

## ***Interactive comment on “Development and testing of a desert dust module in a regional climate model” by A. S. Zakey et al.***

**Anonymous Referee #4**

Received and published: 27 April 2006

**Review of the paper by Zakey et al., ACPD, 2006.**

This paper presents the implementation of a dust emission module into the RegCM regional transport model. The model uses the state-of-the-art parameterizations required to simulate accurate dust concentrations fields. To estimate the model performances, three test cases are performed and discussed. These cases represent very local and specific events to a (short) climatology (3 months). The paper is well written and well-suited for publication in ACP. However, a few minor remarks and questions are addressed in this text, required to remove some shaded parts in the paper.

The title is not adapted: All dust modules implemented into RegCM are already well

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper

known. Since no major changes or research 'development' were done in this paper, we suggest to replace 'Development...' by 'Implementation...' which seems to be more realistic.

**Abstract:** - please explain the *mesoscale low* term. A missing word?

### 1. Introduction:

- "*intense*" -> "up to a threshold value"
- join the several Shao references into one.
- replace development by 'a dust module extension...'

### 2.2.2 "soil aggregate distribution":

this point is the key of accurate dust emissions fluxes. Please explain better the methodology used to describe soil texture and how you are dealing with it. For example: what is exactly the source of the 'global 10 min data file'. Is it public? on the web? developed specifically for dust use? or some others applications?

### sections 2.2.2, 2.2.3, 2.2.4

seems to be strictly the same descriptions and explanations than the original ones published and cited. Since there is nothing really new about these points, the paper would be improved with a shortened text on these parts.

### 2.4:

the text is not very clear with the choice of the bins. The bins chosen for dust emissions seem to be different than the bin used for the AOT calculations during the long-range transport. We can imagine that a complex function has to be used to shift from the first to the second one. But a lot of error may be also be done with this type of calculation. Please be more explicit about this critical point and show that the transfer from a bin distribution don't lead to error in the results.

### 3.1 The northeast africa case:

The authors write that this case is performed without any boundary conditions and

initial conditions. To avoid spin-up in dust modelling is a severe hypothesis and may induce large errors (mainly under the form of concentrations underestimations). Is it possible to prove (using satellite data) that the days before corresponds to 'undusty days', making valuable this hypothesis?

### **Meteorological comparison:**

The comparison between ERA40 outputs and RegCM is not essential (and the *Figure 2* is very small and difficult to read). First, it is strange to have different large-scale patterns since the large-scale forcing is ERA40 in both cases. Can you explain this? Second, please explain the interest to use RegCM if the model resolution is the same before and after (?) Is it for specific turbulent parameterizations? Please also be more explicit on the respective resolutions (information not found in the paper)? (could be added in section 2.1?)

### **10m wind speed:**

Figure 2 presents wind fields patterns comparisons and the authors said that the wind is representative of the first model level (25m). Why this comparison is not achieved using the 10m height wind fields? This will be more 'usual' (a major part of meteorological comparisons are done using 10m wind fields because of the world standard wind measurements on mast at this height above ground level). In addition, the whole set of parameterizations (Marticorena and Bergametti 1995, Alfaro and Gomes, 2001) used parameters and coefficients fitted on data recorded at 10m height (we thus made here the hypothesis the authors have these wind speed values).

### **conclusion**

- *In the seasonal...* Two vertical dust layers are diagnosed with the model. One is between 2000 and 5000m. How many grid cells are in this interval to represent this layer? i.e. this large vertical extension is due to a low vertical resolution or to a realistic dust layers?

---

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 1749, 2006.

S671

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper