

Title: Impacts of Bay Breezes and Thunderstorms on Surface Air Quality in Maryland during DISCOVER-AQ 2011

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Abstract:

Meteorological conditions that lead to ozone production (sunlight and warm temperatures) may also lead to sea/bay/river breezes (from here on referred to as “bay breezes”) and deep convection at or near coastal locations. In the presence of ozone precursors, the same conditions could result in high amounts of photochemical ozone production. When bay breezes occur, they could transport high concentrations of ozone that were transported out over the bay with the mean flow back over land. Along with high ozone concentrations, the bay breeze also transports higher concentrations of water vapor over the land, where in the right conditions, could lead to thunderstorm development. The storms are triggered as a result of upward vertical transport of water vapor associated with the rising branch of the land-sea overturning circulation, as well as surface convergence between synoptic westerlies/south-westerlies and the easterly/north-easterly bay/river breeze. Deep convection triggered during the July 2011 Maryland deployment of NASA’s DISCOVER-AQ field mission is analyzed with observations and modeling using the Weather Research and Forecasting (WRF) model at fine resolution (330 m).