Reviewing Sea Spray-Mediated Air-Sea Fluxes of Enthalpy and Momentum in Tropical Cyclones

The intensity of tropical cyclones is very sensitive to the air-sea fluxes of enthalpy and momentum. Sea spray plays a critical role in mediating enthalpy and momentum fluxes over the ocean's surface at high wind speeds and parameterising the influence of sea spray is a crucial component of any air-sea interaction scheme used for the high wind regime where sea spray is ubiquitous. There have been many studies that have proposed different parameterisations of air-sea flux which incorporate the microphysics of sea spray evaporation and the mechanics of sea spray stress. Unfortunately, there is not yet a consensus on which parameterisation best represents air-sea exchange in tropical cyclones, and the different proposed parameterisations can yield substantially different tropical cyclone intensities. This talk will focus 1) on the common finding among many studies that the sea surface appears to undergo a regime change after a certain threshold wind speed, which impacts the air-sea fluxes, and 2) how the proportion of surface fluxes attributed to sea spray appears to increase with increasing wind speed. Our synthesis of the common findings in the sea-spray literature aims to help those conducting numerical simulations of tropical cyclones select or develop the air-sea interaction scheme that best suits their needs.