

## ***Interactive comment on “Elemental Composition, Leachability Assessment and Spatial Variability Analysis of Surface Soils in the Mugan Plain in the Republic of Azerbaijan” by Junho Han et al.***

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Reviewer #2

C2-1) This paper discusses the elemental composition of Azerbaijani soils. In the present study, the Authors described some chemical parameters of 532 soil samples. They conclude, using XRF and ICP-OES analyses, that the heavy metal guidelines suggested by neighboring Georgia would be appropriate for heavy metal contamination, and Ni and Pb are the most concerning elements in Azerbaijani soils. This manuscript adheres to the journal's standards. The research meets the applicable standards for research integrity.

C1

R2-1) We appreciate the positive evaluation of the manuscript. During the revision process, the manuscript is completely re-written to improve the comprehensibility and readability of the manuscript as commented by the reviewers, and we are grateful for reviewers' and editors' help on this manuscript.

C2-2) The article does not adhere to appropriate reporting guidelines and community standards for data availability: the complete raw database is not made completely available in a public repository, such as Zenodo, for instance. It must be available for future researches on these data.

R2-2) We completely agreed with the reviewer's suggestion in that this kind of data should be open for everyone. Therefore, we asked the National Archive Department of the Republic of Azerbaijan to open the data to the public, and we are still waiting for the official response. After receiving the official document, we will share the data in Zenodo and Soil journal as supporting files.

C2-3) The research output, in terms of novelty, scores poor uniqueness in terms of main findings. The level of clarity is below the threshold of acceptability. Below the threshold of acceptability are the state of the art and the comparative discussion. It partially adopts up to date methodologies with respect to the object of research.

R2-3) We agreed that the novelty and uniqueness are weak for the publication. After extensive and comprehensive revision based on the valuable comments from reviewers', we improved the manuscript to provide new scientific insight for the Azerbaijani soils. We would prefer to mention it as re-write all the manuscript completely. For example, environmental risk assessment using two indexes were conducted, and new soil guideline value was scientifically proposed, and all figures and tables were reconstructed.

C2-4) The paper does not fully discuss the limitations of the approach and potential biases due to the assumptions made. As it is, its potential impact upon the international scientific community of reference is low. The study presents the results of primary

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scientific research, while the comparison with other soils described in the literature should be the toughest section, although not yet exploited into the Discussion section, which must be separated from the Results section.

R2-4) We agreed that the discussion in the limitation and potential biases were not enough. For that reason, the manuscript was re-written to improve the discussion of limitations and bias of this study. We apologize that it was impossible to point out the improved part one by one. We tried our best to discuss the limitation and potential biases during the revision process. We apologize that the result and discussion were not separated, because we decided that the combination of results and discussion section would present our study more concisely and effectively than the proposed structure.

C2-5) Experiments, statistics, and other analyses are performed to a moderately sound technical standard and are partially described in detail. Conclusions presented are not new and must be focused. The article is presented in a quite intelligible manner. This work has not yet a sufficient impact and does not add yet to the knowledge base.

R2-5) We appreciate the positive evaluation on this manuscript. We agreed that the conclusion section was not focused enough; thus, the conclusion section was re-written to improve the manuscript.

C2-6) Strengthens: region Weaknesses: a survey more than a research paper; previously demonstrated correlations between parameters are essentially confirmed.

R2-6) We appreciate the reviewer's valuable comments and helpful criticism of the manuscript, and we agreed that the previous manuscript was similar to a survey report, not a research paper. After extensive and comprehensive revision based on the valuable comments from the reviewers, we believe that the quality of this revised manuscript is improved by thoroughly reconstructing the manuscript to provide new scientific insight for the Azerbaijani soils. The background information or data that can help interpret the soil characteristics and discuss the results in depth was still inaccessible or non-existent; thus, a proper interpretation is severely limited. For example, the

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geological map of the Republic of Azerbaijan is not accessible either online or offline. There are only a few studies (less than 5 papers to our knowledge) available in the literature that dealt with the Azerbaijani soils. For that reason, we could not discuss in depth due to the limitation of data. Please understand this very tough situation, as we believed our first approach to reveal current soil's situation, assess the environmental risk to this country (or nearby countries) based on the measured soil data, and encourage better management of the soil resources. Further, we performed the environmental risk assessment and thus discussed the results with other data obtained in this study.

C2-7) No particularly innovative findings from a functional point of view Keywords: not proper. Most of them are mere repetitions from the title.

R2-7) We appreciate the reviewer's comment, and the keywords were changed as "Elemental composition, geoaccumulation index, potential ecological risk index, leachability assessment, soil guideline value, spatial variability analysis".

C2-8) Tables: 3 (descriptive statistics are not worthwhile, please add the full database as independent dataset)

R2-8) We agreed that this kind of data should be open for everyone. We asked the department of Azerbaijan to open the data, and we are waiting for the official response. After receiving the official document, we will add the dataset in Zenodo and Soil journal as supporting files.

C2-9) Figures: 3 (figure 1 without coordinates is useless, please provide a kmz file instead; unclear the reason for sorting 'agricultural soils' from 'salt affected soils'; units are missing in figure 3)

R2-9) We appreciate the critical comments on the figures. We separated the Fig. 3 as Fig. 4 and Fig. 5 with coordinates with salinity classification and land use scheme. We are going to provide the kmz file with the dataset before publishing this manuscript.

C2-10) Citations: 27 (easily findable: 20; published after the year 2015: 9)

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R2-10) The revised version of the manuscript has 44 references, and 14 references were published after 2015. We tried to include the recently published papers as many as possible.

C2-11) Title: 20 words that describe current (unfocused) content of the paper. Please, focus Introduction: The aims, five, are too many.

R2-11) We appreciate the valuable comments on the manuscript and objective in the introduction. The title is changed as "Environmental Risk Assessment and Spatial distribution of Heavy Metals and Salinization on Surface soils from the Mugan Plain, the Republic of Azerbaijan", and the objectives were more focused as "the objectives of this study were to 1) gather the background information of inorganic elements, 2) appraise the environmental risk assessment and soil guideline value to evaluate the risk of heavy metals, 3) assess leachability and spatial distribution to understand the soil conditions and to improve agricultural productivity."

C2-12) Please, focus Materials & Methods: They are not adequately explained in some parts (field and lab) and redundant in others (modelling) Results: Both amplification and pruning are necessary Discussion: This discussion has not sufficient depth. Conclusions: Vague and not innovative Referencing: There important missing references on broader contexts (both geographical and in terms of management strategies) Originality: It does not contain sufficiently new results, ideas or techniques. Potentially, if re-discussed, it might do Scope: At the current stage, it is extremely poor in scope. A kind of we have an analytical instrument, we analyze a number of samples, and will see what happens approach.

R2-12) We appreciate the critical comments on the manuscript. During the revision process, the manuscript is completely re-written to improve the scope, comprehensibility and readability of manuscript as commented by the reviewers'. During the revision process, environmental risk assessment using two indexes were conducted, and new soil guideline value was scientifically proposed, and all figures and tables were recon-

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structed.

C2-13) Implications: The broader context is completely not explored Organization: Is it not very well organized Figures: They are all necessary. Their quality is poor, and sometimes they are not completely informative (ex. Figure 3 where scales are not shown)

R2-13) We appreciate the valuable comments of the reviewer, and all tables and figures were re-constructed. In the case of Fig.3, it was changed to Fig. 4 and Fig. 5, and the quality of illustration and interpretation were greatly improved during the revision process.

C2-14) Tables: not all are necessary.

R2-14) We agreed with the reviewer's comment, and all tables and figures were reconstructed to improve the quality of the manuscript.

C2-15) Overall evaluation: This paper potentially could improve significantly on previous work of its type as it contains new information. Several data are presented but not discussed. In essence, wasted. At this stage, it is a quite modest work, and contains little novelty and may be of limited interest to most readers.

R2-15) We appreciate the critical and positive evaluation of the manuscript. During the revision process, we tried to discuss the data as many as possible; thus, the additional 3 tables and 2 figures were included in supporting information. We tried our best to improve the novelty by employing environmental risk assessment and development of soil guideline value, and all tables and figures were reconstructed to improve the quality of work.

C2-16) Previous papers on from the open Literature must be linked to this effectively in a sort of synopsis on the main mechanisms. References: several mistakes throughout the whole list (just a couple of examples: at row 467 Colombo, C., et al., or at row 480 Applied Soil Ecology).

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R2-16) We appreciate the reviewer's critical comment. All references were corrected properly, and 16 references were added to link the current result with previous studies. The examples were also corrected.

C2-17) In particular (page.row): 5.122 Please, refer to soil names according to IUSS WG WRB (2015) 7.181 Please, divide in two different sections.

R2-17) We appreciate the reviewer's comment. The soil name was Solonchak according to IUSS WG WRB, and the description was written as "The soils are classified as Solonchak based on world reference base (FAO, 2014)" (Lines 117-118).

C2-18) Results must discuss original results only while in Discussion previously published data can be discussed comparatively.

R2-18) We apologize that the result and discussion were not separated, because we decided that the combination of results and discussion section would present our study more concisely and effectively than the proposed structure.

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