Dear Associate Editor and the editorial support team,

Thank you very much for your review and great support!

We'd like to thank Reviewers for the review of the manuscript and supportive comments. The response to each reviewer comment is provided below.

Colour code: Black – reviewer comments; blue – author response; red – corresponding line number of the changes. Changes to the manuscript are in highlight.

Report #1 (Referee #1):

Comments:

1. If point 2 of my specific comments (2. Methods: How did you define "stabilized conditions" for representative measurements? How long did you wait after any load change on the engines? Were the engines warmed up? Was any of the reciprocal engines fitted with any exhaust treatment mechanism?) is implemented into the manuscript (definition of stabilized conditions & no exhaust after-treatment), I would be accepting the manuscript without any other changes.

   A paragraph describing the required information is added to the revised manuscript (P8 L238 - 242). The paragraph is copied below:

   > 'To ensure stabilised conditions were reached, the sources (test rigs) were operated at the set point for a short period prior to nvPM data collection. The exhaust temperature, measured with a thermocouple fitted to the exhaust of each rig, along with other operating condition data were monitored and available as an indication of combustion stability. Once these operational parameters were determined to be stable, the data collection for that particular set point was initiated. There were no exhaust aftertreatment devices on any of the rigs in the current work.'

Report #2 (Referee #4):

Comments:

1. The peak particle temperature presented in Fig. 5 is determined from the two-color pyrometry method and therefore assumptions on the optical properties of the particles have been made.
   The fact that the temperature reached form the particles produced at the idle condition is lower to the one obtained by those emitted at the HPO conditions, might be due to the fact that the two type of particles have different optical properties.

The authors pointed out later in the text that differences in particle optical properties might cause a shift in the laser fluence curve, however I believe that a short discussion about the assumption on the optical properties would be valuable in completing the description of figure 5.

The reviewer is correct. The temperature is determined by two-colour pyrometry, and therefore influenced by the optical properties. The absolute value of the absorption function, E(m), is not important in determining the temperature. However, the relative value of E(m) between the two detection wavelengths is important. The assumption being used in this study is that the value is the same at both wavelengths (Snelling et al., 2005). To compare the effect of E(m) varying with wavelength to constant E(m), Snelling et al. (2004) showed that a varying E(m) would result in a peak temperature 80 K greater than using a constant E(m). Changing the approach used for E(m) will have an effect, and potentially the approach used and absolute values will be different at the idle and high power conditions, and this could account for <100 K of the ~350K differences in the peak temperature observed in Figure 5(a).

In line with reviewer's suggestion, a short discussion on above is added to the revised manuscript (P14, footnote) stating "The temperature is determined by two-colour pyrometry, and therefore influenced by the nvPM optical properties, i.e. the relative value of E(m) between the two detection wavelengths. In this study, it is assumed that the value of the absorption function, E(m), is the same at both wavelengths (Snelling et al., 2005). The different particle properties at HPO and idle may invalidate this assumption, but the potential effect would only account for <100 K (Snelling, 2004) of the observed difference in the peak temperatures."

2. L314:for sake of clarity I suggest to add that the effective primary particle diameters are reported in Fig.4

   The sentence is revised to add clarity (P13, L318). It now reads as:

   'While not the focus of this study, it is interesting to note the impact of laser fluence and source operating condition on the effective primary particle diameters (ePPD) resulting from the LII 300 measurements as shown in Fig.4 (via the decay rate of the LII signal) (Schulz, 2006)'.

3. L347: please remove "arbitrary".

   It is removed (P15, L351).

Additional changes made to the manuscript:

Throughout the text, the fluence is shown as mJ/m^2, but it should be mJ/mm^2. This unit error has been corrected (for example, in P13, L308-310).