Electrical Anomalies Observed During DC3

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1. Introduction
The primary scientific goals of DC3 involved improving our understanding of the chemical impacts of thunderstorms and their anvils. However, the Colorado domain provided opportunities to study other interesting phenomena, including the potential impacts of smoke ingestion on convection and thunderstorms, electrification processes in smoke plumes and pyrocumulonimbus clouds, and the production of sprites by unconventional thunderstorms.

2. Data
- CSU-CHILL Polarimetric Doppler Radar
- CSU-Pawnee Doppler Radar
- NOAA NMQ Radar Mosaics
- NMT Colorado LMA (COLMA)
- Vaisala NLDN
- GOES Visible and IR
- Suomi NPP Satellite

3. Smoke Impacts on Thunderstorm Electrification?
Summary: Did the major fire activity and smoke in the Colorado domain during DC3 cause anomalous electrification of thunderstorms (i.e., "inverted storms")? Case studies of inverted and normal-polarity charge structures in adjacent "garden variety" convection may offer a way to test this hypothesis.

4. Electrification of Pyrocumulonimbus Clouds Above Wildfires
Summary: Pyrocumuli above three Colorado forest fires (Hewlett Gulch, High Park, and Waldo Canyon) electrified and produced small intracloud discharges whenever the smoke plumes grew to high altitudes (over 10 km MSL). This normally occurred during periods of explosive wildfire growth. The lightning, detected by COLMA but not NLDN, mainly occurred downwind of the fires, and likely was driven by ice crystal-based electrification processes that probably did not involve significant amounts of riming graupel.

5. Sprites in the Colorado Domain
Summary: Two storms (8 and 25 June 2012) produced photographed mesospheric sprites within the COLMA. Portions of these storms also were scanned by Colorado DC3 radars, providing an unprecedented look at the microphysical structures of unusual sprite-producing storms.