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Atmospheric Chemistry and Physics Discussions

Interactive comment on "An integrated modeling study on the effects of mineral dust and sea salt particles on clouds and precipitation" *by* S. Solomos et al.

Anonymous Referee #2

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GENERAL COMMENTS: This paper uses a recently developed integral modelling system to assess the influence of aerosols on cloud formation and precipitation with idealized and realistic case studies. It addresses an interesting and highly relevant topic of atmospheric science that fits well with the scope of ACP. The analysis is scientifically sound and the paper logically structured, but the presentation needs substantial revision. The language needs to be improved and the text and figures should be shortened. The Introduction needs clear objectives that are referred to in the conclusions. Other major and minor points of criticism are listed below.

MAJOR COMMENTS: 1) Length and scope: The paper is much too long. This is mainly due to the fact that a model description, and idealized and realistic case studies are squeezed into one article. In my eyes the former should be compressed as much as possible. Most new model features are taken from elsewhere and could simply be referenced here. You should not explain all possible options, but only the ones you use here. In a way, it would be better to publish the model development as a technical note separate from the science article. The actual results section also needs some shortening and streamlining. 2) Structure: All the results are packed into one long section 3. In my opinion, one section about idealized and one section about realistic simulations would be better. You then need several clearly focussed subsections to these main sections. Give clearer motivations and introductions for each experiment and try to link the different parts better with each other. 3) Language: Particularly in Section 3.2 but also elsewhere, the language needs improvement. Examples of bad style are repetitions such as 2 times "aerosol-cloud-climate interactions" in L9 and 2 times "air quality and meteorology" in L12-13 in Abstract. Wordings such as "A description ... is described" (end of section 1) sound bad. There are also grammatical errors such as subject-verb disagreements and wrong prepositions. 4) Usage of "air-quality": I was somewhat surprised to see that the expressions "air quality" and "polluted" are used here as a synonym for "aerosol content and characteristics". In my eyes the former has a lot to do with impacts on humans while the latter is more neutral and more appropriate here. For example, maritime air is rich in sea salt, but would be considered of high quality. 5) Figures and tables: There are too many figures and tables. Go through all of them and check what is really needed and what could be combined or compressed. Captions are generally too short and do not contain all necessary information. Many numbers or labels are much too small. All panels should have labels a,b,c etc. for clear reference in the text. Omit unnecessary headings.

EDITORIAL COMMENTS: 1) Punctuation: Lots of strange commas or missing commas throughout the text (e.g. L2). Does ACP use British or American enumerations? Check carefully throughout. 2) Tense: A lot of use of past tense. Present tense is often

better, as it makes a paper livelier. 3) Abstract: You don't really do a single-cloud study, do you? Please separate clearly what comes out of the idealized and what from the realistic model study. Say more clearly what you are doing and what the main conclusions are. What is new, what has been known before? 4) Hyphenation: Decide whether you want to write "sea-salt" or "sea salt" and stick with it. Check for other examples. 5) References: Chronological, then alphabetical order. If you use a,b etc., a should come first. 6) Abbreviations: Define at first usage and then use throughout (e.g. IN). 7) Geographical terms: Be consistent. I would write northern (not Northern) Africa for example. 8) Avoid first person, unless you would like to convey a personal opinion. 9) 23961, L7: Why old IPCC report? 10) 23962, L4-5: Parts before and after "and" say the same. 11) 23965, L11: What is meant by the "the particle radius" here? 12) 23968, L23: Is vapor a hydrometeor? 13) 23969, L21: Schulz (also 23977, L10) 14) 23970, L 10: What is "winter weather type"? 15) 23970, L11: 3x wind in one line. 16) 23971, L 19: "clouds suppress precipitation" sounds odd. 17) 23971, L24: Do you mean hazy here? I am confused. 18) 23974, L2-7: A lot of bad terminology here. What is a "cold cyclone"? What do you mean by "second air mass"? Is that the warm sector of the cyclone? When you talk about air masses interacting, do you mean frontal uplift? Say exactly where the convection is triggered. When you say northeasterly, do you mean northweastward? "Hail dispersed" sounds odd. 19) 23974, L17ff: Rather technical and should be integrated into section 2. 20) 23975, L3: I see more than 2 main dust sources. 21) 23975, L6: How do you vary chemical properties from source to source? 22) 23976, L2: What do you mean with "average location" here? 23) 23976, L8: Omit "qualitatively and". 24) 23976, L14: Why is shear important here? 25) 23978, L2-3: Process rather than procedure? The increase in THETAE is not very clear. 26) 23979, L10 and elsewhere: I don't think it is appropriate to give bias improvements in %. 27) 23979, L11: Air mass type is not only about aerosol, it also includes temperature, moisture and stability. 28) 23979, L14-15: Sentence should be dropped. 29) 23979, L18 and elsewhere: I would say it is all the same case, but a different sensitivity experiment. 30) 23980, L1-11: Too general. Try to write a very

focused and concise conclusion section. This is what most people read. 31) 23980, L17: "clouds suspended precipitation" sounds odd. 32) 23982, L10: I don't recall this number from reading the paper. Don't introduce new results here. Summarize and discuss. 33) 23981, L22: basis? 34) 23982: Bias is standard and does not need to be explained. Omit Appendix. 35) The reference list seems a little too extended for my taste. Can you concentrate more on key publications? 36) Table 1: Basic equations in plural. DA: Do you mean analysis data? 37) Table 2: not really needed. 38) Table 4: Strange use of word "air mass". 39) Combine Figs. 4 and 6. 40) Green lines in Fig. 8 are almost impossible to see. Quantify near-surface. Don't repeat date in caption, but reword (other occurrences). 41) Fig. 9: Does flux need time in the unit? Strange color scale. Omit the many tics around the frame (also Fig. 13). 42) Fig. 10: Why different views in a and b? Do you really need Fig. 10? Fig. 11 says practically the same thing. 43) Fig. 15: Caption should say that this is EXP2.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 23959, 2010.