

# Using Lightning data to enhance Nowcasting.

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# Overview.

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- Radar data and TITAN as we know it today.
- Storms generated from Lightning data.
- Combining Lightning storms with Radar storms.
- Running TITAN on the combined field for a new country wide Nowcasting field.
- USA - NCWF product.
- Conclusion.

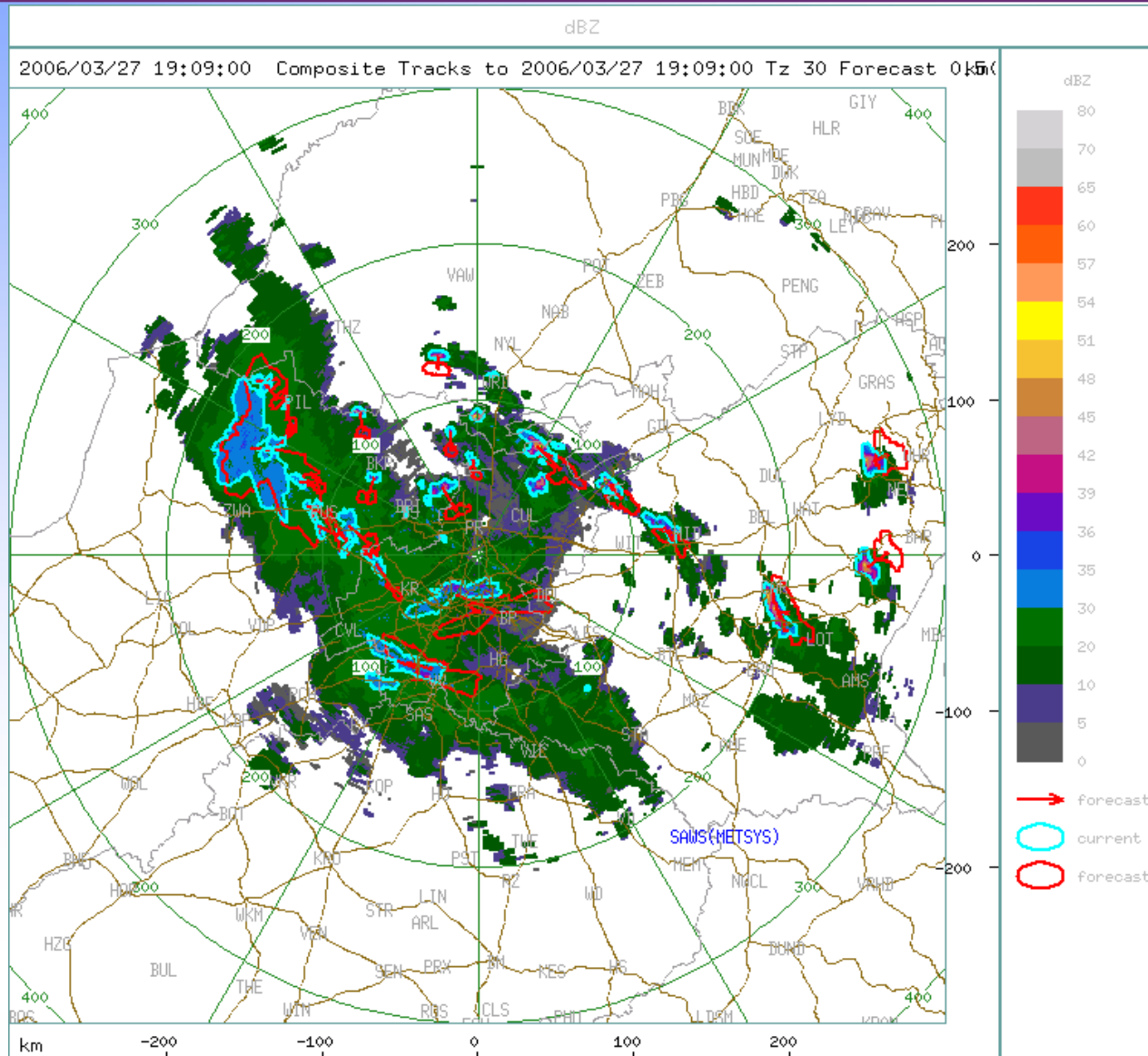
# Radar and TITAN.

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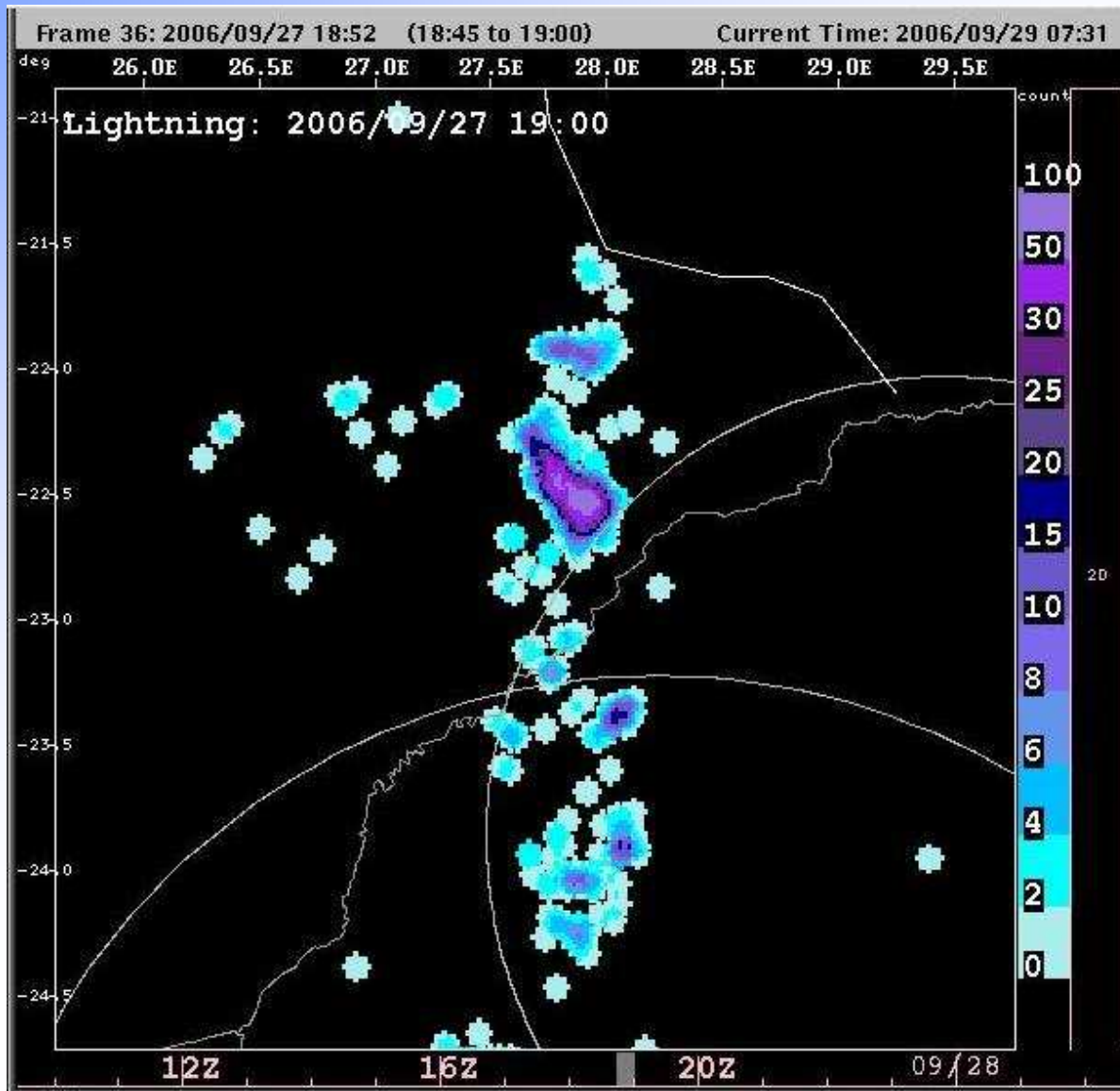


- Background:
- TITAN – Thunderstorm, Identification, Tracking and Nowcasting. (Dixon) Was developed in the early 90's. First used in South Africa at the Bethlehem Precipitation Research Program.
- TITAN generated radar images are published on the SAWS web with 30 minute forecast. ([www.weathersa.co.za](http://www.weathersa.co.za))

# Irene radar

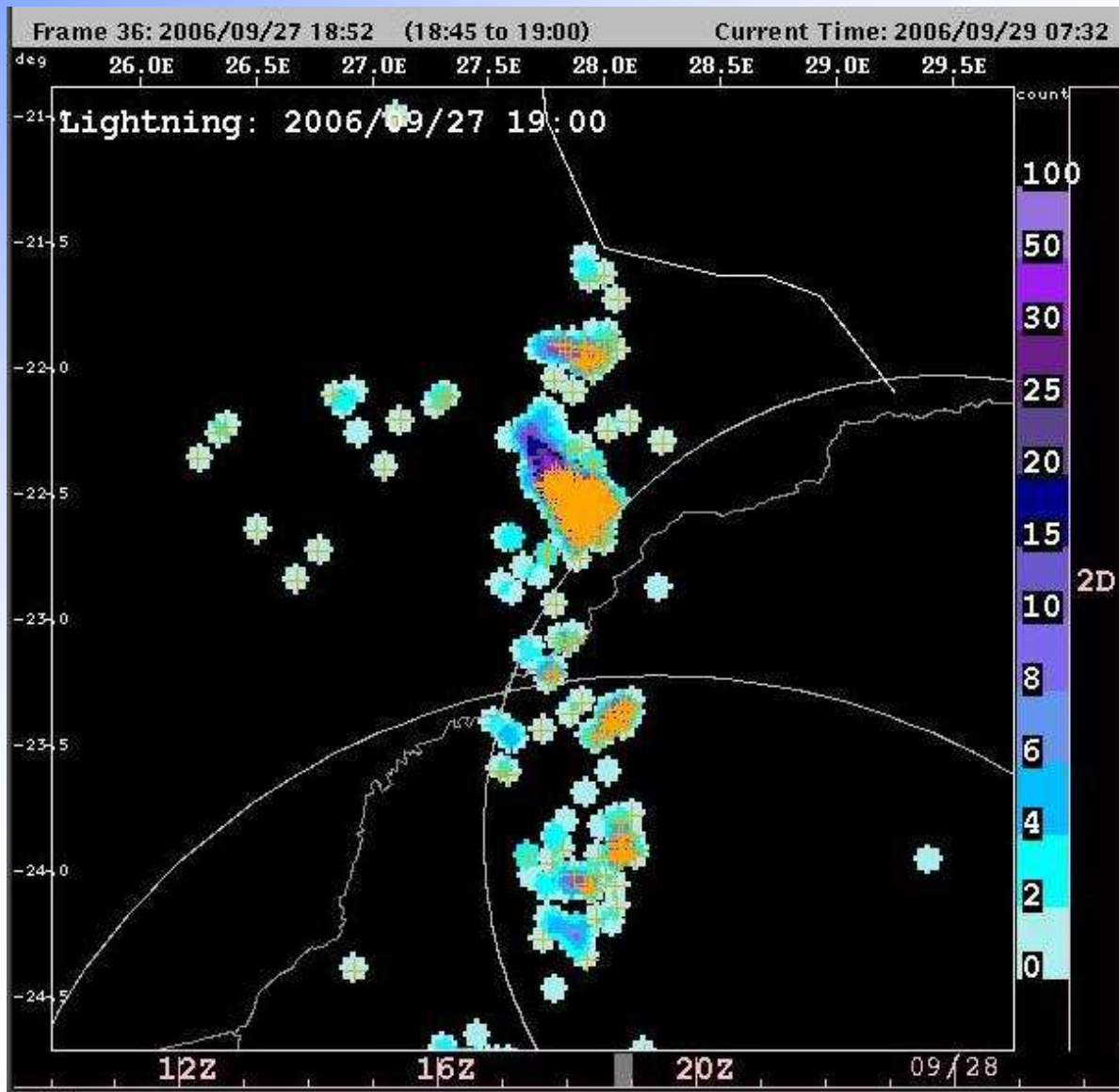


# Lightning Storms



- Every strike represented by a three grid point radius.
- One hour running accumulation.
- Units in counts.

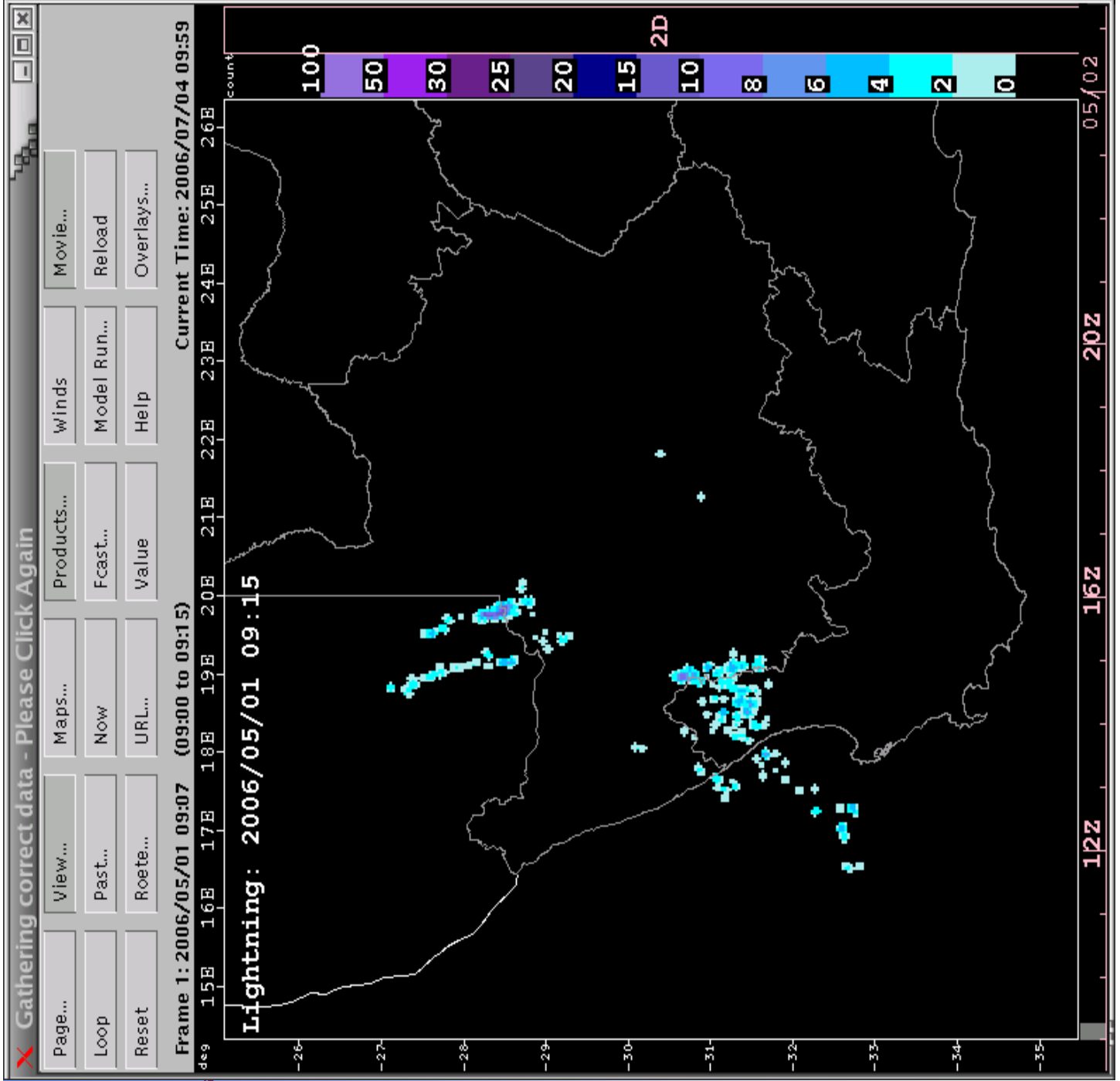
# Lightning data



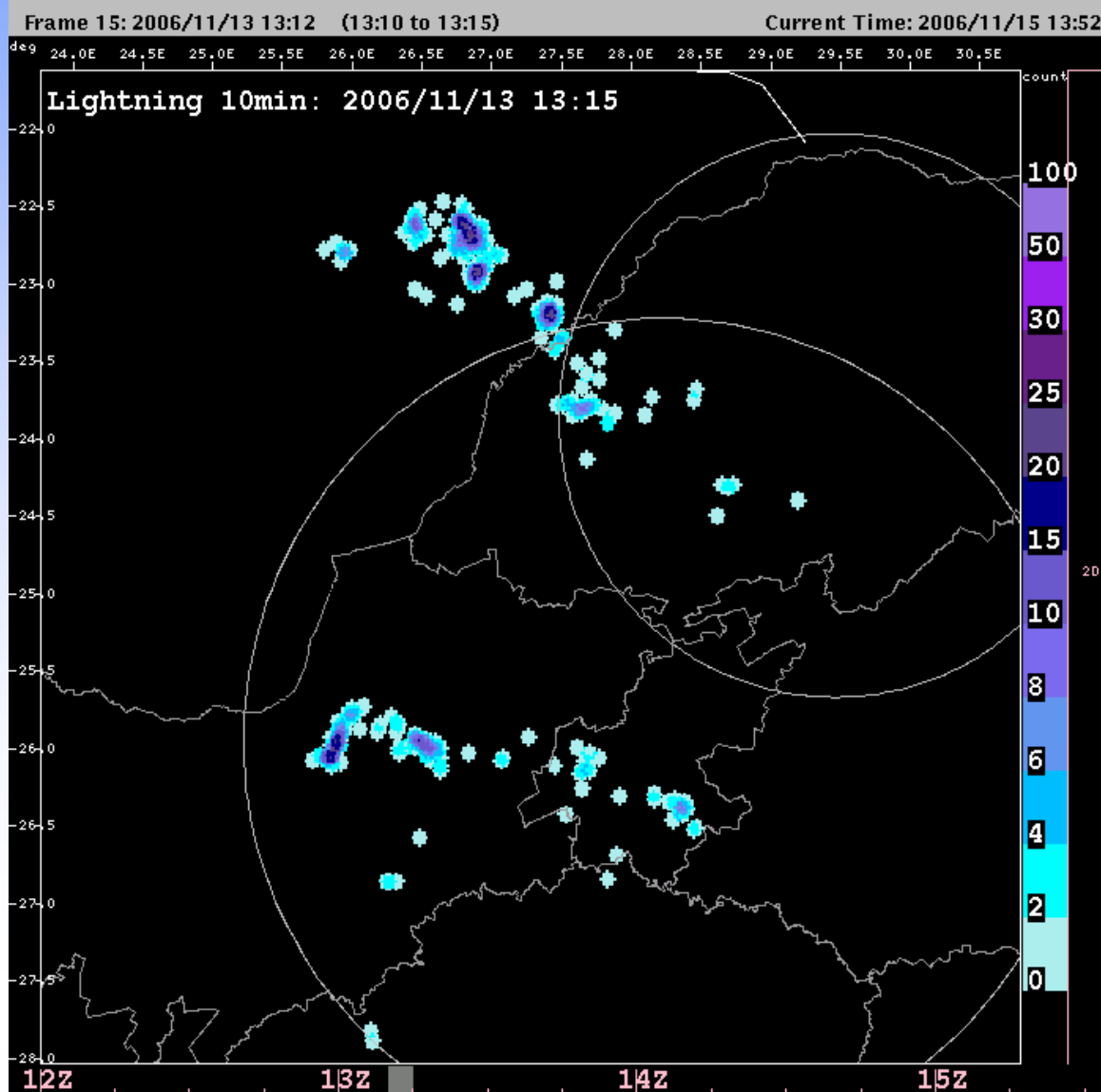
- Last twenty minutes strike data overlaid on the one hour running accumulation field.



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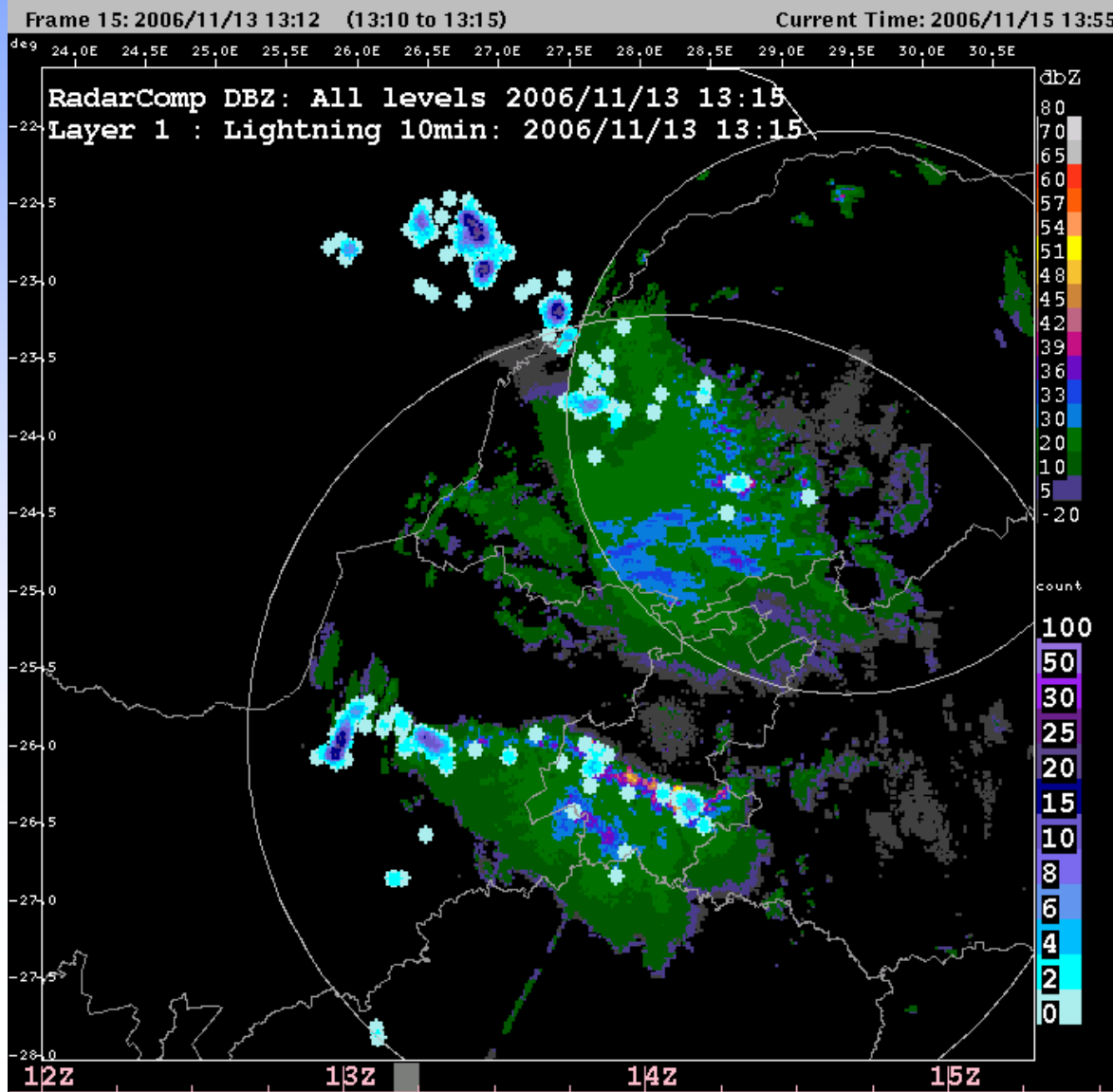
# Lightning data



- Running ten minute accumulation.
- Every strike represent a two grid point radius.
- Updates every five minutes.

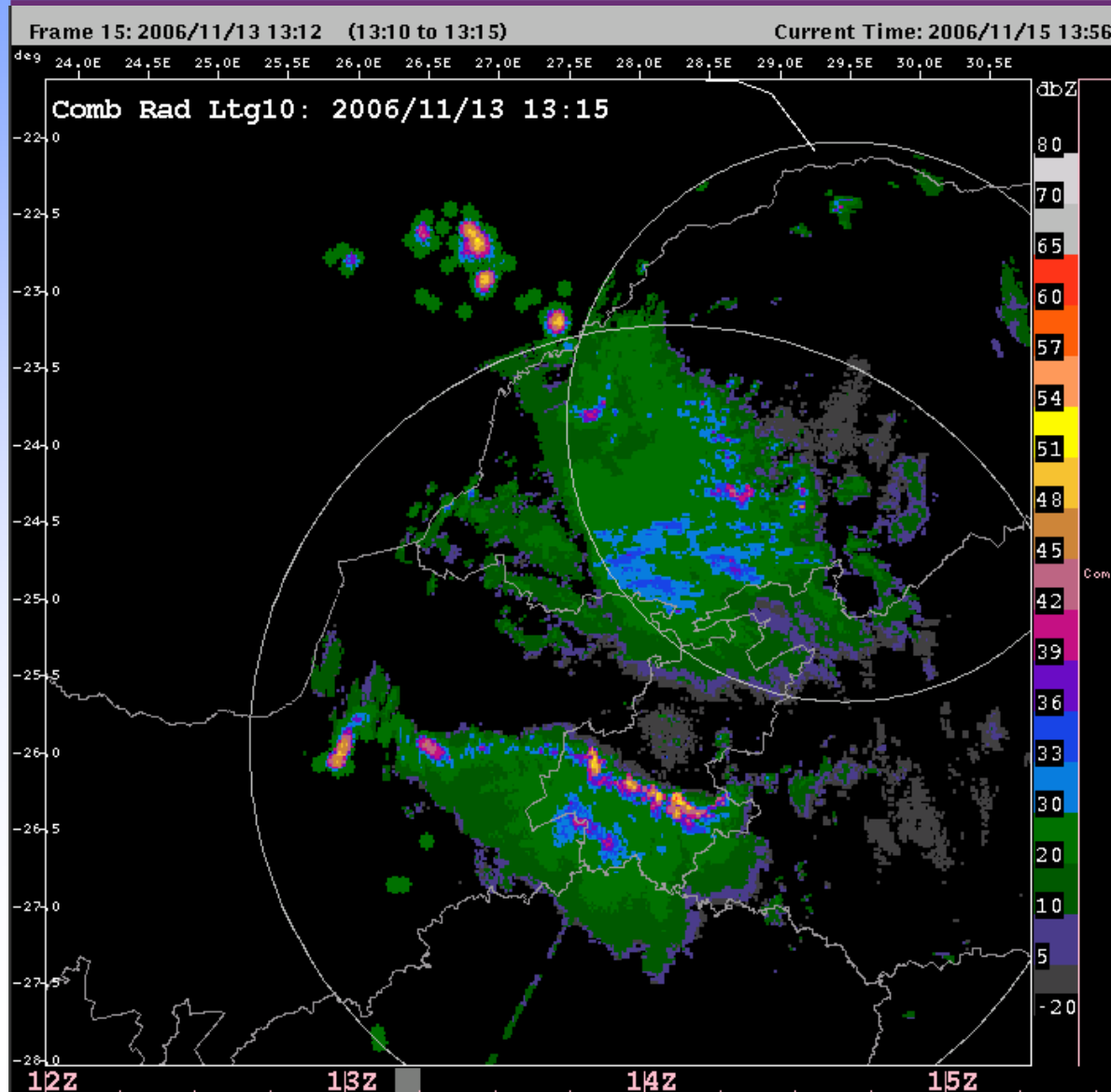


# Radar data



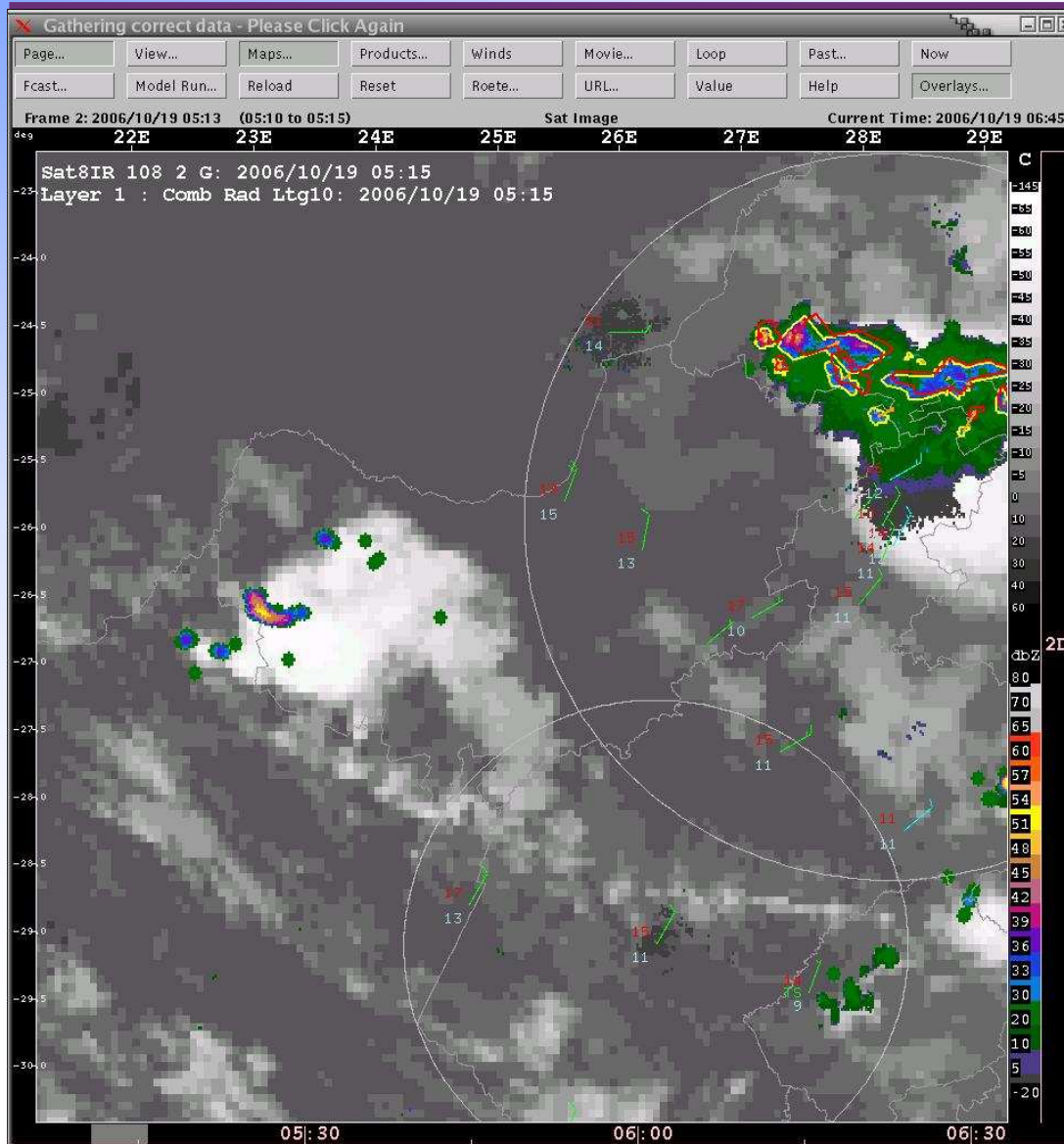
- Polokwane and Irene radar data from merge field.
- Units: dBZ
- Update very five minutes.

# Radar and Lightning field



- Combination of radar and ten minute lightning field.
- Lightning counts is mapped to dBZ values.

# Radar/LTG + SAT IR field



- Combination of radar, ten minute lightning field on top of the 15 minute MSG IR108 field .

# Combining Lightning and Radar

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- Used NCAR software to combine radar and lightning
- Software upgrading was needed to use the SA Radar volume data in a composite mode.
- Software estimates a dBZ value from lightning strike counts on a set scale.
- Dave Procter (CSIR) noted that 20 dBZ storms can produce lightning.
- Lightning strike value ranged from 1 to 100 per pixel. Radar data range from 0 dBZ to 65 dBZ

# Combining Lightning and Radar



# Tracking Combined Storms

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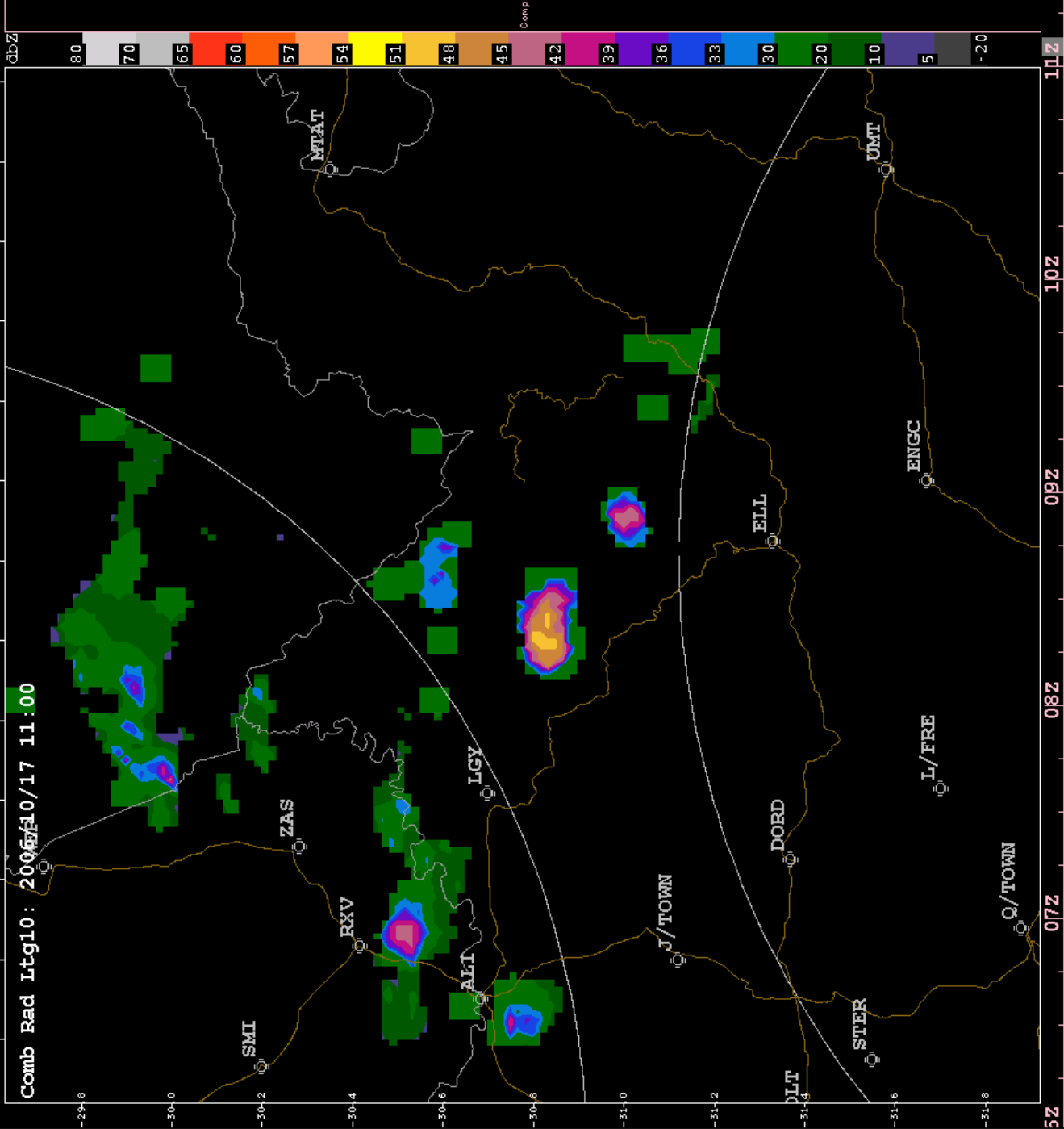
- Ten minute accumulated lightning areas with 3 strikes and more correspond well with the 30 dBZ Radar storm track fresh hold.
- Difference in tracking: Radar storms are tracked in 3D volumes, Lightning & Radar combined fields are tracked in 2D area.



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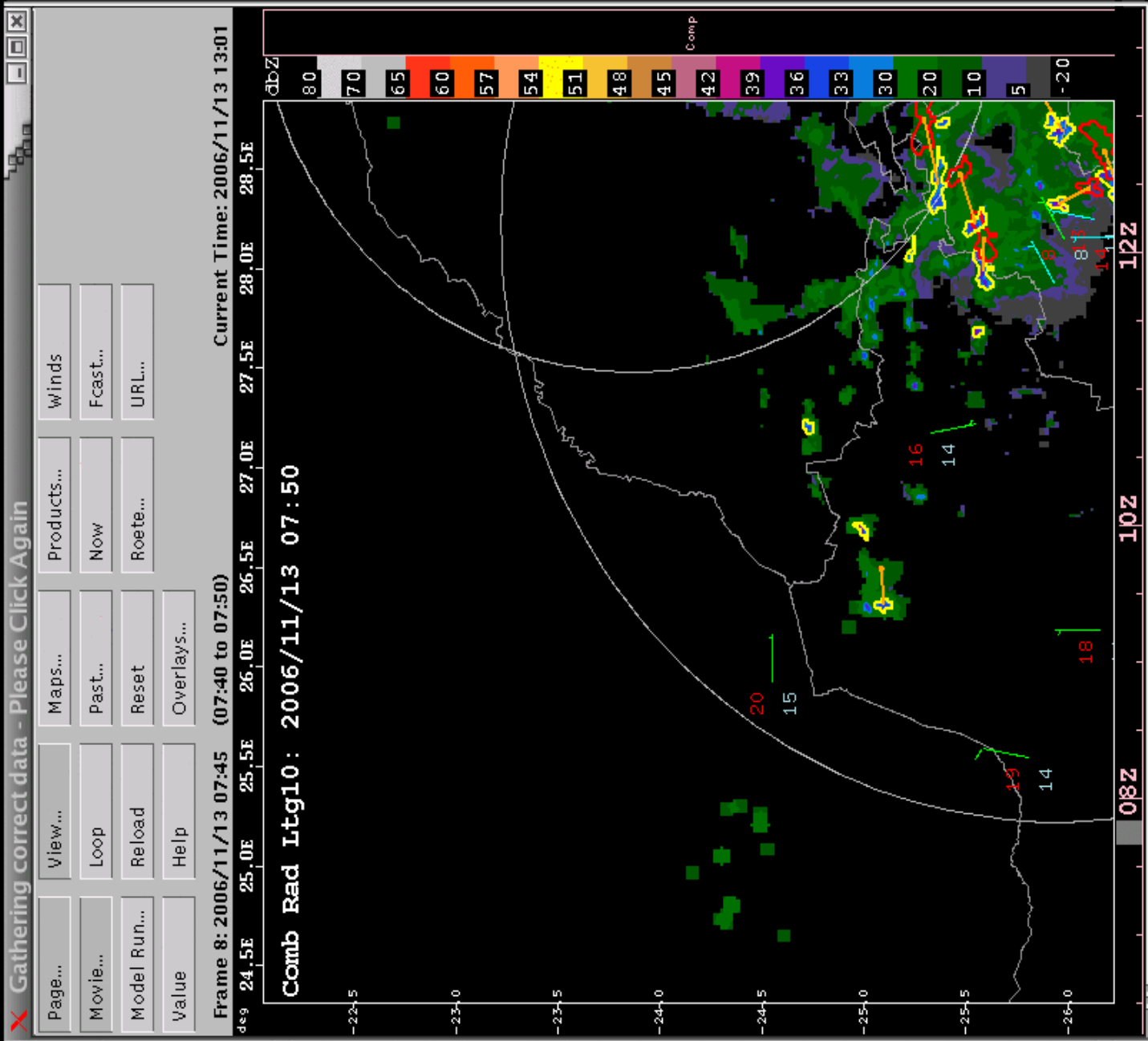
Current Time: 2006/10/17 11:02

Frame 60: 2006/10/17 11:05 (11:02 to 11:07)





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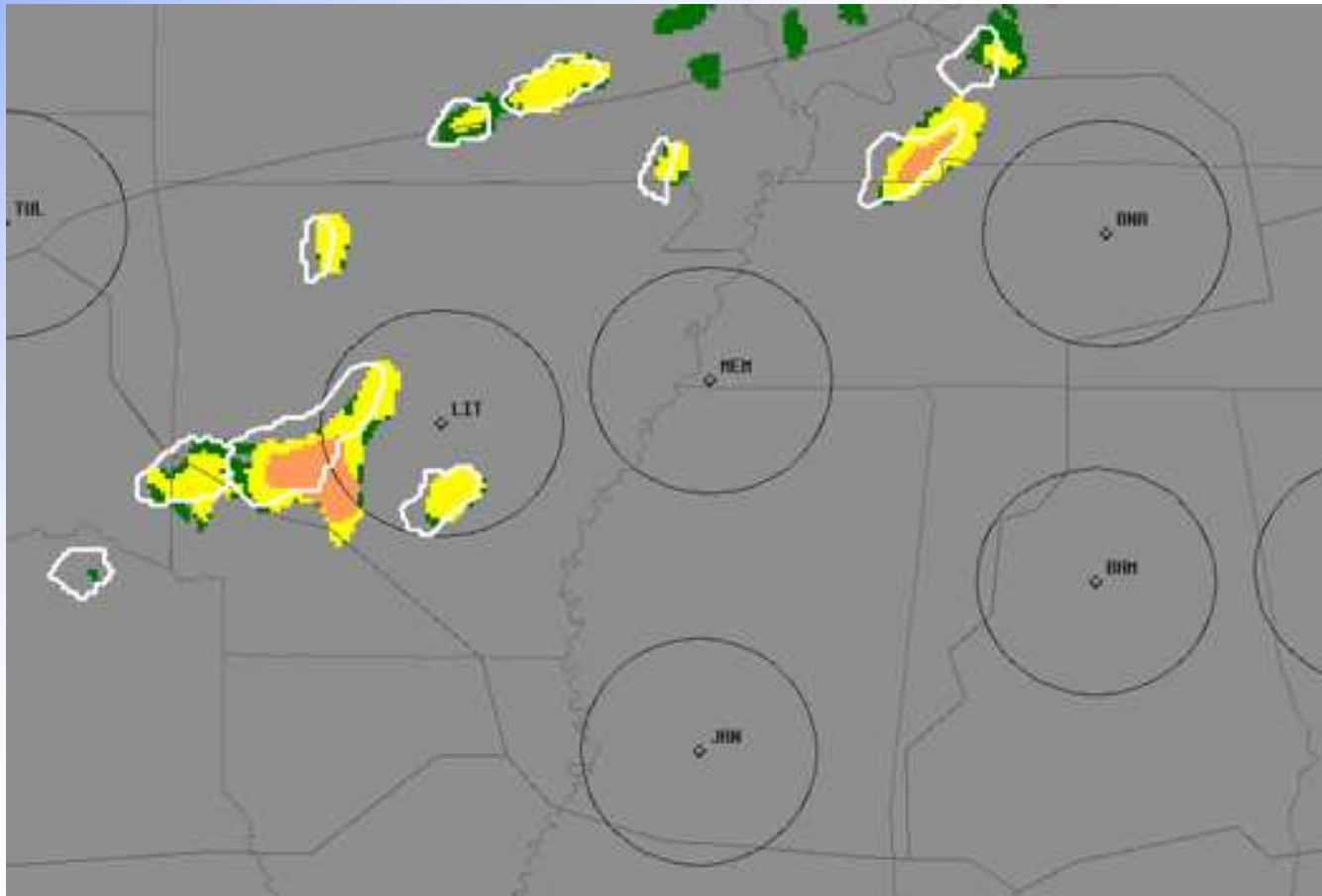


# USA - NCWF



- The National Convective Weather Forecast (NCWF) product, designed and implemented by the National Centre for Atmospheric Research (NCAR), provides current convective hazards and 1 hour extrapolation forecasts of thunderstorm hazard locations.
- The hazard field and forecasts update every 5 minutes.
- The NCWF development is sponsored by the Federal Aviation Administration's (FAA) Aviation Weather Research (AWR) program as part of the Convective Weather Product Development Team.
- The Convective Weather Product Development Team consist of MIT Lincoln Laboratories, National Severe Storms Laboratory (NSSL), National Weather Service's Aviation Weather Centre (AWC), and NCAR.
- The NCWF target users are airline dispatch, general aviation and FAA Traffic Management Units (TMU).

# NCWF Product



# References

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- National Centre for Atmospheric Research  
<http://www.ral.ucar.edu>
- Aviation Weather Centre - NCWF  
<http://aviationweather.gov/products/ncwf/>
- Australia - National Bureau of Meteorology  
– **ATSAS** (Automated Thunderstorm Alerting Service)
- MeteoSwiss – TRT program.

# Conclusion

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- Biggest advantage of the Lightning network is it's coverage of the full South African domain and beyond.
- Radar data will be enhanced as lightning is not limited by the curvature of the earth or beam blocking. Current C-Band radars suffers from attenuation along the beam.
- Disadvantage: We do not get high lightning strike counts in tropical rain events, where more than 20mm can fall in an hour or two with out lightning. Thus difficult to substitute a radar.
- Looking at only the Convective Hazardous storms and cleaning out the “noise” will be the aim to get to a hazardous weather map, similar to the US – NCWF product.

# On going work.

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- More scientific verification of values.
- Invest the use of radar Vertical Liquid Water field and Lightning storms.
- Optimise Lightning storms.
- Decide on a final colour scale and range.
- Using this new field for Precipitation.

# Acknowledgements

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- NCAR - Dr Michel Dixon for many years of support.
- SAWS who provides the infrastructure to generate these world leading products.
- Support from Bethlehem, ICT and Metsys teams.

# Tanks for attending.

Current URL:

[Http://metsys.weathersa.co.za/RSAStorms.html](http://metsys.weathersa.co.za/RSAStorms.html)