Abstract

Environmental Analysis of the Farthest Northwest Severe Thunderstorm Warning Ever Issued

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On 27 June, 2024, the Weather Forecast Office (WFO) in Fairbanks issued the National Weather Services' furthest northwest Severe Thunderstorm Warning to date. The warning was issued at 67.6°N, 163.0°W where no radar coverage exists, surface observations are sparse, and substantial satellite parallax complicates convective warning decision making. This work presents model data leading up to the event, synoptic and mesoscale parameters during the event, and available observational data. Preliminary analysis found two periods of intense lightning activity (>400 strokes per hour) punctuated by passage across a cold body of water - Selawik Lake - when lightning activity paused. Infrared cloud top temperatures of overshooting tops cooled to as low as -52.69°C on the Suomi-NPP satellite (Bachmeier 2024) coinciding with periods of intense lightning activity. Severe wind gusts and hail stones were not reported, but webcam imagery in Noatak showed a well-defined shelf cloud and the closest automated observation site in Kotzebue ~56 km away recorded a 34-knot wind gust. Collective results indicate an unusual convective environment that may highlight severe thunderstorms as an emerging forecasting challenge within a rapidly warming Arctic climate.