

# Mesoscale Features in New Jersey

## Initial Investigations – sea breezes & rain/snow lines

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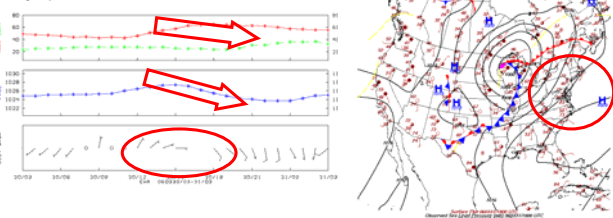
### Sea Breeze Circulation

**Plan:**  
Determine family of local sea breeze circulations in New Jersey (begin March/April)

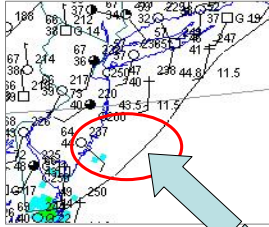
**Tools:**  
- Real-time data collected from the internet.  
- Literature Review & local studies

**Methods:**  
- Determine the characteristics that define sea breezes including:  
 - Width, Orientation, Shape, Movement  
 - Penetration, Depth, Strength/Intensity  
 - Evolution with time and in space  
 - Examine attributes according to:  
 - Wind speed and direction  
 - Temperature differentials  
 - SST versus skin-T  
 - Thunder, Haze, Fog, Visibility  
 - Ozone and Air Quality

**Results/Case:**  
March 30 – sea breeze as seen via data collected at Newark Airport (EWR) and in the context of synoptic high pressure regime with weak pressure gradient present. Winds veered from southwest through west, north, northeast, and then to the east and southeast during the afternoon. Pressure dropped and the temperature cooled slightly at the same time.



**Conclusion/Needs:**  
Based on this project the main factors to determine a sea breeze circulation in New Jersey were south/southeast winds coming off of the ocean, which cause cooler temperatures to be registered during that time. Lower pressure where thunderstorm initiation is expected. A high pressure system situated off of the coast in the Pacific Ocean is the best synoptic situation to create the south/southwest winds desirable.



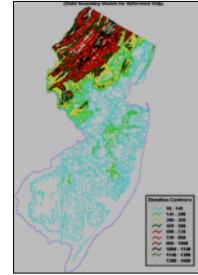
### Mesoscale Phenomena

Sea-Breeze  
Mountain-Valley  
Rain-Snow line  
Air Quality  
Convective Initiation  
Convective Coverage  
Fog and Visibility

*Local variations in temperature, wind speed, wind direction, and water vapor impact the family of occurrences, behavior, & features of these phenomena.*

### Purpose & Intent...

- Identify family of occurrences and their associated features as related to location, time of year/season, and synoptic regime
- Consider behaviors as a function of local physiographic features, land use, urban effects and other factors
- Examine dimensions, shape, orientation, and movement of mesoscale phenomena



*Elevation Physiography*

- Highlands
- Pallisades
- Watchung
- Raritan Valley
- Lawrence Harbor
- Soils & Surface Cover
- Pine Barrens
- Coastal Plain
- Delaware River
- Chesapeake Bay

### Methods

- ❑ Acquire multiple data sets for both surface & upper air; satellite and radar; meteorogram & real-time plots, analyses
- ❑ Time evolution of phenomenon & its features
- ❑ Spatial evolution of phenomenon & its features

### Rain/Snow Line

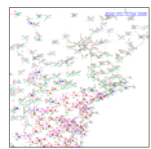
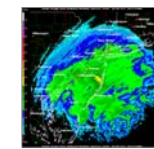
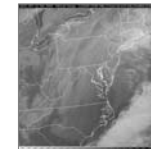
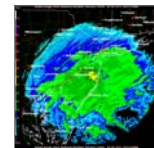
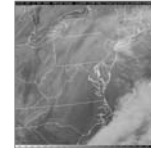
**Intent:**  
To improve understanding of the modalities and behaviors of the rain/snow line via multiple sensors approach including satellite, radar, surface observations, others.

**Tools:**  
Data collected in real time online. Consideration of synoptic regime and approach.

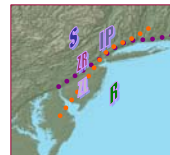
**Methods:**  
Hourly examination and analysis of temperature, dewpoint, wind direction, wind speed, hydrometeor, cloud cover and base, radar and satellite trends, others..

**Results/Case:**  
Two cases were reviewed with regard to location, width, characteristics, and evolution of the rain/snow line in space and time..

**Conclusion/Needs:** More cases necessary, but the complexity of the rain/snow line and its attributes and behaviors require much more investigative work..



**Attributes:**  
Width  
Location  
Orientation  
Movement



**Influences:**  
Coastal  
Physiography  
Synoptic Regime