International Civil Aviation Organization

INFORMATION PAPER

Asia and Pacific (APAC)
Twelfth Meeting of the Meteorological Requirements Working Group (MET/R WG/12)

Bangkok, Thailand, 02 to 05 May 2023

Agenda Item 4: Collaboration between MET services and ATM stakeholders

METEOROLOGICAL SERVICES RELATED TO TROPICAL CYCLONES FOR INTEGRATED AIRPORT CENTRE OF HONG KONG INTERNATIONAL AIRPORT

(Presented by Hong Kong, China)

SUMMARY

A team of meteorologists from the Hong Kong Observatory started to provide services to the Integrated Airport Centre of the Hong Kong International Airport in June 2022. This paper highlights the tailored services related to tropical cyclones for the Centre stakeholders in the tropical cyclone season of 2022.

1. INTRODUCTION

1.1 A team of meteorologists from the Hong Kong Observatory (HKO) has stationed at the Integrated Airport Centre (IAC) of the Hong Kong International Airport (HKIA) since June 2022. New briefing and consultation services have been provided to IAC stakeholders, with focus on meteorological risk assessment over the Hong Kong FIR (HK FIR) and East Asian Region. Details about the new services can be found in IP/03 of MET/R WG/11[1].

1.2 The western North Pacific (WNP) is the most active tropical cyclone (TC) basin in the world, and TCs often impact populous coastal cities in the region such as Hong Kong. The associated hazardous weather such as high winds, strong crosswinds, wind shear and thunderstorms would impact aviation safety and flow control. Therefore, timely and tailored TC services to facilitate flight management and planning are integral parts of the work of the stationed meteorologists.

2. DISCUSSION

2.1 The content of new services is illustrated through a few TC cases in 2022.

[1] "New Meteorological Services to Support the Operation of Integrated Airport Centre" can be accessed at https://www.icao.int/APAC/Meetings/2022%20METR%20WG11/IP03_AI.4_HKC_NEW-MET-SERVICES-TO-SUPPORT-THE-OPERATION-OF-INTEGRATED-AIRPORT-CENTRE.pdf.

Case 1: Severe Tropical Storm Nalgae in late October to early November

2.2 Nalgae was an unseasonal storm that affected Hong Kong and brought gale winds to parts of the city. Owing to its slow movement, local tropical cyclone signals were in force for more than 3 days. It came within 30 km of HKIA, and brought wind speed and crosswinds of above 30 knots and 20 knots to the airport respectively.

2.3 The development of Nalgae was closely monitored by HKO meteorologists. The aviation community was kept informed of its potential impact to HKIA and HK FIR through daily weather briefing in the morning (Figure 1). In the briefing, the duty meteorologist gave an overview of the forecast track, intensity and convections of the TC. The "Significant Convection Monitoring and Forecast" panel[2] assisted the description of the degree of impact of convections to boundaries of HK FIR, holding areas and arrival/departure corridors up to 12 hours ahead. The latest TAF was used to elaborate the weather impact over various periods including changes in crosswinds, and supplementary information about low-level winds, wind shear and turbulence were also provided if situation warrants.

2.4 The HKIA Probability Table was also routinely updated during the shift hours of meteorologists to reflect meteorological risks in the short term. During the day of 2 November, the Probability Table (Figure 2) was updated to reflect the increasing chance of high wind speed and crosswinds overnight, the time when Nalgae was forecast to be closest to HKIA. The period of significant crosswinds was predicted to be shorter than that of high wind speed due to veering of winds from generally northerly to easterly as the TC would pass to the south of HKIA later in the day.

Case 2: Typhoon Ma-on in late August

2.5 Ma-on, an intense tropical cyclone once forecast to hit Hong Kong directly, was a major concern to flight planning and precautionary actions of HKIA a couple of days before the closest approach. HKO, with the IAC team involved, was ready to make additional presentation to the aviation community whenever necessary. Around 100 representatives from various departments of the Hong Kong Airport Authority, airlines and relevant government departments attended the presentation for Ma-on. The presentation (Figure 3) covered the current analysis of the TC, potential track, alternative scenarios, and most importantly a provisional TAF covering the period that HKIA would be most affected. In fact, the presentation was held in the afternoon of 23 August and the provisional TAF covered the period of 24/00 – 25/06 UTC.

Case 3: Super Typhoon Hinnamnor in late August to early September

2.6 Apart from TCs having potential threat to HK FIR, HKO meteorologists also paid attention to TCs over WNP and the South China Sea that may affect regional airports. Hinnamnor was a Super Typhoon developed over WNP and eventually skirted the southeastern coast of the Korean Peninsula. On top of daily weather briefings, the TC's movement, development and impact to regional airports were also summarized in the Weather Tips Diagram. When Hinnamnor was over the East China Sea and forecast to move northwards, impact to airports like high winds, low visibility and showers were described in plain language, with reference to forecasts from HKO, domestic meteorological departments and TAFs (Figure 4).

Here to Assist

2.7 HKO meteorologists in IAC had a unique role in providing on-the-spot consultation services to the Hong Kong Airport Authority and airlines. In TC situations, meteorologists received

[2] More details about the panel can be found in Section 1.2 of "Regional Guidance for Tailored MET to Support ATM Appendix 1: Hong Kong, China": https://www.icao.int/APAC/Documents/edocs/2022-08_APPENDIX-1-HKC.pdf.

enquiries regarding the trend in weather, local weather warning signals, and time and probability of exceedance of any operational thresholds. Opportunity was also taken to explain the alternative scenarios and their likelihood, and adjust the focus of forecasts based on different concerns and risk appetite of stakeholders. HKO meteorologists also relayed the latest information and assessment from the headquarters and the Airport Meteorological Office to IAC.

2.8 In the future, HKO will explore more effective means to share the latest meteorological information with the aviation community. One additional weather briefing will be held in the afternoon on a trial basis later this year to provide updates of regional weather after the morning briefing. They are expected to benefit the stakeholders with updated assessment of rapidly-changing situations like thunderstorms or TCs. More airlines will be invited to the additional briefing. The HKIA Probability Table will also be enhanced in the coming phases by including elements of thunderstorms, low visibility and low-level wind shear, subject to verification results, so that meteorological risks related to aerodrome operations would be more comprehensively addressed.

3. ACTION BY THE MEETING

3.1 Note the information contained in this paper.

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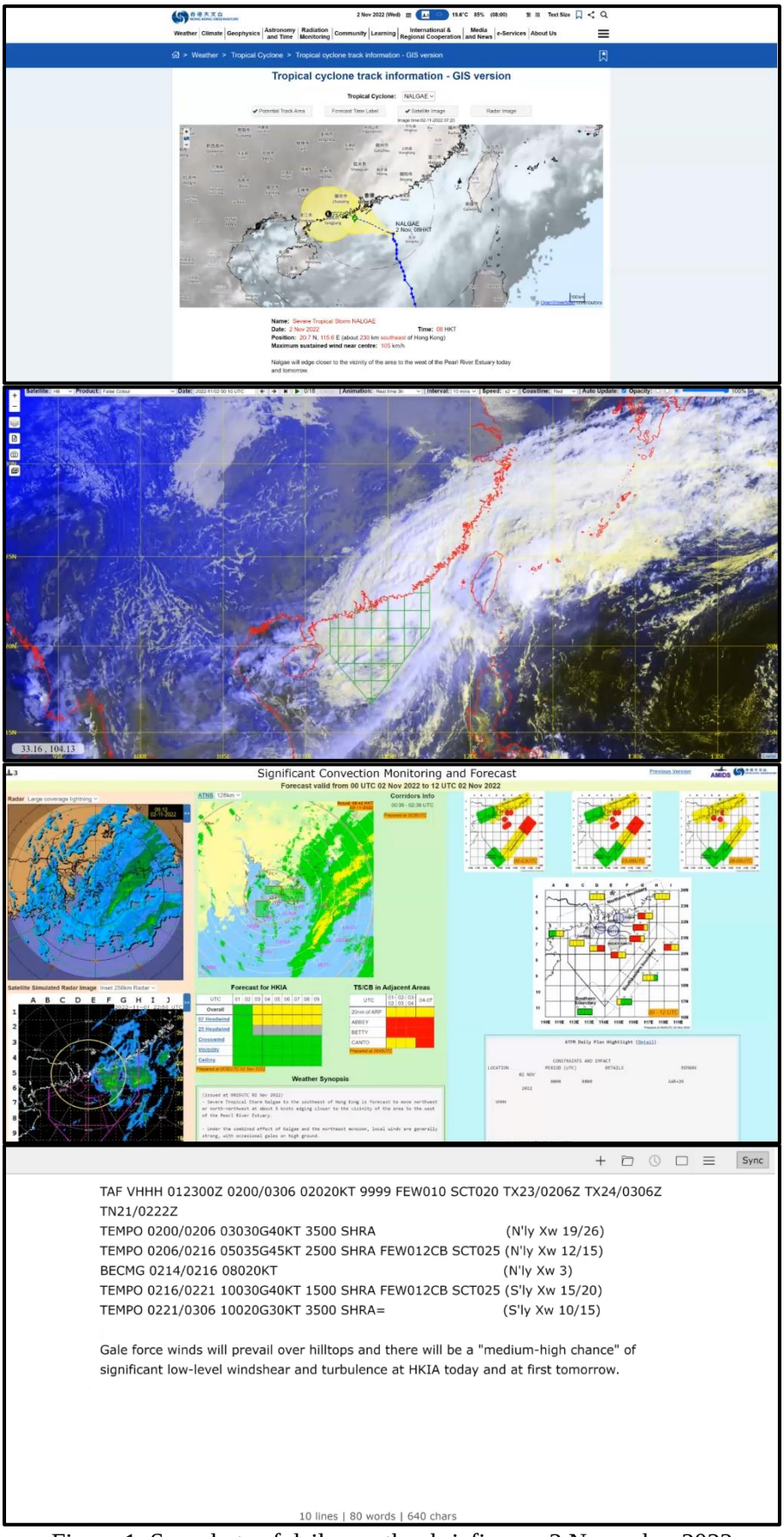


Figure 1: Snapshots of daily weather briefing on 2 November 2022

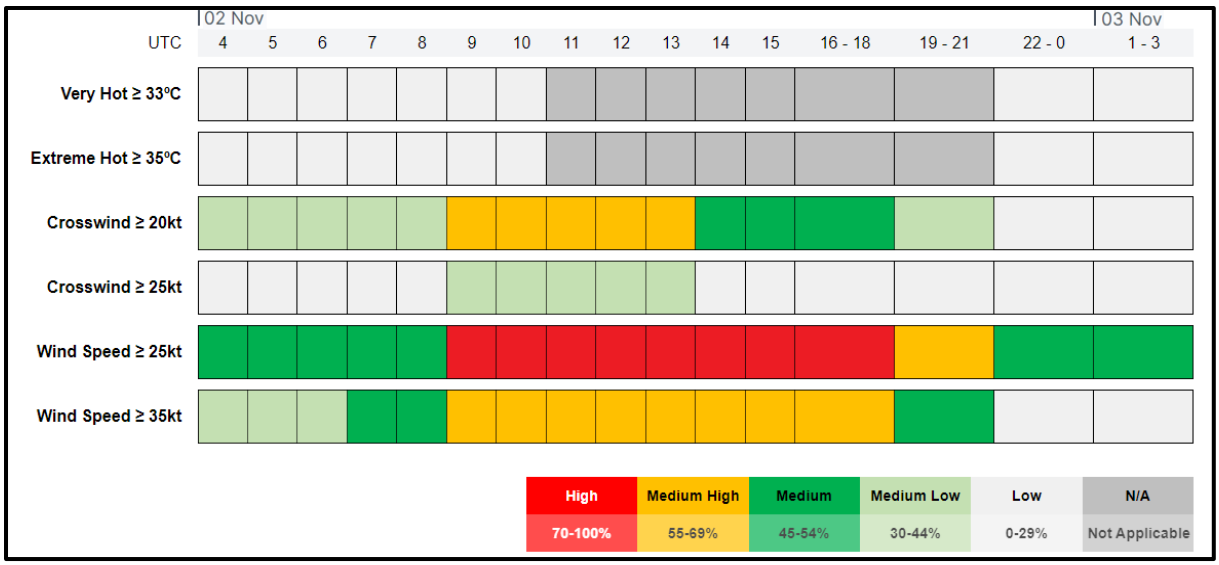


Figure 2: HKIA Probability Table issued at 04UTC on 2 November 2022

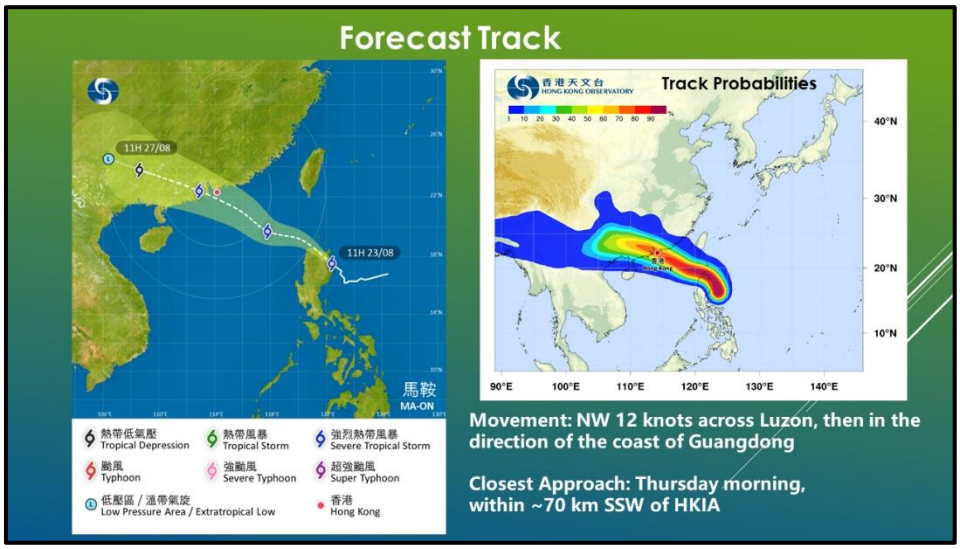
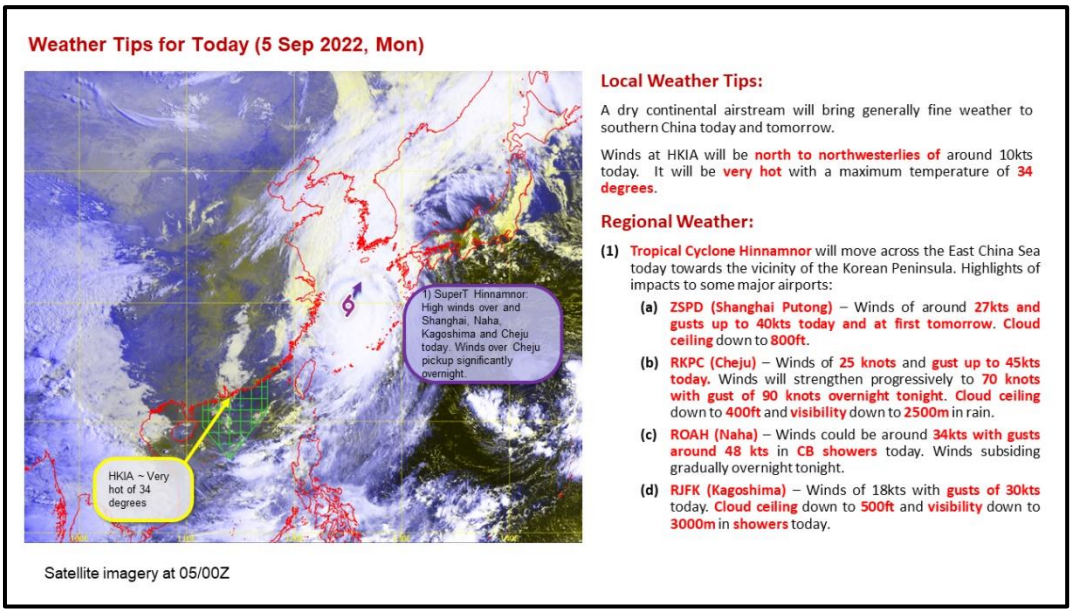


Figure 3: Presentation slides and a photo of the special weather briefing on 23 August 2022



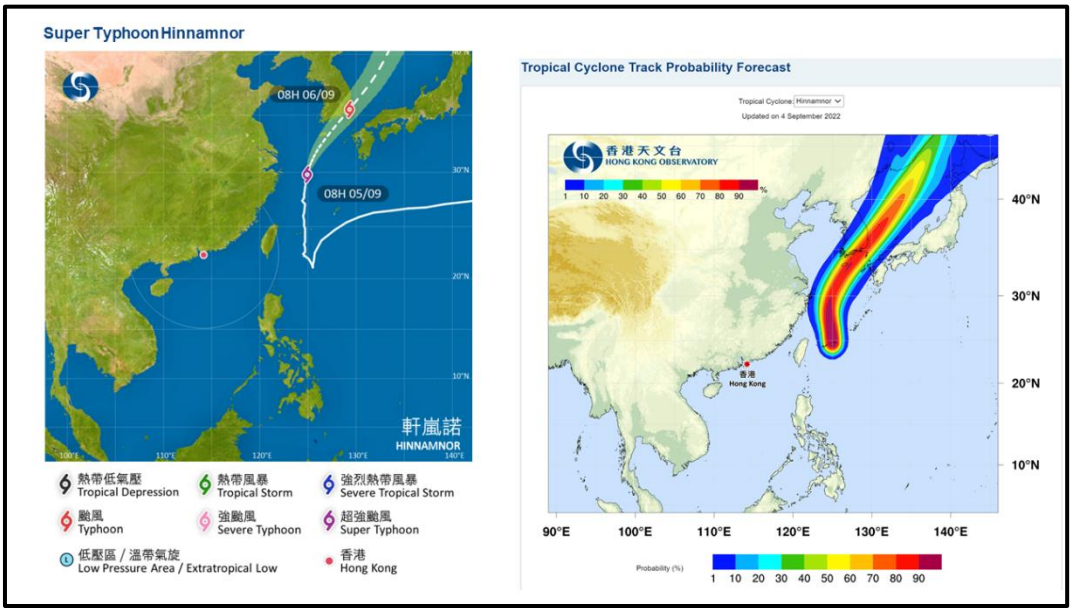


Figure 4: Weather Tips Diagram for 5 September 2022