Windows 10 and Android, with Automatic & Free Software Update



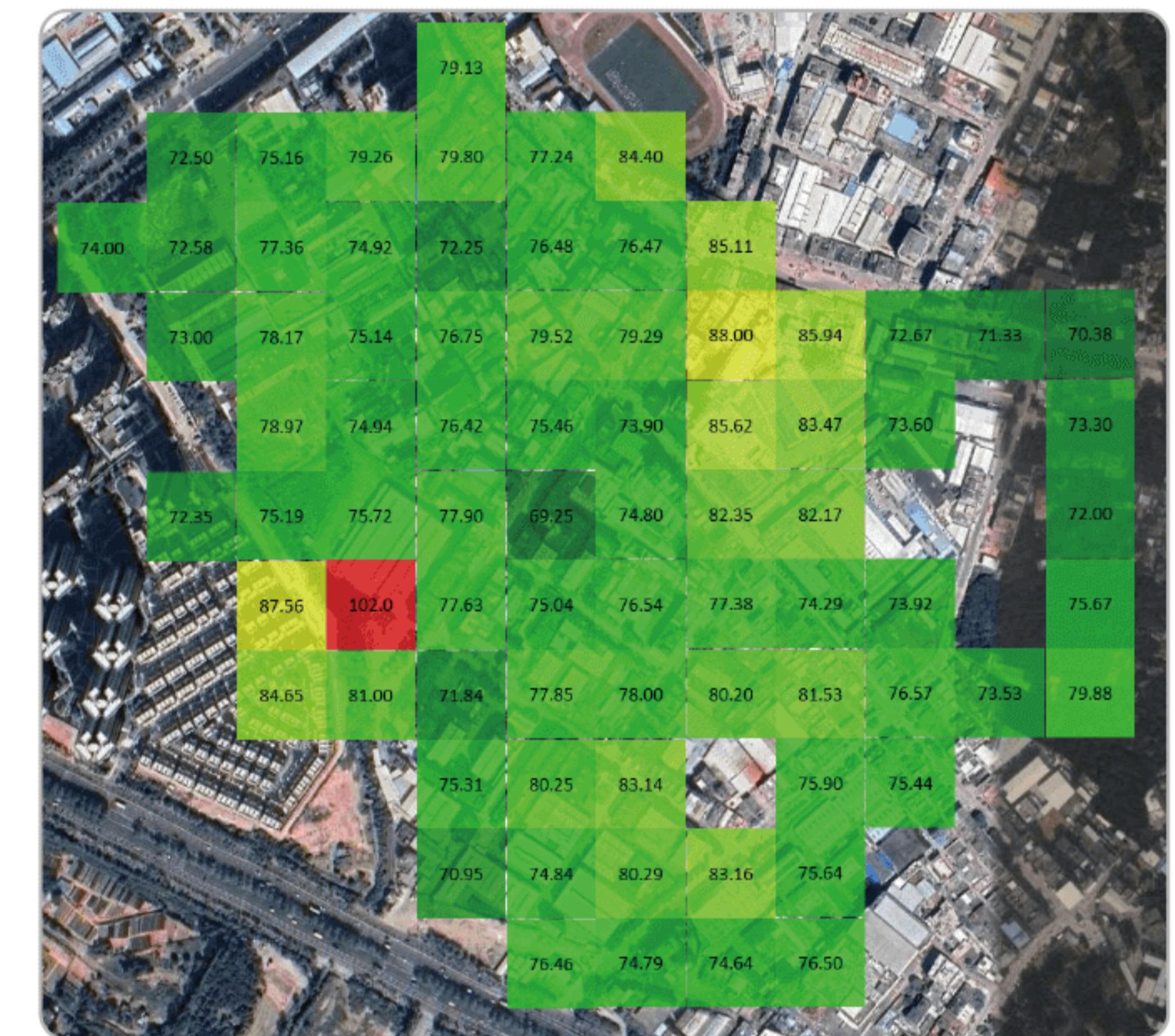
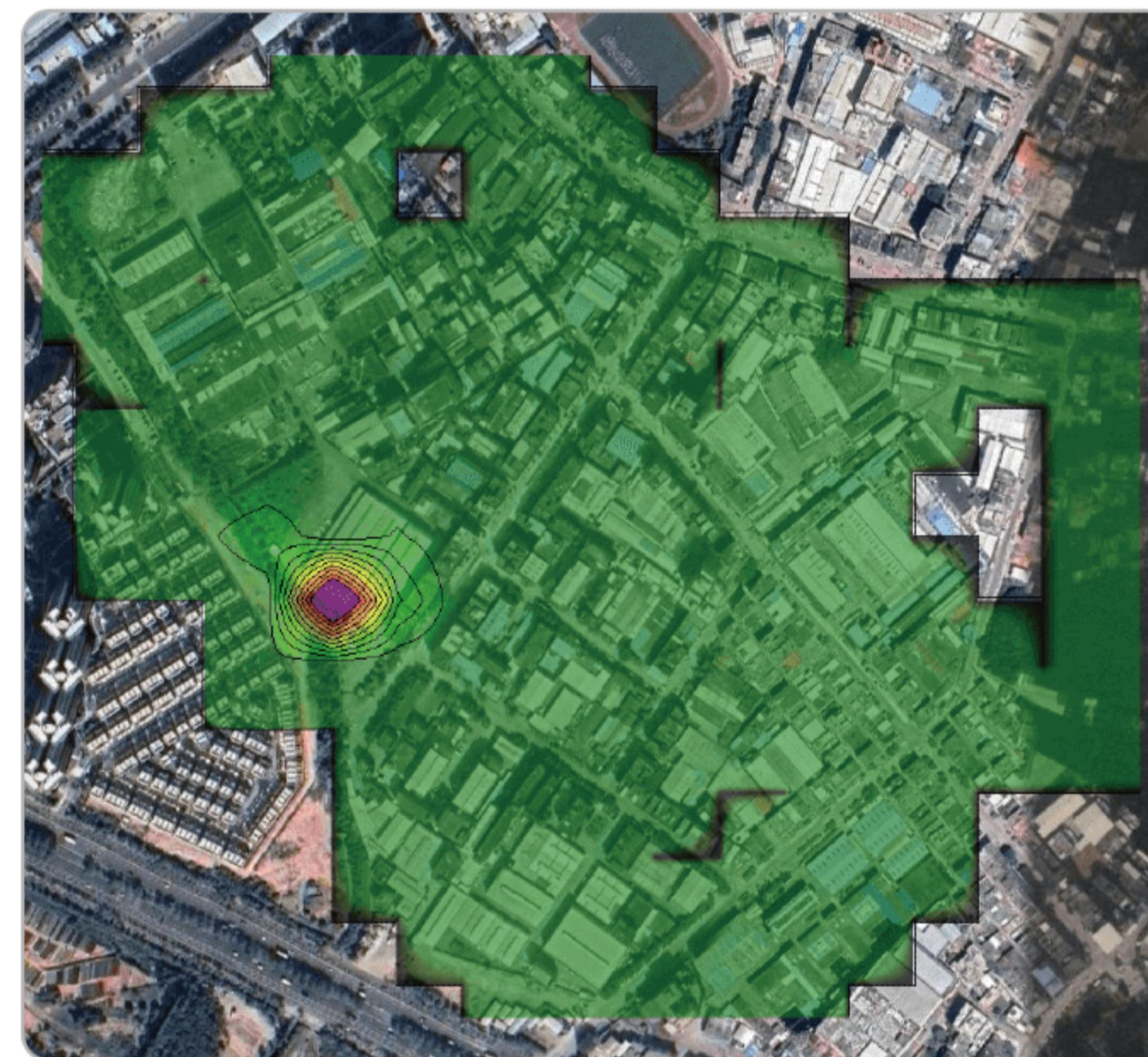
Use Cases

1. Assist Local EPA to Locate Pollution Sources



In November, 2018, Environmental Protection Bureau in Dongguan, China received complaints from residents that their neighborhood was filled with strange smell from time to time.

Considering that such neighborhood was surrounded by industrial parks and construction sites, inspectors from local EPA decided to use drone-mounted Sniffer4D to scan the nearby area and measure volatile organic compounds (VOCs), SO₂ and PM2.5 concentrations.



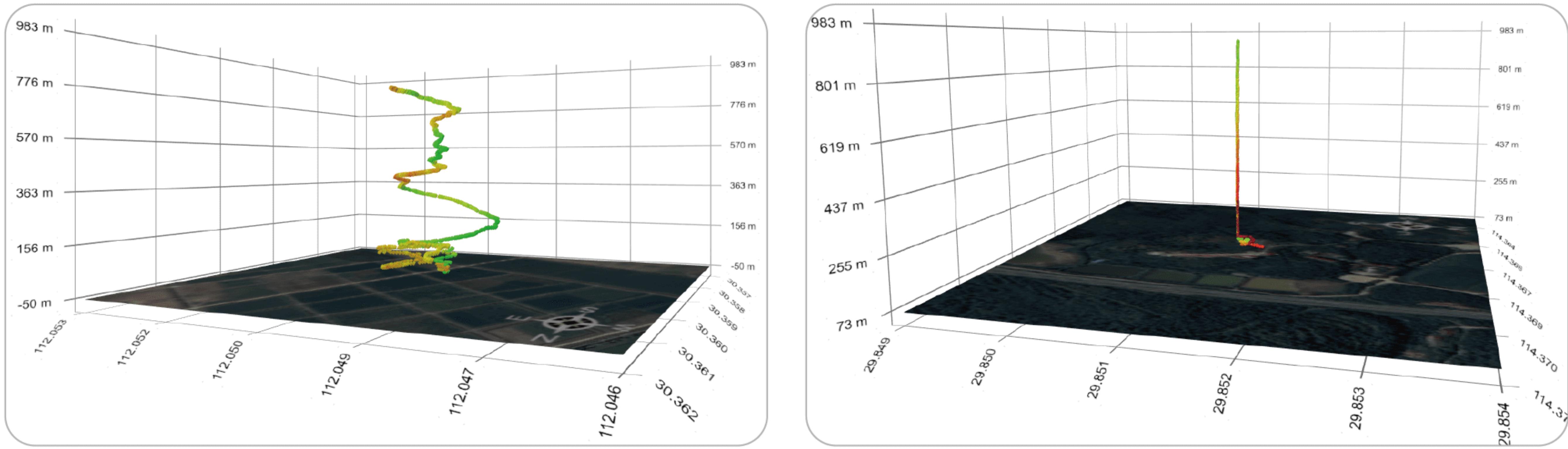
In 80 minutes, drone-mounted Sniffer4D covered an area of 134,000 square meters in 3 flights. The middle and right figures shows the 2D isoline heat map for VOCs and 2D grid heat map for PM2.5 generated by Sniffer4D Mapper in real time, making the air pollution distribution clear at a glance. Inspectors quickly checked the area in red and found a factory that was illegally emitting VOCs. This issue was soon taken care of within the day.

2. Assist Researchers to Collect Key Data



From 2018 to 2019, the Wuhan Institute of Rainstorm of China Meteorological Administration, in conjunction with various agencies, conducted a comprehensive observation experiment on the severely polluted area in the middle reaches of the Yangtze River.

Sniffer4D has been selected as one of the main monitoring equipment of this experiment due to its compact size and light weight, flexibility to choose different sensing modules, geo-tagged and time-stamped air pollution data, and its data reliability and integrity.



The experiment used drones and tethered airships, equipped with observation instruments such as Sniffer4D, meteorological sensors and black carbon meters, to scan the vertical profiles of SO₂, NO₂, CO, O₃, black carbon and PMs within 1500 meters of the atmospheric boundary layer, as well as the vertical profile of meteorological elements such as wind speed, temperature, humidity, and pressure.

The above figures show the 3D point cloud of ozone detected by airship-mounted Sniffer4D and drone-mounted Sniffer4D. The distribution of ozone at different heights is clear at a glance.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1 #Create By: Sniffer4D Mapper 1.2.05.27																			
2 项目名称 : 监测单位 :																			
3 采样点时间 海拔 m 经度 纬度 温度 % 湿度 % VOCs ppm SO ₂ μg/m ³ NO ₂ μg/m ³ O ₃ /NO ₂ μg/m ³ PM1.0 μg/m ³ PM2.5 μg/m ³ PM10 μg/m ³ CxRx % H2S μg/m ³ HCl μg/m ³ NR1SO ₂ μg/m ³ TSP μg/m ³ ID																			
4 2019/5/22 17:23 128.053 30.367 29.85118 30.78431 26.09804 0 29.94065 0.822961 45.13361 146.158 8 12 19 0 0 0 0 0 0 0 0 0 0 0 0																			
5 2019/5/22 17:23 128.053 30.367 29.85118 30.78431 26.09804 0 29.94065 0.822961 45.13361 146.158 5 7 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																			
6 2019/5/22 17:23 128.053 30.367 29.85118 30.78431 26.09804 0 29.94065 0.822961 46.07389 147.1428 6 10 12 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																			
7 2019/5/22 17:23 127.500 30.367 29.85118 31.17647 26.86275 0 29.32981 0.822961 47.01417 146.8158 5 8 12 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																			
8 2019/5/22 17:23 128.056 30.367 29.85118 31.17647 26.47059 0 28.71378 0.822961 47.95446 146.8158 5 9 12 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																			
9 2019/5/22 17:23 128.506 30.367 29.85118 31.17647 26.88233 0 28.10774 0.822961 47.95446 145.8349 5 10 13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																			
10 2019/5/22 17:23 130.399 30.367 29.85118 31.17647 26.88233 0 28.10774 0.822961 47.95446 145.5079 5 10 13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																			
11 2019/5/22 17:23 131.077 30.367 29.85118 31.17647 26.07843 0 27.49671 0.822961 47.95446 145.5079 6 12 15 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																			
12 2019/5/22 17:23 132.725 30.367 29.85118 30.78431 25.68627 0 25.05255 0.819336 51.71935 151.7206 7 12 15 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																			
13 2019/5/22 17:23 133.428 30.367 29.85118 30.78431 25.68627 0 25.05255 0.819336 51.71935 151.7206 7 11 14 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																			
14 2019/5/22 17:23 134.373 30.367 29.85118 30.78431 26.07843 0 25.06039 0.819336 50.30216 150.4127 7 10 14 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																			
15 2019/5/22 17:23 135.066 30.367 29.85118 30.78431 25.68627 0 26.277467 0.819336 50.77531 150.7396 7 10 14 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																			
16 2019/5/22 17:23 136.433 30.367 29.85118 30.78431 25.49902 0 26.88666 0.819336 48.89474 150.0857 8 11 13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																			
17 2019/5/22 17:23 138.766 30.367 29.85118 30.78431 25.29412 0 25.66539 0.819336 43.72318 155.9714 7 11 15 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																			
18 2019/5/22 17:23 140.653 30.367 29.85118 30.78431 25.09804 0 25.05255 0.819336 43.72318 156.2984 7 11 15 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																			
19 2019/5/22 17:23 142.338 30.367 29.85118 30.78431 25.09804 0 23.83047 0.819336 42.78516 156.2984 7 11 15 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																			
20 2019/5/22 17:23 144.261 30.367 29.85118 30.78431 24.90196 0 23.83047 0.819336 42.78516 156.2984 7 10 14 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																			
21 2019/5/22 17:23 145.166 30.367 29.85118 30.78431 24.70588 0 23.83047 0.819336 41.84561 156.2984 7 10 14 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																			
22 2019/5/22 17:23 145.166 30.367 29.85118 30.78431 24.70588 0 24.44151 0.819336 40.09233 156.6554 7 10 14 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																			
23 2019/5/22 17:23 146.059 30.367 29.85118 30.78431 24.70588 0 24.44151 0.819336 39.96208 158.9714 7 10 14 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																			
24 2019/5/22 17:23 152.364 30.367 29.85118 30.78431 25.09804 0 25.05255 0.819336 39.96205 155.6444 7 10 14 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																			
25 2019/5/22 17:23 154.424 30.367 29.85118 30.78431 25.09804 0 25.05255 0.819336 39.96205 155.6444 7 10 16 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																			
26 2019/5/22 17:23 156.484 30.367 29.85118 30.78431 25.09804 0 25.05255 0.819336 40.43219 155.6444 7 10 16 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																			
27 2019/5/22 17:23 158.818 30.367 29.85118 30.78424 25.09804 0 24.44151 0.819336 40.43219 156.2984 7 10 17 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0																			

The left figure shows the exported raw data by Sniffer4D Mapper, including altitude, latitude, longitude, temperature, humidity, air pressure and air quality data of various target gases. The data collection frequency is 1Hz.

By analyzing and processing the raw data, the vertical concentration profiles of the target gases can be obtained.

3. Use Delivery Vehicles to Collect Street-level Air Quality Information



In April 2019, Soarability and JDC cooperated in Suqian, China, to launch a pilot project using delivery vehicle mounted Sniffer4Ds to collect street-level air quality information. The project implementation process is as follows:

5 Sniffer4Ds were mounted onto 5 delivery vehicles. When the couriers started delivery every morning, they only needed to power up the delivery vehicle and Sniffer4Ds will also be powered up.

After Sniffer4Ds had been warmed-up and had GPS fix, Sniffer4D Mapper automatically started missions for the Sniffer4Ds.



As these delivery vehicles travelled through the streets, the 5 Sniffer4Ds sent air quality data back to the software in real time through 4G network. The data was also backed up to the built-in SD card of Sniffer4D to ensure data integrity.

At the same time, people in command center can remotely monitor the trajectory of the 5 delivery vehicles and the air quality in the areas they pass through. Each 'S' in the figure represents a Sniffer4D.

About Soarability

Traditional monitoring stations typically only provide for air pollutant concentrations at city or district level, and so it is unknown how the pollutants are distributed within such areas. This lack of information prevents people from making effective and conscious decisions regarding the air quality impacting their work and daily lives. Our team is here to change that.

Soarability Technologies (previously known as SciflyTech) was founded by a group of people with extensive experience in sensors and mechatronic systems development from University of Auckland in New Zealand. We dedicate ourselves to developing advanced ‘nose’ and ‘brain’ for drones and ground vehicles. Our products and technologies enable aerial and ground vehicles to accurately collect, analyze and visualize hyper-local air pollutant information, supporting decision makings by governments, organizations, research groups, and individuals alike.

Our Sniffer4D Air Pollution Detection & Mapping System is being used in 15 countries (2019.07), setting an industry benchmark for this new niche market and accumulating a large number of applications, including:

- » Assist local EPA to quickly locate pollution sources in industrial and residential areas, and understand the characteristics of pollution transmission;
- » Assist large industrial enterprises to easily obtain gas distribution maps in 3D in the plant areas, and monitor the operation of the plant area safely and efficiently;
- » Assist oil & gas companies to analyze the air components around oil and gas wells, storage tanks and pipelines to improve inspection efficiency and safety;
- » Assist emergency rescue teams to understand the spread of toxic gases in an emergency and to determine the scope of evacuation;
- » Assist research institutes to collect 3D air pollution distribution data that is difficult to collect by traditional means;
- » Assist port management to investigate vessels that burn low standard fuels.

Users of Sniffer4D include Ministry of Ecological Environment of China, BP, SINOPEC, HKUST, University of Macau, HUST, Oxford University, many municipal environmental protection agencies in China, professional drone service providers, and environmental service providers worldwide.



Follow Soarability WeChat
Official Account for more information

 : +86 0755 8656 0586 (Mon-Fri 8:30am-18:00pm)

 : inquiry@soarability.tech

 : +86 18666826697 (Steven Jiang)

 : www.soorability.tech

 : Overseas Scholars Venture Building, Nanshan District, Shenzhen, China

Product specifications may change without any notification.

Shenzhen Soarability Technologies Co., Ltd. reserves the right of final interpretation.