



## **Comparative statistical analysis of planetary surfaces**

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In the present study, we aim to provide a statistical and comparative description of topographic fields by using the huge amount of topographic data available for different bodies in the solar system, including Earth, Mars, the Moon etc.. Our goal is to characterize and quantify the geophysical processes involved by a relevant statistical description. In each case, topographic fields exhibit an extremely high variability with details at each scale, from millimeter to thousands of kilometers. This complexity seems to prohibit global descriptions or global topography models. Nevertheless, this topographic complexity is well-known to exhibit scaling laws that establish a similarity between scales and permit simpler descriptions and models. Indeed, efficient simulations can be made using the statistical properties of scaling fields (fractals). But realistic simulations of global topographic fields must be multi (not mono) scaling behaviour, reflecting the extreme variability and intermittency observed in real fields that can not be generated by simple scaling models. A multiscaling theory has been developed in order to model high variability and intermittency. This theory is a good statistical candidate to model the topography field with a limited number of parameters (called the multifractal parameters). After a global analysis of Mars (Landais et. al, 2015) we have performed similar analysis on different body in the solar system including the Moon, Venus and mercury indicating that the multifractal parameters might be relevant to explain the competition between several processes operating on multiple scales