Review of the article (amt-2015-280) titled "Predicting ambient aerosol thermal-optical reflectance (TOR) measurements from infrared spectra: extending the predictions to different years and different sites" by M. Reggente et al. for publication in Atmospheric Measurement Techniques.

This work aimed to evaluate if a previous method developed to measure elemental carbon (EC) held true for PTFE air samples collected from additional sites in a different year. More specifically, this study investigated an alternative to the analytical method thermal optical reflectance (TOR) to measure atmospheric EC utilizing Fourier Transport Infrared Spectroscopy (FT-IR) using a partial least squares regression. This new method is beneficial for EC and air quality studies since it is non-destructive and allows multiple species of interest to be qualified alongside.

The authors greatly expanded their previous study's sample size and added an additional year and used a sophisticated statistical approach to demonstrate that the FT-IR methodology was comparable to the TOR approach with a few exceptions. The additional sites and year added to the confidence in this model. Overall, it strengthens the FT-IR approach for use in EC measurements, which will have added benefit to air quality studies.

General Comments

GC-1: Overall, I found this work to be extremely well conducted for accurate predictions of EC concentrations via TOR as well as error. However, my one critique is that it not only builds on the previous study, but at some times depends on it. For example, for me to fully understand the development of the calibration model, I had to read the analysis using only the 2011 samples. This is not necessarily a detriment, and anyone interested in this method would naturally read both studies. This work did add new information which makes it stand alone, such as the added predictive error measurements.

GC-2: Two of the new 2013 urban sites, Korea and Fresno, required a separate calibration to improve EC ad OC predictions. I wonder if this implies the model approach is best suited, for now, with rural sites since there are fewer urban sites and the separate calibration curve was only applied to the newer, 2013 samples.

Specific Comments

Page 12441, line 13: It is stated that "which can be visualized" referring to the four classifications of 2013 samples. However, this is no reference to an image, only the appropriate results sections. I suggest using a different word or cite a figure.

Page 12442, line 9: MDL is never defined. I actually did not know this acronym, which took away from the manuscripts flow.

Technical Comments

Page 12436, line 7: IMPROVE is never actually defined, other than the abstract.

Page 12437, lines 7 & 11: It was repeated that the same test set was used.

Page 12445, and elsewhere: Quite a few sentences began with “Figure 7 shows” or “Table 5 reports.” This makes a few spots read like a report rather than a methods paper.