

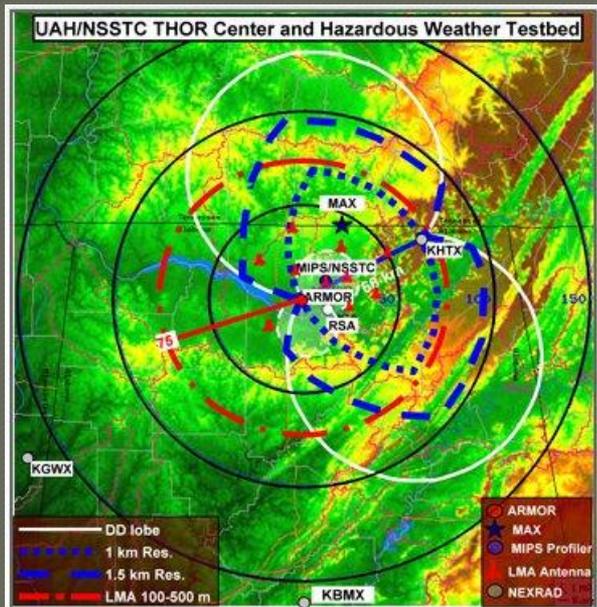
Integrated GOES-R GLM/ABI approaches for the detection and forecasting of convectively induced turbulence (CIT)

Lawrence Carey¹, Wayne Feltz², Kristopher Bedka³, and Walter Petersen⁴

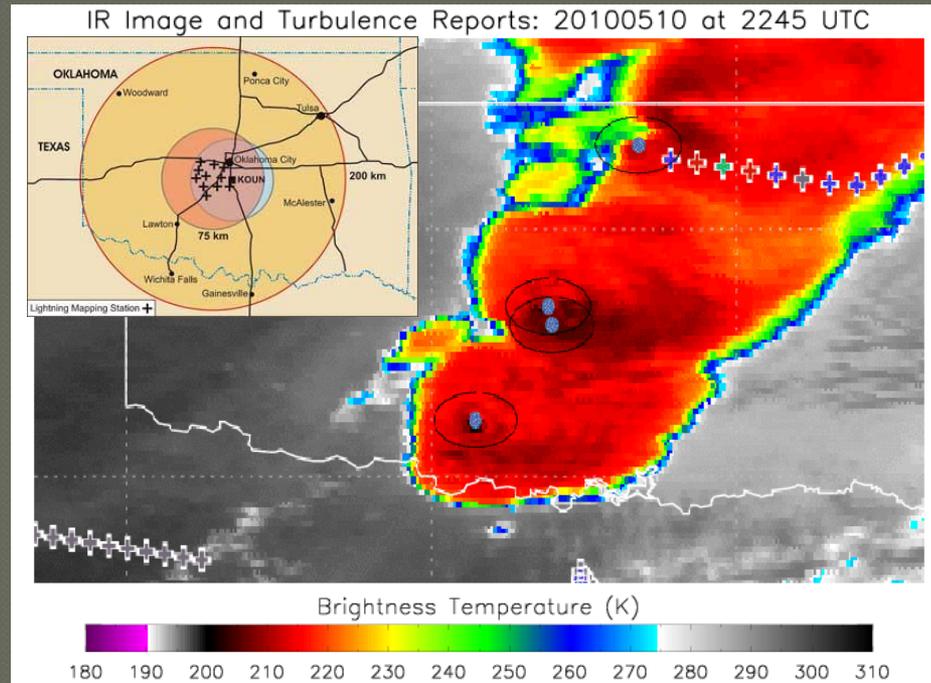
1 – UAHuntsville, Huntsville, AL; 2 – CIMSS, University of Wisconsin-Madison, Madison, WI; 3 – SSAI at the NASA LaRC, Hampton, VA; 4 – NASA GSFC/WFF, Wallops, VA

- Rapidly developing convection is a known source of CIT
- Satellite derived cloud top infrared (IR) cooling rate, overshooting tops (OT)/enhanced-V and total lightning flash rate trends are strong inferences of convective updraft intensity and growth rate
 - hazardous regions along data sparse flight routes (e.g., oceans).
- Turbulence occurrence mined using eddy dissipation rate (EDR) from NCAR turbulence algorithm on commercial aircraft nav data.
- Work leverages available VHF-based total lightning during turbulence encounters over Northern Alabama, Washington DC, Oklahoma, and Florida Lightning Mapping Array (LMA) domains.
 - Explore GLM proxy over the oceans (LF/VLF networks).

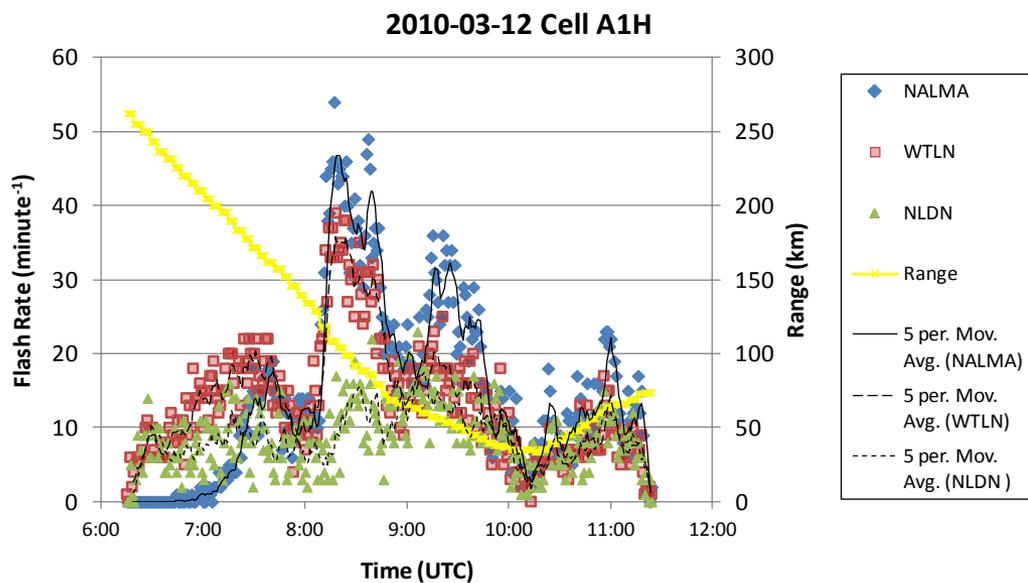
- **Develop database of LMA, GOES, EDR and other observations (radar, TRMM, NLDN, WTLN, GLD360) [Feltz, Carey]**
 - Identify varied (weak, moderate, severe) sample of EDR measured CIT events over LMAs in a variety of environments and convective types.
- **Process LMA for total lightning flash occurrence and rates [Carey] and GOES for convective cooling rate, cloud type transitions, and OT occurrence and other GOES IR properties [Feltz]**
 - Process and assess regional/global VLF/LF lightning networks as GLM total lightning proxy for use outside LMA domain, over oceans.
- **Establish temporal and spatial relationships between total lightning occurrence and LMA flash properties/trends, cloud top cooling, OT occurrence and EDR-CIT events [Carey, Bedka, Feltz]**
 - Leverage ongoing LMA→GLM proxy and object tracking work
- **Utilize environmental (sounding, model), TRMM, ground Doppler/polarimetric radars, field campaign radar-LMA networks and other data (e.g., DC3, SEVIRI during CHUVA) to better understand and validate results [Carey, Petersen]**



NASA NALMA and UAHuntsville radar network



GOES IR Tb, OT's and EDR turbulence reports (blue: light, green: mod, red: severe) in MCS over OK (5/10/2010). Inset: NSSL OK LMA



GLM Flash Proxy and Tracking: NALMA, WTLN, NLDN flash rates in a severe supercell over Northern Alabama (3/12/2010)