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A Multifractal Approach to the Analysis of Size-Frequency Distributions of Craters on Planetary Bodies

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We have developed a multifractal approach to the analysis of size-frequency distributions of craters on planetary surfaces. We demonstrate the use of the method and study the relationship between the multifractal spectrum and the size-frequency distribution of craters. We showed that if the multifractal spectrum of a crater size distribution can be approximated by a parabolic function, the size-frequency distribution of craters are lognormal. For demonstration of our approach we analyzed distributions of craters on selected Phobos areas using Mars Express HRSC images. We demonstrated that the distributions of the craters are very well approximated by lognormal curves, as our technique suggests. Using the multifractal approach we show that size-frequency distributions of small craters on the sub-Mars and anti-Mars sides of Phobos' surface appear to be different. We suggested that this approach may be used for analysis of size-frequency distributions of craters on other planetary bodies.

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