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^{238}U-^{234}U-^{230}Th-^{226}Ra radioactive disequilibria and recent dynamic within weathering profiles: Example of an Amazon lateritic profile in Manaus, Brazil.

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Processes and timescales of chemical weathering controlling formation and evolution of weathering profiles are of first order importance in understanding the relationship and feedback between long-term evolution of continental crust and climate. Combining study of various tracers recording weathering processes under different timescales is a useful tool to answer such questions (1-2).

We have studied variations of ^{238}U-^{234}U-^{230}Th-^{226}Ra disequilibria in an old lateritic profile developed under equatorial climate in Manaus (Brazil), in order to infer recent geochemical dynamics occurring within this surficial formation. The 18 m deep profile developed several million years ago in quartzo-kaolinitic sediments. It is comprised of three different horizons: a 5 m surficial one enriched in kaolinite, a 7 m intermediate layer containing hard Al and Fe oxides nodules in a gibbsite rich matrix, and the deepest one, made up of weathered quartzo-kaolinitic sediments.

Occurrence of U-series disequilibria in 15 analyzed samples indicates recent to present mobility of U and Ra relative to Th through the whole profile. (^{238}U/^{230}Th) and (^{226}Ra/^{230}Th) disequilibria measured in this profile are lower than those generally measured in laterite profiles (1). In the Manaus profile, they range from 0.85 to 1.15, and 0.85 to 1.3, respectively. It is probably related to the specific location of U-series nuclides in strongly refractory primary minerals such as zircon or titane oxides (3). Our results also outline that radioactive disequilibria are characteristic of each hori-

zon of the profile. In the upper horizon the upward increase of (^{238}U/^{230}Th) and (^{226}Ra/^{230}Th) ratios implies recent U and Ra gains relative to Th. The latter have to be related to an external contribution, certainly associated with biogeochemical cycling by the vegetal cover. In the intermediate and deepest horizons, a Ra loss was observed in the nodular zone, whereas a Ra gain was detected deeper in the weathered sediments. Both could be ascribed to a downward Ra flux related to the formation and/or evolution of Al and Fe oxide nodules in the intermediate horizon.

^{238}U-^{234}U-^{230}Th-^{226}Ra disequilibria highlight therefore the major role of the vegetation cycling and of oxide nodule formation and evolution during the recent chemical evolution of the profile. U-series disequilibria will be helpful to constrain the timescales of these two processes.

(1) Dequincey et al. (2002), GCA, 1197-1210; (2) Chabaux et al. (2003), C. R. Acad. Sci., 1219-1231; (3) Balan et al. (2005), GCA, 2193-2204.