Paper ID: 52323
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IAF SPACE EXPLORATION SYMPOSIUM (A3)
Solar System Exploration including Ocean Worlds (5)

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FRACTAL DIMENSIONAL ANALYSIS FOR QUANTITATIVE CHARACTERIZATION STUDY OF THE IRREGULARITY IN TITAN HYDROCARBON LAKES/SEAS AND TOPOGRAPHY OF NEAR SURFACE/REGION.

Abstract

Fractal surfaces are ubiquitous in nature as well as in the sciences. The examples range from the cloud boundaries to the corroded surfaces. Fractal dimension gives a measure of the irregularity in the object under study. The phenomena is of very importance in geophysics where many of surfaces show self-similar character and yet to be studied. The objective of the present work is to demonstrate that the fractal dimension of the boundary of a natural body can be used to shed light on irregularity as well as other properties of a region. With easy availability of satellite images and image processing software's this turns out to be a handy tool to determine the estimate of the fractal dimension of the surface and hence a quantitative characterization of the irregularity and study of topography of the surface and near region. In this study, several lakes and seas of hydrocarbon from "Titan", the largest moon of "Saturn" are analysed. Titan's lakes may contain many organic compounds which would be necessary for life to develop, which is of interest to the scientific community. By understanding the topography of lakes, we may gain better insight into the development of life. The lakes are characterized under three type's dark lake, granular lake and bright lake. The fractal dimension of their boundaries for the length scales resolutions of 0.3-1.5 km, 2-10 km and 40-400 km in general, has variation from 1.2 to 1.5 the method used is box counting method for fractal dimensional analysis.