

Investigation of Indonesian fires during 1979-2016: connection with the type of El Niño and phase of Indian Ocean Dipole

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This study investigates the connection between the severity of Indonesian fires and the types of El Niño and the phase of Indian Ocean Dipole (IOD) by integrating various observational datasets for the time period of 1979 to 2016. The drought conditions (strength and duration) in Indonesia are modulated by the Walker circulation associated with the types of El Niño and the phase of IOD. The severity of Indonesian fires is highly linearly correlated with the drought there (0.80 in Southern Sumatra and 0.78 in Southern Kalimantan during the major fire season August-October). We also found that large Indonesian fires were more likely to occur in the El Niño years characterized as the Eastern Pacific (EP) type (*e.g.*, 1982, 1997, 2006 and 2015) than those characterized as the Central Pacific (CP) type (*e.g.*, 2002, 2004, and 2009). Indian Ocean Dipole (IOD) also plays an important role in modulating the severity of Indonesian fires. Indonesian fires were more severe when Indian Ocean Dipole (IOD) was in phase with El Niño, *i.e.*, when IOD is positive such as during all EP-type years and some CP-type years (*e.g.*, 2002 and 2004), than those out of phase with El Niño, *i.e.*, when IOD is negative such as in other CP-type years (*e.g.*, 1979 and 2009). The outcome of this study can be applied to drought outlook, fire management and air quality forecast in Indonesia and adjacent areas.