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Evidence of the enrichments of ^{230}Th and ^{226}Ra inside soils profiles from Hiva Oa Island (Marquesas archipelago)

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The enrichments of ^{226}Ra in the soils reported in the literature are usually the consequences of human activities (such as mining, gas and petroleum production, agriculture, etc.) contaminating soil surface. However, the weathering of the basalts in Hiva Oa Island (Marquesas archipelago, South-Pacific), forced by the tropical climatic conditions is the only hypothesis which accounts for the enrichments of the ^{238}U daughters of short radioactive periods, namely ^{230}Th (7.5E+04 y) and ^{226}Ra (1.6E+03 y). Indeed, excesses of ^{230}Th and ^{226}Ra with respect to their radioactive parents are observed in the upper part of the profiles (*i.e*. down to 20 cm deep), where activity ratios ^{230}Th/^{238}U and ^{226}Ra/^{230}Th stand above unity (1.6-1.9 and 2.0-3.8, respectively). In addition, some of the soil samples exhibit activity ratio ^{238}U/^{232}Th (0.5 to 0.7) slightly lower than the ones of the basalt (0.6-0.8), suggesting accumulation of thorium with respect to uranium during the weathering of the parent rock. Chemical and X-ray diffraction analyses of the soil samples further highlight a large depletion in alkaline and alkaline-earth elements as well as a strong accumulation of the metals Al, Fe and Ti as gibbsite, hematite, goethite and anatase, confirming a major redistribution of both radioactive and stable elements during to the weathering of the basalt.