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Interactive comment on "Geochemical mass-balance, weathering and evolution of soils formed on a Quaternaryage basaltic toposequences" *by* Hüseyin Şenol et al.

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Solid Earth Manuscript Number: seâĂŘ2016âĂŘ105 Geochemical massâĂŘbalance, weathering and evolution of soils formed on a Quaternary age basaltic toposequences by Hüseyin ŞENOL et al. General: The manuscript refers to the weathering intensity, element release and soil development of four profiles in the Black sea Region of Turkey. The paper is well written and quite well organized and provides valuable information for the understanding of rock weathering and soil formation. Some sections of the text that are in the results and discussion should be placed in the introduction or the methods rather than in the results. For example, the paragraphs 3.4, page 11, lines 10âĂŘ33 and 3.5, page 13, lines 19âĂŘ35 present the different

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weathering indices and the mass balance calculation. The authors have used several weathering indices to quantify weathering intensity and elemental loss. The CIA is mainly used to estimate weathering intensity of felsic rocks with important release of alkaline and alkalineâĂŘearth cations, release of silica and relative accumulation of aluminum from the weathering of feldspars, as written by the authors. This index has some limits as it does not take into account the loss in silica and the accumulation of iron in the soils. The authors should also refer to a recent article âĂŘ The weathering intensity scale (WIS): an alternative approach of the chemical index of alteration (CIA), Meunier et al., 2013 âĂŘ that uses both loss in silica and accumulation of iron and aluminum to quantify weathering intensity. This approach allows a better discrimination of highly weathered rocks than CIA and related indices. To use this approach to quantify weathering the authors should pay attention to two important factors: 1) the reference parent rock should be unweathered (The CIA values of the basalt are in the range of what observed for unweathered basalt), 2) there should be a genetic relationship between the soil, the saprolite and the parent material; i.e. an homogeneity of the profile without allochthonous deposit on the surface. To summarize, this manuscript present data that are suitable for publication in Solid Earth. However, I guess the manuscript is not acceptable in its present from; several issues need to be addressed. Therefore, I strongly recommend the authors to perform minor revision of their manuscript to be in order for publication in SE. Specific comments Page 4, line 1: add a.s.l “above sea level” or a.m.s.l "above mean sea level" after the values of the elevation even if it is implicit. Page 4, line 7: add yrâĂŘ1 after the values of the mean annual rainfall. Page 4, lines 15âĂŘ16: The transverse illustrated in Figure 2 should be also shown in Figure 1 if possible. Page 5, line 6: replace NaOAC by sodium acetate or give the formulae. Page 5, line 12: replace NH4OAC by ammonium acetate or give the formulae. Page 5, lines 14âĂŘ16: give more details of the extraction of the clay fraction after the dispersion method. The procedure of clay fraction treatments should be given before the XRD as they are done before recording XRD patterns. Page 8, line 33: the unit of CEC is cmol(c).kgâĂŘ1 (add comma) Page

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12, table 4: Add the caption of the table and replace Verisol by Vertisol for profile PIV / footslope Page 15, line 5: write In order to identify primary minerals and clay minerals Page15, lines 10âĂŘ11: check the position of the peaks of quartz. Quartz has a peak at 3.34 Å but not at 3.36 and 3.38 Å. The position of the peaks for all minerals should be carefully checked. Page 16, figure 3: The figure should be clarified and simplified. The correct spelling is quartz in the figure caption. The patterns should be in the order Mg, MgâĂŘGly, K25 and K550 from the bottom to the top of the plot to show more easily changes in peak position with the different treatments. Only the main peaks should be labeled for better clarity. Some values are given for features that are rather "noise" of the pattern rather than peaks. e.g. cr: for the 2:1 swelling minerals the peaks at 1.85 Å EG, 1.3 Å Mg, 1.26 Å Mg, 1.12 Å K550 should not be given in the figure. In the text it is possible to explain with asymmetry of shoulder of the main peaks; PII: delete the peaks at 1.91 Å EG, 1.48 Å Mg, 1.38 Mg, 1.16 Å K550. Same remarks for all plots. Check the labeling of the peaks. For PI the peak of the 2:1 swelling clay mineral labeled at 16.8 Å is not at this dâĂŘspacing. 16.8 Å with CuKα radiation is at about 5.25°2θ which is obviously not the case in this figure, but rather at 5.8 °2θ namely $\sim$15 Å. Compare with other samples. The values of the peaks of quartz and kaolinite should be given with higher precision. The 002 of kaolinite is at 3.58 Å and the peak of quartz at 3.34 Å. Reference cited Meunier, A., Caner, L., Hubert, F., El Albani, A., and Prêt, D. (2013). The weathering intensity scale (WIS): an alternative approach of the chemical index of alteration (CIA). American Journal of Science, 313, 113–143. The article can be provided upon request as well as the calculation procedure.

Please also note the supplement to this comment:
http://www.solid-earth-discuss.net/se-2016-105/se-2016-105-RC3-supplement.pdf

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