UPDATE OF REGIONAL WEATHER AND SMOKE HAZE (August 2017)

1. Review of Regional Weather Conditions in July 2017

1.1 Southwest Monsoon conditions continued to prevail in the region in July 2017. The monsoon rain band shifted further north and brought extensive rainfall over the region between latitudes 5°N and 20°N. Heavy rain fell over the coastal regions of Myanmar, Vietnam, the northern South China Sea and the northern parts of Philippines. For the southern ASEAN region, particularly over parts of Sumatra and Java, experienced dry weather conditions in the second half of the month. The rainfall distribution for July 2017 is shown in Figure 1.

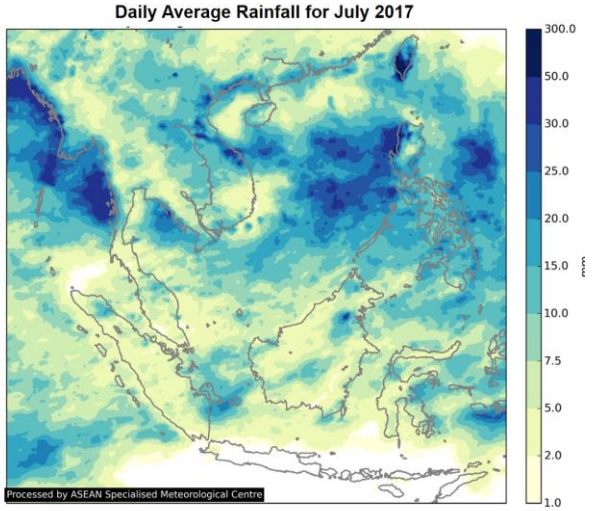

Figure 1: Daily average rainfall for the ASEAN region in July 2017. (Source: JAXA Global Satellite Mapping of Precipitation)

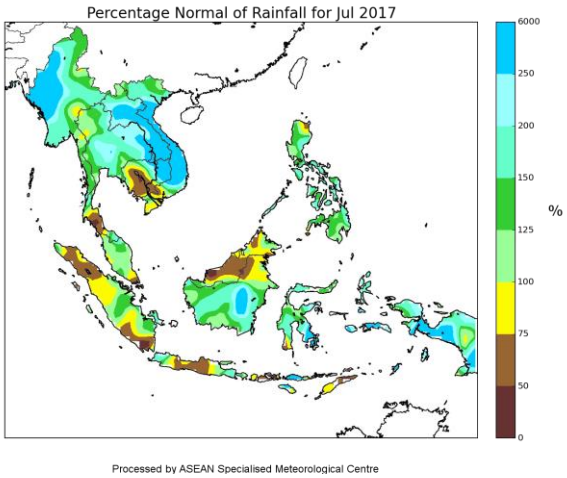

Figure 2: Percentage of Normal Rainfall for July 2017. The rainfall data may be less representative for areas with low density of rainfall network.

1.2 In July 2017, rainfall was above normal over the northern ASEAN region. In the southern ASEAN region, near-normal to above-normal rainfall prevailed except in northern Sumatra, Sarawak, northern Kalimantan and parts of Java where rainfall was below-normal. Figure 2 shows the percentage normal of rainfall for July 2017.

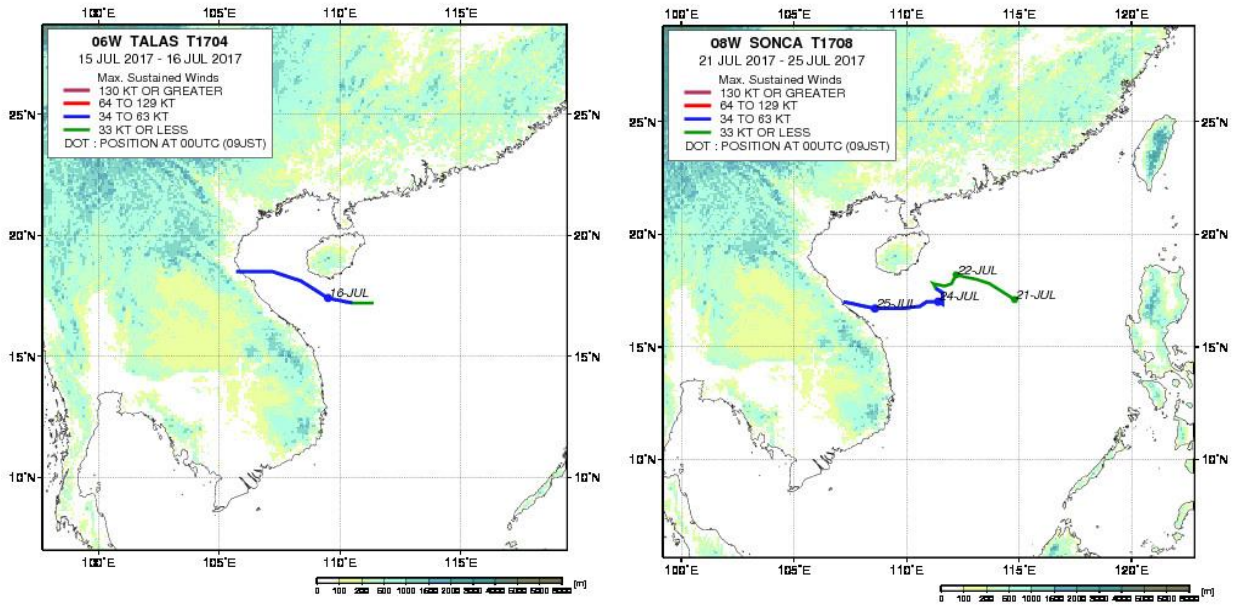

Figure 3: Historical storm tracks for Tropical Storm Talas (left) and Tropical Storm Sonca (right). (Source: JAXA)

1.3 Two tropical storms – Talas and Sonca formed over the South China Sea, east of Vietnam between 15 – 16 July 2017 and 21 – 25 July 2017 respectively. Tropical Storm Talas brought heavy rain and strong winds over the northern parts of Vietnam as it tracked westward on 16 July 2017. The storm dissipated the next day as it made landfall in northern Vietnam. Tropical Storm Sonca tracked westwards, similar to that of Talas except that Sanca's impact was more widespread and brought heavy thunderstorms to parts of Thailand, Lao PDR and Vietnam.

1.4 The prevailing winds during July 2017 were predominantly from the southwest in the northern ASEAN region, and from the southeast or southwest in the southern ASEAN region. An anomalous cyclonic circulation associated with Tropical Storms Talas and Sonca was present over the South China Sea. Figure 3 shows the average and anomalous winds at 5000 feet.

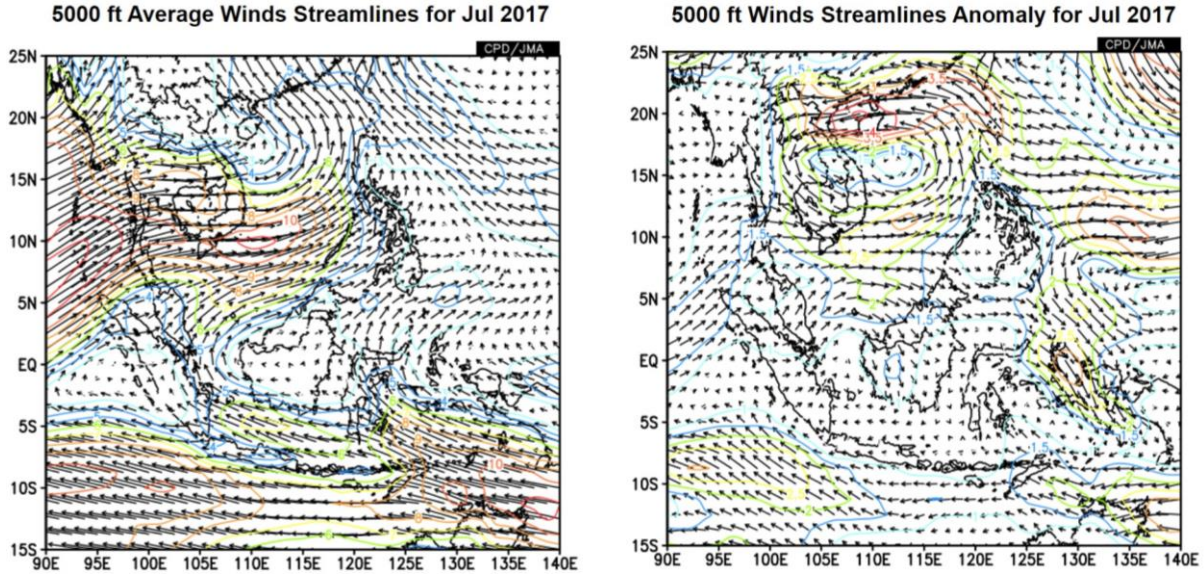

Figure 4: 5000 ft average winds streamlines (left) and anomaly (right) for July 2017. (Source: JMA)

1.5 In July 2017, the equatorial Pacific Ocean's sea-surface temperature (SST) over the Nino3.4 region was warmer than average and close to the El Niño Nino 3.4 index threshold. However, these SST patterns over the tropical Pacific Ocean did not indicate developing El Niño conditions, and the atmospheric indicators such as cloudiness and winds over the equatorial Pacific were at neutral El Niño Southern Oscillation (ENSO) levels.

1.6 During the month, the Madden Julian Oscillation (MJO)[1] was largely weak and non-discernible except for a few days around mid-July 2017 where the MJO strengthened as it emerged in Phase 3 bringing an increase in rainfall over the western Maritime continent. Overall, the contribution by the MJO on the weather over the Maritime continent in July 2017 was not significant.

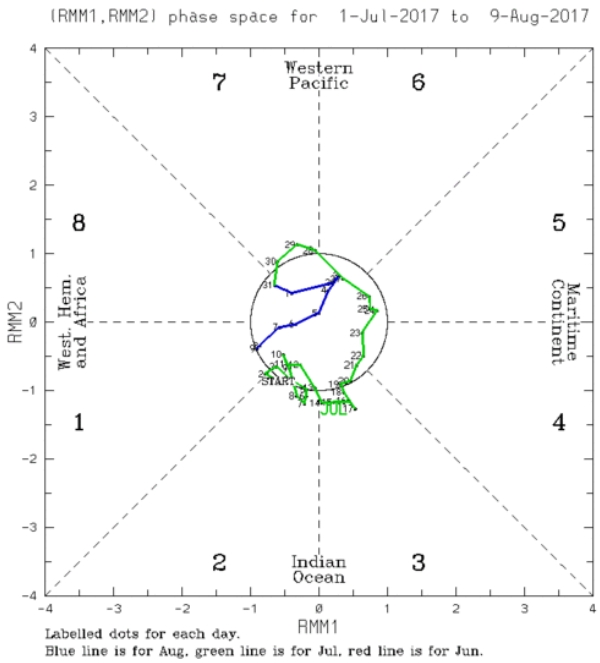

Figure 5: The MJO phase diagram for July 2017 (green). The MJO phase diagram illustrates the movement of the MJO through different phases, which correspond to different locations along the equator. The distance of the index from the centre of the diagram is correlated with the strength of MJO. When the index falls within the circle, the MJO is considered weak or indiscernible. (Source: Bureau of Meteorology)

2. Review of Land/Forest Fires and Smoke Haze Situation

2.1 In the first half of July 2017, hotspot activities in both the northern and southern ASEAN regions remained subdued due to wet weather conditions.

2.2 In the second half of July 2017, dry weather conditions set in over parts of Sumatra and Kalimantan. Significant hotspot activities were first observed in West Aceh Regency, Sumatra, and between 23 and 26 July 2017, hazy conditions were reported with visibility reduced to a low

[1] The MJO is characterised by an eastward propagation of clouds and rainfall over the tropics with an average cycle of 30 to 60 days. The MJO is more prominent between the Indian and western Pacific Ocean, and consists of two phases – an enhanced rainfall (convection) phase and a suppressed rainfall phase.

of 2-3 km during the period. With the occurrence of showers in the days following, 26 July 2017, the haze situation in West Aceh Regency improved. However, in the central and southern parts of Sumatra, the dry weather conditions in the last week of the month brought an increase in hotspot activities which persisted until the end of July 2017. Satellite images depicting some of the hotspot activities over parts of the ASEAN region in July 2017 are shown in Figure 6 to Figure 10.

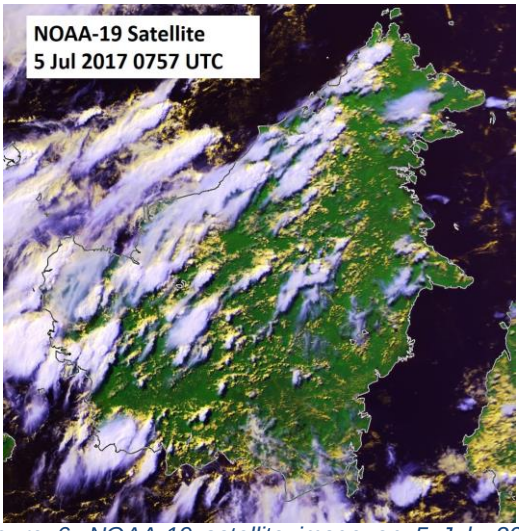

Figure 6: NOAA-19 satellite image on 5 July 2017 shows shower activities over Kalimantan.

Figure 7: NOAA-19 satellite image on 16 July 2017 shows Tropical Storm Talas located off the coast of Vietnam with extensive rain bands extending over northern Vietnam.

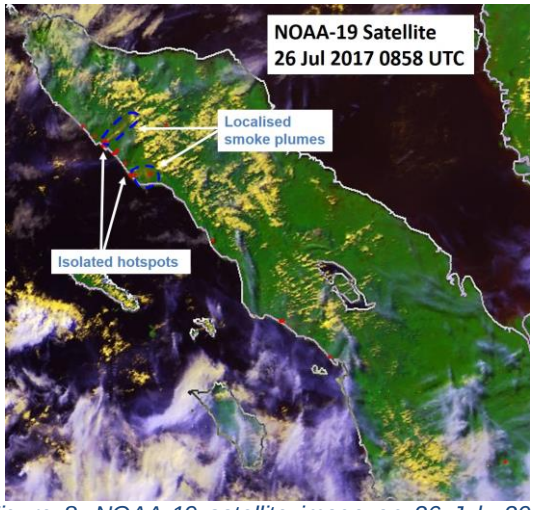

Figure 8: NOAA-19 satellite image on 26 July 2017 shows localised smoke plumes emanating from hotspots detected in West Aceh, Sumatra.

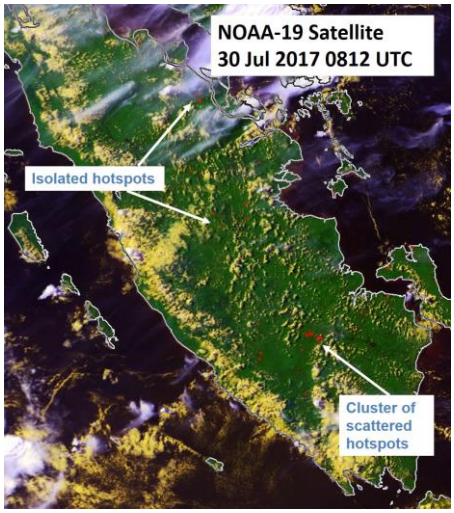

Figure 9: NOAA-19 satellite image on 30 July 2017 shows hotspots over central and southern Sumatra following an extended period of dry weather conditions.

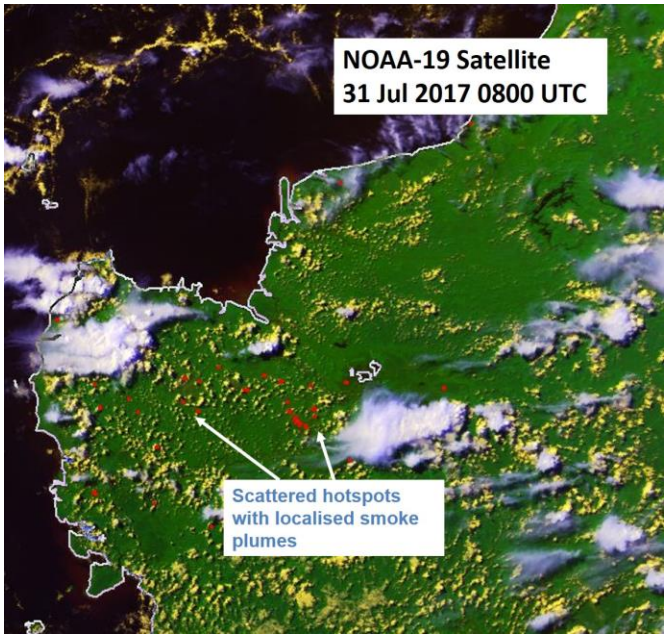

Figure 10: NOAA-19 satellite image on 31 July 2017 shows localised smoke haze observed near hotspots detected in West Kalimantan.

2.3 The hotspot distribution and daily hotspot charts for July 2017 are shown in Figure 11, Figure 12 and Figure 13.

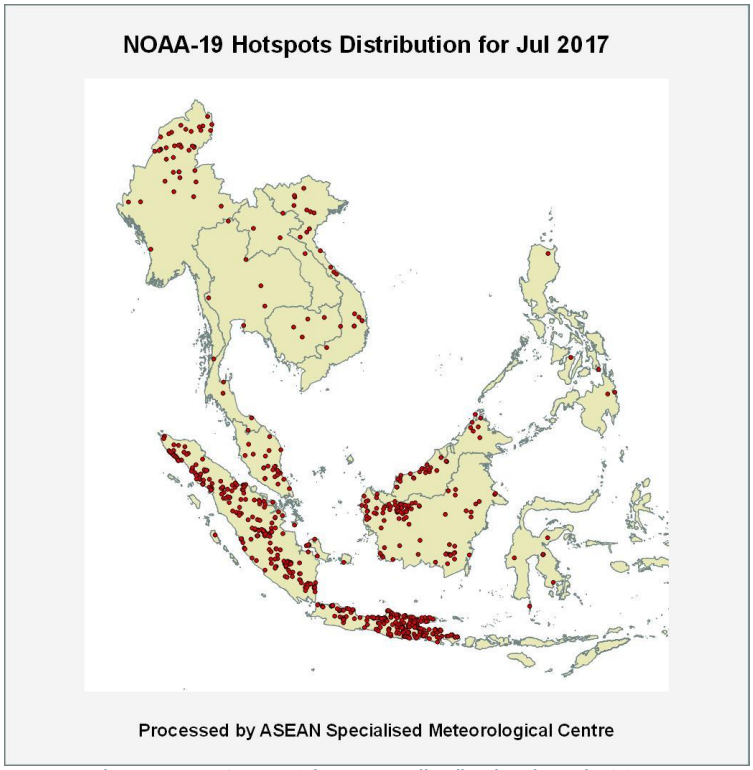

Figure 11: NOAA-19 hotspots distribution in July 2017.

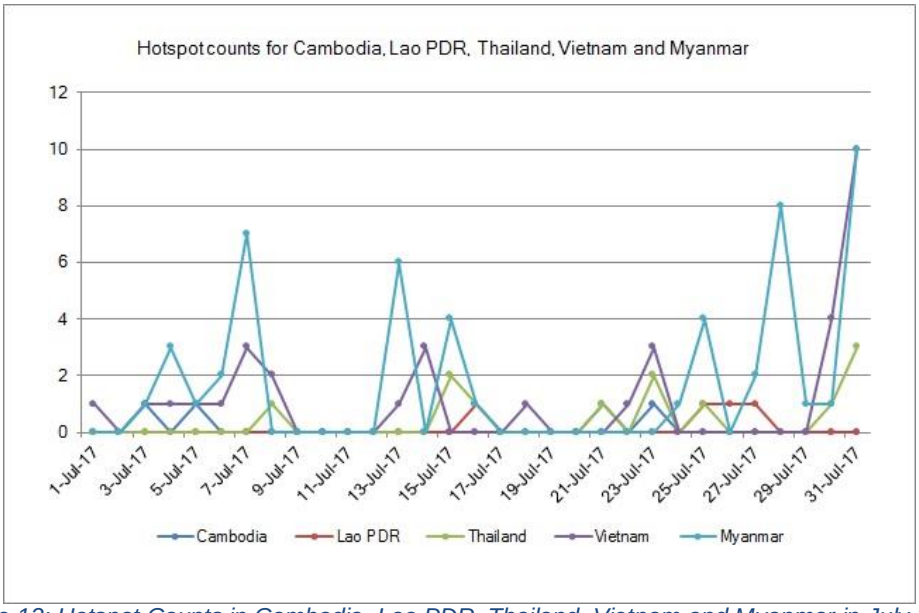

Figure 12: Hotspot Counts in Cambodia, Lao PDR, Thailand, Vietnam and Myanmar in July 2017.

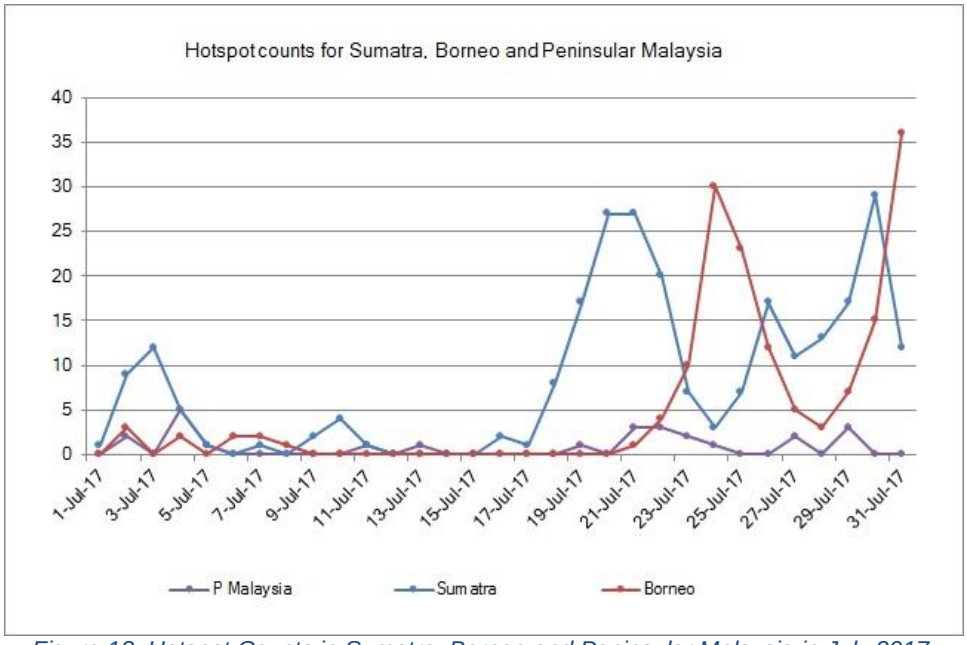

Figure 13: Hotspot Counts in Sumatra, Borneo and Peninsular Malaysia in July 2017.

3. Outlook of El Niño/La Niña and Indian Ocean Dipole

3.1 International climate centres have forecast that the observed warming of the tropical Pacific Ocean would subside and that neutral ENSO conditions are expected to prevail in the second half of 2017.

3.2 Typically, El Niño brings drier-than-normal rainfall conditions to most parts of Southeast Asia during the Southwest Monsoon season. During La Niña events, the opposite, i.e. wetter-than-normal condition, normally occurs. Locally specific impact differs from place to place and for different seasons.

3.3 Despite the low likelihood of an El Niño developing, periods of dry weather condition can still be expected and could lead to the occurrence of transboundary haze in the region. Hence, vigilance should be maintained for any escalation in hotspot activities in the fire-prone areas in the coming months.

3.4 In July 2017, the Indian Ocean Dipole (IOD) index remained in the neutral state (Figure 14). In the next few months, international climate models forecast the IOD to remain neutral, with the possibility that a positive IOD may develop towards the end of the year.

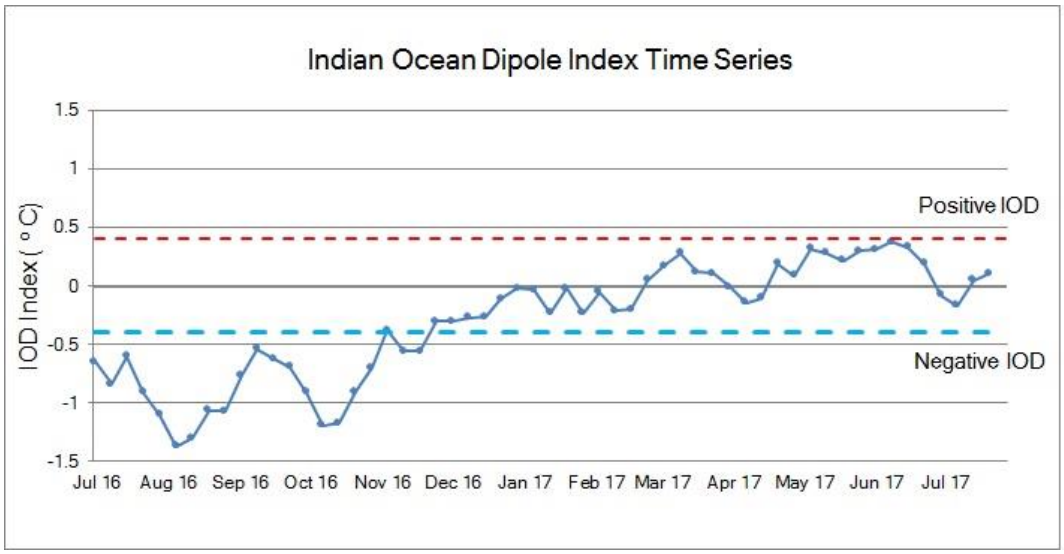

Figure 14: Indian Ocean Dipole (IOD) index time series. The IOD index was at neutral levels in July 2017. (Source: Bureau of Meteorology, Australia)

4. Outlook

4.1. The prevailing Southwest Monsoon conditions are expected to persist over the next few months. The monsoon is associated with the traditional wet (dry) season of the northern (southern) ASEAN region, and during this season, prevailing winds are expected to blow from the southeast or southwest. The development of tropical cyclones in the Western Pacific Ocean and South China Sea are expected, and could bring heavy rainfall to parts of the ASEAN region, particularly over the Philippines and Vietnam.

4.2. For the southern ASEAN region, occasional periods of dry weather conditions may prevail, and could lead to an escalation in hotspot activities over the fire-prone provinces of Sumatra and Kalimantan. Hence vigilance should be stepped up for any escalation of fire activities in the coming months.

4.3. In the third week of August 2017, well above-normal rainfall is expected for most parts of the Maritime Continent, except in the northern half of the Mekong sub-region and Luzon, the Philippines. In the last week of August, the monsoon rain belt is forecast to migrate further north, bringing drier than usual conditions over the southern ASEAN region, and above-normal rainfall over parts of the northern ASEAN region.

4.4. For the upcoming August-September-October season, near-normal rainfall is expected for most parts of the northern ASEAN region. In the southern ASEAN region, near-normal rainfall is expected, except in South Sumatra and West Java where slightly below-normal rainfall is expected. Slightly above-normal rainfall is also forecast for Sulawesi and Papua in August and September 2017. The rainfall outlook for the August to October 2017 season is shown in Figure 15.

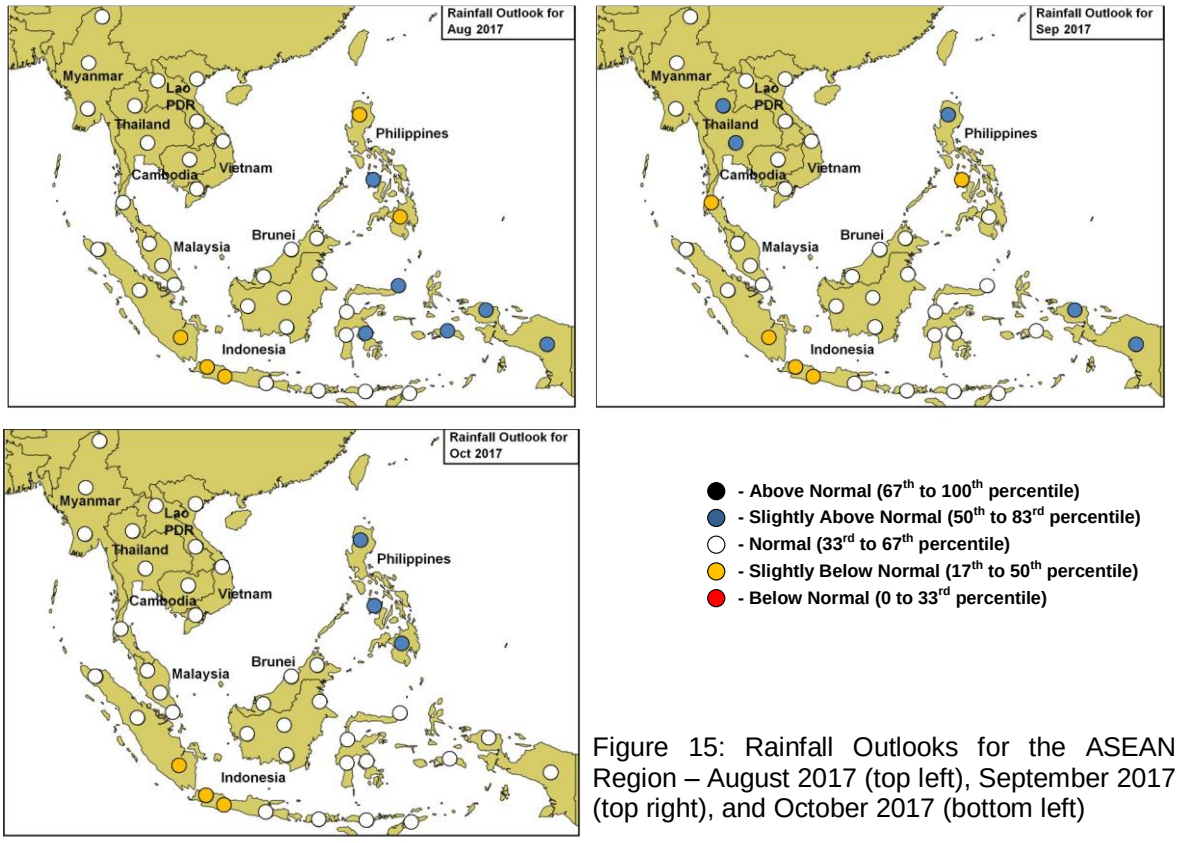

Figure 15: Rainfall Outlooks for the ASEAN Region – August 2017 (top left), September 2017 (top right), and October 2017 (bottom left)

4.5. In October 2017, the Southwest Monsoon season is expected to transit into the inter-monsoon season, and prevailing winds in the region are likely to become light and variable in direction with an increase in shower activities expected mostly in the afternoon. Hotspot activities in the southern ASEAN region are expected to be subdued by the increase in shower activities in the region.

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