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Lightning Generation in Titan due to the Electrical Self-polarization Properties of Methane

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We study a charge mechanics process in Titan's atmosphere due to the self-polarization properties or pyroelectricity of methane that increase the internal electric field in Titan's thunderclouds and facilitated the charge generation and separation process. Microphysics that generates lightning flashes is associated with the physical chemistry properties of the local occurrence atmosphere, so methane could be the principal agent of the electrical activity in Titan because of the great concentration of it in Titan's atmosphere. We calculated the charge obtained by Titan's thunderclouds due to methane, using the approximations of thunderclouds as parallel-planes capacitors (telluric capacitors). We present a time dependent mechanism because the life time of thunderclouds is very low; for that we employ commons atmospheric approach using for the Earth, because the similitude of both atmospheres. In Titan's atmosphere the methane concentration is bigger than the Earth, and the electrical activity is superior, so the observed phenomenology seems to be in agreement with this model.

Key words**:** thunderclouds, lightning flashes, methane, pyroelectricity.