**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "The Wildland Fire Emission Inventory: emission estimates and an evaluation of uncertainty" *by* S. P. Urbanski et al.

Anonymous Referee #1

Received and published: 9 October 2011

This manuscript described the description of the Wild Fire Emission Inventory, an emissions model to develop emission estimates of CO and PM2.5 from wildfires in the western U.S. The emissions model uses a near real time burn area product derived from MODIS observations, different fuel loading maps, and consumption/emissions models. The manuscript further provides a detailed evaluation of the uncertainties associated with the estimation of the emissions. The evaluation considers not only the uncertainties associated with various inputs to the emissions model, but also evaluates the impacts of spatial and temporal resolution on the results from the emissions model. Overall, this is a strong paper that describes a model and outputs relevant to the Atmospheric Chemistry & Physics community. The procedures applied are very good and provide a good compliment to other emissions models available. The authors also provide valuable suggestions in the Future Developments section. Although I believe that

an application of the emission estimates would make this paper stronger, the methods and results here are appropriate for publication in this journal. I have only minor comments that should be addressed before publication is recommended.

General Comments: PM2.5 and CO emissions are useful; however, why wasn't the emissions of other important compounds calculated? Are these available?

The authors present a robust analysis of the uncertainties in the wildfire emissions estimates. The analysis of these uncertainties across temporal and spatial scales is particularly valuable. If one is to apply this model or emissions, is there a recommended set of model combinations (e.g., fuel loadings and consumption models) that the authors suggest, or is a user to run the ensemble of options and use the mean values? It is not entirely clear what is to be used in air quality applications. As a follow to that, in the tables that present the annual results by state (Tables 2-5), are these the annual mean values?

Although this emissions model is applied to the western U.S. only for this particular study, the authors also state that this model can be used elsewhere. However, I understand that FOFEM and CONSUME are constrained for use with fuel maps that have been specifically developed for the U.S. (as are the maps of fuel loadings applied here). Can the authors comment on how this can be applied in other regions?

How consistent are the fuels maps used in CONSUME and FOFEM?

Why were only measurements from field studies used for the emission factors, and not laboratory studies? This study developed best estimates for emission factors of CO and PM2.5 from forested and non-forested landscapes. What were these? It would be interesting to see the PDF for the EFs that were applied in the uncertainty analysis.

Specific Comments: Page 23356, lines 29-31: How much difference does it make to have the contextual filter for the burn scar detection changed to 3km and 5 days (from 5km and 10 days)?

Page 23361, line 13: add the word "consumption" before algorithm to clarify.

Page 23366, Equation 2: How was this relationship developed? Is it defined within one of the references cited?

Page 23367, line 9: How were the data aggregated to the different scales?

Page 23373, line 17: What is FLM 011?

Discussion section 4.1: in this section, are you discussing a particular scenario, or the mean of the all of the simulations?

Page 23377, line17: Change to "inventories (BB EI) that cover"

Page 23382, line 25: Remove the extra "in" and change "this" to "these"