Fifteenth Session of the ASEAN Climate Outlook Forum (ASEANCOF-15)

23, 25, 27 November 2020, ASEAN Specialised Meteorological Centre

Consensus Bulletin for December-January-February (DJF) 2020/2021 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 ASEAN region through pooling the expertise of ASEAN National Meteorological and Hydrological Services (NMHSs).

The fifteenth ASEANCOF (ASEANCOF-15) was organised by the ASEAN Specialised Meteorological Centre (ASMC). Representatives from the NMHSs of ASEAN Member States created a consensus forecast for the boreal winter monsoon 2020/2021 in the ASEAN region. The consensus for December-January-February (DJF) 2020/2021 outlooks was achieved through an online session, which included presentations from NMHSs and Global Producing Centres (GPCs) of seasonal outlooks, questionnaires and discussions regarding the current conditions and predictions for the Southeast Asia region. In particular, the forum considered the possible influence of the El Niño Southern Oscillation (ENSO) and the Indian Ocean Dipole (IOD) on the climate system over Southeast Asia.

CONDITIONS AND OUTLOOK

Recent analysis of sea surface temperature (SST) anomalies over the equatorial Pacific indicated below average SSTs across most of the central and eastern tropical Pacific Ocean and that La Niña conditions are present. The international climate outlooks predict La Niña conditions are very likely to continue during DJF 2020/2021. The La Niña conditions are expected to be moderate to strong during this time. La Niña conditions are expected to weaken during the boreal (Northern Hemisphere) spring.

The current Indian Ocean Dipole (IOD) state is neutral and is expected to remain neutral for DJF 2020/2021.

The Northeast (NE) Monsoon is expected to be stronger than normal, based on model predictions and supported by the current La Niña conditions. For most countries, the onset of the NE monsoon is expected to be near-normal, or slightly earlier.

Overall, the tropical cyclone frequency is expected to be above average for the Bay of Bengal, South China Sea and around the Philippine Sea. This is based on model predictions as well as during La Niña events there tends to be more tropical cyclones than average for the region.

Taking into consideration the national level forecasts, the present state of the climate, and the forecasts available from the GPCs and other global centres, the forum agreed on the following consensus-based outlook for DJF 2020/2021 for the Southeast Asia region:

RAINFALL

For the upcoming boreal (Northern Hemisphere) winter season (December- January- February 2020/2021), near-normal to above-normal rainfall is expected over much of the region (Brunei Darussalam, Malaysia, the Philippines, Singapore, Thailand, and southern parts of Myanmar and Viet Nam). The highest probabilities of above-normal rainfall are over Brunei Darussalam, southern Thailand, and parts of Malaysia and the Philippines.

 Elsewhere, near-normal or a range of below-normal to above-normal rainfall is predicted.

TEMPERATURE

For the southern half of Southeast Asia near-normal to above-normal temperature is predicted, including Brunei Darussalam, Malaysia, Singapore, and the southern half of the Philippines.

In the northern half of Southeast Asia, near-normal to below-normal temperature is expected for parts of Lao PDR and Viet Nam. An increased chance of above-normal temperature is expected over northern Thailand and northern Lao PDR. Elsewhere, near-normal temperature is expected, particularly over most of Thailand, Myanmar and northern Philippines.
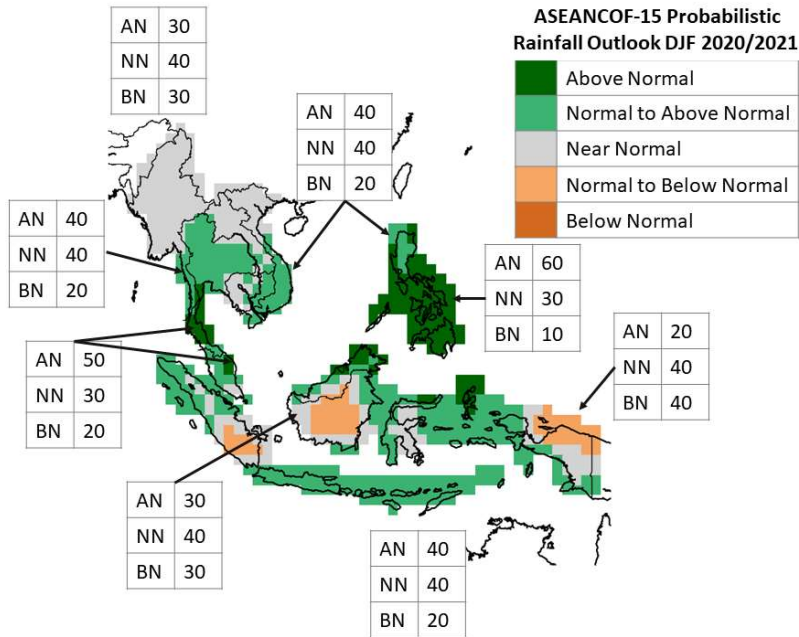
On top of these temperature outlook, there may be increased chance of cold surges due to the stronger Northeast Monsoon predicted for the coming December-January-February 2020/2021 season.

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 NMSs should be consulted (see **Annex B**).
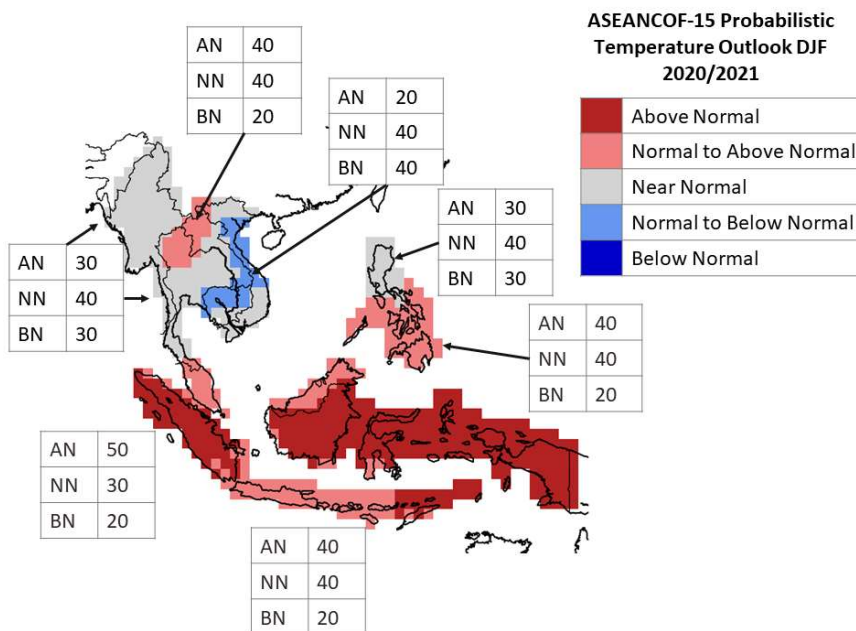
CONSENSUS MAPS FOR DJF 2020/2021

The following maps provide the probabilistic outlooks for DJF 2020/2021 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
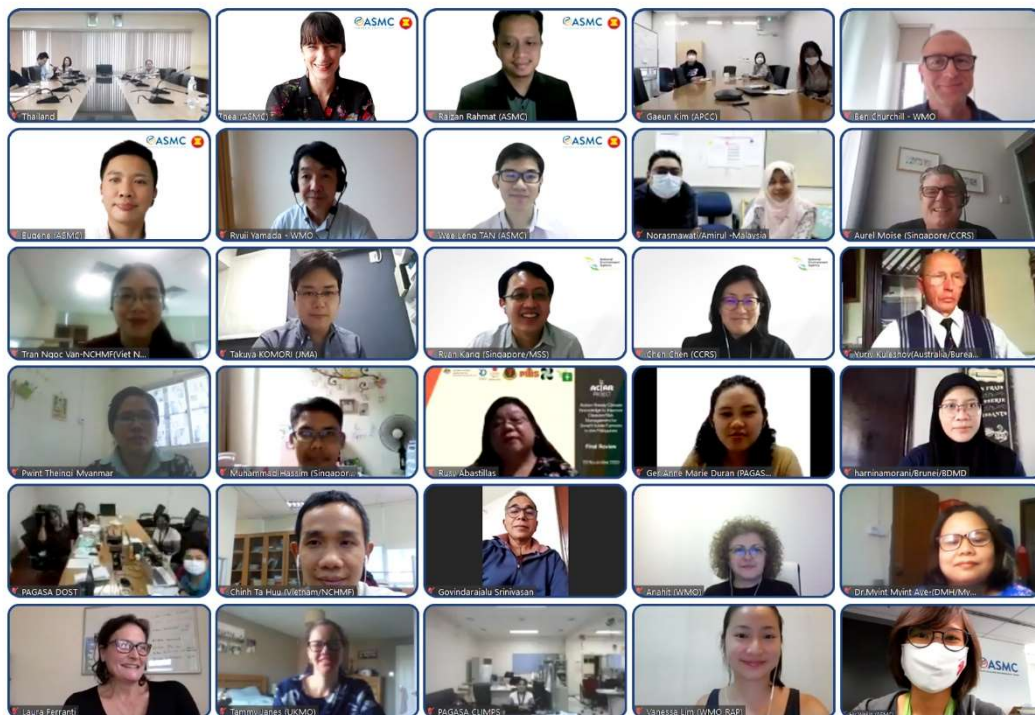
ACKNOWLEDGEMENTS

Photo of online participants during the first day of ASEANCOF-15. Top row: representatives from TMD, Thea Turkington (ASMC), Raizan Rahmat (ASMC), representatives from APCC, and Ben Churchill (WMO). Second row: Eugene Chong (ASMC), Ryuji Yamada (WMO), Wee Leng Tan (ASMC), Amirul Nizam Marodzi and Norasmawati Shahlal (Met Malaysia), and Aurel Moise (MSS). Third row: Tran Ngoc Van (VNMD), Takuya Komori (JMA), Ryan Kang (MSS), Chen (MSS), and Yuriy Kuleshov (BoM). Fourth row: Pwint Theingi (DMH Myanmar), Muhammad Hassim (MSS), Rusy Abastillas (PAGASA), Ger Anne Mariel Duran (PAGASA), and Harnina Binti Morani (BDMD), Fifth row: representatives from PAGASA, Ta Huu Chinh (VNMD), Govindarajalu Srinivasan (RIMES), Anahit Hovsepyan (WMO), and Myint Aye (DMH Myanmar). Sixth row: Laura Ferranti (ECMWF), Tammy Janes (UKMO), Analiza Solis (PAGASA), Vanessa Lim (WMO), Weilin Hu (ASMC).

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).
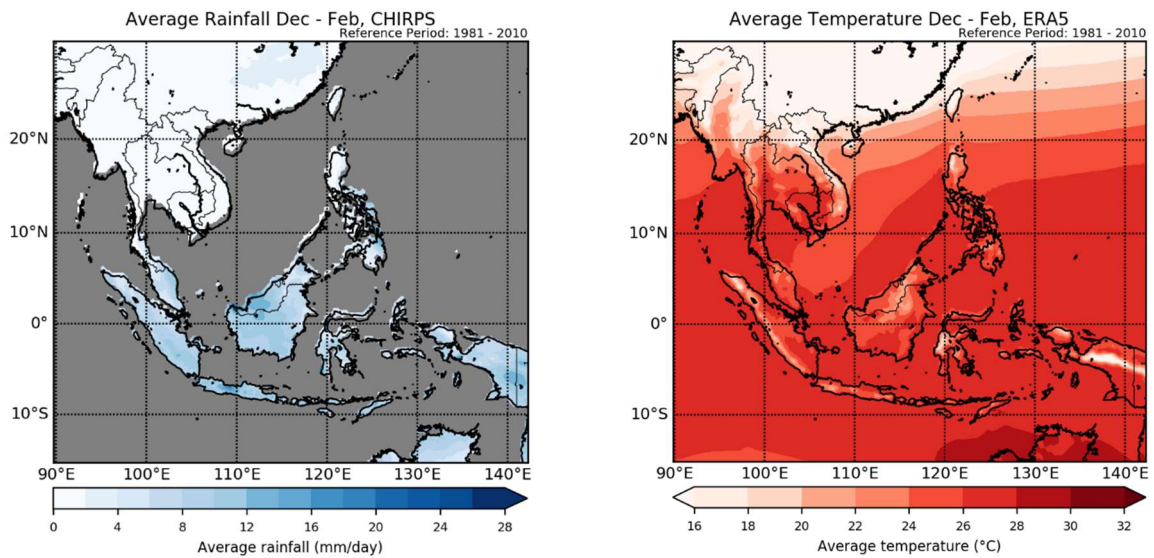

Figure A1: Mean rainfall (left, CHIRPS) and mean temperature (right, ERA5) for DJF for the climatology period 1981-2010.
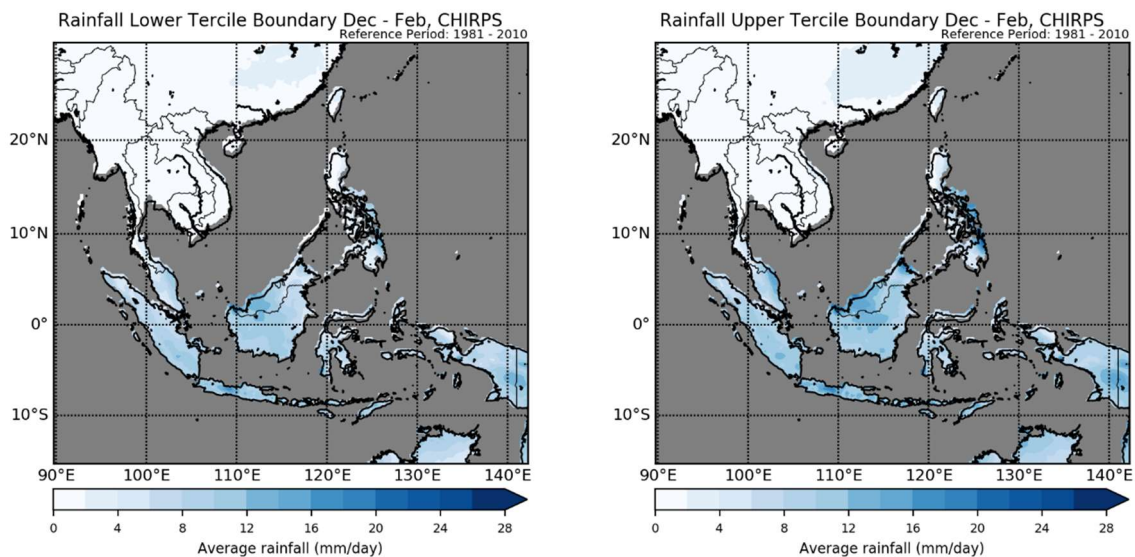

Figure A2: Rainfall climatologies of the lower tercile boundary (left) and the upper tercile boundary (right) for DJF from 1981-2010 using CHIRPS.

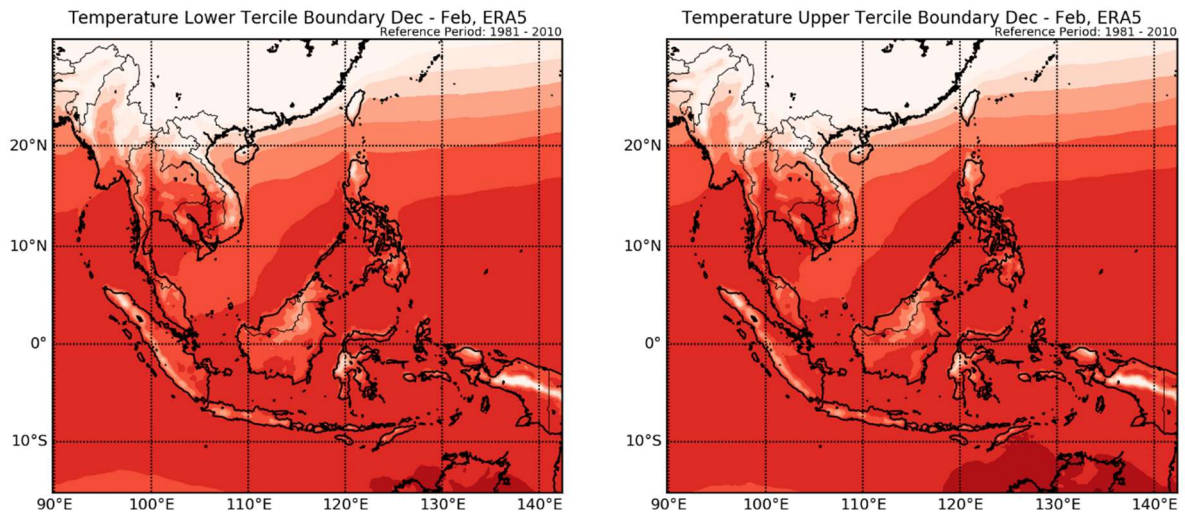**Annex A: Rainfall and Temperature Tercile Climatologies**

Figure A3: Temperature climatologies of the lower tercile boundary (left) and the upper tercile boundary (right) for DJF from 1981-2010 from ERA5.

ANNEX B: NATIONAL METEOROLOGICAL SERVICES' CONTACT INFORMATION

- **Brunei Darussalam Meteorological Department (BDMD)**

http://www.met.gov.bn/weather

- **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**

http://dmhlao.etllao.com/

- **Malaysian Meteorological Department (MMD)**

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

- **Department of Meteorology and Hydrology (DMH), Myanmar**

http://www.dmh.gov.mm/

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

http://www.pagasa.dost.gov.ph/

- **Meteorological Service Singapore Government (MSS)**

http://www.weather.gov.sg/home/

- **Thai Meteorological Department (TMD)**

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

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

http://www.nchmf.gov.vn/Web/en-US/43/Default.aspx

SUMMARY

The rainfall and temperature outlooks were representative of the actual conditions over much of the Southeast Asia. The region experienced near-to above-normal temperature. Much of the equatorial region experience above-normal rainfall with a range of below- to above-normal rainfall elsewhere.

Sea surface temperature (SST) anomalies in May 2020 were near average over much of the Pacific Ocean. During JJA 2020, international climate outlooks favoured ENSO neutral conditions to continue, with a potential that La Niña conditions may develop towards the end of the period. In the Indian Ocean, the Indian Ocean Dipole (IOD) was neutral. Some models were predicting that a negative IOD event could develop during JJA, although the uncertainty was high. The consensus from ASEANCOF was an increased chance of a negative IOD event to develop during JJA while ENSO conditions were most likely to remain neutral during JJA.

For JJA 2020, ENSO was neutral; although there was a trend towards La Niña conditions. The Indian Ocean Dipole was neutral.

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 2020 RAINFALL OUTLOOK

For the upcoming Northern Hemisphere summer season (June-July-August), normal- to above-normal rainfall is expected over much of the equatorial region (Brunei, Malaysia, Singapore, and northern parts of Indonesia) as well as northern Viet Nam and coastal central Viet Nam.

Normal- to below-normal rainfall is expected over southern Myanmar, southern and northeastern Thailand, northern Philippines, parts of Lao PDR, and southeastern Indonesia.

Elsewhere, normal or climatological probabilities are forecasted.

Much of the outlook agreed with the CHIRPS gridded product in **Figure C1.** Above-normal rainfall was observed for much of the equatorial region, with below- to near-normal rainfall in the southernmost part of the region and a mix of below- to above-normal rainfall in the northern part of Southeast Asia. Comparing the observed terciles to the outlook probabilities,

in each case the most likely category matched with the most observed category (**Table C1**). In the case of the normal- to above-normal and normal- to below-normal outlook categories, the observed frequency was higher than the outlook probability for above-normal and below-normal, respectively. Based on the country reviews by NMHSs (**Table C2**), there was also good agreement between the outlook and the observed values. The exceptions were for Viet Nam where below-normal rainfall was observed and for southern Thailand where above-normal rainfall was observed (also seen in Figure C1).
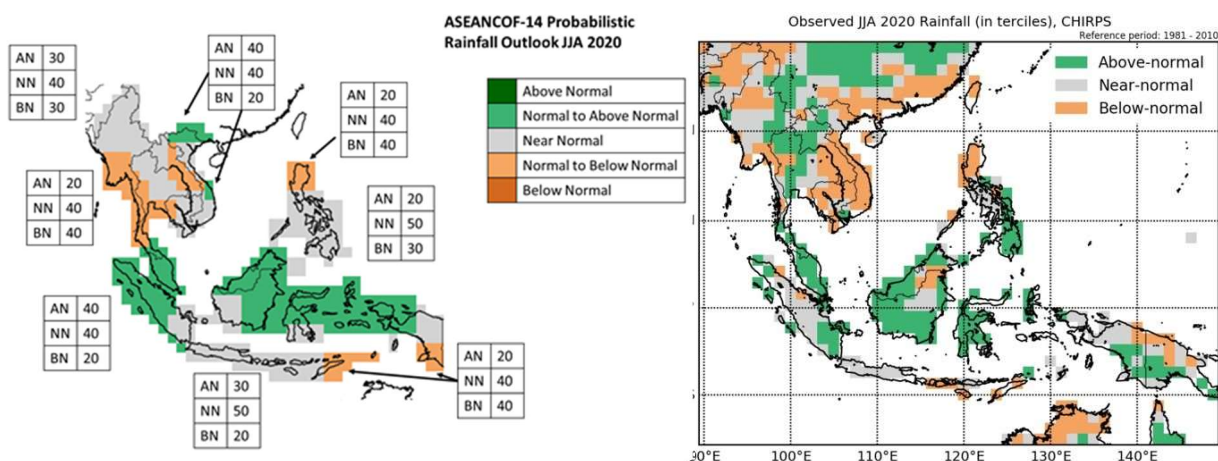

Figure C1: JJA 2020 ASEANCOF outlook (left) observed JJA rainfall in terciles (right, climatology 1981-2010). The rainfall dataset is CHIPRS (Funk et al 2014).

Table C1: Summary of the percentage of grid boxes that observed above- near- and below-normal rainfall during JJA 2020, using the CHIRPS dataset. The average outlook probability for each of the colours is also shown.

	Normal to Above Normal		Near Normal		Normal to Below Normal	
	Outlook probability	Observed	Outlook probability	Observed	Outlook probability	Observed
Above normal	40%	58%	30%	34%	20%	19%
Near Normal	40%	35%	40%	36%	40%	26%
Below Normal	20%	7%	30%	30%	40%	54%

Table C2: Observed Rainfall based on the national level assessment. The Most Likely Category from the 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). Bold texts highlights discrepancies between the outlook and observed.

Country	Location (- indicates the entire country)	Outlook (MLC)	NMHS obs. tercile
Brunei	-	AN (40%)	AN
Malaysia	-	AN (40%)	AN
Myanmar	Southern	BN (40%)	BN
	Rest	NN (40%)	NN
Philippines	Northern	BN (40%)	BN
	Rest	NN (50%)	NN
Singapore	-	AN (40%)	AN
Thailand	Northeastern	BN (40%)	BN
	Eastern	**NN (40%)**	**BN**
	Southern	**BN (40%)**	**AN**
	Rest	NN (40%)	NN
Viet Nam	Northern, central coastal	**AN (40%)**	**BN**
	Rest	**NN (40%)**	**BN**

* MLC: Most Likely Category

JJA 2020 TEMPERATURE OUTLOOK

Above-normal temperature is expected over most of Southeast Asia, although the probability of above-normal temperature is lower over Viet Nam and parts of Indonesia, and northern Philippines.

Most of Southeast Asia experienced above-normal temperature as depicted in the ERA5 data (**Figure C2, Table C3**) and reviews by NMHSs (**Table C4**). More parts of the equatorial region recorded near normal temperature than expected, including Brunei Darussalam, Singapore, and parts of the Philippines, as noted by the NMHSs in Table C4. The percentage of grid boxes that observed above normal temperature was higher where normal- to above-normal rainfall was predicted compared to those where above-normal temperature was predicted (Table C3), although this could be partly due to the relatively smaller area where normal- to -above-normal temperature was predicted. Overall, the observations were in good agreement with the JJA outlook.
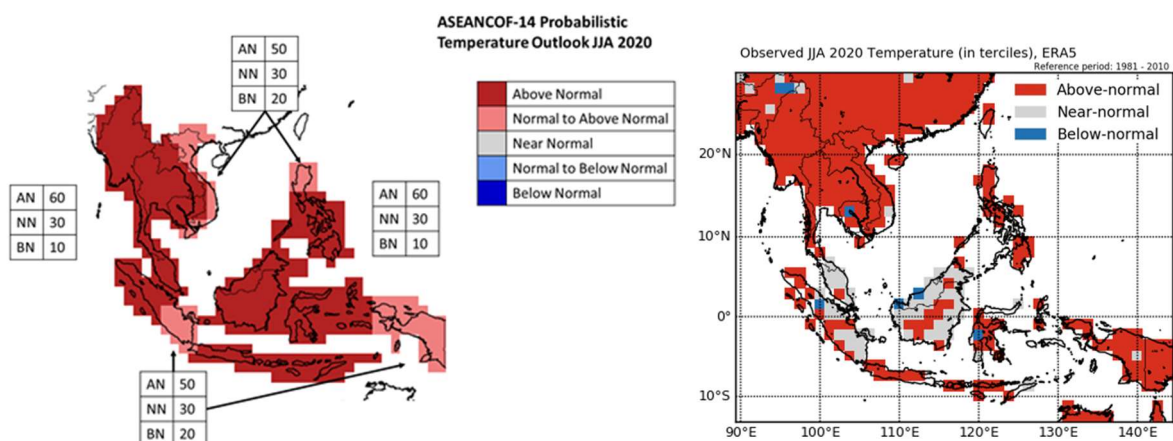
Figure C2: JJA 2020 ASEANCOF outlook (left) observed DJR temperature in terciles (right, climatology 1981-2010). The temperature dataset used is ERA5 reanalysis dataset (Hersbach et al. 2019)

Table C3: Summary of the percentage of grid boxes that observed above- near- and below-normal temperature during JJA 2020, using the CHIRPS dataset. The average outlook probability for each of the colours is also shown.

	Above Normal		Normal to Above Normal	
	Outlook probability	Observed	Outlook probability	Observed
Above normal	60%	69%	50%	89%
Near Normal	30%	30%	30%	11%
Below Normal	10%	5%	20%	0%

Table C4: Observed temperature based on the national level assessment. The Most Likely Category from the 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). Bold texts highlights discrepancies between the outlook and observed.

Country	Location	Outlook (MLC)	NMHS obs. tercile
Brunei	-	**AN (60%)**	**NN**
Malaysia	-	AN (60%)	AN
Myanmar	-	AN (60%)	AN
Philippines	Northern	AN (50%)	AN
	Rest	**AN (60%)**	**NN**
Singapore	-	**AN (60%)**	**NN**
Thailand	-	AN (60%)	AN
Viet Nam	-	AN (50%)	AN

SIGNIFICANT EVENTS

Notable events that occurred during JJA 2020 included flooding in Brunei Darussalam, Malaysia, and Thailand. Frequent heavy rain caused flash floods over low lying areas in Brunei Darussalam. In Malaysia floods in June and July 2020 resulted in more than 4,000 evacuations in southern Peninsular Malaysia. In Thailand, a weakened tropical storm "SINLAKU" was estimated to have caused damages in thirteen provinces and affected more than twenty-thousand households.

High rainfall amounts were recorded in Myanmar and Singapore. During JJA, there were new records for rainfall observed at two stations in Myanmar. For Singapore, June 2020 was the second wettest June over the 1980-2020 period (only slightly less than the 2020 record value).

On the other side of the spectrum, below-normal rainfall was recorded in the Philippines as well as high temperatures in Viet Nam. During June, records were broken in Viet Nam for the number of hot days as well as the monthly mean temperature. Myanmar also broke maximum temperature records at 41 stations during JJA 2020.

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:110.3133/ds832.

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