

Interactive comment on “A new data set of soil mineralogy for dust-cycle modeling” by E. Journet et al.

Anonymous Referee #2

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Overall, this is very useful study, especially important for the dust modelling research. Different from other similar studies, it develops a mineralogical database using much larger published evidence on soil mineralogy; the database also includes more minerals than before, and the geographic area considered is global rather than addressed to current dust sources. However, there is a number of comments listed below suggested to improve the final version of the article.

Major comments

I find “New” in the title as not very practical, the database will remain new may be for some time. When database is mentioned, are its elements: gridded data, descriptive information or a combination of two? If gridded, what is the resolution in the database

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(not of displayed maps) of the information addressed in p. 23950? Is for example the soil color classification also gridded information. Furthermore, it would be clearer for a reader if a table texture vs. clay/silt/sand fraction is shown. In general, the whole paragraph 1-18 could be more clearly written so that the procedure applied in this study could be reproducible.

p. 23949, lines 24-25: By describing criteria applied to generate the database, the authors formulate quite unclear description: 3. the information could be associated with a specific FAO soil unit, even if the authors used an alternative classification in the original study. It needs explanation in more details.

p. 23950, line 2: How mean and standard deviations of data on the mineralogical composition are specified? Any reference and/or description of the procedure?

p. 23952, line 8: the total amount of gypsum is divided equally between the silt and the sand fractions Why sand is included here since previously only silt and clay were considered. Is the proposed division done subjectively or based on a published reference?

p. 23953, line 2: The HWSO grid is then aggregated onto a regular grid with a resolution of 0.5_ × 0.5_. From the point of view of potential users, it is not understandable why the authors degrade the resolution of their new database when the input data to their procedure provides much finer information. If there is no the technical obstacle, I strongly recommend authors to provide a high resolution database. The important reason for that is that many current dust models have resolutions finer than 0.5 deg, and in few years some models will achieve resolutions higher than 10km. would the database be public so that it could be available to wider dust modelling research community?

p. 23953, paragraph on the top: To my opinion, only CASE 2 is relevant for the database implementation. Therefore, I would propose that the authors show modelling examples only using CASE 2.

p. 23953, line 27: 2.7 Validation of the mineralogical maps This subsection should be

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removed, there is anyway no any database validation presented here, nor later what the authors should mention.

p. 23957, line 21: The mineralogical composition of airborne dust is broadly similar to that of the clay fraction of the soil. Is this because clay particles have longer lifetime?

Figure 4-8 show fractions of several but not all considered minerals (e.g. feldspars, kaolinite). I suggest that the percentages of not shown minerals are also displayed. Because of large interest for iron content, I also suggest that a map with estimated total iron in soil is shown. The Images for mineral fractions in soils are too small.

Other comments p. 23946, line 25: specify if is 2 μm radius or diameter. p. 23947, lines 14-15: Quartz and Feldspars are present in all size fractions of soils. They are present in only minor amounts in the clay fraction, but are abundant in the silt fraction. Indicate a reference, if existing

p. 23948, line 19: Replace average iron content with estimated iron content

p. 23950, lines 6-7: The soil texture (abundance of clay, silt and sand size fractions) was taken from the original publication. . . I suppose abundance refers to fractions. Reformulate then. It is not clear from which original publication is taken. Please clarify.

p. 23951, line 8: Analysis of the available data shows that the amount of CaCO_3 in the clay and silt fractions is linearly related to the clay/silt content of the soil (Fig. 2). Show reference if available.

p. 23952, line 24: hematite, goethite and iron Please be more specific when mention iron (iron oxide or else?)

p. 23956, line 13: Please show regions within the map in Fig 9.

p. 23957, line 16: These simulations allowed us to determine the volume fraction of the different minerals relative to the volume of total dust. Why the authors switch from mass (in soil) to volume (in aerosol) fractions, since dust models usually use mass

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concentrations?

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