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Differential and Coupling Impacts of ENSO and IOD on Indonesian Fires

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The impacts of El Niño–Southern Oscillation (ENSO) and Indian Ocean Dipole (IOD) on Indonesian fires were extensively explored. In this study, we analyze monthly FWI_{95d}, which represents the number of days exceeding the 95th percentile of the daily Fire Weather Index, calculated using daily ECMWF Reanalysis version 5 data. FWI_{95d} is highly correlated with the fire observation data for the three fire–prone regions (eastern Sumatra, southern Kalimantan, southern New Guinea) of Indonesia in August–September–October, the major fire peak season of Indonesia. We investigate that Eastern Pacific El Niño events relate to more significant fire amplitude compared to Central Pacific El Niño events in New Guinea. Additionally, the 'IOD–ENSO' coupling case, in which IOD peaks in the preceding fall (September–October–November, SON(0)) and El Niño peaks in the following winter (December–January–February, D(0)JF(1)) shows a larger fire amplitude than sole IOD or ENSO case. Furthermore, It is noted that the potential physical mechanisms driving fires in Sumatra and New Guinea are different.

Key words: El Niño-Southern Oscillation (ENSO), Indian Ocean Dipole (IOD), Fire Weather Index (FWI), Indonesia, fire