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# SEMINÁRIO DO DEPARTAMENTO DE GEOFÍSICA

## “Martian Lightning: Spark of Life or Death Strokes?”

Data: 25/06/2020

Hora: 16h30

Seminário on-line

Google Meet: <https://meet.google.com/rkv-wfjf-cye>

Transmissão: [https://www.youtube.com/channel/UCwMcesUpF\\_V9X43PcSEVhOQ/live](https://www.youtube.com/channel/UCwMcesUpF_V9X43PcSEVhOQ/live)



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The concept of extraterrestrial lightning has remained tantalizing since Miller (1957) first associated it with the production of amino acid and its implications for life beyond Earth. The spark ignited by these experiments never waned and has only grown brighter with the increasing probability of crewed missions to Mars. This need to understand atmospheric electricity beyond Earth is all the stronger that in-situ exploration of planetary environments exposes the instrumentation to potential electrostatic hazards and that multiple observations since the beginning of space exploration have exposed its diversity throughout the solar system.

Observations of Jupiter by Voyager 1 have established the existence of lightning beyond Earth. Forty years later, the mechanisms of Jovian lightning are still the topic of active research. Since Voyager, electrical activity has been observed in the atmospheres of all gaseous giants, which also suggests its existence on exoplanets. For example, Cassini recorded lightning-like activity in the water cloud of Saturn. But whether these or Jovian discharges, can be qualified as “lightning” is another question altogether. It is indeed widely expected that the nature of these discharges is significantly different from terrestrial lightning. But on the other hand, in our most observed neighbors, Mars and Venus, the evidence of electrical discharge is at best inconclusive and its mere existence remains controversial.

We are left with the questions: (1) Are extraterrestrial lightning similar to Earth’s discharges? (2) Do other telluric planets display electrical activity? (3) Can the presence of atmospheric electricity inform us of the presence of extraterrestrial life?

In this talk, we explore the existence of extraterrestrial lightning in our solar system, and compare it to Saint Elmo’s fires, sprites, lightning, jet discharges, and other Transient Luminous Events (TLEs) observed on Earth. These will constitute the ground to discuss the diversity, triggers, and hazards of extraterrestrial electrical activity.

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