

Comments of Referee 2

The Manuscript on the trace metal distribution in the Lena Delta Region by I. Antcibor et al. describes the concentrations of different trace metal in different geologic settings in the Delta Region. In a second step the authors related this data set against different environmental parameters of the soils.

The data set is very interesting and important. However, the presentation of the data could be improved. The data set should be sorted into relevant groups and analyzed accordingly. Also many statistical correlations are shown without an obvious question behind it.

Thus I recommend a structural reworking mainly of the Result and Discussion section (see below). Also the literature cited should be updated.

Introduction

P 2208 L1: wording: Soil can function as barrier by....

P 2208 L3: However, climate change.... I do not understand how climate change could change the function of soil as pollutant filter.

P 2208 L13: Why will global warming mobilize the trace elements from the soil?

P 2209 L5: How is the Lena 2009 expedition related to the present study?

P 2209 L16: Is there no more recent study (> 1968) on the winds in Russia?

P 2209 L17 - 2210 L20: I found the description of the stations rather confusing. Either you describe the stations along the north-south gradient if this is important. Or the stations are described according to their affiliation to the different terraces. Additionally the terraces should be described from 1.order to third, but not 2 - 3 -1.

Also the I find the abbreviations for the different sites not very helpful, I would suggest something along this line 1T-1 (first terrace station 1), 3T-2, or Sam_1.... or PoCe-1 (Polygon centre 1)

P 2210 L23: Polygonal tundra..... start a new paragraph.

Which are the respective sites for the polygonal tundra??

P 2210 L6ff: refer to table 2 in the text.

Material & Methods

P 2212 L7: How were the soil samples transported to Germany, frozen or dried?

P 2213 L8: Wording: Statistical data analyses were performed with SPS...

P 2213 L10: Wording: change to „.... general relationships between amount of trace metals and soil properties.

Results

P 2214 L9: wording:.... except study PJ5

Trace elements in soils

P 2214 L19 - P 2215 L6: This paragraph is a mere description of the data in table 5. As such it is very hard to read and find any connection between the statements. The data have to be grouped in sensible way, for example all site from the 3rd terrace had.... or grouping the metals ...

Second paragraph: why is it necessary to present both data, in mg/kg AND in mg/m³ ?? May be table 5 could be presented as a supplement?

The paragraph on the vertical distribution of Ni in Samoylov soils (P 2216 L15:) should directly follow the paragraph on the vertical distribution of Cu (P 2215 L27:). And the r² should be indicated as in the figures.

The paragraph on the Fe content (P 2216 L5:) should start with the sentence „The ratio of different Fe-fraction can be used to....“ And then this ratio is applied to the different soils to look for their different degrees of pedogenesis. In the end it should be stated which different degrees of pedogenesis were observed. And what is the point in knowing that Fe is related to As content??

I do not like the principle component analysis at all. Two tables and one figure are necessary to show us what? There are four important variables, which determine the trace metal distribution, but you do not know which ones. And in table 8 it seems as if the all possible combinations of factors have been tested, but with no apparent outcome or apparent over all pattern.

The direct regression analysis was much more impressive (figure 3, 5). Are there more metals related to clay content or Corg or other environmental factors??

Discussion

For the discussion in general, there are too many numbers in the text. This is hard to read. If the numbers are really important for comparison they should be put in a small table. Or simply the outcome of the comparison should be stated.

P 22018 L1 - 18: I do not understand this comparison, but I am not a trace metal person. Why would you compare your data with data from the world soil in the 60ies? Is this a comparison between today and 50 years ago?? Or what are the world soils?? Would a comparison between arctic, boreal or tropical soils be more appropriate??

P 2218 L19 ff: Aha, the trace metals behave differently in the soil and there are different groups according to their transport or adsorption behaviour. This information has to go to the beginning of the Ms, and should be used to group the investigated metals. And test the groups versus the determining factor.

P 2219 L14 ff: So is the Lena Delta region now pristine or not??

P 2220 L21ff: The comparison between iron and the other element is an important finding, but should go to the result section.

Conclusions

The conclusions are much too long and should be shortened to the really important outcomes.

Tables

Table 1, what for is the information on the vegetation needed? In the text there is no reference to it.

Table 1 and 2 could be combined as both are describing the different study sites. Also, I think that it would better to sort the study sites according to their landscape affiliation i.e. all site on the 3rd terrace together, followed by all sites on the second terrace.....

Dito for table 4, all site on the polygon rim together and then the ones in the centre

Figures

Fig. 2 The scale of the y-axis for top and bottom soil has to be the same! Otherwise difference cannot be seen. Would it be possible to apply the same scale for all y-axis, may be on a log scale. For the x-axis the break is not necessary. How did you define top and bottom layer? Wording: „Volumetric conc. of trace elements in.....

Fig. 3 Again the abbreviations for the sites are not helpful at all, they should be given names from which in can easily be seen where their origin is. For 3b) the regression line should be plotted in the figure, is the correlation for all Samoylov Stations? And what sort of regression is it? Linear or exponential?

Fig. 5 See comments for Fib. 3