

Quantifying and Visualizing the “Completeness” of the WSR-88D Archive for Severe Weather Events

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Multi-Year Reanalysis of Remotely Sensed Storms (MYRORSS)

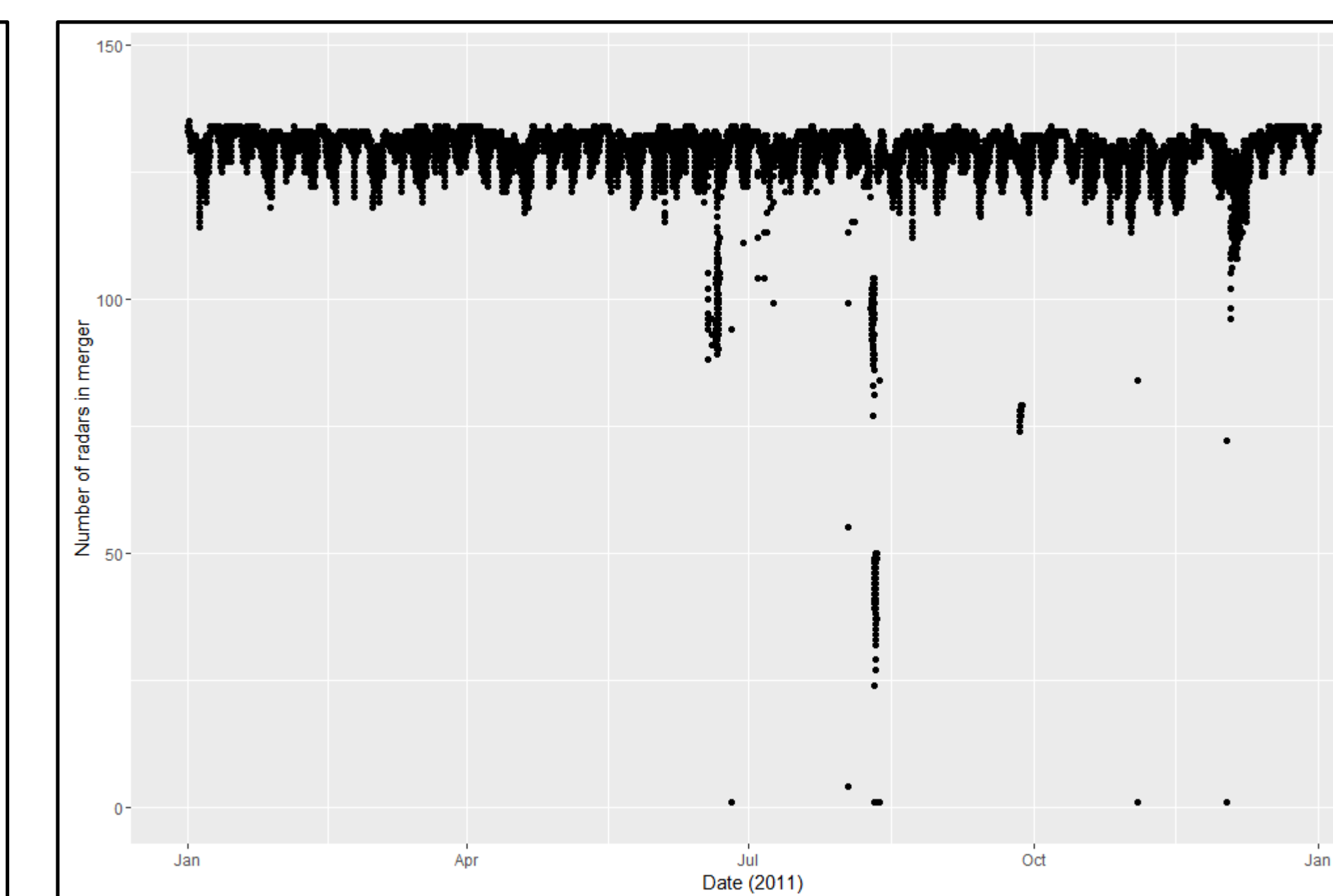
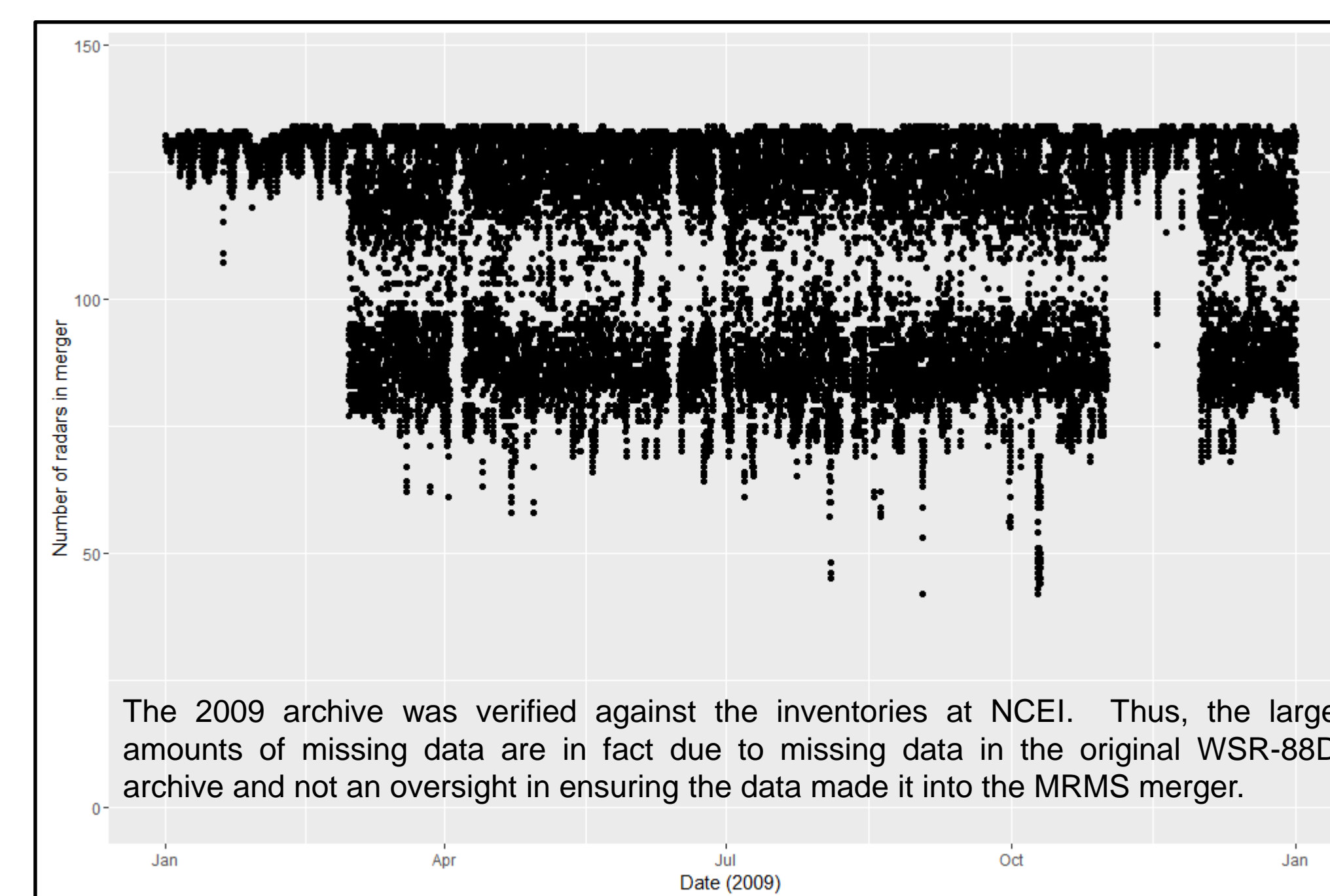
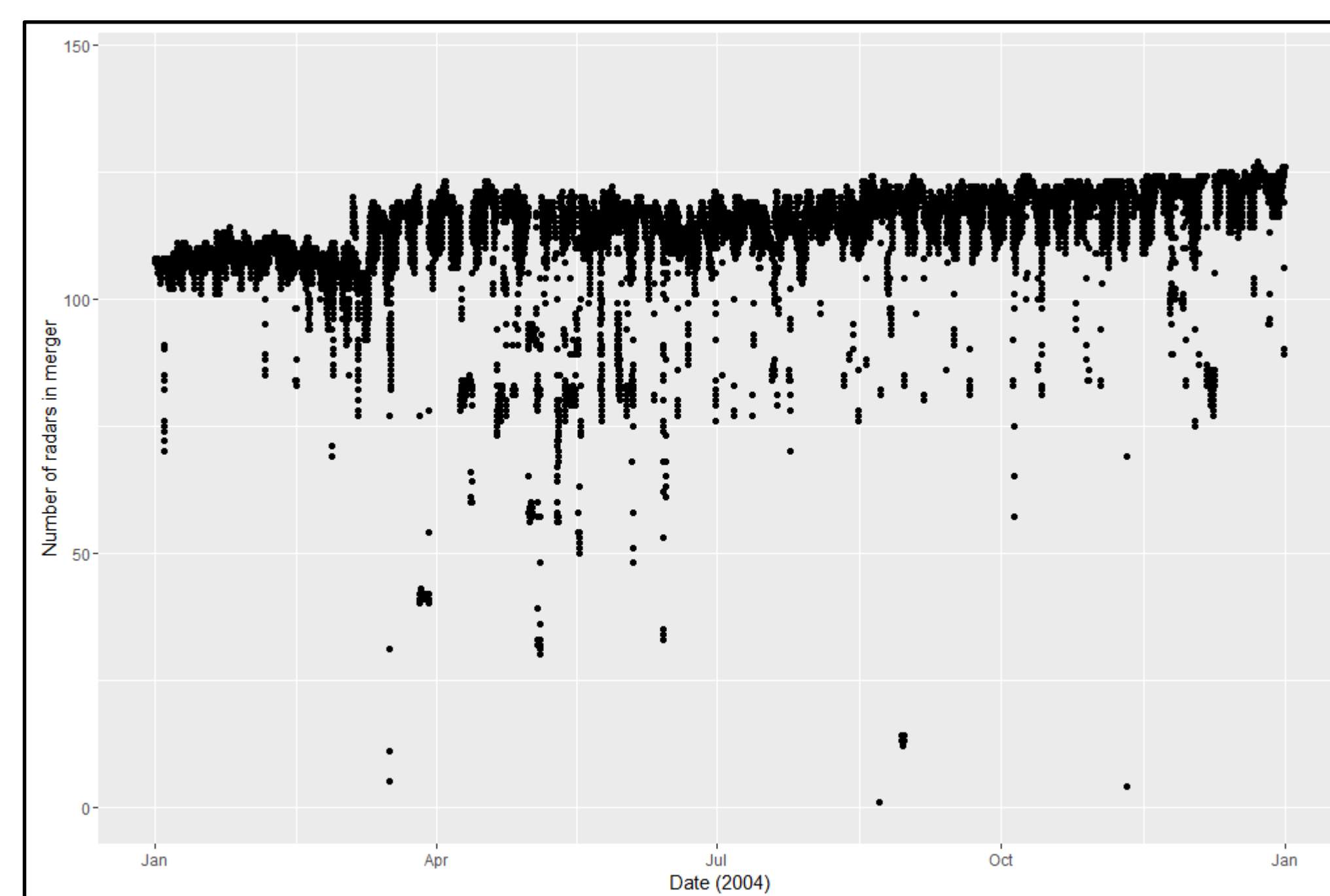
OU/CIMMS, NCSU/CICS, and NOAA’s NSSL and NCEI have been processing and quality controlling a large part of the WSR-88D archive through the Warning Decision Support System—Integrated Information (WDSS-II) to produce a Multi-Radar, Multi-Sensor (MRMS) archive for the contiguous United States.

The input table records for the MRMS merger are compared to *Storm Data* reports and NLDN lightning detections. The distance to the nearest active radar was calculated, while also recording the radar’s VCP. The maximum range from radar in which data was included was 400 km, thus using reports and lightning detections where the nearest active radar was more than 400 km away can reveal days and areas where MRMS coverage was unavailable. The merger records record records the radars ingested into the merger volume and the age of the record. Should radars age beyond 1.5x of the current VCP completion time, they are excluded from future merger volumes. For 88D systems, this means data older than 15 minutes is always excluded since the clear-air VCPs take ~10 minutes to complete.

The exploration of the completeness of the WSR-88D archive allows for investigations into the quality of the MRMS data produced and an additional check for whether all of the WSR-88D was in fact input into the mergers; summarizations of the number of storm events each year which are not effectively sampled by the network; and visualize changes in the operations of the WSR-88D network.

Radars per Merger Volume

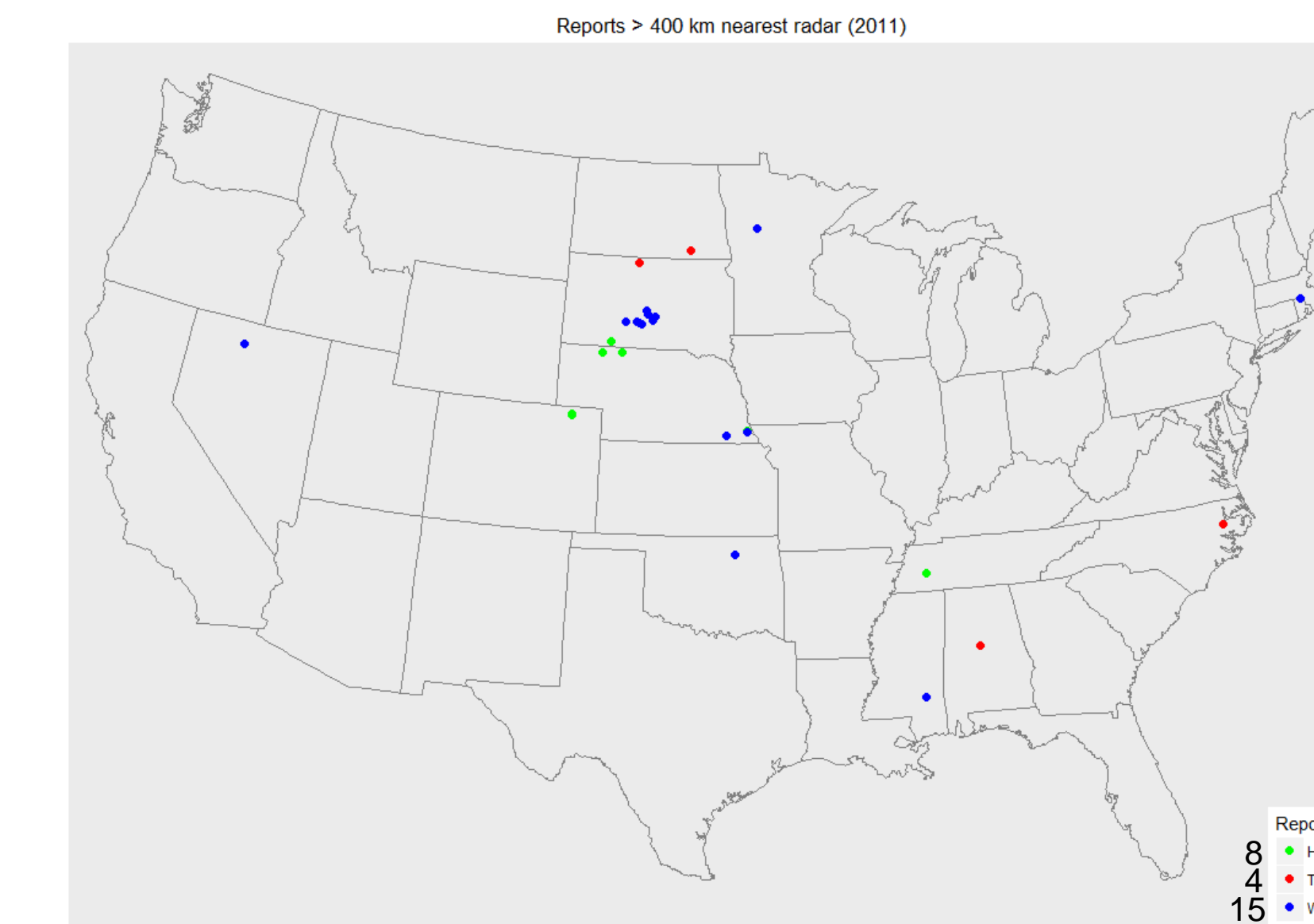
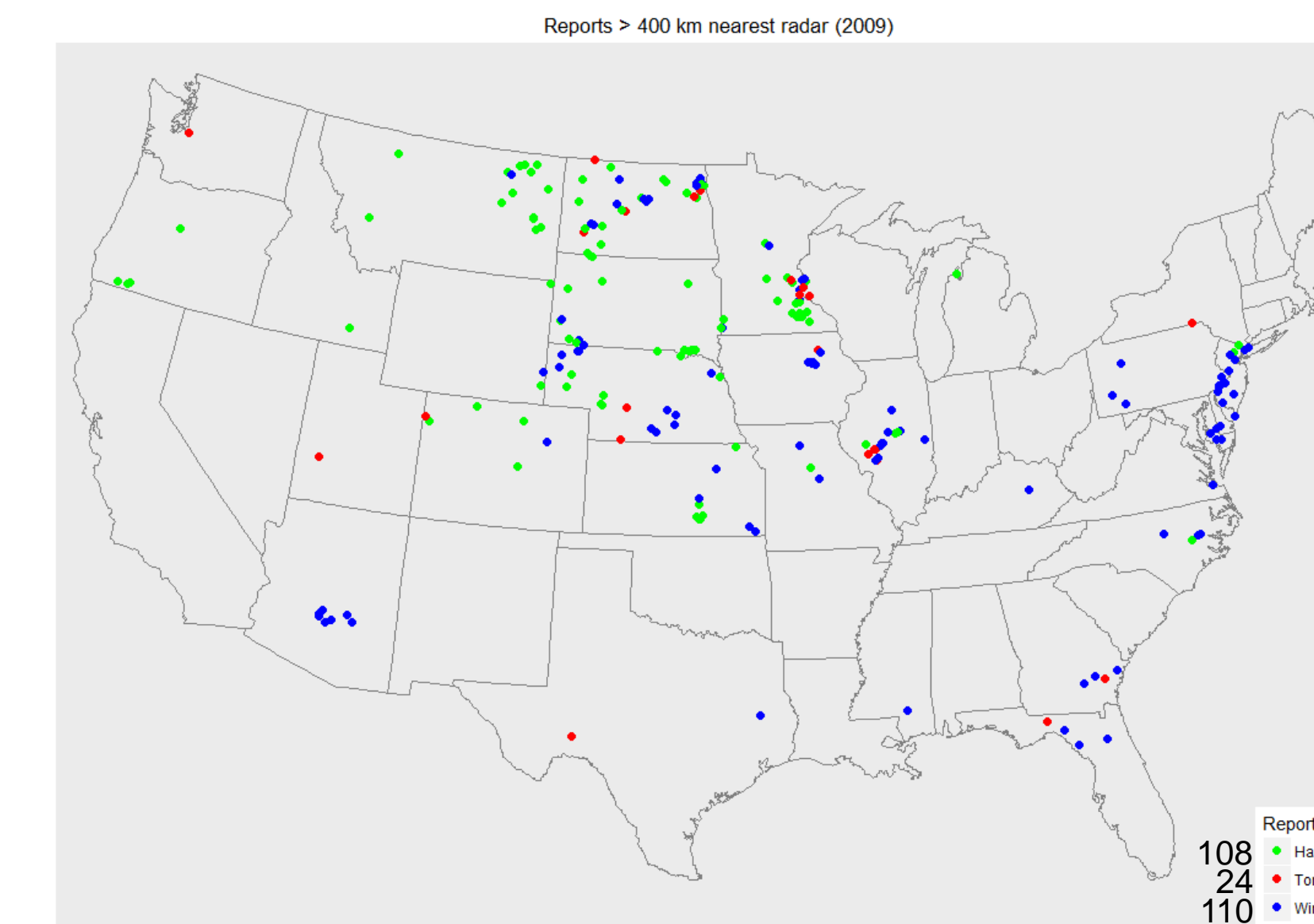
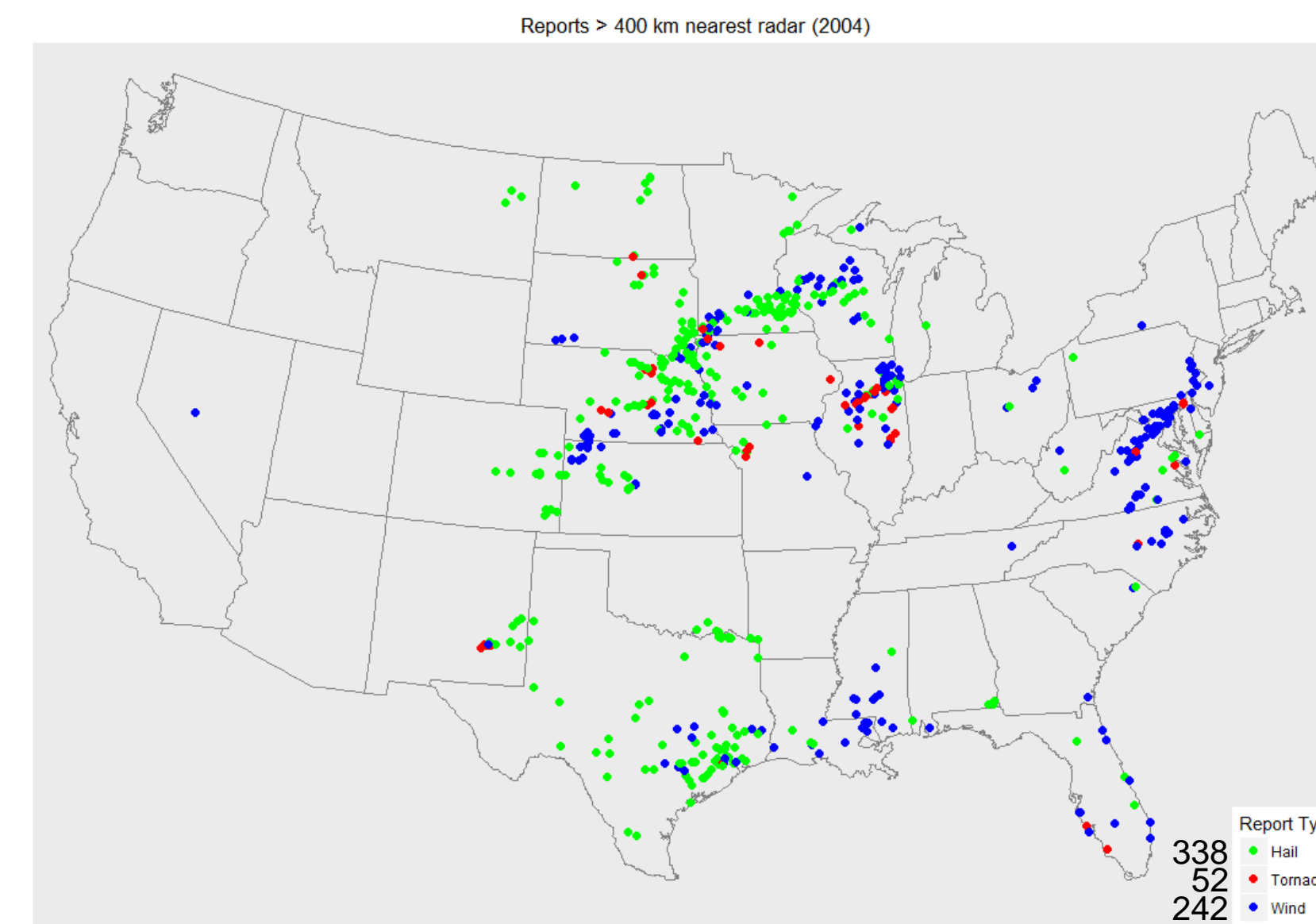
- Early years have the fewest avg. number of radars
- All years show # of radars / volume greatly fluctuates from day-to-day and volume-to-volume
- 2009: highly incomplete archive w/ several hours per day of many radars missing



Number of radars in the merger for 2004 (left), 2009 (center), and 2011 (right). Each point represents an individual volume with ~5 minute spacing.

“Uncovered” Storm Reports

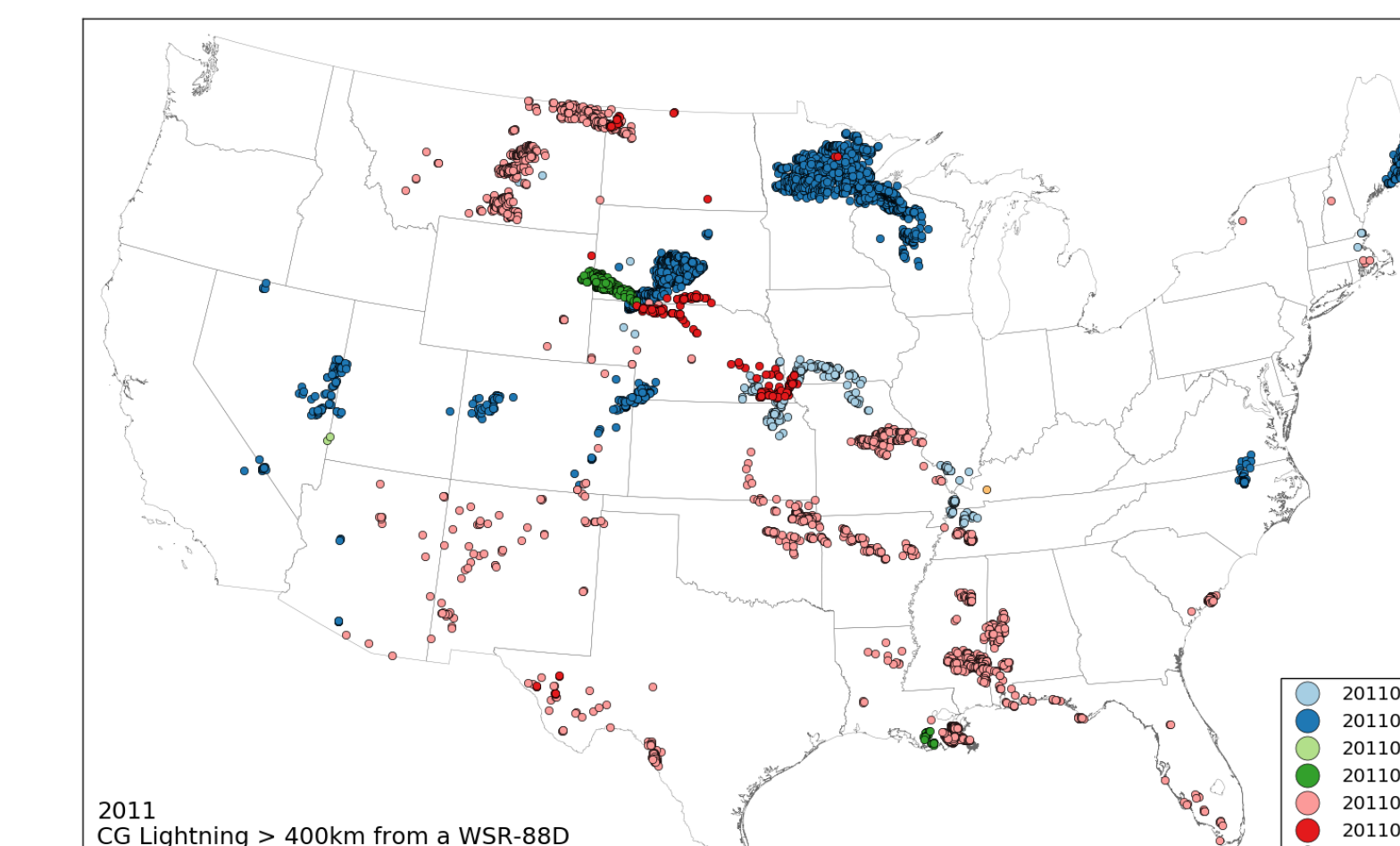
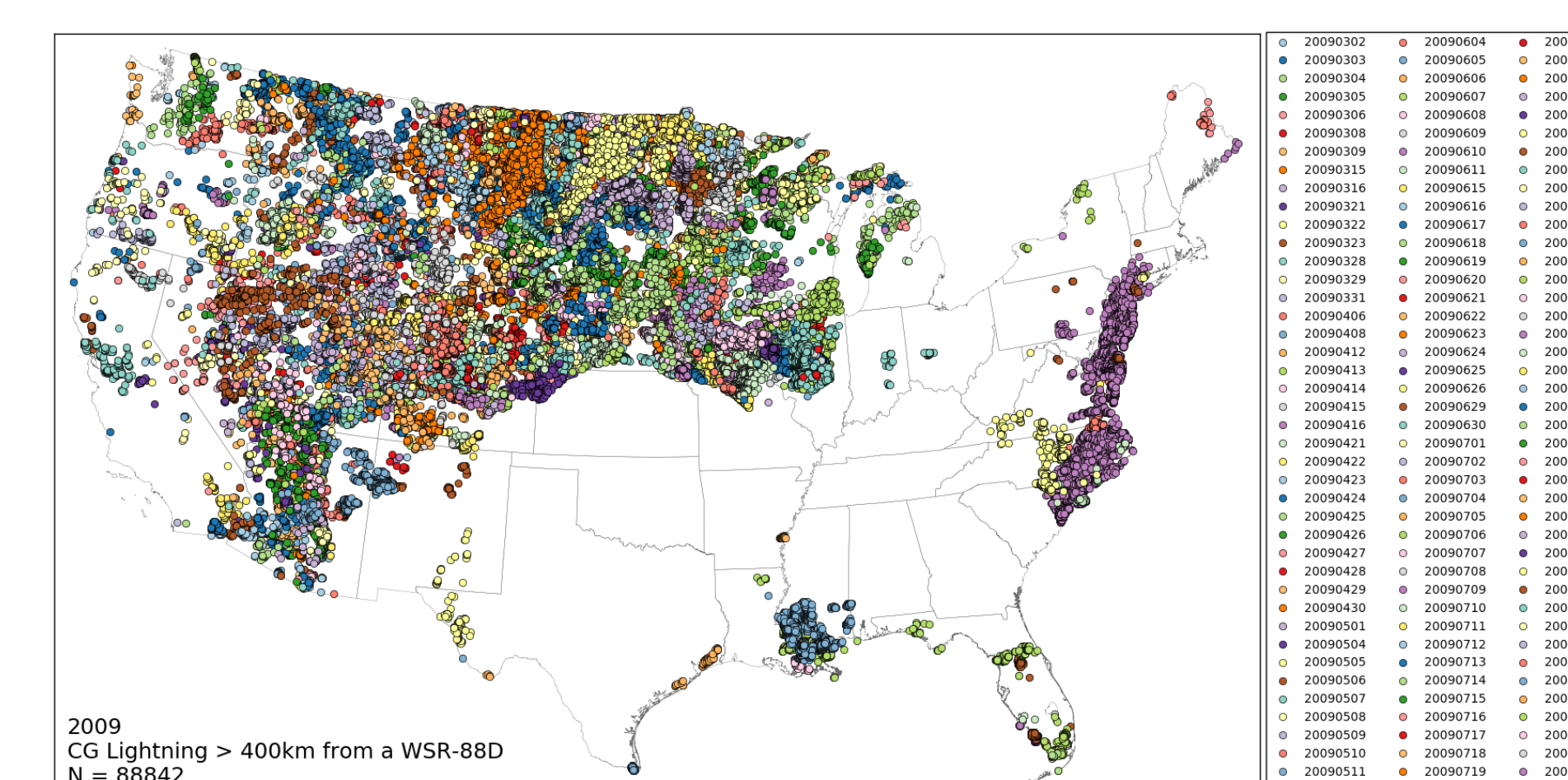
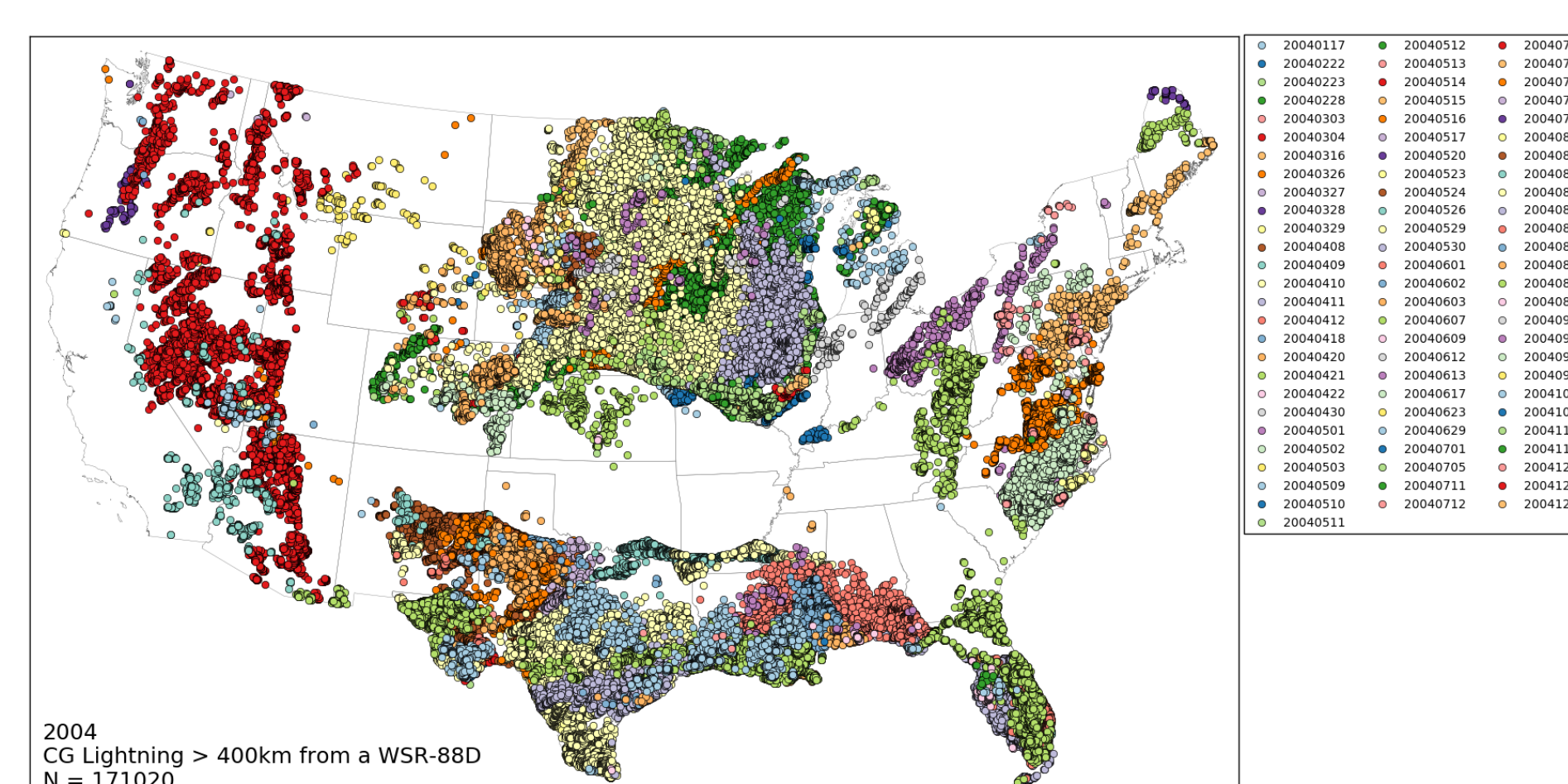
- The number and geographical coverage of “uncovered” storm reports varied from year to year
- 2009: while missing data from the archive was plentiful, “uncovered” reports fewer than 2004
- Overall, usually < 3% reports uncovered



Location and type of report not within 400 km of the nearest radar, and thus not covered by MYRORSS MRMS products

“Uncovered” Lightning

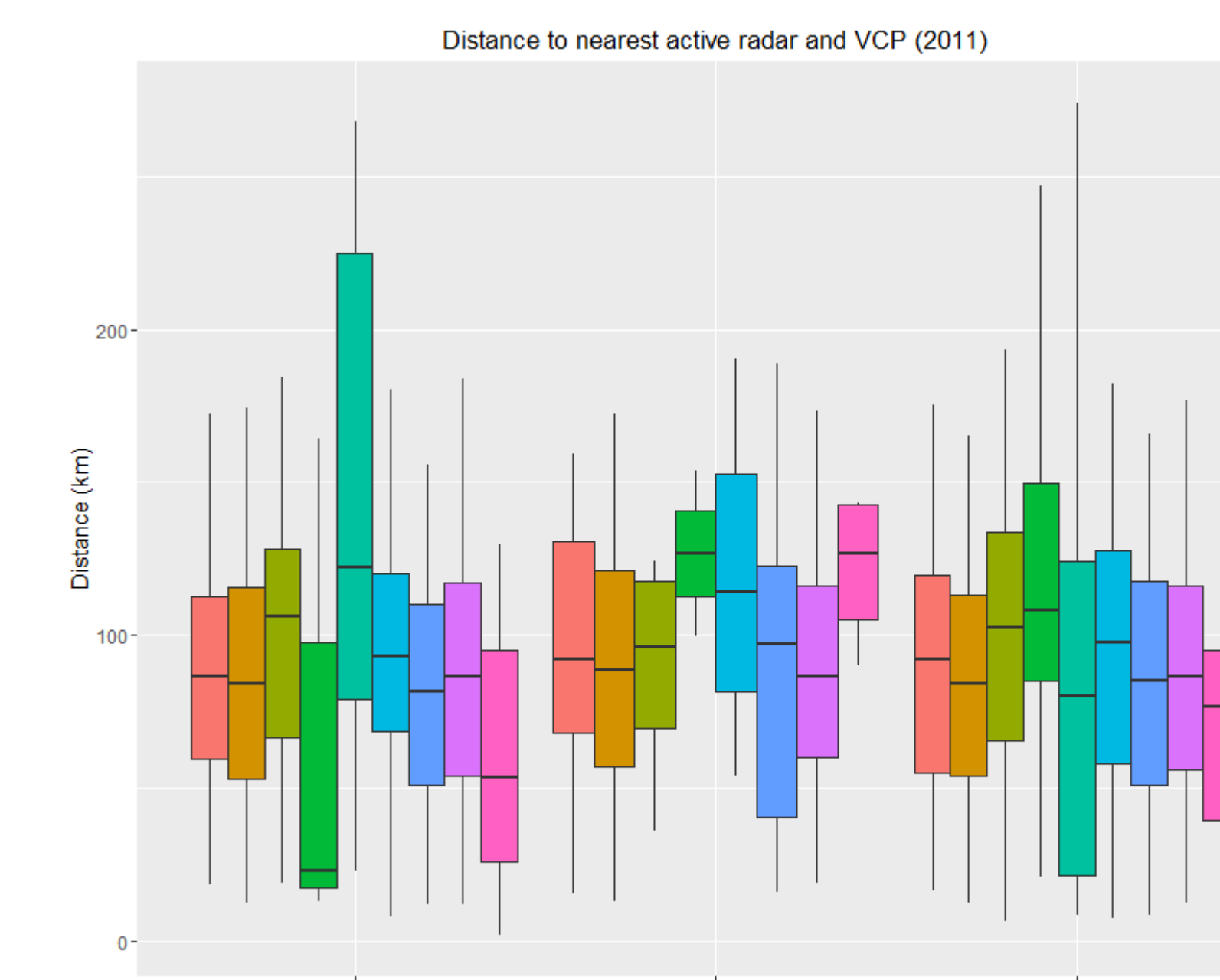
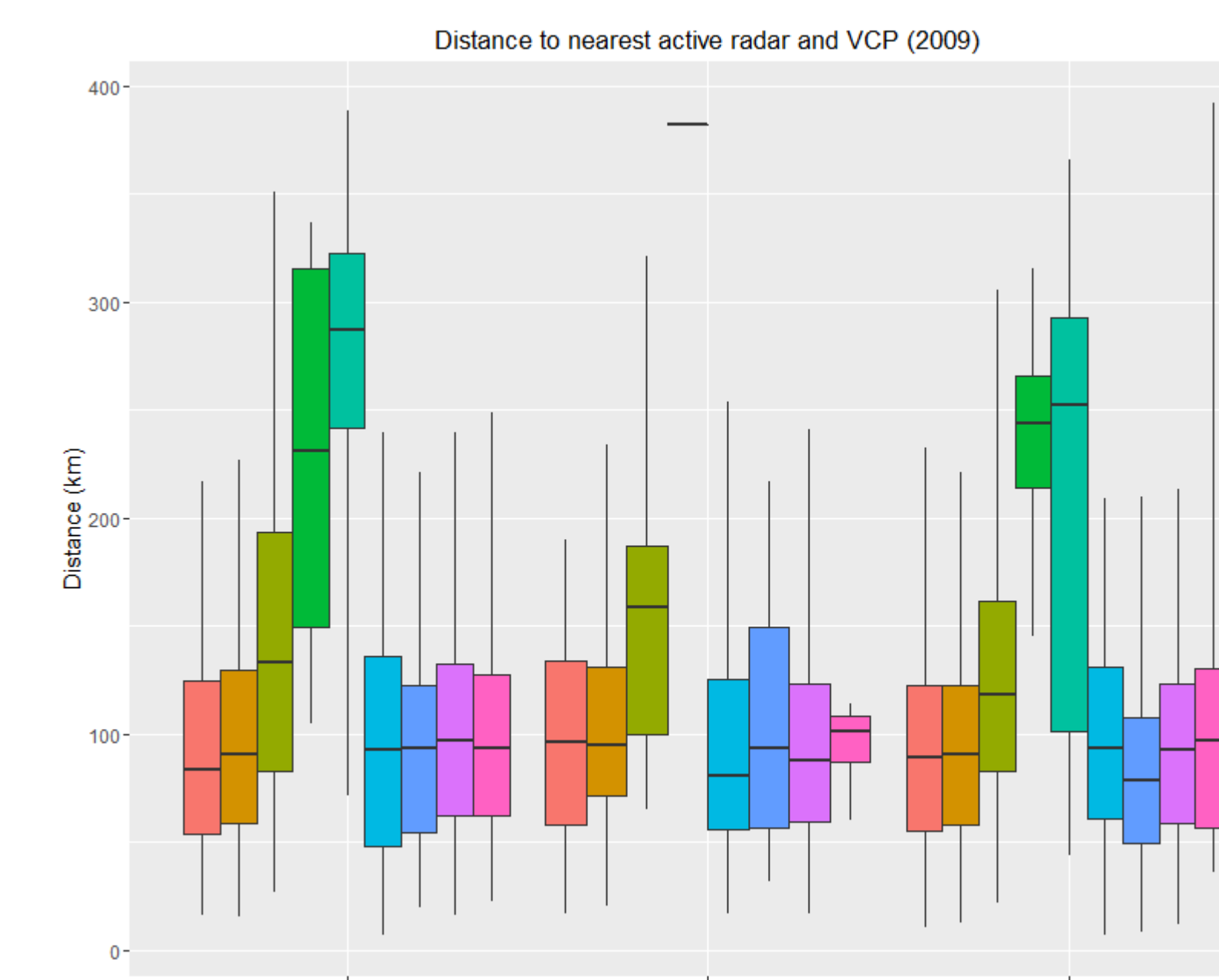
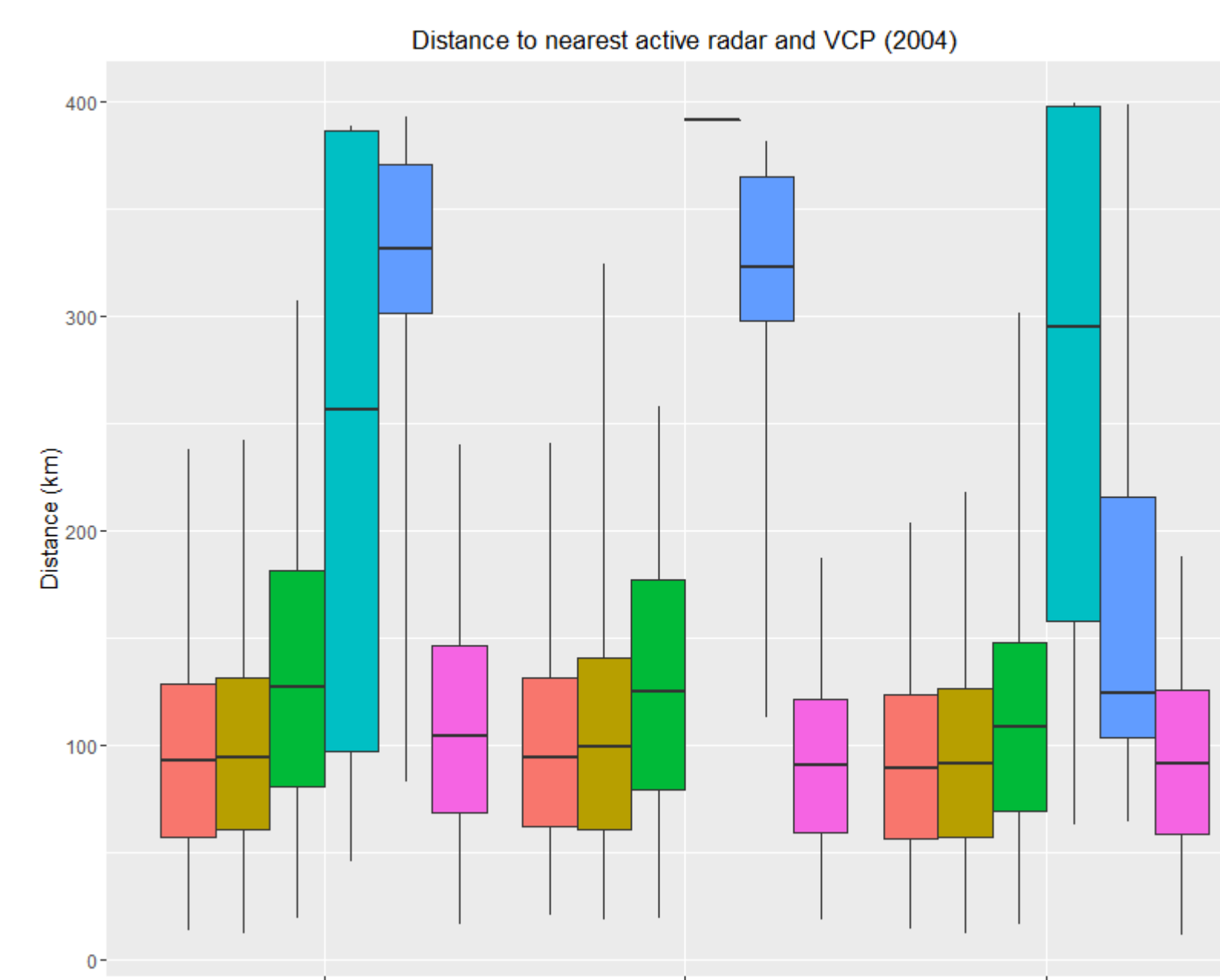
- “Uncovered” lightning also highly variable from year-to-year
- Amount of “uncovered” lightning ~ “uncovered” reports
- Lightning provides the best, “3rd party” data to help check that all radars in fact made it into the MRMS merger



NLDN lightning strikes not within 400 km of an active radar. The colors are the different convective days on which the strikes occurred.

Nearest Radar and VCP Selection

- Clear-air mode (31/32) selections w/ far distances imply actual nearest radar not available; clear-air mode with shorter distances are more problematic but very rare (<<1%)
- Median distances for all reports and all non-clear air mode VCPs ~75-80 km



Distance to the nearest active radar (w/in 400 km) and that radar’s VCP for different storm report types.