Energy Fluxes in the Surface Layer of a Tropical Coastal Ocean

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The tropical coastal ocean is a vital jigsaw-piece to understanding exchanges of energy, moisture, and carbon between the atmosphere and the ocean biospheres. Latent and sensible heat fluxes, microclimate variables, and surface water temperature data were collected using an instrumented tower at a tropical coastal ocean (5°28’6’’N, 100°12’1’’E). The instrumented tower was installed on a stainless-steel platform extending a pre-existing pier. Data were collected for two years, i.e., November 2015 to October 2017, which encompassed two annual cycles of the Monsoons. The first objective of this work is to determine the Monsoonal and diurnal patterns of latent (LE) and sensible (H) heats while the second objective is to determine the relationship between microclimate variables on the energy fluxes. The highest (lowest) LE occurred during the Northeast Monsoon (Southwest Monsoon). The value of H was consistent throughout the year except during the Northeast Monsoon and Southwest Monsoon. The diurnal pattern of LE exhibited a distinct pattern while the daily pattern for H was erratic. At the diurnal time scale, LE is positively correlated with solar radiation, relative humidity, and surface water temperature while H is only positively correlated with solar radiation. At the monthly time scale, LE is negatively associated with relative humidity. The averaged LE and H were 11.7 W m^{-2} and 1.3 W m^{-2}, respectively, with the Bowen at 0.11. These results have important applications in improving numerical weather models.

Keywords: Eddy covariance, air-sea interaction, atmospheric surface layer, latent heat, sensible heat