Summary:

This paper proposes a new approach to study heating rate profiles on the South-eastern Atlantic region, well-known for the influence of extreme biomass-burning episodes. This study is essential to understand drivers of the heating rate in this region. Even if there are some reorganisations of titles and subtitles to apply, authors well explain the method by: 1) detail the calculation of the usually analysed heating rate as well as its dependency on atmospheric absorbers, 2) analyse applications to spirals and radiation walls during the ORACLES-2016 and 2017 experiments, and 3) demonstrate the necessity of the HRE to reduce variability trained by aerosol extinction and incoming solar flux. The description of the method is precise and clear, and authors well explained the limitations of the method.

The results and analyses are interesting for aerosol impact studies in the South-eastern Atlantic region and the method may bring promising information if adapted to other area or to satellite measurements. This is why the study well fit with the journal scope and I would recommend for publication after considering following specific comments and technical corrections.

Specific comments:

1) The study is based on several measurement technics which allow to reduce assumptions and obtain accurate retrievals. However, combining in-situ and remote sensing measurements obtained from different flight patterns drives several issues which have to be considered to discuss the results. This is what I would expect more information and discussions on:
   - Altitudes of measurements for each case for both 4STAR and HSRL measurements. As example, does P-3 exceed 12 km height during measurements?
   - Distances and times between combined spirals and walls. This may be included on Table 3.
   - Spectral ranges and resolutions for each instrument. This may be included on Table 1.

2) The application of the method to the two experiments allows to note the stability of the HRE in the region at the biomass-burning period since the aerosol and water vapor sources are expected to be seasonal. However, as authors well explained, the method is applied at very specific atmosphere conditions and is only applicable to similar aircraft measurements conditions. In order to facilitate comparison study, I would expect more details and discussions on the parameter variations. As example:
   - Figure 6a and 6b would benefit from additional information on AOD and cloud albedo variations along the wall. Link with Figure 7c may be more discussed since it could explain the reason of aerosol heating rate variations.
   - Measured parameters on Figure 10 should be highlighted, for example with filled dots. From there, the heating rate efficiency from each spiral will be shown.
   - Figure 9 well demonstrates the stability of HRE for the two main aerosol layers between 2 and 4.5 km. More discussion on these features are expected.
   - Additional figure with the asymmetric coefficients on Figure 10 will also give relevant information of aerosol particles size impacts on HRE by considering that coarse mode particles are not well represented in the used spectral range.

Technical corrections:

1) Equations (2) to (5) need to be rewritten:
   - Please, detail the meaning of (x).
   - In order to obtain $R_\lambda(x) = 1$ at 532 nm, equation (3) shouldn't be:
   $$AOD_\lambda' = AOD_\lambda' * \frac{AOD_{532}^{HSRL}}{AOD_{532}'^{4STAR}} \ ?$$
   - Used terms have to be consistent between equations. AOD_{532}^{HSRL} in equation (5) instead of AOD_{HSRL}.
2) Figures 3 is discussed earlier than Figure 2 in the text. Please exchange them.
3) Figure 7 format should be consistent between panels:
   - Only mention the wall's date as title.
   - [km] on y-axis.
   - [k/day] and [Km^{-1}] on x-axis on Figure 7f.
4) Figure 8a values seem to correspond to cloud albedo and not SSA as Figure 8b and values on the text. Please also correct the legend.
5) Figure 8: please change y-axis with Aerosol and water vapor Heating Rate instead of on the title.
6) Please, add the coloured code used on Figure 8 and 10 on Table 2.
7) Table 2, why values are expressed at 500 nm and not at 550 or 532 nm as in the whole paper? These values have to be comparable to Table 3 values as well.
8) line 338: the sentence is not needed.