Responses from Authors to reviewer

Many thanks to Cecile Guieu for her very important remarks.

I suggest to change the title to a more explicit one: (suggestion): “Fine fraction of soil used as aerosol analog during the DUNE experiment: a sequential solubility etc.”

Done: "A fine fraction of soil used as an aerosol analogue during the DUNE experiment: sequential solubility in water with step-by-step decreasing pH"

In general for the whole text, I believe it is better to use 'was' instead or the present form.
We changed all the experiment description to the past.

Abstract

I think that the abstract is too weak; at least the justification of the approach is missing (at the end of : This "aerosol like" fine dust is sequentially leached by short contacts with water at pHs decreasing from 7 to 1" you should then justify 'in order to ....'.
We changed: "These pHs are representative of various environmental wet conditions, the lowest of which could be reached during cloud conditions. The evolution of the solubility from the highest to the lowest pHs provide information on the necessary strength for the solubilisation of a given element and its lability."

We did not increase the abstract size but put these additions in the introduction section:

As you have chosen to discuss only the results of the 'non-cloud processed' dust dissolution, it would be interesting to more clearly relate your results at low pH to the dissolution processes that the simulated cloud processes likely had caused.
We added sentences at the end of the introduction (see below)

Also a sentence to make the link to the main DUNE objectives is necessary
Yes, we added at the beginning of the introduction: "This fraction was considered as a model of true atmospheric Saharan dust and was used to seed mesocosms in order to observe the influence of Saharan dust input on the Mediterranean Sea (Guieu et al., 2010)."

Introduction

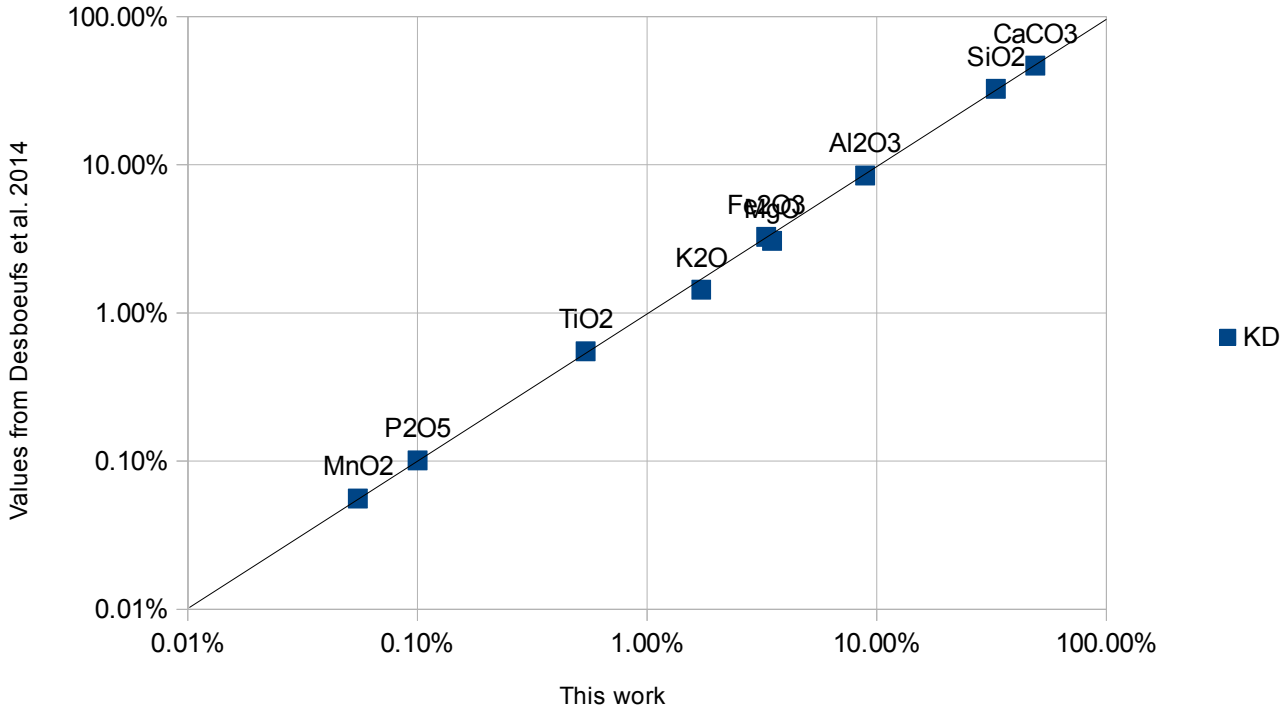
We used both processed (P, R1 R2) and non-processed (Q) dust to seed the large mesocosm during DUNE. I think this is an important point to make: specify that you conducted experiment on non processed dust and justify how the results can help understand the release of chemical elements during the DUNE experiment. This objective of the paper at the end of this section is really missing to my point of view.
We changed the end of the introduction and add this reference: "We report here the results of an experiment based on the successive leaching of small masses of particles used for the DUNE experiment. Processed (P, R1 R2) and non-processed (Q) dust were used to seed the large mesocosm (Guieu et al., 2014). These leaching tests were performed on Q sample using water solutions with increasing acidity in order to measure the lability of the elements in the pristine dust as well as to investigate the fate and behaviour of such dust in various wet environments, including non-polluted rainwater at high pH and cloud polluted droplets at low pH."

Experimental protocol

The point about the different type of dust used during DUNE and the dust used in your study has to be clear in that section: As several dust were used during DUNE, you need to be precise here (and maybe instead of Guieu et al. 2014, refer to Guieu et al., 2010 DUNE Methodology paper but also to Desboeufs et al., this issue using the same dust sample labels as they did in their Table 1 and 2)
Reference is changed to Desboeufs et al this issue.

Results and discussion
This section is rather short and could be increased to make some points more clear for the reader, in particular in relation to the other papers of the SI. I think that the final discussion need to be related to the type of dust used: here you use the non-processed dust and Wuttig et al report on the R experiment where processed dust was used; if the results match is it because the pH used in your exp is similar to what was applied during the dust treatment used in R? that would be an interesting discussion allowing a better link with the DUNE exp and also with atmospheric processes.
We agree and added this sentence: "Because Wuttig et al. have used cloud processed dust, the solubilities similarities obtained from unprocessed dust at pH 3 in water and with cloud processed dust in sea water lets assume that the acidic conditions encountered during the cloud process before are recorded in the dust until it is used to seed the mesocosms."

Regarding Table 2:
- Are the numbers the same as in Desboeufs et al. for NCP DUST 07
Does not match exactly but very well. These analyses are specific of the sub-sample used for this work



- I would add a column without expressing the elements as oxides
It does not add information. The goal of this table is to point out calcium carbonate which would disappear if elements are expressed as elements rather than oxides or carbonates. We have added

the table in supplementary reading.

- Ba and Sr do not have standev?
They have now

- in Karine's table, there is no Ba composition
Not for Q but for R. Elemental composition in metals does not vary a lot between the three different samples because it comes from the same soil. Only N and S are added. We changed the legend but did not explain this detail.

Figures : for all the figures: need to add the labels for Y and X axes on the figures. (see my detailled suggestion directly on the pdf)
Yes, done, all the detailed suggestions on the pdf document have been taken into account, except for the additional column in Table 1.

for Figure 1A and 1B, please add the correspondence between the letters and the measured final pH as this info is on table 1 SI but not in the main paper.
Done

I also find several typo (see the pdf) and I suggest that you have the paper edited by an English colleague if possible.
Done

Finally the table in supplementary info also need a legend.
Done