**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "**Atmospheric emissions from vegetation fires in Portugal (1990–2008): estimates, uncertainty analysis, and sensitivity analysis**" *by* I. M. D. Rosa et al.

Anonymous Referee #1

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Overview of Manuscript

In this manuscript, the authors present estimates of vegetation fires emissions over the period of 1990 to 2008 for Portugal through the product of area burnt, density of biomass, combustion factors and emission factors-based land cover types. Also, sensitivity and uncertainty analysis were done in model variables to estimate the errors involved in the wildfires atmospheric emissions. The main result obtained in this work is the relationship between burn area and greenhouse gases emissions that could be used to estimate pyrogenic emissions for Portugal from remote sensing burned area products. The manuscript is well written but a few errors could be found in the text and

in references, the most important are described below, but a detailed revision is required to final paper. The paper address relevant scientiïïňÁc research that ïňÁts within ACP scope. However, some parts should be more focused, such as error analysis. There are so many figures (13) and it could be condensed in approximately 7-8.

Specific Comments

Abstract

Line 11: CO2eq is not declared.

Introduction

Line 19-25: First paragraph should be at the end of introduction.

In Introduction, a paragraph with state-of-art in biomass burning emission is desired. Also, new methodologies that involve fire radiative power (FRP) and the ECMWF MACC system - which is running real time forecasts from FRP data to Europe, could be cited.

Wooster, M.J., Roberts, G., Perry, G.L.W., Kaufman, Y.J., 2005. Retrieval of biomass combustion rates and totals from fire radiative power observations: FRP derivation and calibration relationships between biomass consumption and fire radiative energy release. Journal of Geophysics Research 110, doi:10.1029/2005JD006318.

Pereira, G., Freitas, S.R., Moraes, E.C., Ferreira, N.J., Shimabukuro, Y.E., Rao, V.B., Longo, K.M., 2009. Estimating trace gas and aerosol emissions over South America: Relationship between fire radiative energy released and aerosol optical depth observations. Atmospheric Environment 43, 6388-6397.

Freeborn, P.H.; Wooster, M.J.; Hao, W.M.; Ryan, C.A.; Nordgren, B.L.; Baker, S.P.; Ichoku, C., 2008. Relationships between energy release, fuel mass loss, and trace gas and aerosol emissions during laboratory biomass fires. Journal of Geophysical Research 113, D1, D01102, 10.1029/2007JD008489.

Kaiser, J.W., Flemming, J., Schultz, M.G., Suttie, M., Wooster, M.J., 2009. The MACC Global Fire Assimilation System: First Emission Products (GFASv0). ECMWF Technical Memorandum 596, 1-17.

Pg. 22049

Line 2: (Brown et al., 2000) must be (Brown and Smith, 2000)?

Line 9: In Miranda et al. 2009, year must be 2009a or 2000b.

Line 11-12: Hodzic et al. 2007 is not on reference list.

Line 21-22: the word estimate appears twice in the same sentence, replace one of them or delete.

Pg. 22050

Line 13: CO2eq is not declared. A suggestion is to describe the meaning of CO2 Equivalent to readers.

Line 12: Replace the word Portuguese "de" after CO2eq.

Line 19-21: This paragraph seems a little bit confused, a suggestion is to rewrite.

Line 22: What are the 3 factors considered by Schultz?

Line 26: (Barbosa et al., 1999) is not on references.

Line 27: (Korontzi et al., 2004) is not on references.

Pg. 22051

Line 11: prone could be replaced by susceptible.

Pg. 22053

In description of table 2, Fernandes et al. 2000b must be correct in references. There are two references of Fernandes et al. with same years.

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Emission Factors topic

I think that Yokelson et al. (2008) should be referenced and maybe the difference in Emissions factor of Andreae and Merlet (2001) with this could be associated in uncertainty analysis.

YOKELSON, R.J.; CHRISTIAN, T.J.; KARL, T.G.; GUENTHER, A. The tropical forest and fire emissions experiment: laboratory fire measurements and synthesis of campaign data. Atmospheric Chemistry and Physics, v. 8, p. 3509–3527, 2008.

Why do not use emission factors derived in Zarate et al. (2000) in generalization between "Savanna and grassland" in agricultural emission?

I. Ortiz de Zarate, A. Ezcurra, J. P. Lacaux, Pham Van Dinh, Emission factor estimates of cereal waste burning in Spain, Atmospheric Environment, Volume 34, Issue 19, 2000, Pages 3183-3193, ISSN 1352-2310, DOI: 10.1016/S1352-2310(99)00254-X.

Results

Pg. 22060

Line 1-7: The results showed in this paragraph isn't easily understood in figure 2. I think Figure 2 and 3 could be grouped in only one figure. A new figure could show the results of this paragraph. Also, what does means the class "burnt in 1990 to 2007 / 1990 to 1998 and 1998 – 2007"?

In Figure 12, errors bars could be placed to indicate annual variability and statistical test must be performed such as Efron (1982) and student-t test.

Efron, B., 1982. The Jackknife, the Bootstrap, and Other Resampling Plans. Society of Industrial and Applied Mathematics CBMS-NSF Monographs. 38.

This methodology used four fundamental parameters well-known in literature but an accuracy assessment and intercomparison is needed in context of emissions. This could be made using CO retrieved from Atmospheric Infrared Sounder (AIRS), SCIAMACHY

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or MOPITT.

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