Atmos. Chem. Phys. Discuss., 8, S6619–S6621, 2008
www.atmos-chem-phys-discuss.net/8/S6619/2008/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "The effects of global changes upon regional ozone pollution in the United States" *by* J. Chen et al.

Anonymous Referee #1

Received and published: 2 September 2008

The authors have conducted an assessment of future climate and emissions effects on meteorology and ozone air quality in the United States. They have been more comprehensive than other studies that have considered similar research questions, in particular by modeling/downscaling effects of global scale changes on land cover, biogenic emissions, and meteorological conditions within the United States. Also they modeled spatial patterns of population growth within the U.S., and effects of those changes on land use/land cover.

A criticism of the future scenario is that it is unduly pessimistic and unrealistic by failing to include the effects of technology change and emission control rules on U.S. emissions, which will surely be a significant effect between the 1990s and 2050. The authors note their future scenario provides an upper bound on climate change by us-

ing the A2 scenario (rapid growth) and neglecting technology change within the U.S. Why not use the U.S. emission forecasts from the A2 scenario rather than assuming no technology change? The authors assumption of no technology change for the U.S. is not even consistent with the relatively pessimistic A2 scenario.

Another concern is the incomplete model evaluation that has been reported. The authors report model performance for summer months only (JJA), but then consider changes in future ozone and emphasize the importance of shifts in ozone during winter and spring. Table 2 and and Figure 6 need to be expanded to evaluate model performance for all 4 seasons (DJF, MAM, JJA, and SON for instance). The current presentation leaves this reader presuming that model performance was not so good during other seasons. Since there is significant emphasis in the paper on ozone changes during non-summer months, model evaluation for the base case is needed at those times as well. The meteorological evaluation (Figure 4) includes all 12 months, so clearly the authors are thinking about changes over the full year.

It is not clear from the text at the top of p. 15175, whether the changes in land use/land cover that the authors estimated were fed in to the fire scenario builder, or were only the changes in future meteorology from MM5 included? Also there will be important history effects of fire suppression policies and accumulated/remaining tree cover on fire frequency and extent in 2050, so I question whether it is appropriate to jump from the 1990s to 2050 without representing what happens in the intervening years.

Table 2: clarify with footnotes what average ozone conditions vs. episodic ozone conditions mean. Indicate that results shown are for JJA only. Add evaluation data for the other three seasons as separate parts of the table.

Figure 9 needs a legend to indicate the two sets of bars correspond to (I suppose) current and future climate scenarios.

Figure 11 caption says similar to Figure 7, but I think the authors mean to refer to Figure 6 instead which is more clearly analogous. For clarity, please indicate in Fig 11 caption

ACPD

8, S6619–S6621, 2008

Interactive Comment

that both current and future cases are *modeled* ozone distributions.

It would be helpful for a broad readership to relabel the EPA Region numbers appearing in Figures 5, 6, and 11 using more intuitive and readily understood names. This will help readers who aren't familiar with the details of EPA's somewhat obscure regional organization structure. For example, "Northeast" would work better as a label than "R1-3". Figure 5 does give this information indirectly, but it would be better to be able to understand Figures 6 and 11 without having to refer back to Figure 5.

In Figure 12, are the number of ozone episodes (in brackets) total episode days or total number of episodes (counting multi-day episodes as 1 episode)? It would be preferable to report the number of episode days, since the distribution of episode duration is shifting as well, a comparison of number of episodes is misleading if they are not the same duration between current and future cases.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 15165, 2008.

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8, S6619–S6621, 2008

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