Geosci. Model Dev. Discuss., 8, C171–C172, 2015
www.geosci-model-dev-discuss.net/8/C171/2015/

Geoscientific Model Development Discussions
Open Access

Interactive comment on "Application of WRF/Chem version 3.4.1 over North America under the AQMEII Phase 2: evaluation of 2010 application and responses of air quality and meteorology–chemistry interactions to changes in emissions and meteorology from 2006 to 2010" *by* K. Yahya et al.

Anonymous Referee #2

Received and published: 17 March 2015

This paper evaluates the WRF/Chem model performance and responses of air quality and meteorology-chemical interactions to the meteorological and emission changes in 2006 and 2010. By comparing the model prediction of WRF/Chem and WRF, the chemical feedbacks to meteorology are assessed. And a series of sensitivity simulations are pursued to distinguish the differences driven by emission changes, meteorological

variation, and Chemical ICONs and BCONs. This paper is valuable to understand the WRF/Chem model performance in catching the yearly variations, and reveals the necessity of improving the accuracy of emissions and chemical BCONs, the SOA module, and the chemical-meteorology feedbacks in the online-coupled model. Nevertheless, several important points should be addressed to support the paper conclusions.

(1) In section 3.5, "The trends for Precip and CF for simulated variables are not consistent with observed trends from 2006 to 2010. Observed NADP Precip increased slightly from 2006 to 2010 by ∼7%, however both simulated WRF and WRF/Chem show a small decrease from 2006 to 2010...." . Can the authors explain why the model fail to reproduce the trends of precipitation and CF between 2006 and 2010?

(2) In the conclusion section, " In general, the model performs well in terms of Corr and NMEs for almost all meteorological and chemical variables in 2006 but not as well in 2010 despite lower NMBs for most variables in 2010, due mainly to inaccuracies in emission estimates and chemical BCONs and ICONs used for 2010 simulations". But the inaccuracies of emission estimates in 2010, comparing with 2006, have not been in-depth explained in the manuscripts, e.g., section 3.2. Please revise.

(3) Figure S2, S5, S8-10, S12 are not in good shape. Please revise.

(4) Figure 13 and 14, please add the explanation of each column, e.g., the Run 2- Run 3 depicts the differences resulted by the emission changes between 2010 and 2006.

Interactive comment on Geosci. Model Dev. Discuss., 8, 1639, 2015.