Unusual Significant Nighttime Tornadoes of 2008 Associated with Relatively Stable Low-level Conditions



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Motivation

- Nocturnal significant tornadoes in Plains fairly rare with enhanced risks
- Forecaster awareness increased following high-impact Spring 2007 events
- Spring 2008 produced comparatively unusual events containing considerable surface-based CINH and no 0-3 km CAPE

Overview of 5/29 and 6/11

- Each had long-lived supercell producing significant nocturnal tornadoes a number of hours into lifespan
- Sig tor environments contained nocturnallylowered LCL/enhanced SRH, but considerable CINH due to proximal/upstream EML
- Each storm remained in warm sector throughout duration

Jewell, KS EF-3 Belleville, KS EF-3





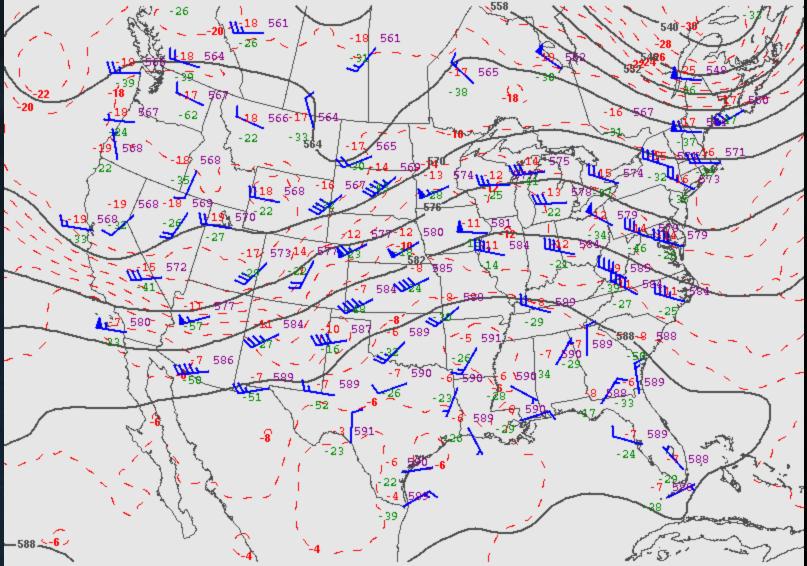


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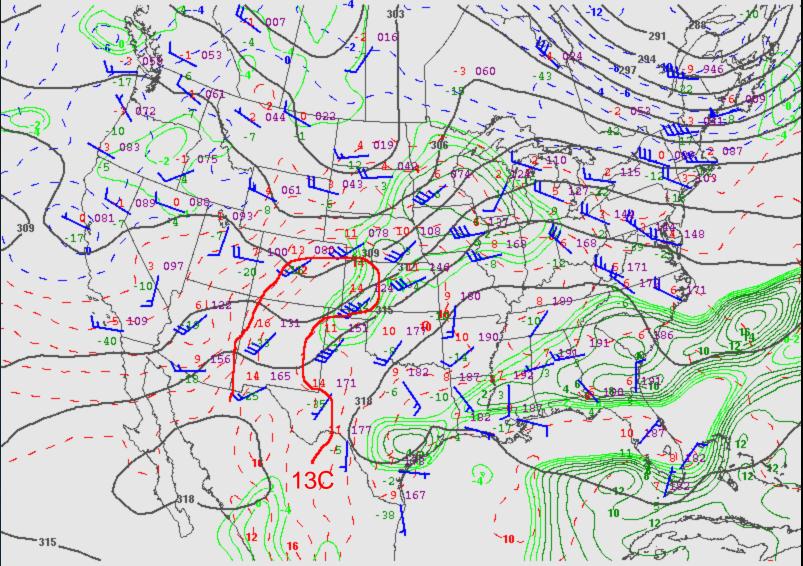
Supercell born ~2200Z

Sig tor phase ~0145-0330Z

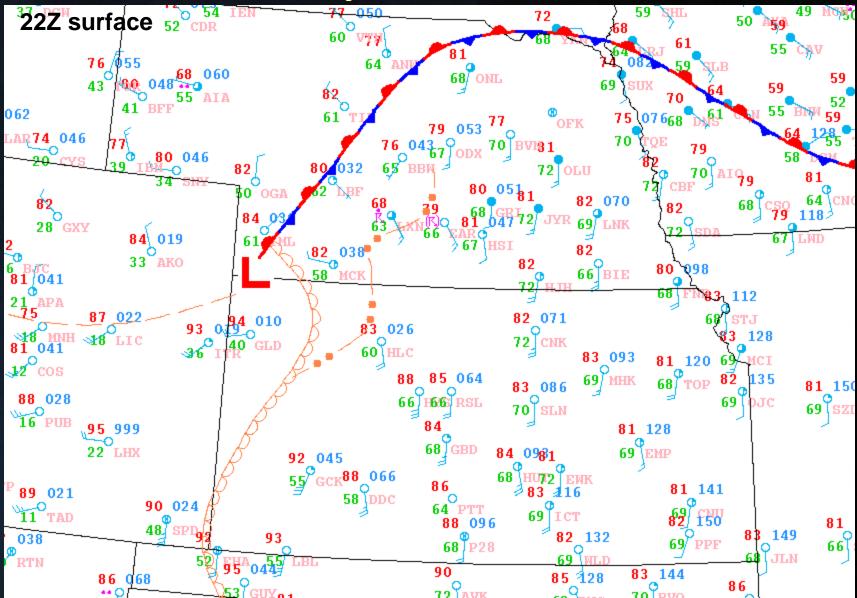
May 29, 2008



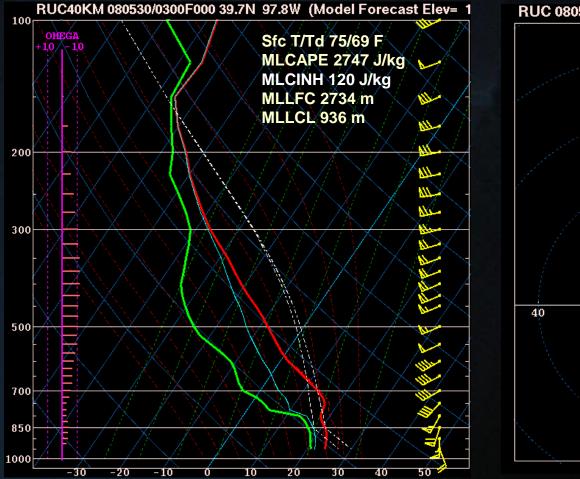
080530/0000 500 MB UA OBS, HGHTS, and TEMPS

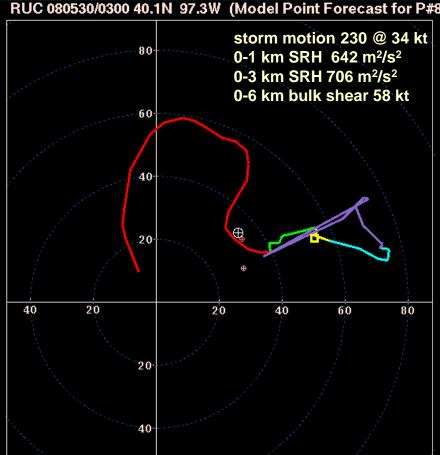


080530/0000 700 MB UA OBS, HGHTS, TEMPS, Td>=-4



May 29, 2008 tornadic NSE

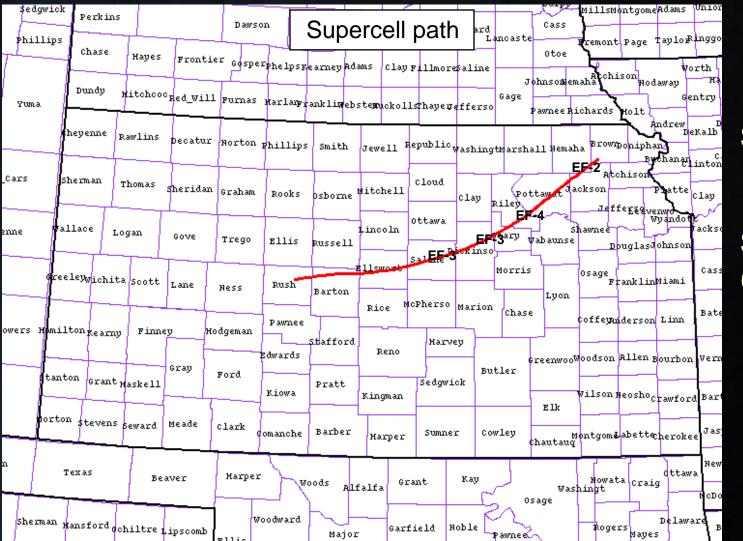




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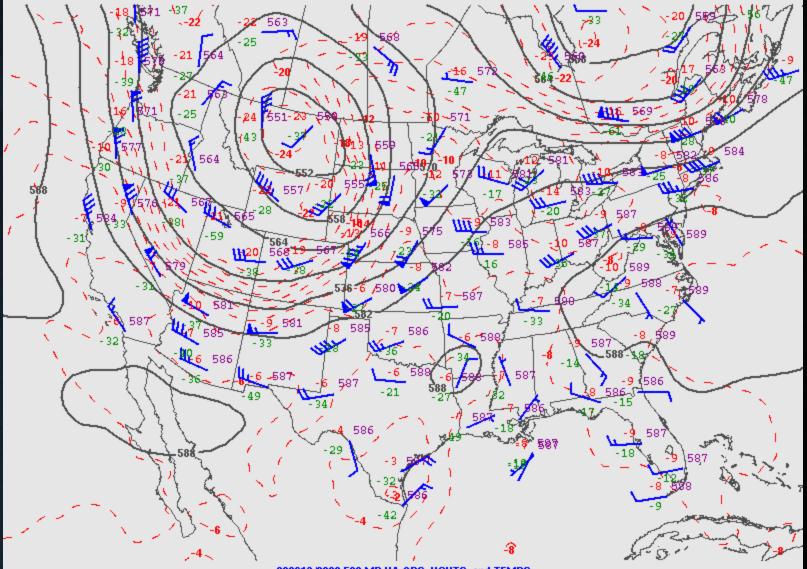
Salina, KS EF-3 Chapman, KS EF-3* Manhattan, KS EF-4 Soldier, KS EF-2*



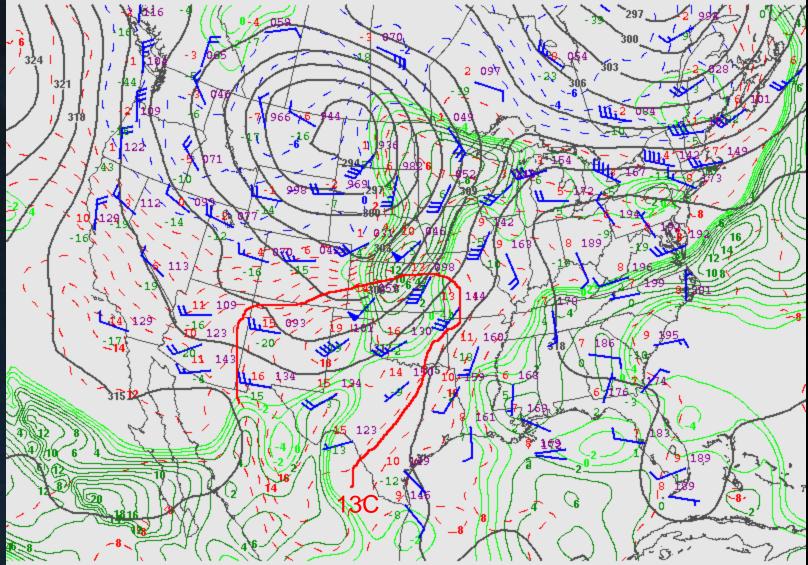


Supercell born ~0050Z

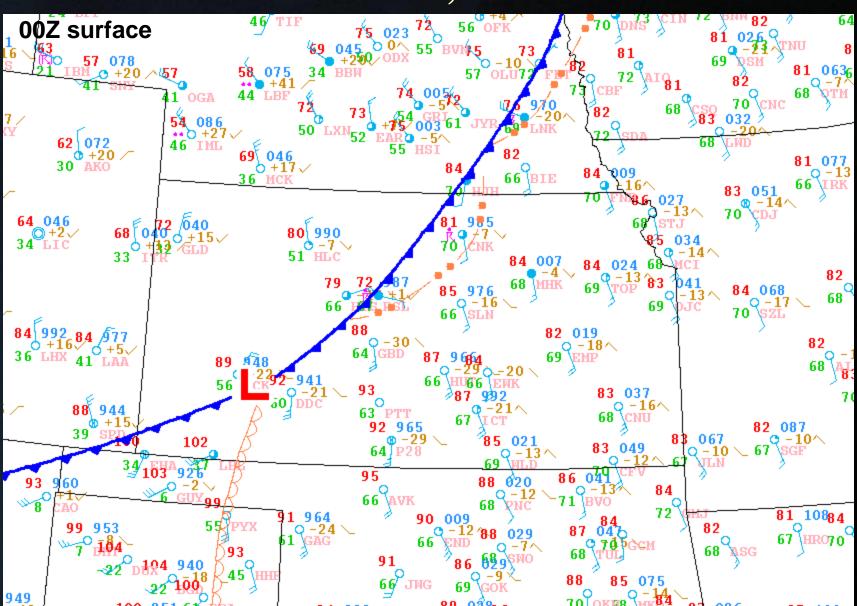
Sig tor phase (intermittent) ~0240-0500Z



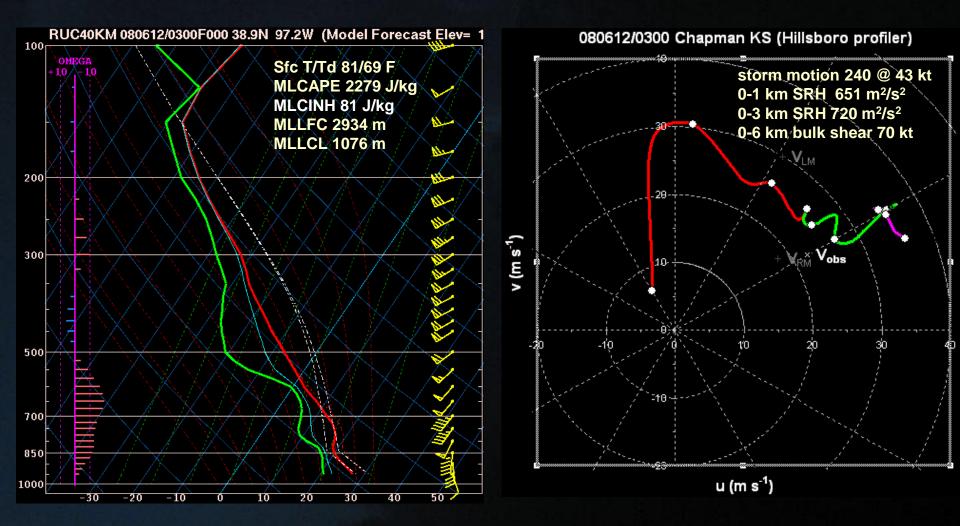
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080612/0000 700 MB UA OBS, HGHTS, TEMPS, Td>=-4



June 11, 2008 tornadic NSE



Review of select NSE parameters (includes EHI)

	Sfc T/Td (F)	700mb T (C)	MLCAPE (J/kg)	MLCINH (J/kg)	0-3 km MLCAPE	0-6 km bulk shear (kt)	0-1 km SRH (m²/s²)	0-1 km MLEHI
05/29	75/69	13.1	2747	120	0	58	642	11.0
06/11	81/69	12.5	2279	81	0	70	651	9.3

Conclusions

- Each supercell produced nighttime sig tors despite capping EML & no 0-3 km CAPE
- Anomalously strong SRH along with strong deep layer shear helped counter CINH via intense/long-lived mesocyclones augmented by vertical pressure perturbations
- In strong CINH environments, be wary of potent SRH/bulk shear combinations via RAOB/ACARS/profiler/VWP data that may help compensate

References

- Craven, J. P., R. E. Jewell, and H. E. Brooks, 2002: Comparison between observed convective cloud-base heights and lifting condensation levels for two different lifting parcels. *Wea. Forecasting*, 17, 885-890.
- Davies, J. M., 2004: Estimations of CIN and LFC associated with tornadic and nontornadic supercells. *Wea. Forecasting*, 19, 714-726.
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