Thanks for the comments and suggestions. Optical reflectance has been measured with helium-neon (He-Ne) lasers at wavelengths of 632.8 nm and detected by photodiode detector on both the original and upgraded carbon instruments. The reflectance measurement principle/configuration remains identical. This is explained better in the revised manuscript through a new figure (Fig. 2, see below), which compares the original and upgraded optical monitoring system. In both instruments, laser beam is directed to the filter sample through a coaxial optical fiber and a quartz light pipe (perpendicular to the sample) by which the reflected light is collected, and $\tau_R$ is determined from the ratio of initial and final (after thermal analysis) reflected light. The upgraded system allows concurrent measurement of both reflected and transmitted light with an additional photodiode detector. Improved electronics in the upgraded system gives a better signal-to-noise ratio which, as explained in the revised text (Lines 219–222), is not expected to influence the time (15s)-averaged reflectance measurement. However, it may affect the OC-EC split by deviating the instantaneous crossover point during thermal analysis:

> (Line 219-222) "With an improved signal-to-noise ratio of the reflectance measurement, the upgraded instruments possibly trigger the split (crossover) later than the original instruments, leading to lower EC fractions. $\tau_R$ quantification is little influenced by the noise, as both $R$ and $R_0$ are averaged over 15 seconds before and after the thermal analysis."

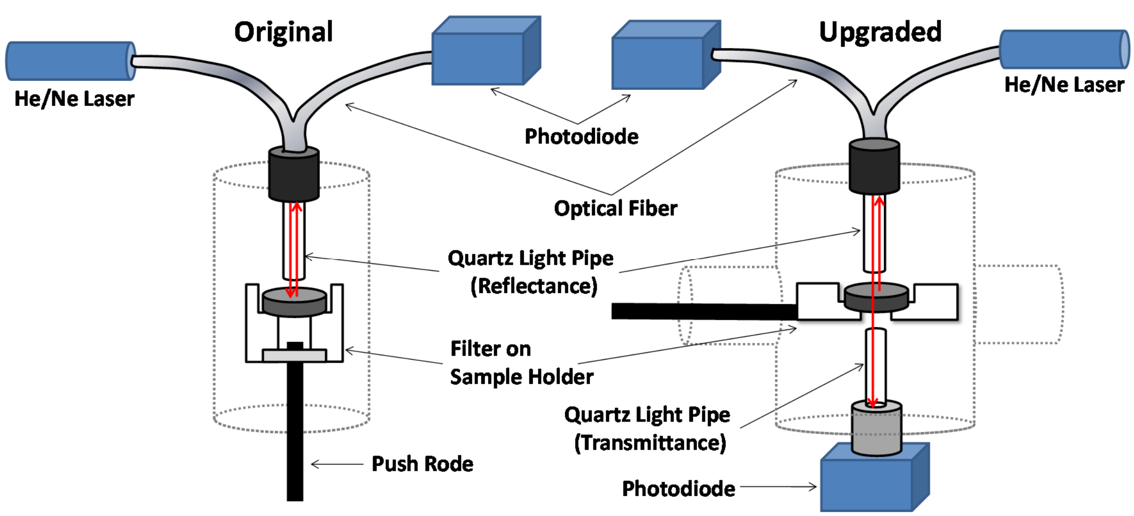


**Figure 2.** Schematics of optical monitoring system in the original (left) and upgraded (right) carbon instrument. Laser beam is directed to the sample through a coaxial optical fiber and a quartz light pipe (perpendicular and ~ 2 mm to the filter sample) by which the reflected light is acquired. The sample holder is redesigned in the upgraded instrument to allow collection and detection of the transmitted light. The dashed boxes illustrate the heating zone for thermal analysis.

The instrumental upgrade should influence EC measurement more than $\tau_R$ measurement. The consistency of EC versus $\tau_R$ trends across the original/upgraded system transition provides some validation of both measurements. It also adds to the "weight-of-evidence" that EC reductions are real rather than an artifact of the measurement process, as emphasized in the revised Abstract.

As to the use of terminology for EC and BC, we have revised the first paragraph in Lines 58-61 of the Introduction section:

> (Line 58-61) "Elemental carbon (EC), a light-absorbing carbon (LAC) component as determined by thermal/optical methods, is the dominant aerosol fraction that absorbs visible radiation in the troposphere (Andreae and Gelencsér, 2006). This fraction is often termed "black carbon" (BC) if quantified by optical or photoacoustic methods (Moosmüller et al., 2009)."

**References**

Andreae, M. O. and Gelencsér, A.: Black carbon or brown carbon? The nature of light-absorbing carbonaceous aerosols, Atmos. Chem. Phys., 6, 3131-3148, 2006.

Moosmüller, H., Chakrabarty, R. K., and Arnott, W. P.: Aerosol light absorption and its measurement: A review, J. Quant. Spectrosc. Radiat. Transfer, 110, 844-878, 2009.