

LAPORAN TAHUNAN
Annual Report

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LAPORAN TAHUNAN
ANNUAL REPORT

2015

JABATAN METEOROLOGI MALAYSIA
KEMENTERIAN SAINS, TEKNOLOGI DAN INOVASI
MALAYSIAN METEOROLOGICAL DEPARTMENT
MINISTRY OF SCIENCE, TECHNOLOGY AND INNOVATION



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PERUTUSAN MENTERI SAINS, TEKNOLOGI DAN INOVASI

MESSAGE FROM MINISTER OF SCIENCE, TECHNOLOGY AND INNOVATION



Salam Sejahtera, Salam 1Malaysia dan Salam 1MOSTI.

Dalam usaha untuk menyokong pertumbuhan sosio-ekonomi negara bermatlamatkan kemakmuran dan kesejahteraan rakyat, Jabatan Meteorologi Malaysia (MetMalaysia) terus komited dalam meningkatkan keupayaan memantau dan menyampaikan maklumat cuaca, iklim dan gempa bumi serta mengeluarkan amaran-amaran cuaca buruk, laut bergelora dan tsunami.

Sepanjang tahun 2015, Malaysia telah menghadapi pelbagai rentetan kejadian cuaca ekstrem, antaranya kejadian banjir semasa Monsun Timur Laut di negeri-negeri pantai timur Semenanjung, Sabah dan Sarawak. Negara juga berhadapan dengan fenomena El Nino yang telah menyebabkan keadaan cuaca panas dan kering.

Di samping itu, pada 5 Jun 2015, Negara turut ditimpa episod bencana gempa bumi bermagnitud 6.0 pada skala Richter di Ranau, Sabah yang telah mengakibatkan 18 pendaki terkorban di Gunung Kinabalu dan kerosakan harta benda serta kemudahan infrastruktur awam.

Salam Sejahtera, Salam 1Malaysia and Salam 1MOSTI.

In efforts to support the socio-economic growth of the nation and the prosperity and well-being of the people, the Malaysian Meteorological Department (MetMalaysia) is committed to enhance its capability in monitoring and disseminating information on weather, climate and earthquake as well as issuing warnings on extreme weather, rough sea and tsunami.

In 2015, Malaysia experienced various occurrences of extreme weather, such as floods during the North East Monsoon in the east coast states of Peninsular Malaysia, Sabah and Sarawak. The country also faced the El Nino phenomenon that brought hot and dry weather conditions.

In addition, on 5 June 2015, the country was struck by an earthquake of magnitude 6.0 on the Richter scale in Ranau, Sabah, which took the lives of eighteen climbers at Mount Kinabalu and damaged properties and public infrastructure.

Pengalaman bencana alam ini telah memberi pengajaran kepada kita semua untuk lebih bersedia bagi menghadapi kejadian yang serupa di masa-masa akan datang. Sebagai langkah susulan, Kerajaan memutuskan untuk meningkatkan keupayaan sistem pemantauan gempa bumi dengan menambah 15 stesen seismik baharu di Sabah. Usaha ini dapat membantu mengesan gempa bumi dengan lebih efektif. Sub-Pusat Pemantauan Gempa Bumi juga akan ditubuhkan di Pejabat Meteorologi Sabah bertujuan meningkatkan sistem penyampaian perkhidmatan berkaitan kejadian gempa bumi kepada orang awam.

Kerajaan juga telah meluluskan projek untuk memperkasa sistem amaran awal cuaca MetMalaysia melalui pelaksanaan projek jangka pendek berimpak tinggi. Projek ini merangkumi model tinjauan cuaca dan sistem penyediaan maklumat cuaca. Projek berpaksikan keperluan rakyat ini dijangka akan beroperasi sepenuhnya pada 2017 bagi membolehkan maklumat dan amaran cuaca dikeluarkan lebih awal, cepat dan tepat kepada agensi-agensi pengurusan bencana dan orang awam dalam usaha membantu mengurangkan impak bencana cuaca ekstrem.

Saya mengucapkan tahniah kepada MetMalaysia atas usaha dan kejayaan melaksanakan sepenuhnya projek "1Daerah, 1AWS (Automatic Weather Station)" bagi memantapkan keupayaan pemantauan dan tinjauan cuaca di seluruh negara.

Di samping itu, MetMalaysia juga telah berjaya membangun dan menyediakan kemudahan aplikasi mudah alih myCuaca bagi meningkatkan sistem penyampaian maklumat dan perkhidmatan kepada rakyat. Teknologi aplikasi mudah alih ini membolehkan orang awam memperoleh maklumat tentang tinjauan cuaca harian dan maklumat gempa bumi serta amaran tsunami.

MetMalaysia juga terus memberikan komitmen dalam menyokong usaha-usaha Kerajaan membentuk masyarakat yang mempunyai kesedaran dalam persediaan menghadapi risiko bencana alam menerusi pelaksanaan program-program kesedaran awam.

The lesson learnt from this disaster, is that we need to be better prepared to face any eventualities in the future. As a result, the Government has decided to increase the capability of earthquake monitoring system with an additional of 15 new seismic stations in Sabah. An Earthquake Monitoring Sub-Centre will also be established at the Sabah Meteorological Office to improve the delivery services related to earthquakes for the public.

The Government has also approved a project to enhance MetMalaysia's weather early warning system by implementing a short-term high-impact project which includes a weather prediction model and weather information system. This project is expected to be fully operational in 2017 to provide earlier, faster and more accurate information and warnings on weather to disaster management agencies and the public in order to mitigate the impact of extreme weather.

My congratulations to MetMalaysia on its efforts and success in implementing the "1District, 1AWS (Automatic Weather Station)" project to strengthen the capability of weather observations and monitoring throughout the country.

MetMalaysia has also successfully developed the mobile application myCuaca to enhance its information delivery system services to the people. This mobile application technology enables the public to obtain daily weather forecasts, earthquake information as well as warning on tsunami.

MetMalaysia continues to give its commitment to support the Government's efforts in developing community readiness in facing disaster risks through the awareness programmes.

Sebanyak lima siri Kempen Kesedaran Awam Mengenai Gempa Bumi, Tsunami Dan Cuaca Ekstrem dengan kerjasama Majlis Keselamatan Negara dan pihak berkuasa tempatan telah dilaksanakan. Kerjasama turut melibatkan Polis Diraja Malaysia, Jabatan Pertahanan Awam Malaysia, Jabatan Bomba dan Penyelamat dan Jabatan Kebajikan Masyarakat.

Kepada seluruh warga MetMalaysia, tahniah dan terima kasih atas usaha gigih dan kejayaan yang telah dicapai sepanjang tahun 2015. Saya berharap agar MetMalaysia terus melakar kecemerlangan, kekal komited, inovatif dan kreatif untuk terus mara ke hadapan dalam usaha memperkukuh daya tahan negara terhadap sebarang ancaman bencana alam.

Five series of Earthquake, Tsunami and Extreme Weather Awareness Campaigns were held in collaboration with the National Security Council and the local authorities. This collaboration also involved the Royal Malaysian Police, Malaysia Civil Defence Department, Fire and Rescue Department and Social Welfare Department.

To all MetMalaysians, congratulations and thank you for your tireless efforts and success achieved in 2015. I hope MetMalaysia will continue to excel, committed, innovative and creative in moving forward to strengthen the resilience of the country in facing any threats of natural disasters.

“ Saya mengucapkan tahniah kepada MetMalaysia atas usaha dan kejayaan melaksanakan sepenuhnya projek “1Daerah, 1AWS (Automatic Weather Station)” bagi memantapkan keupayaan pemantauan dan tinjauan cuaca di seluruh negara.

My congratulations to MetMalaysia on its efforts and success in implementing the “1District, 1AWS (Automatic Weather Station)” project to strengthen the capability of weather observations and monitoring throughout the country. ”

DATUK SERI PANGLIMA MADIUS TANGAU

PERUTUSAN KETUA SETIAUSAHA KEMENTERIAN SAINS, TEKNOLOGI DAN INOVASI

MESSAGE FROM SECRETARY GENERAL
MINISTRY OF SCIENCE, TECHNOLOGY AND INNOVATION



**Assalammualaikum Warahmatullahi
Wabarakatuh, Salam Sejahtera, Salam
1Malaysia dan Salam 1MOSTI.**

Saya ingin mengucapkan syabas kepada Jabatan Meteorologi Malaysia (MetMalaysia) di atas usaha berterusan bagi menambahbaik kualiti perkhidmatan berkaitan cuaca, iklim, gempa bumi dan tsunami yang telah dilaksanakan sepanjang tahun 2015.

Pencapaian ini selaras dengan objektif utama MetMalaysia dalam mempertingkatkan sistem perkhidmatan meteorologi, iklim dan geofizik bagi menjamin kesejahteraan rakyat dan negara.

Antara penambahbaikan yang akan dilaksanakan oleh MetMalaysia ialah mengadaptasi kemajuan sains dan teknologi terkini untuk meningkatkan keupayaan model tinjauan cuaca beresolusi tinggi dan memanjangkan tempoh tinjauan daripada tiga hari kepada tujuh hari.

Sistem penyediaan maklumat cuaca juga akan ditambah baik bagi mentransformasikan produk-produk cuaca sedia ada kepada produk-produk yang lebih mesra pengguna dan memenuhi kehendak terkini *stakeholder*.

**Assalammualaikum Warahmatullahi
Wabarakatuh, Salam Sejahtera, Salam
1Malaysia and Salam 1MOSTI.**

My congratulations to the Malaysian Meteorological Department (MetMalaysia) on its efforts to improve the quality of services related to weather, climate, earthquake and tsunami which have been implemented in 2015.

These achievements are in accordance with the key objective of MetMalaysia to improve the service systems for meteorology, climate and geophysics to safeguard the well-being of the people and country.

Among the improvements to be implemented by MetMalaysia is adapting the advancement in science and the latest technology in order to increase the capability of high resolution weather prediction models and to extend the period of prediction from three to seven days.

The weather information system will also be improved to transform the existing weather products to be more user-friendly and meet the latest requirements of the stakeholders.

Penambahbaikan ini akan memastikan MetMalaysia berupaya meningkatkan kualiti penyampaian maklumat berkaitan amaran awal cuaca secara lebih efektif, cepat dan tepat. Inisiatif ini akan beroperasi sepenuhnya pada tahun 2017 bagi membantu memperkukuh keupayaan pengurusan risiko bencana negara.

MetMalaysia juga telah memeterai memorandum persefahaman bersama Universiti Malaya dalam bidang sains atmosfera yang meliputi pemantauan dan penyelidikan berkaitan komposisi udara terutama di perairan Laut China Selatan.

Saya turut berasa bangga atas kejayaan MetMalaysia menjalinkan kerjasama strategik antarabangsa dengan Amerika Syarikat susulan Mesyuarat *Malaysia-United States Second Joint Committee on Science & Technology* di Washington DC, Amerika Syarikat pada 3 hingga 5 Mac 2015. Kerjasama ini telah menghasilkan Laporan *Assessment of End-to-End Flood Forecast and Early Warning System for Malaysia*. Laporan ini menggariskan hasil kajian dan cadangan kepada Kerajaan Malaysia sebagai salah satu persediaan bagi membantu Negara bersiap siaga menghadapi bencana banjir pada masa akan datang.

Pada masa yang sama, MetMalaysia juga telah mengambil inisiatif untuk mengeratkan lagi kerjasama antarabangsa dalam bidang meteorologi dan klimatologi dengan *United Kingdom Met Office* melalui memorandum persefahaman yang akan dimeterai pada tahun 2016.

Komitmen tinggi telah ditunjukkan oleh MetMalaysia dalam setiap program kesedaran sains, teknologi dan inovasi yang dilaksanakan oleh MOSTI terutamanya melalui Karnival Kreativiti & *Science4U* 2015. Saya percaya penyertaan MetMalaysia ini telah menyumbang kepada usaha membentuk masyarakat yang berpengetahuan tentang risiko dan tindakan yang perlu dibuat semasa menghadapi bencana alam akibat cuaca ekstrem, gempa bumi dan tsunami.

Akhir kata, saya yakin warga MetMalaysia akan terus berkerja dengan penuh dedikasi, bertanggungjawab dan berintegriti untuk mencapai kejayaan dalam melaksanakan program dan inisiatif yang telah dan sedang dilaksanakan.

Such improvements will ensure MetMalaysia to enhance the quality of information dissemination related to early warnings on weather so that it would be more effective, faster and accurate. This initiative will be fully operational by 2017 to strengthen the disaster risk management capability of the country.

MetMalaysia had also signed a Memorandum of Understanding with University of Malaya in the field of atmospheric science which covers the monitoring and research related to air composition particularly in the waters of South China Sea.

I am also proud of the fact that MetMalaysia had fostered international strategic cooperation with the United States of America following the Malaysia-United States Second Joint Committee Meeting on Science & Technology held in Washington DC, United States of America from 3 to 5 March 2015. This cooperation had produced a Report on Assessment of End-to-End Flood Forecast and Early Warning System for Malaysia. The report underscored the result of the study and proposal to the Government of Malaysia as one of the arrangements to assist the country in the alertness for flood disasters in the future.

At the same time, MetMalaysia had also taken the initiative to further strengthen the international cooperation in the fields of meteorology and climatology with the United Kingdom Met Office through a Memorandum of Understanding to be signed in 2016.

MetMalaysia's high commitment towards its responsibility is evidenced in each of the awareness programme on science, technology and innovation organised by MOSTI particularly in the Creativity and Science4U Carnival 2015. I believe MetMalaysia has contributed to the effort to build a community that is knowledgeable about the risk and action needed when facing natural disasters arising from extreme weather, earthquake and tsunami.

I am confident that MetMalaysia personnel will continue to perform their duties with full dedication, responsibility and integrity to achieve success in the programmes and initiatives that had been and are being implemented.

TAN SRI DR. NOORUL AINUR MOHD. NUR

PERUTUSAN KETUA PENGARAH JABATAN METEOROLOGI MALAYSIA

MESSAGE FROM DIRECTOR GENERAL
MALAYSIAN METEOROLOGICAL DEPARTMENT



**Assalamualaikum Warahmatullahi
Wabarakatuh dan Salam Sejahtera.**

Cuaca ekstrem seperti hujan lebat monsun serta cuaca panas dan kering berpanjangan rentetan fenomena El Nino telah memberi kesan ketara kepada negara dalam tahun 2015.

Dalam usaha meningkatkan kesiapsiagaan negara menghadapi cuaca ekstrem, MetMalaysia telah memulakan pelaksanaan projek Peningkatan Sistem Ramalan Cuaca yang tujuan utamanya adalah untuk meningkatkan ketepatan ramalan dan kecekapan penyampaian maklumat cuaca.

Bagi membantu menangani masalah jerebu dan kekurangan air di empangan rentetan cuaca panas dan kering, MetMalaysia dengan kerjasama Majlis Keselamatan Negara dan Tentera Udara DiRaja Malaysia telah melaksanakan 94 operasi pembenihan awan.

Di samping impak cuaca ekstrem, negara turut dikejutkan dengan kejadian gempa bumi kuat di Ranau, Sabah pada 5 Jun 2015. Gempa bumi ini telah meningkatkan keperluan untuk mengujudkan rangkaian stesen pemantauan gempa bumi yang lebih banyak di Sabah. Rentetan itu, Kerajaan telah meluluskan 15 stesen seismologi yang akan beroperasi bermula tahun 2017.

**Assalamualaikum Warahmatullahi
Wabarakatuh and Salam Sejahtera.**

Extreme weather such as heavy monsoon rains and prolonged hot and dry weather induced by the El Nino phenomenon had significantly affected the country in 2015.

In her efforts to enhance the preparedness of the country in facing the extreme weather, MetMalaysia has embarked on the implementation of Weather Forecasting System project with the main aims of improving forecasting accuracy and efficiency of weather information service delivery.

To help address the problems of haze and water shortage in dams due to the hot and dry weather conditions, MetMalaysia in cooperation with the National Security Council and the Royal Malaysian Air Force had conducted 94 cloud seeding operations.

Apart from the impact of extreme weather, the country was also shaken by the occurrence of the strong earthquake in Ranau, Sabah on 5 June 2015. The earthquake had raised the alarm on the needs of having a denser network of earthquake monitoring stations in Sabah. Consequently, the Government has approved 15 new seismological stations for Sabah which will be operational by 2017.

Di persada serantau dan antarabangsa, MetMalaysia dalam tahun 2015 telah menjadi tuan rumah bagi tiga bengkel dan satu mesyuarat dalam bidang meteorologi, geofizik dan sains atmosfera, iaitu *World Meteorological Organization's Global Atmosphere Watch Urban Research Meteorology and Environment Regional Workshop for ASEAN* di Petaling Jaya pada 7 hingga 10 April; *Asia-Pacific Economic Cooperation Climate Center Workshop on Toward a Fire and Haze Early Warning System for Southeast Asia* di Petaling Jaya pada 9 hingga 10 Jun; *37th Meeting of ASEAN Sub-Committee on Meteorology and Geophysics* di Kuala Lumpur pada 25 hingga 27 Ogos; dan *Economic and Social Commission for Asia and the Pacific dan World Meteorological Organization Typhoon Committee 10th Integrated Workshop* di Kuala Lumpur pada 26 hingga 29 Oktober.

MetMalaysia juga telah memulakan kolaborasi dengan *United Kingdom Met Office* (Met Office) dalam usaha untuk meningkatkan tahap penyampaian perkhidmatan bagi memenuhi keperluan *stakeholder* dan pelanggan. Bidang kolaborasi merangkumi:

- Perkongsian pengalaman dan kepakaran dalam bidang cuaca dan iklim
- Pembangunan bersama dalam asas utama sains mengenai cuaca dan iklim
- Peningkatan dan pembangunan model tinjauan cuaca berangka
- Memberi nilai untuk wang dalam pelaksanaan *High Performance Computing* (HPC) dan penggunaan produk dan perkhidmatan cuaca dan iklim
- Pembangunan kapasiti sumber manusia

Dalam usaha merakyatkan perkhidmatan, MetMalaysia telah melaksanakan sebanyak 109 aktiviti kesedaran awam mengenai cuaca ekstrem, gempa bumi dan tsunami. Saya yakin usaha ini telah dapat membantu orang ramai lebih bersedia dalam menghadapi cuaca ekstrem, gempa bumi dan tsunami.

Akhir kata, saya ingin mengucapkan setinggi-tinggi penghargaan terhadap komitmen dan dedikasi semua warga MetMalaysia yang telah menjamin MetMalaysia dapat sentiasa memberikan perkhidmatan terbaik.

In the regional and international arena, MetMalaysia in 2015 had hosted three workshops and one meeting on meteorology, geophysics and atmospheric science. The workshops were World Meteorological Organization's Global Atmosphere Watch Urban Research Meteorology and Environment Regional Workshop for ASEAN, held in Petaling Jaya from 7 to 10 April; the Asia-Pacific Economic Cooperation Climate Center Workshop on Toward a Fire and Haze Early Warning System for Southeast Asia held in Petaling Jaya from 9 to 10 June; the 37th Meeting of ASEAN Sub-Committee on Meteorology and Geophysics held in Kuala Lumpur from 25 to 27 August; and the Economic and Social Commission for Asia and the Pacific and World Meteorological Organization Typhoon Committee 10th Integrated Workshop held in Kuala Lumpur from 26 to 29 October.

MetMalaysia in her efforts to enhance her service delivery in order to meet stakeholders' and clients' needs has also initiated a collaboration with the United Kingdom Met Office (Met Office). The areas of collaboration include:

- *Sharing of experience and expertise in weather and climate*
- *Joint development of underpinning Science in weather and climate*
- *Numerical weather prediction model development and improvement*
- *Delivering value for money in the area of HPC deployment and utilization in weather and climate products and services*
- *Human resources capacity building development*

In her efforts to humanize her services, MetMalaysia had carried out 109 public awareness activities on extreme weather, earthquake and tsunami. I am confident these efforts has helped the public to be better prepared in facing extreme weather, earthquakes and tsunamis.

Last but not least I wish to express my upmost appreciation to all the staff for their commitment and dedication which has ensured MetMalaysia is able to always provide the best services.

DATO' CHE GAYAH BINTI ISMAIL



Maklumat Korporat *Corporate Profile*

WAWASAN, MISI DAN OBJEKTIF

VISION, MISSION AND OBJECTIVES

WAWASAN

Menjadi antara pusat meteorologi, klimatologi dan geofizik yang terbaik di Asia menjelang 2020.

VISION

To be among the best of meteorological, climatological and geophysical service centre in Asia by 2020.

MISI

Memenuhi keperluan rakyat Malaysia dalam perkhidmatan meteorologi, iklim dan geofizik untuk kesejahteraan hidup, keselamatan negara dan pembangunan sosio ekonomi lestari.

To fulfill the needs of the people of Malaysia for meteorological, climatological and geophysical services for societal well-being, national security and sustainable socio-economic development.

MISSION

OBJEKTIF

1. Mempertingkatkan sistem perkhidmatan meteorologi, iklim dan geofizik untuk:
 - Keselamatan dan kecekapan operasi di udara, darat, laut dan ketenteraan;
 - *Homeland security* (seperti pengurusan bencana alam, ancaman perubahan iklim, cuaca melampau, gempa bumi dan tsunami);
 - Keselamatan dan kesejahteraan orang awam; dan
 - Perancangan pembangunan sosio-ekonomi dan pengurusan alam sekitar.
2. Meningkatkan sistem pencerapan, mewujudkan dan mengawal selia pangkalan data meteorologi, iklim, seismologi dan tsunami negara untuk memenuhi keperluan generasi kini dan akan datang.
3. Melindungi kepentingan negara di peringkat antarabangsa serta mempromosikan kefahaman dan kemajuan sains meteorologi, iklim, seismologi dan tsunami dalam negara.

OBJECTIVES

1. *Enhance the meteorological, climatological and geophysical service system for:*
 - *Safety and operational efficiency in the air, land, sea and military;*
 - *Homeland security (such as disaster management and threats from climate change, extreme weather, earthquake and tsunami);*
 - *Public safety and comfort; and*
 - *Social economic development planning and environmental management.*
2. *Enhance the observation system, and establish and regulate the national database of meteorology, climate, seismology and tsunami to meet the needs of present and future generations.*
3. *Protecting national interests at the international level and to promote the understanding and advancement in meteorological, climatological, seismological and tsunami sciences in the country.*

PIAGAM PELANGGAN

CLIENT CHARTER

Jabatan Meteorologi Malaysia berusaha memberikan perkhidmatan meteorologi dan geofizik yang berkualiti tinggi bagi memenuhi keperluan ekonomi dan keselamatan negara kita. Kami berjanji akan melaksanakan perkara-perkara berikut:

Permohonan maklumat meteorologi, seismologi dan tsunami akan diberi maklumbalas dalam tempoh 1 hari bekerja dan dibekalkan dalam tempoh 5 hari bekerja.

Maklumat cuaca untuk penerbangan disediakan dalam tempoh 3 jam sebelum pelepasan.

Buletin Cuaca Bulanan akan diterbitkan dalam tempoh 10 hari bekerja pada setiap permulaan bulan berikutnya.

Ringkasan Pencerapan Cuaca Tahunan akan diterbitkan pada Februari tahun berikutnya.

Buletin Agrometeorologi 10-hari akan diterbitkan dalam tempoh 5 hari bekerja selepas setiap dekad.

Tinjauan dan Analisis Agroklimatik Bulanan akan diterbitkan pada minggu kedua bulan berikutnya.

Permohonan untuk operasi pembenihan awan akan dilaksanakan dalam tempoh 10 hari bekerja.

Imej radar dan satelit di laman web akan dikemaskini setiap 30 minit.

Maklumat awal gempa bumi dan tsunami akan disebarkan kepada agensi-agensi berkaitan dan media massa dalam tempoh 8 minit daripada kejadian gempa bumi dikesan.

The Malaysian Meteorological Department endeavors to provide meteorological and geophysical services of high quality to fulfill the socio-economic and security needs of our nation. We pledge to perform as follows:

Request for meteorological, seismological and tsunami information will be responded to within 1 working day and supplied within 5 working days.

Weather information for flights will be ready in 3 hours before departure.

Monthly Weather Bulletin will be published within 10 working days at the beginning of the following month.

Annual Weather Observation Summary will be published by February of the following year.

10-day Agrometeorological Bulletin will be published within 5 working days after each decade.

Monthly Agroclimatic Analysis and Outlook will be published within the second week of the following month.

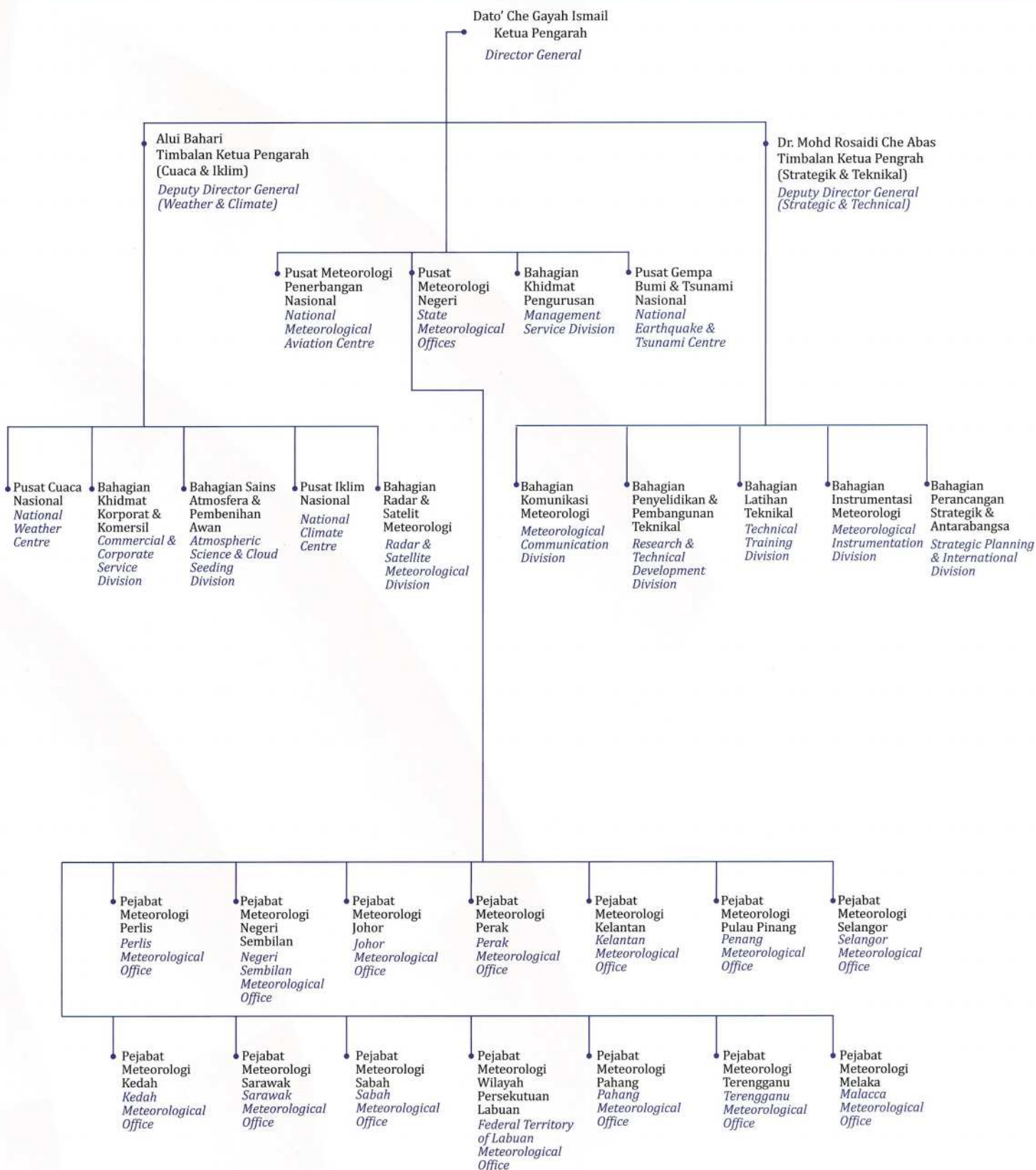
Request for cloud seeding operation will be implemented within 10 working days.

Radar and satellite images on the website will be updated every 30 minutes.

Preliminary earthquake and tsunami information will be disseminated to the relevant agencies and mass media within 8 minutes upon the detection of earthquake.

CARTA ORGANISASI MetMalaysia

MetMalaysia ORGANISATION CHARTS



PENGURUSAN TERTINGGI

TOP MANAGEMENT



ALUI BIN BAHARI
TIMBALAN KETUA PENGARAH
(CUACA & IKLIM)
DEPUTY DIRECTOR GENERAL
(WEATHER & CLIMATE)



DATO' CHE GAYAH ISMAIL
KETUA PENGARAH
DIRECTOR GENERAL



DR. MOHD ROSAIDI BIN CHE ABAS
TIMBALAN KETUA PENGARAH
(STRATEGIK & TEKNIKAL)
DEPUTY DIRECTOR GENERAL
(STRATEGIC & TECHNICAL)



DR. WAN AZLI WAN HASSAN
PENGARAH KANAN
PUSAT GEMPA BUMI & TSUNAMI NASIONAL
SENIOR DIRECTOR
NATIONAL EARTHQUAKE & TSUNAMI CENTRE



KANG THEAN SHONG
PENGARAH KANAN
PUSAT METEOROLOGI
PENERBANGAN NASIONAL
SENIOR DIRECTOR
NATIONAL METEOROLOGICAL AVIATION CENTRE



OTHMAN BIN HAMZAH
PENGARAH
BAHAGIAN KHIDMAT PENGURUSAN
DIRECTOR
MANAGEMENT SERVICE DIVISION

Cuaca & Iklim *Weather & Climate*

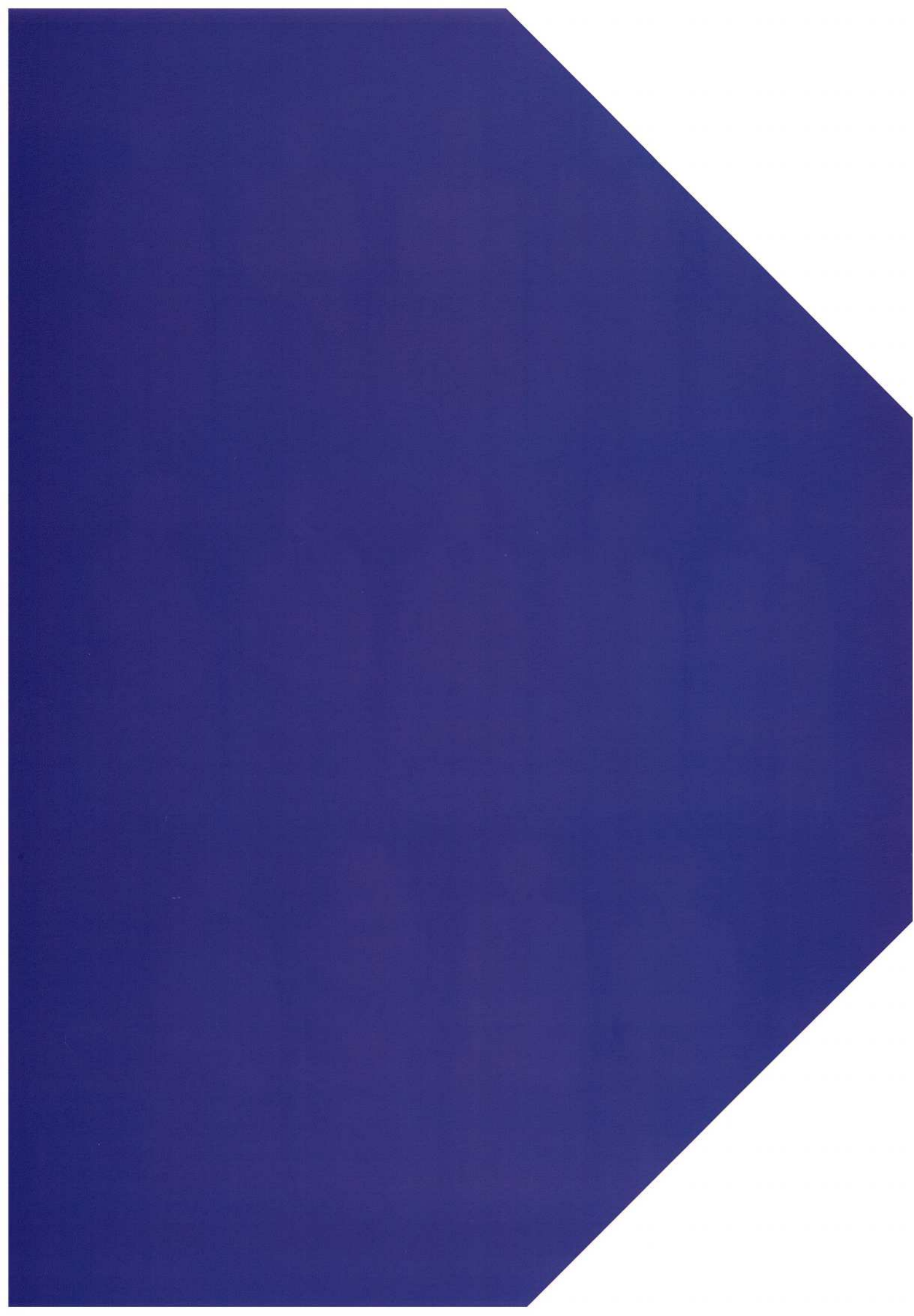


Strategik & Teknikal *Strategic & Technical*



Pejabat Meteorologi Negeri
State Meteorological Offices







MetMalaysia
bersama MOSTI
MetMalaysia
with MOSTI

MetMalaysia bersama MOSTI

MetMalaysia with MOSTI

Pameran di Dataran Pisompuruan, Tambunan sempena Program Kreativiti & Science4u Zon Sabah yang dianjurkan oleh MOSTI

MOSTI organised exhibition at Dataran Pisompuruan, Tambunan, in conjunction with Creativity and Science4u Programme for Sabah Zone



Penerangan model puting beliung oleh Pegawai MetMalaysia kepada YB Datuk Dr. Ewon Ebin, Menteri Sains, Teknologi dan Inovasi, dan Dato' Dr. Mohd Azhar bin Hj. Yahya, Timbalan Ketua Setiausaha (Dasar) MOSTI

MetMalaysia Officer briefing YB Datuk Dr. Ewon Ebin, Minister of Science, Technology and Innovation, and Dato' Dr. Mohd Azhar bin Hj. Yahya, MOSTI Deputy Secretary General (Policy) on the tornado model



YAB Datuk Seri Panglima Musa Haji Aman dan YB Tan Sri Datuk Seri Panglima Joseph Pairin Kitingan mengunjungi tapak pameran MetMalaysia

YAB Datuk Seri Panglima Musa Haji Aman and YB Tan Sri Datuk Seri Panglima Joseph Pairin Kitingan visited the MetMalaysia exhibition booth



Penyertaan MetMalaysia dalam Misi 'Gentech Ops Banjir' anjuran MOSTI di Daerah Pekan, Pahang

MetMalaysia participated in 'Ops Flood Gentech' organised by MOSTI in Pekan District, Pahang

Misi operasi selepas banjir yang dinamakan "GenTech Ops Banjir" yang dianjurkan oleh MOSTI di beberapa lokasi terlibat di Daerah Pekan, Pahang. Misi ini turut disertai oleh Ketua Setiausaha (KSU) MOSTI dan Ketua Pengarah (KP) MetMalaysia pada 14 - 15 dan 21 - 23 Januari 2015

The post-flood mission 'Ops Flood of Gentech' organised by MOSTI was held at various flood locations in Pekan District, Pahang. Secretary General (SG) of MOSTI and Director General (DG) of MetMalaysia also participated in the missions which were held on 14 - 15 and 21 - 23 January 2015



Lawatan turun padang oleh KSU MOSTI ke Pejabat Meteorologi Pahang pada 18 September 2015
SG of MOSTI made a field visit to Pahang Meteorological Office on 18 September 2015



Bengkel Bersepadu Jawatankuasa Taufan ESCAP/WMO Ke-10, 26-29 Oktober 2015, Hotel Berjaya Times Square, Kuala Lumpur

ESCAP/WMO Typhoon Committee's 10th Integrated Workshop, 26-29 October 2015, Berjaya Times Square Hotel, Kuala Lumpur

Penganjuran bengkel ini memberi pendedahan kepada para peserta mengenai peranan perkhidmatan meteorologi dan hidrologi serta agensi pengurusan bencana di negara-negara yang terlibat dalam pengurusan risiko bencana.

The workshop was organised to provide exposure to participants and disaster management agencies on the role of meteorology and hydrology in countries involved in disaster risk management.

Hari Meteorologi Sedunia 2015 dan Pelancaran Aplikasi Mobil myCuaca World Meteorological Day 2015 and Launching of myCuaca Mobile Application



Majlis Pelancaran Aplikasi Mobil myCuaca
Launching Ceremony of myCuaca Mobile Application

Hari Meteorologi Sedunia 2015 bertemakan Iklim: Pengetahuan untuk Tindakan telah diadakan pada 23 Mac 2015 disambut dengan meriah di Pusat Konvesyen Antarabangsa Putrajaya. Sambutan ini diadakan bersekalikan dengan pelancaran Aplikasi Mobil myCuaca. Pelancaran ini telah disempurnakan oleh YB Datuk Dr. Ewon Ebin, Menteri Sains, Teknologi dan Inovasi sempena perasmian Hari Meteorologi Sedunia 2015. Majlis ini turut dihadiri oleh YB Datuk Dr. Abu Bakar Mohamad Diah, Timbalan Menteri MOSTI, YBhg. Dato' Sri Dr. Noorul Ainur Mohd Nur, Ketua Setiausaha MOSTI, ketua-ketua jabatan dan agensi di bawah MOSTI.

The celebration of World Meteorological Day 2015 with the theme Climate: Knowledge for Action was held on 23 March at the Putrajaya International Convention Centre. A Mobile Application myCuaca was launched in conjunction with the celebration. The event was graced by Datuk Dr. Ewon Ebin, Minister of Science, Technology and Innovation, and attended by Datuk Dr. Abu Bakar Mohamad Diah, Deputy Minister of MOSTI, Dato' Sri Dr. Noorul Ainur Mohd Nur, Secretary General of MOSTI, heads of departments and agencies under MOSTI.



Aplikasi Mobil myCuaca
myCuaca Mobile Application

Pada 26 November 2015, Pusat Meteorologi Penerbangan Nasional (PMPN) di KLIA telah menerima kunjungan KSU MOSTI diiringi oleh KP MetMalaysia.

On 26 November 2015, SG of MOSTI accompanied by DG of MetMalaysia visited the National Meteorological Aviation Centre (NMAC) at KLIA.



Ketibaan KSU MOSTI di PMPN
Arrival of SG of MOSTI at NMAC



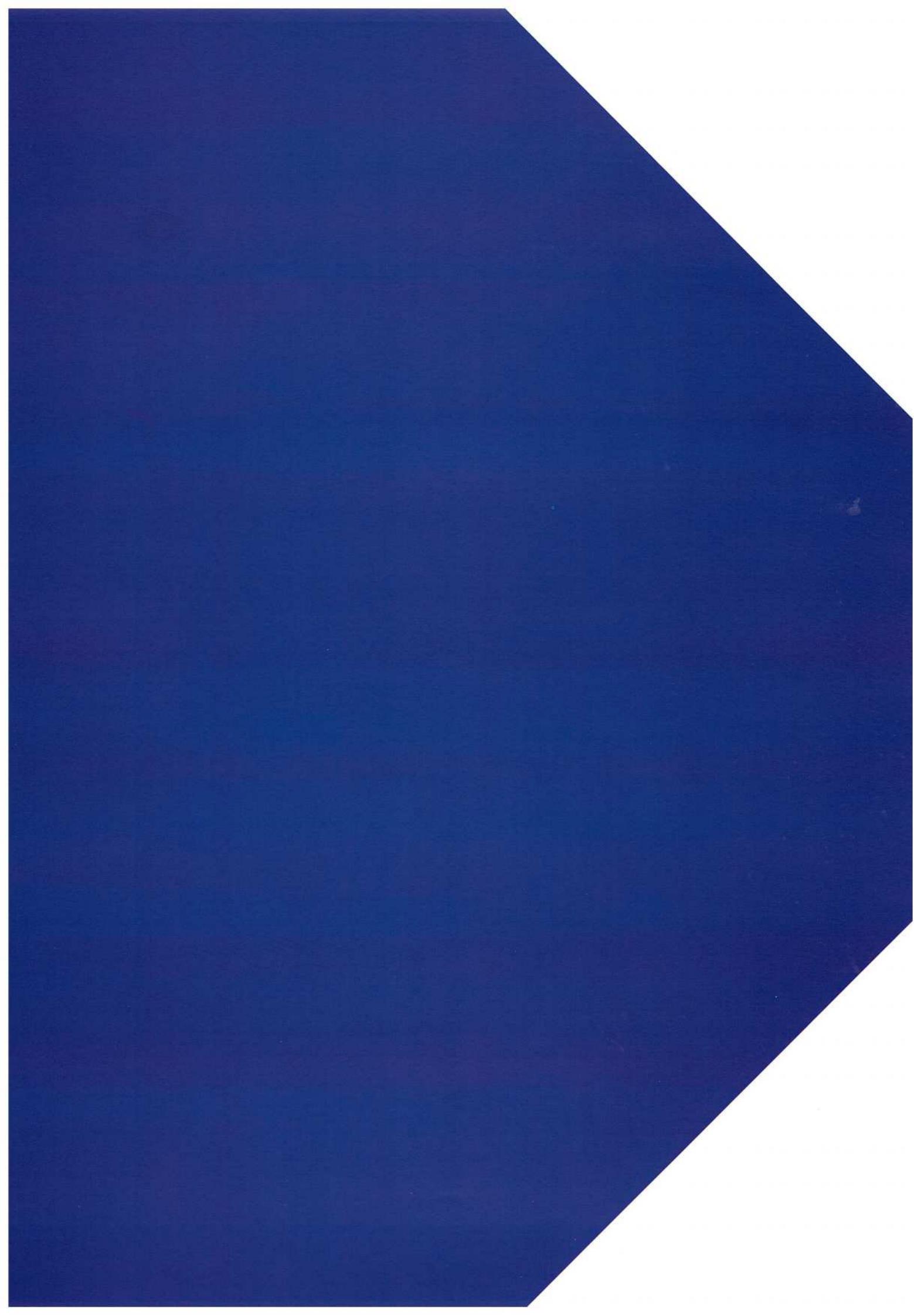
KSU MOSTI & KP MetMalaysia bersama-sama pegawai PMPN
SG of MOSTI & DG MetMalaysia together with NMAC officers



KSU MOSTI diberi taklimat mengenai operasi PMPN
SG of MOSTI being briefed on NMAC operations



KSU MOSTI bersama staf PMPN
SG of MOSTI with NMAC staff





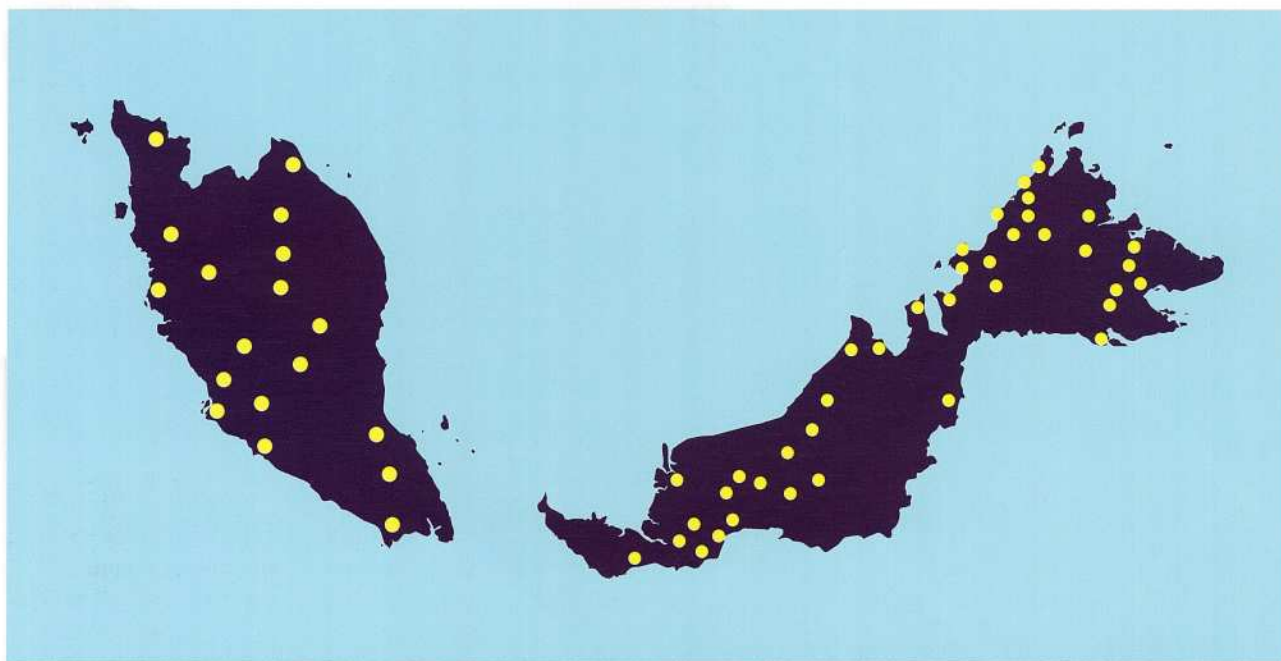
**Pencerapan &
Pemantauan Cuaca**
*Weather Observation &
Monitoring*

PENCERAPAN DAN PEMANTAUAN CUACA

WEATHER OBSERVATION AND MONITORING

MetMalaysia telah menambah sejumlah 60 buah stesen auksiliari *Automatic Weather System (AWS)* di seluruh negara menerusi Rancangan Malaysia Ke-10. Sebanyak 20 buah stesen masing-masing ditempatkan di Semenanjung, Sabah dan Sarawak.

MetMalaysia implemented 60 new Automatic Weather System (AWS) auxilliary stations throughout the country under the 10th Malaysia Plan. There are 20 stations each in Peninsula, Sabah and Sarawak.



Lokasi 60 Stesen AWS Baharu
Location of 60 new AWS Stations



AWS yang menggunakan sistem komunikasi VSAT (Very Small Aperture Terminal) di Stesen Lojing, Kelantan

AWS using VSAT (Very Small Aperture Terminal) communication system located at Lojing Station, Kelantan



Penggunaan sistem komunikasi 3G di Stesen AWS Pulau Pangkor, Perak

3G communication system at Pulau Pangkor AWS Station, Perak

Radar & Satelit

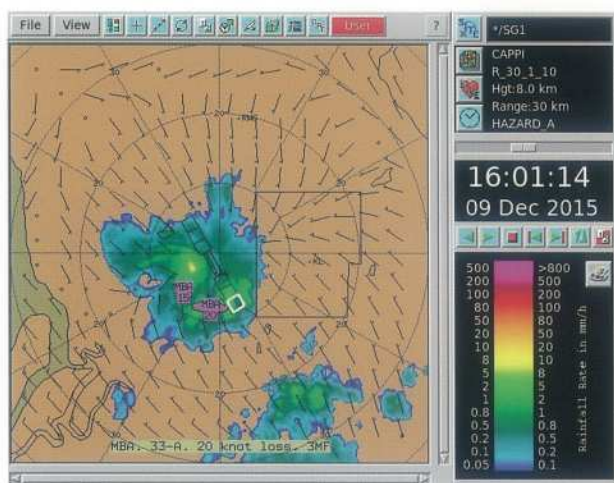
Sistem radar cuaca Subang telah dipertingkatkan keupayaannya kepada Terminal Doppler Weather Radar bagi memenuhi keperluan keselamatan Lapangan Terbang Sultan Abdul Aziz Shah (LTSAAS) di Subang.

Paparan produk tersebut telah ditempatkan di Menara Kawalan Trafik Udara (ATC) dan Pejabat Meteorologi Selangor.

Radar & Satellite

The capability of the radar system at the Sultan Abdul Aziz Airport, Subang (LTSAAS) was upgraded to the Terminal Doppler Weather Radar in order to meet higher security requirements of the airport.

The product is on display at the Air Traffic Control (ATC) Tower and the Selangor Meteorological Office.



Pengesanan cuaca ekstrem di landasan LTSAAS
Detection of severe weather on display at the LTSAAS runway



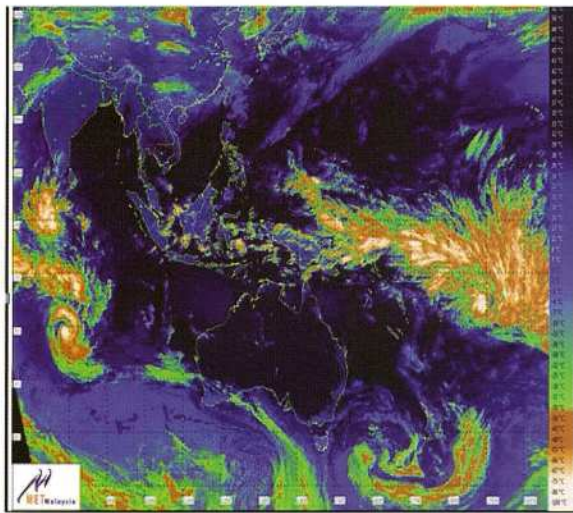
Paparan Amaran Cuaca Ekstrem di Menara ATC LTSAAS
Severe weather warning on display at the ATC Tower, LTSAAS

MetMalaysia menerima data satelit meteorologi geopegun seperti satelit Himawari- 8 dari Jepun dan satelit FY-2G dan CMACast (FY-2D/FY-2E) dari China.

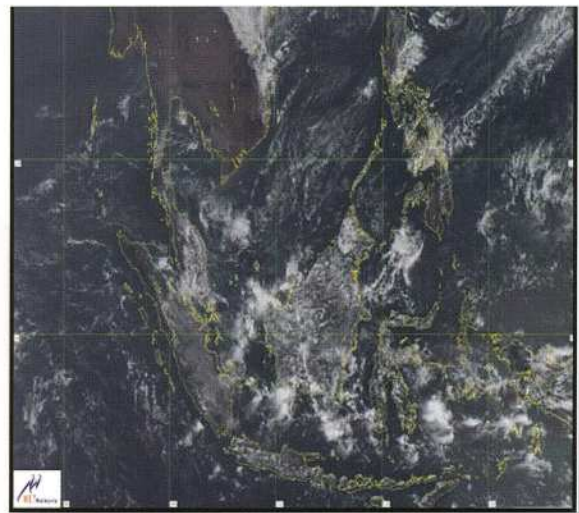
Pada awal tahun 2015, MetMalaysia telah membuat persediaan untuk menerima data dari satelit Himawari-8 dengan membuat pemasangan peralatan penerimaan serta perisian untuk memproses dan memaparkan imej satelit Himawari-8.

MetMalaysia receives geostationary meteorological satellite data from Japan's Himawari-8 satellite, FY-2G and China's CMACast(FY-2D/FY-2E).

In early 2015, MetMalaysia made preparations to receive data from Himawari-8 with the installation of reception equipment to receive data as well as software to process and display images from the Himawari-8 satellite.



Imej *infra-red* dari satelit Himawari-8 yang dipertingkatkan
Infra-red enhanced image from Himawari-8 satellite



Imej *true colour* dari satelit Himawari-8
True colour image from Himawari-8 satellite



Antena untuk menerima data dari satelit Himawari-8
Antenna to receive data from Himawari-8 satellite



Lawatan pakar satelit Himawari-8 dari Japan Meteorological Agency
Visit by Himawari-8 satellite expert from Japan Meteorological Agency



TINJAUAN CUACA

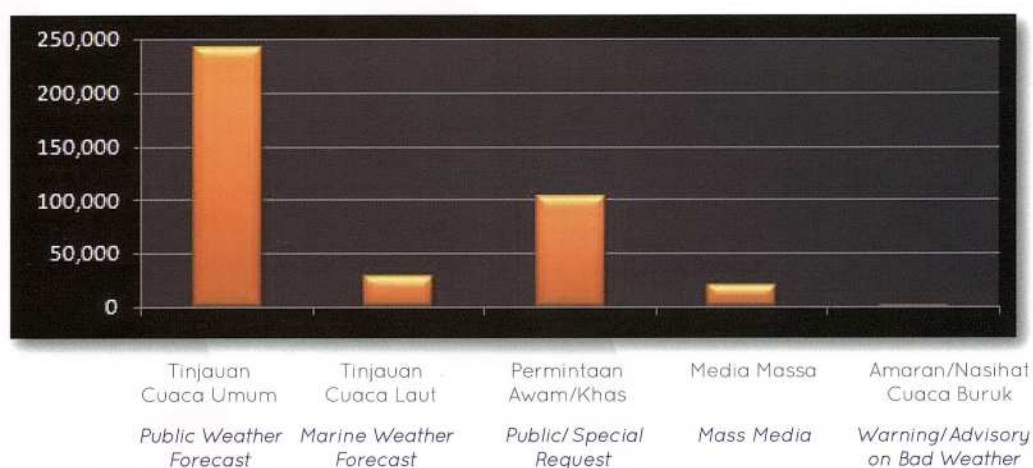
WEATHER FORECAST

MetMalaysia berperanan untuk memantau situasi cuaca secara berterusan di seluruh negara melibatkan kawasan darat dan laut. Ia juga bertanggungjawab menyediakan maklumat dan tinjauan cuaca serta nasihat dan amaran cuaca buruk kepada orang awam, pihak media, agensi kerajaan, sektor swasta dan agensi pengurusan bencana. Fenomena berkaitan cuaca buruk yang melanda negara kita merangkumi kejadian hujan lebat, ribut petir, angin kencang, ribut tropika, ombak besar dan jerebu tebal. Medium penyampaian yang digunakan oleh MetMalaysia untuk penyebaran maklumat, tinjauan, nasihat dan amaran cuaca terdiri daripada pelbagai sumber, seperti melalui laman sesawang, media cetak dan elektronik, laman media sosial, faks dan sistem pesanan ringkas.

Sepanjang 2015, sebanyak 393,728 produk-produk berkaitan cuaca yang meliputi 241,758 tinjauan cuaca umum, 27,600 tinjauan cuaca laut, 101,899 permintaan cuaca khas, 19,916 tinjauan cuaca media serta 2,555 nasihat dan amaran cuaca buruk telah dikeluarkan.

MetMalaysia continuously monitors the weather conditions over land and sea throughout the country. It is also responsible for disseminating information and forecasts as well as providing advisories and warnings of bad weather to the public, mass media, government agencies, private sector and disaster management agencies. Bad weather related phenomena in our country consist of heavy rain, thunderstorm, strong wind, tropical storm, rough seas and thick haze. MetMalaysia uses website, printed and electronic media, social media, fax and short messaging service to disseminate the weather information, forecast, advisory and warning.

Throughout 2015, as many as 393,728 products related to weather, comprising 241,758 public weather forecasts, 27,600 marine weather forecasts, 101,899 special weather requests, 19,916 media weather forecasts and 2,555 advisories and warnings of bad weather were issued.



Bilangan produk cuaca yang dikeluarkan sepanjang 2015
Number of weather related products provided in 2015

OPERASI PEMBENIHAN AWAN

CLOUD SEEDING OPERATION

MetMalaysia bertanggungjawab melaksanakan operasi pembenihan awan (OPA) untuk membantu meningkatkan sumber bekalan air di empangan, membantu menangani masalah jerebu yang melanda negara serta menjalankan kajian dan penyelidikan berkaitan dengan keberkesanan dan teknologi terkini dalam OPA.

OPA yang dijalankan bagi membantu meningkatkan sumber bekalan air adalah seperti berikut:

- Empangan Gemencheh, Negeri Sembilan pada 24 - 29 Mac 2015
- Kawasan tadahan air Lembaga Kemajuan Pertanian Muda (MADA), Kedah pada 1 - 4 April 2015
- Kawasan tadahan air Lembaga Kemajuan Pertanian Kemubu (KADA), Kelantan pada 6 - 10 April 2015
- Kolam takungan air Bukit Merah dan Sungai Kerian, Perak pada 14 - 21 April 2015
- Empangan Sembrong, Macap, Linggiu dan Congok, Johor pada 28 April - 7 Mei 2015
- Kawasan tadahan seperti Sri Aman, Simunjan, Serian, Serapi, Asajaya, Balingian dan Bintulu di Sarawak pada 21 - 30 Julai 2015
- Kawasan tadahan air Layang, Lebam, Linggiu, Machap dan Sembrong, Johor pada 12 - 31 Oktober 2015
- Empangan Linggiu, Layang dan Lebam, Johor pada 21 November - 17 Disember 2015

MetMalaysia is responsible for conducting cloud seeding operation (OPA) to help to improve water supply in dams, to help to mitigate the effects of severe haze plaguing the country as well as to carry out research and studies related to the effectiveness and the latest technology in OPA.

OPA that were carried out to help to increase the water supplies are as follows:

- *Gemencheh Dam, Negeri Sembilan on 24 - 29 March 2015*
- *Catchment area of the Muda Agricultural Development Authority (MADA), Kedah on 1 - 4 April 2015*
- *Catchment area of the Kemubu Agricultural Development Authority (KADA), Kelantan, on 6 - 10 April 2015*
- *Bukit Merah and Sungai Kerian reservoirs, Perak, on 14 - 21 April 2015*
- *Dams of Sembrong, Macap, Linggui and Congok, Johor on 28 April - 7 May 2015*
- *Catchment areas in Sarawak such as Sri Aman, Simunjan, Serian, Serapi, Asajaya, Balingian and Bintulu, on 21- 30 July 2015*
- *Catchment areas of Layang, Lebam, Linggiu, Machap and Sembrong, Johor on 12 - 31 October 2015*
- *Dams of Linggiu, Layang and Lebam, Johor on 21 November - 17 December 2015*

OPA yang dijalankan bagi membantu menangani masalah jerebu adalah seperti berikut:

- Selangor dan Wilayah Persekutuan (WP) Kuala Lumpur pada 29 - 30 Ogos 2015
- Selangor, WP Kuala Lumpur, Perak, Pahang, Negeri Sembilan, Melaka, Johor dan Sarawak pada 15 - 23 September 2015
- Selangor dan WP Kuala Lumpur pada 1 - 6 Oktober 2015
- Selangor, WP Kuala Lumpur, Kedah dan Perlis pada 20 - 25 Oktober 2015

OPA that were conducted to help to mitigate haze issues are as follows:

- *Selangor and Kuala Lumpur Federal Territory (FT) on 29 - 30 August 2015*
- *Selangor, Kuala Lumpur FT, Perak, Pahang, Negeri Sembilan, Melaka, Johor and Sarawak on 15 - 23 September 2015*
- *Selangor and Kuala Lumpur FT on 1 - 6 October 2015*
- *Selangor, Kuala Lumpur FT, Kedah and Perlis on 20 - 25 October 2015*



Kontinjen dari OPA MetMalaysia dan Tentera Udara Diraja Malaysia (TUDM) yang bekerjasama melaksanakan OPA ketika jerebu melanda negara pada tahun 2015

MetMalaysia and TUDM contingents working together in OPA during the haze crisis that affected the country in 2015



Pasukan Pembenihan Awan menyediakan larutan garam bagi OPA
Cloud Seeding Team was preparing the saline solution for OPA



Pembenihan awan dengan kaedah *dry seeding*
Cloud seeding by using the dry seeding method

PERISTIWA CUACA EKSTREM 2015

EXTREME WEATHER EVENTS 2015



Banjir di Kota Belud, Sabah, 2 Januari

Hujan lebat yang berlaku selama beberapa hari telah menyebabkan beberapa kawasan utara Kota Belud ditenggelami air. Sebanyak 18 buah kampung dan beberapa laluan di Kota Belud terputus hubungan dengan seramai 542 orang mangsa telah ditempatkan di dua buah pusat pemindahan.



Flood in Kota Belud, Sabah, 2 January

Heavy rain for several days inundated some areas in the north of Kota Belud. Eighteen villages and some routes in Kota Belud were cut off. A total of 542 people affected by the flood were placed at two evacuation centres.



Puting Beliung di Bagan Serai, Perak, 2 Januari

Satu kejadian puting beliung telah berlaku di Kampung Parit Air Hitam 1, Bagan Serai, pada petang 2 Januari. Angin kencang yang melanda telah merosakkan lima buah rumah penduduk apabila bumbung rumah mereka telah diterbangkan.



Tornado in Bagan Serai, Perak, 2 January

A tornado was occurred at Kampung Parit Air Hitam 1, Bagan Serai, in the afternoon of 2 January. Strong winds had damaged five houses that` had their roofs blown away.



Banjir di Kelantan dan Pahang, 9 Januari

Hujan berterusan yang berlaku telah menyebabkan banjir di beberapa kawasan rendah di sekitar Daerah Kuala Krai, Kelantan. Laluan menghubungkan beberapa kampung dengan Jalan Kuala Krai-Machang melalui Bukit Sireh turut dinaiki air.

Di Pahang, banjir yang berlaku telah meragut nyawa mangsa ketujuh. Lima daerah yang terjejas oleh banjir melibatkan Pekan (7,414 orang), Maran (2,618 orang), Kuantan (1,012 orang), Temerloh (611 orang) dan Bera (164 orang) dengan jumlah mangsa 11,819 orang ditempatkan di 57 pusat pemindahan banjir.



Flood in Kelantan and Pahang, 9 January

Continuous rain had caused floods in several low lying areas in the District of Kuala Krai, Kelantan. Access routes linking several villages with Jalan Kuala Krai-Machang via Bukit Sireh were also flooded.

Flood in Pahang had claimed its seventh victim. Five districts affected by floods were Pekan (7,414 people), Maran (2,618 people), Kuantan (1,012 people), Temerloh (611 people), and Bera (164 people). A total of 11,819 victims were placed at 57 flood evacuation centres.



Cuaca Sejuk di Kuala Krai, Kelantan, 18 Januari

Daerah Kuala Krai telah dilanda cuaca sejuk dengan suhu di antara 19°C hingga 22°C yang berlaku pada awal pagi dan malam.

Keadaan cuaca sejuk, berangin dan berkabus pada sebelah pagi menyebabkan penduduknya terpaksa berbaju tebal untuk ke tempat kerja atau sekolah. Keadaan ini memeritkan lagi mangsa-mangsa banjir yang kehilangan atau kerosakan rumah.



Cold Weather in Kuala Krai, Kelantan, 18 January

Kuala Krai District experienced cold weather with its temperature between 19°C and 22°C during the early morning and night.

The cold, windy and misty weather conditions in the morning caused Kuala Krai residents to wear thick clothings to work or school. The situation was particularly distressing for the flood victims whose homes were gone or damaged.



Banjir di Sarawak dan Sabah, 22 Januari

Keadaan banjir di Sarawak semakin buruk apabila jumlah keseluruhan mangsa banjir mencecah 10,103 orang ditempatkan di 53 buah pusat pemindahan.

Di Sabah, hujan berterusan telah mengakibatkan banjir melanda Daerah Beaufort, Membakut, Tenom dan Keningau yang melibatkan 307 mangsa.



Floods in Sarawak and Sabah, 22 January

The flood situation in Sarawak had worsened with the 10,103 victims placed at 53 evacuation centres.

In Sabah, continuous rain had caused flooding in the districts of Beaufort, Membakut, Tenom and Keningau where a total of 307 people were affected.



Banjir Kilat di Subang Jaya, Selangor, 31 Mac

Kejadian hujan lebat yang bermula pada jam 5 petang telah mengakibatkan beberapa kawasan perumahan di USJ, Batu Tiga, Padang Jawa, Bukit Jelutong, Kampung Melayu Subang dan Taman Eng Ann, Klang, dinaiki air sedalam hampir 0.5 meter.

Selain itu, kejadian tanah runtuh turut dilaporkan berlaku di Lebuhraya Shah Alam (KESAS) dan Seksyen 18, Shah Alam.



Flash Flood in Subang Jaya, Selangor, 31 March

Heavy rain that began at 5pm had caused flooding in several residential areas in USJ, Batu Tiga, Padang Jawa, Bukit Jelutong, Kampung Melayu Subang and Taman Eng Ann, Klang. The flood water level was nearly 0.5m.

A landslide was also reported at the Shah Alam Expressway (KESAS) and Section 18, Shah Alam.



Ribut di Kluang, Johor, 2 Jun

Kira-kira pukul 6 petang, satu kejadian ribut telah berlaku di beberapa kawasan perumahan di Kluang melibatkan 266 buah keluarga. Nilai kerugian dianggarkan berjumlah kira-kira RM2 juta.



Storm in Kluang, Johor, 2 June

At about 6pm, a storm had occurred in several residential areas in Kluang had affected 266 families. The damage was estimated at RM2 million.



Banjir Lumpur di Ranau dan Kota Belud, Sabah, 15 Jun

Hujan lebat yang berterusan telah menyebabkan banjir lumpur di Sungai Kadaminan dan Sungai Mesilau sekitar kawasan Ranau dan Kota Belud. Kejadian banjir lumpur itu berlaku susulan kejadian tanah runtuh akibat kejadian gempa bumi kuat bermagnitud 6.0 pada Skala Richter di Ranau pada 5 Jun 2015.



Mudflows in Ranau and Kota Belud, Sabah: 15 June

Continuous heavy rain had caused mudflows in Sungai Kadaminan and Sungai Mesilau in Ranau and Kota Belud areas. The mudflows were associated with the landslide induced by the strong earthquake with magnitude of 6.0 on the Richter Scale in Ranau on 5 June 2015.



Banjir di Perlis dan Kedah, 17 September

Hujan berterusan selama dua hingga tiga hari telah mengakibatkan banjir di beberapa kawasan di Perlis dan Kedah. Di Perlis, seramai 50 orang dari 12 keluarga dipindahkan ke pusat pemindahan manakala lebih 1,000 penduduk dari lapan kampung di Changlun, Kedah terjejas akibat banjir.



Floods in Perlis and Kedah, 17 September

Continuous rain for two to three days had caused flooding in several areas in Perlis and Kedah. In Perlis, 50 people from 12 families were moved to an evacuation centre while 1,000 residents from eight villages in Changlun, Kedah were affected by the flood.



Fenomena Jerebu, 15 - 16 dan 18 September

Kementerian Pendidikan Malaysia telah mengarahkan semua sekolah di Selangor, Kuala Lumpur, Putrajaya, Negeri Sembilan dan Melaka ditutup pada 15 September ekoran bacaan Indeks Pencemaran Udara (IPU) mencatatkan bacaan melebihi 200 iaitu amat tidak sihat. Manakala di Sarawak sebanyak 463 sekolah di tujuh daerah dalam Bahagian Kuching dan Samarahan ditutup pada 18 September berikutan IPU masih berada di tahap tidak sihat.



Haze Phenomenon, 15 - 16 and 18 September

The Ministry of Education Malaysia ordered all schools in Selangor, Kuala Lumpur, Putrajaya, Negeri Sembilan and Melaka to close on 15 September as the Air Pollution Index (API) recorded a reading of more than 200 which is very unhealthy. In Sarawak, 463 schools in seven districts in Kuching and Samarahan Divisions were closed on 18 September as the API reading was still at an unhealthy level.



Banjir di Baling, Kedah, 7 November

Hujan berterusan telah menyebabkan banjir melanda beberapa kawasan di Daerah Baling, Kedah. Seramai 285 orang dari 69 keluarga telah dipindahkan ke sembilan pusat pemindahan.



Flood in Baling, Kedah, 7 November

Continuous rain had caused flooding in several areas in Baling, Kedah. A total of 285 people from 69 families were moved to nine evacuation centres.



Banjir Lumpur di Lebuhraya Kuala Lumpur - Karak, 11 November

Kejadian banjir lumpur telah berlaku pada petang 11 November di KM52.4 Lebuhraya Kuala Lumpur-Karak. Menurut pihak terbabit, kejadian itu berpunca dari jumlah hujan luar biasa yang turun seminggu sebelum itu dan pada hari kejadian. Sebanyak tiga buah kenderaan persendirian dan sebuah lori tertimbus.



Mud Slide at the Kuala Lumpur-Karak Highway, 11 November

A mud slide had occurred in the afternoon of 11 November at KM52.4 of the Kuala Lumpur-Karak Highway. According to the parties concerned, the mudflow stemmed from an unusual amount of rainfall over the previous week and on the day of the incident. Three private cars and a lorry were buried by the mud.



Banjir Kilat di Selangor dan Johor, 16 November

Hujan lebat yang berterusan sejak tengah hari telah menyebabkan berlakunya kejadian banjir kilat di Shah Alam, Selangor dan Johor Bahru, Johor. Di Shah Alam, plaza tol ditenggelami air menyebabkan laluan dari Lebuhraya Baru Lembah Klang dan Lebuhraya Guthrie ditutup sekitar jam 4 petang. Di Johor Bahru, sesetengah kawasan ditenggelami air hingga setinggi 1.5 meter.



Flash Floods in Selangor and Johor, 16 November

Continuous heavy rain from mid-day caused flash floods in Shah Alam, Selangor and in Johor Bahru, Johor. In Shah Alam, the toll plaza was inundated, resulting in the closure of the North Klang Valley Expressway and the Guthrie Expressway until 4pm. In Johor Bahru, some areas were inundated up to 1.5 metre.



Banjir di Pahang, 23 November

Hujan lebat tiga hari berturut-turut pada sebelah petang hingga ke waktu malam menyebabkan air Sungai Pahang mulai membanjiri beberapa daerah di Pahang seperti Raub, Jerantut dan Lipis.



Flood in Pahang, 23 November

Three days of continuous rain from the afternoon till night had caused Sungai Pahang to overflow and flooded several districts in Pahang such as Raub, Jerantut and Lipis.



Banjir di Terengganu, 28 - 29 Disember

Pada 28 Disember, hujan lebat berterusan telah menyebabkan beberapa daerah di Terengganu dilanda banjir. Sebanyak lapan pusat pemindahan dibuka di Kemaman dan Hulu Terengganu untuk menempatkan seramai 301 orang mangsa.

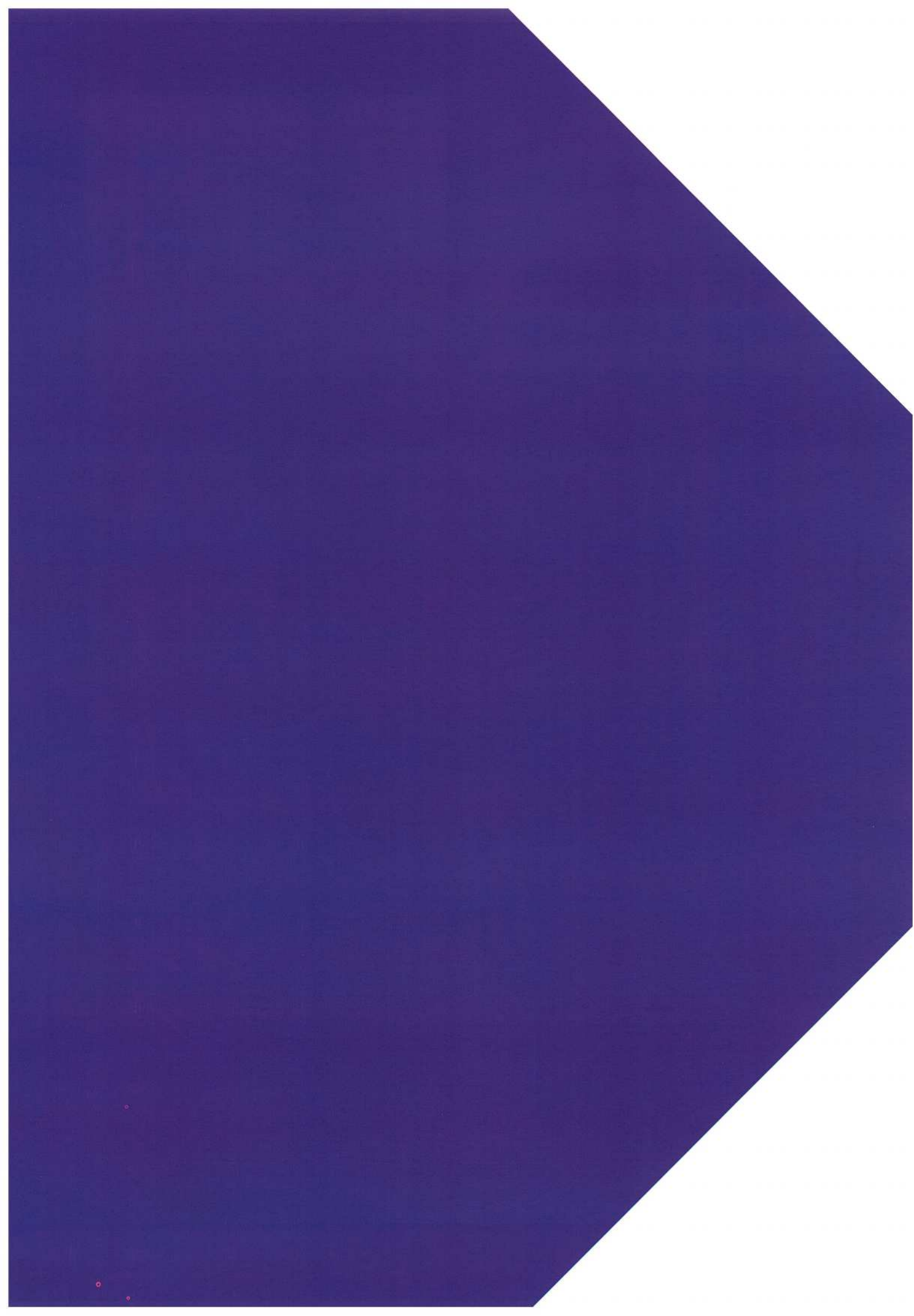
Pada 29 Disember, jumlah mangsa banjir di Kemaman meningkat kepada 1,332 orang dan ditempatkan di 14 pusat pemindahan manakala di Dungun, 358 orang ditempatkan di lima buah pusat pemindahan.

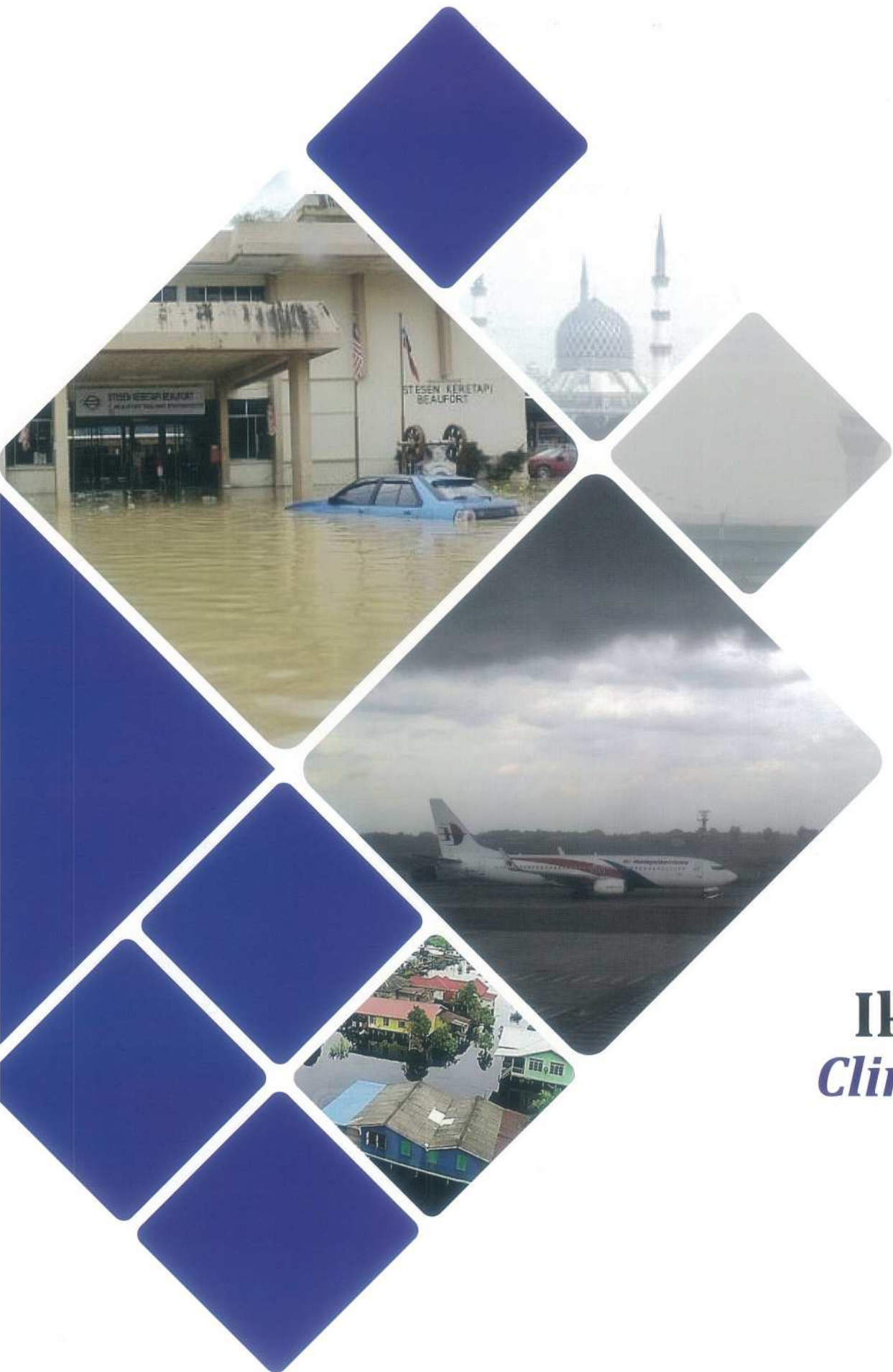


Flood in Terengganu, 28 - 29 December

Continuous rain on 28 December had caused flooding in several districts in Terengganu. Eight evacuation centres to accommodate 301 people were opened in Kemaman and Hulu Terengganu.

On 29 December, the number of flood victims rose to 1,332 people and they were placed at 14 evacuation centres in Dungun. Another 385 people were placed at five other evacuation centres.





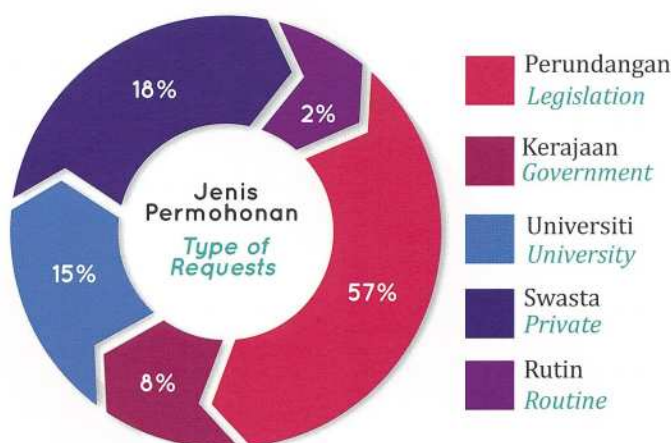
Iklim *Climate*

IKLIM dan HIDROLOGI

CLIMATE and HYDROLOGY

Sebanyak 3,118 permohonan maklumat dan data iklim diterima pada tahun 2015 dengan jumlah kutipan sebanyak RM531,661.77. Permintaan tertinggi adalah daripada sektor perundangan sebanyak 57%, agensi swasta 18%, institut pendidikan 15%, agensi kerajaan 8% dan juga permohonan rutin 2%.

A total of 3,118 requests for climate information and data were received in 2015 with a collection of RM531,662.77. The highest number came from the legal sector accounted for 57% total. Requests from private agencies accounted for 18%, educational institutions 15%, government agencies 8% while routine requests were 2% of the total.



Tiga jenis penerbitan secara bulanan dikeluarkan iaitu Buletin Cuaca Bulanan, Ringkasan Bulanan Pemerhati Meteorologi Stesen Utama dan Ringkasan Bulanan Pemerhati Meteorologi Stesen Aukslari.

Three types of monthly publications issued are Monthly Weather Bulletin, Monthly Summary of Observations from the Primary Meteorological Station and Monthly Summary of Observations of an Auxiliary Meteorological Station.



Sistem Indeks Risiko Kebakaran (FDRS)

FDRS bertujuan bagi meningkatkan kemampuan Malaysia dan Negara di Asia Tenggara dalam menangani kebakaran hutan tanah gambut serta dijadikan panduan bagi pengharaman pembakaran terbuka. Agensi-agensi yang terlibat dalam pemantauan kemarau sering merujuk kepada indeks petunjuk untuk merancang dan menguruskan hal berkaitan kebakaran hutan. Selain itu, sistem ini mampu menyediakan amaran awal potensi kebakaran serius yang boleh mengakibatkan jerebu. Ini kerana produk janaan FDRS memberi anggaran awal potensi nyalaan dan kadar kepayahan mengawal kebakaran.

Forum Iklim Kebangsaan

Forum Iklim Kebangsaan Monsun Timur Laut 2015/2016 dengan tema 'Monsun, Banjir : Bersediakah Kita?' telah dirasmikan oleh Ketua Pengarah MetMalaysia, Dato' Che Gayah Bt. Ismail pada 19 Oktober 2015 bertempat di Dewan Konvensyen, Bangunan E-Learning, Universiti Pendidikan Sultan Idris (UPSI), Tanjung Malim, Perak. Penganjuran Forum Iklim Kebangsaan kali ini merupakan penganjuran bersama MetMalaysia dan UPSI.

Seramai 301 orang peserta yang terdiri daripada pelajar-pelajar UPSI, agensi-agensi kerajaan, badan berkanun dan pertubuhan bukan kerajaan telah menyertai forum ini. Forum ini merupakan platform bagi menyalurkan maklumat mengenai keadaan cuaca dan iklim kepada agensi dan organisasi yang terlibat dalam pemantauan dan pengurusan bencana.

Fire Danger Rating System (FDRS)

FDRS aims at enhancing the capability of Malaysia and Southeast Asia countries to deal with peat fires as well as to serve as a guide in the banning of open burning. Agencies tasked with monitoring drought use the index indicators to plan and manage issues arising from forest fires. The system is also capable of providing early warnings on the potential outbreaks of fires that could induce haze as the FDRS products provide early estimation of the potential ignition and rate of difficulty in containing the fire.

National Climate Forum

The Northeast Monsoon National Climate Forum 2015/2016 with the theme 'Monsoon Floods: Are We Ready?' was officiated by the Director General of MetMalaysia, Dato' Che Gayah Bt. Ismail on 19 October 2015 at the Conventional Hall, Bangunan E-Learning, Universiti Pendidikan Sultan Idris (UPSI), Tanjung Malim, Perak. The forum was jointly organised by MetMalaysia and UPSI.

As many as 301 participants comprising UPSI students and representatives from the government agencies, statutory corporations and non-governmental organisations attended the forum. The forum served as a platform for disseminating information on weather and climate conditions to agencies and organisations involved in monitoring and managing natural disasters.



Peserta Forum Iklim Kebangsaan
Participants of the National Climate Forum

METEOROLOGI PERTANIAN

AGROMETEOROLOGY

Kerjasama MetMalaysia dengan MARDI dan Jabatan Pertanian

MetMalaysia telah menerima lawatan kerja dari Jabatan Pertanian pada 15 April 2015 untuk membincangkan lebih lanjut keperluan data cuaca dan maklumat ramalan untuk pertanian.

Pada 29 April 2015 pula satu kunjungan balas telah diadakan oleh MetMalaysia ke Bahagian Pengurusan & Pemuliharaan Sumber Tanah, Jabatan Pertanian Malaysia. Satu kerjasama juga telah diwujudkan untuk mengemaskini peta *Agriculture Rainfall Index* yang digunakan sebagai salah satu petunjuk dalam menentukan kedapatan air hujan di sesuatu kawasan untuk kegiatan pertanian.



En. Alui Bahari, Timbalan Ketua Pengarah (Cuaca & Iklim) bersama En. As'ari Hassan, Pengarah Bhg. Pengurusan & Pemuliharaan Sumber Tanah, Jabatan Pertanian

Mr. Alui Bahari, Deputy Director General (Weather & Climate) with Mr. As'ari Hassan, Director of Management & Land Resource Conservation, Department of Agriculture

MetMalaysia bersama Jabatan Pertanian Malaysia juga telah mengadakan lawatan kerja ke Pusat Penyelidikan Sumber Strategik, MARDI pada 6 Mei 2015 untuk berbincang dengan lebih lanjut tentang hasil Projek Agro-Ecological & Agro-Climatological Zonation (AEZ) For Malaysia: Web-Based GIS Approaches.

Cooperation between MetMalaysia with MARDI and the Department of Agriculture

The Department of Agriculture made a working visit to MetMalaysia on 15 April 2015 to discuss the weather data and forecast requirements for agricultural purposes.

On 29 April 2015, MetMalaysia made a reciprocal visit to the Management and Land Resource Conservation Division, Department of Agriculture. A cooperative effort to update the Agriculture Rainfall Index map which is used as one of the indicators to determine rainwater catchment in an area slated for agricultural activities also had been established.



Taklimat oleh En. As'ari Hassan, Pengarah Bahagian Pengurusan & Pemuliharaan Sumber Tanah, Jabatan Pertanian

Briefing by Mr. As'ri Hassan, Director, Management & Land Resource Conservation Divison, Department of Agriculture

MetMalaysia with the Department of Agriculture Malaysia also made a working visit to the Strategic Resource Research Centre of MARDI on 6 May 2015 for in-depth discussions on the results of the Agro-Ecological and Agro-Climatological Zonation for Malaysia Project: Web-Based GIS Approaches.

SAINS ATMOSFERA

ATMOSPHERIC SCIENCE

MetMalaysia bertanggungjawab menjalankan pemantauan komposisi atmosfera dan kualiti udara yang dilaksanakan di 23 buah stesen di seluruh negara, tiga daripadanya adalah stesen *Global Atmospheric Watch (GAW)* iaitu Petaling Jaya, Cameron Highlands dan Lembah Danum.

Satu Memorandum Persefahaman (MoU) telah ditandatangani antara Kerajaan Malaysia yang diwakili oleh MetMalaysia dengan Universiti Malaya dalam menjalinkan kerjasama mengenai kajian pemantauan mendapan kimia aerosol, ramalan cuaca ekstrim, penubuhan stesen GAW di Bachok serta kajian dalam bidang sains atmosfera.

World Meteorological Organization's Global Atmosphere Watch Urban Research Meteorology and Environment (WMO GURME) Regional Workshop For ASEAN, 7 - 10 April 2015, Petaling Jaya

MetMalaysia dengan kerjasama WMO telah menganjurkan *WMO GURME Regional Workshop for ASEAN* bertempat di Ibu Pejabat MetMalaysia. Majlis perasmian bengkel ini telah disempurnakan oleh YB Datuk Dr. Ewon Ebin, Menteri, Kementerian Sains, Teknologi dan Inovasi.

Bengkel ini telah disertai oleh lapan peserta dari Indonesia, Filipina, Thailand, Laos PDR dan Myanmar serta tenaga pakar dari Amerika Syarikat, Singapura, Kanada dan wakil WMO. Seramai 10 orang peserta dari Malaysia dan enam orang pegawai MetMalaysia juga telah hadir sebagai peserta pemerhati.

MetMalaysia is responsible for monitoring the atmospheric composition and air quality at 23 stations throughout the country, of which three are the Global Atmospheric Watch (GAW) stations located in Petaling Jaya, Cameron Highlands and Danum Valley.

A Memorandum of Understanding had been signed between the Government of Malaysia represented by MetMalaysia and Universiti Malaya to collaborate in studies related to the monitoring of aerosol chemical sediment, extreme weather forecasts, the setting up of a GAW station in Bachok as well as research in the field of atmospheric science.

World Meteorological Organization's Global Atmosphere Watch Urban Research Meteorology and Environment (WMO GURME) Regional Workshop for ASEAN, 7 - 10 April 2015, Petaling Jaya

MetMalaysia in cooperation with WMO organised the WMO GURME Regional Workshop for ASEAN held at MetMalaysia Headquarters. The Minister of Science, Technology and Innovation YB Datuk Dr. Ewon Ebin graced the occasion.

The eight participants for the workshop came from Indonesia, the Philippines, Thailand, Laos and Myanmar together with experts from the United States of America, Singapore, Canada and WMO representatives. Malaysia had 10 participants and six MetMalaysia officers who attended as observers.



YB Menteri MOSTI, Datuk Dr. Ewon Ebin bersama peserta & fasilitator Bengkel Serantau GURME untuk ASEAN

YB MOSTI Minister, Datuk Dr. Ewon Ebin with participants & facilitators of GURME Regional Workshop for ASEAN



Majlis menandatangani Memorandum Persefahaman antara Kerajaan Malaysia dan Universiti Malaysia
Signing of MoU between Government of Malaysia and University of Malaysia

Mesyuarat 16th Senior Technical Managers' Meeting (STM16) of the EANET (Acid Deposition Monitoring Network in East Asia) di Ulaanbaatar, Mongolia, 25 - 26 Ogos 2015

MetMalaysia telah bekerjasama dengan EANET dalam aktiviti pemantauan pemendapan berasid sejak tahun 2001. Kerjasama yang terjalin dari segi perkongsian data dan latihan telah memberi peluang kepada pegawai-pegawai MetMalaysia untuk sama-sama terlibat dalam mesyuarat dan kursus yang dianjurkan oleh EANET pada setiap tahun. Mesyuarat STM16 ini diadakan bertujuan membincangkan isu-isu teknikal yang dihadapi dan mengkaji laporan data pemantauan bagi setiap negara ahli.

The 16th Senior Technical Managers' Meeting (STM16) of the EANET (Acid Deposition Monitoring Network in East Asia) in Ulaanbaatar, Mongolia on 25 - 26 August 2015

MetMalaysia has been a partner in EANET's acid deposition monitoring activities since 2001. The collaboration in terms of data sharing and training provided opportunities for MetMalaysia's personnel to be involved in meetings and training courses organised by EANET every year. The STM16 was held to discuss technical issues and evaluate the monitoring data report of each member country.



Peserta STM16 di Ulaanbaatar, Mongolia
Participants of the STM16 in Ulaanbaatar, Mongolia

Lawatan Pakar ke MetMalaysia

- *National Institute for Environmental Studies (NIES)*, Jepun diwakili oleh Dr. Nomura Shohei dan Dr. Terao Yukio dari Center for Global Environmental Research (CGER) ke Stesen GAW Lembah Danum pada 27 - 30 Januari 2015 dan 10 - 13 Ogos 2015, Pejabat Meteorologi Langkawi pada 31 Julai - 2 Ogos 2015 untuk tujuan pemantauan karbon dioksida dan kalibrasi.

Experts Visit to MetMalaysia

- *Dr. Nomura Shohei from the National Institute for Environmental Studies, Japan and Dr. Terao Yuki from the Centre for Global Environmental Research to Danum Valley GAW Station on 27 - 30 January 2015 and 10 - 13 August 2015 and Langkawi Meteorological Office on 31 July - 2 August 2015 to monitor carbon dioxide and calibration.*

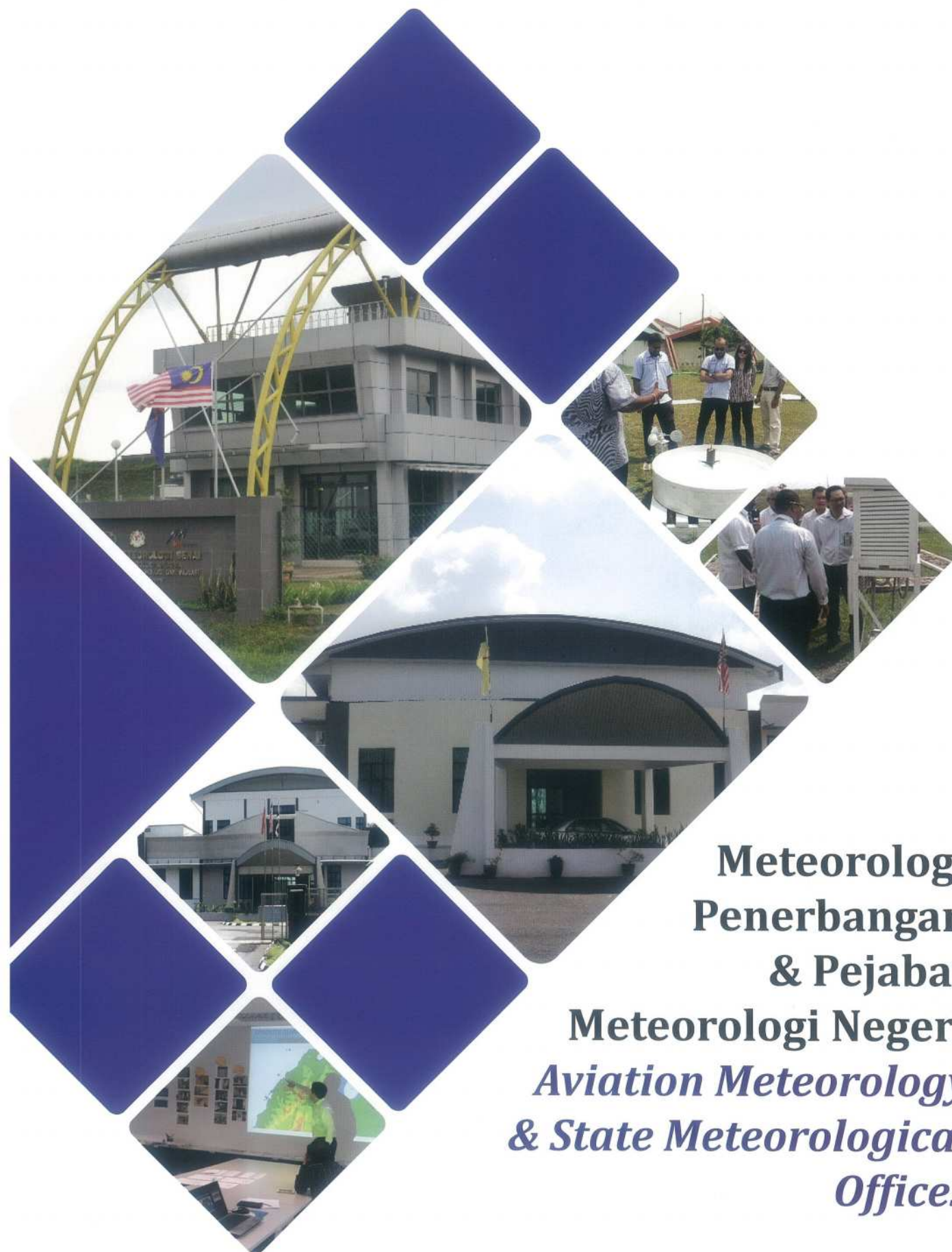
- Universiti Kebangsaan Malaysia, Prof. Dr. Mohd Talib Latif dan En Haris Hafizal ke Stesen GAW Lembah Danum pada 17 - 22 Mac dan 14 - 16 Ogos 2015 di bawah Projek BALI.
- Universiti Cambridge, United Kingdom, Dr. Andrew Robinson dan Dr. Mohd Shahrul Mohd Nadzir dari UKM ke Stesen GAW Lembah Danum pada 17 - 22 Mac 2015, dan sekali lagi pada 28 Julai - 20 Ogos 2015 untuk tujuan kalibrasi μ DIRAC iaitu alat autonomi untuk pengukuran halocarbon.
- Universiti Manchester, United Kingdom, Dr. Iqbal Mead ke Stesen GAW Lembah Danum pada 28 Julai - 2 Ogos 2015 di bawah Projek Bachok.
- Universiti York, Kanada, Dr. James Hopkins dan Ms. Shanni ke Stesen GAW Lembah Danum pada 28 Julai - 20 Ogos 2015 di bawah Projek Isoprene.
- Commonwealth Scientific & Industrial Research Organisation (CSIRO), Australia pada 16 - 22 November 2015.
- *Prof. Dr. Mohd Talib Latif and Mr. Haris Hafizal from National University of Malaysia to Danum Valley GAW station on 17 - 22 March and 14 - 16 August 2015 under the BALI Project.*
- *Dr. Andrew Robinson from Cambridge University, United Kingdom and Dr. Mohd Shahrul Mohd Nadzir from Universiti Kebangsaan Malaysia to Danum Valley GAW station on 17 - 22 March 2015 and again on 28 July - 20 August 2015 for μ DIRAC calibration (an autonomous tool for measuring halocarbon).*
- *Dr. Iqbal Mead from Manchester University, United Kingdom to Danum Valley GAW Station on 28 July - 2 August 2015 under the Bachok Project.*
- *Dr. James Hopkins from York University, Canada and Ms. Shanni to Danum Valley GAW Station on 28 July - 20 August 2015 under the Isoprene Project.*
- *Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia to Danum Valley GAW Station on 16 - 22 November 2015.*



Dr. Marcel bersama staf stesen GAW Lembah Danum
Dr. Marcel with the staff from Danum Valley GAW Station



Dr. James Hopkins dan Ms. Shanni bersama staf stesen GAW Lembah Danum
Dr. James Hopkins and Ms Shanni with the staff of Danum Valley GAW Station



**Meteorologi
Penerbangan
& Pejabat
Meteorologi Negeri
*Aviation Meteorology
& State Meteorological
Offices***

METEOROLOGI PENERBANGAN

AVIATION METEOROLOGY

Pusat Meteorologi Penerbangan Nasional (PMPN) bertanggungjawab membekalkan pelbagai jenis perkhidmatan meteorologi untuk penerbangan selaras dengan ketetapan dalam International Civil Aviation Organization (ICAO) Annex 3 bagi Convention of International Meteorological Practices - Regional Supplementary Procedures.

Operasi PMPN ini disokong oleh Pejabat Meteorologi Sepang (PMS) yang terletak berhampiran runway 2 KLIA, di mana ianya beroperasi 24jam sehari dalam melaksanakan pencerapan cuaca serta pembekalan maklumat meteorologi penerbangan secara berterusan di KLIA dan Wilayah Penerbangan Kuala Lumpur (KL FIR).

PMPN secara berterusan juga turut bekerjasama dengan Jabatan Penerbangan Awam Malaysia dalam perkongsian kepakaran melalui syarahan di Akademi Penerbangan Malaysia (Malaysia Aviation Academy-MaVA) yang berkaitan meteorologi penerbangan. Perkongsian ilmu ini juga dijalankan melalui kunjungan serta lawatan oleh pelatih-pelatih dari MaVA, pelajar-pelajar sekolah dan wakil-wakil dari universiti tempatan.

Sepanjang tahun 2015, produk meteorologi penerbangan yang dikeluarkan oleh PMPN adalah seperti berikut:

The National Aviation Meteorological Centre (NAMC) is responsible for providing various types of meteorological services for aviation in line with the provisions of the International Civil Aviation Organization (ICAO) Annex 3 for the Convention of International Meteorological Practices - Regional Supplementary Procedures.

NAMC's operations are supported by the Sepang Meteorological Office which is located at Runway 2 KLIA. The office, which operates around-the-clock, conducts weather observations as well as supplies continuous aviation meteorological information at KLIA and Flight Information Region Kuala Lumpur.

NAMC in partnership with the Department of Civil Aviation Malaysia in sharing expertise through lectures on aviation meteorology at the Malaysia Aviation Academy (MaVA) and sharing of knowledge through visits by MaVA trainees, students and representatives of local universities.

In 2015, the aviation meteorological products issued by NAMC are as follows:



Produk-produk PMPN
NAMC products

Dalam insiden nahas udara pada 4 April 2015 yang melibatkan sebuah helikopter yang terhempas di Kampung Pasir Batu, Sungai Pening Semenyih. PMPN memberi kerjasama dengan memberikan maklumat meteorologi bagi membantu pihak Jabatan Penerbangan Awam Malaysia menjalankan siasatan punca nahas helikopter tersebut.

On 4 April 2015, incident in which a helicopter crashed at Kampung Pasir Batu, Sungei Pening, Semenyih. NAMC provided meteorological information to assist the Department of Civil Aviation (DCA) in investigating the cause of the crash.

Kerjasama rapat dalam perkhidmatan meteorologi penerbangan dengan Jabatan Penerbangan Awam Malaysia dan Tentera Udara DiRaja Malaysia juga dijalin melalui mesyuarat koordinasi secara berterusan bagi menjamin dan memastikan maklumat meteorologi penerbangan sentiasa memenuhi keperluan industri penerbangan negara dan antarabangsa.

The close cooperation in aviation meteorological services with DCA and the Royal Malaysian Air Force was further strengthened through coordination meetings to guarantee and ensure that aviation meteorological information fulfills the requirements of the national and international aviation industry.



Mesyuarat koordinasi bersama Jabatan Penerbangan Awam Malaysia
Coordination meeting with the Department of Civil Aviation Malaysia

Pejabat Meteorologi Negeri

State Meteorological Offices

Pejabat Meteorologi Negeri bertanggungjawab memantau dan mengeluarkan tinjauan cuaca negeri masing-masing, menyebarkan nasihat/amaran cuaca buruk, nasihat/amaran angin kencang dan laut bergelora, maklumat gempa bumi, tsunami kepada orang awam, Pejabat Setiausaha Kerajaan Negeri, pejabat daerah dan agensi-agensi pengurusan bencana. Pejabat Meteorologi Negeri juga adalah ahli jawatankuasa pengurusan bencana di peringkat negeri dan daerah.

The State Meteorological Offices are responsible for monitoring and issuing weather forecasts for their respective States, broadcasting advice/warnings of severe weather, strong winds and rough seas, as well as information on earthquakes and tsunami to the public, the Office of the State Secretary, district office and other disaster management agencies. The State Meteorological Offices are also members of disaster management committee at district and state levels.



Kempen Kesedaran Awam Mengenai Cuaca Ekstrem, Gempa Bumi dan Tsunami di Auditorium Bintulu Development Authority, Bintulu, Sarawak pada 7 Mei 2015

Public Awareness Campaign on Extreme Weather, Earthquake and Tsunami at Bintulu Development Authority Auditorium, Bintulu, Sarawak on 7 May 2015



War Room semasa gempa bumi di Ranau bertempat di Pejabat Meteorologi Sabah
War Room during Ranau Earthquake located at Sabah Meteorological Office





Program Pengurusan Bencana di Kuala Besut, Terengganu pada 6 Ogos 2015
Disaster Management Programme at Kuala Besut, Terengganu on 6 August 2015



Lawatan Ahli Dewan Undangan Negeri Johor Kawasan Bukit Batu ke Pejabat Meteorologi Johor
pada 15 Oktober 2015
Members from Bukit Batu State Assembly of Johor visiting Johor Meteorological Office on 15 October 2015



Latihan Kebakaran bersama Airport Fire Rescue Service di Pejabat Meteorologi Selangor
Fire Drill together with Airport Fire Rescue Service at Selangor Meteorological Office



Lawatan ke Pejabat Meteorologi Terengganu dan Pameran serta Taklimat Kesedaran mengenai Bencana di Agensi/Sekolah

Visits to Terengganu Meteorological Office as well as Exhibitions and Briefing for Disaster Awareness Programmes at Agencies/Schools



Gempa Bumi & Tsunami *Earthquake & Tsunami*

GEMPA BUMI dan TSUNAMI

EARTHQUAKE and TSUNAMI

Perkhidmatan Pembekalan Maklumat Gempa Bumi dan Nasihat/Amaran Tsunami

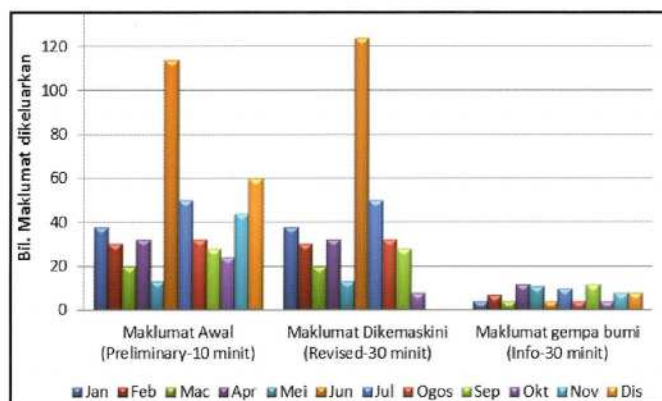
Sepanjang tahun 2015, Pusat Gempa Bumi dan Tsunami Nasional telah mengesan sebanyak 1,170 kejadian gempa bumi yang berlaku di dalam dan luar negara. Sebanyak 92 kejadian gempa bumi yang dirasakan di Malaysia direkodkan dengan 83 gempa bumi berlaku di Sabah, tiga di Sumatera dan empat di Tarakan, Indonesia serta dua di Kepulauan Sulu, Filipina.

Sebanyak 948 maklumat mengenai gempa bumi dikeluarkan kepada media dan orang awam.

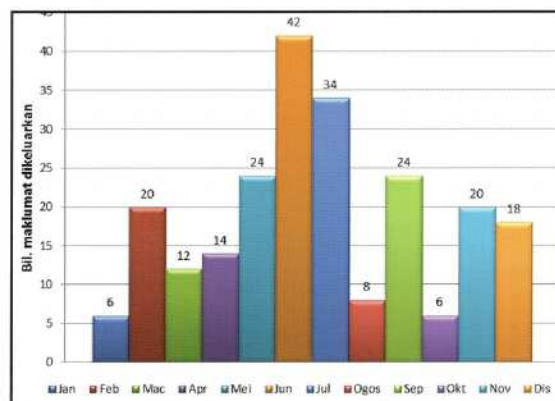
Provision of Information on Earthquake and Advisory/Warning on Tsunami

In 2015, the National Earthquake and Tsunami Centre detected 1,170 incidents of earthquakes which occurred inside and outside the country. A total of 92 earthquakes that were felt in Malaysia were recorded of which 83 occurred in Sabah, three in Sumatra and four in Tarakan, Indonesia as well as two in Sulu Archipelago, Philippines.

A total of 948 earthquake information was disseminated to the mass media and the public.



Maklumat gempa bumi yang dikeluarkan mengikut bulan
Issuance of earthquake information by month



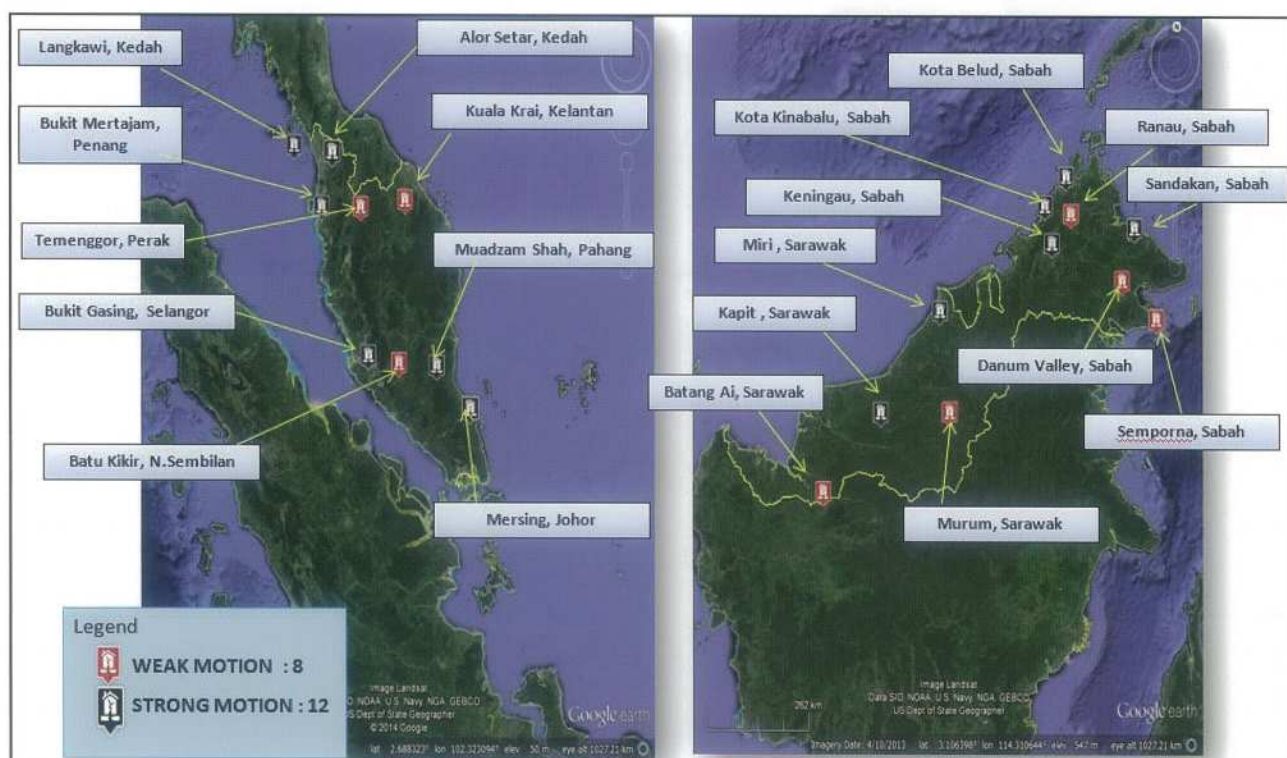
Siaran media dan TV crawlers mengenai gempa bumi dan tsunami
Media releases and TV crawlers on earthquake and tsunami

Penambahan Stesen Seismik

Rangkaian Stesen Seismik MetMalaysia telah dipertingkatkan dengan penambahan 20 stesen seismik iaitu 8 stesen *weak motion* dan 12 stesen *strong motion* di seluruh negara. Penambahan stesen seismik ini dapat membantu mengesan gempa bumi tempatan dengan lebih cepat dan tepat.

Additional Seismic Stations

The MetMalaysia Seismic Stations Network was upgraded with 20 additional seismic stations consisting of 8 weak motion stations and 12 strong motion stations. The additional seismic stations will assist in the detection of local earthquakes faster and more accurately.



Lokasi 20 stesen seismik baharu yang dipasang pada tahun 2015

Location of 20 new seismic stations set up in 2015

Gempa Bumi Ranau pada Jam 7.15 Pagi, 5 Jun 2015

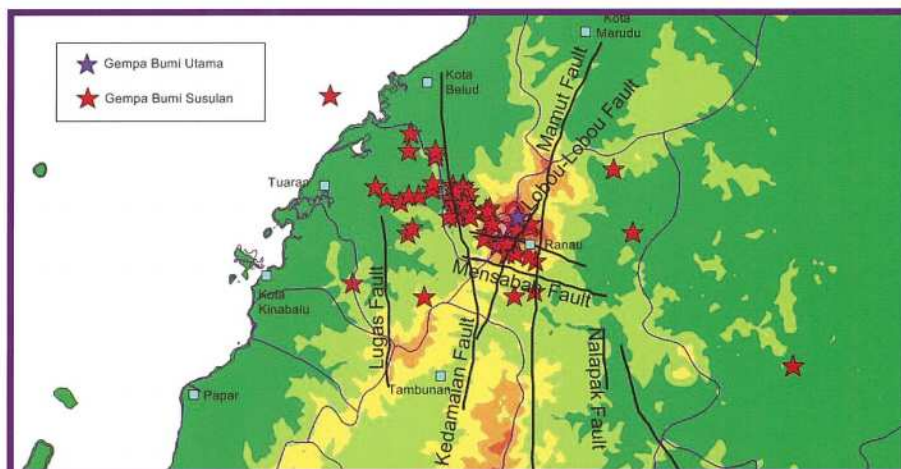
Pada 5 Jun 2015 jam 7.15 pagi Jumaat penduduk Sabah dikejutkan dengan gempa bumi kuat bermagnitud 6.0 pada skala Richter. Pusat gempa tersebut terletak 13km dari barat laut Ranau dengan kedalaman 9km.

Gegaran turut dirasai sekitar Kota Kinabalu, Kundasang, Tuaran, Kota Belud, Ranau dan Tambunan. Kejadian ini telah mengakibatkan kerosakan kepada infrastruktur awam seperti masjid, sekolah dan premis perniagaan di Ranau serta runtuhannya batuan di Gunung Kinabalu yang mengorbankan 18 orang pendaki. Sehingga penghujung tahun 2015 sebanyak 149 gempa susulan dikesan akibat daripada gempa ini.

Earthquake in Ranau at 7.15 am, 5 June 2015

At 7.15 am on Friday 5 June 2015, the people of Sabah were shocked by an earthquake with a magnitude of 6.0 on the Richter Scale. The epicentre of the quake was located 13km northwest of Ranau at a depth of 9km.

Tremor from the earthquake was felt around Kota Kinabalu, Kundasang, Tuaran, Kota Belud, Ranau dan Tambunan. This incident caused damage to public infrastructures such as mosques, schools and commercial premises in Ranau as well as rockslides on Mount Kinabalu which claimed the lives of 18 climbers. Up to the end of 2015, 149 aftershocks were detected.



Pusat gempa bumi utama dan susulan di Ranau pada 5 - 11 Jun 2015
Epicentre of main earthquake and aftershocks in Ranau on 5 - 11 June 2015



Kerosakan di padang golf di Ranau
Damage at Ranau golf course



Kerosakan struktur bangunan di Ranau
Structural damage of building in Ranau

Pusat Pemulihan Bencana untuk Sistem Amaran Awal Tsunami Nasional

Pusat Pemulihan Bencana telah dibangunkan di Pejabat Meteorologi Penerbangan KLIA dan Pejabat Meteorologi Sabah pada pertengahan tahun 2015.

Pada 16 Disember 2015, satu simulasi telah diadakan untuk memastikan pengoperasian sistem-sistem di pusat pemulihan bencana Pejabat Meteorologi Penerbangan KLIA. Simulasi berjalan dengan lancar dan sistem berjaya diaktifkan.

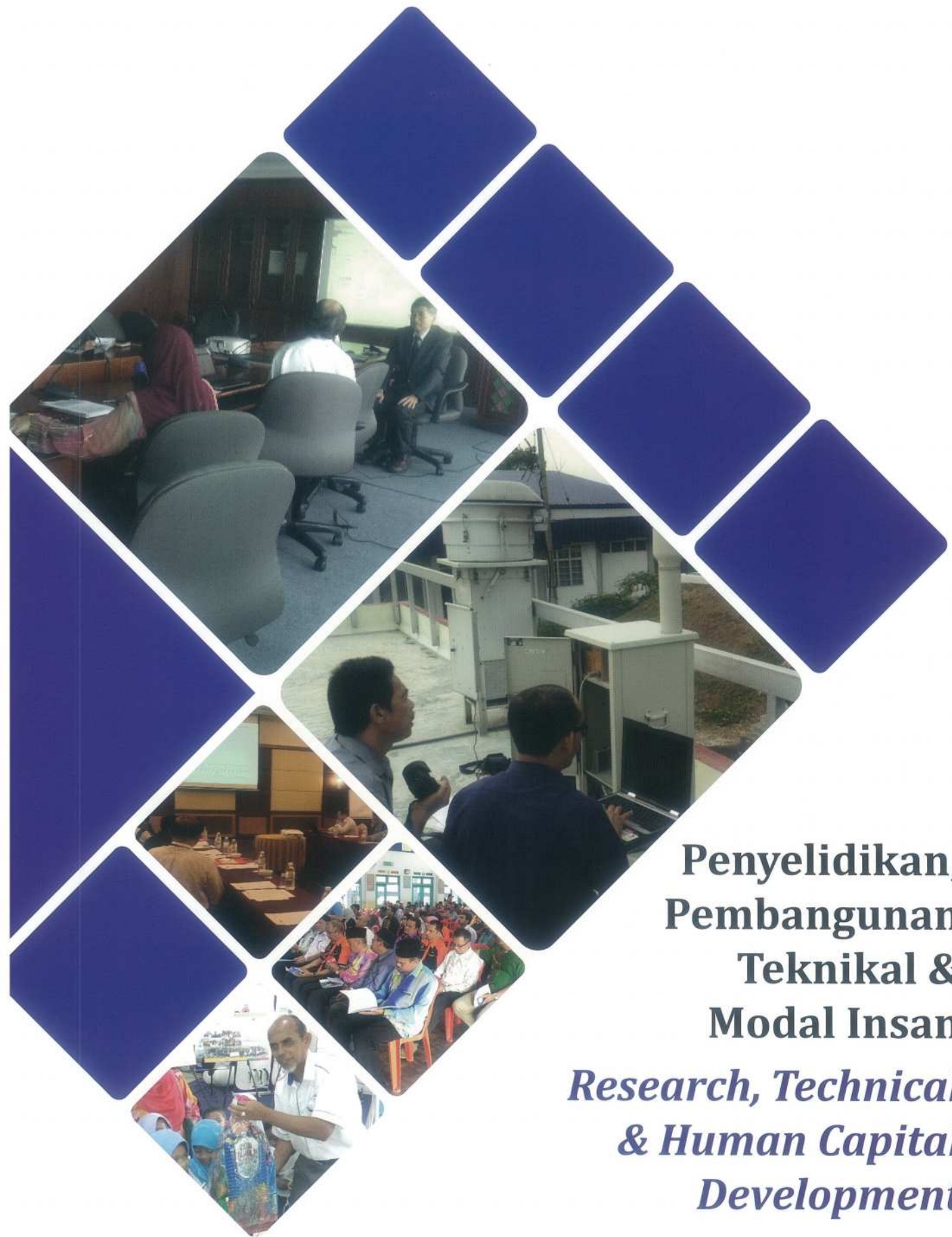
Disaster Recovery Centre for National Tsunami Early Warning System

The Disaster Recovery Centres were established at the Meteorological Aviation Office at Kuala Lumpur International Airport and Sabah Meteorological Office in mid 2015.

On 16 December 2015, a simulation was conducted to ensure the operability of the systems at the disaster recovery centre at KLIA Meteorological Aviation Office. The simulation was carried out smoothly and the systems were successfully activated.



Simulasi di Pusat Pemulihan Bencana Sistem Amaran Awal Tsunami Nasional
Simulation of the National Tsunami Early Warning System at the Disaster Recovery Centre



**Penyelidikan,
Pembangunan
Teknikal &
Modal Insan**

***Research, Technical
& Human Capital
Development***

PENYELIDIKAN, PEMBANGUNAN TEKNIKAL dan MODAL INSAN

RESEARCH, TECHNICAL and HUMAN CAPITAL DEVELOPMENT

Aktiviti penyelidikan yang dijalankan memberi fokus kepada kajian penyelidikan bagi menyokong operasi pemantauan cuaca di Malaysia. Berasaskan kepada pengkhususan ini, beberapa kertas penyelidikan telah diterbitkan seperti berikut:

1. *Analysis on the Long Term Trends of Consecutive Dry and Wet Days and Extreme Rainfall Amounts in Malaysia*
2. *The Definitions of the Southwest Monsoon Climatological Onset and Withdrawal over Malaysian Region*
3. *SWIRLS Nowcasting Using Kuala Lumpur International Airport (KLIA) Doppler Radar*
4. *Characteristics of the 2015 Southwest Monsoon in Malaysia*
5. *Validation of the MMD - JMA MRI-III Wave Model over the South China Sea Using the Hindcast Technique*
6. *Kajian Awal Kejadian Puting Beliung di Malaysia*
7. *Analysis of the Northeast Monsoon 2014/2015*
8. *Analysis on the Weather Pattern from January until April 2015*
9. *Climatological Streamline Analysis.*
10. *Weather Analysis from July until October 2015*
11. *Standard Operating Procedure: Operational Wave Numerical Forecast Model JMA MRI-III-MMD (NAVGEN) 2015*
12. *Modelling of Surface Air Temperature Element in Malaysia*
13. *Study Case : Study On The 2004 Sumatra-Andaman Earthquake for Making Tsunami Inundation Maps in Northwest Coasts of Peninsular Malaysia*
14. *Perbandingan Data Penceraipan dan Data PRECIS*

Research activities conducted are focused on studies that will provide a support to weather monitoring operations in Malaysia. Several research papers with subjects based on such specialisation focus were published.

1. *Analysis on the Long Term Trends of Consecutive Dry and Wet Days and Extreme Rainfall Amounts in Malaysia*
2. *The Definitions of the Southwest Monsoon Climatological Onset and Withdrawal over Malaysian Region*
3. *SWIRLS Nowcasting Using Kuala Lumpur International Airport (KLIA) Doppler Radar*
4. *Characteristics of the 2015 Southwest Monsoon in Malaysia*
5. *Validation of the MMD - JMA MRI-III Wave Model over the South China Sea Using the Hindcast Technique*
6. *Preliminary Study on Tornadoes in Malaysia*
7. *Analysis of the Northeast Monsoon 2014/2015*
8. *Analysis on the Weather Pattern from January until April 2015*
9. *Climatological Streamline Analysis*
10. *Weather Analysis from July until October 2015*
11. *Standard Operating Procedure: Operational Wave Numerical Forecast Model JMA MRI-III-MMD (NAVGEN) 2015*
12. *Modelling of Surface Air Temperature Element in Malaysia*
13. *Study Case : Study On The 2004 Sumatra-Andaman Earthquake for Making Tsunami Inundation Maps in Northwest Coasts of Peninsular Malaysia*
14. *Comparative Data Observation and PRECIS Data*

15. *Study Case: Study on Data Sounding Sensitivity Towards Thunderstorm Activities over Peninsular Malaysia during Inter Monsoon Period from 2010 to 2014*
16. *The Study of Thunderstorm and Rainfall Occurrences over Pahang (in the period 1998-2012)*
17. Kajian Kes: Pemerhatian Terhadap Fenomena Sumatras Di Kawasan Lapangan Terbang Antarabangsa Kuala Lumpur (KLIA) dan Sekitarnya pada Tahun 2011

Pembangunan Model Cuaca dan Iklim

Beberapa projek kerjasama berkaitan dengan pembangunan model cuaca dan iklim di peringkat kebangsaan dan antarabangsa telah dilaksanakan sepanjang tahun 2015.

Projek-projek di peringkat kebangsaan adalah seperti berikut:

- *Study of the Impacts of Anthropogenic Aerosols on Precipitation Patterns in Malaysia using the WRF-Chem Model* di bawah Projek Dana Sains MOSTI
- Dua projek di bawah Jawatankuasa antara Agensi bagi Melaksanakan Kajian Komprehensif untuk Ramalan Cuaca Ekstrem dan Banjir iaitu:
 - i. Penggunaan model *WRF-CHEM* untuk meningkatkan ketepatan model ramalan cuaca numerikal MetMalaysia; dan
 - ii. Peningkatan keupayaan ketepatan model ramalan cuaca numerikal (NWP) MetMalaysia melalui asimilasi data *Global Positioning System (GPS) Integrated Water Vapour (IWV)*
- *Disasters and Climate Extreme - An Integrated Research Framework for Malaysia* di bawah program kerjasama MOSTI dan SEADPRI-UKM. MetMalaysia terlibat untuk melaksanakan sub-projek bertajuk *Variability and Climate Extremes over Malaysia*

15. *Study Case: Study on Data Sounding Sensitivity Towards Thunderstorm Activities over Peninsular Malaysia during Inter Monsoon Period from 2010 to 2014*
16. *The Study of Thunderstorm and Rainfall Occurrences over Pahang (in the period 1998-2012)*
17. Case Study: Observations On The Sumatras phenomenon At Kuala Lumpur International Airport (KLIA) And Its Surroundings in 2011

Development of Weather and Climate Model

Several joint-collaborative projects on development of weather and climate model at both national and international levels were implemented during 2015.

Projects at the national levels are as follows:

- *Study of the Impacts of Anthropogenic Aerosols on Precipitation Patterns in Malaysia using the WRF-CHEM Model* fund by MOSTI Science Fund Project
- Two projects under Inter-Agency Committee for Implementation of Comprehensive Study for Extreme Weather and Flood Forecasting are as follows:
 - i. Improvement of the Numerical Weather Prediction (NWP) models operationalised by MetMalaysia by using *WRF-CHEM* model
 - ii. Improvement of the NWP models currently used by MetMalaysia through data assimilation of *Global Positioning System (GPS) Integrated Water Vapour (IWV)*
- *Disasters and Climate Extreme - An Integrated Research Framework for Malaysia* under the Flagship program MOSTI and UKM - SEADPRI. MetMalaysia engaged to carry out the sub-project titled *Variability and Climate Extremes over Malaysia*

- Peneraju Kumpulan Kerja Teknikal Penyelidikan dan Pencerapan Sistemik, *Third National Communication and Biennial Update Report, United Nations Framework Convention on Climate Change (UNFCCC)*
- Kerjasama dengan Lembaga Urus Air Selangor (LUAS) dalam projek *Development of a Decision Support System (DSS) for Sustainable Water Resources Management System for Sungai Selangor*
- Kerjasama dengan *Institute of Ocean and Earth Sciences (IOES)*, Universiti Malaya di bawah Projek Simulasi WRF untuk kegunaan Model Hidrologi
- *Lead the Research and Systematic Observation Technical Working Group, Third National Communication and Biennial Update Report, United Nations Framework Convention on Climate Change (UNFCCC)*
- *Cooperation with Selangor Water Management Authority (LUAS) in Development of a Decision Support System (DSS) for Sustainable Water Resources Management System for Sungai Selangor Project*
- *Cooperation with the Institute of Ocean and Earth Sciences (IOES), Universiti Malaya in WRF Simulation Project for the purpose of Hydrology Model*

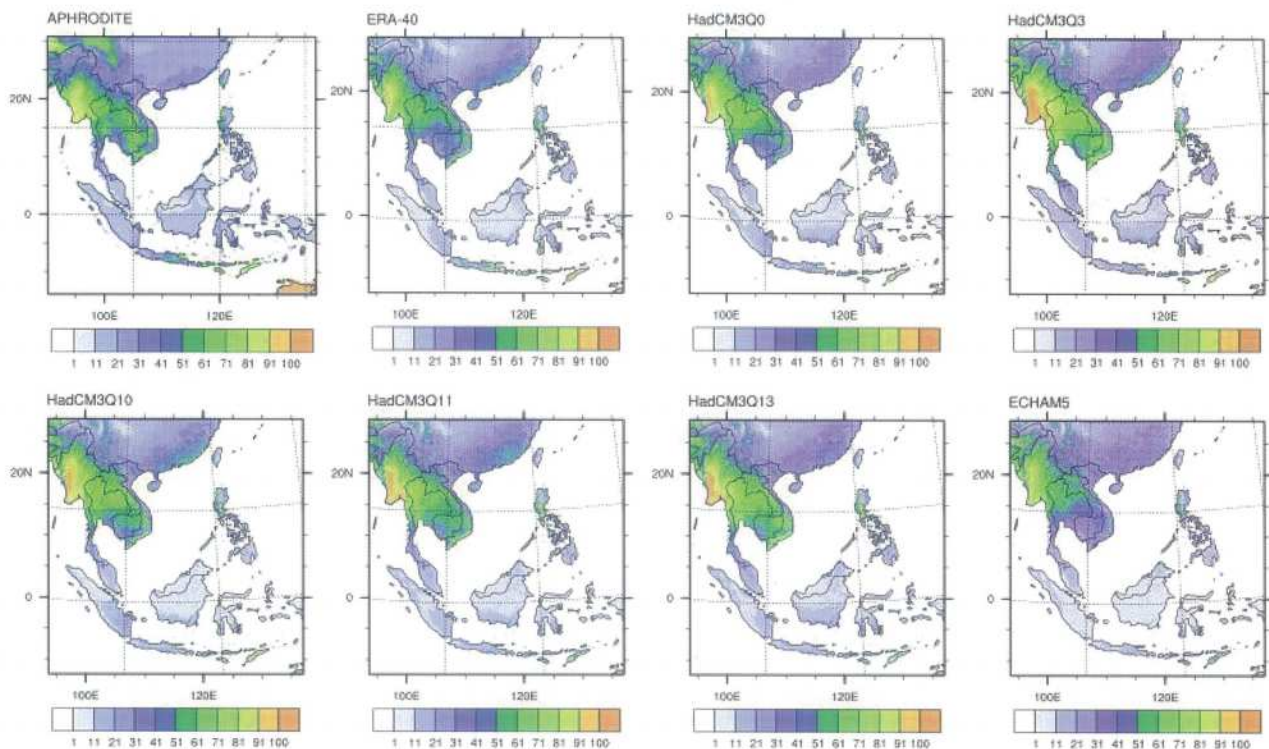
Projek-projek di peringkat antarabangsa seperti berikut:

- *Southeast Asia Climate Downscaling (SEACLID) Project* di bawah *Asia Pasific Network for Global Change Research (APN)*
- *Southeast Asia Climate Analysis and Modelling (SEACAM)* anjuran *Hadley Centre UK Met Office* dan *Centre for Climate Research Singapore (CCRS)* telah menghasilkan penerbitan bertajuk *A Regional Climate Modelling Experiment for Southeast Asia*. Portal output model boleh dicapai di www.precisrcm.com/rcct/#
- Kerjasama dengan *UK Meteorology Office (UKMO)* di bawah program *Newton-Ungku Omar Institutional Linkages*
- Kerjasama dengan *Meteorology Research Institute (MRI)*, Jepun dalam bidang Meteorologi GPS
- Kerjasama dengan *UKM-SEADPRI (South East Asia Disaster Prevention Initiative, Universiti Kebangsaan Malaysia)*, *Universiti Malaya*, *Jabatan Mineral dan Geosains* dan *University of Cambridge* di bawah *Projek Newton-Ungku Omar "Future Cities : Kuala Lumpur"*

Projects at international level are as follows:

- *Southeast Asia Climate Downscaling (SEACLID) Project* under the *Asia-Pacific Network for Global Change Research (APN)*
- *Southeast Asia Climate Analysis and Modelling (SEACAM)* organised by the *UK Met Office Hadley Centre* and the *Centre for Climate Research Singapore (CCRS)* has published *A Regional Climate Modelling Experiment for Southeast Asia*. The model output can be accessed at www.precisrcm.com/rcct/#
- *Collaboration with UK Meteorology Office (UKMO)* under *Newton-Ungku Omar Institutional Linkages Programmes*
- *Cooperation with Meteorology Research Institute (MRI), Japan* in *GPS Meteorology*
- *Collaboration with UKM-SEADPRI (South East Asia Disaster Prevention Initiative, Universiti Kebangsaan Malaysia)*, *Universiti Malaya*, *Mineral and Geoscience Department, University of Cambridge* under the *Newton-Ungku Omar "Future Cities : Kuala Lumpur" project*

1971-2000 CDD (Days)



Unjuran suhu maksimum di bawah Projek SEACAM
Maximum temperature projections under SEACAM Project



Kerjasama dengan MRI, Jepun dalam
 bidang Meteorologi GPS
*Cooperation with MRI, Japan in
 GPS Meteorology*



Kumpulan Kerja Teknikal *Research and Systematic
 Observation, Third National Communication and
 Biennial Update Report, UNFCCC*
*Research and Systematic Observation Technical
 Working Group, Third National Communication and
 Biennial Update Report, UNFCCC*

Pembangunan Modal Insan

Program Pembangunan Modal Insan adalah satu usaha dan pelaburan kerajaan dalam bidang sains, teknologi dan inovasi ke arah meningkatkan kemahiran teknikal, kreativiti dan sumber inovasi sumber manusia berasaskan pengetahuan. Sepanjang tahun 2015, sebanyak 30 program termasuk 11 kursus telah dilaksanakan di bawah Skim Latihan Kepakaran Teknikal, Program Pembangunan Modal Insan MOSTI meliputi latihan di dalam dan luar negara.

Program Biasiswa

Pada tahun 2015, 4 orang pegawai meteorologi telah melanjutkan pelajaran ke peringkat Sarjana.

Latihan Industri

Jabatan Meteorologi menerima 165 permohonan mahasiswa untuk Latihan Industri. Hanya 36 orang sahaja berjaya ditawarkan untuk menjalani Latihan Industri di Ibu Pejabat MetMalaysia dan Pejabat Meteorologi Negeri.

Penilaian Kompetensi Bagi Aeronautical Meteorological Personnel (AMP)

Pada tahun 2015, seramai 9 kakitangan telah dinilai melalui Penilaian Kompetensi Aeronautical Meteorological Personnel (AMP). Penilaian ini melibatkan 3 orang Pegawai Meteorologi dan 6 orang Pembantu Meteorologi. Penilaian AMP ini adalah satu kaedah penilaian kompetensi bagi mematuhi keperluan Pertubuhan Meteorologi Sedunia (WMO) dan Pertubuhan Penerbangan Awam Antarabangsa (ICAO).

Human Capital Development

The Human Capital Development Programme is one of the government's efforts and investments in science, technology and innovation to increase technical skills and creativity in order to develop knowledge-based human resources. In 2015, 30 programmes, including 11 courses were carried out under the Technical Expertise Training Scheme (MOSTI Human Capital Development Programme) which covers training locally and overseas.

Scholarship Programme

In 2015, 4 meteorological officers had furthered their education for a Masters' degree.

Industrial Training

MetMalaysia received 165 undergraduate applications for industrial training. Only 36 applications were approved for training at MetMalaysia Headquarter and state Meteorological Offices throughout the country.

Competency Evaluation for Aeronautical Meteorological Personnel

In 2015, 9 personnel were evaluated through the Aeronautical Meteorological Personnel Competency Evaluation. The evaluation involved 3 Meteorological Officers and 6 Assistant Meteorologists. The AMP evaluation is the assessment for compliance with the requirements of the World Meteorology Organization and the International Civil Aviation Organization.

Bengkel *Agro-Ecological* dan *Agro-Climatological Zonation (AEZ)* di Camar Laut Resort, Sg Pelek, Sepang: 15 – 16 Jun.

Bengkel ini diadakan bertujuan untuk membincang mengenai hasil akhir kerjasama MARDI, MetMalaysia dan Jabatan Pertanian Malaysia bagi Projek *Agro-Ecological & Agro-Climatological Zonation (AEZ)* for Malaysia: *Web-Based GIS Approaches* yang menggunakan Dana Sains di bawah MOSTI. MARDI bertindak sebagai Ketua Projek manakala MetMalaysia dan Jabatan Pertanian bertindak sebagai rakan kerjasama.

Projek ini memberi maklumat asas mengenai status dan kesesuaian sesuatu kawasan untuk pembangunan pertanian serta memberi informasi tentang kesan pemanasan global, perubahan iklim dan cuaca ekstrim pada aktiviti pertanian.

Bengkel Penyampaian Cuaca

Melalui kerjasama MetMalaysia dan Radio Televisyen Malaysia (RTM), tinjauan cuaca disampaikan kepada orang awam secara langsung menerusi TV1 pada setiap hari. Bagi meningkatkan lagi imej dan gaya persembahan para penyampai cuaca MetMalaysia, mereka telah dihantar untuk mengikuti latihan yang bersesuaian seperti Forum Cuaca dan Iklim Antarabangsa untuk Penyampai Cuaca di Paris, Perancis pada Mac 2015, Bengkel Berkomunikasi Sains Perubahan Iklim untuk Penyampai Cuaca di Hanoi, Vietnam pada September 2015 dan Kursus Pemantapan Penyampaian Laporan Cuaca anjuran RTM pada Oktober 2015.

Agro-Ecological and Agro-Climatological Zonation (AEZ) Workshop, Camar Laut Resort, Sg Pelek, Sepang: 15 - 16 June .

The workshop was held to discuss the final results of the cooperative effort between MARDI, MetMalaysia and the Department of Agriculture on Agro-Ecological & Agro-Climatological Zonation (AEZ) for Malaysia Project: Web-Based GIS Approaches which was sponsored by the Science Fund under MOSTI. MARDI was the project leader while MetMalaysia and the Department of Agriculture were collaborators.

The project provides basic information on the status and suitability of an area for agricultural development as well as the effect of global warming, climate change and extreme weather on agriculture.

Weather Presentation Workshop

The cooperation between MetMalaysia and Radio Television Malaysia (RTM) has made it possible for daily live telecasts of weather forecasts to the public through TV1. To further enhance the image and presentation style of MetMalaysia presenters, they were sent for relevant trainings such as The International Weather & Climate Forum for Weather Presenters in Paris, France in March 2015, the Communicating the Science of Climate Change Workshop for Weather Presenters in Hanoi, Vietnam in September 2015 and the Weather Report Presentation Enhancement Course in Angkasapuri, RTM in October 2015.



Kursus Pemantapan Penyampaian Laporan Cuaca di Angkasapuri, RTM
Weather Report Presentation Enhancement Course in Angkasapuri, RTM



Bengkel Berkomunikasi Sains Perubahan Iklim untuk Penyampai Cuaca di Hanoi, Vietnam
Communicating the Science of Climate Change Workshop for Weather Presenters in Hanoi, Vietnam



Forum Cuaca dan Iklim Antarabangsa untuk Penyampai Cuaca di Paris, Perancis
International Weather & Climate Forum for Weather Presenters in Paris, France

Bengkel Latihan Peta Gegeran

Bengkel Latihan Peta Gegeran telah diadakan di MetMalaysia pada 9 - 13 Mac 2015. Dua pakar ShakeMap dari China Earthquake Administration (CEA) telah dijemput bagi mengendalikan bengkel latihan ini. Latihan secara amali telah membantu pegawai-pegawai MetMalaysia dalam mendalami aplikasi Peta Gegeran. Selain itu, bengkel ini telah memberikan peluang kepada para pegawai MetMalaysia untuk bertukar-tukar maklumat dan pandangan dengan pakar-pakar dari CEA. Ceramah teknikal juga diadakan dan melibatkan ahli-ahli penyelidik dari universiti-universiti tempatan, agensi kerajaan dan swasta serta pegawai MetMalaysia.

ShakeMap Training Workshop

A ShakeMap Training Workshop was held at MetMalaysia on 9 - 13 March 2015 and conducted by two experts from the China Earthquake Administration (CEA). The workshop's practical training helped MetMalaysia officers to better understand ShakeMap applications and also gave opportunity for the officers to exchange information and views with the CEA experts. A technical talk on ShakeMap was also held and involved the local university researchers and government and private agencies as well as MetMalaysia officers.



Bengkel Latihan Peta Gegeran
ShakeMap Training Workshop



Ceramah teknikal mengenai Peta Gegeran
Technical talk on ShakeMap

Bengkel Pembangunan dan Pengoperasian Peta Gegaran di Malaysia

Bengkel Pembangunan dan Pengoperasian Peta Gegaran telah diadakan pada 14-18 September 2015 di MetMalaysia. Seorang pakar daripada U.S. Geological Services (USGS) dijemput bagi membantu MetMalaysia dalam pembangunan dan pengoperasian aplikasi Peta Gegaran di Malaysia. Satu ceramah teknikal bertajuk "ShakeMap and Related Products: USGS Real-time Earthquake Product of Potential Use to MMD" telah disampaikan kepada semua peserta terdiri dari pegawai-pegawai MetMalaysia, ahli-ahli penyelidik dari universiti-universiti tempatan, agensi kerajaan dan swasta.

Workshop on Development and Operation of ShakeMap in Malaysia

A Workshop on Development and Operation of ShakeMap was held on 14-18 September 2015 at MetMalaysia. A ShakeMap expert from the U.S. Geological Services (USGS) was invited to assist MetMalaysia in the development and operation of ShakeMap applications in Malaysia. A technical talk on "ShakeMap and Related Products: USGS Real-time Earthquake Product of Potential Used to MMD" was delivered to MetMalaysia officers, local university reseachers, government and private agencies.



Peserta Bengkel Peta Gegaran
Participants of ShakeMap Workshop



Peserta Bengkel bersama Pakar USGS dan Pengurusan Tertinggi MetMalaysia
Workshop Participants with USGS Expert and Top Management of MetMalaysia

Kursus dan Latihan

Pada tahun 2015, MetMalaysia telah menganjurkan 3 kursus berkenaan peralatan seismik dan sistem antelope bagi membangunkan keupayaan dan kemampuan sumber manusia kakitangan seperti berikut:

1. Kursus Pengurusan Peralatan Seismik Dan Sistem Antelope Bagi 20 Stesen Seismik Baru (Teori) pada 28 - 30 Julai
2. Kursus Pengurusan Peralatan Seismik dan Sistem Antelope Bagi 20 Stesen Seismik Baru (Praktikal) pada 3 - 4 Ogos, di Stesen Seismologi Bukit Gasing dan Stesen Seismologi Batu Kikir
3. Kursus Pengendalian dan Penyelenggaraan Peralatan Seismik dan Tsunami pada 6 - 12 September

Courses and Training

In 2015, MetMalaysia held 3 courses on the seismic equipment and Antelope System in order to develop the capacity and capability of the staff. The courses are as follows:

1. *Management of Seismic Equipment and Antelope System for 20 New Seismic Stations (Theory) on 28 - 30 July*
2. *Management of Seismic Equipment and Antelope System for 20 New Seismic Stations (Practical) on 3 - 4 August, at Seismological Station, Bukit Gasing and Seismological Station Batu Kikir*
3. *Handling and Maintenance of Seismic and Tsunami Equipment on 6 - 12 September*



Kursus Pengurusan Peralatan Seismik dan Sistem Antelope bagi 20 Stesen Seismik Baru (Teori)
pada 28 - 30 Julai 2015

*Course on Management of Seismic Equipment and Antelope System for 20 New Seismic Stations (Theory)
on 28 - 30 July 2015*



GovUC
KOMUNIKASI BERSEPADU
Outlook® Web

Komunikasi Meteorologi *Meteorological Communication*

Pensijilan Sistem Pengurusan Keselamatan Maklumat (ISMS) ISO/IEC 27001:2013

MetMalaysia telah berjaya memperoleh pensijilan bagi Sistem Pengurusan Keselamatan Maklumat (ISMS) yang menepati piawai ISO/IEC 27001:2013 (No. Pensijilan: AR 6202) pada 8 Oktober 2015. Melalui pelaksanaan ISMS tahap keselamatan ICT di MetMalaysia akan lebih terjamin kerahsiaan, integriti, ketersediaan dan kesahihan maklumatnya.

Skop pensijilan ISMS MetMalaysia adalah melibatkan ISMS bagi Pengurusan Pengoperasian Laman Web di Pusat Data MetMalaysia. Laman Web MetMalaysia, <http://www.met.gov.my> berperanan penting dalam menyebarkan maklumat seperti amaran cuaca buruk, maklumat kejadian gempa bumi dan maklumat-maklumat cuaca untuk misi-misi seperti maritim, penerbangan dan tentera.

Certification for Information Security Management System ISO/IEC 27001:2013

MetMalaysia was successfully certified with the Information Security Management System (ISMS) which is in compliance with ISO/IEC 27001:2013 (Certification No. 6202) on 8 October 2015. With the implementation of the ISMS, ICT security at MetMalaysia is now more secured in terms of secrecy, integrity, availability and validity of information.

The scope of MetMalaysia's certification include ISMS for Website Operation Management at its Data Centre. The MetMalaysia website, <http://www.met.gov.my> plays an important role in disseminating information such as warnings on severe weather, earthquakes information and weather information for maritime, aviation and armed forces missions.



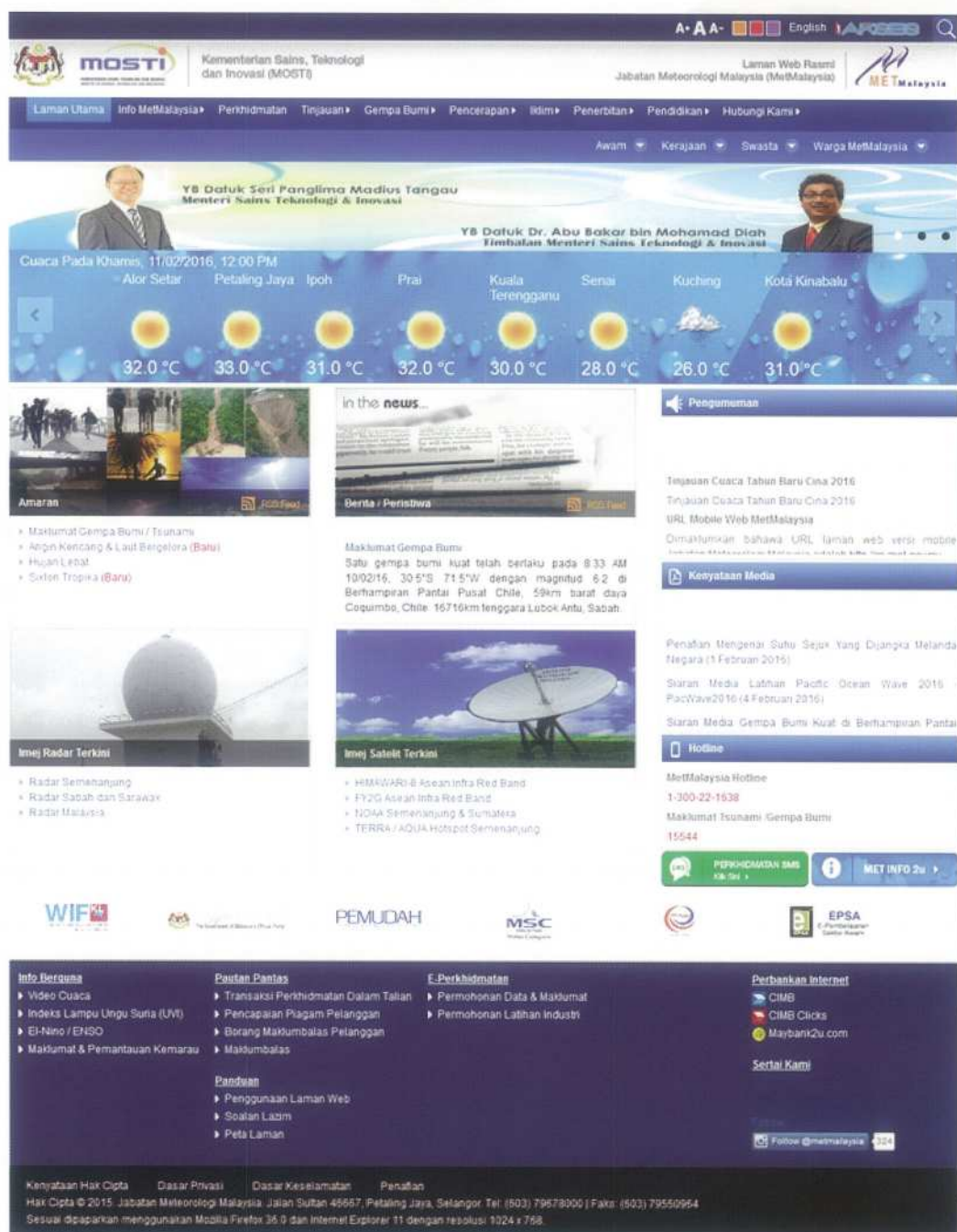
Sijil ISMS ISO/IEC 27001:2013
Certificate of ISMS ISO/IEC 27001:2013

Projek Pemantapan Aplikasi dan Infrastruktur Laman Web Rasmi MetMalaysia

Laman web baharu MetMalaysia telah dibangunkan dan beroperasi mulai 11 November 2015. Laman web ini lebih berinformasi dan dinamik agar penyampaian maklumat yang disalurkan lebih bermakna dan memberi manfaat kepada semua lapisan pengguna. Ianya juga boleh diakses melalui telefon pintar dan aplikasi mudah alih.

Application and Infrastructure Enhancement Project for MetMalaysia Official Website

MetMalaysia's new website was developed and became operational starting from 11 November 2015. This website is more informative and dynamic so that the delivered information are more meaningful and beneficial to all users. It can also be accessed through smart phones and mobile application.



Laman Web MetMalaysia
MetMalaysia's Website

Perkhidmatan 1GovUC di MetMalaysia

Perkhidmatan 1GovUC dilaksanakan sebagai langkah penjimatan kos melalui komunikasi yang diintegrasikan secara kolaboratif bagi membolehkan semua sektor awam di Malaysia berhubung melalui sistem komunikasi yang ditawarkan oleh 1GovUC.

Emel MetMalaysia telah beralih sepenuhnya kepada emel 1GovUC pada 3 September 2015 dan taklimat berkaitan perkhidmatan 1GovUC kepada warga MetMalaysia telah diadakan pada 20 Ogos 2015.

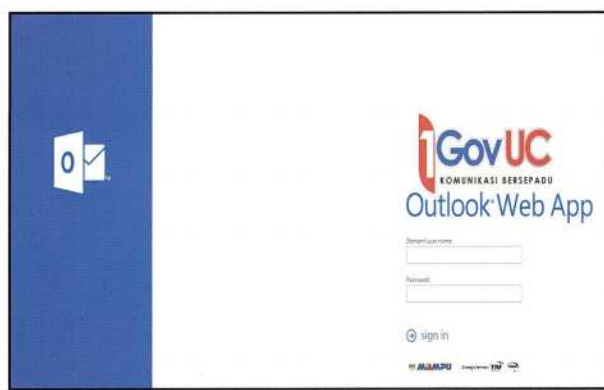
1GovUC Service at MetMalaysia

The 1GovUC service is aimed at reducing costs through collaborative integrated communications to enable the public sector in Malaysia to communicate through communication systems offered by 1GovUC.

MetMalaysia migrated to the 1GovUC email on 3 September 2015 and a briefing on 1GovUC services to MetMalaysia was conducted on 20 August 2015.



Emel lama MetMalaysia
MetMalaysia's old email



Emel 1GovUC
1GovUC email



**Kesedaran Awam &
Pendidikan**
*Public Awareness &
Education*

KESEDARAN AWAM DAN PENDIDIKAN

PUBLIC AWARENESS AND EDUCATION

Sepanjang tahun 2015, MetMalaysia aktif menyertai pelbagai program dan aktiviti pameran di seluruh negara. Usaha yang berterusan ini adalah intipati daripada kesinambungan Tahun Pengkomersilan MOSTI 2014 (MCY2014).

Sejumlah 109 aktiviti pameran, kempen kesedaran awam dan aktiviti lain yang berkaitannya telah berjaya dilaksanakan oleh MetMalaysia. Antara aktiviti yang dijalankan adalah seperti:

- Latihan Mencari dan Menyelamat (SAREX) di Langkawi pada 3 - 6 Mac 2015
- Pameran Program Kreativiti & Science4u Zon Selatan di SM Teknik Tuanku Jaafar Ampangan, Negeri Sembilan pada 6 - 8 Mac 2015
- Pameran Antarabangsa Maritim Dan Aeroangkasa di Langkawi (LIMA) 2015 pada 17 - 21 Mac 2015
- Pameran Program Kreativiti & Science4u Zon Utara di Dewan Millenium Kepala Batas, Pulau Pinang pada 2 - 4 April 2015
- Pameran sempena Hari UNESCO 2015 di Dataran Merdeka, Kuala Lumpur pada 23 - 24 Mei 2015
- Pameran Kempen Kesedaran Awam Mengenai Bencana Gempa Bumi, Tsunami dan Cuaca Ekstrem 2015 di Kota Tinggi, Johor pada 1 Jun 2015
- Pameran sempena Karnival Ya Hijau di Dataran Putra, Padang Terap, Kedah pada 13 Jun 2015
- Pameran sempena Karnival Pendidikan Sains dan Teknologi Pulau Pinang di Institut Pendidikan Guru Malaysia, Kampus Tuanku Bainun, Bukit Mertajam, Pulau Pinang pada 13 - 15 Ogos 2015
- Pameran sempena Forum Iklim Kebangsaan-Monsun Timur Laut 2015/2016 di Dewan Konvensyen, Bangunan E-Learning, UPSI, Tanjung Malim, Perak pada 19 Oktober 2015

In 2015, MetMalaysia participated in various programmes and exhibitions throughout the country. The on-going efforts were a continuation of the MOSTI Commercialisation Year 2014 (MCY2014).

A total of 109 exhibitions, public awareness campaigns and other related activities were held by MetMalaysia in 2015. Among the activities held are as follows:

- *Search and Rescue Exercise (SAREX) at Langkawi on 3 - 6 March 2015*
- *South Zone Creativity and Science4u Program at SM Teknik Tuanku Jaafar Ampangan, Negeri Sembilan on 6 - 8 March 2015*
- *Langkawi International Maritime and Aerospace (LIMA) Exhibition on 17 - 21 March 2015*
- *North Zone Creativity and Science4u Program at Kepala Batas Millennium Hall, Penang on 2 - 4 April 2015*
- *UNESCO Day Exhibition at Merdeka Square, Kuala Lumpur on 23 - 24 May 2015*
- *Public Awareness Campaign on Earthquake, Tsunami and Extreme Weather at Kota Tinggi, Johor on 1 June 2015*
- *Exhibition in conjunction with "Karnival Ya Hijau" at Dataran Putra, Padang Terap, Kedah on 13 June 2015*
- *Exhibition in conjunction with "Karnival Pendidikan Sains dan Teknologi Pulau Pinang" at Institut Pendidikan Guru Malaysia, Kampus Tuanku Bainun, Bukit Mertajam, Penang on 13 - 15 August, 2015;*
- *Exhibition in conjunction with the 2015/2016 Northeast Monsoon National Climate Forum at Dewan Konvensyen, Bangunan E-Learning, UPSI, Tanjung Malim, Perak on 19 October 2015;*

- Pameran sempena Program Pelayanan Rakyat dan Program Dialog STI Masyarakat Orang Asli bersama Menteri Sains, Teknologi & Inovasi di Dewan Tan Sri Bernard Dompok, Simpang Pulai, Perak pada 19 Disember 2015

- *Exhibition in conjunction with the "Program Pelayanan Rakyat dan Program Dialog STI Masyarakat Orang Asli bersama Menteri Sains, Teknologi & Inovasi" at Tan Sri Bernard Dompok Hall, Simpang Pulai, Perak on 19 December 2015*



Aktiviti pameran interaktif yang disertai oleh pelajar sekolah
School students taking part in the interactive activities at the exhibition



Pertandingan penyampaian laporan cuaca
The weather reporting competition



Kempen Kesedaran Awam Cuaca Ekstrem, Gempa Bumi dan Tsunami pada 30 Julai 2015 di Temerloh, Pahang
Public Awareness Campaign on Extreme Weather, Earthquake and Tsunami on 30 July 2015 in Temerloh, Pahang



Kempen Kesedaran Awam Cuaca Ekstrem, Gempa Bumi dan Tsunami pada 1 Jun 2015 di Kota Tinggi, Johor
Public Awareness Campaign on Extreme Weather, Earthquake and Tsunami on 1 June 2015 in Kota Tinggi, Johor



Karnival Rakan Alam Sekitar Bersama Komuniti di Gunung Ledang Resort, Johor
Carnival Enviromental Partnership with the Community at Gunung Ledang Resort, Johor



Karnival Inovasi - Creativity & Science4u 2015
Innovation Carnival - Creativity & Science4u 2015

Pegawai memberi penerangan dalam
 Pejabat Meteorologi Bergerak kepada pelawat
*Officer briefing the visitors in the
 Mobile Meteorological Office*



Pelaksanaan Amalan 5S

Dalam usaha untuk mewujudkan suasana bersih, kemas, teratur, selamat dan mudah untuk diselenggara, MetMalaysia telah melaksanakan Amalan 5S secara berterusan di Bangunan Persekutuan, Petaling Jaya dan Pejabat Meteorologi Sandakan, Sabah. Perbadanan Produktiviti Malaysia telah membuat pemantauan untuk melihat kemajuan dan memberi nasihat terhadap pelaksanaan amalan 5S ini.



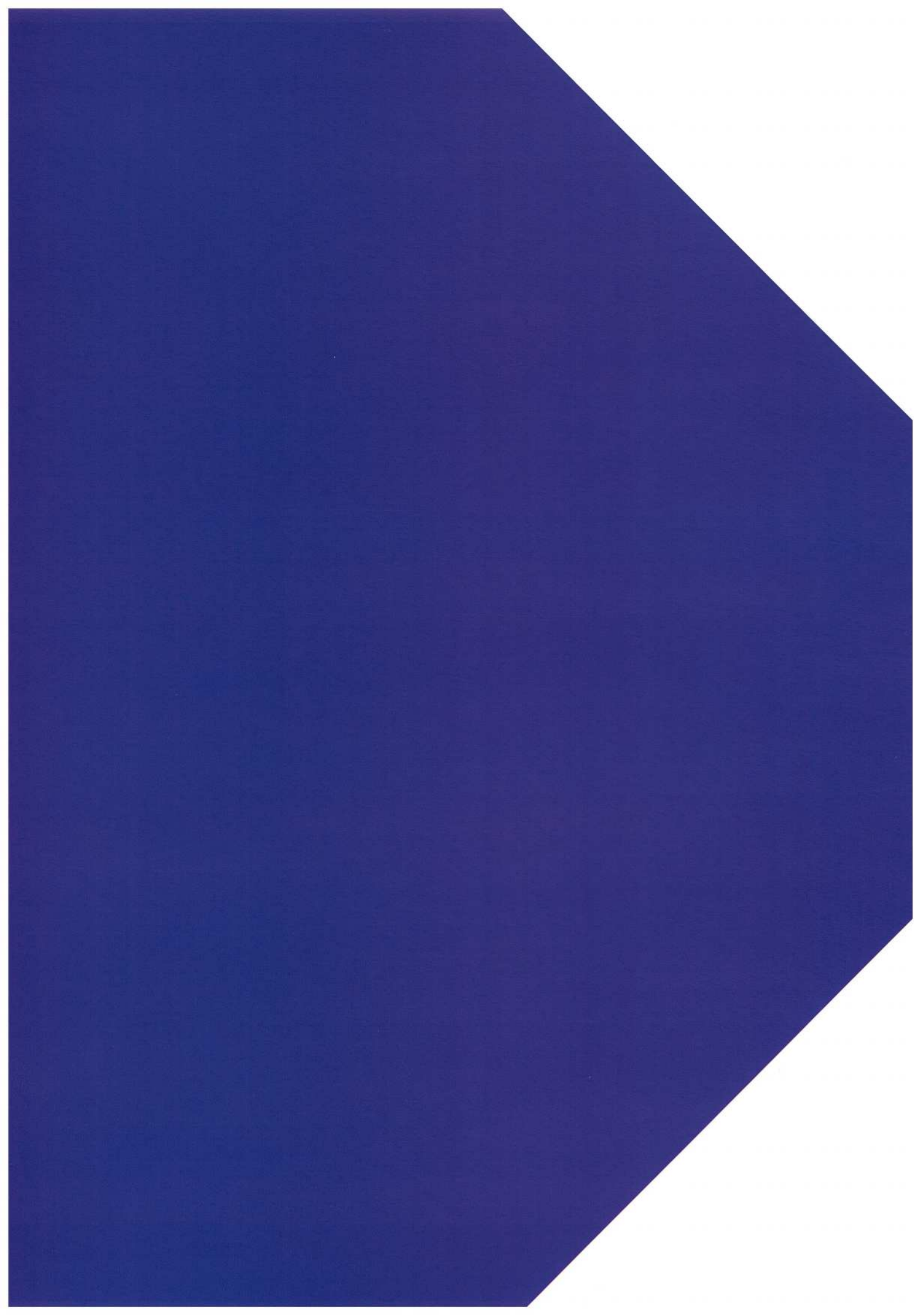
Sudut 5S di Bangunan Persekutuan, Petaling Jaya
The 5S Corner at the Federal Building, Petaling Jaya



Aktiviti 5S di Bangunan Persekutuan, Petaling Jaya
5S activities at Federal Buiding, Petaling Jaya



Aktiviti 5S di Pejabat Meteorologi Sandakan
5S activities at Sandakan Meteorological Office





Album Aktiviti
Sosial
Social Activities
Album

ALBUM AKTIVITI SOSIAL

SOCIAL ACTIVITIES ALBUM



Aktiviti Sukan MetMalaysia
MetMalaysia Sports Activities



Pemain Bola Jaring MetMalaysia (duduk) bersama Jabatan
Perkhidmatan Awam (berdiri)
*MetMalaysia Netball Players (sitting) with Public Service
Department Players (standing)*



Demonstrasi Persolekan
Makeup Demonstration



Majlis pesaraan Tuan Haji Ghazali Bin Mohamed di Pejabat Meteorologi Batu Pahat
Retirement Ceremony for Tuan Haji Ghazali Bin Mohamed at Batu Pahat Meteorological Office



Jamuan Tahunan Kakitangan dan Keluarga Pejabat Meteorologi Ranau
Staff and Families Annual Gathering at Ranau Meteorological Office



Jemputan Temubual Radio Bersama Sandakan FM
A Radio Interview With Sandakan FM



Majlis Persaraan En. Zainudin Salleh di Pejabat Meteorologi Selangor
Retirement Ceremony for Mr. Zainudin Salleh at Selangor Meteorological Office



Jamuan Hi-Tea Puspanita MetMalaysia bersama Keluarga
MetMalaysia Puspanita Hi-Tea Session with Families



Hari Keluarga Pejabat Meteorologi Butterworth
Butterworth Meteorological Office Family Day



Majlis Tahlil Sempena Menyambut Ramadhan Pejabat Meteorologi Selangor
Selangor Meteorological Office Tahlil Ceremony in conjunction with Ramadhan Celebration



Jamuan Berbuka Puasa Pejabat Meteorologi Negeri Sembilan
Negeri Sembilan Meteorological Office Break-Fast Function



Sambutan Hari Raya AidilFitri di Bangunan Persekutuan, Petaling Jaya
AidilFitri Celebration at Federal Building, Petaling Jaya



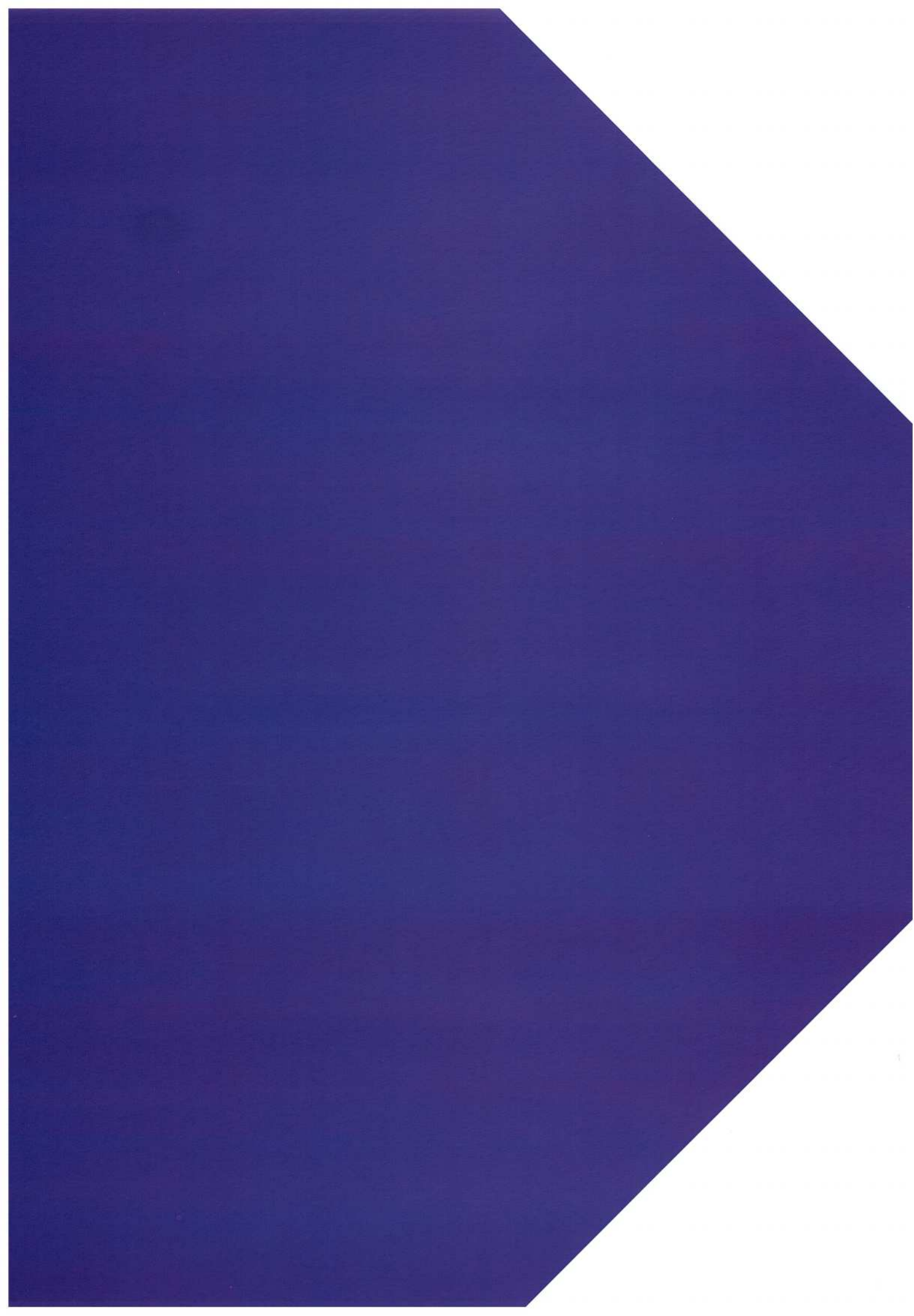
Jamuan Raya MetMalaysia
MetMalaysia Raya Celebration

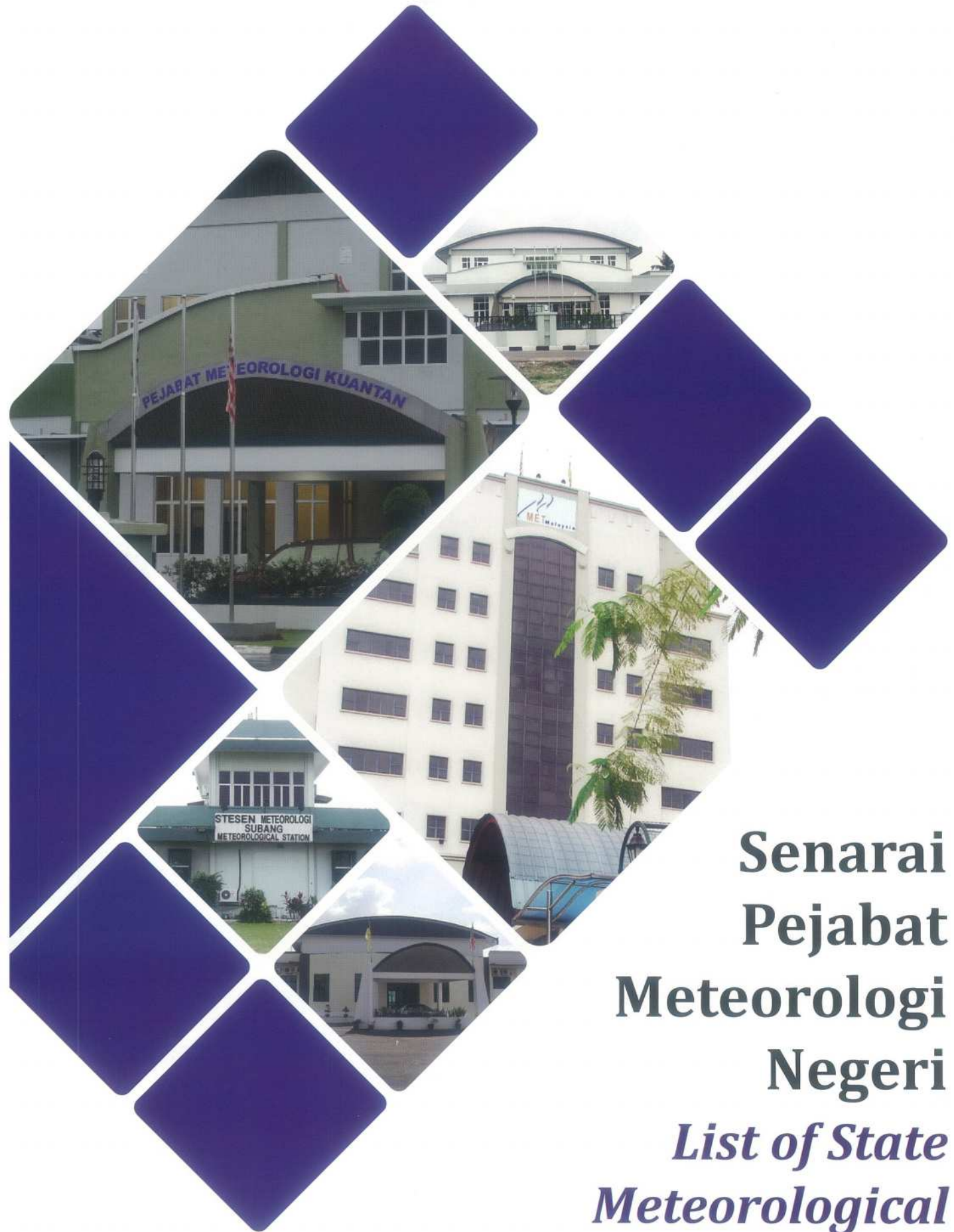


Pemeriksaan Kesihatan
Health Screening



Majlis Malam Mesra MetMalaysia
MetMalaysia Annual Dinner





**Senarai
Pejabat
Meteorologi
Negeri**
*List of State
Meteorological
Offices*

SENARAI PEJABAT METEOROLOGI NEGERI

LIST OF STATE METEOROLOGICAL OFFICES

Ibu Pejabat



Ketua Pengarah

Jabatan Meteorologi Malaysia
Jalan Sultan
46667 PETALING JAYA
Selangor D.E
Tel: 03-7967 8000
Faks: 03-7955 0964
Web: www.met.gov.my



Pengarah

Pusat Meteorologi
Penerbangan Nasional
Tingkat 1 Bangunan Pusat
Pentadbiran KLIA
64000 SEPANG Selangor
Tel: 03-8787 2360
Faks: 03-8787 1019

Pejabat Meteorologi Pahang



Ketua Pejabat

Pejabat Meteorologi
Muadzam Shah
26700 MUADZAM SHAH
Pahang
Tel: 09-452 2055
Faks: 09-452 2606

Pengarah

Pejabat Meteorologi Pahang
Bt.9 Jalan Gambang
26070 Kuantan
Pahang
Tel: 09-5384216/
09-5384366/
09-5397002
Faks: 09-5384673

Ketua Pejabat

Pejabat Meteorologi Batu Embun
Batu Embun
27000 JERANTUT
Pahang
Tel: 09-266 2066

Ketua Pejabat

Pejabat Meteorologi Cameron Highlands
Jalan Tengkolok, Tanah Rata
39000 CAMERON HIGHLANDS
Pahang
Tel: 09-491 1622
Faks: 09-491 3023

Ketua Pejabat

Pejabat Meteorologi Temerloh
Batu 3 Jalan Mentakab
28000 TEMERLOH
Pahang
Tel: 09-277 0617
Faks: 09-277 1421

**Pejabat Meteorologi
Terengganu**



Pengarah

Pejabat Meteorologi Terengganu
Kilometer 8 Jalan
Kuala Besut
22000 JERTIH
Terengganu
Tel: 09- 690 2460
Faks: 09- 690 2461

Ketua Pejabat
Pejabat Meteorologi
Kuala Terengganu
Lapangan Terbang
Sultan Mahmud
21300 KUALA
TERENGGANU
Terengganu
Tel: 09- 666 0304
Faks: 09- 666 0302

**Pejabat Meteorologi
Kelantan**



Pengarah

Pejabat Meteorologi Kelantan
Lot 1244 Jalan Maktab
Pengkalan Chepa
16100 KOTA BHARU Kelantan
Tel: 09-773 7490
Faks: 09-773 5646

Ketua Pejabat
Pejabat Meteorologi
Kuala Krai
18000 KUALA KRAI
Kelantan
Tel: 09-966 6568
Faks: 09-966 4973

**Pejabat Meteorologi
Pulau Pinang**



Pengarah

Pejabat Meteorologi
Pulau Pinang
Lapangan Terbang
Antarabangsa Pulau
Pinang, Gate 16
11900 BAYAN LEPAS
Pulau Pinang
Tel: 04-643 8301
Faks: 04-641 3585

Ketua Pejabat
Pejabat Meteorologi
Butterworth
Pengkalan Udara TUDM
13050 BUTTERWORTH
Pulau Pinang
Tel: 04-3314633

Ketua Pejabat
Pejabat Meteorologi
Seberang Perai
Lorong Perusahaan 10
13600 PRAI
Pulau Pinang
Tel: 04-390 7333

**Pejabat Meteorologi
Kedah**



Pengarah

Pejabat Meteorologi Kedah
Kepala Batas
06200 ALOR SETAR
Kedah
Tel: 04-714 0061
Faks: 04-714 4212

Ketua Pejabat
Pejabat Meteorologi
Langkawi
Lapangan Terbang
Antarabangsa Padang
Mat Sirat
07100 PULAU LANGKAWI
Kedah
Tel: 04-955 1277

Pejabat Meteorologi Perlis



Pengarah

Pejabat Meteorologi Perlis
Mata Ayer
02500 KANGAR
Perlis
Tel: 04-938 2158
Faks: 04-938 2158

Pejabat Meteorologi Perak



Pengarah

Pejabat Meteorologi Perak
Jalan Datuk Ahmad Yunus
32000 SITIAWAN Perak
Tel: 03- 691 1516
Faks: 03- 691 1516

Ketua Pejabat

Pejabat Meteorologi Lubuk
Merbau
33010 KUALA KANGSAR
Perak
Tel: 05 - 776 7493

Ketua Pejabat

Pejabat Meteorologi Ipoh
Lapangan Terbang Ipoh
31350 IPOH
Perak
Tel: 05 - 313 3897

Pejabat Meteorologi Negeri Sembilan



Pengarah

Pejabat Meteorologi
Negeri Sembilan
Lot 7680, Batu 1 Jalan
Tampin
72000 KUALA PILAH
N.Sembilan
Tel: 06- 481 0919
Faks: 06- 481 0920

Pejabat Meteorologi Selangor



Pengarah

Pejabat Meteorologi
Selangor
Terminal 2 Lapangan
Terbang Sultan Abdul Aziz
47600 SUBANG, Selangor
Tel: 03- 7846 3114

Ketua Pejabat

Pejabat Meteorologi Sepang
Jalan Pekeliling
Lapangan Terbang
Antarabangsa KLIA
64000 SEPANG
Selangor
Tel: 03 - 8787 2452

Pejabat Meteorologi Melaka



Pengarah

Pejabat Meteorologi Melaka
Lapangan Terbang
Antarabangsa Melaka
No.6758-1 Off Jalan Chengal
Taman Merdeka
BATU BERENDAM 75350
Melaka
Tel: 06- 317 6855

Pejabat Meteorologi Johor



Pengarah

Pejabat Meteorologi Johor
Lapangan Terbang
Antarabangsa Senai
81250 JOHOR BHARU
Johor
Tel: 07 - 599 4739
Faks: 07 - 599 4521

Ketua Pejabat

Pejabat Meteorologi Kluang
Jalan Mengkibol
86000 KLUANG
Johor
Tel: 07 - 772 1845

Ketua Pejabat

Pejabat Meteorologi Batu Pahat
KM 8, Jalan Kluang
83000 BATU PAHAT
Johor
Tel: 07 - 455 7072

Ketua Pejabat

Pejabat Meteorologi Mersing
Jalan Endau
86800 MERSING
Johor
Tel: 07 - 7991404

Pejabat Meteorologi Wilayah Persekutuan Labuan



Pengarah

Pejabat Meteorologi Labuan
Peti Surat 81413
87008 LABUAN
Wilayah Persekutuan Labuan
Tel: 6(087) 425 114
Faks: 6(087) 412 109

Pejabat Meteorologi Sabah



Pengarah

Pejabat Meteorologi Sabah
Tingkat 7 Wisma Dang Bandang
88995 KOTA KINABALU
Sabah
Tel: 6(088) 234 873
Faks: 6(088) 211 019

Ketua Pejabat

Pejabat Meteorologi Kota Kinabalu
PWD 7806
Jalan Selangor
Tanjung Aru
88100 KOTA KINABALU
Sabah
Tel: 088 - 222 548

Ketua Pejabat

Pejabat Meteorologi Keningau
Jalan Patikang Laut
W.D.T.07
89009 KENINGAU
Sabah
Tel: 087 - 337 752

Ketua Pejabat

Pejabat Meteorologi Tawau
Jalan Utara
Peti Surat 60109
91011 TAWAU
Sabah
Tel: 089 - 950 560

Ketua Pejabat

Pejabat Meteorologi Kudat
WDT No. 41
89050 KUDAT
Sabah
Tel: 088 - 611 504

Ketua Pejabat

Pejabat Meteorologi Sandakan
Peti Surat 1408
90715 SANDAKAN
Sabah
Tel: 089 - 660 535

Pejabat Meteorologi Sarawak



Pengarah

Pejabat Meteorologi Sarawak
Lot 319 Jalan Lapangan Terbang Lama
93667 KUCHING
Sarawak
Tel: 6(082) 617 712
Faks: 6(082) 617 756

Ketua Pejabat

Pejabat Meteorologi Bintulu
Lapangan Terbang Bintulu
Peti Surat 285
97007 BINTULU
Sarawak
Tel: 086 - 334 148

Ketua Pejabat

Pejabat Meteorologi Kapit
Jalan Bletch
96800 KAPIT
Sarawak
Tel: 084 - 796 015

Ketua Pejabat

Pejabat Meteorologi Kuching
Lapangan Terbang Antarabangsa Kuching
93250 KUCHING
Sarawak
Tel: 082 - 460 195

Ketua Pejabat

Pejabat Meteorologi Limbang
Lapangan Terbang Limbang
Jalan Rangau
98700 LIMBANG
Sarawak
Tel: 085 - 215 839

Ketua Pejabat

Pejabat Meteorologi Miri
Lapangan Terbang Miri
98008 MIRI
Sarawak
Tel: 085 - 614 969

Ketua Pejabat

Pejabat Meteorologi Mulu
Lapangan Terbang Mulu
Sarawak
Tel: 085 - 792 110

Ketua Pejabat

Pejabat Meteorologi Sibu
Lapangan Terbang Sibu
96000 SIBU
Sarawak
Tel: 084 - 307 705

Ketua Pejabat

Pejabat Meteorologi Sri Aman
95000 SRI AMAN
Sarawak
Tel: 083 - 322 434

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