

## General comments

This is definitely an improved version of the paper. It benefits from reorganization and it is much clearer now which parameterization schemes are updated compared to the reference version of the model. However there are still some small comments which should be taken into account before publishing the paper.

General points which should be taken into account in the paper:

- The authors added some more references to relevant studies on the impact of different parameterization schemes on model simulations but did not discuss or described (e.g. with numbers) the findings in the paper. That would stress the impact different parameterization schemes can have in the model.
- “Regarding the anthropogenic aerosol emissions, it is true that so-called unspecified primary anthropogenic aerosols are not included in the presented configuration of the model. The reason is availability of such emission inventory for the global emissions. It is not present in ACCMIP inventory. In explaining the difference between SIM2 and observations we mentioned only secondary aerosols, because their quantities are probably more important for the influence in AOD. Of course, we can be sure about it only after completely introducing secondary aerosols in the model.”
  - A short discussion on this issue could be added to the discussion section.

## Specific comments:

### 2 General description of the model

- p.5, end of second paragraph: Please change to aerosol specie
- p.5, last paragraph: Please give a reference for the GADS data

### 3 Aerosol parameterization in the model

#### 3.2 Sedimentation

- Could you please give a reference for the ‘assumed value of the kinematic viscosity’ or explain shortly how there are defined.

#### 3.3 Wet deposition

- This section is much clearer now and the difference between the ‘new’ and ‘old’ scheme is also explained better.
- It might be helpful to include some short headings (without a chapter number) as for example for the fraction of cloud cover of precipitation forming clouds
- p. 10, l.1 This sentence is confusion please rewrite

#### 3.4 Emissions

- p. 13, 3.4., ll. 4-6. Please rewrite the sentence.
- Why is the reference year 1996 chosen? There should be emission databases from more recent years available. Please explain
- p. 13, 3.4., ll. 6-10 This sentence is confusion, please rewrite.

##### 3.4.1 Sea-salt source function

- p. 15, l.18, please change sentence: The difference between **the** two can be **as** large as ...

##### 3.3.2 Desert dust emission schemes

- p. 16, l.14, please change to: Laurent et al. (2006)
- p. 16, l.20, please change to: [...] in different **the** model configuration [...]

#### **4 Observations**

- Please mention also that the EMEP stations are background stations.

#### **6 Results**

- p.18, last sentence, Where in the text can the information on the shift in the size distribution be found? If there is no figure please mention that.
- p. 18+19, Figure 3 is only briefly mentioned in the text but not explained. If there are important findings from this figure please describe them, so far the conclusions described in the text can be also be drawn from figure 2.
- p. 19, l. 14, where does these numbers come from? There are not in the table or the figure.
- P. 21, l. 4, Please change 'Figure 3' to 'Figure 6'
- p. 21, l. 11+15, Where do these numbers come from? Is that averaged over the whole time period?
- p. 22, Fig. 10c is mentioned first in the paragraph (before a, b) please consider reordering the figures.

#### **Figures:**

- Figure 5, What is the green color representing, what are the numbers in the legend? Please clarify