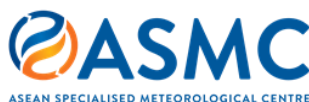




WORLD  
METEOROLOGICAL  
ORGANIZATION



## **Fourteenth Session of the ASEAN Climate Outlook Forum (ASEANCOF-14)**

**21<sup>st</sup> May 2020, ASEAN Specialised Meteorological Centre**

### **Consensus Bulletin for June-July-August (JJA) 2020 Season**

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#### **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 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 Services.

The fourteenth ASEANCOF (ASEANCOF-14) was organised by Meteorological Service Singapore as host of the ASEAN Specialised Meteorological Centre. Representatives from National Meteorological and Hydrological Services (NMHSs) of ASEAN Member States created a consensus forecast for the summer monsoon 2020 in the ASEAN region. The consensus for June-July-August (JJA) 2020 outlooks was achieved through online correspondence, including questionnaires and online 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 indicate near average SSTs and ENSO neutral conditions are present. The international climate outlooks predict ENSO neutral conditions are likely to continue during JJA 2020, although there is potential that La Niña conditions may begin to develop towards the end of the period or later in the year. The previous positive Indian Ocean Dipole (IOD) weakened in January 2020 and the current IOD state is neutral. Some models predict a negative IOD event to develop during JJA, but with relatively high uncertainty at this time of year.

The consensus from ASEANCOF is an increased chance of a negative IOD event to develop during JJA while ENSO conditions are most likely to remain neutral during JJA.

The Southwest (SW) Monsoon is expected to be weaker than normal, based on model predictions. However, local rainfall for some regions will depend on tropical cyclone activity, which is uncertain. For most countries, the *onset* of the SW monsoon is expected to be near-normal. However, the SW monsoon related rainfall may arrive later than normal for a few countries (Thailand and Viet Nam).

Overall, the tropical cyclone frequency is expected to be near normal for JJA 2020.

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

## **RAINFALL**

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.

## **TEMPERATURE**

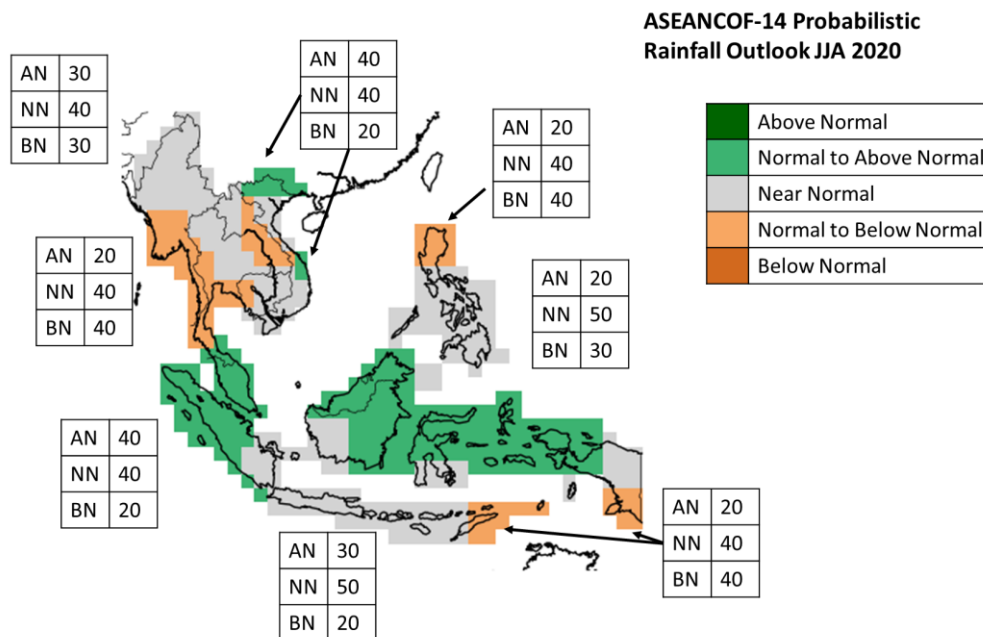
Above-normal temperature is expected over most of Southeast Asia, although the probability of above-normal temperature is lower over Viet Nam and parts of Indonesia, and northern Philippines.

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

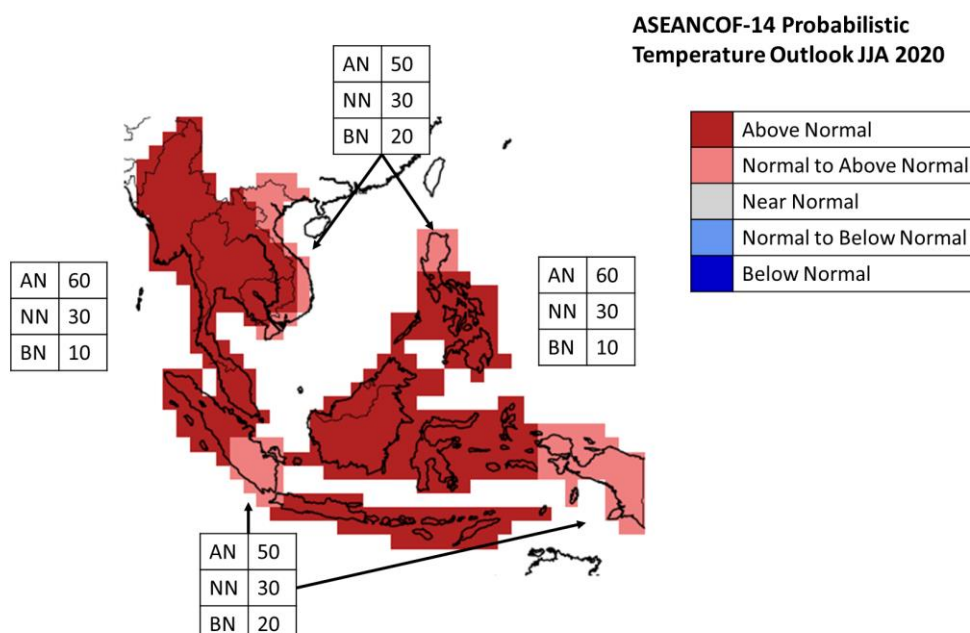
## CONSENSUS MAPS FOR JJA 2020

The following maps provide the probabilistic outlooks for JJA 2020 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

The Forum would like to convey its appreciation to the National Meteorological Services of the ASEAN Member States for sharing their national-level forecasts, the Global Producing Centres and other participating international climate modelling centres for their products and expertise made available for this Climate Outlook Forum.



Photo of online participants during ASEANCOF-14. Top row: Dr Chalump Oonariya, Mr Worapon Sitchanukrist and Ms Nichanun Trachow (Thailand), Dr Wilfran Moufouma Okia (WMO), Ms Anahit Hovsepyan (WMO), Dr Govindarajalu Srinivasan (RIMES). Second row: Ms Harnina Binti Morani (Brunei), Mr Raizan Rahmat (Singapore), Dr Thea Turkington (Singapore), Mr Ryan Kang (Singapore). Third row: Mr Adi Ripaldi (Indonesia), Dr Supari (Indonesia), Ms Analiza Solis (PAGASA), Dr Rusy Abastillas (PAGASA). Fourth row: Mr Amirul Nizam Marodzi and Ms Norasmawati Bt Shahlal (Malaysia), Mr Ta Huu Chinh (Viet Nam), Ms Tran Ngoc Van (Viet Nam), Ms Sabai Lwin (Myanmar), Ms Aye Aye Soe (Myanmar, no photo).

## 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).

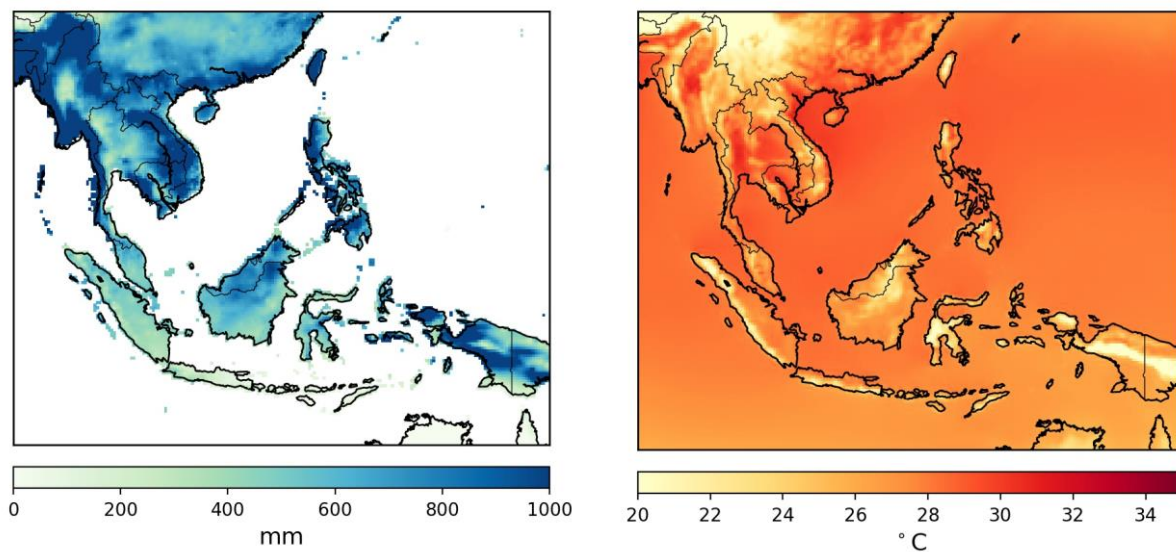


Figure A1: Mean rainfall (left, CHIRPS) and mean temperature (right, ERA5) for JJA for the climatology period 1981-2010.

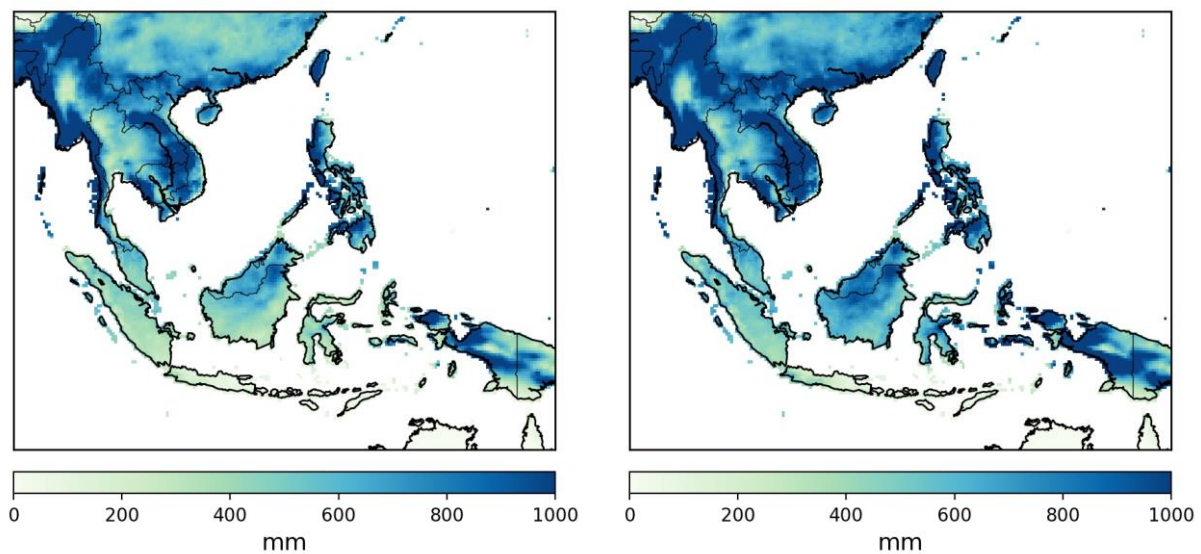
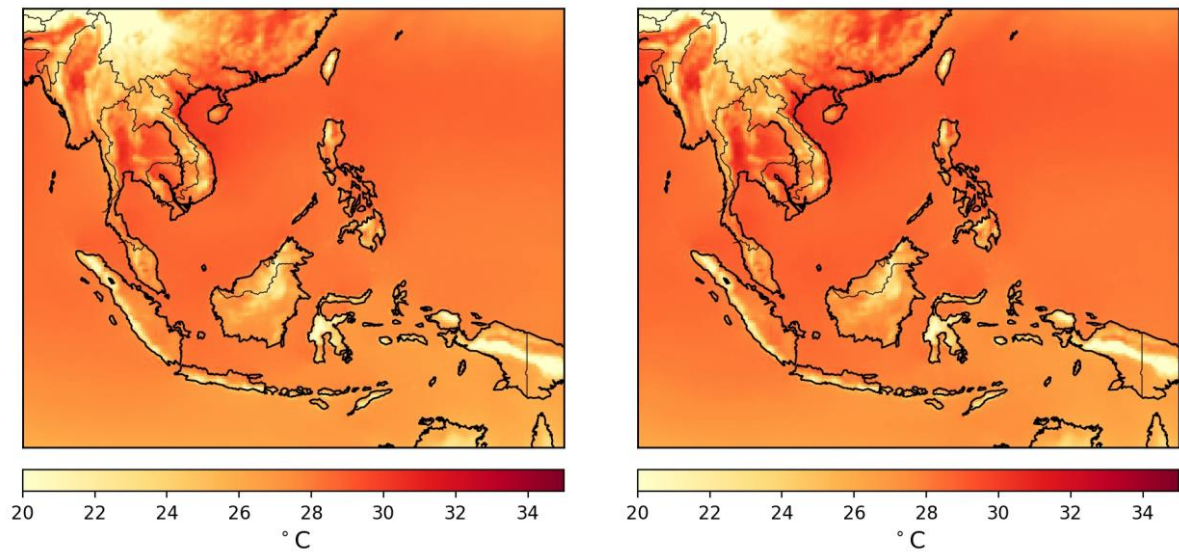


Figure A2: Rainfall climatologies of the lower tercile boundary (left) and the upper tercile boundary (right) for JJA from 1981-2010 using CHIRPS.

## Annex A: Rainfall and Temperature Tercile Climatologies



**Figure A3: Temperature climatologies of the lower tercile boundary (left) and the upper tercile boundary (right) for JJA 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>

## ANNEX C: REVIEW OF DJF 2019-20 CONSENSUS OUTLOOK

### 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 region also experienced near-to-below normal rainfall, with a few regions recording above-normal rainfall. Notable events included floods and tropical cyclones.*

Sea surface temperature (SST) anomalies in November 2019 indicated slightly warmer than average conditions over much of the Pacific Ocean, although still within the neutral range. During DJF 2019-20, international climate outlooks favoured ENSO neutral conditions to continue. In the Indian Ocean, the Indian Ocean Dipole (IOD) was positive during November 2019. During DJF 2019-20, international climate outlooks predicted the IOD to return to neutral.

For DJF 2019-2020, the SST anomalies over the central Pacific remained in the neutral range, although the central and western Pacific were slightly positive. In the Indian Ocean, the positive IOD decayed, becoming neutral again in January 2020. Madden Julian Oscillation activity during DJF 2019-20 also contributed to the rainfall at the subseasonal timescale.

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.

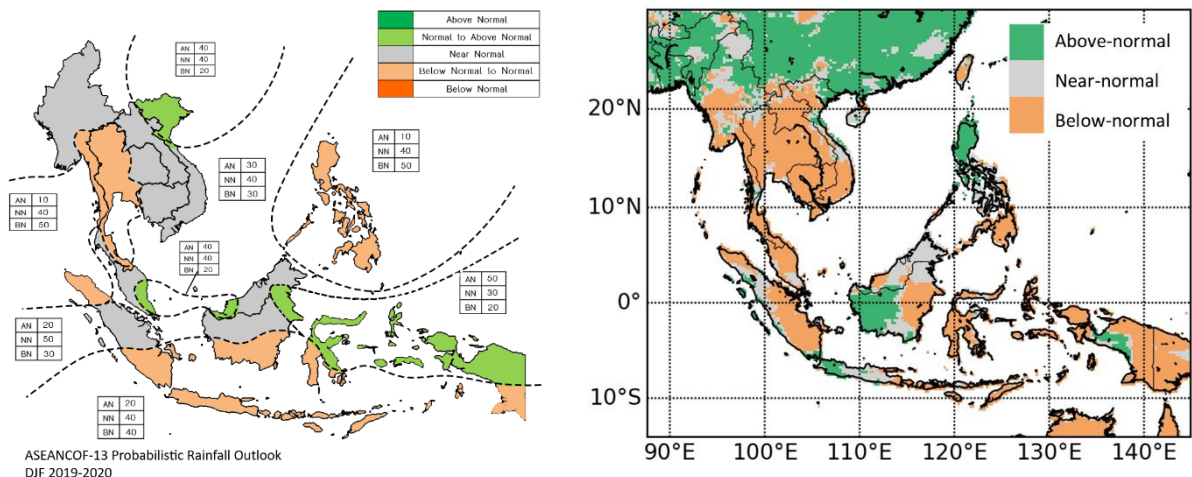
### DJF 2019-20 RAINFALL OUTLOOK

*For the upcoming Northern Hemisphere winter season (December-January-February), near-normal conditions are expected over most parts of Mainland Southeast Asia, and parts of the equatorial region. However, there is a slightly enhanced probability of wetter than normal conditions over northern Vietnam, the eastern part of Malaysia, the eastern part of Celebes, Moluccas and northern part of Papua. There is a slightly increased probability of drier than normal conditions over the southern part of Myanmar, parts of Thailand (the northern, central, eastern and south-eastern of region), Philippines, northern and southern Sumatra, Java, the western part of Celebes, Bali, Nusa Tenggara, the southern part of Borneo and the southern part of Papua.*

Much of the outlook agreed with the CHIRPS gridded product in **Figure C1** including Brunei, and parts of Indonesia, Myanmar, Philippines, and Thailand. In particular, southern Myanmar, western and southern Thailand, northern Sumatra, parts of southern Indonesia,

## Annex C: Review of DJF 2019-20 Consensus Outlook

central and southern Philippines, and upper Thailand, received below-normal rainfall. Near-normal conditions were observed over most of Borneo (including Brunei), and northern Myanmar which reflected the outlook. Above-normal rainfall was observed over western Borneo, slightly further south than outlook depicted. However, the northern Philippines and Java experienced near-to above-normal rainfall using CHIRPS, contrary to the below-normal prediction. Based on the reviews by NMHSs (**Table C1**), the national assessments were generally in agreement with the CHIRPS observations (**Figure C1**).



**Figure C1: DJF 2019-2020 ASEANCOF outlook (left) observed DJF rainfall in terciles (right, climatology 1981-2010). The rainfall dataset is CHIRPS (Funk et al 2014).**

## Annex C: Review of DJF 2019-20 Consensus Outlook

**Table C1: Observed Rainfall based on the CHIRPS dataset and national level assessment. The Most Likely Category from the outlook (MLC), the observed rainfall (observed) and the verification datasets used: weather station, or gridded datasets (e.g. gridded weather stations, satellite data, or reanalysis data). The tercile categories are above-normal (AN), near-normal (NN), and below-normal (BN). The qualifier ‘to’ indicates two categories of equal probability (MLC) or occurrence (Observed). Red highlights discrepancy between outlook and observed.**

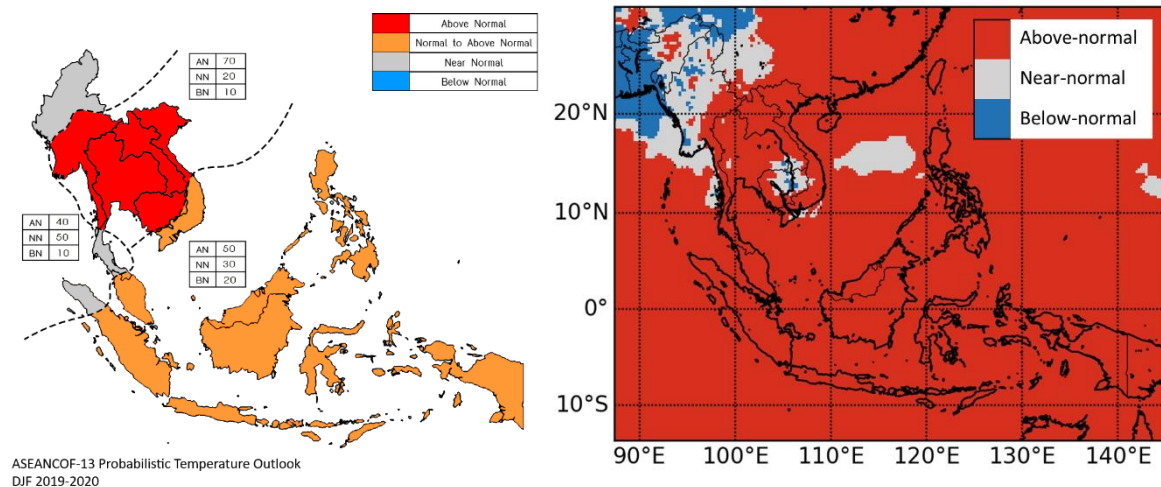
| Country     | Location<br>(- indicates the entire country)       | Outlook<br>(MLC*) | CHIRPS<br>observed<br>tercile | To be filled by NMHS    |                                      |                                   |
|-------------|----------------------------------------------------|-------------------|-------------------------------|-------------------------|--------------------------------------|-----------------------------------|
|             |                                                    |                   |                               | NMHS<br>obs.<br>tercile | Data used for NMHS<br>classification |                                   |
|             |                                                    |                   |                               |                         | Weather<br>Station                   | Gridded datasets<br>(please name) |
| Brunei      | -                                                  | NN                | NN                            | <b>NN</b>               | Yes                                  |                                   |
| Cambodia    | -                                                  | <b>NN</b>         | <b>BN</b>                     |                         |                                      |                                   |
| Laos        | -                                                  | NN                | BN                            |                         |                                      |                                   |
| Indonesia   | Northern Sumatra                                   | BN                | BN                            | <b>BN</b>               | Yes                                  | GsMap                             |
|             | Central Sumatra and<br>central Kalimantan          | NN                | NN                            | <b>BN to<br/>NN</b>     | Yes                                  | GsMap                             |
|             | Western Celebes, Java,<br>Bali, southern Papua     | BN                | BN                            | <b>BN</b>               | Yes                                  | GsMap                             |
|             | Rest                                               | AN                | BN                            | <b>AN</b>               | Yes                                  | GsMap                             |
| Malaysia    | Parts eastern Malaysia,<br>Borneo                  | <b>AN</b>         | <b>NN</b>                     | <b>NN</b>               | Yes                                  |                                   |
|             | Rest                                               | NN                | BN                            | <b>BN</b>               | Yes                                  |                                   |
| Myanmar     | Southern                                           | BN                | BN                            | <b>BN</b>               | Yes                                  |                                   |
|             | Rest                                               | NN                | NN                            | <b>AN to<br/>NN</b>     | Yes                                  |                                   |
| Philippines | -                                                  | NN to<br>BN       | BN to<br>AN                   | <b>BN to<br/>AN</b>     | Yes                                  |                                   |
| Singapore   | -                                                  | NN                | NN                            | <b>BN</b>               | Yes                                  |                                   |
| Thailand    | Northern, central,<br>eastern, and<br>southeastern | BN                | BN                            | <b>BN</b>               | Yes                                  |                                   |
|             | Rest                                               | <b>NN</b>         | <b>BN</b>                     | <b>BN</b>               | Yes                                  |                                   |
| Viet Nam    | Northern                                           | <b>AN</b>         | <b>NN</b>                     | <b>NN</b>               | Yes                                  |                                   |
|             | Rest                                               | <b>NN</b>         | <b>BN</b>                     | <b>BN</b>               | Yes                                  |                                   |

\* MLC: Most Likely Category

## DJF 2019-2020 TEMPERATURE OUTLOOK

*Above normal temperatures are expected for most of Southeast Asia, apart from northern Myanmar, southern Thailand and northern Sumatra, where near normal temperatures are expected. For the regions with expected above normal temperature, the highest probability is over northern Vietnam, Lao PDR, Cambodia, northern Thailand and southern Myanmar.*

Most of Southeast Asia experienced above-normal temperature as depicted in the ERA5 data (**Figure C2**) and reviews by NMHSs (**Table C2**). The gridded product observed above-normal temperatures over most of the ASEAN regions, except for northern and western Myanmar and parts of Cambodia. Based on the national level assessments, Myanmar and parts of the Philippines experienced near-normal temperatures, with the rest of the countries that monitor seasonal temperature observing above-normal conditions (Table C2). While northern Sumatra and southern Thailand predicted a higher probability of near-normal temperature, the probability of above-normal was also higher than normal (above-normal temperature was observed). Overall, the observations were in good agreement with the DJF outlook.



**Figure C2: DJF 2019-2020 ASEANCOF outlook (left) observed DJF temperature in terciles (right, climatology 1981-2010). The temperature dataset used is ERA5 reanalysis dataset (Hersbach et al. 2019)**

## Annex C: Review of DJF 2019-20 Consensus Outlook

**Table C2: Observed temperature based on the ERA5 dataset and national level assessment. The Most Likely Category from the outlook (MLC), the observed rainfall (observed) and the verification datasets used: weather station, or gridded datasets (e.g. gridded weather stations, satellite data, or reanalysis data). The tercile categories are above-normal (AN), near-normal (NN), and below-normal (BN). The qualifier ‘to’ indicates two categories of equal probability (MLC) or occurrence (Observed). Red highlights discrepancy between outlook and observed.**

| Country     | Location<br>(- indicates entire country) | Outlook<br>(MLC) | ERA5<br>Observed<br>tercile | NMHS<br>obs.<br>tercile | Data used for NMHS classification |                  |
|-------------|------------------------------------------|------------------|-----------------------------|-------------------------|-----------------------------------|------------------|
|             |                                          |                  |                             |                         | Weather<br>Station                | Gridded datasets |
| Brunei      | -                                        | AN               | AN                          | NN                      | Yes                               |                  |
| Cambodia    | -                                        | AN               | NN                          |                         |                                   |                  |
| Laos        | -                                        | AN               | AN                          |                         |                                   |                  |
| Indonesia   | Northern Sumatra                         | NN               | AN                          | AN                      | Yes                               |                  |
|             | Rest                                     | AN               | AN                          | AN                      | Yes                               |                  |
| Malaysia    | -                                        | AN               | AN                          | AN                      | Yes                               |                  |
| Myanmar     | Northern                                 | NN               | NN                          | NN                      | Yes                               |                  |
|             | Rest                                     | AN               | AN                          | NN                      | Yes                               |                  |
| Philippines | -                                        | AN               | AN                          | NN to<br>AN             | Yes                               |                  |
| Singapore   | -                                        | AN               | AN                          | AN                      | Yes                               | -                |
| Thailand    | Southern                                 | NN               | AN                          | AN                      | Yes                               |                  |
|             | Rest                                     | AN               | AN                          | AN                      | Yes                               |                  |
| Viet Nam    | -                                        | AN               | AN                          | AN                      | Yes                               |                  |

## SIGNIFICANT EVENTS

Notable events that occurred during DJF 2019-20 included two tropical cyclones (TCs), Typhoon “Tisoy” (KAMMURI), Nov 30-Dec 5 and Typhoon “Ursula” (PHANFONE), Dec 23-28, 2019 that crossed the central Philippines (Southern Luzon and Visayas) packed with heavy rainfall and strong winds, enhanced the northeast monsoon. These TCs brought heavy rainfall to the northeastern part of Luzon and in the Visayas and caused enormous flooding, flashfloods and landslides which devastated the agriculture sector, damage to properties and infrastructure and loss of lives. These events contributed to the above average rainfall to these regions. In the northern part of Viet Nam, on 24th and 25th January, medium and heavy rainfall (even hail) occurred, which led to inundation and damage property. This was a rare event compared to historical winters. In Jakarta, Indonesia on the 1<sup>st</sup> of January 2020, large scale of flood occurred triggered by extensive extreme rainfall event breaking record of daily rainfall over Jakarta Mega City. Daily rainfall of more than 200 mm/day was

## **Annex C: Review of DJF 2019-20 Consensus Outlook**

recorded in many rain stations with the maximum rainfall of 377 mm/day observed by Halim Airport, south-eastern part of Jakarta.

Other countries also noted extreme conditions. Brunei experienced significant month-to month variability, with December 2019 receiving twice the normal rainfall amount, while February recorded 95.7% below normal. New records for rainfall were also recorded at four weather stations in Myanmar, as well as new records for minimum temperature (7 stations).

## **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.

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