

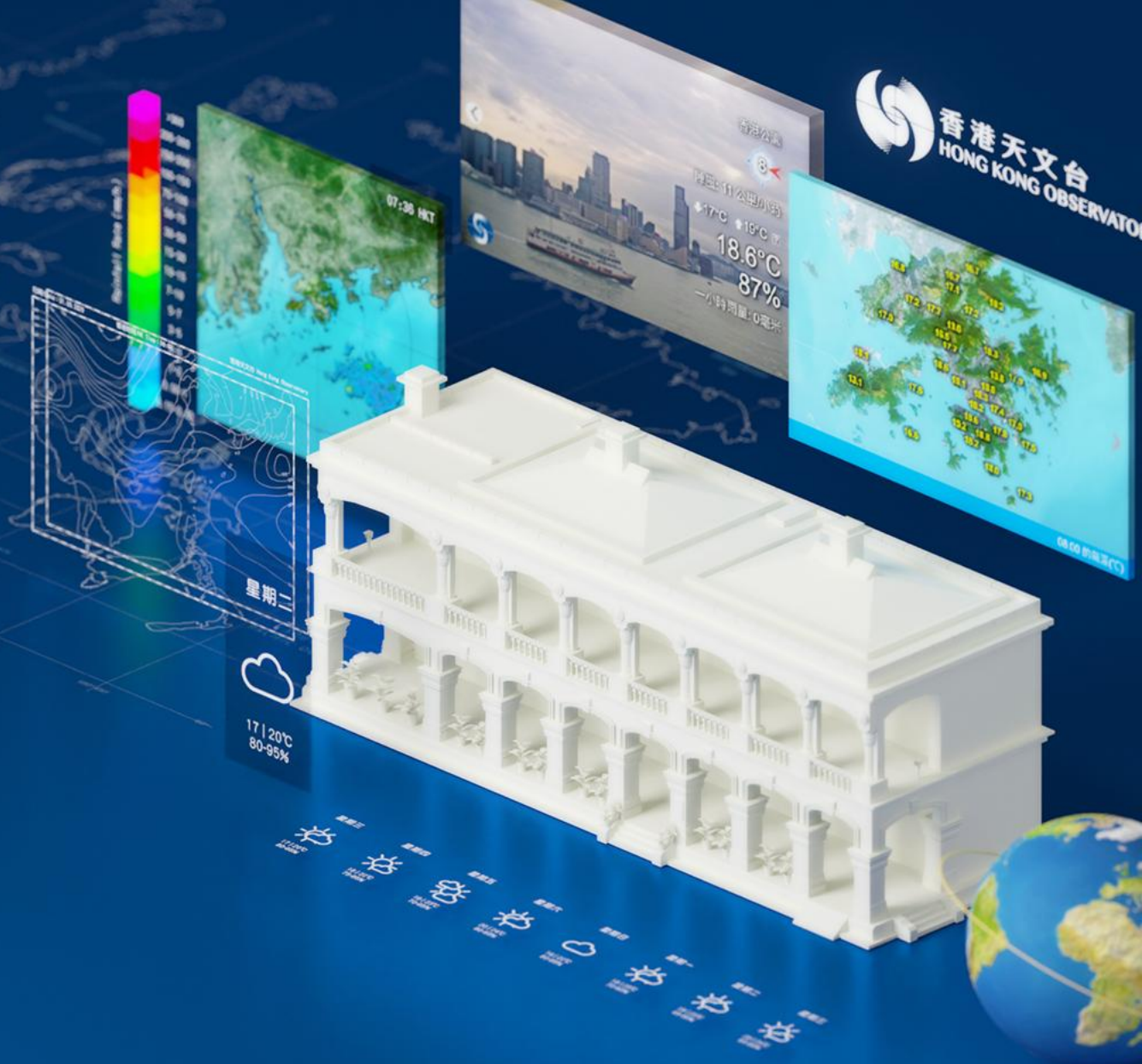
RSMC NOWCASTING PRODUCTS

WMO Severe Weather Forecasting Programme (SWFP)
Regional Sub-programme for Southeast Asia (SWFP-SeA)
Training Desk and Study Visit for Cambodia
(Ha Noi, 19 - 23 May 2025)

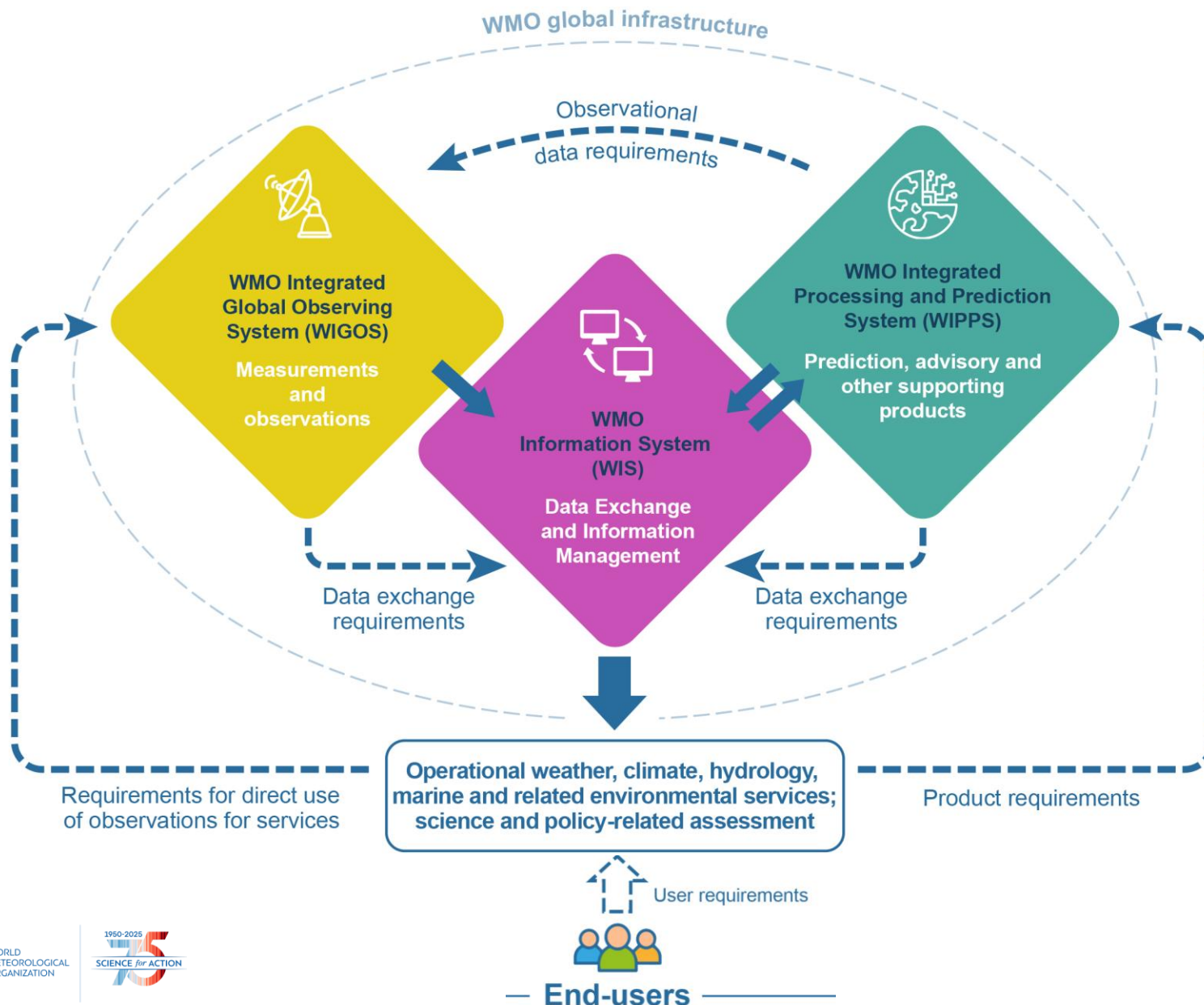
Wai-Kin Wong

Senior Scientific Officer, Forecast Development Division

E-mail: wkwong@hko.gov.hk

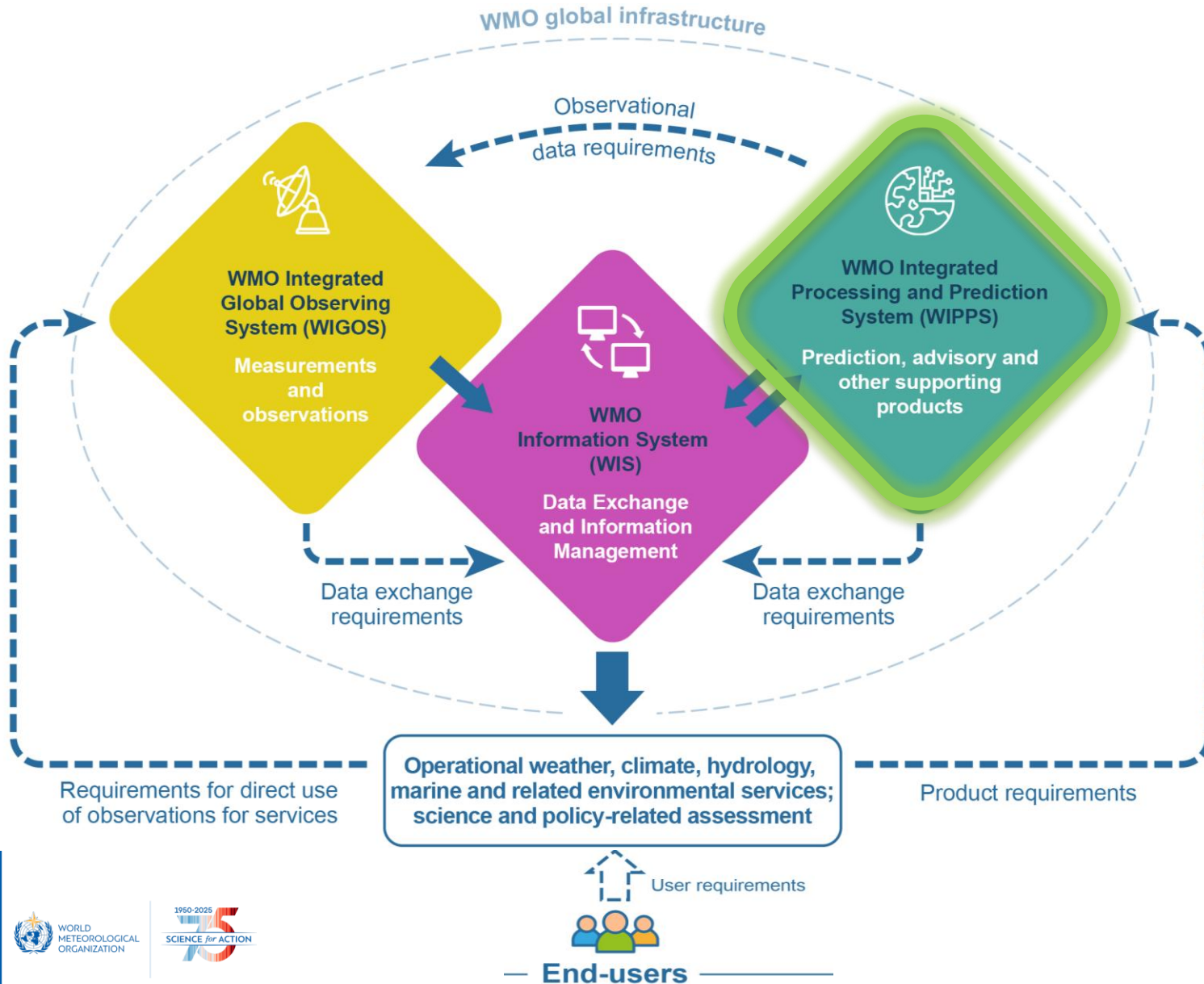


WMO Operational Infrastructure



- **WIGOS**
 - WMO Integrated Global **Observing** System
- **WIPPS**
 - WMO Integrated Processing and **Prediction** System
- **WIS**
 - WMO Information System (**Data exchange**)

WMO Integrated Processing and Prediction System in WMO Global Infrastructure



WIPPS is a worldwide network of modelling centres operated by WMO Members.

Its purpose is to make operationally available defined products and services for applications related to weather, climate, water and environment among WMO Members and relevant operational organizations (*WMO Strategic Plan - Output 2.3*)

Its role is to process observation and generate analysis and prediction products based on science and technology to meet users' needs.

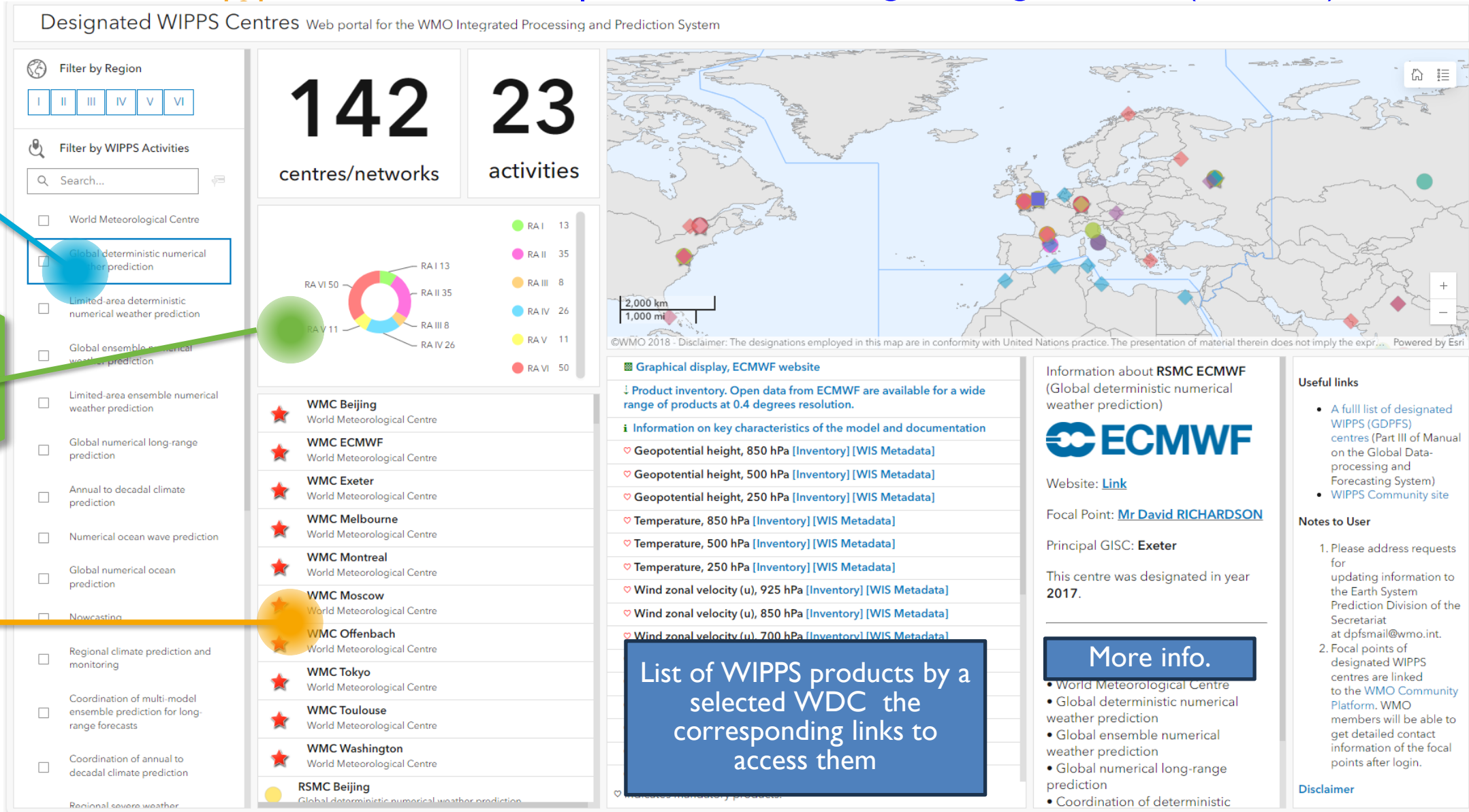
WIPPS Web Portal

- WIPPS Web Portal: [WIPPS Web Portal | World Meteorological Organization \(wmo.int\)](https://wipps.wmo.int)

WIPPS activities at a glance

Geo-statistics

List of designated centres





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臨近預報區域專業氣象中心
RSMC for Nowcasting



香港天文台
HONG KONG OBSERVATORY

WIPPS Web Portal | World Meteorological Organization (wmo.int)

Nowcasting →

Designated WIPPS Centres Web portal for the WMO Integrated Processing and Prediction System

Filter by Region

I II III IV V VI

Filter by WIPPS Activities

搜尋...

☐ World Meteorological Centre

☐ Global deterministic numerical weather prediction

☐ Limited-area deterministic numerical weather prediction

☐ Global ensemble numerical weather prediction

☐ Limited-area ensemble numerical weather prediction

☐ Global sub-seasonal prediction

☐ Global seasonal prediction

☐ Annual to decadal climate prediction

☐ Global climate reanalysis

☐ Numerical ocean wave prediction

☐ Global numerical ocean prediction

☒ Nowcasting

☐ Regional climate prediction and monitoring

☐ Coordination of multi-model ensembles for sub-seasonal forecasts

☐ Coordination of multi-model ensemble prediction for long-range forecasts

☐ Coordination of annual to decadal climate prediction

☐ Coordination of assessment of multiple climate reanalysis

☐ Regional severe weather forecasting

☐ Tropical cyclone forecasting

☐ Nuclear environmental emergency response

☐ Non-nuclear environmental emergency response

☐ Atmospheric sand and dust storm forecasts

☐ Vegetation fire and smoke pollution forecasts

☐ Volcano watch services for

3

centres/networks

1

activities

RA VI 1

RA II 2

RA VI 1

RSMC Hong Kong, China

Nowcasting

RSMC Offenbach

Nowcasting

RSMC Tokyo

Nowcasting

World map showing designated WIPPS centres. Three red dots indicate centres in Europe (Offenbach), Asia (Tokyo), and Hong Kong. A scale bar shows 1,000 km and 500 miles.

©WMO 2018 - Disclaimer: The designations employed in this map are in conformity with United Nations practice. The presentation of material therein does not imply the expression of any opinion whatsoever on the part of WMO concerning the legal status of any country, area or territory or of its authorities... Powered by Esri

Graphical display, RSMC Hong Kong, China website

Information about RSMC Hong Kong, China (Nowcasting)

香港天文台

HONG KONG OBSERVATORY

Website: [Link](#)

Focal Point: [Mr Wai-kin WONG](#)

Principal GIS: **N/A**

This centre was designated in year **2018**.

This centre performs the following WIPPS activities:

Nowcasting

Useful links

A full list of designated WIPPS centres (Part III of Manual on the WMO Integrated Processing and Prediction System)

WIPPS Community site

Notes to User


1. Please address requests for updating information to the Earth System Prediction Division of the Secretariat at WIPPS@wmo.int.

2. Focal points of designated WIPPS centres are linked to the [WMO Community Platform](#). WMO members will be able to get detailed contact information of the focal points after login.



Disclaimer

WMO WIPPS Homepage

- <https://community.wmo.int/en/activity-areas/wmo-integrated-processing-and-prediction-system-wipps>














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Home > activity areas > wmo integrated processing and prediction system wipps

WMO Integrated Processing and Prediction System (WIPPS)

[WIPPS Web Portal](#)
[WIPPS Webinar](#)
[WIPPS Newsletter](#)
[WIPPS Dashboard](#)
[WIPPS Pilot Project](#)
[Forecast Verification](#)
[Data Quality Monitoring](#)
[WMO Public Website](#)
[Overview](#)
[Digital resources](#)
[Provision of high-resolution NWP grid data](#)

Note: WMO Congress adopted WIPPS as a new name of GDPFS at 19th Session (June 2023)

The last decades have witnessed tremendous advancements in Numerical Weather Prediction (NWP), thanks to better assimilated, improved observations, increased computing capacity and advances in our knowledge of dynamics and physics. These advancements have led to increasingly skilful weather forecasting and will continue to be important in the future. Consequently, the emphasis in operational meteorology, hydrology, oceanography and climatology has shifted towards the implementation of increasingly sophisticated and diverse numerical models and applications in order to serve an ever-increasing variety of users. Operational NWP systems generally provide an accurate indication of developing weather events from hours to days ahead. They are, therefore, one of the most relevant components of routine and severe weather forecasting and warnings at National Meteorological and Hydrological Services.

RELATED NEWS

[WIPPS Webinar](#)

[WIPPS Pilot Project](#)

[WIPPS Newsletter](#)

[New Web Portal Eases Access of Forecast Products](#)

RELATED PUBLICATIONS

[Manual on WIPPS \(WMO-No. 485\)](#)

[Guide on WIPPS \(WMO-No. 305\)](#)

[Guidelines on High-resolution Numerical Weather Prediction \(WMO-No. 1311\)](#)

[Seamless prediction of the Earth system: from minutes to months](#)

[Guidelines on Ensemble Prediction Systems and Forecasting \(WMO-No. 1091\)](#)

[Guidelines on Ensemble Prediction System Postprocessing \(WMO-No. 1254\)](#)

[Guidelines for Nowcasting Techniques \(WMO-No. 1198\)](#)

[Guidance on Operational Practices for Objective Seasonal Forecasting \(WMO-No. 1...](#)

[Guidance on Verification of Operational Seasonal Climate Forecasts \(WMO-No. 12...](#)

[Guidelines for Satellite-based Nowcasting in Africa \(WMO-No. 1309\)](#)

[Forecast Verification for the African Severe Weather Forecasting \(WMO-No. 1132\)](#)

[WMO Global Annual to Decadal Climate Update](#)

[WMO Global Seasonal Climate Updates](#)

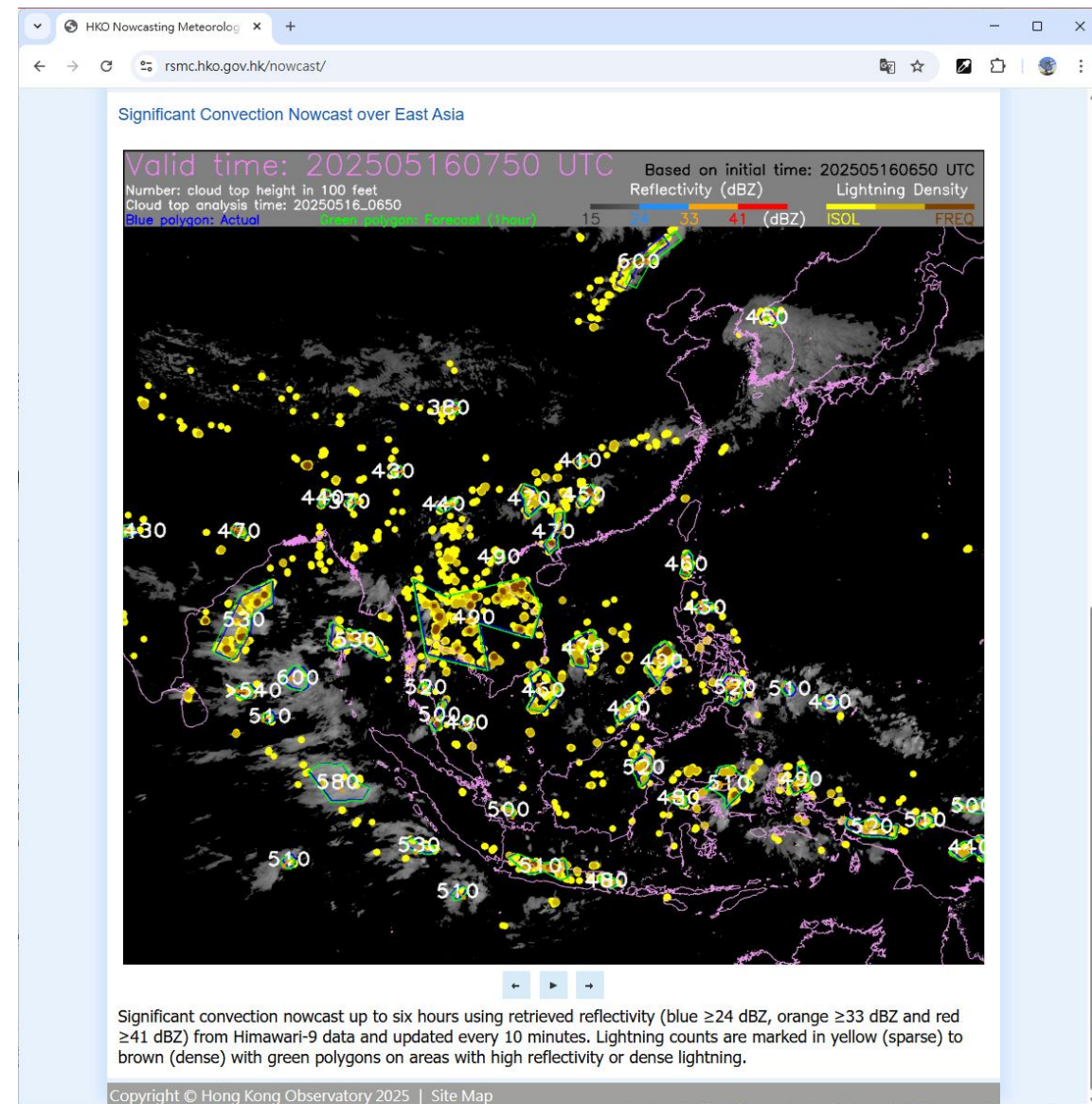
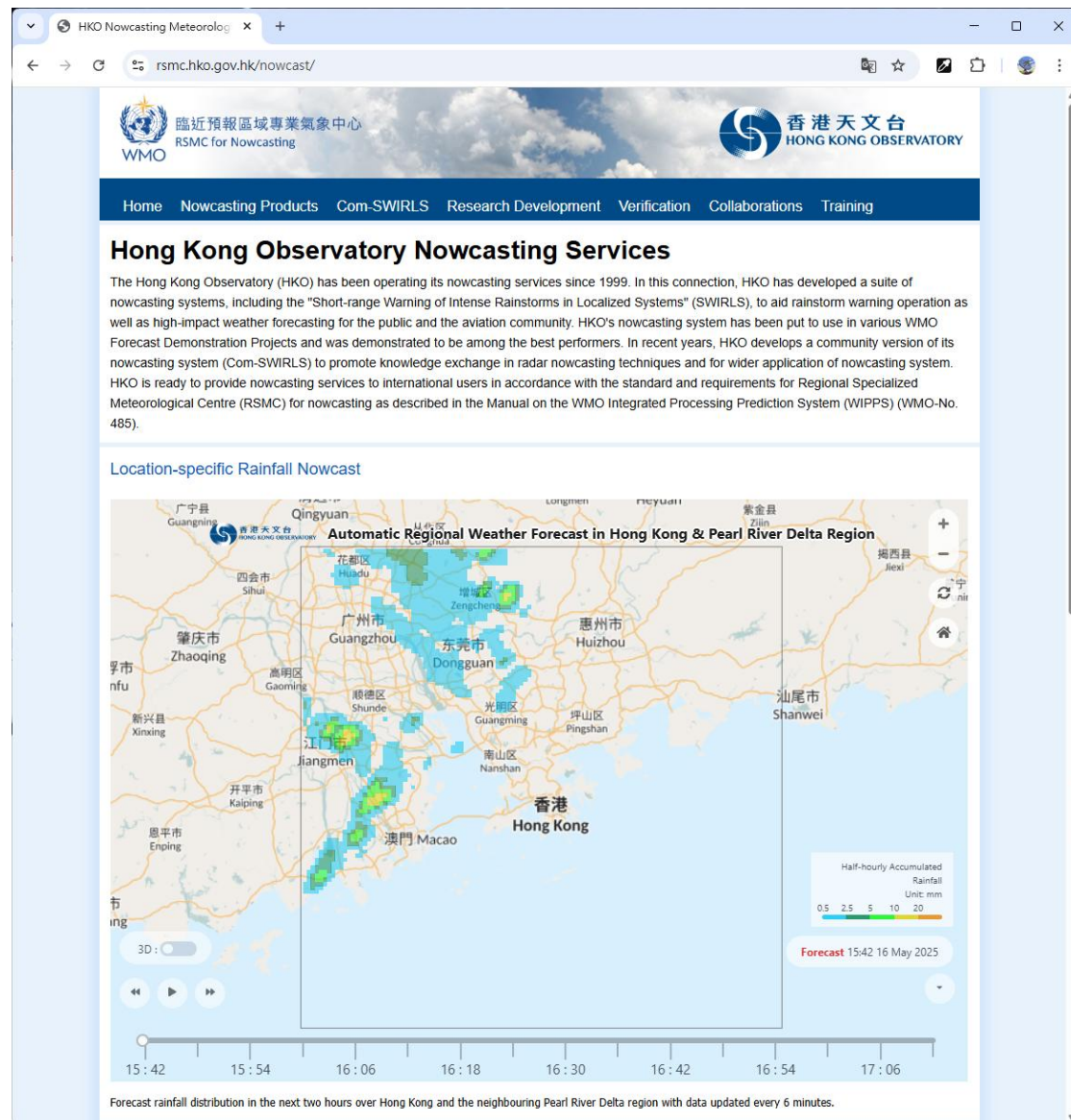
[BAMS paper on "WMO-Accredited Infrastructure to Support Operational Climate Pre...](#)

RELATED DOCUMENTS

[Long-range Forecasts \(1 month to 2 years\)](#)

RSMC Hong Kong for Nowcasting

<https://rsmc.hko.gov.hk/>



HKO SWIRLS Nowcasting System

Data Products and Services for Local to Regional Supports



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RSMC for Nowcasting



香港天文台
HONG KONG OBSERVATORY

SWIRLS: Short-range Warning of Intense Rainstorms in Localized Systems

Observations



Satellites



Radars



Rain
Gauges



Lightning
Detectors

SWIRLS



GPU
computing
servers



Nowcast rainfall, lightning,
hail & gust

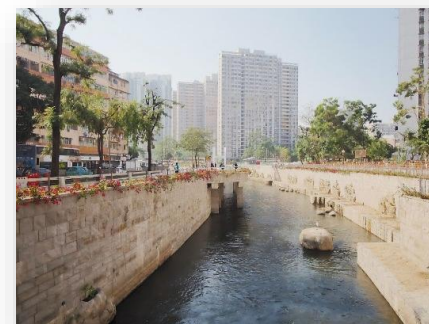
Products and Services



Weather
Forecasters



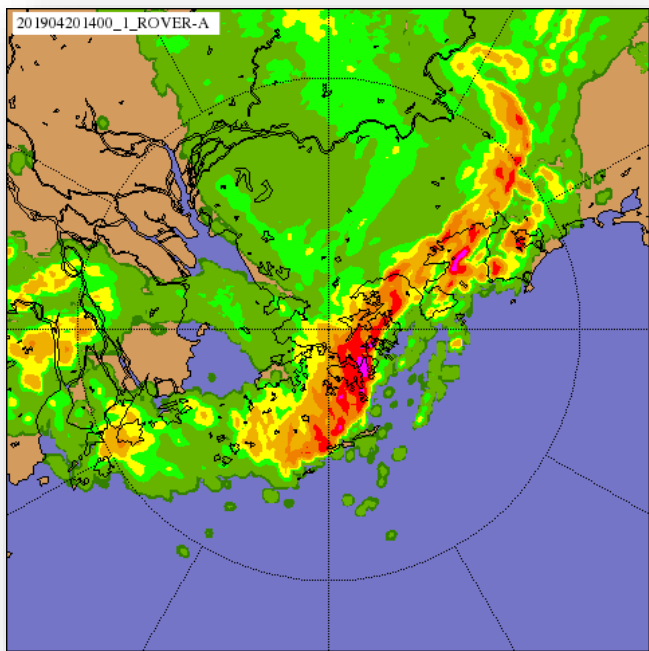
Nowcast alert
to public via
HKO's mobile
app and website



Government &
Utilities

SWIRLS support to government departments

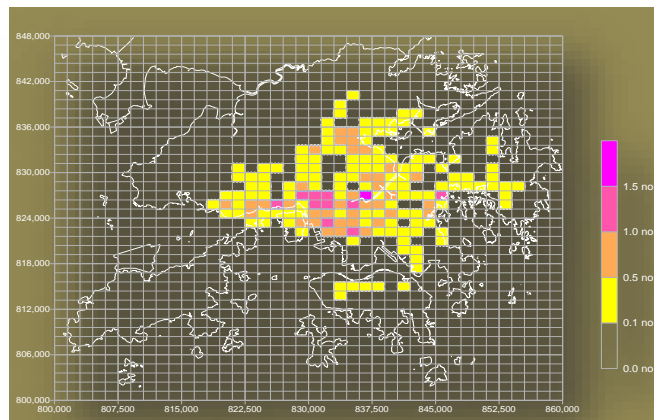
Rainfall Nowcast



Flood risk monitoring and clearance



Drainage system operation

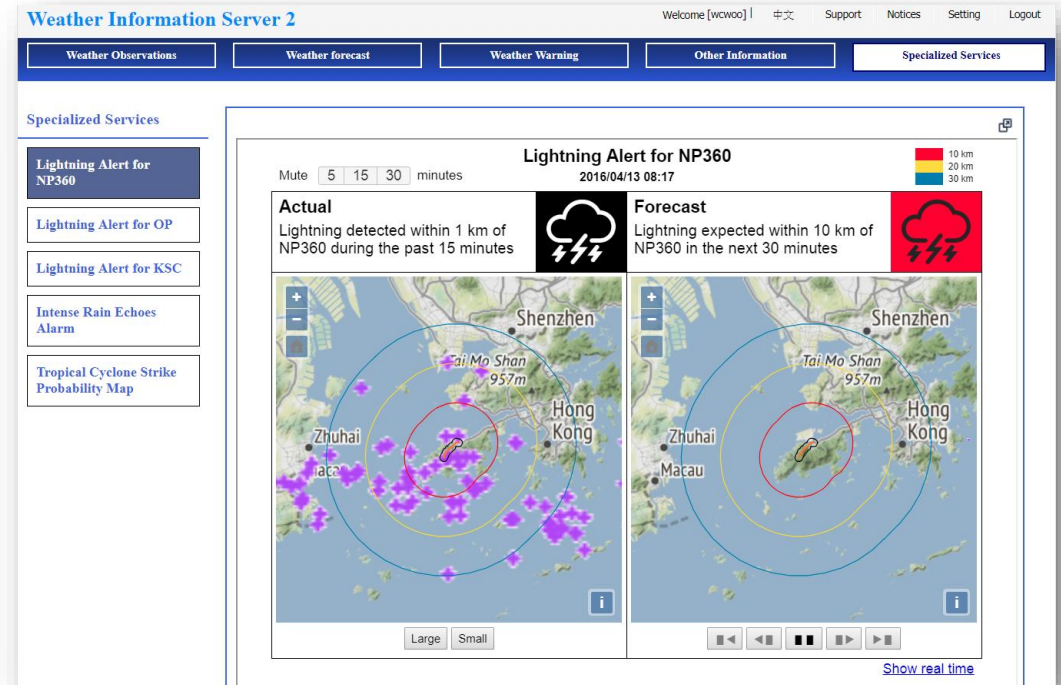
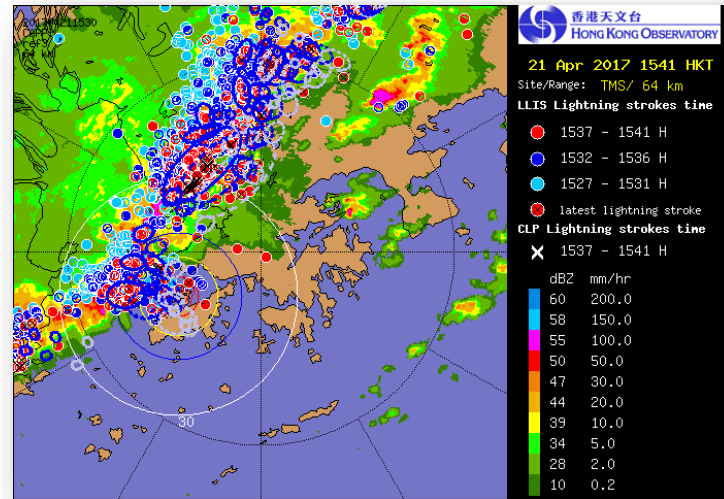


Landslip warning



SWIRLS support to public utilities

Lightning Nowcast



Minimizes risk of lightning strikes for ground operation



Supports decisions on mobilization and smooth operation of power



Timely suspension of services before thunderstorms and early resumption after





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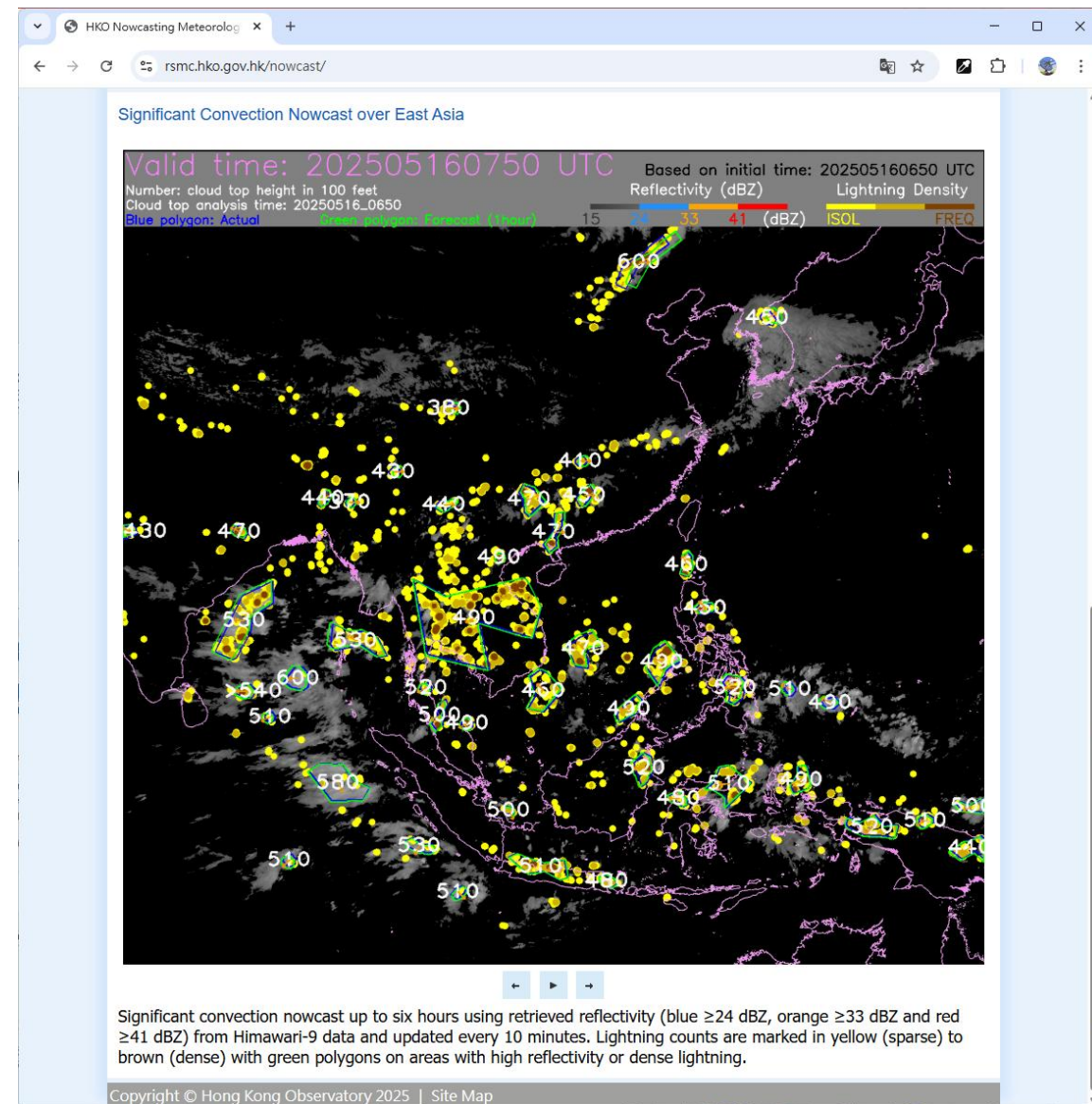
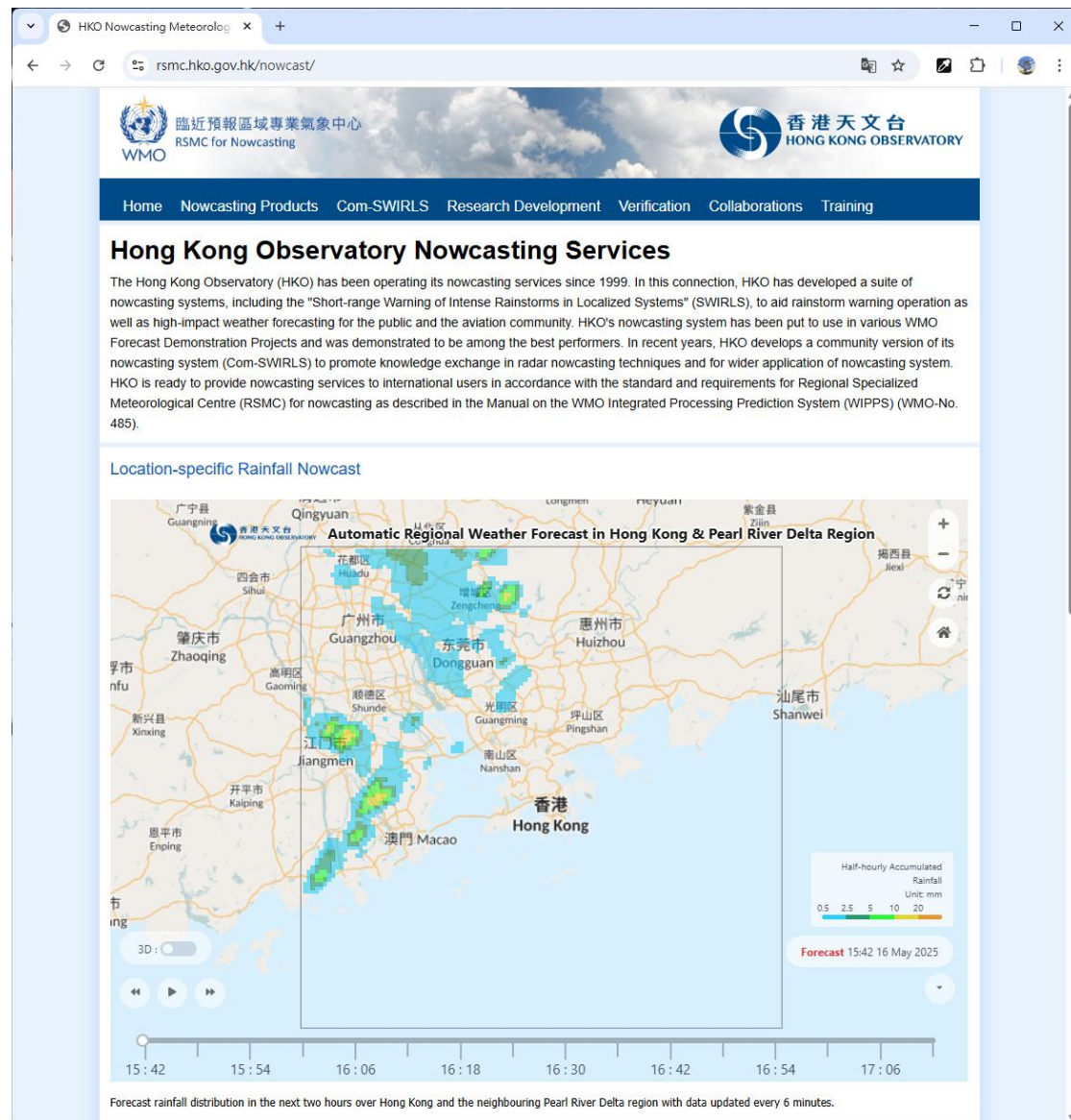
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<https://rsmc.hko.gov.hk/>





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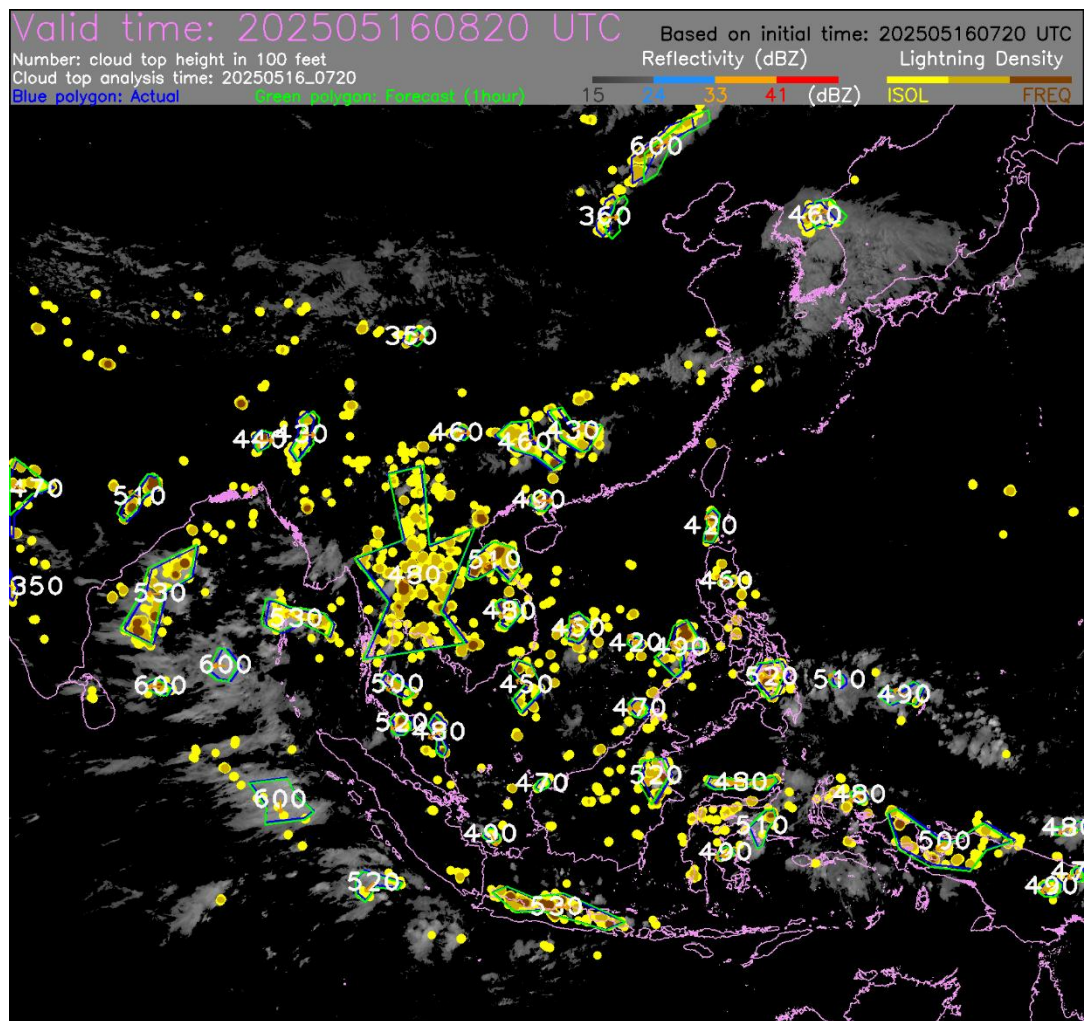
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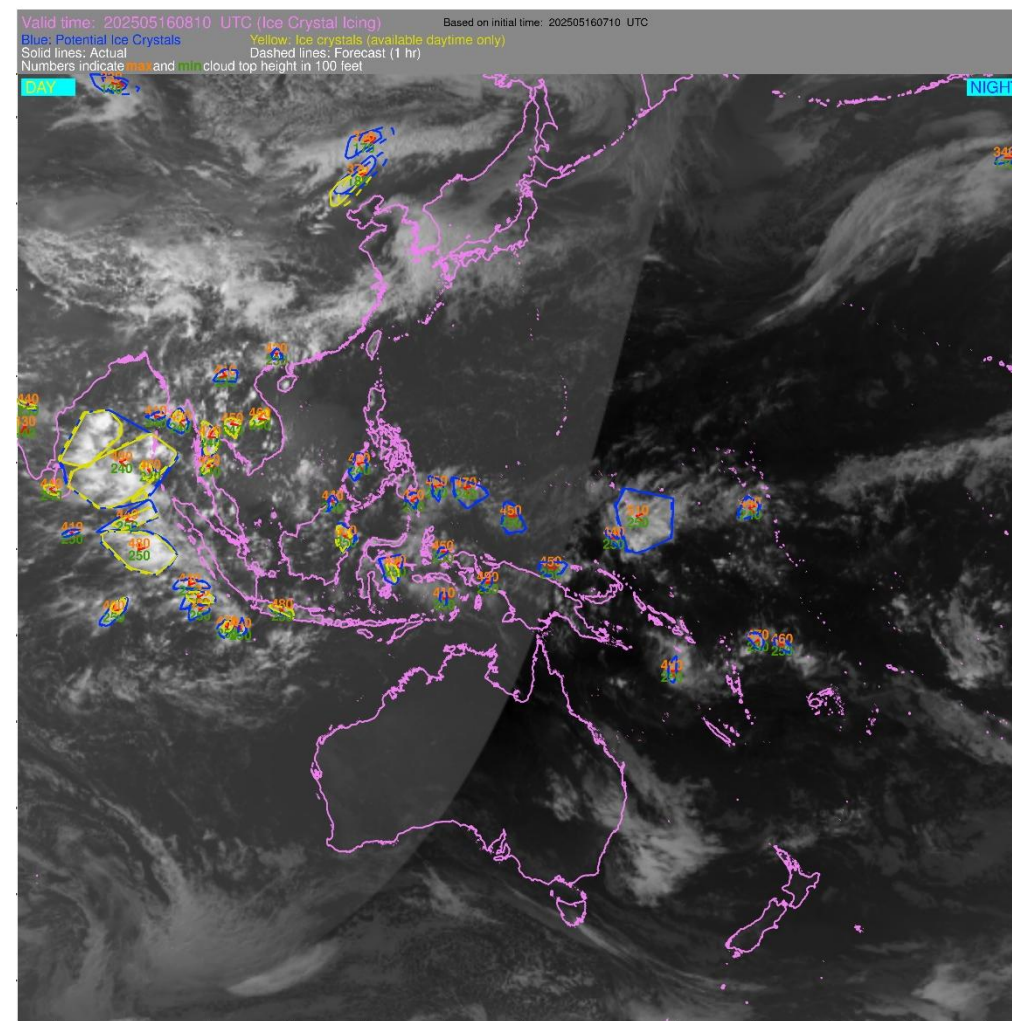
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Real-time Satellite Nowcast Products

Significant Convection (SigConv)



In-cloud Icing (Ice Crystal Icing)

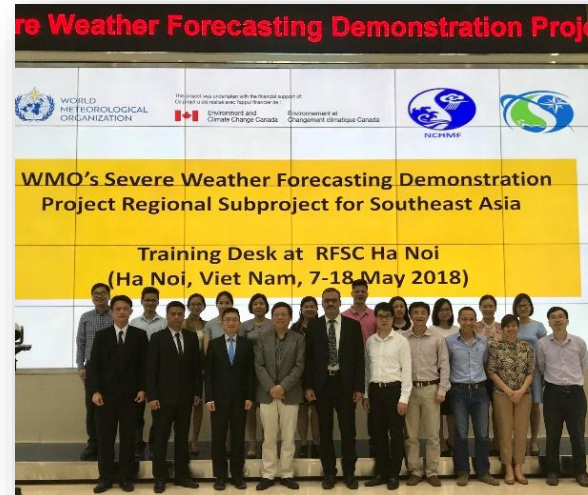


Technology Transfer for Capacity Building on Nowcasting

International / Regional Workshops



SWFP Training Programme



WMO VCP Workshops




Com-SWIRLS Collaborative Platform

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← → ↺ docs.com-swirls.org

Com-SWIRLS/SwirlsPy



2.4.0 ▾

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SWIRLS Nowcast System

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Getting Started

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Reference Manual

Publications

Data Model and xarray

Contributors' Guide

Z-R Relationship

Educational Resources

Acknowledgement

Most Active Developers

Change Log

Terms and Conditions

Contact Us

Acronyms

Docs » Welcome to SwirlsPy's documentation!

[View page source](#)

Welcome to SwirlsPy's documentation!

SWIRLS (Short-range Warning of Intense Rainstorms in Localized Systems) is the operational rainstorm nowcasting system of Hong Kong Observatory (HKO). State-of-the-art techniques are implemented in SWIRLS for analysis and prediction of precipitation and convective weather phenomena in the next few hours. SWIRLS has been in operation in HKO since 1999. SWIRLS was also implemented in various meteorological services or participated in international forecasting projects to support the research and development of rainstorm nowcasting techniques.

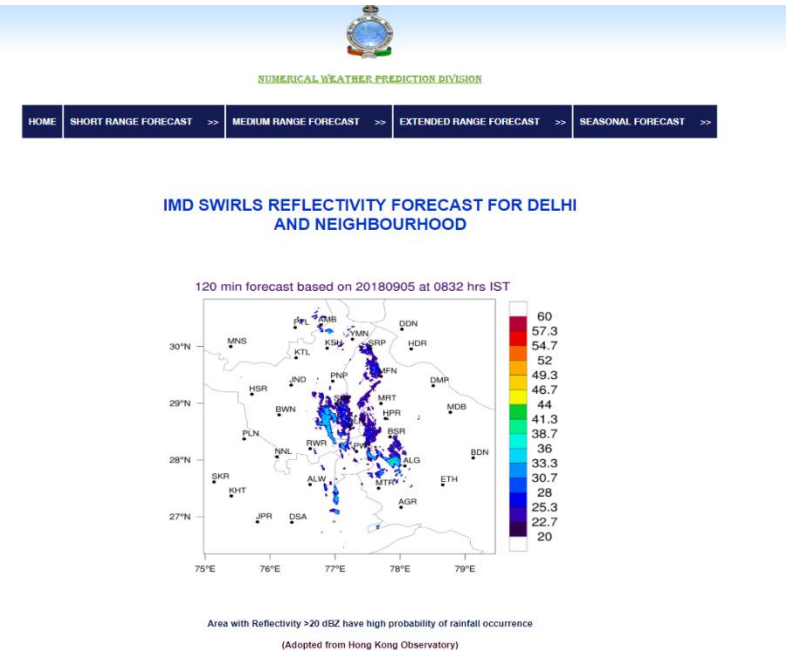
The community version of SWIRLS, or com-SWIRLS, is developed to facilitate knowledge exchange and cooperation on development of rainfall nowcasting technique. Com-SWIRLS can be available from this website for use by the National Meteorological and Hydrological Services (NHMSs) upon request. To request or for any enquiry, please send an e-mail to swirls@hko.gov.hk

- [Sign In or Register](#)
- [RSMC for Nowcasting](#)
- [SWIRLS Nowcast System](#)
- [Awards](#)
 - HKO awarded at 19th APICTA Awards (26 November 2019)
 - Hong Kong Observatory awarded in Hong Kong ICT Awards 2019 (8 April 2019)
 - DSD, HKO and the project team winning ACEHK Annual Award (11 December 2017)
- [Getting Started](#)
 - [Registration](#)
 - [Installation](#)
 - [Contact](#)
- [Examples](#)
- [Reference Manual](#)
 - [SwirlsPy](#)
 - [Subpackages](#)
 - [swirlspy.blending package](#)
 - [Blending data / nowcast.](#)

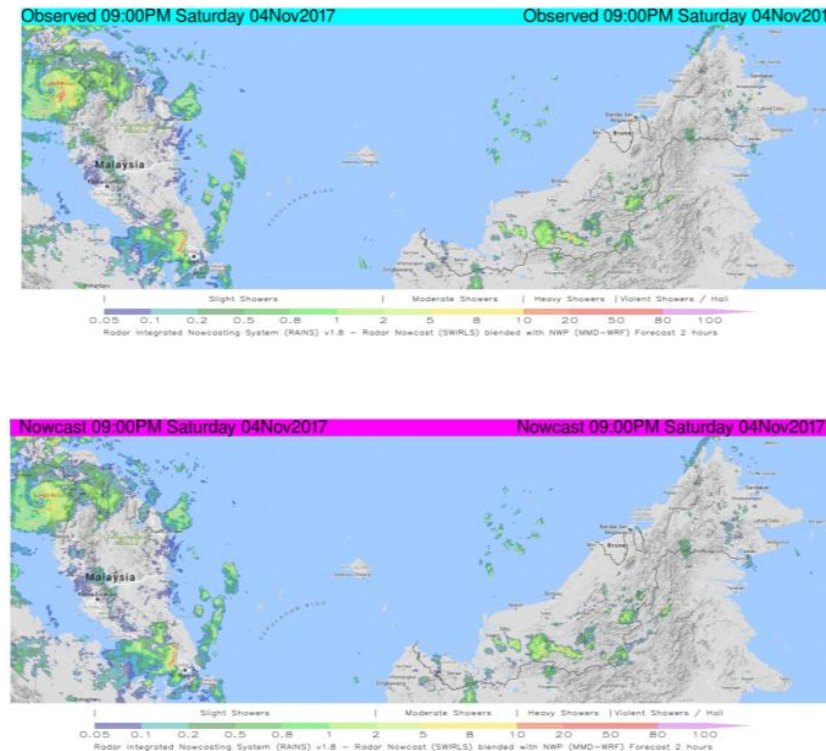


Users of Com-SWIRLS in R&D and operational applications

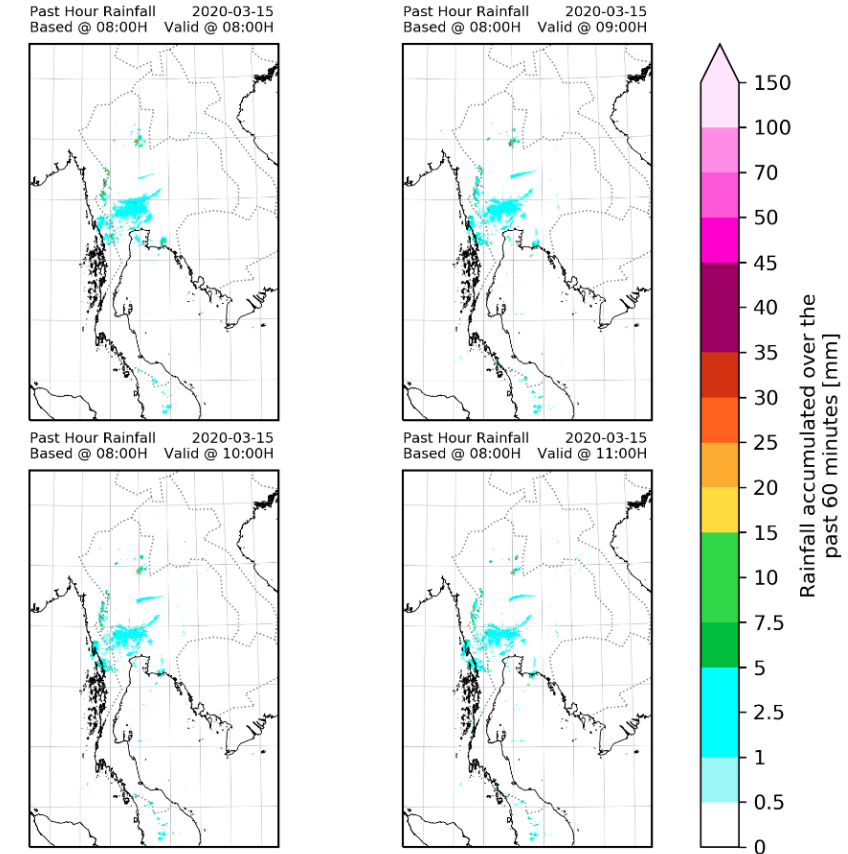
India

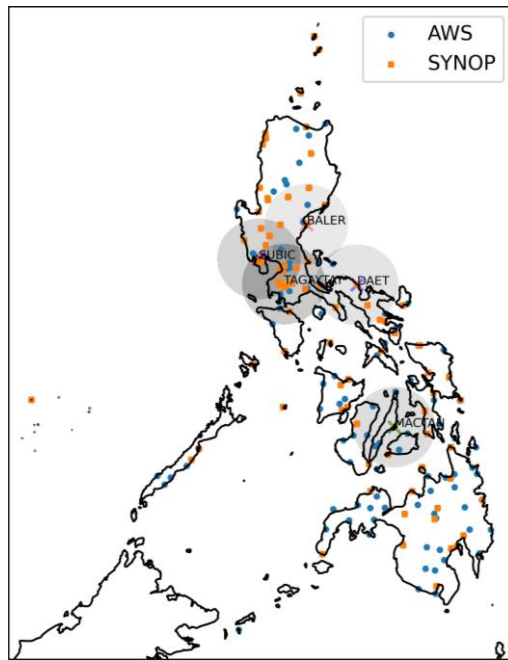


Malaysia

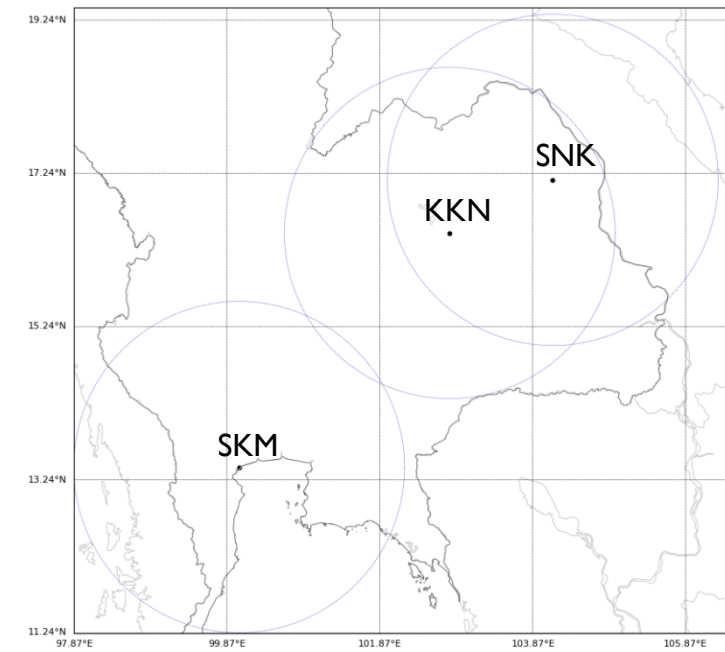


Thailand





Collaboration with PAGASA and TMD in knowledge transfer and implementing Com-SWIRLS and deep learning nowcast models



Model Training: TrajGRU with Pretraining, Individual Radars



Model Training Lasted 5.254 days at 100,000 iterations



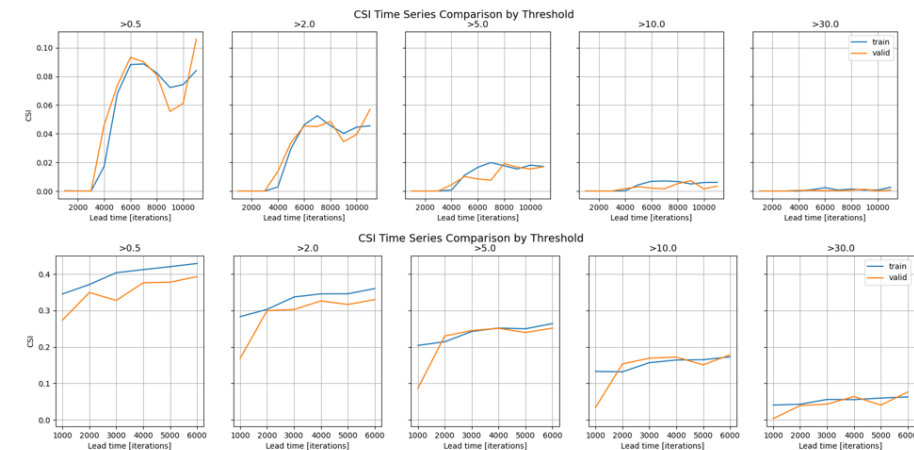
TrajGRU Model

Xingjian Shi, Zhihan Gao, Leonard Lausen, Hao Wang, Di-Yan Yeung, Wai-kin Wong, and Wang-chun Woo, 2017: Deep learning for precipitation nowcasting: A benchmark and a new model

Worked for TrajGRU Model: Result (TH only VS TH + HKO7 – KKN site)
(After revising mask file and frequency sequence time)

TH only

TH + HKO7

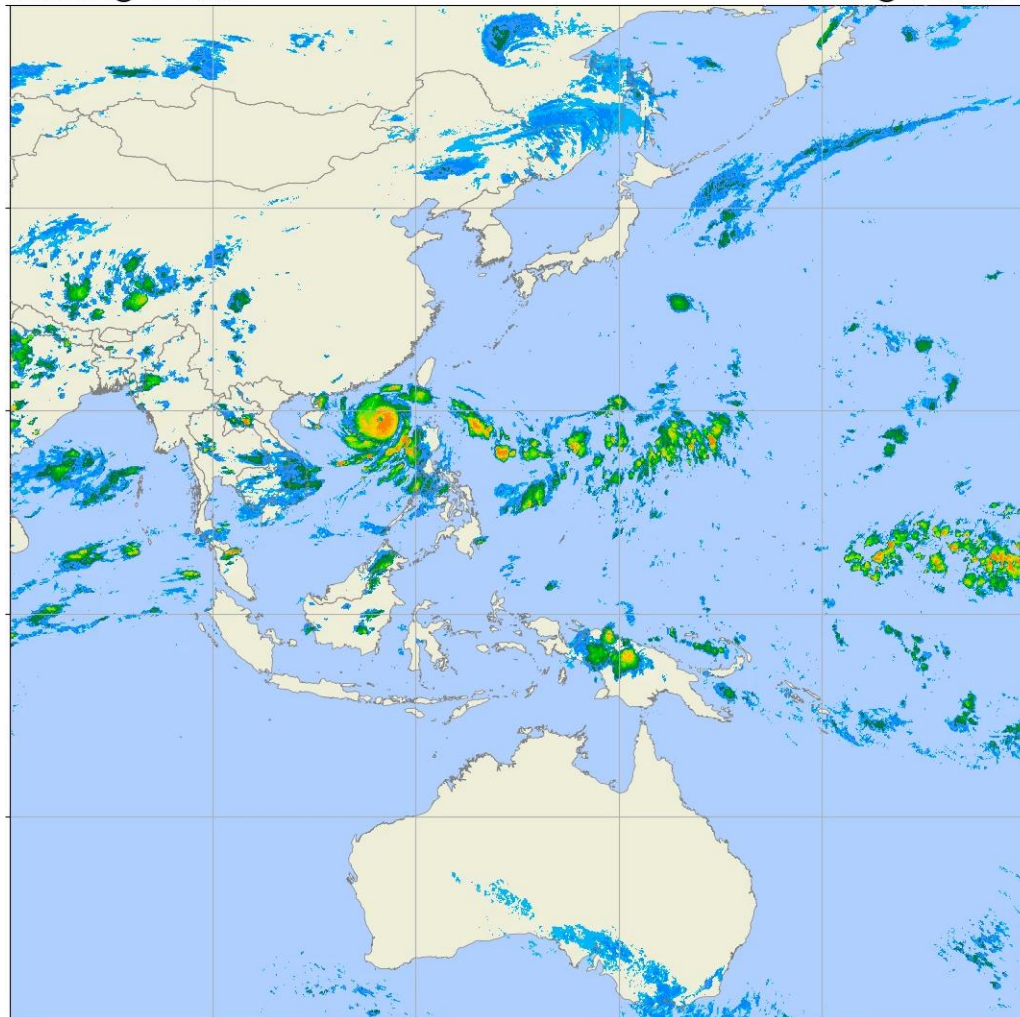


Use of AI/ML in nowcasting – (I) Precipitation or Significant Convection

Actual Observations

Reflectivity
Based @ 14:00Z

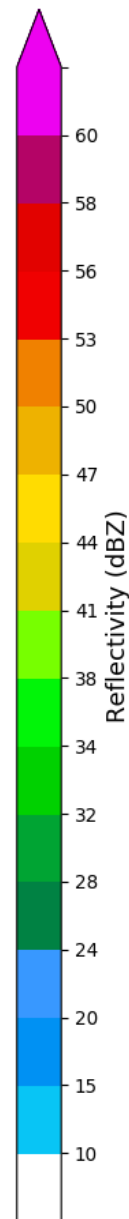
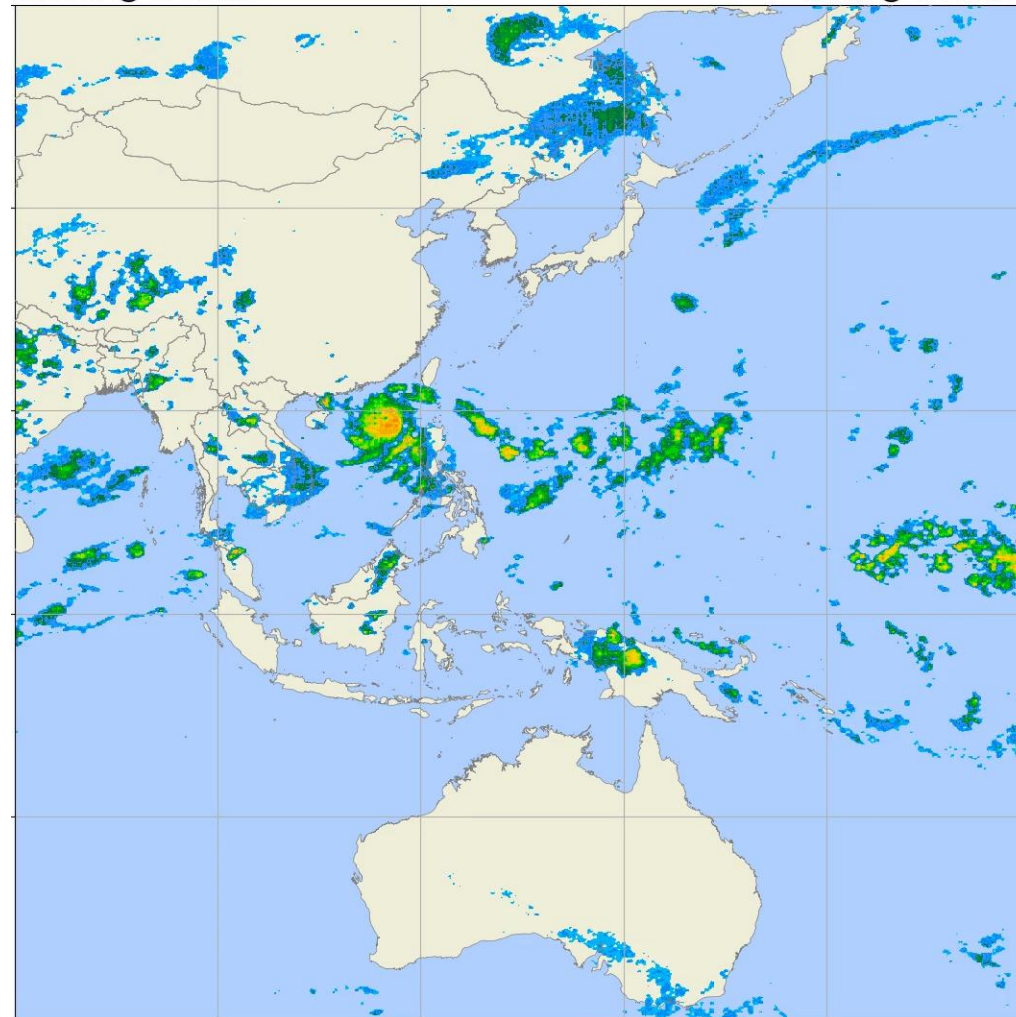
2024-09-04
Valid @ 14:20Z



ResConvLSTM-GAN

Reflectivity
Based @ 14:00Z

2024-09-04
Valid @ 14:20Z





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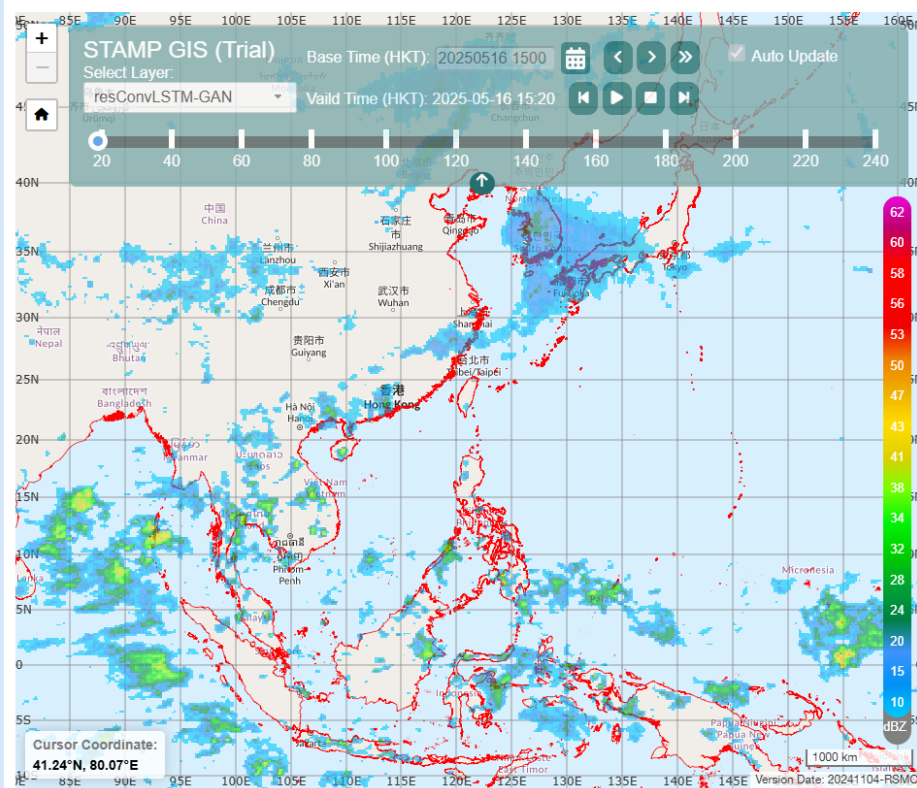
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Home Nowcasting Products Com-SWIRLS Research Development Verification Collaborations Training

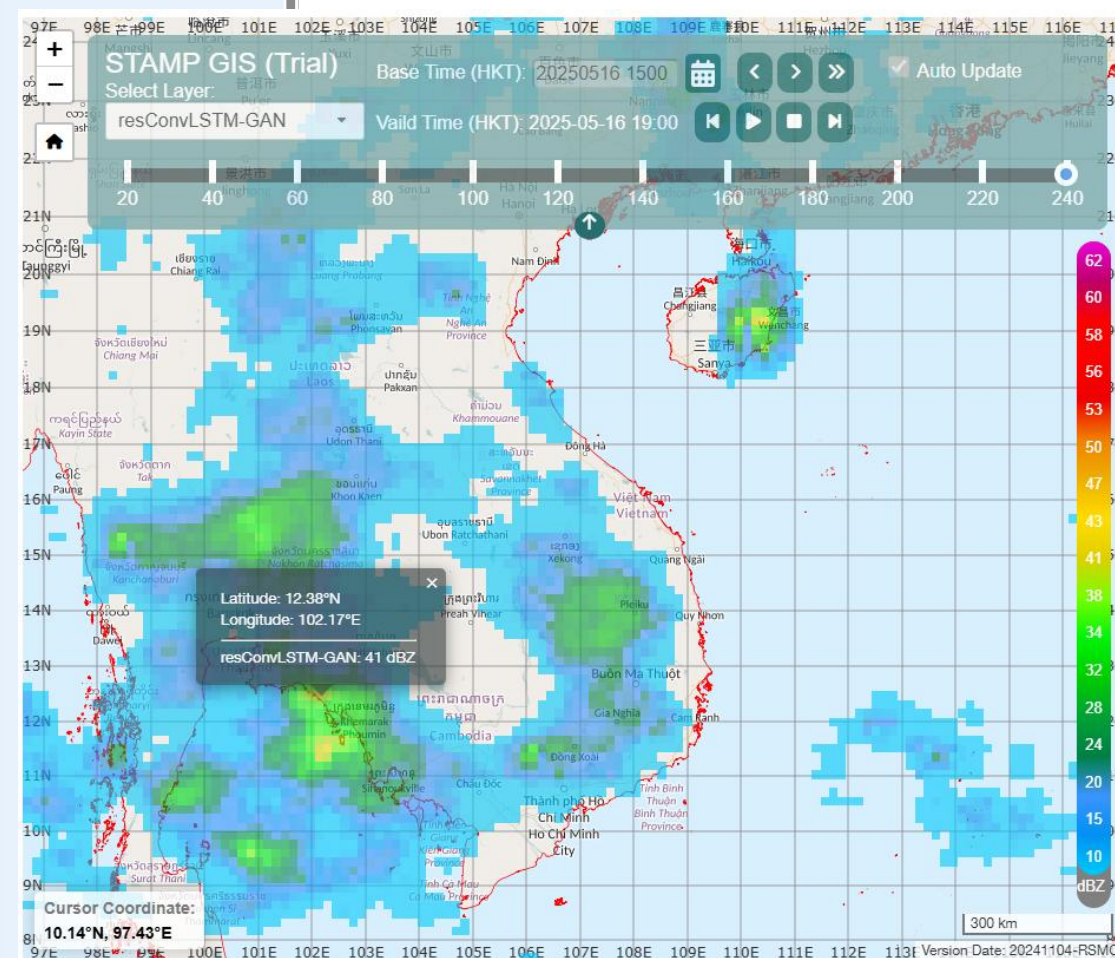
Hong Kong Observatory Nowcasting Services

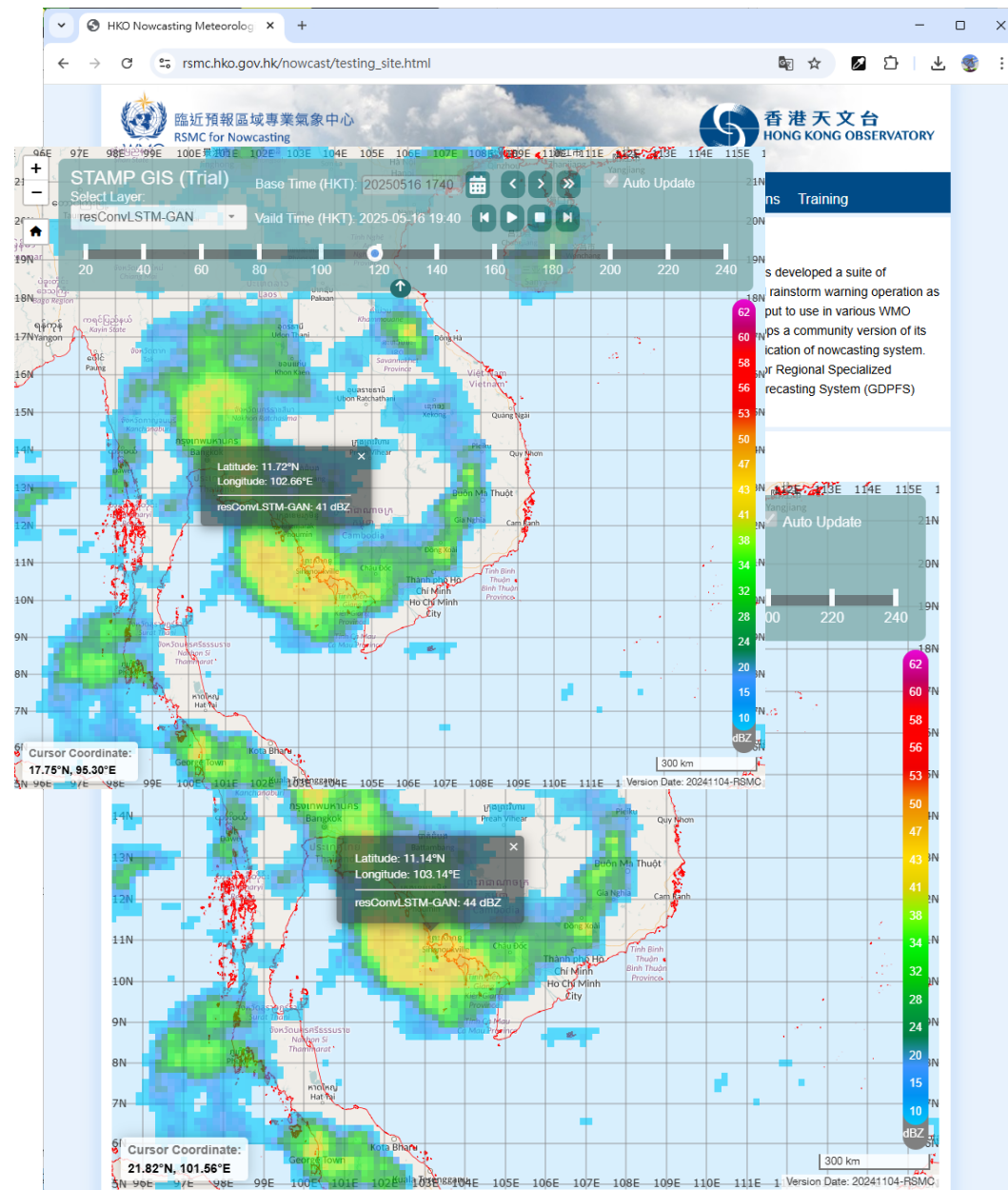
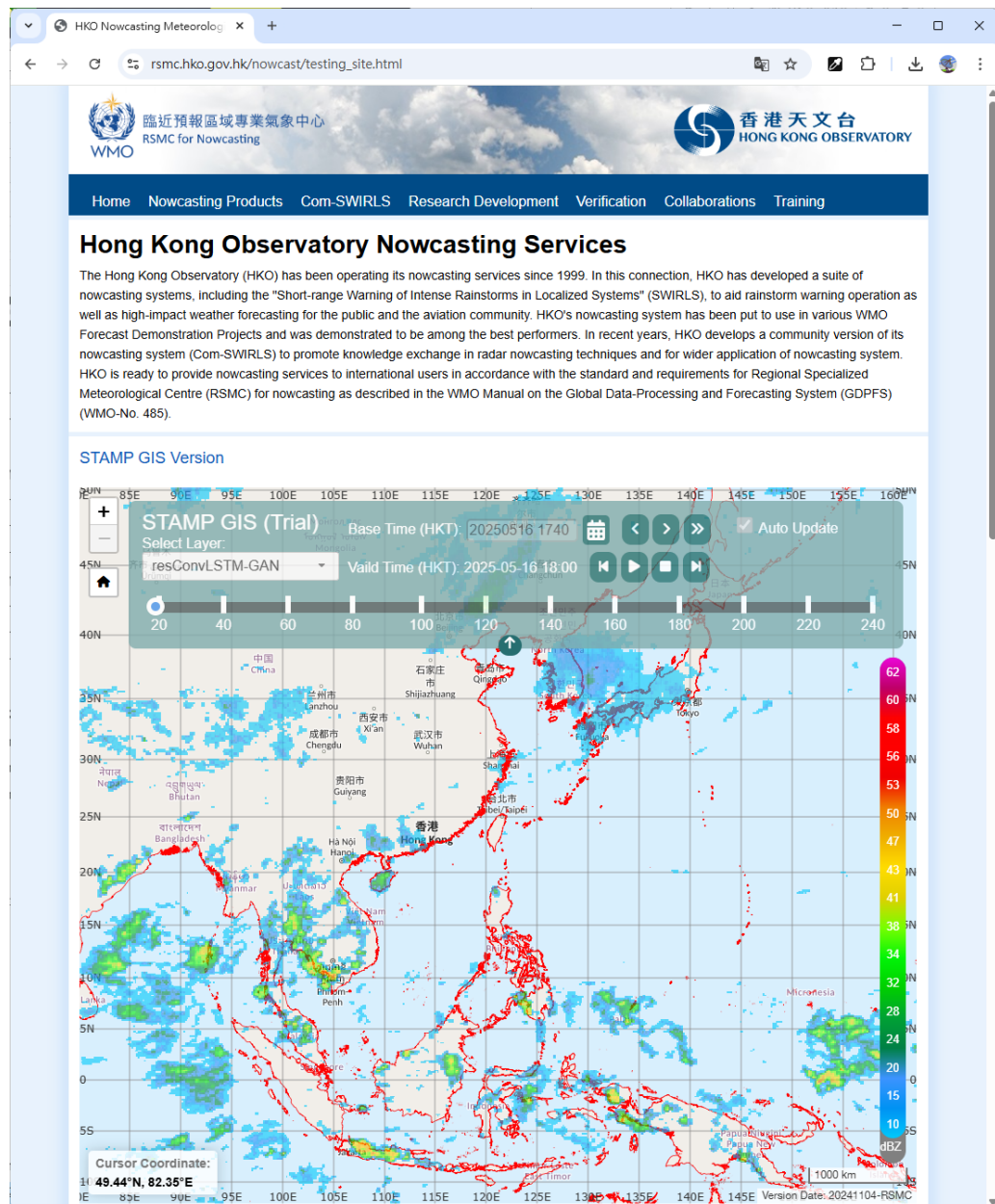
The Hong Kong Observatory (HKO) has been operating its nowcasting services since 1999. In this connection, HKO has developed a suite of nowcasting systems, including the "Short-range Warning of Intense Rainstorms in Localized Systems" (SWIRLS), to aid rainstorm warning operation as well as high-impact weather forecasting for the public and the aviation community. HKO's nowcasting system has been put to use in various WMO Forecast Demonstration Projects and was demonstrated to be among the best performers. In recent years, HKO develops a community version of its nowcasting system (Com-SWIRLS) to promote knowledge exchange in radar nowcasting techniques and for wider application of nowcasting system. HKO is ready to provide nowcasting services to international users in accordance with the standard and requirements for Regional Specialized Meteorological Centre (RSMC) for nowcasting as described in the WMO Manual on the Global Data-Processing and Forecasting System (GDPFS) (WMO-No. 485).

STAMP GIS Version



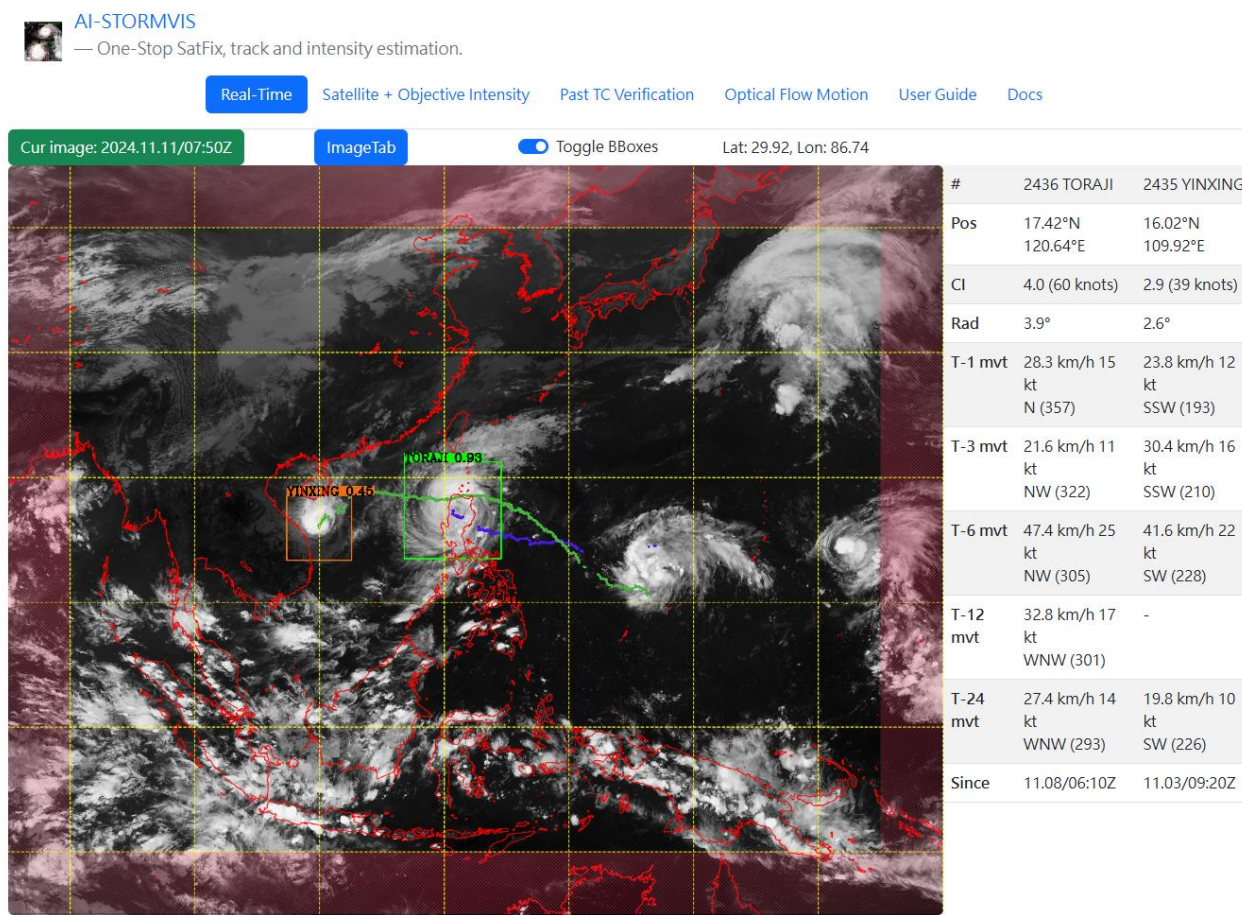
A new web-GIS tool showing
AI/ML nowcast product and
interactive visualization



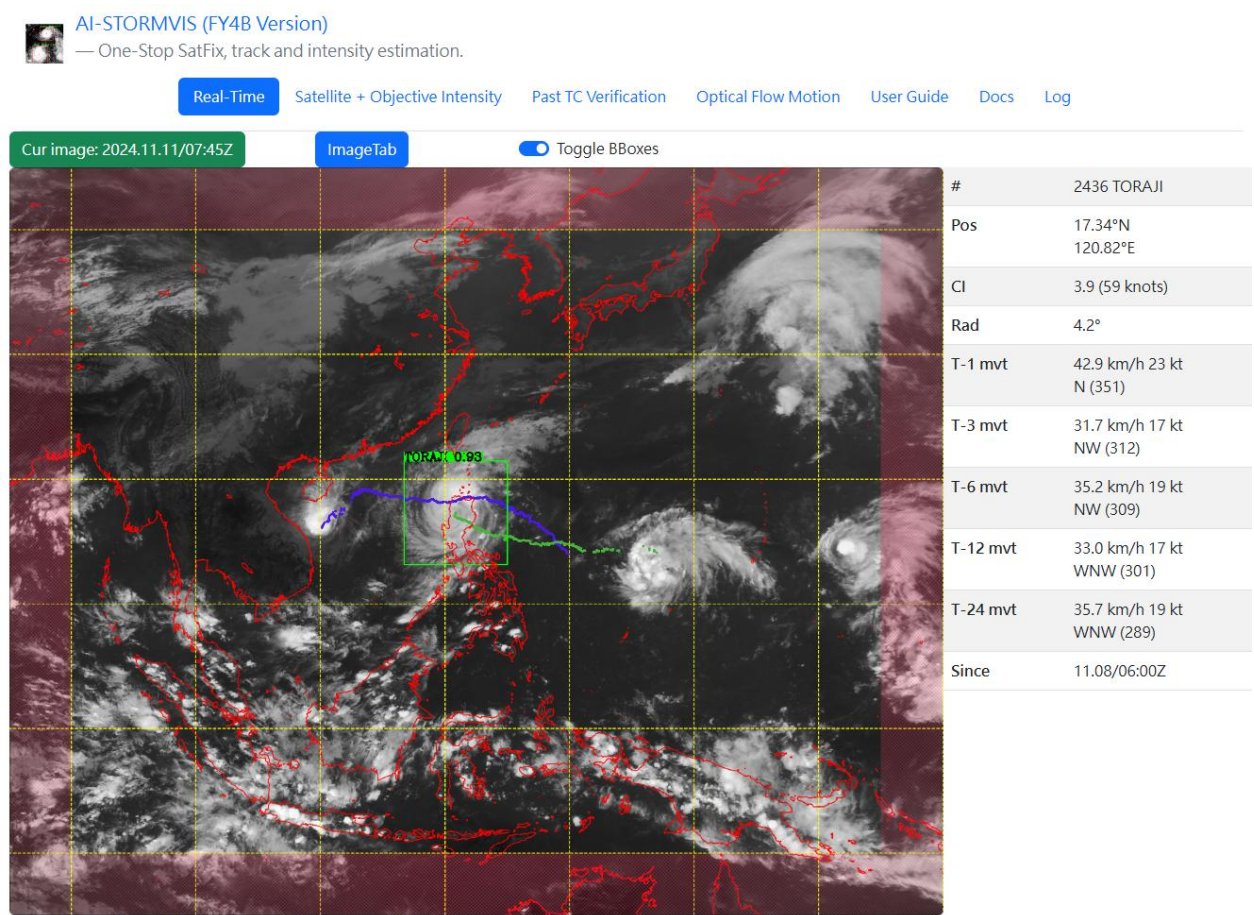


Use of AI/ML in nowcasting –

(2) Automatic Tropical Cyclone Position Fix, Intensity Estimation and Genesis



Note: Outputs in the red-shaded region may not be accurate as TCs could be recognised even without full image.



Note: Outputs in the red-shaded region may not be accurate as TCs could be recognised even without full image.



Thank you very much

Q&A

