Scientific session of the Division of General Physics and Astronomy and the Division of Nuclear Physics of the Academy of Sciences of the USSR (24-25 April 1985)

Usp. Fiz. Nauk **147**, 421–427 (October 1985)

A joint session of the Division of General Physics and Astronomy and the Division of Nuclear Physics of the USSR Academy of Sciences was held at the Lebedev Physics Institute on April 24 and 25, 1985. The following papers were presented:

April 24

1. *M. A. Sadovskiĭ.* Block structure of the Earth's lithosphere.
2. *V. B. Braginskiĭ, A. V. Gusev, V. P. Mitrofanov, V. N. Rudenko, and V. N. Yakimov.* Searches for low-frequency bursts of gravitational radiation.
3. *V. B. Braginskiĭ.* A review of development work on gravitational antennas.

April 25

4. *A. M. Baldin.* Atomic nuclei as quark-gluon systems.
5. *V. A. Tsarev.* Geophysical applications of neutrino beams.

Brief summaries of four of these papers are given below.

M. A. Sadovskiĭ. *Block structure of the Earth 's lithosphere.* It has been found that the block size distribution is polymodal in character.[1,2] Distributions obtained in a very broad range of values were found to contain neighboring "preferred" sizes L_{i+1}, L_i in the ratio of between 2 and 5.

An example of such distributions is shown in Fig. 1 for the case of geoblocks.[3]

Figure 2 illustrates the variation of L_{i+1}/L_i in the range that was investigated.

A rock may be looked upon as a self-organizing system of blocks of different size. When energy is supplied to it from outside, the system can lose stability and redistribute this energy by emitting gravitational waves. This concept implies that it may be possible to control some of the properties of rocks. For example, it is well-known that rock permeability is affected by mechanical vibrations, which in turn influences processes such as the oil and gas yield of deposits. It is probable that a directed heat and mass transport can be produced in a given rock by forcing it into a particular vibration.

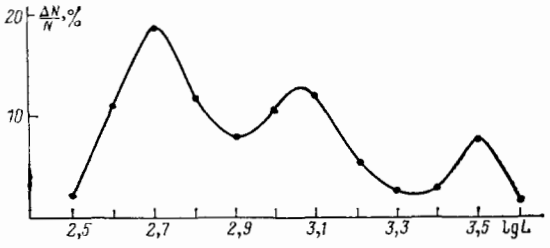

FIG. 1. Smoothed histogram of geoblock and megablock sizes (data of L. I. Krasnyĭ).

Substantial local energy concentrations are likely to occur at the head of micro cracks, the energy being comparable with the activation energy of chemical processes. The possibility of such events must therefore be taken into account in geochemical studies.

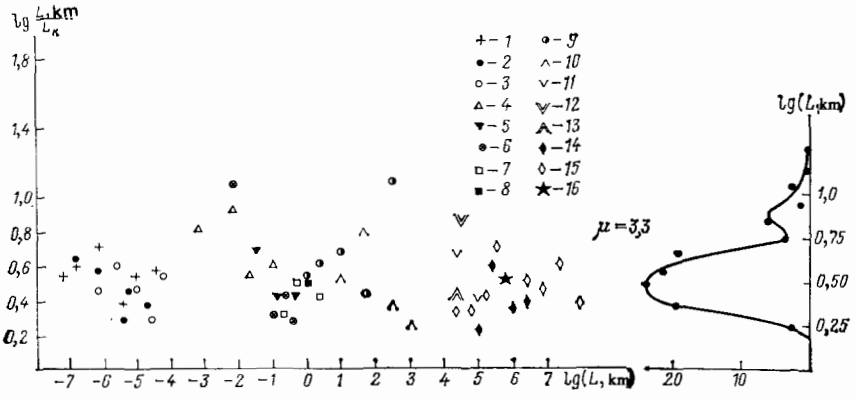

FIG. 2. A plot of $\log(L, \text{km}/L_k)$ against $\log(L, \text{km})$ based on data from different sources: 1—quartz glass, 2—rheological explosion, 3— fragmentation of peat, 4—granulometric analysis of the ground, 5, 6—fragmentation by explosion into small and large components, 7, 8—acoustic sounding by methods I and II, 9, 10—inhomogeneity sizes deduced from *P*-wave fluctuations, 11—seismoacoustic sounding, 12—blocks in the crust deduced from deviations from the recurrence law, 13—geomorphological measurements and helium analysis, 14, 15—active geological faults in Japan and Africa, 16—diameters of bodies in the solar system. The smoothed histogram (rotated through 90°) is shown on the right.

 0038-5670/85/100937-04$01.80

[1]M. A. Sadovskiĭ, L. G. Bolkhovitinov, and V. F. Pisarenko, Izv. Akad. Nauk SSSR, Fizika Zemili, **18** No. 12, 3 (1982) [Izvestiya Physics of the Solid Earth **18**, 919 (1982)].
[2]M. A. Sadovskiĭ, V. F. Pisarenko, and V. N. Radinov, *ibid*. No. 1.
[3]L. I. Krasnyĭ, Sov. Geol. No. 7 (1984).
[4]M. A. Sadovskiĭ, in: Prognoz zemletryaseniĭ (Earthquake Forecasting), No. 4, Donish, Dushanbe (1984).