Atmos. Chem. Phys. Discuss., 11, C2856–C2858, 2011
www.atmos-chem-phys-discuss.net/11/C2856/2011/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Projections of UV radiation changes in the 21st century: impact of ozone recovery and cloud effects" *by* A. F. Bais et al.

Anonymous Referee #1

Received and published: 6 May 2011

General comments: The paper by Bais et al. presents updated results of UV radiation projections for the 21st century. The paper is well-written and suited for publication in ACP. The paper is acceptable for publication after consideration of the comments below.

Specific comments:

1) Page 10771, lines 11-15. It is stated that at high latitudes the UV-Ery will decrease by 12% (line12). In line 15 it is stated that another 2-3% reduction is due to cloud effects. Does this imply that cloud effects are not included in the 12%? Should 2-3%

percent be added to the 12% to get both ozone and cloud effects? Please clarify.

2) Page 10772, lines 23-25: "They examined the changes between 1965 and 2095 and therefore they isolated the effects of climate change from the effects of ozone depletion/recovery." How was ozone and cloud effects isolated by studying the changes between 1965 and 2095?

3) Please include a list describing all acronyms used in the paper.

4) Page 10773: Please include a list of all CCMs used in the paper. Include references to the models, resolution, whether they could calculate CMFs, their contributions/use in the paper, etc.

5) Page 10774: Mean optical properties are used to calculate the changes in surface UV-radiation. Usually the mean of the radiation for a time period is different from the radiation calculated using mean values for the same time period as inputs. For example, the mean radiation for a day is different from the radiation obtained using the mean solar zenith angle (or mean of the cosine of the solar zenith angle). The authors have to show that their approach using means as input is valid. Monthly averaged ozone and cloud fields are input to the radiative transfer model to calculate the UV-Ery changes for local noon. How are these changes affected if daily ozone and cloud fields are used instead? What happens with an even better temporal resolution?

6) Page 10775, lines12-14: It is stated that "However, the CMF calculations depend less on the accuracy of the radiation schemes employed in the CCMs, and more on how clouds and their effects on radiation are represented in each model." May you please elaborate on this?

7) Page 10775: For the 5 CCMs that calculates CMFs: Please describe the cloud models used in the various models (maybe a Table?). What are the similarities and differences between the cloud models? How are the clouds represented in the CCMs?

8) Fig. 2. To strengthen the validity of the model simulations in Fig. 2 it would be

beneficial to include similar "measured" numbers estimated from satellite data from the late seventies until present (TOMS etc.). If the present model runs are correct, the peak in the change should be present in the satellite data as well.

9) Is altitude accounted for in the RT simulations? If so, which topography map was used? If not, what is the effect of neglecting altitude?

Technical comments:

Page 10793, table 2: What is the meaning of (2035), second row, third column?

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 10769, 2011.