Summer Sea Breeze, Upwelling, and their Onshore Interaction

Jeury Betances[1] and Dr. Travis Miles[1]

AUTHOR AFFILIATIONS

INTRODUCTION

- Energy demand can vary significantly across hours, days, and seasons.
- Preliminary findings show that the onset and duration of sea breeze matches with the windows of peak energy load.

METHODS

- Using NEXRAD Level-II doppler radar, AVHRR (Advanced high-resolution radiometer, GOES-16 Satellite (IMAGE OF SEA BREEZE & UPWELLING)
- Collected sea breeze analysis of the summer months of June, July, and August from 2020 to 2022
- Comparing this historical record with PJM's AE market region

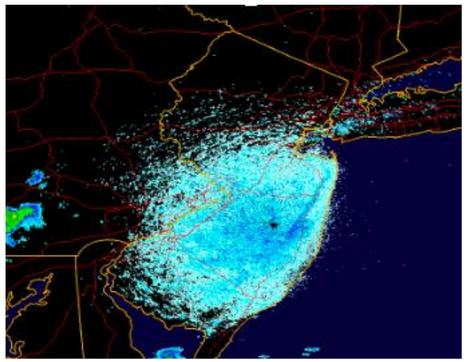


Fig1 An example Nexrad Level-II Doppler radar image.

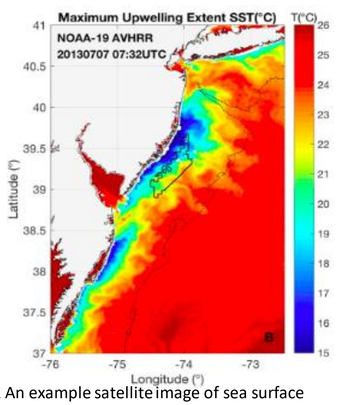


Fig2 An example satellite image of sea surface temperature from the NOAA AVHRR system

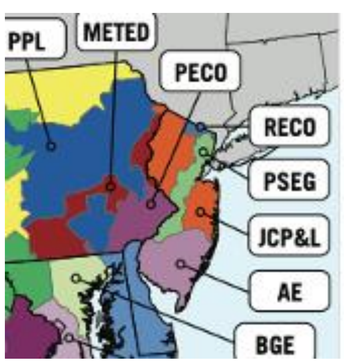
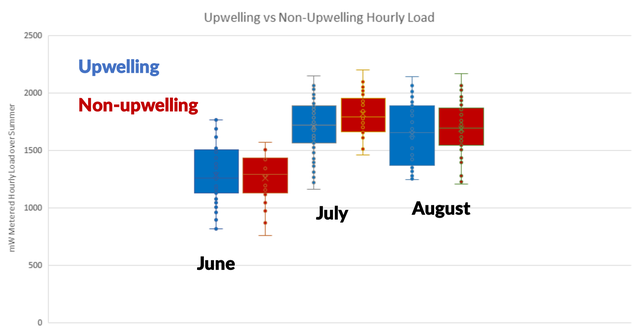


Fig3 A map of the PJM transmission zones including AE (Atlantic City Electric Company) or AECO.

RESULTS

	Count of Days Over Summer			
	2020	2021	2022	Average
Upwelling	54%	42%	77%	58%
Sea Breeze	59%	65%	59%	61%
Overlap	33%	30%	48%	37%



DISCUSSION

The median electricity usage or hourly load for AECO remained comparable between days with upwelling and those without. However, in the context of ongoing research *(Zappala et al., in prep)* we expect these processes to affect power production.

Key Findings

Identified sea breezes occurred on average 61% of all days in summer, upwelling occurred on average 58% of all days.

PJM load was insensitive to these conditions.

Current research indicates that power production is sensitive to these processes.

ACKNOWLEDGEMENTS- RU-COOL, RIOS Interns, the Marine Science Department at Rutgers, Joe Brodie, Joe Gradone, Ronin Costello, Greg Seroka, Chelsie Riche, NJEDA, NJBPU, and Julia Kortrey.

Contact information b.jeury@gmail.com