



Development of a Severe Weather Forecast Decision Aid for East-Central Florida

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Background



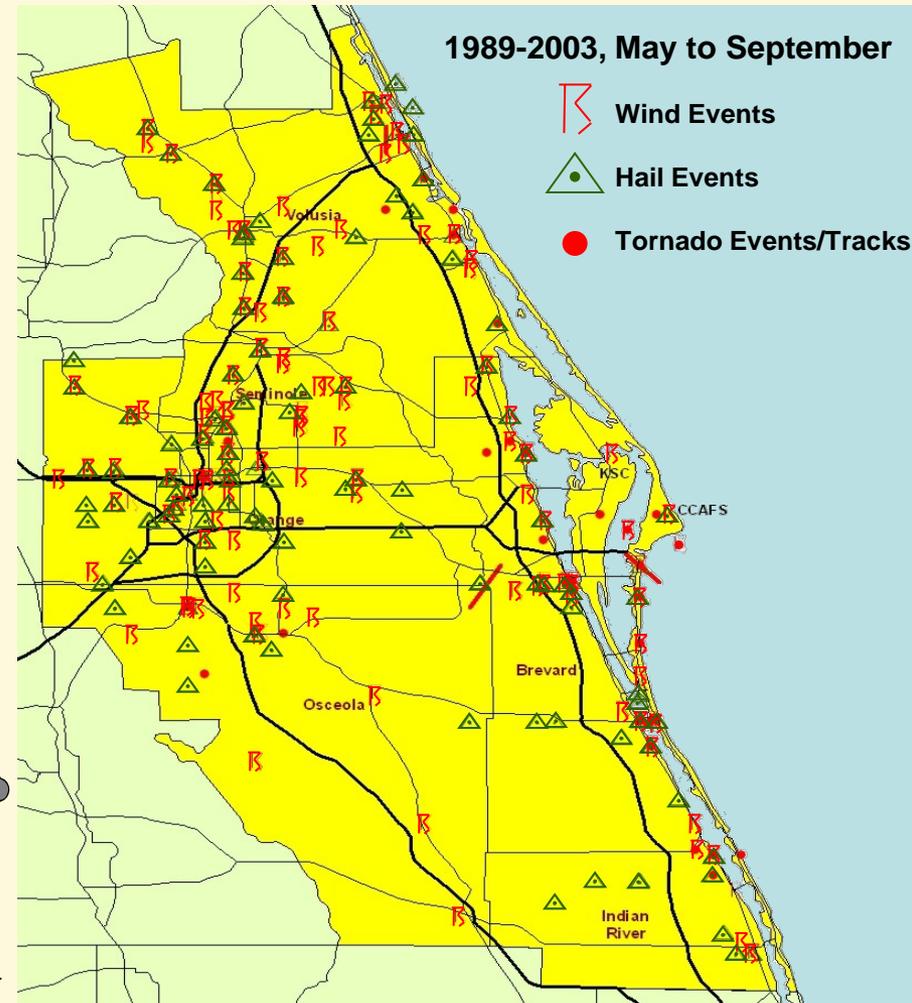
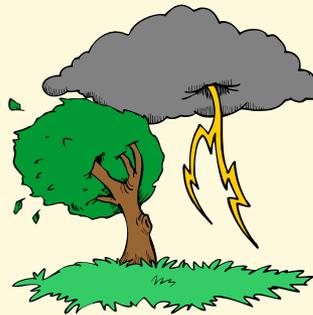
- Goal
 - Develop an objective east-central Florida locally tuned severe weather forecast decision aid
 - Alert forecasters to the possibility of a severe weather event for the day
- Requirement
 - Use information routinely available to forecasters
 - Available for morning briefing
- Functionality
 - An easy-to-use interactive severe weather forecast tool



Data Sets

- Period of record
 - 1989 – 2003
 - May to September
- NCDC and SPC severe weather events data bases
 - Differentiate between severe weather days and days with no reported severe weather
 - Severe weather occurred 13% of all days in POR

“Just because a severe event wasn’t reported doesn’t mean there wasn’t severe weather”

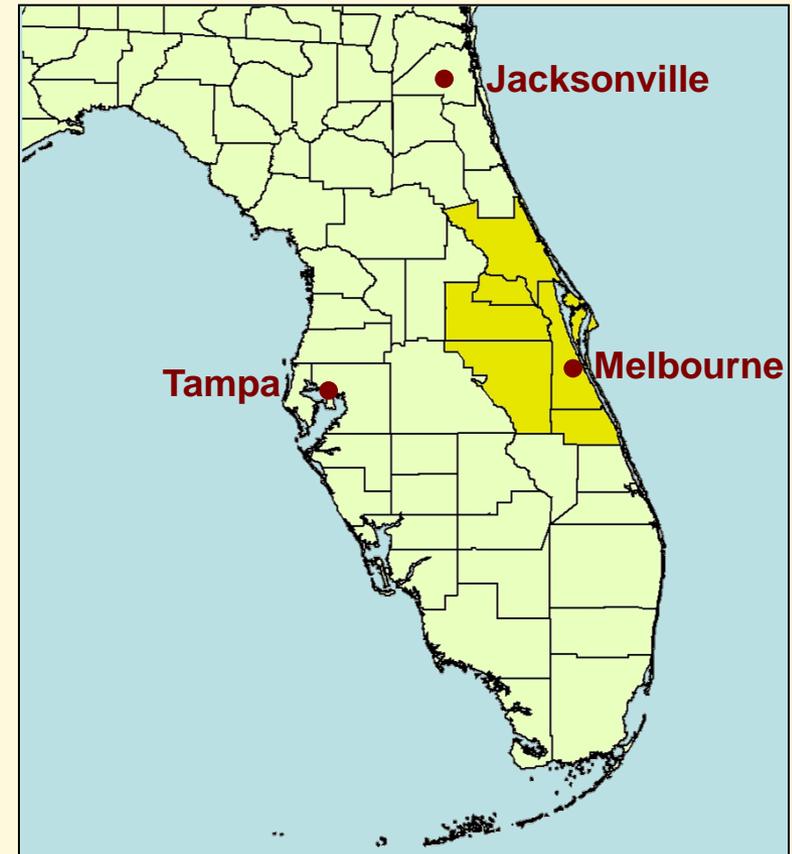




Data Sets

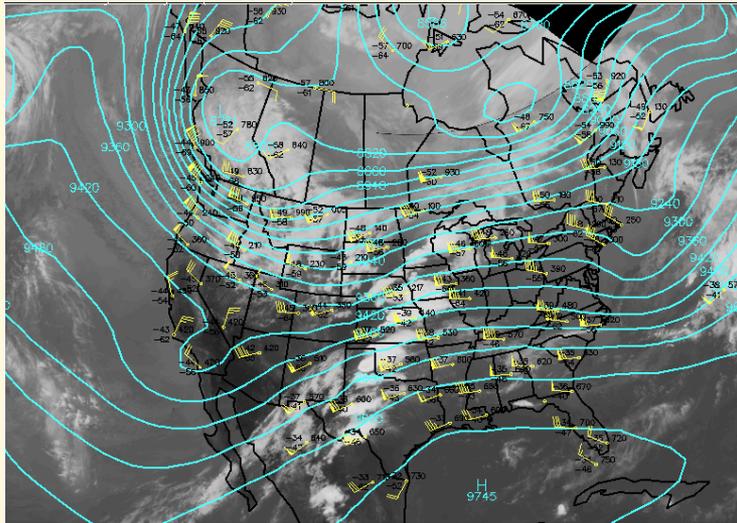


- Local forecast rules
 - 45th Weather Squadron (45 WS) at Cape Canaveral Air Force Station (CCAFS)
 - Visits to select Florida NWS forecast offices
 - Melbourne, Jacksonville and Tampa
 - Jacksonville office was only office of 3 visited to use a severe weather checklist based on sounding stability parameters



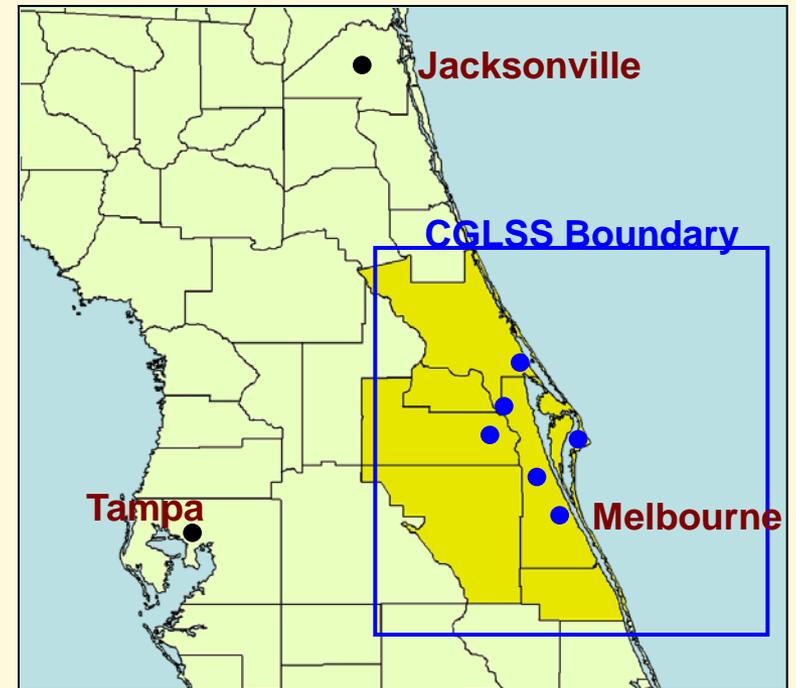
Data Sets

- 250 mb and surface charts
 - Speed max features
 - High pressure ridge position



- Cape Canaveral AFS 1000 UTC (0600 EDT) rawinsonde
 - Calculate stability parameters
 - For morning weather discussion

- Cloud-to-Ground Lightning Surveillance System (CGLSS)
 - Differentiate between lightning and non-lightning days



• CGLSS Antenna Sites



Results – Synoptic Patterns

Occurrence of severe weather for all days in POR

| Surface | | 250 mb | |
|-------------|-----|-------------------------|-----|
| Ridge north | 5% | Speed max overhead | 8% |
| No ridge | 10% | No speed max | 11% |
| Climatology | 13% | Climatology | 13% |
| Ridge south | 22% | Divergence | 18% |
| | | Speed max entrance/exit | 19% |



Results – Thresholds & Stability



- Calculated stability indices for each type of day (severe days, lightning days, and non-lightning days) based on the morning CCAFS sounding
- Evaluated relationship between each stability parameter from the soundings and the threshold criteria for the severe weather threat
 - 45 WS Severe Weather Worksheet
 - JAX Severe Weather Checklist
 - Forecaster experience
 - National criteria (if nothing local was available)





Results – Stability Parameters



- Stability parameters that indicated > 20% occurrence of severe weather – but only at highest thresholds
 - Total Totals > 48
 - Lifted Index < -5
 - Thompson Index ≥ 40
 - Showalter Stability Index < -2
 - Cross Totals ≥ 24
 - CAPE FMaxT > 3500 J/Kg
 - K-Index < 26 (only 8% occurrence)
 - Precipitable Water < 1.0" (only 3% occurrence)





Results – Stability Parameters



- Stability parameters that indicated similar occurrence of severe weather – at all thresholds & close to climatology
 - SWEAT
 - CAPE
 - CAPE $\text{Max}\theta_e$
 - T_{500}
 - Helicity





Severe Weather Forecast Decision Aid



- Interactive, web-based
- Not completely objective
- Only included parameters showing direct relationship to occurrence of severe weather
- Higher the *Total Threat Score*, greater chance of severe weather
 - Tested by forecasters
 - AMU will evaluate
- [Demo](#)





Summary



- Used several warm season data sets from 1989-2003
- Categorized all days into severe weather, lightning only or no lightning and no severe weather
- Examined synoptic features and stability parameters
- Developed an east-central Florida locally tuned Severe Weather Forecast Decision Aid
- Tested by forecasters Summer 2005

<http://science.ksc.nasa.gov/amu>