High Plains Convection: Diurnally Varying Mesoscale-Synoptic Scale Interactions over Complex Terrain during MPEX

Lance F. Bosart
Department of Atmospheric and Environmental Sciences
University at Albany/SUNY

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MPEX Motivation:

Enhanced early morning synoptic and subsynoptic observations over the Intermountain region and their assimilation into convection-allowing models will lead to improved forecasts of convective initiation and afternoon convective mode.

MPEX Opportunity:

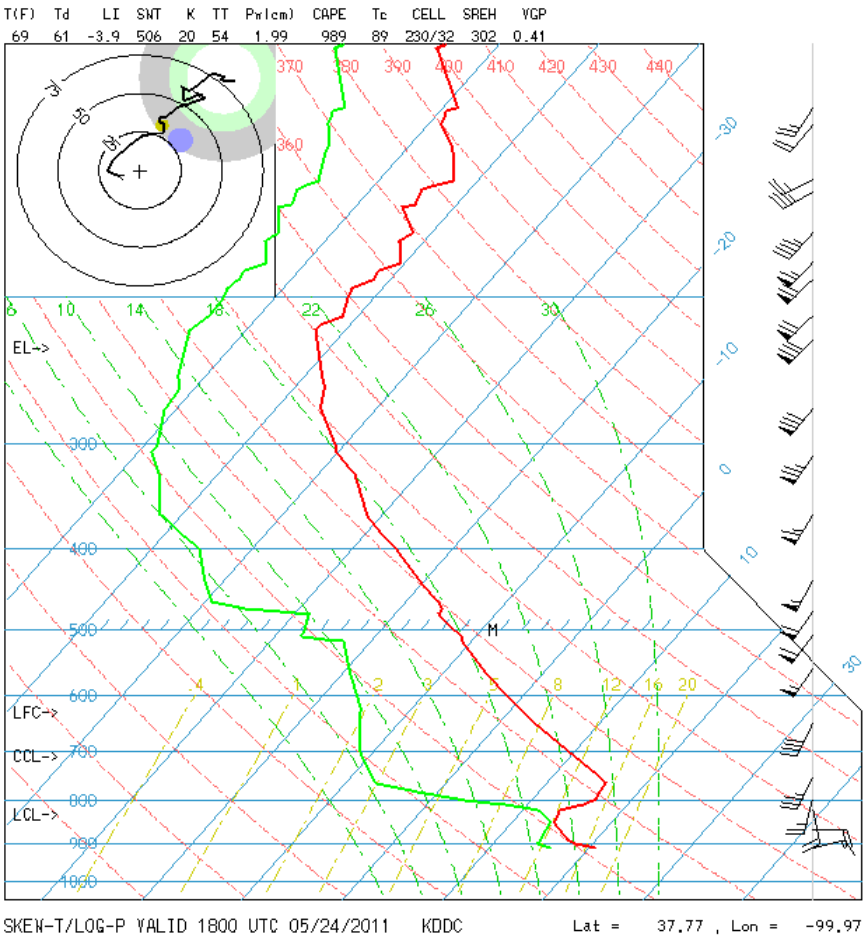
- Investigate the feedbacks between deep convective storms and their environments

- Collaborate with other MPEX investigators on regional-scale NWP of convective storms

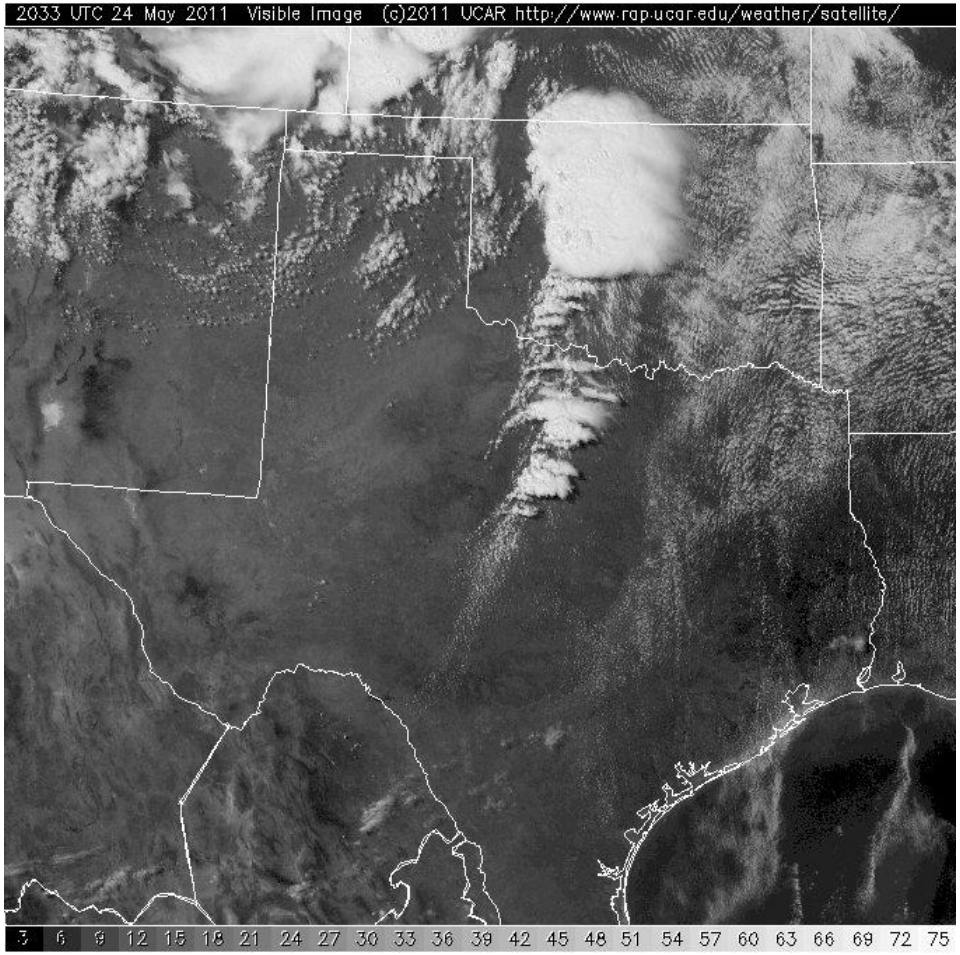
MPEX Research Foci:

- Participate in the SPC spring experiment (familiarity with state-of-the-art ensemble convection-allowing models
- Analyze case studies of troublesome High Plains MCSs (24-25 May 2011 and 19-20 June 2011)
- Participate with graduate student(s) in MPEX field program which will yield new research opportunities
- Exploit MPEX field program datasets to analyze snyoptic and mesoscale circulations in presence of complex terrain
- Focus on identifying physical features that could be relevant to mesoscale forecast uncertainty
- Collaborate with other PIs on MPEX-related predictability issues and serendipitous research opportunities

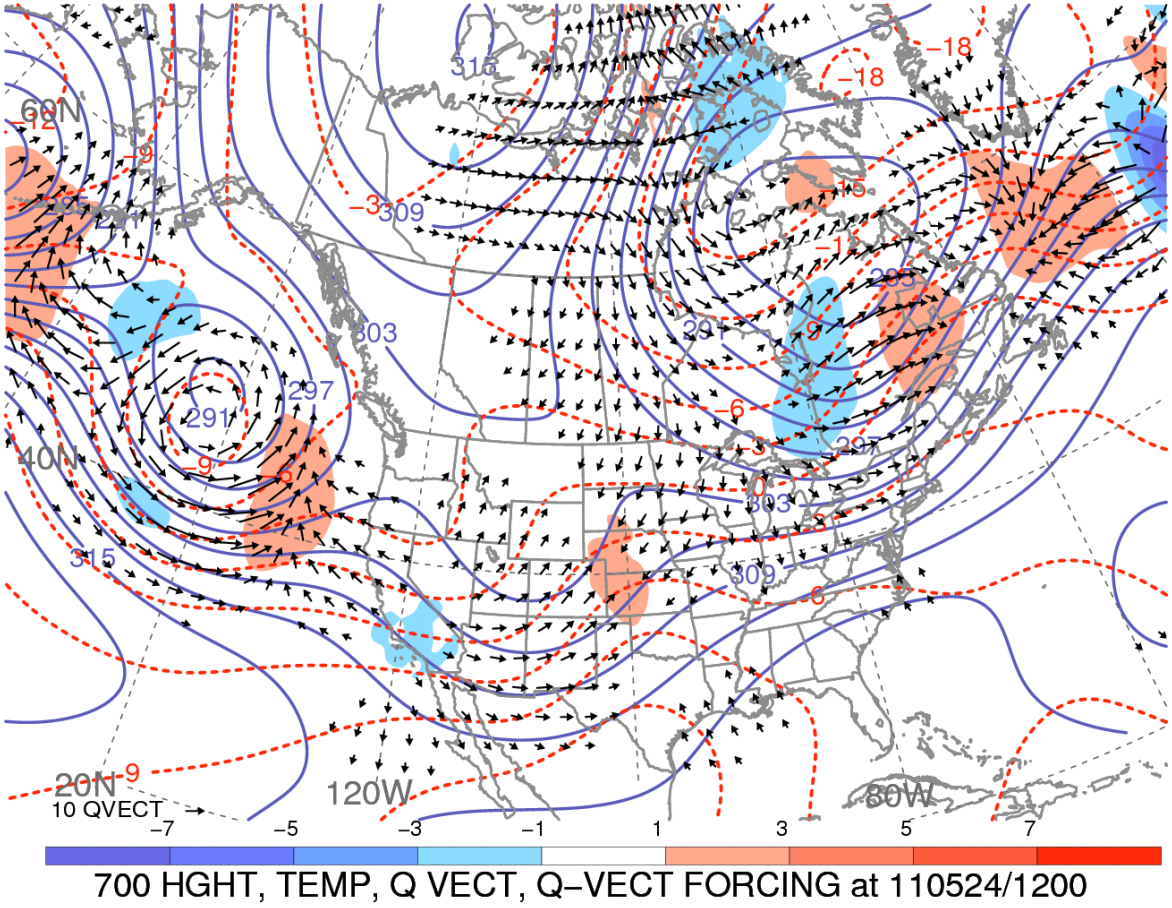
Dodge City (DDC) Sounding: 1800 UTC 24 May 2011



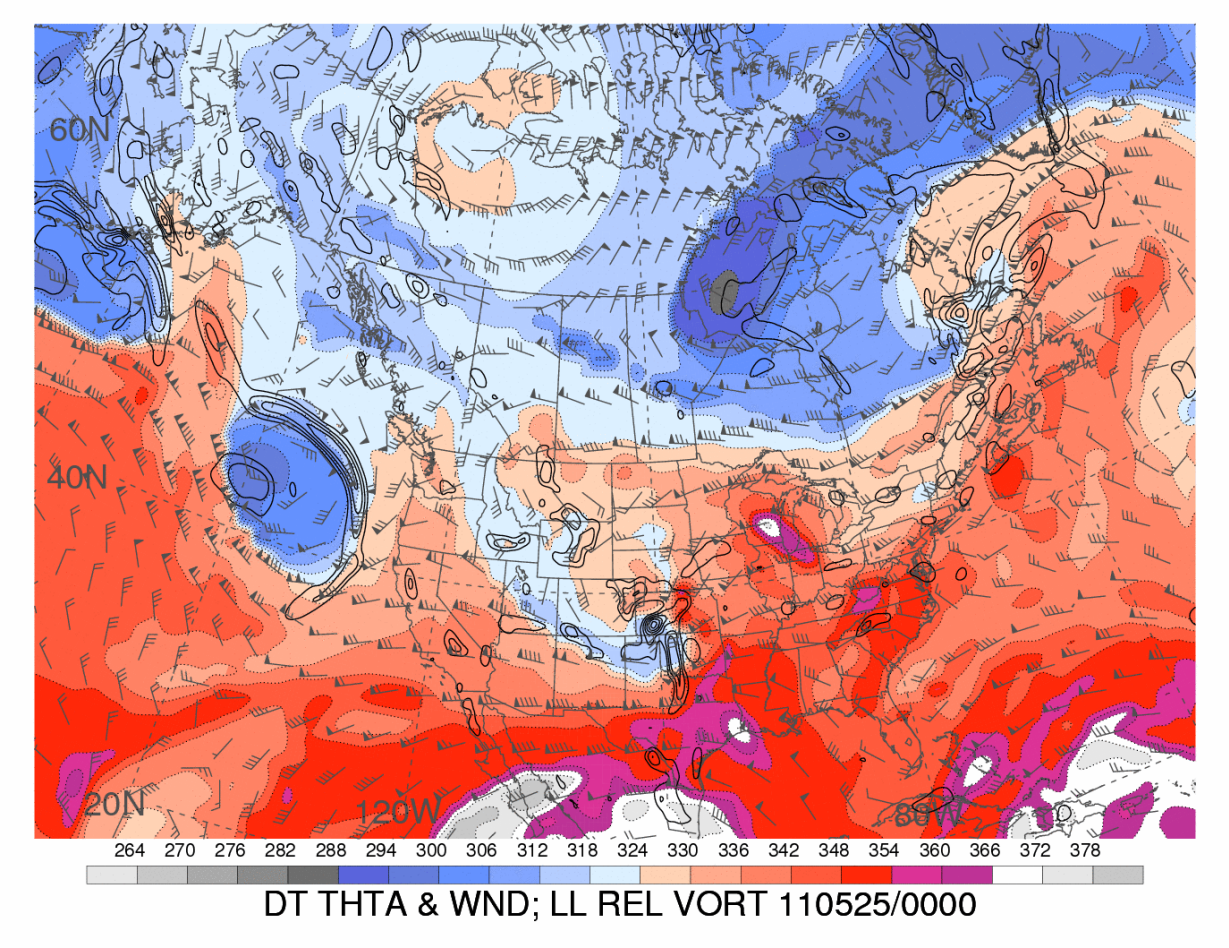
Visible Satellite Image for 2033 UTC 24 May 2011



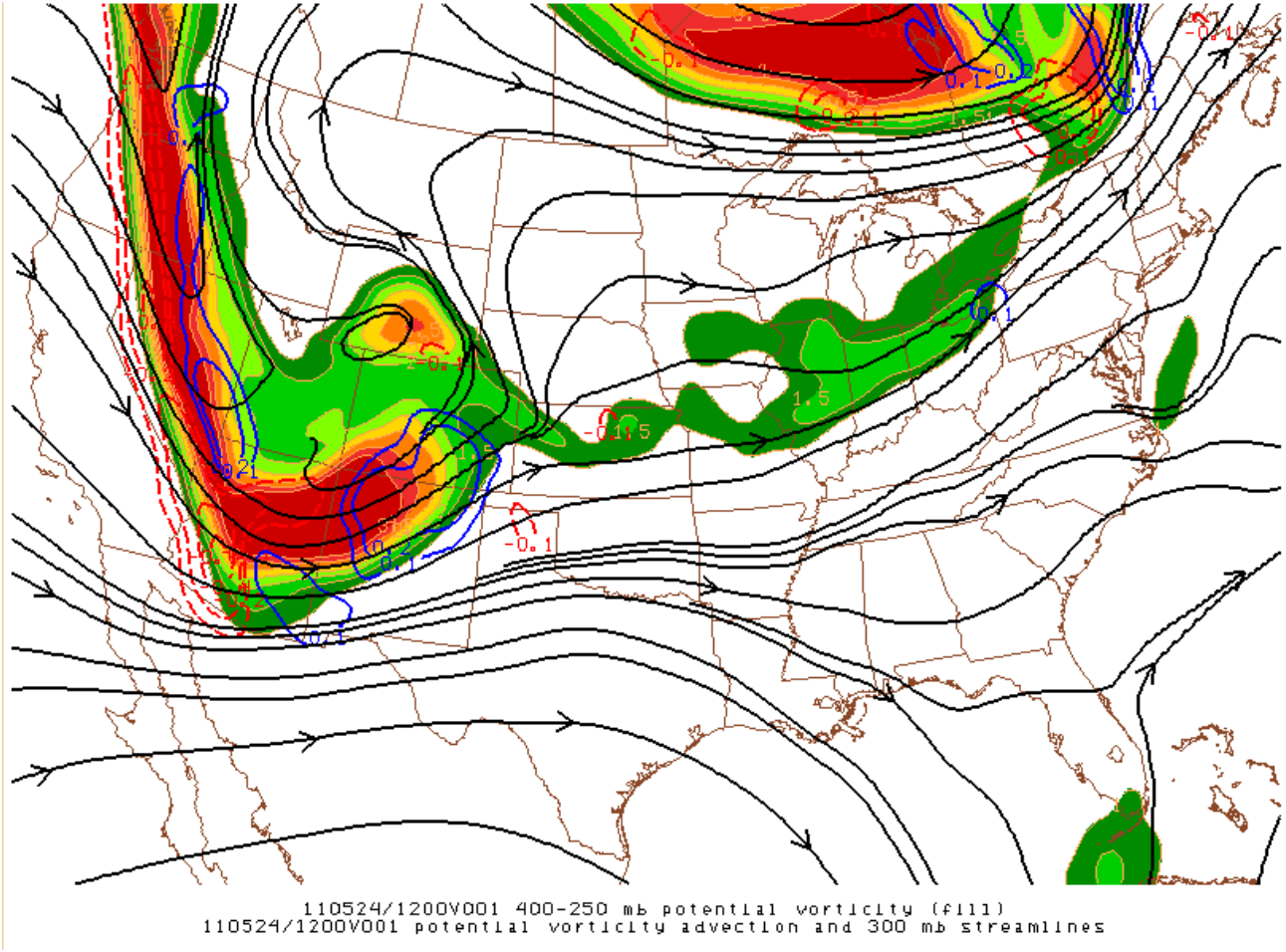
700 hPa Q-Vector, Q-Vector Convergence (shaded), Heights and Temperatures for 1200 UTC 24 May 2011



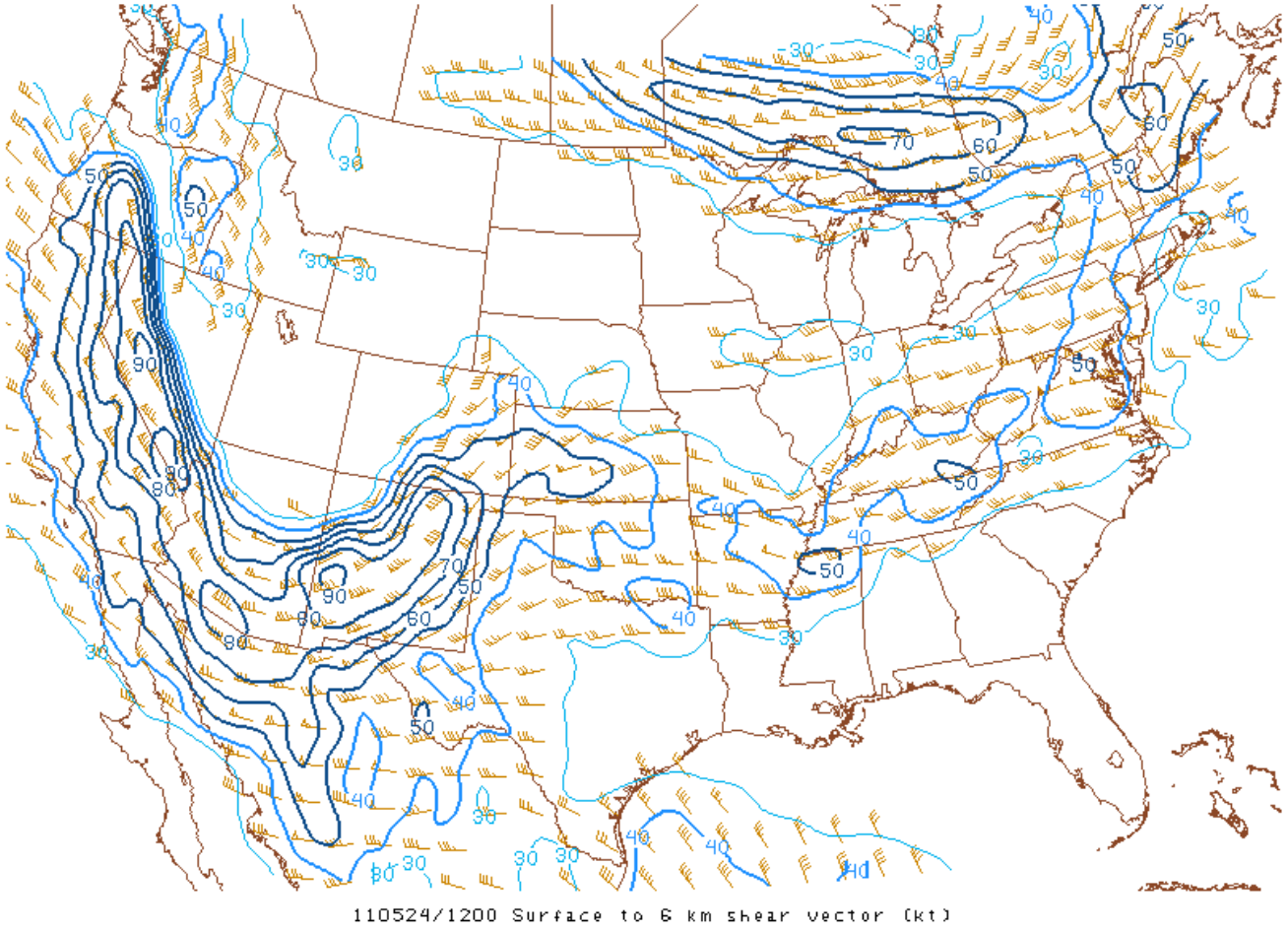
DT Potential Temperature (K; shaded), Winds, and 925-850 hPa layer-mean vorticity (contours): 0000 UTC 25 May 2011



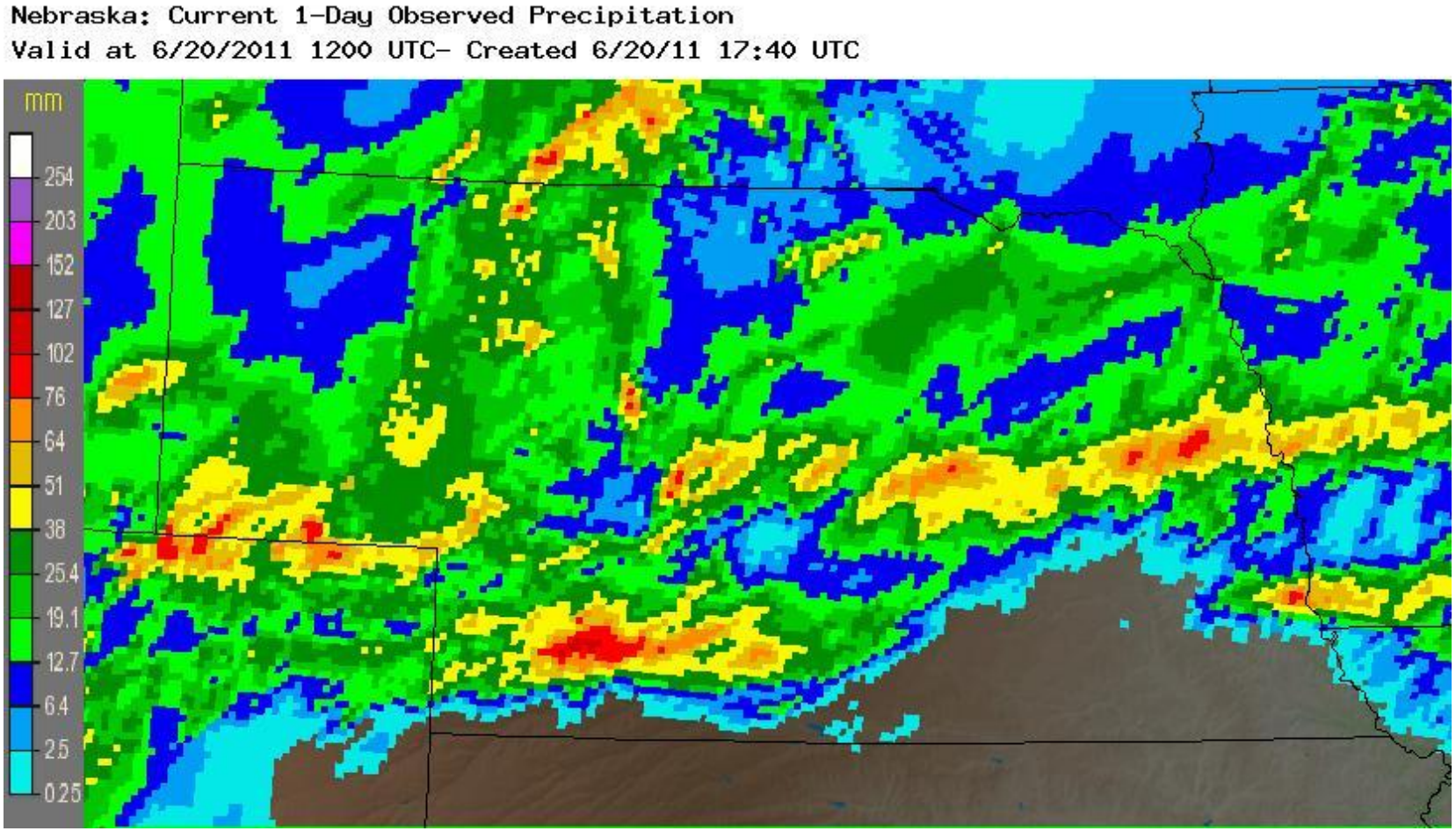
SPC 400-250 hPa layer-mean PV (shaded), PV advection (contours), and 300 hPa streamlines: 1200 UTC 24 May 2011



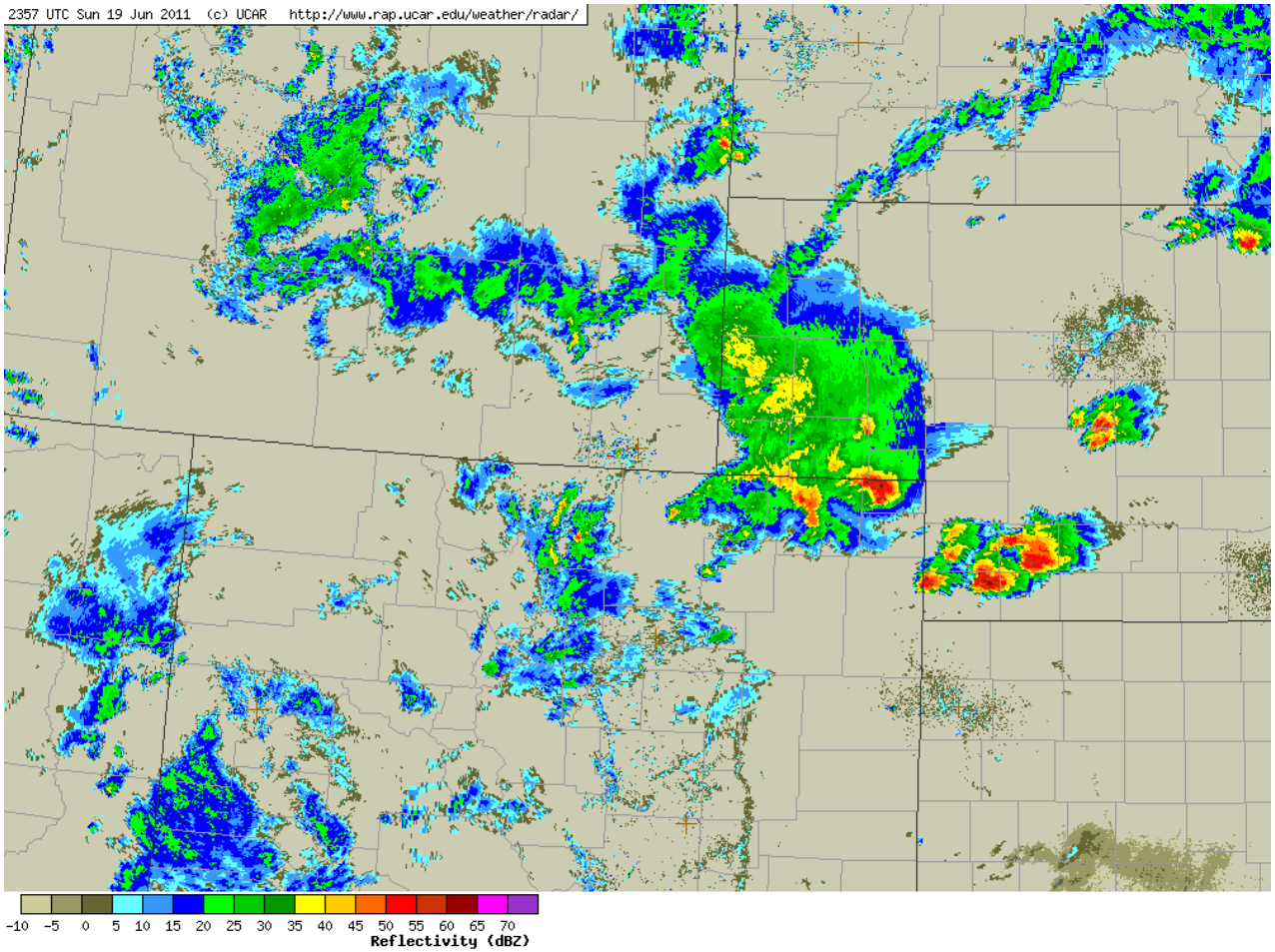
SPC surface-to-6 km shear (kt, contours) and winds (barbs): 1200 UTC 24 May 2011



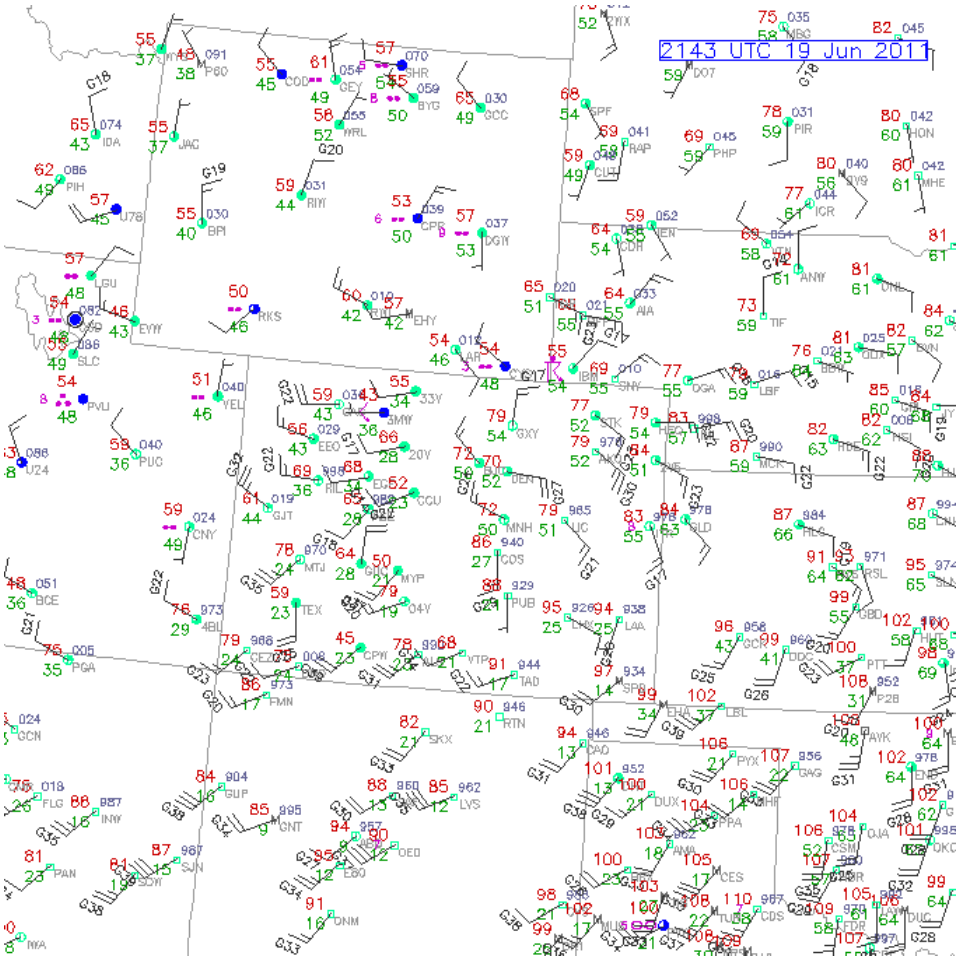
NWS radar-derived total rainfall (mm) for 24 h ending 1200 UTC 20 June 2011



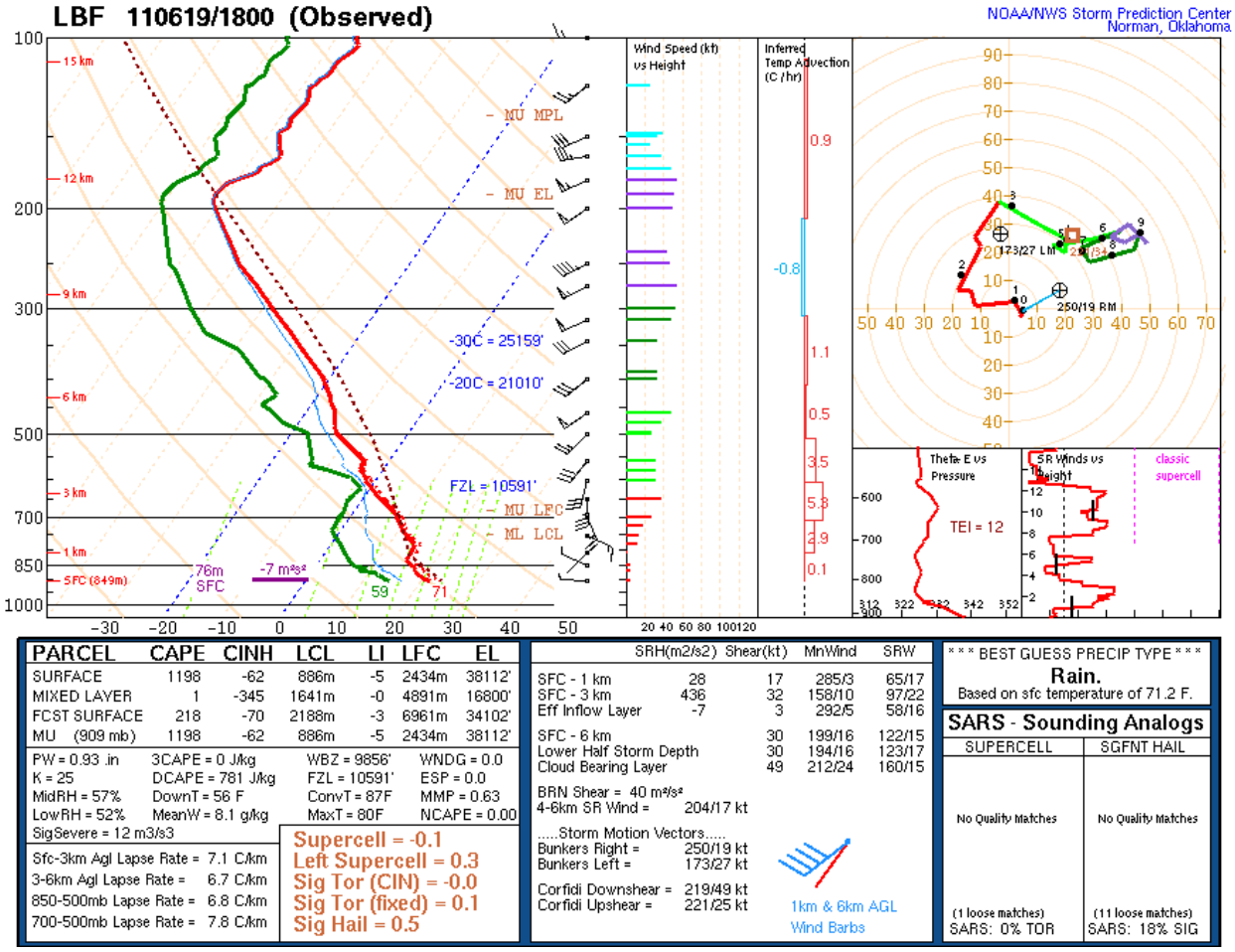
NWS regional base reflectivity (dBZ) analysis for 2357 UTC 19 June 2011



NCAR surface plot for 2100 UTC 19 June 2011



North Platte (LBF) Sounding for 1800 UTC 19 June 2011



PARCEL	CAPE	CINH	LCL	LI	LFC	EL
SURFACE	1198	-62	886m	-5	2434m	38112'
MIXED LAYER	1	-345	1641m	-0	4891m	16800'
FCST SURFACE	218	-70	2188m	-3	6961m	34102'
MU (909 mb)	1198	-62	886m	-5	2434m	38112'

PW = 0.93 in	3CAPE = 0 J/kg	WBZ = 9856'	WNDG = 0.0
K = 25	DCAPE = 781 J/kg	FZL = 10591'	ESP = 0.0
MidRH = 57%	DownT = 56 F	ConvT = 87F	MMP = 0.63
LowRH = 52%	MeanW = 8.1 g/kg	MaxT = 80F	NCAPE = 0.00
SigSevere = 12 m3/s3			

Sfc-3km Agl Lapse Rate =	7.1 C/km
3-6km Agl Lapse Rate =	6.7 C/km
850-500mb Lapse Rate =	6.8 C/km
700-500mb Lapse Rate =	7.8 C/km

Supercell = -0.1
Left Supercell = 0.3
Sig Tor (CIN) = -0.0
Sig Tor (fixed) = 0.1
Sig Hail = 0.5

	SRH(m2/s2)	Shear(kt)	MnWind	SRW
SFC - 1 km	28	17	285/3	65/17
SFC - 3 km	436	32	158/10	97/22
Eff Inflow Layer	-7	3	292/5	58/16
SFC - 6 km		30	199/16	122/15
Lower Half Storm Depth		30	194/16	123/17
Cloud Bearing Layer		49	212/24	160/15

BRN Shear = 40 m²/s²
4-6km SR Wind = 204/17 kt

.....Storm Motion Vectors.....
Bunkers Right = 250/19 kt
Bunkers Left = 173/27 kt

Corfidi Downshear = 219/49 kt
Corfidi Upshear = 221/25 kt

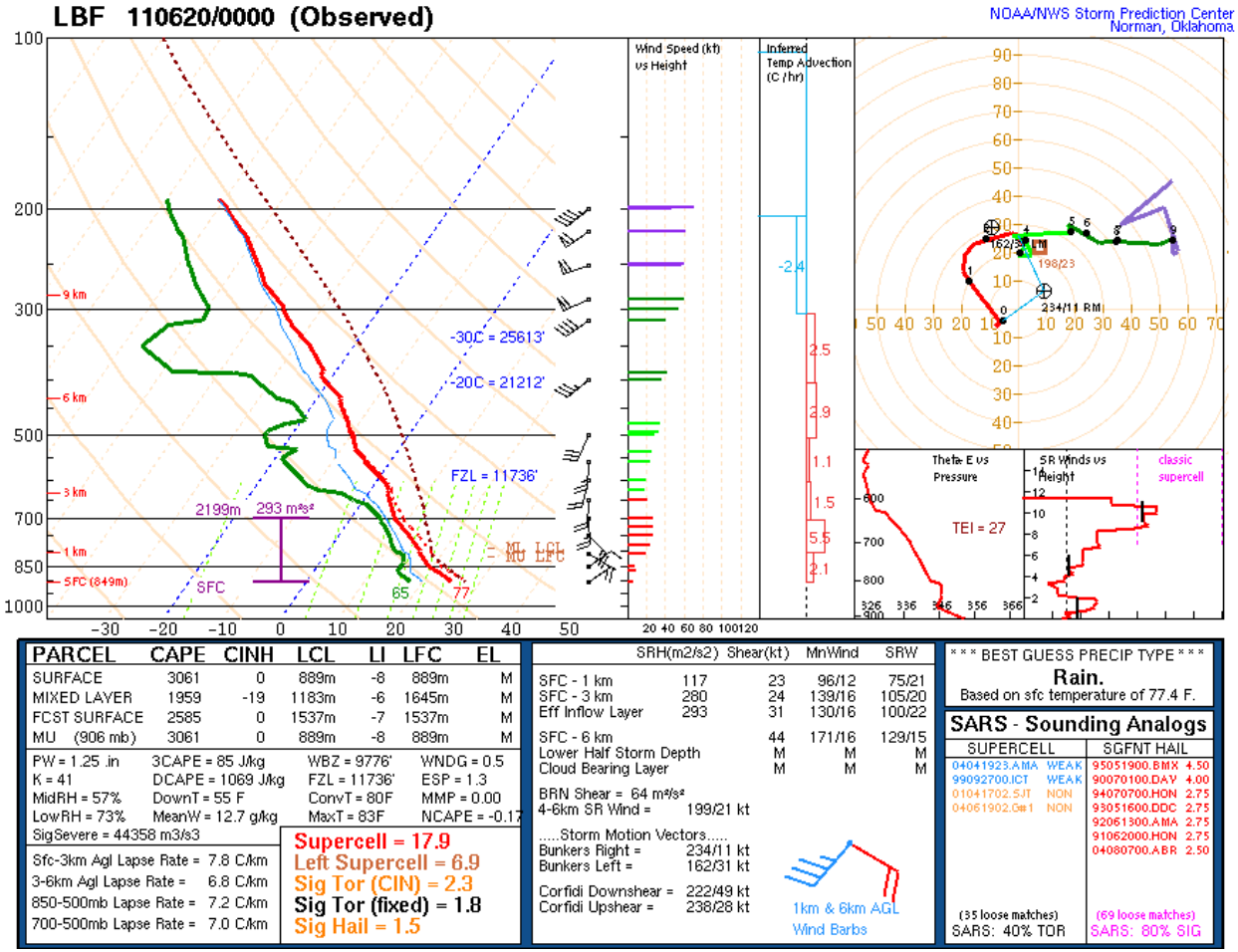
1km & 6km AGL Wind Barbs

*** BEST GUESS PRECIP TYPE ***
Rain.
Based on sfc temperature of 71.2 F.

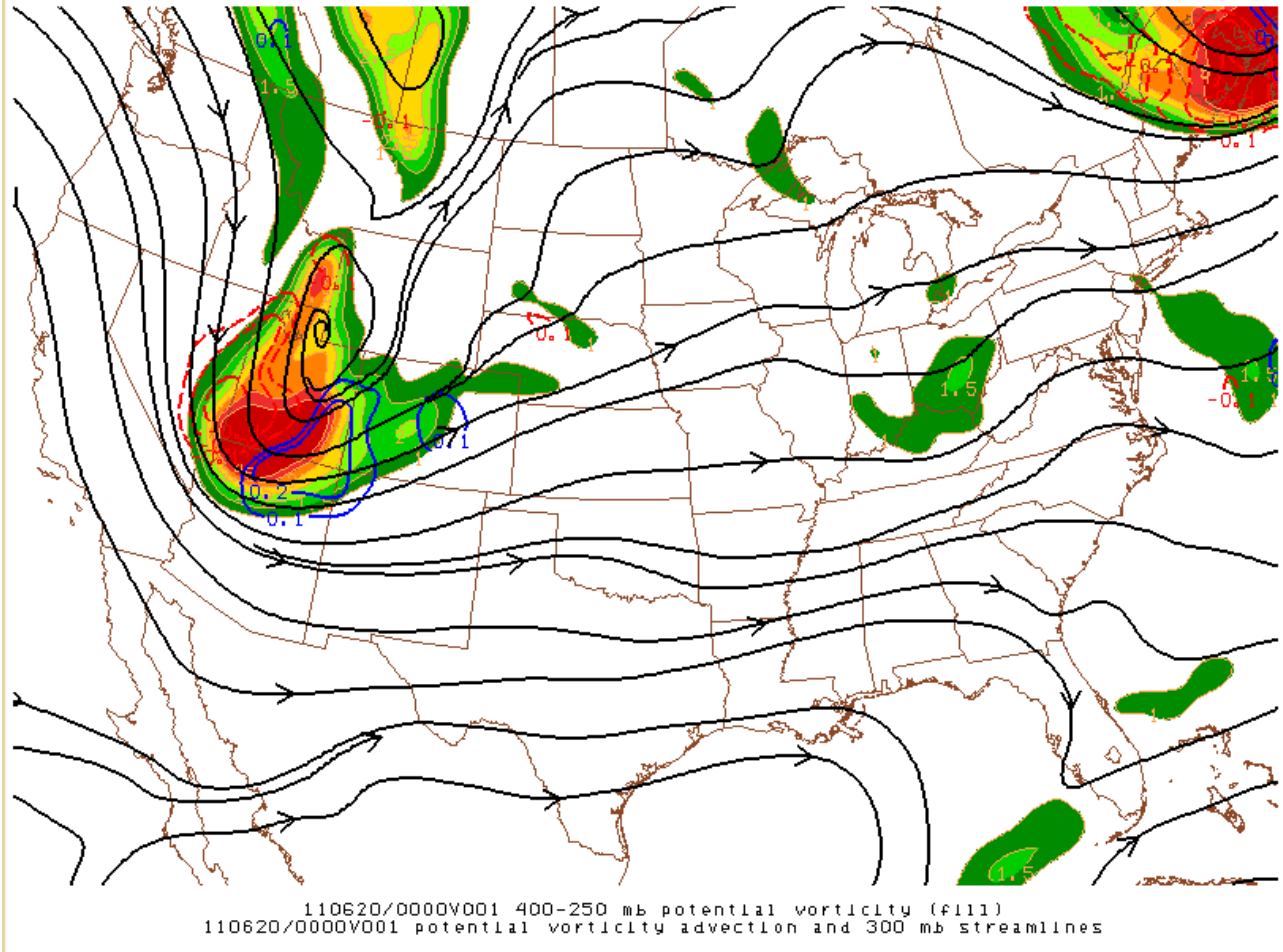
SARS - Sounding Analogs

SUPERCELL	SGFNT HAIL
No Quality Matches	No Quality Matches
(1 loose matches) SARS: 0% TOR	(11 loose matches) SARS: 18% SIG

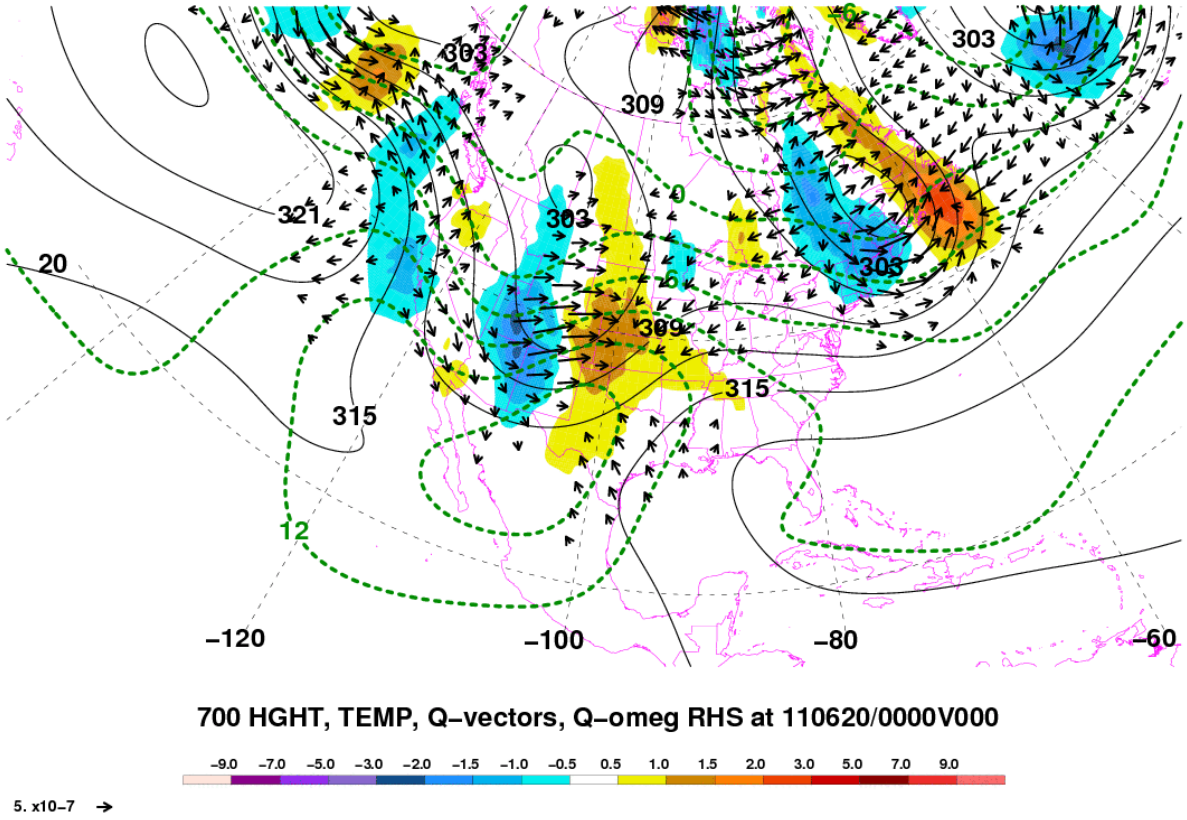
North Platte (LBF) Sounding for 0000 UTC 20 June 2011



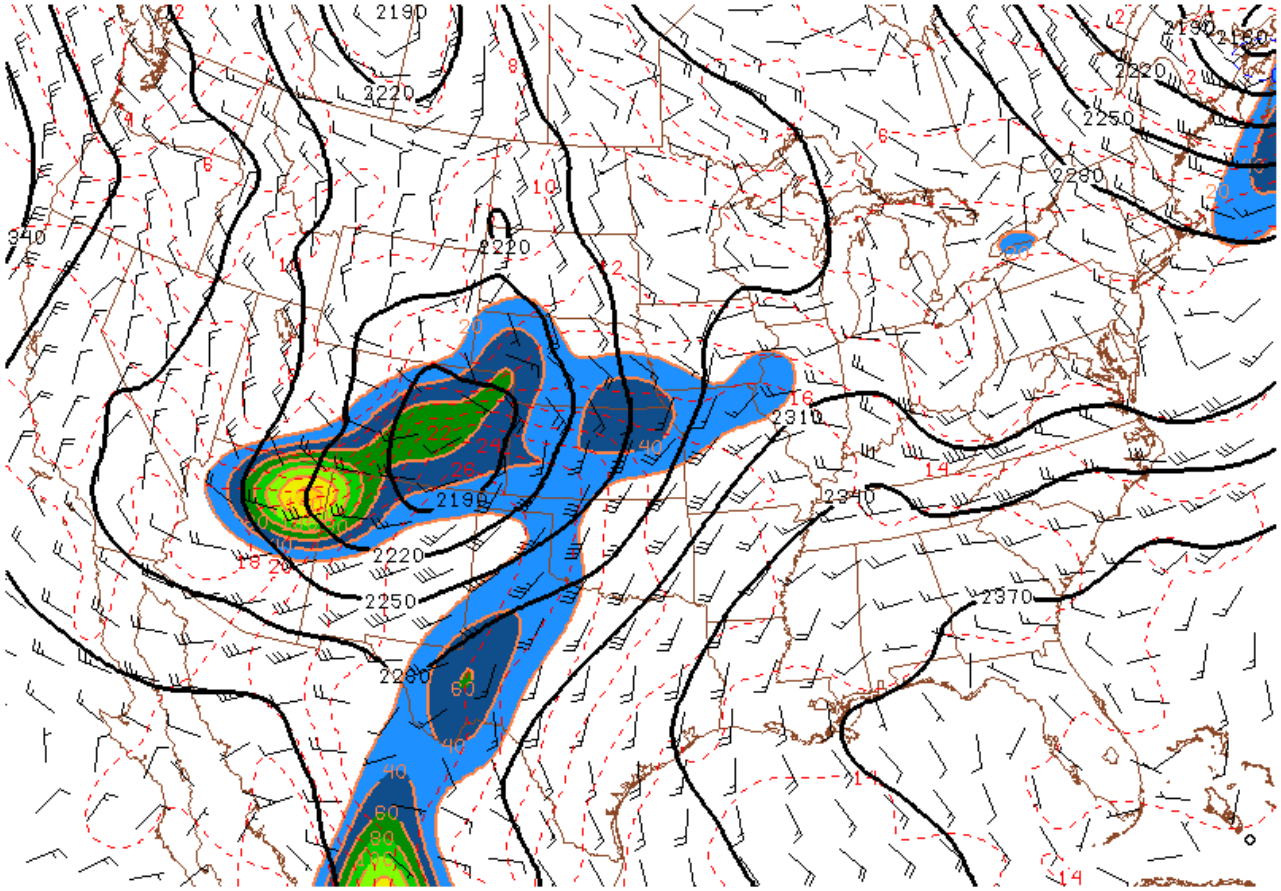
SPC 400-250 hPa layer-mean PV (shaded), PV advection (contours), 300 hPa streamlines for 1200 UTC 24 May 2011



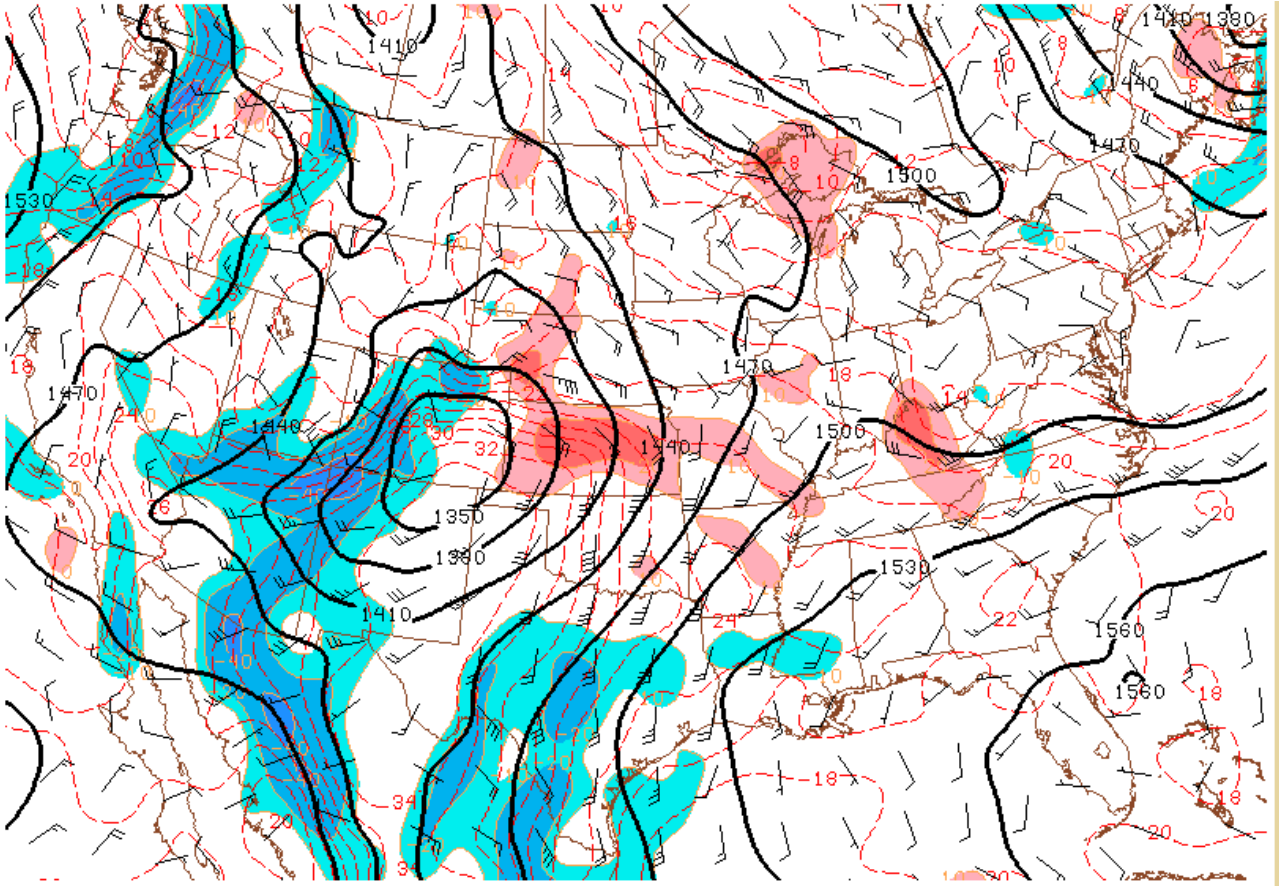
700 hPa Heights (solid contours, dam), Temperature (dashed contours, C), Q-Vectors (arrows), Q-Vector Convergence (shaded) for 0000 UTC 20 June 2011



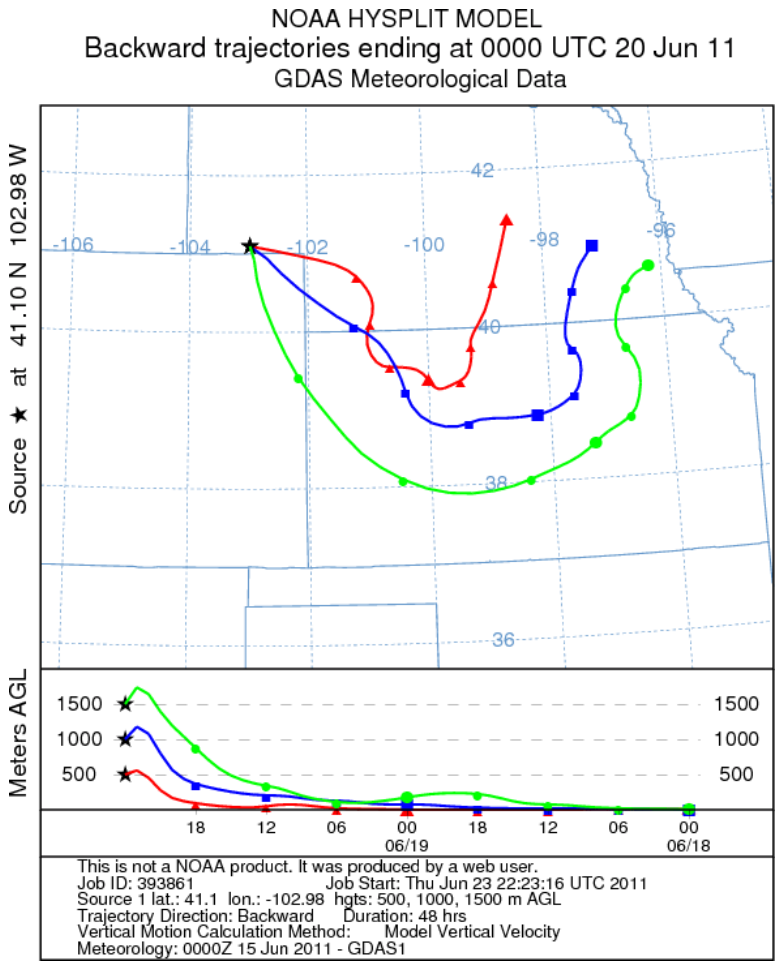
SPC 850-700 hPa Mean Heights (solid, m), Temperatures (dashed, C), Winds (kt), and Frontogenesis (shaded) for 0000 UTC 20 June 2011



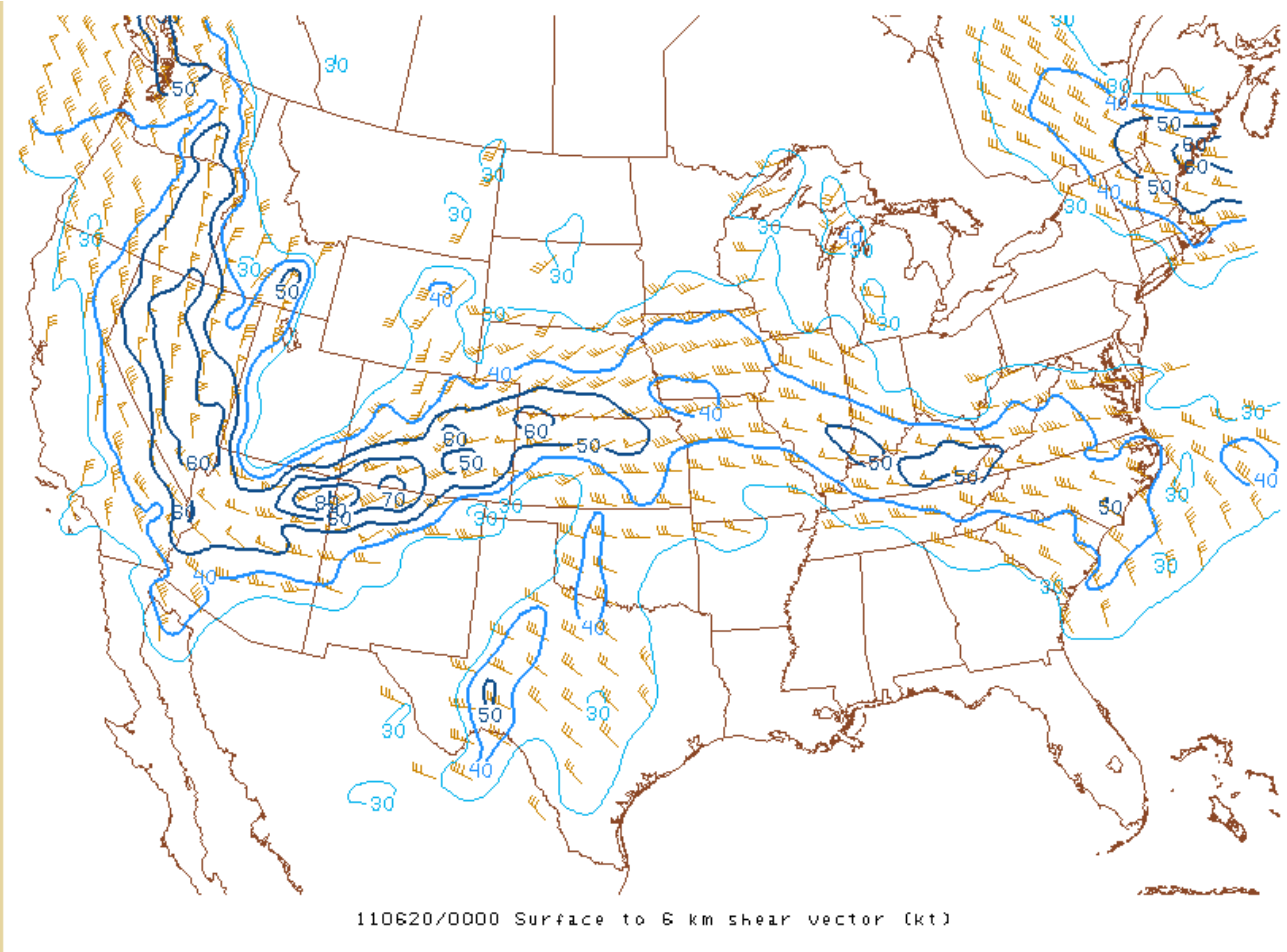
SPC 850 hPa Heights (contours, m), Temperatures (dashed, C), Winds (kt), and temperature advection (shaded) for 0000 UTC 20 June 2011



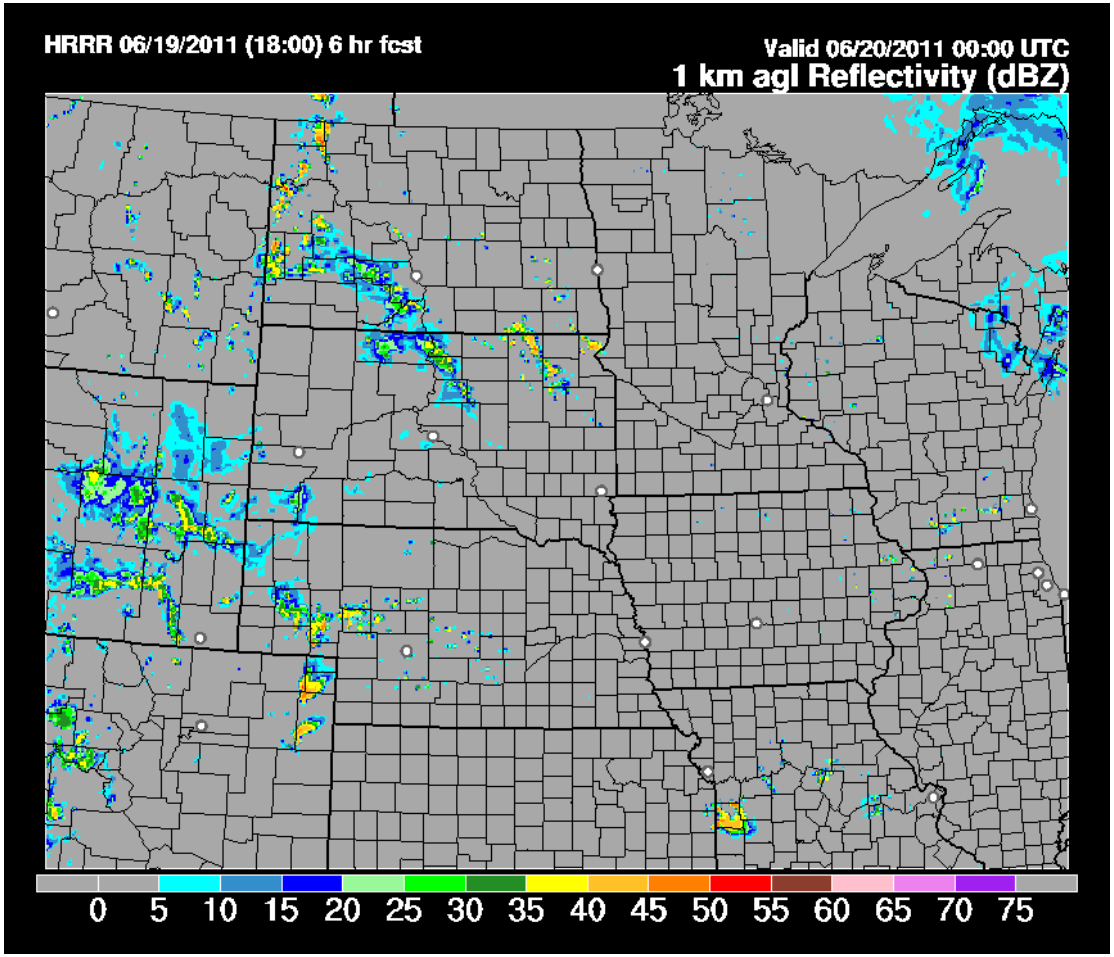
NOAA HYSPLIT 48 h Backward Trajectories Ending at 500, 1000, and 1500 m AGL at SNY at 0000 UTC 20 June 2011



SPC Surface-to-6 km Shear (contours, kt) and Shear Vectors (barbs) for 0000 UTC 20 June 2011



NOAA HRRR 6 h Base Reflectivity (dBZ) forecast valid 0000 UTC 20 June 2011



NOAA HRRR 9 h Total Precipitation (shaded, inches) and SLP (hPa, red contours) valid 0300 UTC 20 June 2011