

UPDATE OF REGIONAL WEATHER AND SMOKE HAZE NOVEMBER 2015

1. Review of Regional Weather Conditions in October 2015

1.1 The Southwest Monsoon conditions continued to prevail for most of October 2015 before giving way to Inter-Monsoon conditions in late-October 2015. In the later part of the month, the monsoon trough migrated southward from northern ASEAN region to the near-equatorial region, of Malaysia, Singapore, Brunei and parts of Indonesia including Sumatra and Kalimantan by end-October.

1.2 Two tropical cyclones affected the ASEAN region in October 2015. Tropical Storm Mujigae, which developed as a weak tropical disturbance near Palau in late September 2015 intensified over the next few days into a Tropical Storm. It made landfall over central Luzon Island in the Philippines on 1 October 2015 bringing heavy rainfall and strong winds to the Luzon region before moving over the South China Sea. Tropical Storm Mujigae intensified into a Typhoon on 3 October 2015 and made a second landfall near Hainan Island on 4 October 2015.

1.3 In mid-October 2015, a much more intense tropical cyclone – Tropical Storm Koppu which formed in the western Pacific Ocean intensified into a Super Typhoon as it tracked westwards over the warm waters of the Philippines Sea towards the Philippines. Super Typhoon Koppu made landfall in Aurora province, the Philippines on 17 October 2015. The slow movement of the Typhoon under a weak steering environment resulted in prolonged heavy rain and widespread flooding in Baguio, the Philippines.

1.4 The prevailing strong El Niño conditions continued to suppress rainfall activity over the ASEAN region. Significant drier than usual weather conditions were experienced over large parts of the southern ASEAN region. Near-normal to slightly below-normal rainfall was received in Philippines. Below normal rainfall was also experienced in most parts of the northern ASEAN region. The regional rainfall distribution for October 2015 is shown in Figure 1A.

Percentage of Normal Rainfall for October 2015

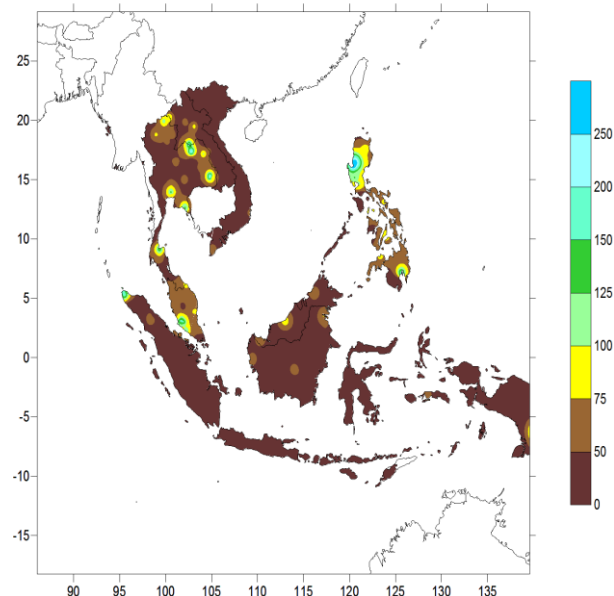


Figure 1A: Percentage of Normal Rainfall for October 2015

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

2.1 In October 2015, hotspot activities over the northern ASEAN region were subdued by the prevailing wet weather conditions. In the southern ASEAN region, the prolonged dry weather conditions further contributed to the prevailing severe haze situation in Sumatra and Kalimantan. Smoke haze from fires in Sumatra and Kalimantan continued to spread over sea areas by the prevailing winds to affect areas southern ASEAN region as well as southern Philippines, southern Thailand, and Vietnam.

2.2 The fires in South Sumatra and central Kalimantan continued to burn in October 2015 emitting dense smoke haze and reducing visibility to below 1km on many days. In addition, Very Unhealthy/Hazardous air quality readings were reported in Pekan Baru, Jambi and Palembang in Sumatra and Palangkaraya in Kalimantan on most days.

2.3 In the first week of October 2015, smoke haze from Sumatra affected many states along the west coast of Peninsular Malaysia and Singapore while the smoke haze from Kalimantan affected the southern parts of Kuching, Sarawak. During this period, the air quality in these areas deteriorated to Unhealthy levels with several places in Selangor such as Shah Alam, Banting, Port Klang and Putrajaya recorded Very Unhealthy/Hazardous air quality readings on some days.

2.4 An increase of shower activities and a shift of prevailing winds in the region to blow from the east or northeast in the second week of October 2015 brought some temporary respite to the haze situation affecting Peninsular Malaysia, Sarawak and Singapore. The shower activities however were short-lived and fell mostly away from the hotspot areas in Sumatra and Kalimantan. The peatland fires and smoke haze in South Sumatra and Central Kalimantan continued to persist.

2.5 In the second half of October 2015, in particular between 18 and 26 October 2015, the indirect influence of Typhoon Koppu over the Philippines resulted in a shift of the prevailing winds to blow from the southeast or south over the southern ASEAN region. This brought the dry weather conditions back to the region which fuelled the fires that were still raging in the southern parts of Sumatra and Kalimantan.

2.6 The prevailing southeasterly or southerly winds carried moderate to dense smoke haze from Sumatra to many parts of Peninsular Malaysia and Singapore, where API readings in central, southern Peninsular Malaysia and PSI readings in Singapore were mostly in the Unhealthy range between 18-23 October 2015. The smoke haze from Sumatra spread further north as well and affected the northern parts of Sumatra and Malaysia, and southern Thailand. The air quality in the affected areas deteriorated to Unhealthy/Very Unhealthy levels between 21 and 23 October 2015. The 24-hr PM₁₀ concentrations in Penang, Peninsular Malaysia and Songkhla, Thailand reached 383 and 360 ug/m³ respectively on 22 October 2015.

2.7 The smoke haze in Kalimantan continued to thicken as land fires persisted, and on 19 October 2015, widespread thick smoke haze blanketed the southern parts of Kalimantan. PM₁₀ concentrations at Palangkaraya exceeded 1500 ug/m³ on most days during the second half of the month, above the Hazardous level of 420 ug/m³. Smoke haze from Kalimantan had also spread to the South China Sea and the east coast of Sabah. Some flights to Kota Kinabalu were disrupted or cancelled on 18 October 2015.

2.8 From 27 October 2015 to the rest of the month, a shift in the prevailing winds to blow from the northeast or east and increased shower activities over the areas where the

fires were raging brought an improvement to the haze situation in Sumatra and Kalimantan. The showers helped to subdue the hotspot activities in the region and brought a significant improvement to the smoke haze situation in the region.

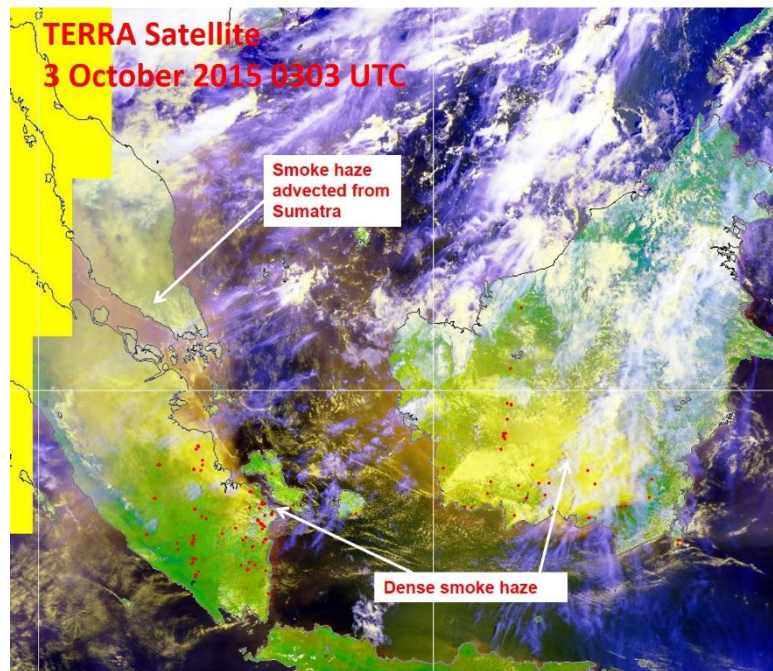


Figure 2B: TERRA satellite image on 3 October 2015 shows smoke haze from Sumatra affecting Peninsular Malaysia and Singapore. Dense haze was observed mainly over South Sumatra and Central Kalimantan.

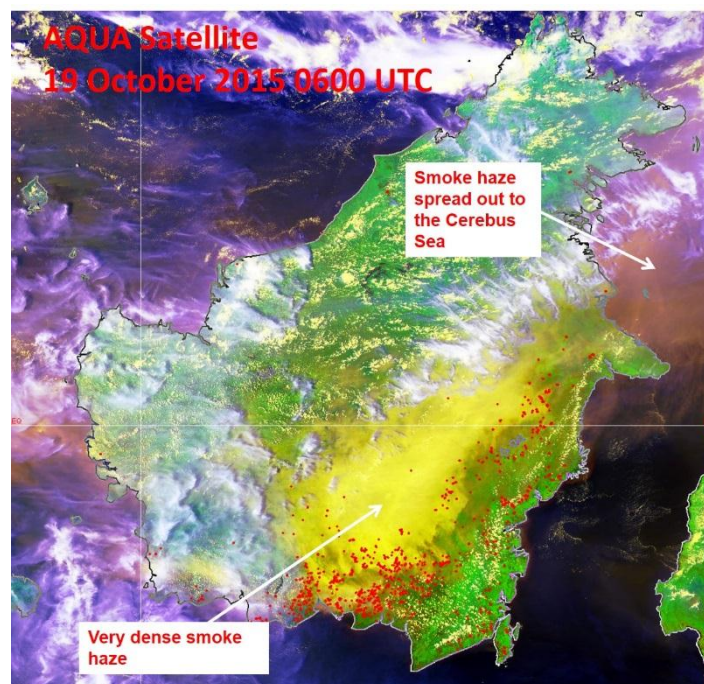


Figure 2C: AQUA satellite picture on 19 October 2015 shows a large area of Kalimantan shrouded in very dense smoke haze. Some haze has spread out to the Cerebus Sea under the prevailing south or south-westerly winds.

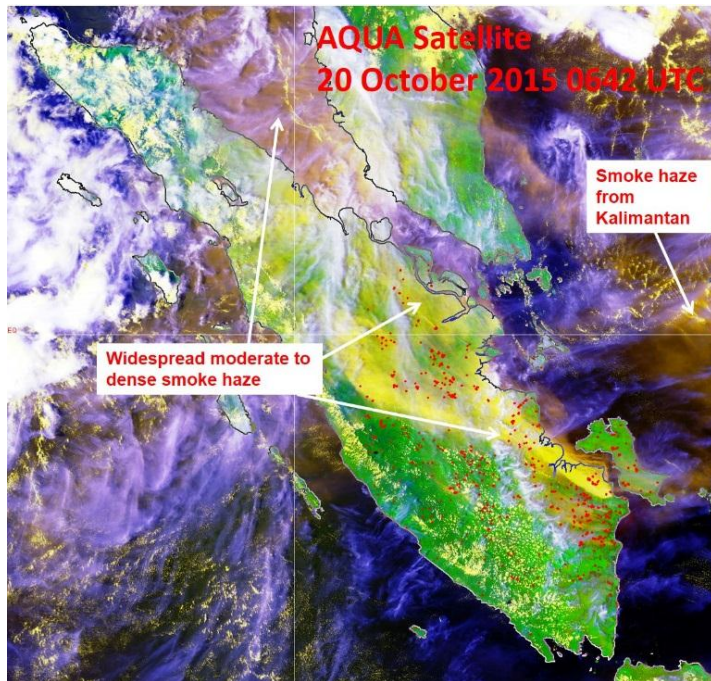


Figure 2D: AQUA satellite image on 20 October 2015 shows smoke haze from Sumatra affecting parts of the Peninsular Malaysia.

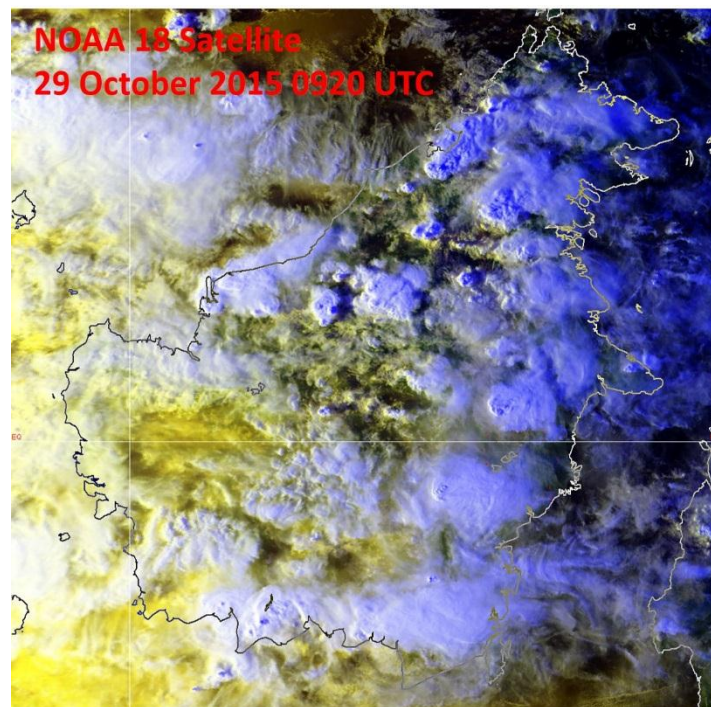


Figure 2E: NOAA 18 satellite image on 29 October shows the return of widespread shower activities in Kalimantan that helped to subdue the hotspot activities.

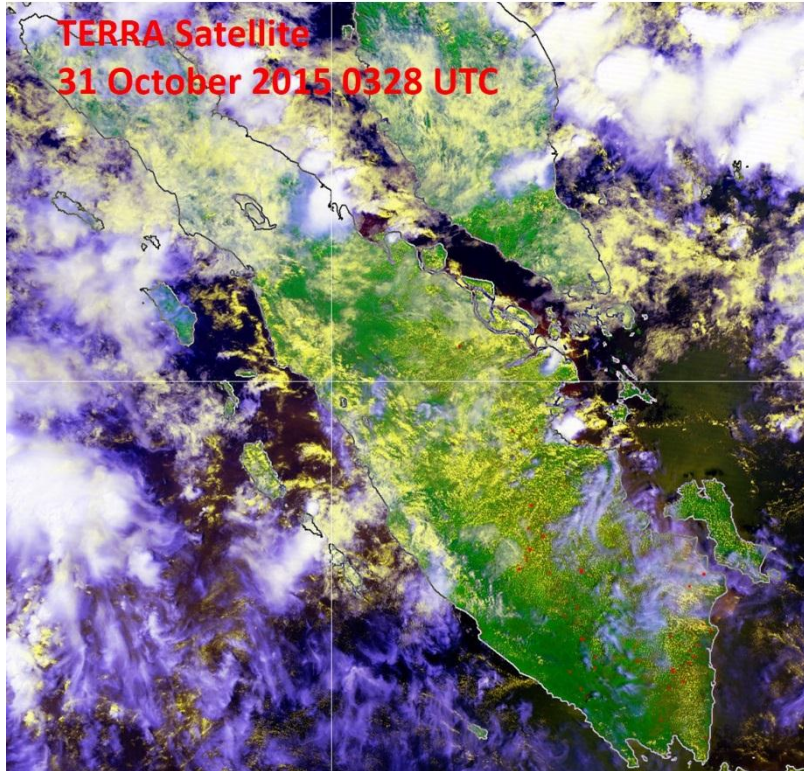


Figure 2F: TERRA satellite picture on 31 October 2015 shows a significant improvement to the haze situation in Sumatra due to increased shower activities in the region in late-October 2015 in late-October.

2.9 The hotspot charts for October 2015 for

- a) Cambodia, Myanmar, Thailand, Lao PDR and Vietnam;
- b) Sumatra, Borneo and Peninsular Malaysia; and

are shown in Figures 2F to 2G respectively.

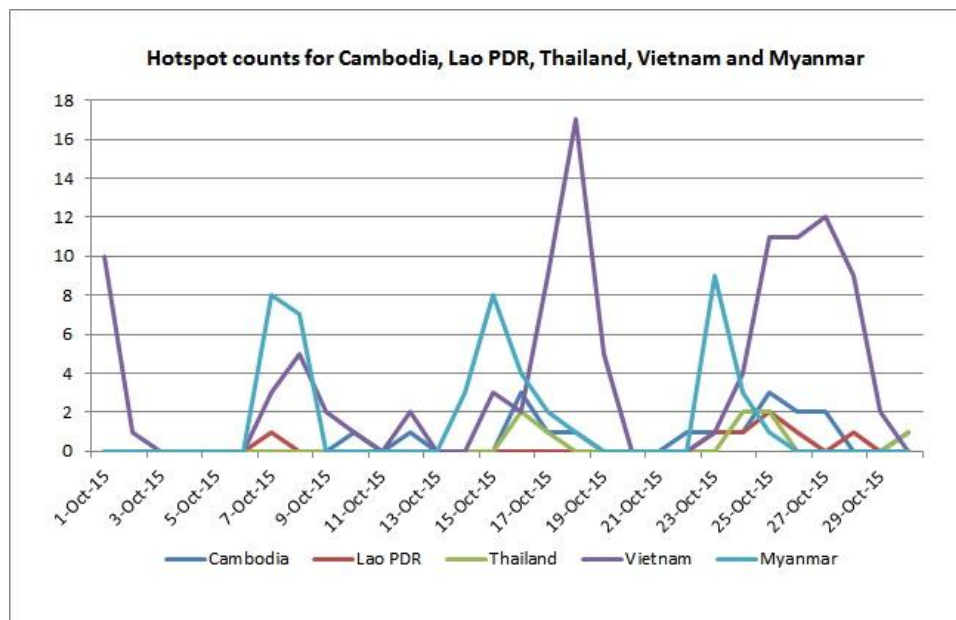


Figure 2G: Hotspot Counts in Cambodia, Lao PDR, Thailand, Vietnam, Myanmar for October 2015

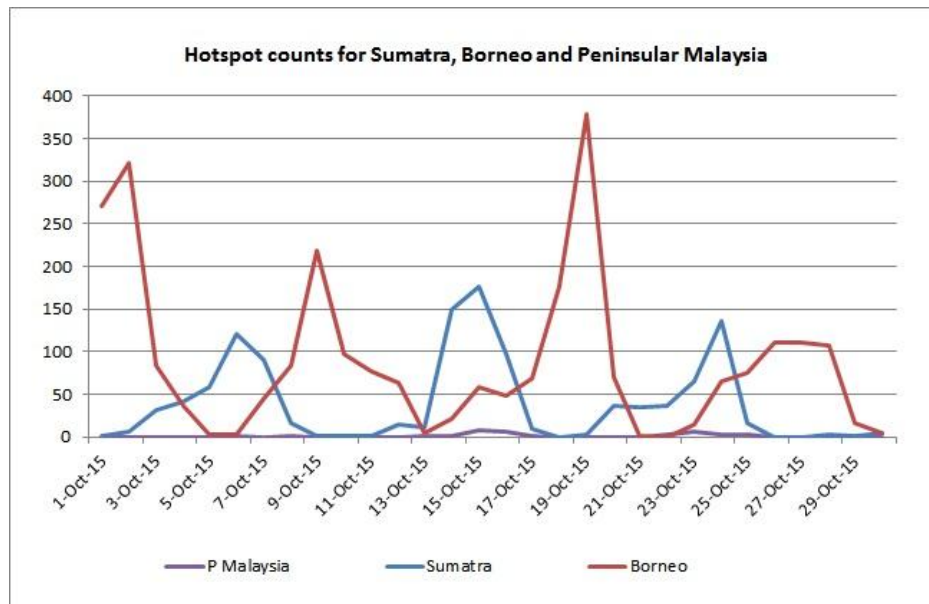


Fig 2H: Hotspot Counts in Sumatra, Borneo and Peninsular Malaysia for October 2015

3. Status of El Niño/La Niña

3.1 A strong El Niño prevails in the tropical Pacific Ocean. In October 2015, the sea surface temperatures (SSTs) in the tropical Pacific Ocean (SST) have increased further although the rate of warming has slowed.

3.2 Atmospheric conditions in the ASEAN region are showing a clear response to the strong El Niño conditions. Large-scale drier-than-normal conditions have been observed particularly in the southern and eastern parts of the ASEAN region. A consensus forecast based on international climate models and expert opinion suggests continuation of strong El Niño conditions into early-2016, with the strength of El Niño likely to peak in coming months before decaying.

3.3 Typically the impact of El Niño for the Southeast Asia region is drier than average rainfall conditions, especially for the southern parts of the ASEAN region during June to October. More locally-specific impact differs from place to place and for different seasons.

3.3 The region is now gradually transitioning from the Inter-Monsoon season (Oct - Nov) into the Northeast Monsoon (Dec - Mar). The impact of El Niño is usually less pronounced during the Northeast Monsoon as compared to the Southwest Monsoon (Jun – Sep).

4. Outlook

4.1 The prevailing Inter-Monsoon season is expected to transit into the wet-phase of Northeast Monsoon by late-November 2015. In the northern ASEAN region, the Northeast Monsoon is associated with the traditional dry season, and usually brings cooler and drier weather conditions. Gradual escalation of hotspot activities can be expected as the season progresses. Vigilance should be stepped up for any escalation of fire activities in the coming months.

4.2 For the southern ASEAN region, the Northeast Monsoon will bring enhanced rainfall activities over most parts of the equatorial region. During the wet-phase of the Northeast Monsoon (December - January), the region may experience several occurrences of monsoon surges due to cold air outbreaks from Siberia or central China. Monsoon surges are associated with heavy prolonged rainfall activities, where each episode could last from two to seven days. Shower activities are likely to keep hotspot activities subdued until mid-January 2016.

4.3 Around end-January, the wet phase of the Northeast Monsoon season will gradually transit to the dry phase of the Northeast Monsoon season (Feb – early Mar) for parts of the southern ASEAN region around the near equatorial region, and occasional dry and windy conditions are expected. During this period, the monsoon rainband shifts further south over the Java Sea areas, and wet weather conditions can be expected over the southern Indonesian islands of Java.

4.5 Drier than usual weather conditions are forecast to continue for the eastern part of the southern ASEAN region in November and December. The impact of El Niño over the southern ASEAN region typically becomes less pronounced during the boreal winter, and near-normal rainfall can be expected for the near-equatorial region in the coming months. For the northern ASEAN region, normal rainfall conditions are forecast except in the Philippines where slightly below to below normal rainfall is forecast. The rainfall outlook for the ASEAN region from November 2015 to January 2016 is shown in Figures 4A – 4C.

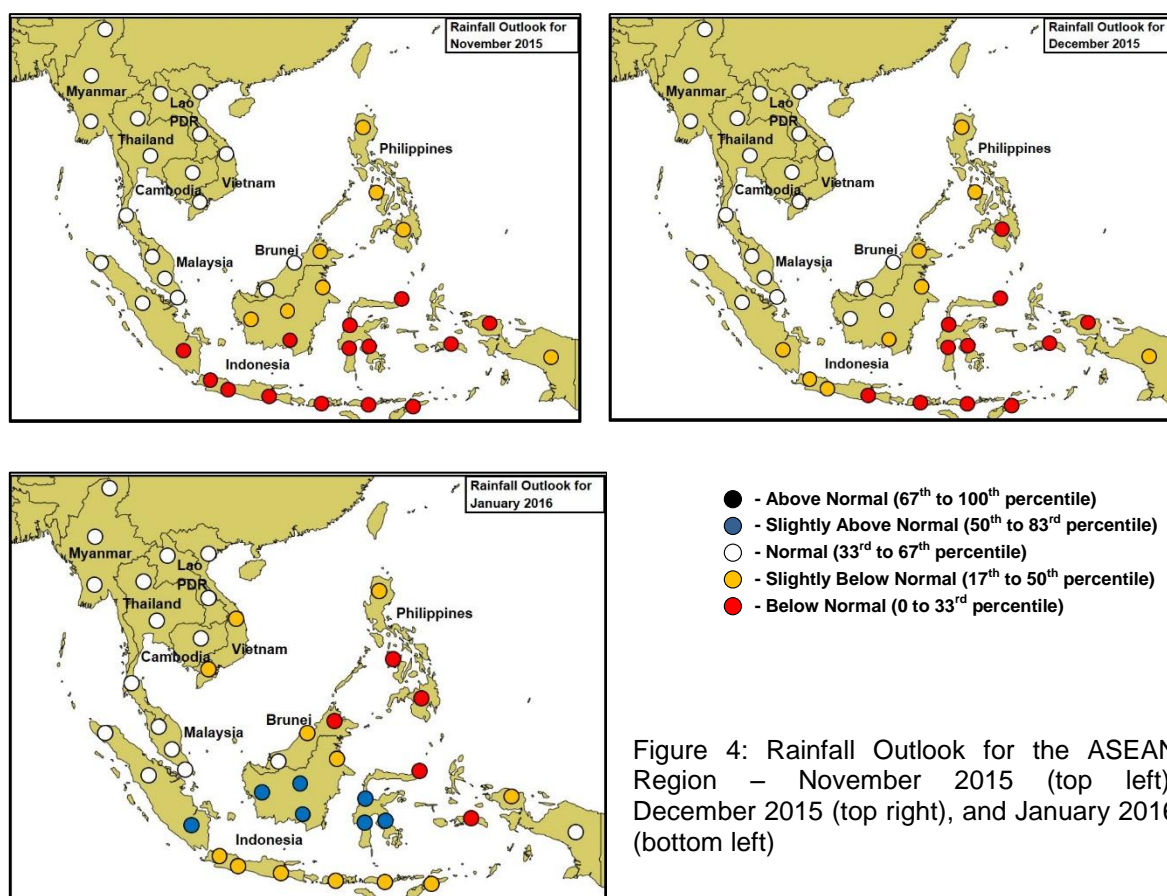


Figure 4: Rainfall Outlook for the ASEAN Region – November 2015 (top left), December 2015 (top right), and January 2016 (bottom left)