INTRODUCTION AND OBJECTIVES
The relationships between lightning, cloud microphysics, and tropical cyclone (TC) storm structure are being examined using data gathered from flights into rapidly intensifying Hurricane Karl (below) during NASA’s Genesis and Rapid Intensification Processes (GRIP) experiment. The objective is to develop a better understanding of the microphysics within electrified and non-electrified regions of TCs. An improved understanding of the occurrence/absence of lightning in TCs may help us discover what information lightning data convey about the storm. This knowledge will be useful for real-time intensity forecast applications as well as future assimilation of lightning data into numerical models.

KARL LIGHTNING ANALYSIS
Several inner core lightning bursts were detected by WWLLN and observed by GRIP aircraft during their flights into Karl (below).

WWLLN VS. GLD360 LIGHTNING
WWLLN and GLD360 are global lightning networks that can be used to study TCs in areas not covered by land-based networks like the National Lightning Detection Network (NLDN). Lightning from WWLLN (blue) and GLD360 (red) was visually compared to evaluate how well WWLLN samples the electrical structure of Karl.

FUTURE WORK
GRIP flights sampled Hurricane Karl during its rapid intensification in the southern Gulf of Mexico. The frequency and spatial distribution of lightning within Karl were highly variable during these flights. The next step will be to analyze the microphysical and radar data along both electrified and non-electrified flight segments. These data, combined with lightning datasets and in situ electrical measurements, will provide a better understanding of the storm properties relevant to lightning production in TCs.

REFERENCES