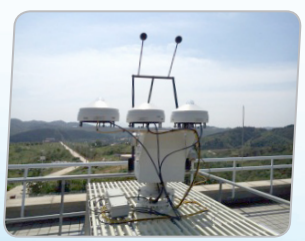
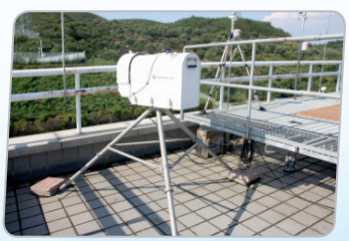
北京上甸子区域大气本底观测站

Beijing Shangdianzi Regional Atmosphere Watch Station





上甸子区域大气本底观测站

Shangdianzi regional atmosphere watch station

☆ 世界气象组织全球大气观测网区域大气本底观测站

☆ 科技部国家野外科学观测研究站

☆ 中国气象局区域大气本底观测站

☆ 中国气象局辐射基准观测站、国家气象观测站

☆ 中国气象局大气本底野外科学试验基地

☆ 全国气象科普教育基地

◇ Regional Atmosphere Watch Station of the World Meteorological Organization Global Atmosphere Watch (WMO/GAW)

◇ National Field Scientific Observation & Research Station of the Ministry of Science and Technology

◇ Regional Atmosphere Watch Station of China Meteorological Administration (CMA)

◇ Reference Radiation Station, and National Meteorological Station of CMA

◇ Field Scientific Experiment Base for Atmosphere Background, CMA

◇ Meteorological Scientific Education Base, CMA

开篇语
Preface

党中央、国务院高度重视气候变化应对和生态文明建设工作，习近平总书记在党的十九大报告指出，加快生态文明体制改革，建设美丽中国，还自然以宁静、和谐、美丽，引导应对气候变化国际合作，成为全球生态文明建设的重要参与者、贡献者。

随着工业化、城镇化和人口规模的不断增加，产生了一系列环境问题，如城市热岛效应、土地过度开发、水资源短缺、大气污染、雾-霾天气频发等。同时，京津冀地区正经历着以“变暖”和“变干”为主要特征的气候变化过程。区域生态文明建设、应对气候变化和大气污染防治工作迫切需要客观、准确、可靠的受人类影响极小的大气“本底”观测数据作为基准。

上甸子气象站自 1958 年便开始气象要素的观测；1982 年开始进行大气飘尘、浑浊度、酸雨等大气成分观测，是我国建立的第一个大气本底观测站，并成为世界气象组织全球大气观测站网成员。上甸子区域大气本底站观测历史悠久、观测要素全面、观测仪器先进、观测流程规范，为研究气候变化、大气环境和大气科学等提供了基础支撑。

The CPC Central Committee and the State Council have attached great importance to the fight against climate change and ecological conservation. As President Xi Jingping noted in his reports to 19th CPC National Congress that we have to speed reform of system for developing an ecological civilization and restore the serenity, harmony, and beauty of nature, so as to build a beautiful China. Taking a driving seat in international cooperation to respond to climate change, China has become an important participant, contributor, and torchbearer in the global endeavor for ecological civilization.

In the process of industrialization, urbanization and continuous population growth, a series of environmental problems have emerged, such as the urban heat island effect, overexploitation of land, shortage of water resources, air pollution, and hazy weather. At the same time, the climate of the Beijing-Tianjin-Hebei (BTH) region has become warmer and drier. The fight against ecological deterioration, climate change and air pollution urgently requires an accurate and reliable atmospheric “background” database, which is minimally influenced by human beings.

The meteorological elements were observed at Shangdianzi weather station in 1958. As some atmospheric composition items such as atmospheric particulates, turbidity, and acid rain were firstly measured at the Shangdianzi station in 1982, it became the first atmosphere watch station of China and was selected as one of the regional atmosphere watch stations of the World Meteorological Organization Global Atmosphere Watch (WMO/GAW). As a station with long observation history, comprehensive observation elements, advanced observation instruments, and standard observation process, Shangdianzi Regional Atmosphere Watch Station (SDZRAWS) is willing to provide fundamental supports for investigations on climate change, atmospheric environment, and atmospheric science.

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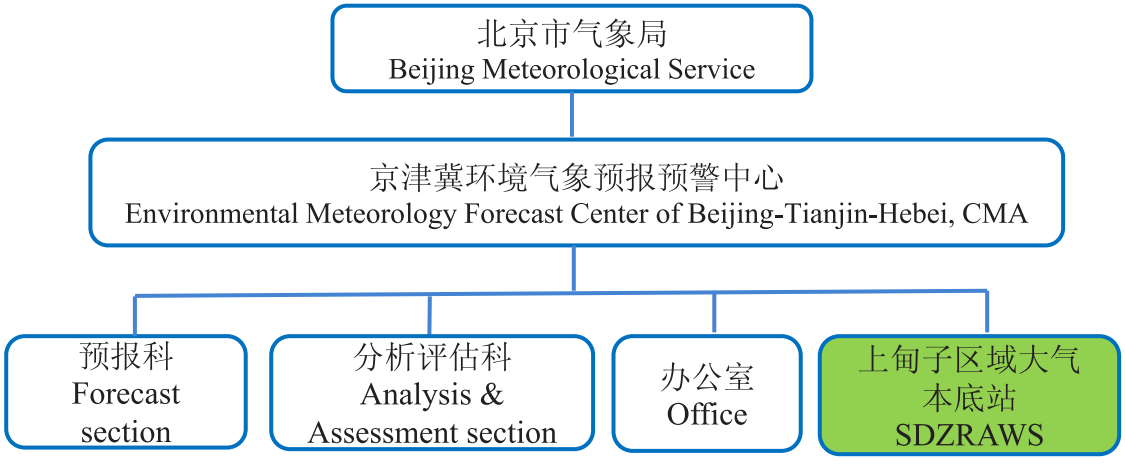
台站简介
Brief Introduction

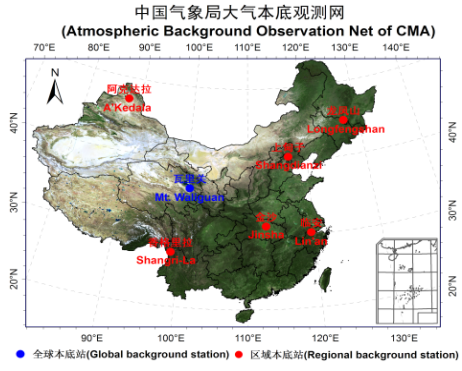
上甸子区域大气本底站由京津冀环境气象预报预警中心负责运行，主管单位为北京市气象局。主要承担华北区域大气成分本底观测、气候观测、科学试验及评估服务等。

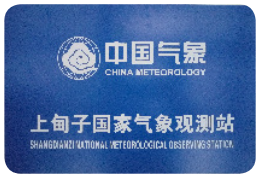
SDZRAWS is charged by the Environmental Meteorology Forecast Center of Beijing-Tianjin-Hebei, which is one of the 14 subordinate units of Beijing Meteorological Service (BMS). It is responsible for monitoring atmospheric composition background data and climatic elements over areas of North China. It also serves as a scientific experiment base field, and provides environmental impact assessment service, etc.

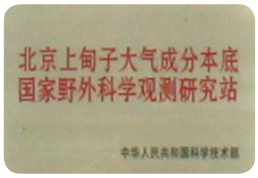


上甸子站现为世界气象组织全球大气观测网区域大气本底观测站、中国气象局区域大气本底观测站、科技部国家野外科学观测研究站、中国气象局辐射基准观测站、国家气象观测站、中国气象局大气本底野外科学试验基地和全国气象科普教育基地。

As a member of the regional global atmosphere watch stations of the World Meteorological Organization (WMO/GAW) and the China Meteorological Administration (CMA/GAW), SDZRAWS plays multiple social roles in many aspects, including national field scientific observation & research station of the Ministry of Science and Technology, reference radiation station, national meteorological station, field scientific experiment base for atmosphere background, and meteorological scientific education base of CMA.



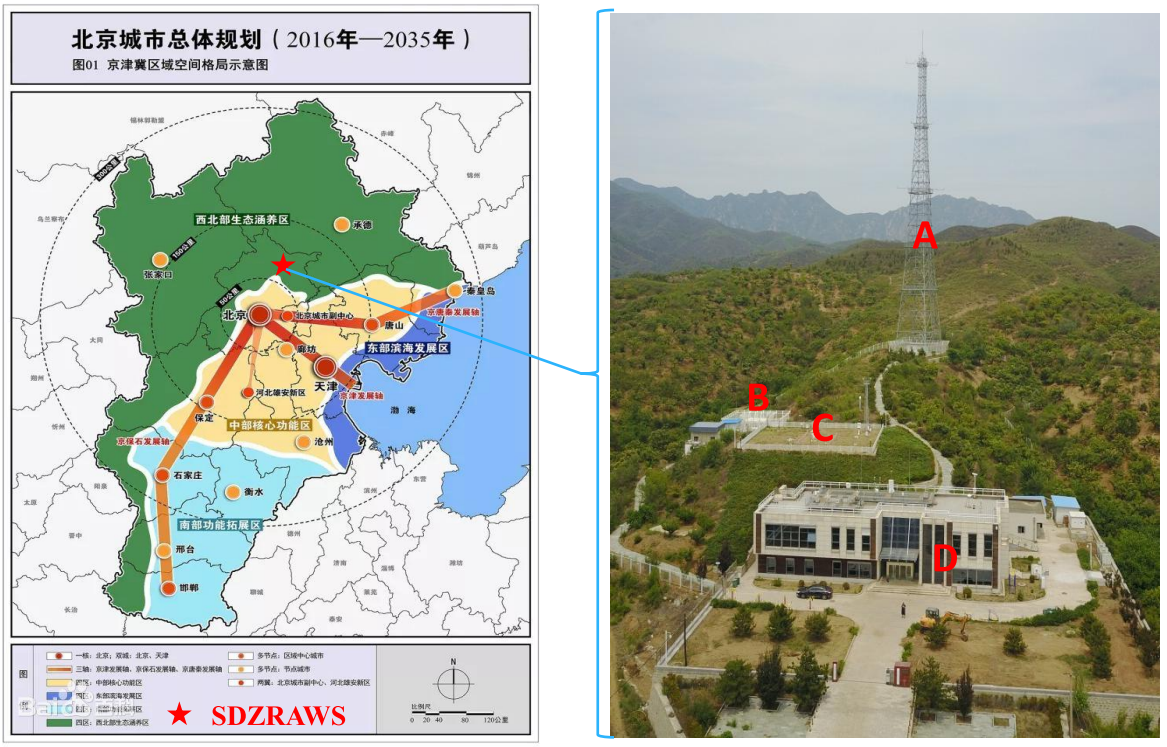




地理位置
Geographical Location

上甸子区域大气本底观测站位于东经 117º 07’，北纬 40º 39’，海拔高度 293.3 米，地处京津冀区域中心位置。该站坐落于北京市密云区高岭镇上甸子村，距北京市区约 150 公里。该站 30 公里范围以内仅有分布在山区的几个小村庄和稀疏的人口分布，因此没有显著的人为影响，观测资料能够较好地代表京津冀区域和华北区域气候变化和大气本底特征。

SDZRAWS (40º39’ N, 117º07’ E, 293.9 m a.s.l.) is located in the center of the Beijing-Tianjin-Hebei (BTH) region and in the Shangdianzi village, Gaoling town, Miyun district of Beijing. It is about 150 km northeasterly to the urban of Beijing. There are only small villages in mountainous areas with sparse population within 30 km of the site, thus anthropogenic emission is insignificant. The data observed at SDZRAWS can be used to represent the regional climate change and atmosphere background properties of the BTH and the North China.



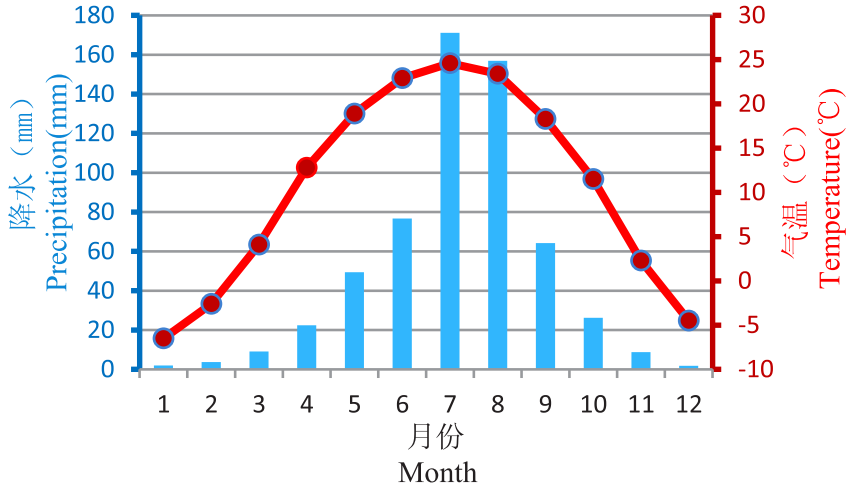
上甸子区域大气本底由工作区和生活区两部分组成，两处相距 750 米，总占地面积 14000 平方米，总建筑面积 2500 平方米。在工作区由北向南依次建有气象梯度观测铁塔 (A)、垂直探测区（B）、地面气象观测场（C) 和业务楼（D）。

SDZRAWS consists of two parts, i.e., the workspace (WS) and the living area (LA). The LA is 750 meters south of the WS. SDZRAWS covers an area of 14, 000 square meters and a building area of 2,500 square meters. There are four buildings in WS from north to south, i.e., meteorological gradient observation tower (A), vertical detection area (B), meteorological observation site (C), and business building (D).

气候特征
Climatic Characteristics

上甸子地区属暖温带、半湿润半干旱大陆性季风气候，年平均气温 10.4℃，年降水量 592.3 毫米，降水主要集中在夏季（6~8 月）达 404.7 毫米，占全年总降水量的 68.3%。

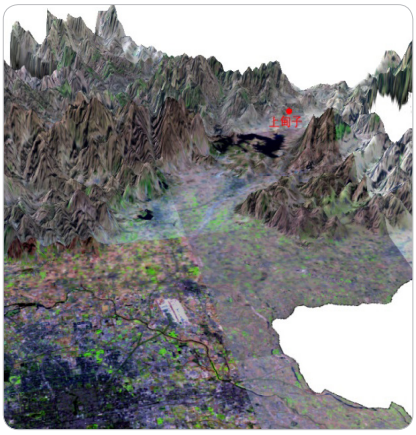
Shangdianzi (SDZ) area belongs to the warm temperate, semi-humid and semi-arid continental monsoon climate. The average annual temperature and annual precipitation of this area are 10.4℃ and 592.3 mm, respectively. The precipitation amounted to 404.7 mm in summer (July- August), which accounts for approximately 68.3 percent of annual precipitation.



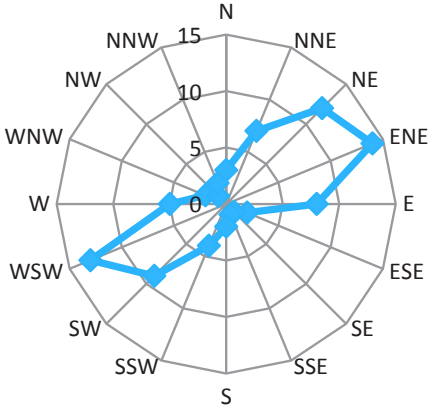
上甸子站月平均气温和降水量分布图（根据 1981~2010 年资料统计）
Monthly average temperature and precipitation of SDZ area (according to 1981~2010 data statistics).

上甸子站的仪器安装在所在的小山的南坡，山坡呈东北 - 西南走向，山谷的西南出口正对着北京和南部平原，受山谷地形的影响，上甸子站地区的主导风向为东北风和西南风。

The instruments of SDZRAWS are installed on the south slope of a hill, which has a valley with a northeast-southwest orientation. The southwest corner of valley faces to the Beijing downtown and the plain of North China. Affected by the topography of the valley, prevailing winds are northeasterly and southwesterly along the valley trends.



上甸子地区地形及卫星遥感图像
The terrain and satellite remote sensing image over SDZ area.



上甸子地区年平均风向玫瑰图
The average annual wind direction rose map of SDZ area.

台站历史
Station history

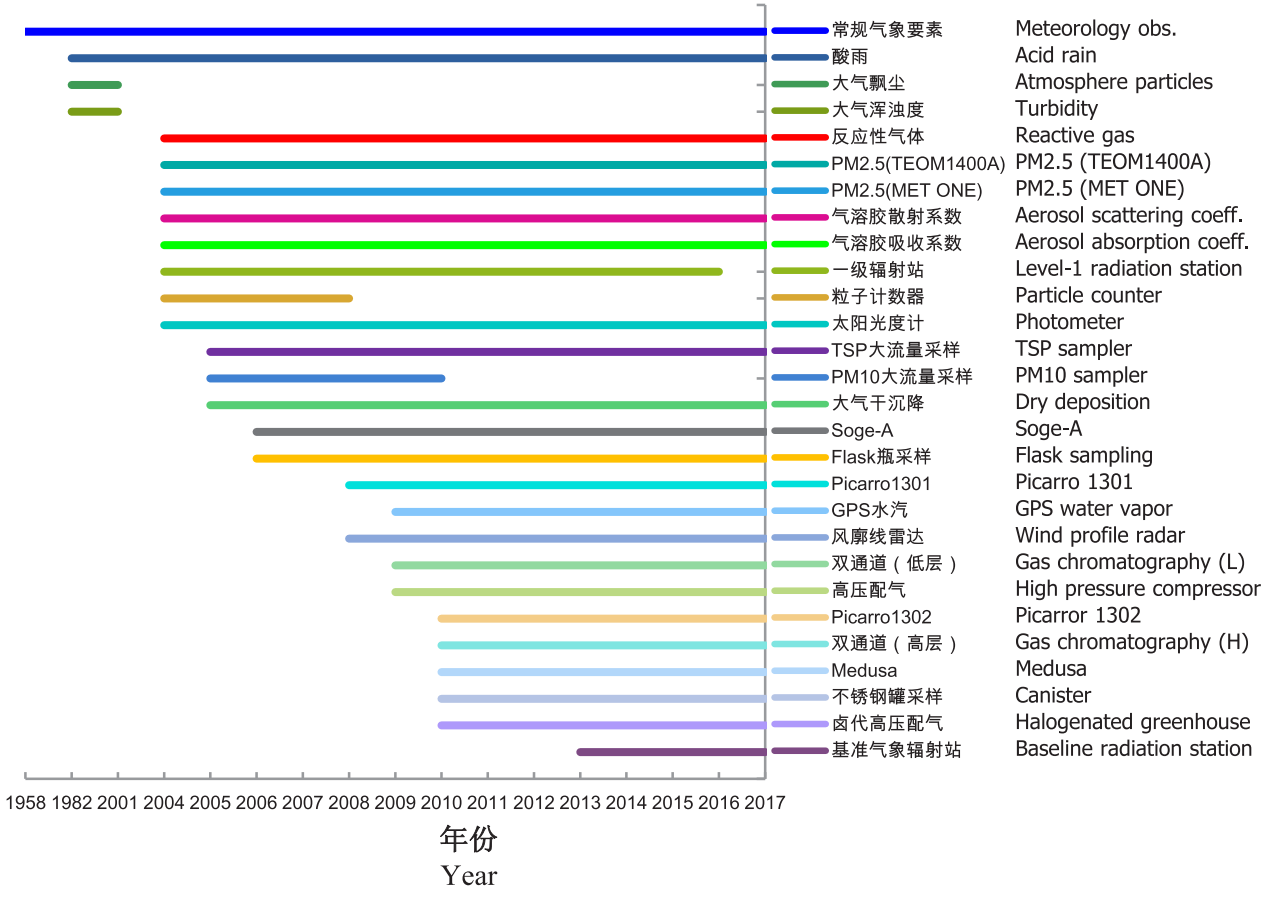
> 1958	1. 上甸子气象站建立	1. SDZ weather station was established in 1958.
> 1982	2. 加入WMO/GAW区域大气本底站, 我国第一个大气本底站	2. As the first atmosphere watch station in China, SDZRAWS was founded in 1982. The same year, it joined the WMO/GAW.
> 2004	3. 建立了气溶胶和反应性气体在线观测系统	3. An on-line aerosol and reactive gas observation system was built in 2004.
> 2005	4. 成为国家野外科学研究观测站	4. SDZRAWS became one of the national field scientific observation and research stations of the Ministry of Science and Technology in 2005.
> 2010	5. 增加了温室气体在线观测设备	5. A series of on-line greenhouse gas instruments were added in 2010.
> 2011	6. 上甸子新业务楼落成	6. New business building in workspace was completed in 2011.
> 2013	7. 建成中国气象局辐射基准站	7. The reference radiation station of CMA was established in 2013.
> 2014	8. 上甸子生活区改造完工	8. The renovation project in living area was completed in 2014.
> 2017	9. 温室气体高压配气系统升级	9. The high pressure gas compression system for greenhouse gases was upgraded in 2017.

序号 No.	姓名 Name	性别 Sex	职务 Duty	任职时间 Term of office
1	王云茂 (Wang Y.M.)	男 (Male)	站长 (Station master)	1958-1966
2	冯振铎 (Feng Z.D.)	男 (Male)	站长 (Station master)	1967-1975
3	刘永富 (Liu Y.F.)	男 (Male)	站长 (Station master)	1976-1985
4	王汉章 (Wang H.Z.)	男 (Male)	负责人 (Administrator)	1986
5	王富新 (Wang F.X.)	男 (Male)	负责人 (Administrator)	1987
6	刘永富 (Liu Y.F.)	男 (Male)	站长 (Station master)	1988-2000
7	赵焕勇 (Zhao H.Y.)	男 (Male)	站长 (Station master)	2001-2003
8	周怀刚 (Zhou H.G.)	男 (Male)	负责人 (Administrator)	2004-2005
9	张小玲 (Zhang X.L.)	女 (Female)	站长 (Station master)	2006-2012
10	权维俊 (Quan W.J.)	男 (Male)	站长 (Station master)	Since 2013

观测项目
Observation Items

1958 年 1 月开始常规气象要素的观测和发报；1982 年开始酸雨、飘尘和大气浑浊度等观测；2004 年增加了气溶胶、反应性气体和辐射等观测；2006 年增加了 2 套瓶（罐）人工采样系统和 4 套温室气体在线自动观测系统，其中氢氟碳化物（HFCs）和全氟化碳（PFCs）在线观测填补了我国该类观测的空白；2008 年以后，又增加了风廓线雷达、微波辐射计、GPS 水汽、梯度气象观测、气溶胶激光雷达等。目前，上甸子本底站已开展 6 大类、160 种要素的观测。

SDZRAWS began to observe and telegraph meteorological elements such as air temperature, pressure, humidity, wind speed, wind direction, precipitation, visibility in 1958. Then a series of atmospheric composition items, i.e., acid rain, atmospheric particles, and turbidity were added in 1982. A lot of on-line instruments designed to measure atmospheric aerosol and reactive gases were added in 2004. Further more, two artificial sampling systems, i.e., the Flask sampler and the Canister sampler, as well as the on-line greenhouse gas (GHG) monitoring systems were introduced in 2006. Among the greenhouse gases measured at SDZRAWS, the Hydrofluorocarbons (HFCs) and the Perfluorocarbons (PFCs) filled the blanks in China. Various of vertical detection equipment such as wind profile radar, microwave radiometer, GPS/MET, gradient meteorological observation tower, aerosol Lidar have been built since 2008. At present, there are 160 elements belonging to six categories are measured at SDZRAWS.



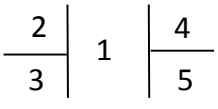
观测仪器
Observation Instruments

◇ 地面气象观测设备
Meteorological observation equipment

在上甸子工作区中部建有 25 米 ×25 米的标准气象观测场，观测场内布设有 HY-3000 型自动气象站、HY-V35 型能见度仪、DSG4 型降水现象仪等仪器，可进行气温、气压、风向、风速、降水、相对湿度、地温、能见度、降水类型等的观测。

A standard meteorological observation field with 25 m×25 m is located in the middle of the workspace, where the meteorological observation equipment such as HY-3000 automatic weather station, HY-V35 visibility meter, and DSG4 precipitation phenomenon instrument are installed. These meteorological observation equipment can provide continuous records of air temperature, pressure, wind direction, wind speed, precipitation, relative humidity, ground temperature, visibility, precipitation types, etc.

1. 标准气象观测场；
2. DSG4 型降水现象仪；
3. HY-V35 型能见度仪；
4. 10 米测风塔；
5. 日照计。



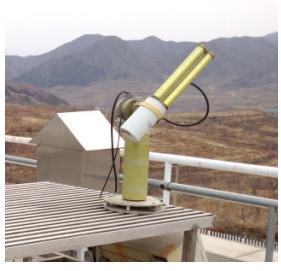
1. Standard meteorological observation field;
2. DSG4 precipitation phenomenon instrument;
3. HY-V35 visibility meter;
4. 10m-high anemometer tower;
5. Heliograph.

观测仪器
Observation Instruments

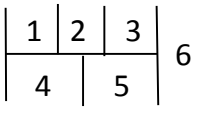
◇ 垂直探测设备
Vertical detection equipment

在上甸子工作区西部集中布置了垂直探测设备：CFL-06L 型风廓线雷达、NET-G3 型 GPS 设备、MP-3000A 型微波辐射计、CE-318 太阳光度计、ALS300 型气溶胶激光雷达，利用这些设备可探测风和气温的垂直分布、大气可降水量、气溶胶光学厚度及后向散射廓线等。另外，在工作区北部建有 82 米气象梯度观测铁塔，利用其上安装的 HMP45D 传感器可观测 18 米 \30 米 \45 米 \80 米高度层的风速、风向、温度、湿度；利用 63 米高度安装的 Li-7500 CO_2/H_2O 分析仪和 CAST3 三维风速仪可分别观测二氧化碳通量和动量通量。

A lot of vertical remote detection equipment such as CFL-06L wind profile radar, NET-G3 GPS receiver, MP-3000A microwave radiometer, CE-318 sun photometer, and ALS 300 Lidar are installed in the west area of the workspace in SDZ. The equipment are used to detect the vertical distribution of wind and air temperature, the precipitable water vapor, the aerosol optical depth (AOD), and backscattering profile of aerosol, etc. Moreover, a meteorological gradient observation tower with a height of 82 meter was constructed in the north part of the workspace. The wind speed, wind direction, air temperature, and humidity at four levels (18m, 30m, 45m, 80m) are observed through the HMP45D sensors settled on the tower. The carbon dioxide flux and momentum flux are also measured by the Li-7500 CO_2/H_2O analyzer and CAST3 three dimensional anemometer installed on the platform of the tower.





1. MP-3000A 型微波辐射计；
2. CE-318 太阳光度计；
3. Li-7500 CO_2/H_2O 分析仪；
4. CFL-06L 型风廓线雷达；
5. ALS300 气溶胶激光雷达；
6. 气象梯度观测铁塔。

1. MP-3000A microwave radiometer;
2. CE-318 sun photometer;
3. Li-7500 CO_2/H_2O analyzer;
4. CFL-06L wind profile radar;
5. ALS300 aerosol Lidar;
6. Meteorological gradient tower.

观测仪器
Observation Instruments

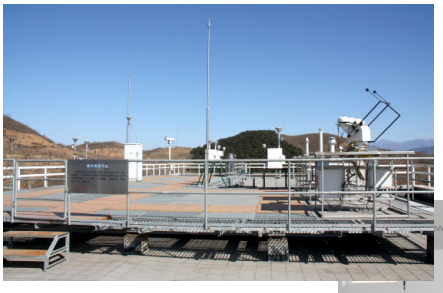
◇ 气溶胶、辐射观测系统
Aerosol & Radiation monitoring system

在上甸子业务楼顶布设了集尘缸、KC-1000 型大流量总悬浮颗粒物（TSP）采样器、气溶胶进气管路和基准辐射观测系统。安装在业务楼工作室内的气溶胶在线观测仪器通过分析进气管路中的空气样品来检测空气中的颗粒物（PM_{10}、$PM_{2.5}$）的质量浓度，气溶胶的吸收系数和散射系数；利用业务楼内化学实验室中的高精度天平，可测量降尘重量、TSP 质量等；利用辐射观测系统可观测太阳直接辐射、散射辐射、总辐射、紫外辐射和光合有效辐射等。

On the top of the business building's floor, a series of devices such as dust collecting cylinder, KC-1000 total suspended particulate collector, aerosol intake pipeline, and reference radiation instruments are installed. On-line aerosol analyzers, i.e., TEOM 1400A, AE-31 aethalometer, M9003 nephelometer, measure the PM_{10} and $PM_{2.5}$ mass concentration, aerosol absorption coefficient, and scattering coefficient by analyzing air samples transported by pipelines. High precision electronic balance along with the sampling film can be used to analysis the total dust reduction and the total suspended particulates. The reference radiation system provides the measurements of direct solar radiation, diffuse radiation, global solar radiation, ultraviolet radiation, photosynthetic radiation, etc.









1. KC-1000 TSP 采样器；2. 集尘缸；
3. 高精度电子天平；4. TSI-3022A 粒子计数器；
5. M9003 浊度仪；
6. 气溶胶采样及辐射观测平台；
7. AE-31 黑碳仪；8. TEOM 颗粒物分析仪；
9. 气溶胶观测室。

1. KC-1000 TSP sampler; 2. Dust collecting cylinder;
3. High precision electronic balance; 4. TSI-3022A condensation particle counter; 5. M9003 nephelometer;
6. Aerosol sampling and radiation observing platform;
7. AE-31 aethalometer; 8. TEOM-1400A particle analyzer;
9. Aerosol observation room.

观测仪器
Observation Instruments

◇ 反应性气体观测系统
Reactive gas monitoring system

在上甸子业务楼的气溶胶和反应性气体观测室内布设了 TE-42i 型氮氧化物（NO_X）分析仪、43CTL 型二氧化硫（SO_2）分析仪、48C 型一氧化碳（CO）分析仪、49C 型臭氧（O_3）分析仪等反应性气体观测设备，可进行 NO_X、SO_2、CO、O_3 浓度的在线观测；除此之外，还在业务楼的科学试验观测室安装了 T200U 氮氧化物分析仪、PAN 分析仪，进行光化学反演前体物如：NO\$NO_2$\$NO_y$、过氧乙酰硝酸酯（PAN）等的观测。

In the aerosol & reactive gas observation room on the second floor of the SDZ business building, the nitrogen oxide analyzer (42i), sulfur oxide analyzer (43CTL), carbon monoxide analyzer (48C), and ozone analyzer (49C) were adopted to detect the concentrations of NO_X, SO_2, CO, and O_3, respectively. In addition, nitrogen oxide analyzer (T200U) and peroxyacetyl nitrate (PAN) analyzers were installed to measure the concentrations of photochemical reaction precursors like NO\$NO_2$\$NO_y$ and PAN.

1 | 2 | 3

1. Thermo Fisher 反应性气体观测系统（NO_X\$SO_2$\CO\$O_3$）；
2. API T200U 氮氧化物分析仪；
3. API PAN 分析仪。

1. Thermo Fisher reactive gas observation system（NO_X\$SO_2$\CO\$O_3$）;
2. API T200U nitrogen oxide analyzer;
3. API PAN analyzer.

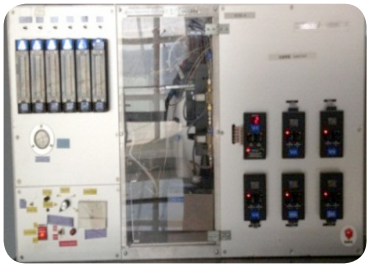
观测仪器
Observation Instruments

◇ 温室气体观测系统
Greenhouse gas monitoring system

在上甸子业务楼的温室气体观测室内布设了基于光腔衰荡技术（CRDS）的 Picarro 分析仪、基于气相色谱技术（GC）的 GC7890 分析仪、基于气相色谱 - 质谱联用的卤代温室气体分析仪 Medusa 等，实现了对《京都议定书》规定限排的主要温室气体二氧化碳（CO_2）、甲烷（CH_4）、氧化亚氮（N_2O）、六氟化硫（SF_6）、氢氟碳化物（HFCs）、全氟化碳（PFCs）以及 40 余种卤代温室气体等的观测。另外，2017 年完成升级的温室气体高压配气系统使上甸子站成为能够为我国大气本底站和国家大气化学实验室提供温室气体配制的两个台站之一。

In the greenhouse gas observation room on the second floor of the SDZ business building, four greenhouse gas analyzers including Picarro's CRDS analyzer, the gas chromatography (GC) GC7890 analyzers, and the Medusa analyzer are installed. Six categories of Kyoto Protocol limited gases, i.e., carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorcarbons (HFCs), perfluocarbon (PFCs), and more than 40 halogenated greenhouse gases are measured by these instruments. Moreover, the high pressure gas compression system for greenhouse gas was upgraded in 2017. It makes SDZRAWS to step into the ranks of the top two atmosphere watch stations in China, and provide standard greenhouse gas for all atmosphere watch stations and the National Laboratory for Atmospheric Chemistry of CMA.





1	2
3	4
5	6

1. Picarro G2401 分析仪；
2. GC7980 分析仪；
3. Soge-A 分析仪；
4. Medusa 分析仪；
5. 温室气体观测室；
6. 温室气体配气室。

1. Picarro G2401 analyzer;
2. GC7890 analyzer;
3. Soge-A analyzer;
4. Medusa analyzer;
5. Greenhouse gas observation room;
6. Room of high pressure compress-air system.

观测仪器
Observation Instruments

◇ 科研试验观测
Scientific experiment observation

根据野外科学试验基地的学科发展方向，自 2007 年以来上甸子站与外单位合作开展了降尘过程观测试验、雾 - 霾垂直观测试验、新粒子生成分粒径观测试验、大气中氨观测试验等 20 余项，获取了一系列与气溶胶物理、化学特性、反应性气体、温室气体及垂直大气关键参数等与气候变化和大气环境研究相关的基础数据。

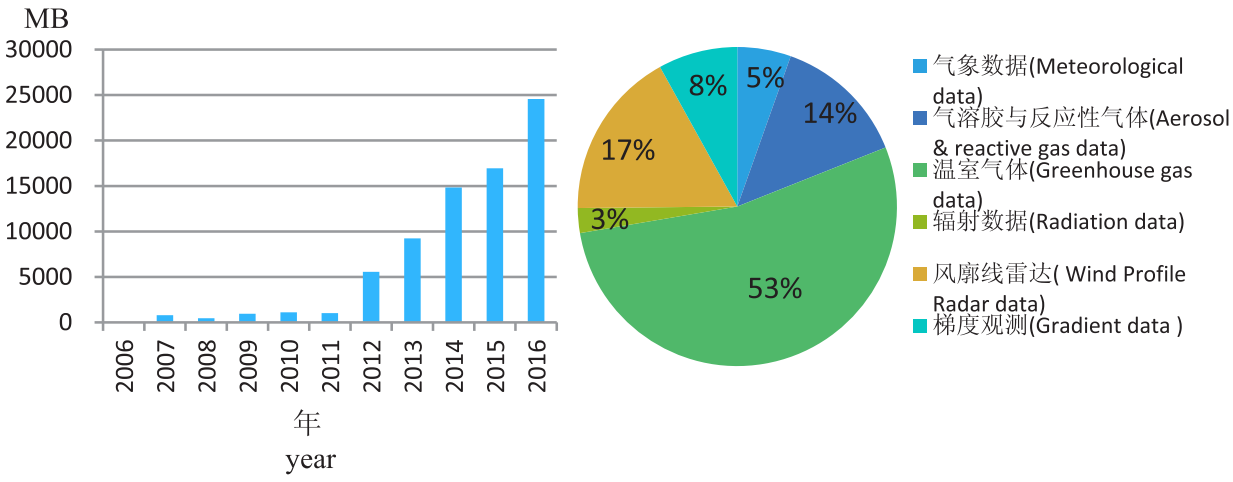
According to the requirement of discipline development, more than 20 cooperation experiments have been performed since 2007. For instance, the Dust Fall Observation Experiment (DFOE), the Fog and Haze Vertical Observation Experiment (FHVOE), the Observation Experiment of New Particle Generation (OENPG), Atmospheric Ammonia Observation Experiments (AAOE), etc. Large amount of observation data related to the physicochemical properties of aerosol, reactive gas, greenhouse gases, and key parameters of the vertical structure of the atmosphere were acquired, which forms up a solid foundation for investigation of climate change and atmospheric environment.

序号 No.	试验名称 Experiment Name	时间 Period	合作者 Cooperator
1	大气降尘过程观测试验 Dust fall observation experiment	Since 2007	北京师范大学 Beijing Normal University
2	气溶胶 - 云 - 气候和空气质量相互作用 Aerosol-cloud-climate and air mass interaction	2008-2015	中国气象科学研究院 Chinese Academy of Meteorological Science
3	京津冀城市群发展对区域本底大气成分的影响评估 Evaluation of the influence of the development of the urban agglomeration in Beijing-Tianjin-Hebei on the regional background atmospheric composition.	2009-2010	中国气象局北京城市气象研究所 Institute of Urban Meteorology, CMA, Beijing
4	总日射表热偏移机制订正观测试验 Pyranometer thermal offset correction mechanism experiment	2011-2012	国家气候中心 National Climate Center
5	超大城市综合气象观测试验 Comprehensive meteorological observation experiment in megacity.	Since 2017	中国气象局大气探测中心 CMA Meteorological Observation Center
6	京津冀城市群高时空分辨率碳排放监测及应用示范项目对比观测试验 Comparative experiment of carbon emission of Beijing-Tianjin-Hebei	2017-2021	中科院大气物理研究所 Institute of Atmospheric Physics, CAS
7	区域背景点位大气污染物背景值量化观测试验 Quantitative observation test of background value of atmospheric pollutants at regional background points.	2017-2019	中国环境科学研究院 Comparative experiment of carbon emission of Beijing-Tianjin-Hebei

数据服务
Data Service

上旬子站观测数据量逐年提高，2016 年数据采集下载量达 24,560 MB, 相比 2015 年增加 7,610 MB，在数据的构成中温室气体在线观测数据量最大，占总数据量的 53%，辐射观测数据量最小，约占总数据量的 3%。

Data obtained at SDZRAWS increased year by year. Data acquisition downloads in 2016 reached 24, 560 MB, an increase of 7,610 MB compared to 2015. It is noteworthy that about 53 percent of total data is the greenhouse gas data, while the percentage of radiation data is only 3 percent.



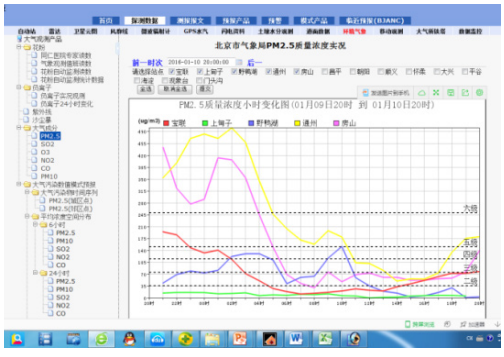
上旬子站根据国家和中国气象局相关规定为用户提供数据共享服务；同时，也为国家特殊环境与特殊功能野外观测台站数据共享平台提供数据支撑。

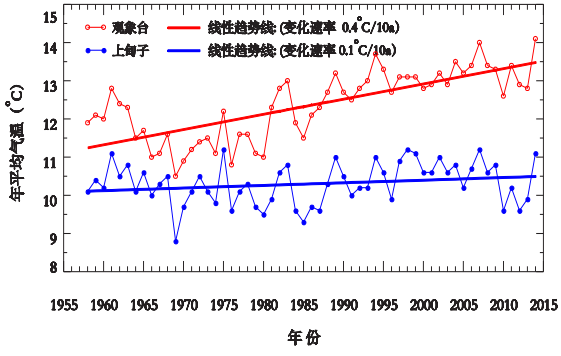
SDZRAWS provides data sharing services for users under the supervisions of the national authorities and CMA. Meanwhile, it also supports the data sharing platform of national special environment and special function field observation station.

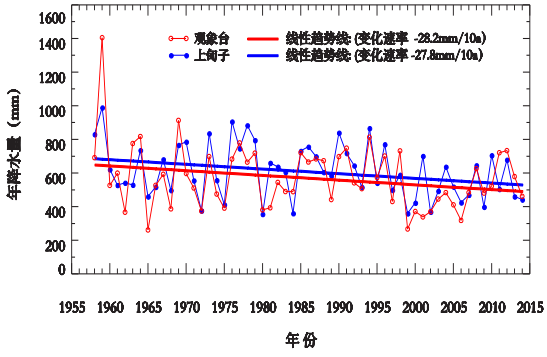
业务服务
Business Service

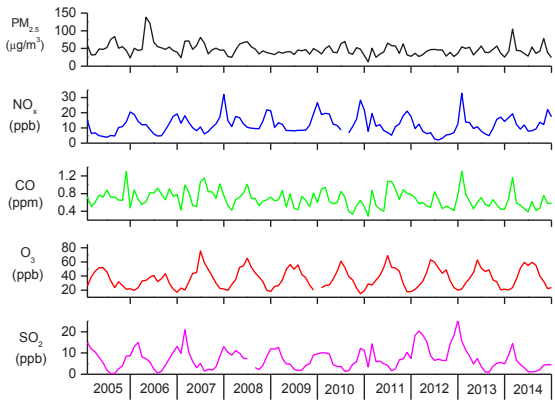
上甸子站每日为环境气象预报提供实时气象观测数据（气温、气压、风速、风向、风速、降水、日照、辐射）和大气成分（$PM_{2.5}$、SO_2、O_3、CO、NOx）观测数据，辅助预报员进行雾-霾预报和空气质量预报。同时，上甸子站观测的长序列气候数据已在区域气候变化分析和大气污染本底观测评估业务中发挥了重要作用。

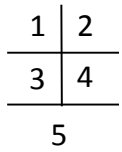
Forecaster uses real-time meteorological data (air temperature, pressure, wind speed, wind direction, precipitation, sunshine, radiation, etc.) and atmospheric composition data ($PM_{2.5}$, SO_2, CO, NOx) provided by SDZRAWS to perform fog-haze and air quality forecast every day. At the same time, the long-time series data is playing an important role in climate change analysis and background pollution influence assessment.











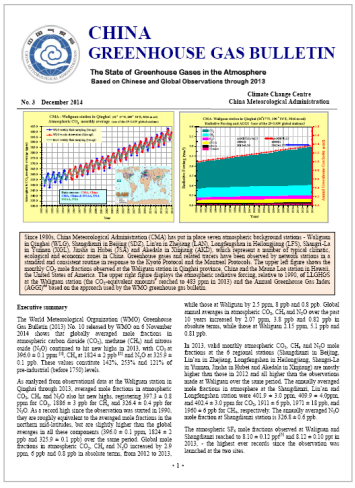
1. $PM_{2.5}$ 质量浓度时间序列；
2. 臭氧（O_3）质量浓度时间序列；
3. 长序列气温时间序列变化；
4. 长序列降水时间序列；
5. 长序列大气成分时间序列。

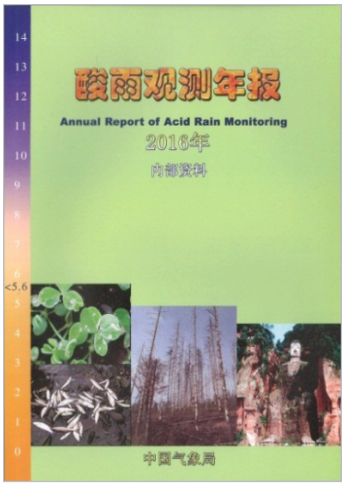
1. Time series of $PM_{2.5}$ concentration;
2. Time series of O_3;
3. Long time series of air temperature;
4. Long time series of precipitation;
5. Long time series of atmospheric composition.

决策服务
Decision-making Service

利用上甸子观测数据撰写的《中国温室气体公报》、《酸雨观测年报》在应对气候变化和大气环境评估方面具有较大的影响力。近年来撰写的多份决策服务报告，得到了中央和北京市领导的批示，如:《密云水库水体面积变化卫星遥感监测分析》、《环首都圈雾霾成因分析及大气污染防治对策建议》、《北京市 2017 年 $PM_{2.5}$ 控制目标的分析报告 》、《北京地区酸雨变化特征及成因分析》等。

Bulletins that have great influence on the climate change and atmospheric environmental assessment, e.g., China Greenhouse Gas Bulletin and Annual Report of Acid Rain Monitoring, were written by using the observation data acquired from SDZRAWS. In addition, a number of decision-making reports based on SDZRAWS data got approvals from leaders in recent years, for example, Monitoring and analysis of water body area of Miyun reservoir by satellite remote sensing, Analysis of haze causes in the ring capital circle and suggestions for the prevention and control of air pollution, Analysis report on the $PM_{2.5}$ control target of Beijing in 2017, Analysis on the characteristics and genesis of acid rain in Beijing, etc.

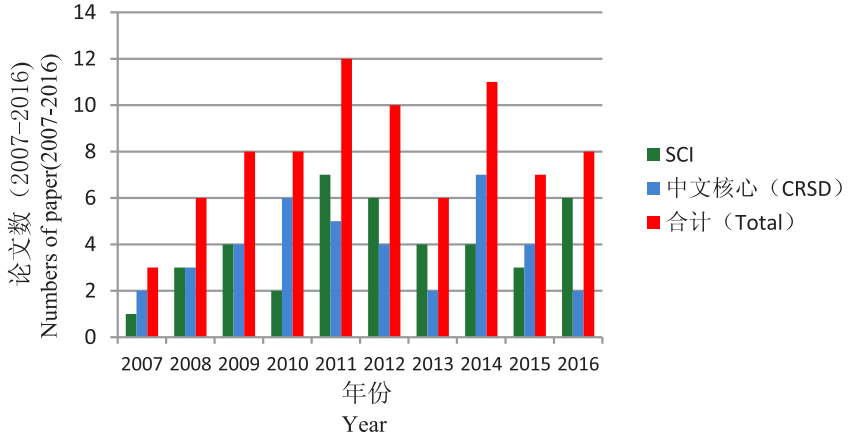


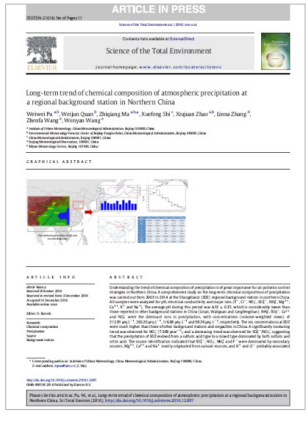


序号 No.	决策服务材料题目 Title	年 Year	批示情况 Approval
1	我国卤代温室气体减排成效显著，建立我国温室气体监测分析系统十分重要 The effect of the halogenated greenhouse gas emission reduction is remarkable. It is very important to establish a greenhouse gas monitoring and analysis system in China.	2007	国家领导人 State leaders
2	京津冀及周边地区秸秆燃烧对空气环境质量的影响分析 Analysis of the effect of straw burning on the air environmental quality in Beijing-Tianjin-Hebei and its surrounding areas.	2013	国家领导人 State leaders
3	近 20 年来我国酸雨特点及形式分析 Analysis of the characteristics and forms of acid rain in China in the past 20 years.	2013	国家领导人 State leaders
4	密云水库水体面积变化卫星遥感监测分析 Analysis of the change of water body area of Miyun reservoir using satellite data.	2010	市政府领导人 Municipal government leaders

依托上甸子试验基地，2012 年以来共承担各类科研项目 33 项，其中国家级项目 8 项，省部级项目 22 项，司局级项目 3 项，总经费近 5438.7 万元。近 10 年（2007~2016）发表学术论文 79 篇，其中 SCI/SCIE 40 篇、核心期刊 39 篇；取得国家软件著作权 3 项，培养硕士研究生 10 余名。1 人入选“2016 年北京市百千万人才工程”，2 人入选中国气象局青年英才，1 人获得第七届全国优秀青年气象科技工作者，1 人被科技部评为野外科技工作先进个人，2 人被评为“北京市科技新星”，1 人被评为“全国气象科普工作先进工作者”称号等。

Based on the data acquired at SDZRAWS, 33 research projects, including 8 national projects, 22 provincial and ministerial level projects, were accomplished. The funds approximately amounted to 5.4 million RMB. About 79 papers, including 40 SCI/SCIE and 39 core journal papers, were published in recent ten years (2007~2016). Moreover, three national software copyrights on the atmospheric composition data processing were acquired. At the same time, more than 10 graduate students accomplished their postgraduate in SDZRAWS. One researcher was selected in “Ten Thousand Talents Project of Beijing, 2016”, two were chosen in “Young Talents Program of CMA”, one was honored as “7th National Excellent Youth Meteorological Scientists and Technicians”, one was honored as “Advanced Worker in Field Science and Technology of Ministry of Science and Technology”, two were named as “New Star of Science and Technology in Beijing”, and one was named as “Advanced Worker of Meteorological Scientific Popularization”, etc.

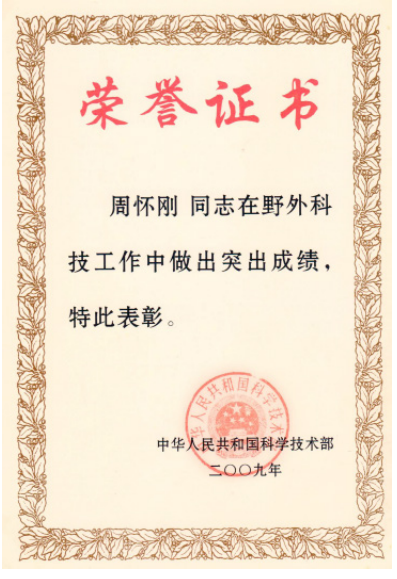


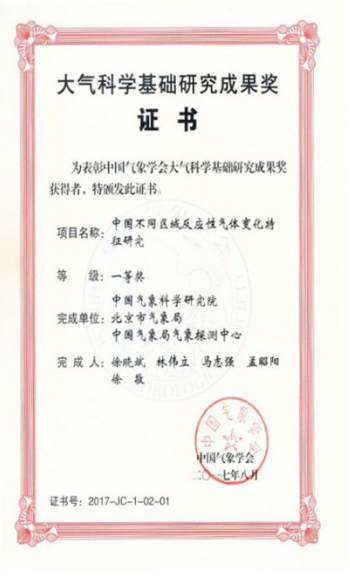


台站荣誉
Honors

上甸子站及职工近年来获得了多项奖励和荣誉，如：中国气象局“2014 重大气象服务先进集体”、2015 年获北京市人民政府“首都环境保护先进集体”、2014 年获北京市总工会“市级职工创新工作室”、 2015 年获“北京市科学技术奖三等奖”、2017 年度中国气象学会“大气科学基础研究成果一等奖”以及“科技部野外科技工作先进个人”、“全国气象科普先进工作者”等。

Both of the SDZRAWS and its staffs have received a number of awards and honors in recent years, such as the “Advanced Unit for Major Meteorological Service of CMA“ (2014), the “Advanced Unit for Capital Environmental Protection” conferred by the Beijing Municipal Government in 2015, the “Municipal Staff Innovation Studio” (2014), the “Beijing science and Technology Award” (2015), and the first class award of ”Fundamental Research on Atmospheric Science” conferred by CMA (2017), the “Advanced Staff in the Field of Science and Technology Research” conferred by the Ministry of Science and Technology (2009), and the “Advanced Staff in Meteorological Science and Technology” of CMA (2012), etc.





科普教育
Scientific Education

2012 年上甸子站被中国气象局授予“全国气象科普教育基地”，它是中国气象局和北京市气象局的重要宣传窗口单位之一。每年接待大中小学生来站进行课外实践和科普宣传活动，同时，国内外技术人员也来站进行技术交流等；中国气象报和中国气象局网站等相关媒体对上甸子站进行过综合报道。

SDZRAWS was awarded the certification of “National Meteorological Scientific Education Base of CMA” in 2012, and perceived as one of the most important units of the publicity window of CMA and BMS. Every year, primary and middle school students are granted to carry out extracurricular practice and popularization of science and technology. Technical personnels at home and abroad visit for technical exchanges and other activities. Medias like China Meteorology Newspaper and CMA website reported SDZRAWS in recent years.

探寻华北空气“本源”

——访北京上甸子区域大气本底观测站

近年来频发的雾霾天气让PM2.5指数从科学研究领域逐渐步入大众视野。人类活动对PM2.5指数影响到底有多大？华北地区“原生态”的空气质量如何？在“3·23世界气象日”来临之际，记者随中国气象局工作人员来到华北地区唯一一个区域大气本底站——北京上甸子区域大气本底观测站一探究竟。

所谓本底，顾名思义，指“未受到人类活动影响的条件下大气各成分的自然含量”。因此，大气本底观测站一般选择在远离人类活动和污染源的地区，以最大限度“还原”大气原貌。

北京上甸子区域大气本底观测站选址在北京市区东北方向150公里远的大山深处——密云县高岭镇上甸子村。从北京市区出发，要经过2个多小时的颠簸路程。这里是京津冀经济圈的中心位置，往前没多远就是河北承德。

观测站坐落在一个小山坡上，周围山势平缓，地形开阔。站点主体是座二层小楼，楼顶观测平台上密布着各种各样的精密观测仪器。在观测站北边的山坡上，矗立着一座80多米高的铁塔，连在铁塔上的10多个探头在高空中采集空气样本，并通过管道传输到监测站内的仪器中进行分析检测。

观测站站长周怀刚指着一个“黑箱子”和旁边的一个“灰白箱子”告诉记者，这就是PM2.5测量仪器。只要两个仪器上都显示出此时的PM2.5指数，一个是44.1微克／立方米，一个是55微克／立方米，两个指数并不一致。

面对记者的疑惑，周怀刚解释说，两个仪器分别用两种测量方法，一种叫酸度天平法，一种是β射线法。由于检测原理不同，数据也略有偏差，但都是符合检测规范的。

目前的北京环境气象预警中心主任张小玲介绍，上甸子区域大气本底观测站，上甸子观测站的结果可以代表整个华北区域大气本底情况。尽管上甸子本底站远离城市，空气相对洁净，但年均PM2.5浓度值仍高于国家二级标准(35微克／立方米)，大气污染的警钟敲响在每一个人的心头。

今年世界气象日的主题是：“天气和气候：青年人的参与”。实际上，应对气候变化，治理大气污染不仅需要青年人的参与，更需要全体公民行动起来，共同保卫我们赖以生存的生命之本。（新华社记者 林晖）

◆ 相关链接 ◆

世界气象日

新华社电（记者王雪梅）3月23日是世界气象日，今年的主题是“天气和气候：青年人的参与”。

1947年9月，国际气象组织在华盛顿召开会议，审议和通过了《世界气象组织公约》。1950年3月23日这一公约正式生效后，国际气象组织更名为世界气象组织，并在1951年成为联合国的专门机构。1960年6月，世界气象组织通过决议，把每年的3月23日定为世界气象日。

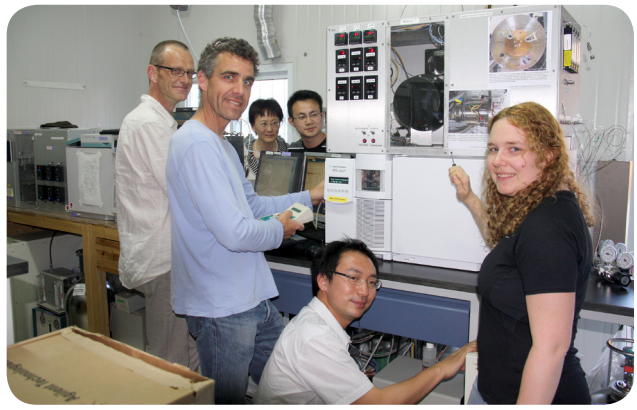
今年的主题被定为“天气和气候：青年人的参与”，意在鼓励青年人更多地了解天气和气候知识，参与到应对气候变化的行动中来。世界气象组织秘书长米歇尔·塔罗在今年世界气象日的致辞中指出，15岁至24岁的年轻人占当今世界人口的六分之一，其中约有85%生活在发展中国家。当前，应对全球变暖任务繁重，青年人是创新的排头兵，可担当重任。

国际交流
International Communications

近年来，来站世界各国的政府部门领导、科学家、仪器专家和国际温室气体会议代表等陆续来上甸子站访问交流，总人数超过 300 人。

More than 300 people, including governmental leaders, scientists, instrument experts, members of International Conference on Greenhouse Gases from all over the world visited SDZRAWS in recent years.

2010 年 6 月 11 日，AGAGE 会议成员来站访问。
Members of the AGAGE conference visited SDZRAWS on Jun 11, 2010.

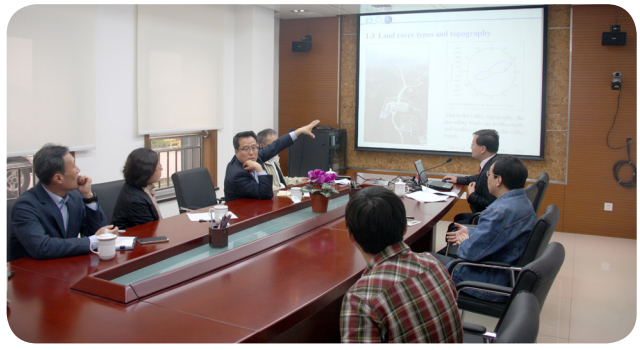


2011 年瑞士专家 Martin 来站工作。
Martin, who is an expert on halogenated GHG from Swiss, worked at SDZRAWS in 2011.

2013 年 6 月 14 日，国际温室气体会议成员访问上甸子站。
Members of the International Conference on greenhouse gases visited SDZRAWS on Jun 14, 2013.

2015 年 10 月 29 日，俄罗斯联邦水文气象与环境监测局代表团访问上甸子站。
Russian Federation hydrological meteorological and environmental monitoring bureau delegation visited SDZRAWS on October 29, 2015.

2016 年 3 月 4 日，美国驻华大使馆官员访问上甸子站。
American embassy officials in China visited SDZRAWS on March 4, 2016.



2016 年 4 月 19 日，韩国首尔市气象厅代表团访问上甸子站。
Delegation of the Seoul meteorological office in South Korea visited SDZRAWS on April 19, 2016.

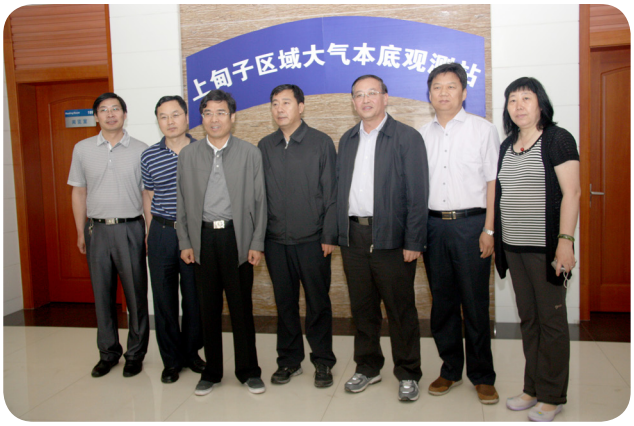
领导关怀
Concern from Leaders

2003 年 9 月 26 日，中国气象局局长秦大河院士陪同诺贝尔化学奖获得者保尔·克鲁岑来站访问。
Qin Dahe, an academician and the director of CMA, accompanied Dr. Paul Crutzen, Nobel prize winner, visited SDZRAWS on September 26, 2003.

2012 年 3 月 9 日，国家发改委副主任解振华在中国气象局局长郑国光陪同下来站视察。
Xie Zhenhua, deputy director of the National Development and Reform Commission, accompanied by Zheng Guoguang, director of the CMA, visited SDZRAWS on March 9, 2012.

2012 年 1 月 20 日，中国气象局局长郑国光来站慰问职工。
Zheng Guoguang, director of the CMA, visited SDZRAWS on January 20, 2012.

2015 年 5 月 16 日，国家自然基金委副主任刘丛强院士来站视察。
Academician Liu Congqiang, deputy director of the National Natural Science Foundation of China, visited SDZRAWS on May 16, 2015.



2013 年 6 月 6 日，北京市副市长林克庆来站视察。
Lin Keqing, vice mayor of Beijing, visited SDZRAWS on June 6, 2013.

2017 年 6 月 2 日，北京市政协副主席李长友来站视察。
Li Changyou, vice chairman of the Beijing Municipal Political Consultative Conference, visited SDZRAWS on June 2, 2017.

野外科学试验基地

为应对气候变化和生态文明建设提供准确的“本底”观测数据

低碳环保示范站和科普宣传基地

上甸子区域大气本底观测站
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