Dear Joana,

one of the reviewer suggested ,... adding a couple of panels to one of the figures (e.g., Figure 3, for the two borderline wavelengths) that compare the refraction-free and refraction-accounted cases.'

Following this suggestion, we decided to enhance the overall consistency of the paper by replacing all results of the sensitivity studies (figures 3, 4, 5, 6) with the correponding simulations results including refraction.

When comparing the updated results of figures 4 and 5 with the corresponding previous results, it turned out that we had made an important error in the calculation of the results shown in these figures (and thus also in the results of Fig. 6 and 7). Instead of calculating the ratio of the radiances of the various scenarios to the radiances of the standard scenario, we had calculated the ratios of the radiance differences (AOD of 0.3 minus AOD of zero, like in Fig, 3). For some of the scenarios, especially for the effects of polarisation, stratospheric aerosols, and ozone absorption, the corresponding changes compared to the original figures are quite large. Fortunately, the total uncertainties and the overall conclusions of the paper stay almost unchanged.

In the revised paper we replaced Figures 3, 4, 5, and 6 with the updated figures including atmospheric refraction (and for Figures 4,5, and 6 with the corrected ratios).

During the revision, we also made some minor corrections and changes as described below:

-we corrected the y-axis labels in Fig. 5 (,Ratio to AOD=0' was changed to ,Ratio to std scenario')

-in Fig. 6 and 7, values below 0.5% are not shown in order to enhance the clarity of the figures.

-for the calculation of the total error, the contribution of a wrong ozone profile was reduced (now half the deviation of the simulation with 20% change instead of the full deviation to the standard scenraio). This change was made, because:
a) otherwise in Figs. 6 and 7 the error related to the ozone absorption would dominate the total error for almost all wavelengths and scenarios, while in relatity the uncertainty of the knowledge of total ozone column (e.g. from satellite observations) is much smaller.
c) this treatment is consistent with the treatment of the other effects.
In section 2.3, 2.5.1, and the conclusions the importance of correct ozone data for the radiative transfer simulations is now emphasised.

-in Fig. 4 and Fig. A3, marine and biomass burning aerosols were reversed (the labelling was wrong in the original figures)

-in the original version, it was mentioned in section 2.1 that , For the comparison to measurements (section 3), also rotational Raman scattering and atmospheric refraction is considered (in the ray tracing calculations).'

This sentence was corrected to ‚For the sensitivity studies (section 2), also rotational Raman scattering is considered.', because in the standard scenario Raman scattering was not included.

The changes in the text are marked by the track change option.

Best regards,

Thomas