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Titan is a known as a satellite with a thick atmosphere (1.5 bar at the surface) mainly composed of nitrogen. Although several hypotheses about the origin of atmosphere have been proposed, it remains an open question how and when such a thick atmosphere was generated. According to the recent satellite formation theory [e.g., Canup and Ward 2002], Titan formed within low temperature and pressure disk. We numerically investigate the property of the primordial atmosphere of Titan that grew in such a circum-planetary disk, especially in terms of the atmospheric mass and the blanketing effect. In spite of such a disk condition, Titan could capture a thick atmosphere strongly bounded by gravity, which is mainly composed of nebula gas components. This would cause a significant blanketing effect inducing differentiation of this satellite, and result in keeping the surface temperature high relatively (~200 K). This suggests that an ammonia-rich proto atmosphere could be kept on Titan even after the disk was dissipated. Titan’s current nitrogen would be generated from ammonia in the proto atmosphere by photochemical reaction [Atreya et al., 1978]

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