

**DESIGN AND ANALYSIS OF THE INSTRUMENT PACKAGE ON
THE FIREFLY MISSION TO STUDY TGFS FROM LIGHTNING**

by

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ABSTRACT

Firefly will provide the first single platform, space based, coordinated measurement of three important lightning parameters: the visible optical signal, the Very Low Frequency Radio signal, and Gamma-ray emissions. Data from Firefly will unambiguously demonstrate when Gamma-ray generation takes place during lightning events by providing submicrosecond relative timing to the arrival time and pulse shape of each of these phenomenon. These data will give people who study lightning new information on how these signals are related which will lead to a refinement of current models on lightning formation and the physical processes that take place during lightning events. This paper describes Firefly's science payload, outlines many of the major design considerations, and details the final circuit implementation of the VLF receiver, Optical lightning detectors, and in the Experiment Controller Boards.