Atmos. Chem. Phys. Discuss., 15, C5594–C5595, 2015
www.atmos-chem-phys-discuss.net/15/C5594/2015/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Influence of aerosols and surface reflectance on satellite NO_2 retrieval: seasonal and spatial characteristics and implications for NO_x emission constraints" *by* J.-T. Lin et al.

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Received and published: 4 August 2015

The paper describes a satellite based method to conclude about anthropogenic emissions. This is important especially in regions with strong temporal variations of emissions as China. Important is the handling of aerosol influences upon the NO2 retrieval including modelling and AOD measurements. Independent from the statements that current MAX-DOAS measurements are very limited over China it would be helpful to show a comparison between the ground-based and satellite-based remote sensing of

NO2 vertical column densities and how the integration of ground-based remote sensing would improve the final results.

Response: We thank Dr. Schaefer's comments.

There are currently insufficient ground-based measurements to systematically evaluate satellite products over China. In our conclusion, we wrote:

"There are no sufficiently comprehensive independent measurements available to systematically evaluate the various NO2 retrieval approaches. Current MAX-DOAS measurements are very limited over China, with few sites and short operation periods (Irie et al., 2012; Ma et al., 2013; Hendrick et al., 2014; Kanaya et al., 2014). In situ measurements are rare for vertical profiles of aerosols and NO2. Our results show that the effects of aerosols and surface reflectance are highly season- and location-dependent. This clearly indicates the need for a comprehensive measurement network to validate satellite data. Nonetheless, our present study and that of Lin et al. (2014b) point the way forward for a physically more realistic NO2 retrieval by explicit inclusion of aerosol effects."

The insufficiency is because there is large spatial and temporal variability in the complex effects of aerosols and/or surface reflectance treatments, as clearly shown in our manuscript. Satellite product evaluation using limited ground-based datasets has been done in many previous studies (see the references in the above quotation), including our own work (Lin et al., 2014b). Except for those in Lin et al. (2014b), most ground-based data are not available to us currently.

In the revised abstract, we have further clarified that:

"A comprehensive independent measurement network with sufficient spatial and temporal representativeness is needed to further evaluate the different satellite retrieval approaches."

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 12653, 2015.