

## **ELVES discovery, modeling, simulations**

*Monday, September 30, 2013 9:30 AM (45 minutes)*

Lightning return strokes radiate an electromagnetic pulse (EMP) which interacts with the D-region ionosphere. The largest EMPs produce new ionization, heating, and optical emissions known as elves. Elves are among the most common transient luminous events, occurring at least six times more frequently than sprites. In this talk, a brief overview of elve research is presented. Additionally, we present a time-domain model of the lightning EMP and its interaction with the lower ionosphere. This model effectively simulates electron heating due to the lightning EMP and includes nonlinear effect such as ionization, attachment, detachment, and the optical emissions that give rise to elves.

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