Uranium and other elements in residual clays of dolerites, granites and aplite-pegmatites from Central Portugal

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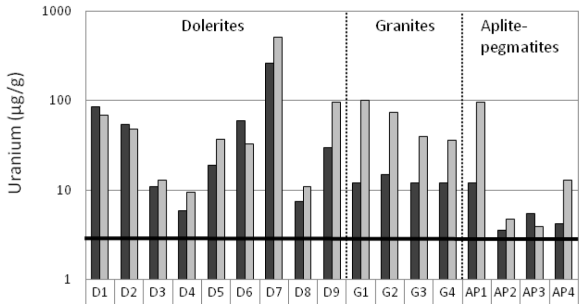
Uranium ores in Central Portugal have been exploited in the past. Accumulation of U occurs in epithermal veins of hercynian granites, and also dessiminated as secundary U minerals in veins, due to recent supergene process.

Uranium and other major and trace elements concentrations in residual clays derived from alteration of granites, and dolerite and aplite-pegmatite veins from Fornos de Algodres region, located in the uraniferous province, are investigated. The chemical composition of clays was determined for the whole sample and the clay fraction (< 2 μm) by instrumental neutron activation analysis (INAA), using the Portuguese Research Reactor.

Clays are enriched in U, among other elements, relatively to the upper continental crust, especially the dolerite ones where extremely high U contents were observed in some samples (Figure 1). The clay fraction of granites is the most enriched in U relatively to whole rock, suggesting thin fraction (clay minerals and Fe-oxyhydroxides) controls, at least in part, the U distribution. The absence of correlation between U and other elements in residual clays of veins, suggests U has independent mineralogical supports.



	D1	D2	D3	D4	D5	D6	D7	D8	D9	G1	G2	G3	G4	AP1	AP2	AP3	AP4
Whole Rock	86	54	11	5,9	19	59	263	7,4	30	12	15	12	12	12	3,6	5,5	4,2
Clay Fraction	69	48	13	9,6	37	33	512	11	97	100	74	40	36	96	4,7	3,9	13

Figure 1: Uranium concentration in studied clays.

Sr and Nd isotopic geochemistry of the Indo-Gangetic plains and the role of proximal sources to the building of the floodplains

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The vast stretch of Indo-Gangetic Plains (IGP) has been studied in reference to isotopic characteristics of various lithotectonic units of the Himalaya and the Indian Shield to understand the role of catchment area lithologies, tectonics and climate in building the sediments of the floodplains. Comparing the isotopic data from the Gangetic plains with those of the Indus, Brahmputra and some tributaries of Ganges from Himalaya, we note that the sediments of the Ganges system has high $^{87}Sr/^{86}Sr$ (≈ 0.78) and low ε_{Nd} (0) (<-15.7) values; however, the western Thar desert sediments ($^{87}Sr/^{86}Sr$: 0.7291 to 0.7502; $\varepsilon_{Nd\,(0)}$: -12.6 to 16.6) and the sediments from the southern side of IGP ($^{87}Sr/^{86}Sr$ (0.7314 to 0.7346; $\varepsilon_{Nd\,(0)}$: -14.4 to -16.26) are isotopically distinct relative to those of the IGP. For the Thar desert sediments, we suggest that erosion of Tertiary Sub-Himalayan lithologies such as the Subathu Formation ($^{87}Sr/^{86}Sr \approx 0.712$, ε_{Nd} (0) ≈ -8) could have played an important role. It has been observed that the Sub-Himalayan regions have had higher rainfall than those of the Lesser and Higher Himalaya and the floodplains in the south during the deposition of the older floodplains by the extinct rivers in the Thar desert during the Quaternary. The Yamuna floodplain sediments at Kalpi in the south of the IGP, after the confluence with river Chambal, show the influence of Peninsular components, including the Deccan Traps. We note here that just as Indus Tsangpo Suture volcanics influnced the Subathu of Sub-Himalayas, the contemporary Deccan source could have influenced the south IGP. Further, with the available isotopic data on Peninsular lithologies and contribution of sediments from the tributaries downstream reveal that the contribution of river Chambal is subdued by supplies from the Himalaya and from the shield, which are isotopically higher in $^{87}Sr/^{86}Sr$ and lower in εNd (0) values than that of the Kalpi sediments. Therefore, we suggest that proximal sources also played an important role in the buildup of the IGP.