Review: "In Situ and Satellite-based Estimates of Cloud Properties and Aerosol-Cloud Interactions over the Southeast Atlantic Ocean"

The study uses aircraft *in situ* cloud property measurements to evaluate MODIS retrieved cloud properties over the Southeast Atlantic Ocean. Compared with previous efforts of evaluating MODIS cloud retrievals, this study further evaluates MODIS cloud retrievals under different ACI conditions in terms of aerosol 'contact' and 'separated' conditions relative to cloud top, which provides support for utilizing MODIS retrievals for ACI study over larger domains. Therefore, the manuscript fits well within the scope of Atmospheric Chemistry and Physics. Overall, the manuscript is well written and well organized. The manuscript is publishable in ACP. However, I do have some comments and concerns as listed below.

Major comments:

1. This study compares *in situ* and MODIS-based estimates of cloud properties in terms of cloud effective radius (R_e), cloud optical depth (τ), and cloud droplet number concentration (N_c). As mentioned in the abstract, there are many previous studies of similar comparisons. Therefore, it is essential for this paper to discuss the results presented in this study related to previous comparisons (e.g., in the discussion section). What are the causes of the overestimations of R_e and τ from MODIS retrievals?
2. Line 59-65: The introduction emphasizes that ACI over the southeast Atlantic Ocean is mainly related to the overly of biomass burning aerosol and the aerosol semi-direct radiative effect, but in section 4 it shows that aerosol indirect effect of causing large *Nc* was observed from the differences between contact and separated cloud profiles. Does this mean that biomass burning aerosol exerts both indirect and semi-direct effects on clouds?
3. Line 536-538: 'The retrieval uncertainty for MODIS R_e provided the largest source of error in calculating MODIS *Nc* but compensating uncertainties for τ, k, C_w, and α resulted in good agreement.' Can this be generalized to all marine stratocumulus under different aerosol loadings? For example, Meyer et al., (2013) show that the presence of absorbing aerosols overlying marine boundary layer clouds cause biases for MODIS retrieved R_e and τ.

   Reference: Meyer, K., Platnick, S., Oreopoulos, L., and Lee, D. (2013), Estimating the direct radiative effect of absorbing aerosols overlying marine boundary layer clouds in the southeast Atlantic using MODIS and CALIOP, *J. Geophys. Res. Atmos.*, 118, 4801–4815, doi:10.1002/jgrd.50449.

Minor comments:

1. Line 29: ‘low biases in MODIS retrievals of cloud properties’, this is confusing. The manuscript shows high biases of MODIS retrieved cloud effective radius and optical depth.
2. Line 58: references are needed here.
3. Line 104: the sentence needs a better structure. Maybe separate it into two sentences.
4. Table 1: for each flight date, the flight duration was usually several hours, but the total contact and separated sample time was only several hundred seconds. How ‘contact and separated sample time’ was selected?
5. Equations: should all items behind ‘/’ be at the denominator or just the variable or constant right behind it at the denominator? Apparently, the expression of equation (6) is not consistent with equation (7) in terms of the usage of ‘/’.
6. Line 283: how deep can MODIS R_e retrievals penetrate in terms of optical depth?
7. Line 406: reference? The study shows that ‘On average, the MODIS Re and τ (11.3 μm and 11.7) were 1.6 μm and 2.3 higher than the in situ Re and τ’. Apparently, the differences are larger than the MODIS average retrieval uncertainty of 7.5 and 5%.