



Technical Basis for the EPA's Development of Significant Impact Levels for PM_{2.5} and Ozone, Appendices

Does Not Represent Final Agency Action; Draft for Public Review & Comment, August 1, 2016

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EPA-454/D-16-001b

August 2016

Technical Basis for the EPA's Development of Significant Impact Levels for PM_{2.5} and Ozone,
Appendices

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1 Bootstrap examples

Bootstrap examples from selects PM_{2.5} sites for the 2008-2010 DV period. Top left, top right, and middle left plots show the distribution of daily PM concentrations for 2008, 2009, and 2010, respectively. The vertical red line shows the annual mean and the vertical blue line shows the annual 98th percentile. Middle left plots show sample distributions of resampled data from 2008, along with the annual mean and the 98th percentile from each resample. The bottom left plots show the distribution of the annual DVs from the 20,000 resampled DV periods (2008-2010). The bottom right plots show the distribution of the 24-hr DVs from the 20,000 resampled DV periods (2008-2010)

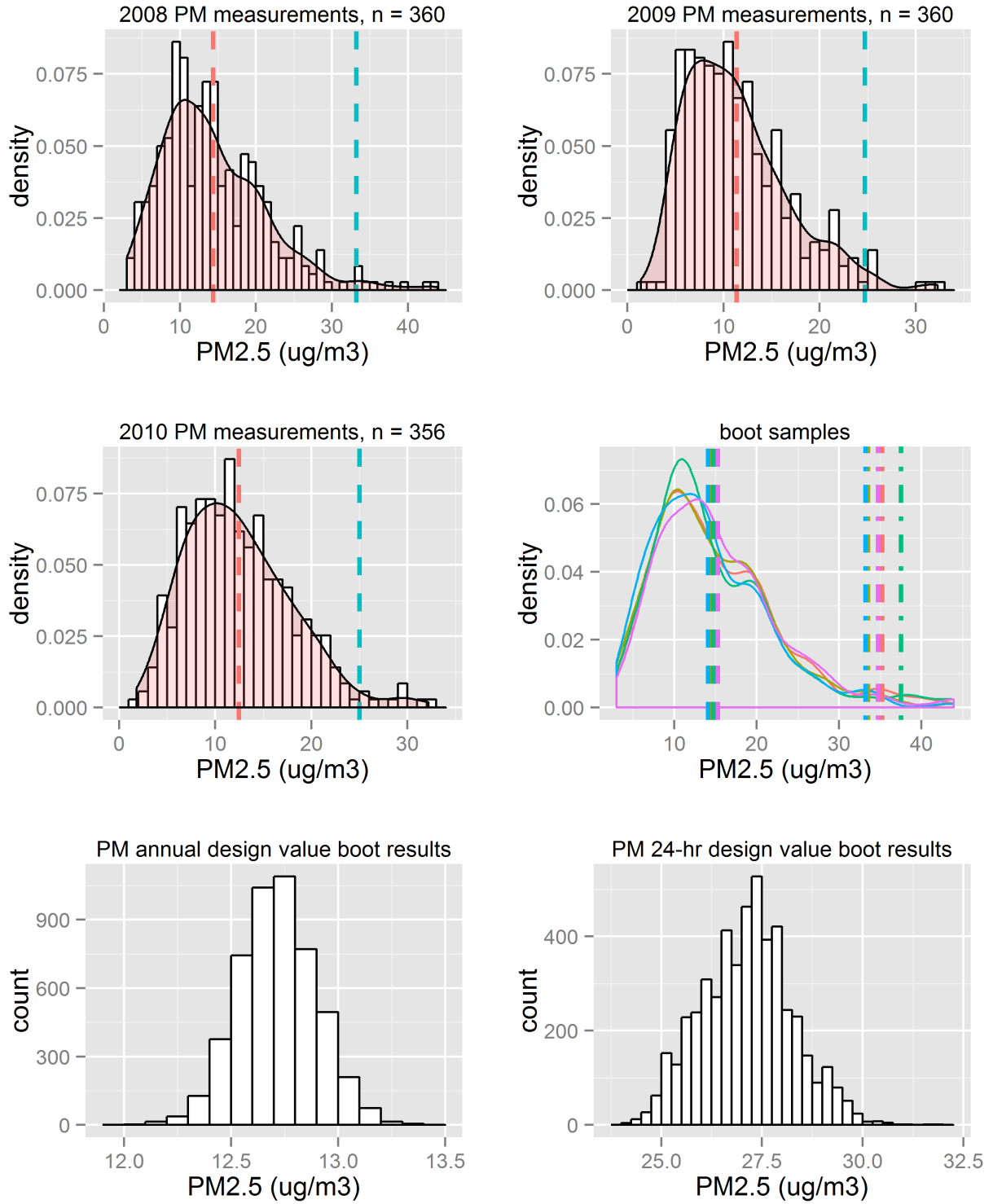


Figure 1: Example from site 10732003.

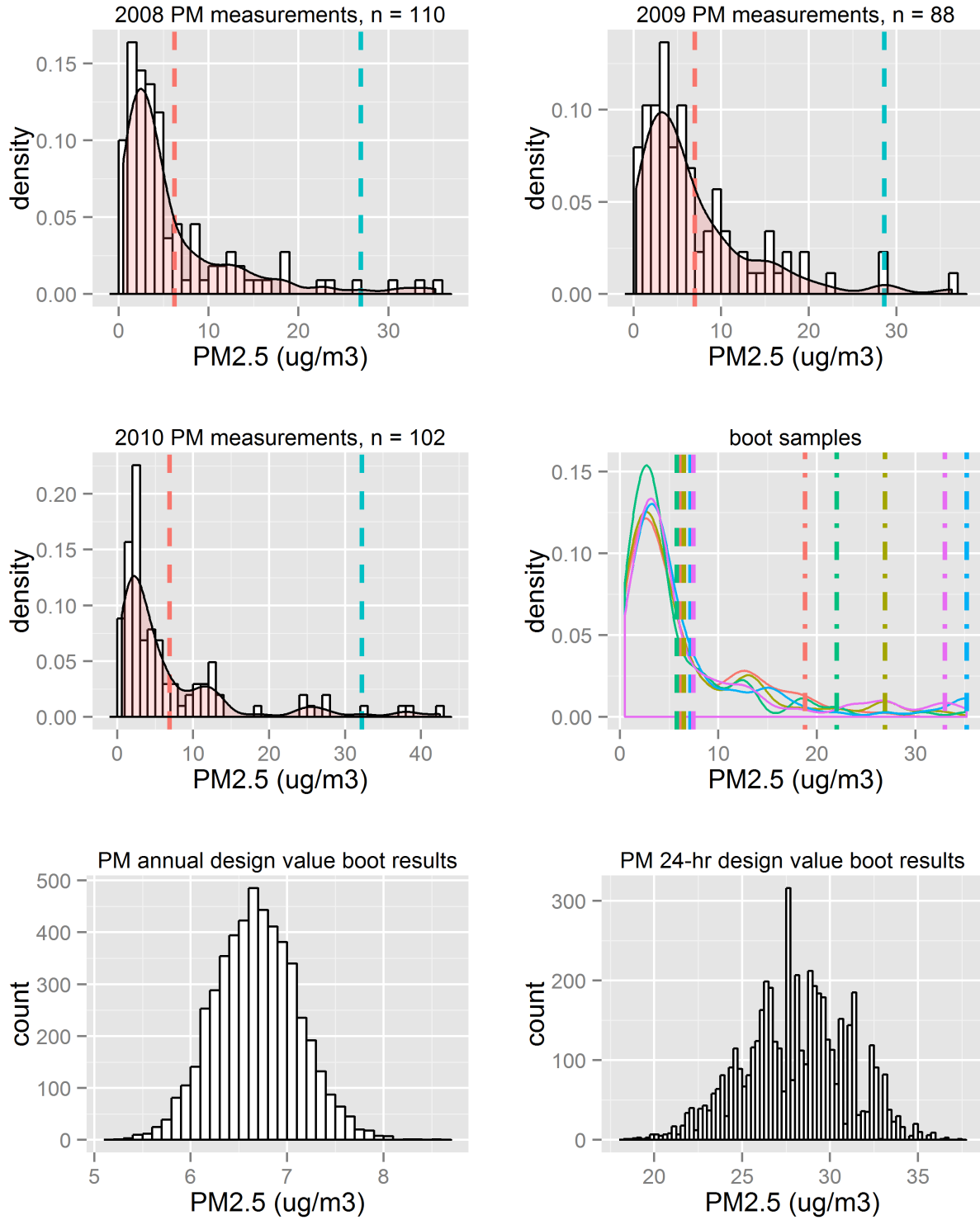


Figure 2: Example from site 21700008.

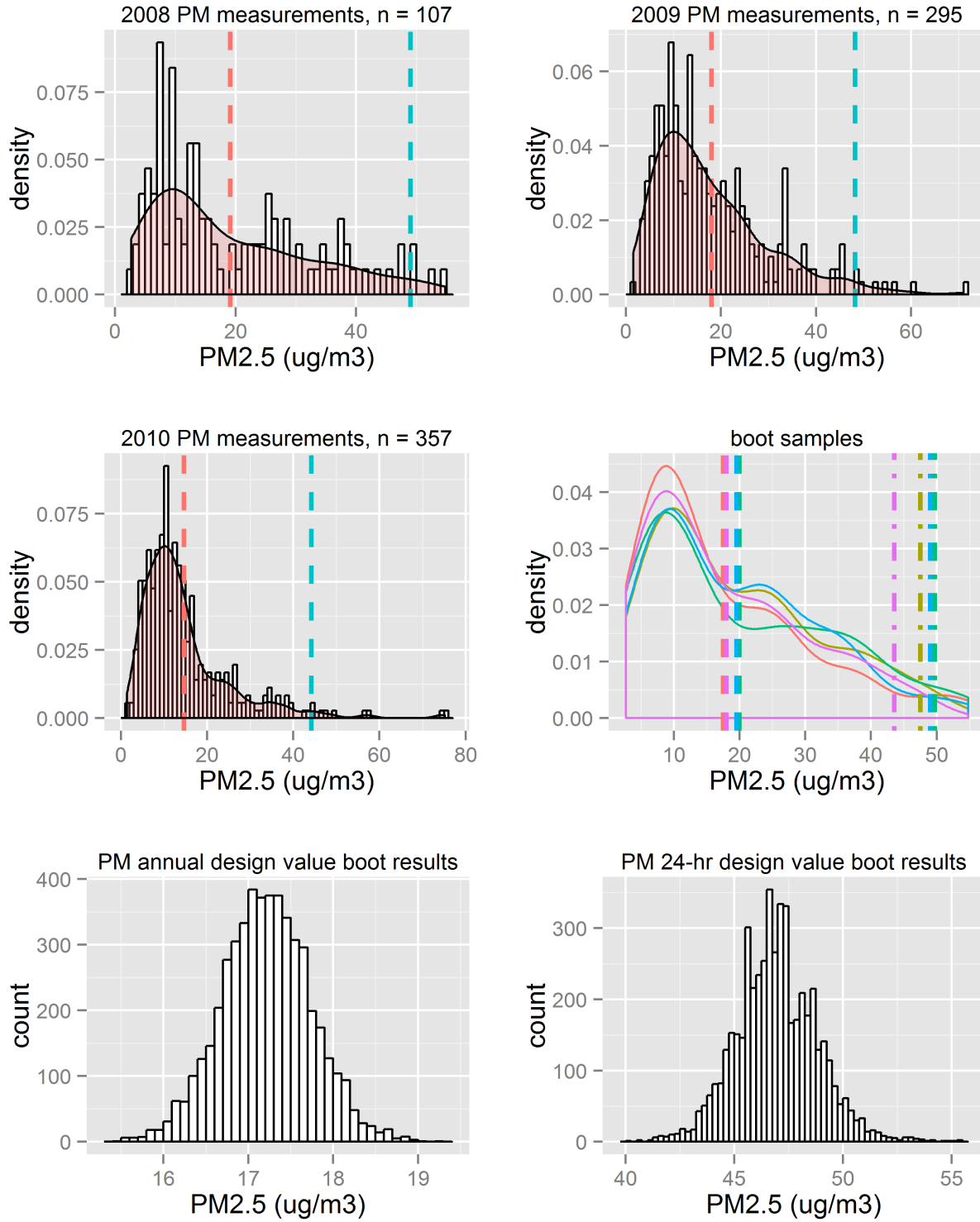


Figure 3: Example from site 60195001.

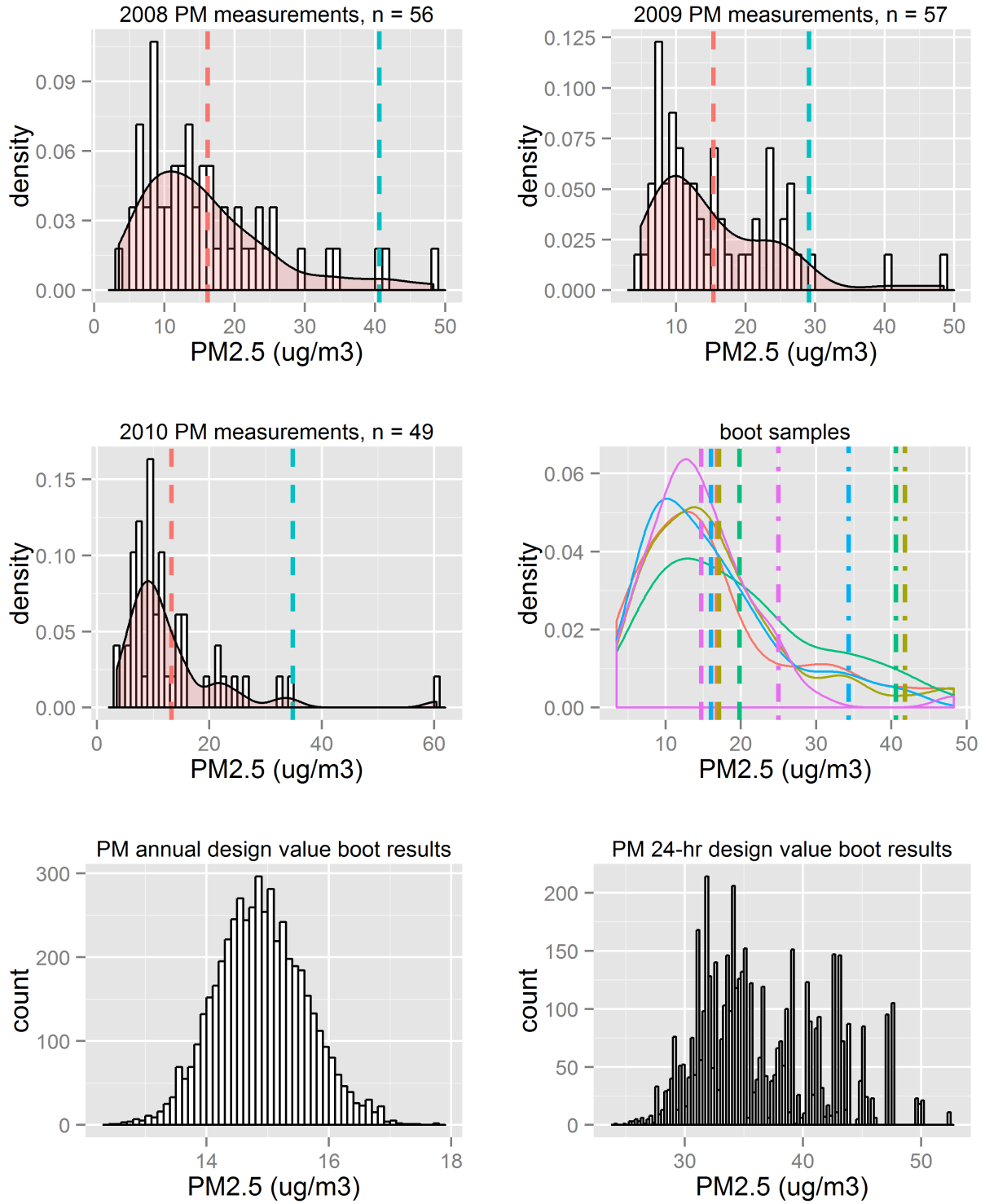


Figure 4: Example from site 481410053.

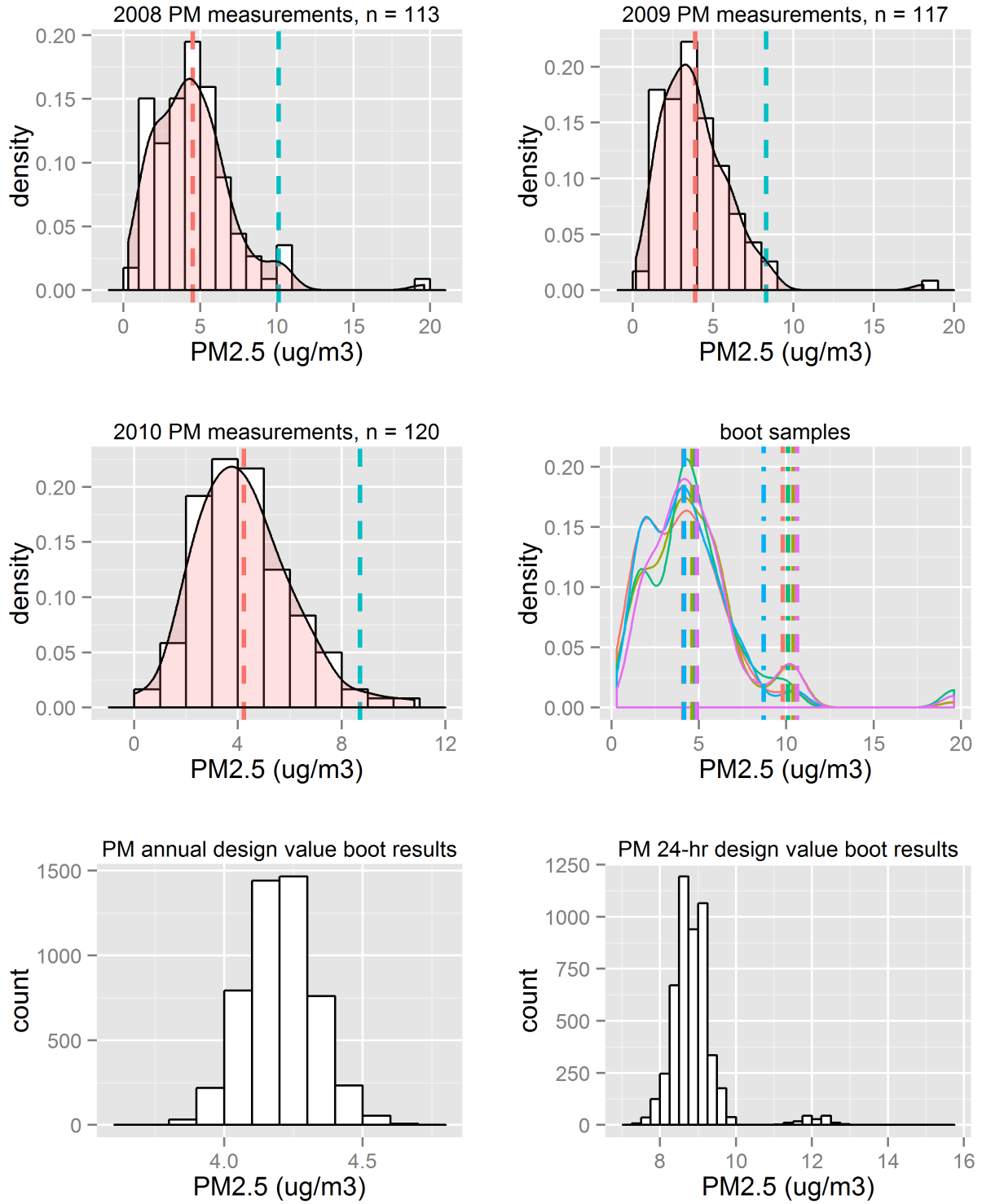


Figure 5: Example from site 560210001.

2 Ozone results

Bootstrap results for ozone data from the years 2000-2013. Each section contains a single DV period, *e.g.*, the results for 2013 include data from 2011-2013.

2.1 2011-2013 ozone bootstrap results

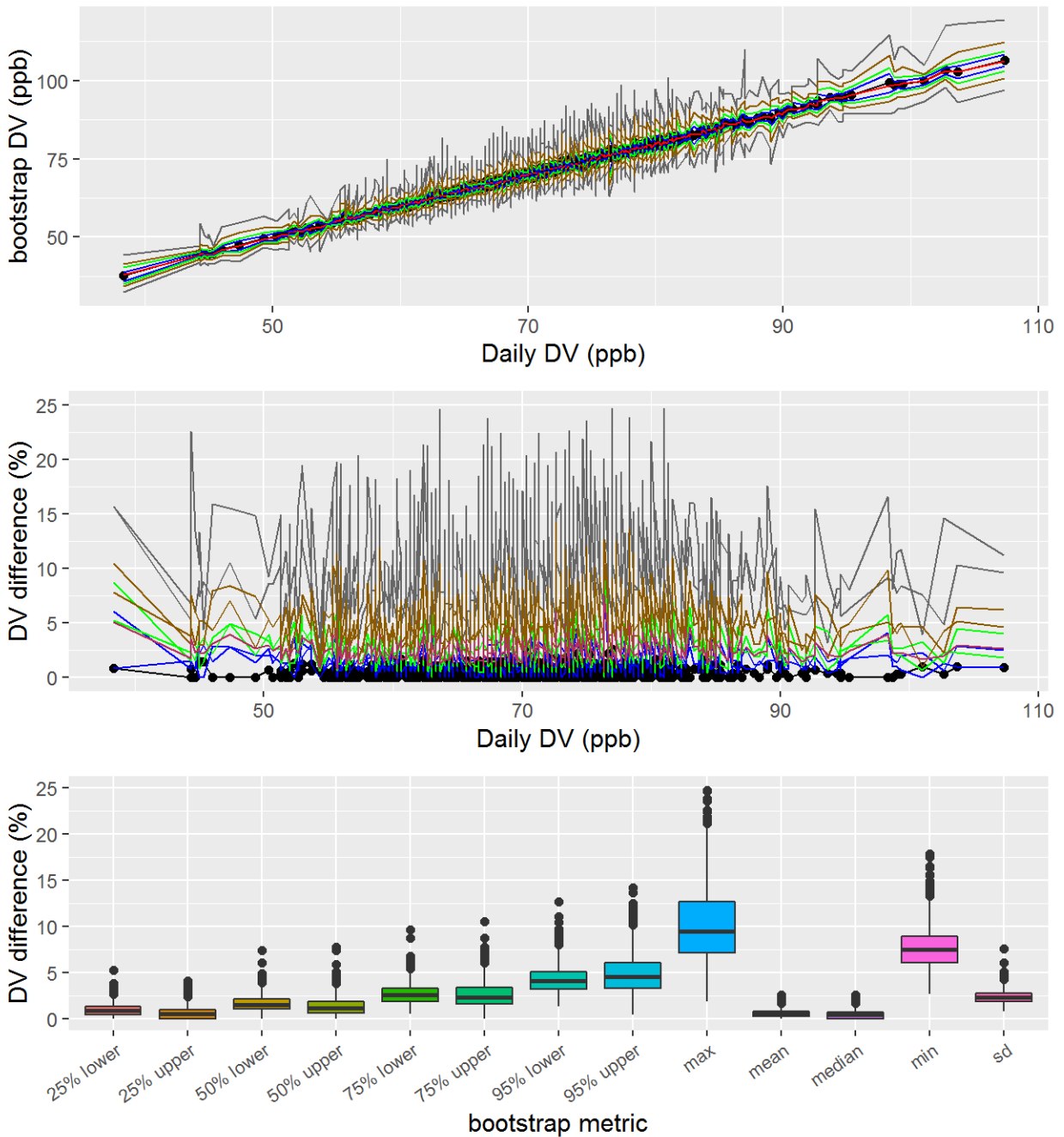


Figure 6: Bootstrap results for the ozone 2013 DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top panel shows the DVs at the various CIs, the middle panel shows the relative difference between the CI and the actual DV, and the bottom panel shows the distribution of the relative differences between the CI and the actual DV.

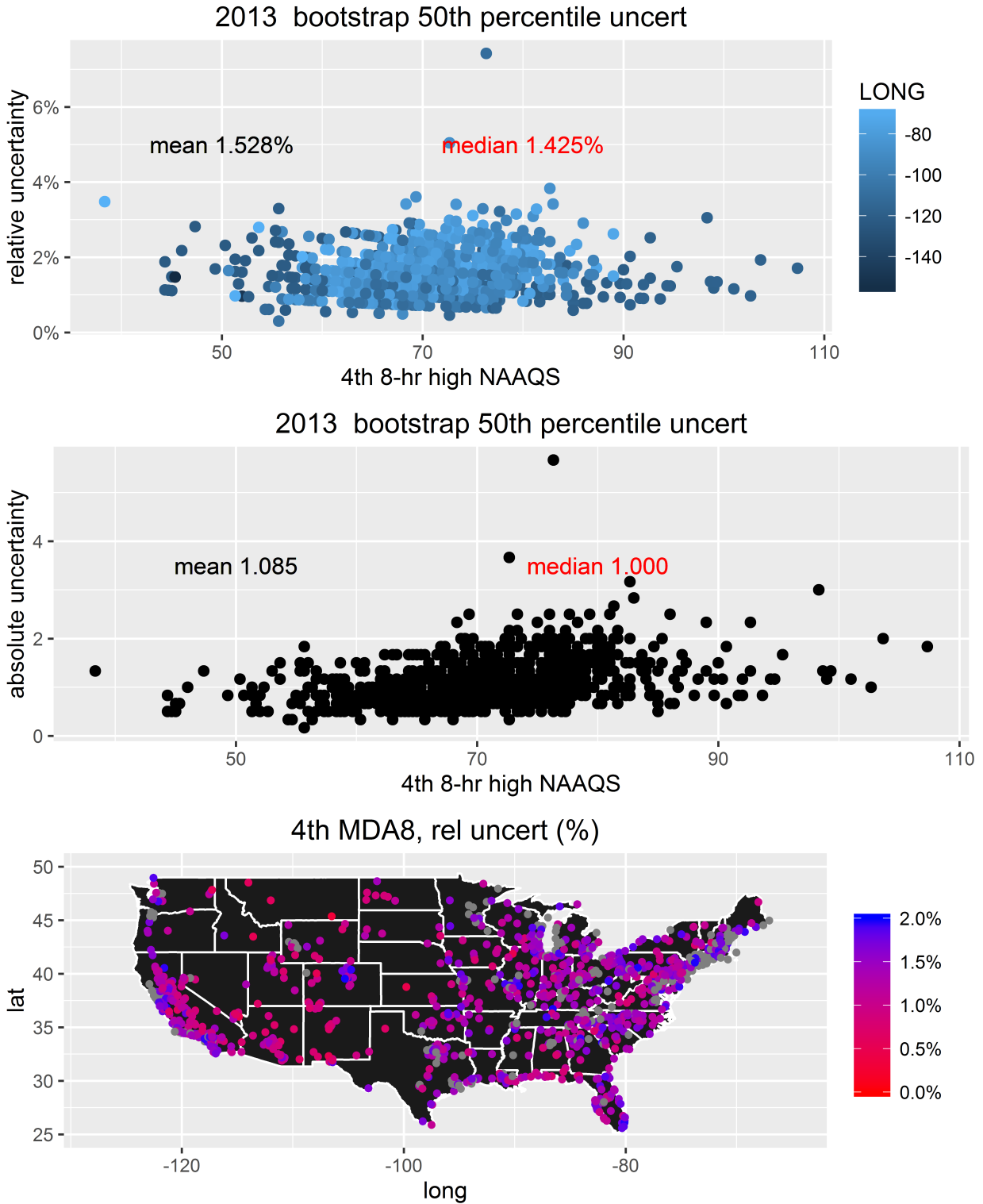


Figure 7: Bootstrap results from the 50% CIs for the 2013 ozone DVs. The top panel shows the relative difference between the CI and the actual DV, the middle panel shows the absolute difference between the values for the DVs at each site and the CI, and the bottom panel shows the spatial distribution of the relative difference between the 50% CIs for the 2013 ozone DV at each site.

2.2 2010-2012 ozone bootstrap results

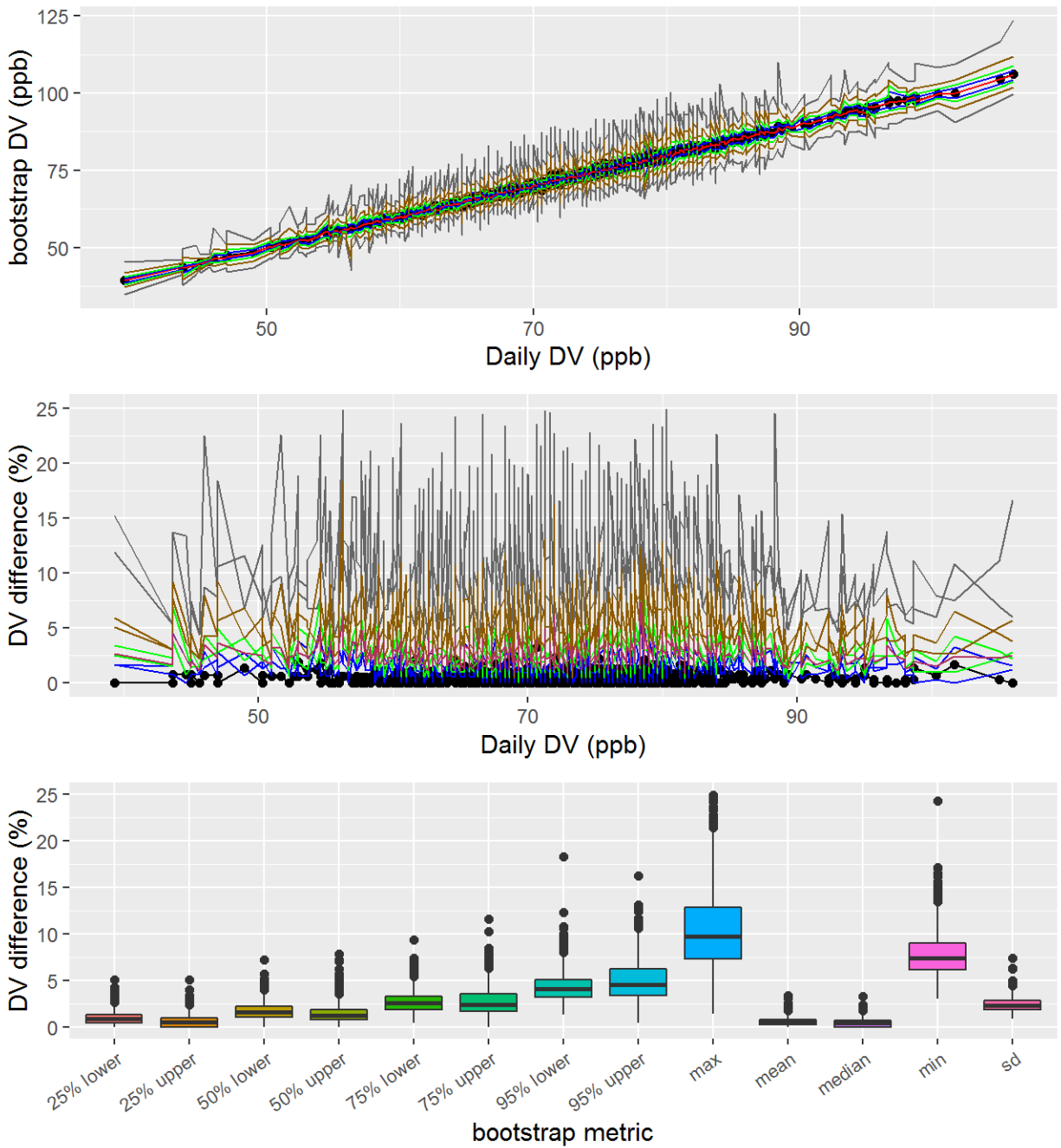


Figure 8: Bootstrap results for the ozone 2012 DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top panel shows the DVs at the various CIs, the middle panel shows the relative difference between the CI and the actual DV, and the bottom panel shows the distribution of the relative differences between the CI and the actual DV.

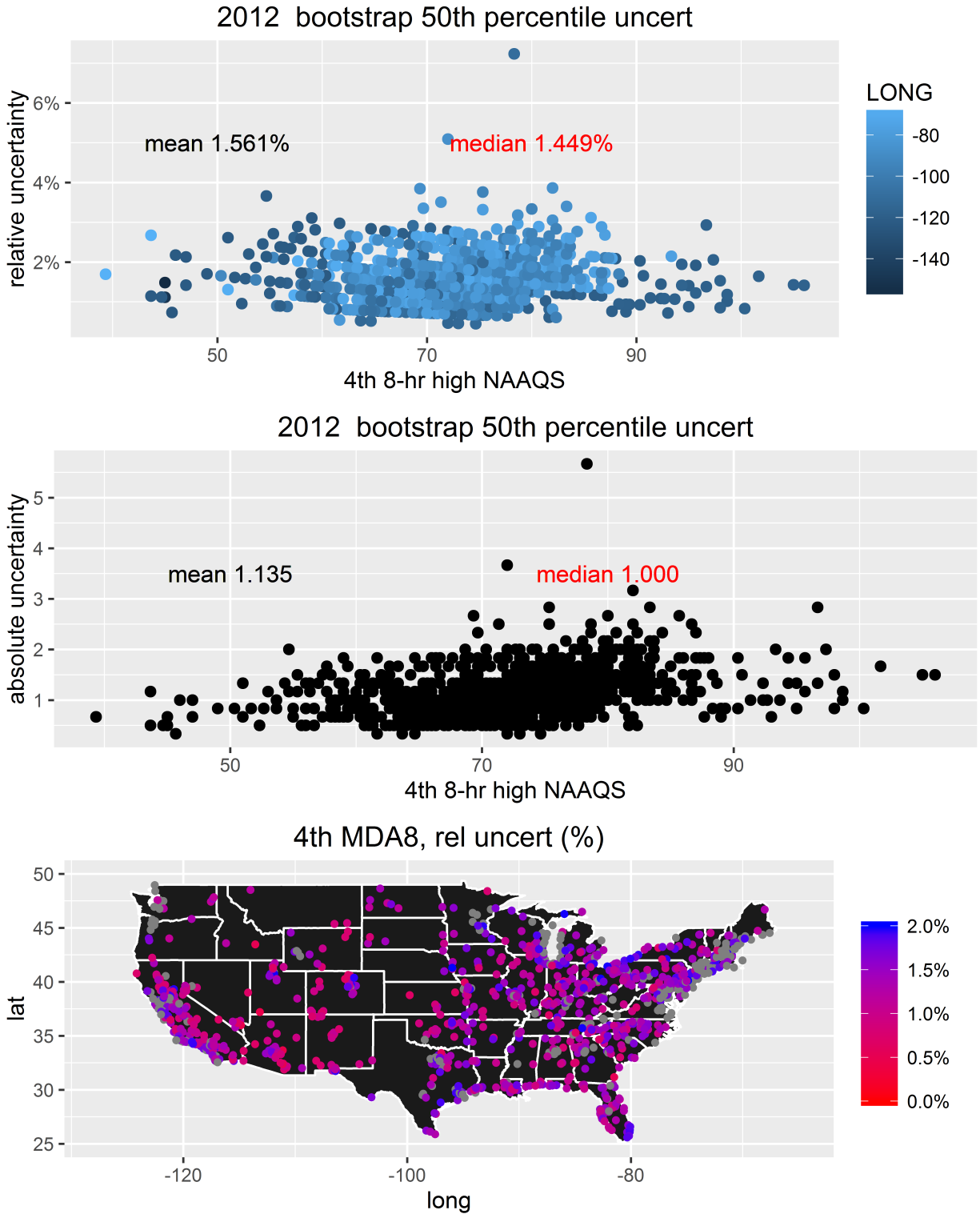


Figure 9: Bootstrap results from the 50% CIs for the 2012 ozone DVs. The top panel shows the relative difference between the CI and the actual DV, the middle panel shows the absolute difference between the values for the DVs at each site and the CI, and the bottom panel shows the spatial distribution of the relative difference between the 50% CIs for the 2012 ozone DV at each site.

2.3 2009-2011 ozone bootstrap results

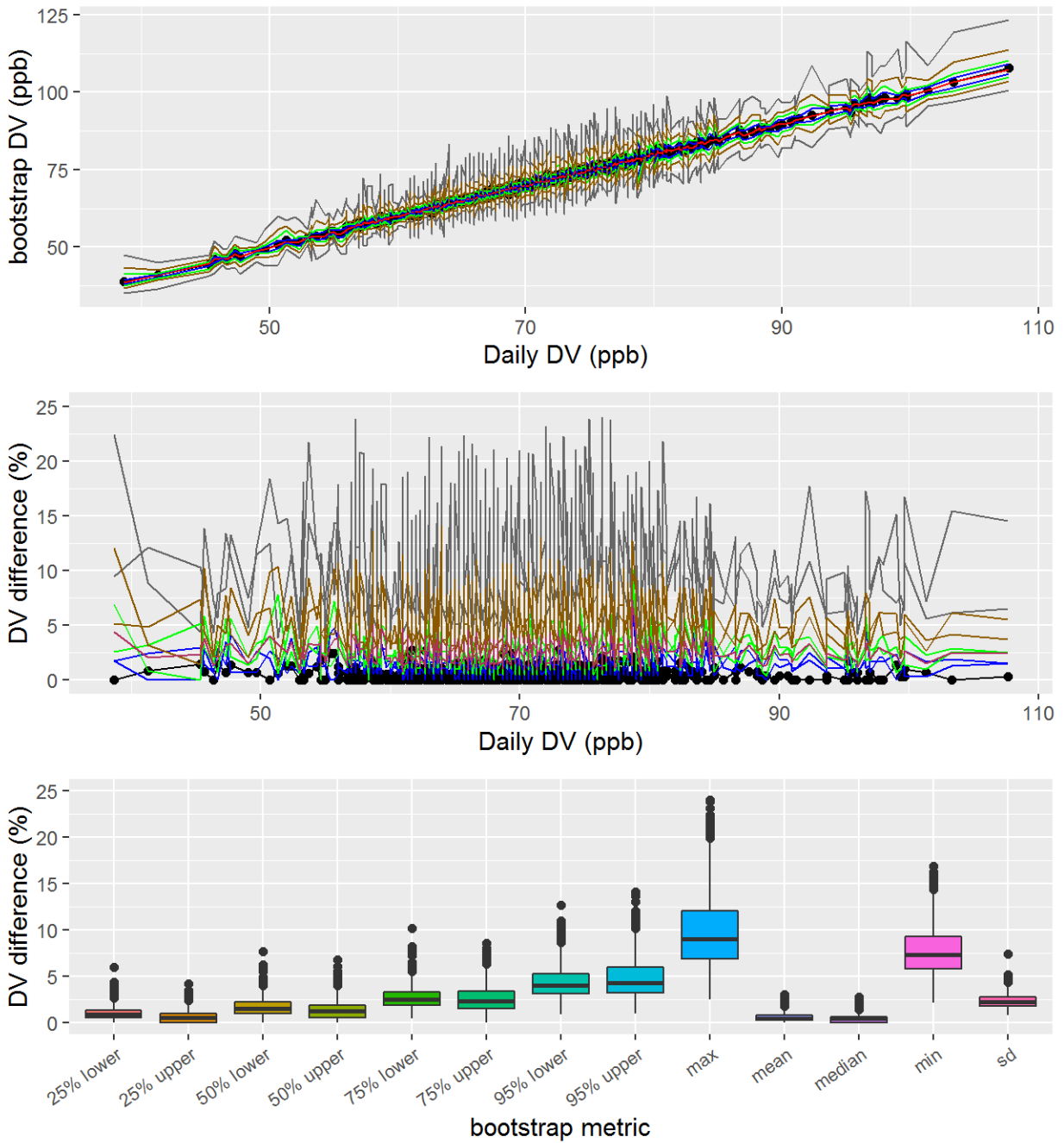


Figure 10: Bootstrap results for the ozone 2011 DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top panel shows the DVs at the various CIs, the middle panel shows the relative difference between the CI and the actual DV, and the bottom panel shows the distribution of the relative differences between the CI and the actual DV.

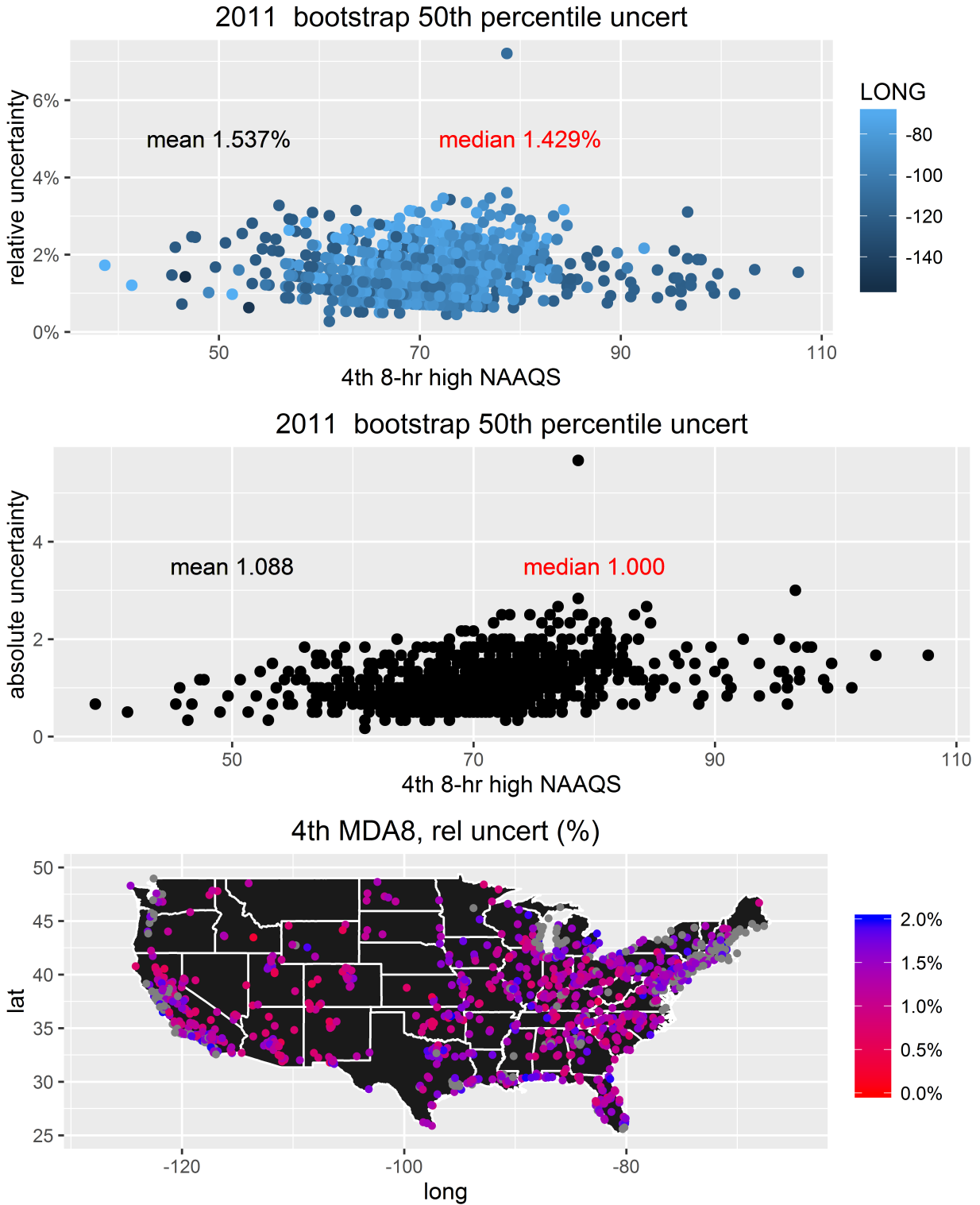


Figure 11: Bootstrap results from the 50% CIs for the 2011 ozone DVs. The top panel shows the relative difference between the CI and the actual DV, the middle panel shows the absolute difference between the values for the DVs at each site and the CI, and the bottom panel shows the spatial distribution of the relative difference between the 50% CIs for the 2011 ozone DV at each site.

2.4 2008-2010 ozone bootstrap results

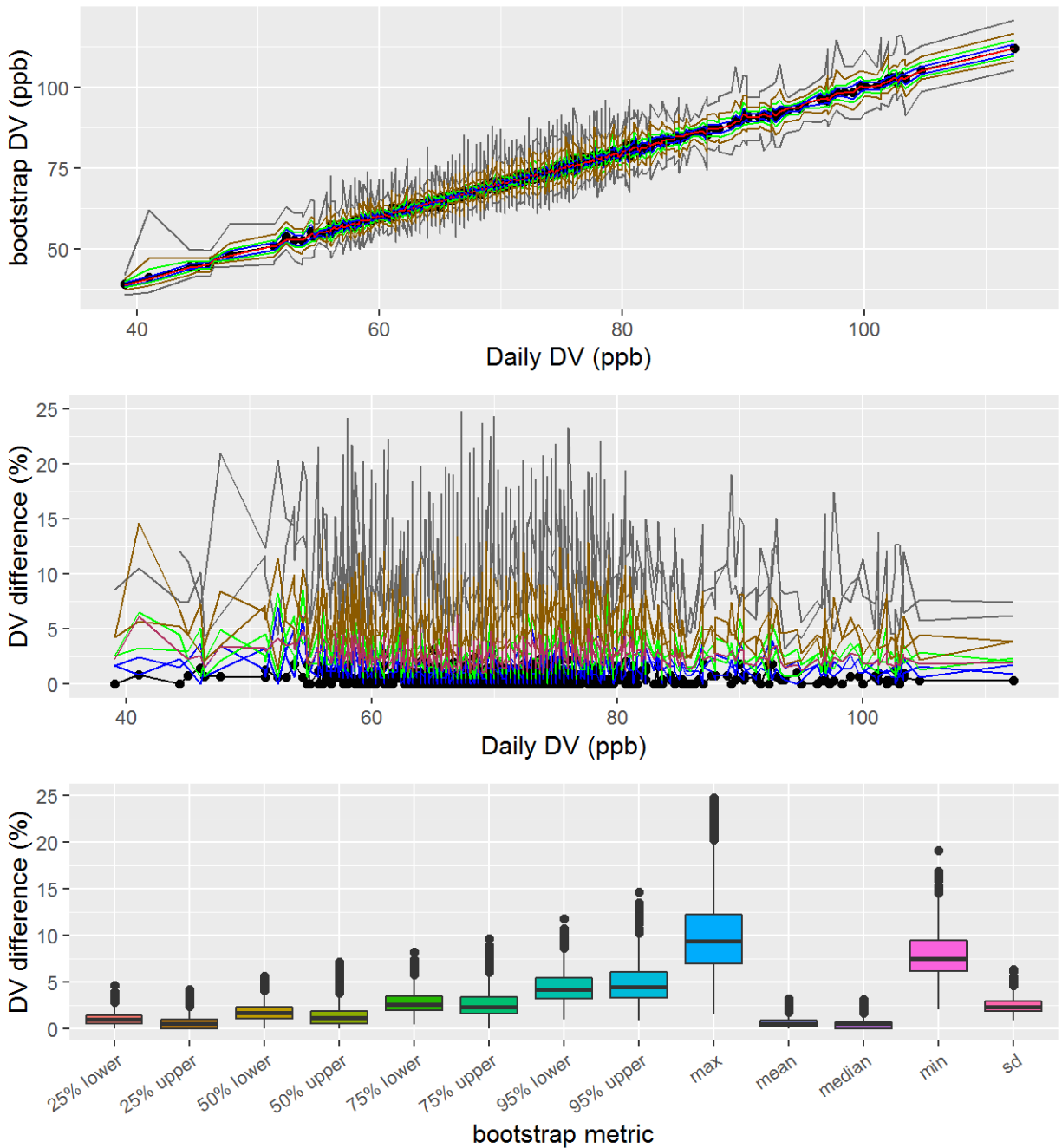


Figure 12: Bootstrap results for the ozone 2010 DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top panel shows the DVs at the various CIs, the middle panel shows the relative difference between the CI and the actual DV, and the bottom panel shows the distribution of the relative differences between the CI and the actual DV.

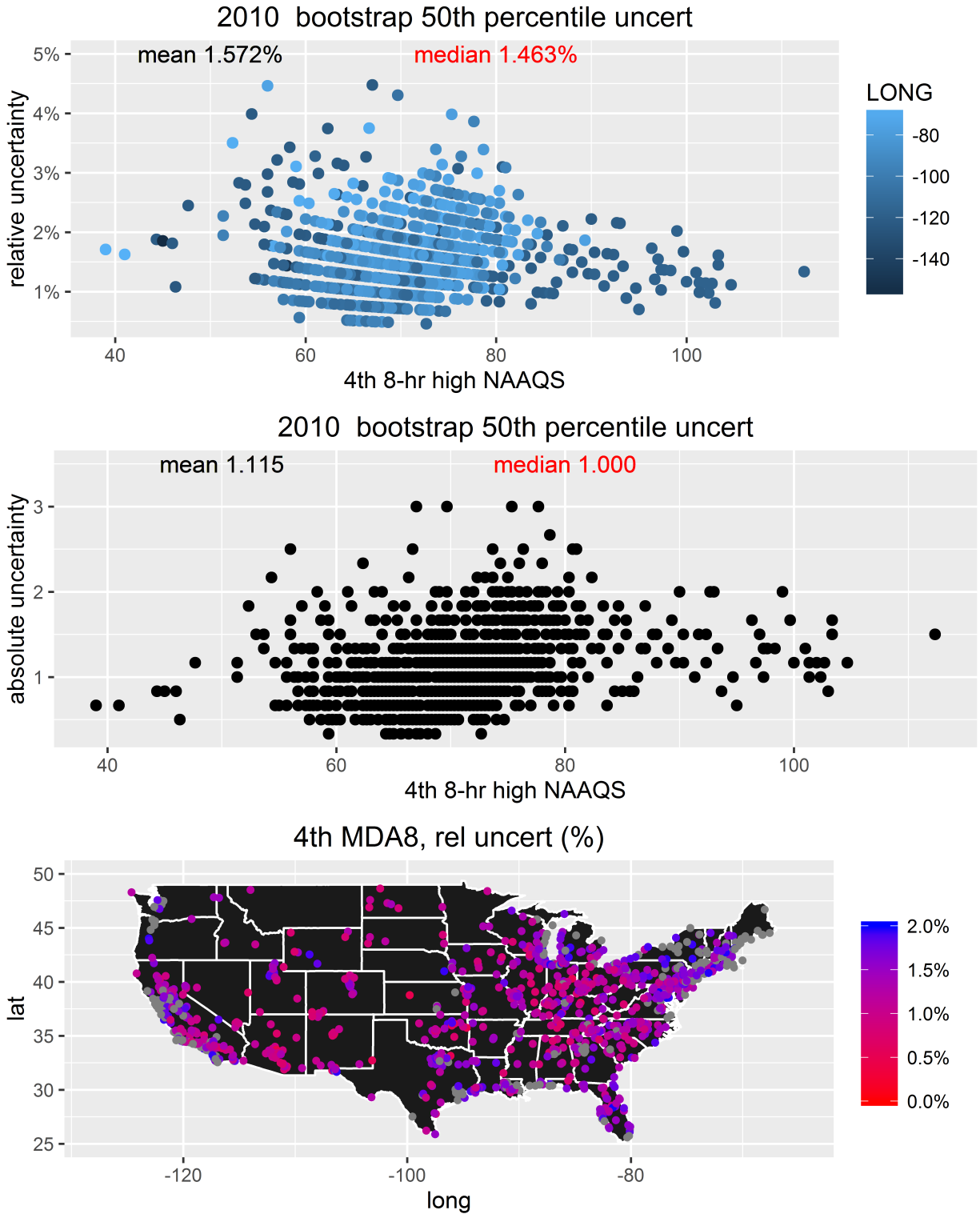


Figure 13: Bootstrap results from the 50% CIs for the 2010 ozone DVs. The top panel shows the relative difference between the CI and the actual DV, the middle panel shows the absolute difference between the values for the DVs at each site and the CI, and the bottom panel shows the spatial distribution of the relative difference between the 50% CIs for the 2010 ozone DV at each site.

2.5 2007-2009 ozone bootstrap results

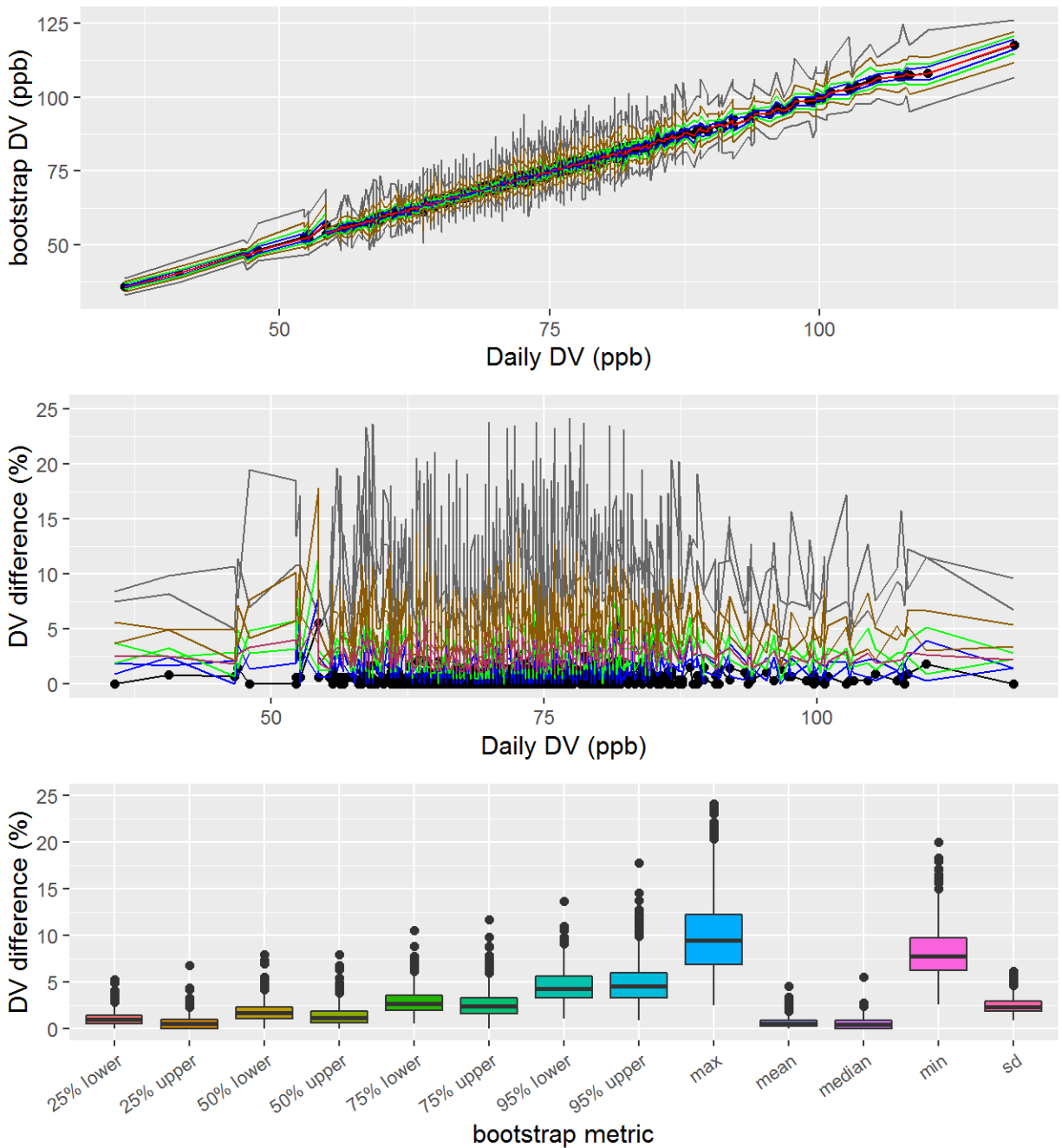


Figure 14: Bootstrap results for the ozone 2009 DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top panel shows the DVs at the various CIs, the middle panel shows the relative difference between the CI and the actual DV, and the bottom panel shows the distribution of the relative differences between the CI and the actual DV.

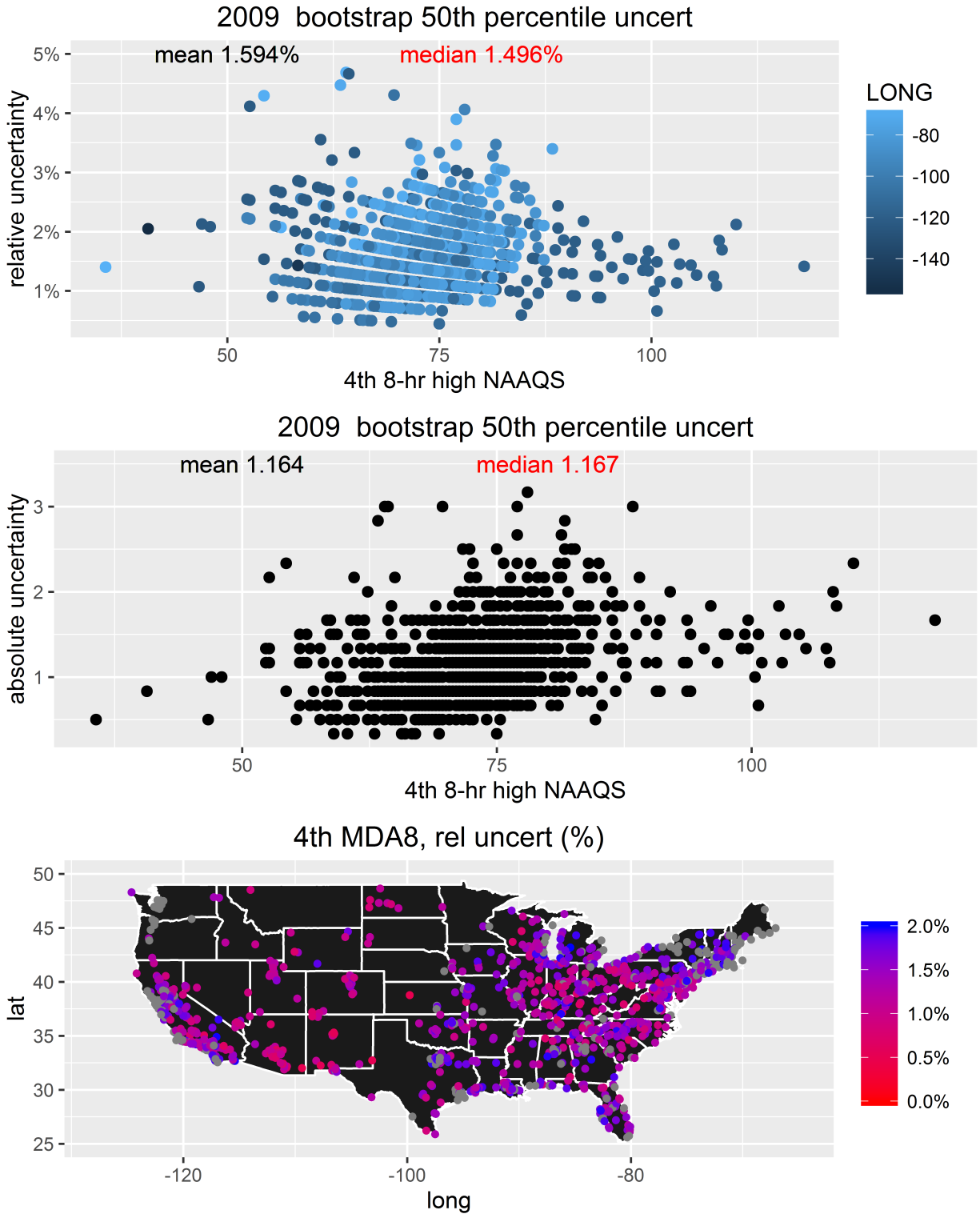


Figure 15: Bootstrap results from the 50% CIs for the 2009 ozone DVs. The top panel shows the relative difference between the CI and the actual DV, the middle panel shows the absolute difference between the values for the DVs at each site and the CI, and the bottom panel shows the spatial distribution of the relative difference between the 50% CIs for the 2009 ozone DV at each site.

2.6 2006-2008 ozone bootstrap results

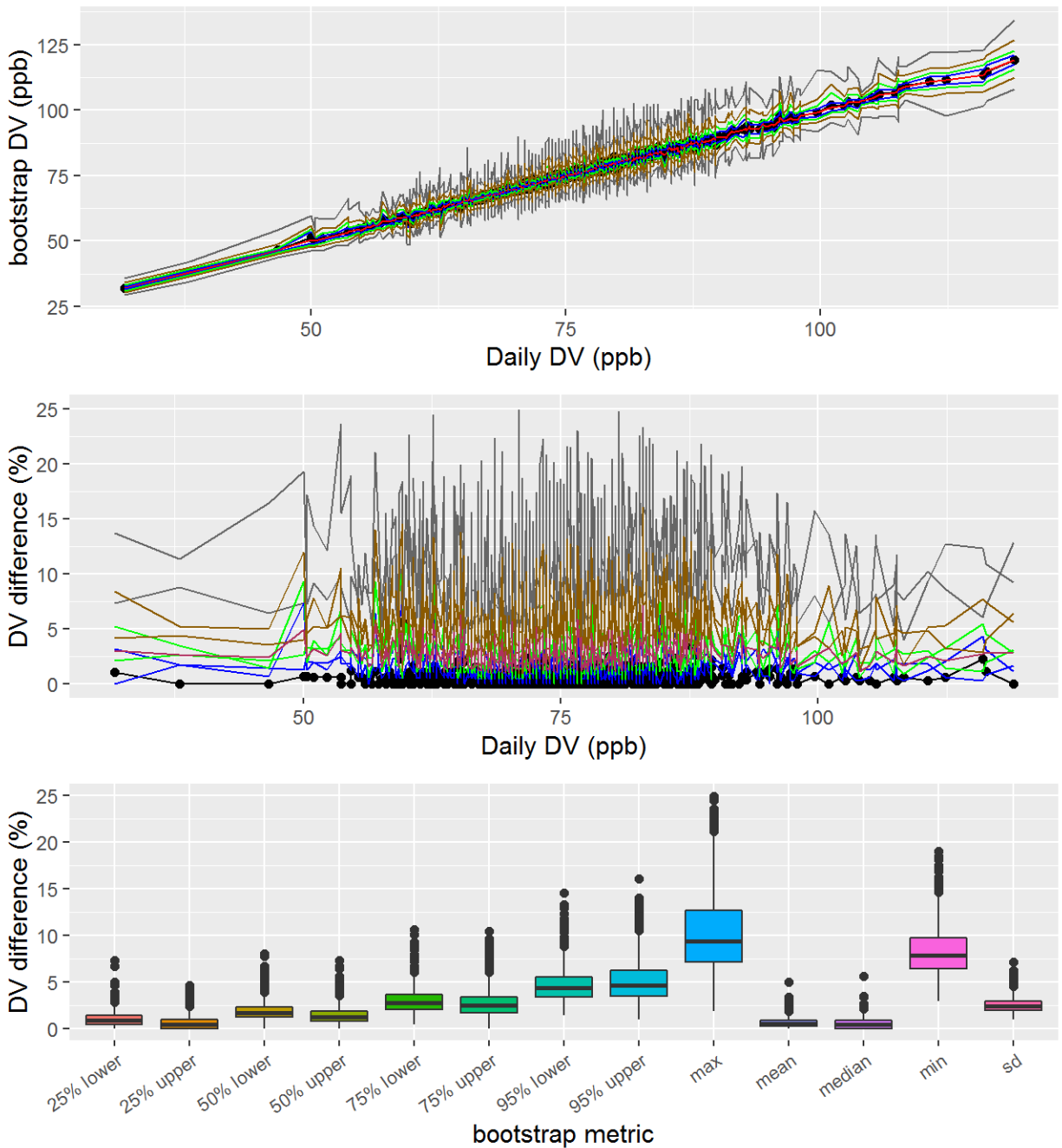


Figure 16: Bootstrap results for the ozone 2008 DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top panel shows the DVs at the various CIs, the middle panel shows the relative difference between the CI and the actual DV, and the bottom panel shows the distribution of the relative differences between the CI and the actual DV.

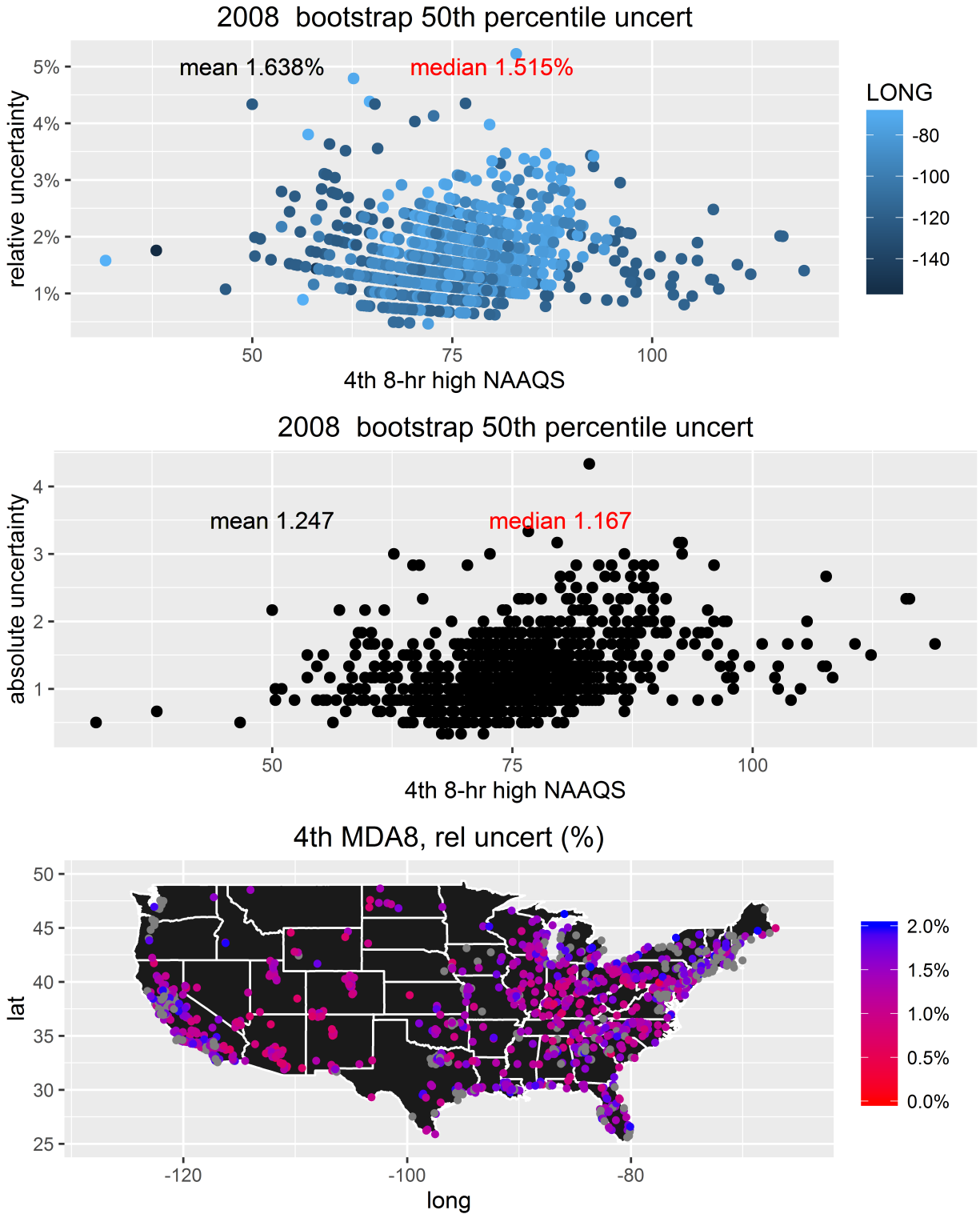


Figure 17: Bootstrap results from the 50% CIs for the 2008 ozone DVs. The top panel shows the relative difference between the CI and the actual DV, the middle panel shows the absolute difference between the values for the DVs at each site and the CI, and the bottom panel shows the spatial distribution of the relative difference between the 50% CIs for the 2008 ozone DV at each site.

2.7 2005-2007 ozone bootstrap results

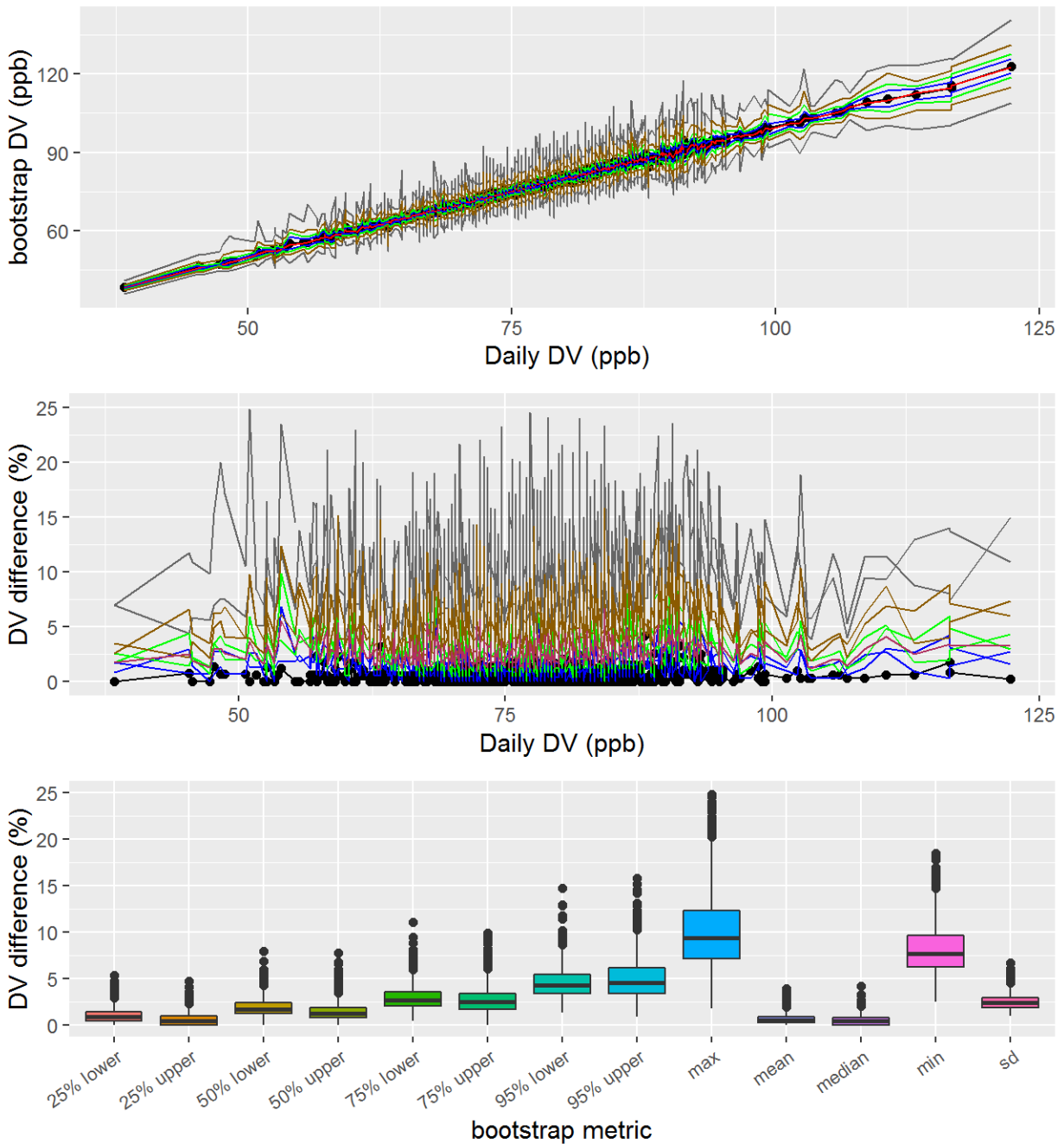


Figure 18: Bootstrap results for the ozone 2007 DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top panel shows the DVs at the various CIs, the middle panel shows the relative difference between the CI and the actual DV, and the bottom panel shows the distribution of the relative differences between the CI and the actual DV.

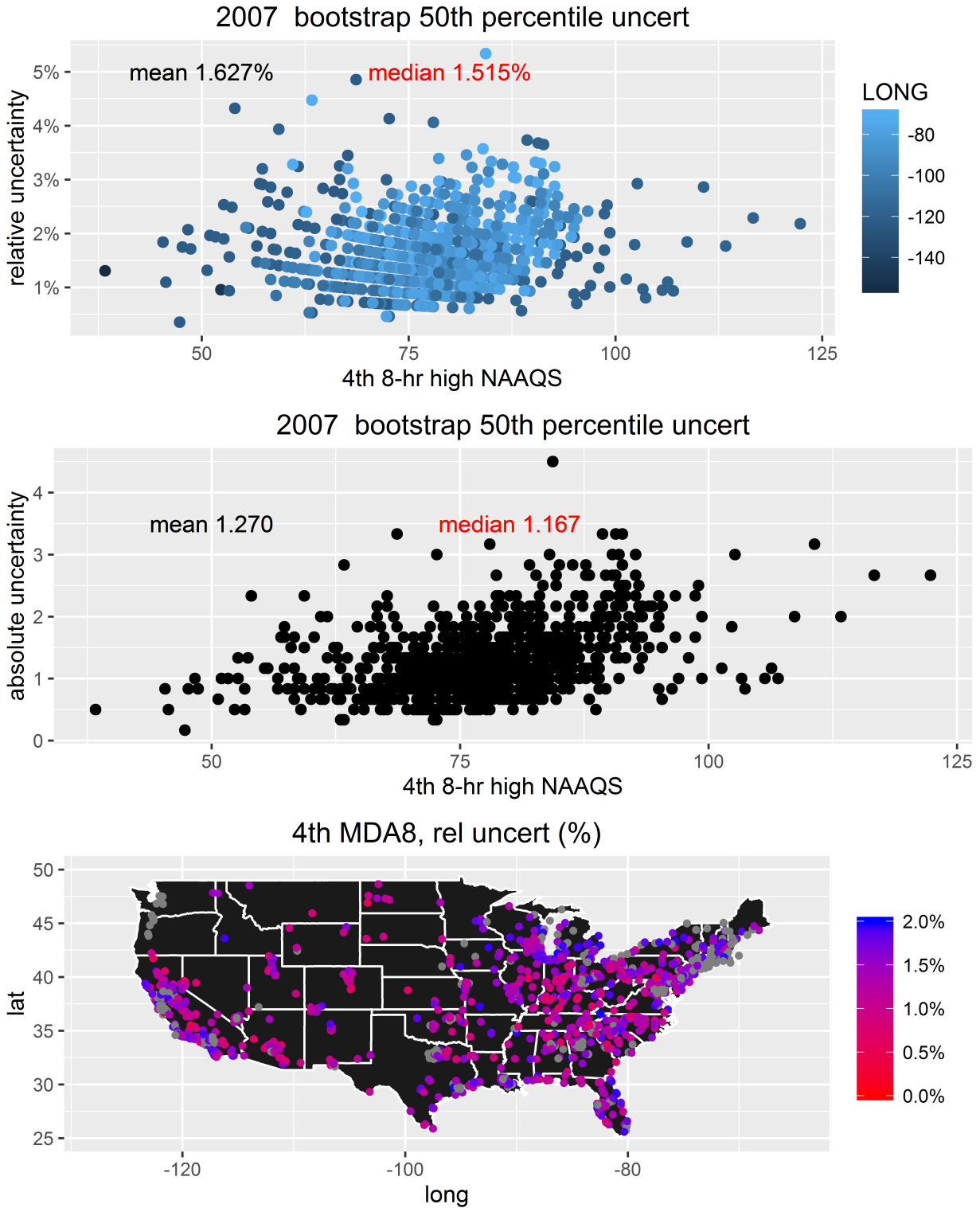


Figure 19: Bootstrap results from the 50% CIs for the 2007 ozone DVs. The top panel shows the relative difference between the CI and the actual DV, the middle panel shows the absolute difference between the values for the DVs at each site and the CI, and the bottom panel shows the spatial distribution of the relative difference between the 50% CIs for the 2007 ozone DV at each site.

2.8 2004-2006 ozone bootstrap results

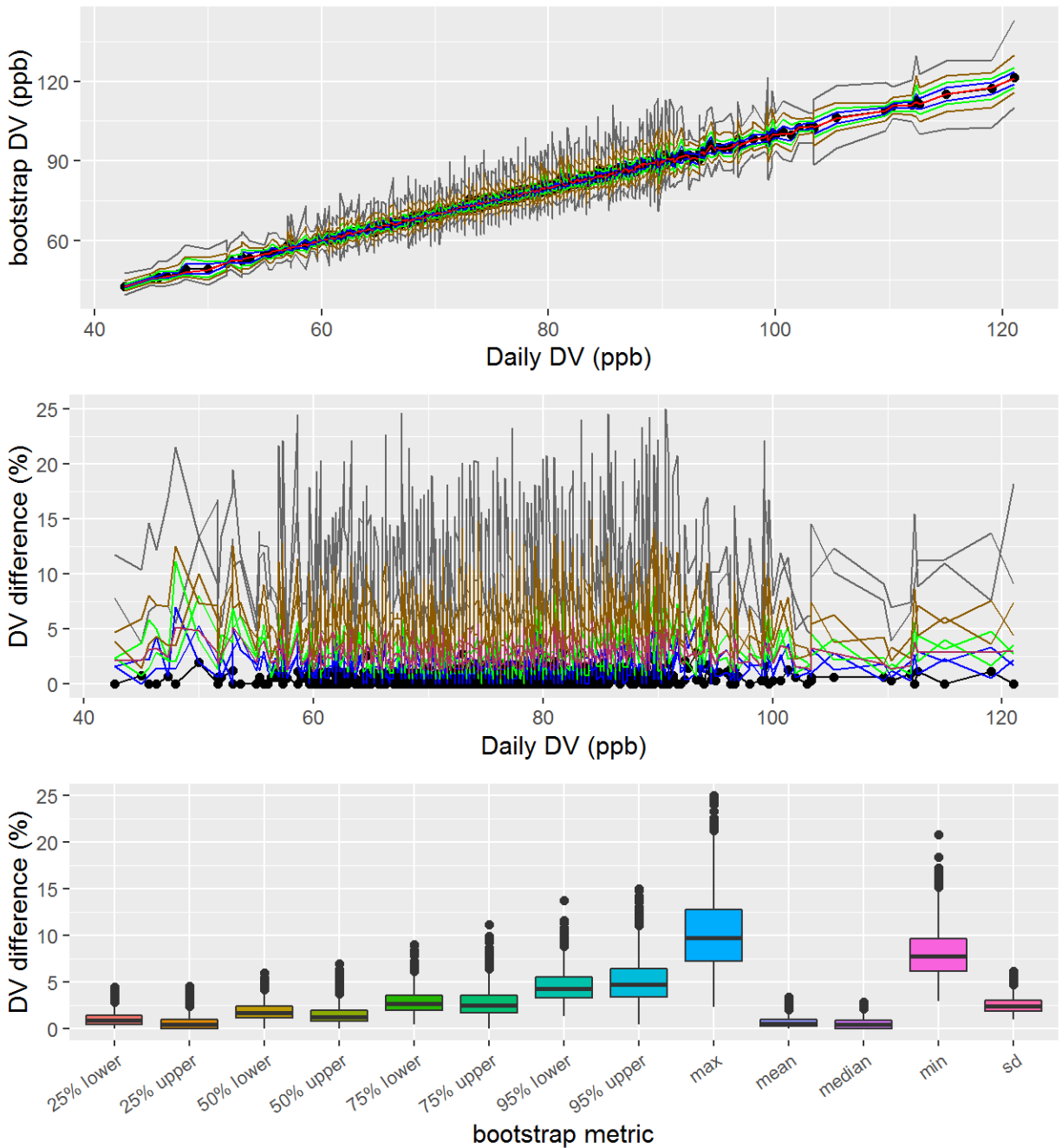


Figure 20: Bootstrap results for the ozone 2006 DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top panel shows the DVs at the various CIs, the middle panel shows the relative difference between the CI and the actual DV, and the bottom panel shows the distribution of the relative differences between the CI and the actual DV.

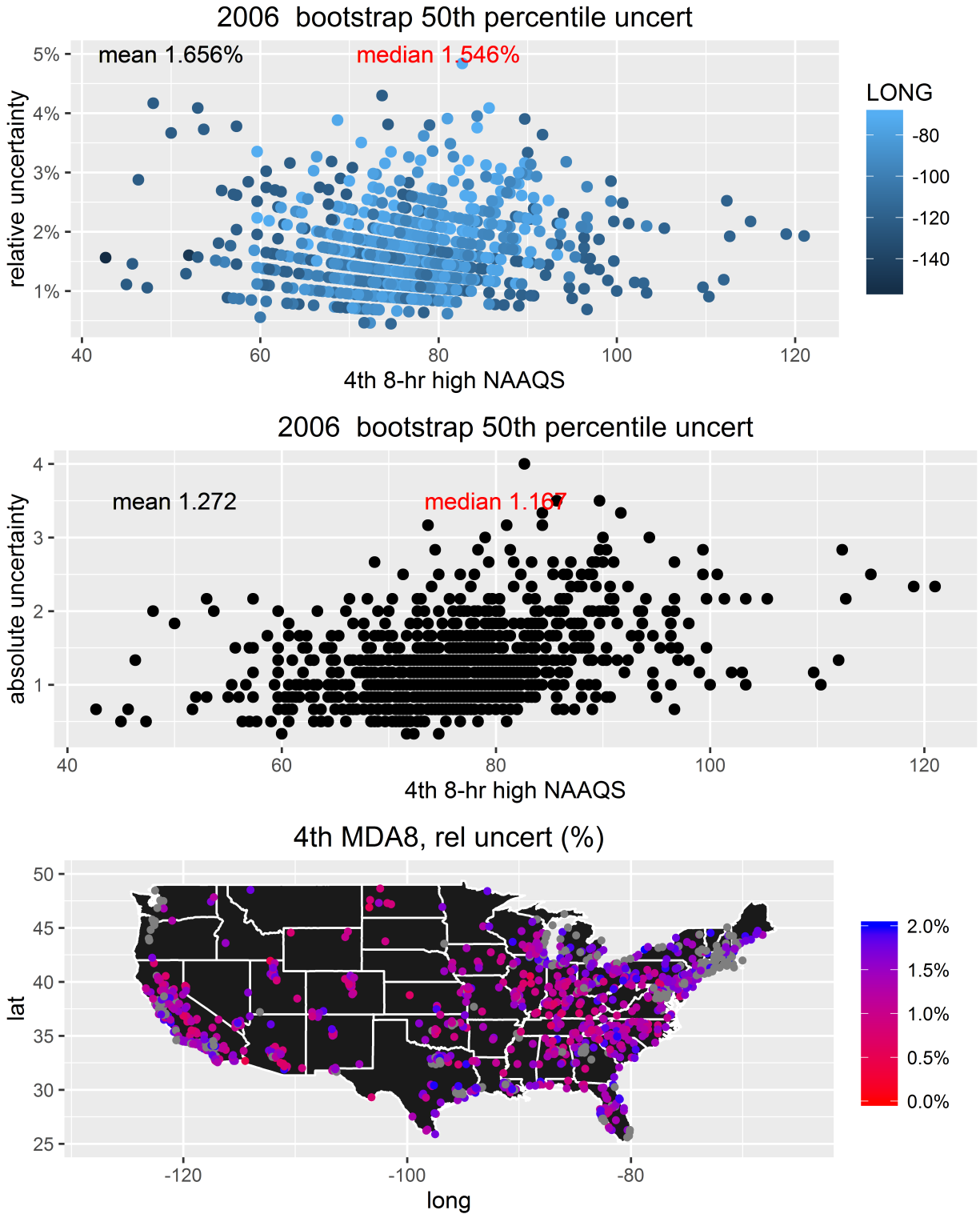


Figure 21: Bootstrap results from the 50% CIs for the 2006 ozone DVs. The top panel shows the relative difference between the CI and the actual DV, the middle panel shows the absolute difference between the values for the DVs at each site and the CI, and the bottom panel shows the spatial distribution of the relative difference between the 50% CIs for the 2006 ozone DV at each site.

2.9 2003-2005 ozone bootstrap results

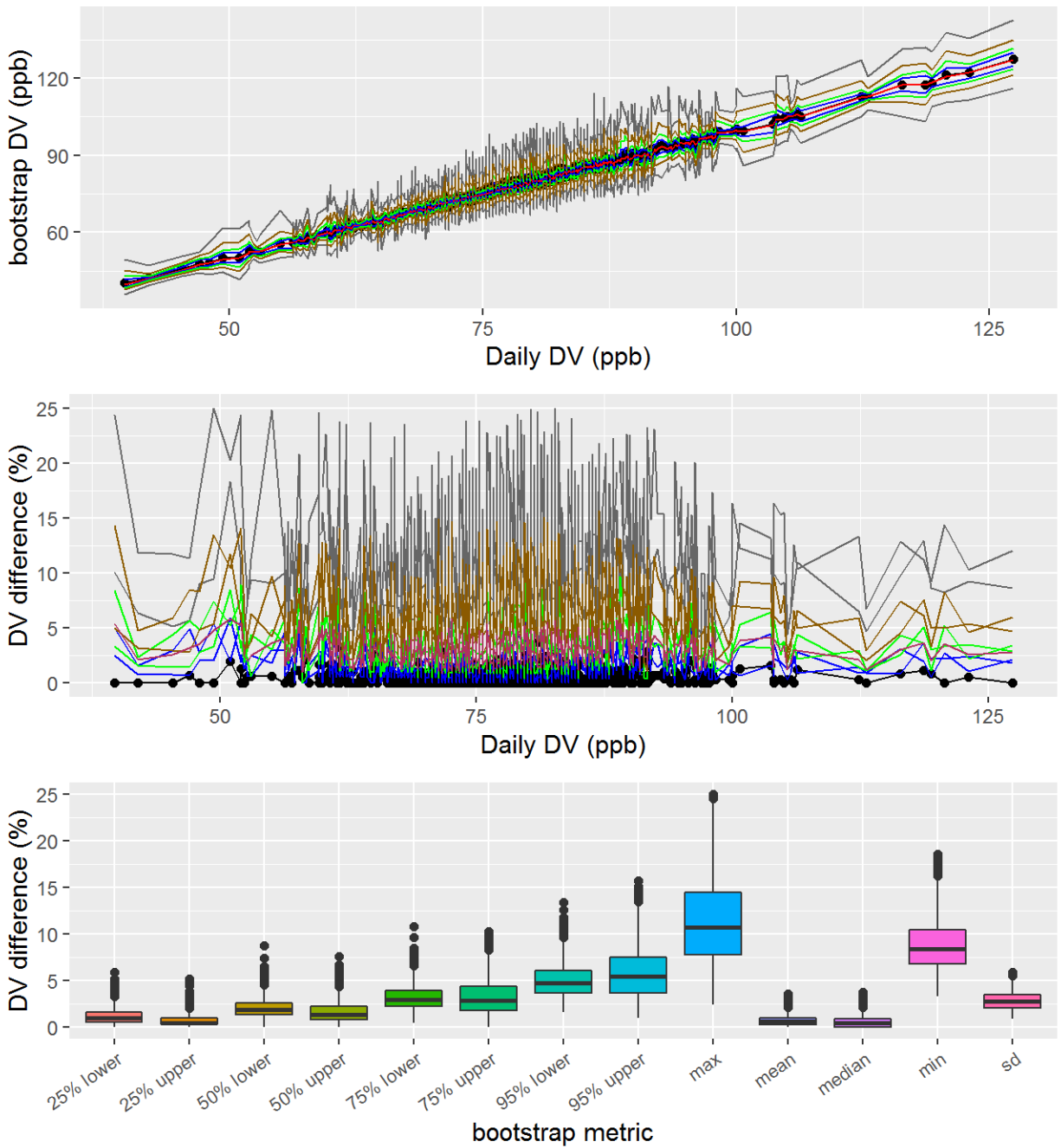


Figure 22: Bootstrap results for the ozone 2005 DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top panel shows the DVs at the various CIs, the middle panel shows the relative difference between the CI and the actual DV, and the bottom panel shows the distribution of the relative differences between the CI and the actual DV.

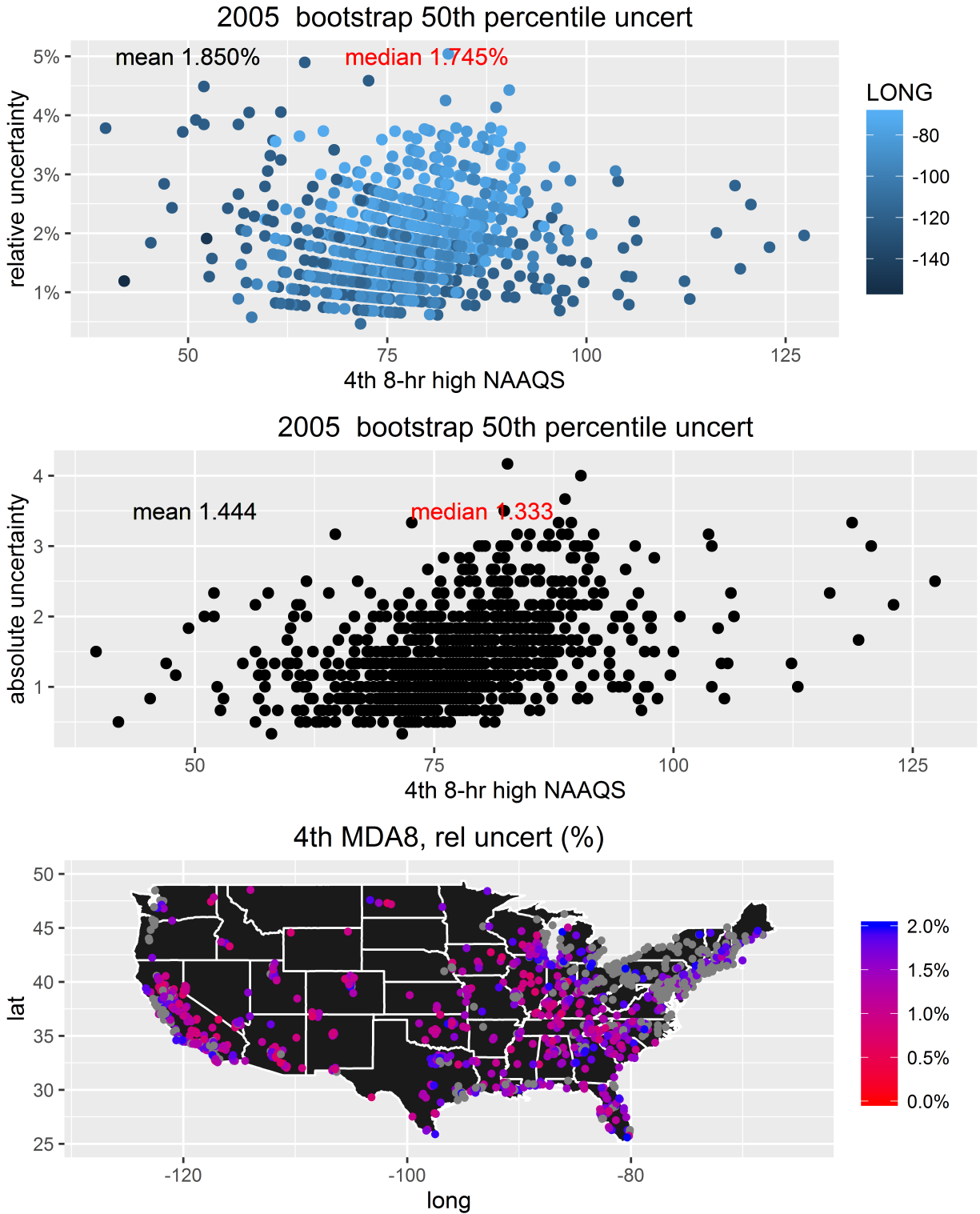


Figure 23: Bootstrap results from the 50% CIs for the 2005 ozone DVs. The top panel shows the relative difference between the CI and the actual DV, the middle panel shows the absolute difference between the values for the DVs at each site and the CI, and the bottom panel shows the spatial distribution of the relative difference between the 50% CIs for the 2005 ozone DV at each site.

2.10 2002-2004 ozone bootstrap results

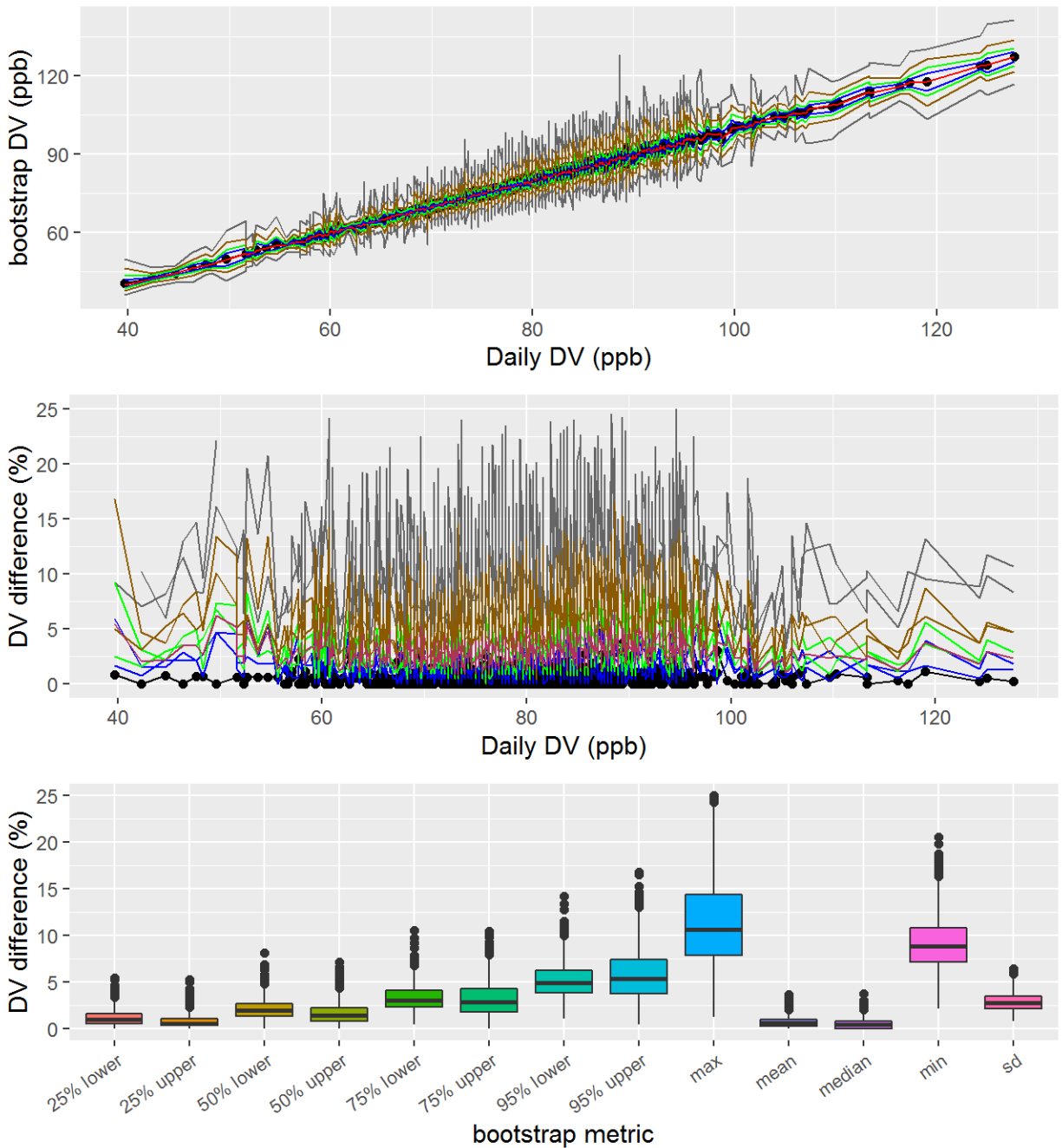


Figure 24: Bootstrap results for the ozone 2004 DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top panel shows the DVs at the various CIs, the middle panel shows the relative difference between the CI and the actual DV, and the bottom panel shows the distribution of the relative differences between the CI and the actual DV.

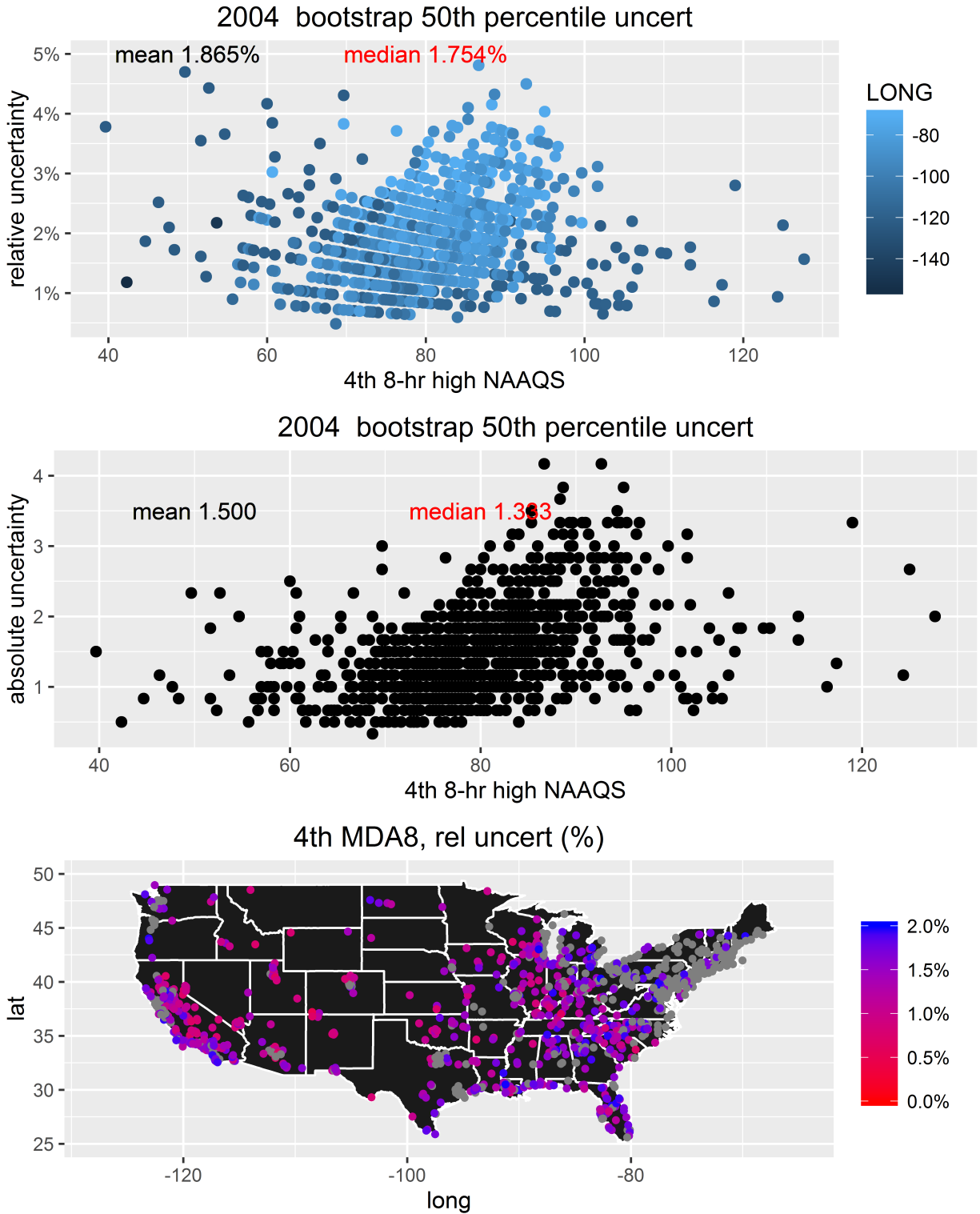


Figure 25: Bootstrap results from the 50% CIs for the 2004 ozone DVs. The top panel shows the relative difference between the CI and the actual DV, the middle panel shows the absolute difference between the values for the DVs at each site and the CI, and the bottom panel shows the spatial distribution of the relative difference between the 50% CIs for the 2004 ozone DV at each site.

2.11 2001-2003 ozone bootstrap results

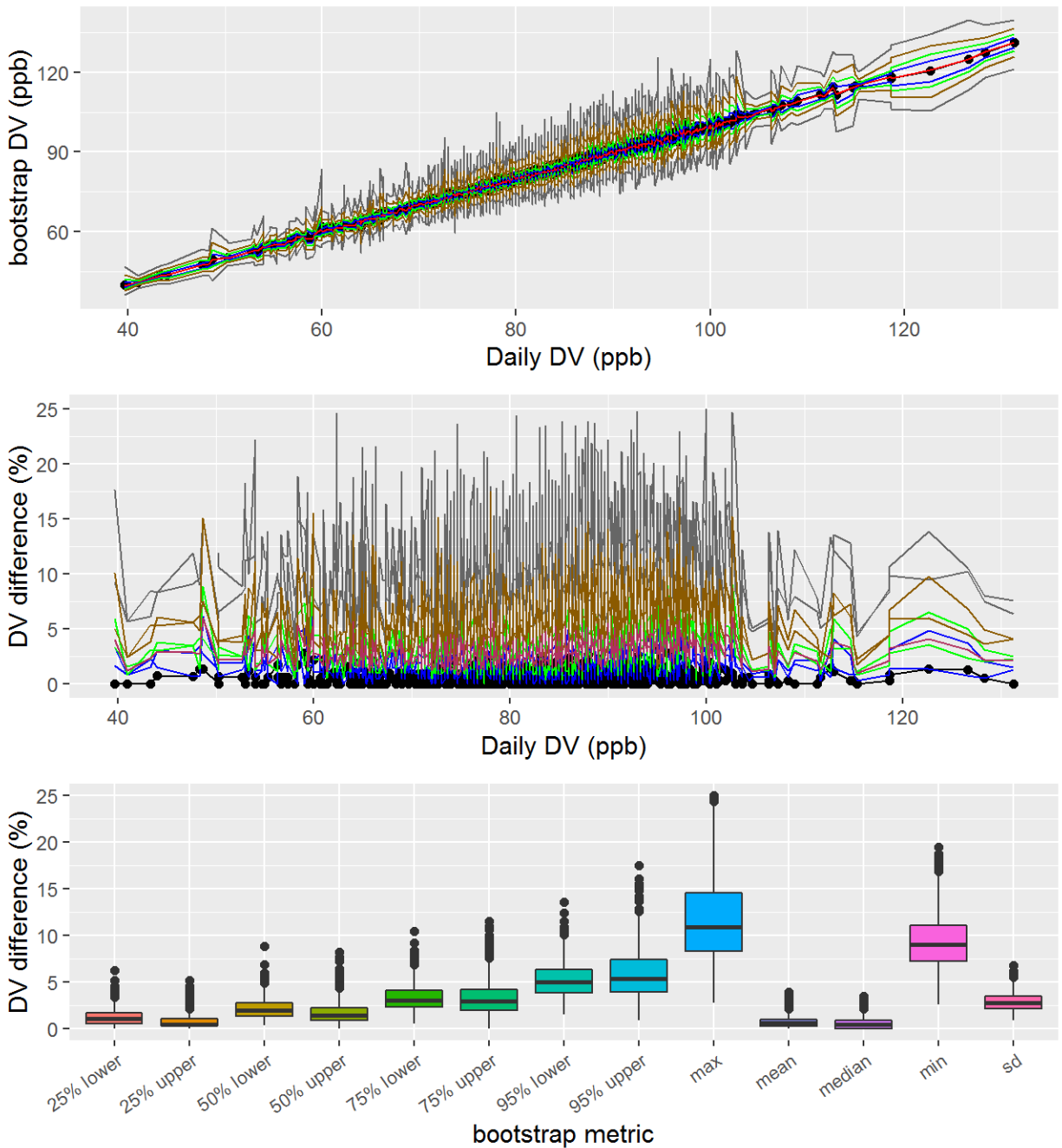


Figure 26: Bootstrap results for the ozone 2003 DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top panel shows the DVs at the various CIs, the middle panel shows the relative difference between the CI and the actual DV, and the bottom panel shows the distribution of the relative differences between the CI and the actual DV.

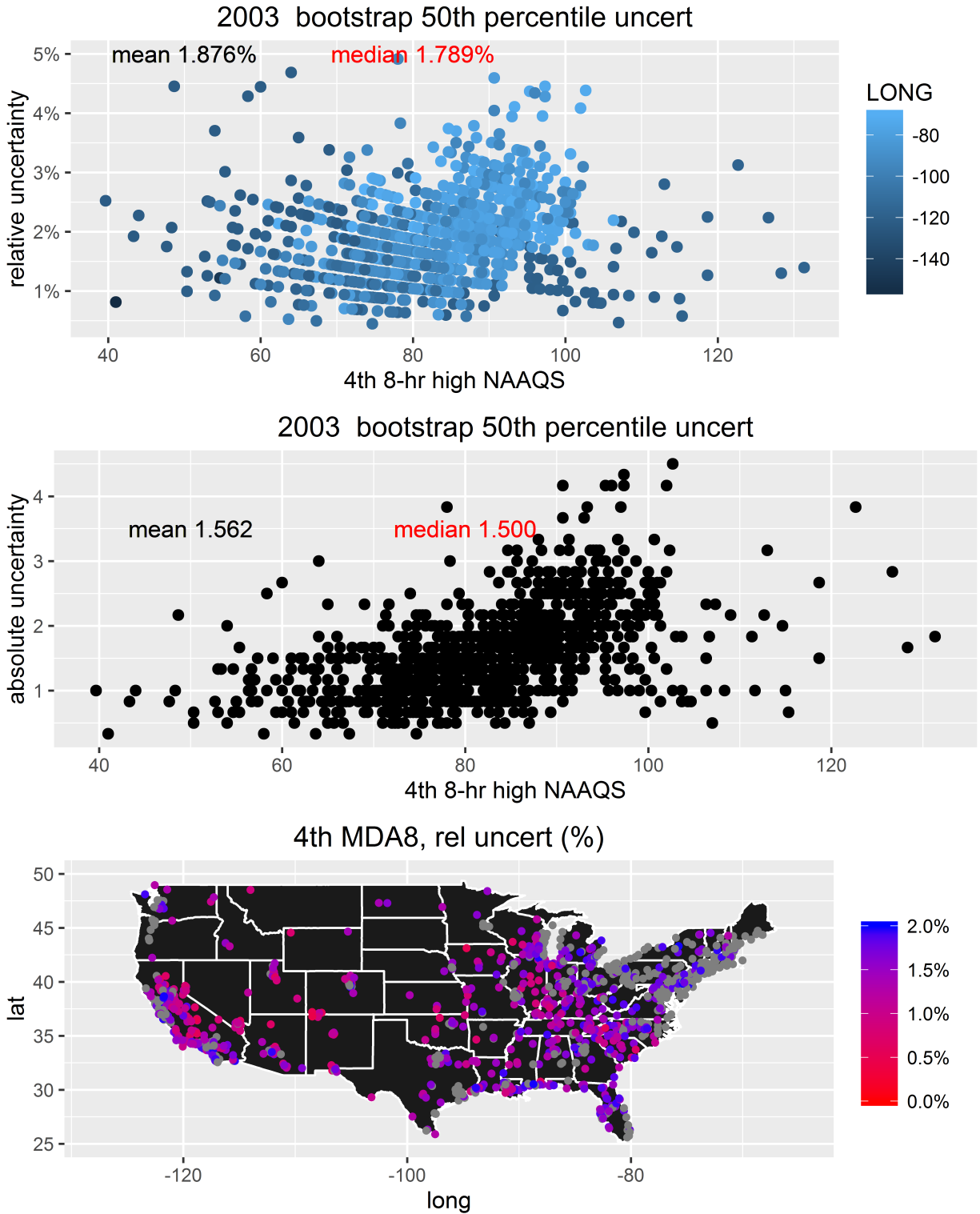


Figure 27: Bootstrap results from the 50% CIs for the 2003 ozone DVs. The top panel shows the relative difference between the CI and the actual DV, the middle panel shows the absolute difference between the values for the DVs at each site and the CI, and the bottom panel shows the spatial distribution of the relative difference between the 50% CIs for the 2003 ozone DV at each site.

2.12 2000-2002 ozone bootstrap results

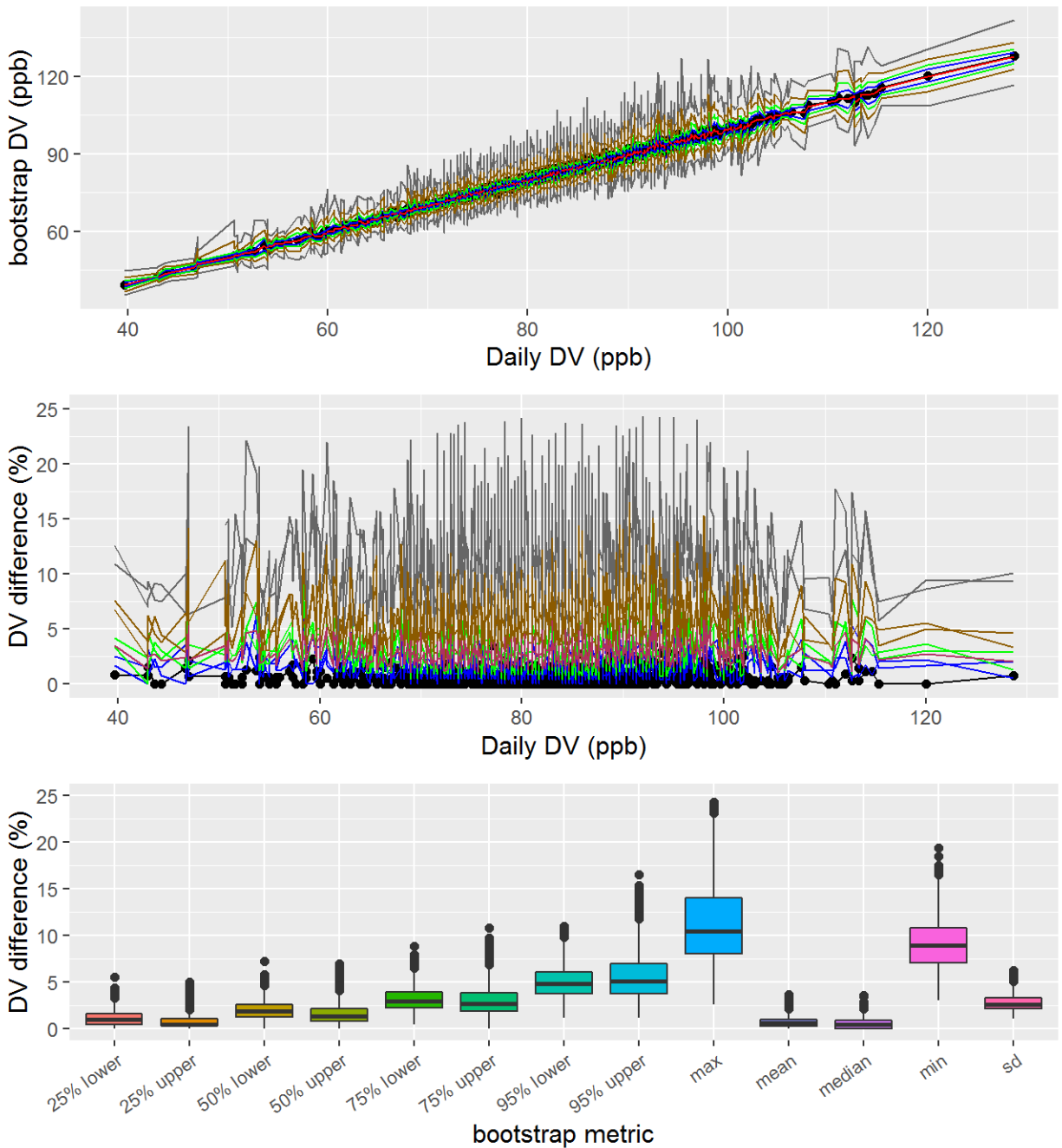


Figure 28: Bootstrap results for the ozone 2002 DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top panel shows the DVs at the various CIs, the middle panel shows the relative difference between the CI and the actual DV, and the bottom panel shows the distribution of the relative differences between the CI and the actual DV.

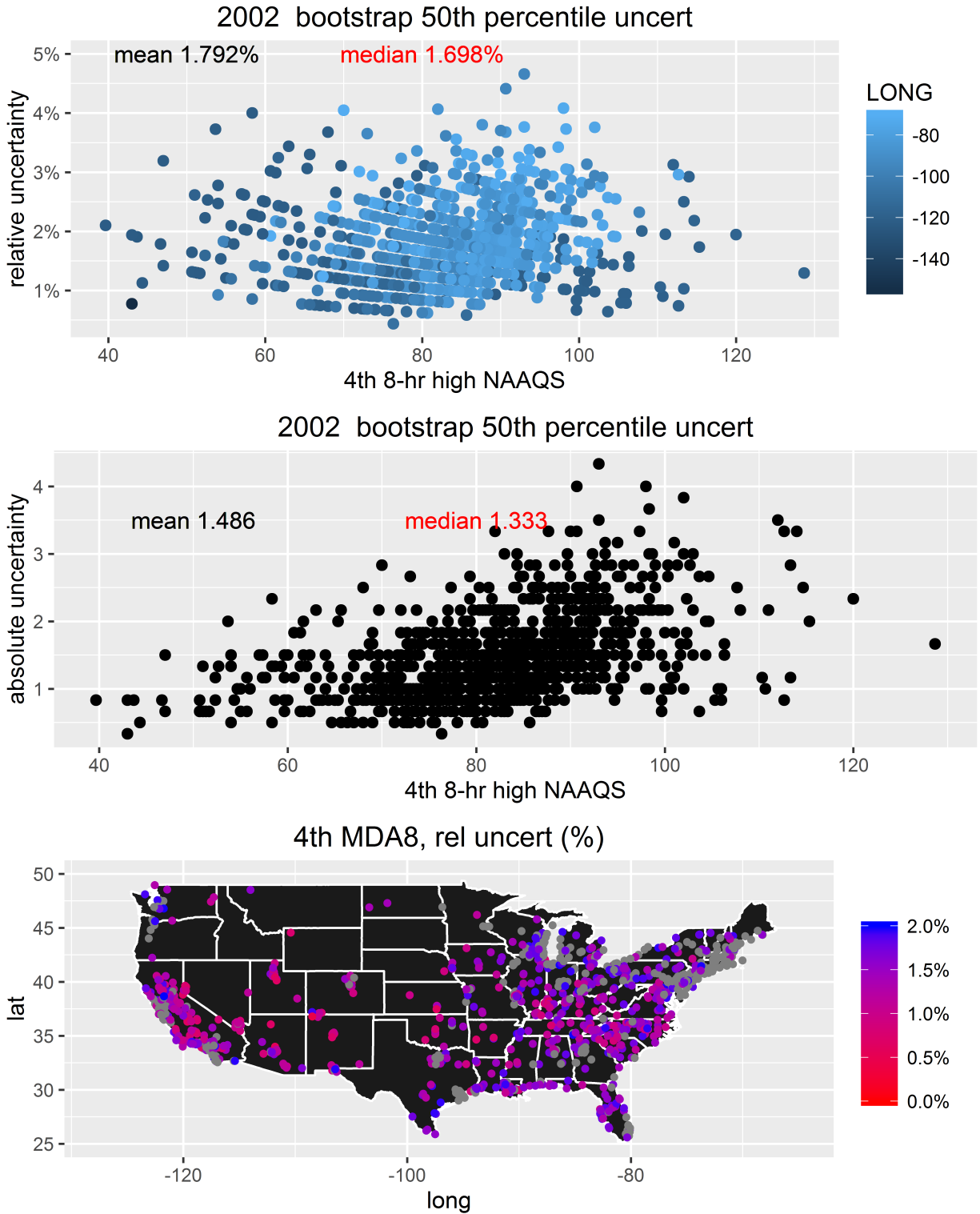


Figure 29: Bootstrap results from the 50% CIs for the 2002 ozone DVs. The top panel shows the relative difference between the CI and the actual DV, the middle panel shows the absolute difference between the values for the DVs at each site and the CI, and the bottom panel shows the spatial distribution of the relative difference between the 50% CIs for the 2002 ozone DV at each site.

3 Air quality variability results for years 2002-2013 for PM_{2.5}

Bootstrap results for PM_{2.5} data from the years 2000-2013. Each section contains a single DV period, *e.g.*, the results for 2013 include data from 2011-2013.

3.1 2011-2013 PM_{2.5} bootstrap results

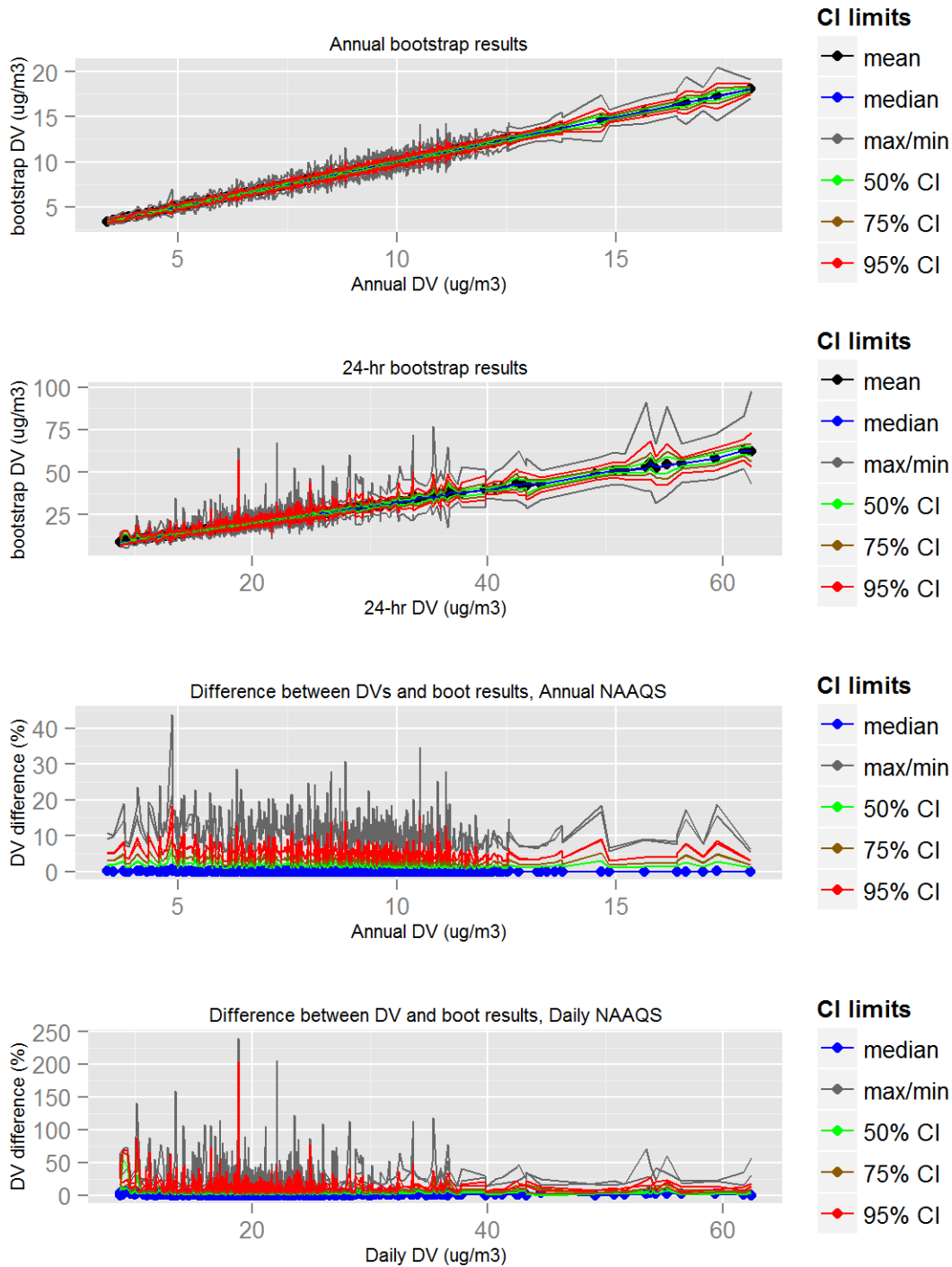


Figure 30: Bootstrap results for the 2013 PM_{2.5} DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top two panels show the values for the DVs at the various CIs, while the bottom two panels show the relative difference between the CI and the actual DV.

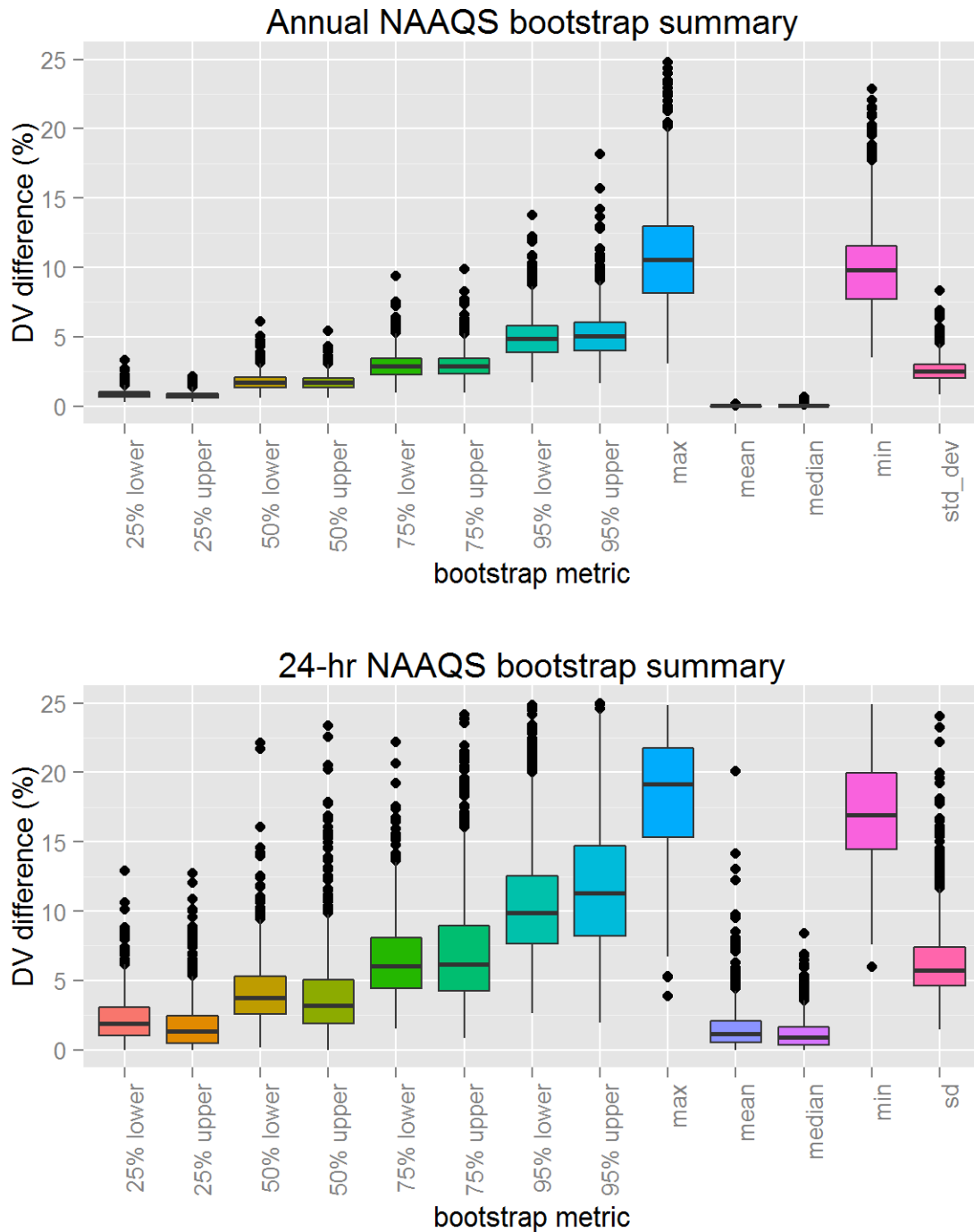


Figure 31: Bootstrap results for the 2013 PM_{2.5} DVs, showing distribution of the relative differences between the bootstrap DVs and the actual DV at the 25%, 50%, 75%, and 95% CIs, along with the mean, median, maximum, minimum, standard deviations of the relative differences.

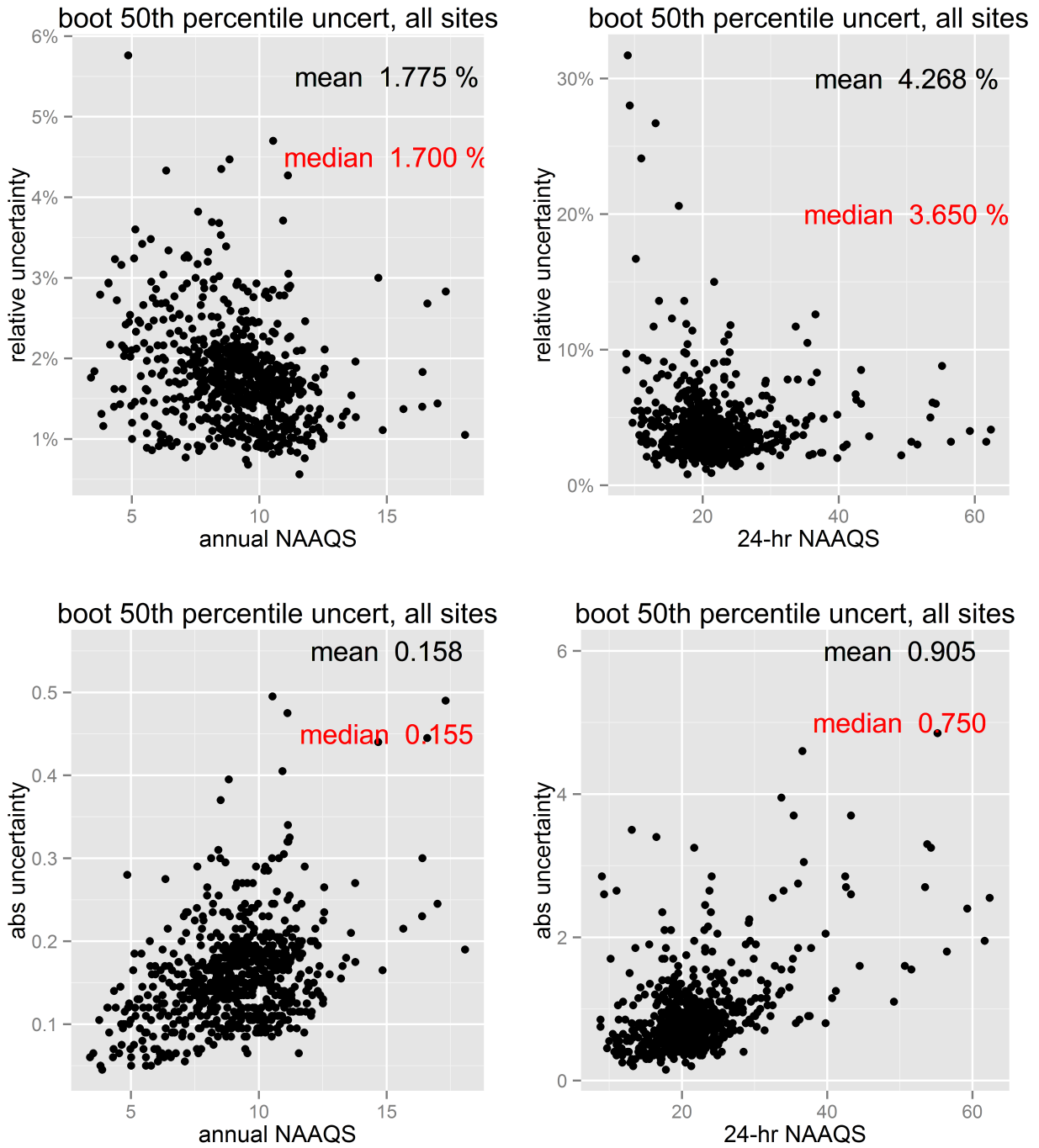


Figure 32: Bootstrap results from the 50% CIs for $PM_{2.5}$ DVs. The top two panels show the relative difference between the CI and the actual DV and the bottom two panels show the absolute difference between the values for the DVs at each site and the CI.

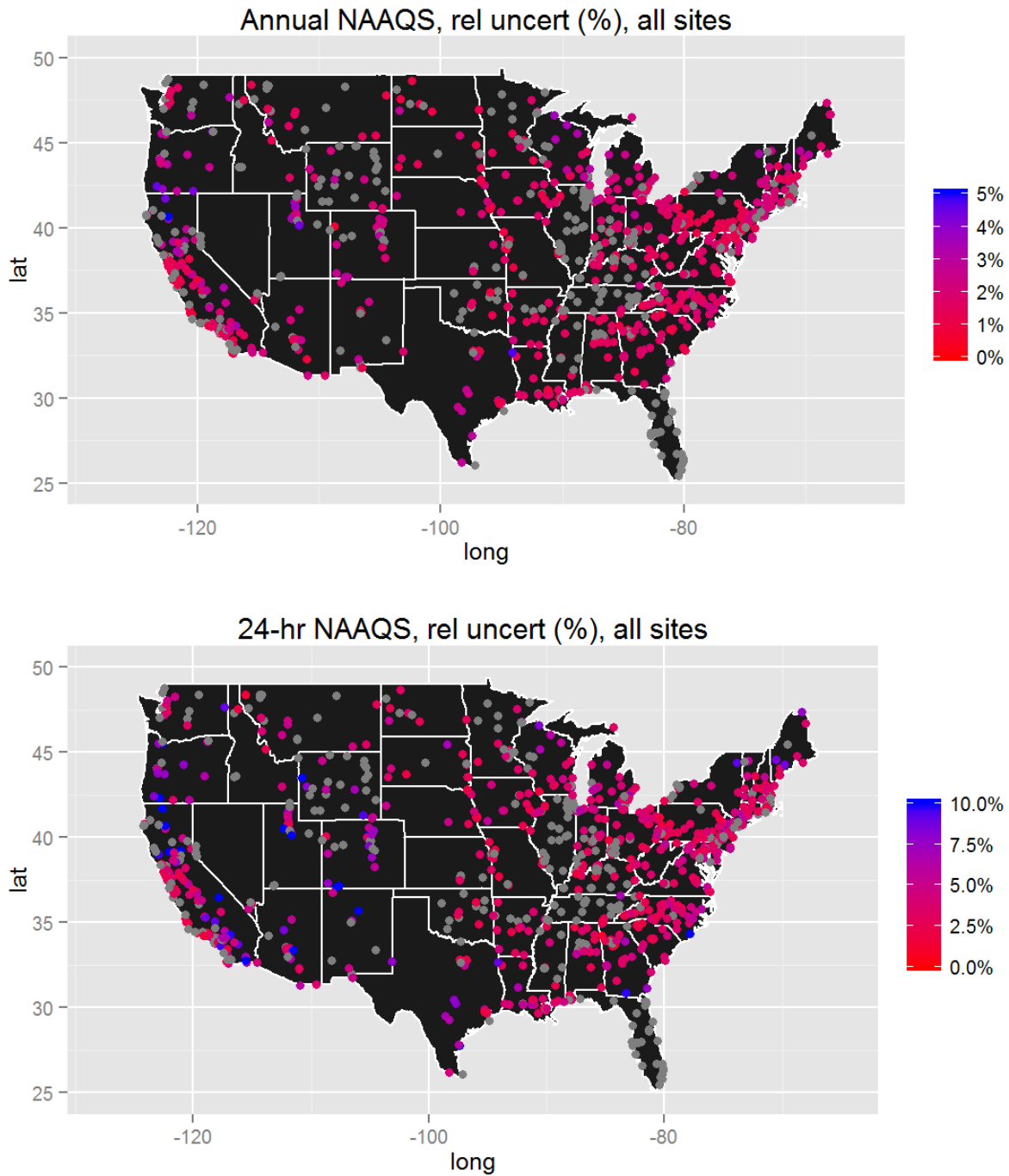


Figure 33: Spatial distribution of the relative difference between the CI and the actual DV from the 50% CIs for the 2013 PM_{2.5} DVs.

3.2 2010-2012 PM_{2.5} bootstrap results

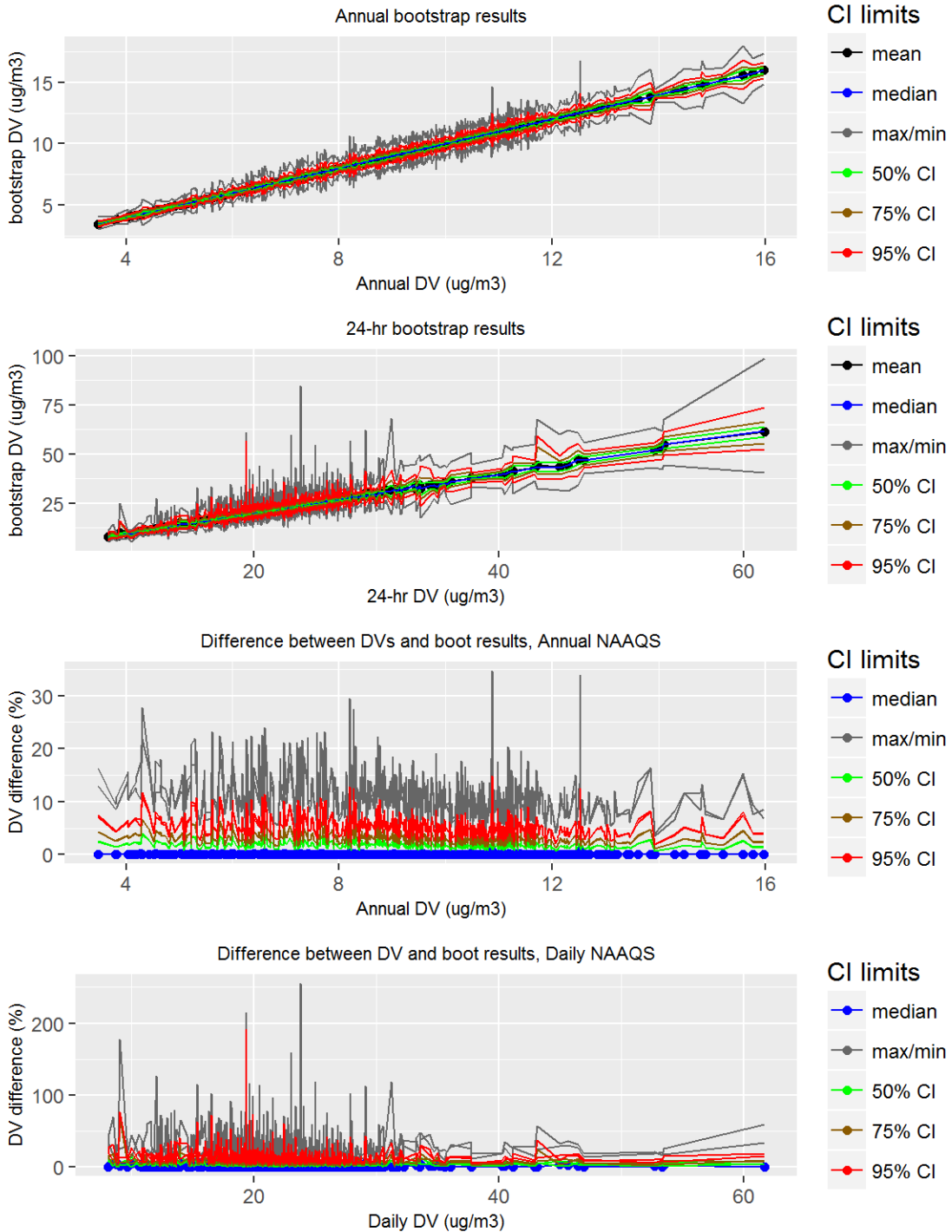


Figure 34: Bootstrap results for the 2012 PM_{2.5} DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top two panels show the values for the DVs at the various CIs, while the bottom two panels show the relative difference between the CI and the actual DV.

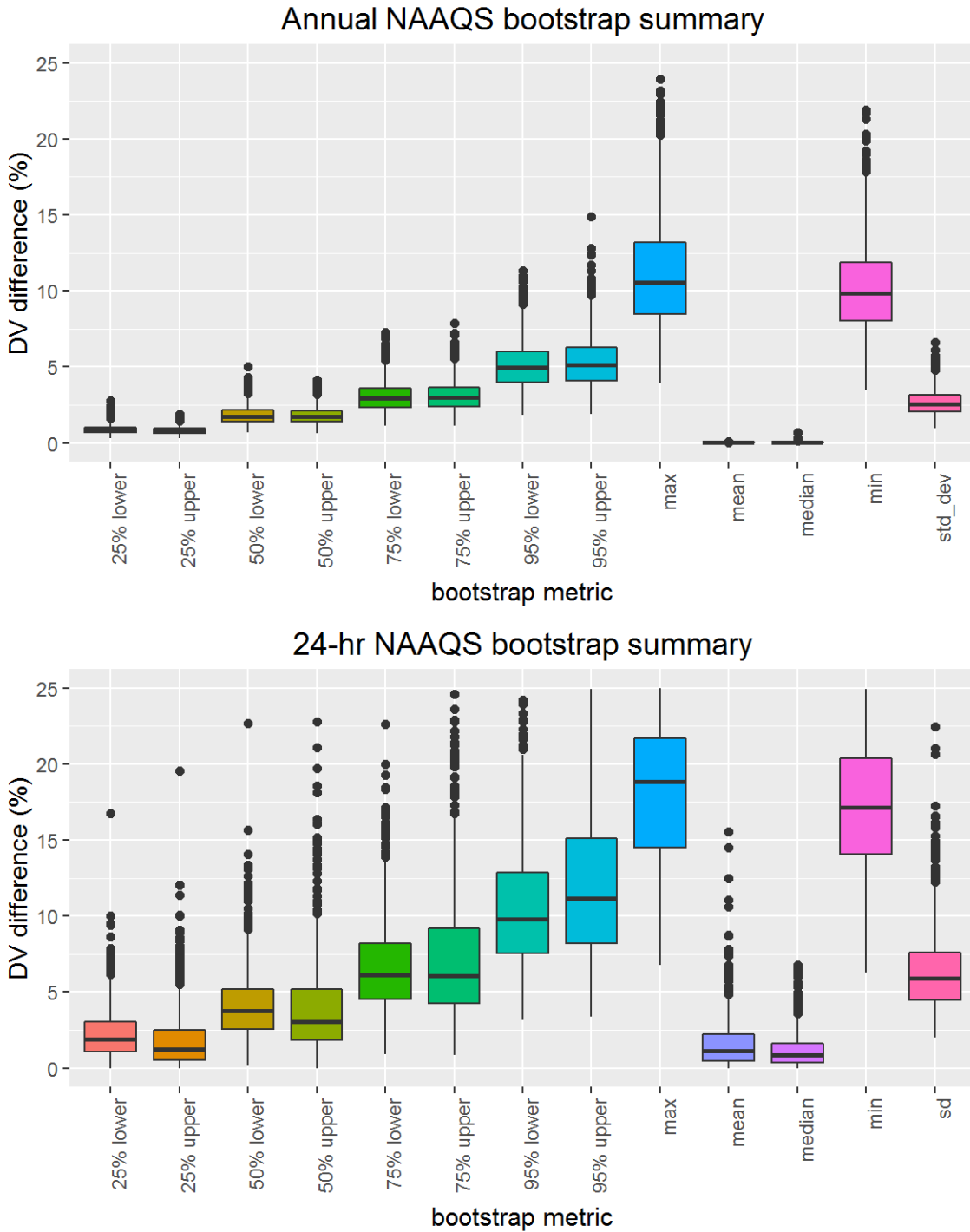


Figure 35: Bootstrap results for the 2012 PM_{2.5} DVs, showing distribution of the relative differences between the bootstrap DVs and the actual DV at the 25%, 50%, 75%, and 95% CIs, along with the mean, median, maximum, minimum, standard deviations of the relative differences.

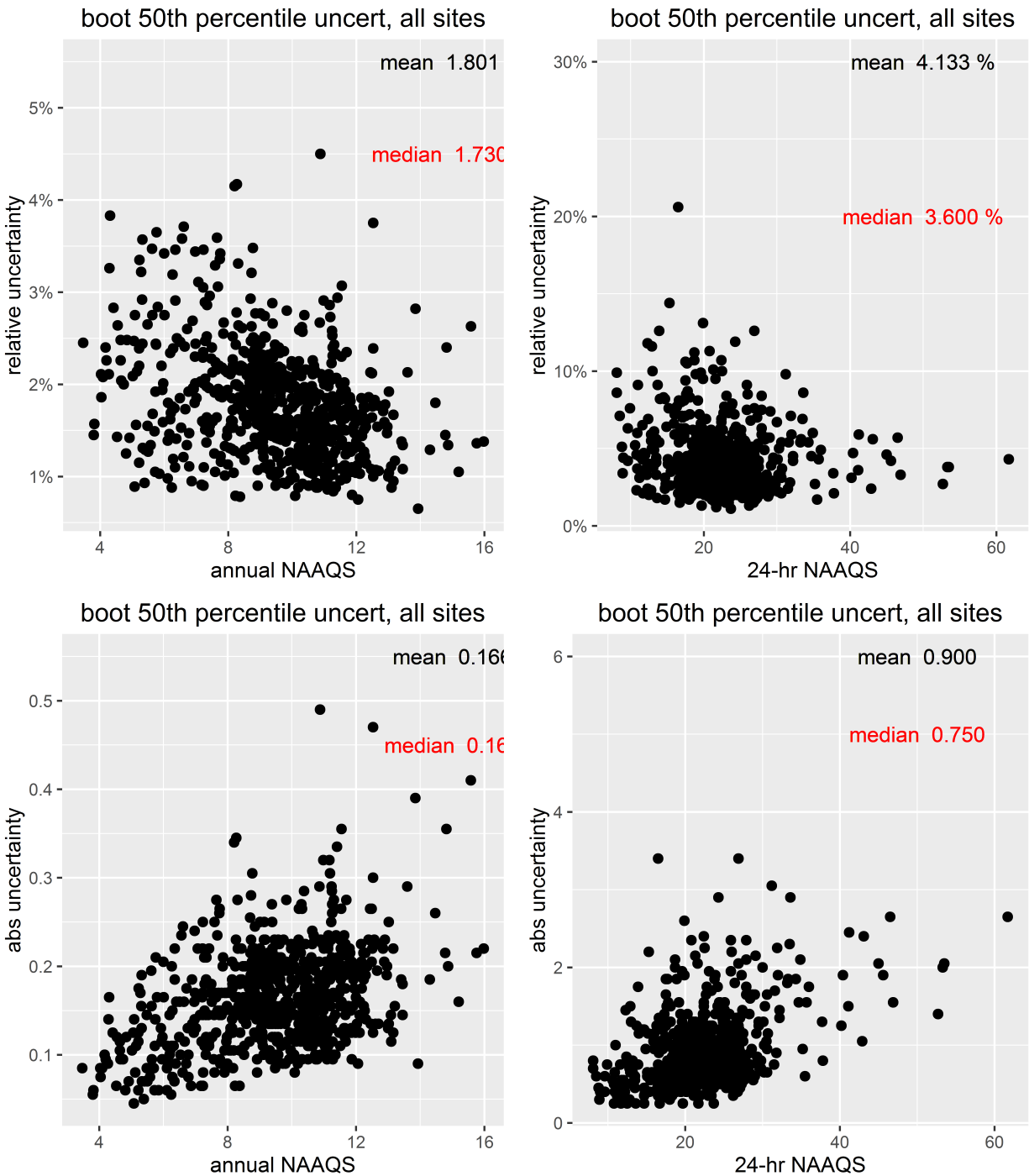


Figure 36: Bootstrap results from the 50% CIs for PM_{2.5} DVs. The top two panels show the relative difference between the CI and the actual DV and the bottom two panels show the absolute difference between the values for the DVs at each site and the CI.

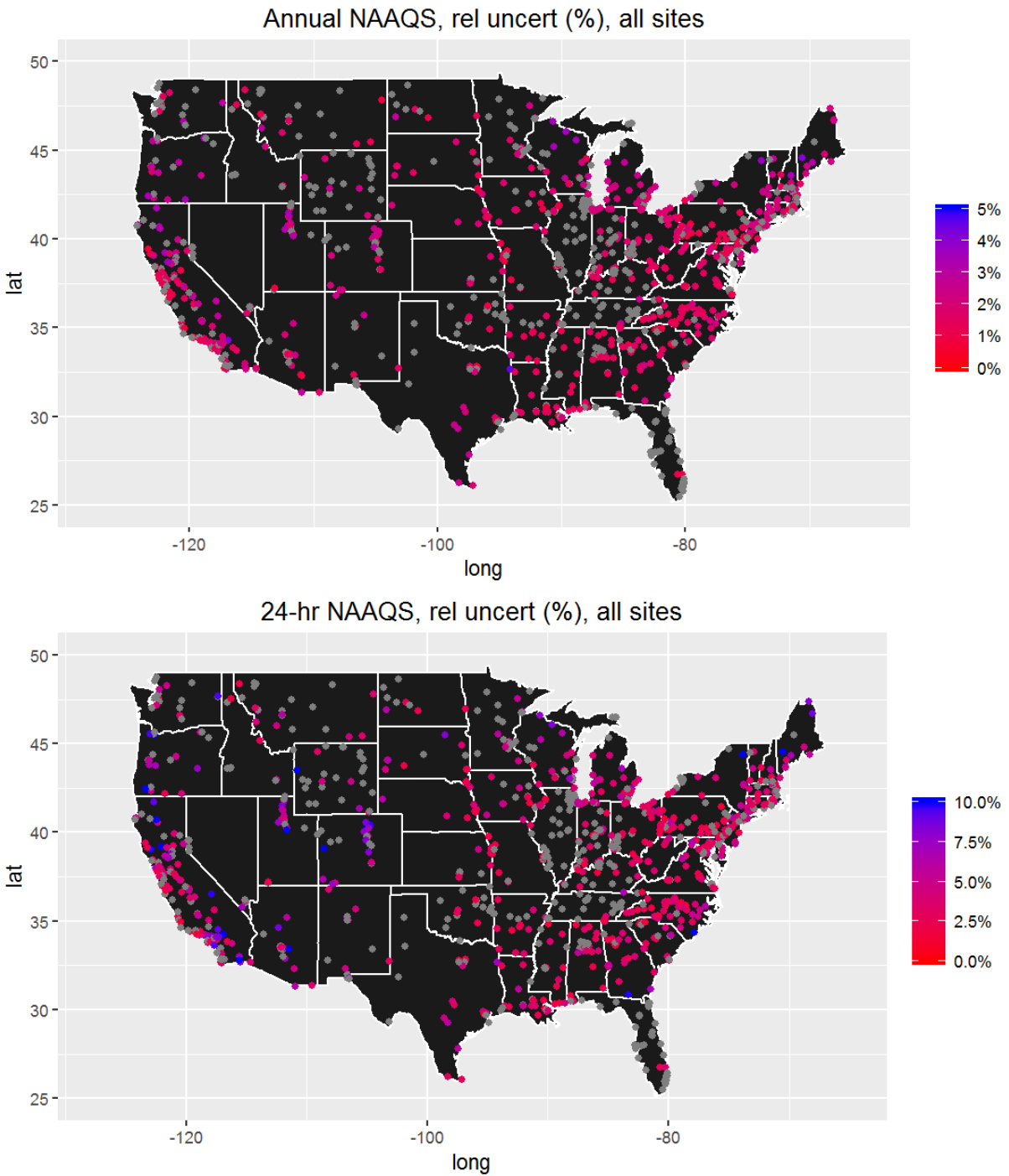


Figure 37: Spatial distribution of the relative difference between the CI and the actual DV from the 50% CIs for the 2012 PM_{2.5} DVs.

3.3 2009-2011 PM_{2.5} bootstrap results

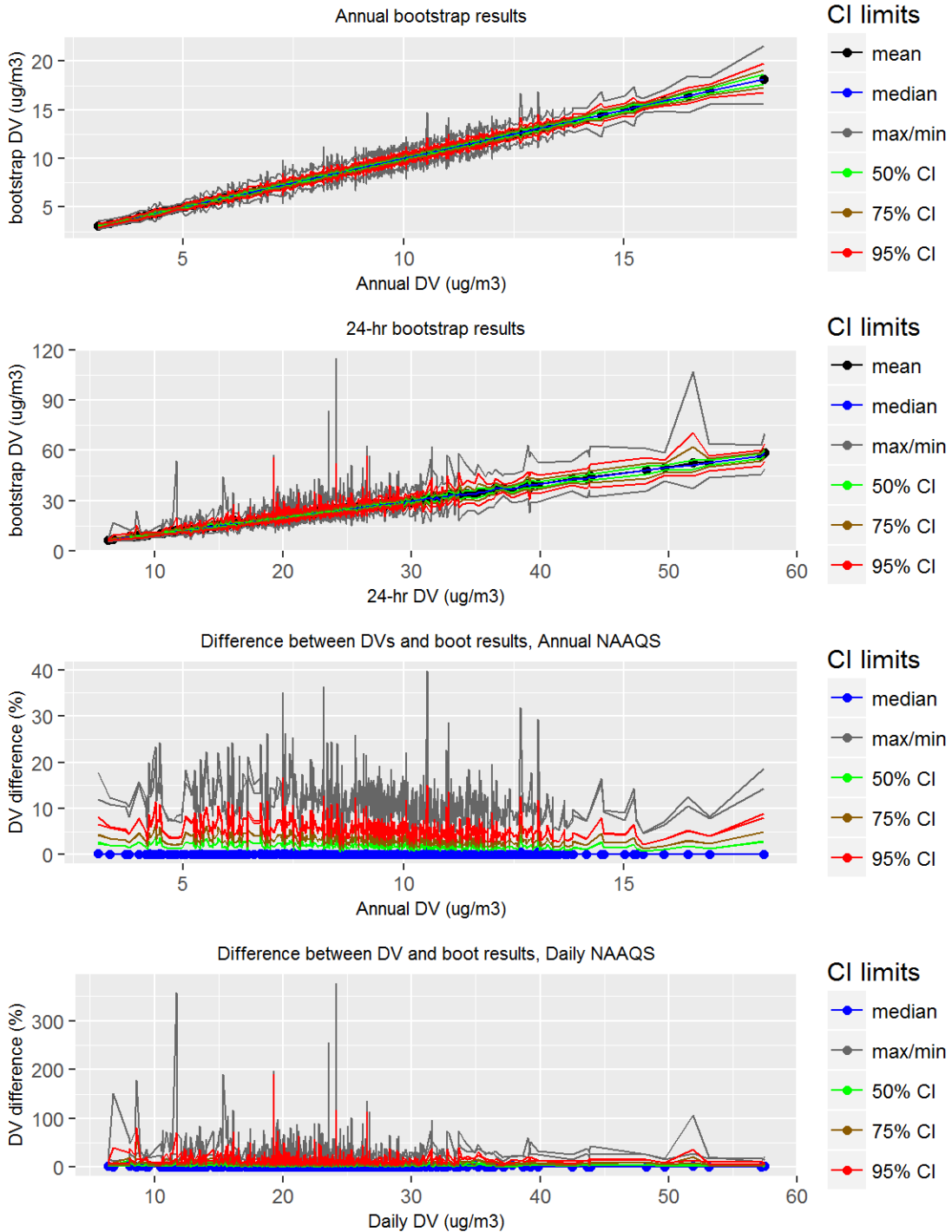


Figure 38: Bootstrap results for the 2011 PM_{2.5} DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top two panels show the values for the DVs at the various CIs, while the bottom two panels show the relative difference between the CI and the actual DV.

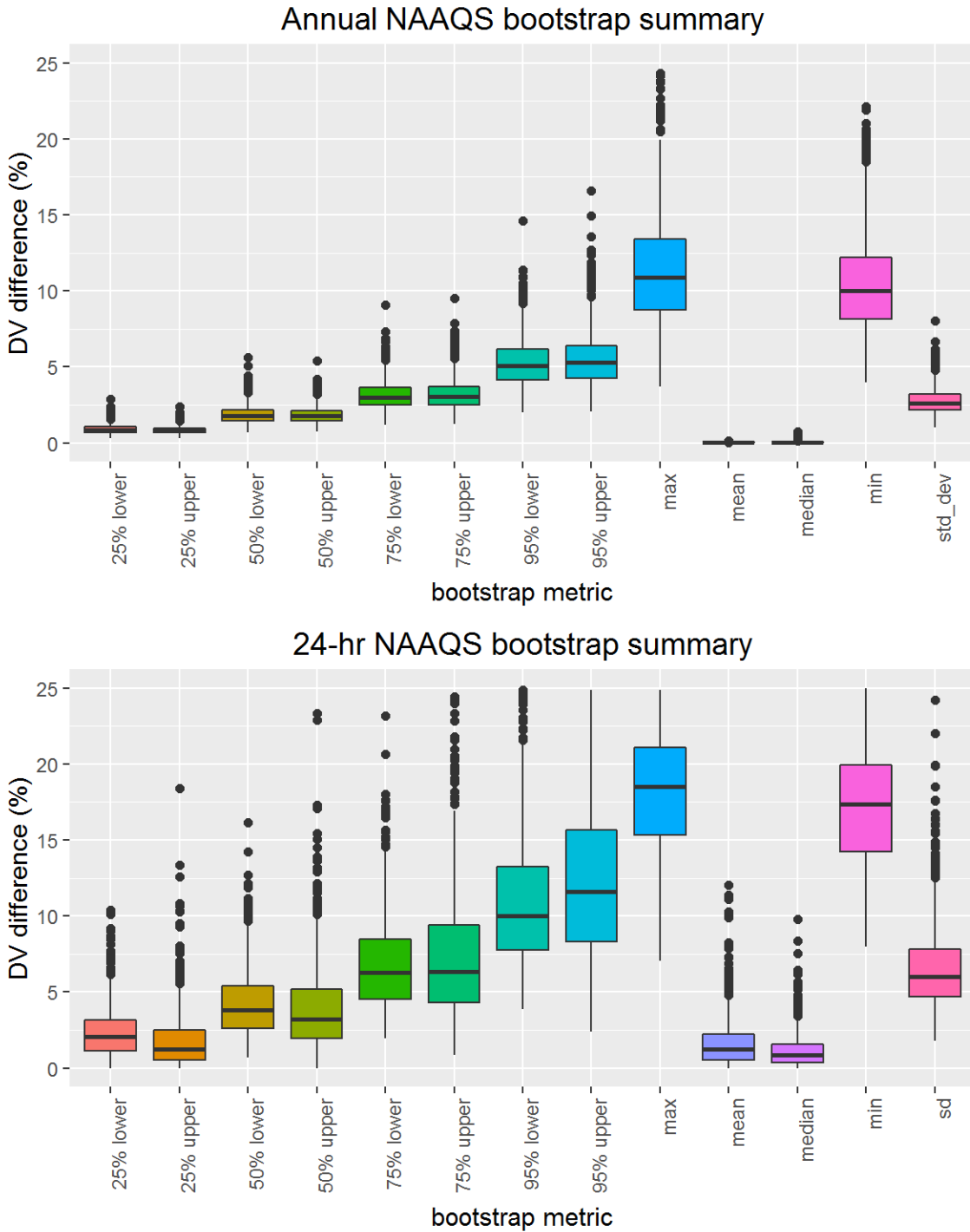


Figure 39: Bootstrap results for the 2011 PM_{2.5} DVs, showing distribution of the relative differences between the bootstrap DVs and the actual DV at the 25%, 50%, 75%, and 95% CIs, along with the mean, median, maximum, minimum, standard deviations of the relative differences.

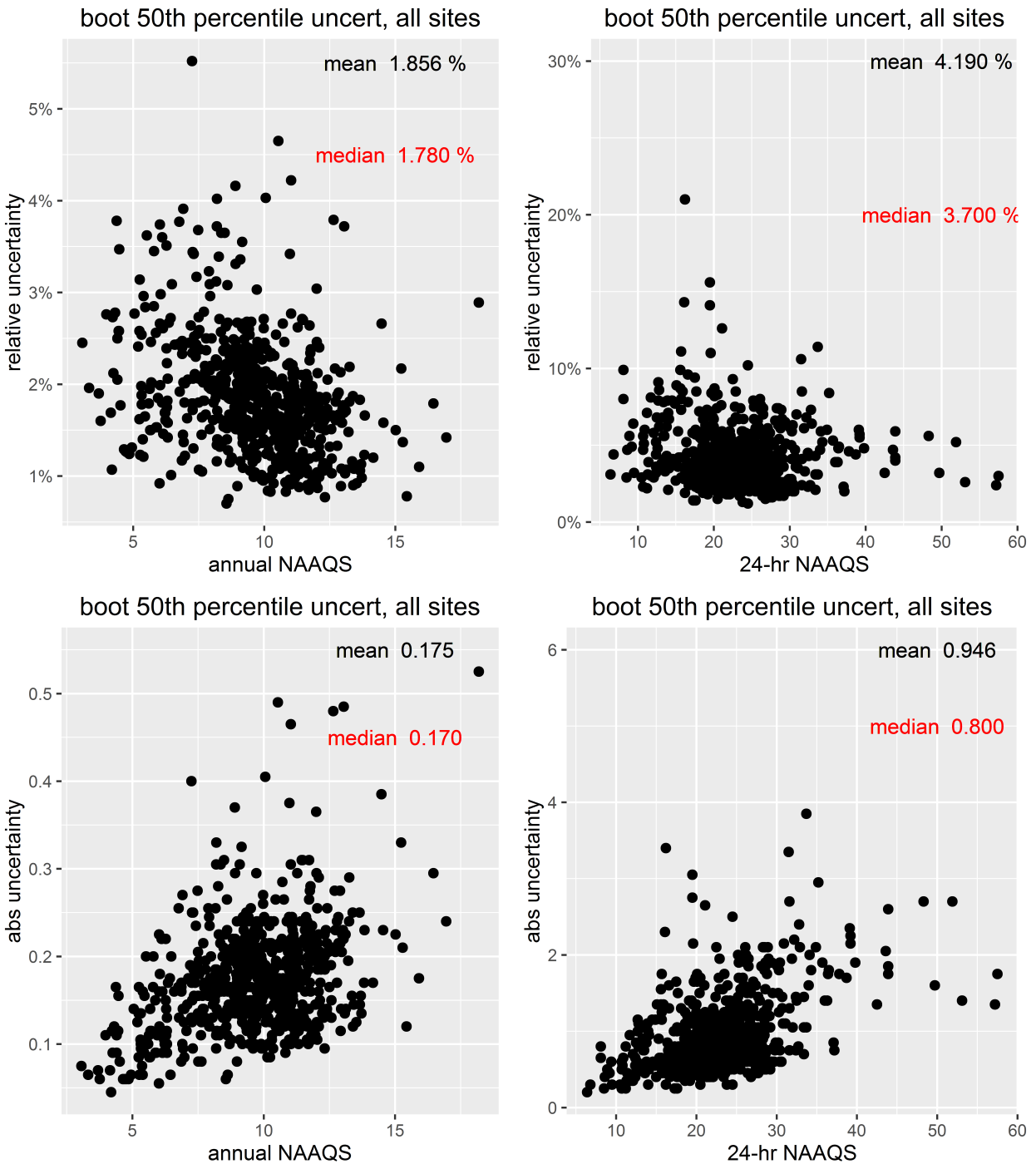


Figure 40: Bootstrap results from the 50% CIs for PM_{2.5} DVs. The top two panels show the relative difference between the CI and the actual DV and the bottom two panels show the absolute difference between the values for the DVs at each site and the CI.

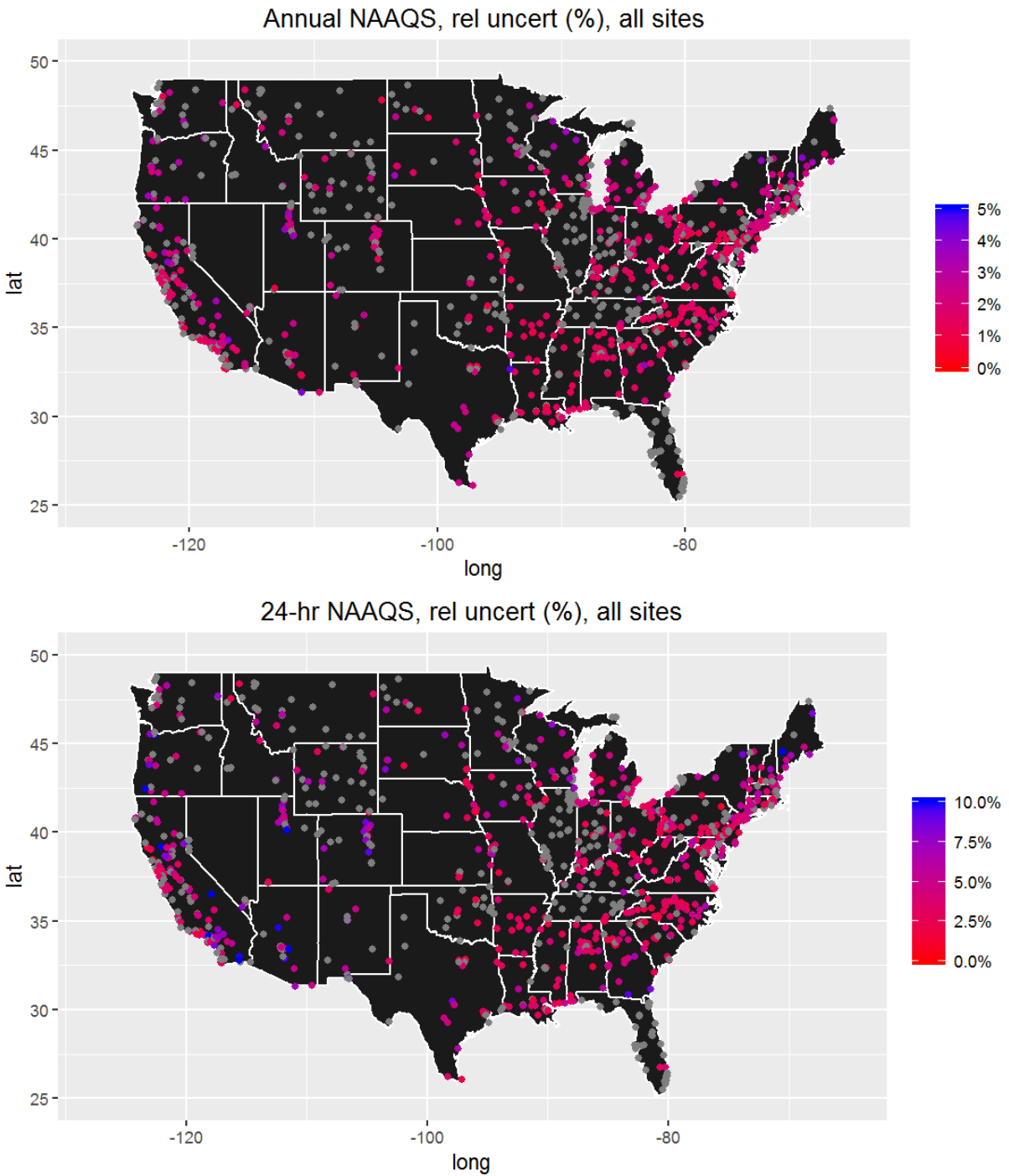


Figure 41: Spatial distribution of the relative difference between the CI and the actual DV from the 50% CIs for the 2011 PM_{2.5} DVs.

3.4 2008-2010 PM_{2.5} bootstrap results

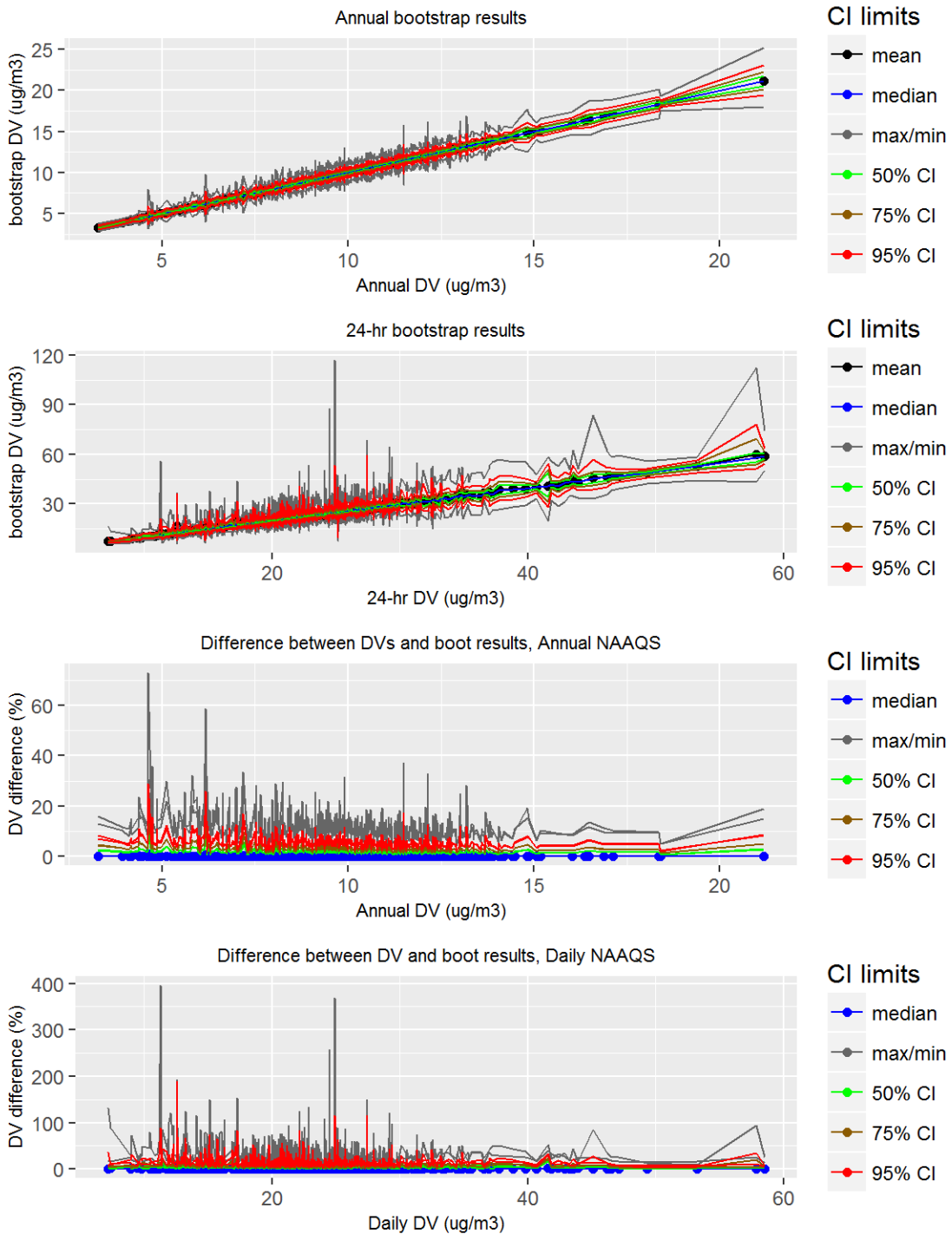


Figure 42: Bootstrap results for the 2010 PM_{2.5} DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top two panels show the values for the DVs at the various CIs, while the bottom two panels show the relative difference between the CI and the actual DV.

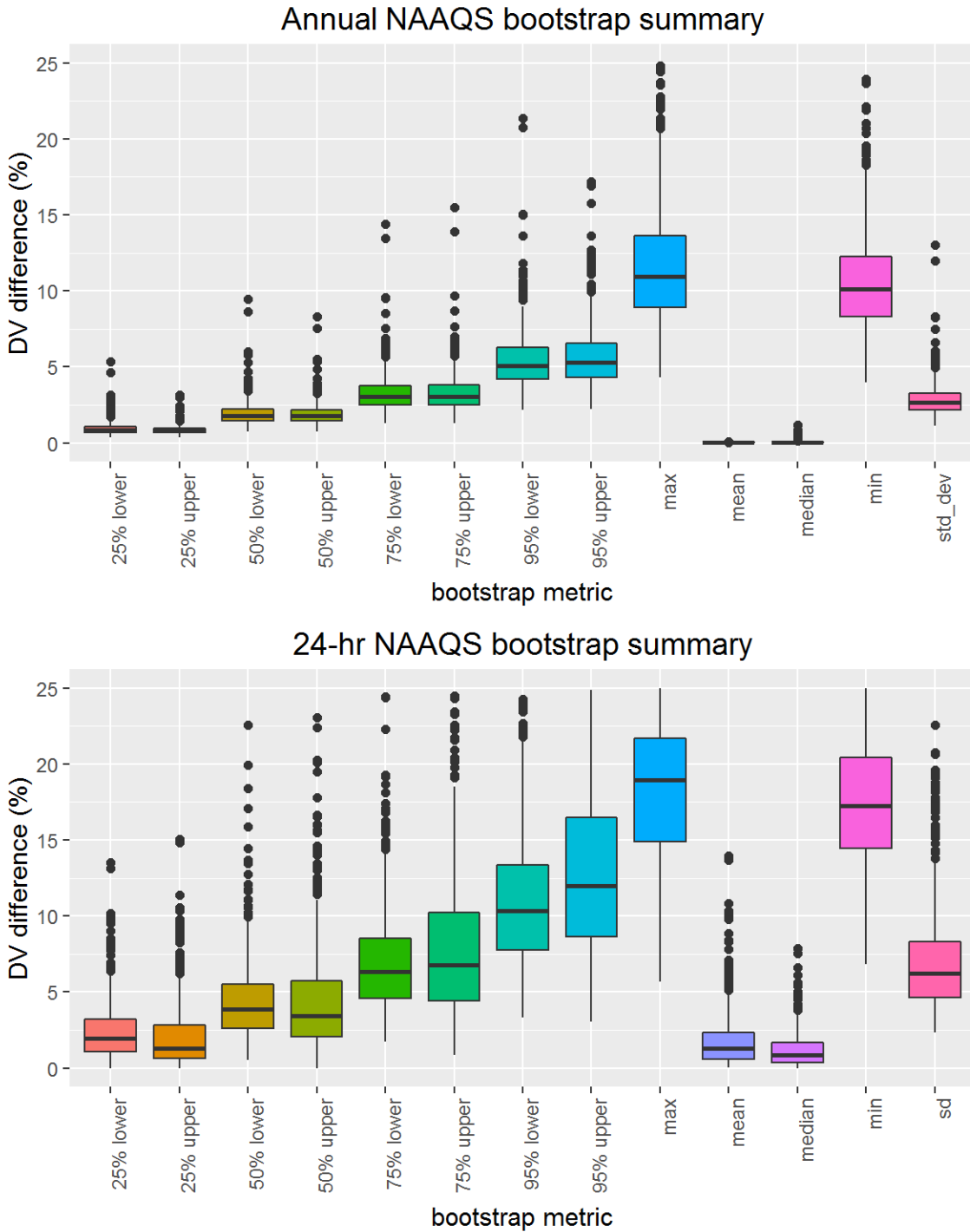


Figure 43: Bootstrap results for the 2010 PM_{2.5} DVs, showing distribution of the relative differences between the bootstrap DVs and the actual DV at the 25%, 50%, 75%, and 95% CIs, along with the mean, median, maximum, minimum, standard deviations of the relative differences.

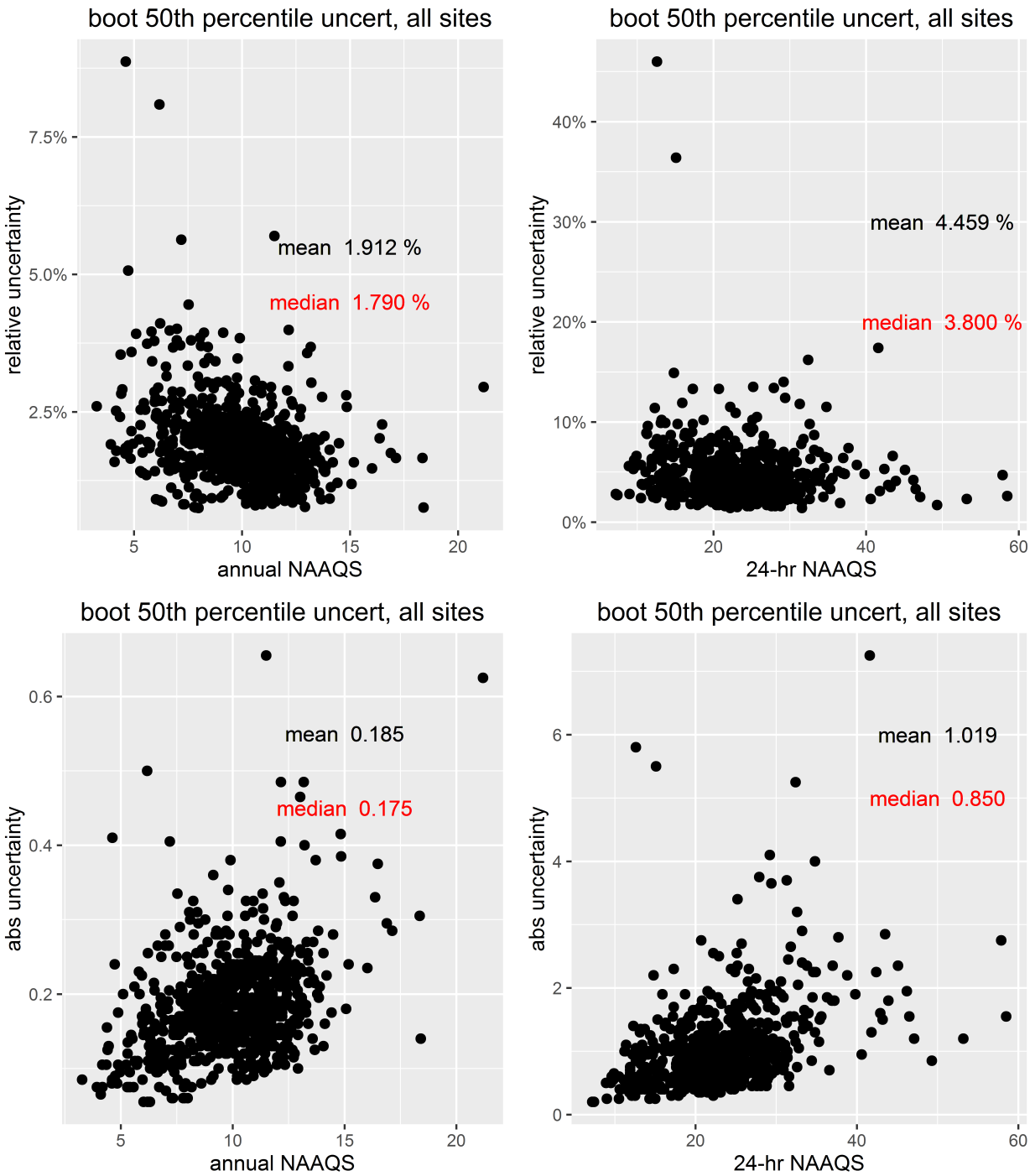


Figure 44: Bootstrap results from the 50% CIs for $PM_{2.5}$ DVs. The top two panels show the relative difference between the CI and the actual DV and the bottom two panels show the absolute difference between the values for the DVs at each site and the CI.

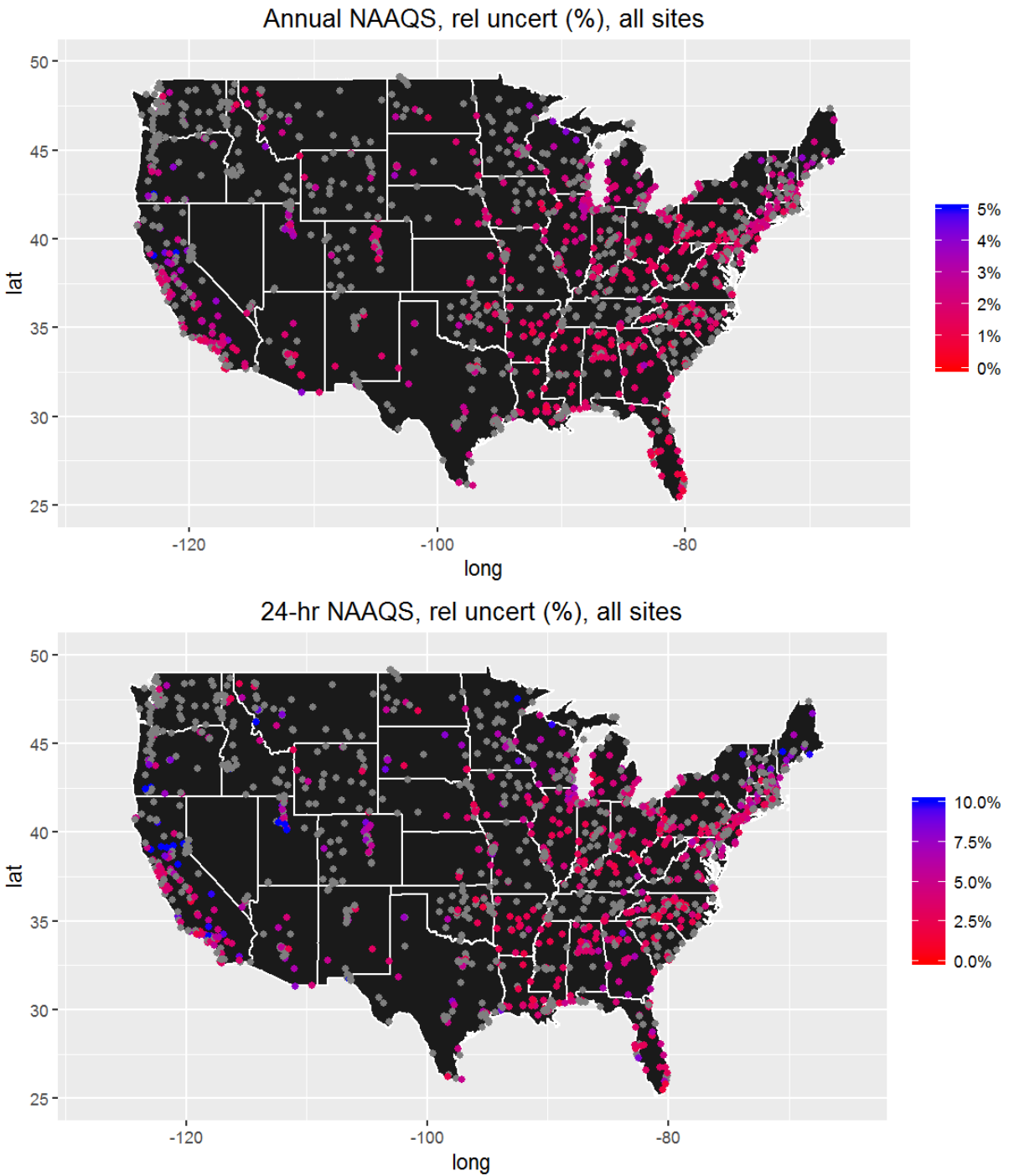


Figure 45: Spatial distribution of the relative difference between the CI and the actual DV from the 50% CIs for the 2010 PM_{2.5} DVs.

3.5 2007-2009 PM_{2.5} bootstrap results

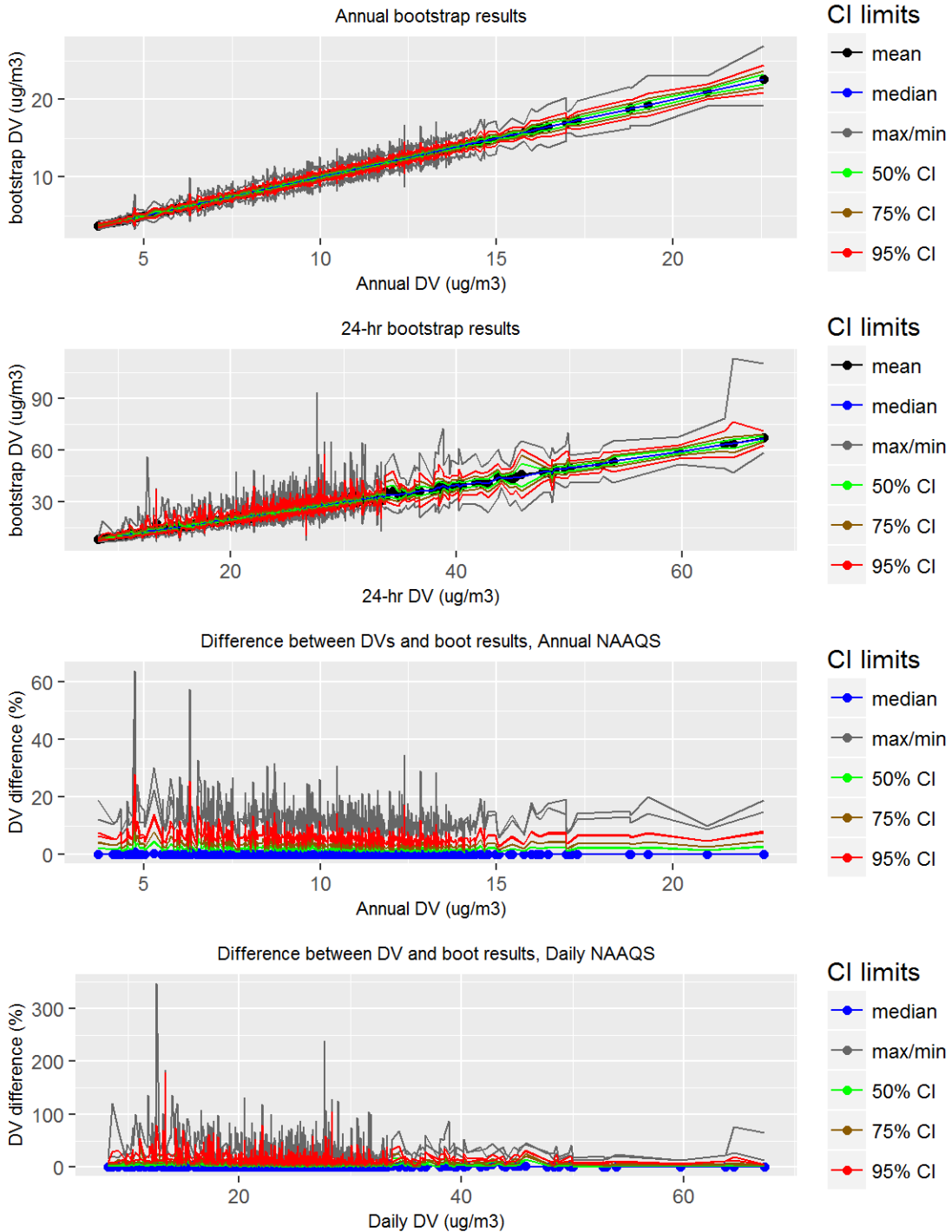


Figure 46: Bootstrap results for the 2009 PM_{2.5} DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top two panels show the values for the DVs at the various CIs, while the bottom two panels show the relative difference between the CI and the actual DV.

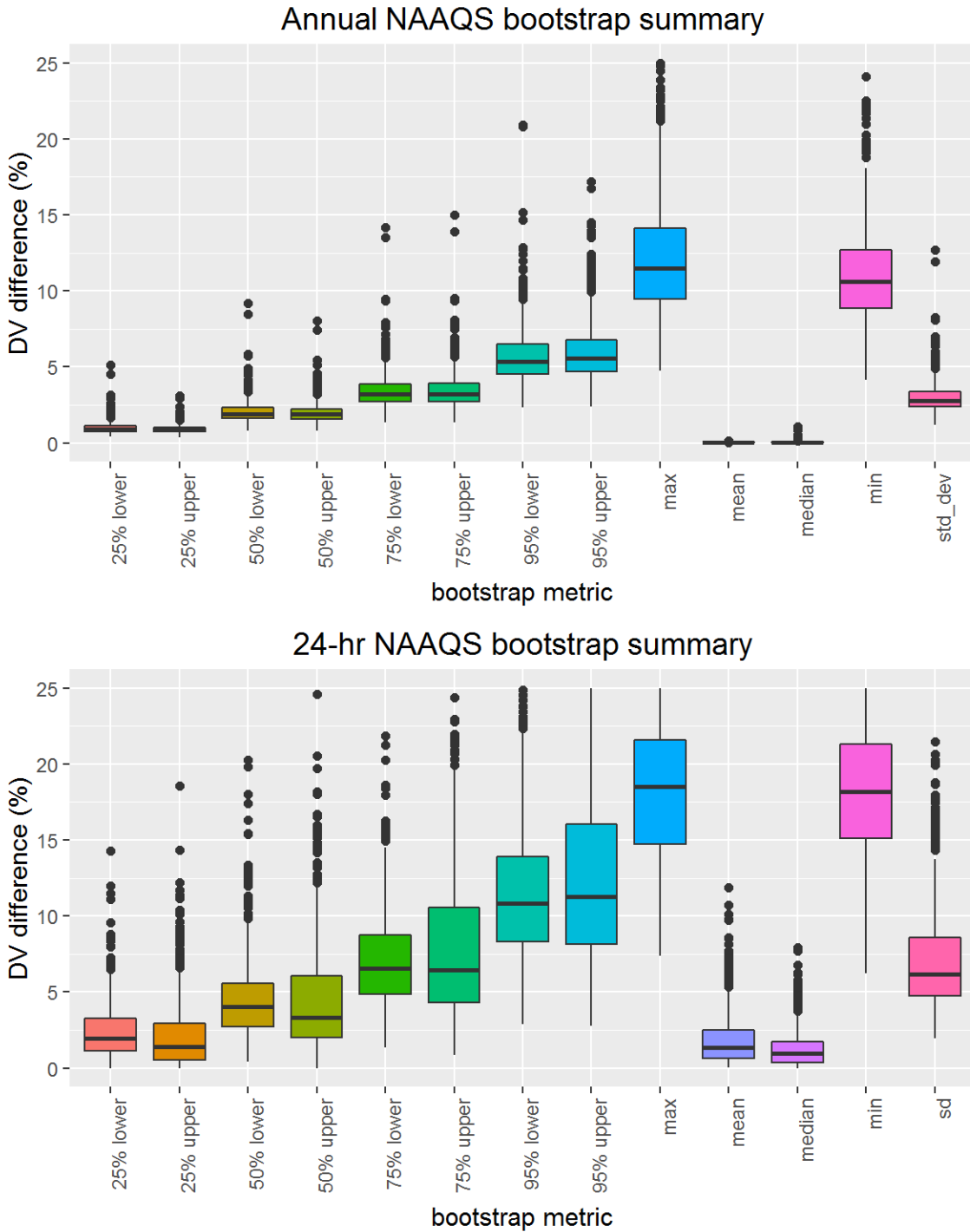


Figure 47: Bootstrap results for the 2009 PM_{2.5} DVs, showing distribution of the relative differences between the bootstrap DVs and the actual DV at the 25%, 50%, 75%, and 95% CIs, along with the mean, median, maximum, minimum, standard deviations of the relative differences.

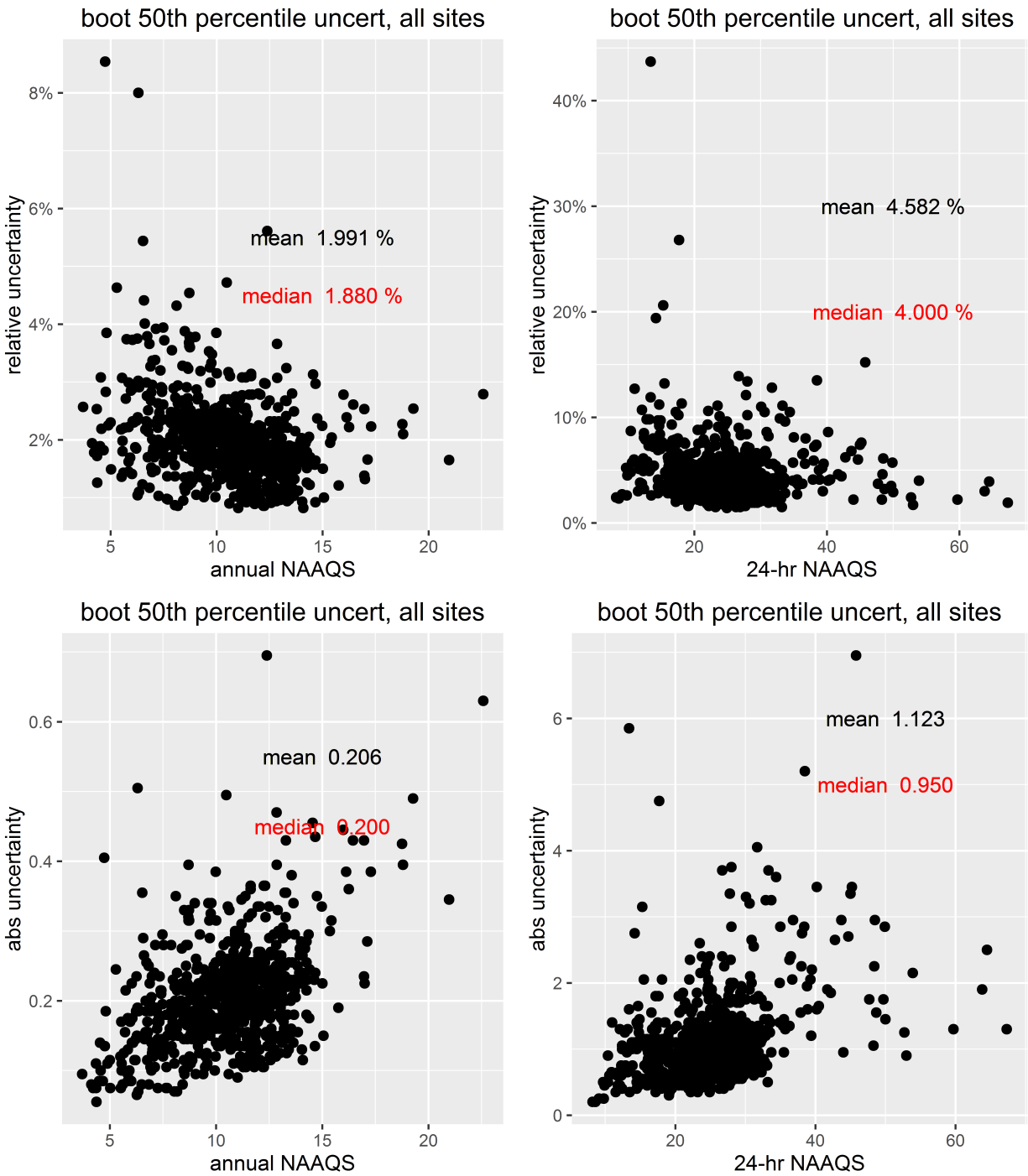


Figure 48: Bootstrap results from the 50% CIs for $PM_{2.5}$ DVs. The top two panels show the relative difference between the CI and the actual DV and the bottom two panels show the absolute difference between the values for the DVs at each site and the CI.

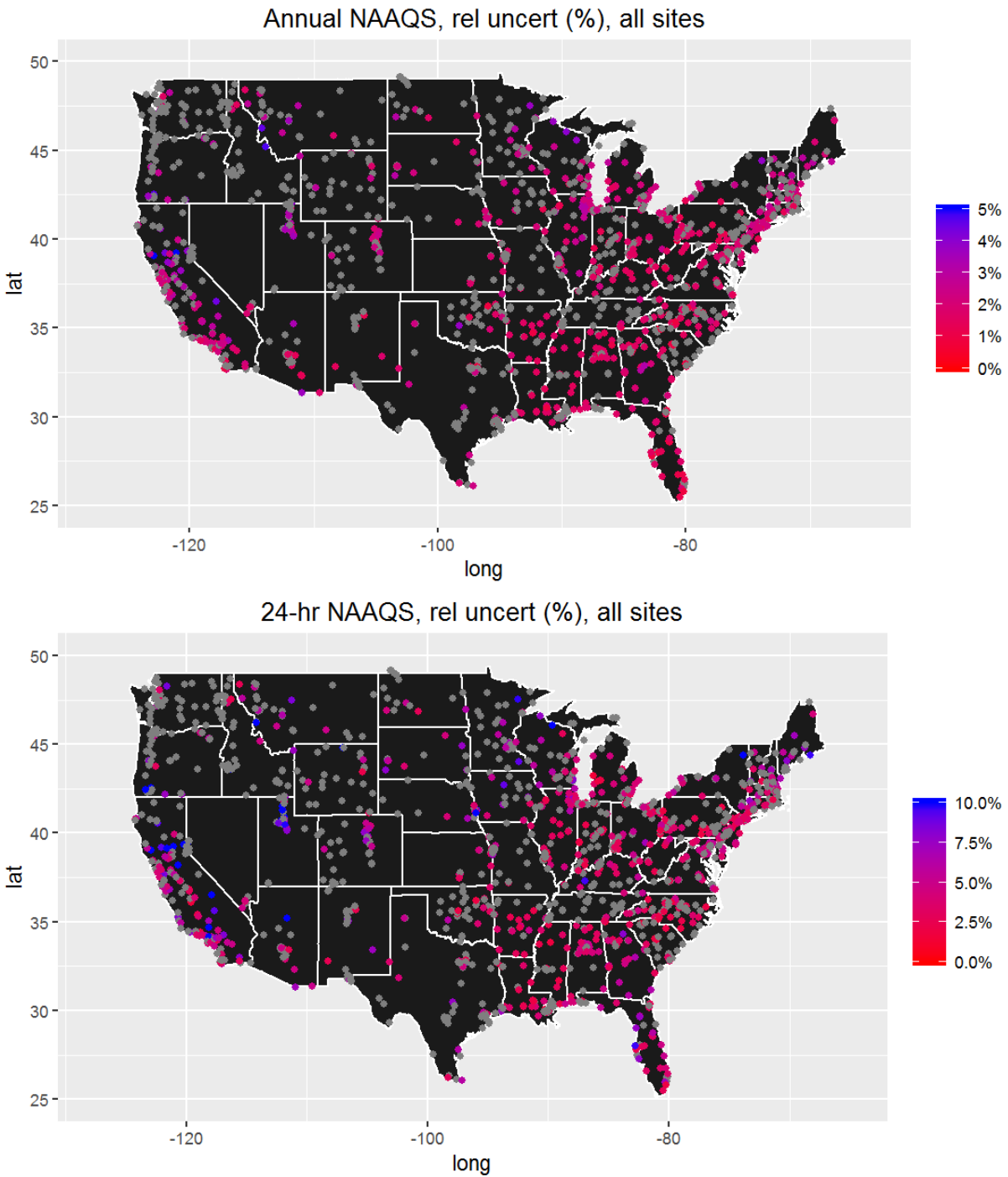


Figure 49: Spatial distribution of the relative difference between the CI and the actual DV from the 50% CIs for the 2009 PM_{2.5} DVs.

3.6 2006-2008 PM_{2.5} bootstrap results

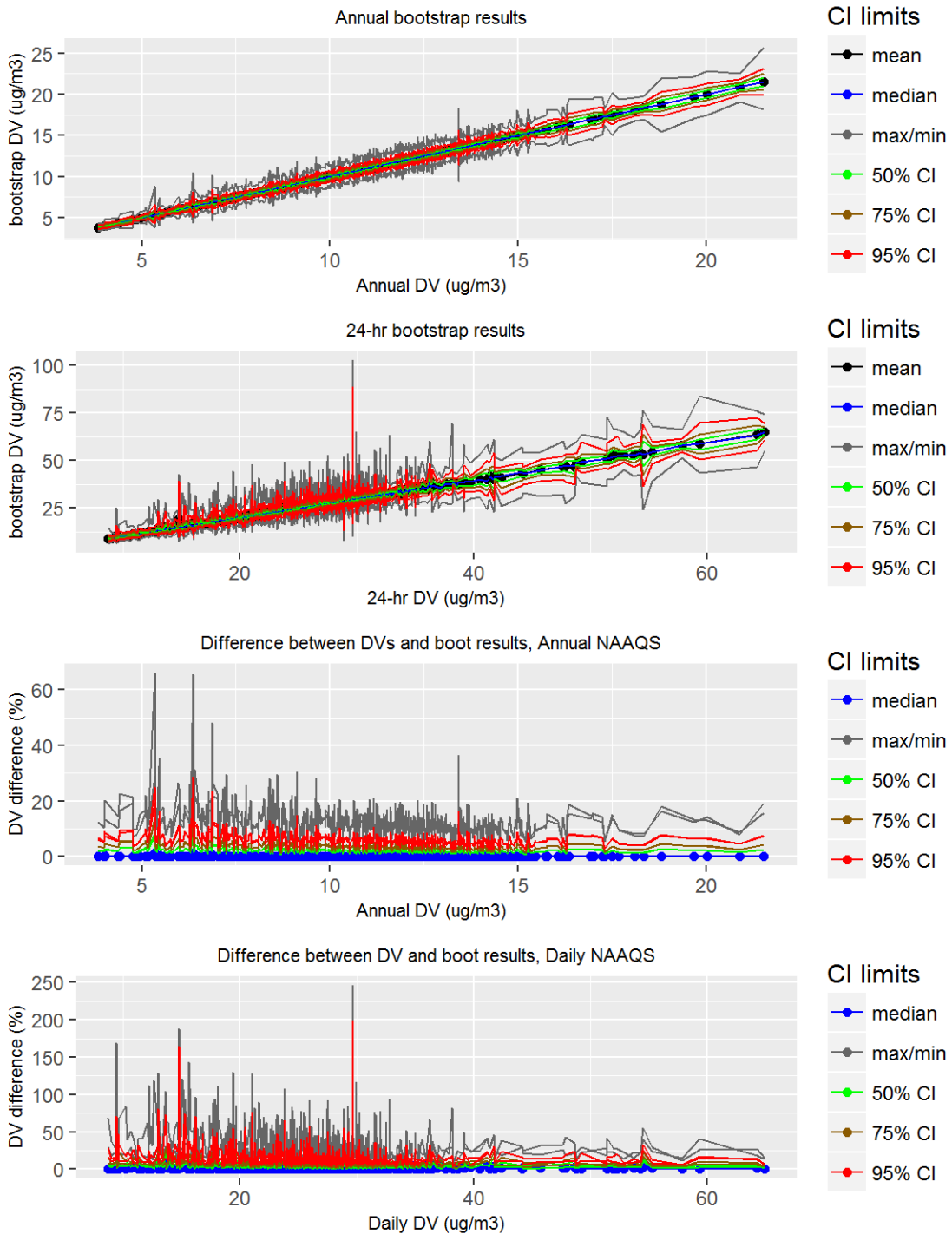


Figure 50: Bootstrap results for the 2008 PM_{2.5} DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top two panels show the values for the DVs at the various CIs, while the bottom two panels show the relative difference between the CI and the actual DV.

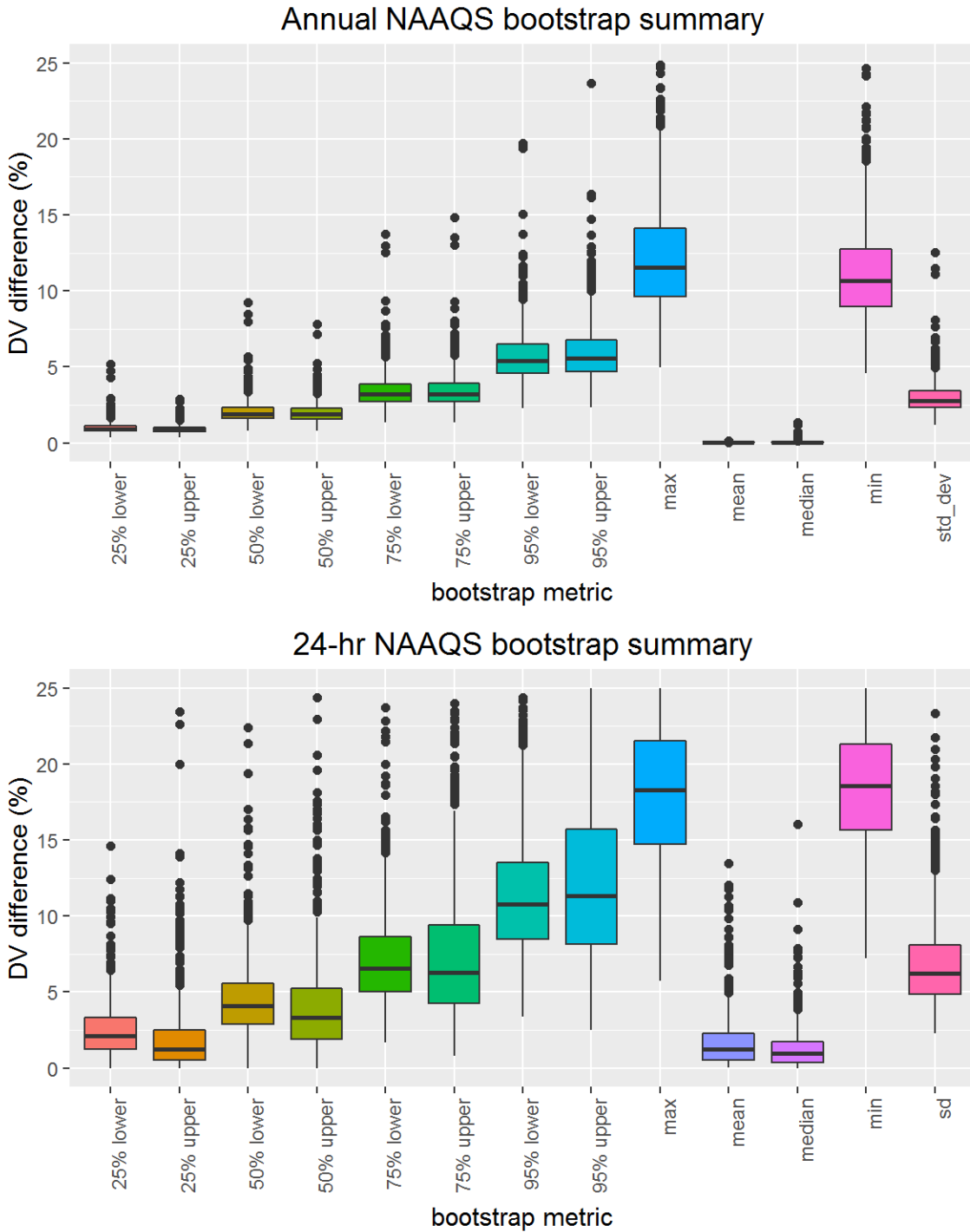


Figure 51: Bootstrap results for the 2008 PM_{2.5} DVs, showing distribution of the relative differences between the bootstrap DVs and the actual DV at the 25%, 50%, 75%, and 95% CIs, along with the mean, median, maximum, minimum, standard deviations of the relative differences.

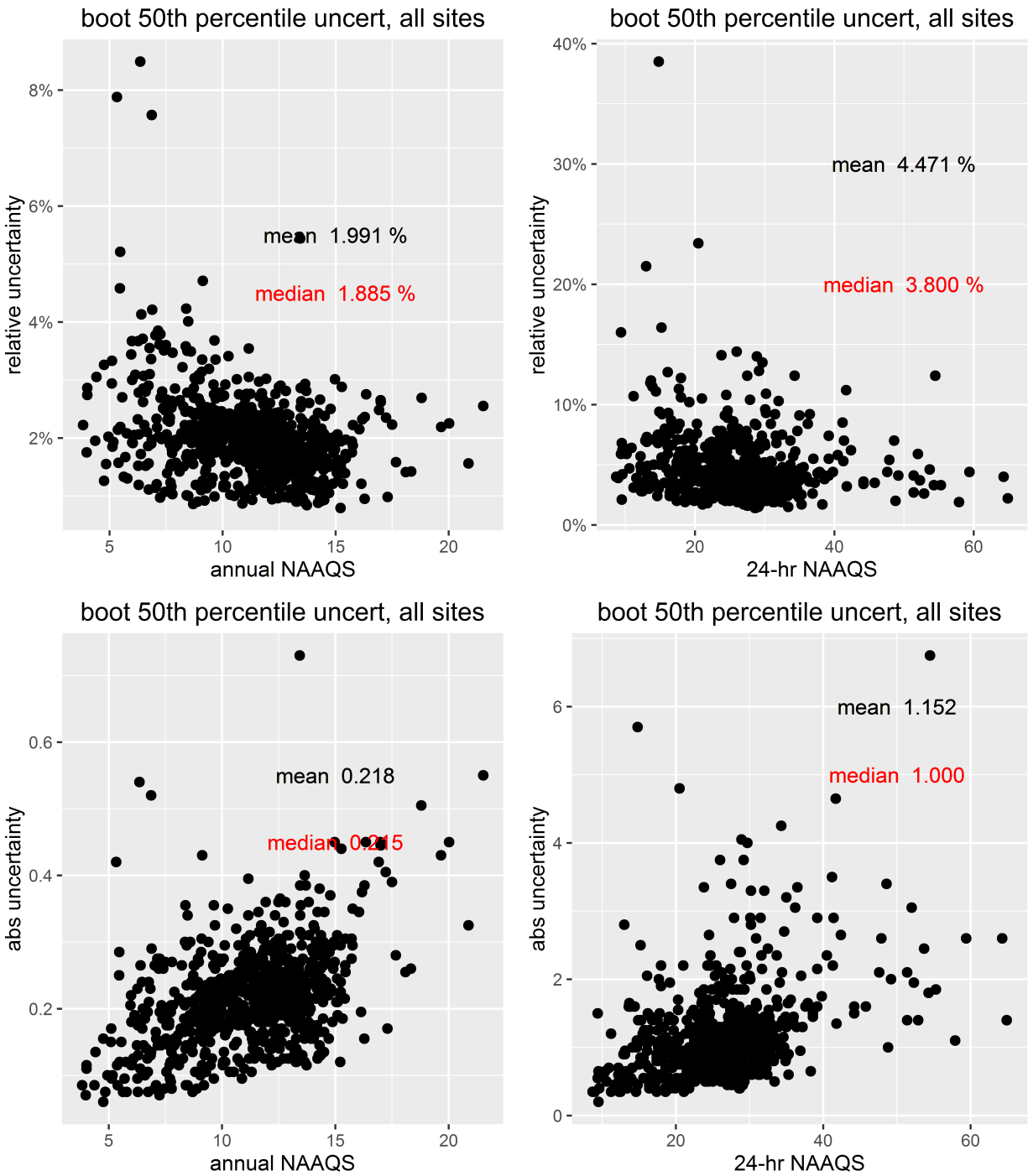


Figure 52: Bootstrap results from the 50% CIs for PM_{2.5} DVs. The top two panels show the relative difference between the CI and the actual DV and the bottom two panels show the absolute difference between the values for the DVs at each site and the CI.

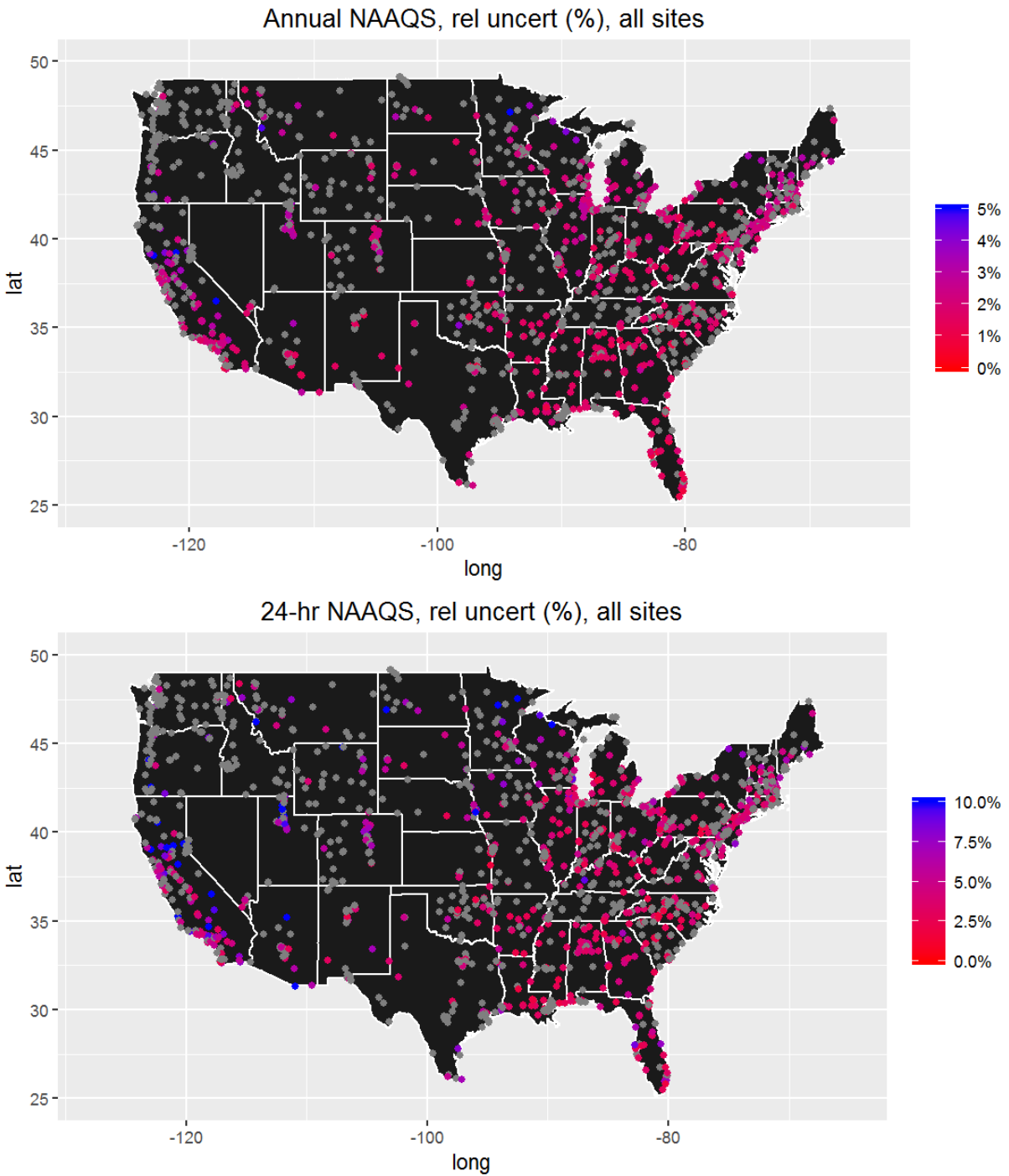


Figure 53: Spatial distribution of the relative difference between the CI and the actual DV from the 50% CIs for the 2008 PM_{2.5} DVs.

3.7 2005-2007 PM_{2.5} bootstrap results

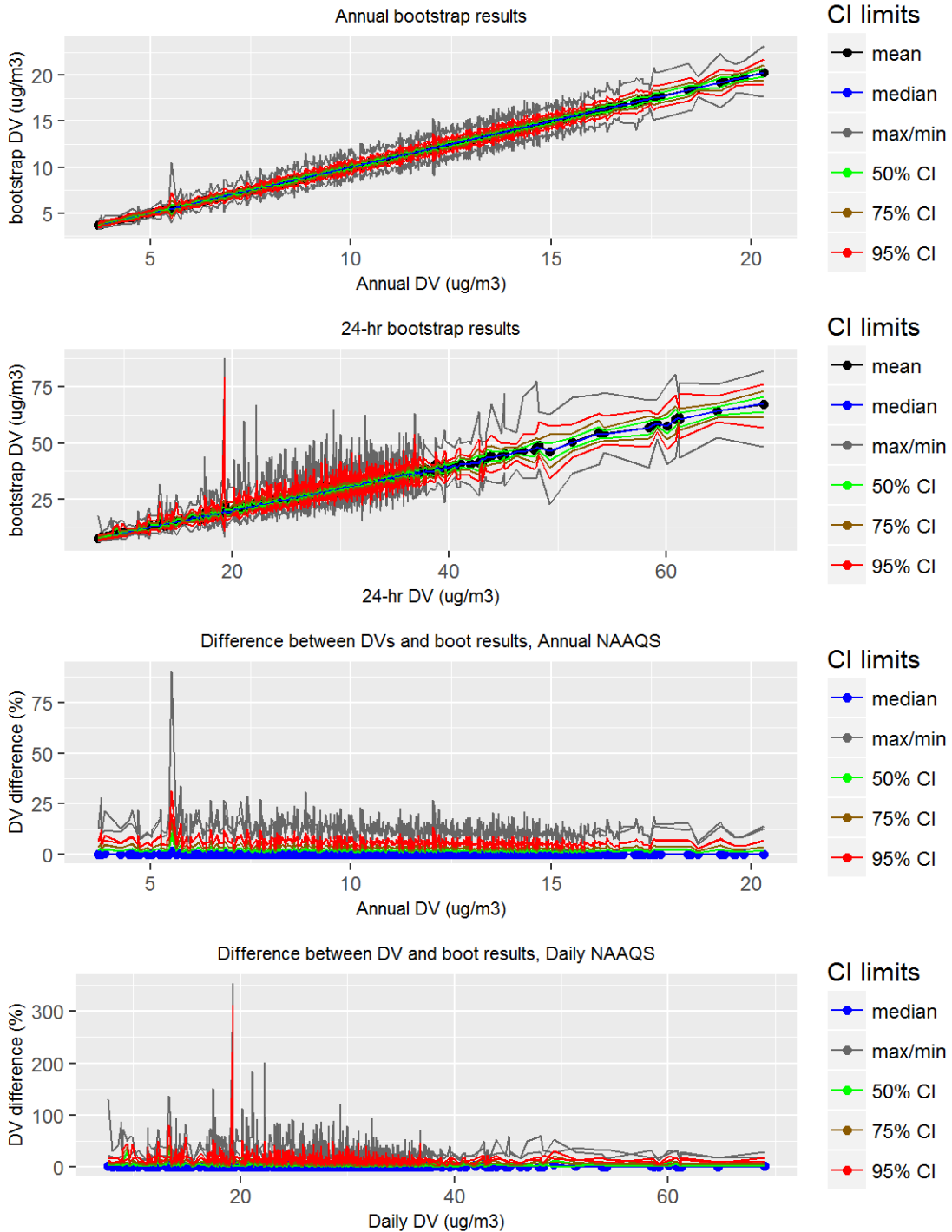


Figure 54: Bootstrap results for the 2007 PM_{2.5} DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top two panels show the values for the DVs at the various CIs, while the bottom two panels show the relative difference between the CI and the actual DV.

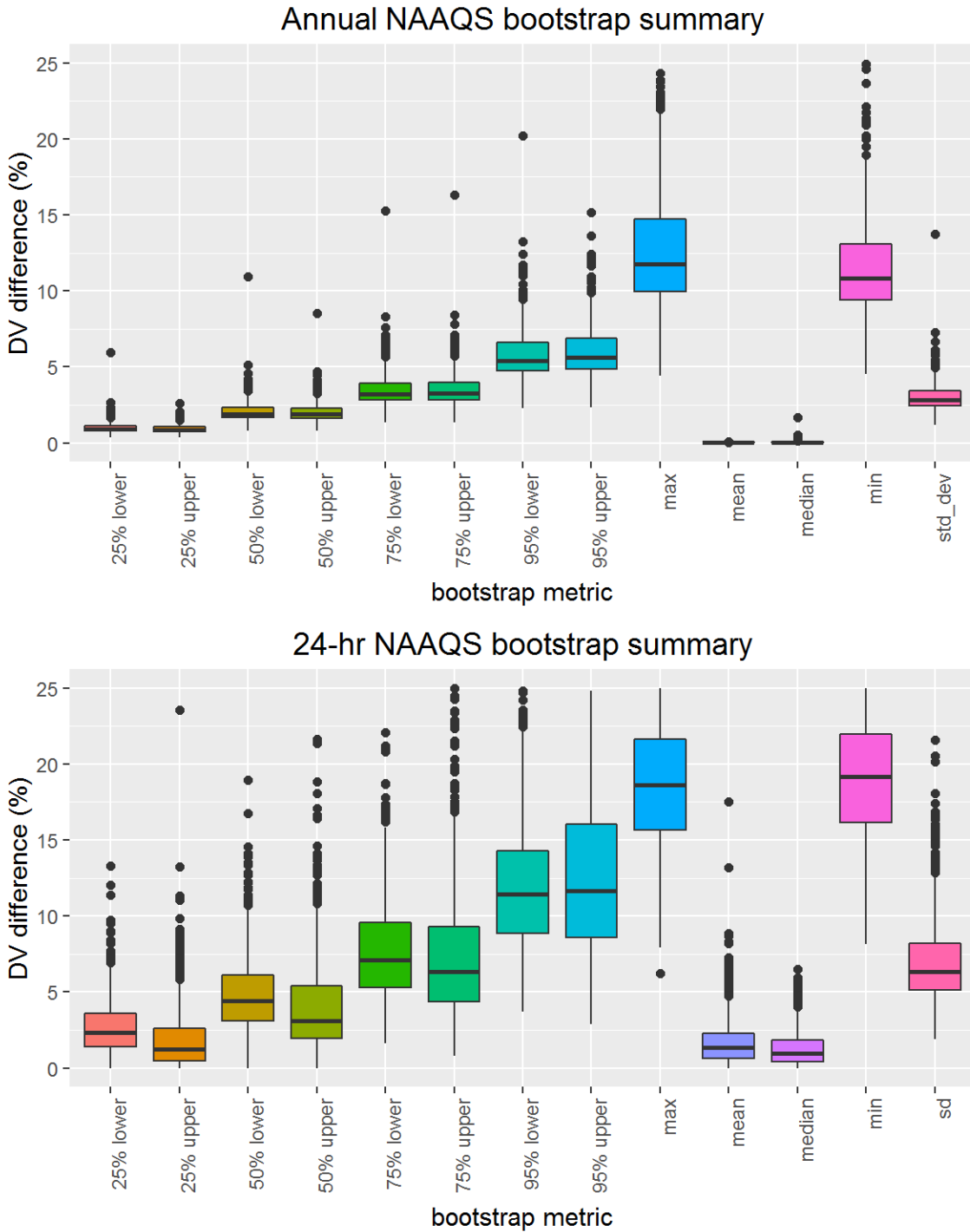


Figure 55: Bootstrap results for the 2007 PM_{2.5} DVs, showing distribution of the relative differences between the bootstrap DVs and the actual DV at the 25%, 50%, 75%, and 95% CIs, along with the mean, median, maximum, minimum, standard deviations of the relative differences.

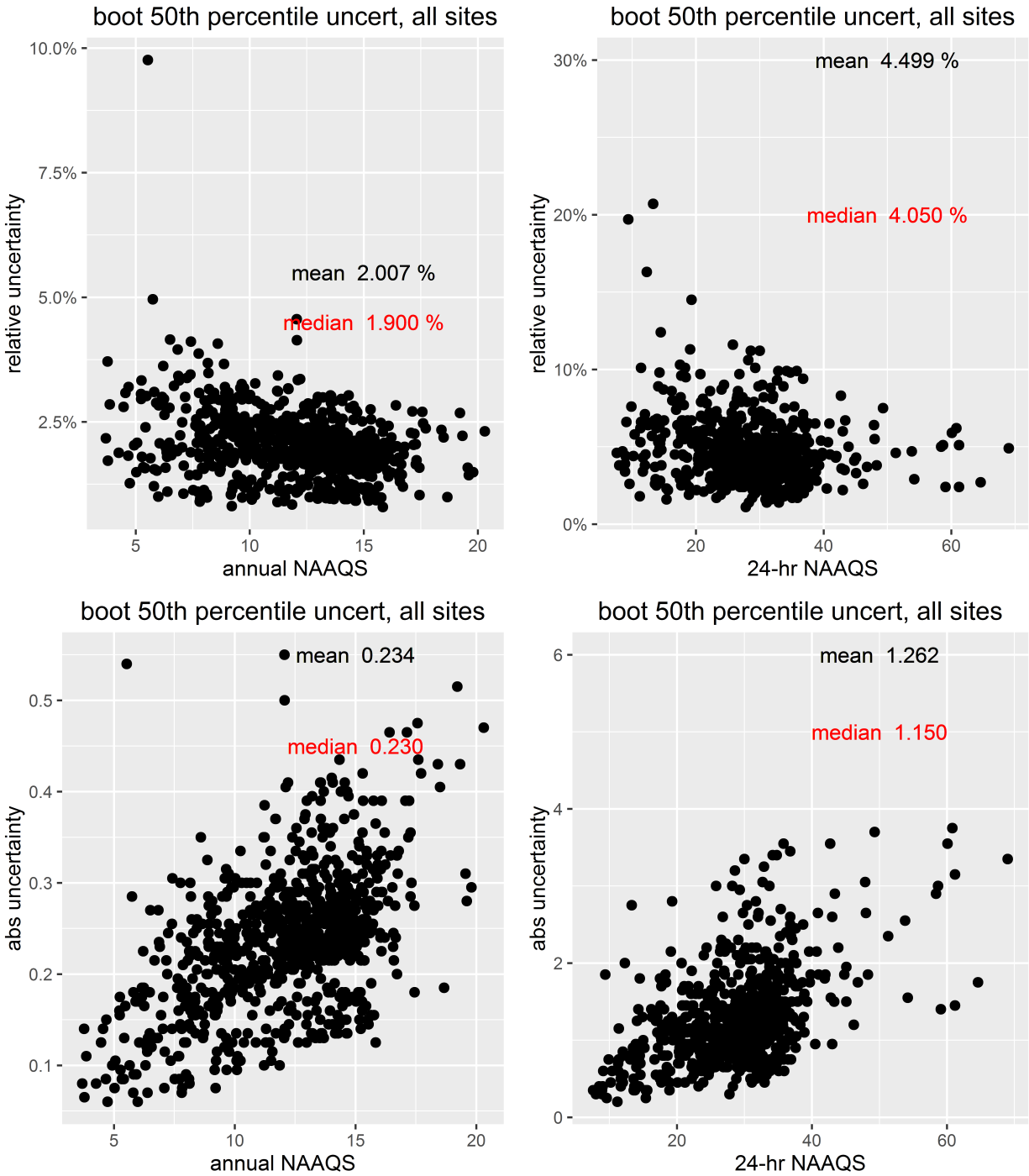


Figure 56: Bootstrap results from the 50% CIs for $PM_{2.5}$ DVs. The top two panels show the relative difference between the CI and the actual DV and the bottom two panels show the absolute difference between the values for the DVs at each site and the CI.

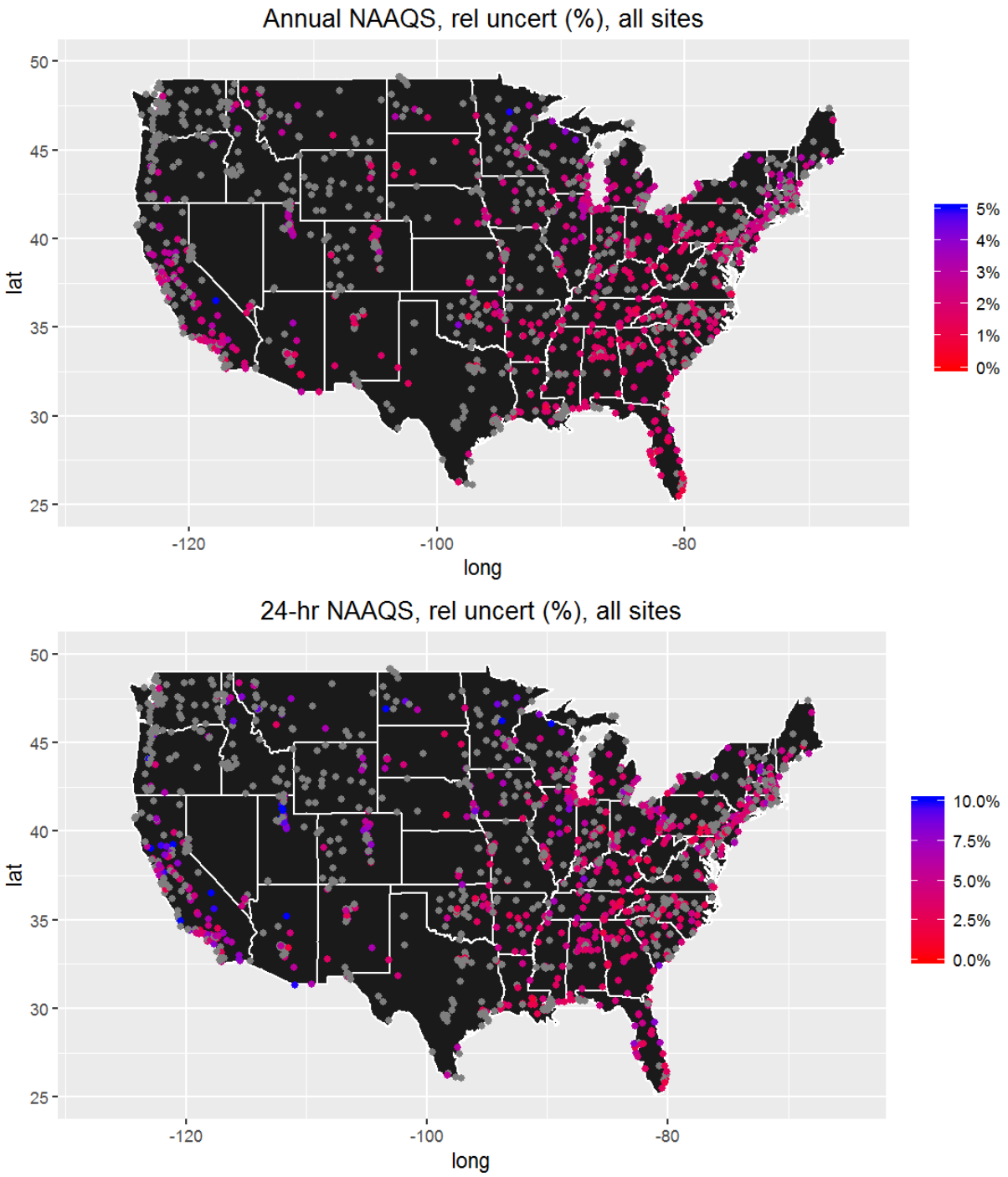


Figure 57: Spatial distribution of the relative difference between the CI and the actual DV from the 50% CIs for the 2007 PM_{2.5} DVs.

3.8 2004-2006 PM_{2.5} bootstrap results

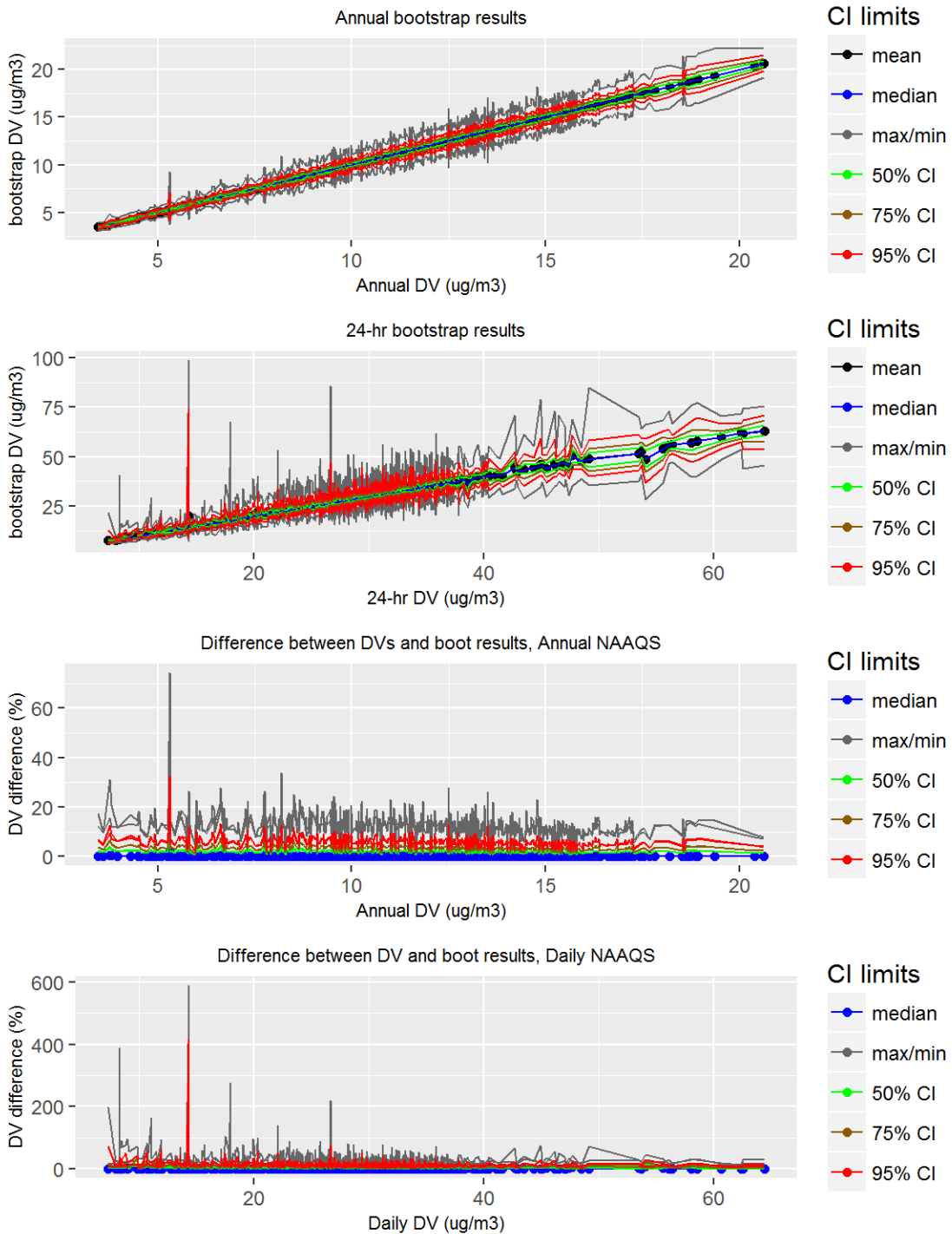


Figure 58: Bootstrap results for the 2006 PM_{2.5} DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top two panels show the values for the DVs at the various CIs, while the bottom two panels show the relative difference between the CI and the actual DV.

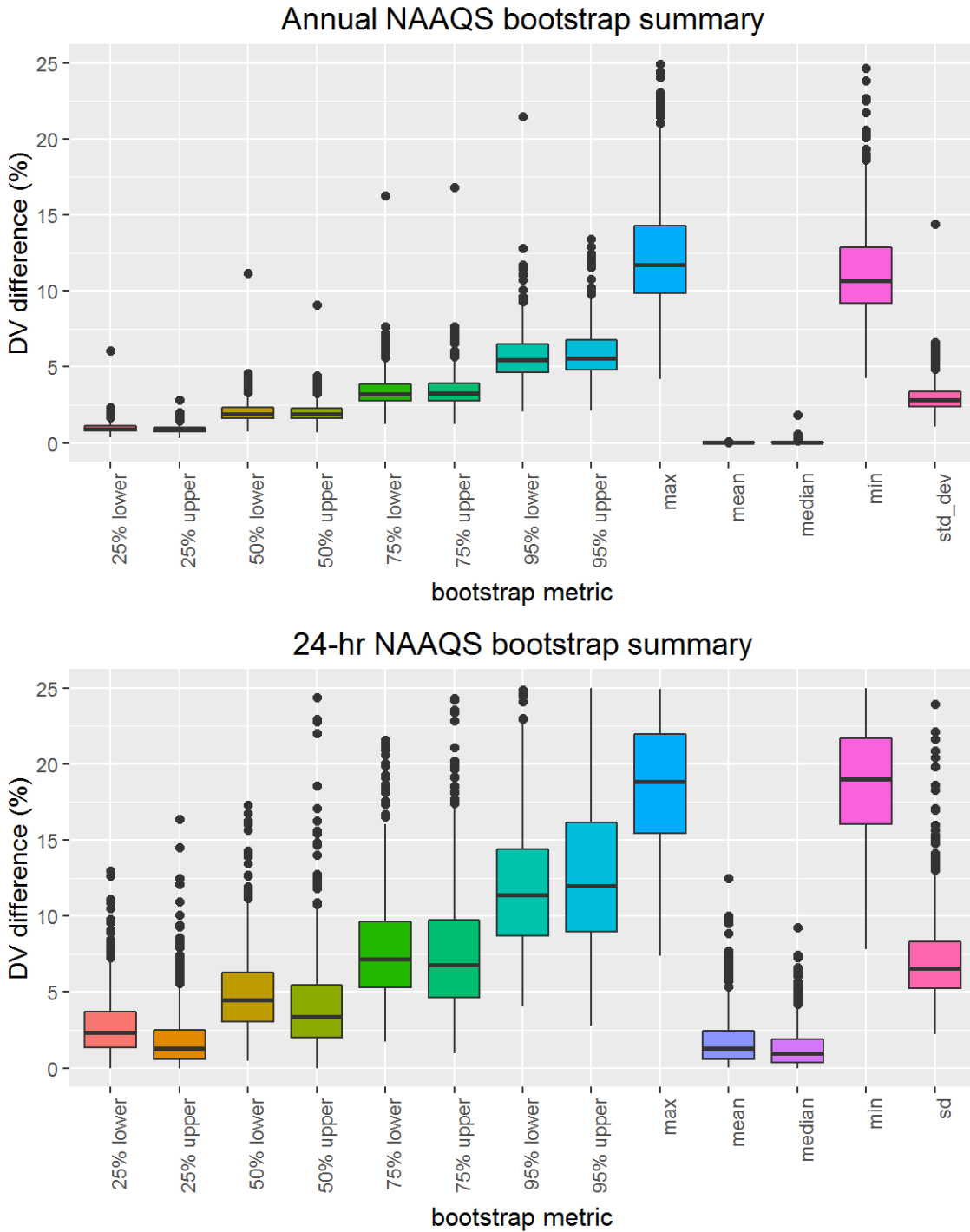


Figure 59: Bootstrap results for the 2006 PM_{2.5} DVs, showing distribution of the relative differences between the bootstrap DVs and the actual DV at the 25%, 50%, 75%, and 95% CIs, along with the mean, median, maximum, minimum, standard deviations of the relative differences.

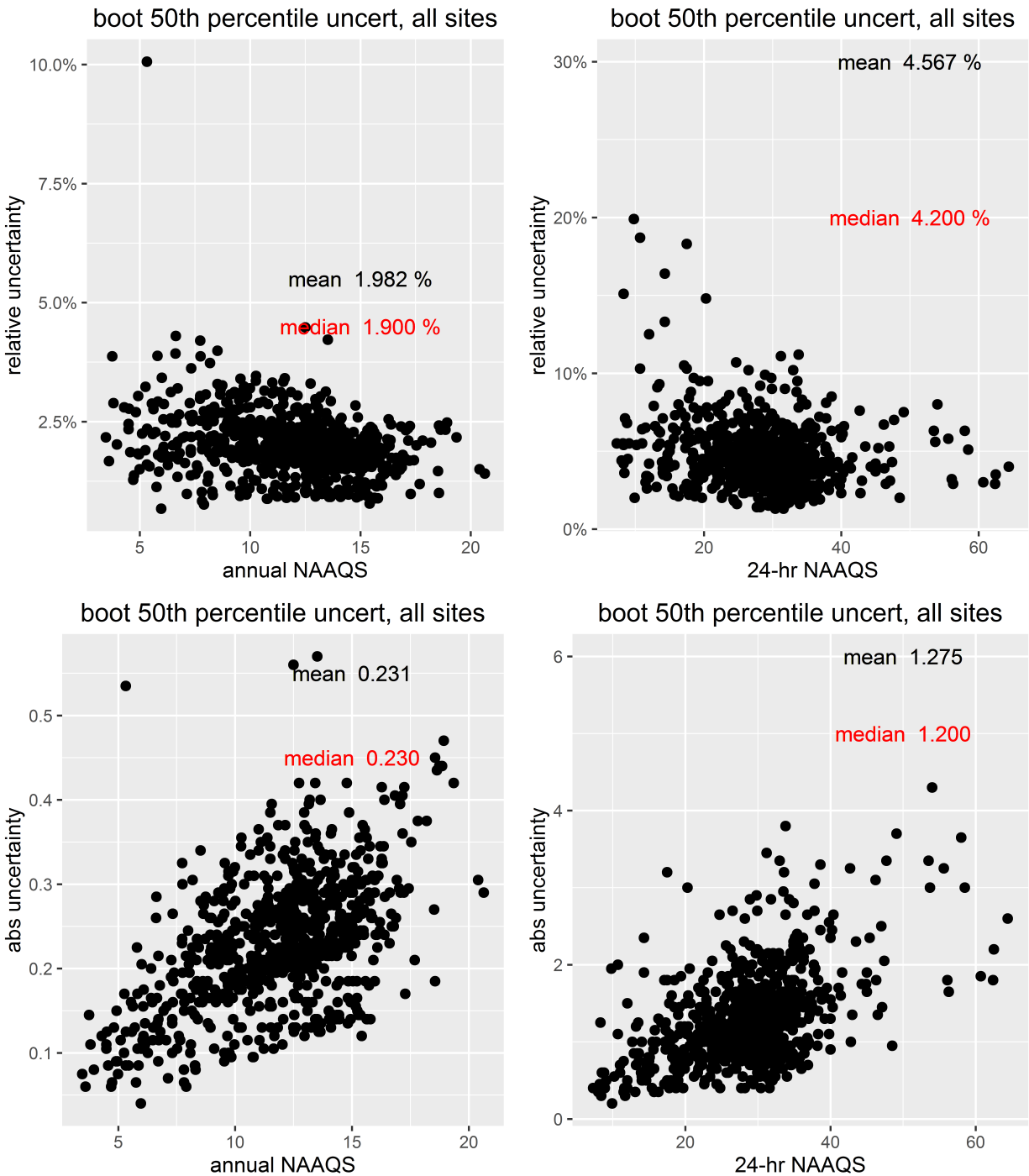


Figure 60: Bootstrap results from the 50% CIs for $PM_{2.5}$ DVs. The top two panels show the relative difference between the CI and the actual DV and the bottom two panels show the absolute difference between the values for the DVs at each site and the CI.

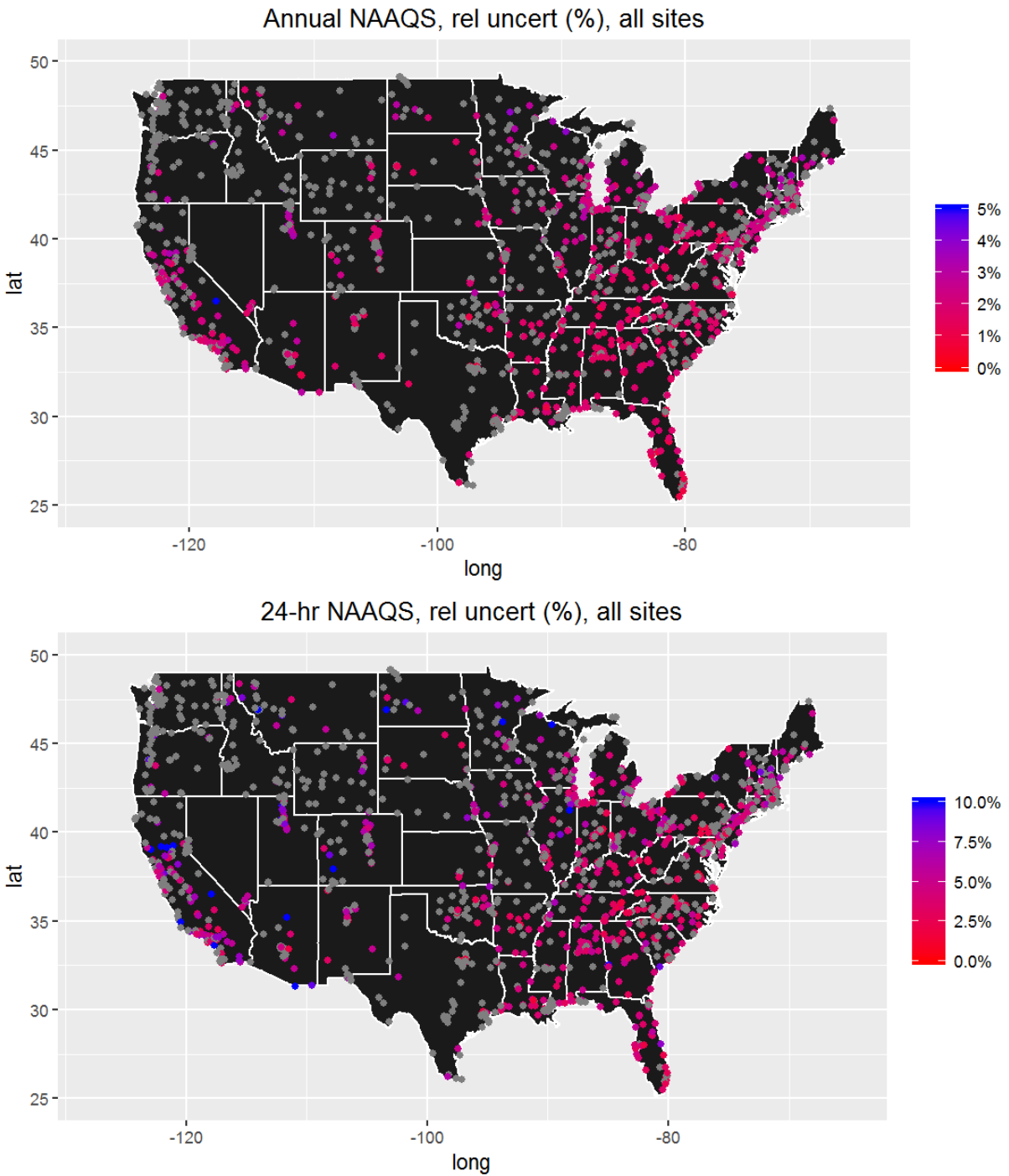


Figure 61: Spatial distribution of the relative difference between the CI and the actual DV from the 50% CIs for the 2006 PM_{2.5} DVs.

3.9 2003-2005 PM_{2.5} bootstrap results

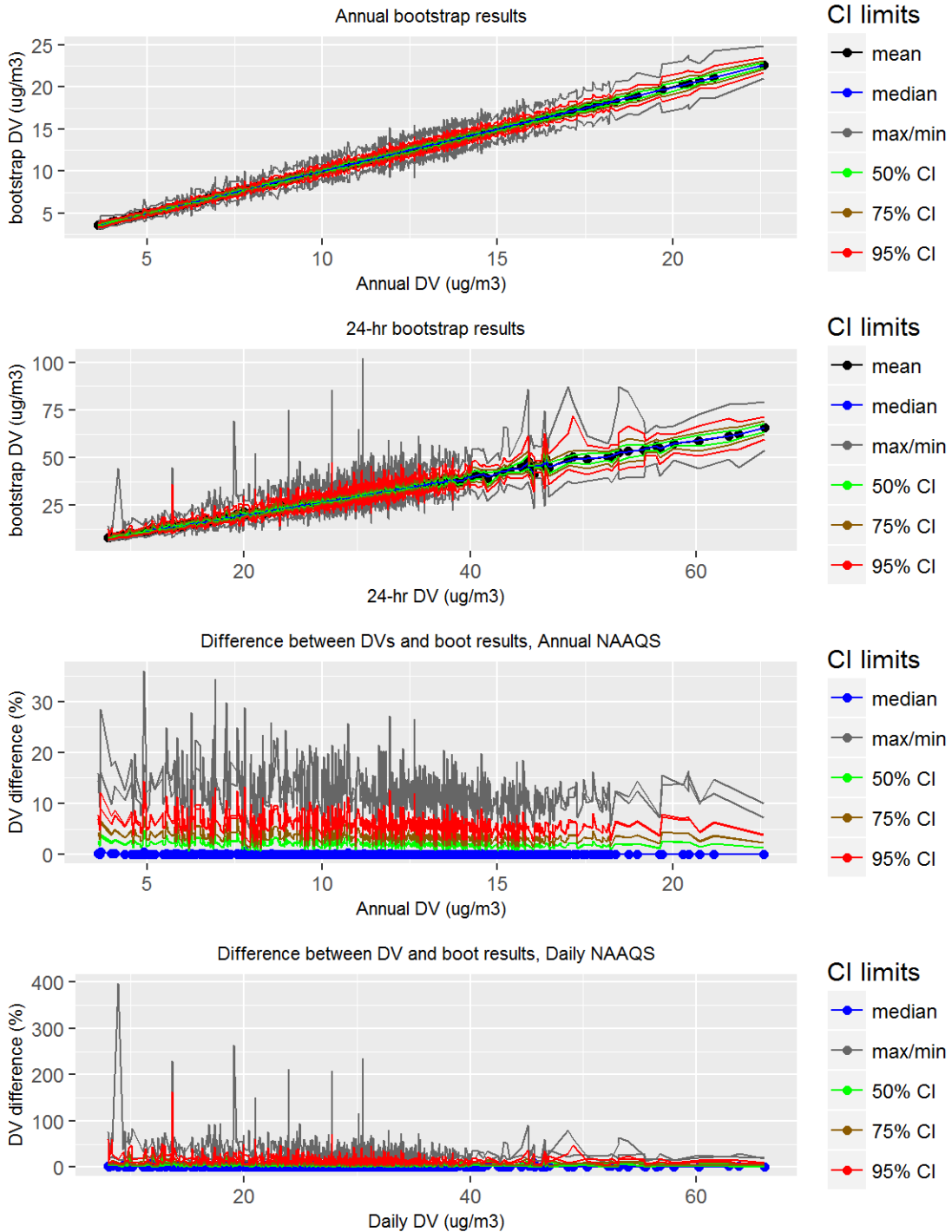


Figure 62: Bootstrap results for the 2005 PM_{2.5} DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top two panels show the values for the DVs at the various CIs, while the bottom two panels show the relative difference between the CI and the actual DV.

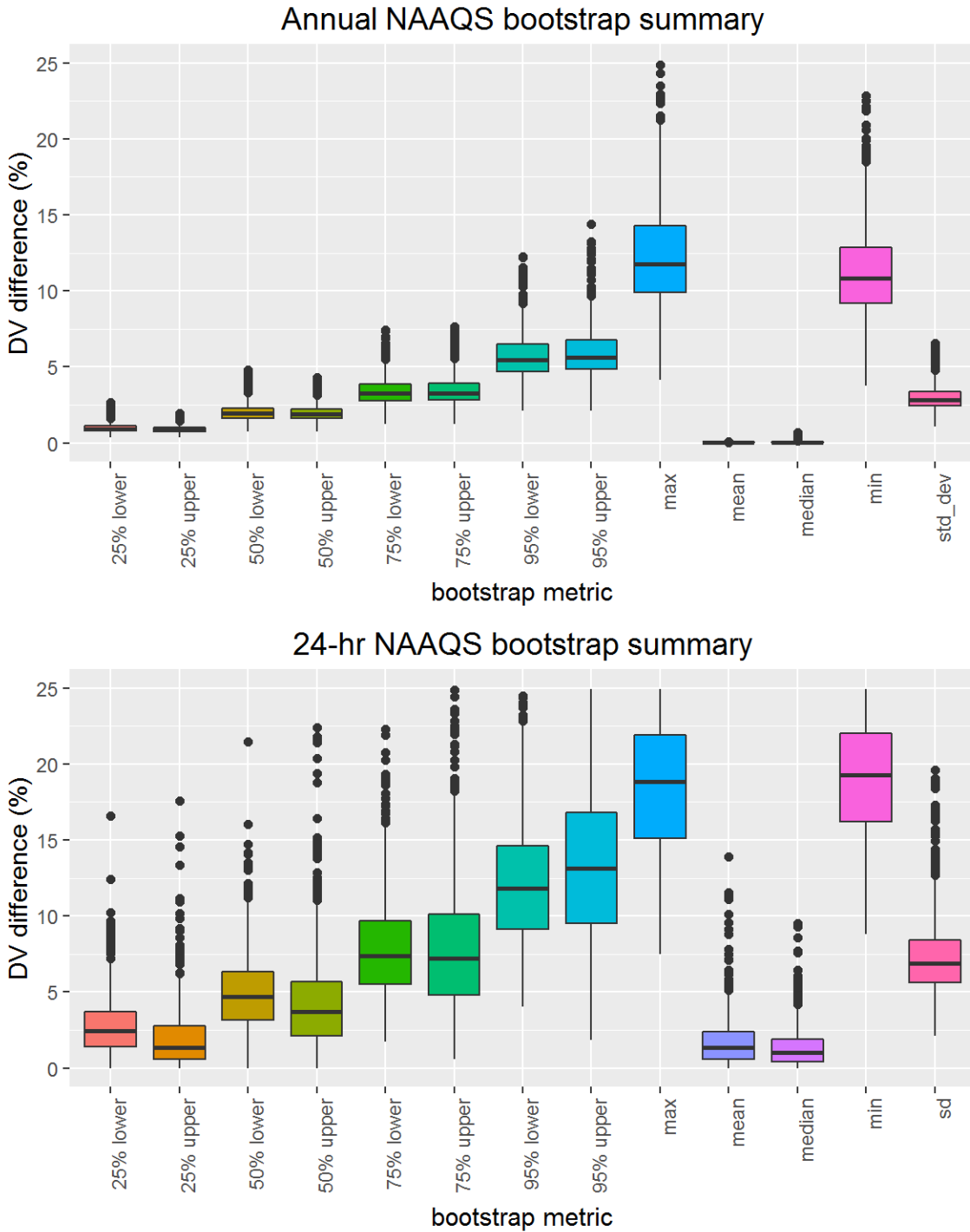


Figure 63: Bootstrap results for the 2005 PM_{2.5} DVs, showing distribution of the relative differences between the bootstrap DVs and the actual DV at the 25%, 50%, 75%, and 95% CIs, along with the mean, median, maximum, minimum, standard deviations of the relative differences.

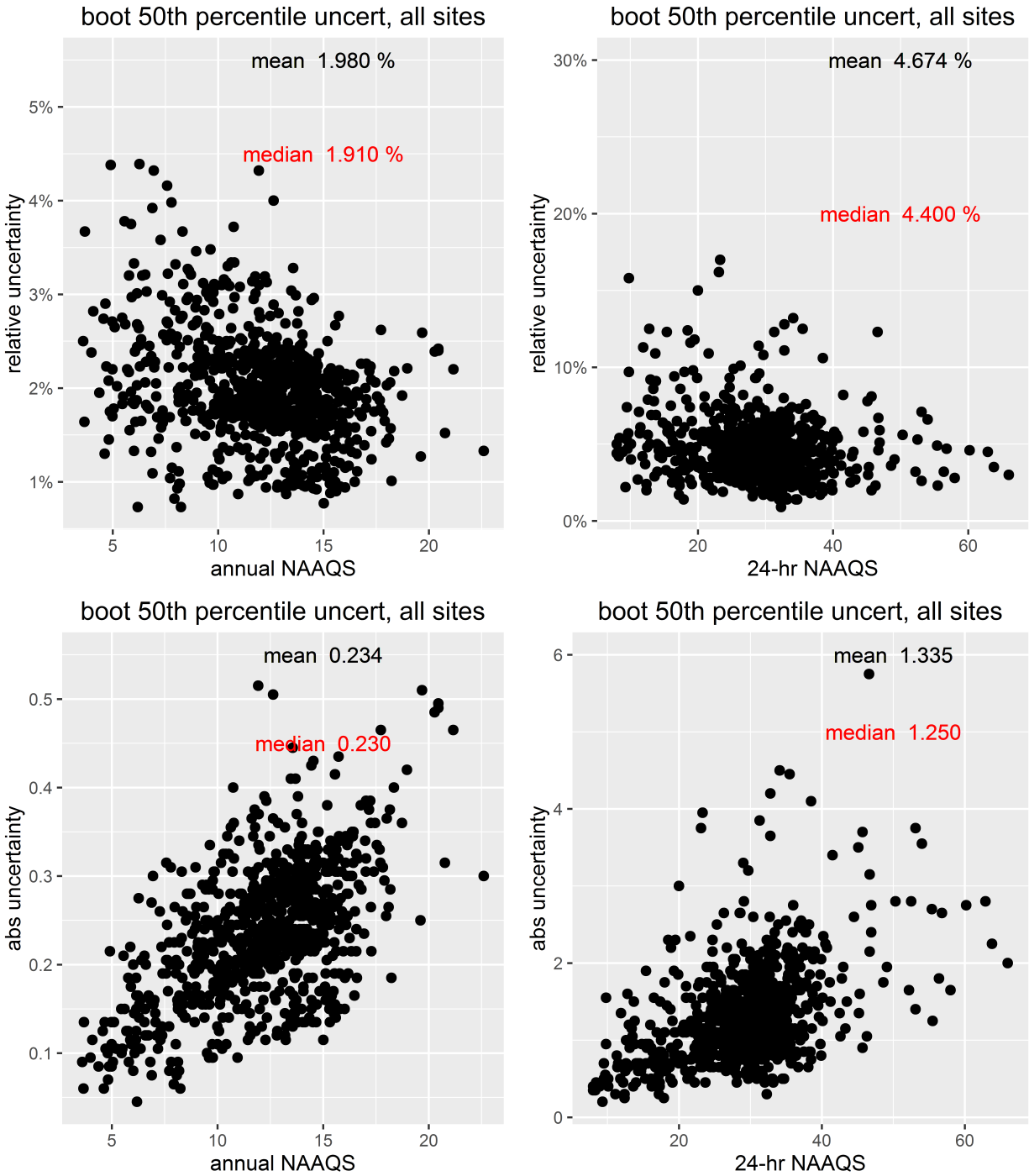


Figure 64: Bootstrap results from the 50% CIs for $PM_{2.5}$ DVs. The top two panels show the relative difference between the CI and the actual DV and the bottom two panels show the absolute difference between the values for the DVs at each site and the CI.

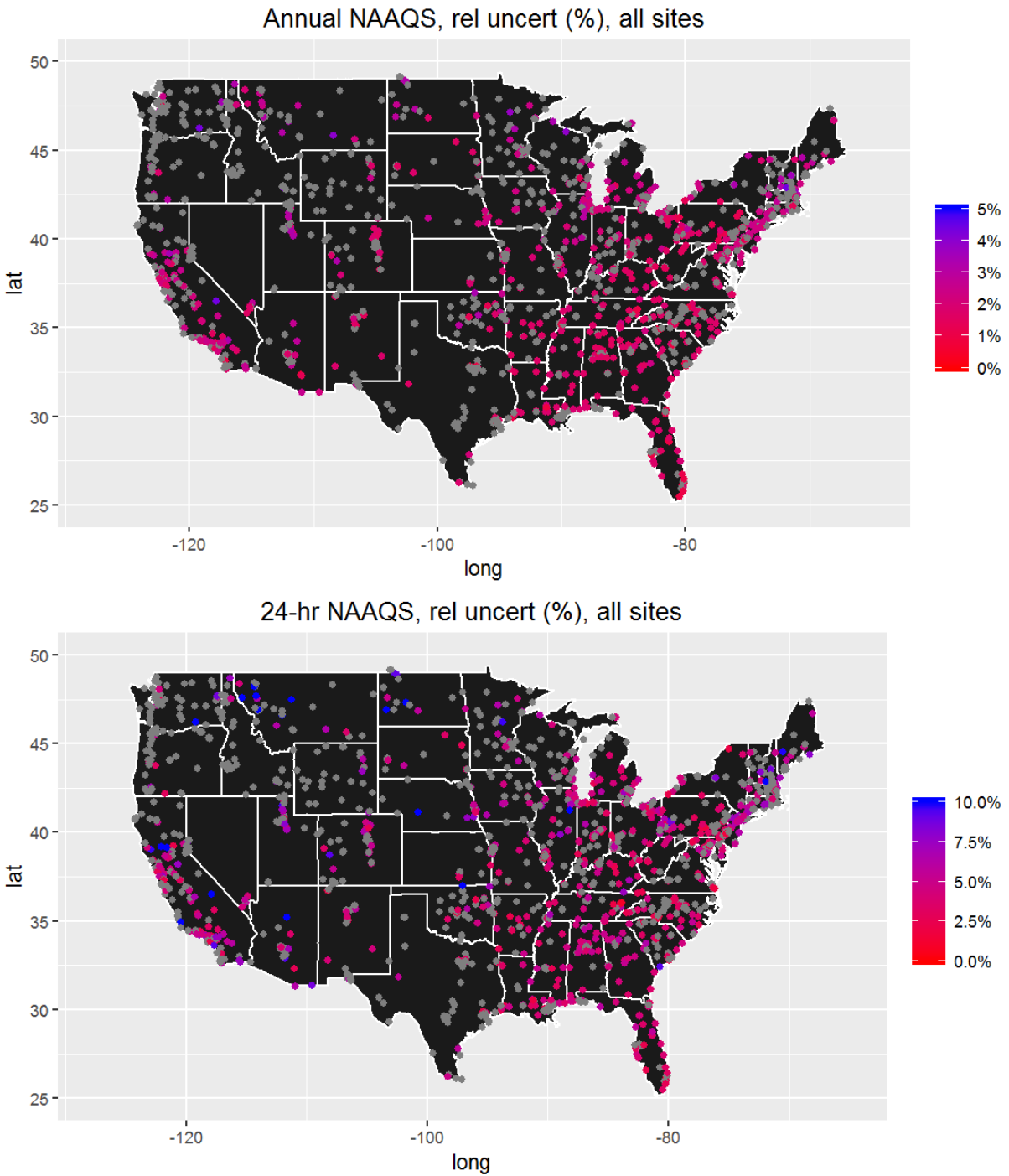


Figure 65: Spatial distribution of the relative difference between the CI and the actual DV from the 50% CIs for the 2005 PM_{2.5} DVs.

3.10 2002-2004 PM_{2.5} bootstrap results

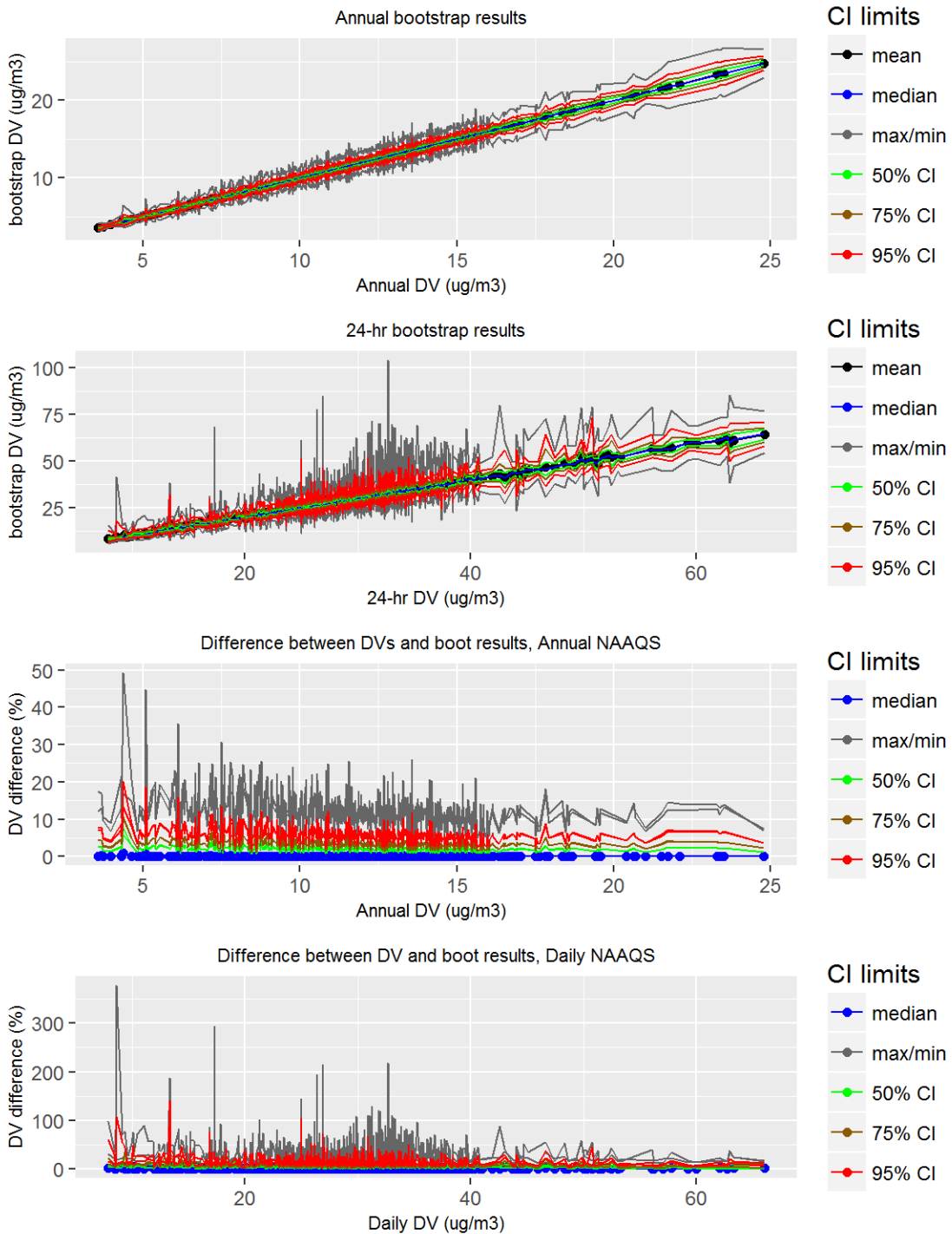


Figure 66: Bootstrap results for the 2004 PM_{2.5} DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top two panels show the values for the DVs at the various CIs, while the bottom two panels show the relative difference between the CI and the actual DV.

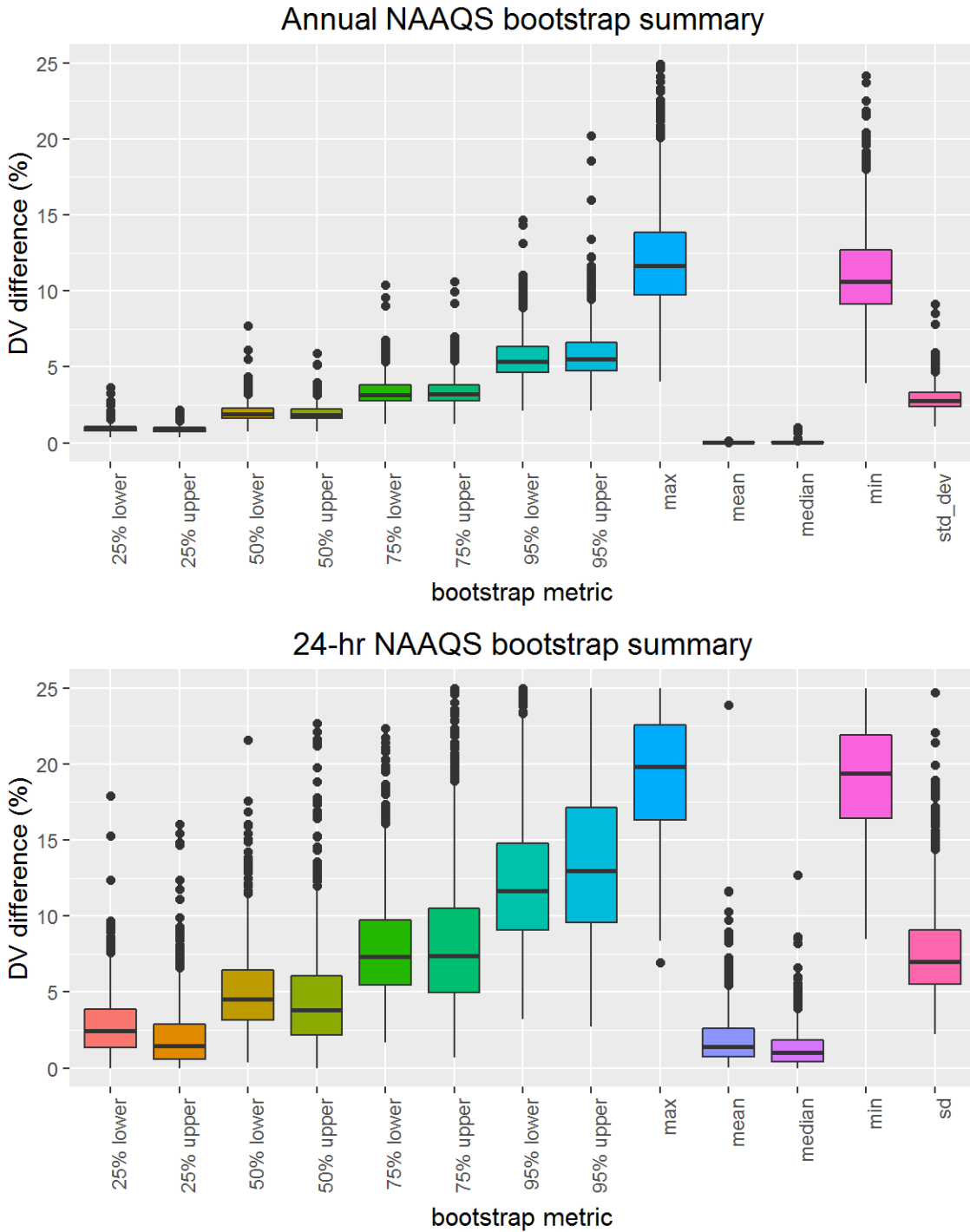


Figure 67: Bootstrap results for the 2004 PM_{2.5} DVs, showing distribution of the relative differences between the bootstrap DVs and the actual DV at the 25%, 50%, 75%, and 95% CIs, along with the mean, median, maximum, minimum, standard deviations of the relative differences.

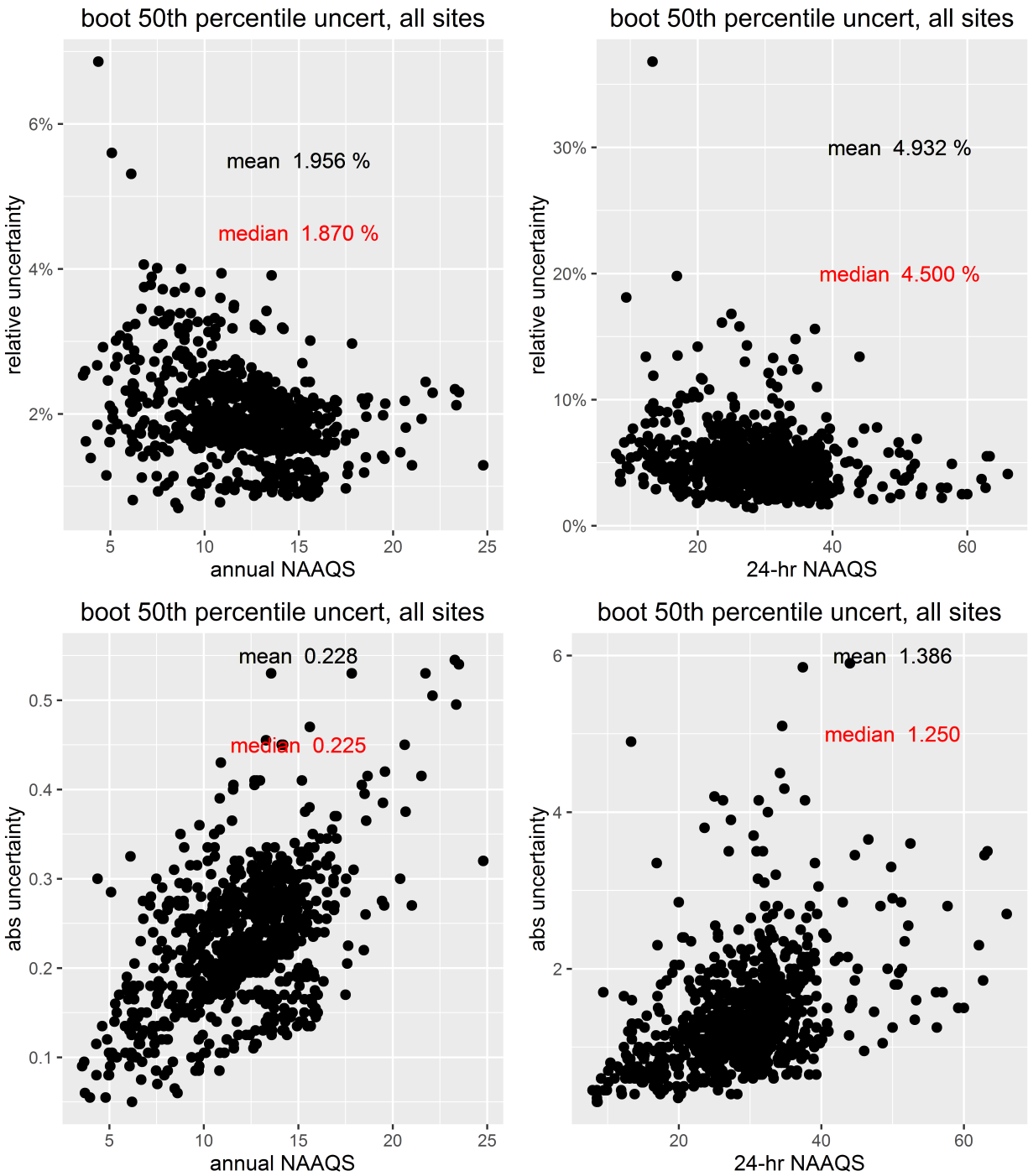


Figure 68: Bootstrap results from the 50% CIs for $PM_{2.5}$ DVs. The top two panels show the relative difference between the CI and the actual DV and the bottom two panels show the absolute difference between the values for the DVs at each site and the CI.

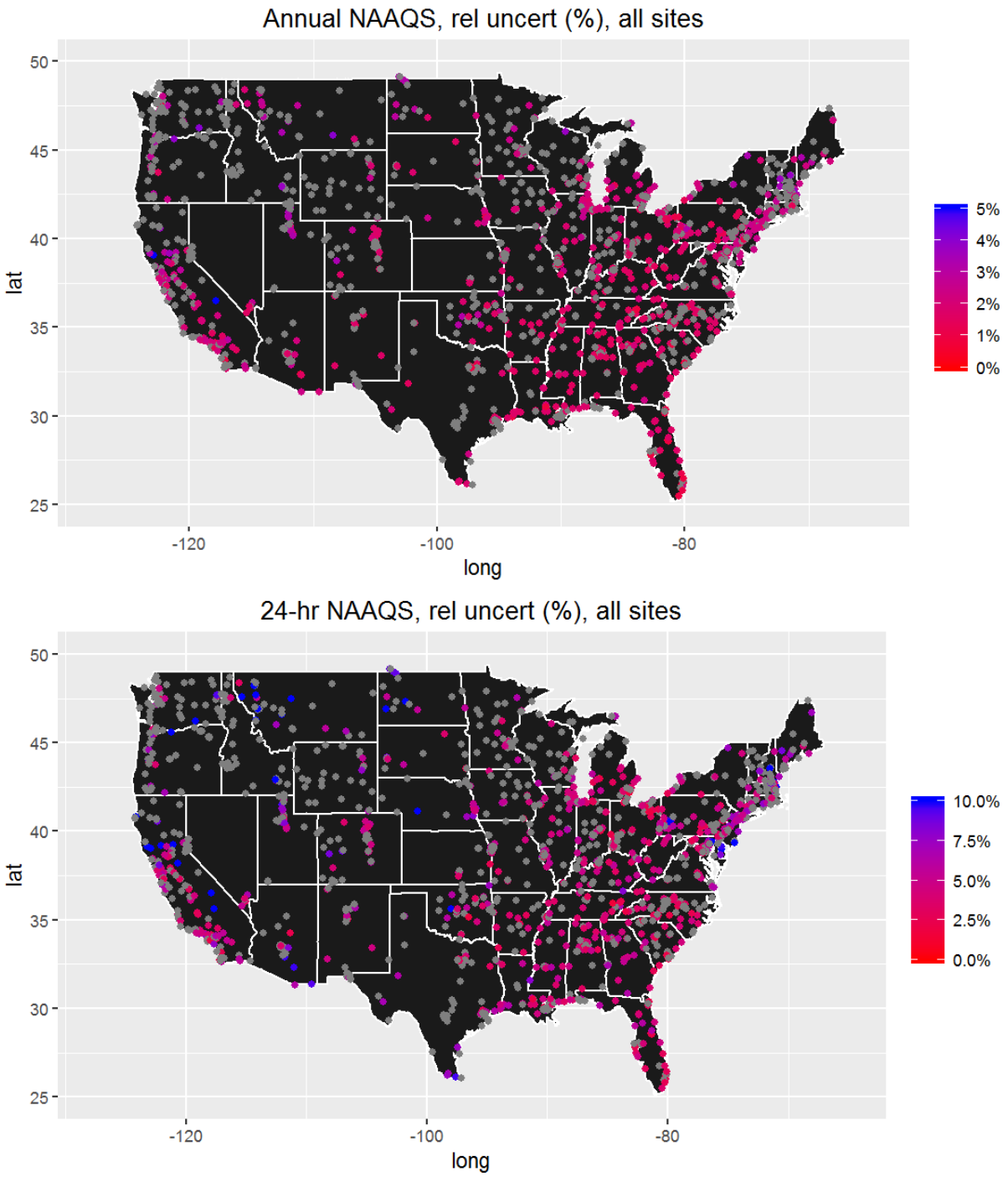


Figure 69: Spatial distribution of the relative difference between the CI and the actual DV from the 50% CIs for the 2004 PM_{2.5} DVs.

3.11 2001-2003 PM_{2.5} bootstrap results

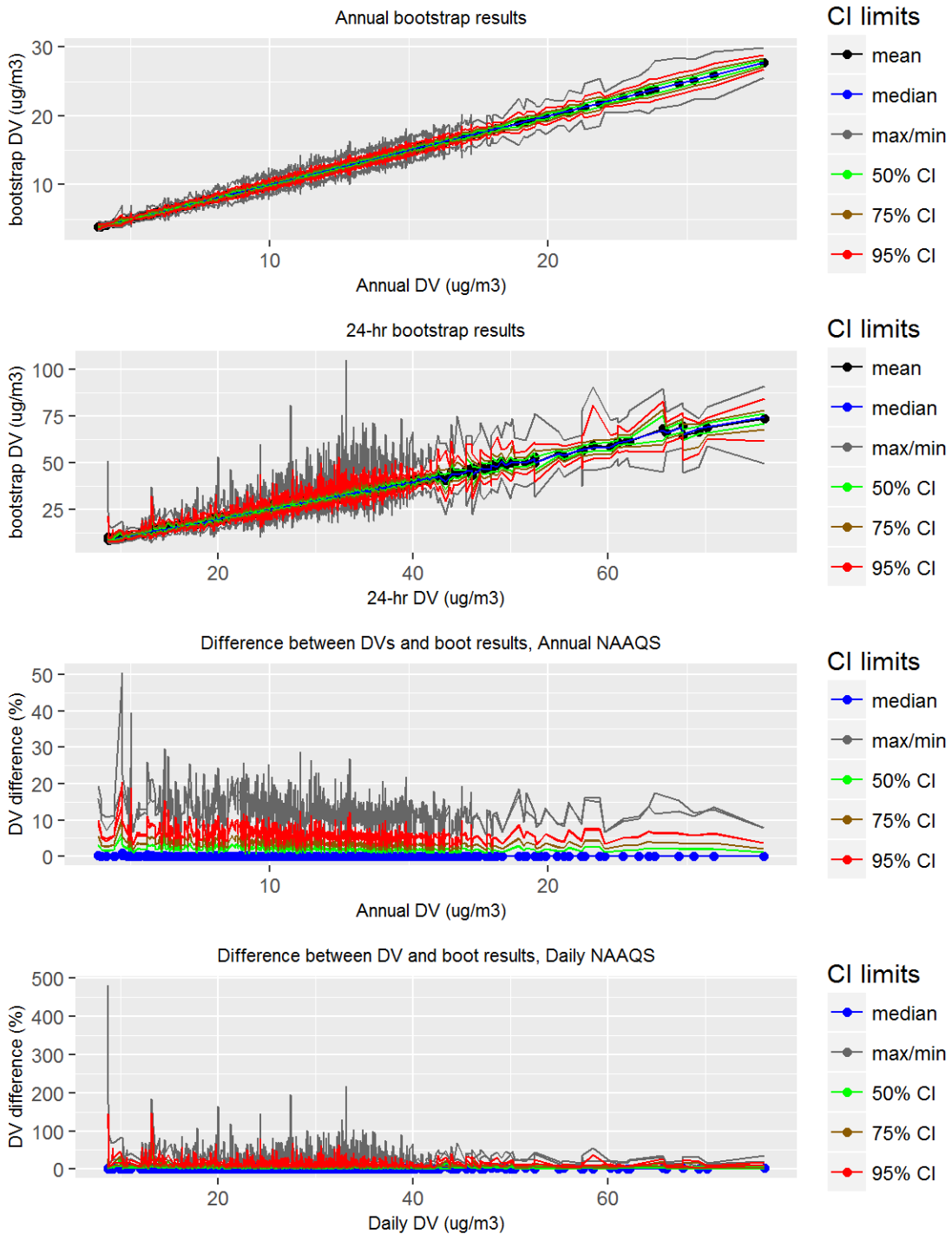


Figure 70: Bootstrap results for the 2003 PM_{2.5} DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top two panels show the values for the DVs at the various CIs, while the bottom two panels show the relative difference between the CI and the actual DV.

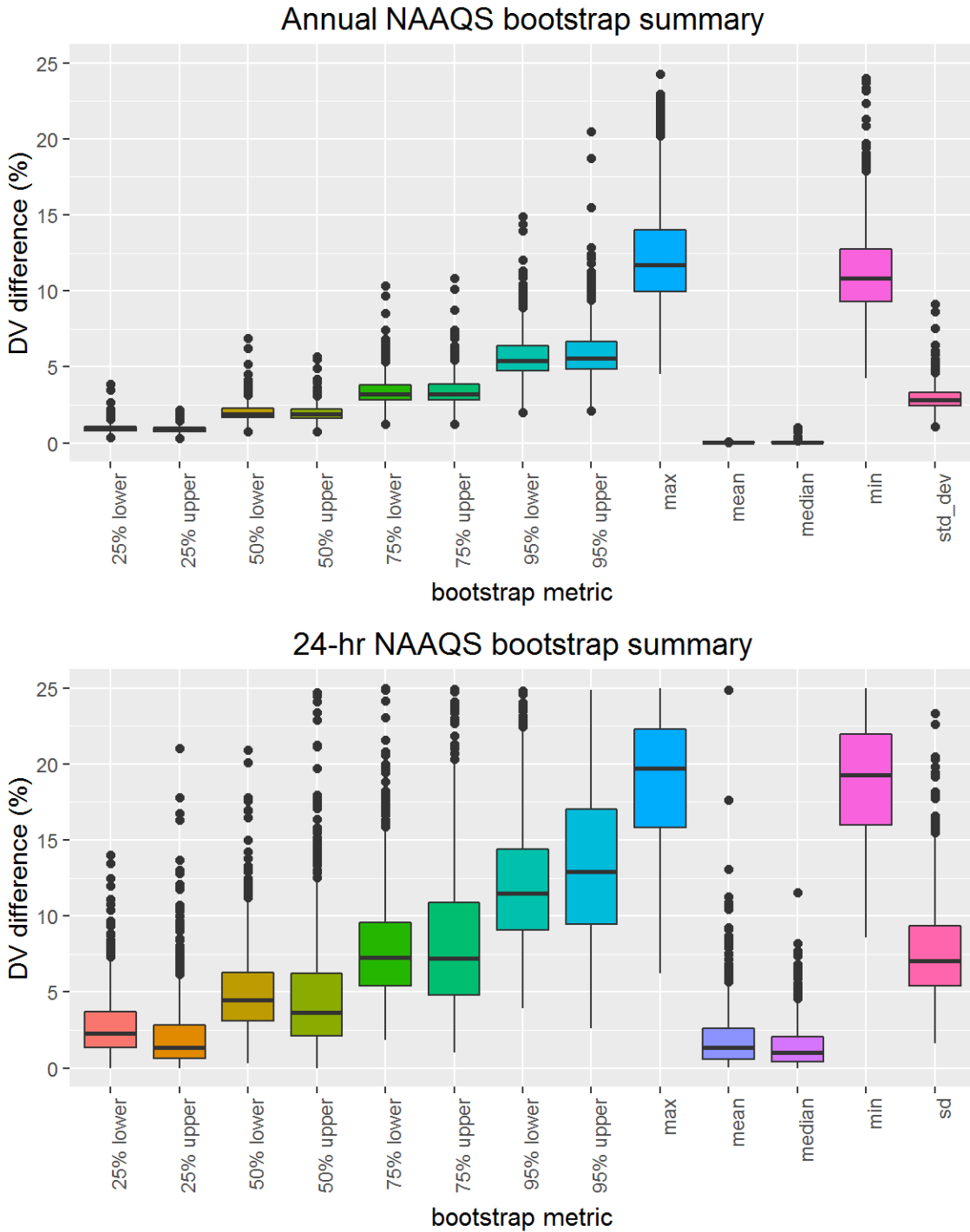


Figure 71: Bootstrap results for the 2003 PM_{2.5} DVs, showing distribution of the relative differences between the bootstrap DVs and the actual DV at the 25%, 50%, 75%, and 95% CIs, along with the mean, median, maximum, minimum, standard deviations of the relative differences.

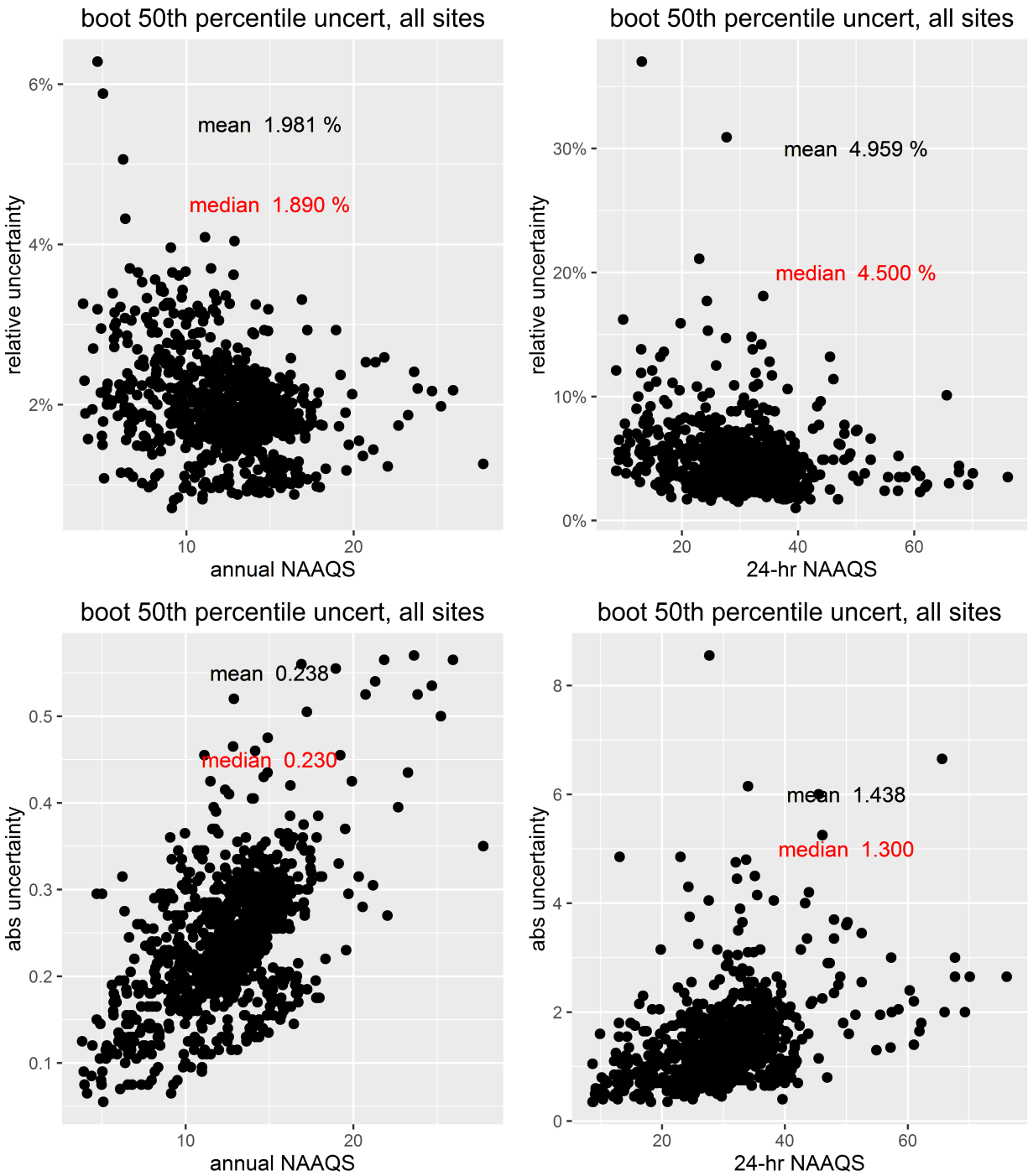


Figure 72: Bootstrap results from the 50% CIs for $PM_{2.5}$ DVs. The top two panels show the relative difference between the CI and the actual DV and the bottom two panels show the absolute difference between the values for the DVs at each site and the CI.

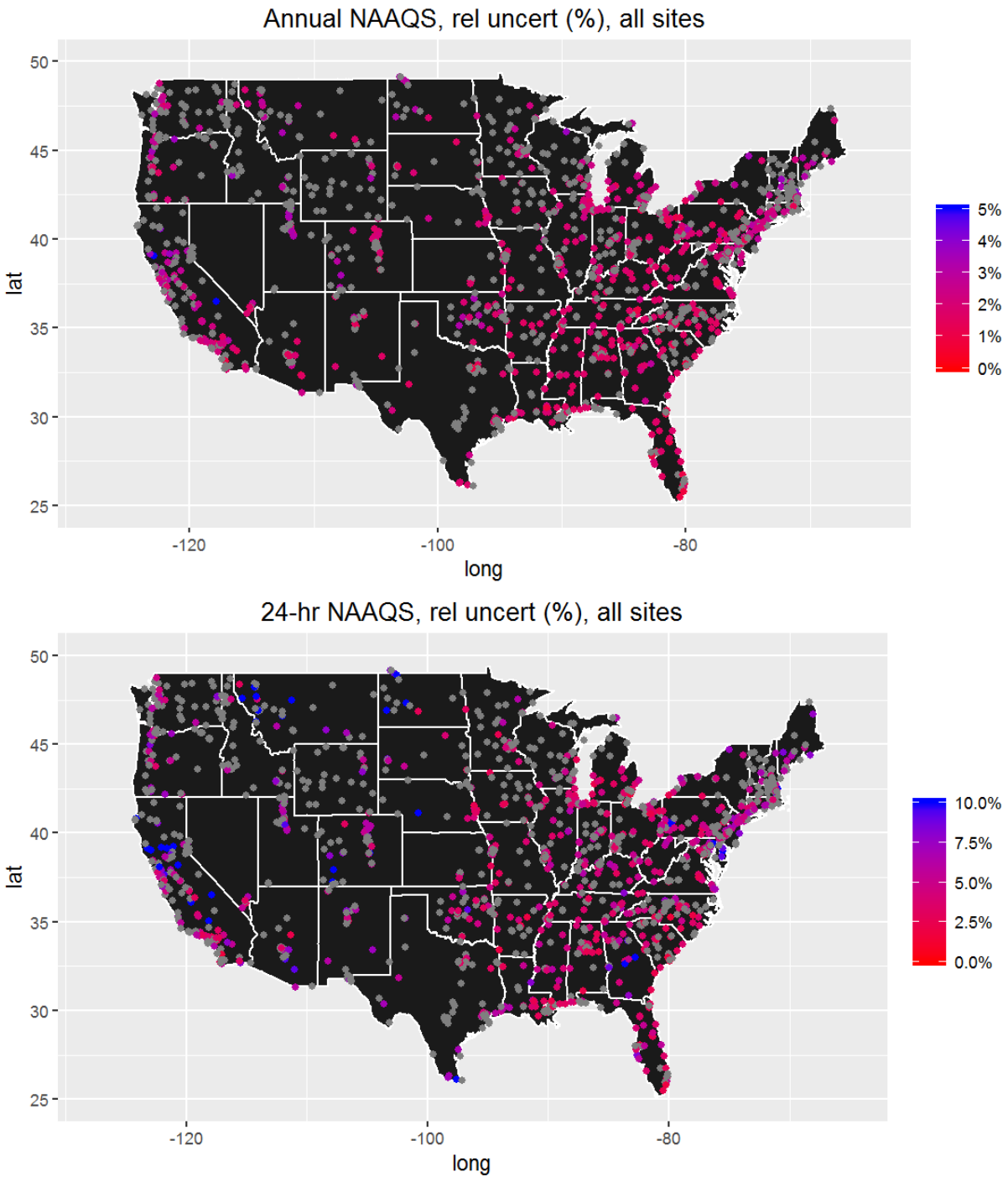


Figure 73: Spatial distribution of the relative difference between the CI and the actual DV from the 50% CIs for the 2003 PM_{2.5} DVs.

3.12 2000-2002 PM_{2.5} bootstrap results

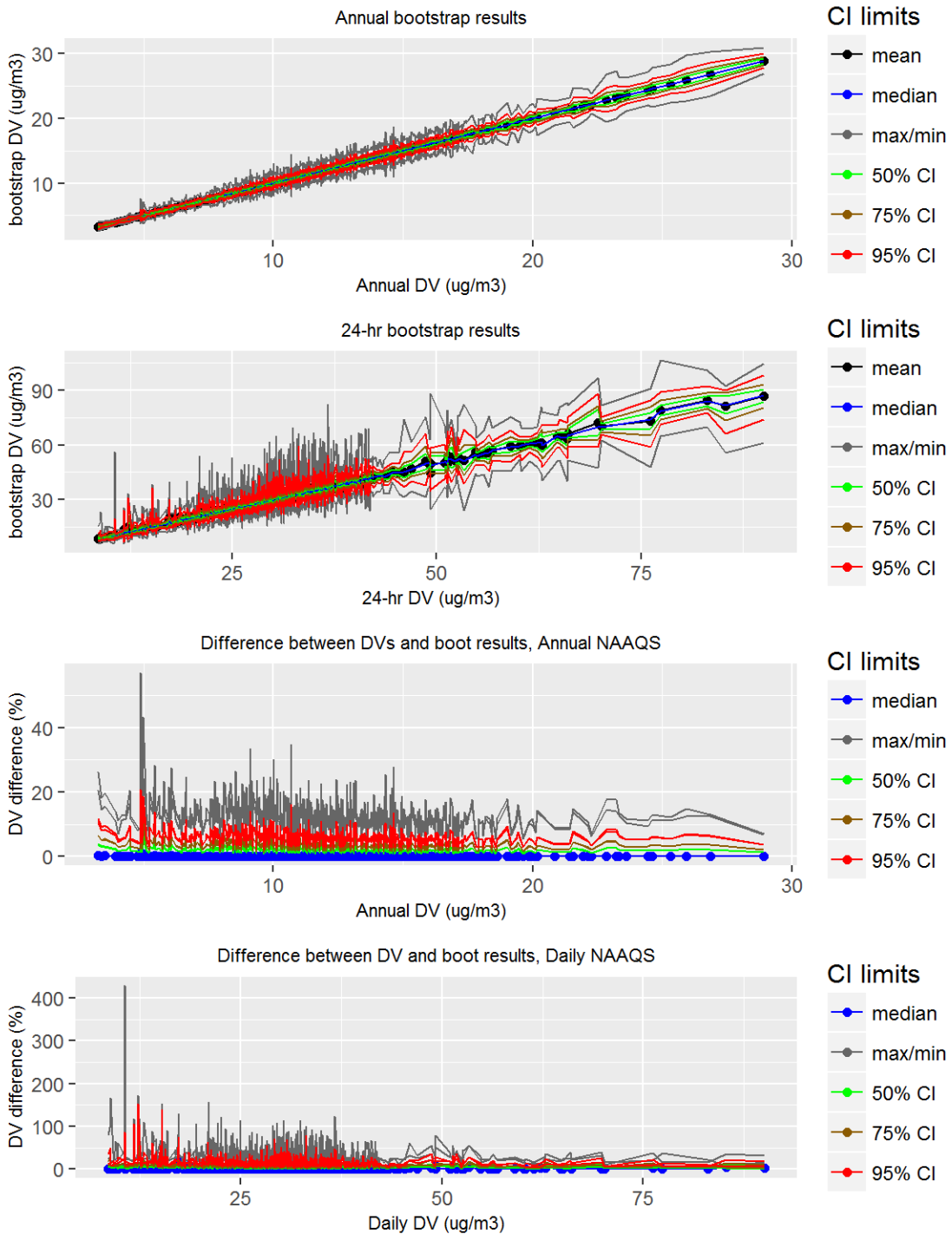


Figure 74: Bootstrap results for the 2002 PM_{2.5} DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top two panels show the values for the DVs at the various CIs, while the bottom two panels show the relative difference between the CI and the actual DV.

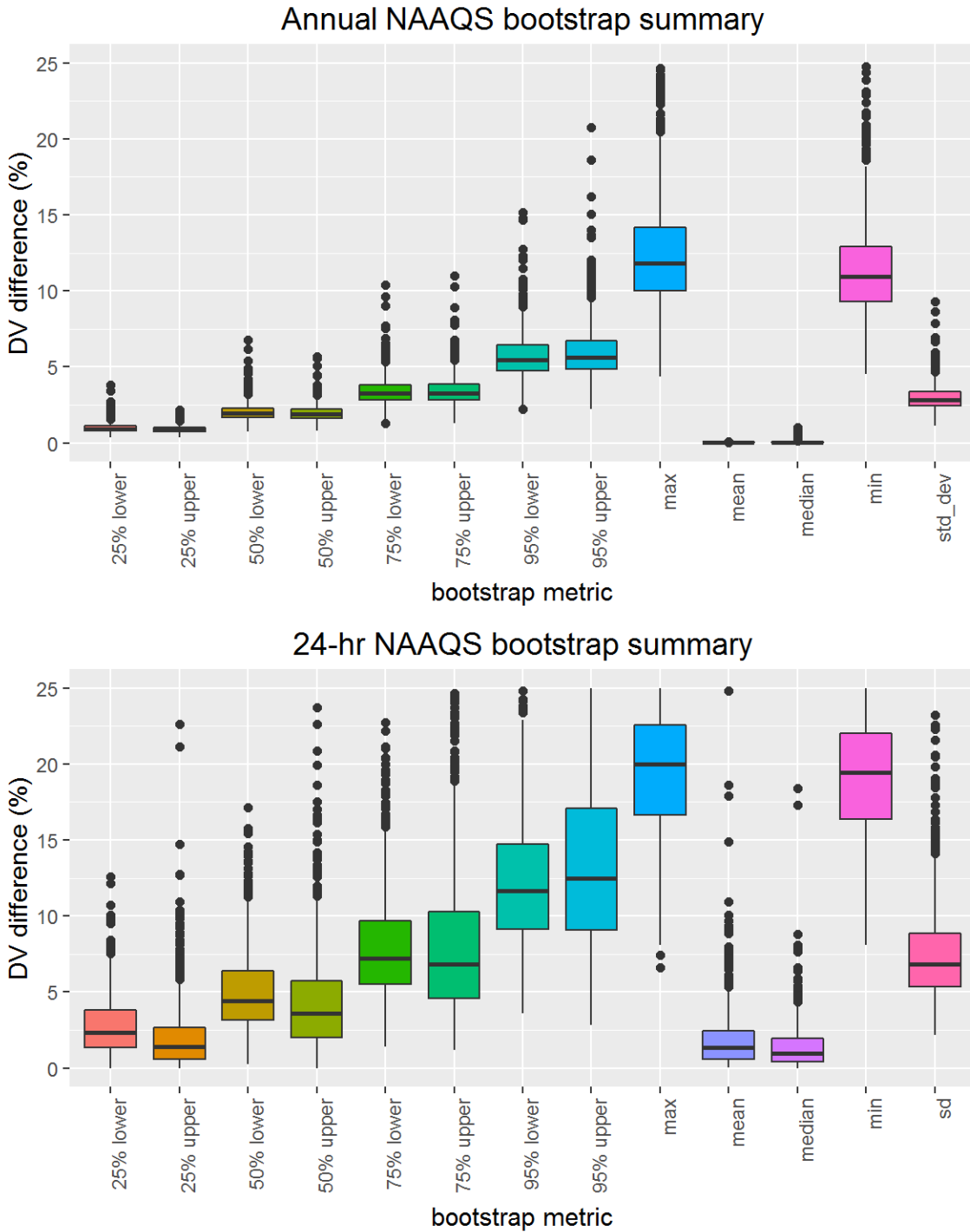


Figure 75: Bootstrap results for the 2002 PM_{2.5} DVs, showing distribution of the relative differences between the bootstrap DVs and the actual DV at the 25%, 50%, 75%, and 95% CIs, along with the mean, median, maximum, minimum, standard deviations of the relative differences.

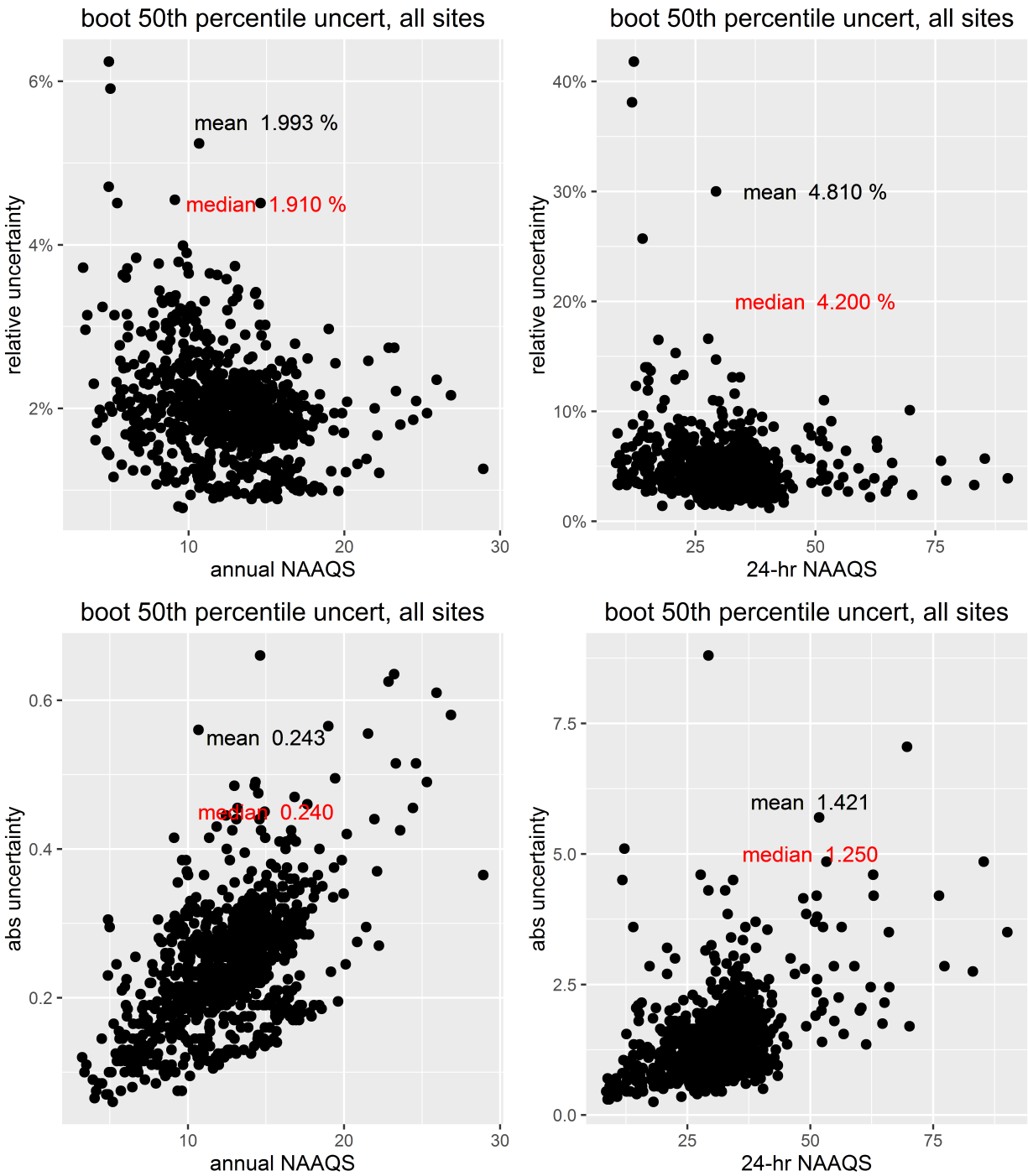


Figure 76: Bootstrap results from the 50% CIs for $PM_{2.5}$ DVs. The top two panels show the relative difference between the CI and the actual DV and the bottom two panels show the absolute difference between the values for the DVs at each site and the CI.

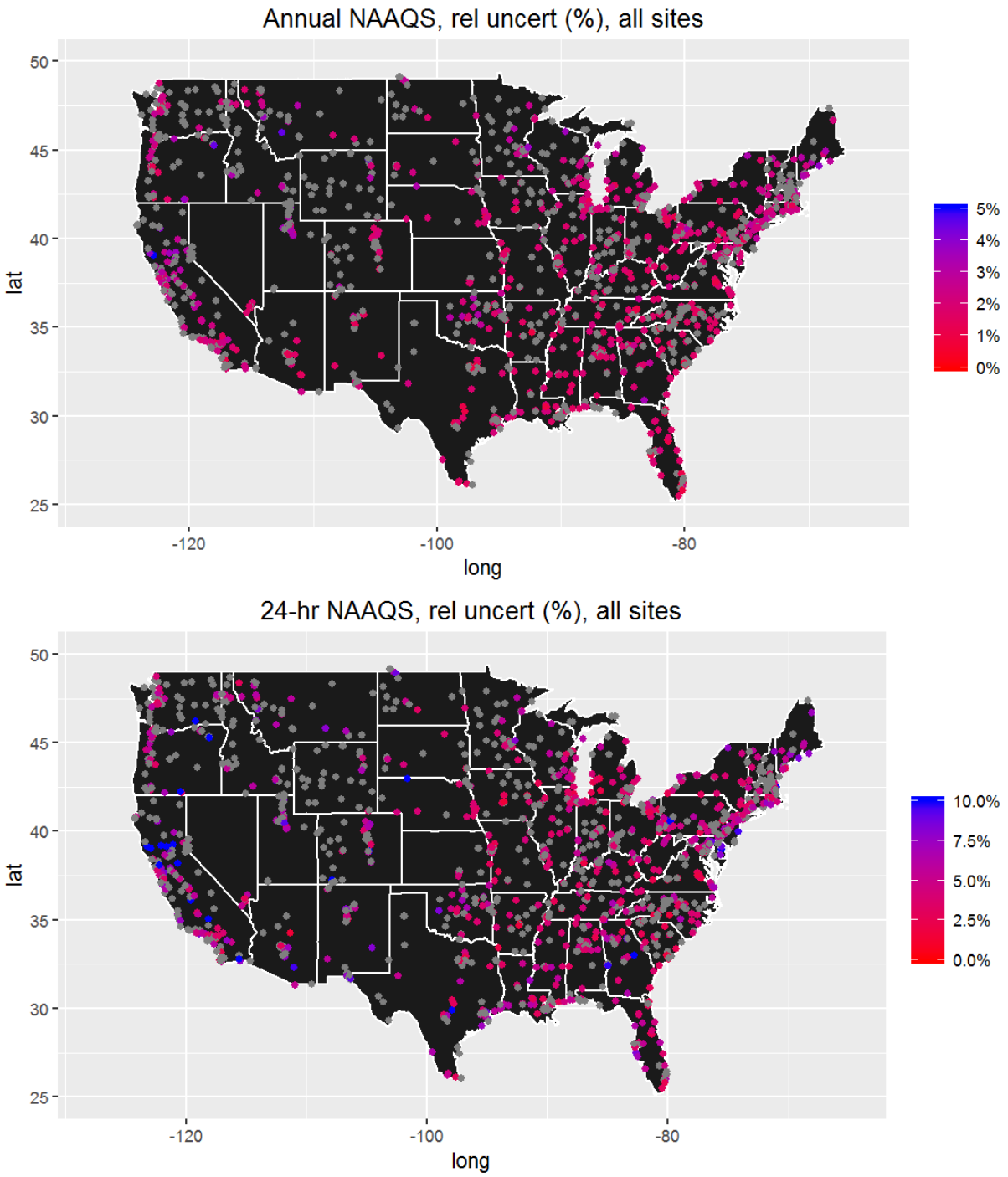


Figure 77: Spatial distribution of the relative difference between the CI and the actual DV from the 50% CIs for the 2002 PM_{2.5} DVs.

4 Comparison plots of nearby sites

Comparison of PM_{2.5} data for paired, nearby sites for the spatial analysis conducted in Section 3.1.2.



Figure 78: Comparison of PM_{2.5} data for sites 150031001 and 150031004. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r^2), with data points are colored by month.

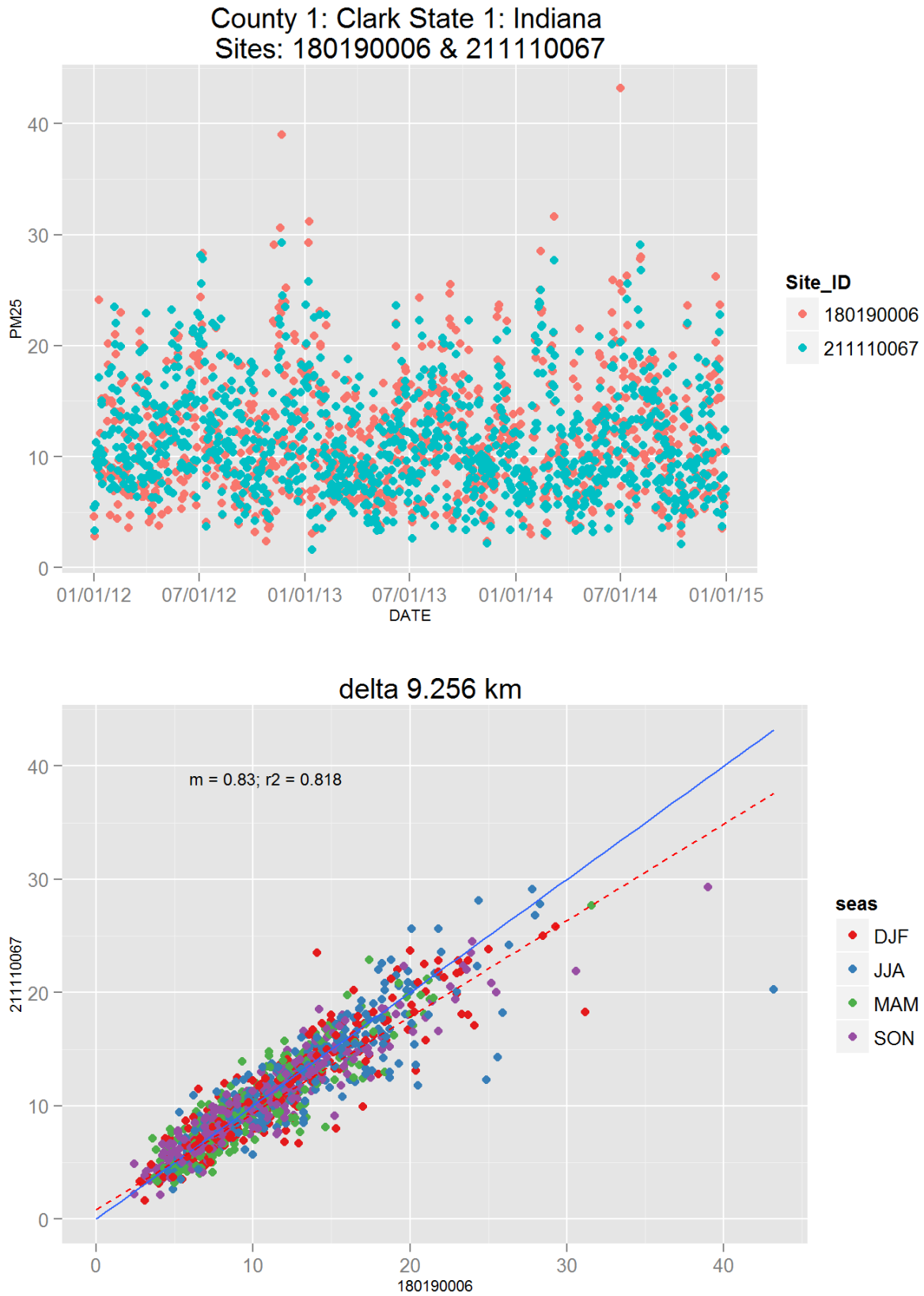


Figure 79: Comparison of PM_{2.5} data for sites 180190006 and 180190006. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

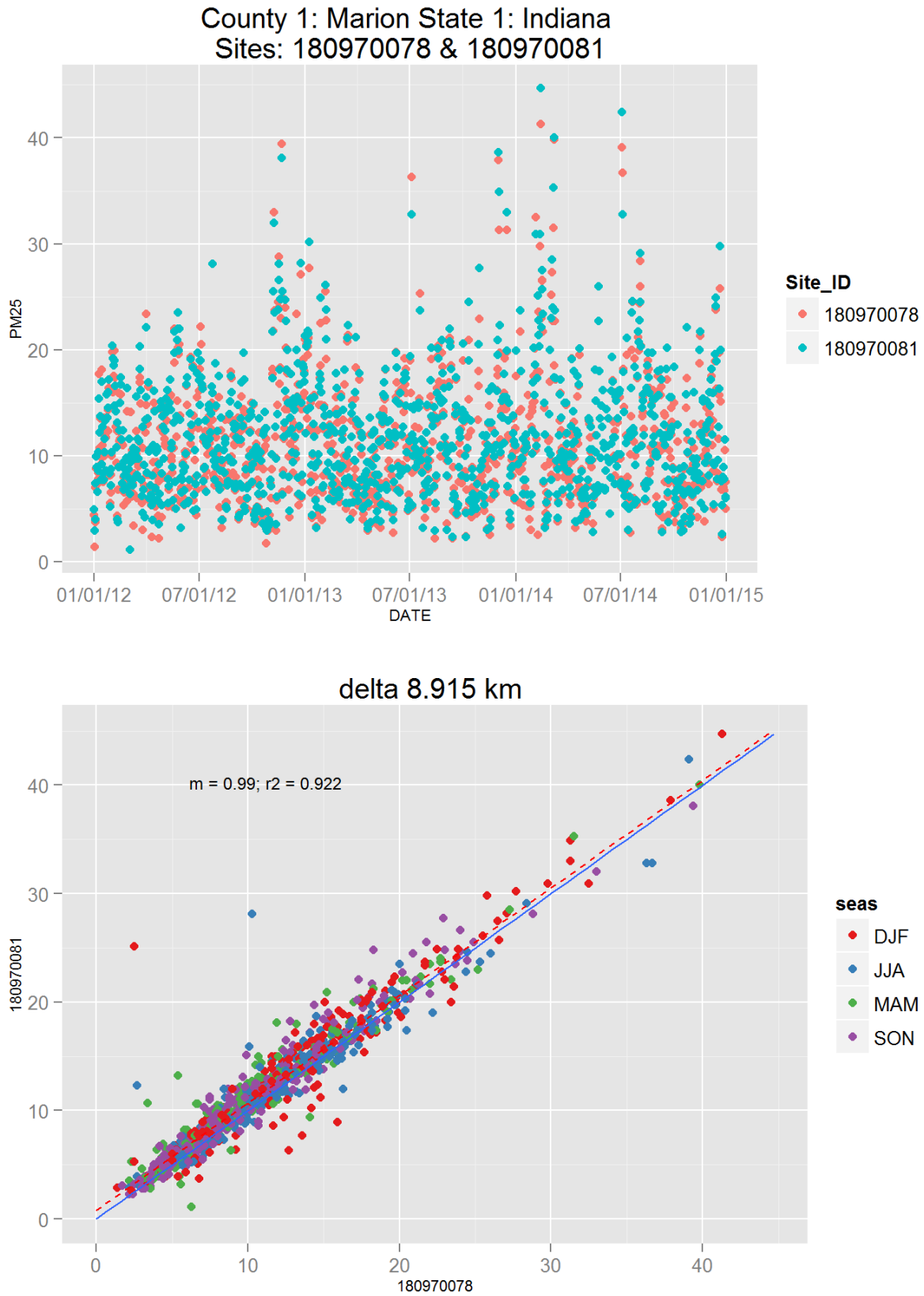


Figure 80: Comparison of PM_{2.5} data for sites 180970078 and 180970081. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

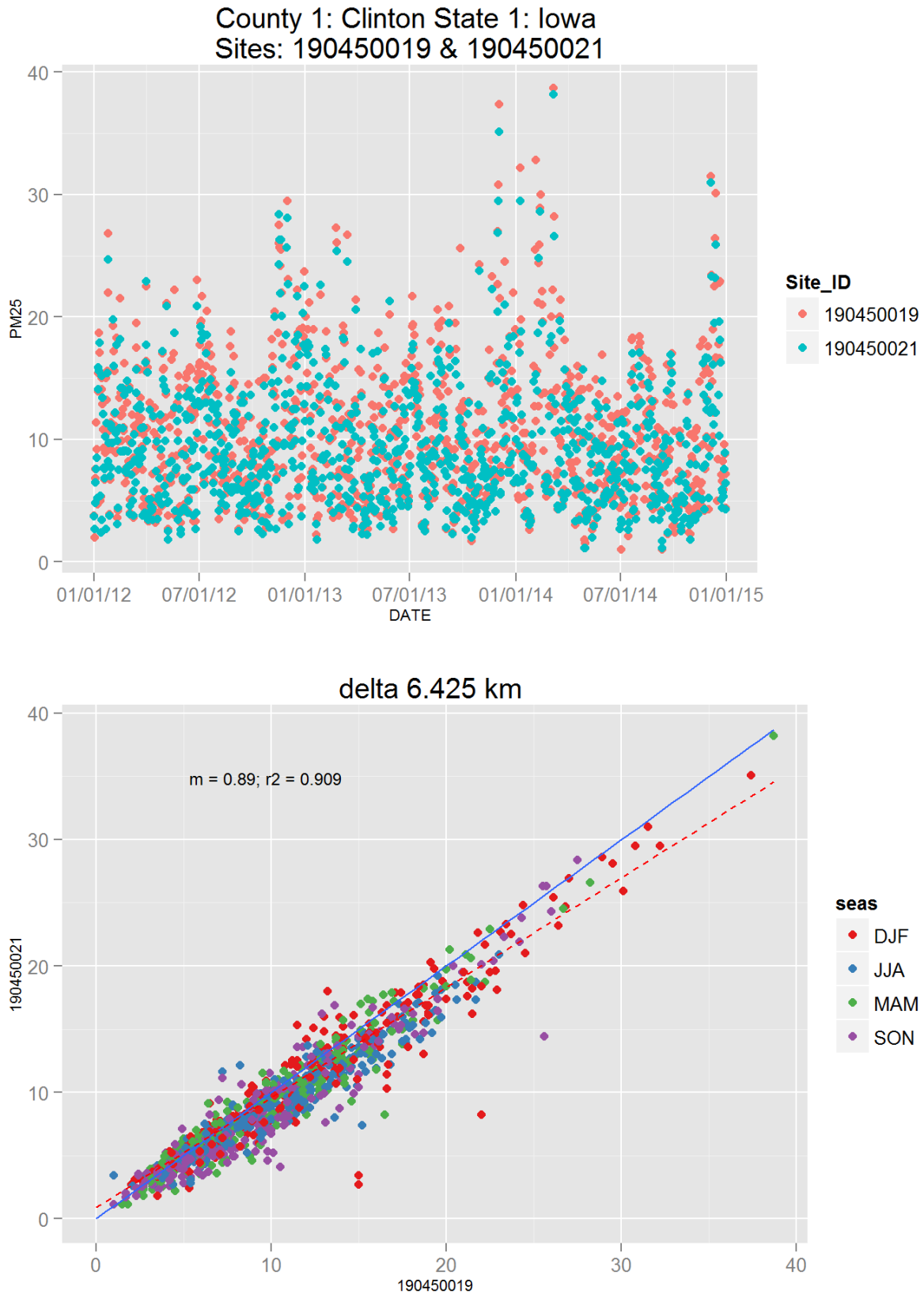


Figure 81: Comparison of PM_{2.5} data for sites 190450019 and 190450019. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

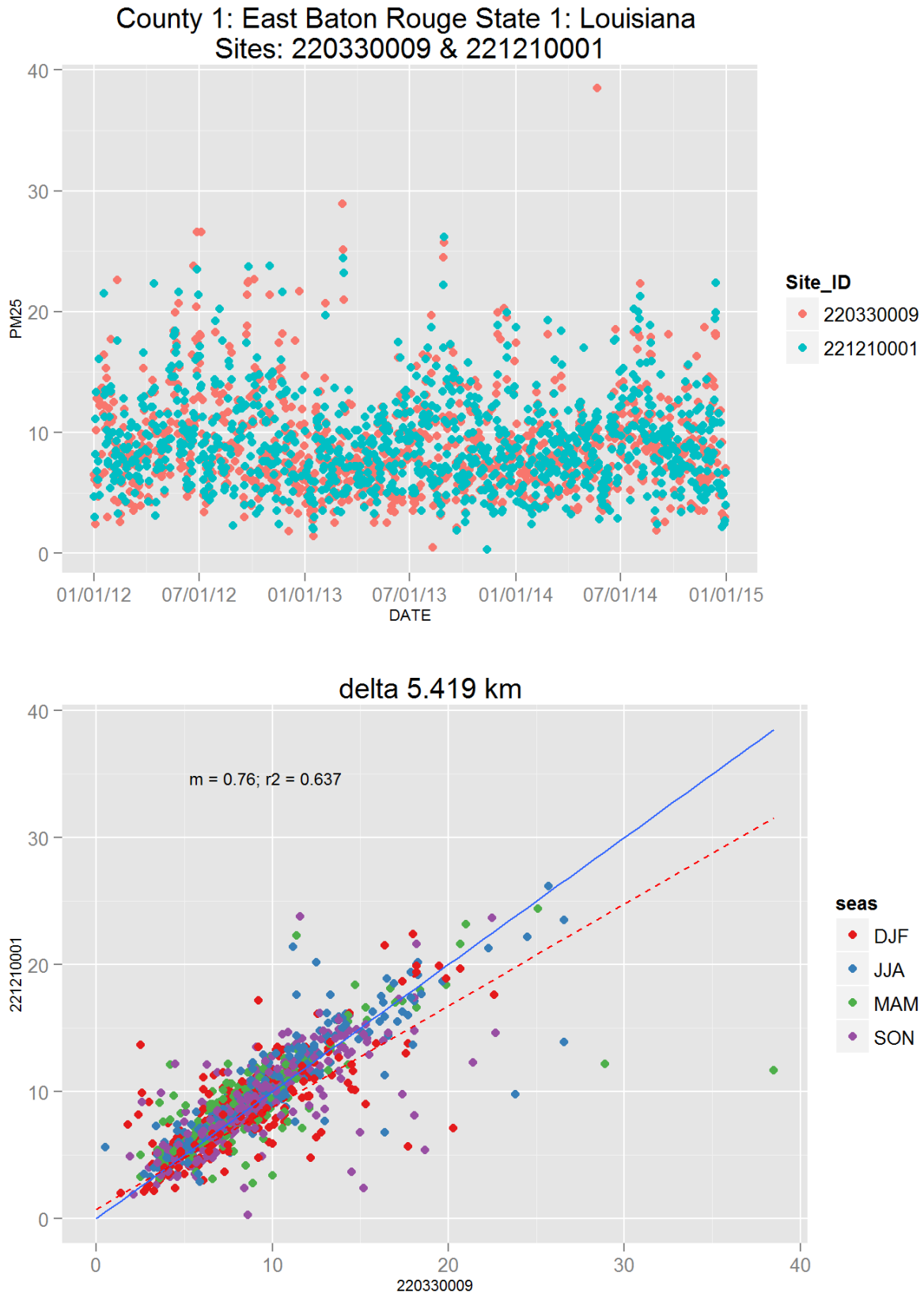


Figure 82: Comparison of PM_{2.5} data for sites 220330009 and 220330009. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

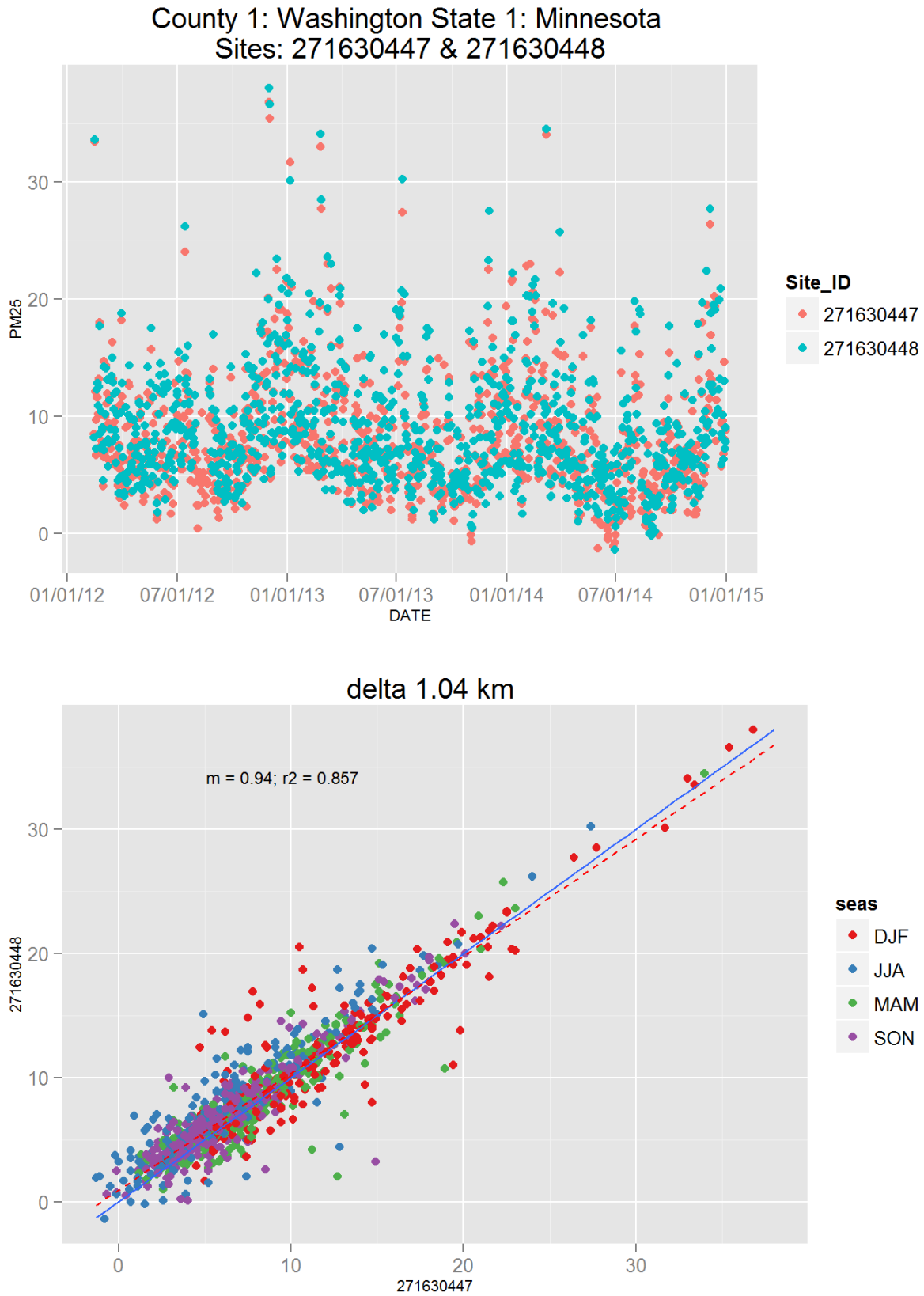


Figure 83: Comparison of PM_{2.5} data for sites 271630447 and 271630448. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

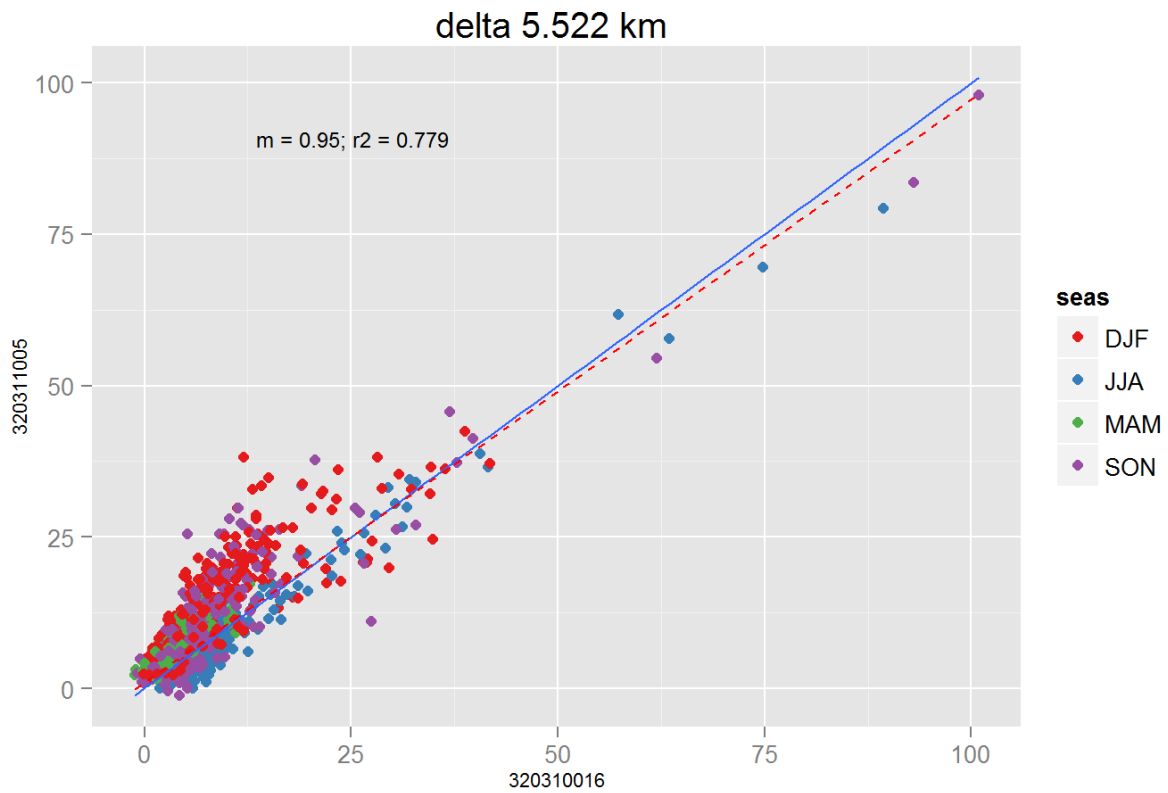
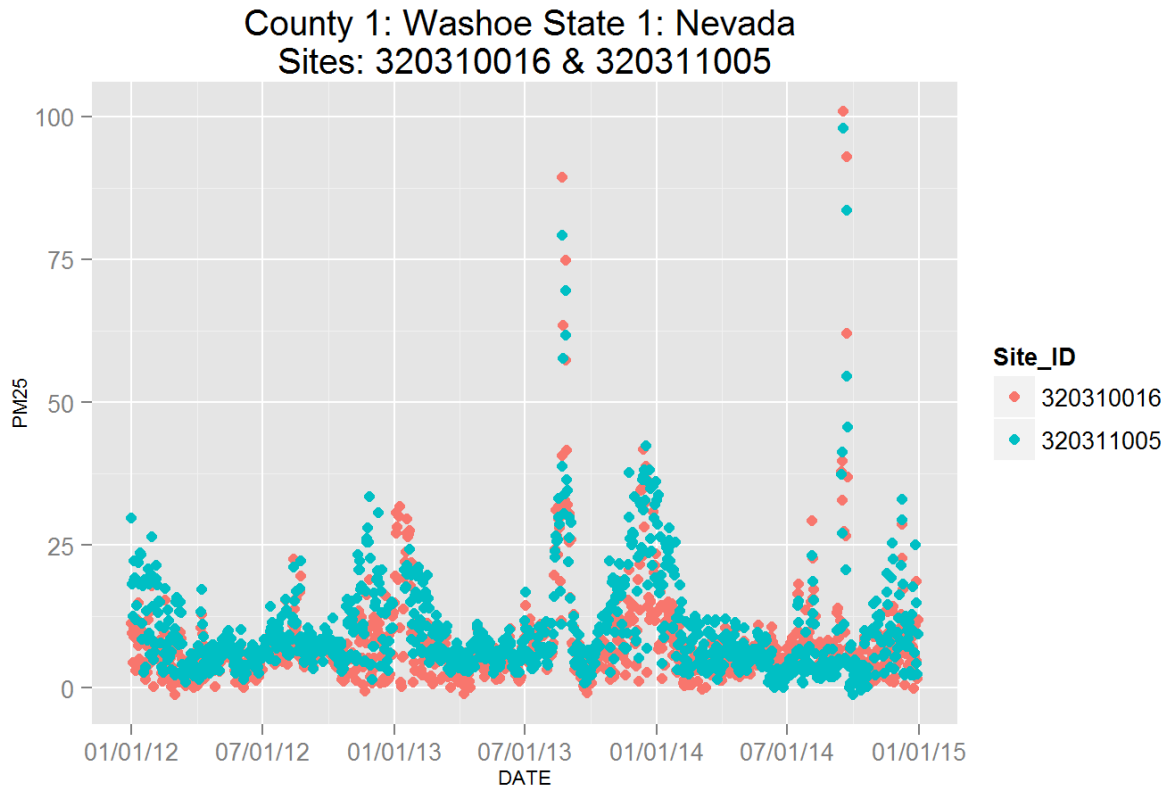


Figure 84: Comparison of PM_{2.5} data for sites 320310016 and 320310016. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r2), with data points are colored by month.

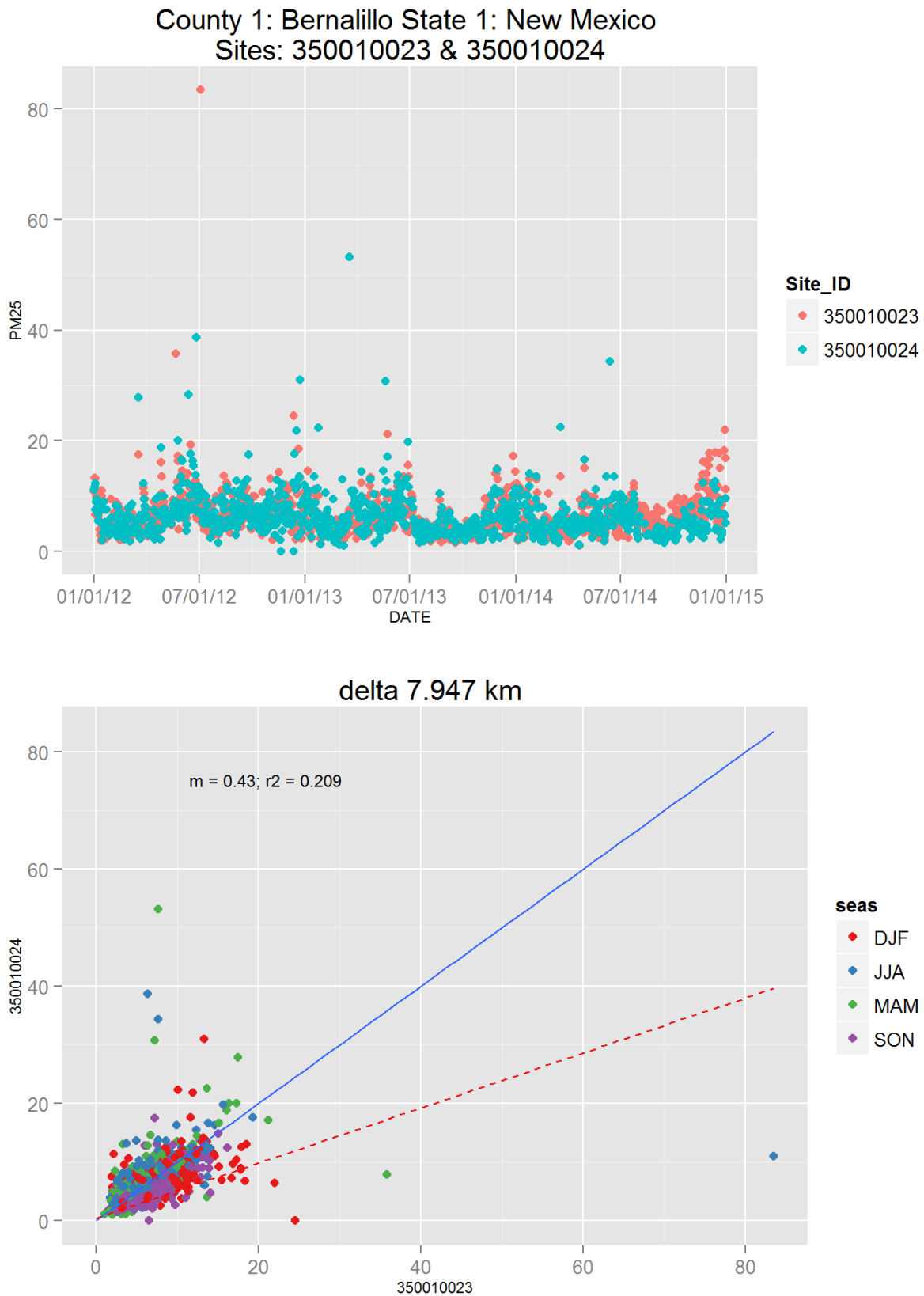


Figure 85: Comparison of PM_{2.5} data for sites 350010023 and 350010024. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

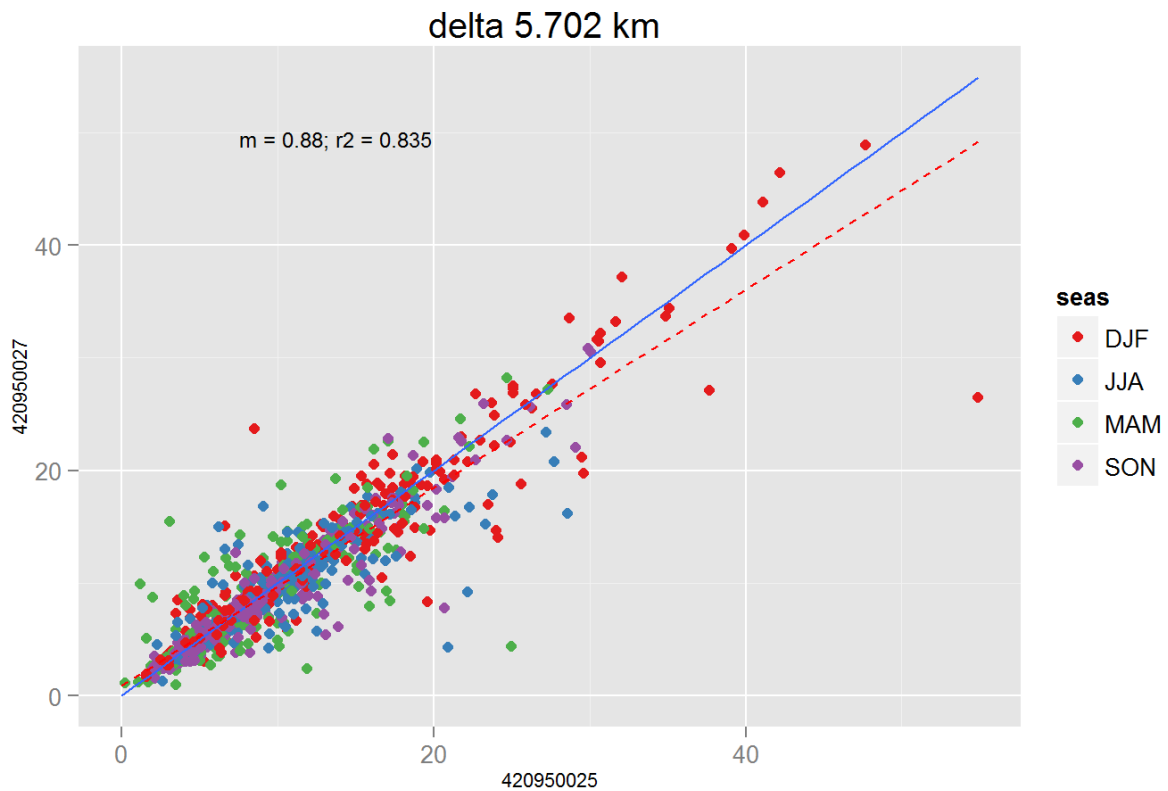
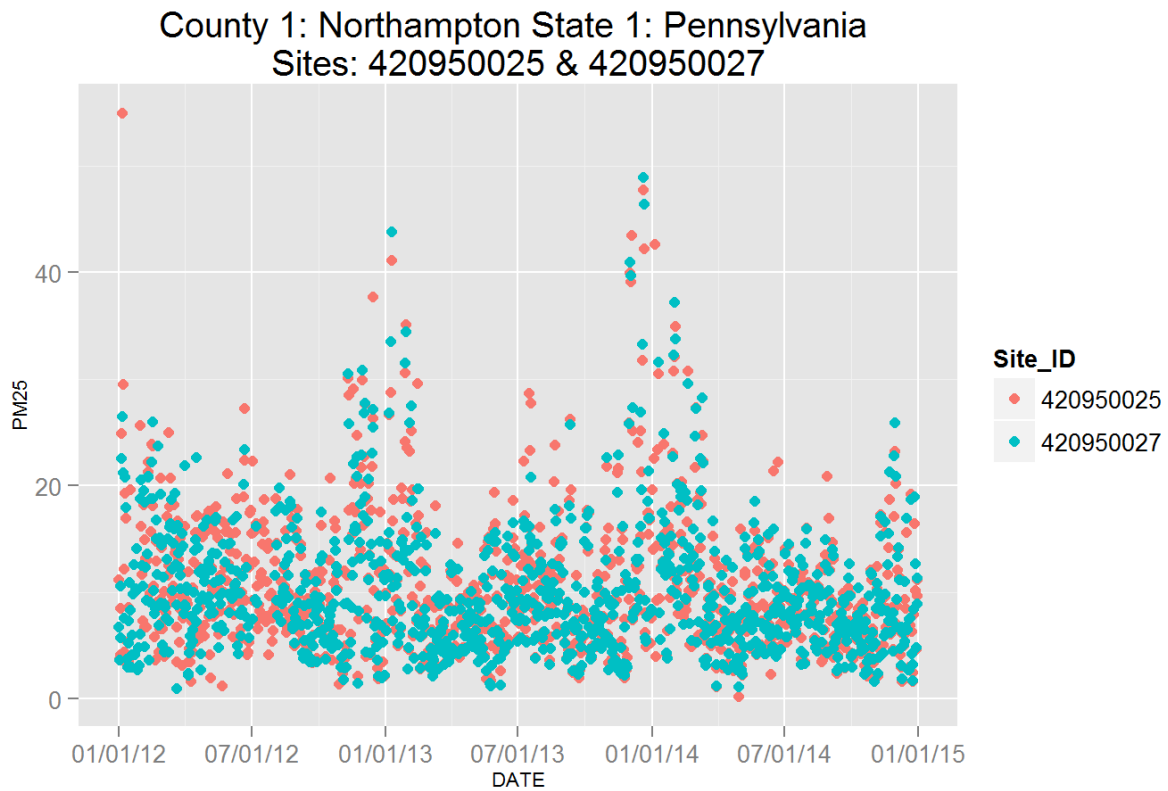


Figure 86: Comparison of PM_{2.5} data for sites 420950025 and 420950027. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r^2), with data points are colored by month.

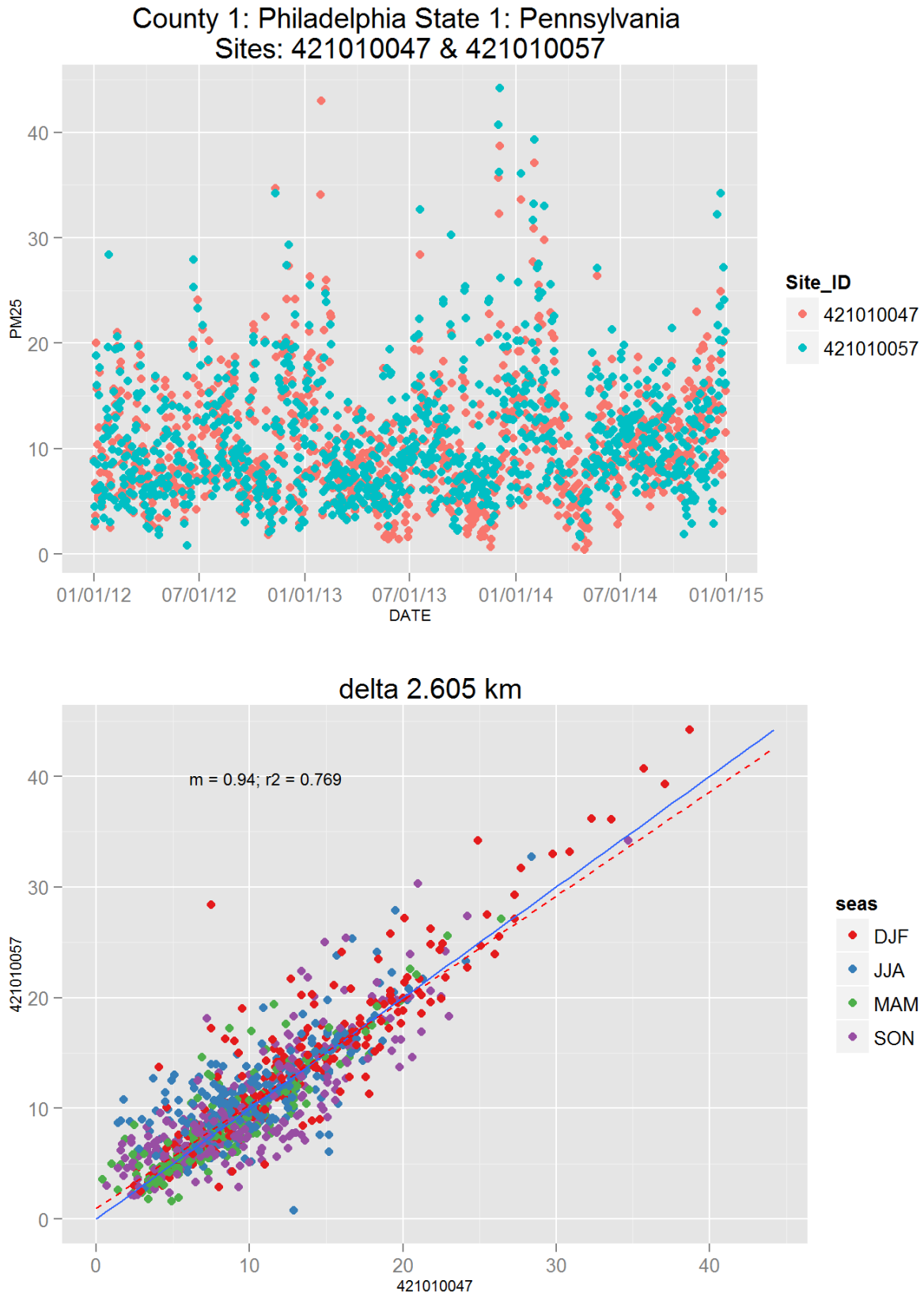


Figure 87: Comparison of PM_{2.5} data for sites 421010047 and 421010047. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.



Figure 88: Comparison of PM_{2.5} data for sites 421010055 and 421010047. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

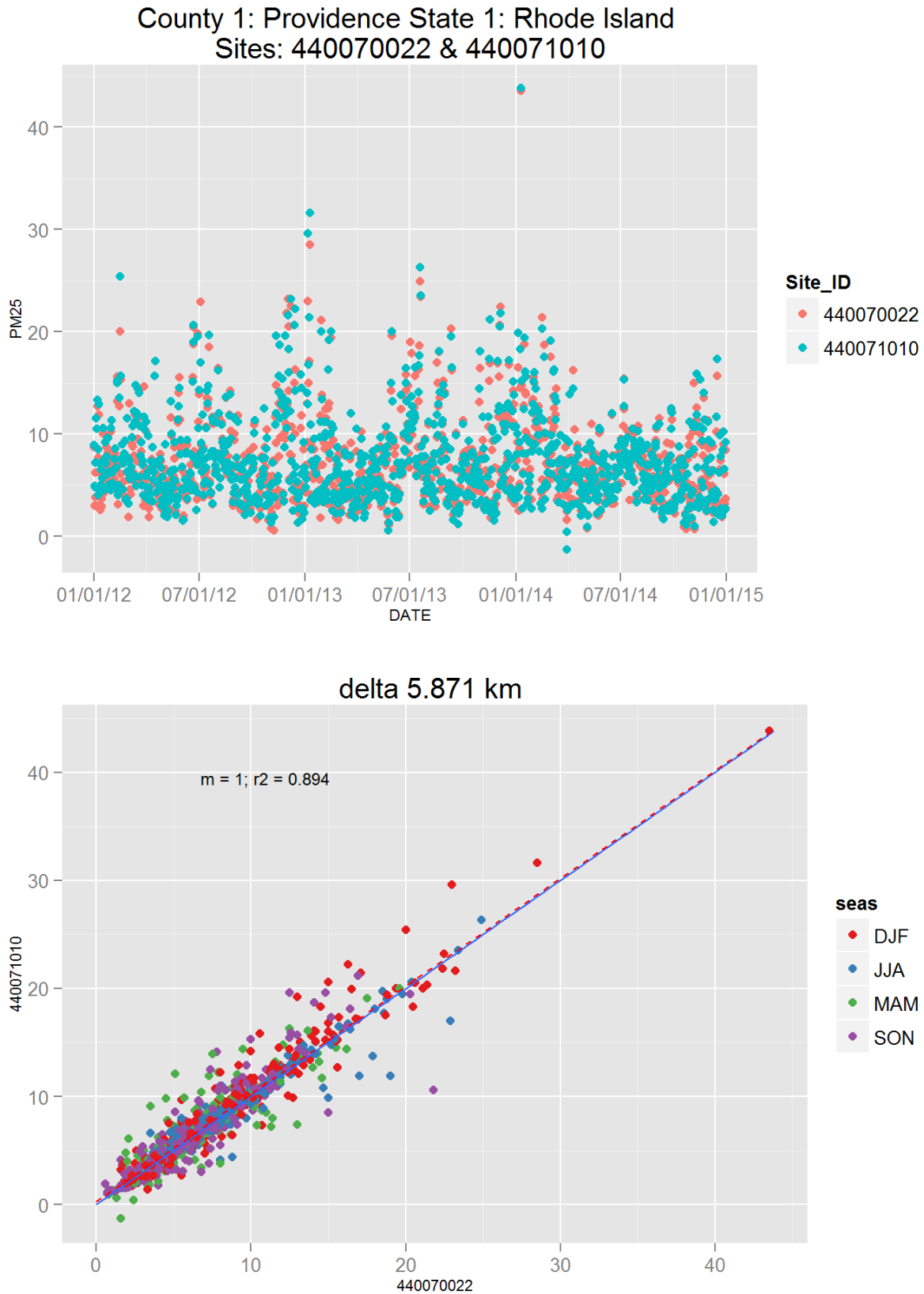


Figure 89: Comparison of PM_{2.5} data for sites 440070022 and 440070022. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.



Figure 90: Comparison of PM_{2.5} data for sites 490353006 and 490353006. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

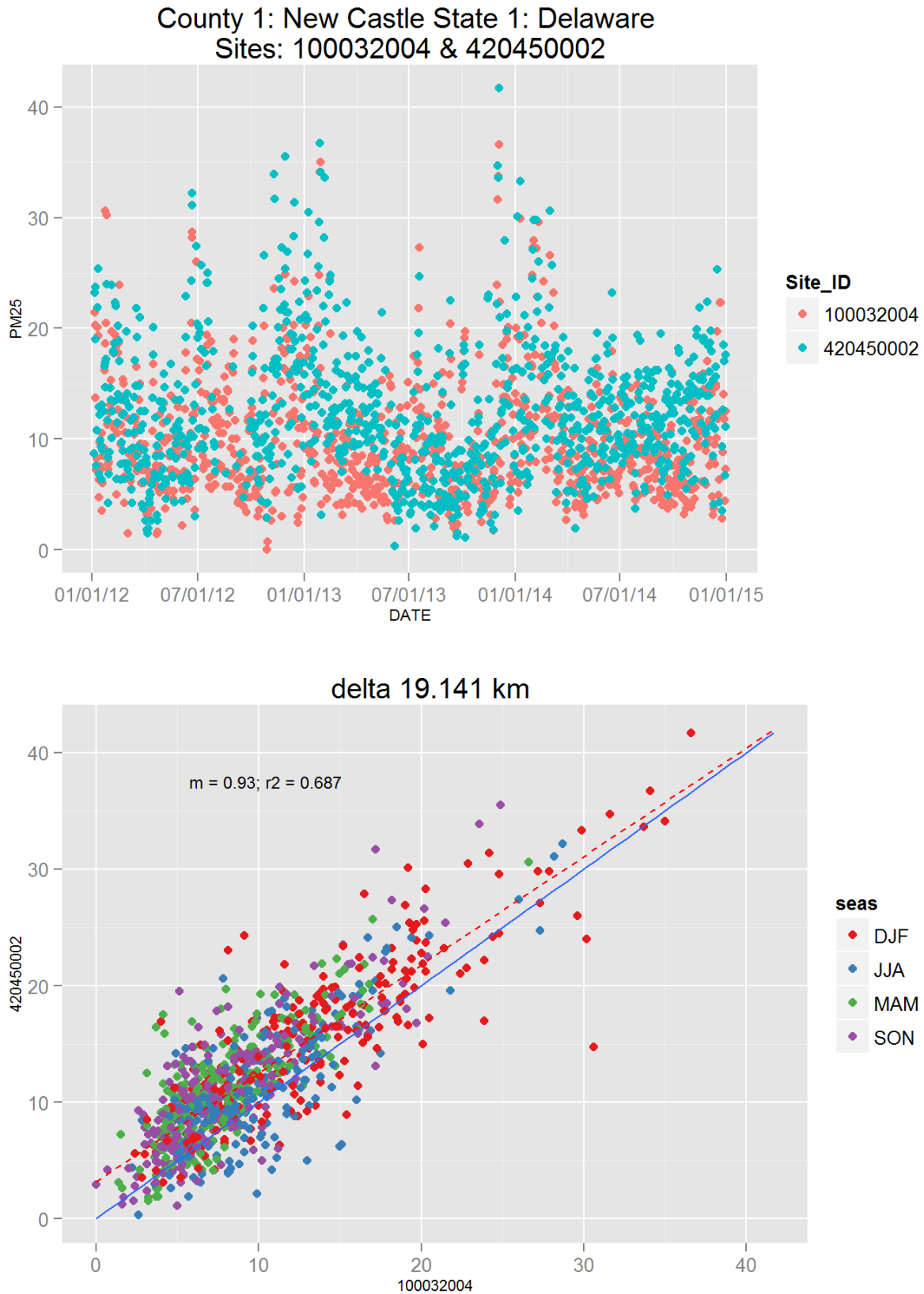


Figure 91: Comparison of PM_{2.5} data for sites 100032004 and 100032004. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

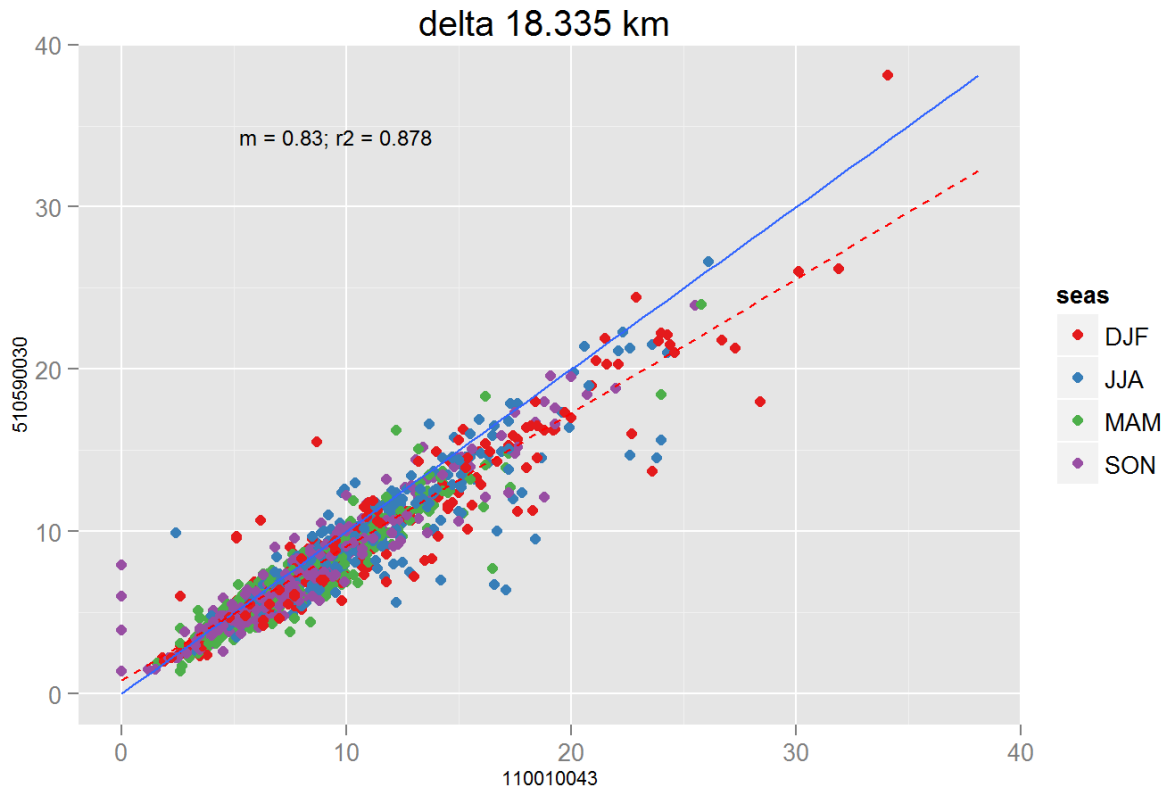
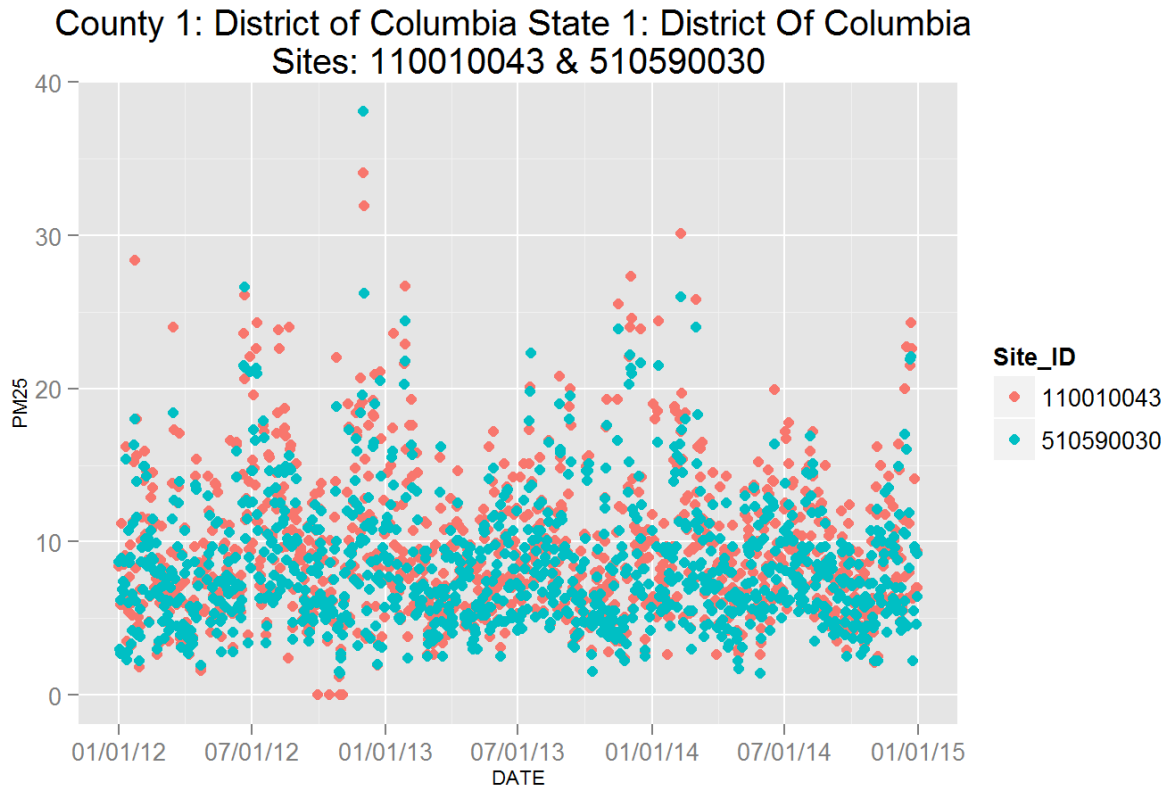


Figure 92: Comparison of PM_{2.5} data for sites 110010043 and 110010043. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r2), with data points are colored by month.



Figure 93: Comparison of PM_{2.5} data for sites 130670003 and 130670003. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

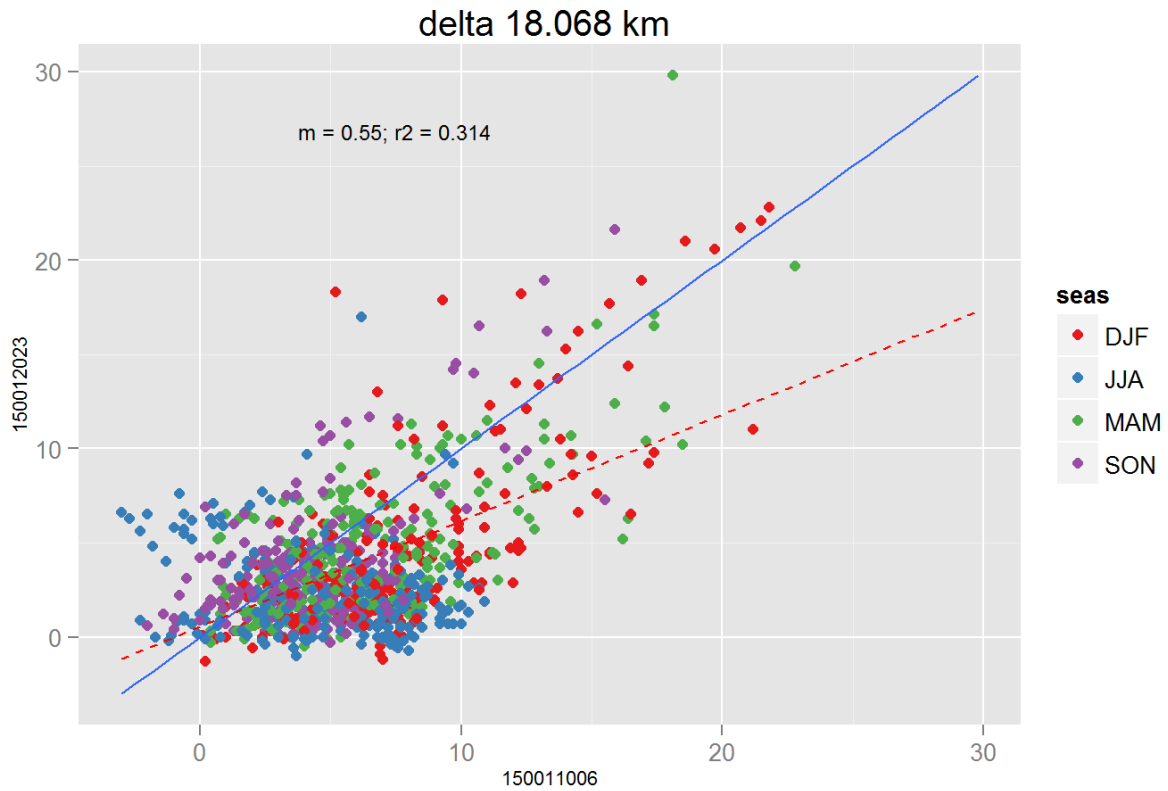
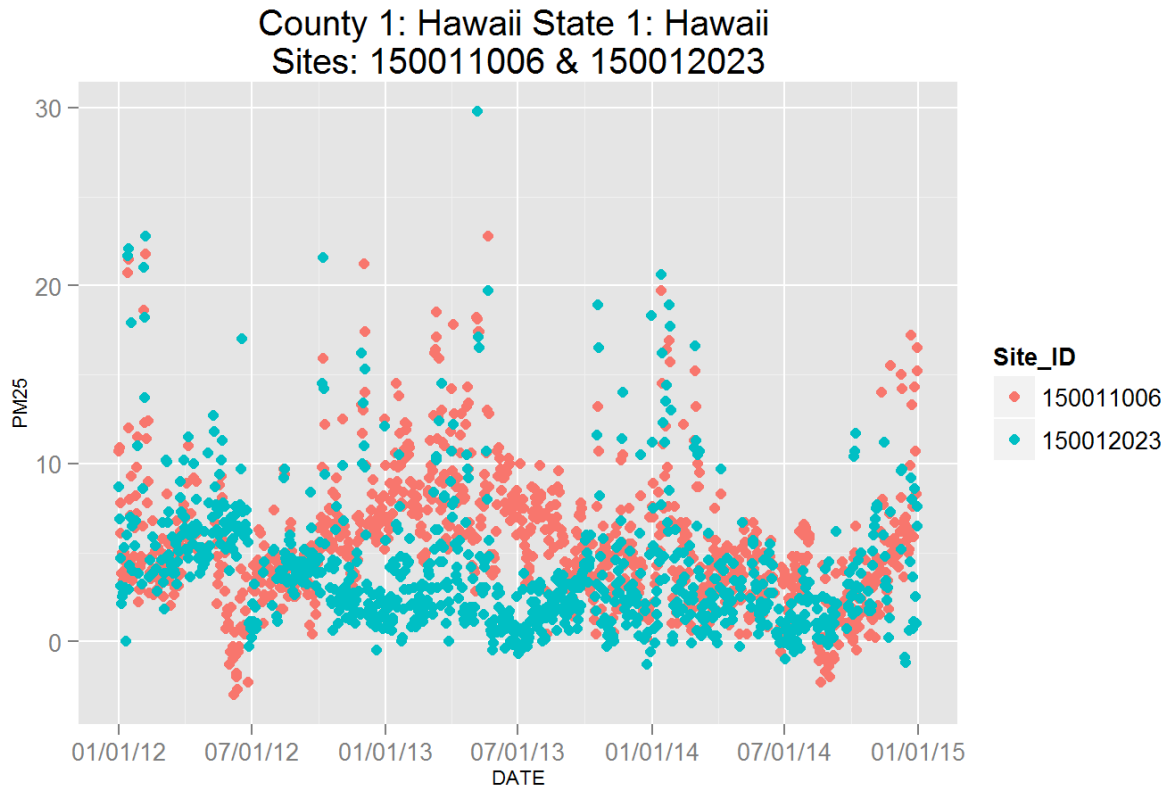


Figure 94: Comparison of PM_{2.5} data for sites 150011006 and 150011006. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

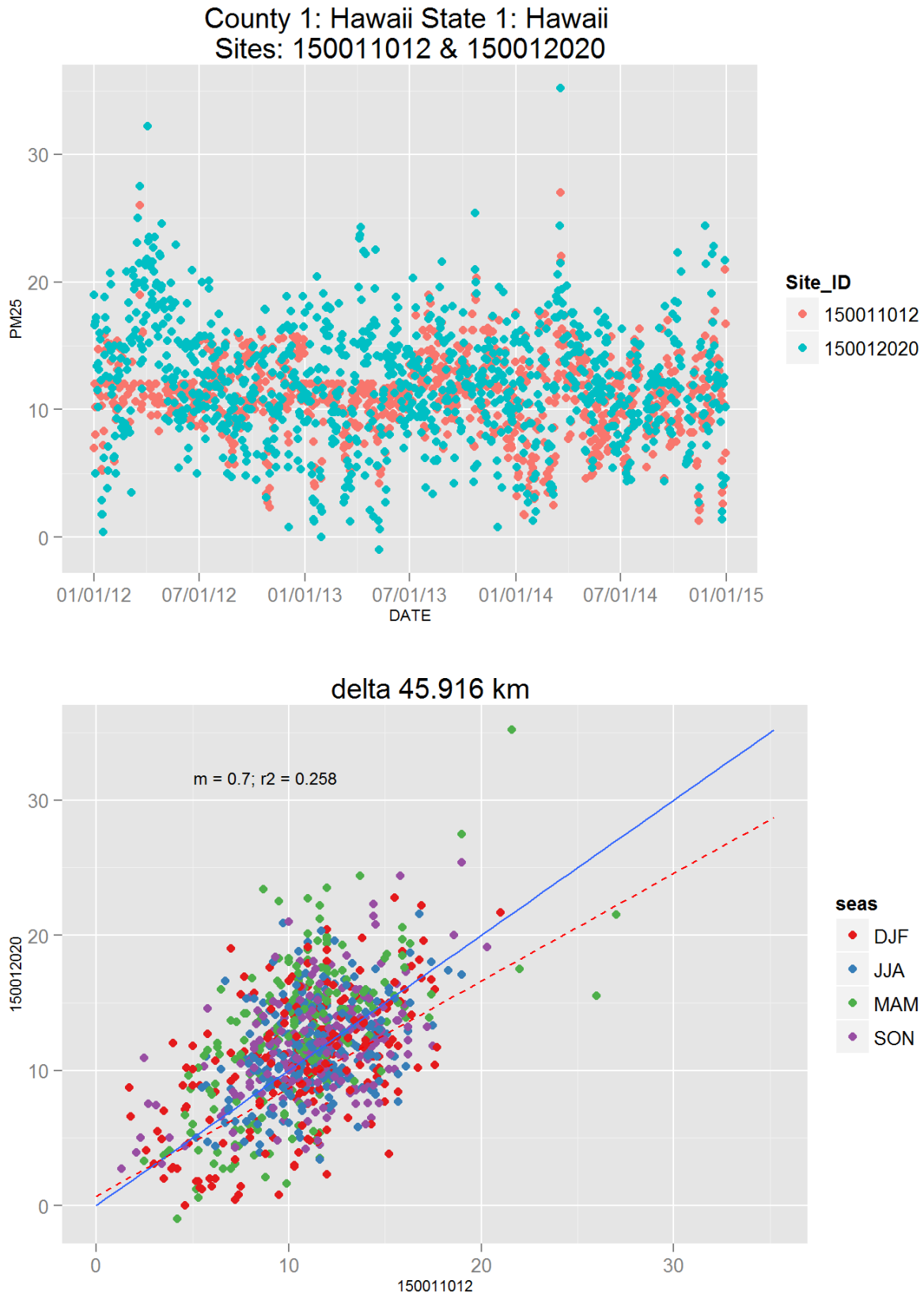


Figure 95: Comparison of PM_{2.5} data for sites 150011012 and 150011012. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.



Figure 96: Comparison of PM_{2.5} data for sites 150012016 and 150012014. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r^2), with data points are colored by month.



Figure 97: Comparison of PM_{2.5} data for sites 150031001 and 150031004. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

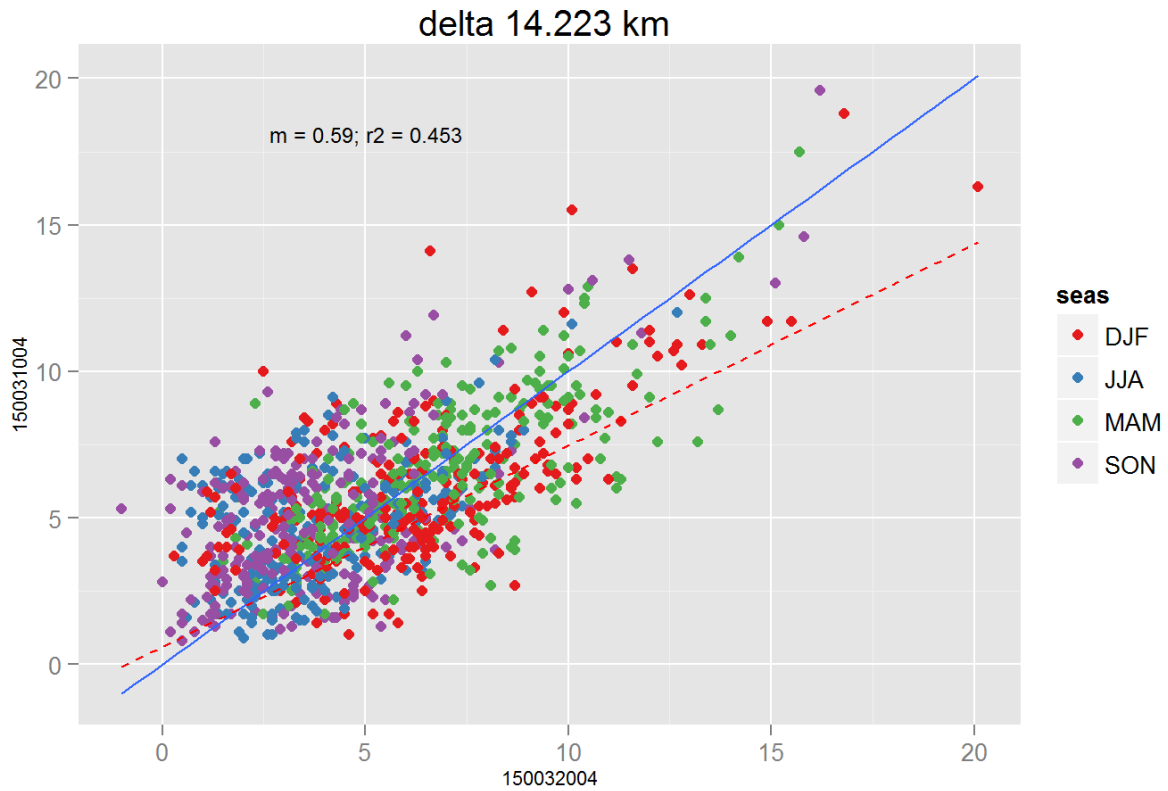
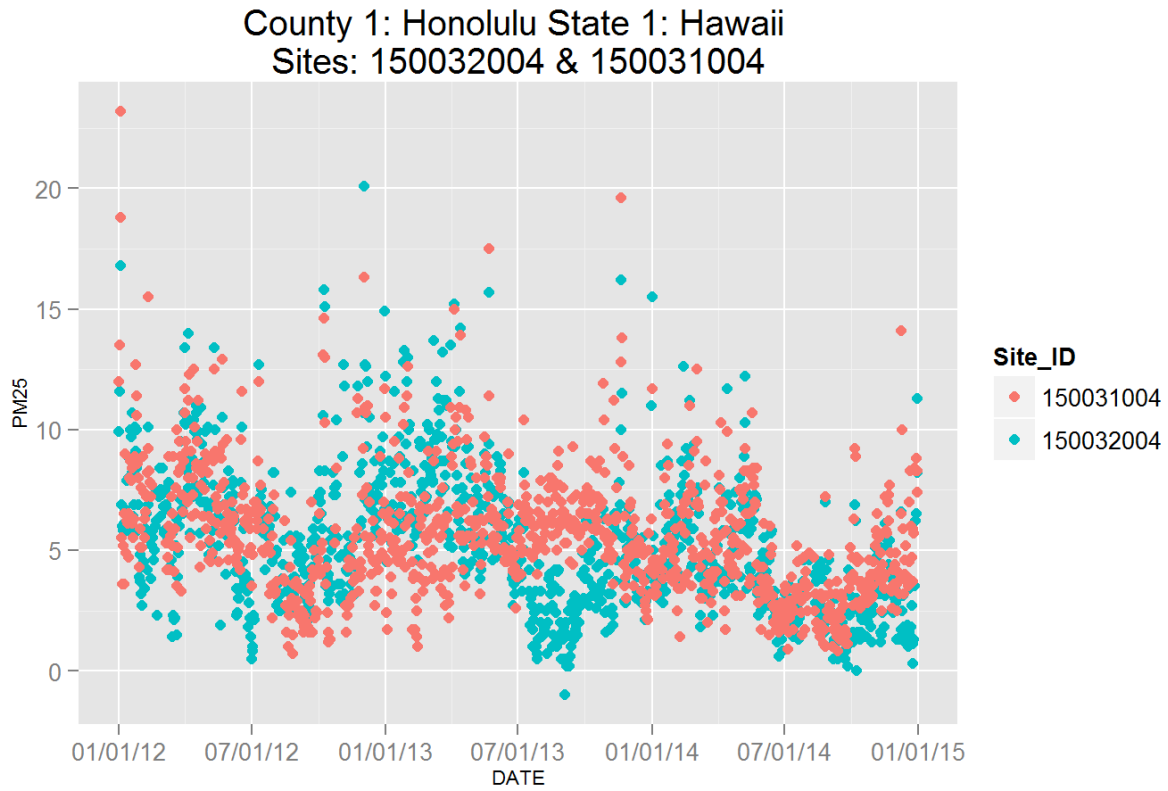


Figure 98: Comparison of PM_{2.5} data for sites 150032004 and 150031004. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

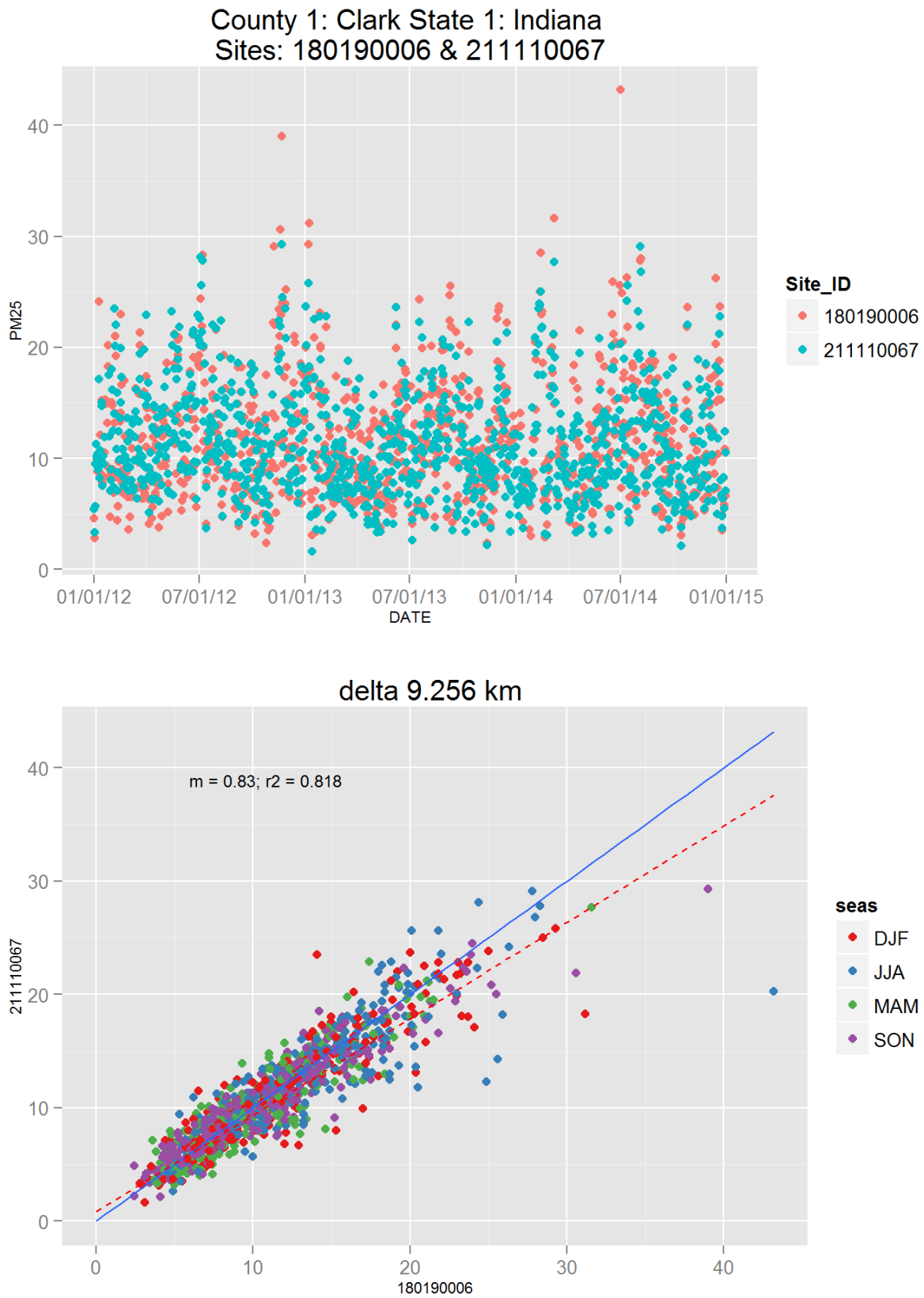


Figure 99: Comparison of PM_{2.5} data for sites 180190006 and 180190006. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

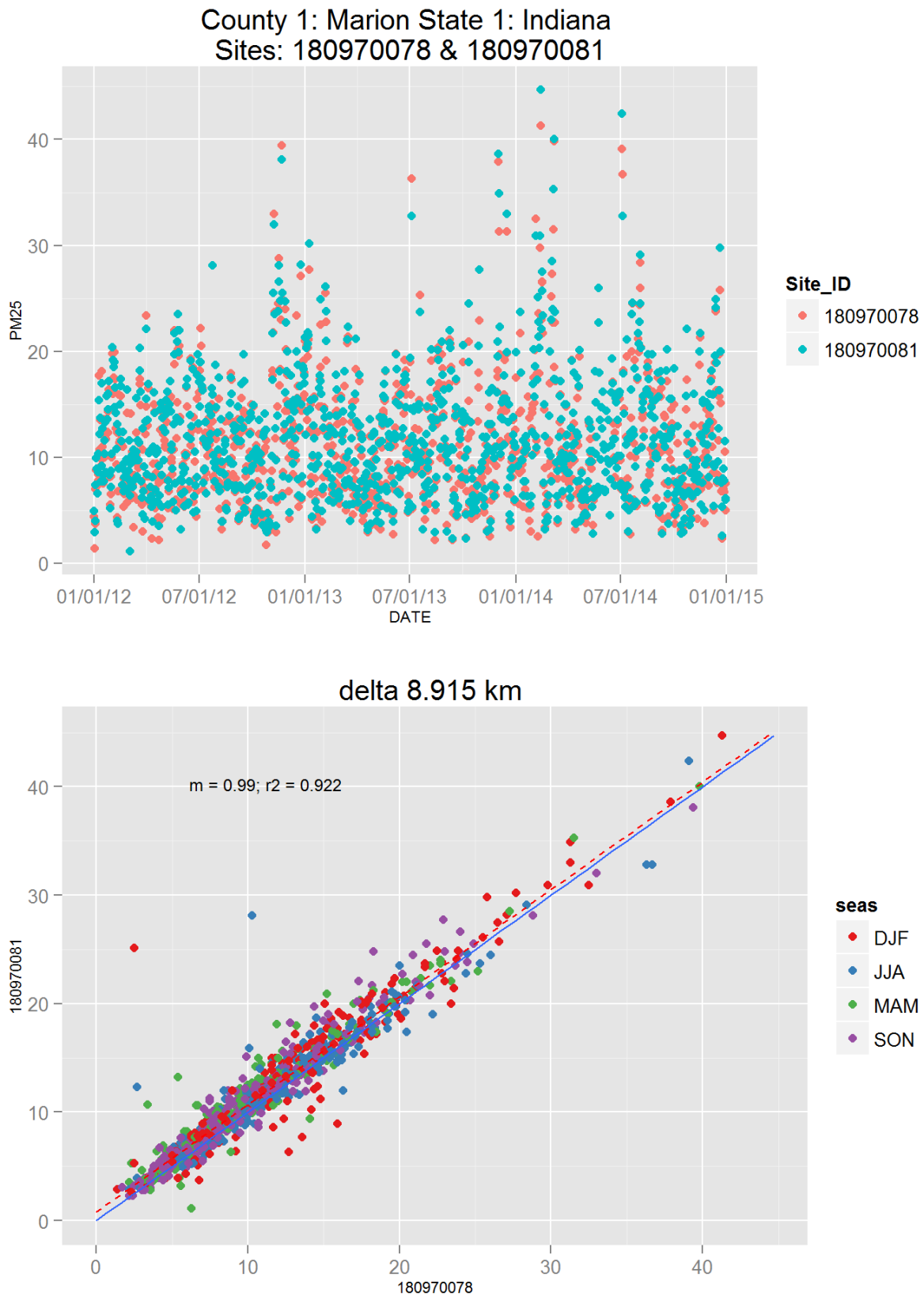


Figure 100: Comparison of PM_{2.5} data for sites 180970078 and 180970078. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

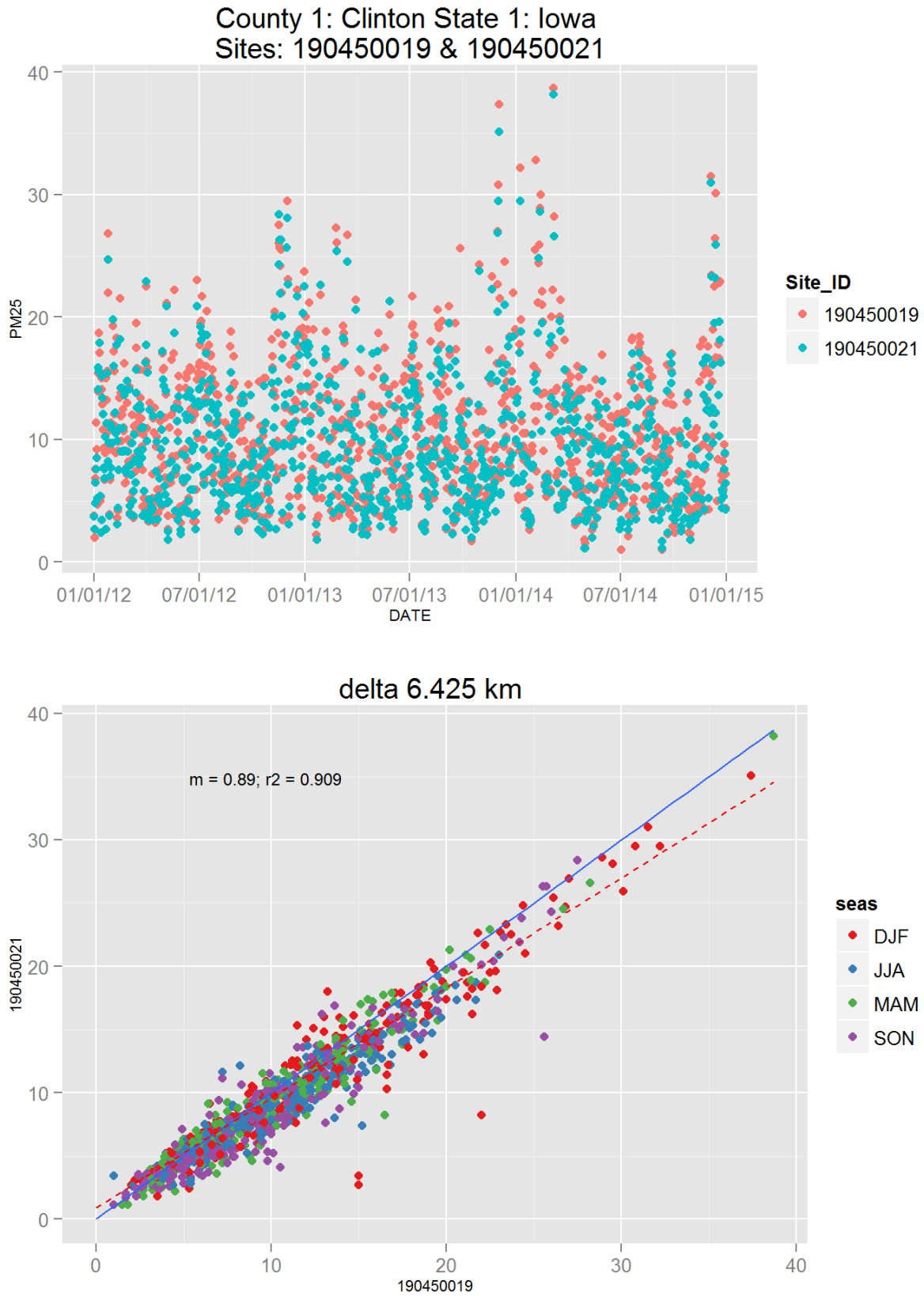


Figure 101: Comparison of PM_{2.5} data for sites 190450019 and 190450019. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

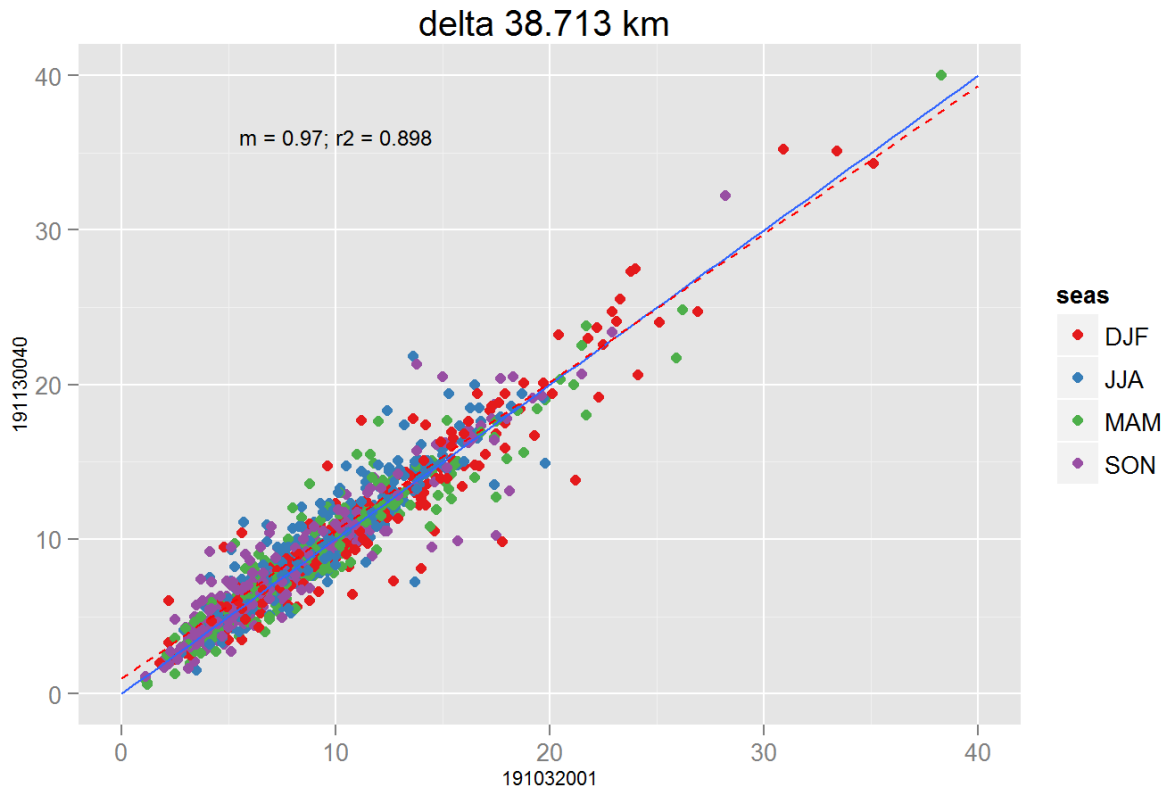
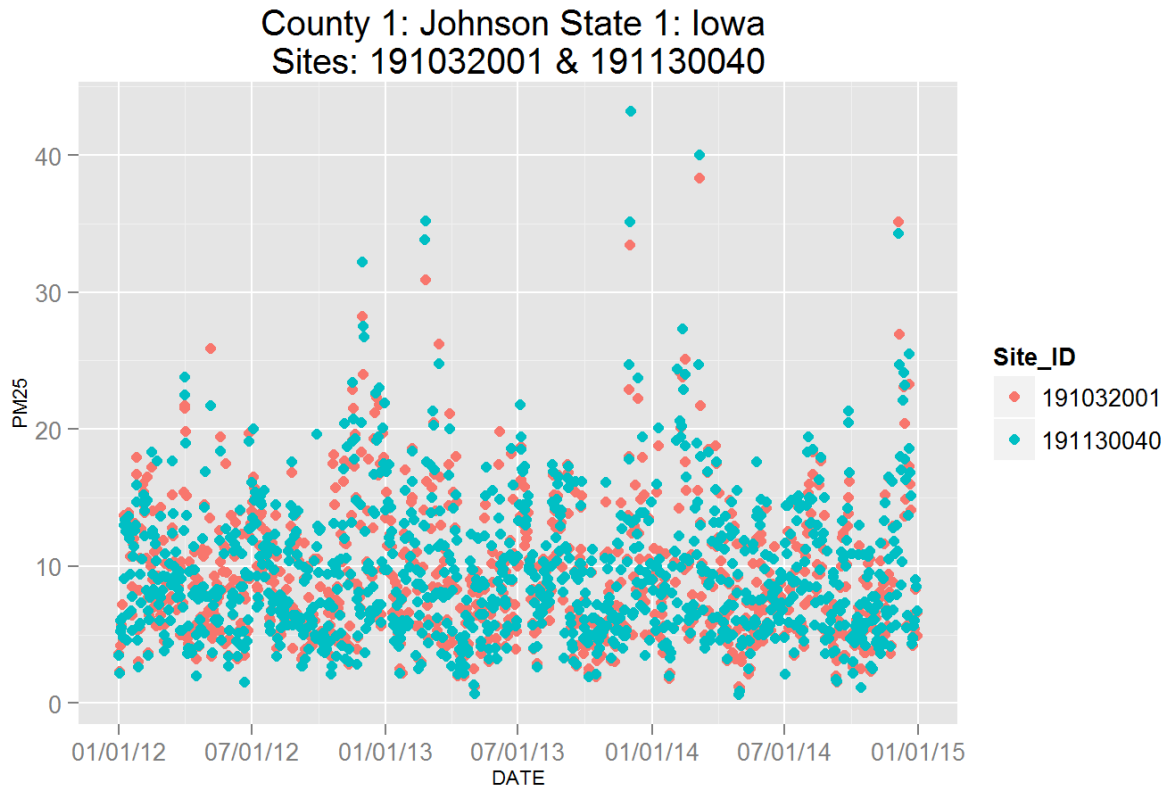


Figure 102: Comparison of PM_{2.5} data for sites 191032001 and 191032001. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r2), with data points are colored by month.

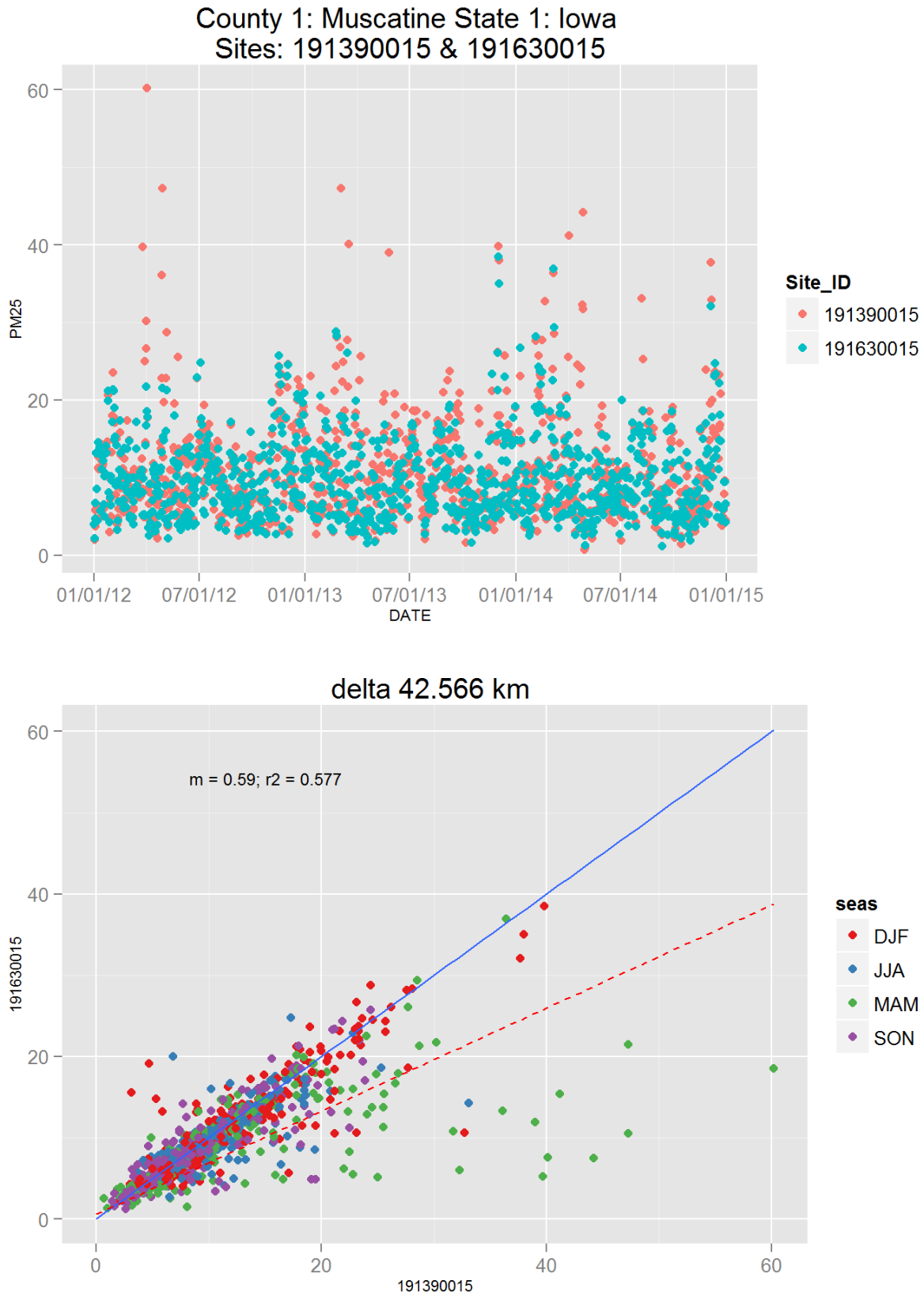


Figure 103: Comparison of PM_{2.5} data for sites 191390015 and 191630015. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.



Figure 104: Comparison of PM_{2.5} data for sites 211110051 and 211110051. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r2), with data points are colored by month.

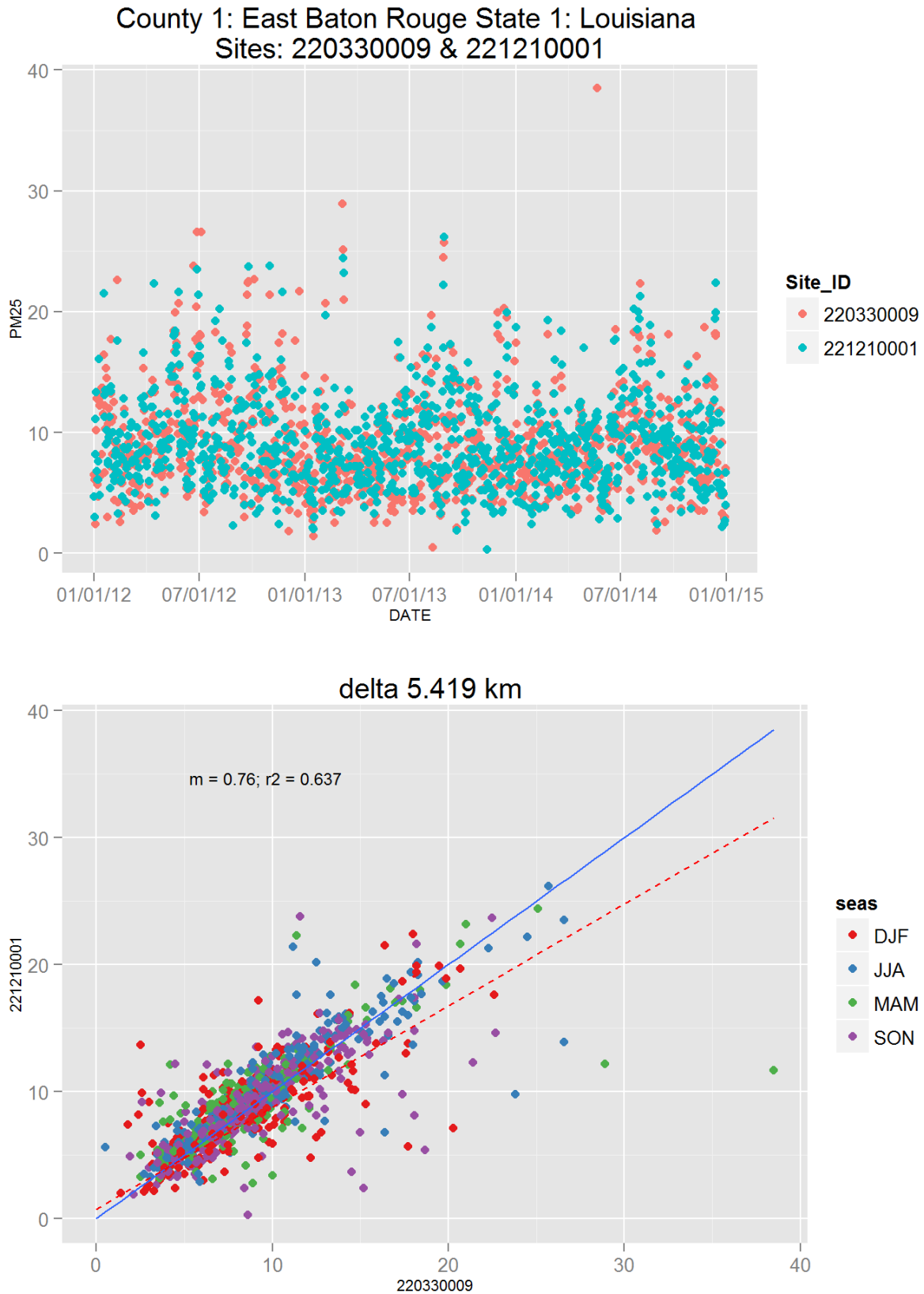


Figure 105: Comparison of PM_{2.5} data for sites 220330009 and 220330009. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

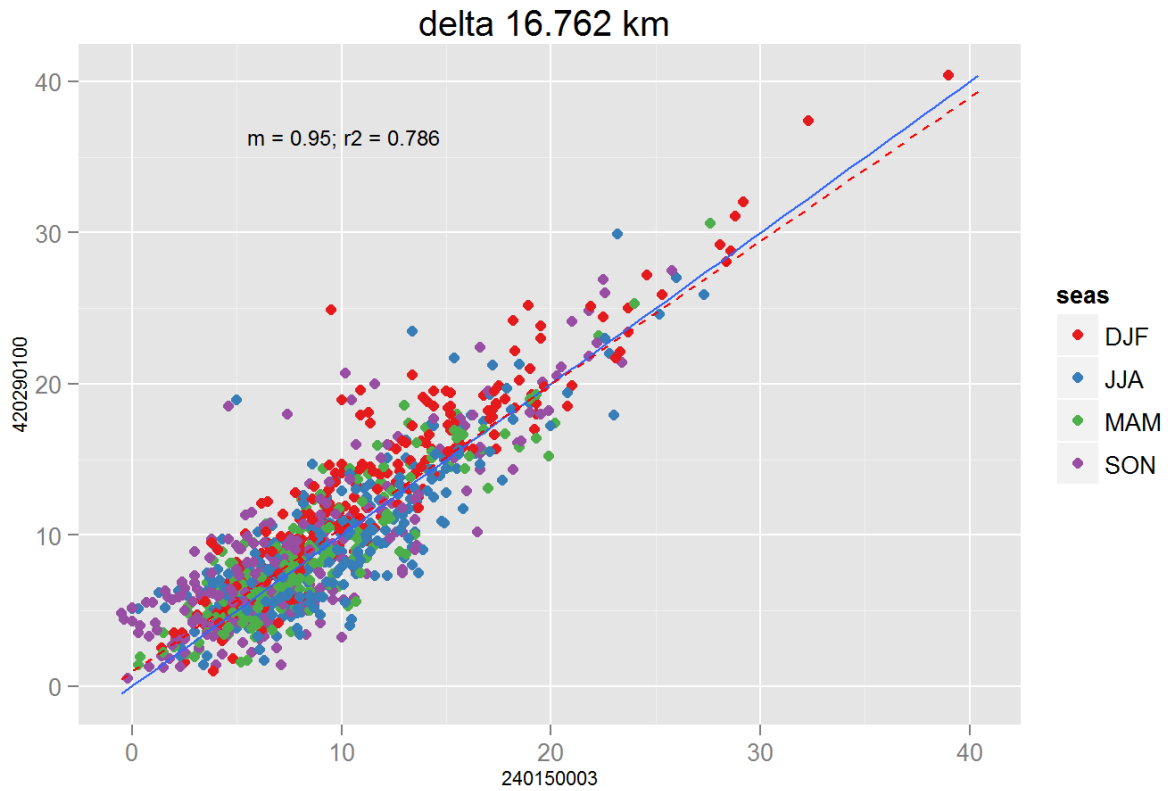
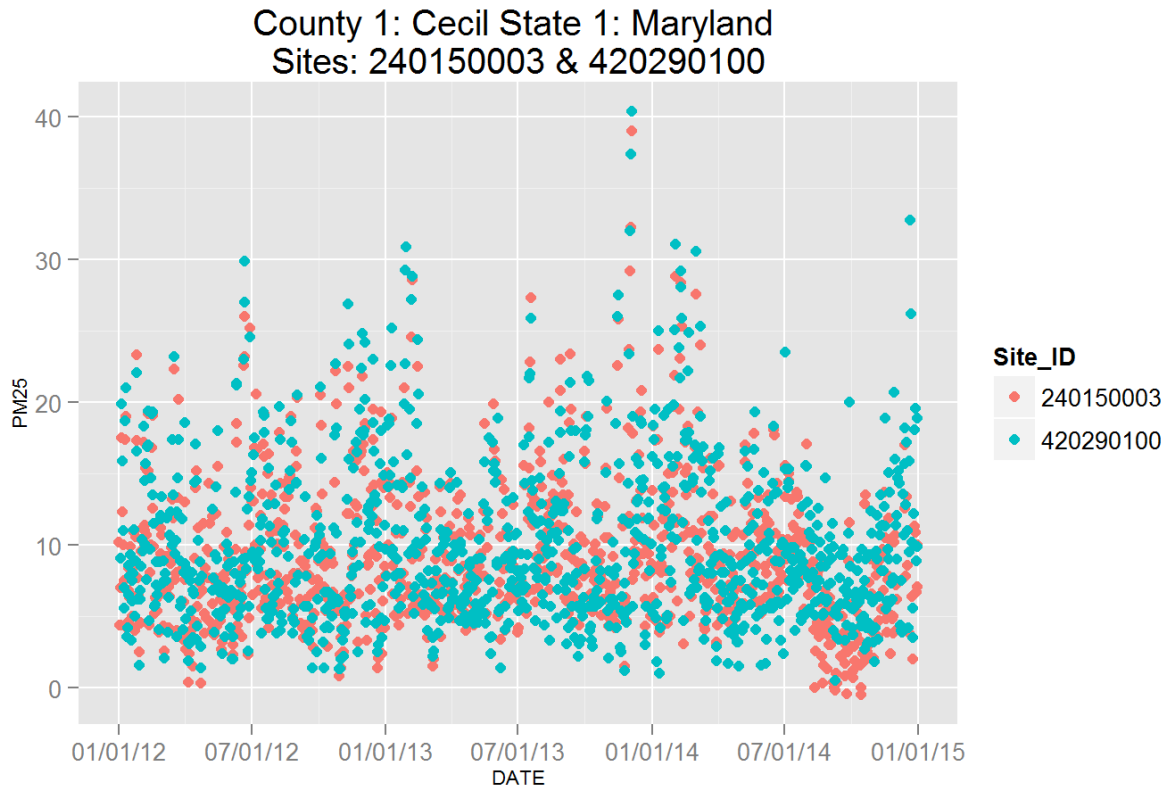


Figure 106: Comparison of PM_{2.5} data for sites 240150003 and 240150003. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r2), with data points are colored by month.

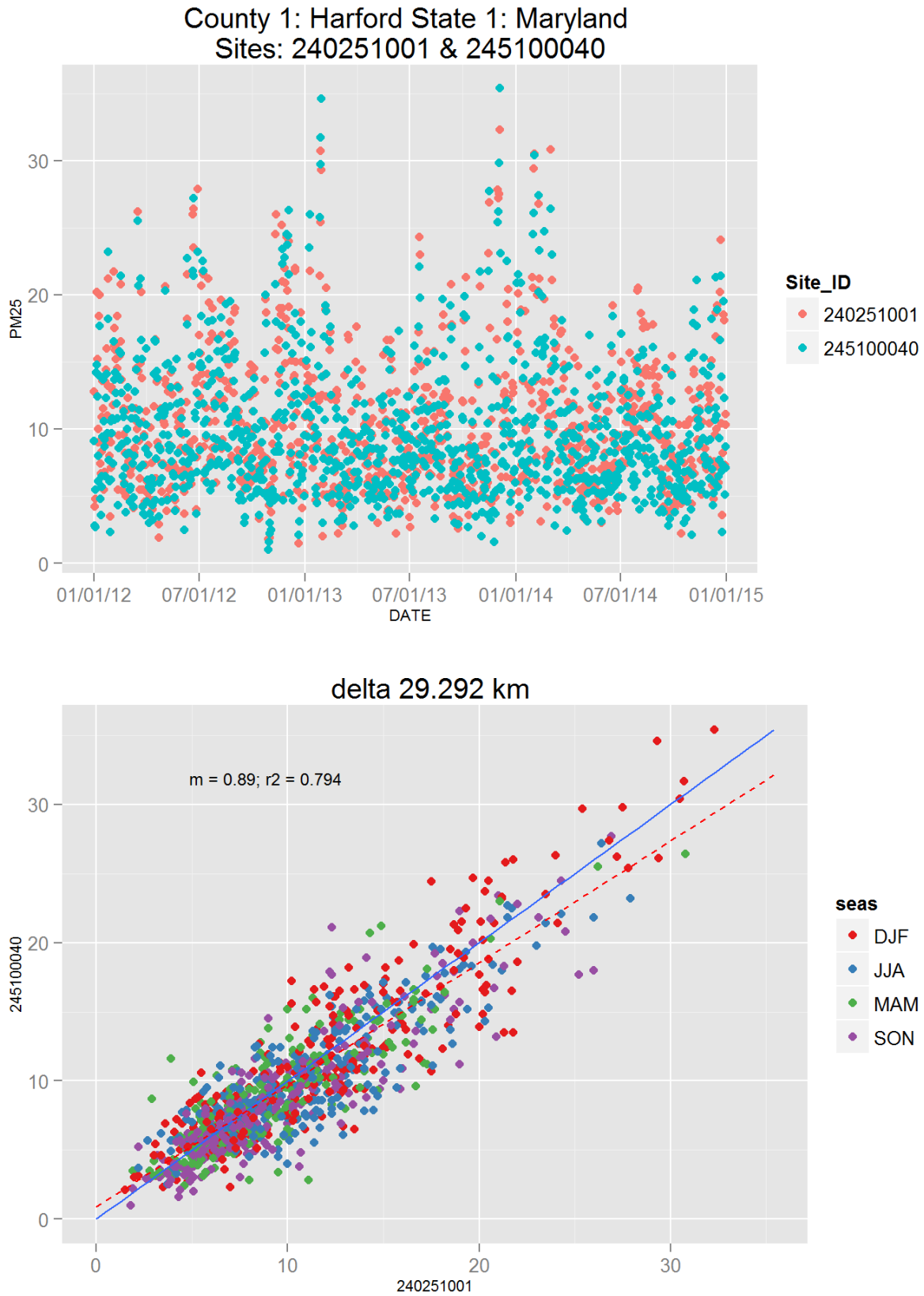


Figure 107: Comparison of PM_{2.5} data for sites 240251001 and 240251001. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.



Figure 108: Comparison of PM_{2.5} data for sites 240290002 and 240290002. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

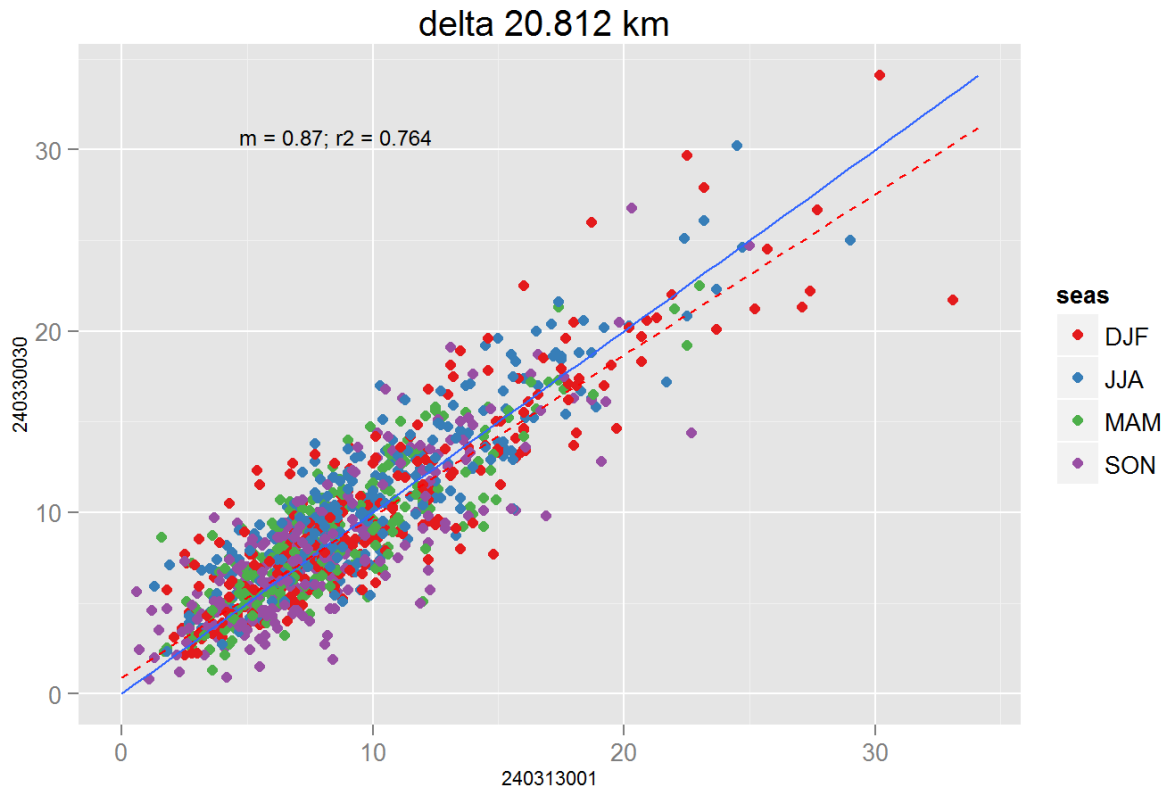
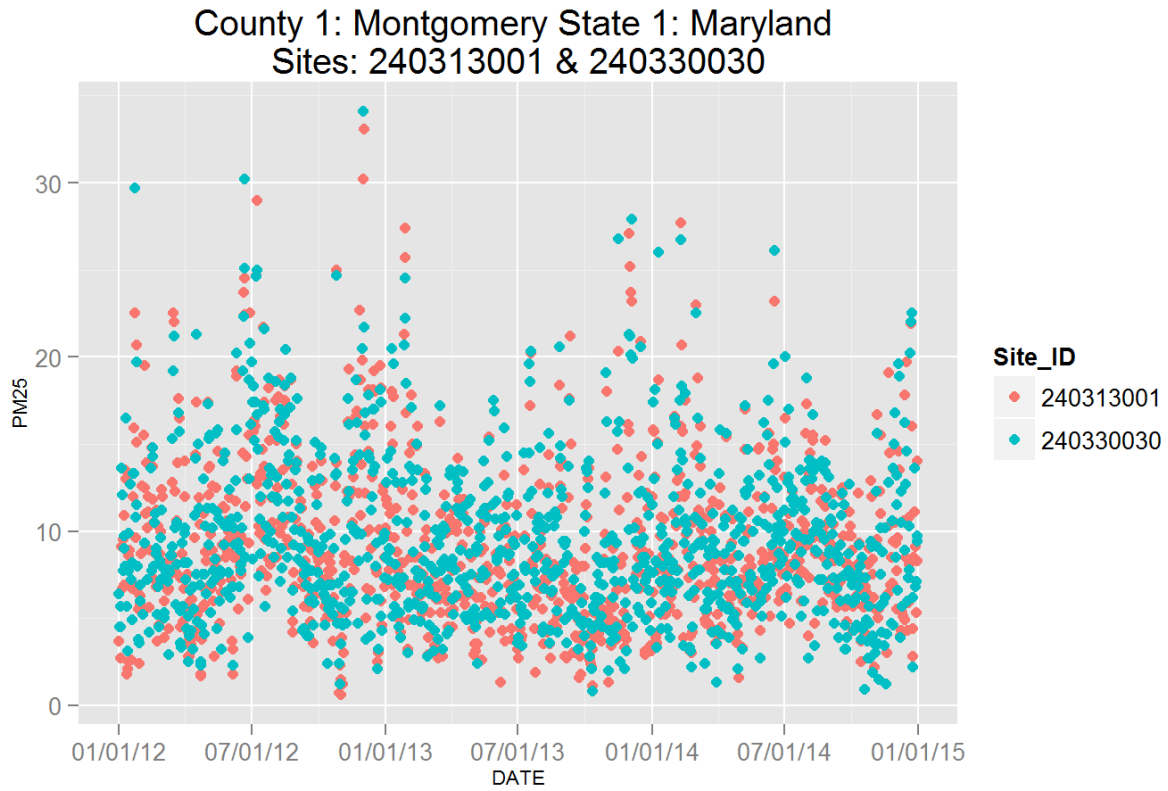


Figure 109: Comparison of PM_{2.5} data for sites 240313001 and 240330030. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r^2), with data points are colored by month.



Figure 110: Comparison of PM_{2.5} data for sites 240330030 and 240330030. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

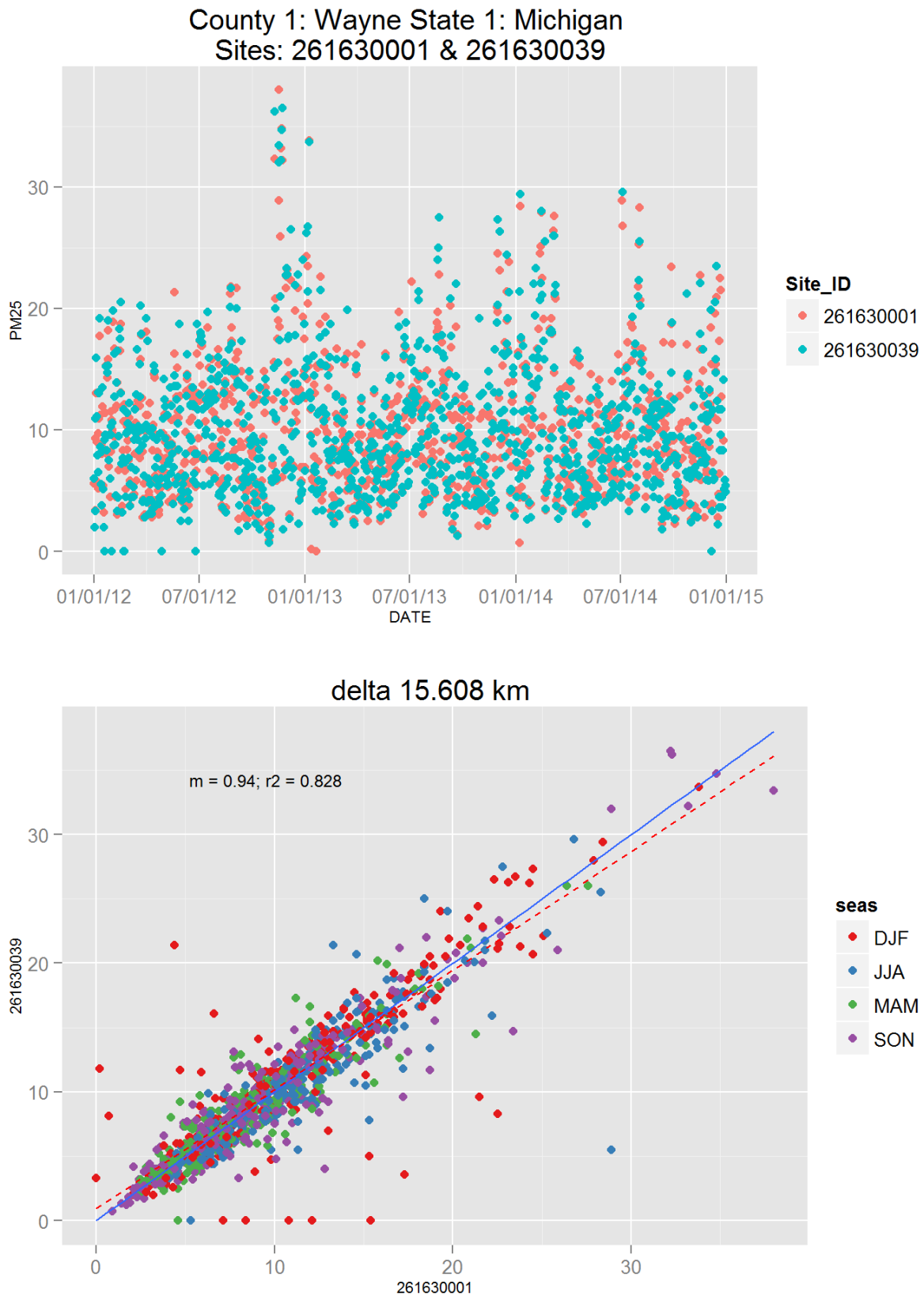


Figure 111: Comparison of PM_{2.5} data for sites 261630001 and 261630001. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

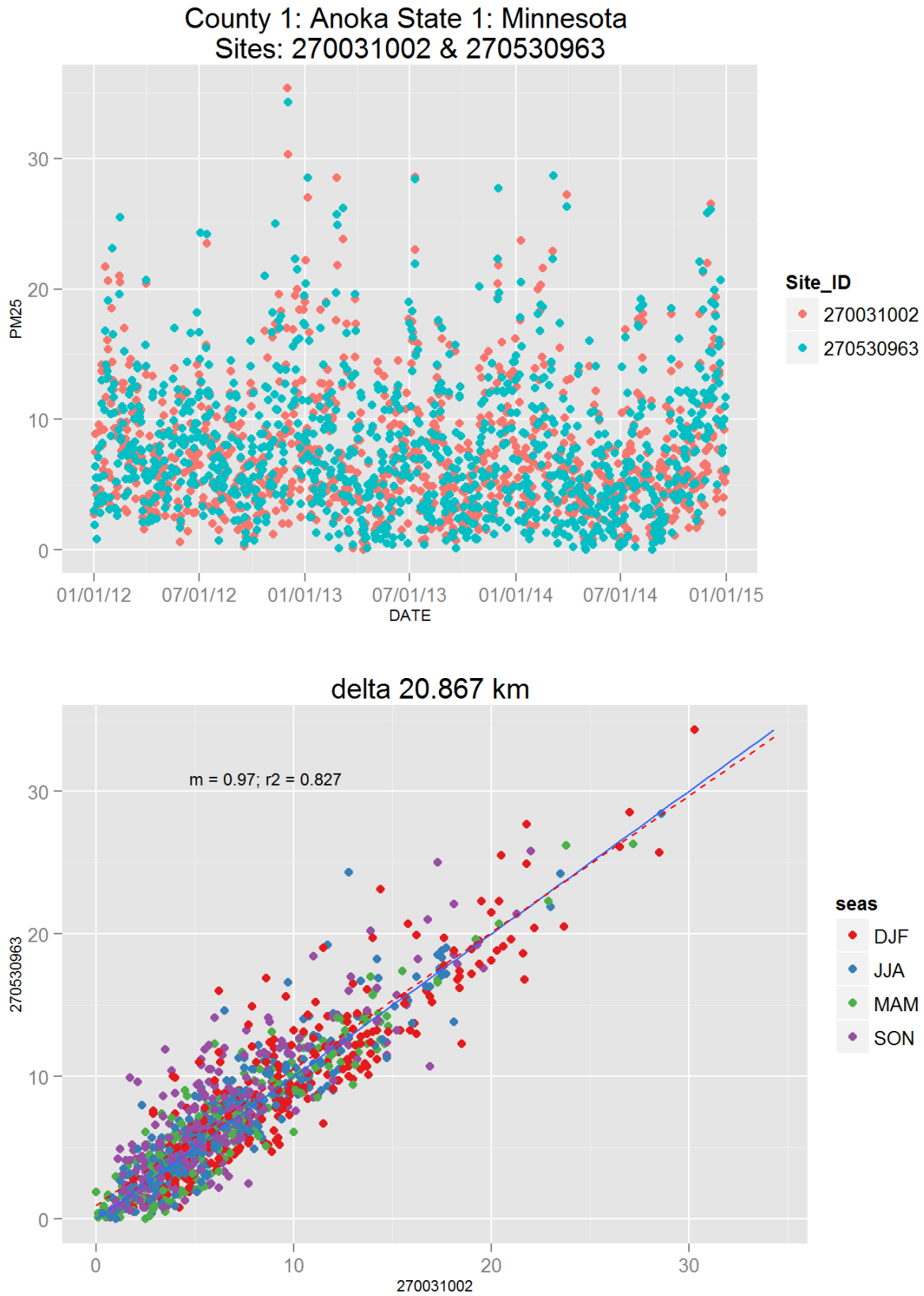


Figure 112: Comparison of PM_{2.5} data for sites 270031002 and 270031002. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r2), with data points are colored by month.

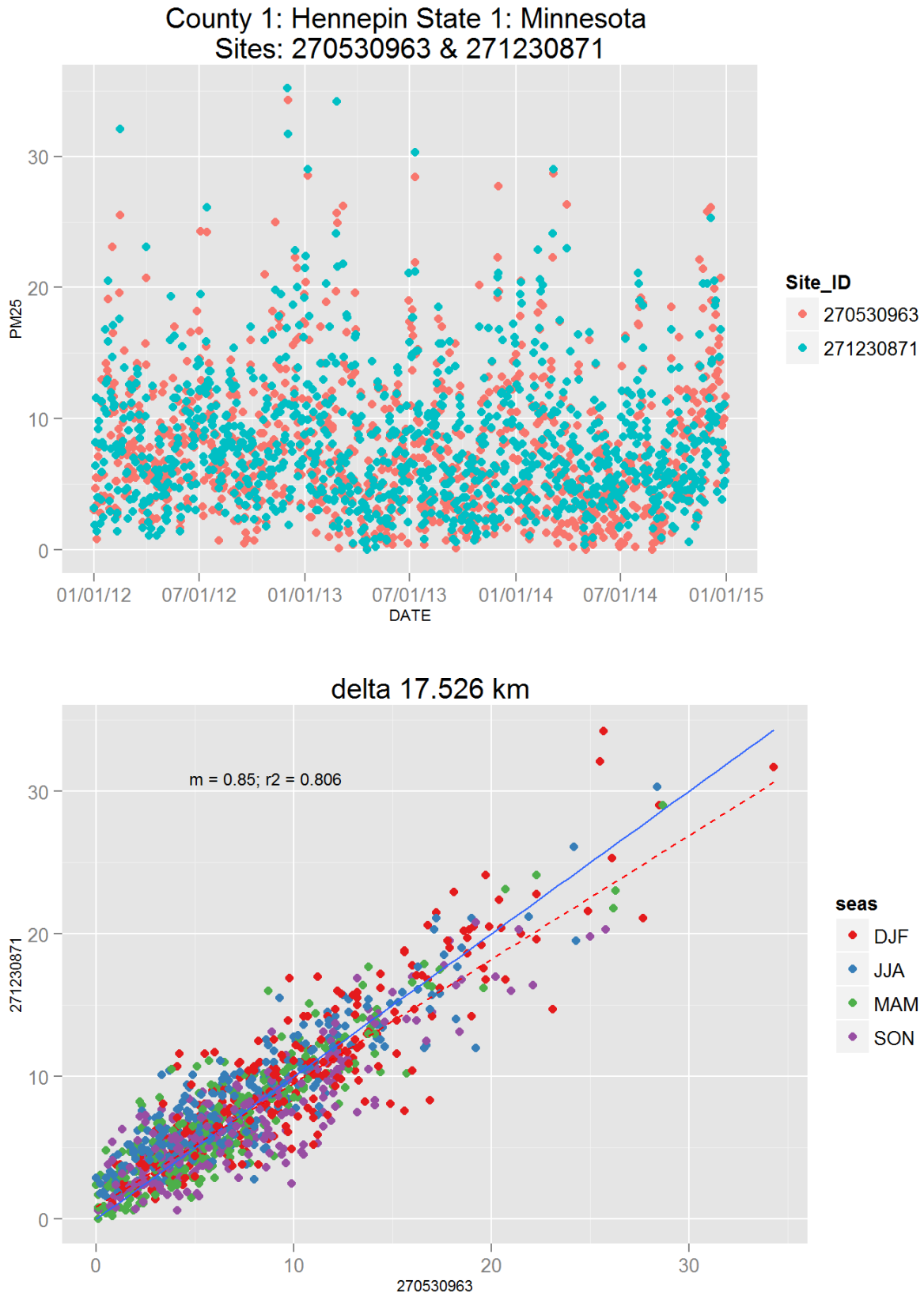


Figure 113: Comparison of PM_{2.5} data for sites 270530963 and 270530963. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

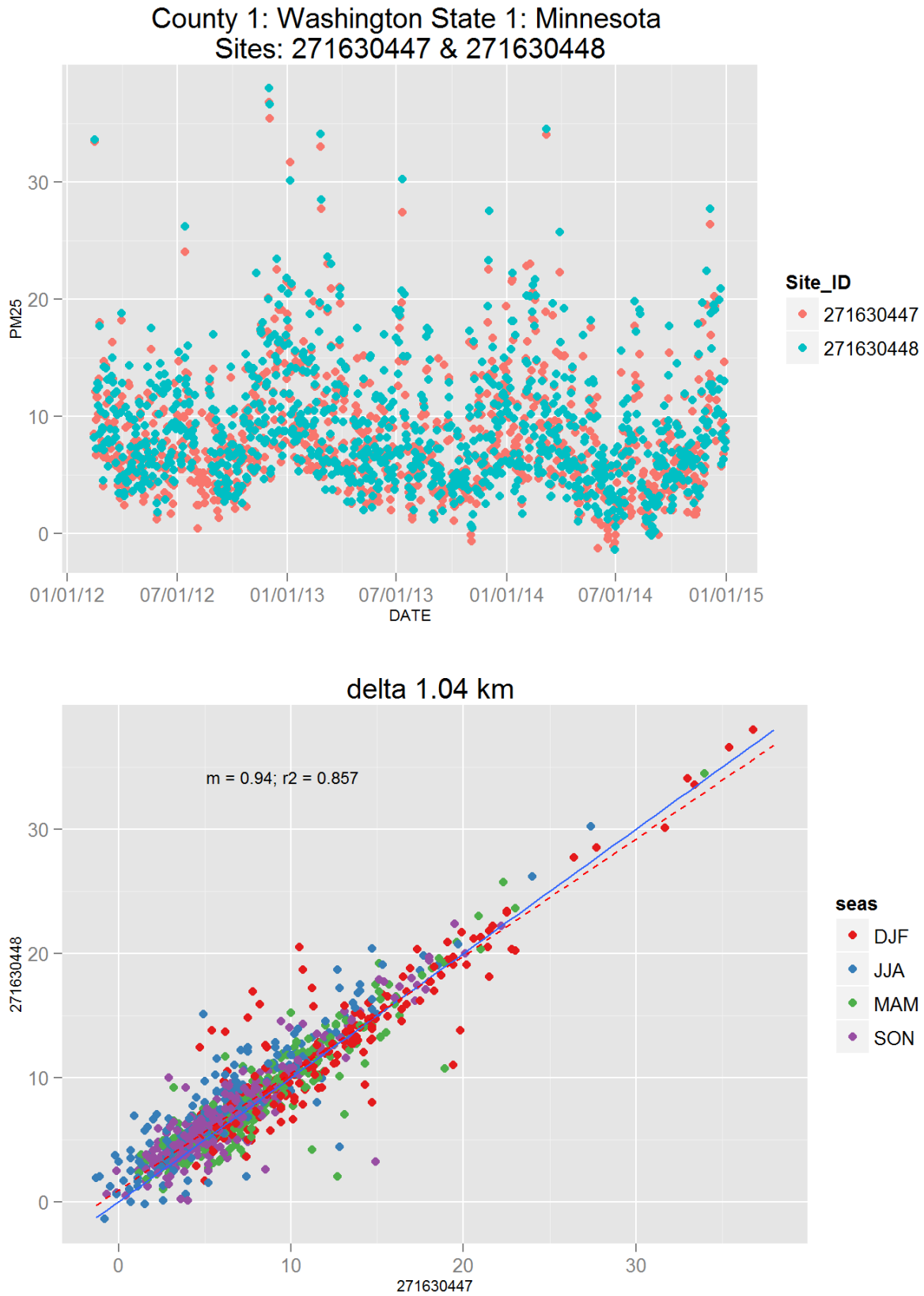


Figure 114: Comparison of PM_{2.5} data for sites 271630447 and 271630447. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.



Figure 115: Comparison of PM_{2.5} data for sites 290370003 and 290370003. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r2), with data points are colored by month.

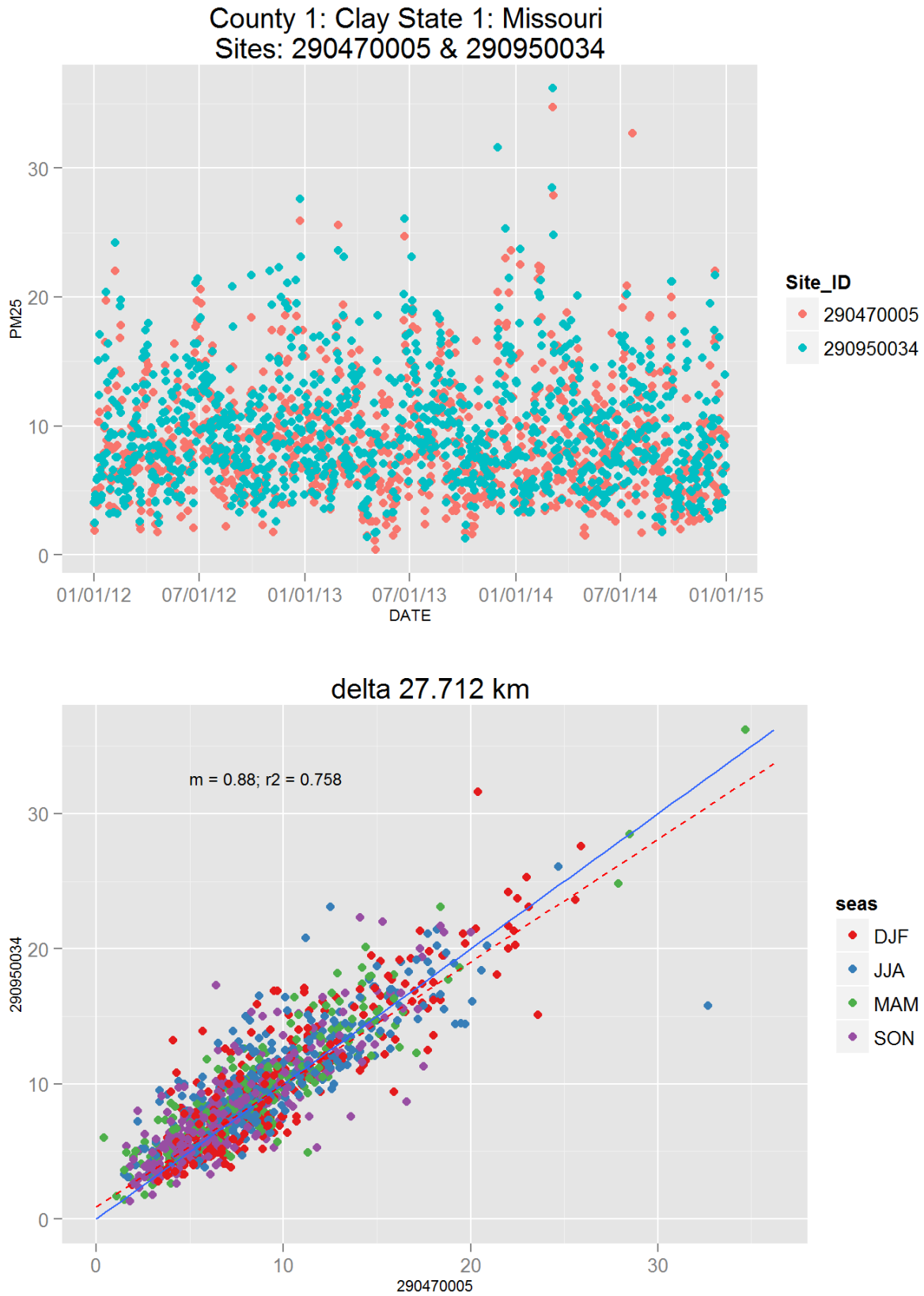


Figure 116: Comparison of PM_{2.5} data for sites 290470005 and 290470005. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r2), with data points are colored by month.

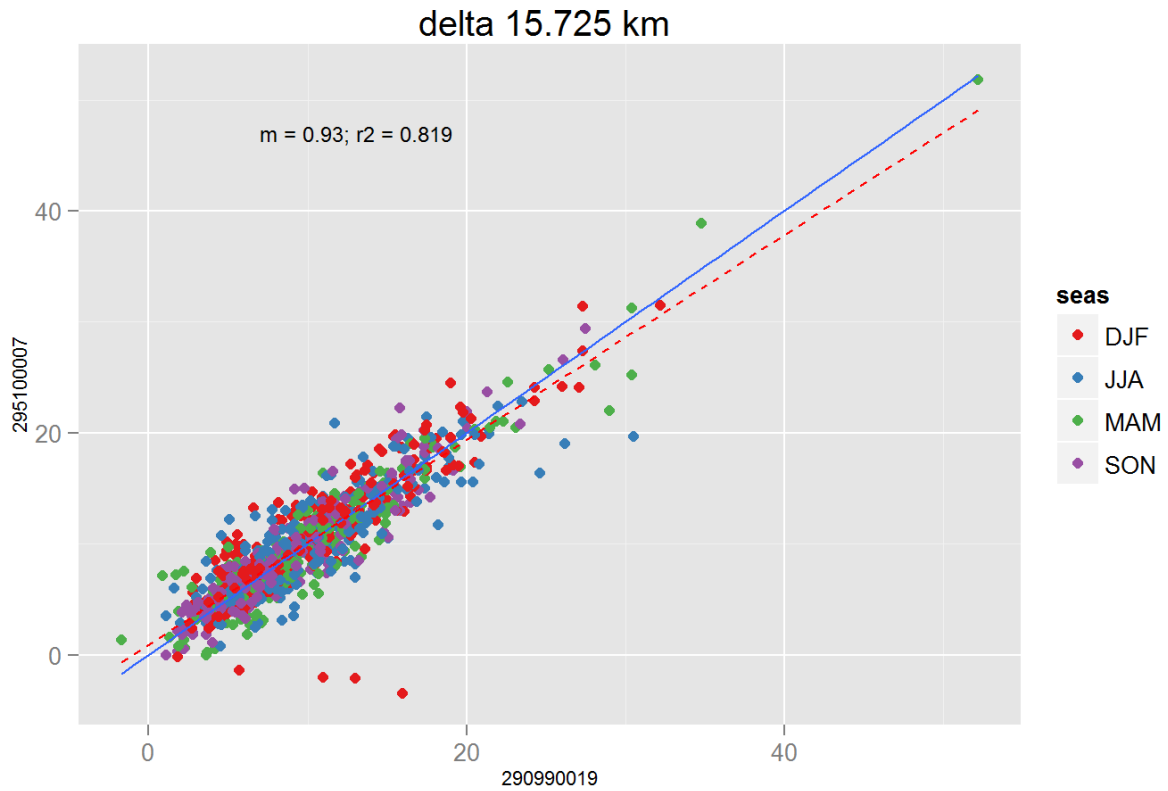
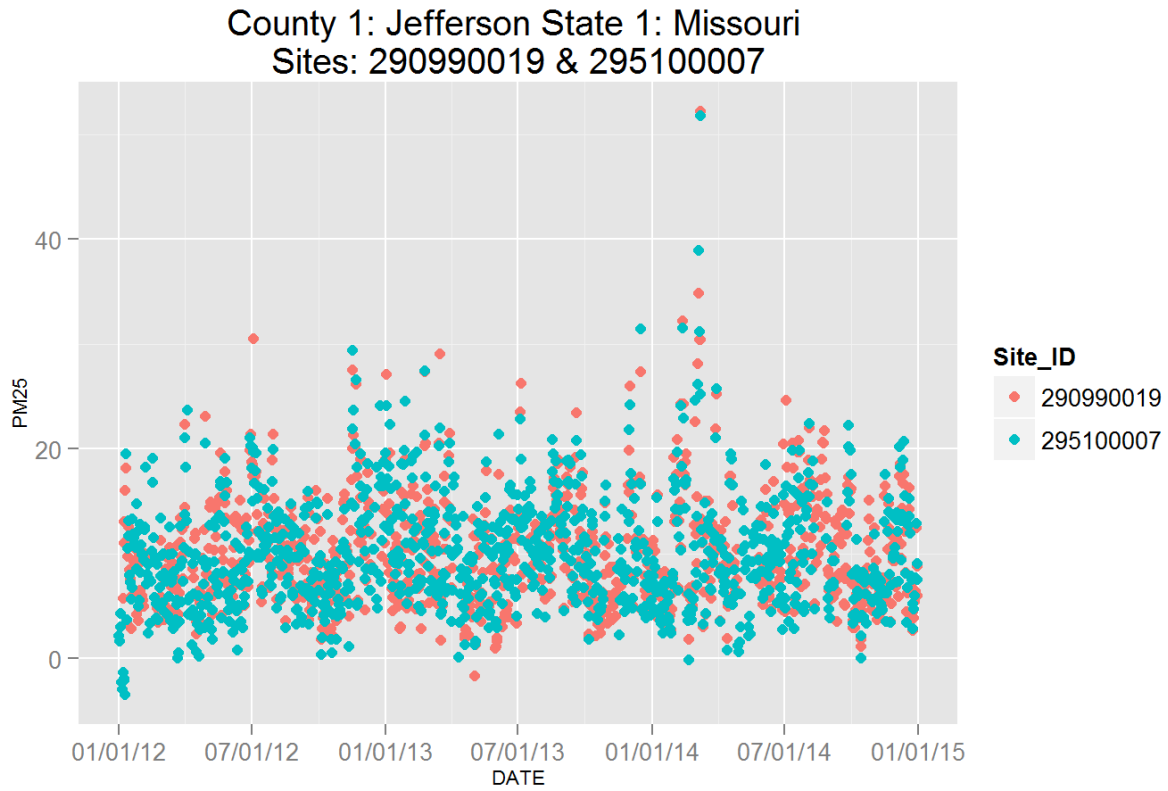


Figure 117: Comparison of PM_{2.5} data for sites 290990019 and 290990019. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r2), with data points are colored by month.

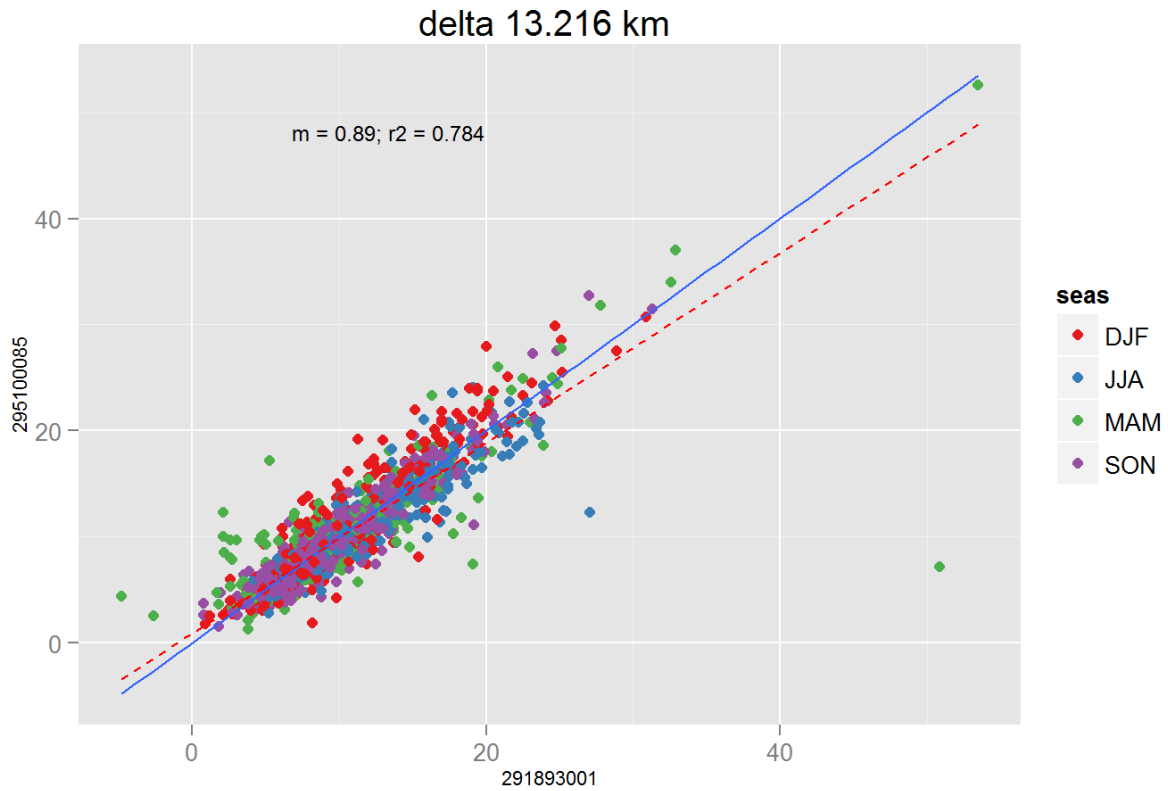
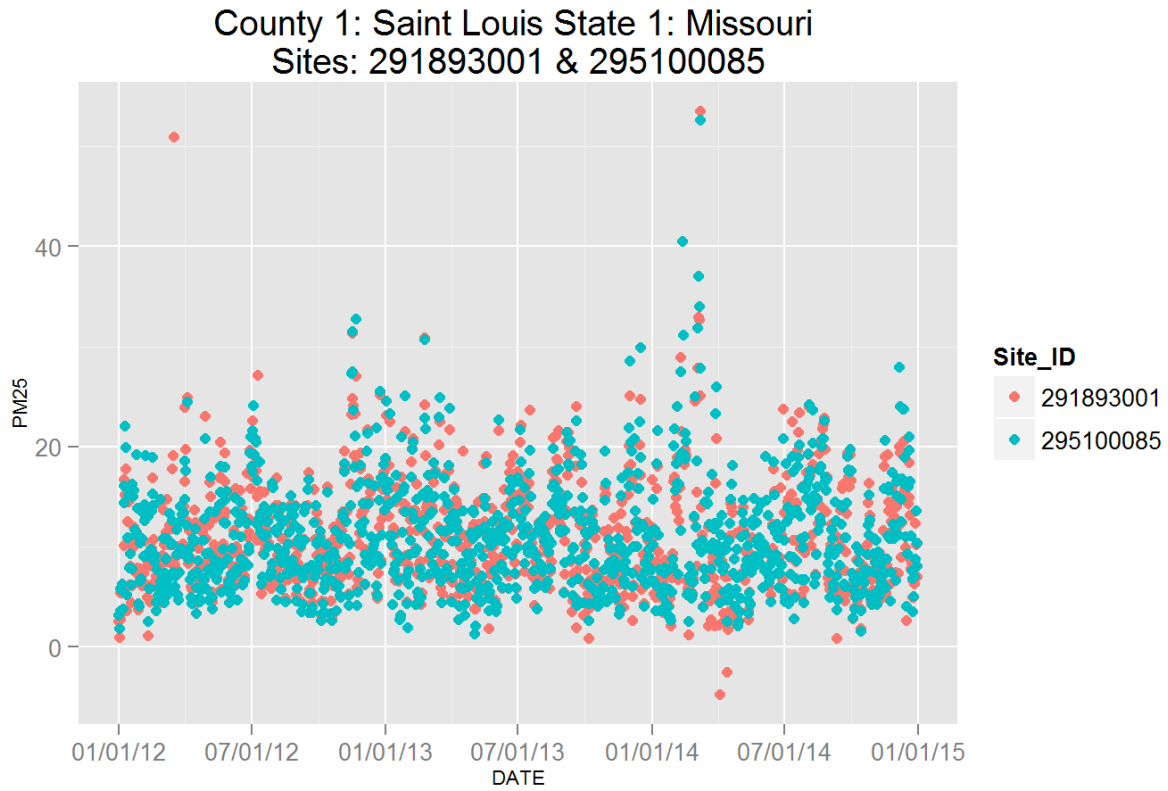


Figure 118: Comparison of PM_{2.5} data for sites 291893001 and 291893001. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

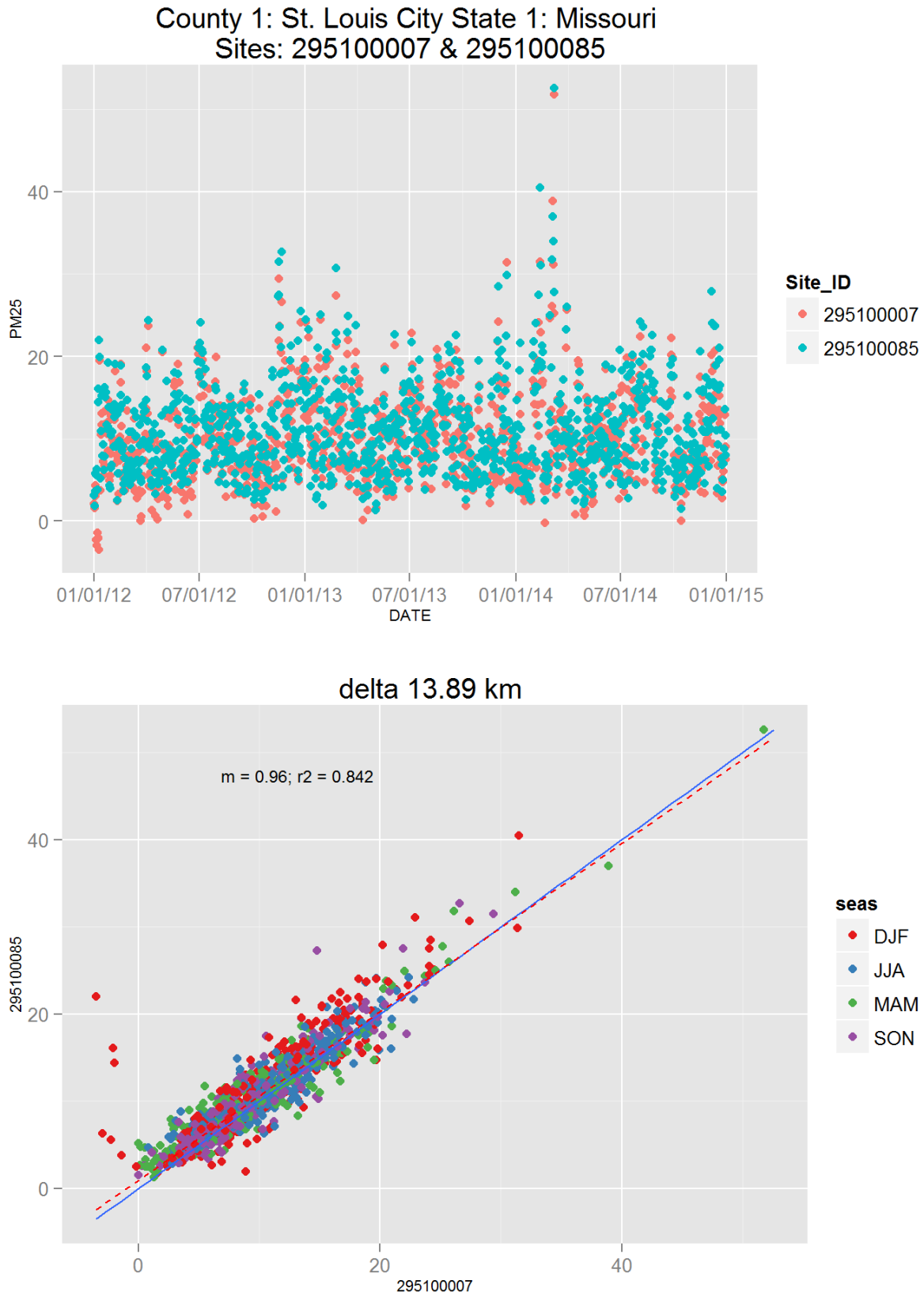


Figure 119: Comparison of PM_{2.5} data for sites 295100007 and 295100085. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

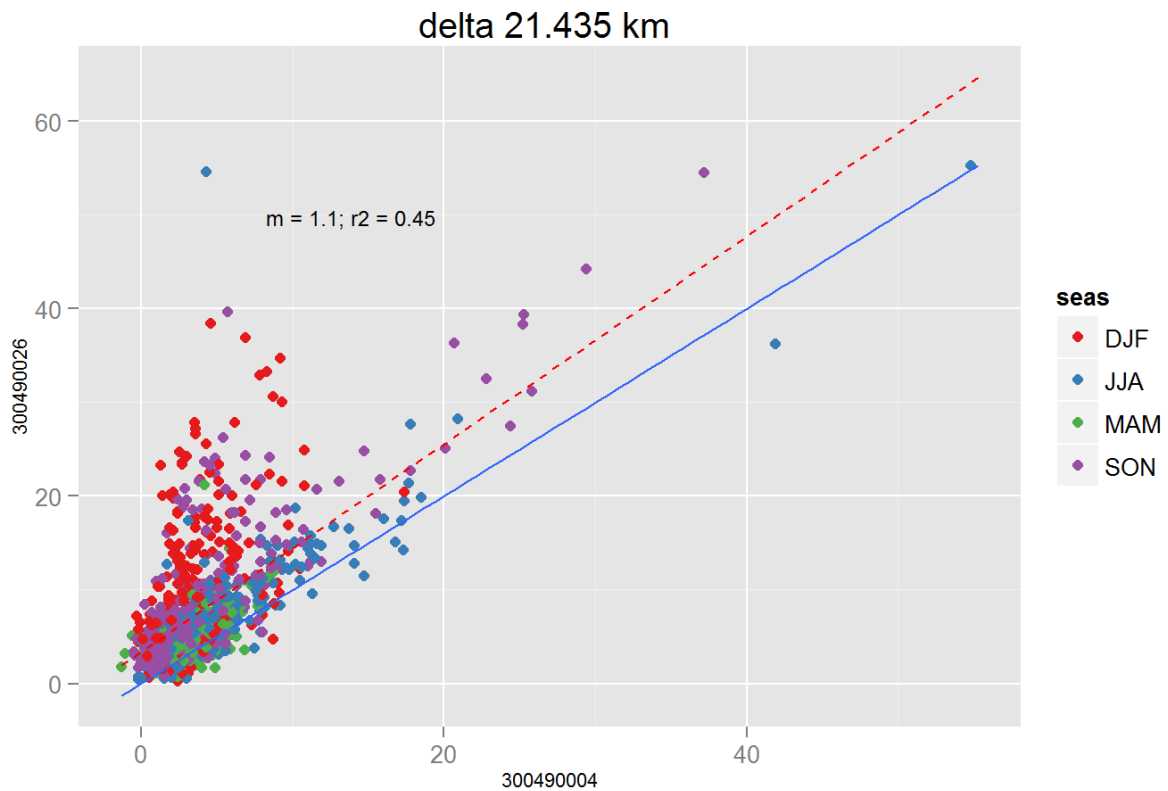
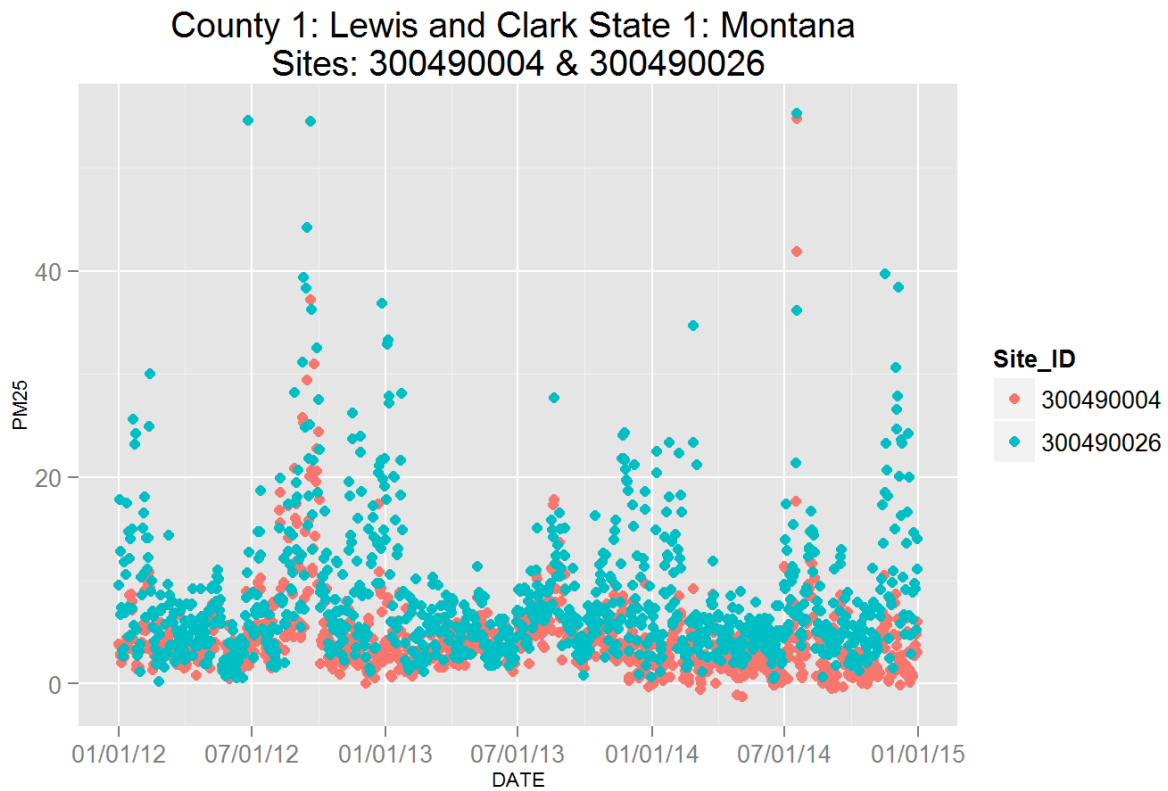


Figure 120: Comparison of PM_{2.5} data for sites 300490004 and 300490004. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r2), with data points are colored by month.

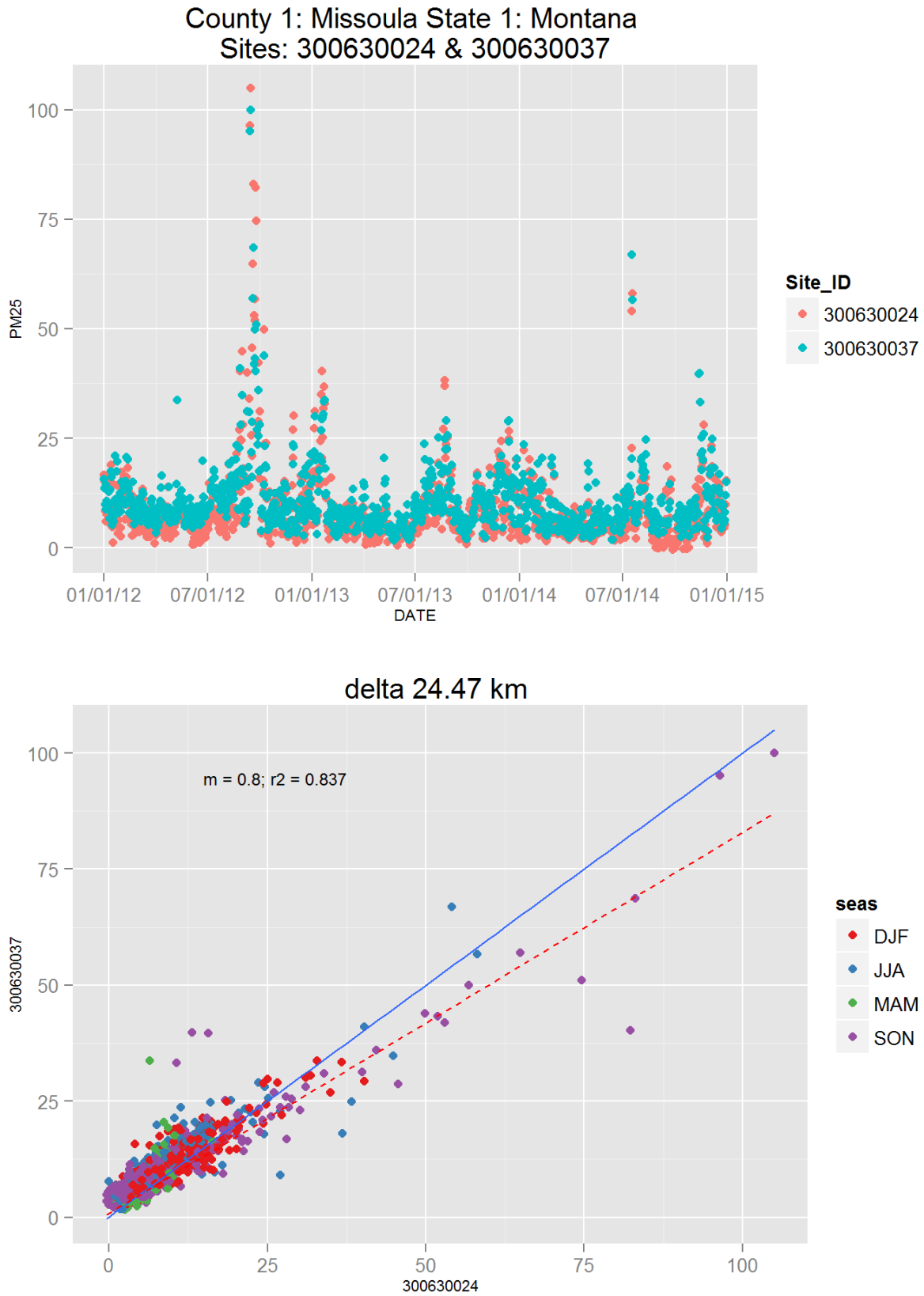


Figure 121: Comparison of PM_{2.5} data for sites 300630024 and 300630024. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

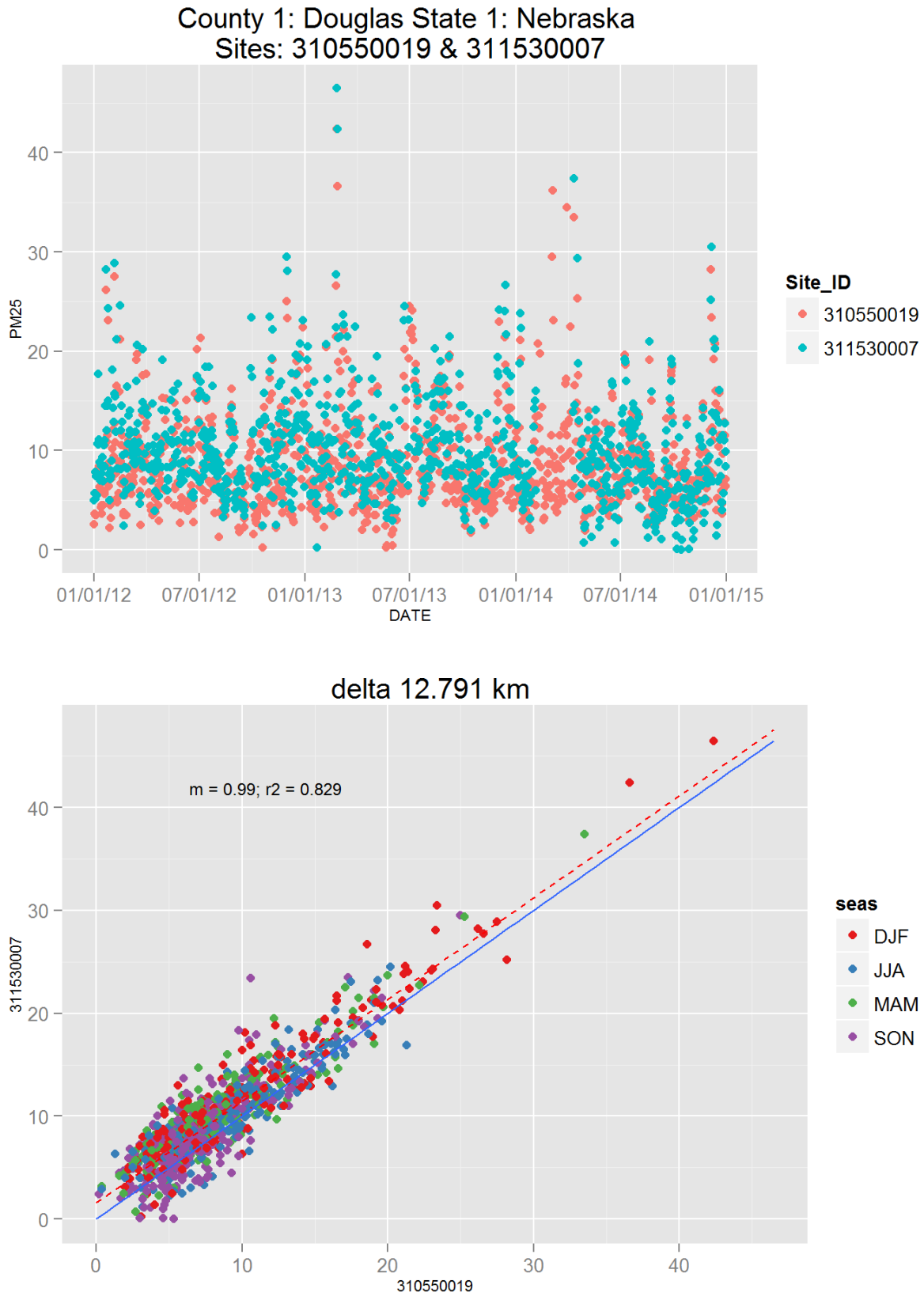


Figure 122: Comparison of PM_{2.5} data for sites 310550019 and 310550019. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r2), with data points are colored by month.

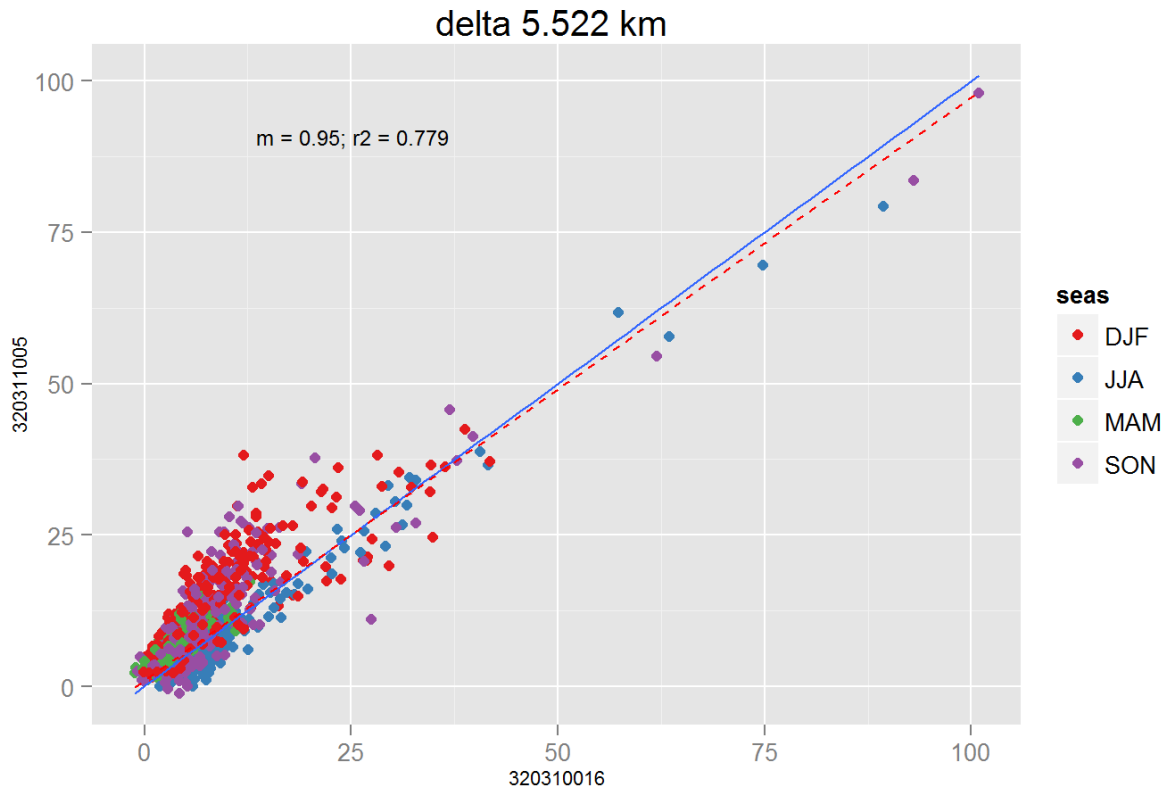
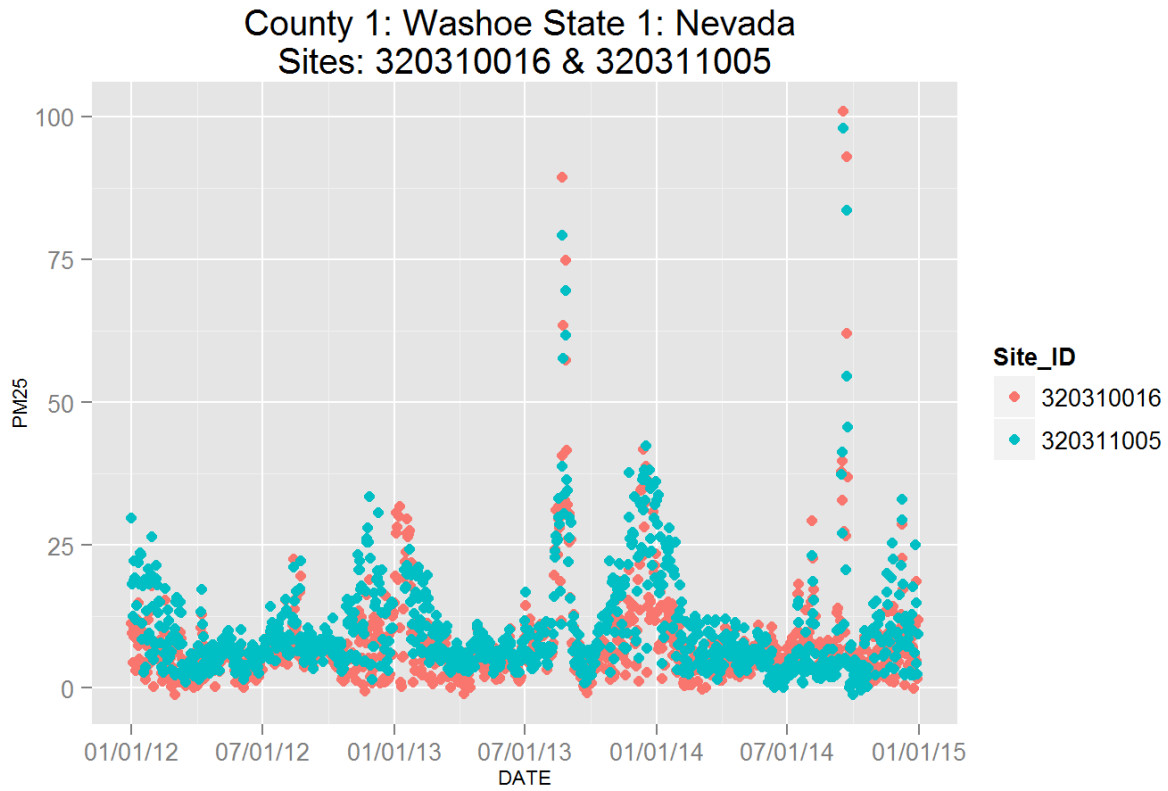


Figure 123: Comparison of PM_{2.5} data for sites 320310016 and 320310016. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r2), with data points are colored by month.

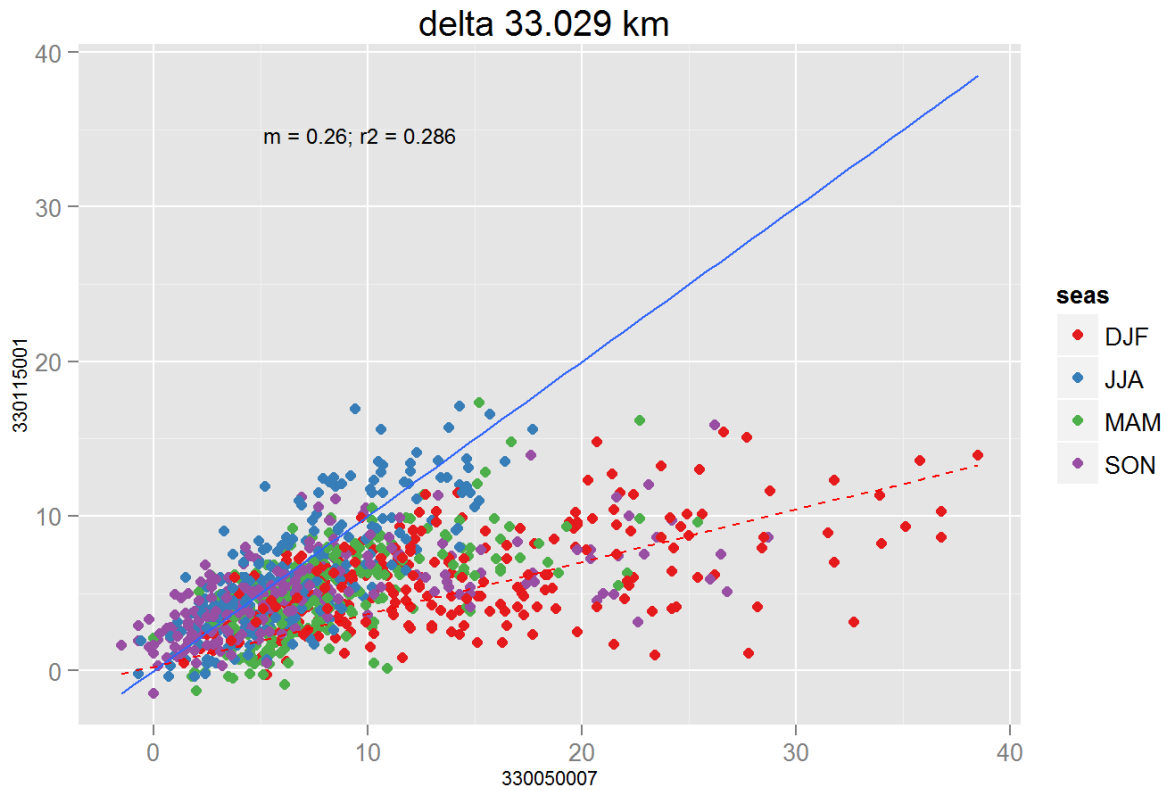
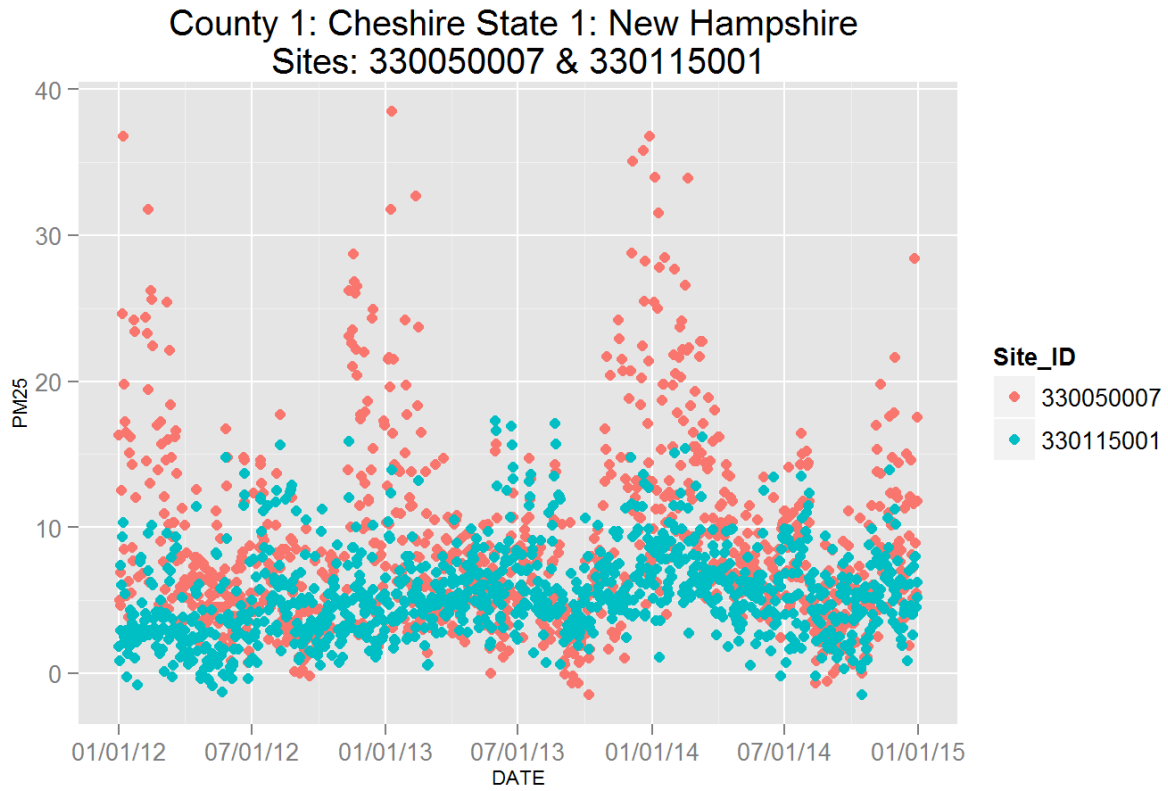


Figure 124: Comparison of PM_{2.5} data for sites 330050007 and 330115001. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r^2), with data points are colored by month.



Figure 125: Comparison of PM_{2.5} data for sites 330150018 and 330115001. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r^2), with data points are colored by month.

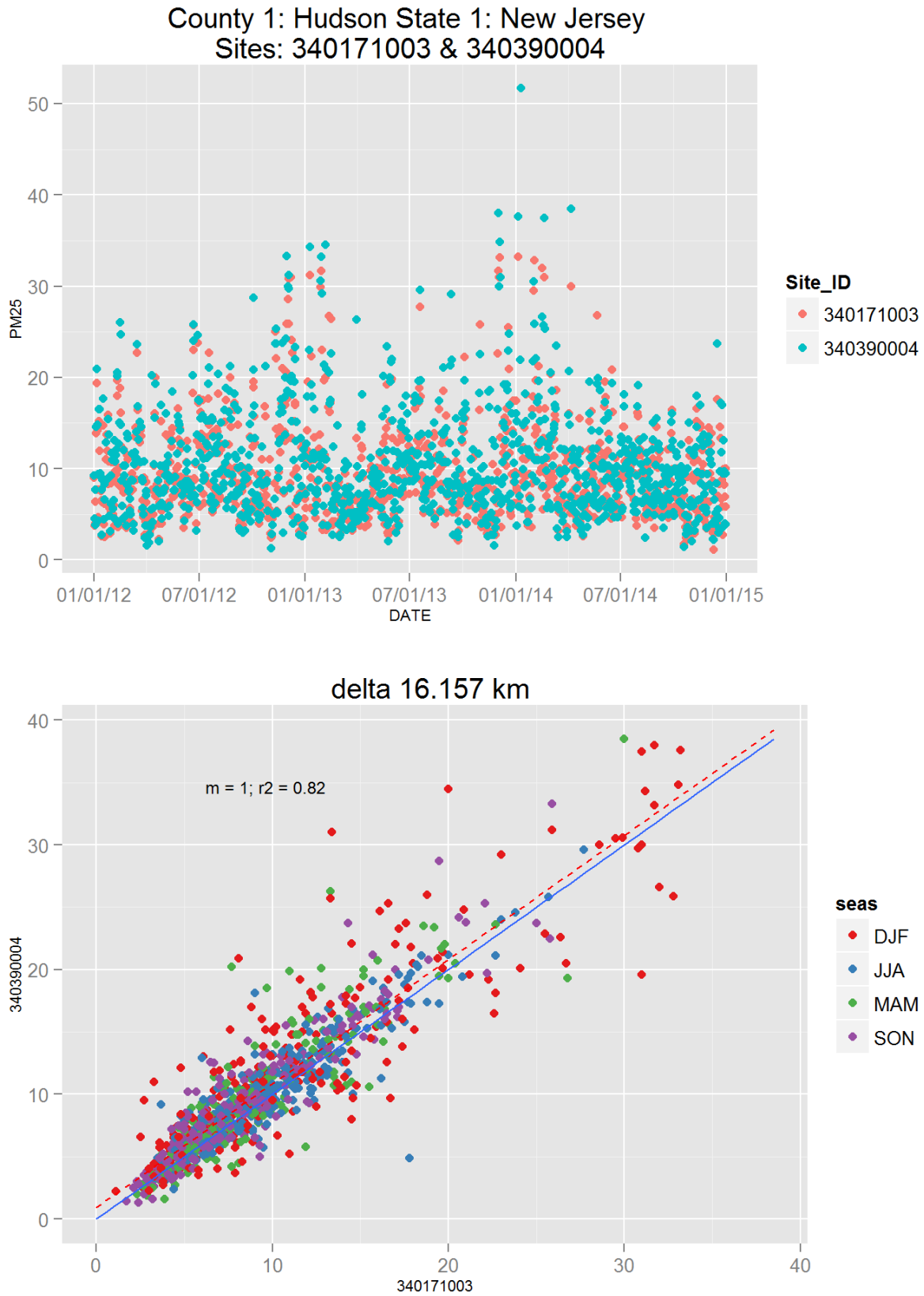


Figure 126: Comparison of PM_{2.5} data for sites 340171003 and 340171003. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r2), with data points are colored by month.

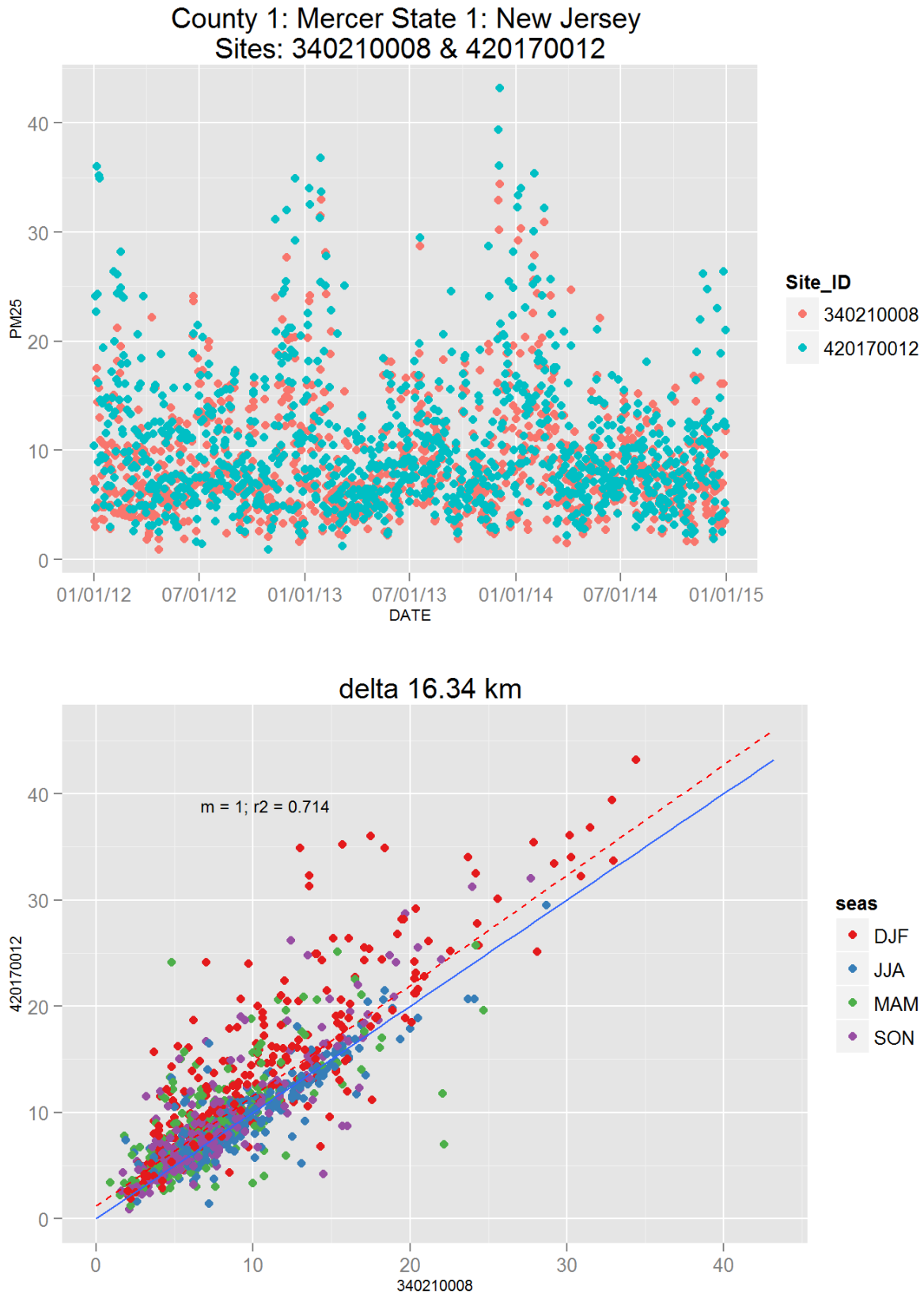


Figure 127: Comparison of PM_{2.5} data for sites 340210008 and 340210008. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r2), with data points are colored by month.

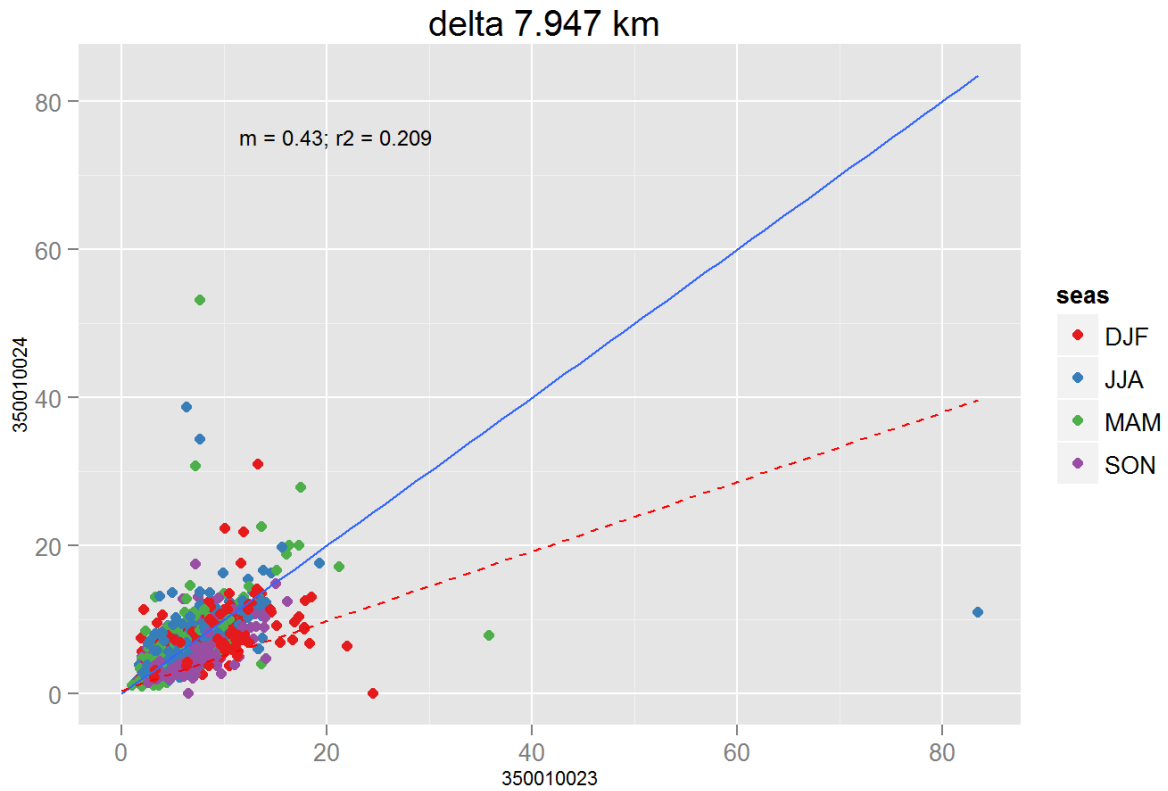
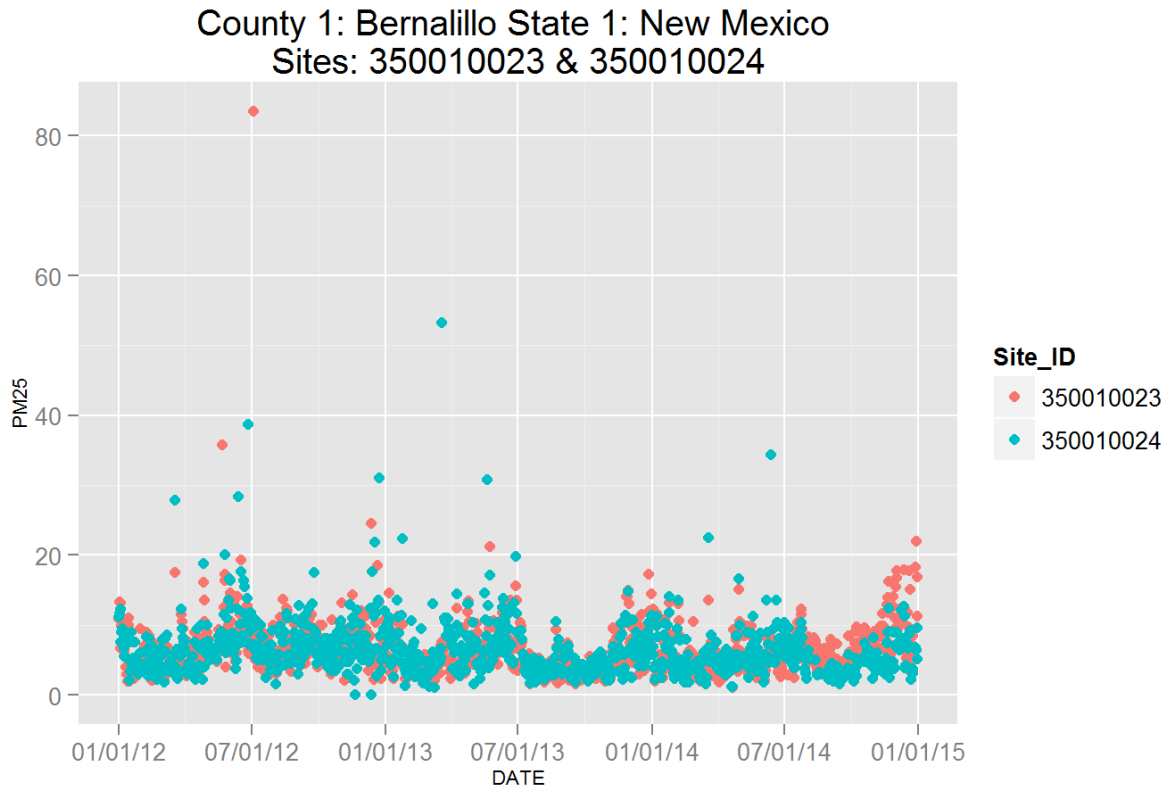


Figure 128: Comparison of PM_{2.5} data for sites 350010023 and 350010023. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r^2), with data points are colored by month.

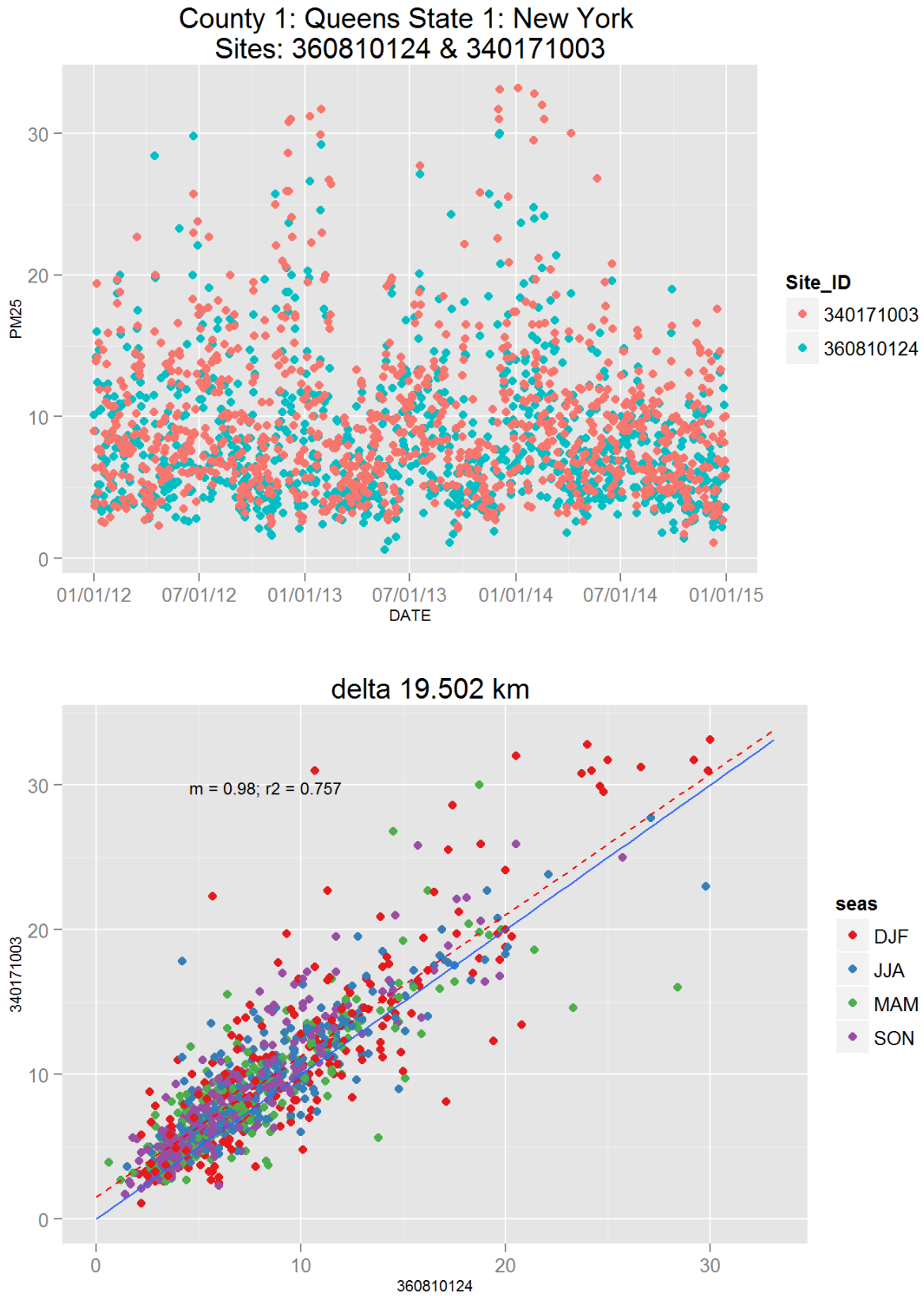


Figure 129: Comparison of PM_{2.5} data for sites 360810124 and 360810124. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

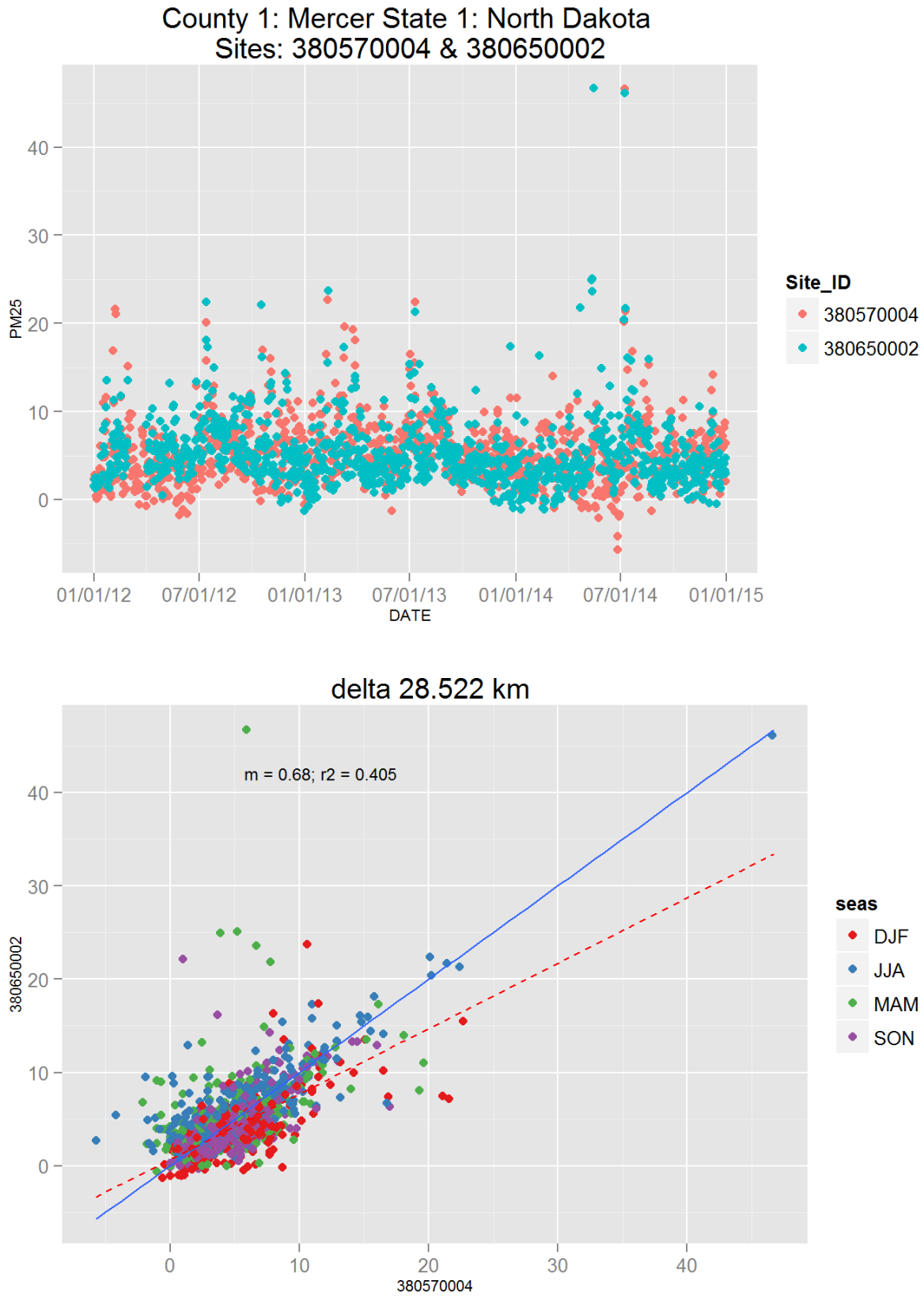


Figure 130: Comparison of PM_{2.5} data for sites 380570004 and 380570004. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r2), with data points are colored by month.

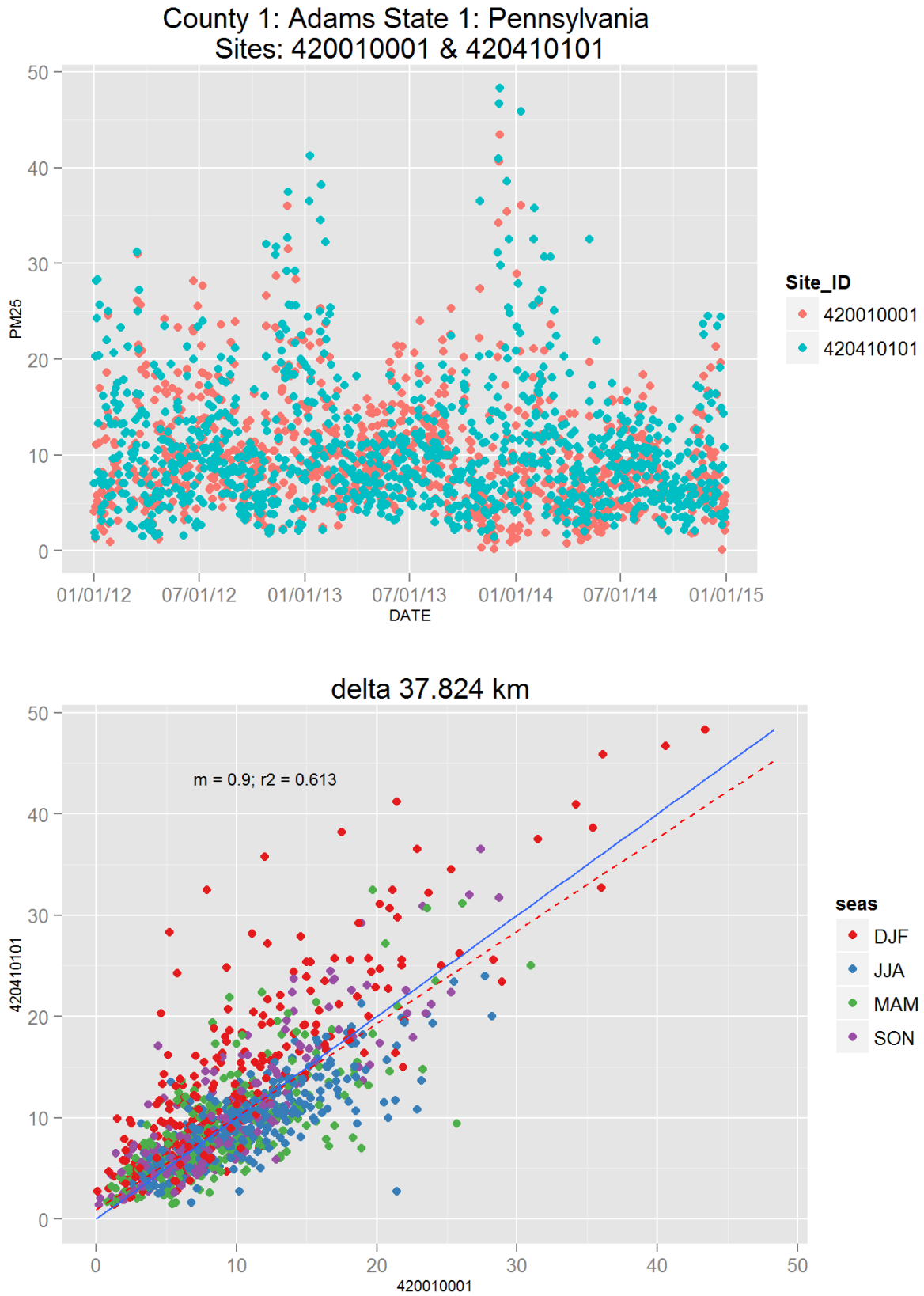


Figure 131: Comparison of PM_{2.5} data for sites 420010001 and 420010001. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r2), with data points are colored by month.

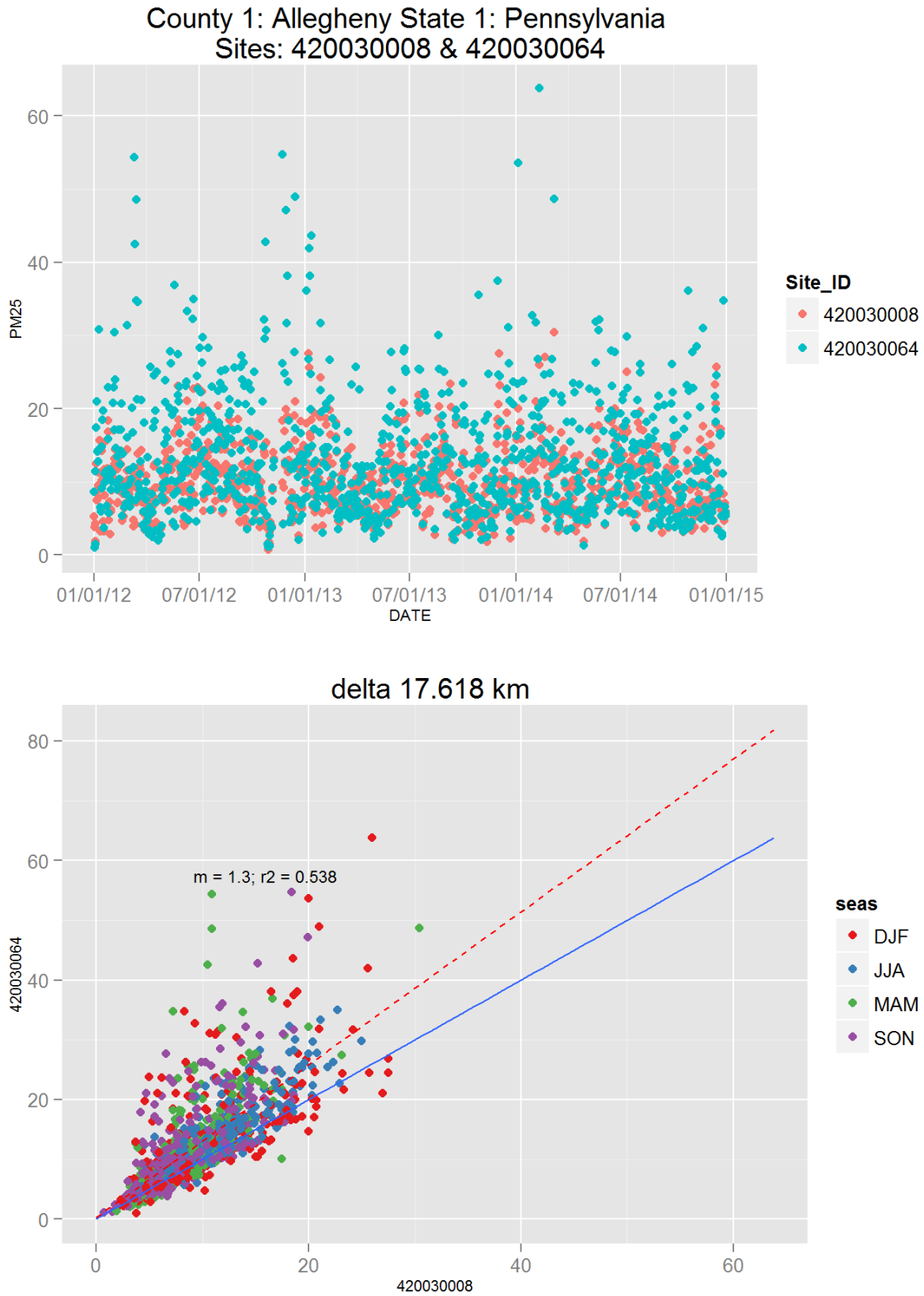


Figure 132: Comparison of PM_{2.5} data for sites 420030008 and 420030008. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

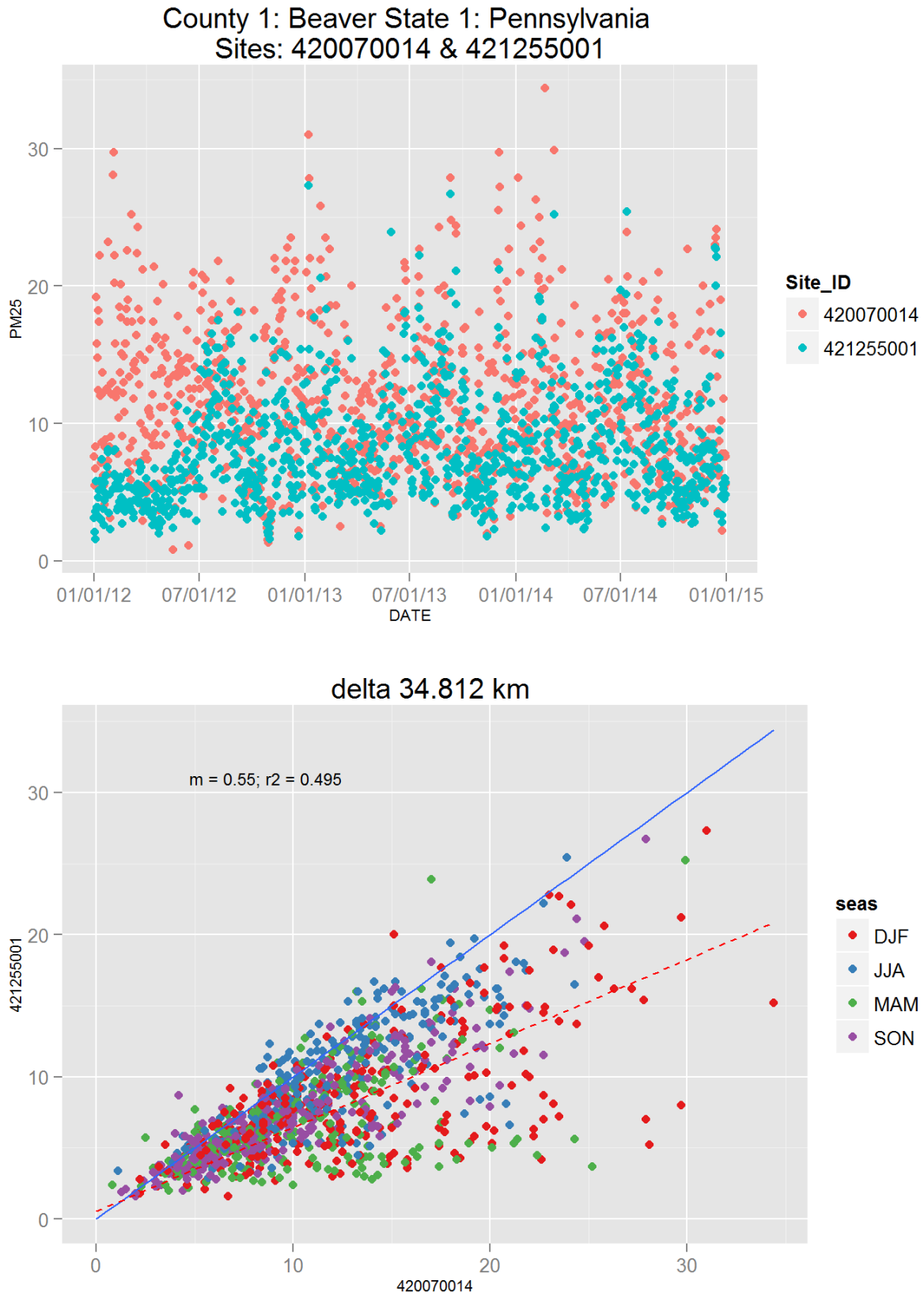


Figure 133: Comparison of PM_{2.5} data for sites 420070014 and 420070014. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

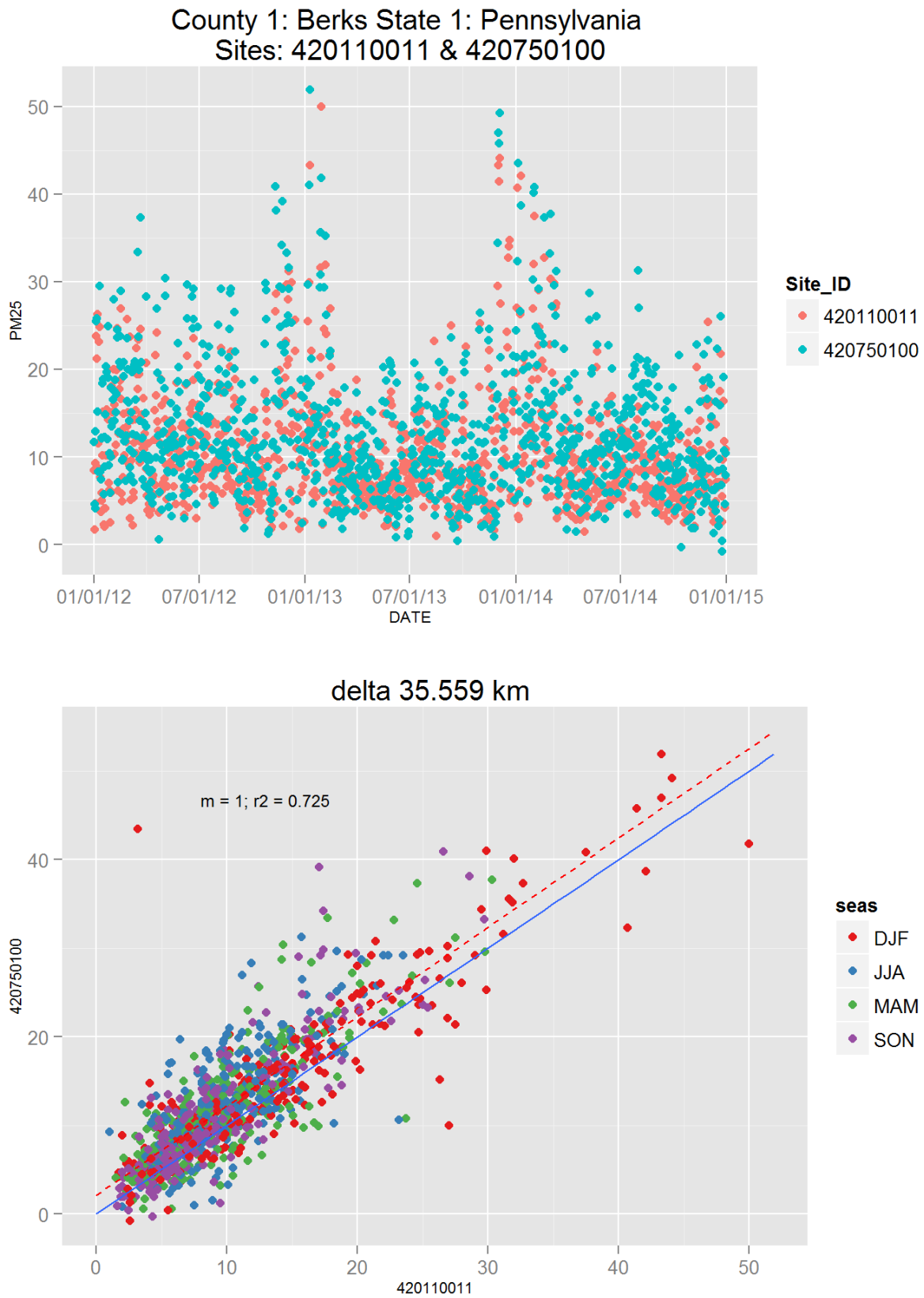


Figure 134: Comparison of PM_{2.5} data for sites 420110011 and 420750100. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r2), with data points are colored by month.



Figure 135: Comparison of PM_{2.5} data for sites 420410101 and 420410101. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r2), with data points are colored by month.



Figure 136: Comparison of PM_{2.5} data for sites 420450002 and 420450002. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

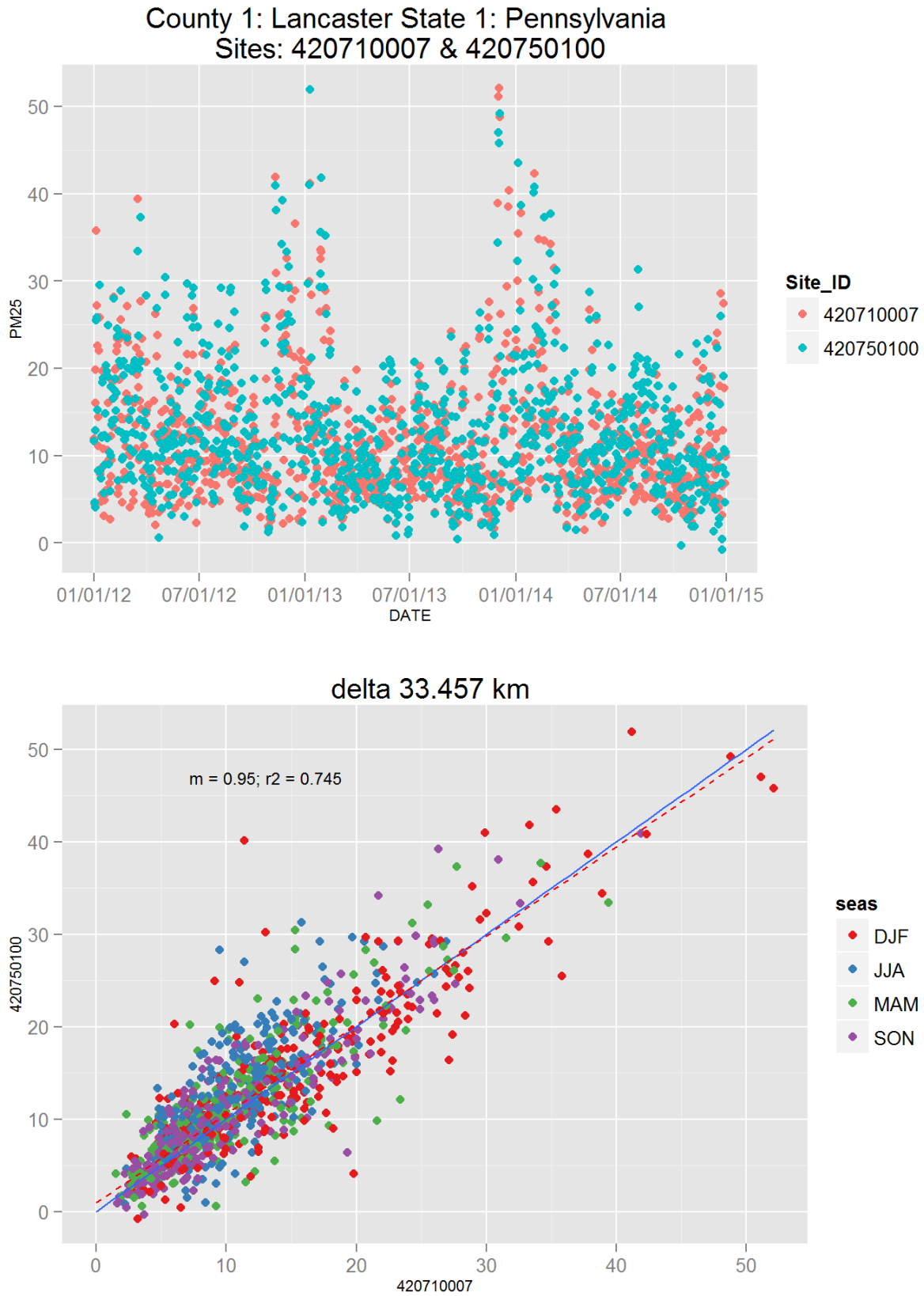


Figure 137: Comparison of PM_{2.5} data for sites 420710007 and 420710007. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r2), with data points are colored by month.

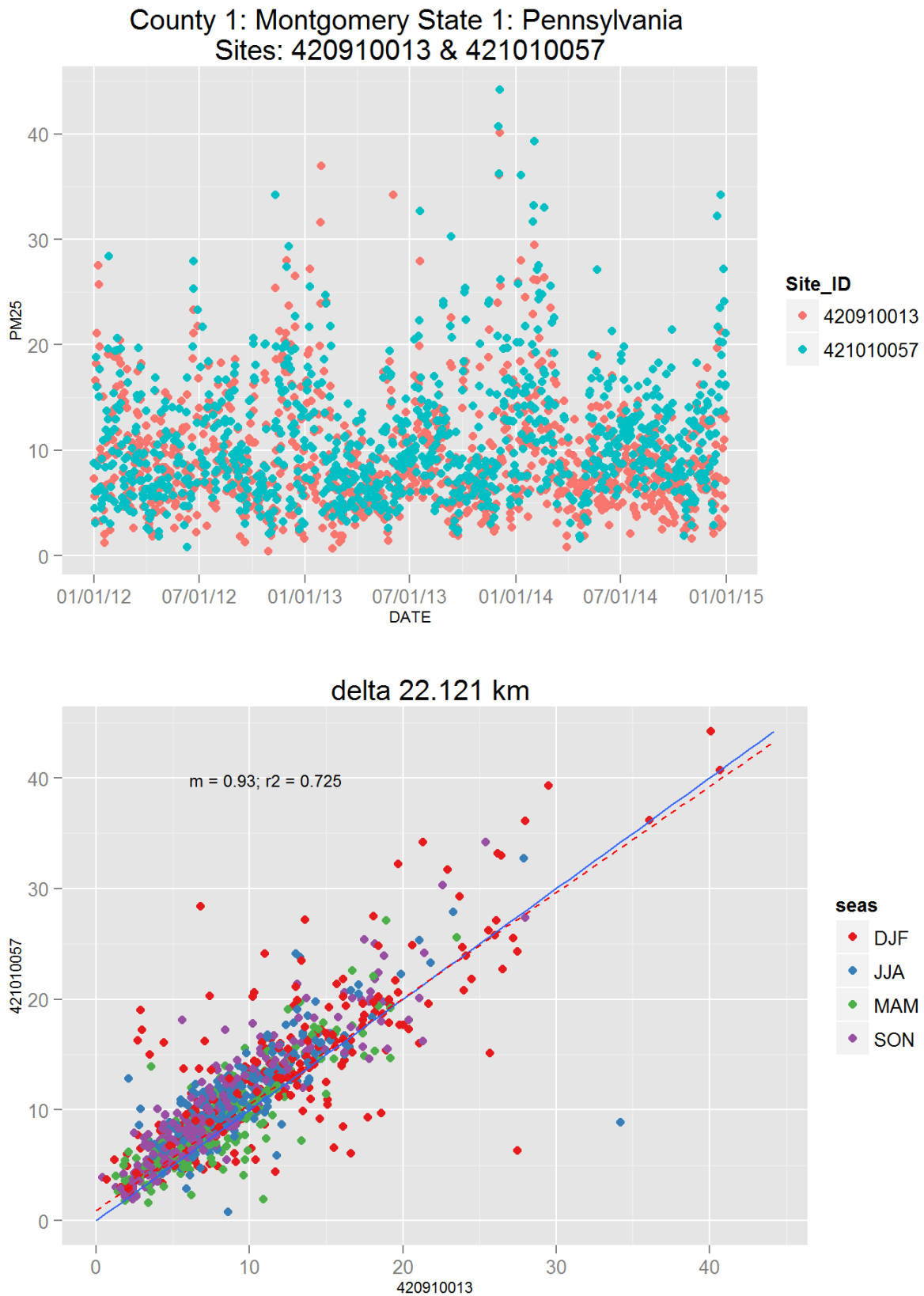


Figure 138: Comparison of PM_{2.5} data for sites 420910013 and 420910013. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

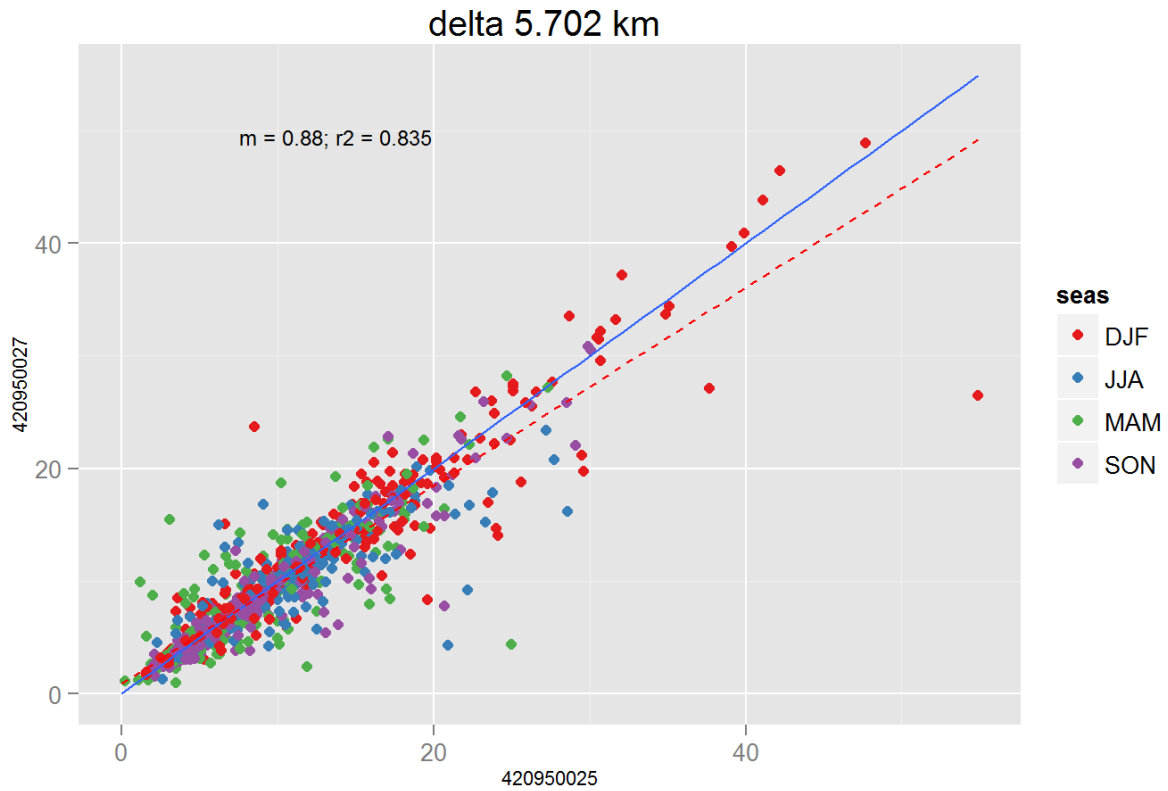
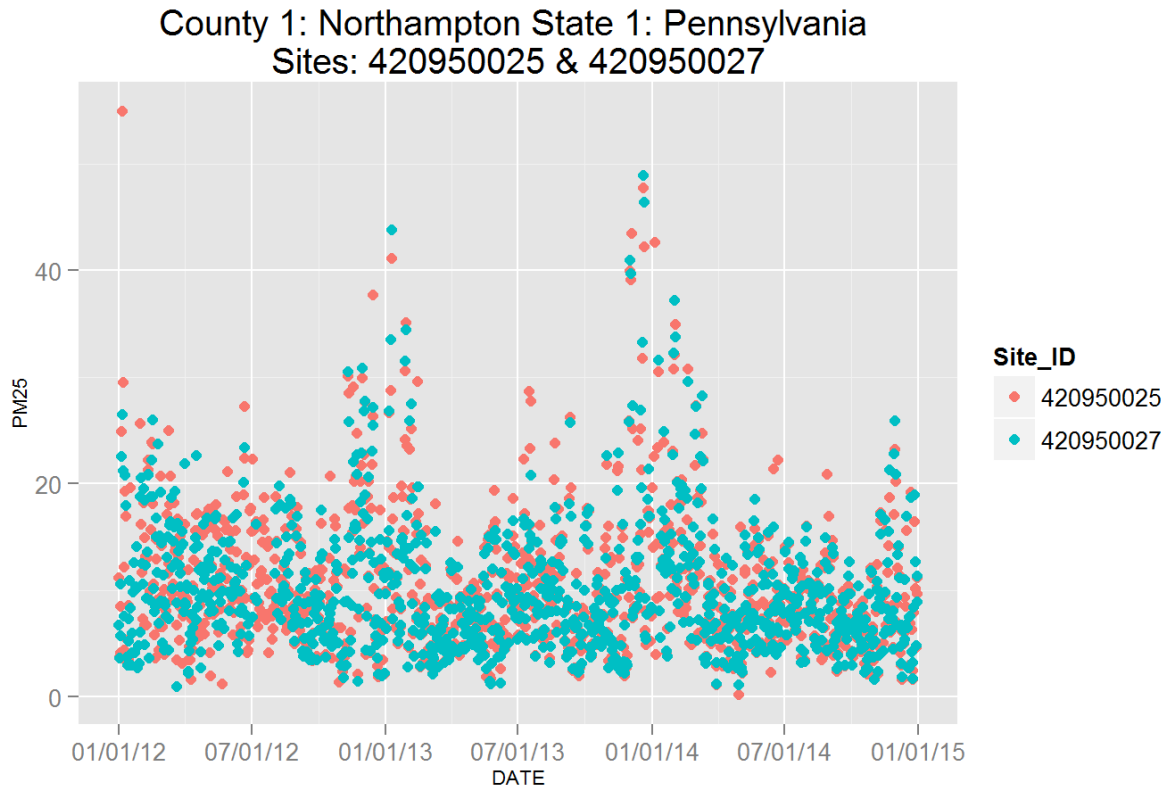


Figure 139: Comparison of PM_{2.5} data for sites 420950025 and 420950027. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r^2), with data points are colored by month.

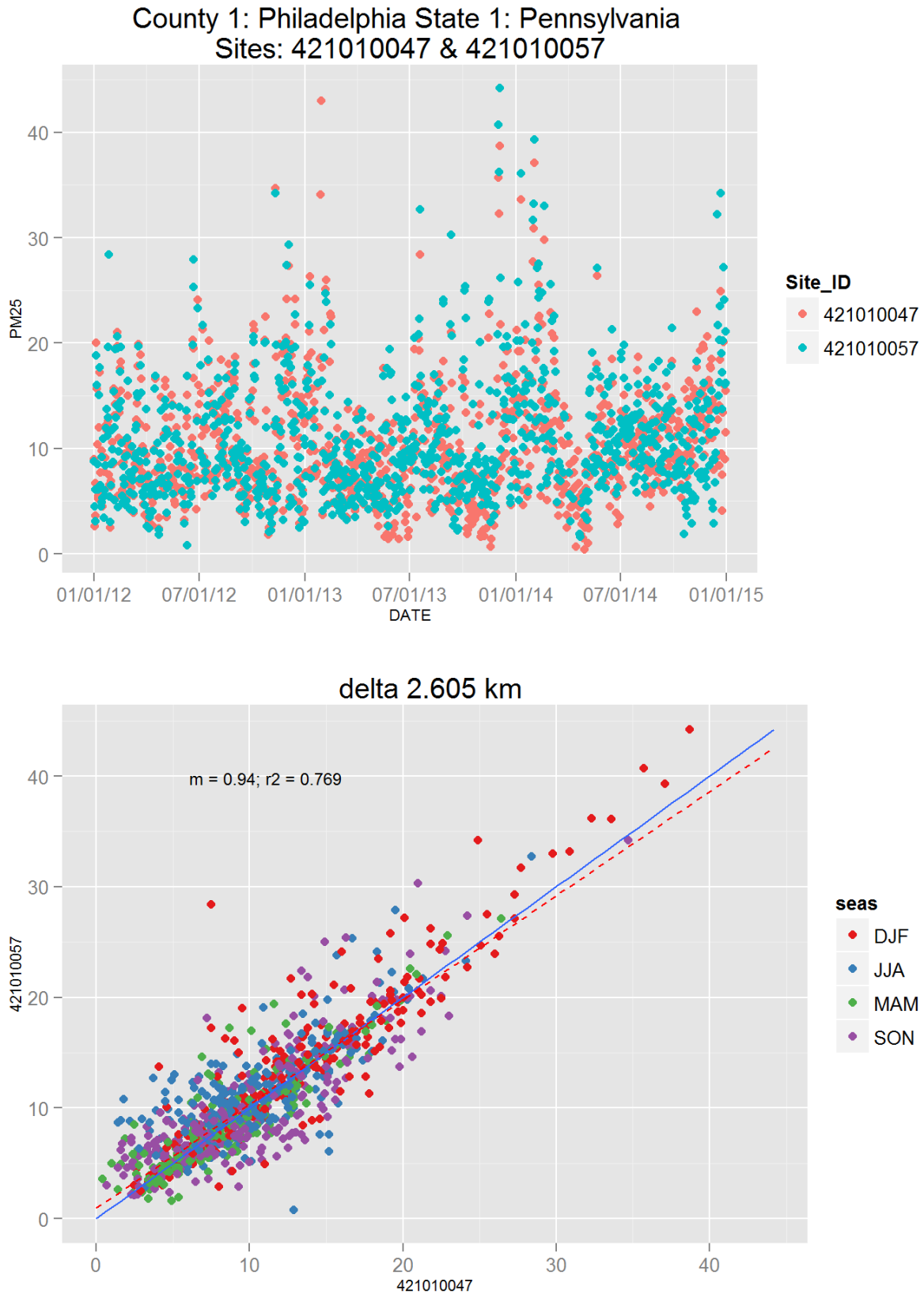


Figure 140: Comparison of PM_{2.5} data for sites 421010047 and 421010047. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

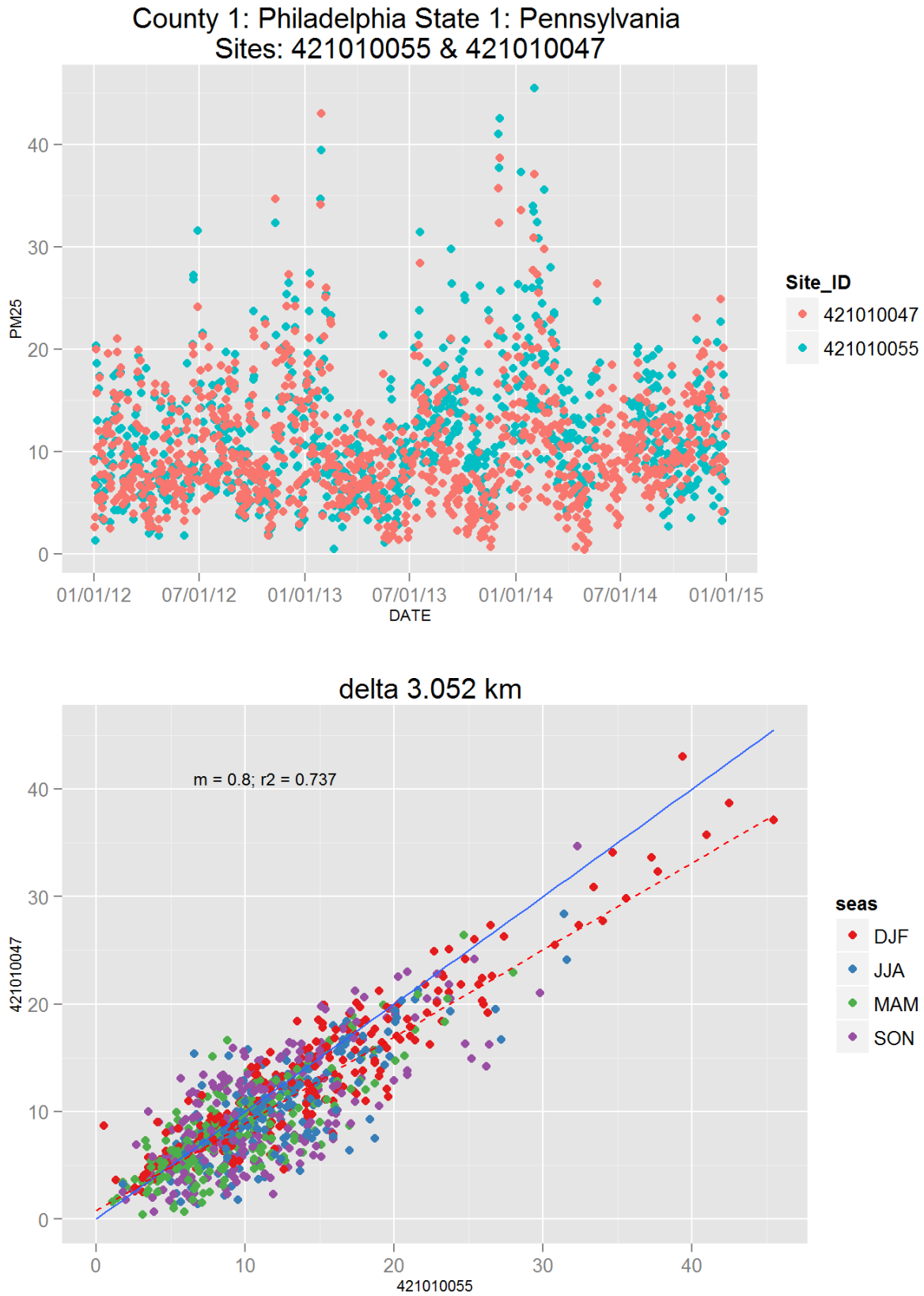


Figure 141: Comparison of PM_{2.5} data for sites 421010055 and 421010047. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r^2), with data points are colored by month.



Figure 142: Comparison of PM_{2.5} data for sites 421250005 and 421250005. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r2), with data points are colored by month.



Figure 143: Comparison of PM_{2.5} data for sites 421250200 and 421250005. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.



Figure 144: Comparison of PM_{2.5} data for sites 421255001 and 421250200. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.



Figure 145: Comparison of PM_{2.5} data for sites 421290008 and 420030064. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r^2), with data points are colored by month.



Figure 146: Comparison of PM_{2.5} data for sites 421330008 and 421330008. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

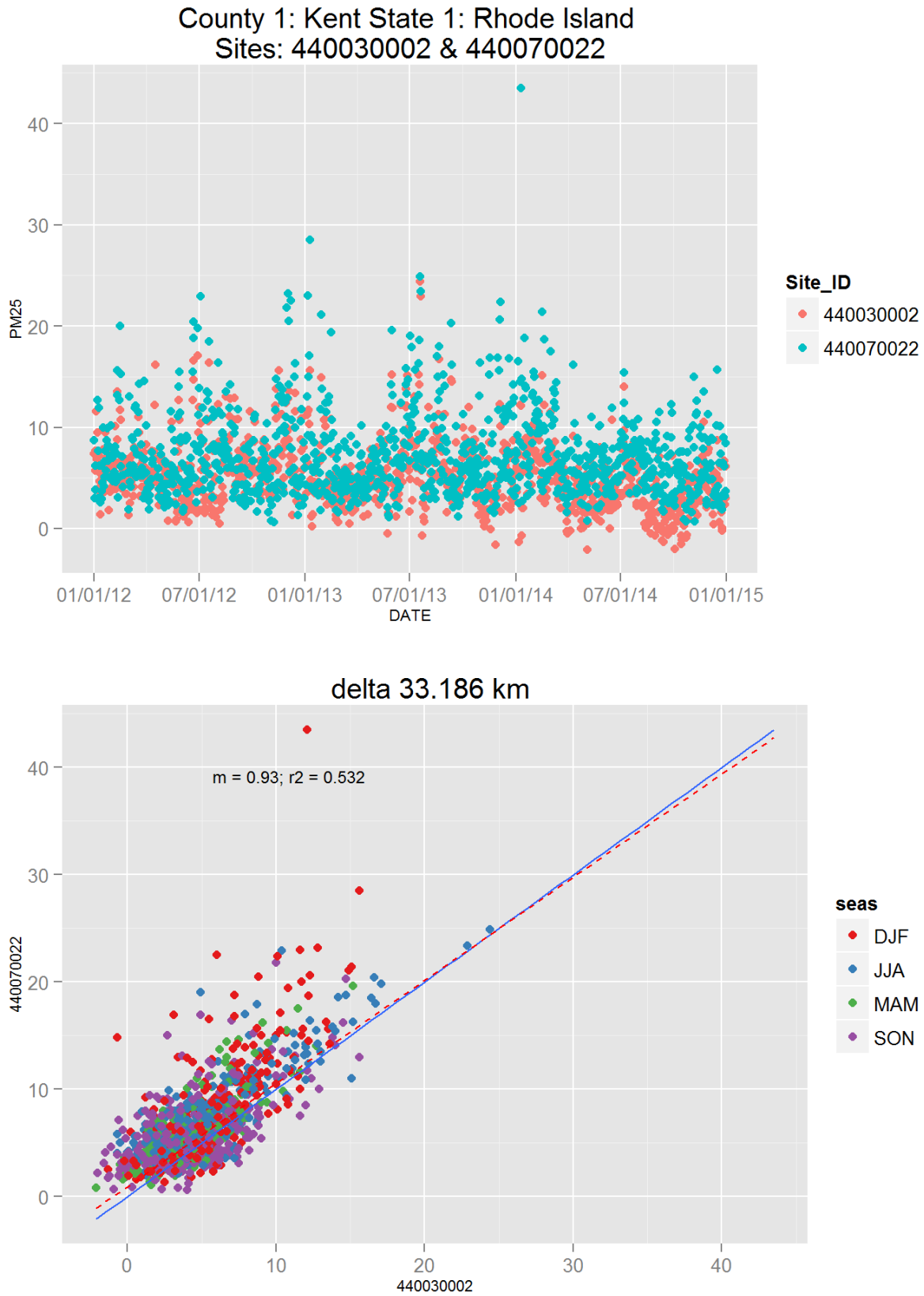


Figure 147: Comparison of PM_{2.5} data for sites 440030002 and 440070022. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

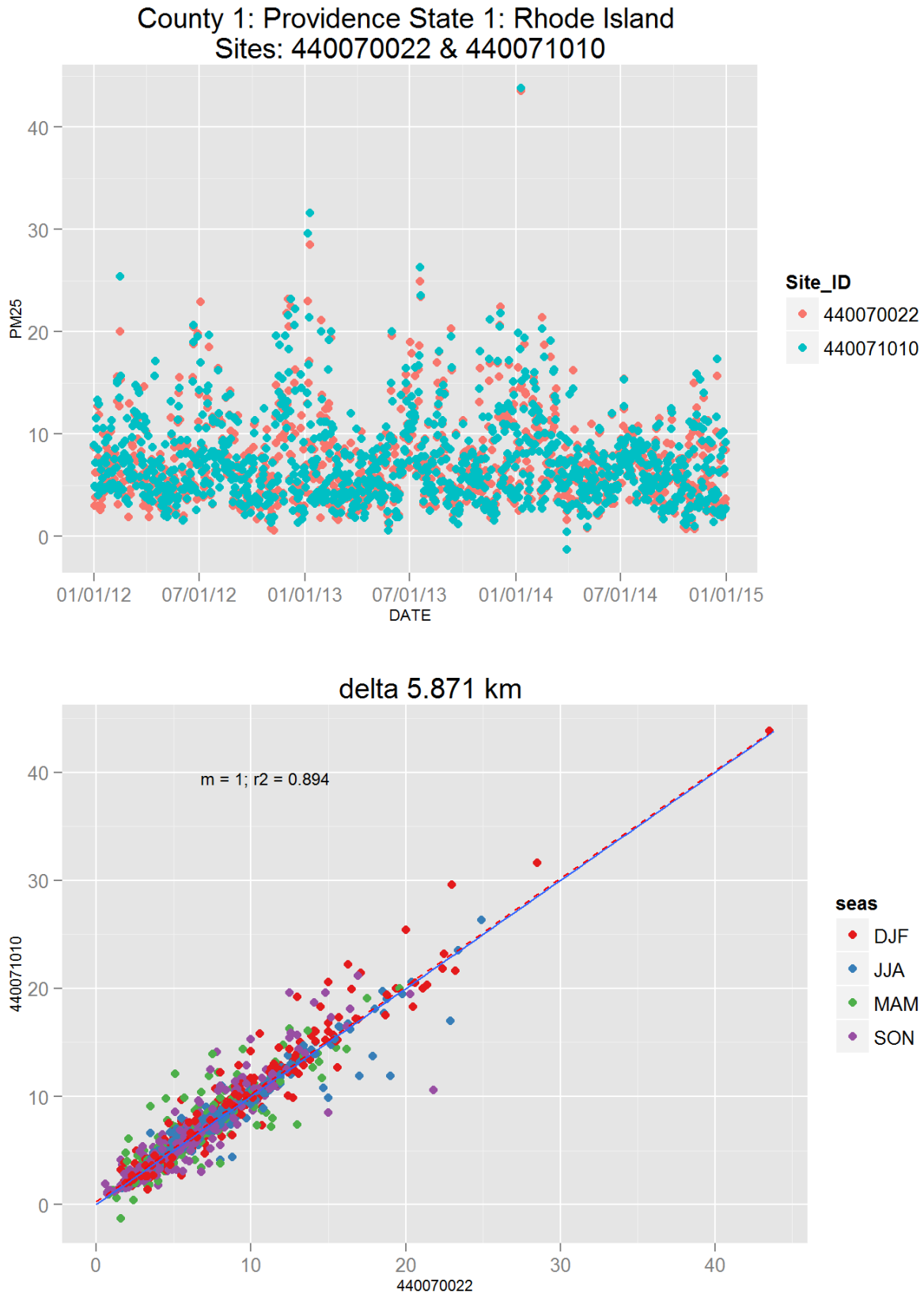


Figure 148: Comparison of PM_{2.5} data for sites 440070022 and 440070022. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

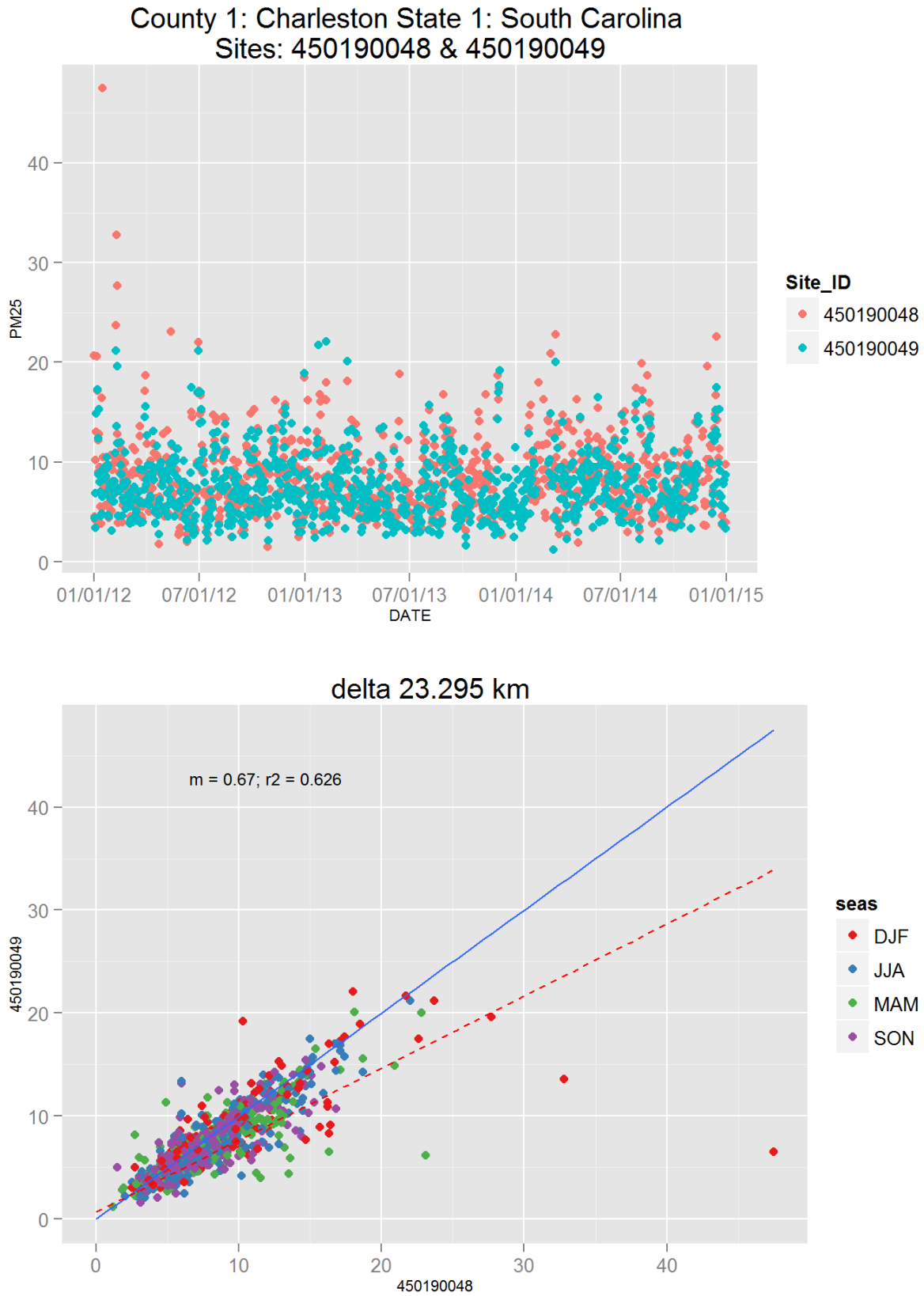


Figure 149: Comparison of PM_{2.5} data for sites 450190048 and 450190048. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

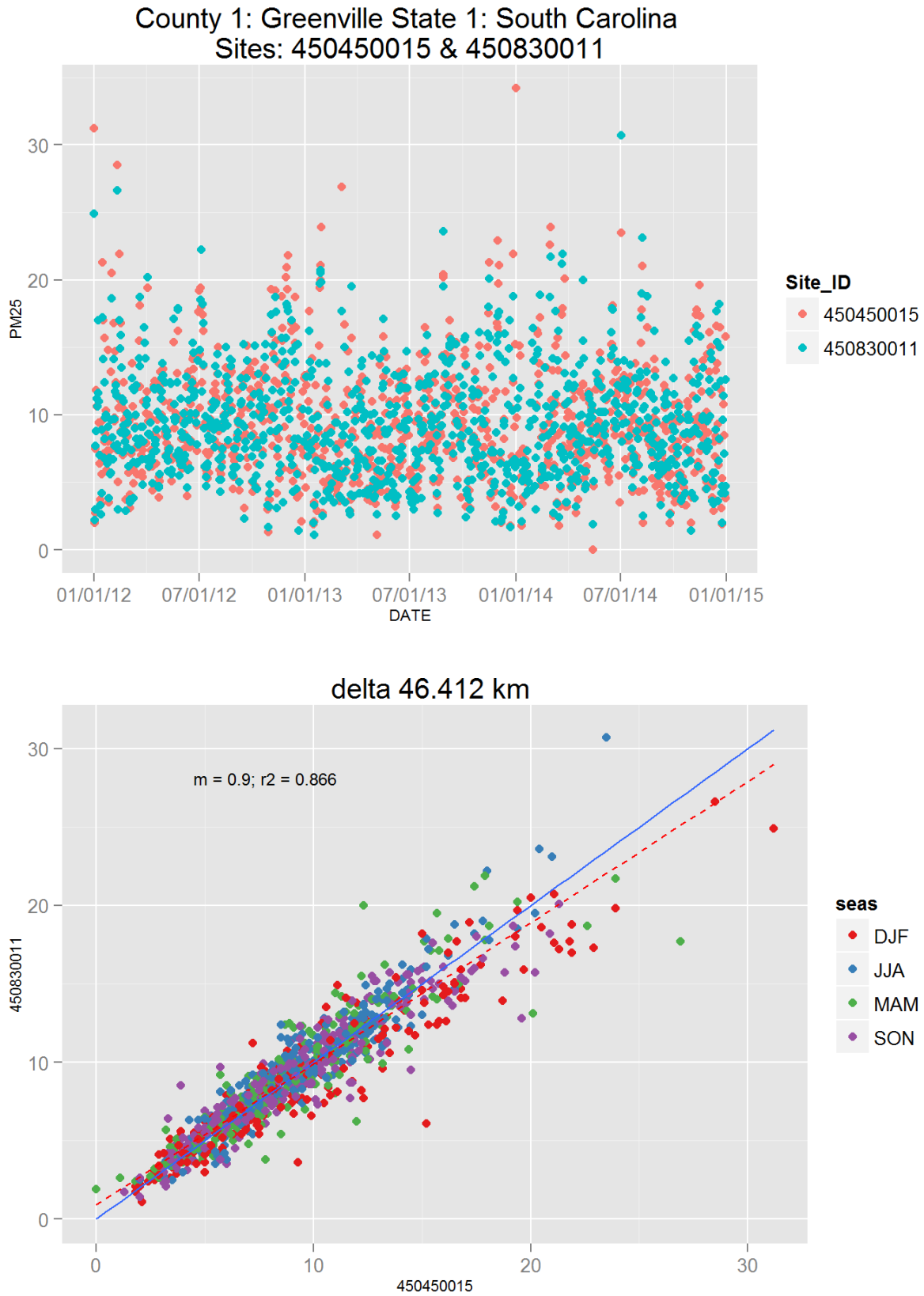


Figure 150: Comparison of PM_{2.5} data for sites 450450015 and 450830011. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r2), with data points are colored by month.



Figure 151: Comparison of PM_{2.5} data for sites 450630008 and 450630008. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.



Figure 152: Comparison of PM_{2.5} data for sites 482011035 and 482011039. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

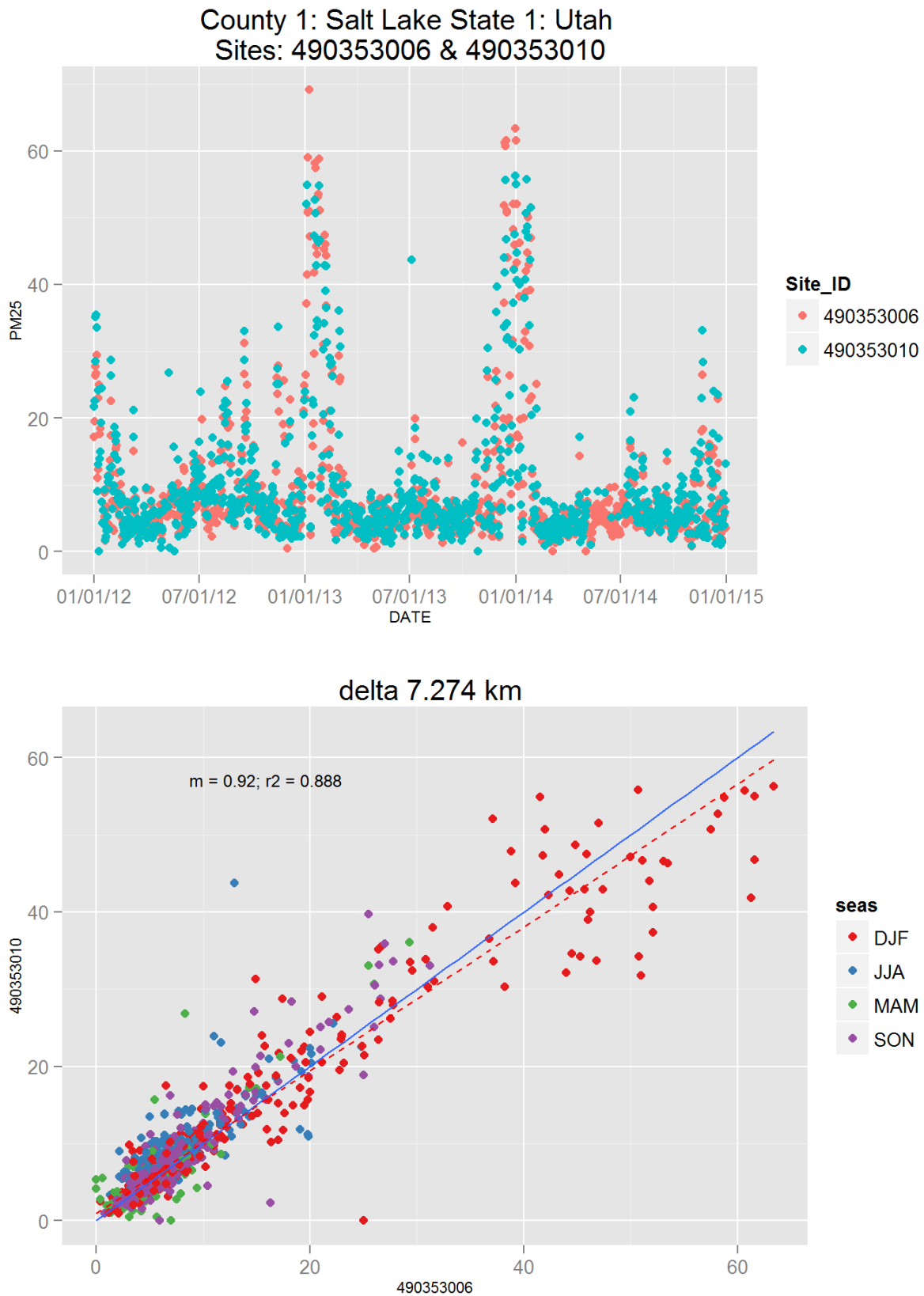


Figure 153: Comparison of PM_{2.5} data for sites 490353006 and 490353006. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

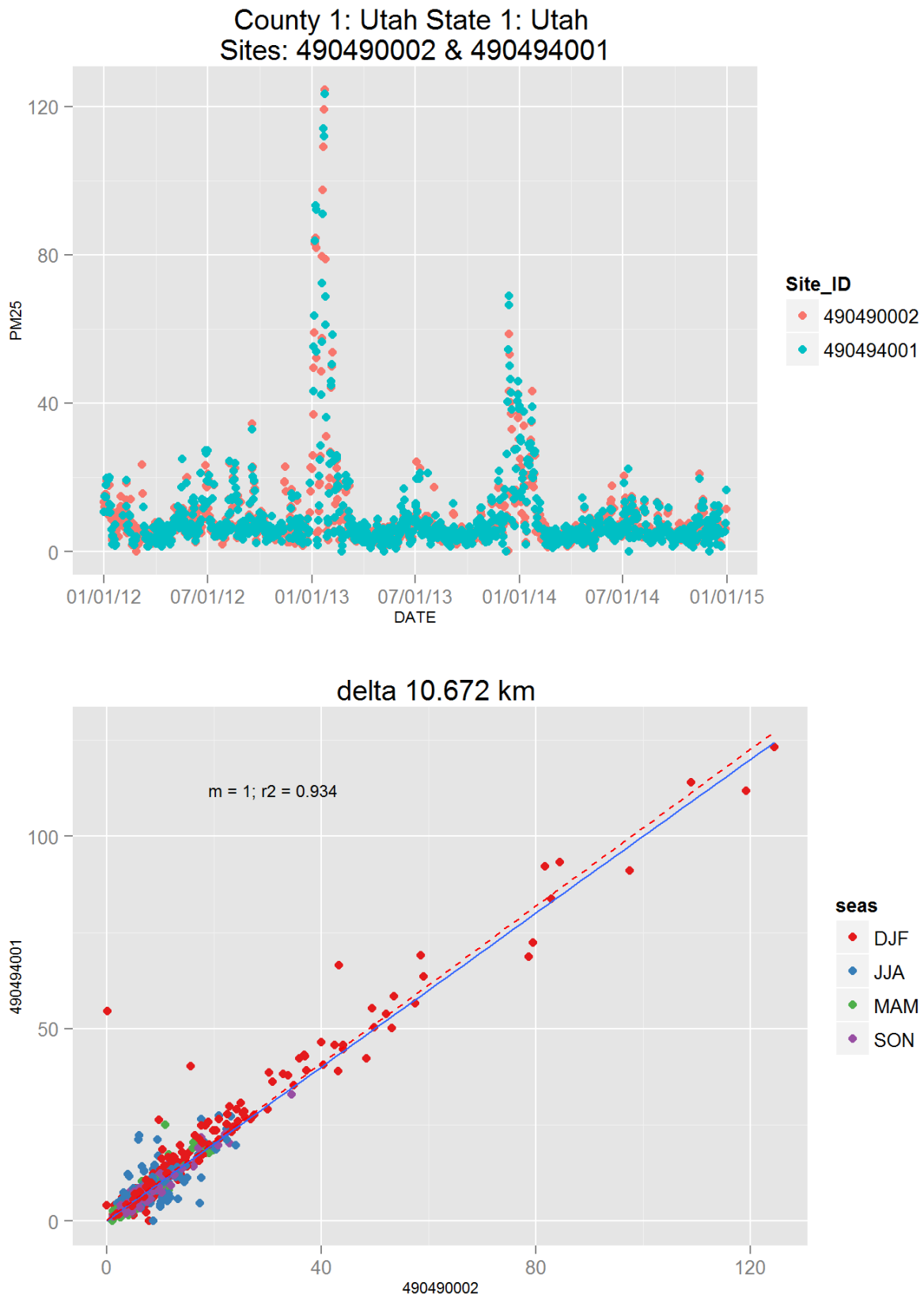


Figure 154: Comparison of PM_{2.5} data for sites 490490002 and 490490002. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r²), with data points are colored by month.

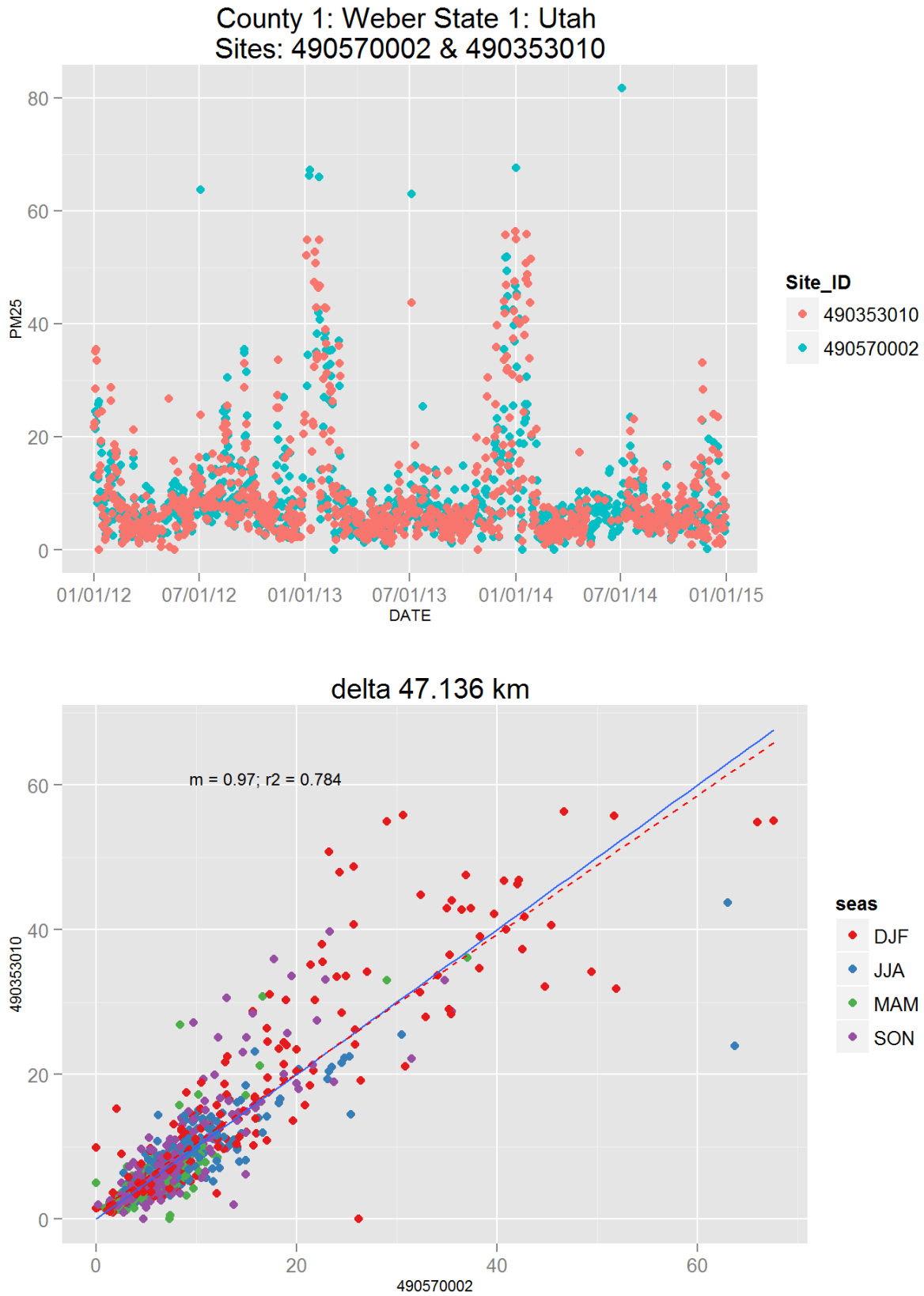


Figure 155: Comparison of PM_{2.5} data for sites 490570002 and 490353010. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r^2), with data points are colored by month.

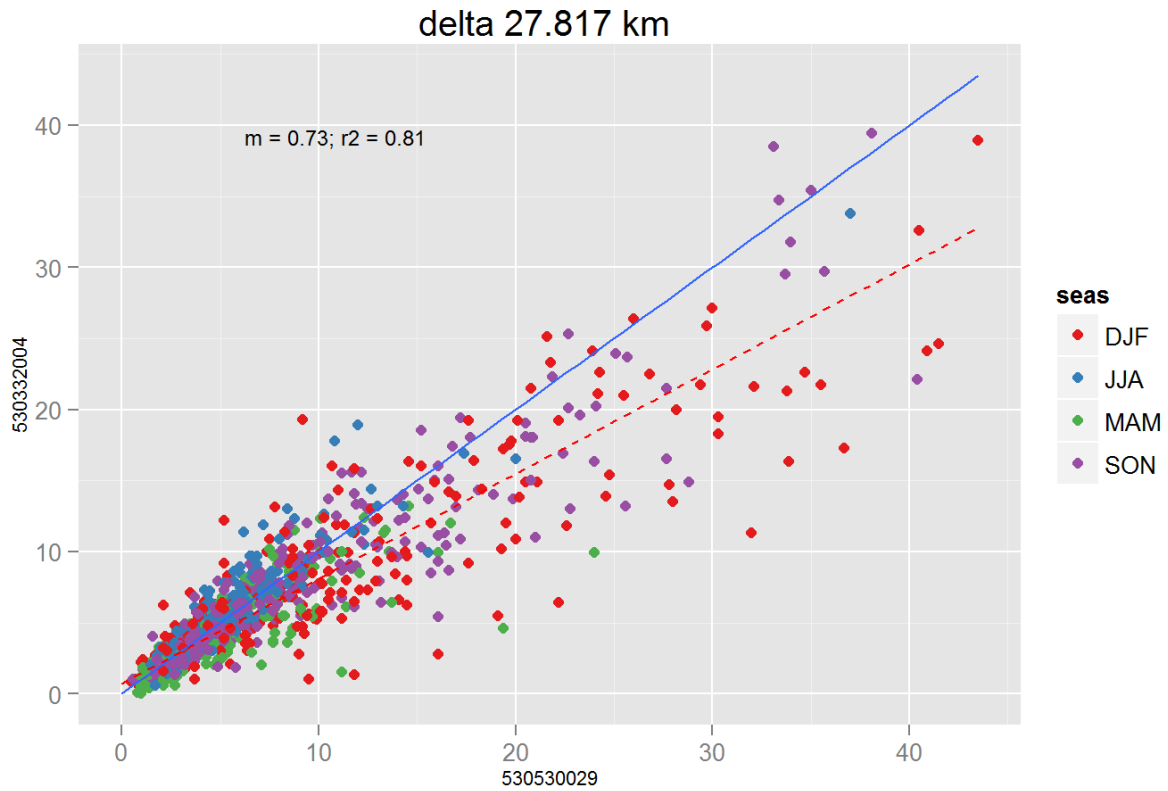
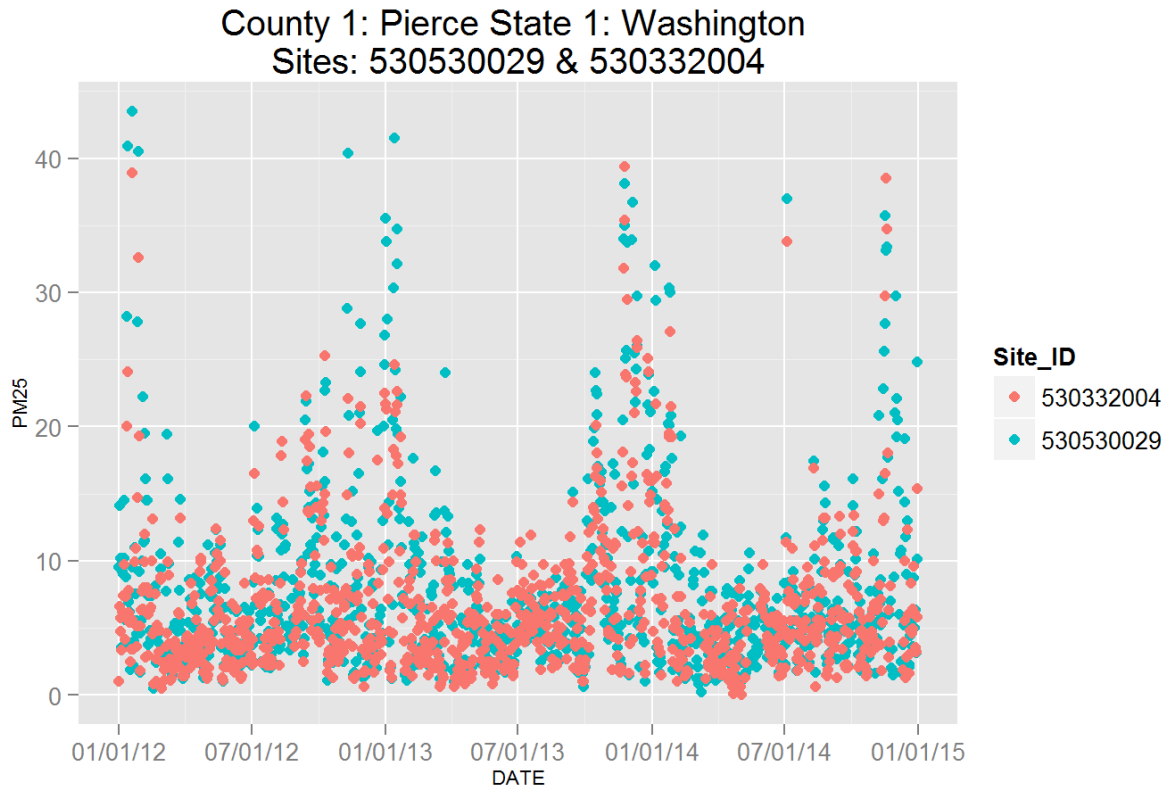


Figure 156: Comparison of PM_{2.5} data for sites 530530029 and 530332004. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r^2), with data points are colored by month.



Figure 157: Comparison of PM_{2.5} data for sites 530610005 and 530610005. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r2), with data points are colored by month.

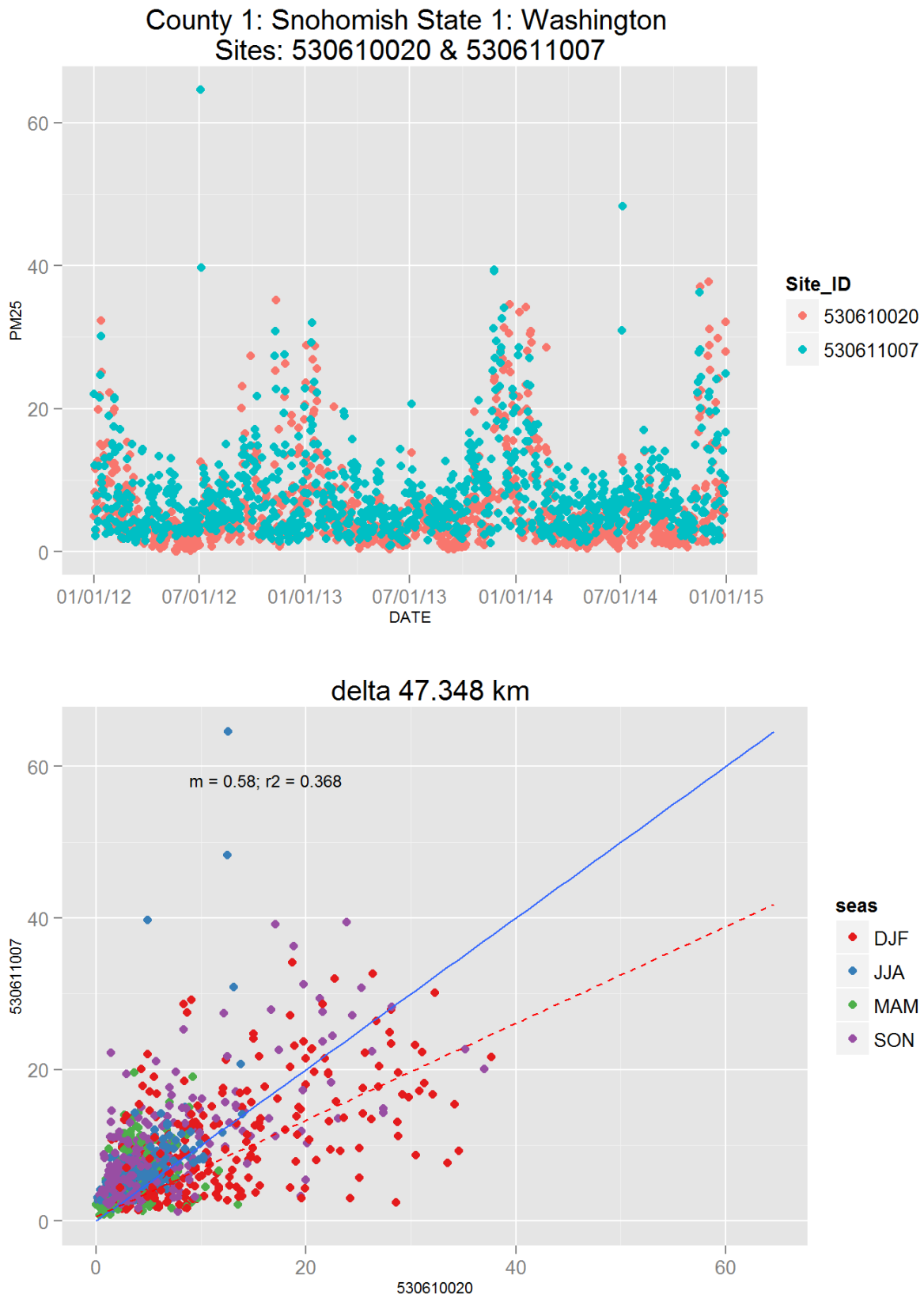


Figure 158: Comparison of PM_{2.5} data for sites 530610020 and 530610020. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r^2), with data points are colored by month.

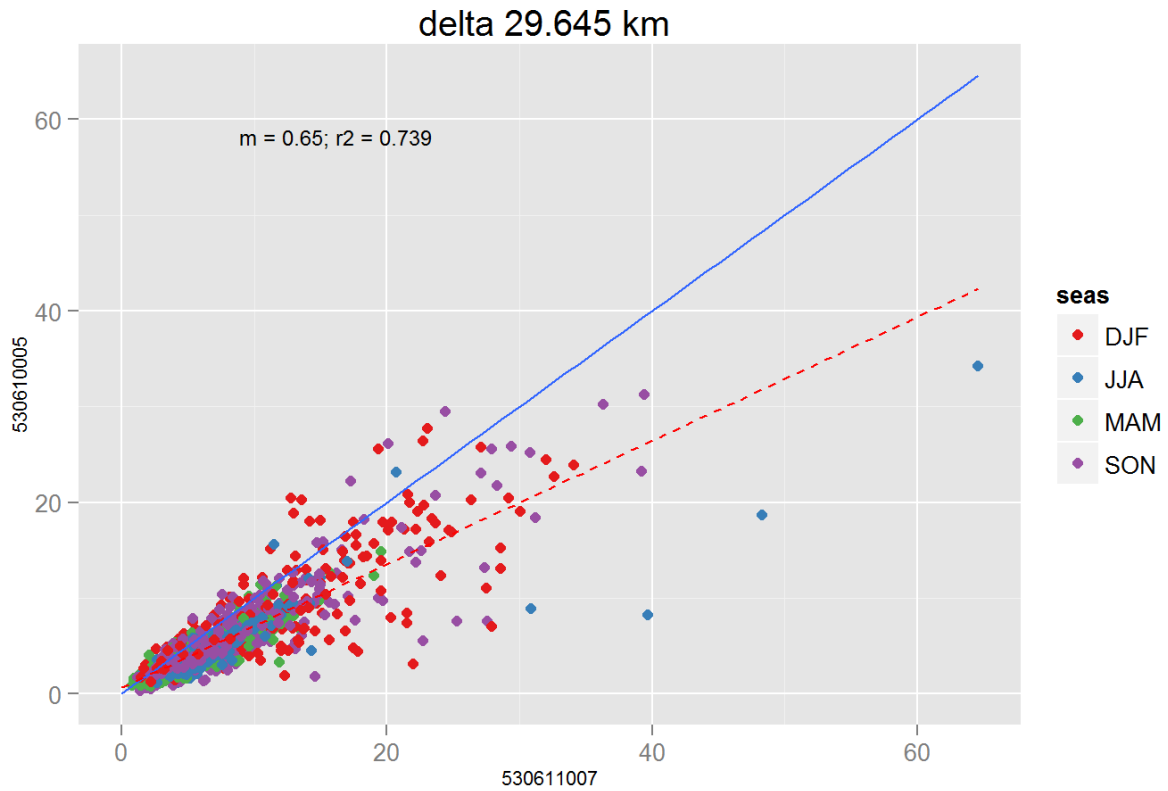
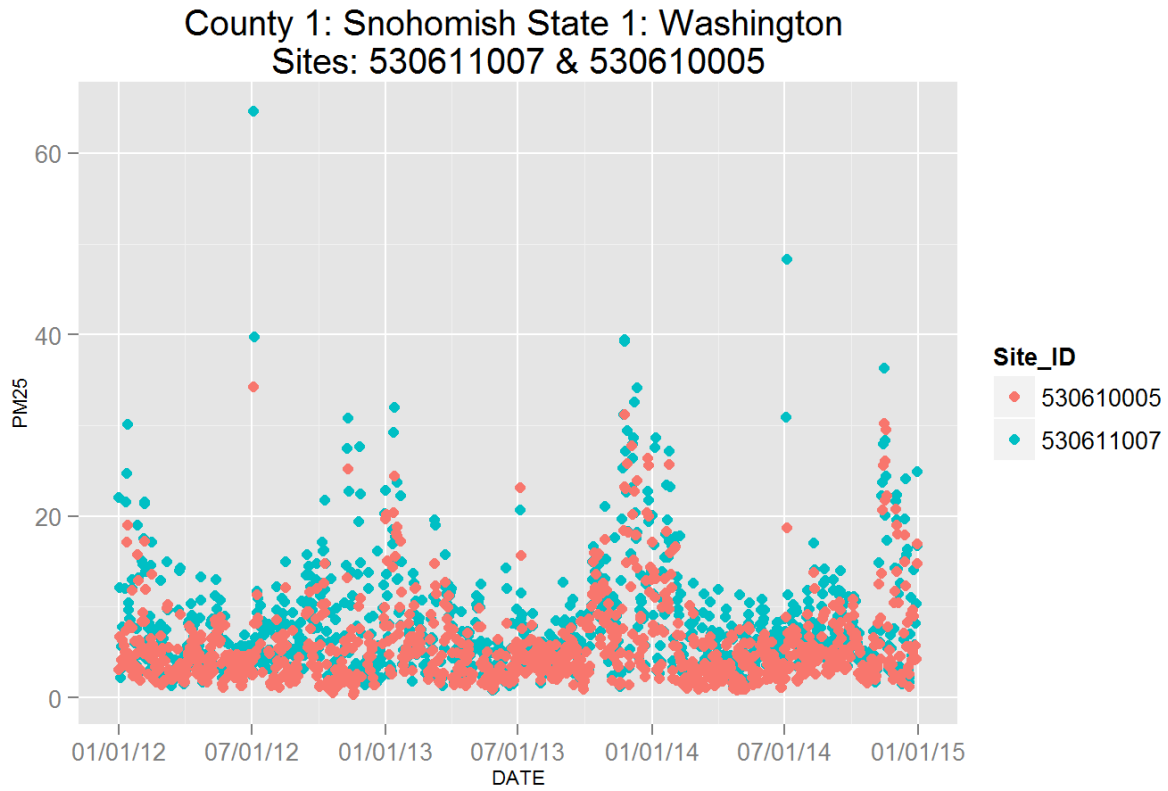


Figure 159: Comparison of PM_{2.5} data for sites 530611007 and 530610005. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r^2), with data points are colored by month.

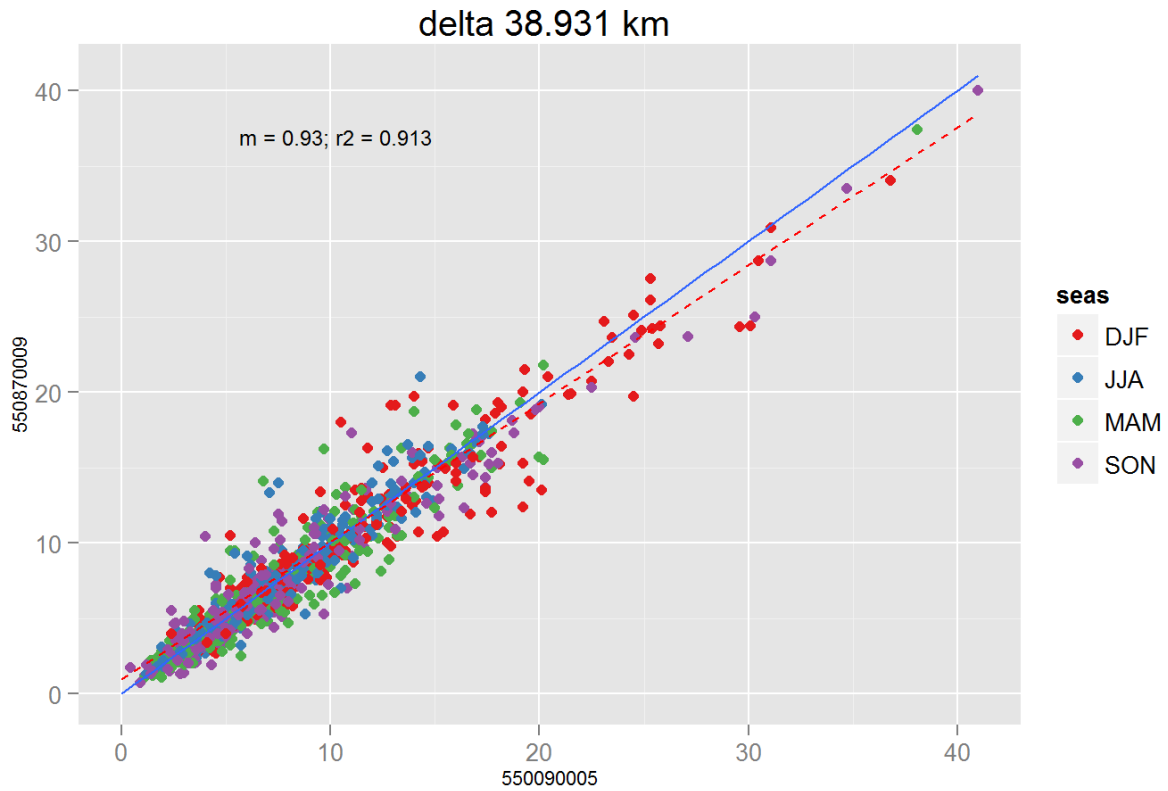
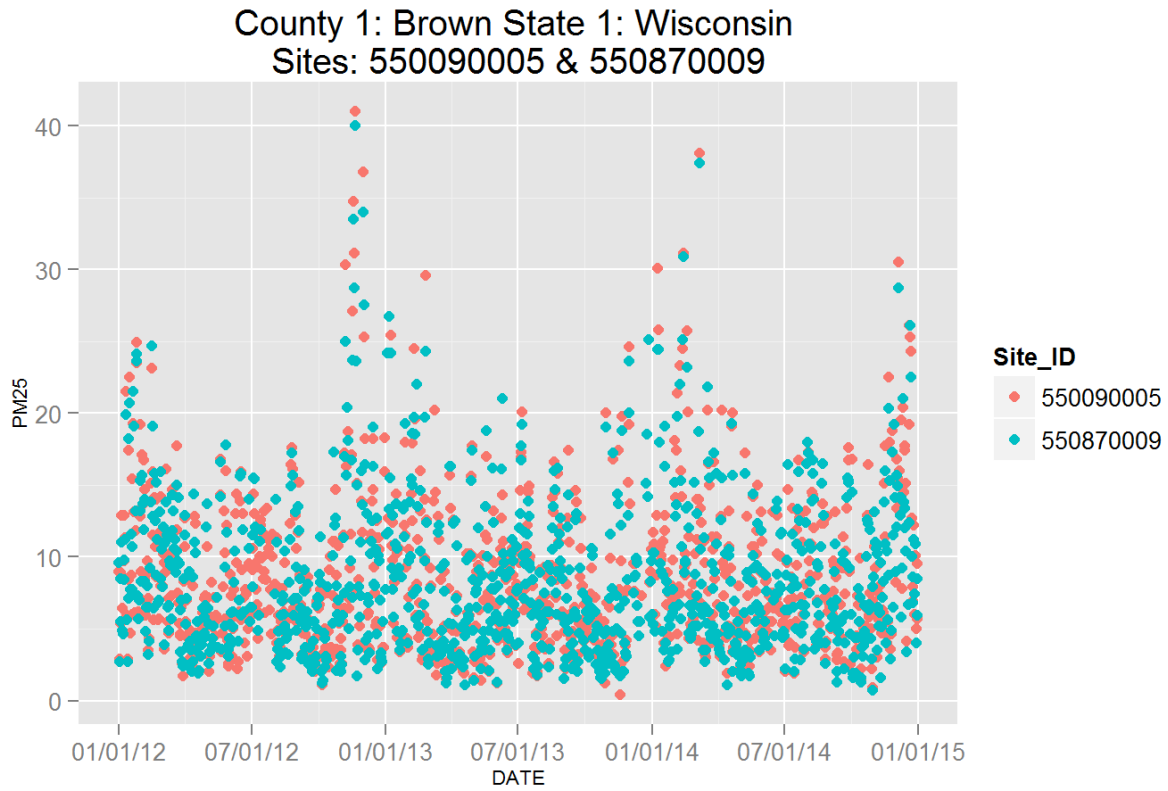


Figure 160: Comparison of PM_{2.5} data for sites 550090005 and 550870009. Top panel shows time series for both sites for years 2012-2014. Bottom panel shows scatter plot of paired data, along with slope for the linear regression and correlation coefficient (r^2), with data points are colored by month.

5 Comparison of air quality variability for ozone sensitivity tests

Results from the ozone sensitivity analysis discussed in Section 2.2.3.

5.1 All available data, no quarterly subsets

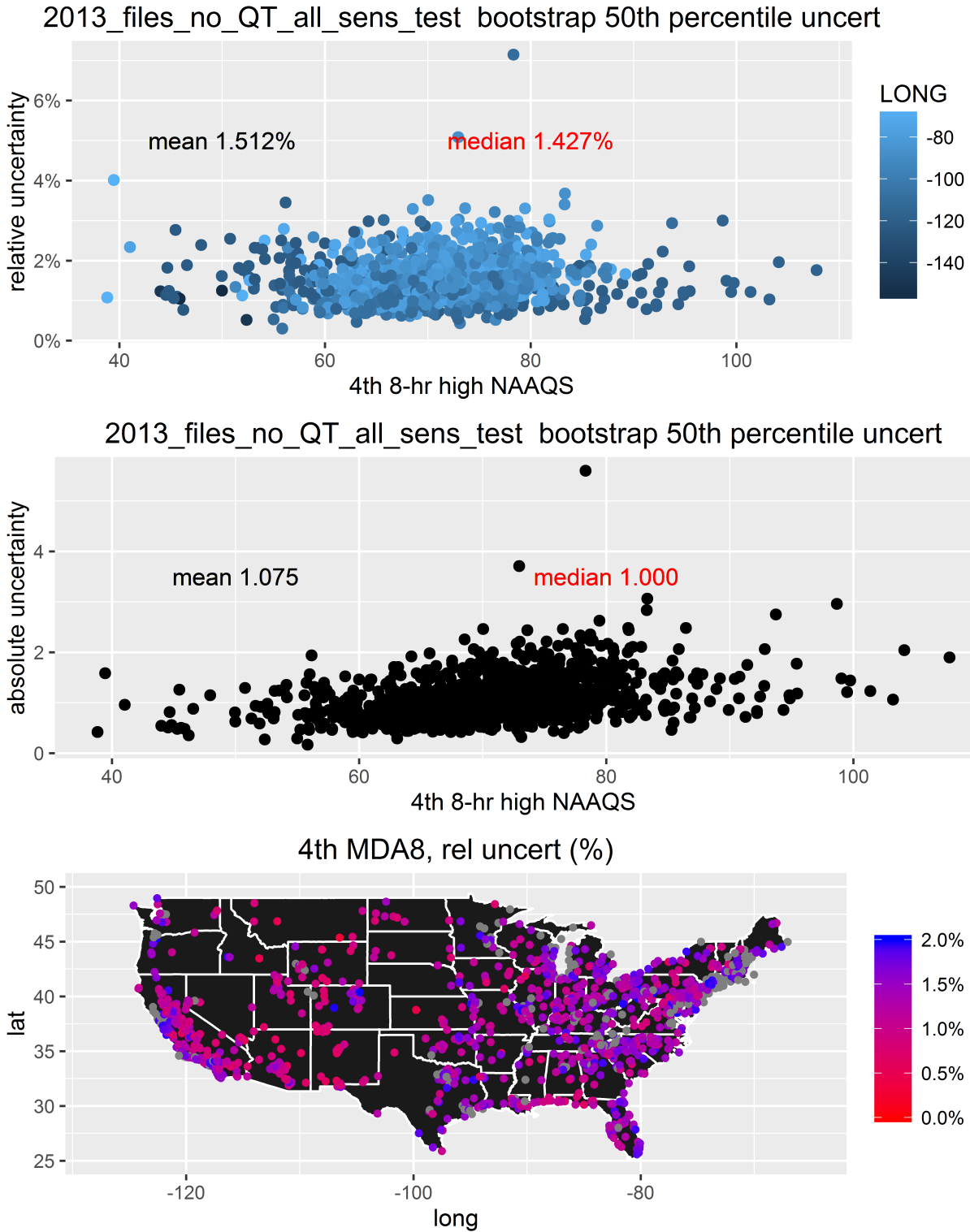


Figure 161: Bootstrap results for the ozone 2013 DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top panel shows the DVs at the various CIs, the middle panel shows the relative difference between the CI and the actual DV, and the bottom panel shows the distribution of the relative differences between the CI and the actual DV.

5.2 All available data, with quarterly subsets

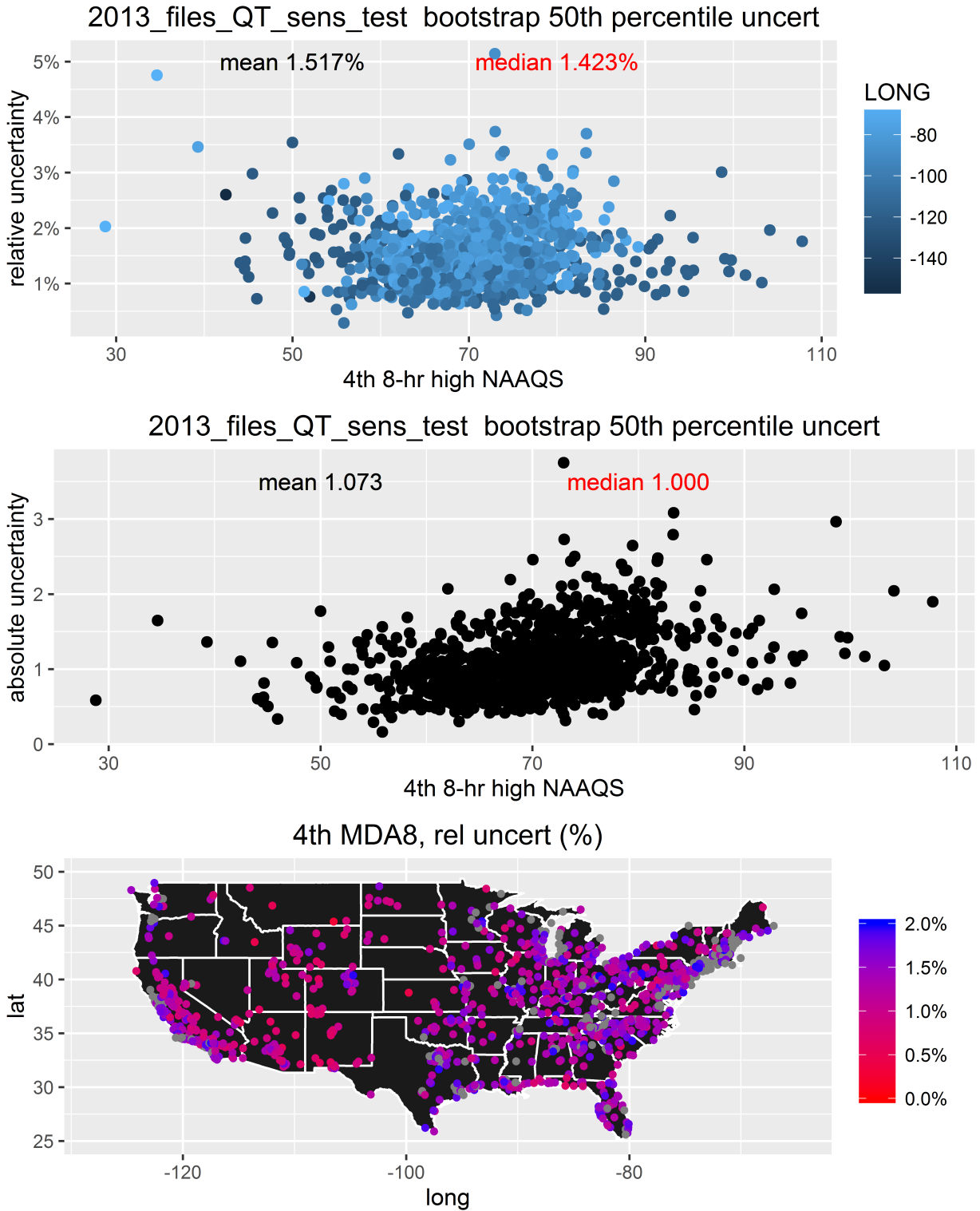


Figure 162: Bootstrap results for the ozone 2013 DVs, showing the 25%, 50%, 75%, and 95% CIs, along with the mean and median bootstrap DVs. The top panel shows the DVs at the various CIs, the middle panel shows the relative difference between the CI and the actual DV, and the bottom panel shows the distribution of the relative differences between the CI and the actual DV.

Does Not Represent Final Agency Action; Draft for Public Review & Comment, August 1, 2016

Does Not Represent Final Agency Action; Draft for Public Review & Comment, August 1, 2016

United States
Environmental Protection
Agency

Office of Air Quality Planning and Standards
Air Quality Analysis Division
Research Triangle Park, NC

Publication No. EPA-454/D-16-001b
August, 2016
