The Quality Control Algorithms used in the Creation of NASA Kennedy Space Center
Lightning Protection System Towers Meteorological Database
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An accurate database of meteorological data is essential for designing any aerospace vehicle and for preparing launch commit criteria. Meteorological instrumentation were recently placed on the three Lightning Protection System (LPS) towers at Kennedy Space Center (KSC) launch complex 39B (LC-39B), which provide a unique meteorological dataset existing at the launch complex over an extensive altitude range. Data records of temperature, dew point, relative humidity, wind speed, and wind direction are produced at 40, 78, 116, and 139 m at each tower. The Marshall Space Flight Center Natural Environments Branch (EV44) received an archive that consists of one-minute averaged measurements for the period of record of January 2011 – April 2015. However, before the received database could be used EV44 needed to remove any erroneous data from within the database through a comprehensive quality control (QC) process. The QC process applied to the LPS towers' meteorological data is similar to other QC processes developed by EV44, which were used in the creation of meteorological databases for other towers at KSC. The QC process utilized in this study has been modified specifically for use with the LPS tower database. The QC process first includes a check of each individual sensor. This check includes removing any unrealistic data and checking the temporal consistency of each variable. Next, data from all three sensors at each height are checked against each other, checked against climatology, and checked for sensors that erroneously report a constant value. Then, a vertical consistency check of each variable at each tower is completed. Last, the upwind sensor at each level is selected to minimize the influence of the towers and other structures at LC-39B on the measurements. The selection process for the upwind sensor implemented a study of tower-induced turbulence. This paper describes in detail the QC process, QC results, and the attributes of the LPS towers meteorological database.