



## SUMMARY REPORT ASEAN REGIONAL SEMINAR ON WEATHER MODIFICATION 2024 (ASWM 2024)

18 - 22 October 2024, Thailand

### INTRODUCTION

1. The ASEAN Regional Seminar on Weather Modification 2024 is an inaugural project under ASEAN Weather Modification Centre (AWMC) of which the Term of Reference (TOR) was endorsed by the 44<sup>th</sup> Meeting of the ASEAN Sub-Committee on Meteorology and Geophysics (SCMG-44). AWMC, hosted and served as a secretariat by Thailand's Department of Royal Rainmaking and Agricultural Aviation (DRRAA), is a platform to collaborate among ASEAN Member States (AMS), dialogue partners, and cooperating partners or collaborators of DRRAA, with an intention to be a HUB for exchanging, discussing, and strengthening the community on weather modification among AWMC members in order to further mitigate droughts and other water-security-related disasters to ensure well-being of ASEAN in a sustainable manner.
2. The seminar was held on 18 - 22 October 2024 in Bangkok, and Chon Buri province, Thailand, comprised with 4 sessions as follows:  
Session I: Panel Discussion on Climate Change Adaptation and Mitigation  
Session II: Development in Weather Modification  
Session III: Oral Presentation on scientific advancement under 4S Framework (Security, Safety, Sustainability and Seamlessness)  
Session IV: Poster Presentation under 4S Framework (Security, Safety, Sustainability and Seamlessness)  
Session V: Networking and Collaborative Discussion on AWMC goal and R&D roadmap  
Session VI: Study visit on Royal Rainmaking Operation and Meteorological Sites
3. The seminar was attended by delegates from ASEAN Member States, including the Kingdom of Cambodia, the Republic of Indonesia, Malaysia, the Republic of the Philippines, and the Kingdom of Thailand as well as countries from the Asia region such as the People's Republic of China, the Republic of Korea, Mongolia, and from the Middle East, including Hashemite Kingdom of Jordan and the United Arab Emirates. The list of delegates appear as **ANNEXES 1-2**

### OPENING CEREMONY

4. Mr. Suphit Phithaktham, Director-General of DRRAA expressed his sincere appreciation to Mr. Sedthakiat Krajangwongs, the Deputy Permanent Secretary of Ministry of Agriculture and Cooperatives (MOAC) of Thailand for giving the precious time to inaugurate the ASWM 2024.
5. He reported that under the framework of multilateral cooperation among ASEAN Member States, the ASEAN Sub-Committee on Meteorology and Geophysics (ASEAN SCMG) recognizes the importance and advocates for

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cooperation on weather modification in the region. The ASEAN SCMG acknowledges that Thailand has expertise in Royal Rainmaking Technology, which has been tested and developed continuously for over 55 years since 1969. As a result, in October 2023, it was mutually agreed that Thailand by DRRAA, would serve as the focal point and secretariat of AWMC, with its office established in Thailand.

6. This event was aimed at 1) promoting cooperation on the development, research, and implementation of weather modification, both domestically and internationally, 2) enhancing personnel capabilities to initiate technologies suitable for each country's context and 3) jointly establishing strategies to strengthen operations under the AWMC, by developing a collaborative action plan for weather modification, which will serve as guideline and mechanisms for managing water resources and mitigating air pollution at the regional level, leading to effective outcomes aligned with mutual agreements.
7. He finally invited the Deputy Permanent Secretary of Ministry of Agriculture and Cooperatives of Thailand to open the ASWM 2024.
8. The Deputy Permanent Secretary, warmly welcomed the delegates to the ASWM 2024. He highlighted that Thailand is lucky country that His Majesty King Bhumibol Adulyadej The Great concerned over the poverty of his people due to climate variation. The Royal Rainmaking project was initiated since 1955, in order to solve drought problem not only in Thailand but also in other countries in the region suffering from severe drought.
9. In his remarks, he encouraged all delegates to gather as much information and knowledge as possible to apply in practice, and to collaborate in research and development of technologies that will serve as tools for sustainable water resource management in the future.

## **SESSION I: PANEL DISCUSSION ON CLIMATE CHANGE ADAPTATION AND MITIGATION**

11. The panel discussion was contributed by 4 agencies including DRRAA, Department of Climate Change and Environment, Thai Meteorological Department, Faculty of Environment of Kasetsart University to share the impact caused by climate change in Thailand, the implementation of national policy in order to align their work with the UN agenda for sustainable development, aiming to mitigate and assist in the adaptation to climate change, and reduction of natural disaster with the advancement of weather modification technology, which contribute to the national and global resilience in sustainable agri-food system onward.

## **SESSION II: DEVELOPMENT IN WEATHER MODIFICATION**

12. The representatives from all participating countries shared and updated on the current operations with their experiences and knowledge on weather modification,

applied and conducted in their country as well as related meteorological activities.

### **12.1 Weather observation and forecasting in Cambodia**

The seminar noted the presentation by Cambodia on the current of observation network, weather forecasting, and dissemination. Eventhough, Cambodia has not yet conducted any research or operation on weather modification, Department of Meteorology is willing to increase capacity in this technology.

### **12.2 Progress on Indonesian weather modification**

The seminar noted the presentation by Indonesia on the background, current service activities, the potential on weather modification to support the Sustainable Development Goals, role of Meteorological, Climatological, an Geophysical Agency (BMKG) as regulator and operator, the advancement and scientific reports as well as challenges on implementation of artificial intelligence for weather modification operation.

### **12.3 Weather modification activities in Malaysia**

The seminar noted the presentation by Malaysia on the historical background until its present status, methodology of seeding with two modes of dispersal (wet seeding and dry seeding), the record of weather modification activities over past five year, as well as its challenges to tackle.

### **12.4 Weather Modification in the Philippines**

The seminar noted the presentation by Philippines on the historical timeline by conducting weather modification experiment, to recent cloud seeding operations with its protocal and task forces, as well as the upcoming research projects (cloud zapping techniques using electric charge for rainfall and localization of hygroscopic flares for groud-based cloud seeding)

### **12.5 Weather Modification in China**

The seminar noted the presentation by China on the overview on weather modification with requirements and demands for a great deal of purposes, law and regulations to implement the operation, organization and operation with a wide range of techniques employed in China as well as development in near future including integrated operation system and enhancement on service efficiency.

### **12.6 Recent activities of cloud seeding of National Institute of Meteorological Sciences: NIMS of Koran Meteorologcak Agency :KMA**

The seminar noted the presentation by the Republic of Korea (ROK) on the importance to implement/start weather modification activitiy with 3 main structures : Experiment, Observation and Modeling. The experimental process with 4

steps is a guideline of working force. The further challenge to conduct research was related to estimation of enhanced precipitation, aerosol reduction and automatic numerical prediction of cloud.

### **12.7 Country Report of Jordan Meteorological Department**

The seminar noted the presentation by Jordan on the general information on topography, weather system, climate distribution, weather service by satellite and radar as well as rain enhancement projects including rainmaking using silver iodide or dry ice crystals, Royal Thai rainmaking technology and ionization technology.

### **12.8 Weather Modification Activities in Mongolia**

The seminar noted the presentation by Mongolia on the background and key milestones of weather modification, purposes and current technique and technology used in operation which mainly focuses on rocket and ground-based generator as well as challenges and limitations to continue weather modification effectively.

### **12.9 UAE Rain Enhancement Program: A global nexus for a more resilient climate**

The seminar noted the presentation by the United Arab Emirates (UAE) on the UAE rain enhancement timeline, program components composing of Operations, Manufacturing and Research, the UAE research program for rain enhancement science : 6<sup>th</sup> cycle solicitation, and the International Rain Enhancement Forum (IREF) as well as strategy to enhance and further develop capacity.

### **12.10 Weather Modification in Thailand**

The seminar noted the presentation by Thailand on the background of DRRAA's establishment timeline, weather modification by Royal Rainmaking Technology with 3 basic steps based on natural cloud cycles (formation, maturity, and dissipation), current missions, further research and development under 4S Framework (Security, Safety, Sustainability and Seamlessness), which was in line with the oral presentation of title 15.1 - 15.4.

## **SESSION III: ORAL PRESENTATION ON , SCIENTIFIC ADVANCEMENT UNDER 4S FRAMEWORK (SECURITY, SAFETY, SUSTAINABILITY AND SEAMLESSNESS)**

13. The Representative from all participating countries shared the presentations on scientific advancement on weather modification practices under 4S Framework of which its definition as follows:

- 1) **Security:** rainwater security for the balance between water demand and supply with innovation - driven development and smart operation
- 2) **Safety:** water resources preservation and water safety for users with natural-based solution and green growth development

- 3) **Seamlessness:** seamless and smarter working style and service with digital service platform and digital productivity solution
- 4) **Sustainability:** capacity increase, community and cooperation network strengthening with integrated talent management and whole of nation approach

### **13.1 The Application of Ground Based Generator Technology (GBG) for Royal Rainmaking Operation in Thailand**

The seminar noted the presentation by Thailand on the general information about Ground-Based Generator (GBG) Technology, motivated by the study visit in Indonesia and the exchange among ASEAN Workshop on Weather Modification 2018, to be used as an alternative technology in mountainous areas and rain shadow regions. It covered the conceptual framework of research and development, GBG specification, the process of GBG experimental operation, as well as the next phase of the project to be extended in Thailand.

### **13.2 The Usage of Alternative Rainmaking Substances for Rain Enhancement**

The seminar noted the presentation by Thailand on the introduction of AR23 (alternative rainmaking substance) that used in the first step of the Royal Rainmaking operation (the triggering step), with relative humidity levels below 60% to increase the possibility of the Royal Rainmaking operation in the dry season. It included background research timeline from Labs to Operation, AR23 effectiveness of increasing rainfall volume by 2.80%, comparing to formula  $1(4/2)$  which is current seeding substance, as well as technology transfer to the operating officers.

### **13.3 Design and Testing of Natural Substance Flare Packaging for Cold Cloud Seeding**

The seminar noted the presentation by Thailand on the research on natural substances based on environment friendly to be used instead of silver iodide (AgI) which is currently used for cold cloud seeding and may cause negative effects in long term. The result of testing flare propulsion efficiency showed that the flare packaging namely Model 3, developed with wooden ejector inside paper used as a core was found 100% achievement in ejecting substances and suitable for further testing in in-flight operations.

### **13.4 Development of Water Requirement Mapping and Digital Participation Platform**

The seminar noted the presentation by Thailand on the background with its constraint situation to develop the project, with the objective to conduct Royal Rainmaking for “Right Place and Right Time”, and fulfilling the water requirements for 4 main cash crops i.e. rice, corn, casava and sugarcane, the conceptual framework and its result in crop water requirement model and maps for effective planning of the rainmaking operation, as well as digital participation platform for local feedback on the Royal Rainmaking Operation.

### **13.5 Progress of Scientific Experiment and Research**

The seminar noted the presentation by China on the current activities conducted under China Meteorological Administration by Weather Modification Centre, on cloud chamber for developing cloud physics research, new seeding agent development, and seeding technique, wind tunnel for hygroscopic flare test, types of aircrafts, equipped with advanced probes as well as alternatives i.e. rockets and UAV. The numerical models namely Cloud and Precipitation Explicit Forecast System, the effect evaluation technique, as well as field bases and experiments were presented.

### **13.6 Introduction of Developmental Techniques for Large Dynamic Wall-based Double Structure Cloud Chamber in Korea (K-CPEC)**

The seminar noted the presentation by the ROK on the introduction of the first high-performance large double-structure cloud physics experiment chamber with dynamic wall temperature control in Korea, together with its multi-purposes i.e. weather modification, weather and climate research, evaluation of weather measurement and understanding hazardous weather condition. The design of K-CPEC with two main parts: Cloud Chamber and Aerosol Chamber with its various observational instrument, and future plan of K-CPEC were explained.

### **13.7 Updates on Weather Modification Implementation in Indonesia**

The seminar noted the presentation by Indonesia on the records of hydrometeorological disasters, paradigm for using weather modification as preventive and alleviative measures for forest and land fires, and other purposes including supporting agricultural sector, national priority project of which the development of new capital city (NUSANTARA) was showed as case study for rain reduction.

### **13.8 The Sustainability of Weather Modification in Malaysia**

The seminar noted the presentation by Malaysia on the seasonal period to conduct weather modification activities with its purpose of each period, the future of new technology such as by employing UAS and GBG, and the sustainability of weather modification issues to be concerned on environmental impact, economic effect, social and ethical challenges, effectiveness and scientific operation, as well as alternatives with their long-term solutions.

### **13.9 Development and Application of Cloud Zapping Technique using Electric Charge for Rainfall Stimulation**

The seminar noted the presentation by the Philippines on the background and concept to alter the balance of positive and negative charges in the cloud, in order to encourage the cloud droplets to merge and grow. The research project will be implemented with the cooperation and support by United Kingdom, Finland, and UAE. The methodology of this initiative project was illustrated with

an aim at cloud seeding experiments and applications for freshwater enhancement in Philippines.

### **13.10 Cloud Seeding in the United Arab Emirates**

The seminar noted the presentation by the UAE on the the UAE's experience in cloud seeding, conducted with international partnerships, the study on airborne atmospheric, automatic weather station network with rain gauges and radar network all over the nation. The hygroscopic flares were employed to do cloud seeding in the UAE where it was found frequent convective cloud accumulation in summer, while the result of cloud seeding operation and its economic value was illustrated.

### **SESSION IV: POSTER PRESENTATION UNDER 4S FRAMEWORK (SECURITY, SAFETY, SUSTAINABILITY AND SEAMLESSNESS)**

14. There were 15 presentations on research and development projects, and related implementations contributed by DRRAA and its MOU counterparts, displaying its endeavor to adapt and develop in order to keep pace with changes, with an aim to increase operation efficiency for the utmost outputs with the Right Place and the Right Time, as well as Precision and Productivity, for water Security and Sustainability accordingly.
15. The UAE Research Program for Rain Enhancement Science (UAEREP): 6th Cycle Solicitation for Advanced Research in Rainfall Enhancement was announced to invite innovative research proposals that advance rain enhancement science and technologies, particularly for arid regions. The awarded project will be funded by the program, which lead further to increase knowledge on rain enhancement operations in the UAE and in the world.

### **SESSION V: NETWORKING AND COLLABORATIVE DISCUSSION ON AWMC GOAL AND R&D ROADMAP**

16. DRRAA as the AWMC Secretariat reported the background of AWMC establishment which was endorsed at the 44<sup>th</sup> Meeting of the ASEAN Sub-Committee on Meteorology and Geophysics (SCMG-44) and the 84<sup>th</sup> Meeting of the Committee on Science, Technology and Innovation (COSTI-84), and announced at the 20<sup>th</sup> ASEAN Ministerial Meeting on Science, Technology and Innovation (AMMSTI-20)
17. The seminar noted four countries, joining as Participating Member States: Indonesia, Malaysia, and the Philippines, with Thailand serving as the chair for the first term and secretariat. In addition to ASEAN Member States (AMS), non-participating members include Brunei Darussalam, Myanmar, China, Mongolia, Sri Lanka and the World Meteorological Organization (WMO).
18. The AWMC website has been developed and is accessible at: <https://awmc.royalrain.go.th/asean>.

19. The key outputs specified in TOR of AWMC are considered as 3M-Model composing of Material, Method and Manpower which provide 1) shared scientific information, Standard Operating Procedures (SOPs), new and innovative techniques, as well as necessary resources (financial, technical, and human resource) 2) digital interactive platform, guideline on sharing, accessing or disseminating related information and 3) Capability enhancement respectively.
20. The delegates contributed their inputs related to the projects/activities under AWMC which was envisaged to serve as a driving force/mechanism to standardize the wide range of techniques, and fill the gap of country members who have difficulties and lack necessary resources. The technical working group shall be established to work on specific/common interest. While the name list of joint research projects (such as evaluation methods, alternative techniques and substance seeding) among members shall be discussed and developed for submitting to the funding sources. The promotion of AWMC to be well-known globally and exploration of more members shall be placed the importance as well.
21. The AWMC Secretariat noted all useful inputs and key takeaways, gathered from all delegates to be analysed to draft the action plan of AWMC accordingly.

#### **SESSION VI: STUDY VISIT ON ROYAL RAINMAKING OPERATION AND METEOROLOGICAL SITES**

22. The daily Royal Rainmaking operations involve several steps. These include analyzing weather data from various sources such as weather maps, weather radar, satellite imagery, and radiosonde data. If weather conditions are suitable for rainmaking operations, as determined by flight decision criteria including relative humidity, wind speed, atmospheric stability, and thunderstorm index, a flight plan is then developed. The plan considers target areas and avoids areas where rainfall is not desired.
23. On this occasion, the delegates were invited to observe the demonstration on rainmaking operation aimed at replenishing the Khlong Si Yat reservoir in Chachoengsao province. This operation involved the triggering step which is the first step of cloud seeding, using two CASA aircrafts to disperse AR23 a seeding substance developed by DRRAA, at an altitude of 6,000 feet. After the operation, rainfall was observed in Rayong province. However, the cloud dissipated before reaching the catchment area of the Khlong Si Yat reservoir in Chachoengsao province, due to weakening wind.
24. Currently, DRRAA employs both S-band (6 stations) and C-band (5 stations) radars. These radars are instrumental in weather monitoring, flight planning, and post-operation evaluation. They can be used as a substitute for automatic rain gauges, which have limitations in terms of widespread installation. Additionally, they are used in research for rainfall forecasting, to support farmers' decisions in planting, harvesting, and pumping water from irrigation systems, and for natural disaster warnings such as floods and landslides.



25. The Sattahip Radar Station in Chon Buri province conducts various meteorological activities, including: 1) upper-air soundings using radiosonde balloons to gather data for morning rainmaking planning, 2) real-time weather monitoring using a microwave radiometer for day-time operational planning, and 3) post-operation evaluation using radar to track rainfall and weather conditions in the region, complemented by automatic rain gauges for ground-level precipitation data.
26. The detail information of ASWM 2024 including presentation files and presenters' names in **SESSION I - VI** is accessible at <https://awmc.royalrain.go.th/awmc2024/index.html>

## **CLOSING CEREMONY**

27. Mr. Rachen Sillaparaya, Deputy Director-General of DRRAA concluded that the seminar provided valuable knowledge on modern and advanced technology. Technical presentations and practical applications for rainmaking were showcased. Research papers were presented in both poster and oral formats by various institutions and agencies. Delegates also have the opportunity to network, make new friends, and reconnect with old acquaintances.
28. He also encouraged all delegates to apply the knowledge and benefits gained to their respective responsibilities and contribute to the advancement of the field, benefiting the public, community and country further, as well as express a gratitude to organizing teams for their hard work, presenters, and delegates for contributing knowledge into this event.
29. He took this opportunity and asked everyone to kindly give a round of applause to thank Indonesia, who will be taking over from Thailand as the host of the next event.
30. In the spirit of solidarity and cordiality, he wished all have the physical, mental, and intellectual strength to apply the knowledge gained to create significant benefits, and finally declared the ASWM 2024 closed.

## **ACKNOWLEDGEMENT**

31. The seminar noted the next ASEAN Workshop on Weather Modification would take place in Indonesia in 2025, and hosted by BMKG of Indonesia. The details of the next workshop will be announced in due course.
32. The ASWM 2024 was held in the traditional spirit of ASEAN cordiality and solidarity. It was successfully completed with the participation and contribution of all delegates.

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**ANNEX 1  
LIST OF INTERNATIONAL DELEGATES**

**ASEAN REGIONAL SEMINAR ON WEATHER MODIFICATION 2024 (ASWM2024)  
18 - 22 October 2024, Thailand**

**CAMBODIA**

Name : Ms. Sophorn Meng  
Position : Deputy Chief  
Organization/Ministry : Office of Monitoring and Evaluation, Ministry of Industry Science, Technology and Innovation

Name : Dr. Rattana Chhin  
Position : Assistant  
Organization/Ministry : Ministry of Water Resources and Meteorology

**INDONESIA**

Name : Dr. Tri Handoko Seto  
Position : Deputy of Weather Modification  
Organization/Ministry : Meteorological, Climatological, and Geophysical Agency (BMKG)

Name : Mr. Adi Bayu Rusandi  
Position : Field Operation Manager  
Organization/Ministry : Meteorological, Climatological, and Geophysical Agency (BMKG)

Name : Mr. Eendarwin  
Position : Director of Weather Modification Governance  
Organization/Ministry : Meteorological, Climatological, and Geophysical Agency (BMKG)

Name : Mr. Ibnu Athoillah  
Position : Operational Administration Manager  
Organization/Ministry : Weather Modification, Meteorological, Climatological, and Geophysical Agency (BMKG)

Name : Mr. M.Bayu Rizky Prayoga  
Position : Technical Operation Manager  
Organization/Ministry : Meteorological, Climatological, and Geophysical Agency (BMKG)

Name : Mr. M.Tito Pradipta Putra  
Position : Standardization and Certification Manager  
Organization/Ministry : Meteorological, Climatological, and Geophysical Agency (BMKG)

## **MALAYSIA**

Name : Mr. Mohd Khairul Ikhwan Bin Mohd Zawawi  
Position : Meteorological Officer  
Organization/Ministry : Malaysian Meteorological Department

Name : Mr. Mohd Zunaidi Bin Mat  
Position : Senior Director of Meteorological Instrumentation and Atmospheric Science Center  
Organization/Ministry : Malaysian Meteorological Department

## **PHILIPPINES**

Name : Mr. Edino Nonato Leonardo Nolasco  
Position : Senior Weather Specialist  
Organization/Ministry : Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)

Name : Ms. Guile Ganzon Saligo  
Position : Weather Specialist  
Organization/Ministry : Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)

## **Non-ASEAN Entities**

### **CHINA**

Name : Ms. HE Jie Meng  
Position : Deputy Director of Weather Modification Division  
Organization/Ministry : Department of Emergency Response, Disaster Mitigation and Public Services, China Meteorological Administration

Name : Prof. LOU Xiaofeng  
Position : Senior Scientist  
Organization/Ministry : Research and Operation Management Division of Weather Modification Centre, China Meteorological Administration

### **JORDAN**

Name : Mr. Khaled Atef Al-Salameen  
Position : Senior Weather Forecaster  
Organization/Ministry : Jordan Meteorological Department

### **MONGOLIA**

Name : Ms. Sereenendorj Javzmaa  
Position : Senior Officer in charge of the International Cooperation  
Organization/Ministry : Finance, Planning, and International Cooperation Division  
National Agency for Meteorology and Environmental Monitoring of Mongolia

### **SOUTH KOREA**

Name : Dr. CHANG Ki-ho  
Position : Deputy Director of Research Applications Department  
Organization/Ministry : Korea Meteorological Administration

Name : Ms. KIM Youngmi  
Position : Research Scientist  
Organization/Ministry : Research Applications Department, Korea Meteorological Administration

## **UAE**

Name : Mr. Ahmed Al Kamali  
Position : Acting Head of Cloud Seeding Operations Section  
Organization/Ministry : National Center of Meteorology

Name : Mr. Muhannad Al Badri  
Position : Managing Director  
Organization/Ministry : APCO

Name : Ms. Alya Al Mazrouei  
Position : Director of the UAE Research Program for Rain  
Enhancement Science  
Organization/Ministry : National Center of Meteorology



**ANNEX 2  
LIST OF THAILAND DELEGATES**

**ASEAN REGIONAL SEMINAR ON WEATHER MODIFICATION 2024 (ASWM2024)  
18 - 22 October 2024, Thailand**

**Department of Royal Rainmaking and Agricultural Aviation**

Name : Mr. Suphit Phithaktham  
Position : Director-General

Name : Mr. Rachen Sillaparaya  
Position : Deputy Director-General

Name : Ms. Wassana Wongrat  
Position : Director of Royal Rainmaking Technology Research and  
Development Division  
Division : Royal Rainmaking Technology Research and Development  
Division

Name : Dr. Pakdee Chantraket  
Position : Director of Royal Rainmaking Operation Division  
Division : Royal Rainmaking Operation Division

Name : Mr. Chanti Detyothin  
Position : Expert on Applied Atmospheric Science Research and  
Development

Name : Mr. Rangsana Budmuang  
Position : Director of Northern Royal Rainmaking Operation Center  
Division : Royal Rainmaking Operation Division

Name : Ms. Khuawan Sangpho  
Position : Director of Lower Northern Royal Rainmaking Operation  
Center  
Division : Royal Rainmaking Operation Division

Name : Ms. Nuenghatai Tantiplubthong  
Position : Director of Northeastern Royal Rainmaking Operation  
Center  
Division : Royal Rainmaking Operation Division

Name : Mr. Tanthai Polharn  
Position : Director of Lower Northeastern Royal Rainmaking Operation Center  
Division : Royal Rainmaking Operation Division

Name : Mr. Rathakorn Waroonsukhasiri  
Position : Director of Central Royal Rainmaking Operation Center  
Division : Royal Rainmaking Operation Division

Name : Mr. Weeraphol Sudchada  
Position : Director of Eastern Royal Rainmaking Operation Center  
Division : Royal Rainmaking Operation Division

Name : Mr. Sinchai Pungtambol  
Position : Director of Southern Royal Rainmaking Operation Center  
Division : Royal Rainmaking Operation Division

Name : Mr. Parinya Intaracharoen  
Position : Director of Royal Rainmaking Technology Research and Development Group  
Division : Royal Rainmaking Technology Research and Development Division

Name : Mr. Marut Ratmanee  
Position : Director of Information Technology Center  
Division : Royal Rainmaking Technology Research and Development Division

Name : Mr. Thitikorn Chanyatham  
Position : Director of Hua Hin Royal Rainmaking Center  
Division : Royal Rainmaking Technology Research and Development Division

Name : Ms. Supaluck Dasom  
Position : Director of Royal Rainmaking Technology Cooperation Development Group  
Division : Royal Rainmaking Technology Research and Development Division

Name : Mr. Anuchit Sooknarint  
Position : Director of Royal Rainmaking Academic Group  
Division : Royal Rainmaking Operation Division

Name : Mr. Keattikul Dendoung  
Position : Scientist  
Division : Royal Rainmaking Operation Division

Name : Mr. Nukun Sandmuenkaew  
Position : Scientist  
Division : Royal Rainmaking Weather Observation Development  
Division

Name : Mr. Patathip Meesangngern  
Position : Scientist  
Division : Royal Rainmaking Operation Division

Name : Mr. Pinpong Kongchana  
Position : Scientist  
Division : Royal Rainmaking Operation Division

Name : Mr. Pruek Pripanapongs  
Position : Scientist  
Division : Royal Rainmaking Operation Division

Name : Mr. Puttinun Sukumonjan  
Position : Scientist  
Division : Royal Rainmaking Operation Division

Name : Mr. Ruttanin Wattanasirikoson  
Position : Scientist  
Division : Royal Rainmaking Operation Division

Name : Mr. Sarawut Arthayakun  
Position : Scientist  
Division : Royal Rainmaking Technology Research and Development  
Division

Name : Mr. Sattra Sirikaew  
Position : Scientist  
Division : Royal Rainmaking Technology Research and Development  
Division

Name : Mr. Songpon Mittassa  
Position : Scientist  
Division : Royal Rainmaking Operation Division



Name : Mr. Supakit Kaewpat  
Position : Scientist  
Division : Royal Rainmaking Operation Division

Name : Mr. Thanakorn Sereesakulthon  
Position : Scientist  
Division : Royal Rainmaking Operation Division

Name : Mr. Veerapat Boonme  
Position : Scientist  
Division : Royal Rainmaking Operation Division

Name : Mr. Witthaya Appamatho  
Position : Scientist  
Division : Royal Rainmaking Operation Division

Name : Mr. Wongsakrit Changpreecha  
Position : Scientist  
Division : Royal Rainmaking Operation Division

Name : Ms. Arisara Nakburee  
Position : Scientist  
Division : Royal Rainmaking Technology Research and Development  
Division

Name : Ms. Aroonroth Sricharounhot  
Position : Scientist  
Division : Royal Rainmaking Operation Division

Name : Ms. Aurussaya Silpcharoen  
Position : Scientist  
Division : Royal Rainmaking Operation Division

Name : Ms. Chayaphim Innun  
Position : Scientist  
Division : Royal Rainmaking Operation Division

Name : Ms. Hathaichanok Panjamart  
Position : Scientist  
Division : Royal Rainmaking Operation Division

Name : Ms. Jaturaporn Leenanon  
Position : Scientist  
Division : Royal Rainmaking Technology Research and Development  
Division

Name : Ms. Krittiya Thongkaew  
Position : Scientist  
Division : Royal Rainmaking Operation Division

Name : Ms. Napatchanan Uttayotha  
Position : Scientist  
Division : Royal Rainmaking Technology Research and Development  
Division

Name : Ms. Phatsacha Khamsuk  
Position : Scientist  
Division : Royal Rainmaking Technology Research and Development  
Division

Name : Ms. Pornnapa Prempree  
Position : Scientist  
Division : Royal Rainmaking Operation Division

Name : Ms. Saranjit Paitoonyakul  
Position : Scientist  
Division : Royal Rainmaking Operation Division

Name : Ms. Siripen Somruen  
Position : Scientist  
Division : Royal Rainmaking Technology Research and Development  
Division

Name : Ms. Sritam Danpradit  
Position : Scientist  
Division : Royal Rainmaking Technology Research and Development  
Division

Name : Ms. Sumamas Chaiwong  
Position : Scientist  
Division : Royal Rainmaking Technology Research and Development  
Division

Name : Ms. Thidarat Chalothorn  
Position : Scientist  
Division : Royal Rainmaking Operation Division

Name : Ms. Waraporn Yamoo  
Position : Scientist  
Division : Royal Rainmaking Operation Division

Name : Ms. Wattanapon Tiempathom  
Position : Scientist  
Division : Royal Rainmaking Technology Research and Development Division

Name : Mr. Atthaporn Chumbut  
Position : Electrician  
Division : Royal Rainmaking Weather Observation Development Division

Name : Mr. Sivarot Putponpai  
Position : Electrician  
Division : Royal Rainmaking Weather Observation Development Division

Name : Mr. Supawat Sornklang  
Position : Electrician  
Division : Royal Rainmaking Weather Observation Development Division

Name : Mr. Kantapon Jinakun  
Position : Electrical Engineer  
Division : Royal Rainmaking Weather Observation Development Division

Name : Mr. Methee Taweechon  
Position : Electrical Engineer  
Division : Royal Rainmaking Weather Observation Development Division

Name : Mr. Supatcharong Thongchai  
Position : Electrical Engineer  
Division : Royal Rainmaking Weather Observation Development Division

Name : Maj. Wasawat Kulchatprasit  
Position : Pilot  
Division : Agricultural Aviation Administration Division

Name : Mr. Kittisak Rattanapukdee  
Position : Pilot  
Division : Agricultural Aviation Administration Division

Name : Mr. Nattakorn Germprapai  
Position : Pilot  
Division : Agricultural Aviation Administration Division

Name : Mr. Nutthawut Saiyud  
Position : Pilot  
Division : Agricultural Aviation Administration Division

Name : Mr. Pornthep Leela-Amornrat  
Position : Pilot  
Division : Agricultural Aviation Administration Division

Name : Mr. Prachachon Tiloklert  
Position : Pilot  
Division : Agricultural Aviation Administration Division

Name : Mr. Sira Tungateja  
Position : Pilot  
Division : Agricultural Aviation Administration Division

Name : Mr. Warit Planthong  
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Name : Ms. Kaeogetfa Tangsupakit  
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Name : Ms. Pitchayapak Anyapo  
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## MOU counterparts of DRRAA

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Organization : Faculty of Social Sciences Chiang Mai University

Name : Dr. Ratchaphon Samphutthanont  
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Name : Dr. Chalump Oonariya  
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Name : Ms. Sarisa Tongjeen  
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Name : Dr. Thippawan Thodsan  
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