



Episodic outgassing of methane during Titan's history

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The quest of methane's source on Titan started more than two decades ago after Titan's flyby by Voyager 1. Even after Huygens landing, the origin of the atmospheric methane remains quite problematic. One explanation for the methane renewing may be provided by outgassing from a methane reservoir in the interior. In the present paper, we investigate the likelihood of such a possibility using a thermal-orbital coupled model simulating the evolution of methane clathrate hydrate distribution and their dissociation within the interior. We show that methane destruction in the atmosphere can be counterbalanced by methane outgassing through cryovolcanic process at present time, if this mechanism started late in Titan's history. This suggests a long period of time without any methane in the atmosphere. We will discuss how these predictions can be tested by the Cassini-Huygens data set.