THE REGIONAL FORUM ON METEOROLOGICAL SERVICES
FOR AVIATION SAFETY IN SOUTHEAST ASIA

JAKARTA, INDONESIA
29–30 APRIL 2015

FINAL REPORT

WORLD METEOROLOGICAL ORGANIZATION
Participants in the Regional Forum on Meteorological Services for Aviation Safety in Southeast Asia (Jakarta, Indonesia, 29 April 2015)
The Regional Forum on Meteorological Services for Aviation Safety in Southeast Asia
(Jakarta, Indonesia, 29–30 April 2015)

EXECUTIVE SUMMARY

The Regional Forum on Meteorological Services for Aviation Safety in Southeast Asia was held in Jakarta, Indonesia, at the Headquarters of the Agency for Meteorology, Climatology and Geophysics of the Republic of Indonesia (BMKG) from 29 to 30 April 2015 with the participation of Directors and/or senior officials from nine National Meteorological and Hydrological Services (NMHSs) providing aviation meteorological services in Southeast Asia, representatives of international organizations and regional partners, airlines, air traffic services, and the volcanological institute.

The objective of the Regional Forum was to discuss the current status of provision of meteorological services to aviation stakeholders with focus on:

- Institutional arrangements for aviation meteorological services – roles and responsibilities of stakeholders;
- Compliance with ICAO and WMO requirements on the Quality Management System (QMS) and competency;
- Technological level to support MET services for aviation; and
- Deficiencies (as per the ICAO regional List of air navigation deficiencies).

The Forum adopted “Jakarta Recommendations on Regional Cooperation for Enhancing Meteorological Services for International Air Navigation by the WMO Member States in Southeast Asia” for the aviation safety in Southeast Asia, which includes the needs of:

- Compliance with ICAO and WMO requirements on the provision of requisite services, METAR, TAF, SIGMET, information on volcanoes’ pre-eruptive activities, Quality Management System (QMS), Competency and Qualifications of the Aeronautical Meteorological Personnel;
- Improved communication and cooperation with the aviation stakeholders including MET Authority and Civil Aviation Authority (CAA), Air Traffic Services, Airline operators, Airports, and VA institutions;
- Alignment of national and regional development planning with the ICAO Global Air Navigation Plan (GANP) and its Aviation Systems Block Upgrades (ASBU) methodology; and
- Coordination between WMO and ICAO in the region.
The Regional Forum on Meteorological Services for Aviation Safety in Southeast Asia
(Jakarta, Indonesia, 29–30 April 2015)

GENERAL SUMMARY OF THE WORK OF THE FORUM

1. Opening

1.1 At the kind invitation of the Government of the Republic of Indonesia, the Regional Forum on Meteorological Services for Aviation Safety in Southeast Asia was held in Jakarta, Indonesia, at the Headquarters of the Agency for Meteorology, Climatology and Geophysics of the Republic of Indonesia (BMKG) from 29 to 30 April 2015.

1.2 The Regional Forum was attended by Directors and/or senior officials from nine National Meteorological and Hydrological Services (NMHSs) providing aviation meteorological services in Southeast Asia, representatives of international organizations and regional partners, airlines, air traffic services, and the volcanological institute.

1.3 Dr Andi Eka Sakya, Director-General of the Agency for Meteorology, Climatology and Geophysics of the Republic of Indonesia (BMKG) welcomed the participants to Jakarta. He stressed on the importance of the meteorological service for aviation in a region characterized by a number of meteorological hazards – tropical cyclones, severe convective storms, active volcanoes. Dr Sakya wished the participants a very successful Forum and an enjoyable stay in Jakarta.

1.4 In his keynote address, Dr Chung Kyu Park, Director of Regional Office for Asia and the South-West Pacific, World Meteorological Organization (WMO), thanked the Government of the Republic of Indonesia and BMKG for hosting the Regional Forum. He extended his gratitude to Dr Andi Eka Sakya, Permanent Representative of Indonesia with WMO, and his staff for the warm welcome and hospitality and for the excellent arrangements made to ensure the success of the Forum. Dr Park noted that aeronautical meteorology has been recognized as one of the five key priorities in the WMO Strategic Plan for 2012–2015, especially for the urgent need to assist Members to achieve compliance with the ICAO and WMO standards on Quality Management and competency for aeronautical meteorological personnel and stressed that a close cooperation among the aviation community is an essential contribution to the aviation safety in the Region.

1.5 Mr Peter Dunda, Regional Officer, Aeronautical Meteorology, Asia and Pacific Office, International Civil Aviation Organization (ICAO), thanked the Government of the Republic of Indonesia and WMO for organizing, and BMKG for hosting, the Forum and for inviting ICAO to the Forum. He emphasized the importance of coordinating the regional activities of WMO and ICAO in order to enhance the provision of the aeronautical meteorological services and resolve related deficiencies in the air navigation field.

1.6 Mr Suprasetyo, Director General of Civil Aviation, Ministry of Transportation of the Republic of Indonesia, representing the Minister of Transportation, welcomed the participants to the Forum. He mentioned that the Ministry of Transportation had published numerous regulations and programmes in the last five years in line with global endeavor for aviation safety. Mr Suprasetyo noted that the Global Air Navigation Plan (GANP) and Aviation System Block Upgrades (ASBU)

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1 The presentation materials and relevant documents for Regional Forum on Meteorological Services for Aviation Safety in Southeast Asia are available on the WMO web site: https://sites.google.com/a/wmo.int/aviation-seasia_2015/

2 A deficiency is considered to be a situation where a facility, service or procedure does not comply with a regional air navigation plan approved by the ICAO Council, or with related ICAO Standards and Recommended Practices, and which situation has a negative impact on the safety, regularity and/or efficiency of international civil aviation.

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methodology should be implemented in the future at national or sub-regional level and stressed that regional cooperation mechanism should be developed among the states to ensure the implementation of the methodology. Mr Suprasetyo declared the opening of the Forum.

1.7 Mr Chi-ming Shun, President of WMO Commission for Aeronautical Meteorology (CAeM), delivered a keynote presentation entitled “Aviation Meteorology – Need for Upgrades in the Next Decade and Beyond”. In his talk, Mr Shun stressed that in order to achieve the goals for improved safety, efficiency and safeguarding the environment, the aviation meteorology should be prioritized as a key enabling factor, in order to respond to the challenges of the strong growth of aviation transport sector with a demand for capacity. With proper governance, strong leadership, and close cooperation with all stakeholders, aviation MET could become, in the foreseeable future, a self-sustained sector, a “service of excellence” and a role model for other service areas provided by the NMHSs. Mr Shun also mentioned that the 17th WMO Congress in May 2015 would call for a long-term prioritized planning of aviation MET, respective regional plans and an intensive capacity development programme would be developed with focus on the developing and least developed Members.

2. Aviation hazards in the region and related services for aviation users

2.1 Dr Yunus S. Swarindto, BMKG, gave a presentation on the main aviation hazards in the tropical Region. He stressed that the forecasting of tropical weather is a major challenge. The phenomena accompanying convective storms, such as heavy rain, microbursts, strong winds, turbulence are the risk factors. Dr Swarindto also noted that the Indonesian National Transportation Safety Committee (NTSC) had attributed 30% of the aviation accidents in the last 3 years to bad weather and that Air Asia QZ-8501 had been shown as an example of severe weather impact on safety.

2.2 Mr Emile Jansons, Darwin Volcanic Ash Advisory Centre (VAAC), Australia, gave a presentation “Keeping Aircraft Clear of Volcanic Ash”. In his talk, Mr Jansons noted that Southeast Asia was the region with the largest number of active volcanoes in the world and that the Galunggung eruption (Indonesia) with its impact on BA 009 flight had been a major factor leading to the establishment of the ICAO International Airways Volcano Watch (IAVW). He mentioned that the number of Volcanic Ash advisories issued by VAAC Darwin had been growing mostly due to the advancement of the capabilities for detection of volcanic ash clouds through satellite information. He added that further improvements were expected with the utilization of the high resolution HIMAWARI information.

2.3 Ms Naoko Komatsu, JMA, gave a presentation “ICAO TCAC Services and JMA’s role as RSMC/TCAC Tokyo”. She explained the role and operations of the Tropical Cyclone Advisory Centres (TCACs) in accordance with the relevant ICAO Standards And Recommended Practices (SARPs) and presented examples of the operational products in text and graphical format and details of the operational procedures of TCAC Tokyo. She also added that Regional Specialized Meteorological Centre (RSMC) Tokyo held training courses on tropical cyclone analysis and forecast intended for the forecasters in the countries within its area of responsibility.

2.4 In response to three presentations, the following remarks were raised:
- Runway contamination (standing water) is also considered as an important factor for aviation incidents and the lack of information for this phenomenon is a concern for the pilots.
- Pilots would appreciate a better (3-D) description of cloud layers based on satellite information in order to improve the situational awareness.
- Pilot reports are very important source of near-real-time information on hazards, but they are not utilized properly; it is important to consider how to improve their availability and usage.
- The importance of the MET service for Search and Rescue (SAR) operations following major natural catastrophes should be recognized.
• Volcanic Ash Advisory (VA) and Tropical Cyclone Advisory (TC) services in the region are at state-of-the-art level, but SIGMET-related deficiencies are still an issue for most countries.
• The necessary monitoring of hazard and phenomena is inadequate in some parts of the region due to lack of infrastructure capacity (e.g., weather radar networks).
• There is a specific challenge related to the low predictability of tropical weather, in particular for long-haul flights – this should be a major area for future improvement.

3. Current status of provision of meteorological services

3.1 Representatives of NMHSs in Southeast Asia reported briefly on the current status of provision of meteorological services to aviation stakeholders with focus on:
• Institutional arrangements for aviation meteorological services – roles and responsibilities of stakeholders;
• Compliance with ICAO and WMO requirements on the Quality Management System (QMS) and competency;
• Technological level to support MET services for aviation; and
• Deficiencies (as per the ICAO regional List of air navigation deficiencies).

3.2 The country presentations showed the existing diversity of the service delivery level, based on the different level of institutional and technical capabilities as well as different level of aviation activities and related demand for services.

3.3 Several countries demonstrated advanced capabilities and good level of compliance with the ICAO and WMO requirements, as follows:
• Indonesia, Malaysia, Thailand – well developed infrastructure over large territory, including weather radar networks. There are good relations with national aviation stakeholders. QMS requirements have been fulfilled including ISO 9000 certification. Most SIGMET deficiencies in these countries have been resolved by 2014.
• The competency assessment (CA) of the aeronautical meteorology personnel is in progress, but there is a need for further capacity development, including training.
• There is progress in establishing formal arrangements or service level agreements between the MET service providers and national stakeholders, e.g., Memorandum of Understanding (MoUs) with Air Traffic Service (ATS) providers, volcanological institutes, etc.
• Singapore goes one step further by implementing a Safety Management System (SMS). Development and utilization of advanced products (beyond current Annex 3 requirements) has also been reported, like MET support for terminal area (MSTA).
• Some countries have well designed aviation MET web pages that are used as an additional information source to brief pilots – such development should be encouraged.
• Philippines’ PAGASA plans to complete the QMS ISO certification by August 2015 (to be able to do the certification under the current ISO 9001:2008 standard before the introduction of the new 9001: 2015 standard later this year).

3.4 Several countries need assistance and capacity development in most areas of aeronautical MET services (Cambodia, Lao People’s Democratic Republic, Myanmar and Viet Nam), e.g., QMS and CA requirements, SIGMET. WMO should consider such assistance in coordination with ICAO.

3.5 The Forum noted that more discussion would be necessary regarding funding and cost-recovery issues.

4. Coordination with aviation stakeholders

4.1 Representatives of aviation stakeholders gave presentations on various subjects concerning coordination with MET services, including dissemination of volcanic ash information for producing SIGMET and coordination in the development of services infrastructure.
4.2 Mr Peter Dunda, Regional Officer, Aeronautical Meteorology, Asia and Pacific Office, ICAO, provided an overview of the ICAO standards for meteorological service recognized as necessary for the safety and regularity of the international air navigation. He emphasized the issues associated with implementation of the ICAO standards in the Southeast Asia region and the activities coordinated by the ICAO aimed at improving aeronautical meteorological service in the region. He highlighted the following implementation issues:

- Provision of volcanic ash information;
- Responsibilities for Meteorological Watch Office and the provision of SIGMET information;
- Use of WAFS products by aerodrome meteorological offices;
- Attention was also drawn to potential contributing factors such as governance issues related to the overall performance of the service, which include:
  - The designation of meteorological authority;
  - The establishment and implementation of quality management systems; and
  - Cost recovery mechanisms for aeronautical meteorological services.
- He added that ICAO was working through the Asia Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) bodies to assist Members to resolve those issues.

4.3 Mr Martin Eran-Tasker representing the Association of Asia Pacific Airlines (AAPA) highlighted the rapid growth of aviation in Asia/Pacific with very thin profit margins for airlines and need to maintain and improve safety performance. He noted the following issues to be considered for improvement of aeronautical meteorology:

- Key to safe operations is the accuracy of weather reporting and forecasting;
- Need for real time and up to date weather information once the flight is airborne;
- Identify and recognize deficiencies – very often safety related, and urgent actions to fix them;
- Utilize modern technology and tools that are currently available to improve weather reporting and forecasting;
- Implement tools which allow the system to use all available aircraft observations; and
- Promote the role of MET in the Air Traffic Management (ATM), progressively recognized as an integrated necessity for future operations. In this regard, some of the existing ICAO and States’ tools and products are not suited for direct ATM use.

4.4 Captain Jaffar Hassan, International Federation of Airline Pilots’ Associations (IFALPA), briefed on IFALPA’s vision on weather. While presenting some examples of essential meteorological information in graphic form which are available electronically, he pointed out that not all were accessible to pilots in-flight and even at dispatch. He emphasized the safety and economic benefits in giving pilots continuous access to real time weather and meteorological information in all phases of flight. Captain Hassan made concrete proposals for improved meteorological information as follows:

- Weather information presented to pilots should have the same information content as that available on the ground and in automatic systems;
- Access to the information should be continuous and available while on the ground as well as in the air; the information should be displayed in easy to understand, preferably graphical form;
- Weather graphics should make use of colour to highlight important phenomena;
- Low latency ground-radar and satellite pictures, such as those available via high-speed datalink or onboard Internet, should be available for the duration of the flight;
- The planned flight – track should be displayed on charts and pictures; and
- Independence of their period of validity, routine TAF should be issued every 3 hours.

4.5 Mr Amran, Airnav Indonesia, presented the current status and future plans in Indonesia for modernizing the air traffic management in coordination with all aviation stakeholders. This includes further reorganization and consolidation of the airspace and related services to achieve better
quality and efficiency. He also emphasized that an excellent cooperation between the Airnav Indonesia and BMKG had been maintained under the MoU, signed on 11 June 2014.

4.6 Captain Lucky Luksmono from Garuda Indonesia Airlines gave a presentation on meteorological services from airline perspectives. He expressed concerns about lack of information for some smaller airports and suggested some possible “quick fixes”, e.g., inclusion of additional airports in VOLMET, better use of amended TAF (TAF AMD), better information for domestic flights, wind shear warnings and alerts at exposed airports.

4.7 Mr I Gusti Made Agung Nandaka, Center for Volcanology and Geological Hazard Mitigation (PVMBG) provided an overview of the arrangements for volcano monitoring and collaborative mechanisms for exchange of volcanic activity information in Indonesia. He stressed on the good progress achieved in recent years and good cooperation with VAAC Darwin which raised the capabilities for providing timely information for volcanic ash in the most volcano-active region in the world.

4.8 Important questions and messages from users’ presentations were summarized as follows:

- Safety is a non-competitive issue for airlines – should be regarded as a fundamental property and treated equally by all stakeholders (one such example would be international vs. domestic operations);
- Accuracy, timelines, fitness for purpose of weather reports and forecasts is a key to safe operations;
- Better integration of MET information in ATM – key enabler of future ATM (this is linked to the main ICAO Global Air Navigation Plan (GANP) and Aviation System Block Upgrades (ASBU) objectives);
- Concerns about slow implementation of existing modern technology into operational service provision (not a regional issues – need to be considered by regulators and international organizations concerned); and
- The cooperation between pilots – ATM – MET is a major factor, they have joined challenges and need to address them together.

5. Panel discussion on needs and priorities for aviation safety

5.1 Five panellists were invited to express their views on need and priorities for aviation safety.

5.2 Mr Peter Dunda appreciated the very open exchange between users and providers and stressed that such interaction with users provides a good opportunity to learn more about their needs. He recommended that the actions coming from this meeting should be well coordinated with the existing bodies of the ICAO APANPIRG. The MET Sub-group of the APANPIRG should be the appropriate body to address any issues to be considered by ICAO. The priority should be put on resolution of deficiencies, e.g., those related to information and services for volcanic ash. Another issue that emerged from the discussions was the availability and use of aircraft reports, in particular, the special aircraft reports which provide important information about the hazard observed/experienced by aircraft. Other issues raised by users, such as RWY contamination and standing water, that are not of pure meteorological nature, should be addressed by appropriate ICAO groups on airport safety. He concluded his talk saying that ICAO welcomed that the meeting reinstated the importance of operational performance, e.g., quality and sustainability; progress is well noted, but efforts should continue to raise the capacity of all countries to comply with the respective ICAO and WMO requirements.

5.3 Capt. Jaffar Hassan, representing IFALPA, appreciated the efforts by Indonesia for enhancing their MET service to aviation and also for facilitating the regional cooperation in this regard. Noting the role of the weather factor as part of the causes for accidents, the question is: are accidents avoidable? In this regard, the MET community should investigate what could be done better to assist pilots with more accurate information about weather hazards. It is crucial to work together, look for new ideas, improve the exchange of information, etc. He expressed his very
positive impression for the meeting, which was a step into a right direction and wished that the dialogue should continue.

5.4 Mr Martin Eran-Tasker stressed that the meeting was very useful and outlined some clear messages. It was a good starting point of an extensive dialogue between providers and users that would help to raise their mutual awareness of needs and problems. Noting that both ICAO and WMO work on the aviation meteorology, he recommended that their programs and actions be better integrated with due account of their respective priorities. He expressed his great satisfaction of the meeting and stressed that such sessions should be conducted more often as they provide for an open exchange and sharing best practices. He emphasized that the recent Air Asia accident could happen anywhere, but highlighted some deficiencies and lessons learnt were important and thus, further dialogue of the stakeholders was strongly supported.

5.5 Ms Chin Ling Wong, on behalf of the participating WMO Members, noted the importance of compliance with WMO and ICAO requirements. She emphasized that more concerted efforts be made to address the long-standing issue of SIGMET deficiencies in the region, and supported the proposal to establish a task group on cross-border coordination of SIGMET. She noted the pilots’ needs for more real-time en-route meteorological information, and making them available on a timely basis. She added that developing a regional weather radar mosaic would be a useful initiative; this would be technically challenging but doable. She also pointed out that producing accurate forecasts in the tropics has always been a scientific challenge, and proposed that convective-scale tropical weather modeling be included as a research area under the World Weather Research Programme (WWRP) of WMO. As to the IFALPA’s request for improved presentation of meteorological charts, Ms Wong suggested some form of standardized coloured products that could be addressed by a regional working group. Finally, she said that NMHSs would play a more effective role as aviation MET service providers benefit from better understanding the end users’ needs and requirements. Therefore a regular regional platform involving the various aviation stakeholders such as this Forum would be a good starting point.

5.6 With regard to nowcasting techniques, Mr Chi-ming Shun informed the Forum that the WWRP/CAeM/Commission for Basic Systems (CBS) Aviation Research Demonstration Project (AvRDP) was on the way and the kick-off meeting would be held in June 2015 in Shanghai, China. He stressed that partnership was crucial with all major stakeholders – airlines, ATM, airports, etc. The NMHSs should ensure that the services they provide are relevant and add value – this is what will help the NMHSs keep their relevance. Mr Shun referred to additional activities in which CAeM has been involved, including assessment of the impact of climate change and variability on aviation in near and longer term; for instance, impact of El Niño on important environmental conditions for aviation – such as convection and turbulence. He added that following the interest expressed by ICAO in these issues, the CAeM Expert Team on Aviation, Science and Climate (ET-ASC) would work on those subjects. With regard to the ICAO Met Panel strategy for resolving deficiencies through regionalization, he advised that regional advisory centres’ task should be supported. Regionalized issuance of SIGMET will be eventually materialized after 2020 and will be guided by the regions themselves. To that end, there was a need to develop related guidance and ensure inclusiveness, the recognition of the role of the NMHSs as providers of basis services and infrastructure. Mr Shun mentioned that Hong Kong Observatory could support Members on issues related to wind shear information.

5.7 It was pointed out that AIREP messages provide important feedback through automatic downlink, but traditional pilot reports were also important and some airlines, like Japan and Korean airlines, have well established procedures for regular reporting. It was suggested that Indonesia consider similar procedures.

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3 Air-report—A report from an aircraft in flight prepared in conformity with requirements for position, and operational and/or meteorological reporting.
5.8 The Philippines pointed out that a training event on aviation will be conducted in PAGASA this year, and other countries may be invited, which would improve competencies. It was also added that lecturers from pilots would be welcome.

6 Recommendation on Regional Cooperation for Enhancing Meteorological Services for International Air Navigation

6.1 The Forum considered a draft recommendation on Regional Cooperation for Enhancing Meteorological Services for International Air Navigation. It was pointed out that recommendations should be categorized into some groups depending on urgency. The participants adopted draft the recommendations and agreed on its naming as “Jakarta Recommendations on Regional Cooperation for Enhancing Meteorological Services for International Air Navigation by the WMO Member States in Southeast Asia” as given in Annex II.

7 Closure of the meeting

7.1 Dr Sakya thanked the participants for their significant contribution to the success of the Forum. The Forum was closed at 1.00 p.m. on 30 April 2015. The list of participants is attached as Annex III to this report.
ANNEX I

Regional Forum on Meteorological Services for Aviation Safety in Southeast Asia
(Jakarta, Indonesia, 29–30 April 2015)

PROGRAMME

DAY 1: 29 APRIL 2015 (WEDNESDAY)

09:00-09:30 REGISTRATION

09:30-10:30 Opening Ceremony
- Welcoming address – Dr Andi Eka SAKYA, Director-General of the Agency for Meteorology, Climatology and Geophysics of the Republic of Indonesia (BMKG)
- Keynote Address – Dr Chung Kyu PARK, Director, Regional Office for Asia and the South-West Pacific, WMO
- Keynote Address – Mr Peter DUNDA, Regional Officer, Aeronautical Meteorology, Asia and Pacific Office, ICAO
- Opening statement – Mr Suprasetyo, Director General of Civil Aviation, Ministry of Transportation of the Republic of Indonesia (representing Minister of Transportation)
- Keynote presentation: Aviation Meteorology – Need for Upgrades in the Next Decade and Beyond – Mr Chi-ming SHUN, President of WMO Commission for Aeronautical Meteorology (CAeM) (via videoconference)

10:30-11:00 Group Photo & Coffee break

11:00-11:10 Objectives and working arrangements of the Forum (Mr Dimitar IVANOV, Chief, Aeronautical Meteorology Division, WMO)

11:10-12:30 Session 1: Aviation hazards in the region and related services for aviation users (Chair: Dr Andi Eka SAKYA)

Presentations on the aviation hazards in the region including tropical weather, volcanic ash and tropical cyclones and other related information services for aviation community

1.1: Aviation Hazard in Tropical Region (Dr Yunus S. SWARINOTO, BMKG)
1.2: Keeping Aircraft Clear of Volcanic Ash (Mr Emile JANSONS, Darwin VAAC, Australia)
1.3: ICAO TCAC Services and JMA’s role as RSMC/TCAC Tokyo (Ms Naoko KOMATSU, JMA)

Discussion

12:30-14:00 Lunch (Drafting group)
Session 2: Current status of provision of meteorological services (Chair: Ms Chin Ling WONG)

Country report with focus on the following issues:
- Institutional arrangements for aviation meteorological services – roles and responsibilities
- Compliance with ICAO and WMO requirements on QMS and competency
- Technological level
- Deficiencies (as per the ICAO regional List of air navigation deficiencies)

2.1: The Meteorological Data Providing for Aviation Services Currently in Cambodia (Mr Monitchoth SO IM, Cambodia)
2.2: Country Report by the Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG) (Mr Mustari Heru JATMIKA, Indonesia)
2.3: Current status of provision of meteorological services for aviation in Lao PDR (Mr Singthong PATHOU MMADY, Lao PDR)
2.4: Current Status of Provision of Meteorological Services (Mr Abdul Malik TUSSIN, Malaysia)
2.5: Aviation Meteorological Services in Myanmar (Ms Ni Ni KHINE, Myanmar)
2.6: The Philippine Meteorological Services for Aviation (Dr Esperanza O. CAYANAN, Philippines)
2.7: Status and Development of Meteorological Services for Aviation Safety in Singapore (Mr Kwok Wah CHOW, Singapore)
2.8: Activities of Bureau of Aeronautical Meteorology (Dr Phuwieng PRAKHAMMINTARA, Thailand)
2.9: Current status of provision of meteorological services (Mr NGUYEN Vinh Thu, Viet Nam)

Discussion

Coffee Break

Session 3: Coordination with aviation stakeholders (Chair: Dr Chung Kyu PARK)

Presentations and discussion on various subjects concerning coordination with aviation stakeholders including
- Coordination in services system (including dissemination of volcanic ash information for producing SIGMET)
- Coordination in the development of services infrastructure

3.1: Meteorological information supporting the safety of international civil air navigation (Mr Peter DUNDA, Regional Officer, Asia and Pacific Office, ICAO)
3.2: Weather Reporting – Airline Industry perspective (Mr Martin ERAN-TASKER, Association of Asia Pacific Airlines (AAPA))
3.3: Pilots' Vision on Weather (Capt. Jaffar HASSAN, Regional Vice-President for Asia/East, International Federation of Air Line Pilot’s Associations (IFALPA))
3.4: Airnav Indonesia's Coordination with Aviation Stakeholders (Mr AMRAN, M.Sc. Tech, AirNav Indonesia)
3.5: Meteorological Services from Airline Perspective (Capt. Lucky LUKSMONO, Garuda Indonesia)
3.6: Volcano Monitoring and Information for Volcanic Disaster mitigation in Indonesia (Mr I Gusti Made Agung NANDAKA, Center for Volcanology and Geological Hazard Mitigation (PVMBG))

Discussion
DAY 2: 30 APRIL 2015 (THURSDAY)

09:00-09:20 Summary of Day 1 and WMO Aeronautical Meteorology Priorities (Mr Dimitar IVANOV, Chief, Aeronautical Meteorology Division, WMO)

09:20-11:00 Session 4: Panel discussion on needs and priorities for aviation safety (Moderator: Dr Andi Eka SAKYA, BMKG)
Panellists:
- Mr Peter DUNDA, Regional Officer, Asia and Pacific Office, ICAO
- Mr Martin ERAN-TASKER, Technical Director, AAPA
- Capt. Jaffar HASSAN, Regional Vice-President for Asia/East, IFALPA
- Mr Dimitar IVANOV, Chief, Aeronautical Meteorology Division, WMO
- Mr Chi-ming SHUN, President of WMO CAeM (via videoconference)
- Ms Chin Ling WONG, Director-General, Meteorological Service Singapore

11:00-11:30 Coffee Break

11:30-12:30 Session 5: Recommendations on Regional Cooperation for Enhancing Meteorological Services for International Air Navigation (Chair: Dr Andi Eka SAKYA, BMKG)

12:30-14:30 Lunch

14:30-15:30 Plenary discussion – Report on the Recommendations

15:30 Closing
Regional Forum on Meteorological Services for Aviation Safety in Southeast Asia  
(Jakarta, Indonesia, 29–30 April 2015)  

Jakarta Recommendations  
on Regional Cooperation for Enhancing Meteorological Services for International Air  
Navigation by the WMO Member States in Southeast Asia  
(Outline of a Regional Roadmap)  

1. Introduction  
The Forum discussed the current status of provision of aeronautical meteorological service in light of the challenges and opportunities faced by the aviation industry in the region and the need to maintain safety, manage growth, increase efficiency and take care about environmental issues related to the growing aviation activities. In recognition of the demand for high quality meteorological information and service and the related requirements for the meteorological service providers an open dialogue with the aviation users and other stakeholders was the main objective of the forum. It was further recognized that the desired improvements should be pursued not only at the national level but in a harmonized regional way to ensure consistency and seamlessness.  

2. Problem Statement  
In order to enhance the aeronautical meteorological services in Southeast Asia in the interest of aviation safety, efficiency and regularity, with due regard to the environment, co-ordinated national action plans and enhanced regional cooperation are needed to ensure that the international requirements and standards established by the International Civil Aviation Organization (ICAO) and the World Meteorological Organization (WMO) are implemented by all Member countries at the necessary level.  

Gap analysis should be conducted at national and regional level to identify, in particular, critical areas that need to be addressed as a matter of urgency through focused projects. For instance, countries not providing the minimum requisite services should be addressed with proposals for urgent assistance and national meetings with aviation authorities and stakeholders should be organized. Special attention should be given to raising the capacity of the service providers to deal with the specific aviation meteorological hazards typical for the region, e.g., organized convective systems, tropical cyclones, volcanic ash clouds and transboundary haze.  

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4 Brunei Darussalam, Cambodia, Indonesia, Lao People’s Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor Leste, and Viet Nam
3. Recommendations

The participants of the forum agreed on the recommendations to guide an ordered improvement of the meteorological services through a series of regional and national actions coordinated and designed specifically for the local conditions and challenges of the Southeast Asian countries. It is well understood that the success of the recommendations will be dependent to a great extent to the participation of all relevant stakeholders, in particular, the national civil aviation administration, whose support to the sustainable meteorological service would be critical.

At international level, the recommendations are supported by WMO and ICAO who are committed to be engaged in the planned activities and focused assistance to resolve critical deficiencies and build capacity of the region as a whole. Other aviation stakeholders also expressed their support. One crucial element will be the cooperation among the WMO Members, in particular through assistance from more advanced Members to those that need to build their basic capacities. The enhancement of the meteorological service in support of the safety, efficiency and the environment in Southeast Asia should be sought by addressing three areas, through national and international efforts, as follows:

(1) Demonstrate compliance with ICAO and WMO requirements on the provision of requisite services, METAR, TAF, SIGMET, information on volcanoes’ pre-eruptive activities, Quality Management System (QMS), Competency and Qualifications of the Aeronautical Meteorological Personnel, with particular focus on:

a. At national level:
   - Analysis of the current legal/regulatory set up, including funding and agreed cost-recovery arrangement with stakeholders, and identification of gaps;
   - Full inventory of the existing technology, equipment and identification of discrepancy to requirements and state-of-the-art; forward planning for enhanced technology;
   - Identification of major gaps regarding additional information, such as weather radar and satellite;
   - Forecasting techniques, in particular capabilities for forecasting severe weather, including tropical convection and cyclones; emphasis on nowcasting and short-range forecasting (e.g., the TAF forecasting range of up to 30 hours);
   - QMS (if not yet implemented – put top priority);
   - Competency of aeronautical meteorological observers and forecasters; and
   - For those States that are lacking basic capacities – immediate planning for achieving the minimum requirements (seek WMO (and ICAO) assistance for projects and advocacy);

b. At regional level:
   - Establish a task group on Cross-border coordination of SIGMET (each country to designate a national focal point)
   - Provide opportunity for the sharing of best practice;
   - Consider delegation of service provision in case of lack of capacity at national level, as appropriate;
   - Facilitate exchange of non-conventional real-time meteorological data e.g. weather radar, wind profiler, etc
   - Enhance the use of the products and services provided by regional centres and facilities – Regional Specialized Meteorological Centres (RSMCs)/ Tropical Cyclone
Advisory Centres (TCACs), WMO Regional Training Centres (RTC)s, Volcanic Ash Advisory Centres (VAACs);

- Promote twinning/mentoring arrangements between the Members in particular for the implementation of QMS and competence requirements for Aeronautical Meteorology Personnel, and MET inspectorate;
- Identification of regional needs for training based on competency standard, national plans and with clear goals and objectives; WMO, in coordination with ICAO to assist in the provision of training based on priorities and needs; and
- Coordinated ICAO and WMO efforts for resolving deficiencies.

(2) Improved communication and cooperation with the aviation stakeholders including MET Authority and Civil Aviation Authority (CAA), Air Traffic Services, Airline operators, Airports, and VA institutions:

a. At national level:
   - Analysis of the current legal/regulatory set up and identification of gaps;
   - Where missing, development of procedural agreements (Letter of Agreement (LoA), Memorandum of Understanding (MoU) with the major users);
   - Regular meetings with users (as required by QMS) to raise the common awareness and understanding, in particular, the mechanism of exchange of information between the MET service and users; and
   - Use of the feedback received to improve products and services;

b. At regional level:
   - Sharing best practices;
   - Conducting end to end volcanic ash exercises; and
   - Develop mechanisms and platform for better liaison with regional stakeholders.

(3) Alignment of national and regional development planning with the ICAO Global Air Navigation Plan (GANP) and its Aviation Systems Block Upgrades (ASBU) methodology, with particular emphasis on:

- Enhancing Regional Awareness on the forthcoming changes in service provision;
- Keep abreast of the developments related to potential establishment of Regional Hazardous Weather Centres (based on guidance from ICAO and WMO) to assist States with deficiencies in SIGMET issuance;
- Establish a regional plan for the transition to the use of XML/GML for meteorological messages, including needs for training; and
- Support and organize capacity development activities to promote and enable introduction of enhanced services for Air Traffic Management (ATM) in line with the GANP and ASBU (e.g., services for terminal area, for Trajectory-Based Operation (TBO), etc.).

(4) Operational improvements – short-term (based on input from users)

- Better situational awareness – aircraft reports, radar networking;
- Explore possibilities for cross-border weather radar data exchange (possibly on bilateral basis);
- Improved information through Automatic Terminal Information Service (ATIS) and VOLMET (to be considered by ICAO regional bodies);
- Availability of information for smaller airports (national action required);
- VA information – use of ICAO volcano level of alert colour code and Volcano Observatory Notice for Aviation (VONA) messages – coordination with volcano observatories;
- Evaluate and enhance NMHSs website products – study available best practices and give due consideration of quality assurance principles and follow ICAO guidelines on the use of the public Internet for aeronautical application;
- Address RWY contamination issues, in particular, the authorities responsible for providing this information such as standing water (report to appropriate ICAO body);
- Coordinate training events (PAGASA, ICAO, WMO).

(5) Coordination between WMO and ICAO in the region:

- Noting that the objectives of the APANPIRG and its contributory bodies include the implementation of air navigation systems and services in support of air traffic safety, regularity and efficiency, and the rectification of specific deficiencies in the air navigation related fields, the forum invited the ICAO and the WMO to ensure follow-up on the outcomes/recommendations from the forum is coordinated appropriately and effectively with respect to the work programme of the APANPIRG.

(6) Additional considerations on future work:

- Engage relevant RA II and RA V subsidiary bodies to continue working on the Roadmap.
- Engage the CAeM Expert Teams to provide assistance for developing the roadmap and its consistence with other planning documents.
- Proactive participation of Southwest Asia WMO Members is essential.
- Keep momentum and plan regular consultations with user groups.
### ANNEX III

**Regional Forum on Meteorological Services for Aviation Safety in Southeast Asia**  
*(Jakarta, Indonesia, 29–30 April 2015)*

**LIST OF PARTICIPANTS**

<table>
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<tr>
<th>Country</th>
<th>Name</th>
<th>Title/Position</th>
<th>Contact Information</th>
</tr>
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<tbody>
<tr>
<td><strong>AUSTRALIA</strong></td>
<td>Mr Emile JANSONS</td>
<td>Manager, Darwin Volcanic Ash Advisory Centre, Bureau of Meteorology</td>
<td>E-mail: <a href="mailto:e.jansons@bom.gov.au">e.jansons@bom.gov.au</a></td>
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<tr>
<td><strong>CAMBODIA</strong></td>
<td>Mr Monitchoth SO IM</td>
<td>Deputy Director, Department of Meteorology, Ministry of Water Resources and Meteorology</td>
<td>Tel: +855 11 274 458, E-mail: <a href="mailto:monichoth@gmail.com">monichoth@gmail.com</a></td>
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<tr>
<td><strong>HONG KONG, CHINA (VIA VIDEO CONFERENCE)</strong></td>
<td>Mr Chi-ming SHUN</td>
<td>President, WMO Commission for Aeronautical Meteorology (CAeM) and Director, Hong Kong Observatory</td>
<td>Tel: +852 2926 8221, Fax: +852 2311 9448, E-mail: <a href="mailto:cmshun@hko.gov.hk">cmshun@hko.gov.hk</a></td>
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<tr>
<td><strong>INDONESIA</strong></td>
<td>Mr SUPRASETYO</td>
<td>Director General of Civil Aviation, Ministry of Transportation of the Republic of Indonesia</td>
<td>Tel: +62 21 3505133, Fax: +62 21 3505139</td>
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<td></td>
<td>Dr Andi Eka SAKYA</td>
<td>Director General, Agency for Meteorology, Climatology and Geophysics of the Republic of Indonesia (BMKG)</td>
<td>Tel: +62 21 424 8016, Fax: +62 21 424 6314, E-mail: <a href="mailto:andi.eka.sakya@bmkg.go.id">andi.eka.sakya@bmkg.go.id</a></td>
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<td></td>
<td>Dr Yunus S. SWARINOTO</td>
<td>Deputy Director General for Meteorology, Agency for Meteorology, Climatology and Geophysics of the Republic of Indonesia (BMKG)</td>
<td>Tel: +62 81210109924, Fax: +62 21 65867065, E-mail: <a href="mailto:yunus.swarinoto@bmkg.go.id">yunus.swarinoto@bmkg.go.id</a></td>
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<td>Mr Mustari Heru JATMIKA</td>
<td>Head of Division for Aeronautical Meteorology, Agency for Meteorology, Climatology and Geophysics of the Republic of Indonesia (BMKG)</td>
<td>Tel: +62 81342778679, Fax: +62 21 65867065, E-mail: <a href="mailto:heru.jatmika@bmkg.go.id">heru.jatmika@bmkg.go.id</a></td>
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<td></td>
<td>Mr Drs Amran, M.Sc.TECH</td>
<td>Director of Aviation Traffic Management, Airnav Indonesia/LPPNI</td>
<td>Tel: +62 21 55915000, Fax: +62 21 55915100, E-mail: <a href="mailto:amran@airnavindonesia.co.id">amran@airnavindonesia.co.id</a></td>
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<td></td>
<td>Mr I Gusti Made Agung Nandaka</td>
<td>Center for Volcanology and Geological Hazard Mitigation (PVMBG)</td>
<td>Tel: +62 8122702564, E-mail: <a href="mailto:igmanandaka@vsi.esdm.go.id">igmanandaka@vsi.esdm.go.id</a>, <a href="mailto:igmanandaka@gmail.com">igmanandaka@gmail.com</a></td>
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<tr>
<td><strong>Prof. Edvin Aldrian, M.Sc</strong></td>
<td>Director, Research and Development Centre, Agency for Meteorology, Climatology and Geophysics of the Republic of Indonesia (BMKG) Tel: +62 21 424 6321 Fax: +62 21 65866238 E-mail: <a href="mailto:e_aldrrian@yahoo.com">e_aldrrian@yahoo.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Drs Tuwamin Mulyono, M.Si</strong></td>
<td>Advisor to the Director General of BMKG Tel: +62 21 424 6321 Fax: +62 21 424 6314 E-Mail: <a href="mailto:tuwamin@yahoo.com">tuwamin@yahoo.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dr Erwin Eka S. Makmur, M.Si</strong></td>
<td>Head of Climatology Division, Research and Development Centre, Agency for Meteorology, Climatology and Geophysics of the Republic of Indonesia (BMKG) Tel: +62 21 424 6321 Fax: +62 21 65866238 E-Mail: <a href="mailto:erwin.makmur@bmkg.go.id">erwin.makmur@bmkg.go.id</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ms Asteria S. Handayani, S.Si</strong></td>
<td>Researcher, Research and Development Centre, Agency for Meteorology, Climatology and Geophysics of the Republic of Indonesia (BMKG) Tel: +62 21 424 6321 Fax: +62 21 65866238 E-mail: <a href="mailto:tya.lazuardi@gmail.com">tya.lazuardi@gmail.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Drs Maman Sudarisman, DEA</strong></td>
<td>Head of International Affairs Division, Agency for Meteorology, Climatology and Geophysics of the Republic of Indonesia (BMKG) Tel: +62 21 424 6321 E-mail: <a href="mailto:maman_sudarism@yahoo.com">maman_sudarism@yahoo.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ms Titah Sri Rudati, SE</strong></td>
<td>Staff, Research and Development Centre, Agency for Meteorology, Climatology and Geophysics of the Republic of Indonesia (BMKG) Tel: +62 21 424 6321 Fax: +62 21 65866238 E-mail: <a href="mailto:titahrudati@gmail.com">titahrudati@gmail.com</a></td>
<td></td>
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<tr>
<td><strong>Mr Ferdika Amsal Harapan, M.Si</strong></td>
<td>Observer, Research and Development Centre, Agency for Meteorology, Climatology and Geophysics of the Republic of Indonesia (BMKG) Tel: +62 21 424 6321 Fax: +62 21 65866238 E-mail: <a href="mailto:ferdikaamsal@gmail.com">ferdikaamsal@gmail.com</a></td>
<td></td>
<td></td>
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<tr>
<td><strong>Mr Wido Hanggoro, M.Kom</strong></td>
<td>Researcher, Research and Development Centre, Agency for Meteorology, Climatology and Geophysics of the Republic of Indonesia (BMKG) Tel: +62 21 424 6321 Fax: +62 21 65866238 E-mail: <a href="mailto:wido_hanggoro@yahoo.com">wido_hanggoro@yahoo.com</a></td>
<td></td>
<td></td>
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<tr>
<td><strong>Ms Rahayu Sapta Sri Sudewi, S.Kel</strong></td>
<td>Researcher, Research and Development Centre, Agency for Meteorology, Climatology and Geophysics of the Republic of Indonesia (BMKG) Tel: +62 21 424 6321 Fax: +62 21 65866238 E-mail: <a href="mailto:rahayu.sapta@gmail.com">rahayu.sapta@gmail.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mr Utoyo Ajie Linarka, S.Si</strong></td>
<td>Researcher, Research and Development Centre, Agency for Meteorology, Climatology and Geophysics of the Republic of Indonesia (BMKG) Tel: +62 21 424 6321 Fax: +62 21 65866238 E-mail: <a href="mailto:ajielinarko@gmail.com">ajielinarko@gmail.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mr Zulkarnain, M.Si</strong></td>
<td>Staff, Information of Aeronautical Meteorology Sub Division, Agency for Meteorology, Climatology and Geophysics of the Republic of Indonesia (BMKG) Tel: +62 21 424 6321 E-mail: <a href="mailto:zulkarnain@bmkg.go.id">zulkarnain@bmkg.go.id</a></td>
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<tr>
<td>Japan</td>
<td>Ms Naoko KOMATSU</td>
<td>Scientific Officer</td>
<td>Office for Aviation Weather Forecasting Japan Meteorological Agency</td>
</tr>
<tr>
<td>Lao People's Democratic</td>
<td>Mr Singthong PATHOUMMADY</td>
<td>Deputy Director-General</td>
<td>Department of Meteorology and Hydrology (DMH)</td>
</tr>
<tr>
<td>Republic</td>
<td>Mr Abdul Malik TUSSIN</td>
<td>Director, Sabah Meteorological Office</td>
<td>Malaysian Meteorological Department</td>
</tr>
<tr>
<td>Malaysia</td>
<td>Ms Ni Ni KHINE</td>
<td>Assistant Director</td>
<td>Department of Meteorology and Hydrology</td>
</tr>
<tr>
<td>Myanmar</td>
<td>Dr Esperanza O. CAYANAN</td>
<td>Officer-in Charge of Weather Division</td>
<td>Philippine Atmospheric, Geophysical and Astronomical Services Administration</td>
</tr>
<tr>
<td>Philippines</td>
<td>Ms Chin Ling WONG</td>
<td>Director-General</td>
<td>Meteorological Service Singapore</td>
</tr>
<tr>
<td>Singapore</td>
<td>Mr Kwok Wah CHOW</td>
<td>Principal Meteorologist</td>
<td>Meteorological Service Singapore</td>
</tr>
<tr>
<td>Thailand</td>
<td>Dr Phuwieng PRAKHAMMINTARA</td>
<td>Director of Bureau of Aeronautical Meteorology</td>
<td>Thai Meteorological Department</td>
</tr>
<tr>
<td>Vietnam</td>
<td>Mr NGUYEN Vinh Thu</td>
<td>Senior Forecaster of Meteorology, Chief of Numerical Weather Prediction and Remote Sensing Division</td>
<td>National Centre for Hydro-Meteorological Forecasting National Hydro-Meteorological Service of Viet Nam</td>
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<td>AAPA</td>
<td>Mr Martin ERAN-TASKER</td>
<td>Technical Director</td>
<td>Association of Asia Pacific Airlines</td>
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<td>ICAO</td>
<td>Mr Peter DUNDA</td>
<td>Regional officer, Aeronautical Meteorology</td>
<td>Asia and Pacific Office International Civil Aviation Organization</td>
</tr>
<tr>
<td>IFALPA</td>
<td>Capt. Jaffar HASSAN</td>
<td>RVP for Asia/East</td>
<td>International Federation of Airline Pilots’ Associations (IFALPA)</td>
</tr>
<tr>
<td>Garuda Indonesia</td>
<td>Capt. Lucky LUKSMONO</td>
<td>VP Corporate Quality safety &amp; Environment MGT</td>
<td>Garuda Indonesia Airlines</td>
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<tr>
<td>AirAsia</td>
<td>Capt. Achmad SADIKIN</td>
<td>Director of Corporate Safety &amp; Aviation Security</td>
<td>Indonesia Air Asia Airlines</td>
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<tr>
<td>WMO SECRETARIAT</td>
<td>Dr Chung Kyu PARK</td>
<td>Director</td>
<td>Regional Office for Asia and the South-West Pacific Development and Regional Activities Department</td>
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<td>Mr Ryuji YAMADA</td>
<td>Programme Manager</td>
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<td>APANPIRG</td>
<td>Asia Pacific Air Navigation Planning and Implementation Regional Group (of ICAO)</td>
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<td>Aviation System Block Upgrades</td>
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<td>Global Air Navigation Plan</td>
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