



Sensitivity of Mid-Atlantic Coastal Breezes to Surface Variability

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Thermally driven circulations such as coastal land and sea breezes are influenced by variations in surface properties. Recent investigations of the Delaware Bay and Sea breezes have characterized these typical, thermally driven, winds and classified them based on their orientation to the coastline as a first step toward developing a sea breeze prediction scheme. A marked sensitivity to variations in both land and sea surface properties has been observed, modifying the initiation time, propagation speed and direction, and overall penetration. In particular, the occurrence of easterly coastal winds and a falling tide can lead to a sea breeze-like circulation moving up the axis of the Delaware Bay instead of parallel to the coastline. These so-called bay breezes, which are visible on weather radar in clear air mode, typically form when there is a relatively uniform heating of the atmosphere over the land and the Bay. The ability to correctly characterize the timing and strength of coastal breezes in this Mid-Atlantic region is the first step in being able to predict these local winds, which is important for disaster preparation and mitigation, tourism, and electricity supply and demand.