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TITLE: Distribution of Fluoride in the Phosphorite Mining Area of Hahotoe?Kpogame (Togo)

AUTHOR: ['Gnon Tanouayi', 'Kissao Gnandi', 'Kamilou Ouro-Sama', 'Adoté Agbéko Aduayi-Akue', 'Housséni Ahoudi', 'Yawovi Nyametso', 'Hodabalo Dhéoulaba Solitoke']

ABSTRACT:

Phosphorites in the mining area of Hahotoé-Kpogamé contain high levels of fluoride that can cause illness among people living close to the mining and processing sites. To assess the distribution of fluoride in the different areas around the phosphorite mining areas in Togo, analyses were performed by molecular absorption spectrometer (HACH DR3800) according to the procedure manual at the geochemical laboratory of the University of Lomé. The sodium 2 - (parasulfophenylazo) - 1,8 - dihydroxy - 3,6 - naphthalenedisulfonate (SPADNS) method was used to determine fluoride contents and the PhosVer® 3 with acid persulfate digestion method was used to measure phosphorus pentoxide (P₂O₅). GraphPad Prism version 3.0 software was used for the data processing. The surface water of the mining sites had a fluoride content ranging from 0.38 to 3.52 mg/l (average = 1.33 mg/l; n = 10, n is the number of samples). Groundwater in this area had a fluoride content between 0.15 mg/l and 1.39 mg/l (average = 0.58 mg/l, n = 15). In the groundwater in the villages around the phosphorite processing plant, the fluoride content ranged between 0.15 and 0.63 mg/l (average = 0.41 mg/l; n = 22). The fluoride content in the water of the phosphorite mining area was higher than in Gbodjomé (reference area). Meanwhile, assessment of the effluents discharged into the ocean had a fluoride content ranging from 12 to 20 mg/l. In dusts, the P₂O₅ and fluoride contents were 36.02% and 1.85%, respectively. Vegetables from the local market garden produce showed levels of fluoride up to 2.06%. The average contents of P₂O₅ and fluoride in one of the phosphorite profiles were 32.38% and 3.00%, respectively. A significant correlation was observed between P₂O₅ and fluoride. The correlation between P₂O₅ and fluoride in phosphorites shows that phosphorite mining is the main source of fluoride pollution in this area.

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