

Central Florida Flow Regime Based Climatologies of Lightning Probabilities

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The threat of lightning is a daily concern during the warm season in Florida. Research has revealed distinct spatial and temporal distributions of lightning occurrence that are strongly influenced by large-scale atmospheric flow regimes. In previous work, the Applied Meteorology Unit (AMU) calculated the probability of lightning climatologies using gridded lightning data for the large-scale flow regimes at 1-, 3- and 6-hr intervals, in 5-, 10-, 20-, and 30-NM diameter range rings around the Shuttle Landing Facility (SLF) and eight other airfields within the National Weather Service Melbourne (NWS MLB) county warning area (CWA). These climatologies were made available to forecasters in a graphical user interface (GUI) for quick and easy access.

For this work, the AMU recalculated the lightning climatologies for the SLF and the eight airfields in the NWS MLB CWA using individual lightning strike data to improve the accuracy of the climatologies. The AMU also updated the GUI with the new data. As in the previous work, the AMU stratified the climatologies for each location by time interval, distance and flow regime. In addition to these updates, the AMU included all data regardless of flow regime as one of the stratifications, added monthly stratifications, used modified flow regimes, and added three years of data to the period of record.

The AMU used individual strike data from the National Lightning Detection Network (NLDN) instead of NLDN gridded lightning data to create more accurate climatological values for each range ring than was possible with the gridded data set. Individual strike data had the following advantages over gridded data:

- Simplified the data processing,
- Provided more accurate (temporal and spatial) climatologies, and
- Did not require estimating circular range rings from square grids.

In addition, to better meet customer requirements, the AMU made changes such that the 5- and 10-NM radius range rings are consistent with the aviation forecast requirements at NWS MLB, while the 20- and 30-NM radius range rings at the SLF assist SMG in making forecasts for weather Flight Rule violations of lightning occurrence during a Shuttle landings .

The NLDN individual lightning strike data were provided to the 45th Weather Squadron by the 14th Weather Squadron (14 WS) Strategic Climatic Information Service for use by the AMU staff. The NLDN database contains lightning strike data provided to the 14 WS by Vaisala Inc., in Tucson AZ. The 14 WS customized the dataset for the AMU and provided files that included the date, time, latitude and longitude, polarity and strength of every strike within a 30 NM radius of the center of the runway for each site and included the years 1989-2007.

The results were presented in tabular and graphical format and incorporated into a web-based GUI so forecasters could easily navigate through the large amount of data. The GUI's HyperText Markup Language format makes it usable in most web browsers on computers with different operating systems.

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14. ABSTRACT The threat of lightning is a daily concern during the warm season in Florida. Research has revealed distinct spatial and temporal distributions of lightning occurrence that are strongly influenced by large-scale atmospheric flow regimes. Previously, the Applied Meteorology Unit (AMU) calculated the gridded lightning climatologies based on seven flow regimes over Florida for 1-, 3- and 6-hr intervals in 5-, 10-, 20-, and 30-NM diameter range rings around the Shuttle Landing Facility (SLF) and eight other airfields in the National Weather Service in Melbourne (NWS MLB) county warning area (CWA). In this update to the work, the AMU recalculated the lightning climatologies for using individual lightning strike data to improve the accuracy of the climatologies. The AMU included all data regardless of flow regime as one of the stratifications, added monthly stratifications, added three years of data to the period of record and used modified flow regimes based work from the AMU's Objective Lightning Probability Forecast Tool, Phase II. The AMU made changes so the 5- and 10-NM radius range rings are consistent with the aviation forecast requirements at NWS MLB, while the 20- and 30-NM radius range rings at the SLF assist the Spaceflight Meteorology Group in making forecasts for weather Flight Rule violations during Shuttle landings. The AMU also updated the graphical user interface with the new data.					
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