

Head 168 — HONG KONG OBSERVATORY

Controlling officer: the Director of the Hong Kong Observatory will account for expenditure under this Head.

Estimate 2020–21 **\$412.9m**

Establishment ceiling 2020–21 (notional annual mid-point salary value) representing an estimated 352 non-directorate posts as at 31 March 2020 rising by seven posts to 359 posts as at 31 March 2021 **\$234.8m**

In addition, there will be an estimated five directorate posts as at 31 March 2020 and as at 31 March 2021.

Controlling Officer's Report

Programmes

Programme (1) Weather Services	This programme contributes to Policy Area 7: Public Safety (Secretary for Commerce and Economic Development).
Programme (2) Radiation Monitoring and Assessment	This programme contributes to Policy Area 9: Internal Security (Secretary for Security).
Programme (3) Time Standard and Geophysical Services	This programme contributes to Policy Area 7: Public Safety (Secretary for Commerce and Economic Development).

Detail

Programme (1): Weather Services

	2018–19 (Actual)	2019–20 (Original)	2019–20 (Revised)	2020–21 (Estimate)
Financial provision (\$m)	289.7	325.4	325.4 (—)	349.6 (+7.4%)
				(or +7.4% on 2019–20 Original)

Aim

2 The aim is to provide weather forecasts and issue warnings to the public, special users, the shipping community and aviation groups in order to reduce loss of life and damage to property, and minimise disruption to economic and social activities during hazardous weather.

Brief Description

3 The Central Forecasting Office and Airport Meteorological Office of the Hong Kong Observatory (HKO) are responsible for the preparation and issuance of weather information, forecasts and various warnings on hazardous weather to the public, special users, the shipping community and aviation groups. HKO also promotes public awareness of, and community preparedness for, natural disasters. The work involves:

- operating a network of mostly automated weather stations;
- carrying out real-time exchange of data with meteorological centres in the world;
- receiving meteorological satellite imageries, and operating weather radar systems and other meteorological instruments;
- analysing meteorological data and computing the future weather by numerical modelling;
- disseminating weather information by a diversity of means;
- issuing warnings and advisory messages on hazardous weather such as tropical cyclones, storm surges, rainstorms, landslips, flooding, thunderstorms, windshear, fire danger and extreme hot and cold conditions; and
- conducting public talks, interviews and training courses as well as producing TV weather programmes and educational materials on hazardous weather phenomena.

4 In 2019, HKO fulfilled its performance pledge of issuing at least one bulletin every hour of the day, disseminating 100 per cent of the bulletins within ten minutes after each hour, and attained a forecast accuracy (as verified by objective means) of 90 per cent. The total number of page views of the HKO website and mobile weather application “MyObservatory” reached a record high of 187 billion in the year.

5 To meet the needs of the public, HKO enhanced the provision of weather information in 2019–20 through:

- revamping the design of the HKO website to better support mobile users and improve user experience;
- enriching the regional weather information provided on the HKO website by featuring real-time wind information at North Point, Central Pier and Lamma Island as well as temperature information at Tai Lung;
- enriching the interactive webpage Earth Weather with more weather information, including tropical cyclone forecast track and sea wave and swell forecast;
- enriching the extended weather outlook service on the HKO website by adding probability forecast of mean-sea-level pressure;
- enriching the HKO mobile weather application “MyObservatory” with Earth Weather, location-specific heavy rain information, and lightning nowcast;
- launching location-specific meteorological information for hikers jointly with the Agriculture, Fisheries and Conservation Department; and
- launching the weather website for the Greater Bay Area in collaboration with meteorological services in Guangdong and Macao, to provide weather forecast and warning information for more than 60 regions in 11 cities within the Greater Bay Area.

6 HKO 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. In 2019–20, the electronic flight bag weather mobile application “MyFlightWx” developed by HKO was formally launched and was used by two local airlines to provide latest weather information to flight crew electronically. To further enhance flight safety, HKO commenced the operational alert of building-induced turbulence at HKIA using a short-range Light Detection and Ranging system with finer and more frequent scans.

7 Other noteworthy activities for 2019–20 include:

- providing meteorological support in the Government’s review of handling super typhoon co-ordinated by the Security Bureau to facilitate the formulation of the work arrangements under “extreme conditions” after cancellation of Tropical Cyclone Warning Signal No. 8 for super typhoons;
- enhancing the HKO mobile weather application “MyObservatory” to relay urgent and important government messages for extreme conditions in relation to super typhoons;
- enhancing communication and engagement with the public through social media, including crowdsourcing materials from the public for preparing content for HKO’s Facebook page and Instagram account;
- launching a new set of TV and radio Announcements in the Public Interest on storm surge and enriching the content of the “Tidal Information” webpage on the HKO website with information on extreme water levels recorded during past extreme storm surge events to enhance public awareness of and preparedness for such extreme events;
- conducting studies on topics related to tropical cyclone activities and extreme weather events, including the assessment of damages and direct economic losses related to Super Typhoons Hato and Mangkhut;
- collaborating with a local airline for real-time downlink of turbulence data from its B777 aircrafts;
- installing more microclimate stations for a pilot study on urban weather monitoring and development of data sharing platform and related weather products;
- enhancing marine meteorological observation and services by deploying drifting buoys in the South China Sea and western North Pacific, recruiting more ships to join the Hong Kong Voluntary Observing Ships Scheme and launching the new “MyOceanWx Automatic Sea State Forecast” webpage to provide detailed four-day forecast of the wave and swell conditions over the South China Sea, western Pacific Ocean and the Indian Ocean;
- extending the International Organization for Standardization (ISO) 9001:2015 certification for the provision of meteorological measurement services at King’s Park to solar radiation and carbon dioxide concentration measurements, and automatic regional temperature measurement services;
- promoting public awareness of HKO’s achievements in nowcasting service (which won two awards each at the Hong Kong ICT Awards 2019 and the 19th Asia Pacific Information and Communications Technology Alliance Awards respectively), mobile application “MyFlightWx” (which won a certificate of merit in the Hong Kong ICT Awards 2019) and the Tate’s Cairn Weather Radar Station project (which won a merit award at the Building Surveyor Awards 2019 and the Best Government Project Award at the 5th International BIM Awards);
- sharing in-house developed software package for nowcasting of severe weather with overseas weather services in the capacity of the Regional Specialized Meteorological Centre for Nowcasting for the Asian region; and
- organising a number of educational events and outreach activities engaging young people and students through the “Science in Public Service Campaign” and the “Community Weather Information Network”, including workshops on building community weather stations as well as various scientific and public talks.

8 The key performance measures in respect of weather services are:

Targets

	Target	2018 (Actual)	2019 (Actual)	2020 (Plan)
forecasts perceived as accurate by the public (%)#	78	78	78	78
accurate public forecasts as verified by objective means (%)	88	91	90	90
accurate forecasts as assessed by ship captains (%)	96	97	97	96
accurate forecasts as assessed by airline operators (%)	96	100	99	96
hourly local weather reports disseminated within the first ten minutes of each hour (%)	99	99	100	99

Indicators

	2018 (Actual)	2019 (Actual)	2020 (Estimate)
calls answered by the Dial-a-Weather system (million)#	7.5	6.3	7.5
telephone enquiries answered manually#	21 916	16 806	18 000
visits to the HKO website (billion)^	146	187	190
companies and organisations subscribing to special weather and warning services	106	109	109
total revenue from the above subscribers (\$m)	0.7	0.7	0.7
media interviews and public lectures/talks on weather#	1 663	679	1 200
meteorological documents for flights departing Hong Kong	217 000	214 000	214 000
visits to the aviation weather information system (million)	201.6	246.3	247.0

The actual figures may vary depending on whether there are more weather changes of concern to the public in that particular year.

^ Figures measured in page views refer to the number of access to the HKO website which includes the mobile website, the Weather Wizard and the mobile application.

Matters Requiring Special Attention in 2020–21

9 During 2020–21, HKO will:

- continue to provide weather forecasts, regional weather services and extended weather outlook, and conduct research and enhance forecasting and warning services on high-impact weather;
- strengthen efforts in public communication of high-impact weather, as well as outreach and public education to enhance public awareness of and preparedness for natural disasters and impact of climate change;
- enhance the provision of probability forecast of tropical cyclone tracks over a larger area in the western North Pacific;
- take forward the project of replacing the Tai Mo Shan storm-detecting weather radar, subject to funding approval of the Legislative Council;
- continue to promote the use and continuous improvement of “MyFlightWx” in collaboration with airlines to provide the latest inflight weather information to flight crew electronically;
- continue to take forward the implementation of meteorological facilities in support of the Three-Runway System project for the HKIA;
- continue to implement urban-scale weather monitoring and forecasting (including the implementation of microclimate stations) and develop forecasting products in support of initiatives under the *Smart City Blueprint*;
- continue to develop nowcasting services and products on high-impact weather for local and regional applications;
- continue to take forward the meteorological study for Government Flying Service’s new Forward Base at Kai Tak;
- continue to enhance marine meteorological observations and the provision of weather information to the marine community;

- continue to develop social media services for enhancing communication to the public of weather information, forecasts and warnings, and awareness of the impact of climate change, by means including short educational videos and other social media posts, as well as production of a music video of the theme song “Climate and Life” launched in March 2019;
- continue to enrich the content of the “MyObservatory” mobile application;
- continue to enhance the Earth Weather service with more weather information;
- continue to enhance the automatic weather station network for the provision of more weather information; and
- conduct trial to enhance observation of inclement weather and special weather phenomena such as hail via crowdsourcing from public.

Programme (2): Radiation Monitoring and Assessment

	2018–19 (Actual)	2019–20 (Original)	2019–20 (Revised)	2020–21 (Estimate)
Financial provision (\$m)	35.7	39.5	39.5 (—)	36.8 (–6.8%)
				(or –6.8% on 2019–20 Original)

Aim

10 The aim is to provide information on environmental radiation levels in Hong Kong and advise government departments on the protective action that may be necessary during nuclear emergencies.

Brief Description

11 HKO 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, HKO will notify and advise government departments on the possible consequences in Hong Kong and recommend protective action. HKO organises training and exercises on radiation monitoring 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.

12 In 2019–20, all radiation monitoring and assessment work in this programme was carried out satisfactorily. All equipment was maintained in a state of readiness. The radiation laboratory and the ambient gamma radiation level measurement service successfully passed the annual surveillance audit under ISO 9001:2015 certification, reaffirming the quality of these services meeting the latest international standards. Inter-comparisons between Hong Kong and Guangdong on radiological measurements continued. Exercises, drills and training on radiation monitoring and assessment were conducted. Implementation of new radiation monitoring and assessment facilities, in particular the high pressure ionization chambers of the Radiation Monitoring Network and the automatic gamma spectrometry system at Ping Chau were in steady progress. Memoranda on technical co-operation were signed with the Nuclear Safety Center of the Ministry of Ecology and Environment as well as the Airborne Survey and Remote Sensing Center of Nuclear Industry. The “Radiation Monitoring, Assessment and Protection” webpage was revamped to become mobile-friendly and enriched with more information. In-house produced video clips on radiation and nuclear emergency preparedness were shown on “Cool Met Stuff” channel on the HKO website, the “MyObservatory” mobile application and YouTube. Outreach activities such as public and school talks, exhibitions and visits to radiation monitoring facilities were also conducted to promote public education.

13 The key performance measures in respect of radiation monitoring and assessment are:

Target

	Target	2018 (Actual)	2019 (Actual)	2020 (Plan)
data availability of radiation monitoring network (%)	99.0	99.8	99.8	99.5

Indicators

	2018 (Actual)	2019 (Actual)	2020 (Estimate)
exercises and drills	22	21	21
visits to HKO's webpage on radiation	1 681 870	3 359 910	2 200 000

Matters Requiring Special Attention in 2020–21

14 During 2020–21, HKO will continue to:

- implement the agreed arrangements between Hong Kong and Guangdong on radiation monitoring and assessment;
- conduct drills and exercises 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 public education on radiation by developing school community education programme.

Programme (3): Time Standard and Geophysical Services

	2018–19 (Actual)	2019–20 (Original)	2019–20 (Revised)	2020–21 (Estimate)
Financial provision (\$m)	12.8	16.5	16.5 (—)	26.5 (+60.6%)
				(or +60.6% on 2019–20 Original)

Aim

15 The aim is to maintain the Hong Kong time standard and to provide geophysical, oceanographic, astronomical and climatological information to the public.

Brief Description

16 HKO 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 to meet the requirements for planning, engineering design and environmental impact assessments. It monitors earthquakes and the sea level and releases related information to the public, including the operation of the tsunami warning system. It also keeps abreast of research and development on international issues such as global climate change and advises the public and government departments on the likely implications. The work involves:

- maintaining a caesium beam atomic clock 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 Nino and other longer term atmospheric phenomena on Hong Kong.

17 In 2019–20, the objectives and targets of this programme were generally met through the following:

- providing scientific support to studies by relevant government bureaux/departments on the mitigation, adaptation and resilience-building measures required in combating climate change and its impacts including extreme weather events;
- conducting school talks on climate change, providing educational videos, and publishing articles and latest research findings of global climate change on the HKO website to promote public understanding and awareness of climate change and its impacts;
- holding an academic forum with the Intergovernment Panel on Climate Change (IPCC) Working Groups Co-chairs to discuss climate change issues with local academics and relevant government bureaux/departments;

- updating sea-level rise projection for Hong Kong and its adjacent waters based on the latest assessment by the IPCC Special Report on the Ocean and Cryosphere in a Changing Climate;
- strengthening the resilience of the tide stations through additional sensors and enhanced facilities;
- participating as a collaborating partner in the COPE project, an international collaborative effort involving the Hong Kong Jockey Club Disaster Preparedness and Response Institute and the United Nations Office for Disaster Risk Reduction, in the production of the COPE Disaster Book Series on earthquake and tsunami to increase disaster resilience of children;
- upgrading the network time service system to provide the public and other government bureaux/departments with a more stable and accessible time service; and
- conducting joint webcasts of the partial lunar eclipse on 17 July 2019 and the partial solar eclipse on 26 December 2019 with the Hong Kong Space Museum, the Ho Koon Nature Education cum Astronomical Centre, the Po Leung Kuk Ngan Po Ling College and the Hong Kong Sheng Kung Hui Solar Tower.

18 The key performance measures in respect of time standard and geophysical services are:

Targets

	Target	2018 (Actual)	2019 (Actual)	2020 (Plan)
time standard accuracy (microseconds per day)	0.01 Δ	0.01	0.01	0.01
geophysical, meteorological and oceanographic data capture rate (%)	99	100	100	99
climatological information (% of written requests responded to within ten working days)	99	100	100	100

Δ The target is enhanced from 0.1 to 0.01 as from 2019 due to technological advancement.

Indicators

	2018 (Actual)	2019 (Actual)	2020 (Estimate)
visits to HKO's Internet time service (million).....	26 295	35 248	31 000
requests for geophysical, climatological and oceanographic information and advice	782	621	700

Matters Requiring Special Attention in 2020–21

19 During 2020–21, HKO will continue to:

- undertake and support monitoring and assessment of earthquake, tsunami risk and sea level in the region;
- strengthen the resilience of the tide stations to better cope with extreme sea level conditions;
- monitor and study climate change issues, provide relevant government bureaux/departments with latest information and assessment of climate change and its impacts to support their studies, and develop new methodology for the projection of likely impacts on Hong Kong;
- upgrade relevant hardware of the timing system to meet the growing demand for HKO's Internet time service;
- engage various stakeholders in promoting the effective use of climate information and in developing climate-related services in support of the emerging needs of different sectors and government bureaux/departments; and
- conduct outreach activities to promote public understanding of the mitigation, adaptation and resilience-building measures required in combating climate change impacts.

Head 168 — HONG KONG OBSERVATORY

ANALYSIS OF FINANCIAL PROVISION

	2018–19 (Actual) (\$m)	2019–20 (Original) (\$m)	2019–20 (Revised) (\$m)	2020–21 (Estimate) (\$m)
Programme				
(1) Weather Services	289.7	325.4	325.4	349.6
(2) Radiation Monitoring and Assessment	35.7	39.5	39.5	36.8
(3) Time Standard and Geophysical Services	12.8	16.5	16.5	26.5
	338.2	381.4	381.4 (—)	412.9 (+8.3%)
				(or +8.3% on 2019–20 Original)

Analysis of Financial and Staffing Provision

Programme (1)

Provision for 2020–21 is \$24.2 million (7.4%) higher than the revised estimate for 2019–20. This is mainly due to the increase of five posts in 2020–21, increased operating expenses and increased requirements for capital expenditure.

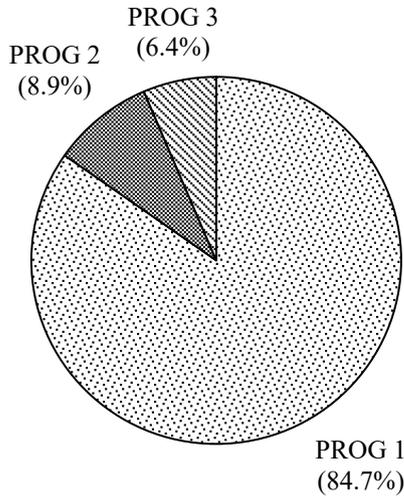
Programme (2)

Provision for 2020–21 is \$2.7 million (6.8%) lower than the revised estimate for 2019–20. This is mainly due to the decreased requirement for capital expenditure.

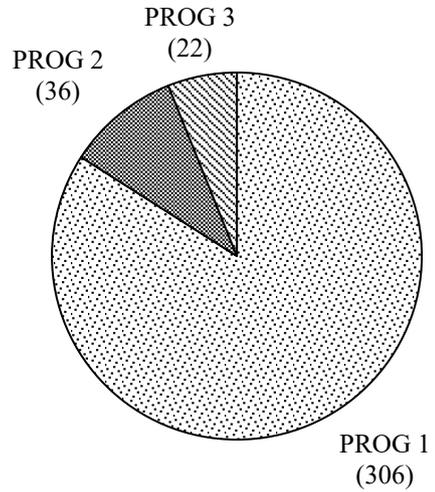
Programme (3)

Provision for 2020–21 is \$10.0 million (60.6%) higher than the revised estimate for 2019–20. This is mainly due to the increase of two posts in 2020–21, increased operating expenses and increased requirements for capital expenditure.

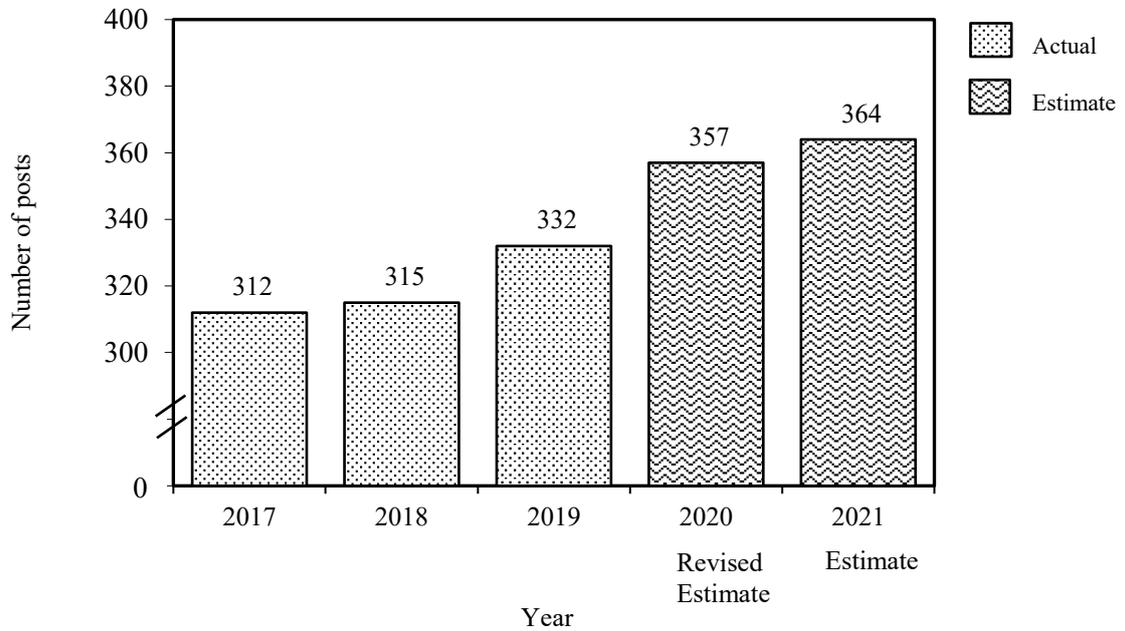
Allocation of provision to programmes (2020-21)



Staff by programme (as at 31 March 2021)



Changes in the size of the establishment (as at 31 March)



Head 168 — HONG KONG OBSERVATORY

Sub-head (Code)	Actual expenditure 2018–19	Approved estimate 2019–20	Revised estimate 2019–20	Estimate 2020–21	
	\$'000	\$'000	\$'000	\$'000	
Operating Account					
Recurrent					
000	Operational expenses	317,929	353,098	353,098	373,459
	Total, Recurrent.....	317,929	353,098	353,098	373,459
	Total, Operating Account	317,929	353,098	353,098	373,459
Capital Account					
Plant, Equipment and Works					
661	Minor plant, vehicles and equipment (block vote).....	20,319	28,266	28,266	39,453
	Total, Plant, Equipment and Works.....	20,319	28,266	28,266	39,453
	Total, Capital Account.....	20,319	28,266	28,266	39,453
	Total Expenditure	338,248	381,364	381,364	412,912

Head 168 — HONG KONG OBSERVATORY

Details of Expenditure by Subhead

The estimate of the amount required in 2020–21 for the salaries and expenses of the Hong Kong Observatory is \$412,912,000. This represents an increase of \$31,548,000 over the revised estimate for 2019–20 and \$74,664,000 over the actual expenditure in 2018–19.

Operating Account

Recurrent

2 Provision of \$373,459,000 under *Subhead 000 Operational expenses* is for the salaries, allowances and other operating expenses of the Hong Kong Observatory.

3 The establishment as at 31 March 2020 will be 357 posts. It is expected that there will be an increase of seven posts in 2020–21. Subject to certain conditions, the controlling officer may under delegated power create or delete non-directorate posts during 2020–21, but the notional annual mid-point salary value of all such posts must not exceed \$234,834,000.

4 An analysis of the financial provision under *Subhead 000 Operational expenses* is as follows:

	2018–19 (Actual) (\$'000)	2019–20 (Original) (\$'000)	2019–20 (Revised) (\$'000)	2020–21 (Estimate) (\$'000)
Personal Emoluments				
- Salaries.....	204,065	227,696	226,001	233,294
- Allowances.....	2,169	2,228	3,432	3,976
- Job-related allowances.....	529	716	430	683
Personnel Related Expenses				
- Mandatory Provident Fund contribution.....	646	960	877	856
- Civil Service Provident Fund contribution.....	7,398	9,706	8,468	10,459
Departmental Expenses				
- General departmental expenses	103,017	111,682	113,780	124,081
Other Charges				
- World Meteorological Organization.....	105	110	110	110
	317,929	353,098	353,098	373,459

Capital Account

Plant, Equipment and Works

5 Provision of \$39,453,000 under *Subhead 661 Minor plant, vehicles and equipment (block vote)* represents an increase of \$11,187,000 (39.6%) over the revised estimate for 2019–20. This is mainly due to the increased requirement for new and replacement equipment.