

***Interactive comment on “Anthropogenic changes in the surface all-sky UV-B radiation through 1850–2005 simulated by an Earth system model” by S. Watanabe et al.***

**Anonymous Referee #1**

Received and published: 12 March 2012

This manuscript described a well-designed study that provides considerable insight into the causes of historical and future changes in surface UV-B radiation. By employing additional diagnostic radiation calculations to simulations with natural forcing only, greenhouse gas forcing only, and aerosol forcing as well as natural and greenhouse gas forcing, the study isolates the influences of tropospheric and stratospheric ozone (each having different spatial signatures), direct and indirect effects of aerosols, and cloud changes due to climate change from increasing greenhouse gases. The presentation is for the most part clear, with an appropriate selection of figures that effectively illustrate the key points. Only a few changes are needed before this work is published.

C496

1. Page 4226, lines 5–9. How valid is the linear approximation? It is easy to imagine changes in GHG affecting the aerosol, or changes in aerosol affecting the ozone. 2. The distinction between clear-sky and all-sky is unclear and confusing. I understand you are showing the “contributions of clear-sky part (Fig. 3d–f) and cloud forcing (Fig. 3g–i) to the all-sky UV-B changes”, but I find the repeated mentioning of all-sky UV confusing. The text always refers to the all-sky UV-B change, even when discussing clear-sky processes such as ozone. Is the all-sky adjective really needed? I think it would be more accurate to say clear-sky UV when discussing clear-sky processes. I’m not sure what to call the cloud forcing component.

---

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 4221, 2012.

C497