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Large-scale properties of lightning in extrasolar objects

Christiane Helling (1), Rachel Bailey (2), Gabriella Hodosan (1), Camille Bilger (3), and Craig Stark (1)
(1) University of St Andrews, UK (Christiane.Helling@st-andrews.ac.uk), (2) Zentralanstalt fuer Meteorologie und Geodynamik, Vienna, (3) Department for Engineering, University of Cambridge, UK

Mineral clouds play a special role as a catalyst for a variety of charge processes also in extrasolar objects. If clouds are charged, the surrounding environment becomes electrically activated, and ensembles of charged grains are electrically discharging (e.g. by lightning), which significantly infuences the local chemistry creating conditions similar to those thought responsible for life in early planetary atmospheres. We note that such lightning discharges contribute also to the ionisation state of the atmosphere. We apply scaling laws for electrical discharge processes from laboratory measurements and numerical experiments to Drift-Phoenix model atmosphere results to model the discharge's propagation downwards (as lightning) and upwards (as sprites) through the atmospheric clouds. We evaluate the spatial extent and energetics of lightning discharges. First attempts to show the infuence of lightning on the local gas phase indicate an increase of small carbohydrate molecules like CH and CH2 at the expense of CO and CH4. Dust forming molecules are destroyed and the cloud particle properties are frozen-in unless enough time is available for complete evaporation.