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# Recoil leader properties estimated from X-ray emission in aircraft triggered discharges.

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In 2014-2016 an Airbus test aircraft flew into thunderstorms over Europe and Australia. During the test flights multiple X-ray producing events were observed by the on board lightning detection equipment (ILDAS). Measurements of the change in local electric field, currents on the aircraft and x-ray energies were made for all the aircraft triggered lightning strikes.

This work will focus on radiation observed during aircraft triggered lightning. Two distinct radiation producing events were found to be correlated to the triggered lightning strike itself; X-rays associated with the stepping of the negative leader, and X-rays in association with large currents flowing through the aircraft during recoil processes. The majority of observations are of X-rays associated with recoil leaders. Recoil leaders are thought to be created when the positive leader extends into a pocket of negative charge, where an ionization wave will initiate and propagate back towards the aircraft, along the channel of the preceding positive part of the bidirectional leader attached to the aircraft.

Using the observed X-ray spectra from these phenomena we determined the characteristics of the leader and electric field needed to create the observed X-ray spectra. We compare our findings to a GEANT4 model of aircraft based detection of X-rays at 4km altitude.