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Journal Name:	Asian Journal of Soil Science and Plant Nutrition
Manuscript Number:	Ms_AJSSPN_52285
Title of the Manuscript:	OCCURRENCE OF HARDENED MATTERS IN THE ANDOSOLIC COVER FROM THE WESTERN HIGHLANDS OF CAMEROON: CASE STUDY OF THOSE RISEN ON TRACHYTE IN THE SOUTHERN SIDE OF THE BAMBOUTO MOUNTAINS
Type of the Article	Original Research Article

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PART 1: Review Comments

	Reviewer's comment	Author's comment (if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)
Compulsory REVISION comments	<p>Explain the processes of allitisation in detail, so that a layman or non-geologic reader can understand the weathering process in the evolution of the minerals. Hydrolysis of orthoclase feldspar produces sequentially illite, kaolinite and to Gibbsite (Aluminum Hydroxide) with the release of Silica into the solution. When there is 1/1 clay it is monosiallitisiation (which produces Gibbsite/iron oxide) and 2/1 clay is termed bisiallitisiation.</p> <p>You may add</p> <p>“(i)allitisation corresponding to intense genesis of Al-hydroxides (gibbsite and boehmite) ; (ii) <i>monosiallitisiation</i> meaning intense genesis of an aluminous silicate with release of silica into solution (kaolinite) ; (iii) <i>bisiallitisiation</i> resulting in illite and smectite genesis ; (iv) and last, <i>podzolisation</i> generating free silica, which is a minor process in West Africa. In the allitisation and monosiallitisiation domains, ferritisation prevails, which means that iron is only in an oxidized or hydroxidized form (goethite and hematite).” Please make references to those that coined the terms of Allitisation (Buol and Eswaran 2000), (Erhart, Millot and Pedro 1966)</p> <p>From line 246 to 248 stating “Geochemically, the hardened matters have high concentrations of aluminum (55.88%Al₂O₃) and enough concentrations of iron (11.68%Fe₂O₃); the silicon is quite absent (2.88%SiO₂)” is a clear indication that the allitisation and monosiallitisiation prevails for the high aluminum enrichment (56%) , ferritisation prevailed as well (11.68%Fe₂O₃).</p> <p>Generally above the wet season water table in region of low erosion, Kaolin is weathered to Gibbsite yielding usually Bauxite when the rock is relatively low in iron.</p>	
Minor REVISION comments	<p>From your discussions starting from Line 260 to line to 351</p> <p>“The upper part of the Bambouto Mount is made of many flow-like domes with abrupt sides, bordering deep valleys; this is the particularity of plateau landscape [11]. The climate is equatorial of Cameroonian subtype [13]; it is the characteristic of environments where allitisation predominates [8]. The rock is of felsic type [19]; its richness in sanidine [9], coupled to the highly wet climate is a token of bauxitisation [21]. The presence of horizons with hardened matters in the andosolic cover agrees with the existence in the upper part of the Bambouto Mountains of hardpan at different topographic position. Their presence testimonies the bauxitisation phenomenon occurring elsewhere in the volcanic line of Cameroon as described by [22], [2], [7], and [8].</p>	



3.2.1 The lithorelictual facies

[23] demonstrated that during the lavas flow, this magmatic fluid is organized in superposed layers. These bands isolate among them discontinuities, which are the openings through which water and other solutions that can attack the rock flow [24]. So, during the alteration, the layers are dislocated into isalteritic blocks with variable sizes, which will finally fossilized the flatty shape of the layers of the lavas. Under the compound light microscope, intense pseudomorphosis process is observed within those isalteritic blocks [9]. This contributes to maintain the organization of the rock [25] and to increase its hardness [9]. Moreover, at the same time, some locations of those isalteritic blocks in transformation are reddened and tanned, with isoctic plasmic structure [9]. This implies the contribution of iron among other in the hardening process of the isalteritic blocks; this corroborates the high degree of hardness of those matters as observed on the field. Great quantities of aluminum are detected in those blocks; this observation is the testimony of the fact that they have aluminous characteristics. Gibbsite is their main mineral; this corroborates their high concentration in aluminum. So, their high hardness makes them hardened matters ([6], [26]). The high concentration of aluminum and gibbsite in those hardened matters brings them closer to aluminous hardened matters. According to [25] and [27], they can be said to be lithorelictuel hardened matters. The studies of [21] and [8] are openings allowing us to consider those matters as bauxitic matters. The rock outcropping are characterized by the presence on their surface of many phenocrysts of sanidine [9]. The conservation of the rock structure in the isalteritic blocks and further in those bauxitic matters contribute to create lithorelictuel facies, characterized by the flatty shape and the rough surface of the blocks. ”.

3.2.2 The vitreous facies

The diaclasis of the isalteritic blocks on the uphill position and on the intermediate position are filled with a hardened matter characterized by its smooth surface, vitreous aspect, with a break in conchoidal marnner. In fact, within the discontinuities of the rock and isalteritic blocks, water filled with ions moves [24]. When the saturation point of each ion is reached in the water percolating within the cracks, the process of precipitation starts, producing secondary crystallized matters [28] on the borders of the cracks. According to the high quantity of aluminum in the andosolic pedological cover of Bambouto Mountains [9], aluminum followed by iron are the first metals to start the precipitation. In the red and yellow horizons, hardened matters with tanned borders perfectly lined with diaclasis from rock are observed [9]. This observation agrees with the accumulation process in the cracks in one hand, and in the other hand with the implication of those diaclasis in the transfer of ions through water flowing across the pedological cover. In addition, that observation implies also the lateral and vertical migration of aluminum in the andosolic pedological cover of the Bambouto Mounts ([1], [29], [30], [31], [3], [32]). The vitreous hardened matters deposited in the cracks resemble the paving stone-like matters with smooth surface blocks present in the hardened horizons [9]; we can then think that a genetic link exists between those two matters. In the blocks constituting the vitreous facies, rare phantoms of sanidine pseudomrphosed by gibbsite are present; this can be due to the resorption of the portion of the isalteritic blocks closer to the cracks [9].

The hardened matters observed in the diaclasis are highly translucent on the uphill position compared to those



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observed on the downhill position. Moreover, all those matters are highly reddened and tanned on the downhill position compared to those observed on the uphill position. The reddening can be explained by the precipitation of iron on the surface of those matters; the tanning for its one can be explained by the precipitation of manganese. Under the compound light microscope, the dark matrix covers partially the red matrix; this shows that iron precipitates before manganese; this agrees with the high quantities of iron in the pedological cover compared to that of the manganese. This observations strengthen the theory of the migrations of matters within the andosolic cover of the Bambouto Mounts ([29], [32]), improved by the gravity [27]. At the point of the emergence of streams, hardpans are present; this certifies the implication of water in the development of this pedological matters. In the pedological cover, the rate of humidity increases towards downhill. This is in accordance with the reddening and the tanning phenomenon observed on the borders of hardened matters filling the diaclasis of isalteric blocks on the downhill position. The degree of induration of isalteritic blocks decreases away from the diaclasis. This is in accordance with the possibility of migration followed by the deposit of hardening substances such as aluminum and iron on the borders of cracks through water ([33], [1], [31], [32]); this corroborates the great quantity of aluminum followed a little bit far by iron detected in this pedological cover by [9]. The predominance of aluminum in this andosolic pedological cover certifies that the concerned hardening matter is principally aluminum; this corroborates the great quantity of rain falls in this environment, necessary to generate bauxitic weathering ([34], [21], [35]). The presence of two levels of hardened horizons on the downhill position testimonies a high degree of accumulation of matters in that direction [9]. In the isalteritic horizon, isalteritic blocks are the most abundant compared to the vitreous hardened matters deposited in the cracks. At the end of the evolution of those two different matters, this original organization is maintained. This is then why the hardened blocks of the rough facies wraps up the hardened blocks of the paving stone-like with smooth facies. During the transformation of the hardened matters deposited in the cracks into the paving stone-like blocks found in the hardened horizons, the smooth aspect of their surface is maintained [9]; this contributes to create the vitreous facies.

This should be revised. This is looking like an elaborate introduction and grand literature of the area. Too many references to so many Authors and established facts/confirmed statements on the area without corresponding relationship between the supposed results you have in the area. This section is results and you should be talking about your own results more and not literature review of others. Your own results should be used to validate or proof the existing Authors or vice versa and not like review of existing literatures where 3 of 4 authors are quoted together without the reference to your new discoveries in your results. Talking of too much established facts in your results than your own work could be considered as plagiarism
Please revise.

Conclusions too small, some of the discussions should be in the conclusion. Line 11-12 stated the purpose of the thesis from the Abstract as
"Mountains were highlighted in order to understand their genesis, organization, composition and evolution"
I don't think there is much specification on the genesis/source of the hardened materials.....is the source bauxite or gibbsite or those are by product of biochemical alteration weathering, leaching, allitisation or otherwise of the source rock.



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	<p>I think the composition is well taken care of in saying “They include a lithorelictuel and a vitreous facies. Microscopically, their plasmas are cristic and locally isotic. Gibbsite, goethite and halloysite are their main minerals. Geochemically, both facies are highly aluminous. They are then bauxitic hardened matters.”</p> <p>But the process of evolution from the source rock to the present minerals is lacking. In the evolution during the discussion you made mention of environments where allitisation predominates in line 264. This, I think should for a basis of the evolution from source rock to the presently observed minerals. Is it an oxidizing or reducing environment, weak or high pH, Which of the ions is mobilized relative to the other, which is in abundant and which is depleted/ in loss amongst the ions (Si, Al and Fe) I</p> <p>How are the two recognized major zones which are an eluviation zone (loss of Si, Al and Fe) and an illuviation zone (accumulation of Al and Fe) constitute to the process of evolution and are at which part of the lithologic profile. Explain environments where (top, middle or bottom) the allitisation or bisiallitisation predominates and use to explain the process of evolution from source to the present minerals as illustrated above.</p> <p>You may add “Hydrolysis is the attack of silicate minerals by water to result in a total reorganization of the initial mineral structure to another completely different mineral or hydroxide. Some other ions mostly silicate ions are discharged into the solution. Allitisation is an extreme stage of hydrolysis, in which all the silica and alkaline cations has been lost and only Gibbsite (Al₂(OH)₃) remains with the hydrated ferric oxides”</p> <p>Then mention the initial source mineral that is hydrolyzed by water and through an evolution process to produce which new mineral...Goethite, Gibbsite or what?). If Goetite which mineral is enriched and which is in solution, if the by product is bauxite hardened materials please explain why the evolution/hydrolysis process follows that trend?</p>	
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<p>Optional/General comments</p>	<p>Guidelines on Abstract and Introduction</p> <p>Abstract</p> <p>The abstract should be written after you have completed the entire report. The following aspects is covered sequentially:</p> <ul style="list-style-type: none"> the purpose the methodology, the results and conclusions contributions and implications <p>Organization of Abstract</p> <p>First, state the research purpose in one short sentence. E.g. The purpose (or aim, intention, objective, goal, target) of this study is to</p> <p>Second, describe the specific approach adopted to fulfil the purpose.....</p> <p>Third, list the main results and conclusions obtained through the research. E.g. Through this study, it was found that ..., and ... The results indicate that...</p> <p>Fourth, highlight the contributions and implications of the results and conclusions.</p> <p>Fifth: References. The findings of this research may serve as ...</p> <p>Organization of Introduction</p> <p>The Introduction of your report should be organized as a funnel that begins with an overview of the research background and ends with precise aim of the research. The first part is a paragraph on the background, development and significance of the research problem. The second part is a multi-paragraph, thorough review of the existing studies on the research problem.</p> <p>Only very slight review of the Abstract and introduction is needed to be effected and not compulsory.</p> <p>Conclusion Review</p> <p>From line 357 to 364 Major conclusion to the thesis is drawn as</p> <p>“These matters have low thicknesses, are highly hardened, and are mostly reddened and tanned on the downhill position. Gibbsite, goethite and halloysite are their main minerals. Geochemically, both facies are highly aluminous. They are then bauxitic hardened matters”</p> <p>This is not enough. More references should be made as to the commercial exploitation of the ore, what the type of the bauxite in the area could be used for or which refined product the bauxite ore is suited for. The level of purity (and possibly the beneficiation process or additive to make it suitable as a raw material for?) of the Gibbsite, Goethite and Hallosite and they are raw materials to what? Other references to unconcluded facts and the area that need more</p>	
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	research work needs to be in the reference too.	
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PART 2:

	Reviewer's comment	Author's comment <i>(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)</i>
Are there ethical issues in this manuscript?	<i>(If yes, Kindly please write down the ethical issues here in details)</i>	

Reviewer Details:

Name:	Samuel Oni
Department, University & Country	University of Ibadan, Nigeria