

Climate and Weather Characteristics in Southeast Asia during the 7-SEAS



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Climatologically, the East Asian high merges with the westward expansion of the northwestern Pacific subtropical high in March. The local East–West cell/circulation is enhanced by a well-organized convergent center that forms over Indochina at 925 h Pa in March. This allows the emitted air pollutants from the biomass burning to be uplifted to the free troposphere and immediately transported downwind to the east. Using the data collected from the 2010 7-SEAS/Dongsha Experiment, six cases of long-range transport events involving air pollutants during March–April were identified at the Hengchun air quality monitoring station in southern Taiwan. These events were related to active burning phases over Indochina Peninsula. The air pollutants produced by these events were transported to Taiwan after a 2–3 day journey. A composite analysis for these identified six cases showed that the boundary layer of the southwesterly flow confluence coupled with a well-organized convergent center located over a thermal low under clear skies over the Indochina Peninsula may induce a distinct ascending motion to form the upward branch of the transient local East–West cell/circulation during the burning phase. This inferred upward motion together with the strong thermal buoyancy created by the active biomass burnings could carry the air pollutants to the lower free troposphere where they would effectively be conveyed downwind along the westerly flow above 850 h Pa level. The air pollutants were brought down to the surface by downward branch of the transient local East–West cell/circulation, which was induced by the subsidence of a cold surge anticyclone. Using continuous point sources, the six identified cases were simulated with the Hybrid Single-Particle Lagrangian-Integrated Trajectory (HYSPPLIT) particle dispersion forward model to confirm our supposition regarding the mechanism for the long-range transport of Southeast Asian biomass burning pollutants that has a significant impact on the surface air quality of the downstream areas, particularly in Taiwan.



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