

Sundström et al.;

On the use of satellite remote sensing based approach for determining aerosol direct radiative effect over land: a case study over China

### **Response to Reviewer #2 comments**

We thank the Reviewer for valuable comments concerning our manuscript. These suggestions clarified the presentation and quality of the original manuscript. Please find below authors response (A) to Reviewer's comments (R):

#### **General comments:**

**R :** *Abstract. The abstract does not really reflect the content of the paper. It summarizes the application of the methodology on the selected case study rather than summarizing the discussion on the methodology. The authors should consider revising this.*

**A:** The abstract has been revised.

**R :** *Discussion on Figure 2: What is the relevance of Figure 2 at this point of the text? To demonstrate the variable aerosol type conditions over the area? Since this paragraph is in a section named "Reference data" the reader gets the impression that these data are part of the methodology. Is this the case? If yes please be more specific where these are used in the methodology. As it is structured it is confusing.*

**A:** We have reorganized the structure of Section 3. Figure 2 is included to illustrate the aerosol type and variation that are observed within the study area. The simulations are carried out to get a priori estimate of ADRE pattern over the study area, and more specifically to see where ADRE is most likely negative and positive. These simulations, as they are presented in this section, are not part of the methodology, and they have not been used to define the satellite-based ADRE. The normalization procedure that is introduced later in the text (Sec. 4.2) uses also RT-simulations, that are different from these a priori estimates.

**R:** *Page 15120. Line 8. The authors have used LibRadtran to simulate TOA-fluxes for different scenarios. It would be good to give brief summary of these (e.g. range of input values, which combinations have been selected etc).*

**A:** A short description of the LibRadtran inputs has been added.

**R:** *Section 4. This section is hard to read. It would be very useful if the authors introduce in the beginning the steps applied (using eventually a block diagram) and then discussing each one in more detail. As it is written, although the information is there, it is confusing.*

**A:** We have reorganized Section 4, and divided the section into three different subsections. In addition, one new figure, a block diagram, has been added to illustrate the different steps in determining the instantaneous ADRE from the satellite observations.