Early results from the RELAMPAGO Lightning Mapping Array

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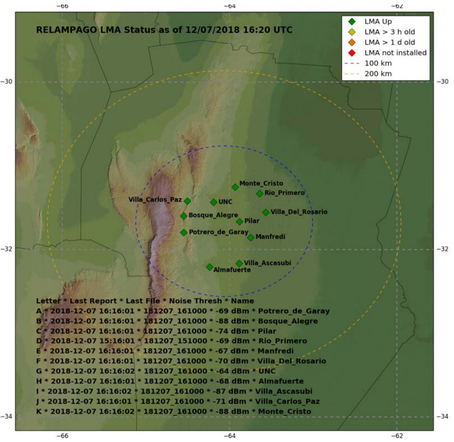
1. Introduction

- RELAMPAGO (Remote sensing of Electrification, Lightning, And Mesoscale/microscale Processes with Adaptive Ground Observations) is a National Science Foundation (NSF) field campaign to understand intense and severe convection in central Argentina, near the Sierras de Cordoba mountain range.
- In order to address RELAMPAGO science goals, as well as to assist with ground validation of the Geostationary Lightning Mapper (GLM) instrument on the GOES-16/17 satellites, NASA Marshall Space Flight Center (MSFC) has installed an 11-station Lightning Mapping Array (LMA) in this region.
- The LMA supported the Enhanced Observing Period (EOP) of RELAMPAGO, and then is continuing operations until mid-to-late April 2019.

2. Network Status

- The RELAMPAGO LMA was installed during 10/24-11/14/2018, with valid data starting by 11/7.
- Each station is remotely accessible via CloudGate modem, and health is routinely monitored.
- Data are downloaded and processed occasionally to ensure scientific quality.
- Occasional maintenance visits



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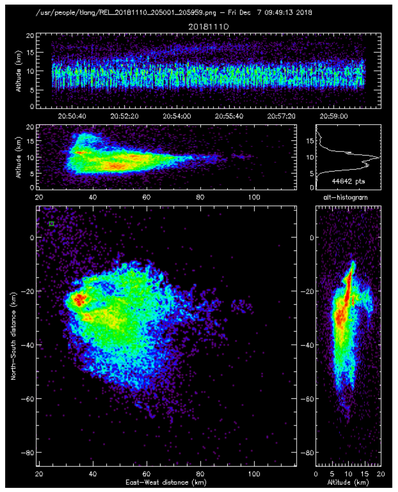
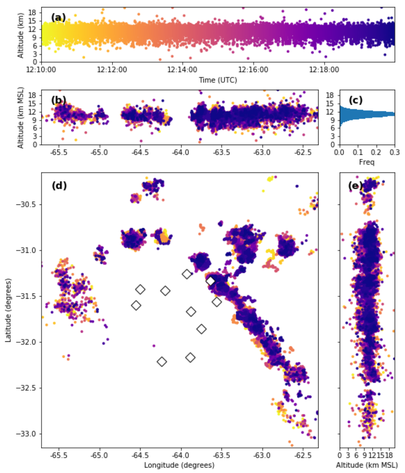
3. Data Examples and Qualitative Comparisons with GLM

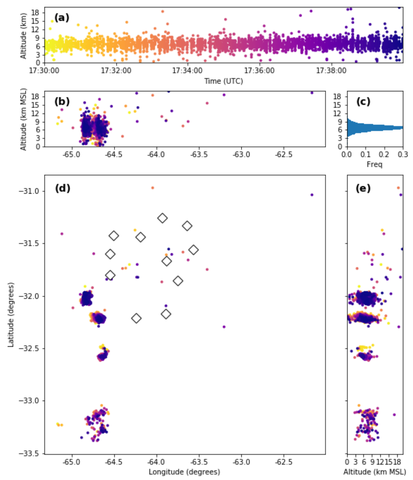
11/10/2018 - Supercell



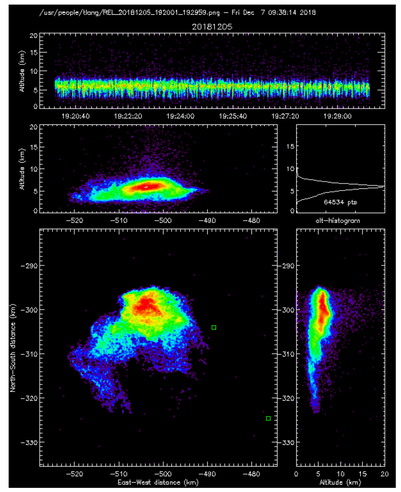
11/22/2018 - MCS

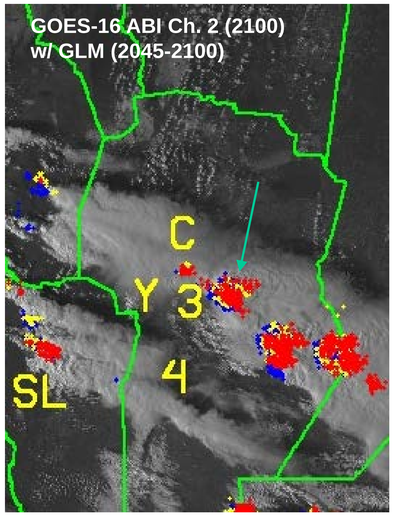


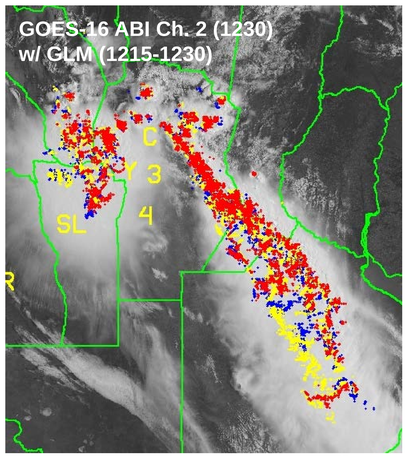
11/29/2018 - Mountain Convection

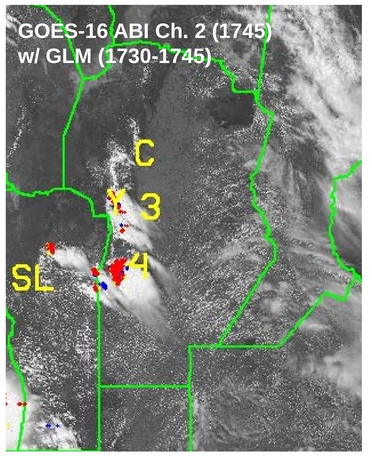


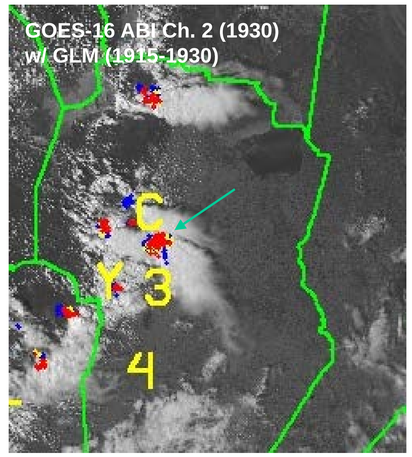
12/05/2018 - Anomalous Storm



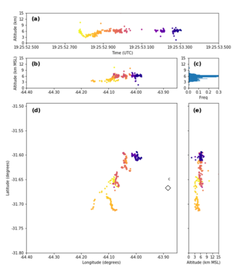


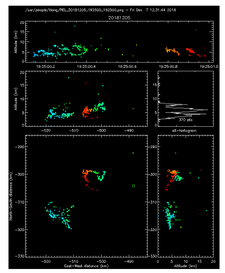


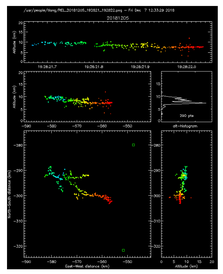




- Work continued on the LMA throughout November 2018, which led to increased VHF source rates and network performance toward the end of the month
- Notable cases to date include a supercell with overshooting top lightning and a lightning hole near the apparent updraft, multiple MCS passages, garden-variety mountain convection, and even evidently anomalously charged thunderstorms
- Source rates have improved significantly since the first couple weeks, and sub-flash processes are readily visible when examining individual flashes (data to right from 12/05)







4. Conclusions

- RELAMPAGO LMA has been in operation since November 2018; bandwidth allows network health monitoring, as well as occasional full-rate processing
- Network improved significantly during its first month, and has already captured a wide variety of convection
- Qualitative correspondence to GLM is observed, and LMA's ability to map 3D structure already has observed many interesting phenomena

Acknowledgments

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