

Interactive comment on “The impact of deforestation in the Amazonian atmospheric radiative balance: a remote sensing assessment”

by E. T. Sena et al. submitted to Atmos. Chem. Phys. Discuss., 12, 14837–14874, 2012.

We thank the editor for the careful review of our manuscript. We found the three referee reports very useful and they helped to improve the final version of the manuscript. The answers to anonymous referees #1 and #2 were previously posted. Please find below the answers to anonymous referee #3 comments.

Specific answers to Anonymous Referee #3:

In bold type, the issues raised by the reviewer, followed for our action in each issue raised.

We would like to thank referee #3 for his/her careful review and for the several suggestions that helped us improving the final manuscript.

The title of the work mentions the impact of deforestation in the Amazonian atmospheric radiative balance. While the objective is described as the assessment of the temporal and spatial distributions of the direct aerosol radiative forcing at the top of the atmosphere (TOA) over the Amazon Basin and Brazilian cerrado areas during the biomass burning season. Then the title and the objective are not agreeing. In this context, it seems that the analysis is considering the land cover types (Forest, cerrado, and non forested areas). The deforestation analysis appears mainly in the section 3.3 (Evaluation of the surface albedo change radiative forcing over Rondônia). In most part of the manuscript it is mentioned forest and cerrado regions. In the Section 4 (Discussions) the deforestation is not mentioned.

Thank you for pointing that out. In the manuscript we consider the emission of aerosol from biomass burning due to forest fires as an important byproduct of deforestation, therefore justifying the choice of this work title. It is worth to mention that although deforestation rates have significantly decreased, still a large area, of 6200 km², was deforested in the Amazonia in the year 2011. In addition to the emission of biomass burning aerosols, two other important aspects of deforestation were also addressed in this manuscript: the increase of surface albedo and the decrease of column water vapour content over the deforested area. To clarify these points, we have modified the revised manuscript in the introduction, discussions and conclusions sections. Following your suggestion, we have also modified the title in order to make it more specific and comprehensive.

In general the content of the manuscript is clearly organized. The remote sensing data and the methodology are adequate for the work.

Some suggestions:

To review the text according to the title and the objectives of the work.

The revised manuscript was modified in the introduction, discussions and conclusions sections in order to match the title and the objectives of the work. The title of the manuscript was also modified to : “Spatial variability of the direct radiative forcing of biomass burning aerosols and the effects of land use change in Amazonia”. This new title reflects much better the objectives of this work.

P.14843, L.12 – “In this work, if the average cell broadband albedo was less than 0.140 it was classified as forest; if the average broadband albedo was greater than 0.155 the cell was classified as cerrado; otherwise (albedo values between 0.140 and 0.155) the cell was classified as a transition region”. – This classification approach should be discussed and validated or could be used some land cover maps available.

Thank you for bringing up this important question. The broadband albedo reported in CERES-SSF product is already derived from the International Geosphere-Biosphere Programme (IGBP) land cover map. In our study, we have denominated regions with high albedo (larger than 0.155) as cerrado. Nevertheless croplands and pasture areas should also be included in this category. We have now added an explanation and revised the whole text in order to make this point clear.

P.14843 – L.26 - the satellite timepass — the satellite overpass

This suggestion was accepted and incorporated to the revised manuscript.

P.14844, L.26 – “the visual inspection of MODIS red, green and blue (RGB) composite images. - Which bands are used in this composite image ?

MODIS’s channel bands 1, 4 and 3 were used in the composite images. These bands are centered in 648 nm (red), 555 nm (green) and 470 nm (blue). This information was now included in the revised manuscript.

P.14846 – L.12 – forest covered areas (F1), deforested (D1 and D2) and forested (F2) regions (Table 1) — What is the difference between F1 and F2 in terms of land cover?

There are no significant differences between areas F1 and F2 in terms of land cover. Area F2 was used in the assessment of the land-use change radiative forcing (LURF) in order to assure that the deforested and forested regions selected for this study are located around the same latitude ranges, and therefore the mean solar zenith angle during the satellite overpass is similar in both areas.

P.14858, L.21 - models, IEEE T. Geosci. Remote — IEEE T. Geosci. Remote Sens.

This reference was corrected in the revised manuscript.