Fluoride release from rocks and sediments from East African Rift Valley

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Fluoride is one of the most severe natural contaminants that affects natural water and soils. Besides dental fluorosis, an excess of F may cause skeletal fluorosis, which is a bone disease. FLOWERED (http://www.floweredproject.org) is an H2020 European project whose objective is to contribute to the development of a sustainable water management in areas of Ethiopia, Kenya and Tanzania affected by F contamination in water, soils and food, with the aim of improving the living for local population. In the current study, a petrographic and geochemical description of 27 representative rock samples (fresh and weathered) from these 3 countries is presented together with the results of a set of leaching batch experiments aiming at understanding the control for the release of F from rocks to groundwaters.

Ethiopian samples are mainly characterized by volcanic rocks of basaltic to rhyolitic compositions, while Kenyan and Tanzanian samples are mostly rhyolitic to trachidacitic and trachi-basaltic, respectively. F content in solid samples ranges from 0.02 to 0.30 wt.%. Also, richest F-bearing samples are those corresponding to obsidian rich rhyolite in Kenya and Ethiopia (0.21 and 0.30 wt.%). Furthermore, F-rich amphiboles are identified in some samples .

Fast leaching batch experiments results suggest that there is not a direct correlation between the bulk F content or detection of F-bearing minerals with the total F leached from rocks. F release capacity seems to be more related to the degree of rock alteration.

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