Talking points for “Water Vapor Imagery Analysis for Severe Thunderstorm Forecasting”.

1. Title.
2. Learning objectives. These are the topics we’ll consider during this training session, the goal of the session is to learn about the utility of the water vapor imagery in the severe weather forecast and how it blends in with other available datasets. The wavelength for GOES-east is 6.5 um while for GOES-west it is 6.7 um, the same ideas apply for both channels.
3. Let’s first review some basic water vapor imagery interpretation.
4. Here’s the description of how to locate a jet streak in the water vapor imagery from the NESDIS manual by Roger Weldon. Ideally, one learns to identify jet streaks in the imagery by looking frequently at the imagery and become skilled at this as one gains experience.
5. The terms “short wave” and “jet streak” are often intertwined when looking at these features in water vapor imagery, so to be precise we show the definitions from the AMS glossary. A shortwave is a progressive wave in the horizontal pattern of air motion with dimensions of cyclonic scale. Typically, we think of shortwaves as being associated with an area of lift since they’re usually accompanied by PVA. Vertical motions can be created by sub-synoptic scale processes. A jet streak is a relatively small region of maximum wind speed in a jet stream. Typically we think of jet streaks as something that can influence the organization, initiation, and maintainence of storm systems. Jet streaks are associated with severe convection via their vertical motions and coupled ageostrophic flows.
6. Color tables – In order to be consistent, we will be using the same color table enhancement on all water vapor imagery (including the 7.4 um channel). This enhancement will show warmer brightness temperatures as darker and also into the dark orange colors. It’s important that you experiment with different color tables, and find what works best for you even in different situations.
7. October 4, 2006 – Let’s look closely at a shortwave moving from Nevada into Idaho from the GOES water vapor imagery (6.7 um channel). Around 15:30 UTC we see a dark area over southwest Nevada moving northeast. By 1945 UTC this dark area has reached the Idaho / Nevada state line. Soon thereafter, we see convection develop along the leading edge of this dark area. Let’s overlay other fields to look at this shortwave in more detail. First overlay the RUC 300-500 mb layer vorticity. We choose a layer of vorticity since the water vapor imagery observes the net temperature of the moisture in a relatively broad layer. Typically this layer is centered around 400 mb, so that the 300-500 mb layer vorticity should capture the majority of the signal we see in the water vapor imagery. In this case we do see an associated vorticity maximum associated with the dark area moving from Nevada into Idaho. We can overlay the water vapor imagery with model forecast fields in this way to gain confidence in the ability of the model to pick up on important features such as shortwaves. Next, overlay the RUC 300 mb isotachs. We can see that the dark region also corresponds to a jet streak around 300 mb as it moves towards Idaho. Surface observations can be overlaid as well to see the near-storm environment and look for any low-level convergence boundary where convection may develop.
8. April 29 2009 – Rock the loop to analyze the fast moving lighter region in the water vapor imagery moving eastward across northern Mexico towards Texas. There seems to be a good correlation between the arrival of this feature and convective initiation in west Texas. The 400 mb isotachs from the NAM (12:00 UTC run) seem to go along pretty well with this jet

streak. The GOES derived winds in the 350-450 mb layer are consistent with what we see in the NAM. This should yield greater confidence in the position and intensity of the jet streak.

9. This is the visible imagery and metars that goes along with the water vapor imagery from the previous slide. Note there are no clouds associated with the jet streak of interest. When the jet streak becomes juxtaposed with the dryline in west Texas, convective initiation occurs. The jet streak also provides a favorable near-storm environment for the storm to continue intensification.
10. July 20, 2009 - Identify any shortwaves and/or jet streaks in the water vapor imagery that may aid in the development of convection. The most obvious feature is the dark area that is over west central Wyoming early in the loop moving southeast. An overlay of the 300-500 mb vorticity from the 1200 UTC run of the NAM supports this as a vort max, in association with a shortwave that is just south/southeast of the trough observed further north. The leading edge of the dark area extends to the northeast and becomes more defined during the day. Convection initiates ahead of this dark area in western Nebraska. 300 mb isotachs from the 1200 UTC NAM run show a good agreement between this dark area and the forecast jet streak location. Overlay the GOES derived winds in the vicinity of 300 mb to check the observed winds versus the NAM forecast. Switch off the overlays and look for another shortwave that comes through west Central Wyoming that aids in convective development as seen in the imagery between 2300-0046 UTC. The 300-500 mb vorticity does show this feature, although it’s not as strong as the one that went through earlier and affected areas of the Plains. There are indications of this as a jet streak in the NAM 300 mb isotachs, and supported by the GOES derived winds (see the 0146 UTC image). This feature goes on to aid in convective development along the Front Range of Colorado (beginning around 0400 UTC) where severe weather was reported, including tornadoes and hail up to 2 inches in diameter. The water vapor imagery depicts this feature and should yield higher confidence in a short-term forecast of convection for the Front Range of Colorado.
11. Platteville, CO profiler – Evidence of the upper-level jet streak in combination with low-level upslope flow came together at the right time for severe weather along the Front Range.
12. May 5, 2009 – Evidence of a strong upper-level jet streak in northwest flow across Colorado is moving southeast towards Texas. Overlay the RUC 250 mb isotachs and GOES 250 mb winds to see supporting evidence of this jet streak. Overlay the metars (at 2031 UTC) to observe convective initiation in north Texas occurred at the juxtaposition of the upper-level jet and the low-level convergence boundary. Transverse ageostrophic circulations about the jet axis may assist in convective initiation.
13. Tucumcari, NM profiler – Evidence of the upper-level jet in the profiler data as the winds around 250 mb increased by about 80 knots during the day.
14. May 29, 2008 – Water vapor imagery shows a well defined upper-level jet oriented northeast to southwest from New Mexico to eastern Colorado, northwest Kansas and southwest Nebraska. Convective initiation occurs along the juxtaposition of the dryline and upper-level jet.
15. The weighting function profile gives us a clear indication of what level in the vertical the channel is seeing. Here is the weighting function profile based on the 1800 UTC sounding at North Platte, NE for the 6.9 um wavelength, which is representative of the 6.5 / 6.7 um water vapor imagery. The 7.3 um weighting function profile is also given, which is representative of the GOES sounder 7.4 um channel we will look at on the next slide. The maximum values for the 6.9 um channel are around 400 to 500 mb. Think of this as the net

temperature of the layer of moisture the channel sees peaks around 400 to 500 mb, with decreasing values above and below that layer. Let's contrast that with the 7.3 um curve shown in purple which we will look at next. This channel sees the moisture over a broader depth and at lower-levels.

16. This is the GOES sounder 7.4 um channel with the same enhancement as the earlier water vapor imagery loop. Keep in the mind, the nominal resolution of the sounder is about 10 km, while that of the imager as in the water vapor imagery we just looked at, is about 4 km. At this latitude, the resolution would be even more coarse. Also, the temporal resolution is hourly, which will always be less than that of the 6.7 um water vapor imagery. The advantage of this channel is that we can look lower in the atmosphere than the 6.7 um channel, so that mid-level jets may appear in this channel. Keep in mind, since the weighting function is broad, we're still including contributions at upper levels as well, just not as much as the 6.7 um channel. In the imagery we see a fast moving dark area over generally the same area we saw in the water vapor imagery, but also further east. An overlay of the 500 mb isotachs from the RUC show the jet at this level to be along and slightly west of the faster moving dark region. Looking a little lower down at 600 mb we see the corridor or strongest winds aligns quite well with what we see in the 7.4 um imagery. Lower down at 700 mb, the jet is even further east. Metars show the location of the dryline where storms initiate.
17. Let's look at a cross section across the region of interest.
18. Cross section of wind speed and theta-e. This shows the typical configuration of the strongest upper-level winds furthest to the west, with the mid-level jet further east and the low-level jet transporting low-level moisture (i.e., higher theta-e at low-levels) even further east. Using the 6.7 um water vapor imagery and 7.4 um imagery in tandem can help identify jets at the various levels.
19. At times, the GOES sounder 7.4 um imagery can be used to trace the elevated mixed layer that can be important for severe weather setups. When an elevated mixed layer profile develops, hot/dry air from the higher terrain of Mexico and the western US is advected eastward. Mid-tropospheric steep lapse rates originate on the elevated terrain and are advected as an elevated mixed layer over the low-level moist air. The weak static stability of this air mass enhances the upward motion ahead of the advecting cyclone. In this diagram, the edge of the lid (E) would correspond to the location of the dryline where deep moist convection may develop. Thunderstorm development as a result of underrunning the cap occurs when the unstable parcels at low levels flow out from under the margins of an elevated mixed layer. Underrunning occurs because the transverse / vertical circulations are so arranged as to promote strong baroclinic forcing of ageostrophic flow and vertical motion along the lid edge. This region can be monitored as the dark area corresponding to warm/dry conditions that exists at mid-levels. The edge of the lid would correspond to the edge of the dark region along the dryline.
20. In this example, we see the development during the day of a warm/dry (dark region) in the GOES sounder 7.4 um imagery off the higher terrain to the west advecting northeast. Thunderstorms develop along the edge of this dark region along the dryline in southwest Nebraska and northwest Kansas.
21. Here is the visible imagery along with metars that goes along with the loop from the previous slide. The origin of the well mixed layer can be seen in the observations. This mid-level warm/dry air mass moves northeast where a dryline is situated. Severe thunderstorms develop along the dryline from southwest Nebraska into western Kansas.

22. Dodge City, KS soundings from 1800 and 0000 UTC. The 1800 UTC sounding is launched just before dryline passage. The 0000 UTC sounding is launched in the dry air west of the dryline. Note the warming / drying at the lowest levels, below about 800 mb, while at mid-levels we still see drying but it's cooling (note the 500 mb temperature dropped from -10 to -20). It's the mid-level drying / cooling that helps to steepen lapse rates and decrease static stability. The stable layer just below 400 mb corresponds to the top of the deep, mixed layer over elevated terrain.
23. May 18, 2000 – At times, the elevated mixed layer can be advected well to the east and be a key ingredient for severe weather episodes east of the Plains. In this example we can track the dark area associated with the elevated mixed layer advect eastward towards Illinois. It's important to keep track of the trajectories of the elevated mixed layer and inspect soundings, as these dark regions may be observed further east and not be associated with an elevated mixed layer from the source region of the Rockies or northern Mexico.
24. 1800 UTC sounding from Lincoln, IL (ILX) – Note the elevated mixed layer at this location with the dry air at mid-levels and steep mid-level lapse rates.
25. April 2, 2009 – Note the dark region over Texas advecting eastward. This is the elevated mixed layer with origins over the elevated terrain of northern Mexico and the southern Rockies. In the next slide we'll show soundings within the dark region as supporting evidence. An overlay of the RUC 600 mb wind barbs and isotachs clearly shows the mid-level jet at the leading edge of the dark zone. This mid-level jet is juxtaposed with a front at the surface across the southeast that is responsible for severe weather. For comparison purposes between model forecast versus observations, we could compare model 600 mb RH with the sounder imagery as shown in the overlay. This comparison can yield greater or less confidence in the model output.
26. The 1500 UTC sounding from Slidell, LA (LIX) depicts the elevated mixed layer. Remember to use soundings in addition to noting the trajectories in the imagery to be sure that you're looking at the elevated mixed layer.
27. Dark zone signature in the water vapor imagery.
28. The dark zone shows up with the storm in southwest Kansas. The key to remember is this is a storm-induced dark zone, not pre-existing. It's likely caused by strong subsidence in the vicinity of a vigorous updraft.
29. Next we'll look at gravity waves in the context as a hazard for aviation.
30. May 24, 1998 – Gravity waves can be generated by vigorous convection as well as jet streaks, although we have both in this example, I will discuss the convection. Here, we have gravity waves generated by cloud-environment interactions spreading from the most vigorous convection, indicating potentially dangerous turbulence for aviation. The strength of the above-cloud turbulence has a strong influence on the occurrence and intensity of above-cloud turbulence, with strong shear conditions producing the most intense turbulence.
31. Norman 0000 UTC 25 May 1998 sounding. Here is the sounding that goes along with the previous loop, indicating high CAPE and strong shear. The shear contributes to the intensity of the turbulence.
32. Cloud cover forecast
33. For our examples on cloud cover forecast, rather than looking through many forecast model fields to assess severe weather potential, we'll use the SPC forecast graphics to help us narrow in quickly on the region expecting severe weather then assess the cloud cover forecast for that region.

34. To help us focus in a little more we'll show the probabilistic tornado forecast from SPC and note the area in the eastern Texas panhandle and western Oklahoma appears to be at slightly higher risk of more significant severe weather, in addition to portions of Nebraska and South Dakota.
35. Here is the visible imagery from 1302 – 1732 UTC. In the northern sector of Nebraska and South Dakota, there is little cloud cover to impede destabilization. Further south across Texas / Oklahoma and Kansas we see a fair amount of cloud cover in the moist sector with a region of clearing to the west, followed by a region of cirrus across far west Texas extending into New Mexico.
36. The water vapor imagery over a large scale goes from 0532 – 1732 UTC to look for trends with the improved continuity through the night. Let's focus on the southern Plains. West of the clouds in the moist sector, we see the clearing region in the Texas panhandle, then the region of cirrus from far west Texas into New Mexico that we observed in the visible imagery. Note just upstream of this region in Arizona we see a fast moving impulse with considerable cirrus associated with it, just about to reach the aforementioned region of existing cirrus. What effect will this fast moving impulse have on the existing cirrus and regions further east?
37. We turn to the IR imagery a little bit later in the day (from 1432 – 2002 UTC). IR imagery depicts cirrus better than water vapor imagery since we're viewing the cold cirrus against a warm background (think of the weighting function peaking at low-levels) versus the water vapor imagery viewing cold cirrus against a cold background (think of the weighting function peaking at mid-levels). We see the effects of that fast moving impulse moving in from Arizona causes a considerable increase in the thickness and coverage of the cirrus in far west Texas and New Mexico. We see a dramatic increase in the cirrus further east across the Texas panhandle moving towards our forecast area.
38. Visible imagery from 1902-2345 UTC. We now see the effects of this fast moving impulse in that we see a considerable increase in the thickness and coverage of the cirrus across the Texas panhandle advect over the area of interest in Oklahoma and Texas affecting potential destabilization during the afternoon. The cloud cover appears to have had a significant influence on thunderstorm development in Texas and Oklahoma, whereas further north we see thunderstorms occur in the region far removed from the effects of the cirrus.
39. SPC storm reports, note the lack of severe reports where the cirrus development took place.
40. For our next case, we'll consider the SPC day 2 convective outlook. Note the statement taken from the outlook with a concern for high clouds.
41. Visible imagery up to 1515 UTC. Note the extensive cloud cover over the Texas panhandle during the morning hours. Will this area clear out in time?
42. Water vapor imagery that begins during the nighttime hours and ends at the same time as the visible imagery we just looked at. Note the dry region (darker area) approaching the forecast area. This dark region is associated with the clearing we saw on the previous slide, moving eastward. This should increase confidence in insolation for later so that convective initiation may occur.
43. Visible imagery for the afternoon and evening hours show that clearing did indeed take place across the Texas panhandle where insolation allowed for convective initiation and development of severe thunderstorms.
44. Storm reports
45. Convective Initiation

46. May 10, 2005 – Note the relatively fast moving region in the water vapor imagery from eastern New Mexico into eastern Colorado / western Kansas then into Nebraska. We see indications of lift associated with this feature as it moves northward until it intersects a region of high instability and low-level convergence boundary in southern Nebraska.
47. In the visible imagery, we see a patch of cirrus at the leading edge of the feature we discussed in the water vapor loop. There are indications of forced ascent associated with this feature, we can see towering cumulus in northwest Kansas as the feature comes through, and convective initiation in south central Nebraska as the feature moves in.
48. GFS 250 mb isotach analysis valid at 1800 UTC with corresponding visible image. There are indications of a jet streak associated with the feature we've been discussing.
49. Here is the RUC 250 mb isotach analysis at the same time, more subtle than the GFS but the key to remember is believe what you're seeing in the satellite imagery, use supporting data to gain confidence in the feature and keep it in mind for possible convective initiation along a low-level convergence boundary as well as a more favorable near-storm environment.
50. Profiler from Granada, CO (southeast CO), times increase to the right, upper level winds increase during the middle of the day and provides supporting data for the jet streak we followed in the satellite imagery.
51. May 22, 2007 – In this case, we see a trough centered on Idaho, we see a jet streak across Colorado and what appears to be another one further south across New Mexico. Convective initiation occurs in northwest Kansas around 2130 UTC. Note the north-south oriented dark region stretching southward from the storm in Kansas, it extends all the way down into Texas. Could this be the dryline? We'll answer that next in the visible. Before we move to the visible, note the cirrus developing in northeast New Mexico and southern Colorado after 2130 UTC. Is this cirrus associated with a jet that may initiate storms along the dryline to the east?
52. The corresponding visible imagery with surface observations confirm that the dark area oriented north-south extending from the storm in Kansas into the Texas panhandle is associated with the dryline. For reasons we'll look at in more detail later, the dryline typically does not appear in the water vapor imagery. The dark area may correspond to subsidence, so could we infer subsidence in the vicinity of the dryline during the afternoon hours after this signature first appears? Let's look at additional data to help answer this question.
53. Do we see this signature in the GOES sounder 7.4 um imagery? No, probably the resolution is too coarse for detection.
54. Let's take a cross section across the Oklahoma panhandle as depicted in the upper right of relative humidity, wind, and omega (shaded). This is from the 1200 UTC NAM run. Moving forward to the 6 hour forecast at 1800 UTC we see a large area of downward motion (in the purple colors) in the vicinity of the dryline. Moving ahead to 2100 UTC, we see the location of the dryline by looking at the low-level relative humidity field. Notice that there is a level of strong subsidence just above the moist side of the dryline around 830 mb up to about 500 mb. This would be an inhibiting factor for possible convective initiation along the dryline.
55. Now we look at a plan view of 600 mb omega and surface winds from the 1200 UTC NAM run. At 2100 and 0000 UTC we see a the signal of strong subsidence along and just east of the dryline. This corresponds with the subsidence we observed in the water vapor imagery and can confidently forecast no thunderstorm development in this region.

56. Here is the visible imagery later in the day zoomed in across the region of interest. Notice a couple of indications of cumulus along the dryline in the Texas panhandle, just out ahead of some cirrus clouds. These are very brief as the strong subsidence keeps any convection from developing.
57. The next series of examples ask what are we looking at in the water vapor imagery.
58. July 4, 2004 – Over Oklahoma and Kansas we see considerable convection, which results in a MCS that moves off to the east. Behind the MCS we see indications of an approximately east-west oriented line moving southward, we also see some type of line oriented north-south.
59. Let's look at the weighting function profile based on the 1200 UTC sounding at Norman, OK. Here we are looking at the 6.9 and 7.3 um channels which are representative of the 6.7 um and 7.4 um channels respectively. The weighting function for the 6.7 um water vapor imagery peaks between 300-400 mb, so that the majority of the signal we're seeing is from this layer with rapidly decreasing signal as we go down. The 7.4 um weighting function looks similar, except it has a secondary peak around 600 mb and is broader so we are looking at a greater depth.
60. Here is the 1200 UTC sounding from Norman, OK which was used to derive the weighting function profile. There are multiple inversions of interest, the low-level nocturnal inversion and a subsidence inversion around 470 mb. Keep the mid-level inversion in mind as we continue to look at more imagery.
61. Here is the GOES sounder 7.4 um imagery. Keep in mind that the spatial and temporal resolution is coarser than the GOES 6.7 um water vapor imagery. The data is only available hourly and is greater than 10 km horizontal resolution. There are indications of the east-west oriented line moving southward, however it is more subtle, likely due to coarser horizontal resolution. The north-south oriented line is undetectable.
62. The visible imagery shows additional details with its improved spatial resolution. The north-south oriented lines appear to be an undular bore. The cloud top height algorithm from the IR imagery indicates these clouds to be around 550 mb, remember in the morning sounding from Norman a subsidence inversion exists around 470 mb. Typically clouds associated with an undular bore exist at low-levels, less than the cloud heights observed here. Recall in the water vapor imagery we didn't see multiple north-south oriented lines, just one "dividing line" in the north-south direction. Clouds associated with an undular bore typically do not show up in the water vapor imagery, which is consistent with what is observed here. Perhaps the north-south "boundary" we see here is a gravity wave at the western edge of the undular bore, with origins associated with outflow from the MCS. The east-west oriented line appears in the water vapor imagery prior to convective initiation, then convection develops along a segment of this line in southern Kansas. This east-west line continues to move south, and although it corresponds closely to the outflow associated with the storms on the visible imagery in southeast Oklahoma, the absence of this feature in the visible imagery along with the fact it was observed in the water vapor imagery prior to convective initiation should give support to the idea that we're looking at a gravity wave. Also, surface observations do not show a wind shift with the passage of this east-west line.
63. April 21, 2001 – Focus your attention on southwest Kansas and southeast Colorado. This area appears to be un a strong upper level jet. During the late afternoon hours we see a northwest-southeast oriented line (darker region) that is moving northeast. We see

convective initiation take place near a segment of this line near the end of the loop. What is this feature? Does it have any effect on convective initiation?

64. The GOES sounder 7.4 um imagery shows a dark region moving from the Texas panhandle into Kansas. The feature of interest does not appear in this imagery.
65. Here is the visible imagery with metars overlaid. With a surface low to the west, we see rapid advection of moisture towards the northwest. A warm front is situated across Kansas that extends back to the dryline, convective initiation occurs along the triple point as well as further east along the warm front. The feature of interest is likely a gravity wave, although studies have shown that gravity waves can initiate deep moist convection, it's impossible to say here what role the gravity wave played in convective initiation since we had well-defined surface features. The key is to get experience looking at water vapor imagery, recognizing these type of features so that in the future you will be able to quickly identify features that may play a role in convective development.
66. April 23, 2007 – The 10.7 um imagery can detect dryline in the absence of clouds due to the weighting function being at low-levels, so that low-level moisture can be seen. Later in the loop, as the sun is setting the dry air cools off faster than the moist air. The moist region east of the dryline has warmer brightness temperatures, or darker in this color table, while the dry air has cooler brightness temperatures or lighter in this color table. Overlay the metars to see the good agreement with dryline location.
67. Here is the water vapor imagery for the same time period as the water vapor loop. Note that the dryline actually shows up in the water vapor imagery, prove this with overlaying the metars. Why does low-level moisture show up in the water vapor imagery which should be seeing mostly at mid to upper levels?
68. Let's look at the weighting function profile based on the 0000 UTC Amarillo sounding and here will will focus on the green line, 6.9 um which corresponds closely with the 6.7 um water vapor imagery. We see a double peak, not only the typical maximum in the vicinity of 400 mb, but also a maximum in the vicinity of 600 mb. In this example, we're seeing lower in the atmosphere due to favorable atmospheric conditions.
69. Amarillo, TX 0000 UTC sounding. In this situation, the conditions are just right to view the moisture at lower levels. There is very dry air at upper levels which allows us to "see" further down into the region of higher relative humidity that begins just below 600 mb.
70. Quiz question (May 22, 1996) – identify various features we've discussed during this training session. Shortwave shows up as a darker region moving across CO and into KS. Just west of this feature is an elongated lighter region which appears to be a jet streak. Storms go up in near this jet in southwest Nebraska. The storm induced dark zone signature appears on the storm from southwest Nebraska into northwest Kansas, and also near the Big Bend of Texas. A darker line appears from northeast Colorado extending into western Kansas, getting darker with time. Is this the dryline? We'll look at surface observations next.
71. Surface observations at 2200 and 0000 UTC May 22, 1996 – The dryline indeed corresponds to the dark line observed in the water vapor imagery. The dryline bulge evident in southwest Kansas in the water vapor imagery also shows up on the surface observations.
72. Weighting function profile …. Remember that most of the time, low-level features will not appear in the water vapor imagery, however occasionally they do as we showed in this presentation, knowing what you're looking at will increase your situational awareness so you won't be "caught off guard". You may view weighting function profiles in real-time on the

CIMSS web-site which you can bring up with the see URL button or go to the student guide for this training session.

73. In the future, when GOES-R becomes available there will be much improved spatial and temporal resolution as well as more channels. This will allow corresponding improvement in satellite imagery interpretation to increase your situational awareness. We discussed use of the GOES sounder 7.4 um channel during this presentation, a channel that has uses but is limited by the hourly temporal resolution and greater than 10 km spatial resolution. On GOES-R, this channel will be available every 5 minutes and look very similar to the MODIS 7.3 um channel. Compare the images at about the same time and you can see significant potential utility with this channel.
74. Synthetic imagery has been around for a while, but it continues to improve so that comparison with GOES data allows for better model assessment. Sources for synthetic imagery may be found on the student guide page for this training session.
75. Here is synthetic imagery from the WRF-ARW model. We're looking at the simulated water vapor channel, it's actually 6.9 um which is very close to the 6.7 um channel. This is for the severe weather event of April 24, 2010 that took place in the southeast. The synthetic imagery can be used to look at features such as shortwaves and jet streaks associated with dark regions. A comparison of short-term forecast with GOES imagery allows one to have greater or less confidence in these features. This imagery may also be used for cloud cover applications such as what we discussed earlier with cloud coverage for air mass destabilization.
76. Here is the synthetic imagery from the 4 km NSSL version of the WRF-ARW model for the 7.3 um channel, representative of the GOES sounder 7.4 um channel. Until GOES-R data is available, the synthetic imagery from this channel can also be used in tandem with the existing GOES sounder 7.4 um channel to fill in the gaps in the hourly data that is available, and get a look at much greater spatial resolution than the coarse data that is currently available. Of course, this comes with the usual limitations of interpreting model output but is worthwhile until we get the much improved spatial and temporal resolution with GOES-R.
77. Conclusions
78. Note on WES case. For any student wanting to have a record of this training in the LMS, email me after you complete the WES case and I will mark you as having completed the WES case training exercise in the LMS.