**Questions and Discussion Topics for the Missouri Flood Case (29-30 April 2017)**

0000-0100 UTC, 29 April

* No major activity occurring in Missouri
* Sun is setting, so get low angle light on visible through ~0030 UTC
* Discuss what the participants see
  + Compare ABI 11.2 with 0.64
  + What is seen in the GLM group density? How does it compare with ABI imagery?
  + How does the GLM group density compare to the NLDN points?
    - (Technically the NLDN points are 2 km density boxes)
    - Specifically can see GLM extent – GLM also highlighting strongest updrafts

0059-0210 UTC, 29 April

* Small storms developing in western Kentucky and Tennessee
* Note the difference between when GLM observes lightning initiation (western Tennessee at 0109 UTC) versus NLDN (same location at 0110 UTC)
  + Not much of a difference, but highlights the lead time
* Initial lightning in Missouri bootheel seen by both systems at 0121 UTC
  + However, note that GLM is showing continuous lightning versus NLDN
    - What is happening?
      * GLM is observing intra-cloud flashes that make up a larger percentage of the overall lightning versus the cloud-to-ground only NLDN
* Compare how lightning and ABI observations compare as storms are initiating
* Ask to compare storms in southeast Missouri versus those in extreme southwest Indiana
* 1st GLM observation in northwest Arkansas at 0205 UTC (NLDN at 0217 in the next animation)

0200-0252 UTC, 29 April

* 1st GLM along the southwest Missouri / northwest Arkansas border (NLDN at 0221 UTC)
* Again, compare GLM and NLDN lightning observations to what is seen in the ABI 11.2 micron.
* Discuss again what is physically happening to generate the GLM total lightning
  + Stronger, more voluminous updrafts extending into the mixed-phase region
  + With that physical relationship, what are the “bulls-eye” structures telling us about the storm?
  + Can we infer anything about the potential precipitation?
* Does the fact that we are seeing lightning continuously in relatively the same location provide any insight to these storms (e.g., their intensity, longevity, etc.)?
* What is lightning showing when compared to the large spatial area of the cold cloud tops?
  + (Answer: Gives a way to observe by proxy roughly where the main convective line is located)
* Compare what you see with the GLM (specifically with the spatial extent) versus the NLDN points. Is GLM helping or hindering your assessment of these storms?
* Note towards the end of the loop how the lightning in Illinois/Indiana is weakening in intensity, but still active. What does this tell us about the storms (keeping in mind what is physically driving the lightning activity)?

0250-0510 UTC, 29 April

* Discuss evolution of scene in the ABI versus the GLM and NLDN. What features stand out in each?
* By 0300 UTC note the “clustering” of GLM lightning observations (also seen somewhat with NLDN). Note how this compares with ABI overshooting tops (or coldest tops) and what that may say about the precipitation features.
* Also, by 0300 GLM group densities are increasing throughout the line of storms.
  + How does this compare with NLDN and the ABI observations?
  + What is this potentially telling us about the storms?
* GLM remains fairly steady through 0400 UTC. Compare to NLDN and ABI, particularly as cold cloud top shield expands over southern Missouri, Illinois, and Indiana as well as northwestern Arkansas
* Around 0330+ UTC note the changes in the GLM spatial extent characteristics. The lightning appears to be extending away from the core more. Note that NLDN is showing individual cloud-to-ground strikes with these flashes?
  + Discuss what may physically be occurring (i.e., charge lofted by updraft is advected into the stratiform region)
  + How does seeing this affect perception for lightning safety?
  + Does ABI help with this?
* First obviously long flash(es) at 0443 UTC in southwest Missouri extending to northeast into central Missouri. NLDN indicating about 6 cloud-to-ground flashes with this.
  + Note: I say flash(es) as since we are dealing with a group density, there could be multiple flashes that are tapping into this charge.
* Note towards the end of the loop that the GLM densities are increasing again and spatial extent is covering wider area?
  + What can we infer about precipitation pattern from this and the expanding ABI observed cloud shield?
* Also, note the direction that the spatial extent is extending with respect to the ABI observed cold cloud shield. GLM densities are extending mostly to the north of the central line of coldest cloud tops. Can anything be inferred from this?