Fusing Total Lightning Data with Aviation Weather Center and Storm Prediction Center Operations

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Severe Weather and Lightning

GOES-R Proving Ground and Training

2nd NOAA Satellite Science Week Virtual Meeting, 18-22 March 2013

Introduction

- GOES-R total lightning preparations focus on local forecast offices
  - Severe weather, lightning jumps, situational awareness, and safety (Bridenstein et a. 2005; Goodman et al. 2005; Demetriades et al. 2008; Schultz et al. 2009; Darden et al. 2010; Gatlin and Goodman 2010; Schultz et al. 2011; Stano 2012; White et al. 2012)
- Proposed a GOES-R Visiting Scientist trip
  - Meet with Aviation Weather Center and Storm Prediction Center
  - Learn needs / operational priorities

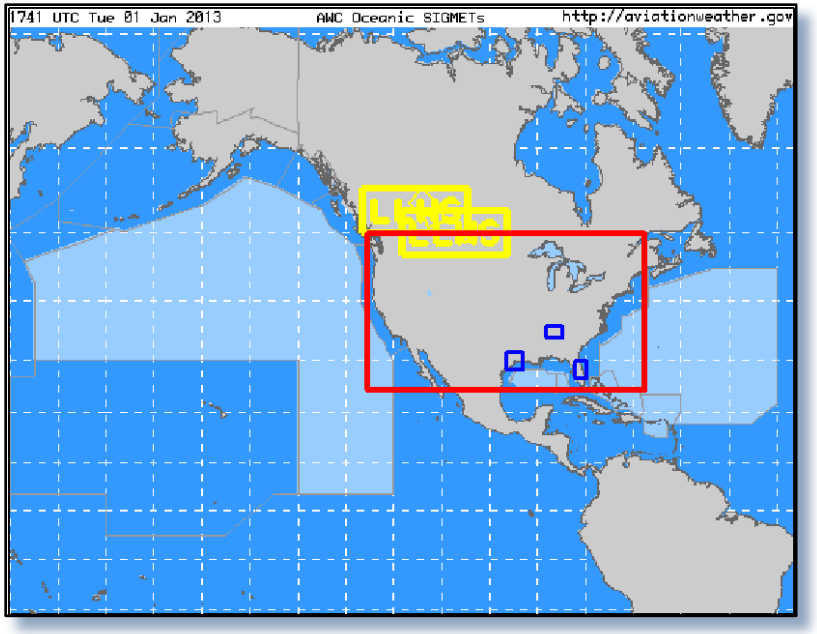

Figure 1: Subset of AWC domain (full image), the SPC domain (red box), and three SPoRT partner WFOs (blue boxes)

Methodology / Expected Outcomes

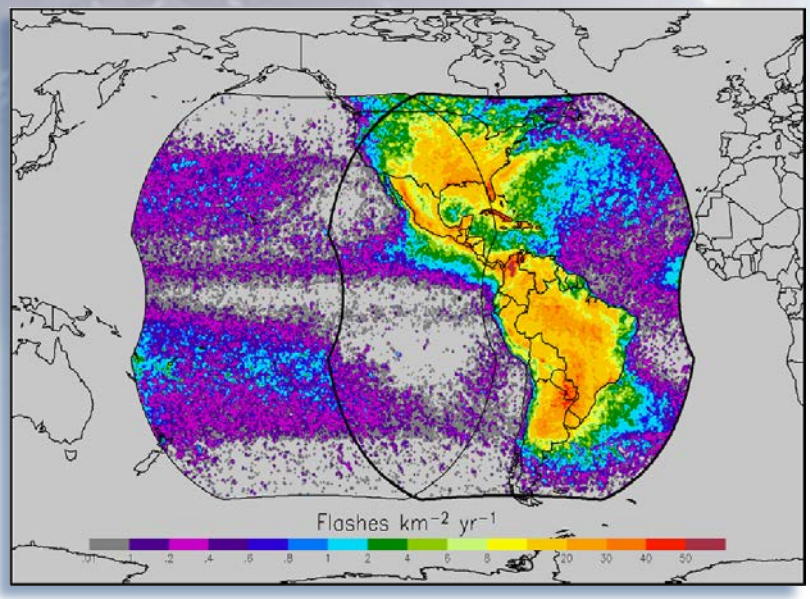

Figure 2: The GLM field of view for GOES-East and West positions with total lightning climatology from OTD and LIS (1995-2005)

- Outline of visit
  - Job shadow Center forecasters
  - Learn about Center operations, needs, and priorities
  - Train on total lightning and the pseduo-GLM (PGLM) demo products (Stano et al. 2011; 2012)
- Outcomes of visit
  - Develop a PGLM display for Centers
  - Discuss procedures to incorporate total lightning into operations
  - Develop evaluations of PGLM for GOES-R preparations

Pseudo-GLM Display at AWC and SPC

- Needed different display from local forecast offices
  - Developed the PGLM Mosaic (Figure 3)
  - All collaborative networks in one product (not one at a time like local offices)
- Multiple collaborations
  - North Alabama, Washington D.C., and Kennedy Space Center (NASA)
  - West Texas (Texas Tech University)
  - Oklahoma (University of Oklahoma)

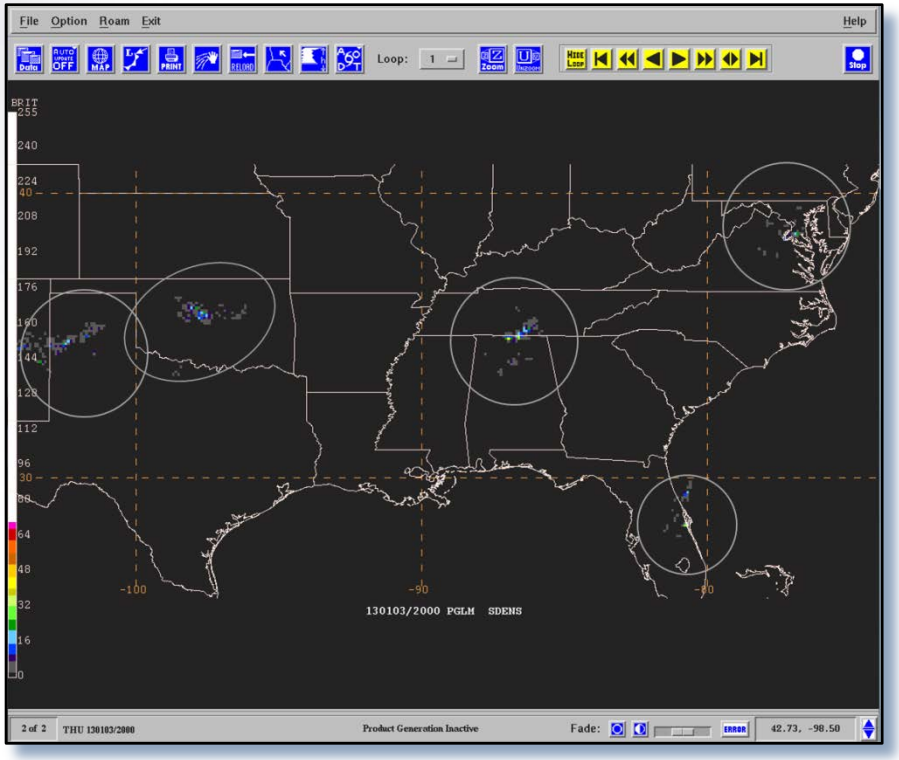

Figure 3: Display of PGLM Mosaic in N-AWIPS with range rings outlining individual network ranges.

Operational Uses at AWC and SPC

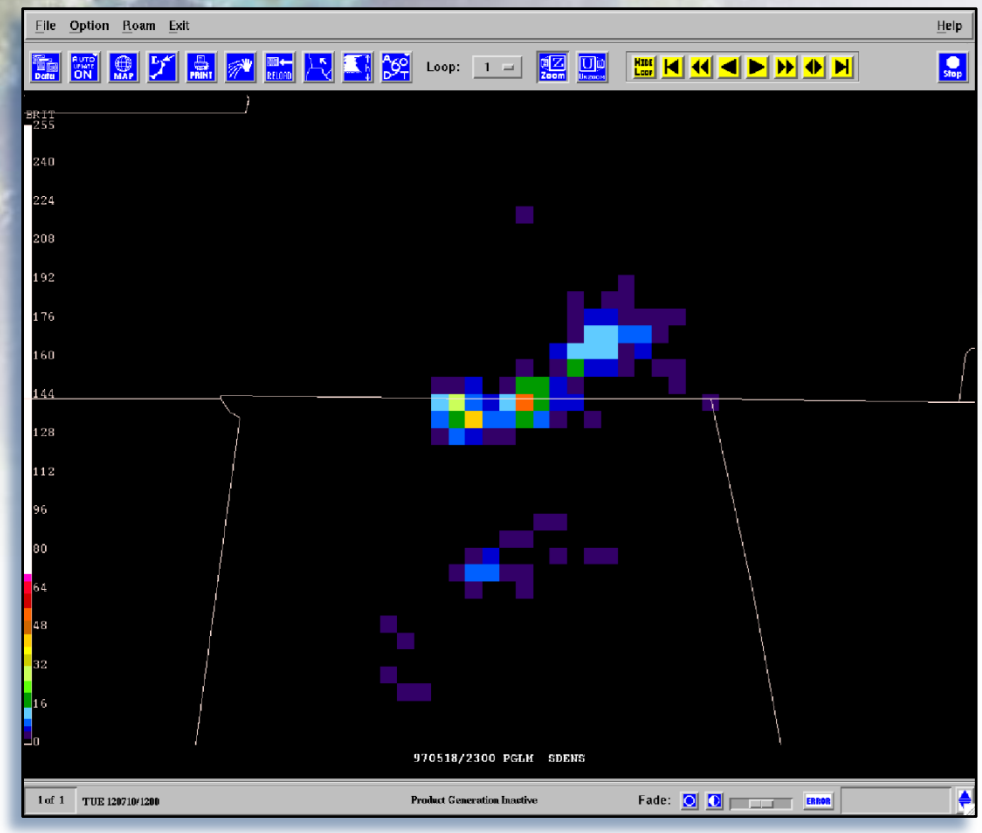

Figure 4: Same as Figure 3, but zoomed in on North Alabama.

- Operational uses of PGLM data at AWC and SPC
  - Confirm convection in remote regions
  - Aid with flight diversions
  - Monitor status of cap breaking
  - Modify mesoscal discussions (i.e. expire or re-issue)
  - Modify convective forecasts
  - Utility in tropical regions
  - Nighttime decay and morning initiation scenarios

AWC Summer Experiment - Intro

- Ran from 4-15 June 2012
  - Involved AWC, CWSUs
  - FAA, AFWA, Airlines
  - Researchers
- Emphasis
  - Traffic flow management
  - Aviation Weather Statements
  - GOES-R Products (such as SPoRT's PGLM Mosaic)

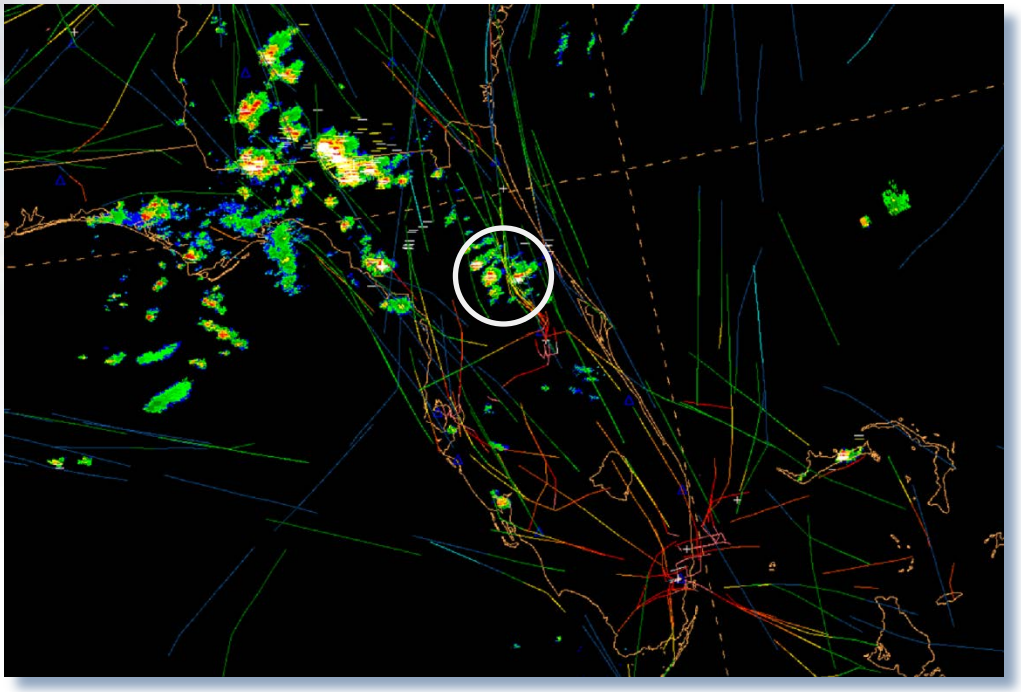

Figure 5: Radar reflectivity over Florida with flight paths. Emphasis (circle) on routing aircraft between storms on approach to Orlando on 1708 UTC, 14 June 2012. Cloud-to-ground observations noted clear path.

AWC Summer Experiment - Results

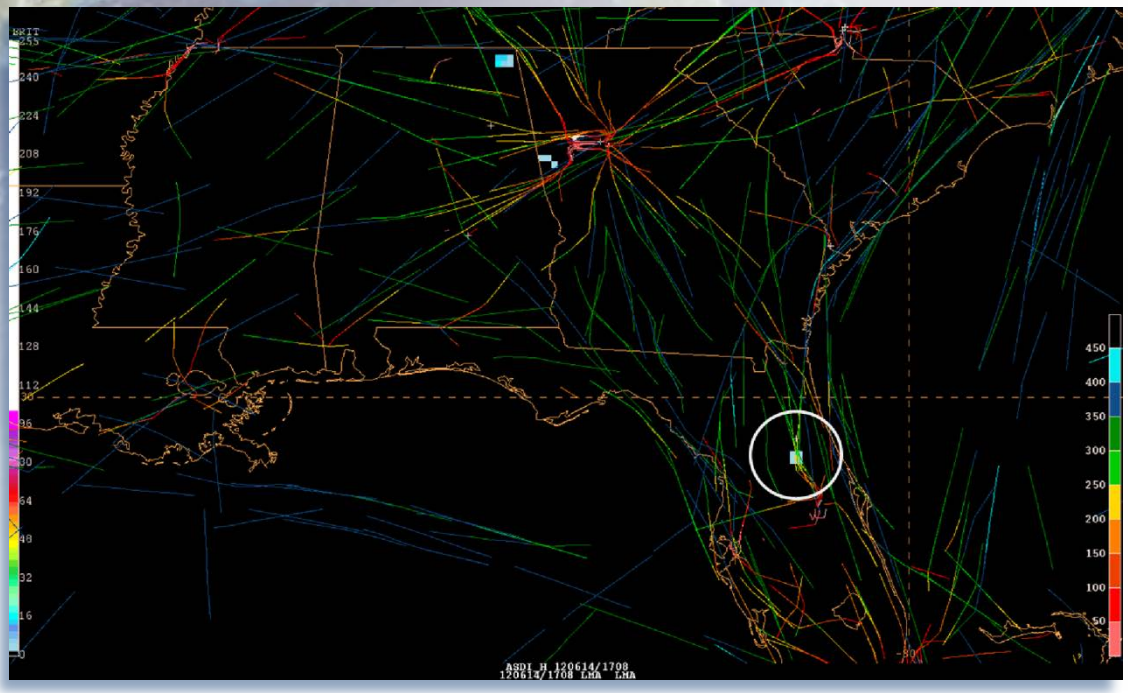

Figure 6: Similar to Figure 5, but with the PGLM mosaic plotted. Note that the corridor selected for aircraft actually includes total lightning, suggesting strong updrafts in flight path.

- PGLM had few opportunities for use this year (limited activity)
- Still, the PGLM evaluation
  - Generated plenty of interest
  - Drove applications discussions (Figures 5 and 6)
  - Will lead to development of national center specific total lightning training

Possible Path to Operations

- PGLM Mosaic already in N-AWIPS (Figures 3 and 4)
  - Major point as current SPoRT efforts have been with AWIPS II
- Currently displayed in demonstration mode
  - I.e. Not on operations floor
- Coordinate with Satellite Champions to move to operations floor
  - Done in conjunction with training
  - Ensure that forecasters understand available data
- Proposal submitted to evaluate PGLM data with Operations Proving Ground

Future Plans

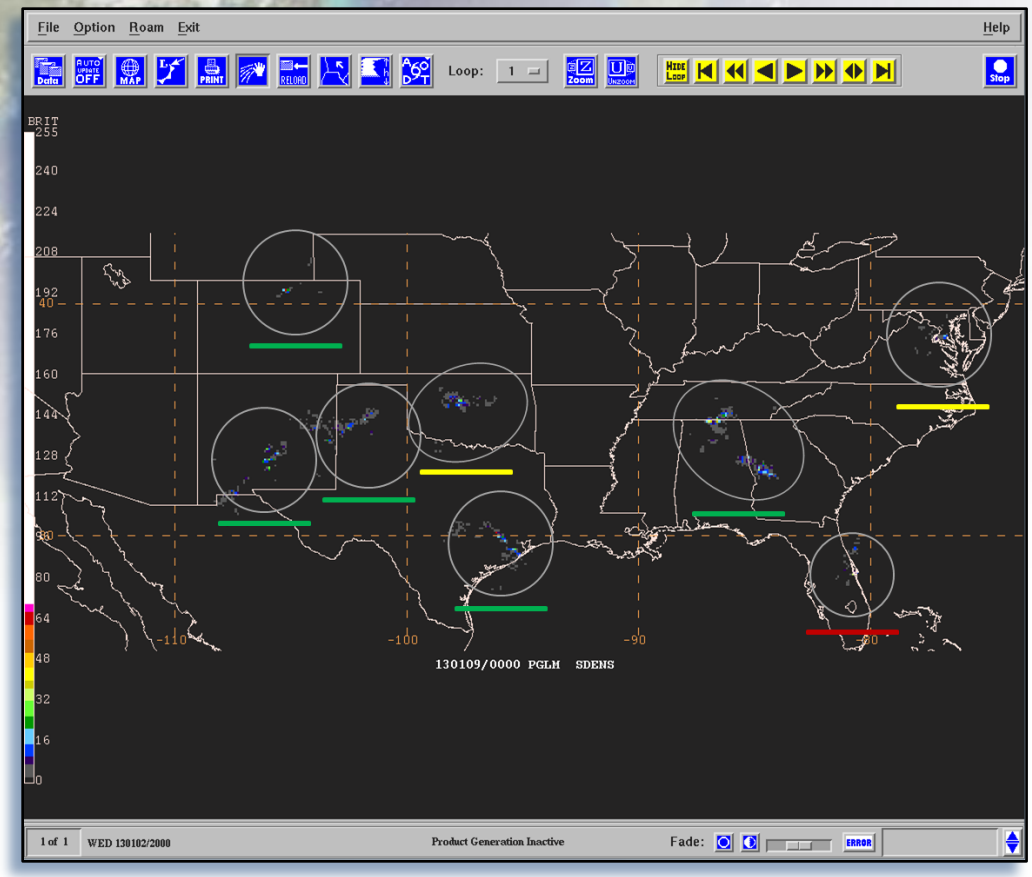

Figure 7: Enhanced PGLM Mosaic in N-AWIPS with new collaborative networks and a network status indicator.

- Already preparing display upgrades (Figure 7)
  - More network collaborations
    - (CIRA/CSU, New Mexico Tech, Georgia Tech)
  - Provides better coverage
  - SPoRT developing a network status indicator
- Upcoming training
  - Collaborating with Satellite Champions on National Center specific module

Publications List

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