

ANALYSIS OF CLOUD AND CLOUD-TO-GROUND LIGHTNING IN WINTER CONVECTION

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ABSTRACT

The combination of the full suite of cloud-to-ground (CG) and cloud stroke data is used to observe lightning in precipitation events involving winter precipitation. In particular, we observe data for the winter season of 2006 to 2007 for winter events that generated the weather phenomenon known as thundersnow. Only 1.4% of all lightning observed were associated with winter precipitation in 14 events involving thundersnow. 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 diagrams showed the dominance of low amplitude negative strokes (between -10 and -30 kA) in each storm. Lightning in winter precipitation had a cloud-to-CG ratio of 0.46 (1 cloud to 2.2 CG strokes) throughout the season. Analysis of 24-hour diurnal trends in the winter lightning showed a tendency for greater activity between 0000 and 0400 UTC. Composite soundings from Rapid Update Cycle (RUC) initial fields showed a similarity to previous work done on proximity soundings in thundersnow events. Further, comparisons to an elevated warm precipitation event showed similarity in the vertical profiles. However, the diurnal characteristics of the lightning show no similarity as do synoptic and mesoscale environments surrounding the event.