

SPATIAL AND TEMPORAL PATTERNS OF BIOMASS BURNING IN THE WESTERN PART OF INSULAR SOUTHEAST ASIA 2001-2010

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ABSTRACT: Biomass burning in the humid tropical conditions of insular Southeast Asia is regulated by human activities while at the same time influenced by environmental characteristics of the region. The Centre for Remote Imaging, Sensing and Processing (CRISP) at the National University of Singapore has been monitoring fire activity in the region using both high resolution SPOT satellite data and medium resolution MODIS data. In this study we analyse spatial and temporal patterns of fire activity in Peninsular Malaysia, Sumatra and Borneo from 2001 to 2010 and the correlation of fire activity with precipitation and the El Niño conditions. The results highlight three concentration areas of fire activity in the region: Riau and South Sumatra provinces in Sumatra and the Southern lowlands of Borneo Island. In all of these areas the results of visual fire detection on high resolution SPOT satellite images correlated well with the automatic MODIS hotspot detection, thus showing the capability of high resolution satellite images in providing a reliable and valuable source of information for more detailed analysis of the characteristics of fire activity (e.g. type/purpose of fire, burning land cover type etc.). Rainfall patterns (from TRMM satellite) were noticed to differ significantly in the three major fire concentration areas. In all cases, fires activities are observed to correlate inversely with precipitation. Extreme fire events in South Sumatra and Southern Borneo had a clear correlation with El Niño. In contrast, fires in Riau do not seem to be influenced by El Niño. Fire activity remains consistently high throughout the study period, even during non-El Niño years. These two different temporal patterns suggest that anthropogenic factors have more effects on the fires in Riau. High levels of fire activity would occur, primarily for land clearing purposes, whenever weather conditions permitted biomass burning. On the other hand, extreme fire events occur in South Sumatra and Southern Borneo during El Niño periods when fires get out of control.