

Delaware Sea Grant Project:

Local urban growth and climate change impacts on Delaware Bay sea breeze (R/ETE-16)

Investigator:

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Project Abstract:

The Delaware Sea/Bay breeze is a phenomenon that has, until recently, been significantly understudied. The sea breeze impacts local summer climate for inhabitants and visitors to Delaware's coastline by providing cooling breezes that modify temperatures and often causes low-level convergence that leads to afternoon showers. The population in coastal Delaware has increased significantly in the last 10 years, and is predicted to continue to do so for the foreseeable future. As the population changes, land use near the coast changes, particularly along major roadways, which has a distinct and non-negligible impact on the physical properties of the land surface, such as changed reflectivity, surface roughness, porosity and moisture. Many recent studies have indicated that increased urbanization has a notable impact on the sea breeze, particularly on penetration distance from the coast, wind speed, and location of convergence (and thereby where the rain falls). Decreasing the strength of the sea breeze such that the breezes are felt less, and modifying the location and duration of the afternoon rain which relieves summer humidity will be local climate changes directly experienced by the coastal population. In this regional climate modeling study, the following is proposed: 1) characterization of the Delaware sea/bay breeze, 2) identification of the physical changes (e.g. reflectivity versus porosity) that the sea breeze is most sensitive to, 3) modification of the model's land-surface parameterization to reflect current Delaware land use, 4) prediction of how land usage will change over the next 30 years using orthophotography of Delaware's land surface and an urban growth model, and 5) prediction of how this land use change will impact the local climate and the Delaware Sea/bay breeze. The implications of local changes in climate and modification of the sea breeze may influence tourism, agriculture and economy of this region of Delaware. Therefore, dissemination of these results to state and local leaders and decision-makers will be important.