

Possibility of collision induced cloud charging in Venusian atmosphere

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The charging of cloud particles in a planetary atmosphere plays an important role in atmospheric electrical conductivity and the process of cloud lightning. Previous works on Venus clouds put forward the sources like Solar Energetic Particles and Galactic Cosmic Rays as the primary source for ionization in the upper and middle atmosphere [1]. The particles in Venusian clouds follow a trimodal distribution based on the size. The largest of the particle bins, namely mode 3 which has been detected by Pioneer Venus - 2, is expected to be of crystalline in nature [2]. The existence and composition of mode 3 or similar large sized cloud particles has been the subject of extensive study. In other independent studies [3,4], there have been possibility of hydrated sulphuric acid ice formation in the middle cloud region, which is coincident with the detection of mode 3 particles.

There is a possibility of cloud particle charging by triboelectrification process. The triboelectrification process is responsible for the graupel charging in thunderstorms [5], the volcanic ash charging on Earth, the electrification in dust devils on Mars and similar processes on other planetary atmospheres. Earlier, a triboelectrification model based on asymmetric rubbing of granular insulator particles was taken into account to assess the possibility of particle charging [6]. The study aims to put forward a collision induced charging process in the middle and lower cloud region of Venus atmosphere based on previous studies on cloud composition and insulator triboelectrification. The work attempts to address the possibility in the process of cloud charging and behaviour of mode 3 particles.

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