A Statistical Procedure to Forecast Warm Season Lightning over Portions of the Florida Peninsula

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1. Introduction

Florida leads the nation in cloud to ground (CG) lightning strikes. Atlantic and Gulf of Mexico sea breezes influence lightning patterns. Lightning causes power disruptions, problematic for power companies and social welfare programs. The Florida Power and Light Corporation (FPL) seeks to forecast lightning strikes for power disruption mitigation. L eft: A statistical procedure to forecast lightning then declines for larger KI values between 25 and 30.

2. Data

Radiosonde Data:
- Temperature, humidity, wind speed, and direction
- Soundings from 50 stations
- 4500 soundings from 1989-2002

Lightning Data:
- National Lightning Detection Network (NLDN)
- 395,000 flashes from 1986-2004
- Daily data - midday and late afternoon counts calculated for each area

3. Equation Development

Final Prediction Equations Example: Miami-Dade Area

- Probability of at least one CG flash
- Non-Linear Relationships
- Conditional probability of a Q4 event
- Parameter estimates determined from the data
- Probit and logit functions
- Cox proportional hazards model
- Nonlinear and interaction effects also were addressed

4. Results

Skill scores for all areas

5. Conclusions & Future Work

SUMMARY & CONCLUSIONS
- Lightening wave was found to be the dominant factor contributing to the likelihood of lightning in each area.
- Guidance for eleven areas is provided to the public.
- Considerable skill predicting whether at least one CG flash will occur.
- Quartile scheme does best predicting to within one quartile of the observed
- No additional significant differences were found in the models.
- Guidance is currently being used operationally by FPL during the warm season.

FUTURE WORK
- Use of multiple approach was based on several assumptions that are not always valid.
- Development of larger scale and regional models.
- Development of different models for specific areas.
- Future work will utilize mesoscale models to create spatial forecast fields of lightning probability and amount in the eastern Florida Peninsula.
- Model data will be more accurate, and new techniques to a static and dynamic mesoscale model will be considered.
- Florida Power and Light developed cloud microphysics hopefully predictive of lightning.