UPDATE OF REGIONAL WEATHER AND SMOKE HAZE (May 2017)

1. Review of Regional Weather Conditions in April 2017

1.1 Inter monsoon conditions, characterised by afternoon showers and winds that are generally light and variable in direction, prevailed over the region in April 2017. During the month, there was a gradual increase in rainfall over parts of the Mekong sub-region, mostly over Thailand, Cambodia and central Vietnam. Wet weather conditions continued to persist in the southern ASEAN region. The rainfall distribution for April 2017 is shown in Figure 1.

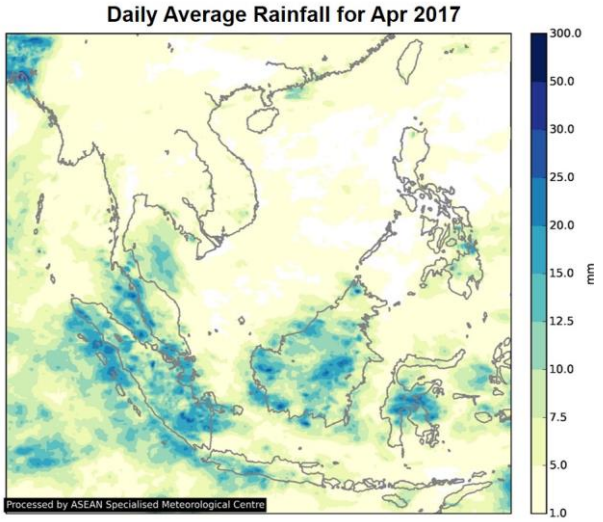

Figure 1: Daily average rainfall for the ASEAN region in April 2017. (Source: JAXA Global Satellite Mapping of Precipitation)

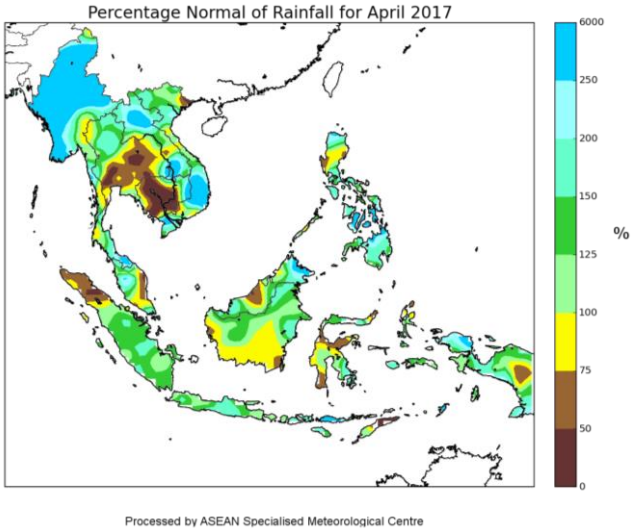

Figure 2: Percentage of Normal Rainfall for April 2017. The rainfall data may be less representative for areas with low density of rainfall network.

1.2 In April 2017, Myanmar, Vietnam and Lao PDR received near-normal to above-normal rainfall. However, over the eastern parts of Thailand and Lao PDR below-normal rainfall was recorded. Near-normal rainfall was received in northern parts of the Philippines while rainfall was above-normal in central and southern Philippines. In the southern ASEAN region, rainfall was near-normal except in northern Sumatra, east coast of Peninsular Malaysia and parts of Sarawak where below-normal rainfall was received. Figure 2 shows the percentage normal of rainfall for April 2017.

1.3 The prevailing winds during April 2017 were predominantly from the east or south-southwest over the northern ASEAN region. In the southern ASEAN region, prevailing winds were light but continued to blow mainly from the west or northwest. Similar to the conditions in March 2017, weak westerly wind anomalies were observed over the equatorial region between the Indian Ocean and the eastern parts of the Indonesian Archipelago. An anomalous cyclonic circulation over southern Thailand also contributed to enhanced rainfall activity in April 2017. Figure 3 shows the average and anomalous winds at 5000 feet.

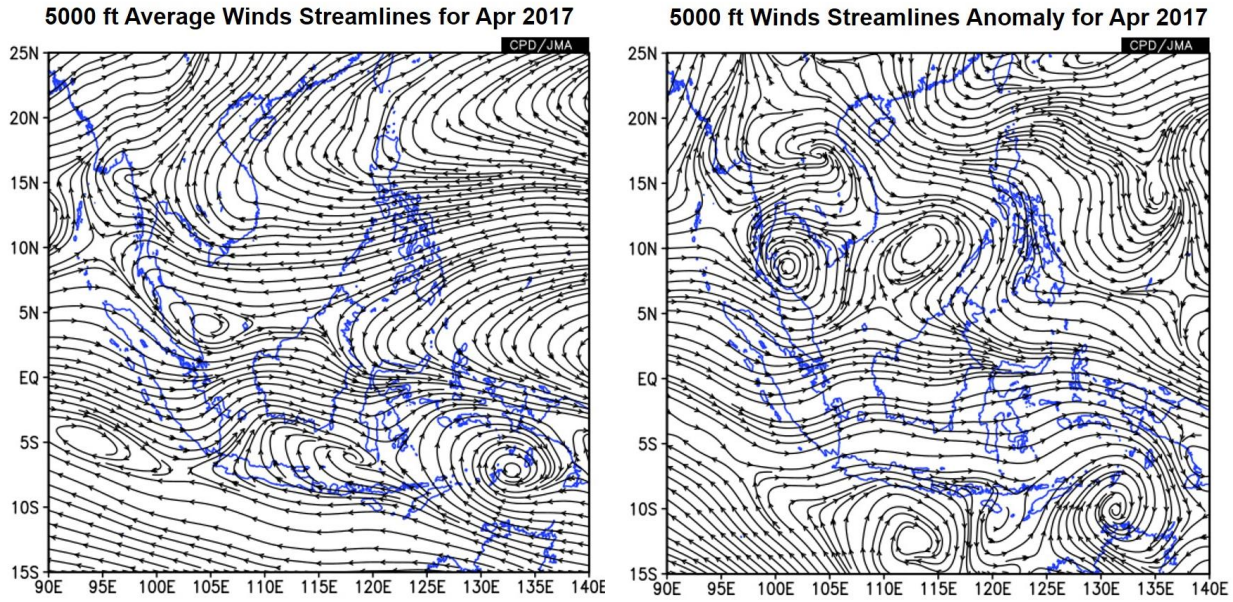

Figure 3: 5000 ft average winds streamlines (left) and anomaly (right) for April 2017. (Source: JMA)

1.4 On 13 April, a low pressure system developed in the Bay of Bengal and strengthened into Tropical cyclone Maarutha on 15 April 2017. Cyclone Maarutha made landfall in Myanmar the next day bringing widespread showers over most parts of Myanmar. This contributed to about 50 - 400 % of the long-term average rainfall in April over parts of western Myanmar. The cyclone dissipated quickly into a low pressure system on 17 April 2017.

1.5 The equatorial Pacific Ocean's sea-surface temperature (SST) over the Nino3.4 region continued to warm but remained at neutral (neither El Niño nor La Niña) values. Most of the atmospheric indicators over the equatorial Pacific were in the near average conditions.

1.6 In the first half of April 2017, the Madden Julian Oscillation (MJO)[1] was non-discernible . By late April 2017, while the MJO gradually strengthened, it remained at weak levels and did not have any significant influence on the weather patterns over the southern ASEAN region.

[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.

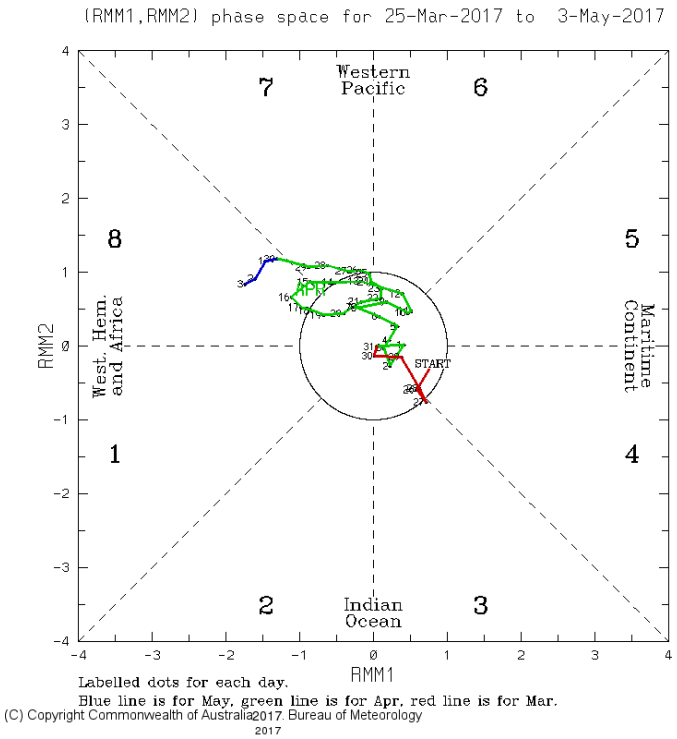

Figure 4: The MJO phase diagram for April 2017 (green). The MJO phase diagram illustrates the movement of the MJO through different phases, which correspond to different locations along the equator. The distance of the index from the centre of the diagram is correlated with the strength of MJO. When 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 northern ASEAN region, an escalation of hotspot activities was observed mainly in Myanmar, Thailand and Lao PDR. During the first half of the month, widespread hotspots with smoke haze were detected along the western Arakan Ranges, eastern border of Myanmar, northern Thai provinces and northern parts of Lao PDR. Nonetheless, the passage of Tropical Cyclone Maarutha brought increased shower activities which helped alleviate the hotspot situation in Myanmar and northern Thailand.

2.2 In the early part of the second half of April 2017, brief periods of dry weather conditions led to an increase in the number of hotspots detected in northern Lao PDR. Moderate smoke haze was seen emanating from these hotspots. However, the fire hotspots were short-lived as they were subdued by onset of shower activities around end April 2017.

2.3 In the southern ASEAN region, hotspot activities remained generally subdued due to the rainy weather in the region. Satellite images depicting some of the hotspot activities over parts of the ASEAN region during April 2017 are shown in Figure 5 - Figure 9.

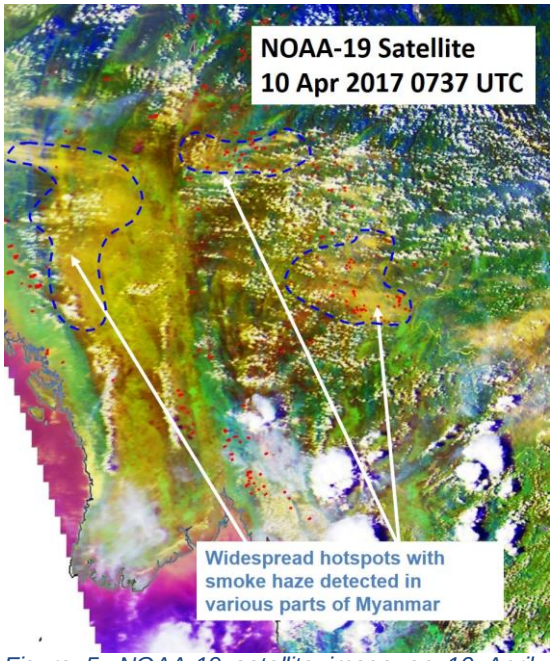

Figure 5: NOAA-19 satellite image on 10 April 2017 shows widespread hotspots with smoke haze detected in various parts of Myanmar.

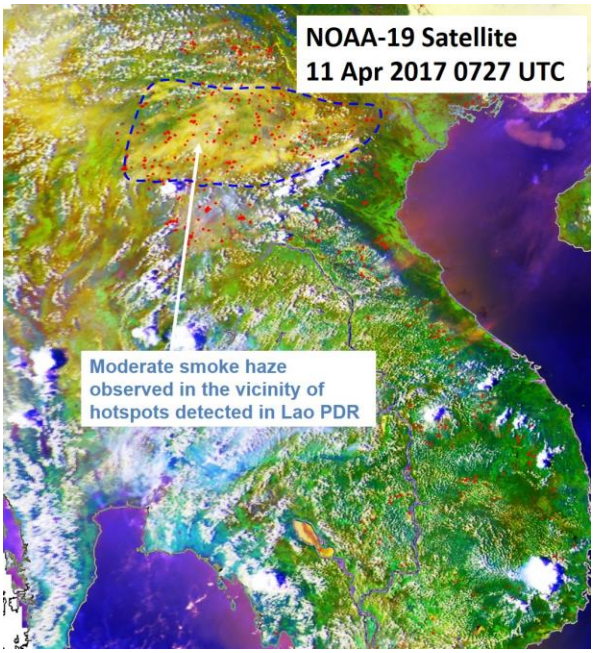

Figure 6: NOAA-19 satellite image on 11 April 2017 shows moderate smoke haze emanating from a cluster of hotspots in Lao PDR.

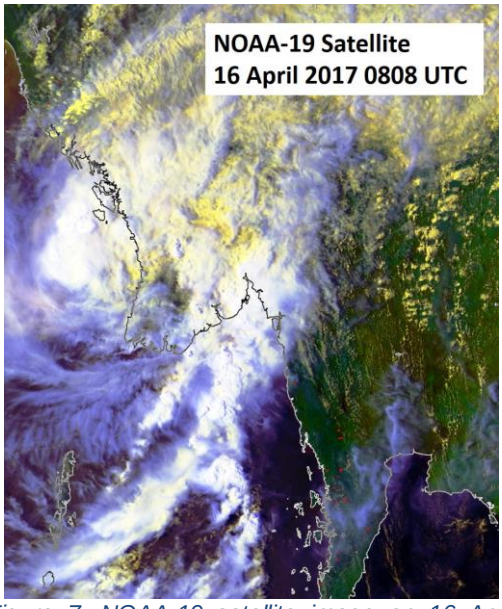

Figure 7: NOAA-19 satellite image on 16 April 2017 shows Tropical Cyclone Maarutha which brought widespread rains that helped to subdue hotspots in Myanmar.

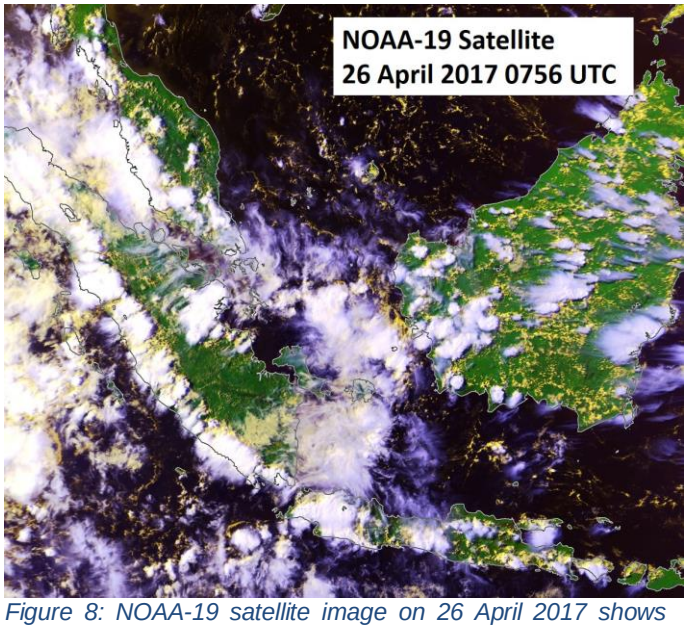

Figure 8: NOAA-19 satellite image on 26 April 2017 shows hotspot activities remained subdued in the southern ASEAN region.

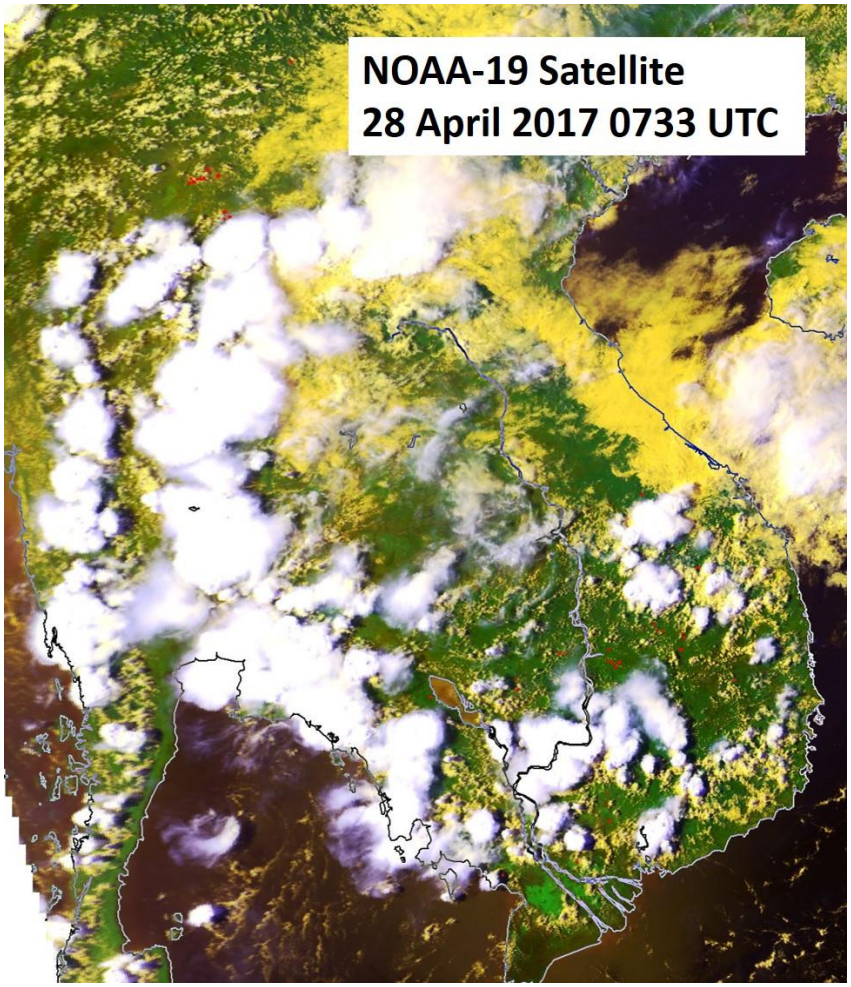

Figure 9: NOAA-19 satellite image on 28 April 2017 shows a reduction in the number of hotspots detected in the Mekong sub-region due to increased shower activities.

2.4 The hotspot distribution and daily hotspot charts for April 2017 are shown in Figure 10, Figure 11 and Figure 12 respectively.

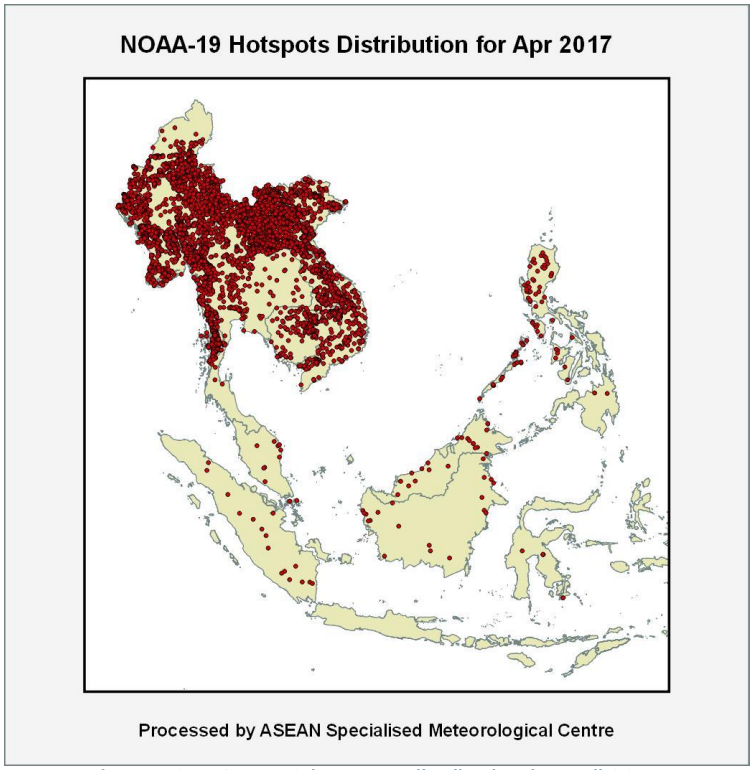

Figure 10: NOAA-19 hotspots distribution in April 2017.

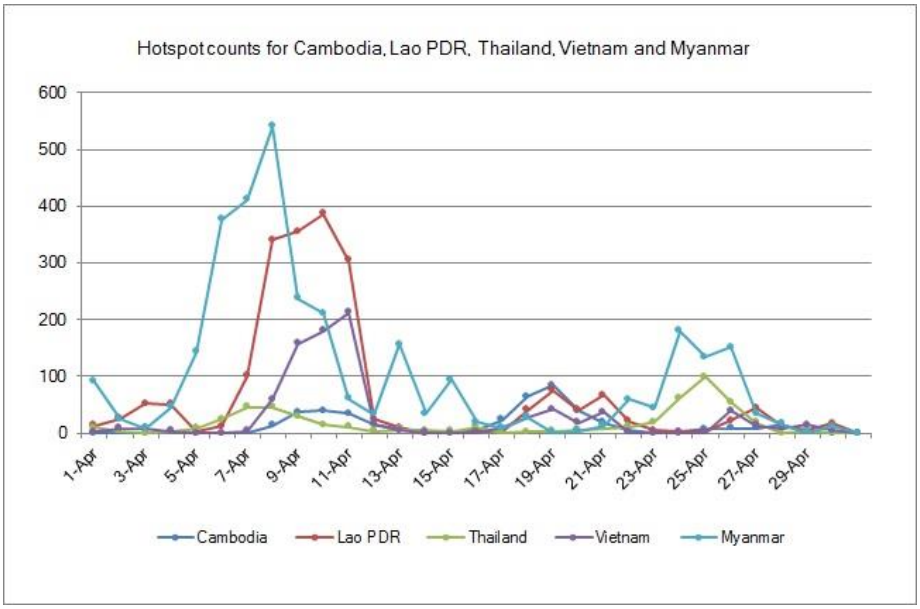

Figure 11: Hotspot Counts in Cambodia, Lao PDR, Thailand, Vietnam and Myanmar in April 2017.

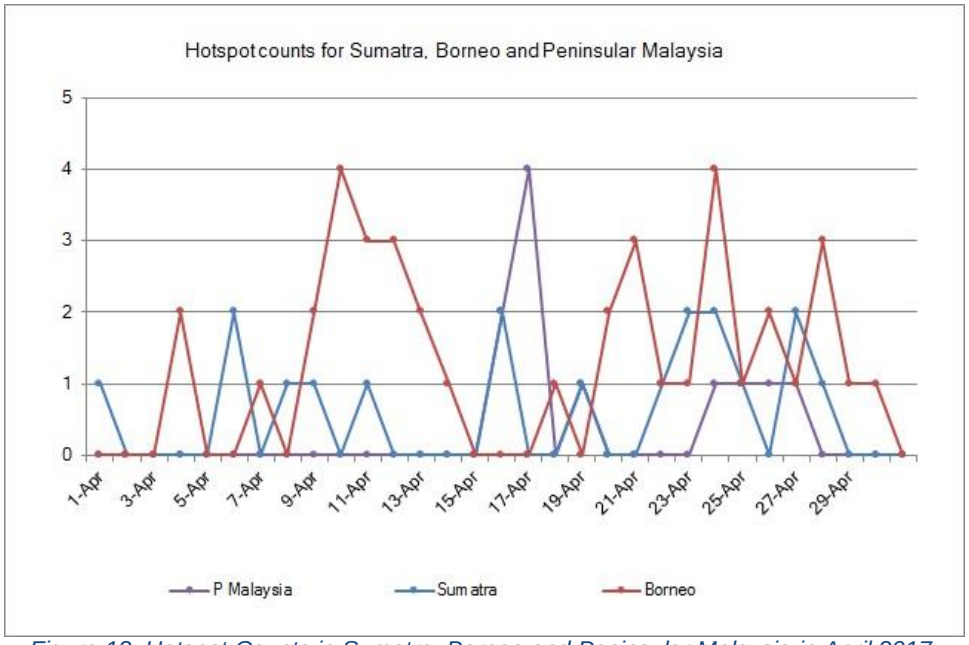

Figure 12: Hotspot Counts in Sumatra, Borneo and Peninsular Malaysia in April 2017.

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

3.1 Most models from major climate centres indicate the tropical Pacific Ocean will continue to gradually warm in the next 6 months. Forecasts suggest El Niño conditions being slightly favoured over neutral conditions from July-August-September.

3.2 However, the seasonal prediction model outlooks of El Niño at this time of the year are the least skillful all year round, a more confidence assessment of El Niño risk would be available from June onwards.

3.3 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.

3.4 In April 2017, the Indian Ocean Dipole (IOD) index has increased slightly from previous month but continued to remain at neutral levels (Figure 13). In the next few months, based on international climate models, the IOD is forecast to remain neutral, with some chance that a positive IOD may develop later in the year. The IOD is unlikely have a significant influence on the weather over the ASEAN region for the next few months.

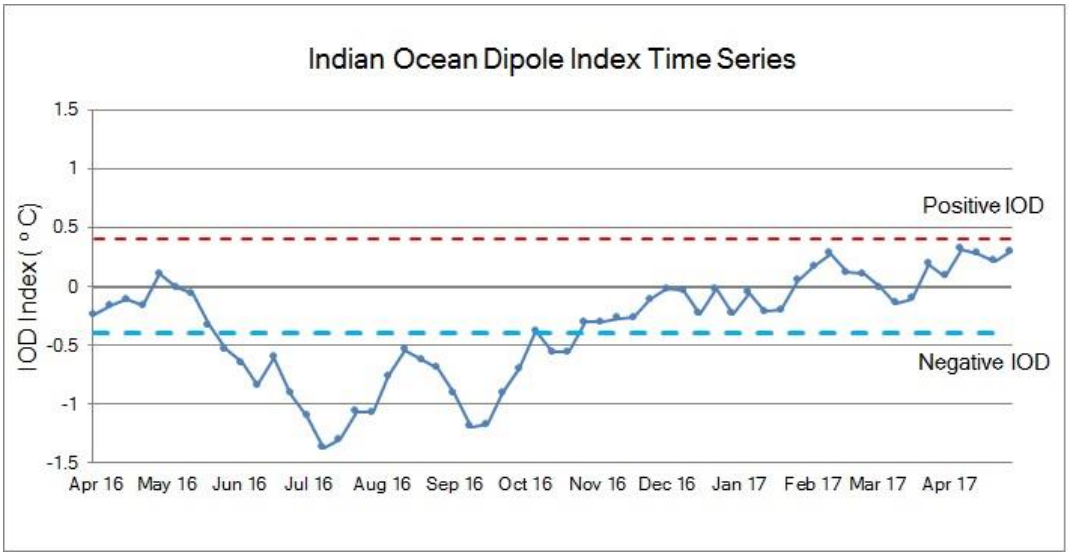

Figure 13: Indian Ocean Dipole (IOD) index time series. The IOD index was at neutral levels in April 2017. (Source: Bureau of Meteorology, Australia)

4. Outlook

4.1. For the May-June-July season, inter-monsoon conditions are expected to prevail in May 2017 and is forecast to transition to Southwest Monsoon conditions in June 2017. In May 2017, the prevailing winds are forecast to remain light and variable in direction, and thundery showers can be expected mostly in the afternoon. With the monsoon rain band forecast to migrate north towards the northern ASEAN region, a gradual increase in rainfall can be expected over the northern ASEAN region. In the southern ASEAN region, wet weather conditions are expected to persist. Nonetheless, isolated hotspot activities may still emerge during brief periods of dry weather conditions.

4.2. By June 2017, the inter-monsoon conditions are expected to give way to Southwest Monsoon conditions. The Southwest Monsoon season is associated with the traditional dry (rainy) season of the southern (northern) ASEAN region. During the season, the presence of tropical cyclones in the Western Pacific Ocean and South China Sea could bring heavy rainfall over parts of the region, in particular, the Philippines and Vietnam. For the southern ASEAN region, extended periods of dry weather conditions can be expected and this could lead to an increase or escalation in hotspot activities over the fire-prone provinces of Sumatra and Kalimantan. Typically, in the early part of the traditional dry season in the southern ASEAN region, most of the fires emerge in northern and central Sumatra and western Kalimantan.

4.3. Between the second and last week of May 2017, near-normal to above-normal rainfall is forecast for the Mekong sub-region, and below-normal rainfall is expected for the coastal regions in Myanmar, northern and central parts of Philippines. Rainfall is expected to be above-normal for most parts of the southern ASEAN region, except in Java where conditions are likely to be drier than usual.

4.4. For the May-June-July 2017 season, near-normal to above-normal rainfall is expected over most parts of the northern ASEAN region, as well as for the near-equatorial region including Malaysia, Singapore, Brunei and parts of Sumatra. Slightly below-normal to below-normal rainfall is forecast for southern half of Sumatra, Kalimantan and Java. The rainfall outlooks for the May to July 2017 season are shown in Figure 14.

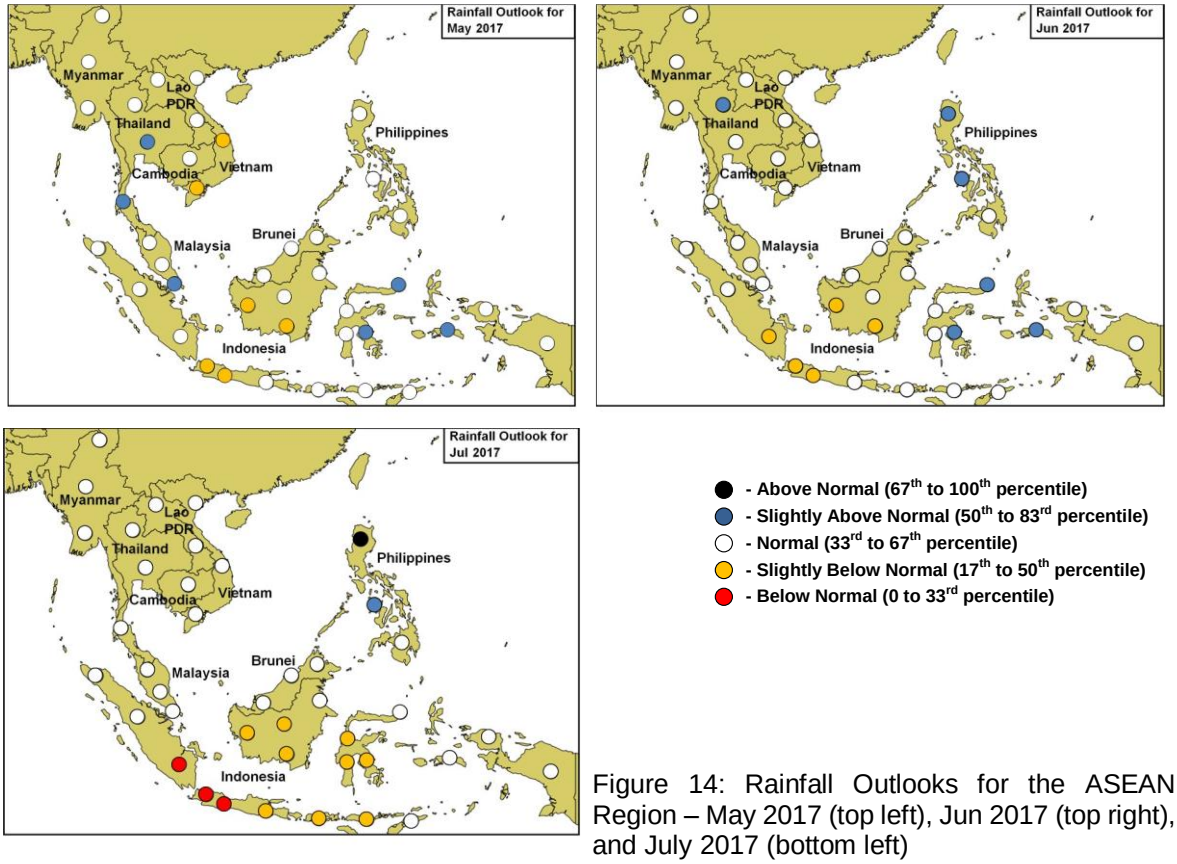

Figure 14: Rainfall Outlooks for the ASEAN Region – May 2017 (top left), Jun 2017 (top right), and July 2017 (bottom left)