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## **Meteorological context of lightning detected over the Arctic Ocean in summer, 2019**

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### **Abstract**

On 28 June, 2019, Vaisala's GLD360™ detected lightning within a couple hundred miles of the north pole, with the northernmost event occurring just 110 miles from the pole itself. Then, on 10-11 August, 2019, the GLD360 detected a large swath of thunderstorms extending northward from near the northern coast of Siberia to, again, just a few hundred miles from the north pole. The 28 June lightning occurred entirely over sea ice, and the 10-11 August thunderstorms occurred right around the boundary of the remaining sea ice at that point in the summer. Lightning is rather rare in the Arctic in general, but exceptionally so over the sea ice: Over an eight year period (2012-2019 inclusive), the 28 June and 10-11 August, 2019, lightning outbreaks not only yielded the most northerly lightning observed by GLD360 at all, but they also accounted for the majority of all lightning counts north of 80° latitude over the eight years. In an effort to understand what caused lightning to occur that far north and in a (relatively) large amount, we investigate air-flow trajectories, numerical weather prediction data, polar-orbiting satellite data, and sounding data from stations on land in the vicinity of air mass source regions 48-72 hours ahead of these two thunderstorm outbreaks. In this paper, we present our analysis of these two events and our findings to date.

### **Topic Areas**

Lightning and Weather

### **Submission Format**

No preference