

## ***Interactive comment on “Consistency of long-term elemental carbon trends from thermal and optical measurements in the IMPROVE network” by L.-W. A. Chen et al.***

### **Anonymous Referee #1**

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This manuscript presents an interesting approach to validate the consistency of long-term EC trends in the IMPROVE network, based on filter reflectance measurements. The manuscript is well written and the results are discussed in depth. However, I only have one main concern which refers to the validity of the reflectance values as independent tracers of EC. Reflectance may only be used as a tracer of EC if it was measured throughout the entire monitoring period (2000–2009) using the same methodology, in a way that when comparing reflectance and EC, the only potential source of variability would be the change in the EC analytical method (before and after 2005). In the methodology section the authors state that this was indeed the case, and that digital

thermograms were reprocessed to obtain reflectance values from 2000 to 2009. However, in section 3, page 3844 (line 22), the authors state the certain differences may be due to the different sensitivities of reflectance measurements between the old and new instruments, from which I understand that reflectance values were obtained with different instruments and thus might not be comparable throughout the period 2000–2009. This introduces one additional variable in the model (the variability of the EC methods PLUS the variability of the reflectance methods), which as a result limits the robustness of the model.

One additional minor comment: page 3838, line 17, "also known as black carbon", with the numerous discussions going on currently regarding the definitions of BC, EC, EBC, etc., I find this definition too simplistic (see "Position of the GAW Scientific Advisory Group on the use of Black Carbon terminology", GAW/WMO SAG – AEROSOL). It would be better to extend it slightly to give the reader a better introduction to these concepts.

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