An Integrated 0-1 hour First-Flash Lightning Nowcasting, Lightning Amount and Jumping Lightning Warning Capability

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Project Goals
- Using satellite-based methods that provide accurate 0-1 hour convective initiation (CI) nowcasts, and rely on proven success coupling satellite and radar fields in the Corridor Integrated Weather System (CWS; operated and developed at MITLL, now NASA Laboratory), to subsequently monitor for first-flash lightning initiation (LI) and later period lightning trends as storms evolve.
- Enhance IR-based methods within the GOES-R CI Algorithm (that must meet specific thresholds for a given cumulus cloud before the cloud is considered to have an increased likelihood of producing lightning next 90 min) that forecast LI.
- Integrate GOES-R CI and LI fields with radar thresholds (e.g., first 240 dBZ echo at the −10 °C altitude) and NWP model data within the WDDS-II system for LI-events from new convective storms. Track ongoing lightning using Lightning Mapping Array (LMA) and pseudo-Geostationary Lightning Mapper (GLM) data to assess per-storm lightning trends (e.g., as tied to lightning jumps) and outline threat regions.
- Evaluate the ability to produce LI nowcasts through a “lightning threat” product, and obtain feedback from National Weather Service forecasters on its value as a decision support tool.

Proof of Concept

Lightning Initiation Interest Fields
Prior research (Harries et al. 2010; Matteo and McKealski 2013) have developed understanding of how specific satellite and channel time trends and channel time trends related to produce lightning initiation (LI).

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- This first case example occurred with NASA support (since July 2014) through grant NNX14AG23G. PI John R. McKealski/UAHuntsville

Immediate Plans
- Develop Lightning Threat (WDDS-II) system to be semi real-time by summer 2015.
- Optimize use of radar and GOES infrared indicators toward predicting first-flash LI.
- Develop threat cone within WDDS-II as cloud objects evolve to radar objects with accompanying LMA flash density data.
- Move to fully integrate High Resolution Rapid Refresh (HRRR) model LFA forecasts into the WDDS-II system.
- Collect performance statistics and demonstrate with NWS Forecasts for Lightning Threat Product line.
- Develop a statistical model (with a training database) toward optimizing the Lightning Threat 0-60 min forecast product.