

Tenth Session of the ASEAN Climate Outlook Forum (ASEANCOF-10)

**May 2018, Malaysian Meteorological Department
in collaboration with Centre for Climate Research Singapore (CCRS),
Meteorological Service Singapore**

Consensus Bulletin for June-July-August (JJA) 2018 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 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 ASEAN region through pooling the expertise of ASEAN National Meteorological Services.

The Tenth ASEANCOF (ASEANCOF-10) was organised by the Malaysian Meteorological Department in collaboration with the Meteorological Services Singapore as host of the ASEAN Specialised Meteorological Centre. Representatives from National Meteorological and Hydrological Services (NMHSs) of 10 ASEAN Member States created a consensus forecast for the summer monsoon 2018 in the ASEAN region. The consensus for June-July-August (JJA) 2018 outlooks was achieved through online correspondence. The consensus is made based on the completed questionnaires on current conditions and predictions for the Southeast Asia region. In particular, the forum took into account the significant influence of the El Niño Southern Oscillation (ENSO) and the Indian Ocean Dipole (IOD) on the climate over Southeast Asia.

CONDITIONS AND OUTLOOK

Recent analysis of sea surface temperature (SST) anomalies over the tropical Pacific indicate an ENSO neutral state. The warmer than average SSTs during first quarter of 2018 over eastern Pacific weakened in May.

Conditions and Outlook

The international climate outlooks show ENSO-neutral conditions are now present and likely to continue during JJA 2018. The present neutral Indian Ocean Dipole (IOD) is expected to continue towards the later part of the year.

The Southwest Monsoon is predicted to be generally normal throughout Southeast Asia. As such, the occurrence of five to seven tropical cyclones is expected in the Philippines. Likewise, near normal occurrence of tropical cyclones is also expected over the Bay of Bengal. Elsewhere, the occurrence of Squalls is favoured during this period.

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 2018 for the Southeast Asia region:

RAINFALL

For the upcoming Northern Hemisphere summer monsoon season (June-July-August), normal conditions are expected over most parts of the Southeast Asia. However, there is a slightly enhanced probability of wetter than normal conditions over coastal Myanmar and central Philippines. Below to near normal rainfall is expected over western and central Borneo, Singapore, and central Indonesia.

TEMPERATURE

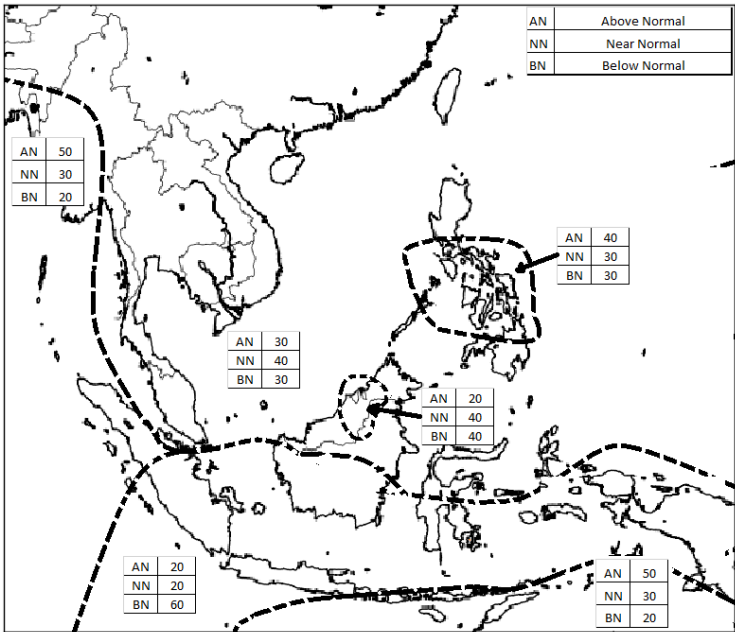
Above normal temperatures are expected over much of central and eastern Southeast Asia, including parts of Peninsular Malaysia, Singapore, northern Borneo, central and southern Philippines, and eastern Indonesia. Near normal temperature are expected elsewhere, including over Mainland Southeast Asia.

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 winter monsoon outlook and further updates on the national scale, the relevant NMSs should be consulted (see **Annex B**).

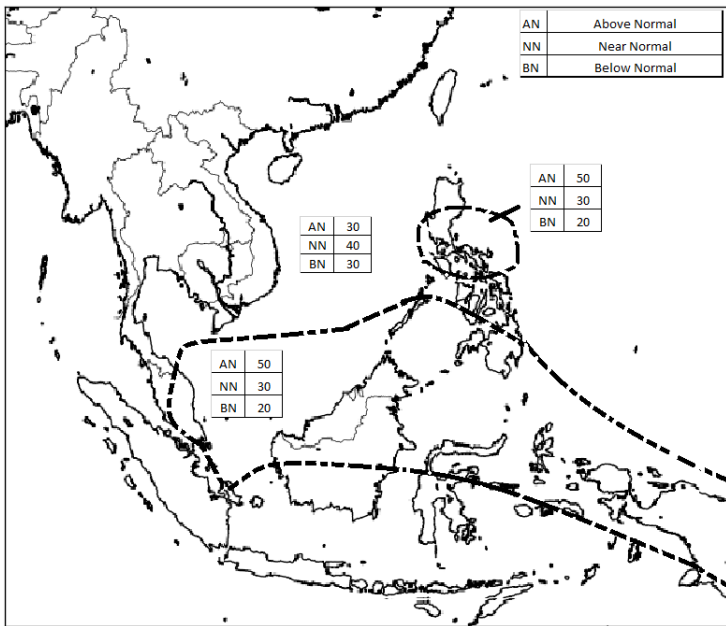
CONSENSUS MAPS FOR JJA 2018

The following maps provide the probabilistic outlooks for JJA 2018 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.

ANNEX A: RAINFALL AND TEMPERATURE TERCILE CLIMATOLOGIES

The following figures are rainfall and temperature mean and tercile boundary climatologies to reference against the consensus outlook. Only a single source of data for each variable is provided (CRU, UEA). 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 National Meteorological Services).

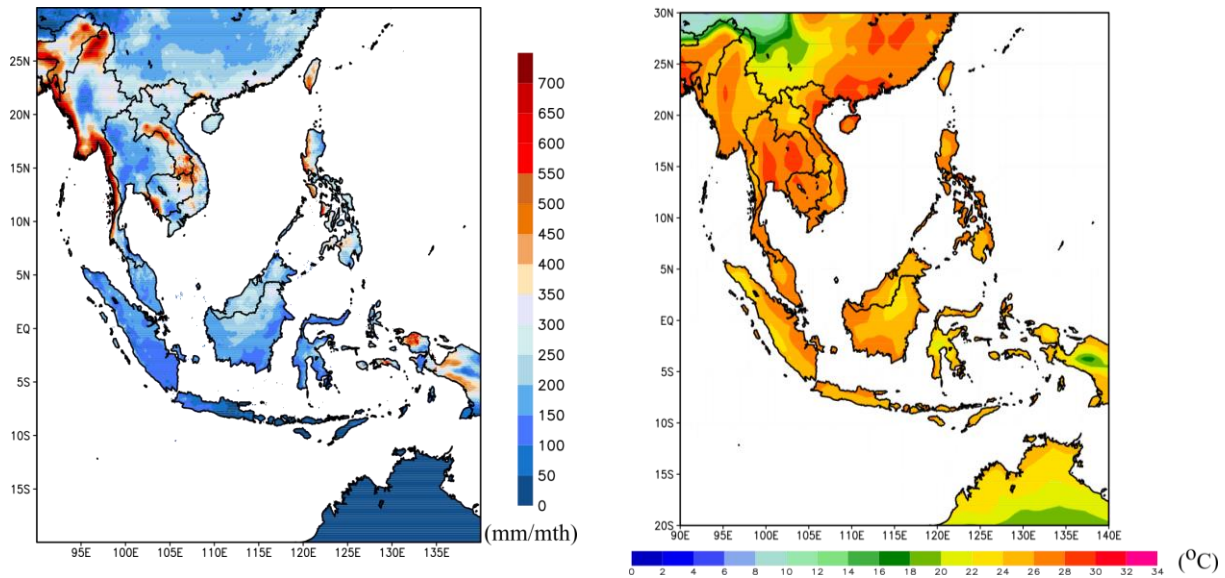


Figure A1: Rainfall mean climatology in mm/month (left, CHIRPS) and the temperature mean climatology (right, ERA-Interim) for JJA from 1981-2010

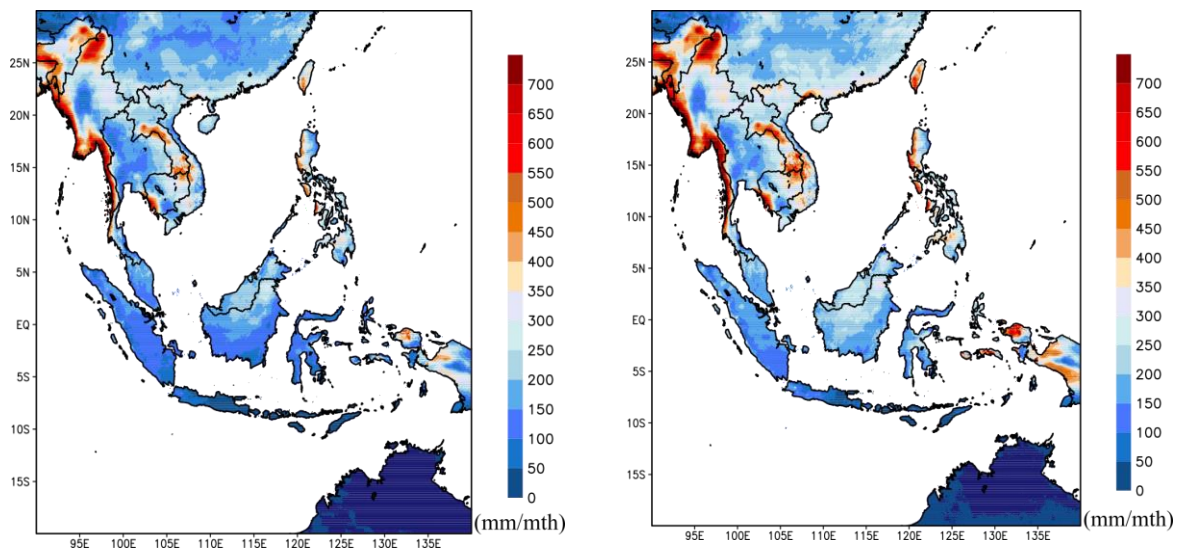


Figure A2: Rainfall climatologies of the lower tercile boundary (left) and the upper tercile boundary (right) for JJA from 1981-2010 from CHIRPS in mm/month

Annex A: Rainfall and Temperature Tercile Climatologies

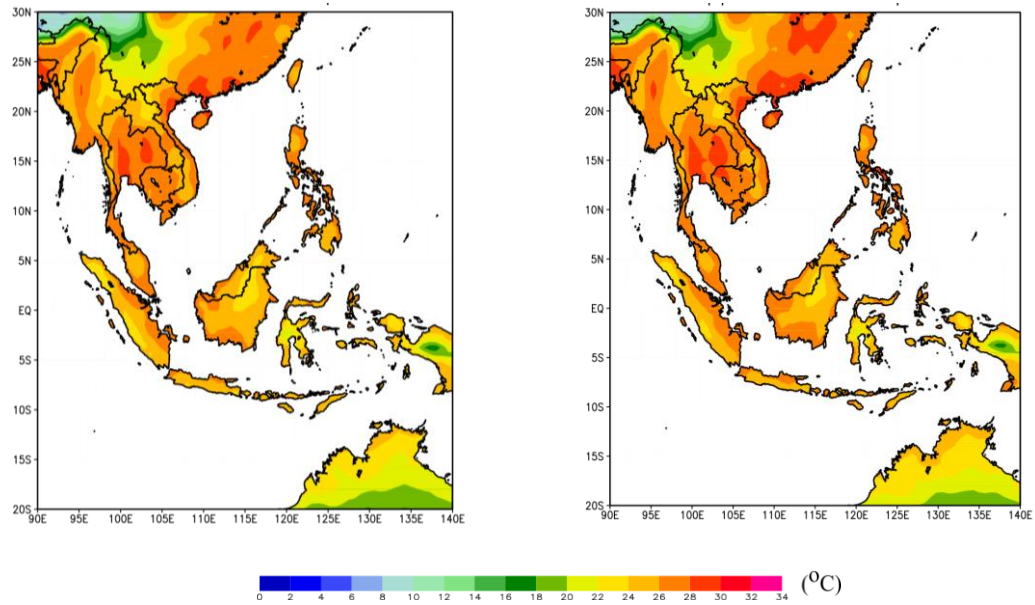


Figure A3: Temperature climatologies of the lower tercile boundary (left) and the upper tercile boundary (right) for JJA from 1981-2010 from ERA-Interim

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 2017-2018 CONSENSUS OUTLOOK

SUMMARY

The rainfall and temperature outlooks were representative of the actual conditions over most parts of the Southeast Asia. The unusual period of cold spells over Lao PDR, Malaysia, Singapore, Thailand and Vietnam during the December-January-February 2017-2018 could be associated with the cold air advection from active high pressure areas and the monsoonal surge originated from Siberia.

Sea surface temperature (SST) anomalies at the start of the outlook period indicated an ENSO La Niña conditions over the Tropical Pacific Ocean. During DJF 2017-2018, international climate outlooks showed **Weak La Niña** conditions is favoured (exceeding approximately 80%) through the Northern Hemisphere winter 2017-2018, with a transition to ENSO-neutral most likely during the mid-to-late spring. La Niña is indicated by cooler SSTs over central and eastern tropical Pacific and often leads to wetter conditions for Southeast Asia. In the Indian Ocean, the Indian Ocean Dipole (IOD) was within the neutral range, although slightly negative. There was uncertainty in whether a negative IOD phase would develop.

For DJF 2017-2018, the SST anomalies were slightly cooler than average in the central Tropical Pacific Ocean. The atmospheric circulation over the tropical Pacific Ocean also reflected La Niña, with convection suppressed near the International Date Line and enhanced over Indonesia. The low-level trade winds were stronger than average over the western and central Pacific, with anomalous westerly winds at upper-levels. Overall, the ocean and atmosphere system reflected La Niña. The IOD also remained within the neutral range, albeit slightly negative.

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

DJF 2017-2018 RAINFALL OUTLOOK

For the upcoming boreal winter monsoon season (Dec-Jan-Feb 2017-2018), above-normal rainfall is favoured over the eastern Maritime Continent, southern Vietnam, central and southern Thailand as well as central Myanmar. Below-normal rainfall is slightly favoured over western Borneo and northern Mainland Southeast Asia. Elsewhere near-normal rainfall is favoured.

Much of the outlook was in good agreement with the CHIRPS gridded product in **Figure 1** including parts of Indonesia, Philippines, and Thailand. In particular, Moluccas and Papua regions of Indonesia, as well as central Philippines and central Thailand, received above-normal rainfall. Below-normal conditions were observed over west Kalimantan, which reflected the outlook.

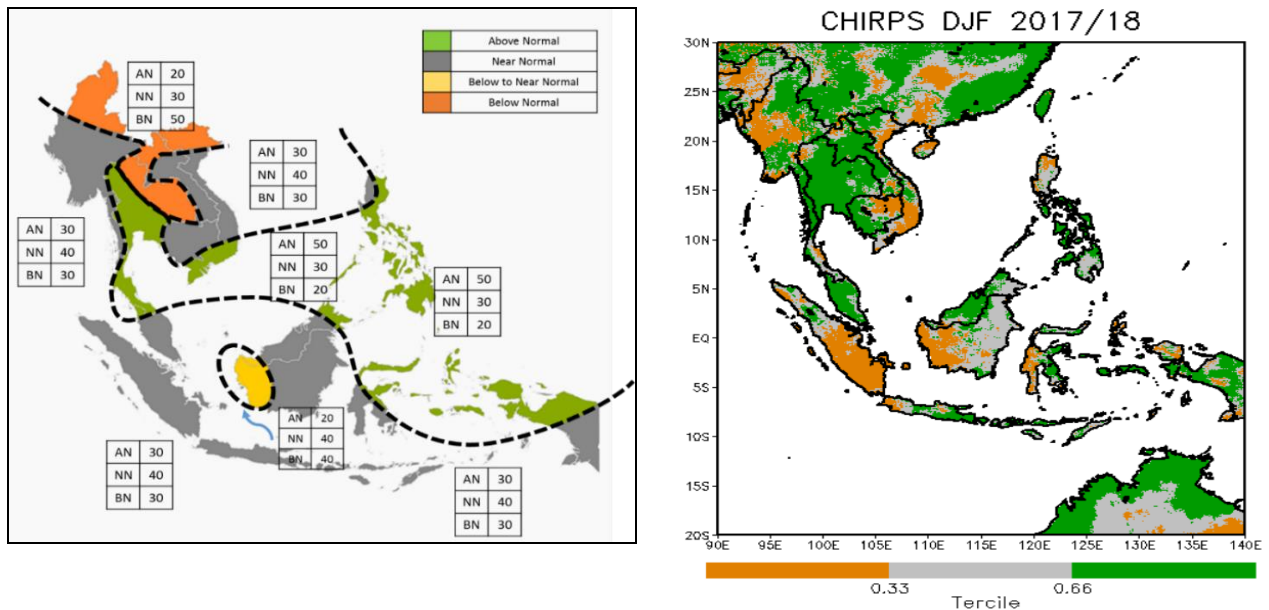


Figure 1: DJF 2017-2018 Rainfall outlook (left) with observed rainfall from CHIRPS (right; Funk et al., 2014)

Based on the reviews by NMHSs (**Table 1**), the outlooks were also in good agreement with what was observed over Lao PDR, Malaysia, and Singapore as well as both northern and southern Vietnam. A few regions received more rainfall than predicted by the dominant tercile category, including central Vietnam and Myanmar respectively, northern Thailand, and Brunei (**Figure 1** CHIRPS and **Table 1**). The occurrence of above-normal rainfall over northern Mainland Southeast Asia may be associated with the presence of westerly trough. For the regions where predictions favoured near-normal conditions but the season developed into above- or below normal-conditions, the near-normal predictions were considered low-confidence predictions due to the low probability attached to the middle tercile category.

Annex C: Review of JJA 2018 Consensus Outlook

Table 1: Observed Rainfall based on national level assessment. The Most Likely Category from the outlook (MLC), the observed rainfall (observed) and the verification datasets used: weather stations, gridded weather station (Gridded Stations), satellite data (Satellite), and reanalysis data (Reanalysis). 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	Outlook MLC	Observed	Product used			
			Weather Stations	Gridded Stations	Satellite	Reanalysis
Brunei	NN	AN	Y	N	N	N
Indonesia	AN	BN to NN				
-Moluccas & Papua	BN	BN	Y	N	Y	N
-West Kalimantan	NN	BN to NN				
-Rest	NN	NN				
Lao PDR	NN	NN	Y	N	N	N
Malaysia						
-Northern Peninsular	AN	AN				
-Rest Peninsular	NN	NN	Y	N	N	N
East Malaysia						
-West	BN to NN	BN				
-Central	NN	NN to AN				
-East	AN	AN				
Myanmar						
-Northern	BN	BN	Y	N	N	Y
-Central	NN	AN				
-Southern	NN	BN				
Philippines						
-Northern	NN	BN	Y	Y	N	Y
-Rest	AN	AN				
Singapore	NN	NN	Y	N	N	N
Thailand						
-Central Northern	BN	AN	Y	N	Y	Y
-Rest Northern	BN	BN				
-Southern	AN	AN				
Vietnam						
-Northern	BN	BN	Y	N	N	N
-Central	NN	AN				
-Southern	AN	AN				

DJF 2017 TEMPERATURE OUTLOOK

Above-normal temperatures are favoured over much of the Southeast Asia region for the upcoming boreal winter monsoon season (Dec-Jan-Feb 2017-2018), with the highest probabilities over the eastern Maritime Continent, northern Mainland Southeast Asia, and Sumatra. Below-normal temperatures are favoured over northern Philippines and southern Vietnam.

Annex C: Review of JJA 2018 Consensus Outlook

The Southeast Asia experienced normal- to above-normal temperature as depicted in the ERA Interim data (**Figure 2**) and reviews by NMHSs (**Table 2**). The gridded product observed above-normal temperatures over the ASEAN region, except for Lao PDR, coastal Myanmar, west central Thailand, and Vietnam that experienced near-normal conditions. Based on the national level assessments, Brunei, central Philippines, and Singapore also experienced near-normal temperatures, in agreement with the JJA outlook. The regions favouring below-normal temperature in the outlooks, however, experienced near-normal to above-normal temperature based on ERA-Interim data and national level assessments.

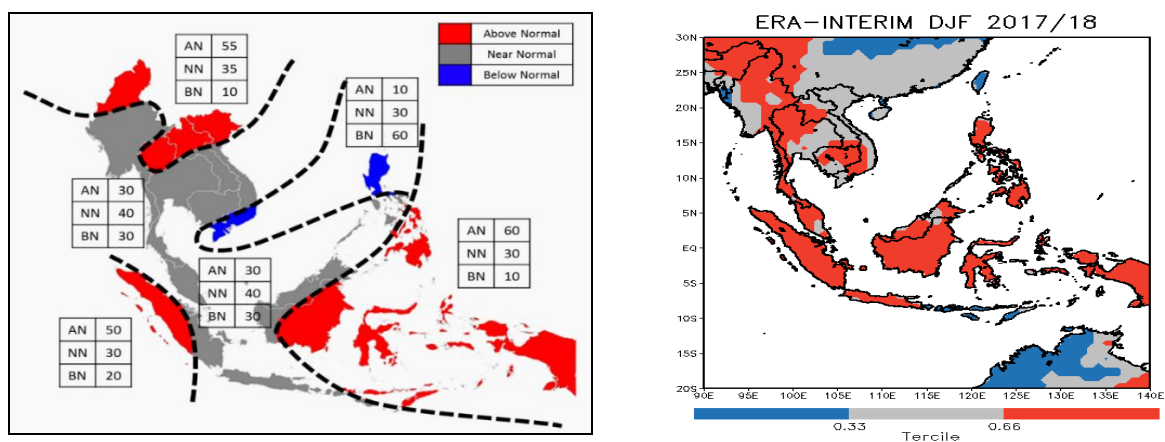


Figure 2: DJF 2017-2018 Temperature outlook (left) and observed temperature from ERA Interim (right; Dee et al., 2011)

Annex C: Review of JJA 2018 Consensus Outlook

Table 2: Observed temperature based on national level assessment where applicable. The Most Likely Category from the outlook (MLC), the observed temperature (observed) and the verification datasets used: Weather stations, gridded weather station (Gridded Station), satellite data (Satellite), and reanalysis data (Reanalysis). 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	Outlook MLC	Observed	Product used			
			Weather Stations	Gridded Station	Satellite	Reanalysis
Brunei	NN	NN	Y	N	N	N
Indonesia						
-Java	NN	NN	Y	N	N	N
-Rest	AN	AN				
Lao PDR						
-Northern	AN	NN	Y	N	N	N
-Southern	NN	NN				
Malaysia						
-Peninsular	NN	NN	Y	N	N	N
-East Malaysia	NN	NN				
Myanmar						
-Northern	AN	NN	Y	N	N	Y
-Central	NN	NN				
-Southern	NN	NN				
Philippines						
-Northern	BN	AN	Y	Y	N	Y
-Central	NN	NN				
-Southern	AN	NN				
Singapore	NN	NN	Y	N	N	N
Thailand						
-Northern	AN	AN	Y	N	Y	Y
-Rest	NN	NN				
Vietnam						
-Northern	AN	AN	Y	N	N	N
-Central	NN	AN				
-Southern	BN	AN				

SIGNIFICANT EVENTS

Notable events that occurred during DJF 2017-2018 in the Southeast Asia include long cold spells, which were recorded in Vietnam in December 2017, Malaysia, Singapore, and Thailand in January 2018, while Lao PDR in February 2018. The period of the cold spell for Vietnam was observed for four days with minimum temperature of -0.2°C, whereas Malaysia was six days with minimum temperature of 20.2°C. Singapore, however, recorded five days with minimum temperature of 21.2°C while Lao PDR experienced 11 days with minimum temperature of 5.0°C. Meanwhile, four tropical cyclones, namely Kai-tak, Tembin, Bolaven, and Sanba crossed the Philippines and resulted in flooding and landslides. Kai-tak

and Tembin also brought heavy rainfall to the east coast of Malaysia, Thailand, and coastal Vietnam in December 2017.

REFERENCES

CHIRPS: Funk, C. C, Peterson, P. J., Landsfeld, M. F., Pedreros, D. H., Verdin, J. P., Rowland, J. D., Romero, B. E., Husak, G. J. Michaelsen, J. C., and Verdin, A. P. (2014) A quasi-global precipitation time series for drought monitoring: U. S. Geological Survey Data Series 832, 4 p., dx.doi.org/10.3133/ds832.

ERA Interim: Dee, D. P., Uppala, S. M., Simmons, A. J., Berrisford, P., Poli, P., Kobayashi, S., Andrae, U., Balmaseda, M. A., Balsamo, G., Bauer, P., et al. (2011), The ERA-Interim reanalysis: configuration and performance of the data assimilation system. *Q.J.R. Meteorol. Soc.*, 137: 553–597. doi:10.1002/qj.828.