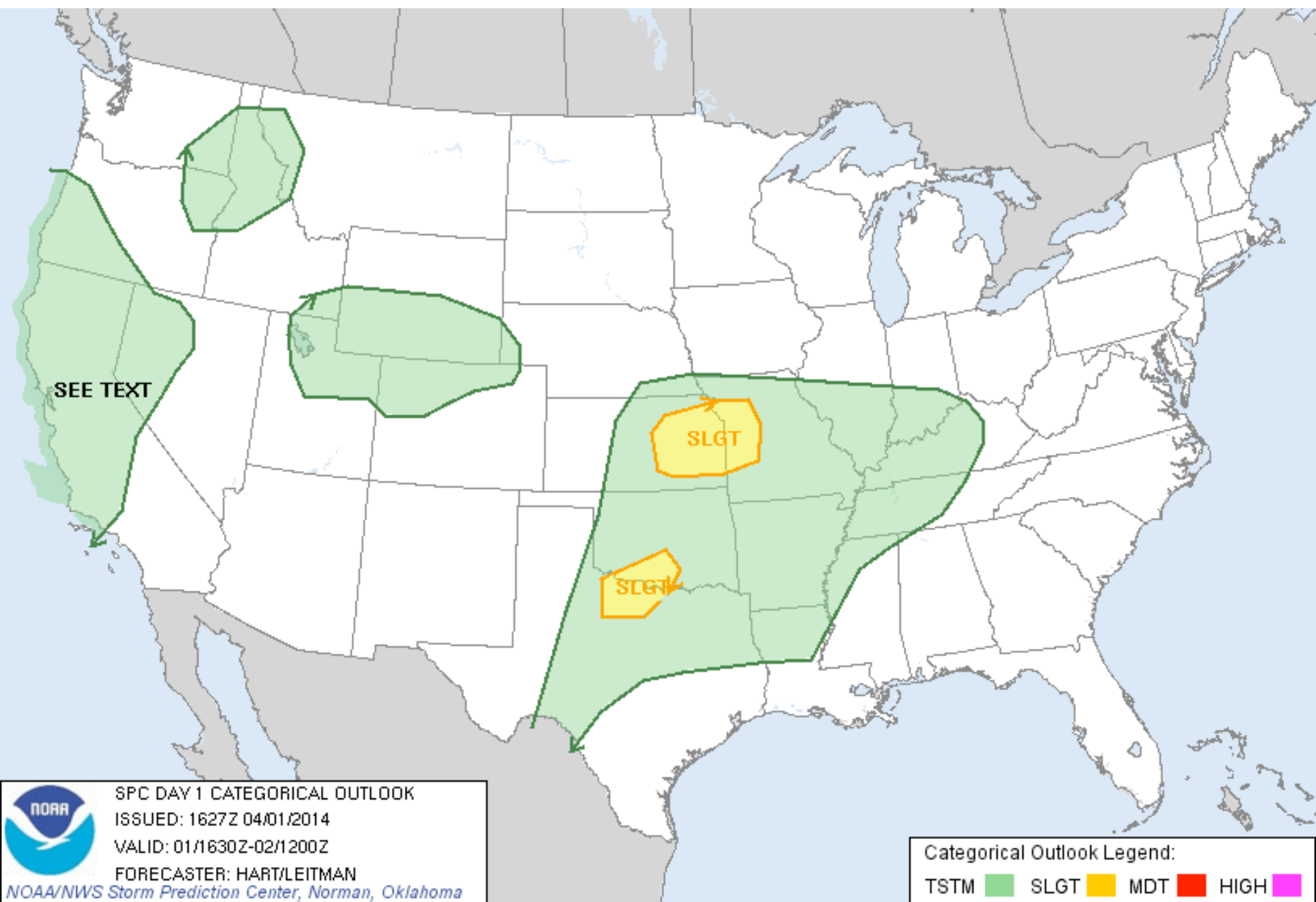
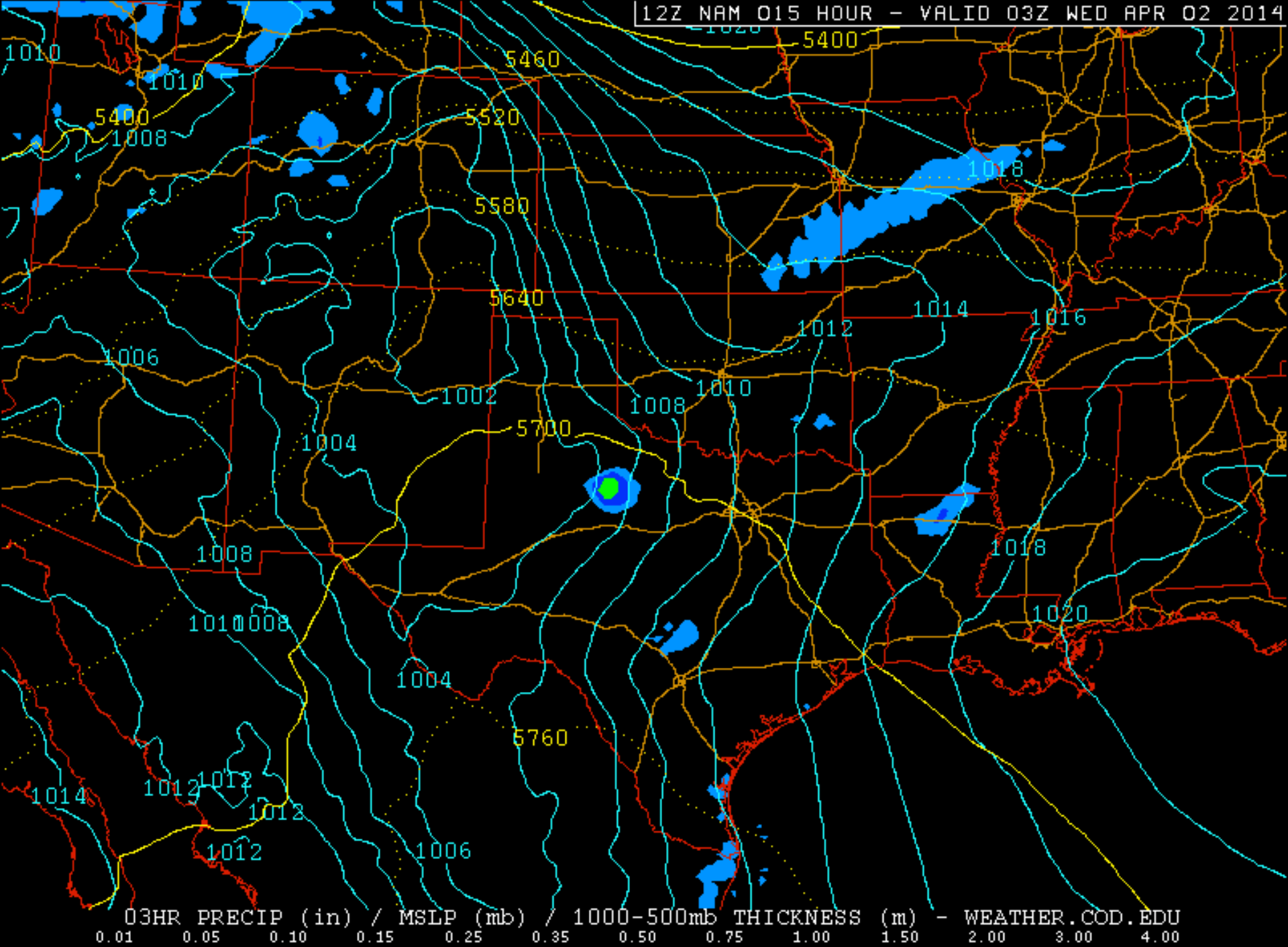




WELCOME **to the WoF – HiW Workshop of 2014**

Steve Koch
National Severe Storms Laboratory

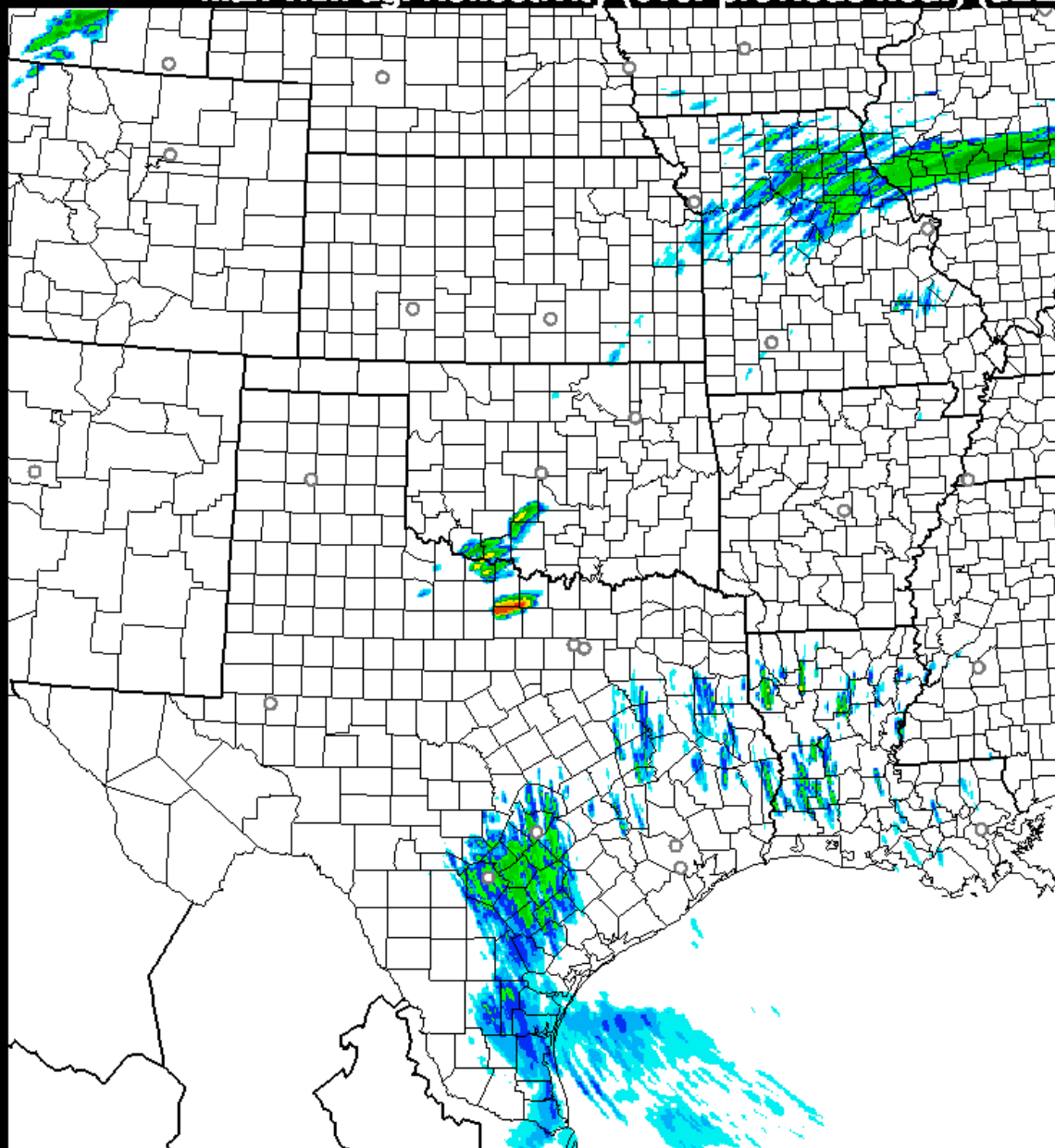




HRRR 04/01/2014 (15:00) 12h fcst - Experimental

Valid 04/02/2014 03:00 UTC

Max 1km agl Reflectivity (over previous hour) (dBZ)



Weather Forecasting Improvement Act of 2014

113TH CONGRESS
2D SESSION

H. R. 2413

To prioritize and redirect NOAA resources to a focused program of investment on near-term, affordable, and attainable advances in observational, computing, and modeling capabilities to deliver substantial improvement in weather forecasting and prediction of high impact weather events, such as tornadoes and hurricanes, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

JUNE 18, 2013

Mr. BRIDENSTINE (for himself, Mr. SMITH of Texas, Mr. STEWART, and Mr. HARRIS) introduced the following bill; which was referred to the Committee on Science, Space, and Technology

A BILL

To prioritize and redirect NOAA resources to a focused program of investment on near-term, affordable, and attainable advances in observational, computing, and modeling capabilities to deliver substantial improvement in weather forecasting and prediction of high impact weather events, such as tornadoes and hurricanes, and for other purposes.

1 Be it enacted by the Senate and House of Representa-
2 tives of the United States of America in Congress assembled,

1 SEC. 4. TORNADO WARNING IMPROVEMENT AND EXTEN-
2 SION PROGRAM.

3 (a) IN GENERAL.—The Under Secretary, in collabo-
4 ration with the American weather industry and academic
5 partners, shall establish a tornado warning improvement
6 and extension program.

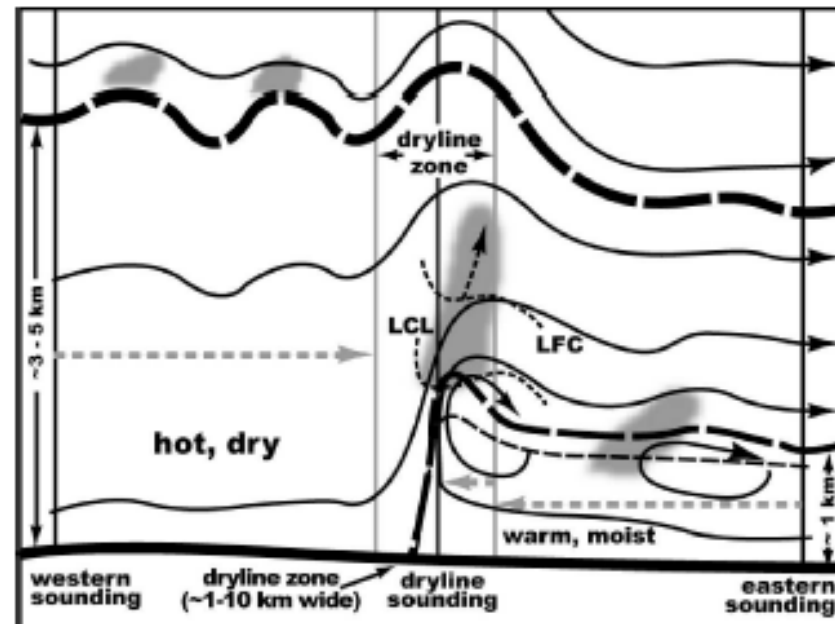
7 (b) GOAL.—The goal of such program shall be to re-
8 duce the loss of life and economic losses from tornadoes
9 through the development and extension of accurate, effec-
10 tive, and timely tornado forecasts, predictions, and warn-
11 ings, including the prediction of tornadoes beyond one
12 hour in advance.

13 (c) PROGRAM PLAN.—Not later than 6 months after
14 the date of enactment of this Act, the Assistant Adminis-
15 trator for OAR, in consultation with the Assistant Admin-
16 istrator for NWS, shall develop a program plan that de-
17 tails the specific research, development, and technology
18 transfer activities, as well as corresponding resources and
19 timelines, necessary to achieve the program goal.

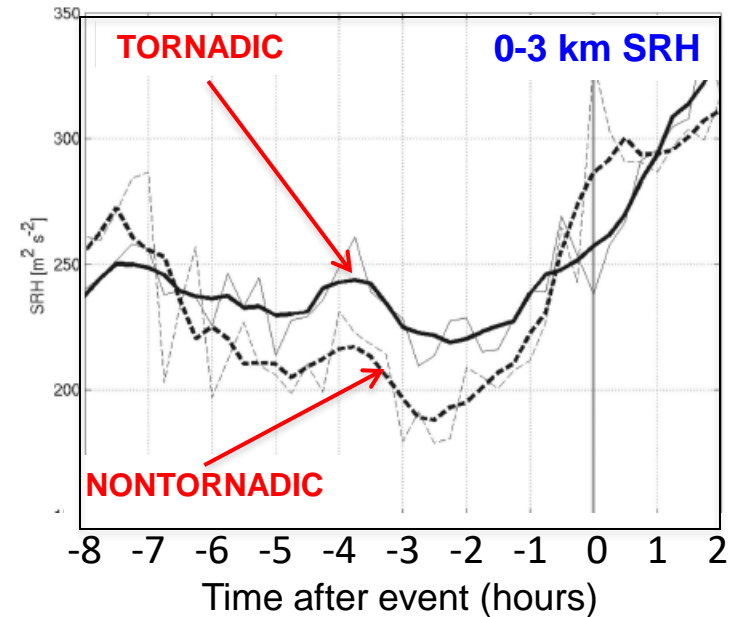
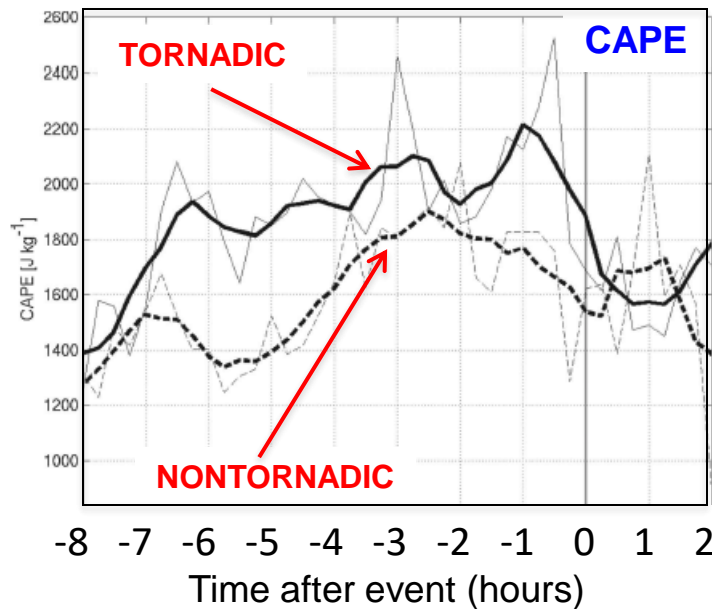
20 (d) BUDGET FOR PLAN.—Following completion of
21 the plan, the Assistant Administrator for OAR, in con-
22 sultation with the Assistant Administrator for NWS, shall
23 transmit annually to Congress a proposed budget cor-
24 responding to the activities identified in the plan.

Warn-on-Forecast Needs Beyond Radar and Satellite Data

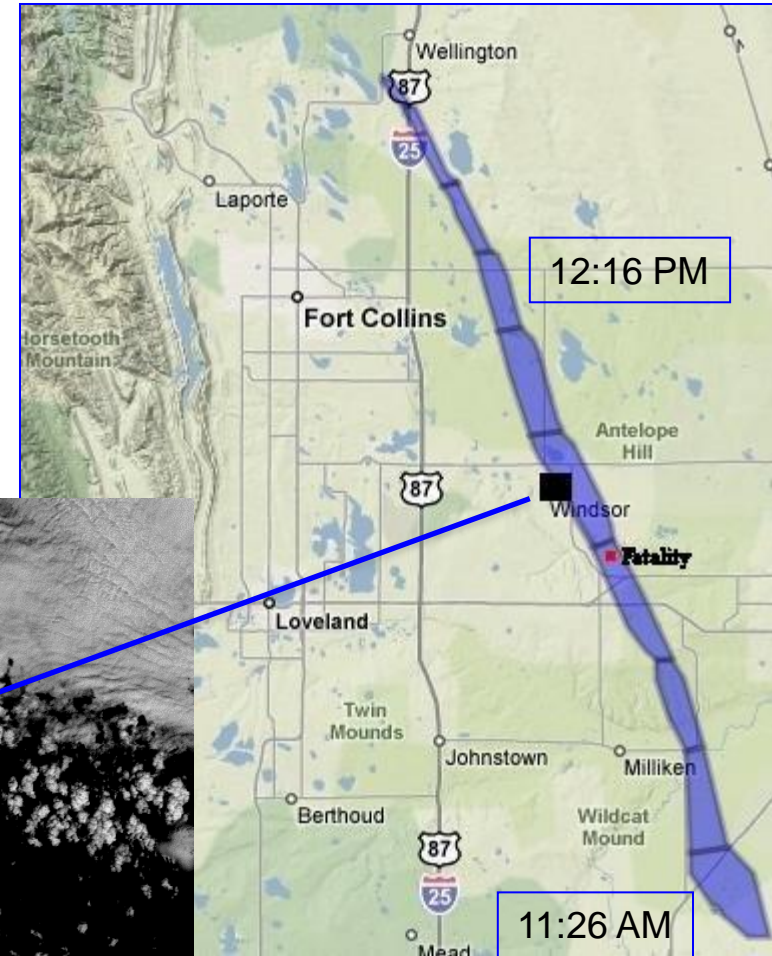
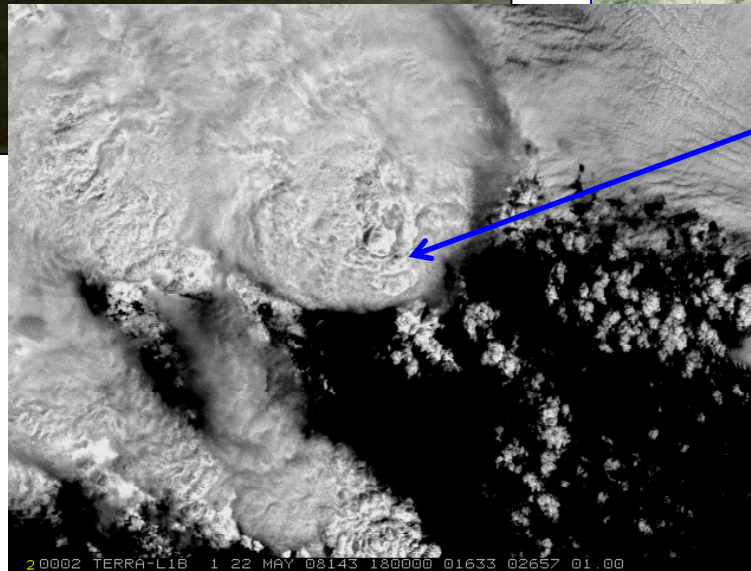
- **Radar**: cannot measure thermodynamic near-storm environment nor fully detect low-level mesoscale convergence areas
- **Satellite**: insufficient vertical resolution (PBL), limited to clear atmosphere
- **Convection Initiation**: strength and depth of mesoscale updrafts, near-storm thermodynamics and storm-relative flow, parcels residence time sufficient to reach their LFC before leaving the mesoscale updraft regions



AERI and Wind Profiler Monitoring of Convective Indices from a 4-year record at CART/ARM site in Oklahoma

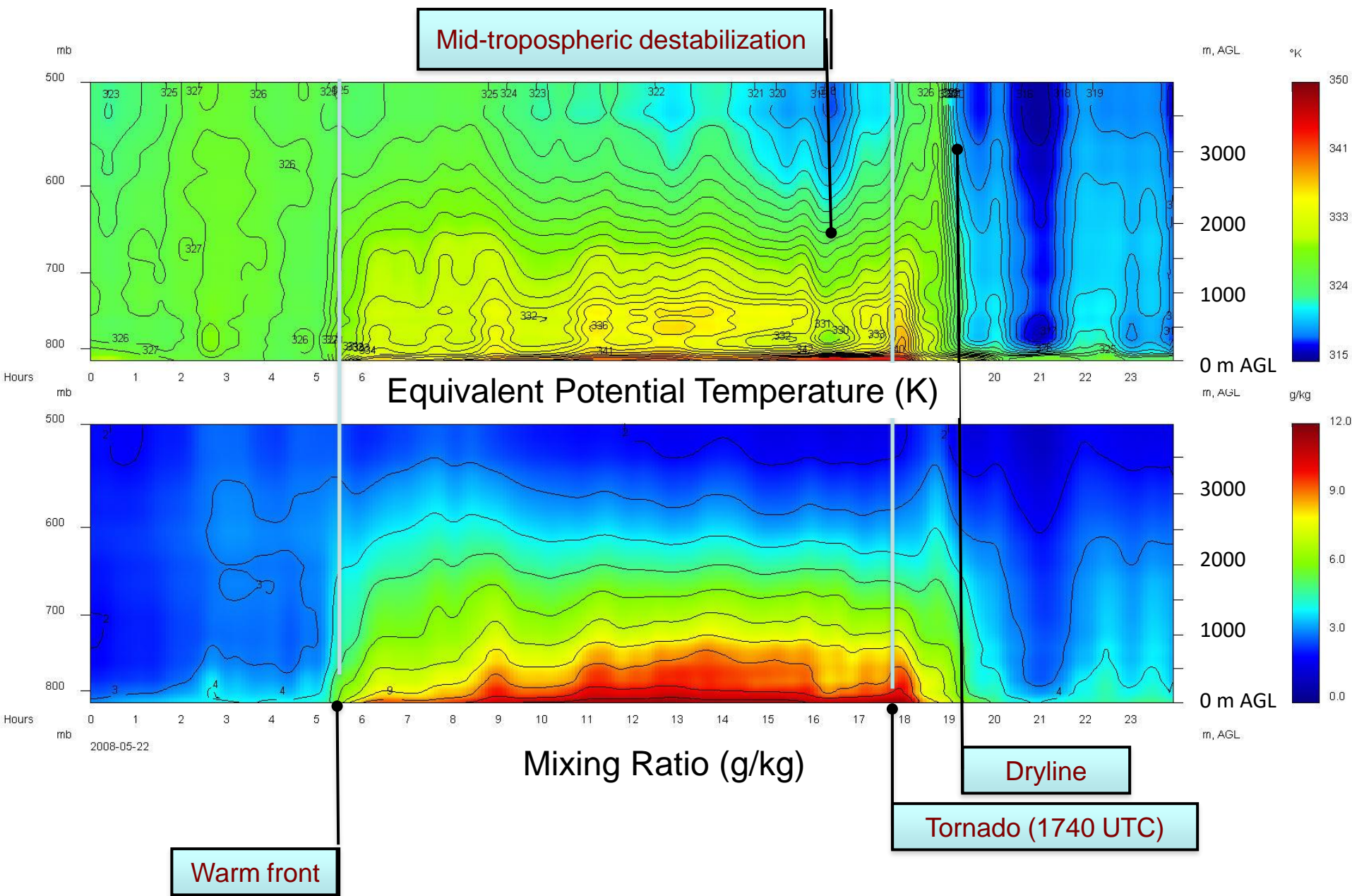


Windsor CO Tornado: 22 May 2008



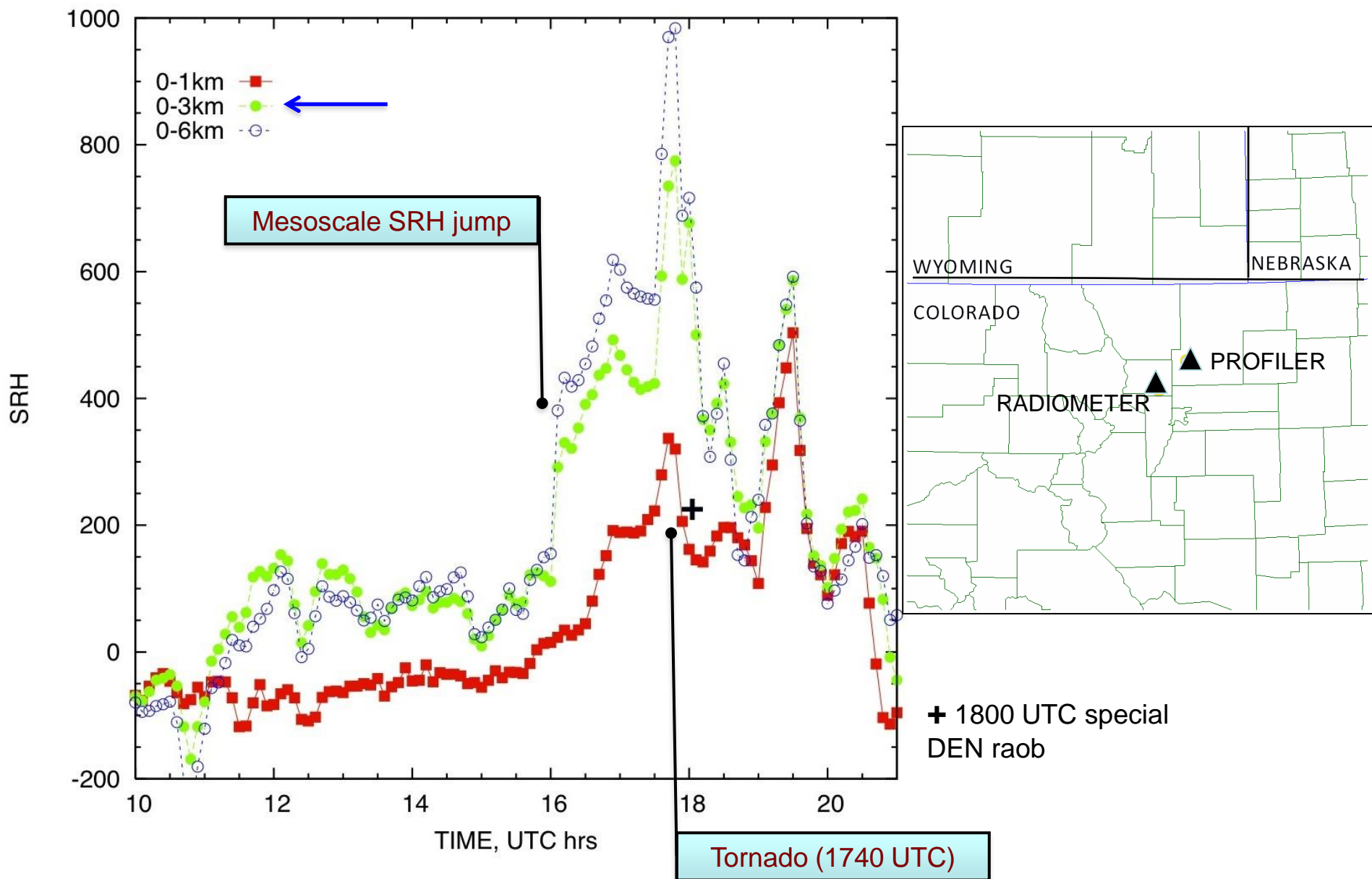
Windsor was hit by a mile-wide EF3 tornado – the costliest tornado in Colorado history - around lunch time on 22 May 2008. The tornado tracked northwestwardly on the ground for 55 km through northern Colorado.

Retrieved thermodynamic information from Microwave Radiometer: 00Z/28 – 00Z/29



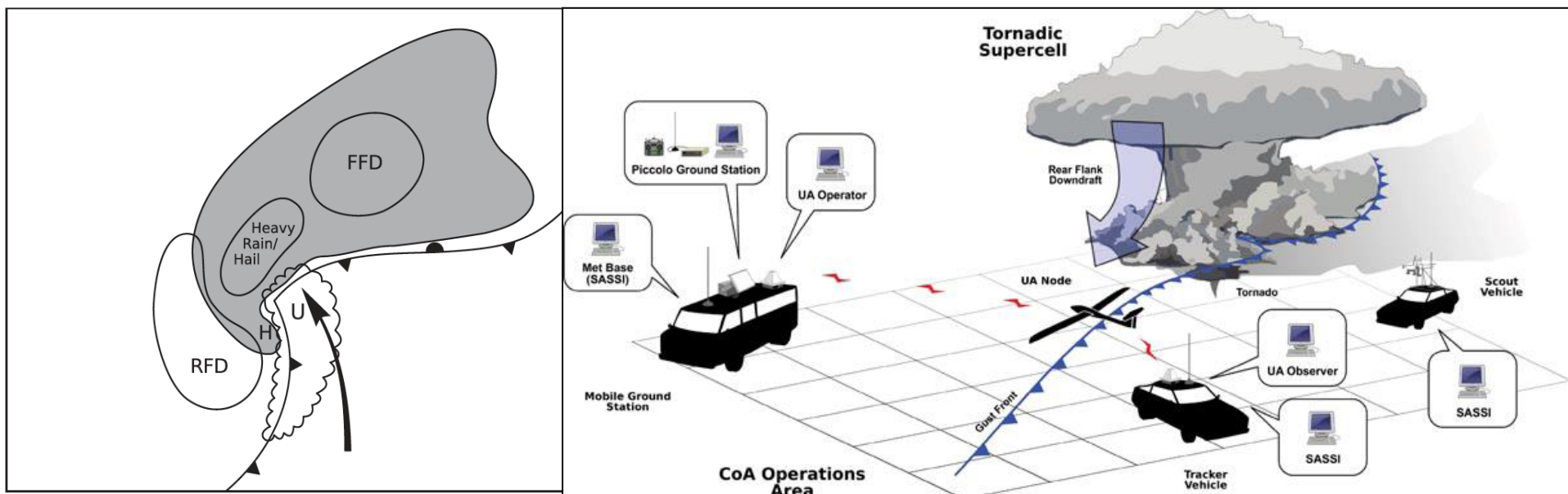
Storm-Relative Helicity from combined analysis of Platteville Wind Profiler and 1-km VLAPS

1230 - 1600 Profiler, 1606-2100 VLAPS



UAS Monitoring of RFD

- Tempest UAS flown through RFD of supercells for the first time (2010).
- CONOPS required 48-h notification (now a 2h notice) for COA approval (limited to 4 at a time, each COA region of 20mi x 20 mi size)
- Stationary ground station van for interrogation
- Tracker vehicle for constant visual contact with UAS
- Successfully measured thermodynamic properties of several RFDs



So, major points repeated:

- Strong sensitivity of WoF ensembles to choices made for microphysics and PBL schemes – primarily using radar (satellite) data for storm-scale initial conditions – and also to data assimilation approaches.
- Rotating supercells can be predicted with some skill out to 60 minutes, but not tornadoes nor to the same degree non-supercell storms, which exhibit considerable sensitivity to variations in local environment.
- Supercells have a limited predictability even for perfect NWP models with homogeneous conditions –need for near-storm observations
- Ground-based remote sensing systems show that instability and storm-relative helicity increase just prior to convective initiation, and rapid changes in some events dictate vertical profiling every 15 min at scales <25 km.
- Ground-based remote sensing systems and targeted, adaptive observations need to be examined rigorously by us.