**Natural Hazards
and Earth System
Sciences**

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Interactive comment on "Potential ecological risk assessment and prediction of soil heavy metal pollution around coal gangue dump" *by* X. Jiang et al.

Anonymous Referee #1

Received and published: 24 March 2014

GENERAL COMMENTS The paper is focused on the assessment of wind-driven contamination associated with a selected coal mine dump located in Northern China (Jilin Province). In a first order approach, I would say that I have found a little bit difficult to follow the contents of the paper due to two main reasons: Firstly, English-writing is not as clear as desirable and, secondly the structure of the paper needs to be reinforced. For the first issue I would suggest an in-depth English revision of the text in order to gain clarity in the exposition. The second one demands a review of the contents and a greater clarification of the key points of the paper: Introduction (Why to perform such a study? What is what the authors pretend to contribute with their re-

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search?...), methodology (What kind of materials have been investigated -ashes, slags, mixed rock-coal of big/medium/small grain size-? What are the expected contaminant transport processes –solid particle wind-driven, solid particle gravity-driven, dissolution transport and soil retention. . .-? How many reference "background" samples? Which was the reference composition of the coal dump? Moisture conditions of the samples? Soil mineralogy and corresponding exchange capacity? Why a 1:2.5 solid:liquid ratio? What are the justifications of the selected predictive contamination models -uniform vs. non-uniform forecasts-?), results/discussion (interpretation and significance of the observations, for instance to explain what is described in page 1990, lines 16 to 21) and conclusions (that should not be a summary of the paper). More specific comments follow. SPECIFIC COMMENTS âĂć In page 1979, line 29. The selected mine dump appears to be rather small (6300 m3). What are the properties of this mine dump in terms of grain size, composition, etc.? To what extent is it affected by active erosion and particle redistribution due to the action of gravity (plus water, etc.)? A cross section sketch/cartoon illustrating its main features would be advisable. âĂć In page 1981, second paragraph, the authors indicate that they focus on wind-driven contamination. Have performed the authors any type of mass balance relating the export rate from the mine dump and remaining mine dump mass? What is more relevant in terms of contamination potential: The wind-driven action or the active weathering related with chemical reaction processes? âĂć In page 1981, last paragraph. The authors indicate that gangue samples were integrated by mixing five samples from different depths. How many samples were collected? From which depths were the samples integrated? Is there any difference when comparing the surface (i.e. weathered) of the coal dump with deeper portions? âĂć There is information on additional chemical constituents (for instance, electrical conductivity, Fe, Mn, Ca, etc.). This information could be useful in order to indentify sources and processes. âĂć In page 1982, lines 25 to 27. Was pH the only variable tested when looking to correlation coefficients? There are more potential additional variables of interest (i.e. soil total cation exchange capacity, clay content, etc.) âĂć Page 1983, first paragraph. Please, provide with a reference of the so-called

NIPI, preferably the original or first one. âĂć In page 1983, last paragraph, the authors employ the Hakanson's (1980) PER Index in their assessment of the soil contamination potential. However, the authors do not use the same battery of contaminants (i.e. the pollutant types). However, they readjust the corresponding heavy metal indices but do not provide further information. Rationale for the readjustment as well as the actual values used is relevant and should be given. âĂć In page 1985, first paragraph. It would be advisable to provide with further information concerning the used forecasting methods, specially taking into account that the references given (Fan et al., 2005 and Yan et al., 2007) are described in the bibliography as being in Chinese. âĂć In page 1986, scenarios (1) and (2). The description of the two forecasting scenarios is not sufficiently clear and a wide range of variation is possible between the "null environmental protection actions" –i.e. scenario (1)- and "full promotion of environmental protection actions" –i.e. scenario (2)-. It is reasonable to expect that the results expected for both situations will deviate significantly what would render forecasting controversial. âĂć In page 1987, second paragraph. How many reference samples were taken? What are their corresponding statistics (mean, median, CV, standard deviation, etc.) âĂć In page 1987, lines 20 to 22. Classification of pH ranges would require some refinement. I would suggest "slightly acidic" rather than "acidic" if pH is around 5, "mildly acidic" (if between 5 and 6.5) and mildly alkaline (if between 7.5 and 8.5). âĂć In page 1990, line 13. Reference Carmona et al (2013) lacks from the reference list. âĂć In page 1990, first and second paragraph. There is no trial of explanation in order to interpret the observed sample groupings. âĂć Reference listed but not called in the text: Uceda et al. (2013) âĂć Table 1 could be eliminated and information transferred to Figure 1 âĂć Table 3. Concentration of target metals in the gangue and reference soil is, with respect some of them, not so different (e.g. Cu and Pb). It would be advisable to include the variability around these mean values in order to make sure that the difference in composition is significant. âĂć Table 4. Some of the heavy elements analyzed in the samples have mean concentrations higher than the "background" sample (e.g. Cu, Zn, Pb). Are the authors sure that the "background" values are representative? If so,

can be concluded that contamination is severe, even in the case of Cd? What about the variability of the "background" values? âĂć General comments about tables: There are, perhaps, too much tables. It would be desirable to merge, when possible, some of them. âĂć Figures 2, 3, 4 and 6. The amount and distribution of the available data do not support the type of plot presented by the authors. Isovalue lines appear to be skewed due to the spatial dispersion and scarcity of data. It is suggested to replace these map plots by x-y plots, being the x-variable distance with respect the coal dump.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 2, 1977, 2014.

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