

1. Review of Regional Weather Conditions for First Fortnight of September 2019

1.1 In the first fortnight of September 2019, weak to moderate southwesterly or westerly winds prevailed over most parts of the northern ASEAN region (Figure 1). Anomalous strong southwesterly winds were observed to the east of Viet Nam and southeast of the Philippines due to the influence of Tropical Storm Kajiki and Typhoon Lingling (Figure 2). In the southern ASEAN region, the prevailing winds blew mainly from the southeast or southwest.

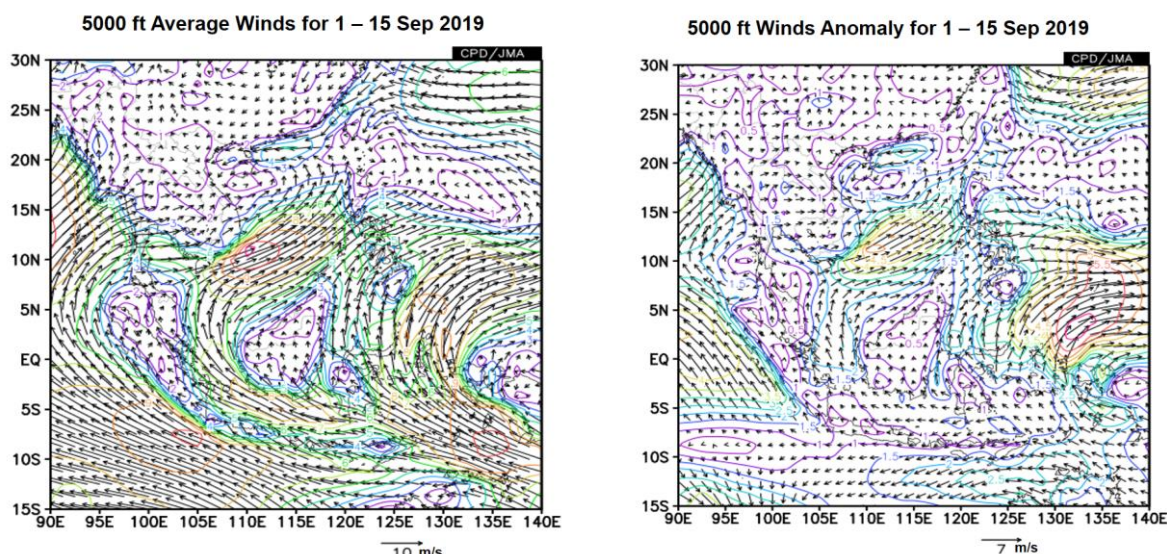


Figure 1: 5000 ft average winds (left) and winds anomaly (right) for 1 - 15 September 2019. (Source: JMA)

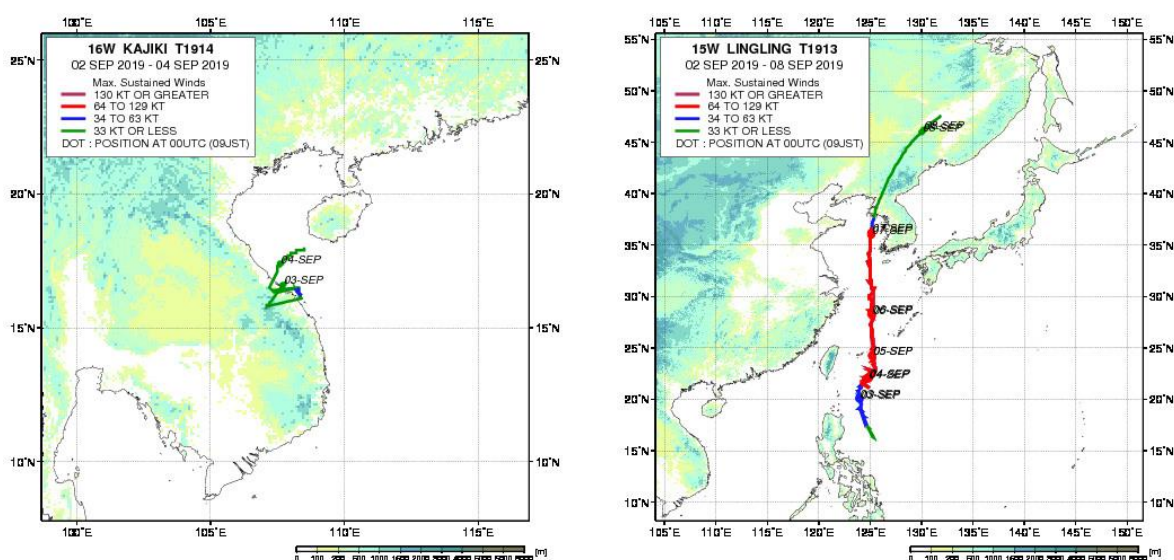


Figure 2: Historical track of Tropical Storm Kajiki (left) and Typhoon Lingling (right). (Source: JAXA)

1.2 Southwest Monsoon conditions prevailed in the first half of September 2019. Much of the northern ASEAN region received above-average rainfall except for some areas in Cambodia and Thailand. In the southern ASEAN region, below-average rainfall was observed over many areas (Figures 3 and 4).

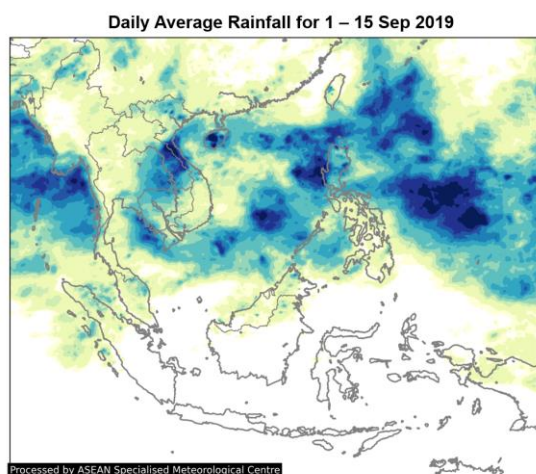


Figure 3: Daily average rainfall for the ASEAN region in the first fortnight of September 2019. (Source: JAXA Global Satellite Mapping of Precipitation)

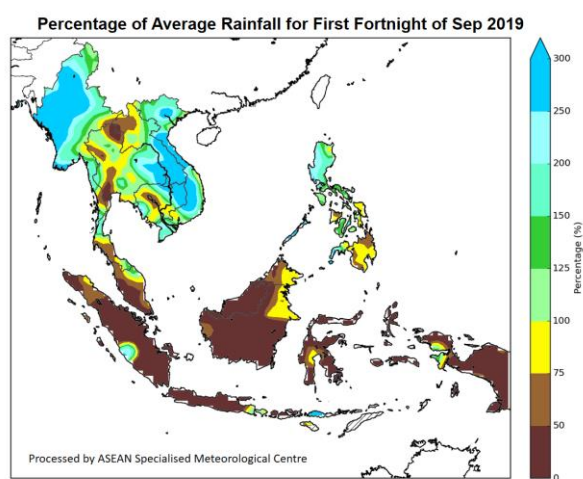


Figure 4: Percent of average rainfall for 1 – 15 September 2019. The rainfall data may be less representative for areas with a less dense rainfall network. (Source: IRI NOAA/NCEP CPC Unified Precipitation Analyses)

1.3 Throughout the first fortnight of September 2019, the Madden-Julian Oscillation (MJO) remained weak based on the RMM index and did not significantly influence the weather over the ASEAN region (Figure 5).

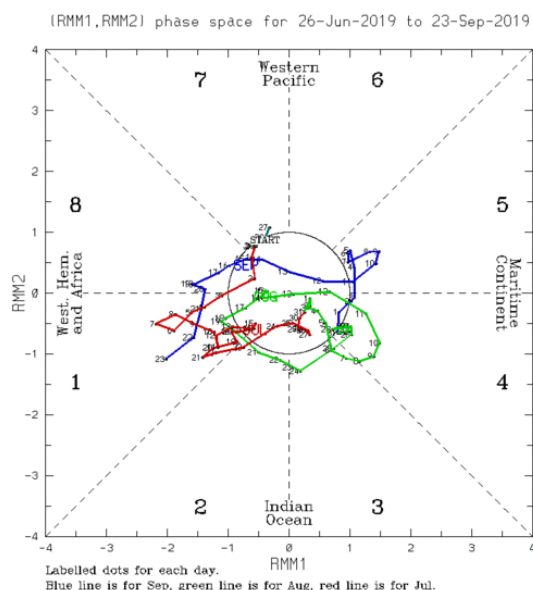


Figure 5: The MJO phase diagram for Sep 2019 (blue). The diagram illustrates the movement of the MJO through different phases, which correspond to different locations along the equator. The distance of the index from the centre of the diagram is correlated with the strength of MJO. When the index falls within the circle, the MJO is considered weak or indiscernible. (Source: Bureau of Meteorology)

1.4 The state of the El Niño-Southern Oscillation (ENSO) is currently neutral (neither El Niño nor La Niña), and the sea-surface temperatures (SST) over the tropical Pacific Ocean continue to show a cooling trend. An Indian Ocean-related index, known as the Indian Ocean Dipole (IOD),

is observed to be in the positive phase, as colder-than-average sea surface temperatures continue to be present over the eastern Indian Ocean. The positive IOD has contributed to the drier conditions over the southern ASEAN region during the first fortnight of September 2019.

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

2.1 Under prevailing wet conditions, no significant hotspot activity was observed in the northern ASEAN region.

2.2 In the southern ASEAN region, prolonged dry weather in the first fortnight of September 2019 led to the significant increase in the hotspot activities, particularly over Sumatra and Kalimantan. Widespread moderate to dense smoke haze was observed to emanate from persistent hotspots detected in Sumatra and Kalimantan, and hazy conditions had shrouded many areas there during the fortnight period. Some of the smoke haze from Sumatra and Kalimantan had also been blown by the prevailing winds to affect Malaysia and Singapore.

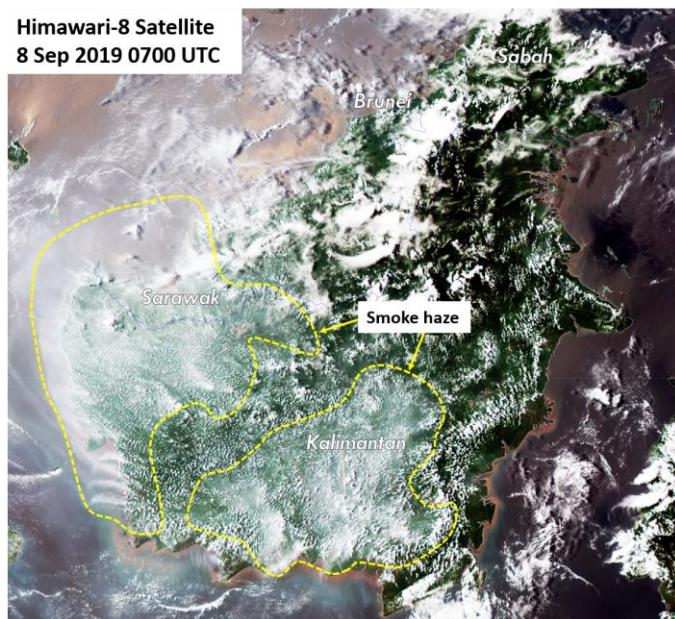


Figure 6: Himawari-8 satellite image on 8 Sep 2019 shows smoke haze from hotspots detected in West, Central and South Kalimantan; some of the smoke haze had been blown toward the adjacent sea areas and western Sarawak.

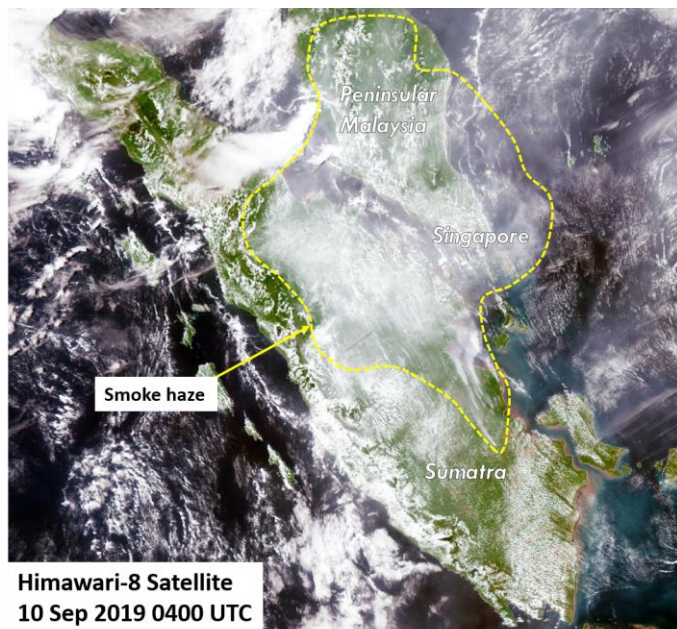


Figure 7: Himawari-8 satellite image on 10 Sep 2019 shows smoke haze from hotspots detected in southern and central Sumatra; some of the smoke haze had been transported to affect Peninsular Malaysia and Singapore.

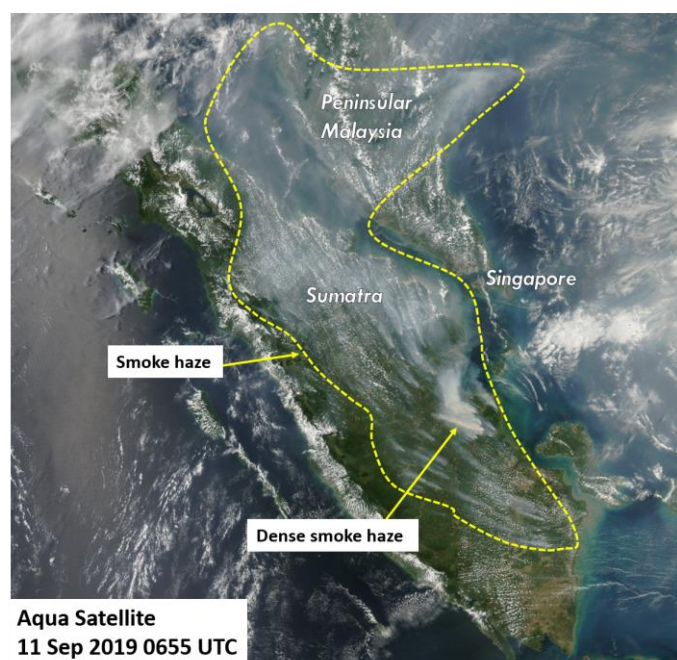


Figure 8: Aqua satellite image on 11 Sep 2019 shows widespread moderate to dense smoke haze from hotspots detected in southern and central Sumatra.

Aqua Satellite
14 Sep 2019 0549 UTC

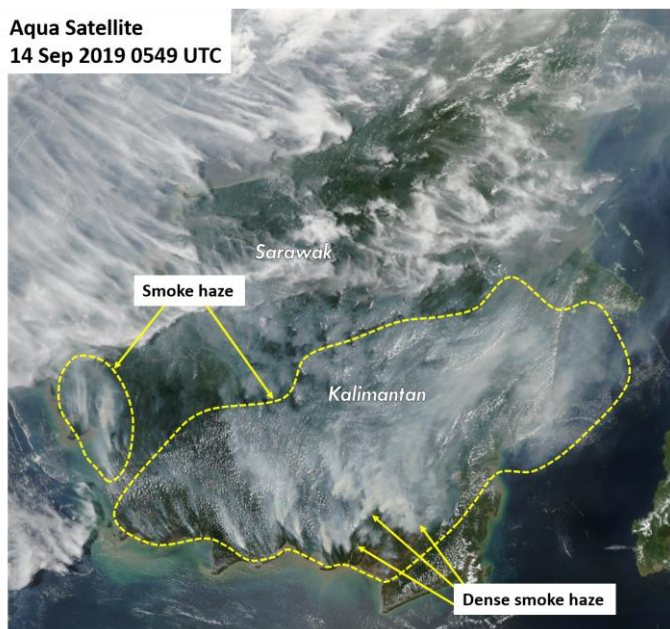
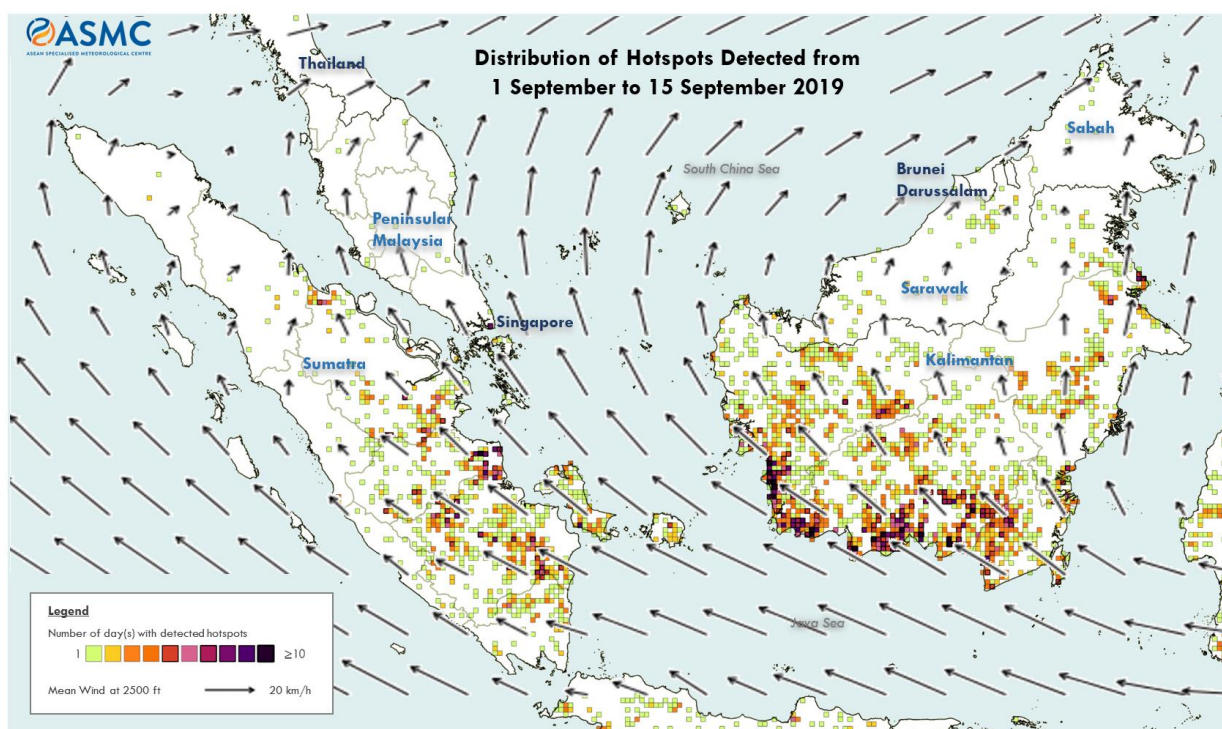


Figure 9: Aqua satellite image on 14 Sep 2019 shows widespread moderate to dense smoke haze from hotspots detected in Kalimantan.



Note:
Hotspots may not have been detected on some days due to cloudiness or partial satellite pass.
Each coloured 10km x 10km grid represents the number of days in which hotspots were detected within that grid over the two-week period. A darker grid colour indicates more days with detected hotspots within that grid.

Figure 10: The distribution of hotspots detected from 1 September to 15 September 2019 in Sumatra, Kalimantan and Malaysia, based on NOAA-20 satellite surveillance. (Source of prevailing winds: JMA)