

DEGREE OF CHEMICAL HOMOGENEITY OF CARBONACEOUS
CHONDRITES AS POSSIBLE ANALOGS OF PHOBOS MATERIAL

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The study of Phobos surface chemistry by Phobos spaceprobe [1] gives rise to the problems of representativity of the data obtained. The sizes of areas which will be under one-shot analysis are different for various instruments. It is apriori evident that the larger the sampling footprint is, the more representative the data obtained are. As Phobos according to optical and some other observations is composed probably of the material kindred to carbonaceous chondrites [2] we have studied a degree of chemical variability of samples of four carbonaceous chondrites: CI Orgueil, CM Mighei, CO Kainsaz, CV Efremovka [3]. In the polished section(s) of each of the meteorites XRF analyses were made in 20 randomly spaced footprints of 3, 30 and 100 μ across (Fig. 1) and represented as element/Si ratios. Then the means of the ratios (\bar{X}) and coefficients of their variation ($V = \frac{\sigma}{\bar{X}} \cdot 100\%$) were calculated. The latter were plotted v.s. the footprint sizes (Fig. 2-6).

The data obtained show that if Phobos material is really kindred to carbonaceous chondrites so its probable compositional variability in the mm-scale (Lima spectrometer footprint), is evidently within the range $V=5-20\%$ for Al/Si, Fe/Si, Mg/Si, Ca/Si, Cr/Si. The variation coefficient for Ni/Si and S/Si are also rather small except for Efremovka CV which rise up to 120-130%. For footprints of tens meters across (Grunt experiment) the variation coefficients are evidently less 3% for all element/Si ratios under study. Such degree of inhomogeneity is evidently less than the analytical errors of the instruments. So the variations of surface chemistry of Phobos can be detected only if its variability would be significantly higher. If real variability of Phobos material is approximately the same as the studied samples have, so the contents of chemical elements measured by Phobos mission will be representative.

REFERENCES: (1) Phobos project. Preprint of Inst. for Space Research, USSR Academy of Sciences, 1986. (2) Pang et al., Science, 199, 64, 1978. (3) Moroz L.V. et al., 8th Vernadsky/Brown Microsymposium Abstracts, 63-64, 1988.

