Public Abstract

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Title:Analysis of Cloud and Cloud-to-Ground Lightning in Winter Convection

The combination of the full suite of cloud-to-ground (CG) stroke and cloud flash data is used to observe lightning in precipitation events involving winter precipitation. In particular, we observed data for the winter season of 2006 to 2007, which is defined as October through April, for winter events that generated the weather phenomenon known as thundersnow, or convective snow. There were a total of 44,122 lightning strokes associated with winter precipitation in 14 events involving the occurrence of thundersnow. This total made up only 1.4% of all lightning observed in these events. Cloud flashes made up 31.4% of the observed lightning in winter precipitation. Further, 92.0% of the observed CG strokes were found to have a negative polarity. Storm total histograms consistently showed the dominance of lower amplitude negative strokes (between -20 and -30 kA) in each storm. The lightning in winter precipitation maintained a cloud-to-CG ratio of 0.46, or 1 cloud to 2.2 CG strokes, throughout the season. Analysis of diurnal trends in the winter lightning showed a tendency for greater activity between 0000 and 0400 UTC. Using Rapid Update Cycle (RUC) initial fields, composite soundings were generated for areas of greatest (or exact) observed lightning location, showing a similarity to previous work done on proximity soundings in thundersnow events. A comparison to an elevated warm precipitation event shows similarity in the vertical profiles. However, the diurnal characteristics of the lightning show no similarity as do synoptic and mesoscale environments surrounding the event.