

The authors would like to thank the editor, the two reviewers, and Dr. Ouimette for their thoughtful and thorough review, and constructive remarks. We have modified the manuscript based on these comments to improve and clarify the text. Please find below detailed responses in bold blue text (with direct quotes from the revised manuscript shown in “bold, quoted and italic” text) to the comments and suggestions offered by the reviewers (shown in normal text). All line numbers in our responses correspond to the “clean” version of the revised manuscript.

**RESPONSE TO THE COMMENTS FROM JAMES OUIMETTE, 09 May 2024**

Hi,

Thank you for your preprint. I have a couple suggestions that could improve your paper. Could you please provide a table with the following information about each of the PA sensors used in this study:

PurpleAir ID number; AQS number for the regulatory monitoring site; name of regulatory PM2.5 monitor (e.g., Teledyne T640x, Met One BAM 1020, etc); distance from PurpleAir to regulatory PM2.5 monitor; name of the NOAA site used for relative humidity and temperature data; distance from PurpleAir to NOAA site.

**Response: Thank you for the comment. A table (Table S13) with the suggested information has been added in the Supplemental Information.**

*“Table S13: List of the PurpleAir sensors and Federal Reference Methos (FRM) or Federal Equivalence Method (FEM) used in the study with the estimated distance between stations”*

<i>Site #</i>	<i>PA ID</i>	<i>AQS ID</i>	<i>FRM or FEM Type</i>	<i>Distance PA-AQS (km)</i>	<i>NOAA ID</i>	<i>Distance PA-NOAA (km)</i>
<i>FL</i>	<i>25949</i>	<i>121150013</i>	<i>Teledyne T640</i>	<i>0.028</i>	<i>722115-12871</i>	<i>13.392</i>
<i>FL</i>	<i>16317</i>	<i>121150013</i>	<i>Teledyne T640</i>	<i>0.123</i>	<i>722115-12871</i>	<i>13.350</i>
<i>FL</i>	<i>101259</i>	<i>120570113</i>	<i>Teledyne T640</i>	<i>0.011</i>	<i>722110-12842</i>	<i>7.877</i>
<i>FL</i>	<i>149710</i>	<i>120570113</i>	<i>Teledyne T640</i>	<i>0.011</i>	<i>722110-12842</i>	<i>7.874</i>
<i>*GA</i>	<i>142428</i>	<i>131210056</i>	<i>Met One BC-1060</i>	<i>0.500</i>	<i>722190-13874</i>	<i>17.434</i>
<i>*GA</i>	<i>148123</i>	<i>131210056</i>	<i>Met One BC-1060</i>	<i>0.500</i>	<i>722190-13874</i>	<i>17.434</i>
<i>SC</i>	<i>35139</i>	<i>450190020</i>	<i>Teledyne T640X</i>	<i>0.438</i>	<i>722080-13880</i>	<i>10.972</i>
<i>NC</i>	<i>98623</i>	<i>371190041</i>	<i>Met One BAM-1020</i>	<i>0.307</i>	<i>723140-13881</i>	<i>18.780</i>
<i>NC</i>	<i>6008</i>	<i>370670022</i>	<i>Teledyne T640X</i>	<i>0.005</i>	<i>723193-93807</i>	<i>2.445</i>
<i>VA</i>	<i>178279</i>	<i>518100008</i>	<i>Teledyne T640X</i>	<i>0.052</i>	<i>723080-13737</i>	<i>7.038</i>
<i>TX</i>	<i>166421</i>	<i>482010046</i>	<i>Met One BAM-1022</i>	<i>0.053</i>	<i>720594-00188</i>	<i>16.597</i>
<i>TN</i>	<i>176311</i>	<i>470450004</i>	<i>Met One BAM-1022</i>	<i>0.033</i>	<i>723347-03809</i>	<i>6.604</i>
<i>TN</i>	<i>93593</i>	<i>471130010</i>	<i>Met One BAM-1022</i>	<i>0.066</i>	<i>723346-03811</i>	<i>16.645</i>
<i>TN</i>	<i>51741</i>	<i>470990003</i>	<i>Met One BAM-1022</i>	<i>0.004</i>	<i>723235-13896</i>	<i>46.322</i>
<i>TN</i>	<i>51867</i>	<i>470990003</i>	<i>Met One BAM-1022</i>	<i>0.001</i>	<i>723235-13896</i>	<i>46.323</i>
<i>*TN</i>	<i>51737</i>	<i>470990003</i>	<i>Met One BAM-1022</i>	<i>0.002</i>	<i>723235-13896</i>	<i>46.321</i>
<i>TN</i>	<i>93577</i>	<i>471192007</i>	<i>Met One BAM-1022</i>	<i>0.086</i>	<i>723249-00463</i>	<i>21.910</i>

<i>TN</i>	<i>93645</i>	<i>470370023</i>	<i>Teledyne T640X</i>	<i>0.064</i>	<i>723270-13897</i>	<i>9.235</i>
<i>TN</i>	<i>51921</i>	<i>470370023</i>	<i>Teledyne T640X</i>	<i>0.058</i>	<i>723270-13897</i>	<i>9.264</i>
<i>TN</i>	<i>51873</i>	<i>470370023</i>	<i>Teledyne T640X</i>	<i>0.076</i>	<i>723270-13897</i>	<i>9.262</i>
<i>TN</i>	<i>116559</i>	<i>470370023</i>	<i>Teledyne T640X</i>	<i>0.474</i>	<i>723270-13897</i>	<i>9.589</i>

*\* sensor removed after QA process*

The sites that you chose are characterized by high dew points, resulting from both high RH and high temperatures.

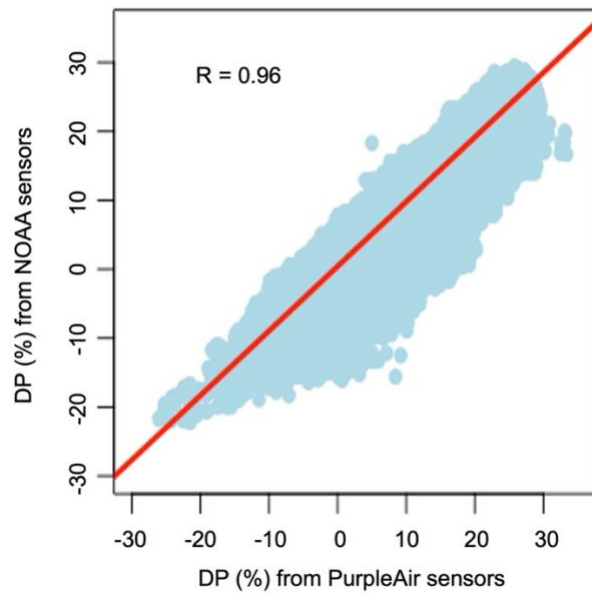
Your graphs comparing RH between the PurpleAir and its corresponding NOAA site is inadequate for assessing whether or not the NOAA site is representative. The best way to show if the PurpleAir and its corresponding NOAA site are sampling similar air is to compare their hourly average dew points. That's because the PurpleAir slightly heats the air sample, resulting in a higher temperature and lower RH compared to the NOAA site. However, the water content and dew point should be the same for the PurpleAir and the NOAA site.

Could you please provide graphs comparing the hourly average dew points for your 21 sites.

**Response:** Thank you for the comment. We included a comparison section between DP from NOAA sites and PurpleAir in the Supplemental Information (Fig. S5, see below) and referenced in line 406. However, we wanted to point out that DP was excluded from our study because DP exhibited correlation with both RH and T in the regression analysis when testing for variance inflation factor. A high correlation of 95% was found between DP and T. Therefore, including it would inflate the goodness of fit of the model.

*“After comparing NOAA and PurpleAir meteorological data (Fig. S5), we included ....” (line 406)*

*“To better estimate if NOAA meteorological data can replace PurpleAir meteorological data, we compared their DP since the water content and DP should be the same for the PurpleAir and the NOAA sites. Figure S5, which used all hourly datapoints of our study, showed a Pearson correlation of 96%. Except TX, which represented only 0.32% of our dataset and exhibited a low correlation (13%), all the NOAA sites resulted in a high correlation ranging from 80 to 97% with PurpleAir sites.” (Lines 127-131 of the Supplemental Information)*



*Figure S5: Correlation between DP from PurpleAir and NOAA*

Thanks,  
Jim Ouimette