STATISTICAL CHARACTERISTICS OF OSCILLATORY ZONING OF POPCORN FROM HUNGARY

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The grey level of popcorn and PIXE data of trace elements were investigated by statistical methods. Spectral analysis of grey level has shown pronounced periodicity. Fractal geometry has been applied to grey level and Hurst exponent of 0.65 was measured by width and power methods, indicating persistent behavior. The grey level is strongly correlated with the Sr concentration. The Sr content is anti-correlated with Fe content. This means that Sr-rich zones are light and Fe-rich zones are dark. Spectral analysis of PIXE data has found that Fe distribution and Sr distribution have a periodicity. But another trace elements As, Cu, Ni and Zn have not shown a periodicity may be from experimental noise. It has been shown that profiles of As, Cu, Ni and Zn can be described in term of self-affine fractals only at length scales smaller than 1mm, where they have Hurst exponents in range 0.15 - 0.36. Profiles of Fe and Sr can be described in term of self-affine fractals at any length scales and they have persistent behavior (H0.5) at length scales smaller than 0.1 mm. It means that there were constant changes in the external geological environment during popcorn growth, for example climate changes outside cave.