



**Twenty Third Session of the ASEAN Climate Outlook Forum (ASEANCOF-23)
26 – 29 November 2024, Online**



Consensus Bulletin for December-January-February (DJF) 2024/2025 Season

INTRODUCTION

The ASEAN Climate Outlook Forum (ASEANCOF) is an avenue to collaboratively develop consensus-based seasonal climate outlooks and related information on a regional scale. The forum's outlook and its activities contribute significantly to one of the key roles of the ASEAN Specialised Meteorological Centre (ASMC), which is to conduct climate and seasonal prediction for the Association of Southeast Asian Nations (ASEAN) region through pooling the expertise of ASEAN National Meteorological and Hydrological Services (NMHSs). In 2021, the ASEANCOF Working Group was established with the goal to guide and support the long-term development of ASEANCOF, in particular with regard to the implementation of objective outlooks.

The Twenty-third session of ASEANCOF (ASEANCOF-23) was organised by the Department of Meteorology and Hydrology of Lao PDR, RIMES, the ASEANCOF Working Group, and WMO. Participants from the NMHSs of ASEAN Member States created a consensus forecast for the boreal winter monsoon 2024/2025 in the ASEAN region. The consensus for the December-January-February (DJF) 2024/2025 outlook was achieved through an online session, which included presentations from ASEAN NMHSs, questionnaires, and discussions regarding the current climate conditions and predictions for Southeast Asia. The theme of ASEANCOF-23 was Agriculture and Climate Services. On the last day of ASEANCOF-23, a sharing session was held which included updates from ASEANCOF-22 around the use of climate services for agriculture.

CONDITIONS AND OUTLOOK

Recent analysis of sea surface temperature (SST) anomalies over the equatorial Pacific shows average to slightly below-average SSTs across the equatorial Pacific Ocean, and along with atmospheric indicators such as trade wind strength and cloudiness, indicate La Niña-like conditions. In the Indian Ocean, the positive Indian Ocean Dipole did not develop, and based on the recent analysis, the SST anomalies show signs of a negative Indian Ocean Dipole.

The international climate outlooks predict that a weak La Niña is likely to develop sometime in December 2024 and persist until February 2025. After DJF 2024/2025, most models predict La Niña conditions to transition back to ENSO neutral.

There is a chance that a short-lived negative Indian Ocean Dipole (IOD) may be present during December 2024 based on the model predictions. However, the IOD is predicted to be neutral during January – February 2025.

The onset of the Northeast Monsoon season has been or is expected to be near or later than average for much of the northern ASEAN region. The onset for much of the southern ASEAN region has been or is expected to be near average. The strength of the Northeast Monsoon is predicted to be near average over most of Southeast Asia.

During DJF 2024/2025, tropical cyclone frequency is predicted to be near average around the Philippine Sea, the Bay of Bengal, and South China Sea.

RAINFALL

For the upcoming boreal (Northern Hemisphere) winter season (DJF 2024/2025):

Over the Maritime Continent, near- to above-normal or above-normal rainfall is predicted for much of the region, including the Philippines, Brunei Darussalam, and Singapore. The exception is over parts of the equatorial region, where a mix of near-normal and normal- to below-normal rainfall is predicted.

Across Mainland Southeast Asia, near- to above-normal or above-normal rainfall is predicted for much of the southern part, including southern Myanmar, southern Thailand, Cambodia, southern Lao PDR, and southern Viet Nam. Below-normal rainfall is predicted for northern Viet Nam and elsewhere, near-normal rainfall is predicted.

TEMPERATURE

For the upcoming boreal (Northern Hemisphere) winter season (DJF 2024/2025):

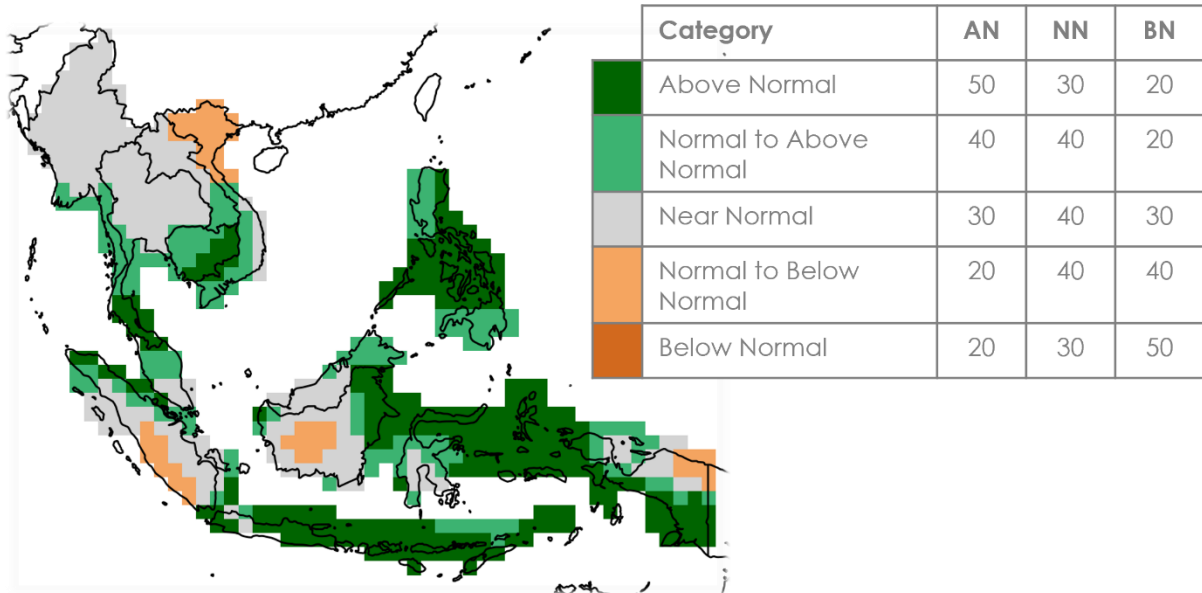
Near- to above-normal or above-normal temperature is predicted over most of the ASEAN region. The exception is over northern Lao PDR, and northeast and central Viet Nam, where near-normal temperature is predicted. The highest chance of above-normal temperature is over northern and central Myanmar, northern Thailand, southern Lao PDR, Singapore, the southern Philippines, and Brunei Darussalam.

Refer to **Annex A** for reference on what is meant by “above, near, or below normal” in the outlook. For more information on the boreal (Northern Hemisphere) winter monsoon outlook and further updates on the national scale, the relevant NMHSs should be consulted (see **Annex D**).

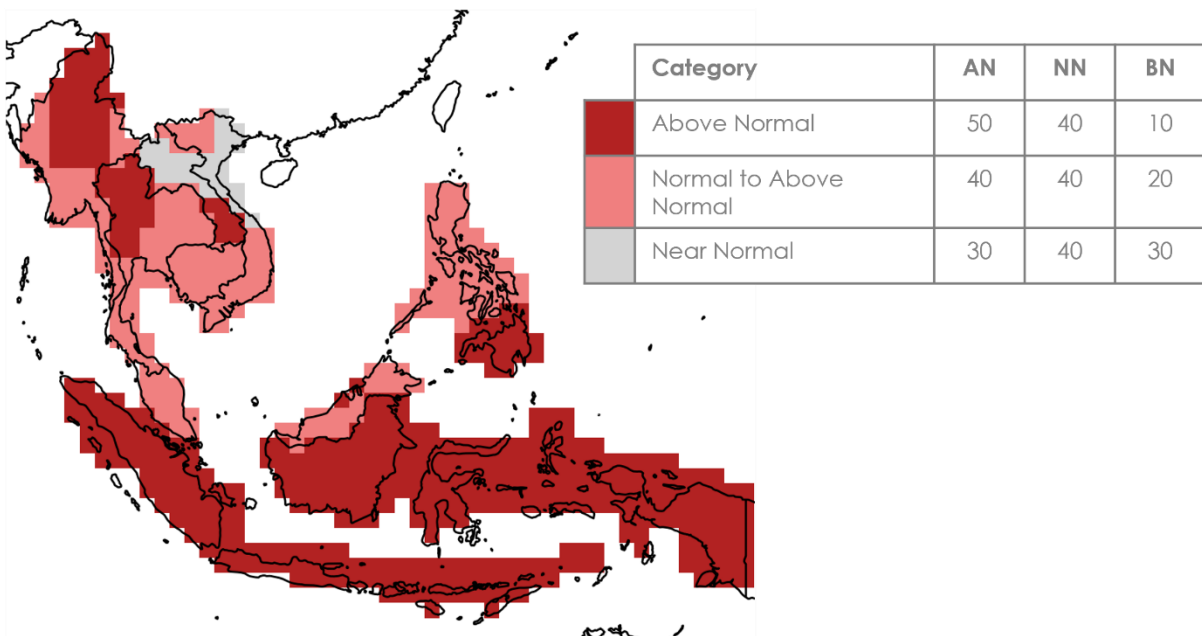
CONSENSUS MAPS FOR DJF 2024/2025

The following maps provide the probabilistic outlooks for DJF 2024/2025 season in terms of tercile categories of “Above Normal” (AN: upper tercile), “Near Normal (NN: middle tercile) and “Below Normal” (BN: lower tercile).

PROBABILISTIC RAINFALL OUTLOOK

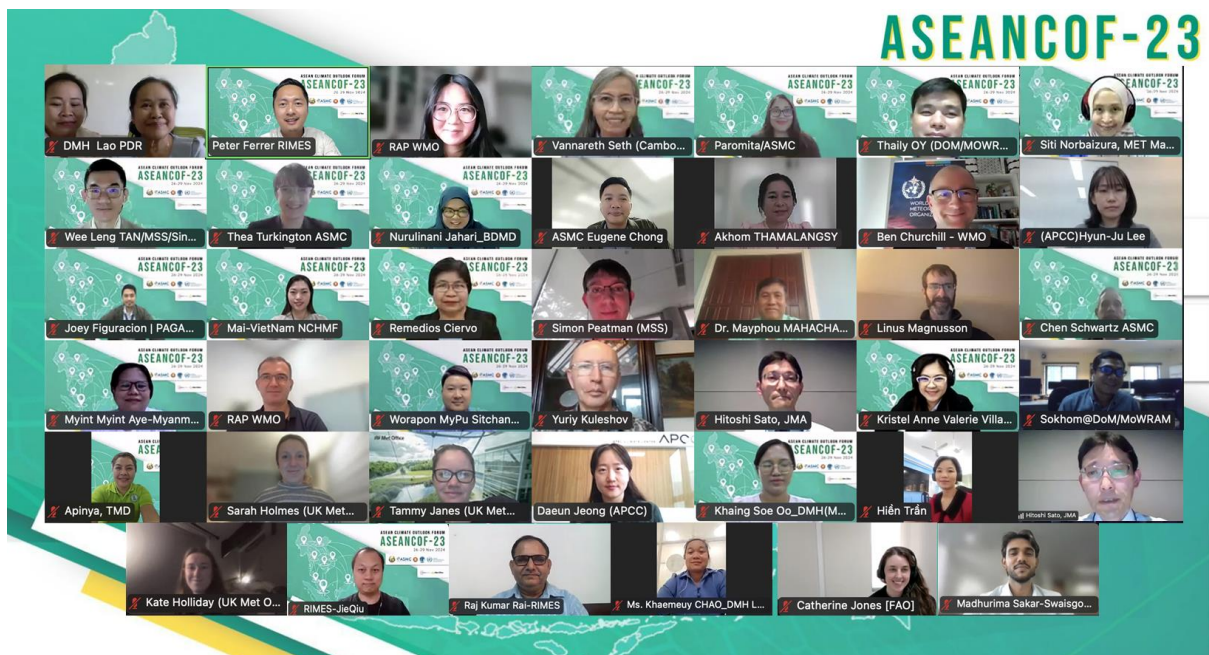


PROBABILISTIC TEMPERATURE OUTLOOK



ACKNOWLEDGEMENTS

ASEANCOF would like to convey its appreciation to the NMHSs of the ASEAN Member States for sharing their national level forecasts, the Global Producing Centres, the Southeast Asia Regional Climate Centre – Network, RIMES, UN ESCAP, and other partners of ASEANCOF for sharing their products and expertise, and the World Meteorological Organization Regional Office in Asia and the Southwest Pacific (WMO-RAP) for their continued support of ASEANCOF. The Forum would also like to thank DMH Lao PDR for hosting the forum virtually, as well as trainers from RIMES and UK Met Office.



Online participants of ASEANCOF-23

Annex A: Rainfall and Temperature Tercile Climatologies

ANNEX A: RAINFALL AND TEMPERATURE TERCILE CLIMATOLOGIES

The following figures include mean rainfall and temperature and tercile boundary climatologies to reference against the consensus outlook. Only a single source of data for each variable is provided: for rainfall CHIRPS (Funk et al. 2014) and for temperature ERA5 (Hersbach et al. 2019). For more representative climatologies, reference should be made also against observational datasets known to better characterize local patterns (e.g. quality-controlled station data from the respective NMHSs).

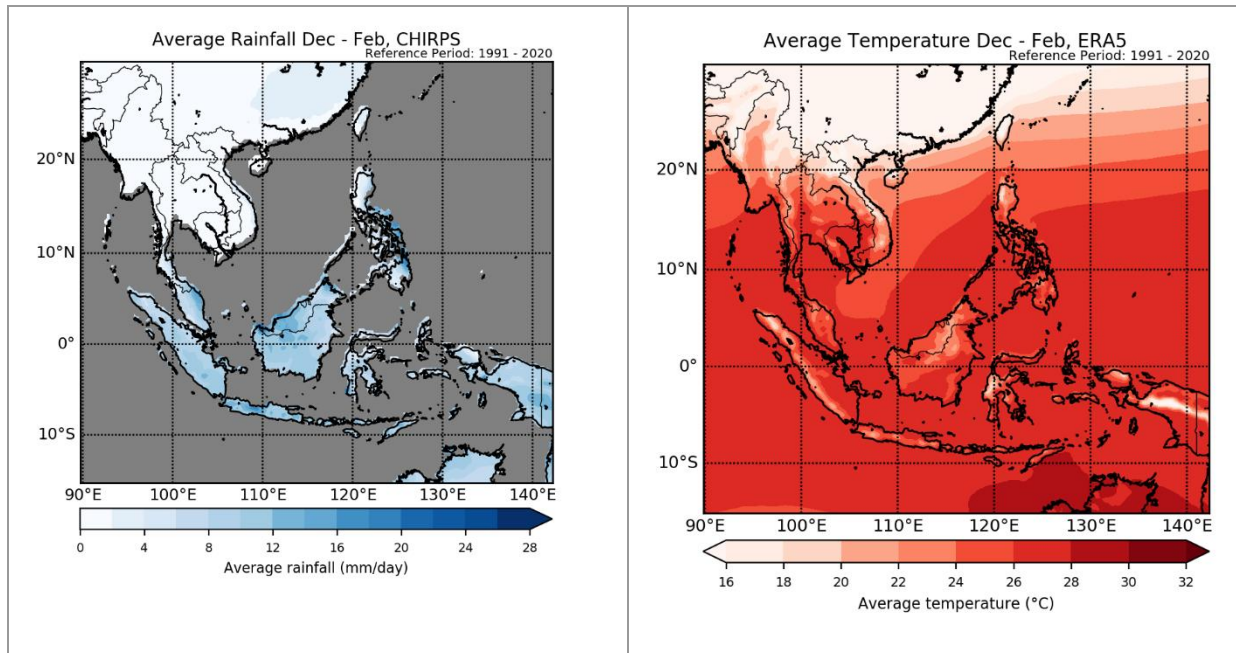


Figure A1: Mean rainfall (left, CHIRPS) and mean temperature (right, ERA5) for DJF for the climatology period 1991-2020.

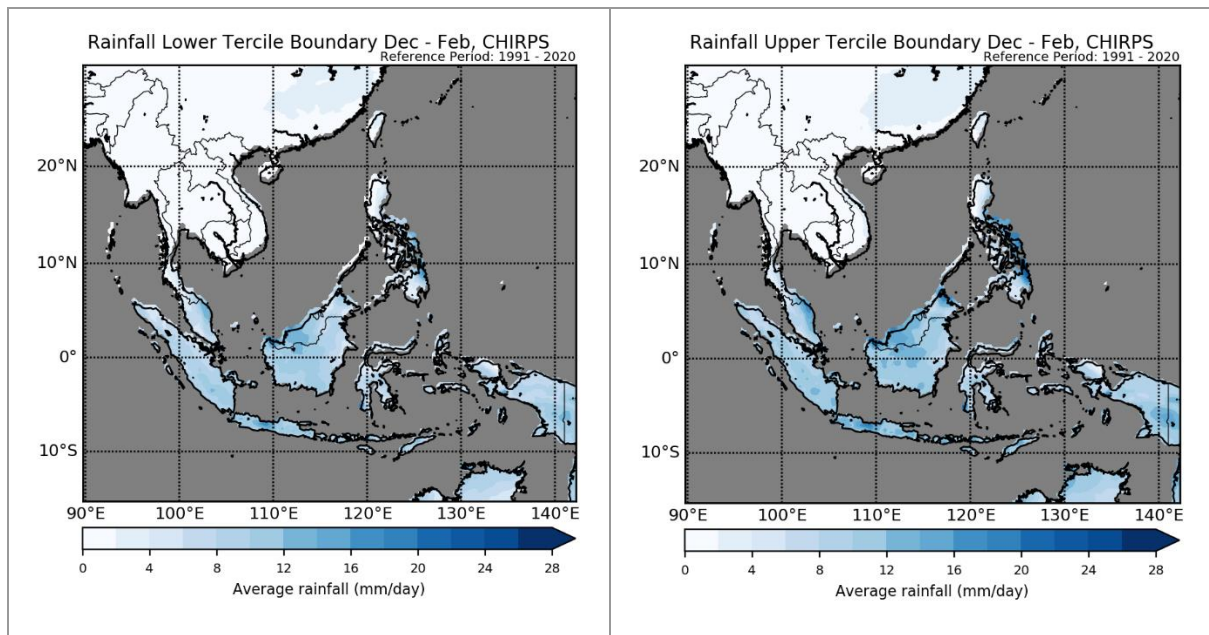


Figure A2: Rainfall climatologies of the lower tercile boundary (left) and the upper tercile boundary (right) for DJF from 1991-2020 using CHIRPS.

Annex A: Rainfall and Temperature Tercile Climatologies

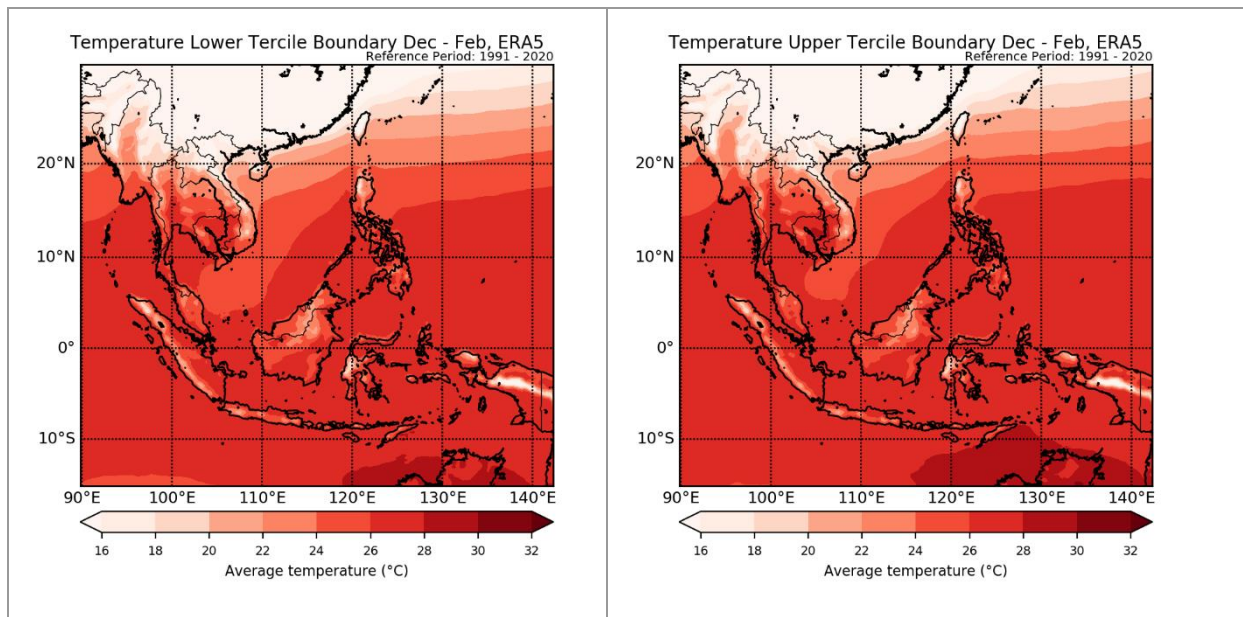


Figure A3: Temperature climatologies of the lower tercile boundary (left) and the upper tercile boundary (right) for DJF from 1991-2020 from ERA5.

ANNEX B: RAINFALL AND TEMPERATURE OUTLOOK FROM MODELS

The following figures show the starting point from the consensus discussion. From this point, NMHS representatives proposed changes, based on the typical impact during ENSO neutral or La Niña events, additional models (including statistical post-processed models), and assessment of model skill.

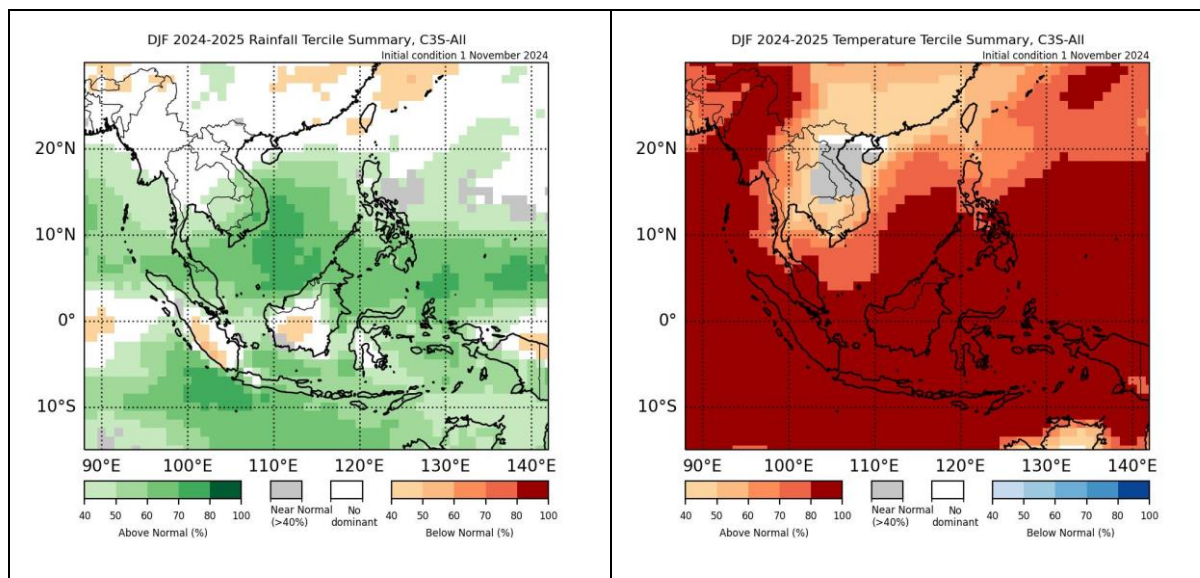


Figure B1: Outlook from the C3S seasonal models for DJF 2024/2025 for rainfall (left) and temperature (right). The models used included NCEP, ECMWF, JMA, UK Met Office, DWD, CMCC and MeteoFrance.

ANNEX C: AGRICULTURE OUTLOOK FROM UN ESCAP

In line with the theme of ASEANCOF-23: Agriculture and Climate Services, potential impact to rice and maize crops were prepared by UN ESCAP based on the ASEANOCF-23 rainfall outlook.

Rice Crop

During December – February, many countries in the region will be at harvest (Indonesia, the Philippines) or planting (Lao PDR, Myanmar, Thailand, Viet Nam) season for the rice crop.

For rice crop at the harvest stage, below-normal precipitation could induce drought and delay rice heading date, negatively affecting the crop yield. Above-normal temperature will delay rice harvest time and reduce grain filling rate, negatively affecting the crop yield.

For rice crop at the planting state, below-normal precipitation may negatively affect the germination process by limiting water absorption and weakening the seedlings. Below-normal temperature may impede germination and reduce seedling vigour, increasing seedling mortality.

Maize Crop

During December – February, many countries will be at planting (Cambodia, Viet Nam), mid-season (Myanmar) or harvest (the Philippines) season for the corn crop.

For corn crop at planting stage, below-normal precipitation may cause the soil to become too dry and cause uneven germination time for corn seeds. Above-normal temperature can lead to oxidative stress in corn seedlings, causing growth abnormalities.

For corn crop at mid-season stage, below-normal precipitation may lead to drought stress and in turn reduce corn yields. Above-normal precipitation may reduce nitrogen fertilizer levels in the soil, which may affect corn growth. Above-normal temperature can negatively affect pollination during flowering and limit the kernel number.

For corn crop at harvest stage, above- or below-normal precipitation can alter the climate-yield relationship and potentially increase the risk of maize yield reduction. Above-normal temperature can have negative affect by disrupting the plant's phenology, reducing pollen viability, impacting the female component of the plant, altering biomass allocation, and reducing kernel number and weight.

Annex D: National Meteorological Services' Contact Information

ANNEX D: NATIONAL METEOROLOGICAL SERVICES' CONTACT INFORMATION

- Brunei Darussalam Meteorological Department (BDMD)

<http://www.met.gov.bn/>

- Department of Meteorology, Cambodia

<http://www.cambodiameteo.com/map?menu=3&lang=en>

- Badan Meteorologi, Klimatologi dan Geofisika, Indonesia (BMKG)

<http://www.bmkg.go.id>

- Department of Meteorology and Hydrology (DMH), Lao PDR

<http://dmh.monre.gov.la/>

- Malaysian Meteorological Department (MMD)

<http://www.met.gov.my/>

- Department of Meteorology and Hydrology (DMH), Myanmar

<https://www.moezala.gov.mm/>

- Philippines Atmospheric, Geophysical and Astronomical Services Administration
(PAGASA)

<http://bagong.pagasa.dost.gov.ph/>

- Meteorological Service Singapore (MSS)

<https://www.weather.gov.sg/home/>

- Thai Meteorological Department (TMD)

<http://www.tmd.go.th/en/>

- National Center for Hydro-Meteorological Forecasting (NCHMF), Vietnam

<https://nchmf.gov.vn/KttvsiteE/en-US/2/index.html>

ANNEX E: REVIEW OF JJA 2024 CONSENSUS OUTLOOK

SUMMARY

The rainfall outlooks were representative of the actual conditions over some parts of Southeast Asia whereas temperature outlooks were representative of actual conditions over most parts of Southeast Asia for June-July-August (JJA) 2024. The region experienced a mix of near to above-normal rainfall during JJA 2024, and predominately above-normal temperature.

In May, sea surface temperature (SST) anomalies over the equatorial Pacific showed average to slightly below average SSTs across the equatorial Pacific Ocean, and along with atmospheric indicators such as trade wind strength and cloudiness, indicated ENSO-neutral conditions. In the Indian Ocean, the Indian Ocean Dipole was also neutral. The international climate outlooks predicted that a La Niña was likely to develop sometime during JJA 2024. There was a chance that a weak positive Indian Ocean Dipole (IOD) may become established during JJA 2024 based on the model predictions. However, it was predicted to most likely be short-lived.

Based on the assessment as part of ASEANCOF-22, [SEA RCC Climate Monitoring Node](#), and the [WMO El Niño/La Niña Updates](#), during the JJA 2024 period ENSO-neutral conditions were present, with a neutral to positive IOD starting to develop around the end of August in the Indian Ocean.

In the sections below, a combination of global gridded data and reviews by National Meteorological and Hydrological Services (NMHSs) was used to verify the outlook.

JJA 2024 RAINFALL OUTLOOK

Above-normal rainfall is predicted over northern Myanmar, parts of Cambodia and parts of the equatorial region, including Brunei Darussalam and middle part of East Malaysia. Near- to above-normal rainfall is predicted over southern Thailand, western part of East Malaysia, and the southern Philippines, as well as parts of Mainland Southeast Asia including western Myanmar, northwestern Lao PDR, parts of Cambodia, and southern Viet Nam.

Below-normal rainfall is predicted over the western part of Northern Philippines. Below- to near- normal rainfall is predicted over southern Lao PDR, the rest of Northern Philippines, and southernmost parts of Southeast Asia.

Elsewhere, near-normal rainfall is predicted.

A mix of near- to above-normal rainfall was observed over much of the ASEAN region, as can be seen by CHIRPS rainfall in Figure E1. There is some agreement between the predicted and observed rainfall for the region.

Over the northern ASEAN region, near-normal rainfall was recorded over southern Myanmar, central and western Thailand, in line with the outlook and typical of neutral ENSO conditions. Below-normal rainfall was observed over southern Lao PDR and above-normal rainfall was observed over southern Cambodia, also in line with the outlook. Elsewhere, there was a mix of below- to above-normal rainfall, which does not correspond with the most likely tercile from the outlook.

Over the southern ASEAN region, above-normal rainfall was recorded over parts of the northwestern Maritime Continent in line with the outlook. Above-normal rainfall was also recorded over much of the eastern half of the Maritime Continent, also in agreement with the outlook. Over the southern Maritime Continent, however, a mix of near-to above-normal rainfall was observed where the outlook predicted a higher chance of below- to near-normal rainfall.

Annex E: Review of JJA 2024 Consensus Outlook

Based on the country reviews by NMHSs (Table E1), there was reasonable agreement between the outlook values averaged over the country and the observed values. There were some differences between the country reviews (based on primarily rain gauge data) and the CHIRPS gridded product in Figure E1. CHIRPS recorded drier conditions over parts of eastern Thailand and Cambodia (below- to near-normal rainfall), while this was near- or above-normal based on the respective country assessments. CHIRPS recorded above-normal rainfall over parts of Borneo, including Sarawak and Brunei Darussalam, in contrast to the near-normal rainfall reported in the country assessments.

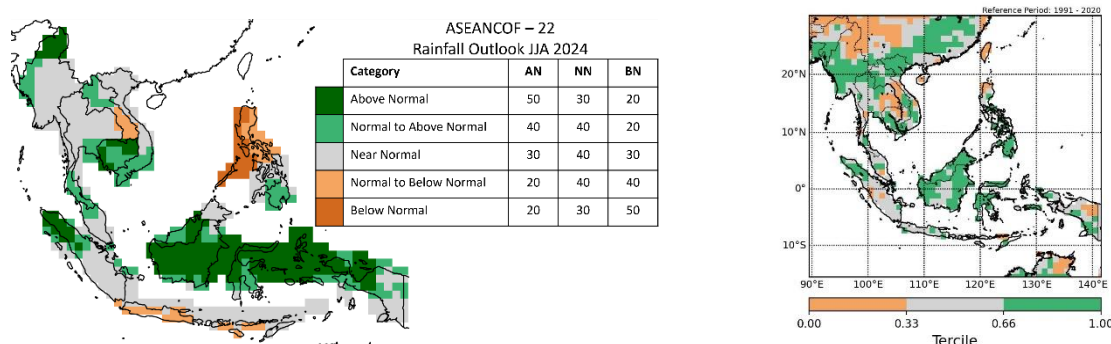


Figure E1: JJA 2024 ASEANCOF outlook (left) observed JJA rainfall in terciles (right, climatology 1991-2020). The rainfall dataset is CHIRPS (Funk et al 2014).

Table E1: Observed Rainfall based on the national level assessment. The Most Likely Category from the ASEANCOF-22 outlook (MLC), the observed rainfall as noted by the NMHS (obs. tercile) are included. The tercile categories are above-normal (AN), near-normal (NN), and below-normal (BN).

Country	Outlook (MLC*)	NMHS OBS TERCILE
Brunei	AN	NN
Cambodia	Western, northern: AN Rest: NN	Western northern: AN Rest: AN
Lao PDR	Northwestern: NN – AN Northeastern: NN Rest: BN - NN	Northwestern: AN Northeastern: NN Rest: BN
Malaysia	Southern Sarawak: AN Northern Sarawak: NN – AN Rest: NN	Southern Sarawak: NN Northern Sarawak: NN Rest: NN-AN
Myanmar	Northern: AN Northwestern: NN - AN Rest: NN	Northern: NN Northwestern: NN Rest: NN-AN
Philippines	Northwestern: BN Northeastern: BN-NN Central: NN Southern: NN - AN	Northwestern: BN-NN Northeastern: BN-NN Central: NN Southern: NN-AN
Singapore	NN – AN	NN
Thailand	Parts southern: NN - AN Rest: NN	Parts southern: NN Rest: NN – AN
Viet Nam	Southern: NN – AN Rest: NN	Southern: NN Rest: NN – AN

JJA 2024 TEMPERATURE OUTLOOK

Above normal temperature is predicted over most of Southeast Asia, apart from over much of Myanmar, Lao PDR, Cambodia, Brunei Darussalam, and the Philippines where near- to above-normal temperature is predicted.

Most of the ASEAN region experienced above-normal temperature, apart from over northern parts where a mix of below- and above- temperature was recorded, based on the CPC Unified Gauge dataset (Figure E2). Overall, this is in good agreement with the outlook.

The results from NMHS country reviews (Table E2) also show predominantly near- to above-normal temperatures. There is good agreement between most likely tercile from the outlook averaged over the country and the observed values, as well as between the CPC Unified Gauge data and the country assessments.

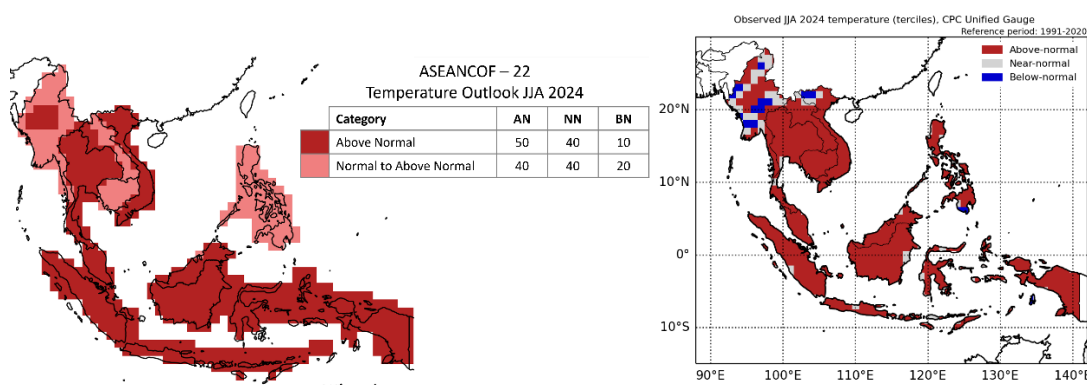


Figure E2: JJA 2024 ASEANCOF outlook (left) observed temperature in terciles (right, climatology 1991-2020). The temperature dataset is CPC Unified Gauge (Chen et al 2008).

Table E2: Observed temperature based on the national level assessment. The Most Likely Category from the ASEANCOF-22 outlook (MLC), the observed temperature as noted by the NMHS (obs. tercile) are included. The tercile categories are above normal (AN), near normal (NN), and below normal (BN).

Country	Outlook (MLC*)	NMHS OBS TERCILE
Brunei	AN	AN
Cambodia	NN – AN	AN
Lao PDR	NN – AN	Northern: AN Rest: AN
Malaysia	AN	AN
Myanmar	Central: AN Rest: NN – AN	Central: NN Rest: BN-NN
Philippines	NN – AN	NN-AN
Singapore	AN	AN
Thailand	AN	AN
Viet Nam	AN	AN

SIGNIFICANT EVENTS

During JJA, several low pressure systems over the ASEAN region brought a number of heavy rainfall events to the region. In Myanmar, three low pressure systems over the Bay of Bengal caused floods, while record rainfall was observed at 9 stations in the country. Lao PDR experienced flash floods and landslides caused by four tropical cyclones that impacted the country from June 2024 onwards, especially Typhoon Yagi and tropical storm Soulik that hit the northern parts in September. There were additional heavy rainfall events in the region. Brunei was hit by a severe squall on 30 August, combined with an enhanced southwest monsoonal flow over South China Sea, leading to wind gust over 64 km/h.

Alongside the severe rainfall events, the region also experienced high temperatures in a number of countries. The northern delta and central region of Viet Nam experienced higher than normal number of days with temperature above 35°C. Parts of the Philippines also saw high temperatures, with the heat index soared to 54°C across the country in June. Singapore recorded its highest monthly mean daily minimum temperature in July.

REFERENCES

CHIRPS: Funk et al. 2014: A quasi-global precipitation time series for drought monitoring: U.S. Geological Survey Data Series 832, 4 p., doi:10.3133/ds832.

CPC Unified Gauge: Chen, M., W. Shi, P. Xie, V. B. S. Silva, V E. Kousky, R. Wayne Higgins, and J. E. Janowiak (2008), Assessing objective techniques for gauge-based analyses of global daily precipitation, *J. Geophys. Res.*, 113, D04110, doi:10.1029/2007JD009132.

ERA5: Hersbach et al. 2019: Global reanalysis: goodbye ERA-Interim, hello ERA5. ECMWF Newsletter, doi:10.21957/vf291hehd7.