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Possible cryovolcanic and tectonic processes on Titan and Enceladus: Similarities to terrestrial systems.

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Long-lasting investigations, measurements and analysis by the Cassini-Huygens mission since 2004, showed that Saturn's fascinating satellites, Titan and Enceladus, present complex, dynamic and Earth-like geology [1]. Endogenous as well as exogenous dynamic processes, have created diverse terrains with extensive ridges and grooves, impact units, icy flows and caldera-like structures, layered plains and stable liquid lakes [2]. In addition, Cassini's Radar has partially revealed the topography of the surfaces, indicating severe types of superficial expressions [3]. Due to this complex topography, combined with spectroscopic studies that showed a variety of surface composition, Titan and Enceladus are capable of having active volcanic (referred to as cryovolcanic) and tectonic activity. In order to investigate Titan's and Enceladus's internal and superficial processes and structures it is necessary to study their geology. The Cassini-Huygens mission to the Saturnian system lacks the opportunity to acquire a rock sample, to take in situ chemical composition measurements as well as images that reveal in detail the morphology and topography. Thus, a comparative study to terrestrial volcanic and tectonic systems is essential. This study presents the processes that trigger the volcanic and tectonic systems on Earth, the volcanic edifices that are internally created and also the superficial expressions such as calderas, domes, lava flows and types of pyroclastic depositions which can find correspondance on Titan and Enceladus. Thus, Titan and Enceladus's models of internal stratification [4] are presented, and we approach the issue via two patterns by comparing the interiors and the material "directions" to the surfaces and vice versa, with a view to compare the moons' and Earth's internal dynamic system as well as the surficial structures. Eventually the research is being reinforced by the fact that many new theories and hypothesis are being proposed to interpret the arriving data.

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