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ON THE FACTAL MECHANISM OF INTERRELATION BETWEEN THE GENESIS, SIZE AND CONTENT OF ATMOSPHERIC AEROSOLS IN DIFFERENT REGIONS OF THE EARTH

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Experimental data from the National Air Surveillance Network of Japan from 1974 to 1996 and from independent measurements performed simultaneously in the regions of Ljubljana (Slovenia), Odessa (Ukraine) and the Ukrainian «Academician Vernadsky« Antarctic station ($64^0$15W; $65^0$15S), where the elemental content of the air was determined by the standard method of atmospheric aerosol collection on the nucleopore filters and subsequent neutron activation analysis, were analyzed.

Comparative analysis of different pairs of aerosol element concentration data sets, measured in different regions of the Earth, revealed a stable linear (on a logarithmic scale) correlation, showing a power law increase of every atmospheric aerosol element mass and simultaneously the cause of this increase – the fractal genesis of atmospheric (secondary) aerosols. Therefore the elemental concentration distribution in aerosol particles has the form of a log-normal distribution. A comparison of the experimental dependencies with the results of multifractal theory shows that the atmospheric aerosols are unusual multifractals having different scales corresponding to the different sizes of the elements. It was called as self-affined multifractal.