

***Interactive comment on* “The effects of a solar eclipse on photo-oxidants in different areas of China” by J.-B. Wu et al.**

Anonymous Referee #2

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The authors use the WRF-Chem model to examine the effect of a total solar eclipse on atmospheric pollutants occur over China. The overall idea is excellent and the scientific results and conclusions are presented in a clear, concise, and well structured way. However, the scientific quality, relative to the reproduction of the radiation change due to the solar eclipse, is quite poor and this affects strongly the results and the scientific value of the manuscript. The authors try to reproduce the solar eclipse by varying the solar constant and the photolysis rates to the same extent. The variations are introduced by the use of a scaling factor dependent on latitude, longitude and time. Then, they try to validate this hypothesis with downward solar radiation measurements, for which, it is true, the variation during the time of the eclipse is approximately proportional to the obscuration of the sun. However, it has been shown clearly in recent studies (both in ACP, Emde and Mayer(2007), Kazantzidis et al. (2007) and references

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therein), that the effect of the eclipse on surface irradiance has spectral characteristics due to the limb darkening. According to those studies, the reduction (relative to non-eclipse conditions) in UVB is almost 1.5 higher than UVA and visible. This effect should be introduced in the WRF-Chem radiation scheme, since it affects significantly the photochemical calculations of this study. In this case, most of the scientific work and analysis should be redone. So, I recommend the rejection of the manuscript.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 2473, 2011.

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