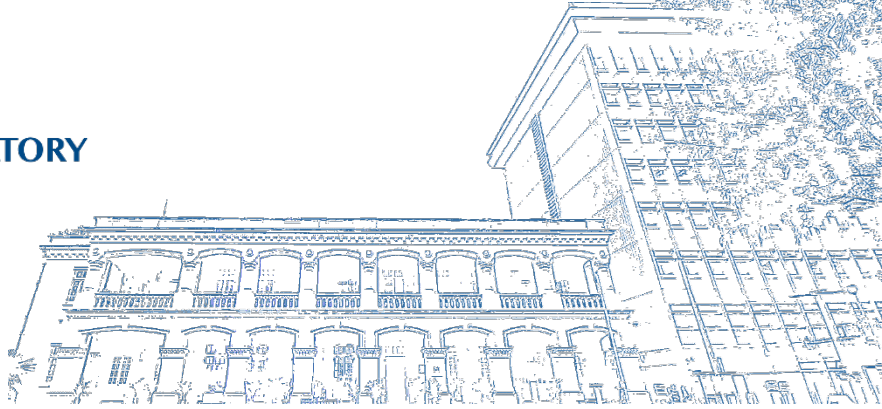
香港天文台
HONG KONG OBSERVATORY



2024

INTRODUCTION

The three main objectives of the Hong Kong Observatory (the Observatory, or HKO) are:

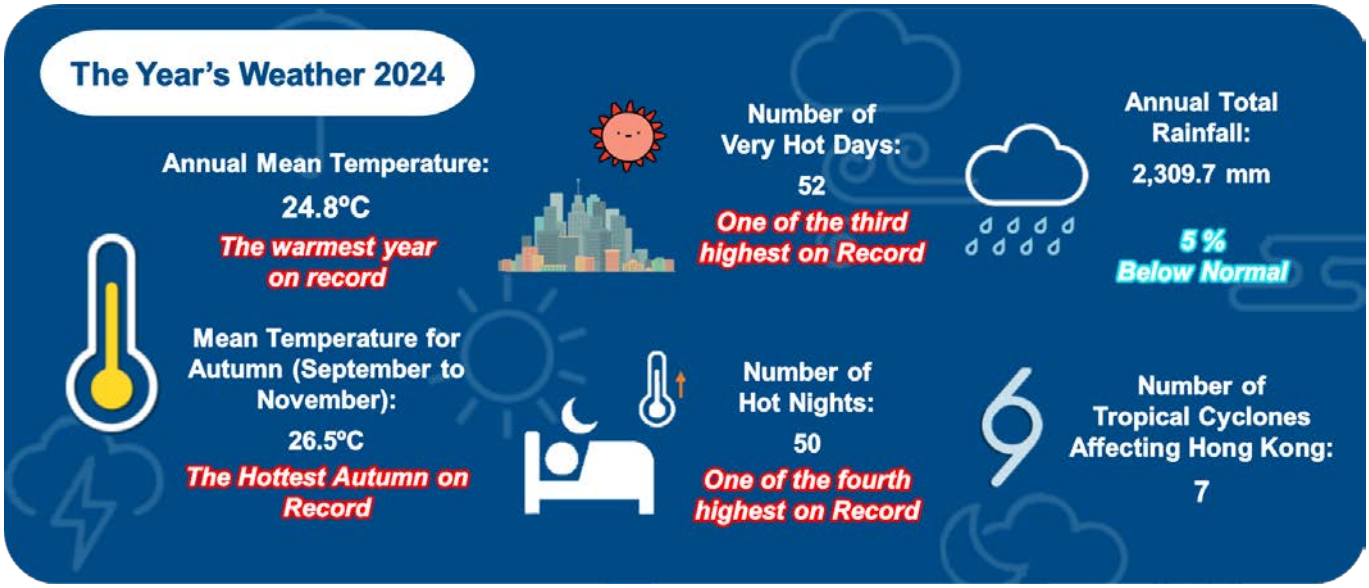
(1) to provide weather forecasts and warnings to meet the public's demand for weather services, and to provide weather services for aviation and shipping in accordance with international standards;

(2) to monitor local environmental radiation levels, assess possible consequences and impacts and advise the Government on counter-measures that may be necessary during nuclear emergencies; and

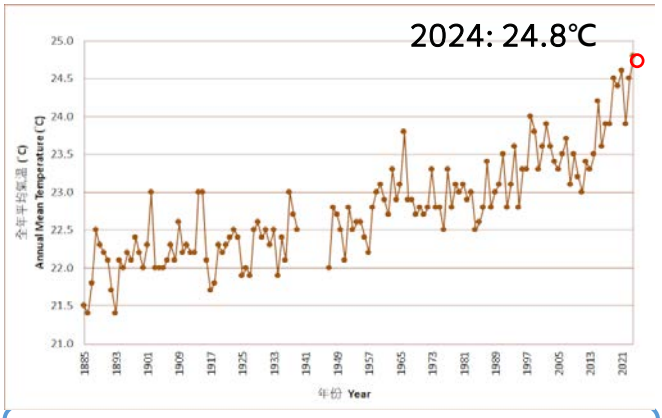
(3) to maintain the Hong Kong time standard and to provide geophysical, oceanographic, astronomical and climatological information and consultative services to the public and business sectors.

During the financial year 2024-25, the department's total expenditure was $442 million and the total revenue was $150 million. As at 31 March 2025, the department had an establishment of 368 posts.

The Year's Weather 2024



The year 2024 was the warmest year in Hong Kong since record began in 1884 with the annual mean temperature reaching 24.8 degrees, 1.3 degrees above the 1991-2020 normal. In particular, the mean temperature for autumn (September to November) reached 26.5 degrees, the highest on record. There were 52 Very Hot Days and 50 Hot Nights in Hong Kong in 2024, respectively ranking one of the third highest and one of the fourth highest on record.



Long-term time series of annual mean temperature in Hong Kong (1885-2024)

Seven tropical cyclones affected Hong Kong in 2024. The No. 8 Gale or Storm Signals were issued during the passage of Super Typhoon Yagi on 5 September and Typhoon Toraji on 13 November. The successive strikes of tropical cyclones Yinxing, Toraji and Man-yi in November necessitated the issuance of tropical cyclone warning signals three times in November for the first time since 1946.

The annual total rainfall in 2024 was 2,309.7 millimetres, about 5 percent below the 1991-2020 normal. The upper-air disturbances associated with the southern branch of a westerly trough over the Tibetan Plateau affected southern China on 4 May. Coupled with significant low-level convergence and upper-level divergence, there were heavy showers and severe squally thunderstorms in Hong Kong that day. More than 100 millimetres of rainfall were recorded over many places. There was exceptionally severe rainstorm over some areas in the eastern part of the territory in the morning with an hourly rainfall of 145.5 millimetres recorded at Tseung Kwan O. Besides, the weather of Hong Kong was unsettled on 28 September. A waterspout briefly appeared over the sea areas off Hung Hom, marking the first occurrence over Victoria Harbour according to the reports received by the Observatory since 1959.

WEATHER SERVICES

WEATHER SERVICES, MESSAGE DELIVERY AND SOCIAL MEDIA

Local Weather Reports Disseminated Within the First 10 minutes of Each Hour
100 %

Total No. of Page Views of the Observatory Websites and the Mobile App MyObservatory
169 Billion

No. of Followers of the Observatory's Facebook Page
~ 360,000

No. of Followers of the Observatory's Instagram Account
~ 100,000

Forecast Accuracy as Verified by Objective Means
91 %

Calls Handled by the Dial-a-Weather Service
3.8 Million

Total Accumulated Views of the Observatory's YouTube Channel
~7.66 Million

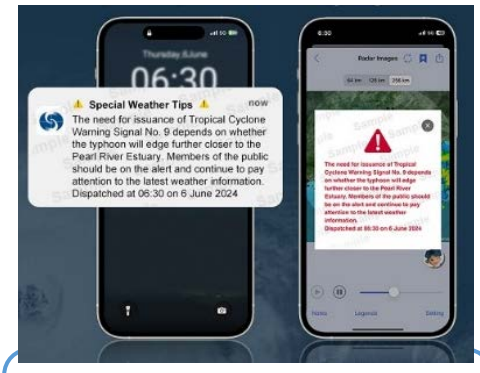
The Observatory provides weather forecast and warning services to the public, special users, the shipping and aviation communities to reduce loss of life and damage to property, and to minimise disruption to economic and social activities during hazardous weather.

In 2024, the Observatory fulfilled its performance pledge of issuing at least one weather bulletin every hour of the day, disseminating 100% of the bulletins within 10 minutes after each hour, and attained a forecast accuracy (as verified by objective means) of 91%.

Weather information was enhanced in 2024-25 to meet the needs of the public through:

- Enhancing the dissemination of extreme weather alerts by：

  (1) issuing “Special Weather Tips” through the “MyObservatory” mobile application to notify the public of the weather changes when the Tropical Cyclone Warning Signal No. 9 may be issued;



“Special Weather Tips” about the possible issuance of Tropical Cyclone Warning Signal No. 9

  (2) enhancing the “MyObservatory” mobile application to provide more vivid and eye-catching notifications when Tropical Cyclone Warning Signal No. 9 or 10 is issued;

  (3) conducting hourly briefings to provide the public with the latest weather information when the Black Rainstorm Warning Signal is in force;

  (4) issuing “Special Weather Tips” during exceptionally heavy rainstorms; and

  (5) issuing Special Landslip Advisory message in collaboration with the Geotechnical Engineering Office when landslip may be induced by heavy rain;

- Enriching the “MyObservatory” with the introduction of：

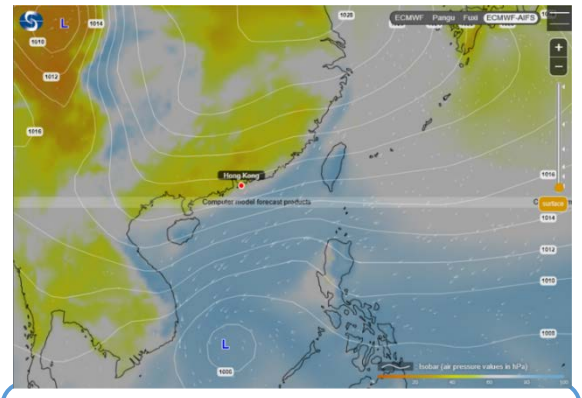
  (1) voice function in the HKO chatbot;

  (2) weather information for cities in the Greater Bay Area;

  (3) space weather information; and

  (4) facelifted menu supporting bookmark and search function;

- Enriching the “Earth Weather” on the HKO website and the “MyObservatory” by adding more weather forecast products based on the weather prediction models, including AI models;



Artificial Intelligence/Integrated Forecast System of the European Centre for Medium-range Weather Forecasts

- Providing flood risk information to government users through the flood risk assessment system to strengthen overall capability in coping with extreme weather in particular heavy rain;

- Providing support to Labour Department in optimising the operations of the Heat Stress at Work Warning;

- Enhancing the climate prediction services by launching the monthly forecast;

- Commissioning of the reconstructed Tai Po Kau Tide Gauge Station to strengthen the monitoring of tide levels in Tolo Harbour; and

The reconstructed Tai Po Kau Tide Gauge Station

- Posting new Chinese Fengyun-4B satellite images on the HKO website for public access.

Moreover, the Observatory acquired a solid state weather radar for enhancing the operational backup of HKO's long-range weather radars, and monitoring of rainstorms and tropical cyclones through measurements of low-level winds and precipitation, enhancing HKO's work in monitoring and predicting high impact weather. Besides, the Observatory continuously supports other weather services as a Regional Specialized Meteorological Centre (RSMC) for Nowcasting of the World Meteorological Organization in the provision of severe weather nowcasting products, sharing of nowcast software or technique development, and capacity building activities.

During the year, the Observatory has extended the quality management system on automatic meteorological measurements to include microclimate station network. The Observatory has also implemented numerical weather prediction models and forecast products on a new high performance computer system in support of weather forecast operation.

In 2024, the total number of page views of the Observatory website and mobile weather application "MyObservatory" reached about 169 billion. PC users can install the "Weather Wizard" desktop application to obtain the latest weather information. A personalised website that allows users to customise the information is also available. Besides, users can receive weather warnings and information through the Observatory's Facebook, Instagram, X, Weibo and WeChat. The Observatory's YouTube channel accumulated a yearly total of around 7.66 million views. The Dial-a-Weather service (187 8200) handled a total of around 3.8 million calls during the year; and the Observatory's internet time service received about 152 billion visits.

Professional meteorologists of the Observatory produce and host television weather programmes which are broadcasted through major television channels in the mornings and evenings. Weather programmes and educational feature "Cool Met Stuff" are broadcasted on television, YouTube, Facebook and the "MyObservatory" mobile application.

During the year, the Observatory continued to enhance communication and engagement with the public through social media. The Observatory's Facebook page and Instagram account attracted around 360,000 and 100,000 followers respectively by the end of 2024.

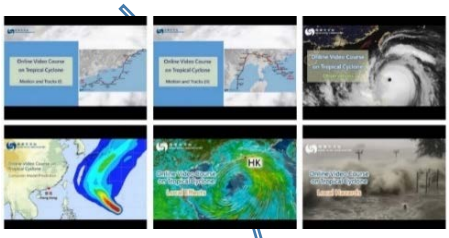
In 2024, a total of 64 government bureaux, departments and relevant organisations subscribed to the services of the Observatory through the Government Weather Information Server (GOWISE). Specialised weather services were also provided to utility companies, public transport operators, engineering contractors and information providers on a cost-recovery basis. A total of 75 clients subscribed to the Observatory's specialised services in 2024, generating a revenue of about $0.7 million.

The Observatory maintains a close surveillance of the weather at and around the Hong Kong International Airport (HKIA) and provides the aviation community with the weather information needed for its operations. HKO's Aeronautical Meteorological Advisers provided weather consultation services as well as probabilistic forecast of significant weather elements to support the operation of the Integrated Airport Centre of the HKIA. As the Backup Centre of the Asian Aviation Meteorological Centre, HKO takes over the role of the Main Centre from Beijing for one week every quarter to issue hazardous weather forecasts and warnings to aviation users in the Asian region.

The Observatory installed two new long-range Light Detection and Ranging Systems, two new weather buoys, and one additional wind profiler to further enhance the detection and warning of low-level windshear at the HKIA. HKO also implemented the necessary aviation meteorological facilities to facilitate the full operation of the Three-Runway System of the HKIA. HKO further enhanced the electronic flight bag weather mobile application "MyFlightWx" to provide inflight weather information to flight crews electronically and promoting its use to airlines operating from the HKIA. The Observatory issues forecasts of wind, weather, waves and swells for the marine community and container terminals. HKO launched the revamped webpage for Hong Kong Port Meteorological Services, which facilitates Hong Kong Voluntary Observing Ships and the shipping community to obtain relevant information on port meteorological services. HKO will continue to enhance marine meteorological observations through the deployment of buoys, both drifting and moored over the South China Sea, and the installation of meteorological equipment on board more merchant and fishing vessels.

Public Education and External Collaborations

Public Education In 2024-25, the Observatory continued to promote awareness of high-impact weather, the impacts of climate change and the Observatory's services through public education. Noteworthy activities include:



The Observatory launched a 6-episode English version of the "Online Video Course on Tropical Cyclone" to promote the basic knowledge of tropical cyclones to a wider audience group.

The Observatory participated in the "Education & Careers Expo 2025" held at the Hong Kong Convention and Exhibition Centre and introduced the public to the work of its various departmental grades, including job duties, entry requirements and career opportunities.

The Observatory organised HKO Open Day in November and December 2024, and March 2025. Through the event, the public learned about the Observatory's efforts in collaborating with meteorological authorities in Mainland China and around the world over the years and leveraging the latest technology to provide various services to the public. Visitors also gained a deeper understanding of the impacts of climate change and extreme weather.

Local Collaborations The collaborations established locally by the Observatory in 2024-25 include:

The Observatory participated in the "New Territories Disaster and Emergency Preparedness Day 2024" organised by the Fire Services Department. The Observatory promoted knowledge of radiation and nuclear emergency response, as well as the Observatory's work on radiological survey and environmental sample collection.

The Observatory and the Senior Citizen Home Safety Association (SCHSA) held a joint press conference in June and December to remind the public to get prepared for the very hot weather in summer and winter.

Regional Collaborations The collaborations established with regional partners in 2024-25 include:

The Observatory joined the Chinese delegation attending the Twelfth Meeting of the Regional Working Group on Tsunami Warning and Mitigation System in the South China Sea Region. The progress of work and future plans of the Member States in enhancing the capacity in tsunami monitoring and prediction were reviewed in the meeting. The members also discussed ways to further enhance the tsunami warning capability and build community preparedness and resiliency to reduce tsunami-related risks.

HKO, technical parties in Guangdong province, and the Macao Meteorological and Geophysical Bureau participated in the Guangdong-Hong Kong inter-comparison on ambient gamma radiation measurement, hosted by the China Institute of Atomic Energy. During the exercise, all experts exchanged views and ideas on various aspects, including radiation monitoring methodology, data quality, technical development to ensure the reliability of measurement results among the participating parties.

The Observatory hosted a training workshop on the theme of radiological dispersion modelling and consequence assessment. Experts from the German Federal Office for Radiation Protection and the Karlsruhe Institute of Technology were invited to deliver lectures focusing on the application of dispersion model for consequence assessment in the event of a nuclear incident and the latest developments in simulating the dispersion of radioactive nuclides in oceans. Professionals from relevant government departments in Hong Kong, the Mainland, and Macao also participated in the workshop.

Meteorologists from the China Meteorological Administration, Guangdong Meteorological Service, Macao Meteorological and Geophysical Bureau, Guangxi Meteorological Service, Hainan Meteorological Service and HKO attended the 37th Guangdong - Hong Kong - Macao Seminar on Meteorological Science and Technology and the 29th Guangdong - Hong Kong - Macao Meeting on Cooperation in Meteorological Operations in Zhuhai.

A total of 31 technical reports were presented at the seminar, with topics covering summaries and analyses of weather events, applications of artificial intelligence, high-impact weather forecasting and forecast technology.

International Collaborations The collaborations established with international partners in 2024-25 include:

The Director of HKO, Dr Chan Pak-wai, was elected as a co-Vice-President of the Commission for Observation, Infrastructure and Information Systems (INFCOM) of the World Meteorological Organization (WMO). As one of the two technical commissions under the WMO, the INFCOM contributes to the development and implementation of globally coordinated Earth system observations, data and prediction systems. It also makes recommendations to the Executive Council and the World Meteorological Congress on international standards for methods, procedures, techniques, and practices in meteorology and operational hydrology.

HKO organised a workshop on “Promoting Technical Exchange of Artificial Intelligence (AI) Applications in Tropical Cyclone Analysis and Forecasting” under the United Nations Economic and Social Commission for Asia and the Pacific / WMO Typhoon Committee, sharing on the developments and applications of AI in tropical cyclone analysis and forecasting. The participants also discussed the requirements for AI technologies and products within the Typhoon Committee region.

HKO staff participated as members of the Chinese delegation in the 29th Conference of the Parties to the United Nations Framework Convention on Climate Change. During the event, the Environment and Ecology Bureau and HKO organised a side event and invited the Secretary-General of the WMO and experts from various regions to share their insights on climate science and climate actions.

HKO establised "The Meteorological Training Centre for Belt and Road Countries" in enhancing the capabilities of meteorological professionals in the Belt and Road regions and promoting future meteorological co-operation and development. The Training Centre first organised a workshop themed "Aviation Meteorological Science and Service Development". Over 90 participants from more than 45 countries attended the workshop either online or in person.

The Observatory organised educational events and outreach activities to engage the public, in particular young people and students, through the 'Science in Public Service Campaign', the 'Public Course on Weather Observation' and the 'Community Weather Information Network', which included workshops, scientific talks, practicals, day camp, quiz competition and guided tours of the Observatory's facilities. HKO also conducted public talks, interviews and training courses as well as produced TV weather programmes and educational materials on hazardous weather phenomena.

RADIATION MONITORING AND ASSESSMENT

The Observatory monitors ambient radiation levels in Hong Kong and conducts radiological measurements on air, soil, water and food samples. In the event of a nuclear emergency, the Observatory will notify and advise relevant government departments on the possible consequences in Hong Kong and recommend protective actions. Moreover, HKO organises training and exercises on radiation monitoring, assessment and protection for other government departments involved in the Hong Kong contingency plan for nuclear emergencies. The work involves:

- Operating a network of radiation monitoring stations, an aerial radiation monitoring system, two radiological survey vehicles, a radiation laboratory and an emergency radiation data management system;
- Keeping abreast of the latest development on the methodology for nuclear accident consequence assessment; and
- Planning and participating in exercises and drills in response to nuclear emergencies.

In 2024–25, all radiation monitoring and assessment work was carried out satisfactorily. All equipment was maintained in a state of readiness. Exercises, drills and training on radiation monitoring, assessment and protection were conducted. A new cycle of inter-comparison of radiation measurements between Hong Kong and Guangdong began. The Emergency Radiation Data Management System was revamped to enhance IT security, data presentation and user communication. Radiation monitoring of sea water samples in local waters in response to the discharge of nuclear-contaminated water from Fukushima of Japan continued. Outreach activities such as public and school talks were conducted to enhance public education. The school community ambient radiation measurement programme named "Gamma-Go" continued to promote students' understanding of radiation through STEM activities.

TIME STANDARD, GEOPHYSICAL AND CLIMATE SERVICES

The Observatory maintains the Hong Kong time standard, provides time signals for the public and contributes to the International Bureau of Weights and Measures for the determination of the universal standard time. It provides geophysical, oceanographic, astronomical and climatological information, climate projection, seasonal and annual forecast to meet the needs for planning, engineering design and environmental impact assessments.

The Observatory monitors earthquakes and the sea level and releases related information to the public. It also operates a tsunami warning system. The Backup South China Sea Tsunami Advisory Center (Hong Kong) (BSCSTAC), which is set up at the Observatory's Headquarters, takes up scheduled operation from the Beijing Main Centre for a period of time every year in the

winter, providing tsunami alert services to nine counties around the South China Sea.

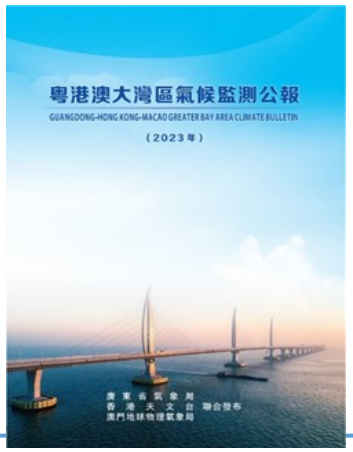
The Observatory also keeps abreast of research and development on international issues such as global climate change and advises the public and government bureaux/departments on the likely implications.

The work of time standard, geophysics and climate services involves:

- Maintaining a network of caesium beam atomic clocks as the Hong Kong time standard and providing time signals for radio broadcasts, automatic telephone answering service and synchronisation of clocks via the Internet;
- Operating seismological, tide and sea level monitoring networks and conducting related analyses;
- Carrying out real-time exchange of seismic data with overseas centres and disseminating earthquake information by various means;
- Compiling climatological and other related data;
- Conducting studies on climate change in Hong Kong and promoting public understanding; and
- Providing updates on the effects of El Niño, La Niña and other longer-term atmospheric phenomena on Hong Kong.

Initiatives undertaken in 2024-25 include:

- Providing scientific support to studies by relevant government bureaux/departments on the mitigation, adaptation and resilience-building measures required in combatting climate change and its impacts including extreme weather events;



Guangdong Meteorological Service, Hong Kong Observatory and Macao Geophysical and Meteorological Bureau jointly compiled the "Guangdong-Hong Kong-Macao Greater Bay Area Climate Bulletin 2023" (Chinese version only). The bulletin covers the climate status of the Greater Bay Area in 2023, as well as major weather and climate events.

- Monitoring climate change-related scientific studies, and provided the latest assessment of climate change and its impacts, as well as enhanced and updated climate projections to support policy making and action planning of relevant government bureaux/departments; and
- Promoting public understanding and awareness of climate change and its impacts through conducting school talks, participating in public fora, launching online quiz games, producing educational videos, and publishing articles and latest international research findings on global climate change on the HKO website.

PUBLIC OPINION SURVEY

In the public opinion survey conducted in 2024, the public considered that on average 77% of the weather forecasts issued by the Observatory were accurate, and gave an average score of 7.6 (out of 10) to its overall service.

OUTLOOK

The Observatory will further enhance its services in the following aspects in 2025-26:

Weather Services

- Continue to provide weather forecasts, regional weather services and extended weather outlook, including multi-hazard and impact-based forecast;
- Continue to develop and enhance nowcasting and forecasting services on high-impact weather for the public and special users;
- Continue to explore better utilisation of technologies such as big data and AI to support weather forecast operations and to further enhance the flood risk assessment system to strengthen the capability in coping with hazards such as flooding in the event of extreme weather conditions;
- Enhance the regional weather webpage on HKO website to integrate information of automatic weather stations, urban-scale meteorological stations and automatic weather forecasts;
- Continue to study the use of small unmanned aircraft in meteorological measurements;
- Replace two aging LIDARs in support of the low-level windshear and turbulence warning service for the HKIA;
- Enhance the capability in monitoring space weather including ionospheric scintillations in support of the development of low-altitude economy;
- Study and map out plans through engaging with stakeholders to develop the required weather service support to facilitate the development of low-altitude economy;
- Continue to enrich the content of the mobile weather application "MyObservatory" and HKO website;
- Continue to enhance marine meteorological observations through the deployment of buoys, both drifting and moored over the South China Sea, and installation of meteorological equipment onboard more merchant and fishing vessels;
- Arrange tendering for acquisition of three sets of Phased Array Weather Radar System (PAWRS) to implement a PAWRS network in Hong Kong for enhancing HKO's capability of territory-wide monitoring and predicting high impact weather in Hong Kong;
- Continue to develop regional nowcast products and provide support for other weather services under the RSMC for Nowcasting;
- Continue to enrich the "Earth Weather" webpage on HKO website with more weather forecast products based on prediction models;
- Continue to implement the numerical weather prediction models on the high performance computer system in support of weather forecast operation;
- Procure additional computing power for a high performance computer system; and
- Continue to operate the virtual Meteorological Training Centre for Belt and Road Countries and organise training courses in collaboration with other international organisations.

Radiation Monitoring and Assessment

- Implement the agreed arrangements between Hong Kong and Guangdong on radiation monitoring and assessment;
- Conduct drills, exercises and communication tests on emergency response in conjunction with other government departments as well as the relevant Guangdong counterparts;
- Organise training on radiation monitoring and assessment;
- Take forward the enhancement of radiation monitoring and assessment facilities; and
- Further promote outreach activities and the Gamma-Go programme to enhance public education on radiation.

Time Standard, Geophysical and Climate Services

- Undertake and support monitoring and assessment of earthquake, tsunami risk and sea level in the region;
- Enhance its earthquake monitoring and tsunami warning capability;
- Enhance the capability of earthquake intensity analysis by making use of the newly installed earthquake intensity meters over the territory;
- Monitor and study climate change issues, enhance climate projections, as well as provide relevant government bureaux/departments with latest information and assessment of climate change and its impacts to support their studies;
- Engage various stakeholders to promote the effective use of climate data in support of the emerging needs of different sectors and government bureaux/departments; and
- Conduct outreach activities to promote public understanding of measures required in combatting climate change.