Exploring Issues of Parallax Correction: Use of GOES data at High Latitudes

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Satellite Science Week
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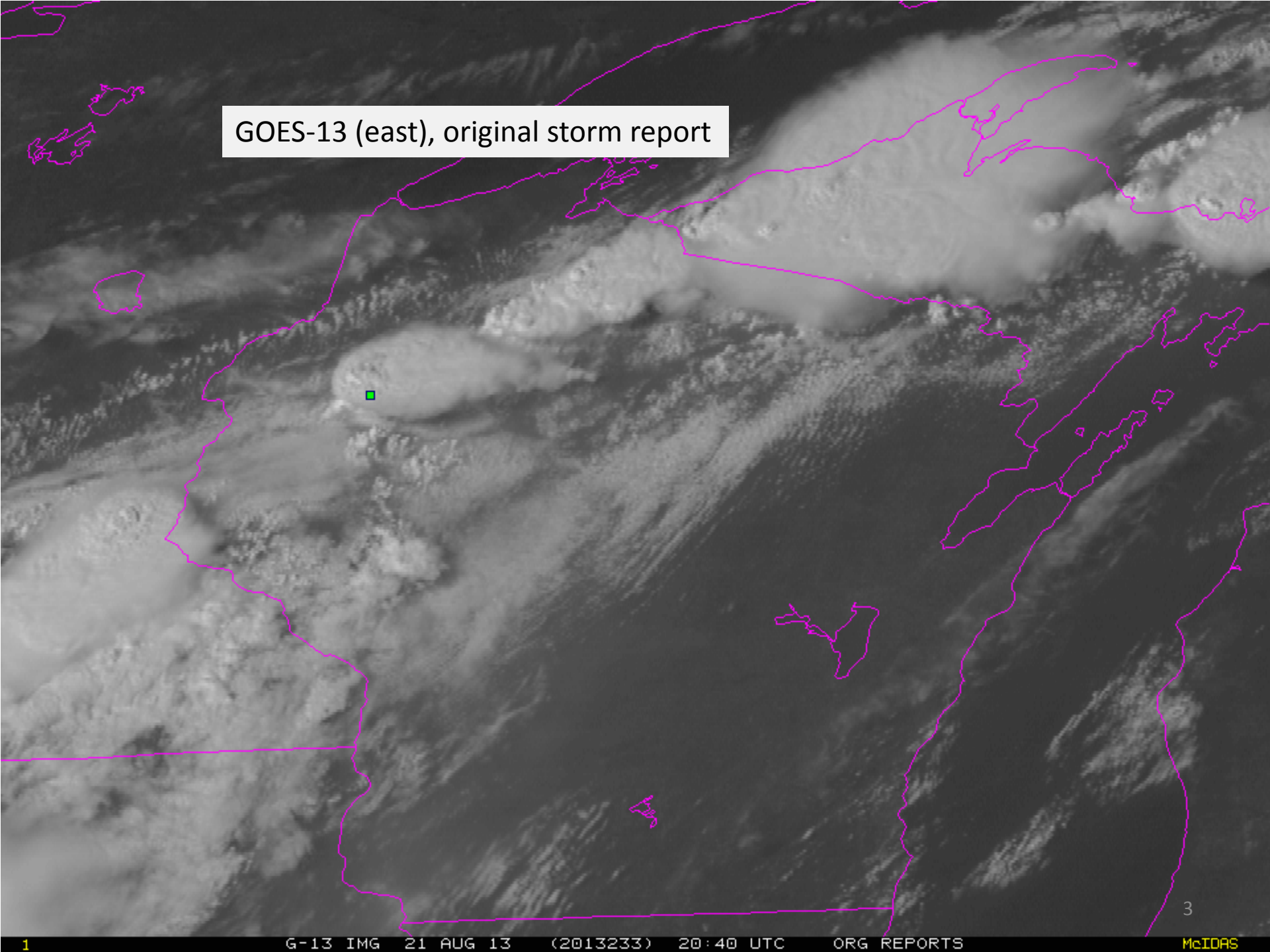
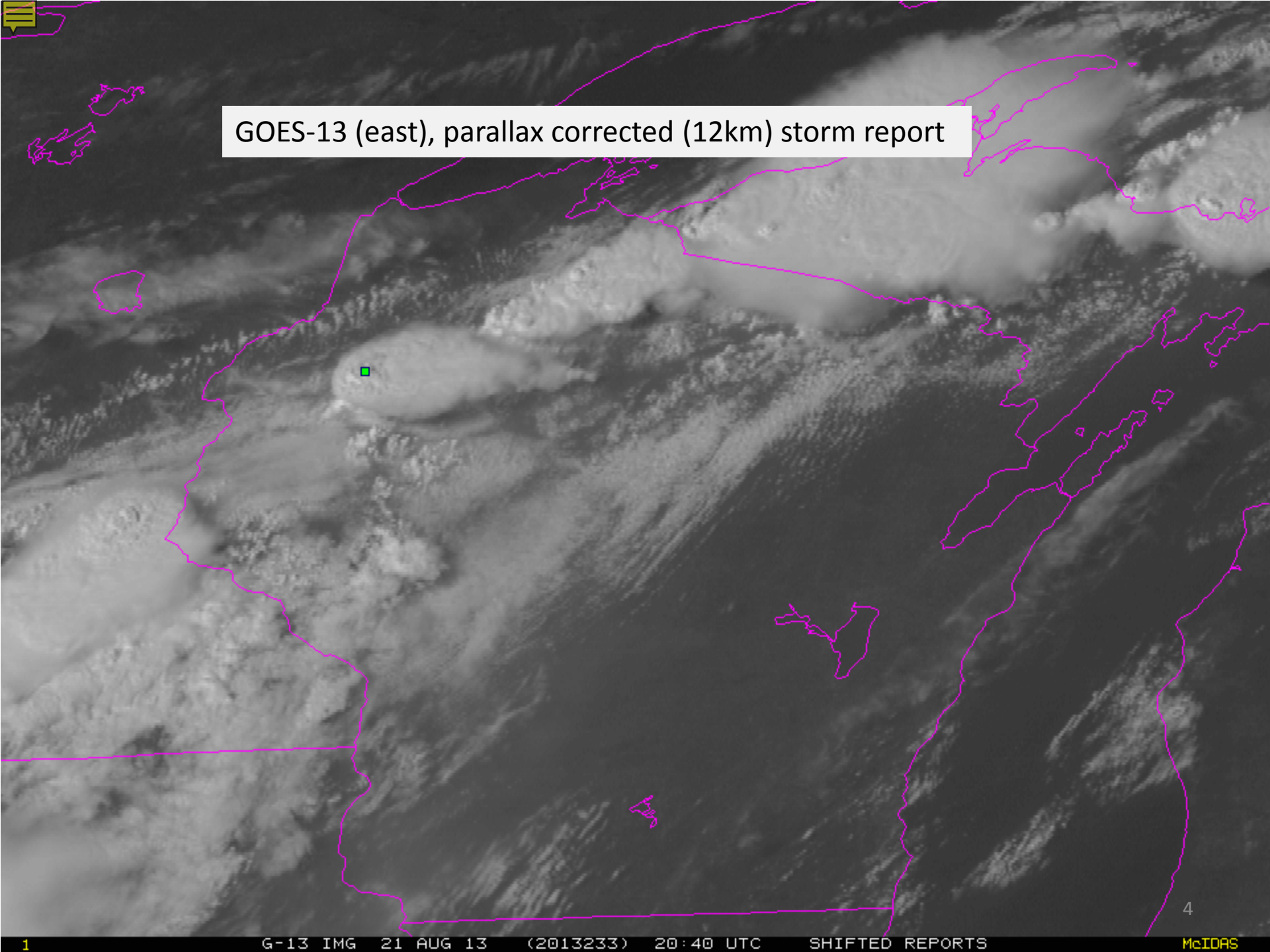
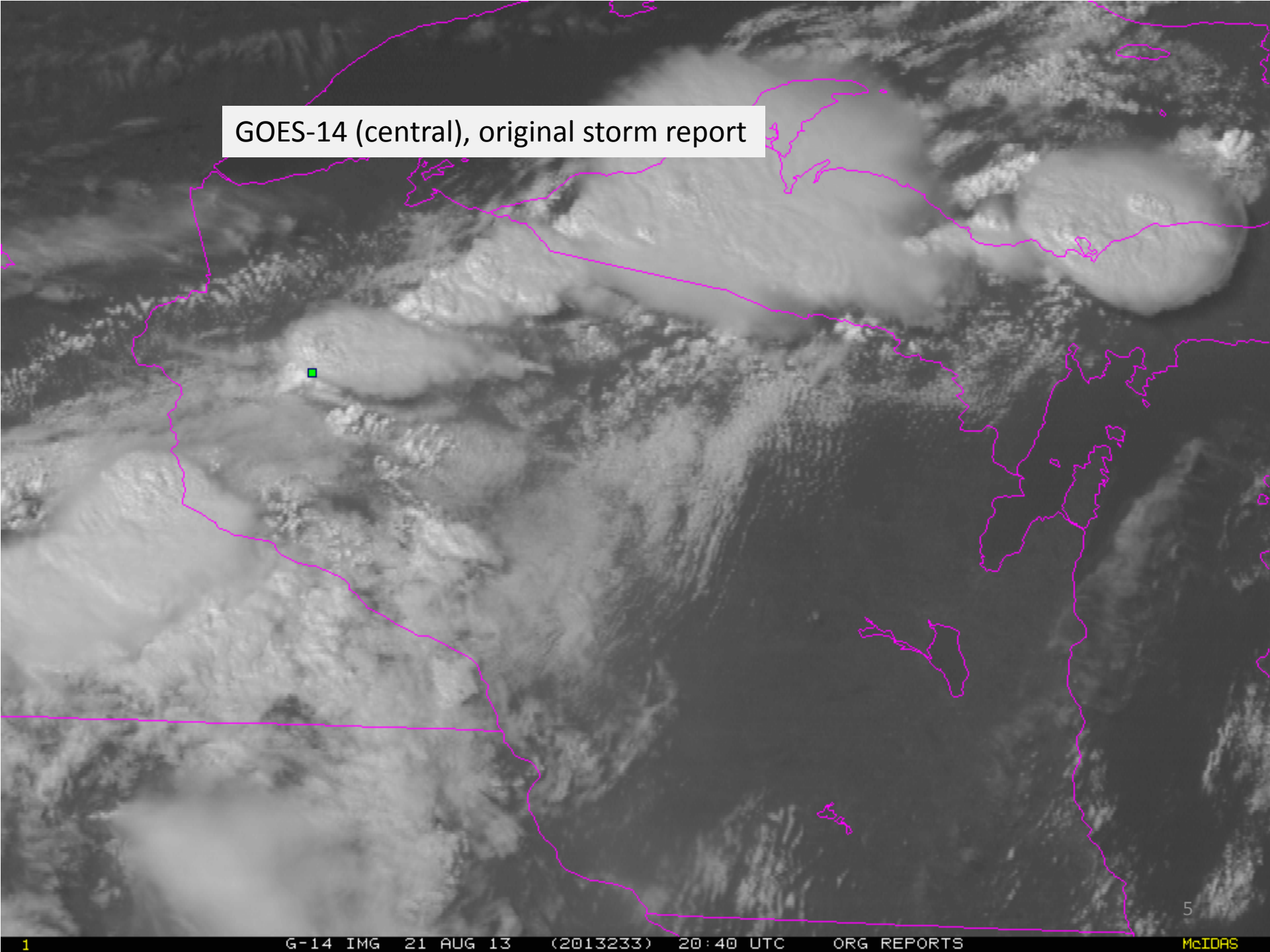
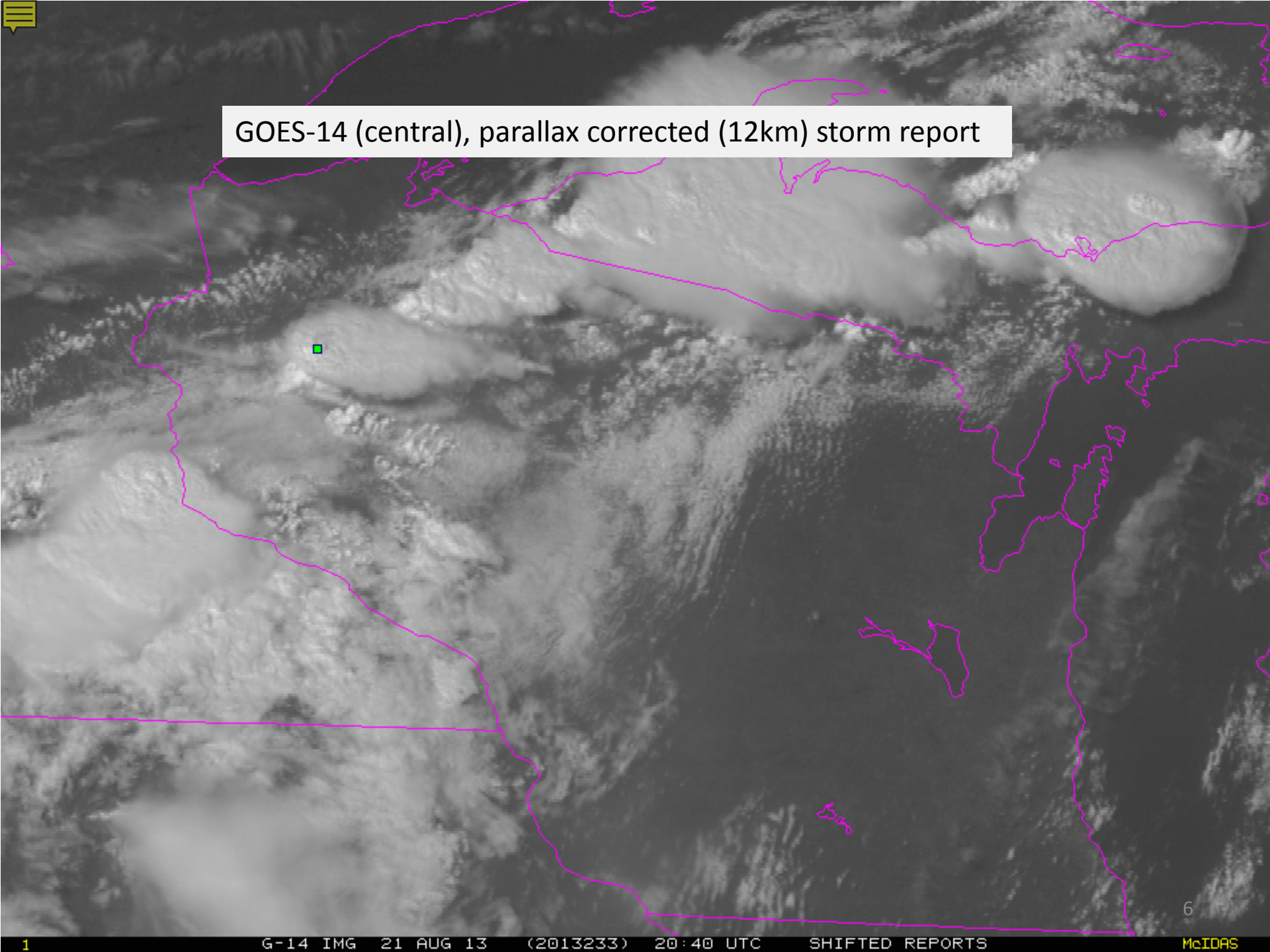
GOES – 13/14/15
Parallax Examples

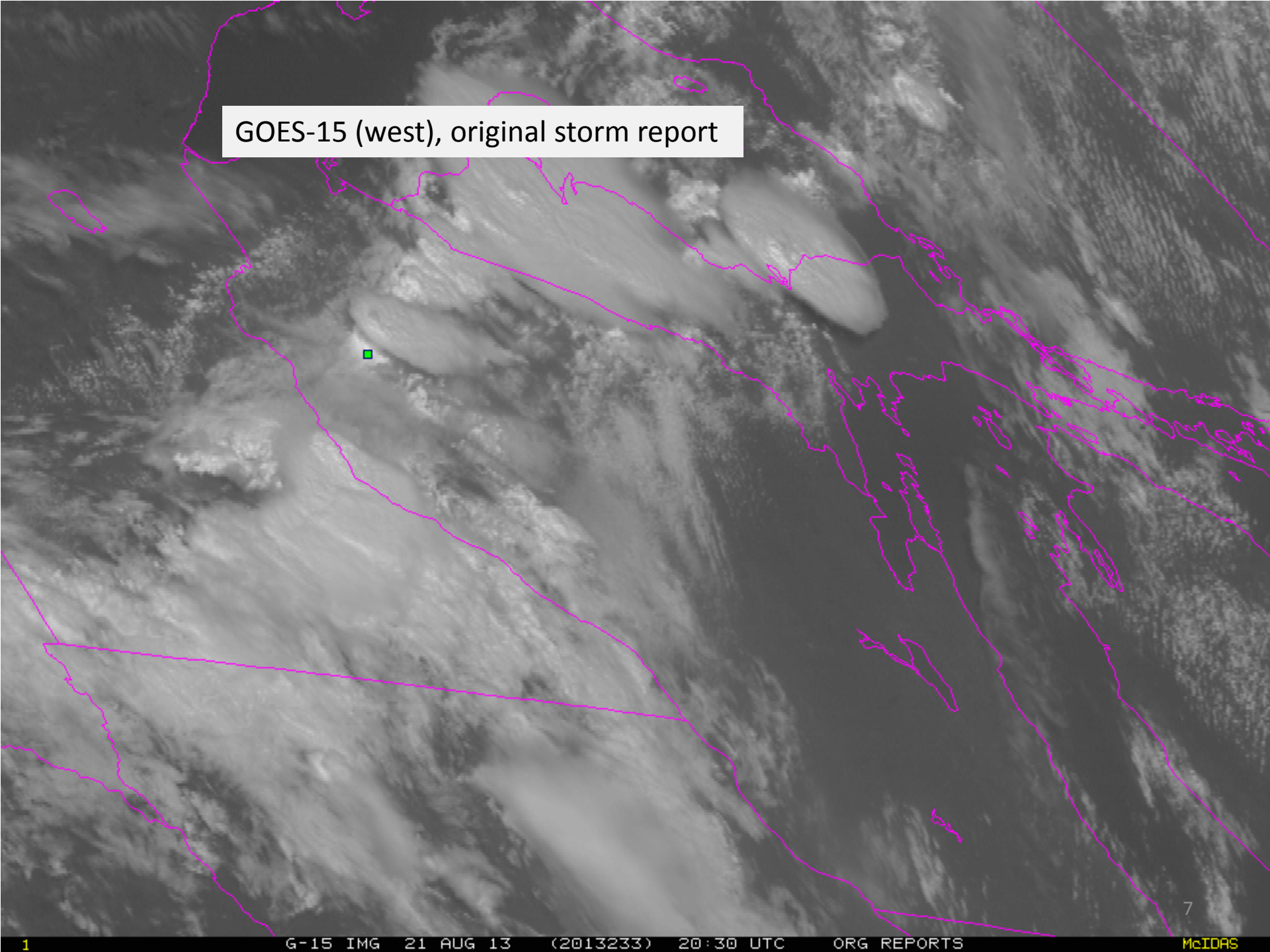

GOES-13 (east), original storm report
1
G-13 IMG 21 AUG 13 (2013233) 20:40 UTC ORG REPORTS
McIDAS

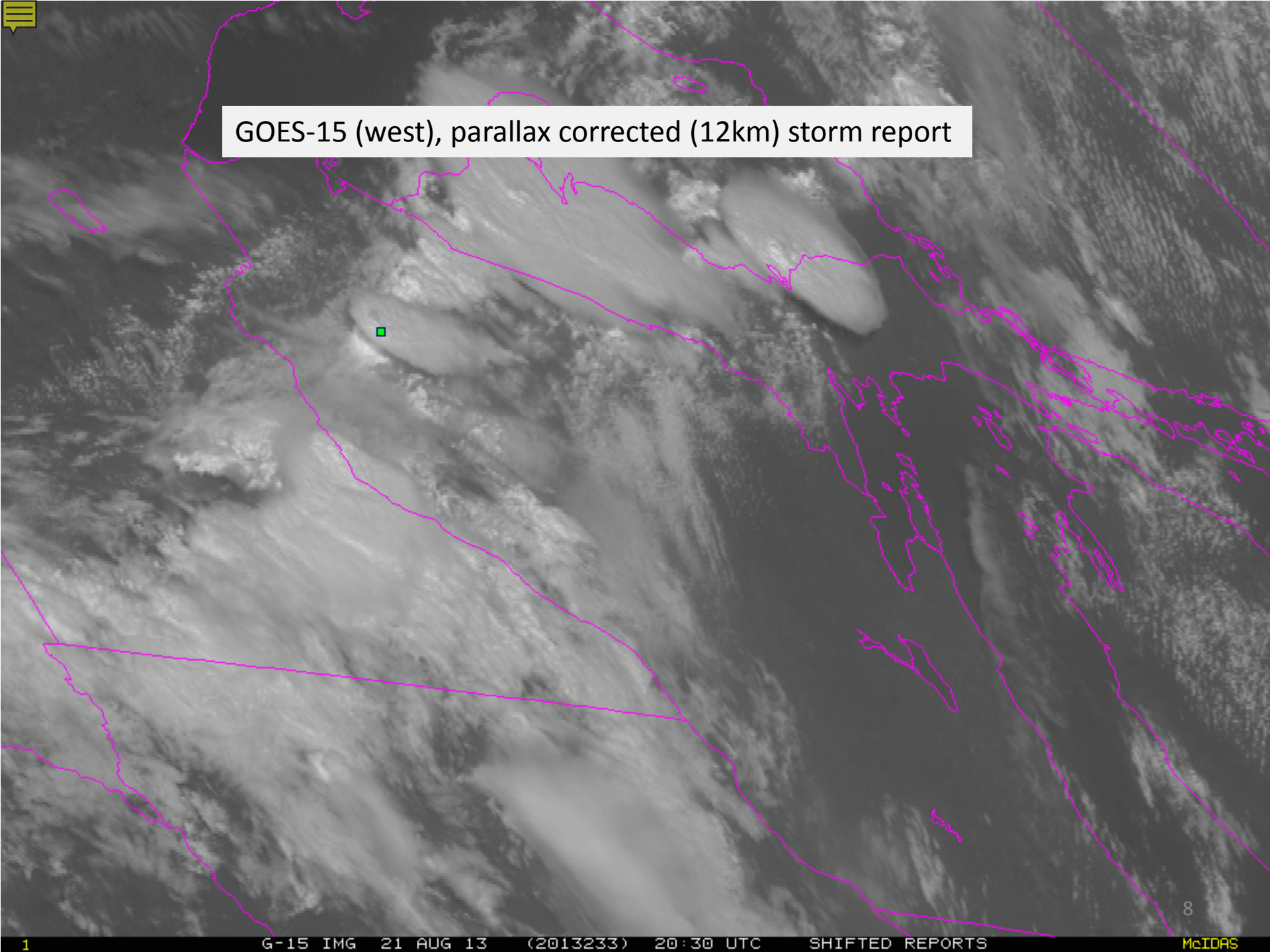

GOES-13 (east), parallax corrected (12km) storm report
1
G-13 IMG 21 AUG 13 (2013233) 20:40 UTC SHIFTED REPORTS
McIDAS


GOES-14 (central), original storm report
1
G-14 IMG 21 AUG 13 (2013233) 20:40 UTC ORG REPORTS
McIDAS

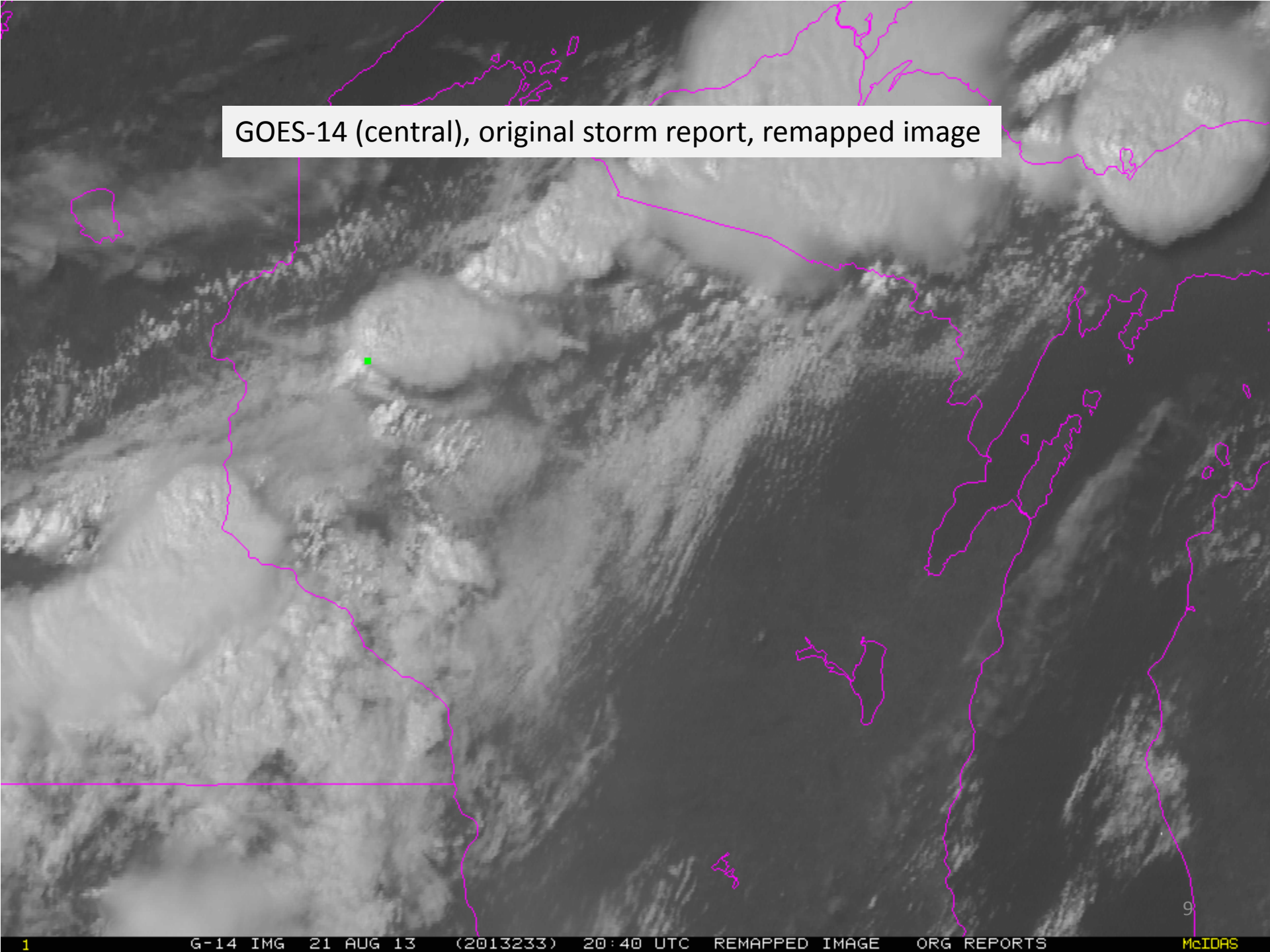
GOES-14 (central), parallax corrected (12km) storm report



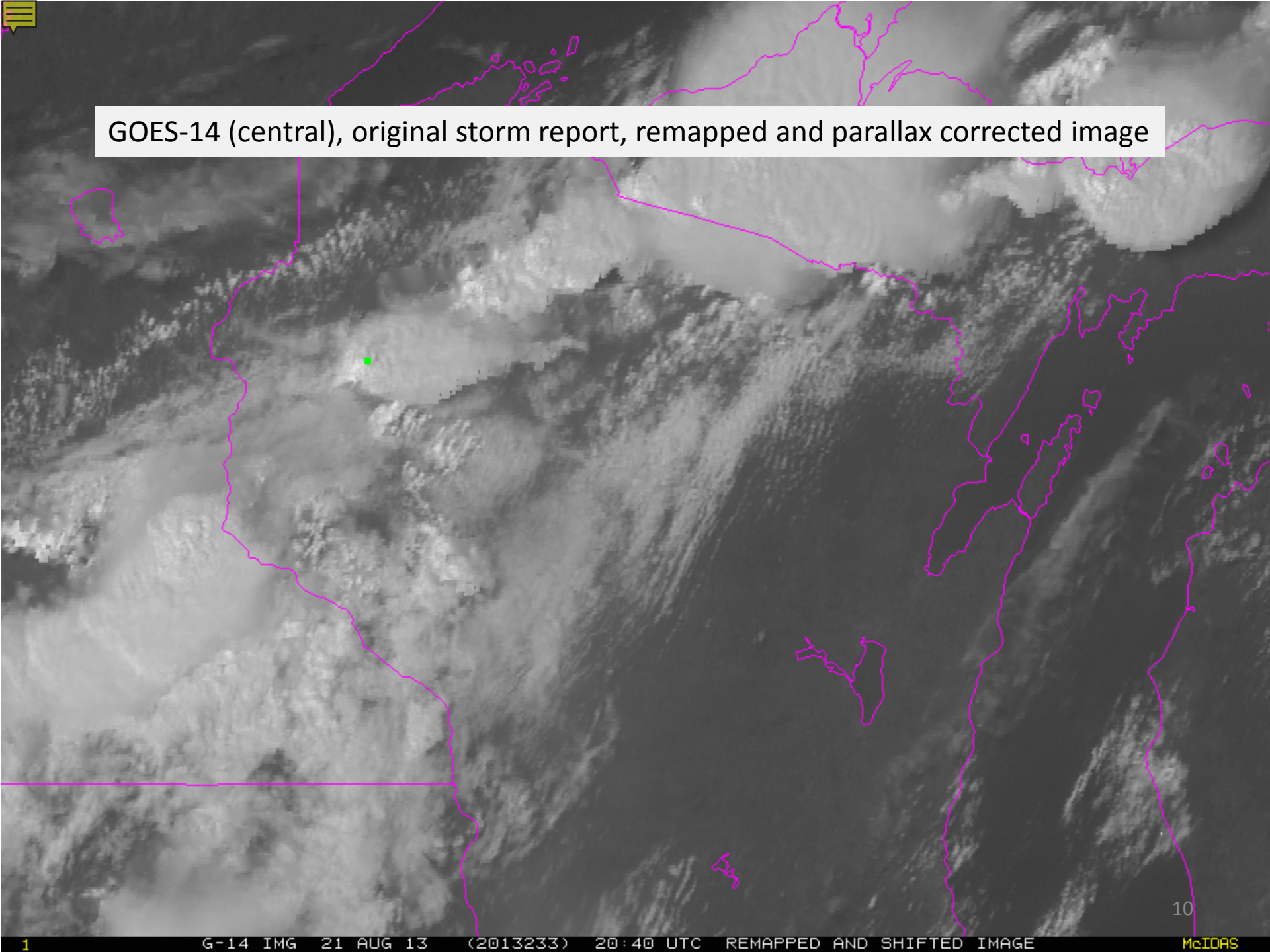

GOES-15 (west), original storm report
1
G-15 IMG 21 AUG 13 (2013233) 20:30 UTC ORG REPORTS
McIDAS


GOES-15 (west), parallax corrected (12km) storm report
1
G-15 IMG 21 AUG 13 (2013233) 20:30 UTC SHIFTED REPORTS
McIDAS

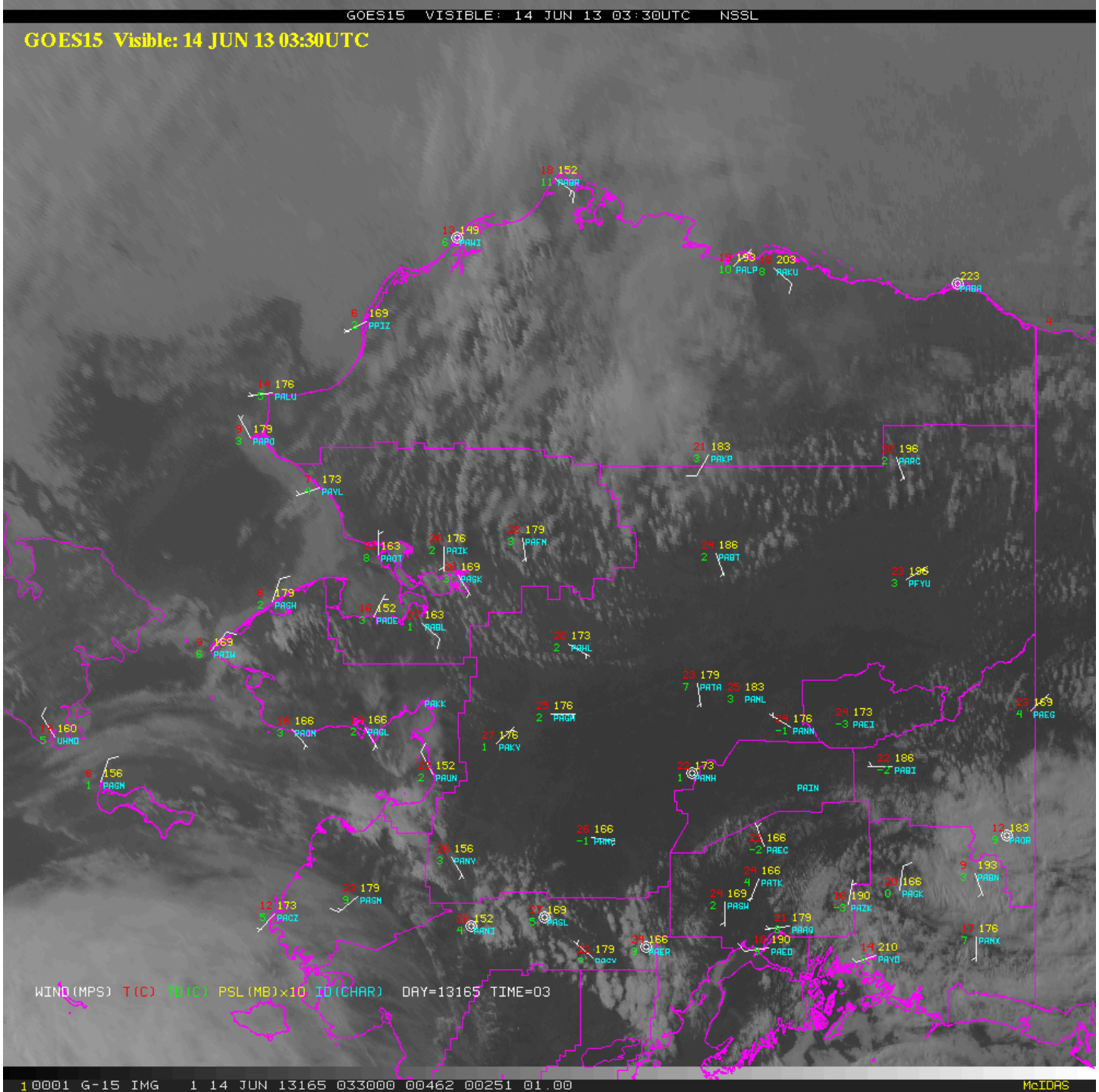
GOES-14 (central), original storm report, remapped image

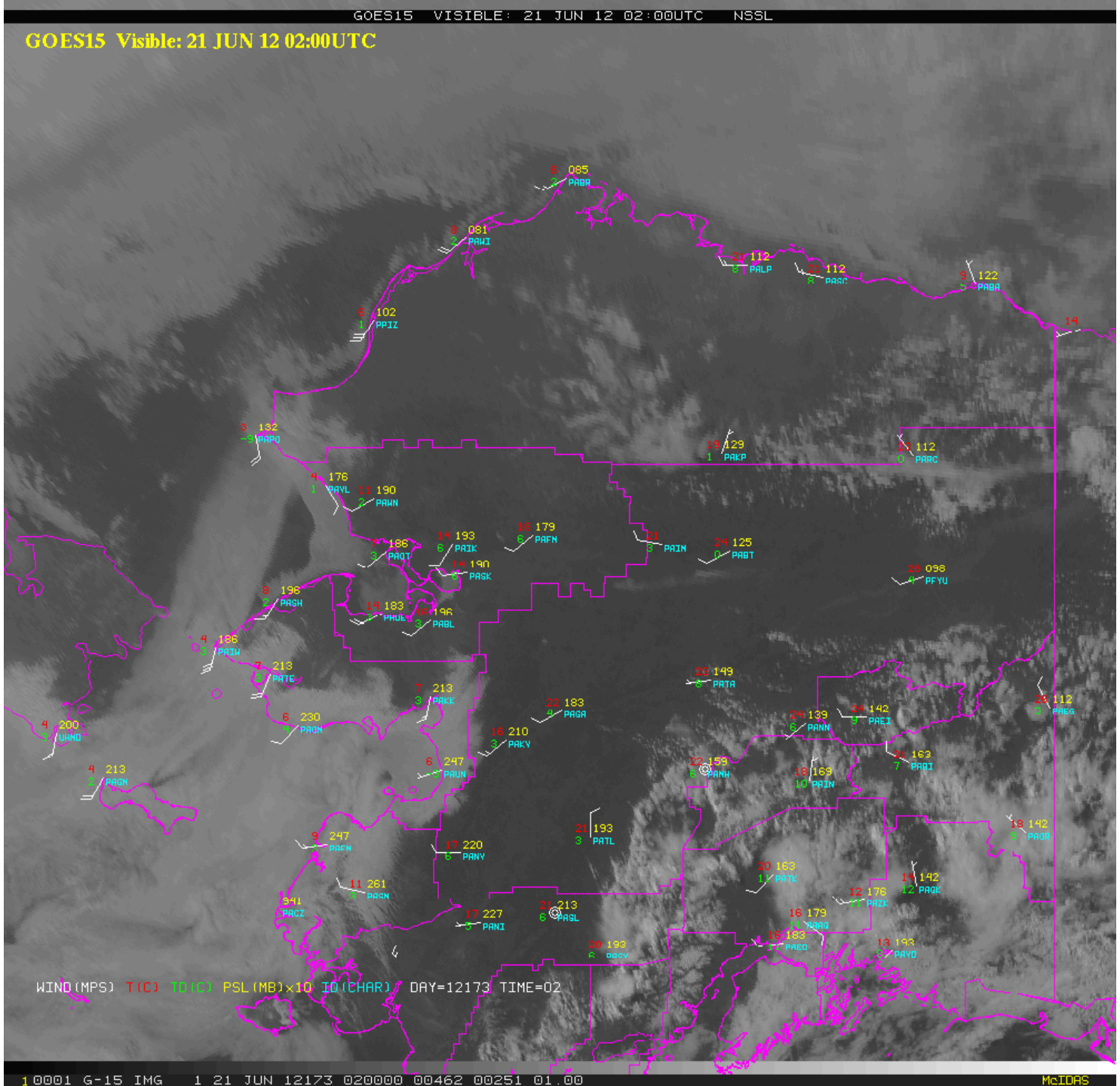


GOES-14 (central), original storm report, remapped and parallax corrected image



High Latitude imagery:
North Slope of Alaska and Arctic Ocean

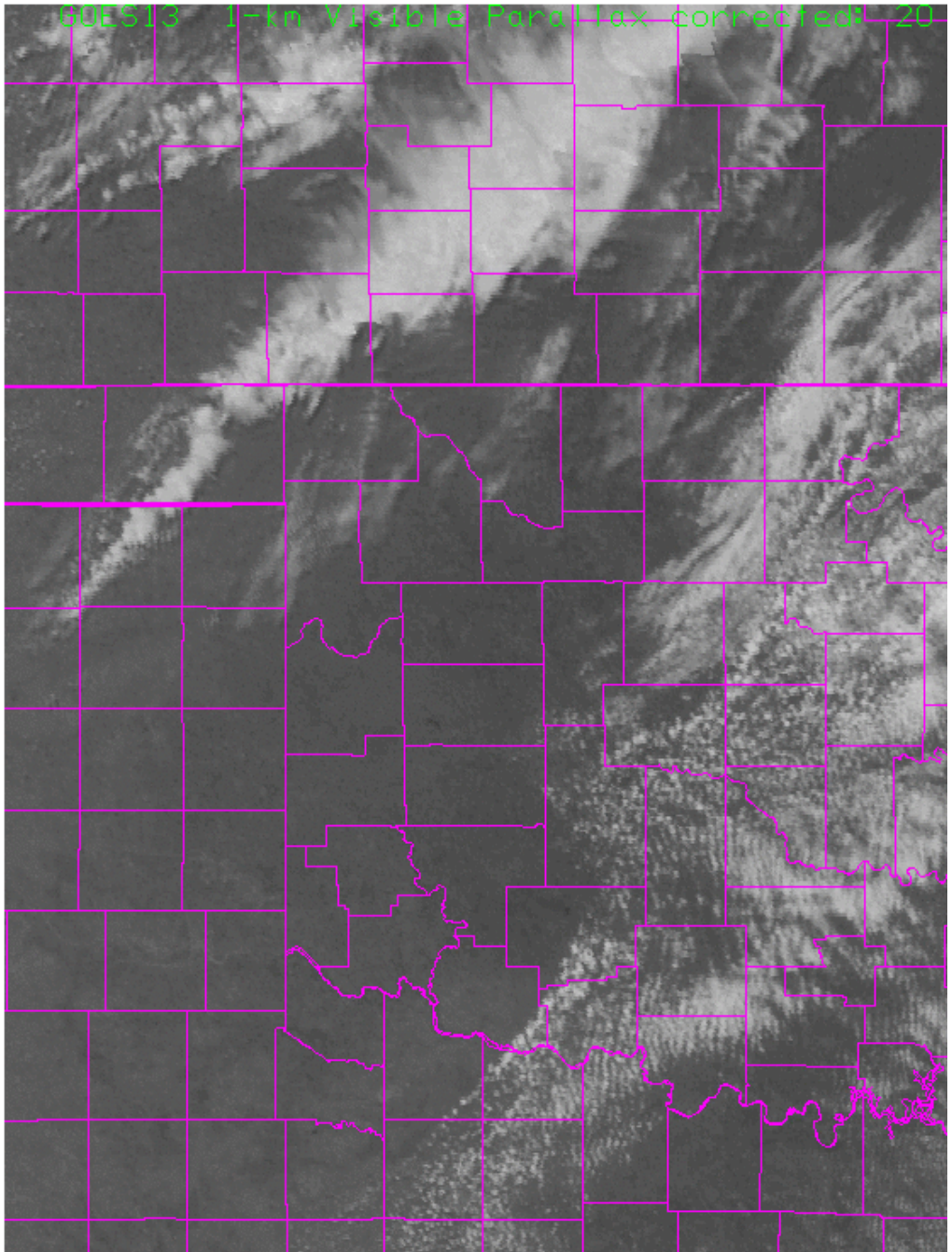

GOES15 VISIBLE: 14 JUN 13 03:30UTC NSSL
GOES15 Visible: 14 JUN 13 03:30UTC
WIND(MPS) T(C) TD(C) PSL(MB)x10 ID(CHAR) DAY=13165 TIME=03
1 0001 G-15 IMG 1 14 JUN 13165 033000 00462 00251 01.00
McIDAS


GOES15 VISIBLE: 21 JUN 12 02:00UTC NSSL
GOES15 Visible: 21 JUN 12 02:00UTC
WIND(MPS) T(C) TD(C) PSL(MB)x10 ID(CHAR) DAY=12173 TIME=02
10001 G-15 IMG 1 21 JUN 12173 020000 00462 00251 01.00
McIDAS

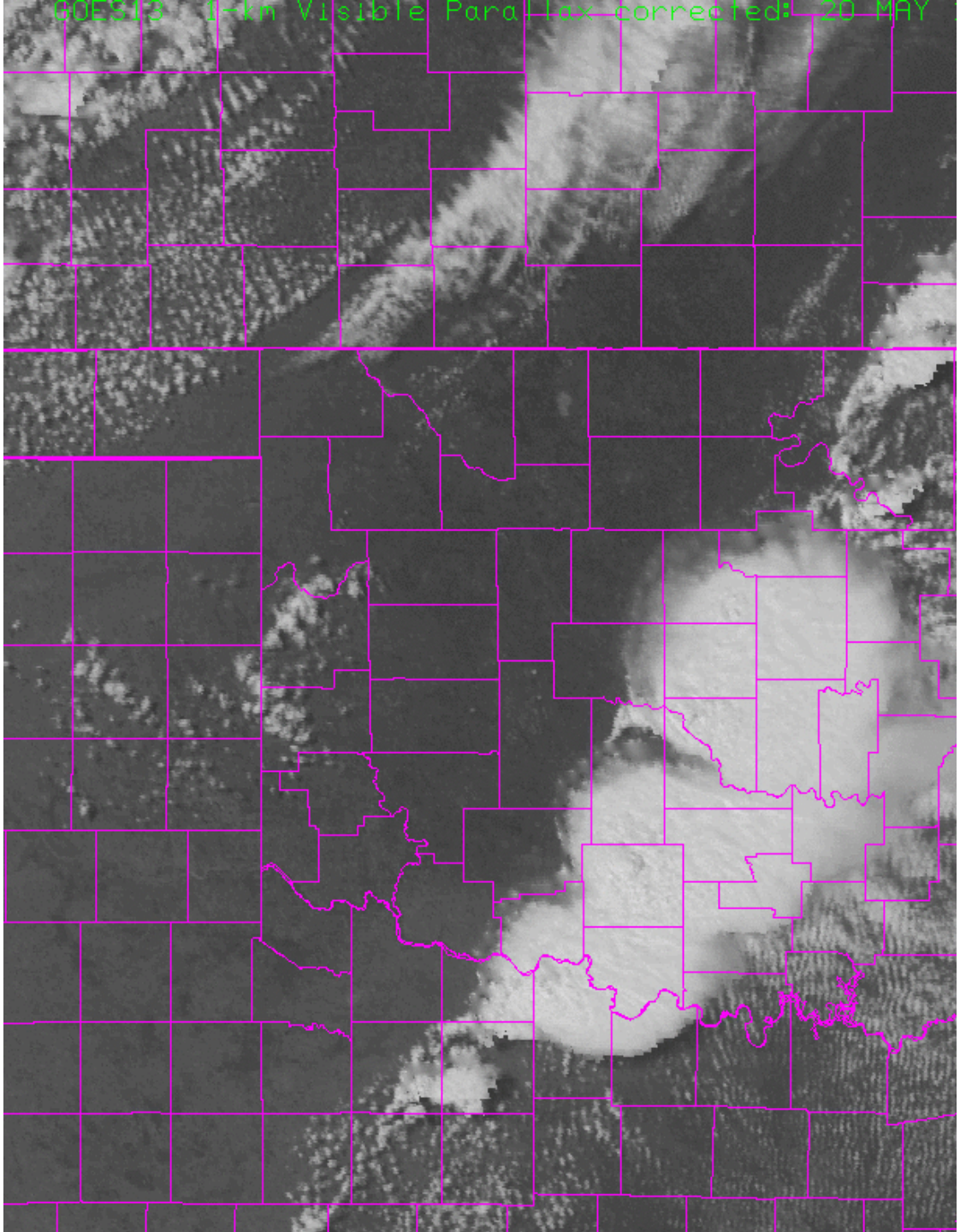
Severe Convection:

Geolocating Satellite and radar imagery

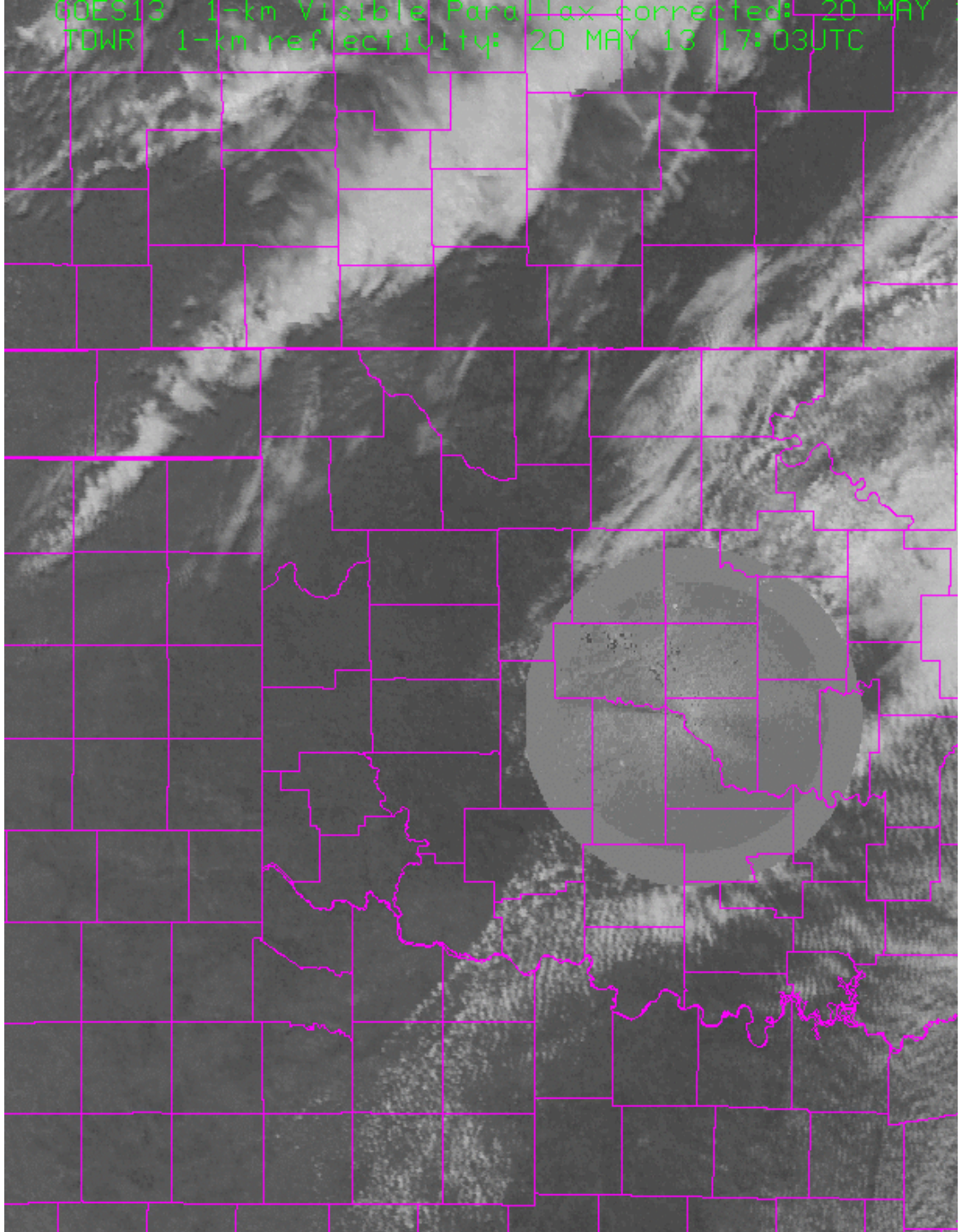
20 May 2013
1715 UTC



20 May 2013
1955 UTC

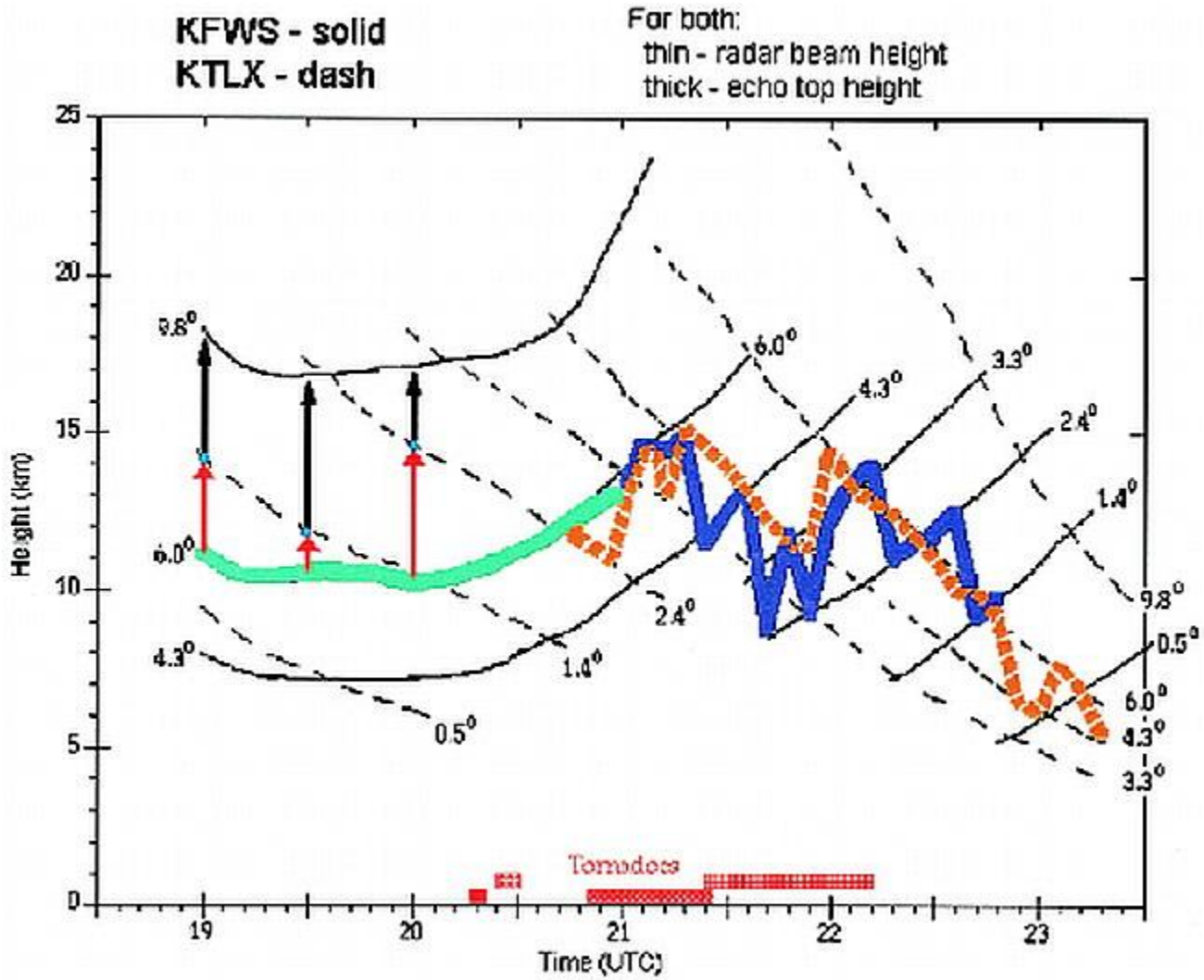


20 May 2013
1702-2045 UTC



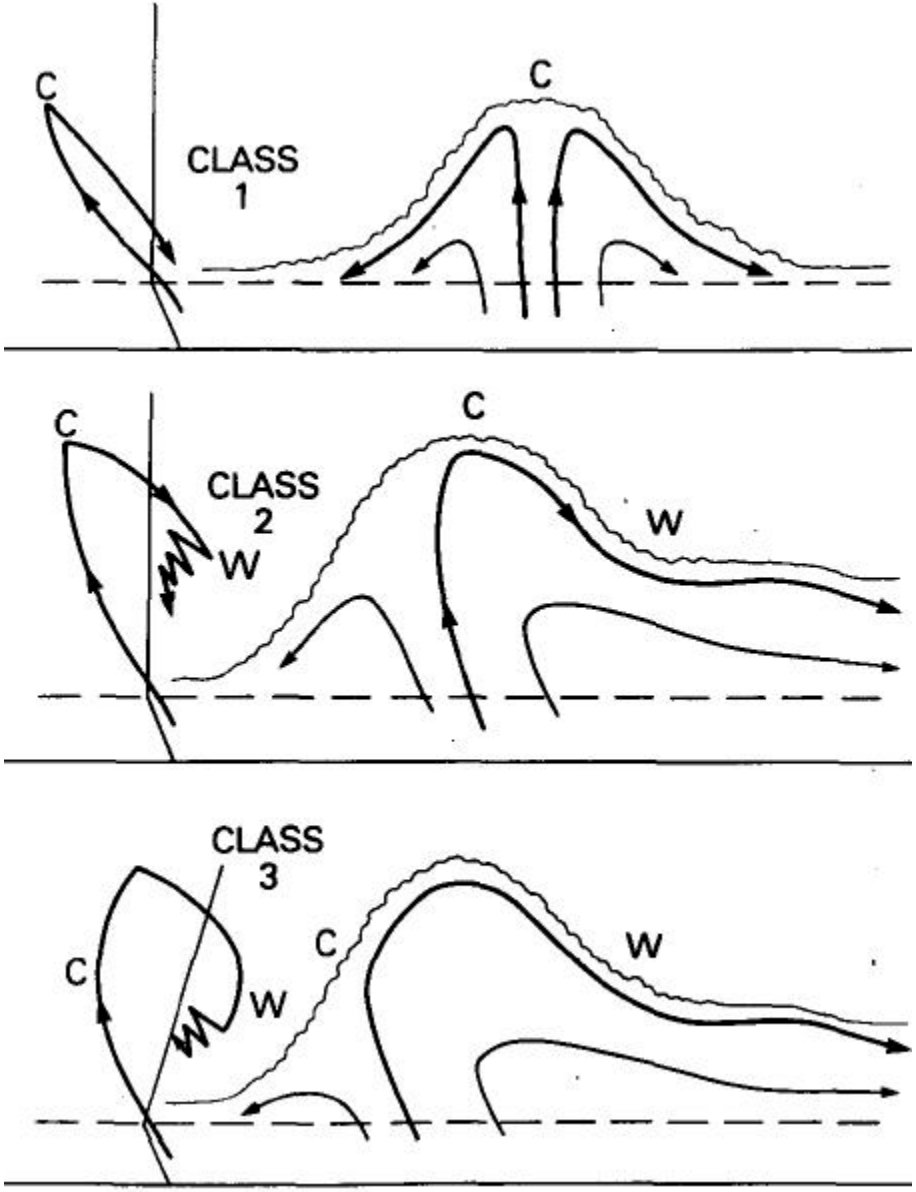
Limitations of Cloud Height Algorithms

Uncertainty in echo height from WSR-88D



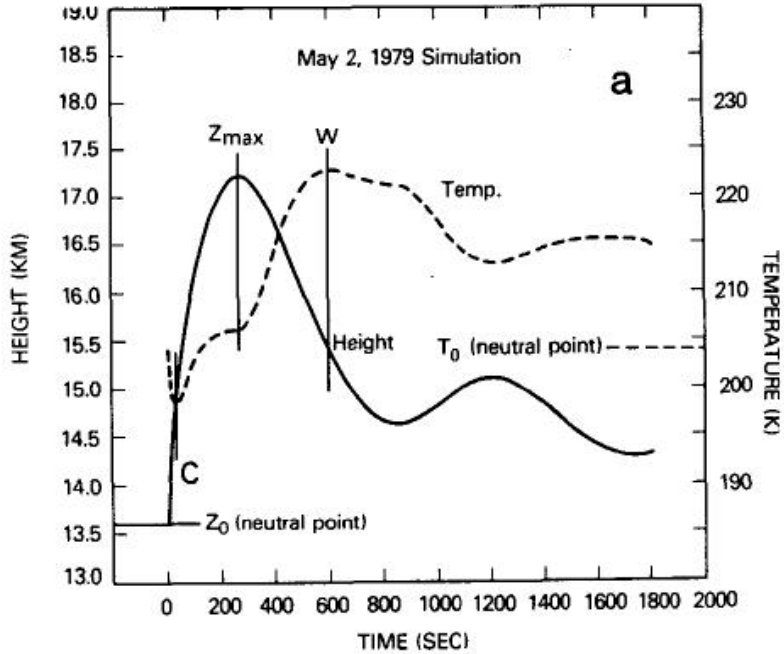
From Maddox et al., 1999

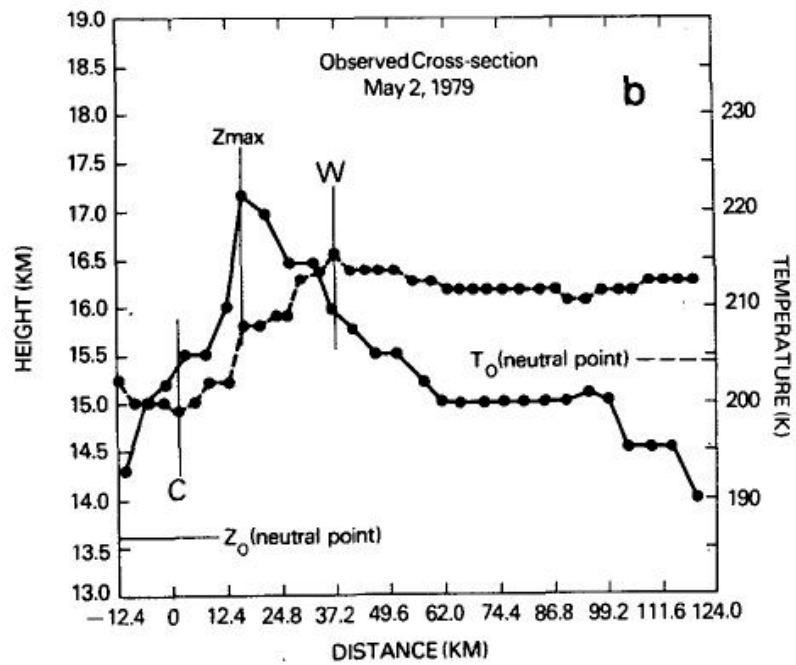
Overshooting tops: Deviation of cloud top temperature from ambient profile



From Adler and Mack, 1986

Displacement
Of cloud top
From coldest
Cloud temperature





From Adler and Mack, 1986

Stereo Approach

From S. Mahani, GOES-RR report

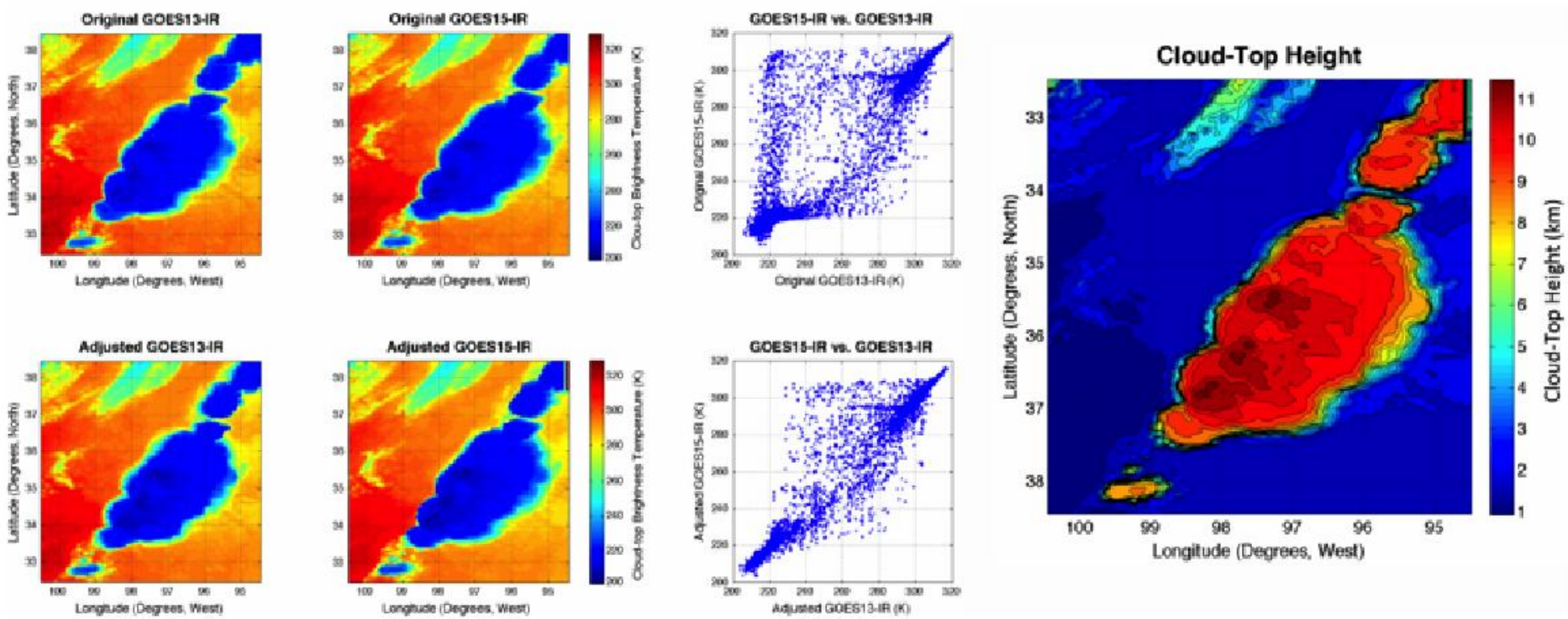


Figure 3: Comparison between original and adjusted GOES-West and GOES-East cloud-top IR and CTH model product for tornado Moore on May 20,2013 at 20:35UTC.

Conclusions

- **GOES visible imagery can be used at high latitudes**
  - **Should be even more helpful with GOES-R**

- **Parallax correction important but difficult**
  - **Especially important if target is polar-ward**

- **Applications for both adjusted and un-adjusted data**
  - **Satellite-to-satellite comparisons could remain in the native perspective**
  - **Ground-truth comparison require adjustment**

- **Requires accurate cloud height assignment**

- **Stereo approach, especially for validations?**

Discussion

What’s the best approach?

Which GOES-R products will be corrected?

Is training needed for forecasters on this topic?