Review on the “Modeling a typical winter-time dust event over the Arabian Peninsula and the Red Sea” by Kalenderski et al. (acpd-12-26607-2012).

This is a modeling study on dust over the Arabian Peninsular and the Red Sea using WRF-Chem. They argue that dust emission from the region is large with the significant impact on the radiative budget based on their simulation result. It is an interesting case study considering that there are not many modeling studies on this subject but I have a few major questions.

Major comments:

1) Why it is typical winter-time dust event? The simulation lasts for 2 weeks in 2006 with 2 major dust events. It looks me a case study in winter. Is the transport of dust from the Arabian Peninsula to the Red Sea common?
2) It needs more vigorous model evaluation. There is no validation of meteorological parameters such as wind vector and boundary layer height. Reanalysis data may be helpful in this regional scale study. Modeled dust is compared with MODIS images in Figure 1 and 5. MODIS image in Figure 1 covers only part of the domain (~45E) and it should be extended to ~60E. MODIS AOD in Figure 5 mostly empty and it looks like due to the cloud contamination. If there is no clear case during the period, you may consider integrating 2 weeks period for model and MODIS comparisons. The comparison with AERONET in Figure 6 needs statistical score. Please check the performance of the model using RMS and BIAS.
3) It needs to consider the transported dust from the North Africa to the Arabian Peninsular. A sensitivity test for the transported dust would be helpful for explaining the transport effect to the current result.
4) Unlike to the description in section 4.1.2, the original GOCART model is a bin model (~10 micron) not a modal model. It needs discussion about the change due to the altered model configuration. Also the particle size (dg) needs to be clarified.

Minor comments:

- It would be nice if you can add a discussion about why winter is chosen.
- The results follows wavelength of 600 nm for modeled dust. Common wavelength for modeling study is 550 nm as MODIS retrieve AOD for that wavelength. Please add discussion on the selecting 600 nm.
- MENA is used to name the study region. But there is already common name such as “dustbelt”. I would suggest to provide “longitude-latitude boundary” if you keep MENA in the text.
- Please check the order of authors in the citation. (Zender et al., 2004) is looks correct, not (Tegen et al., 2004).
- page 26609 line 23: You may need more descriptive on how “little” is. Please provide some literature study.
- Only GOCART module is used for this study. Description of chemistry in WRF is not necessary for this study (p 26611, line 19-p 26612, line 7).
- Show full name of GOCART, AERONET, and MODIS.
- Is assimilation used for WRF simulation?
- page 26615 line 16-18: Be more specific about the location of “north, south, middle”. I would suggest to add lat-lon in the text of add legend in figure 2.
- All figure titles are in captions, makes hard to follow. It would be better put titles in panels. Also font size in figures needs to larger.