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Possible Meteorological Triggers of Staggered Mass Flowering in Tropical Rainforest of Sarawak

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In March to June 1996, a staggered mass flowering occurred in the tropical rainforest of Lambir National Park, Sarawak. A key question may be what caused or triggered this mass flowering. It has been noted that preceding to the flowering a couple of abnormally low surface air temperature events occurred in January and February which possibly triggered the flowering through the low-temperature physiological stress as noticed by Ashton et al. (1988). They pointed out that the abnormally low temperature below 20 C in the tropical rainforest in Southeast Asia might have been induced by radiational cooling effect of relatively clear sky associated with the dry climatic anomaly under the El Nino event in the equatorial eastern Pacific.

We investigated large-scale meteorological conditions associated with the mass flowerings in 1996 as well as in 1992/1993, by using the in-situ meteorological station data at Miri and Kuchin, and the global objectively-analysed gridded meteorological data from NCEP (National Center for Environmental Prediction), NOAA, USA and satellite cloud images of GMS (Geostationary Meteorological Satellite), JMA, Japan. The results show that the abnormal low temperature events in January and February in 1996 occurred in the rainy days under the disturbed weather condition, which was associated with the strong cold air surge of northeast winter monsoon from East Asia. A similar synoptic weather condition was also seen in 1992/1993 case. In addition, it has been proved that these strong winter monsoon surge from the East Asia (or Siberia) are likely to occur associated with the non-El Nino or even the La Nina -type climatic condition in the tropics. These results may suggest an important implication for the paleo-climatic history and the evolution of the major flowering forest species, (e.g., Dipterocarp) since the last 100 million years or so.