Inter-comparison of Lightning Trends from Ground-based Networks during Severe Weather: Applications toward GLM

Lawrence D. Carey[1*], Chris J. Schultz[1], Walter A. Petersen[2], Scott D. Rudlosky[3], Monte Bateman[4], Daniel J. Cecil[1], Richard J. Blakeslee[2], Steven J. Goodman[5]

[1] *University of Alabama in Huntsville, Huntsville, Alabama*

[2] *Earth Sciences Office, NASA Marshall Space Flight Center, Huntsville, Alabama*

[3] *University of Maryland, College Park, Maryland*

[4] *USRA (NASA MSFC), Huntsville, Alabama*

[5] *NOAA NESDIS, Silver Springs, Maryland*

The planned GOES-R Geostationary Lightning Mapper (GLM) will provide total lightning data on the location and intensity of thunderstorms over a hemispheric spatial domain. Ongoing GOES-R research activities are demonstrating the utility of total flash rate trends for enhancing forecasting skill of severe storms. To date, GLM total lightning proxy trends have been well served by ground-based VHF systems such as the Northern Alabama Lightning Mapping Array (NALMA). The NALMA (and other similar networks in Washington DC and Oklahoma) provide high detection efficiency (> 90%) and location accuracy (< 1 km) observations of total lightning within about 150 km from network center. To expand GLM proxy applications for high impact convective weather (e.g., severe, aviation hazards), it is desirable to investigate the utility of additional sources of continuous lightning that can serve as suitable GLM proxy over large spatial scales (order 100's to 1000 km or more), including typically data denied regions such as the oceans. Potential sources of GLM proxy include ground-based long-range (regional or global) VLF/LF lightning networks such as the relatively new Vaisala Global Lightning Dataset (GLD360) and Weatherbug Total Lightning Network (WTLN). Before using these data in GLM research applications, it is necessary to compare them with LMAs and well-quantified cloud-to-ground (CG) lightning networks, such as Vaisala's National Lightning Detection Network (NLDN), for assessment of total and CG lightning location accuracy, detection efficiency and flash rate trends. Preliminary inter-comparisons from these lightning networks during selected severe weather events will be presented and their implications discussed.

*Corresponding author: Earth System Science Center (ESSC), University of Alabama in Huntsville, 320 Sparkman Dr, Huntsville, AL 35805. E-mail: larry.carey@nsstc.uah.edu Phone: 256-961-7909