BASALT AND RHYO-DACITE WEATHERING AND SOIL CLAY FORMATION UNDER SUBTROPICAL CLIMATE IN SOUTHERN BRAZIL

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Resumo: Highly weathered soils are a constant in whole Brazil, due to its climate (high temperatures and high annual precipitation). Though different studies made in several areas of the country, fewer are those focused in the mass balance of the soils. The mass balance will measure the loss and concentration of different and important cations, which are important for mineralogy formation and even more important for plants development (nutrition).The objective of this study was to measure the mass balance in soil profiles and to compare the results with the mineralogy. The plateau of basaltic to rhyo-dacitic composition covers a large area (1.200.000 Km^2), in south and southern Brazil and part of Argentina, Uruguay and Paraguay, it is one of the latest events of separation of Gondwana supercontinent (the event dated from late Triassic/early Jurassic, about 130 million years ago). The area isintensively cultivated (cash crops, such as soybean, corn, apples, pines (*Pinustaeda* and *Pinuselliotti*), and ryegrass) which represents high economical importance, and the soils to be used properly they need a widely and resourceful studies. For this study we have chosen two profiles to analyze the mineralogy and chemical composition. The two profiles were chosen, so they would be representative of the litholigies of the region: profile 1a soil developed over a rhyo-dacite (near the city of São Francisco de Paula) and profile 2 (near the city of Canela) soil developed over a basalt. The laboratory analyses for both profiles were done after air drying samples at room temperature and sieving to obtain <2mm fraction. The general analyses were: organic carbon, pH, cation exchange capacity (CEC), density of different soil horizons, particle-size distribution, dithionite-citrate-bicarbonate, ammonium oxalate at pH 3 and clay characterization by X-ray diffraction (XRD). The general analyses helped us to have an overview of the profiles, showing that the mineralogy was 1:1 clay minerals and oxy-hydroxides of Fe and Al and the existence of hydroxyl-Al interlayered minerals, high values of organic carbon for the top soil horizons, moderate to high values of CEC for both profiles, acidic pH (4.4 to 4.8) and low bulk density, due to its high organic matter content.After these results, specific chemical analyses were made to better understand the weathering processes in both profiles. The total chemical analyses of bulk sample were performed by X-ray fluorescence (XRF) to calculate the 4Si (number of $Si4^+$ cations divided by 4 to refer to the general formula unit of phyllosilicates); M^+ (Na^++K^++2Ca^{2+}); R^{2+} (Mg^{2+}+ Fe^{2+}+Mn^{2+}); and R^{3+} (Al^{3+}+Fe^{3+}). Following these results the weathering indices were calculated (Chemical Index of Alteration, CIA; Weathering Intensity Scale, WIS) and element mass balance. The results of these analyses have shown extensive loss of all elements (high *Δ4Si*, WIS and CIA) with residual accumulation of Fe and Al oxy-hydroxides. The weathering degree is different in comparison of both profiles being higher on the rhyo-dacite than on the basalt.

Palavras-chave: WEATHERING, SOILS, MASS BALANCE