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Montréal, 7 to 18 July 2014

Agenda Item 2: Improving the safety and efficiency of international air navigation through enhanced meteorological service provision

2.2: Enhanced integrated meteorological information to support strategic, pre-tactical and tactical operational decision-making from 2018 (including ASBU Module B1-MET)

FUTURE AERONAUTICAL METEOROLOGICAL SERVICE PROVISION

(Presented by China)

SUMMARY

This paper presents a number of key considerations on the development and the management and oversight of regional and global weather advisory centres to support the Aviation System Block Upgrades (ASBUs). Action by the meeting is in paragraph 3.

1. INTRODUCTION

1.1 ICAO has developed an Aviation System Block Upgrade (ASBU) methodology to achieve a harmonized upgrade of the air navigation services in a systematic manner. MET/14-WP/6|CAeM-15/Doc. 6 outlines the main thrust of ASBU Block 1 for aeronautical meteorological (MET) services to international air navigation. China supports ICAO's initiative in this regard and raises a few points on the future MET service provision for consideration of the meeting.

2. ESTABLISHMENT OF GLOBAL AND REGIONAL CENTRES

2.1 MET/14-WP/6|CAeM-15/Doc. 6 describes the broad evolution of a number of MET services, including the world area forecast system (WAFS) and the international airways volcano watch (IAVW) for successful implementation of ASBU module B1-AMET.

2.2 China commends the significant enhancement of WAFS and IAVW since their establishment and supports the broad evolution of local, regional and global meteorological services as proposed in MET/14-WP/6|CAeM-15/Doc. 6. However, it is considered that the development of the global and regional centres should be put in their proper historical perspective.

2.3 It is understood that the establishment of WAFS in 1982 was based on the then situation that not all States have numerical weather prediction (NWP) and satellite dissemination capabilities. Moreover from software development and application perspective, it would be much easier to represent the weather data on a well-defined grid.

2.4 However, during the past three decades, the global situation has changed significantly in that many States now operate NWP models with high spatial and temporal scales out to a week or more. At the same time, satellite dissemination technologies are no longer cost-effective compared to the Internet. Therefore apart from the WAFS model forecasts, there are many different global model forecasts which could be available for use, for en-route flight planning purpose, provided that they meet a required level of performance and internationally designated. Furthermore, many aerodrome meteorological offices and meteorological watch offices (MWOs) already have the technologies (regional NWP models downscaled from global models for providing even higher resolution regional forecasts, and nowcasting systems based on data from multiple observational platforms for predicting high impact weather in the short-term) and local expertise for providing meteorological services over a larger airspace, such as meteorological services for the terminal area (MSTA). Therefore in the future SWIM environment, it is expected that coupling of NWP models and nowcasting systems for different scales will be required to enhance the MET services for aviation users, i.e. it is clear that one size will not fit all in the future SWIM environment.

2.5 It should further be recognized that many of these facilities to support international air navigation, such as weather radars, lightning networks, NWP, nowcasting systems, etc are implemented by many States to support their own national meteorological and hydrological services (NMHSes). At present in many States, the aviation community has the benefit of utilizing such basic meteorological information from these facilities at little or even no additional cost under the current MET services provision. On the other hand, if all these data are to be shared to ensure that the future sub-regional, regional and multi-regional centres will have real-time access of data for sub-regional, regional and multi-regional service provision, it might not necessarily be more cost-effective as the NMHSes may start to charge for the provision of such data to these centres to cover their losses of income from MET services, not to say the significant communication investments to facilitate such real-time data exchanges for aviation purpose.

2.6 If a significant part of the forecast services is to be moved to the sub-regional, regional or multi-regional centres so that the MWOs are only responsible for low-level weather observations and forecasts at the aerodrome, the aviation users would miss the local knowledge and expertise of NMHSes, such as the influence of local topography on convection and turbulence which will still not be well predicted by the regional and global models in the foreseeable future, not to mention the local observations possessed by NMHSes for monitoring and prediction of volcanic ash and radioactivity dispersion. Furthermore, it will also be plausible that the investment by many capable States on the research and development of new observation and forecasting technologies and infrastructures for the high-density airspace and terminal areas would likely reduce, thus in the long term limiting the sustainable development of such MET services worldwide. Moreover, there are also survival issues for the NMHSes where MET services are their major source of income, especially for those in the developing world, such that even the very basic meteorological infrastructure in these regions will be jeopardized. Therefore, in considering the formation of sub-regional, regional and multi-regional centres to support international air navigation, mutual cooperation respecting equal opportunity, prerogative of States, sustainability of existing meteorological infrastructures and local expertise in addressing aviation user needs should be of utmost importance.

2.7 Politically, while the strategic combination of MET services provision across a number of States may be plausible for some regions (e.g. Europe and Australia/New Zealand), such service provision model may not be applicable in other parts of the globe. Furthermore, for hazards that are more sensitive, such as radioactivity, such model may also create liability and coherency issues where the advisories from the regional centre do not agree with the national radiation authority.

2.8 From users' perspective, while coherency of weather information across flight information region (FIR) boundaries features high in their consideration, the accuracy, credibility and fit-for-purpose of the weather information are equally, if not more, important. Verification suggests that for certain regions, the tropical cyclone track forecast issued by some NMHSes could be more accurate than that provided by the

associated Tropical Cyclone Advisory Centre (TCAC). This is particularly important for aerodromes where small variation in the tropical cyclone track would have a great impact to air traffic, and thus it is considered that the coherency of weather information across FIR boundaries should not be the only consideration here.

2.9 While airlines and pilots are major users of aviation weather services in the future trajectory-based operation, we should never lose sight of the needs of air traffic services (ATS) and air traffic management (ATM). Noting the varying needs of ATS/ATM due to the local considerations, it is unlikely that a global model/solution would fit all. Moreover the proximity of the local meteorological service provider and ATS/ATM would facilitate collection of user feedback and post-event analysis. It is thus considered that the means to meet the ATS/ATM requirements should best be determined by the meteorological authority in consultation with the ATS authority of the State. It is of benefit, in the future trajectory-based operation, for the airlines and pilots to use the same data set as the local ATS/ATM for common situation awareness. The cross-over point, from en-route data provided by global or regional centres, to terminal data provided by MWO may also vary from State to State. In line with the Chicago Convention principle that "international air transport services may be established on the basis of equality of opportunity" and considering the discussions above, the meeting might like to concur that the prerogative to provide MET services, including but not be limited to issuing observations, forecasts and warnings for the aerodrome as well as weather services for the larger terminal areas and high density airspace, should continue to rest with States, especially for States with demonstrable MET capability.

2.10 It should be noted that the Chicago Convention already allows for sub-regional, regional and multi-regional arrangements to meet their ICAO obligations on either a national, cross-border, or multi-state or regional level. The regional cooperation being developed in Europe to meet the objectives of Single European Sky is also noted. Another successful model is the delegation of SIGMET issuance of Cambodia to Chengdu MWO of China. China supports the call for ICAO to facilitate States in this endeavour but on the understanding that it remains the right of States, viz. the meteorological authority, to determine how to provide in its territory the MET services that best fits its own operational conditions to support international air navigation, in accordance with the standards and recommended practices in the spirit of Article 28 of the Convention.

2.11 With regard to the suggestion that regional centres be best established as international consortia with States within respective regions holding an equal share of funding responsibilities where the funding be achieved through a global levy system operated by a third party international body, it is considered that such proposed arrangement may work over some regions (e.g. Europe and Australia/New Zealand) where the level of development and volume of air traffic are similar but might not work in others. It is thus considered that the funding mechanism should be further deliberated, possibly allowing for flexibility for different models, such that they could be acceptable by the States concerned, taking into consideration of the regional differences.

2.12 Appendix B of MET/14-WP/6|CAeM-15/Doc. 6, sets out the roadmap for the establishment of Regional Hazardous Weather Advisory Centres (RHWAC). Three phases are proposed, in particular, phase 1 suggests that advisory messages be provided by RHWACs to assist MWOs in the issuance of SIGMETs, before the replacement of SIGMETs by advisory messages in the phase 2.

2.13 There is a suggestion that phase 1 be removed and directly goes to phase 2. However, as discussed in paragraph 2.11 above and Appendix C of MET/14-WP/6|CAeM-15/Doc. 6, the cost-recovery mechanism for regional hazard weather centres is still to be deliberated. Moreover, thorough trial of the whole concept over all regions has yet to be conducted, in particular, to assess whether the advisories provided by the RHWACs are "fit for purpose" and meet the user requirement such as the accuracy, timeliness and consistency of the advisories in response to the occurrence of hazardous weather, coherency between advisories and MSTA products from MWOs, etc. The meeting might like to concur that a directly transit to phase 2 is premature.

2.14 The meeting is invited to formulate the following recommendation:

Recommendation 2/x — Review of MET information service provision framework to reflect GANP objectives

That ICAO:

a) review the existing "MET information service provision framework" as laid down by Annex 3 — *Meteorological Service for International Air Navigation*, in consideration of the emerging needs from users, including ATS/ATM, for consistent, coherent, accurate, credible and fit-for-purpose MET information in support of the overall objectives of the GANP;

b) facilitate where requested, for MET service provision to be done locally, sub-regionally, regionally, multi-regionally and globally and local, sub-regional, regional, multi-regional and global user communities could use this information in their operations, guided by mutual cooperation respecting equal opportunity, prerogative of States, sustainability of existing meteorological infrastructures and local expertise in addressing aviation user needs;

c) coordinate effort in the:

i) future development of provisions for meteorological information for flight planning and provisions for information concerning volcanic ash, space weather and the release of radioactive material into the atmosphere;

ii) implementation and the phase-by-phase transition to a regional advisory system for selected en-route hazardous meteorological conditions;

iii) MET support to trajectory-based operations in general and collaborative decision-making at the airport and network levels; and

iv) development of guidance for States concerning how their ICAO obligations may be met in the context of local, sub-regional, regional, multi-regional and global MET.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) consider the adoption of the draft recommendation proposed for the meeting's consideration.

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