

Forecasting the Spread of Soybean Rust Using an Ensemble HYSPLIT Modeling Approach

Joseph Pietrowicz

ZedX, Inc

Bellefonte, PA



HYSPLIT

HY brid

Single-

Particle

Lagrangian

Integrated

Trajectory

Model



HYSPLIT

- Developed by NOAA, National Oceanic and Atmospheric Administration, ARL, Air Resources Laboratory
- In development since 1982
- Considered a world standard for dispersion modeling

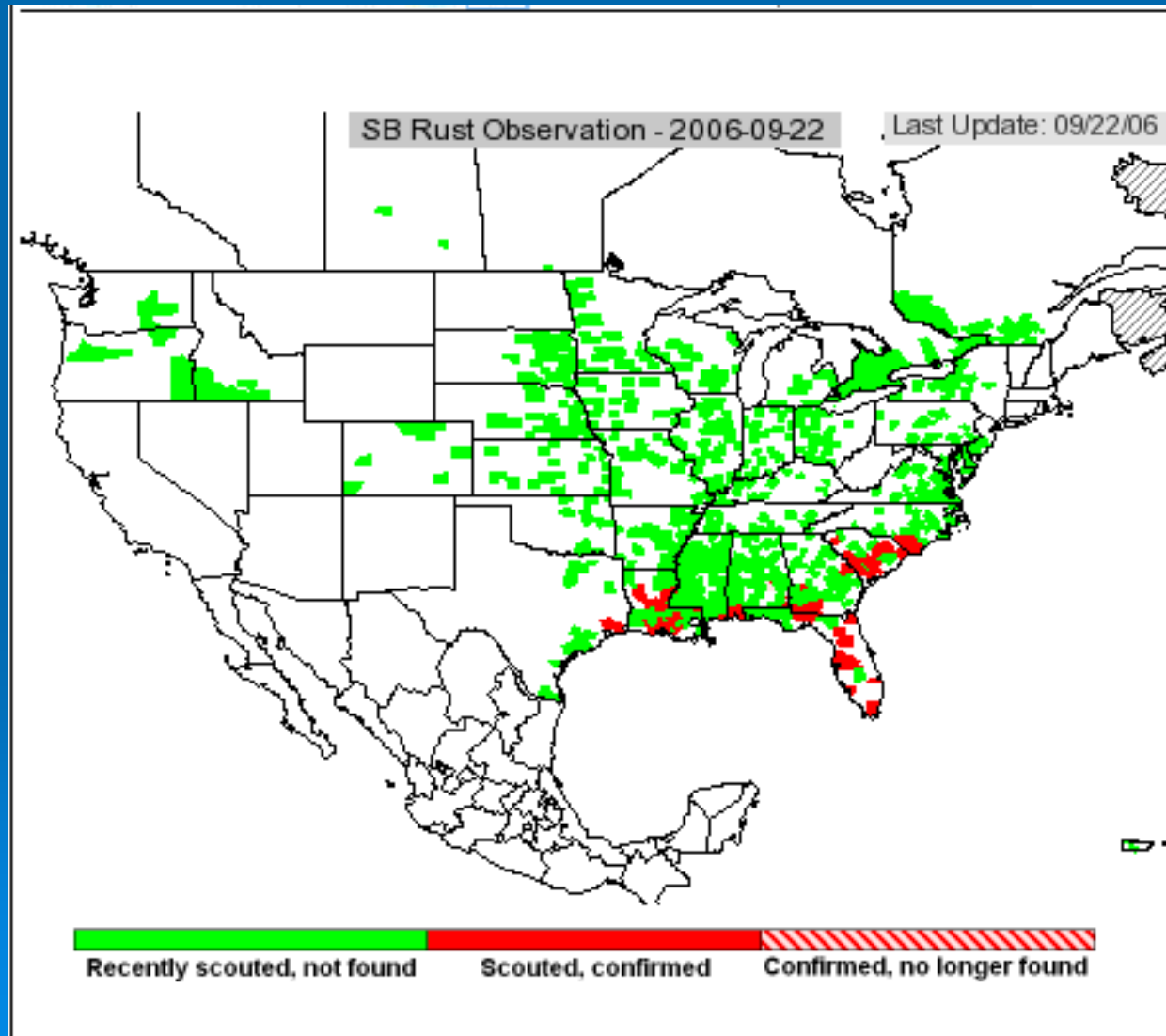
HYSPLIT

- Integrated system of models to compute
 - Trajectories
 - Dispersion
- New computational options such as
 - Users now can enter up to 3 different trajectory source locations instead of just one
 - A trajectory ensemble option will produce multiple trajectories from the first user-selected starting location

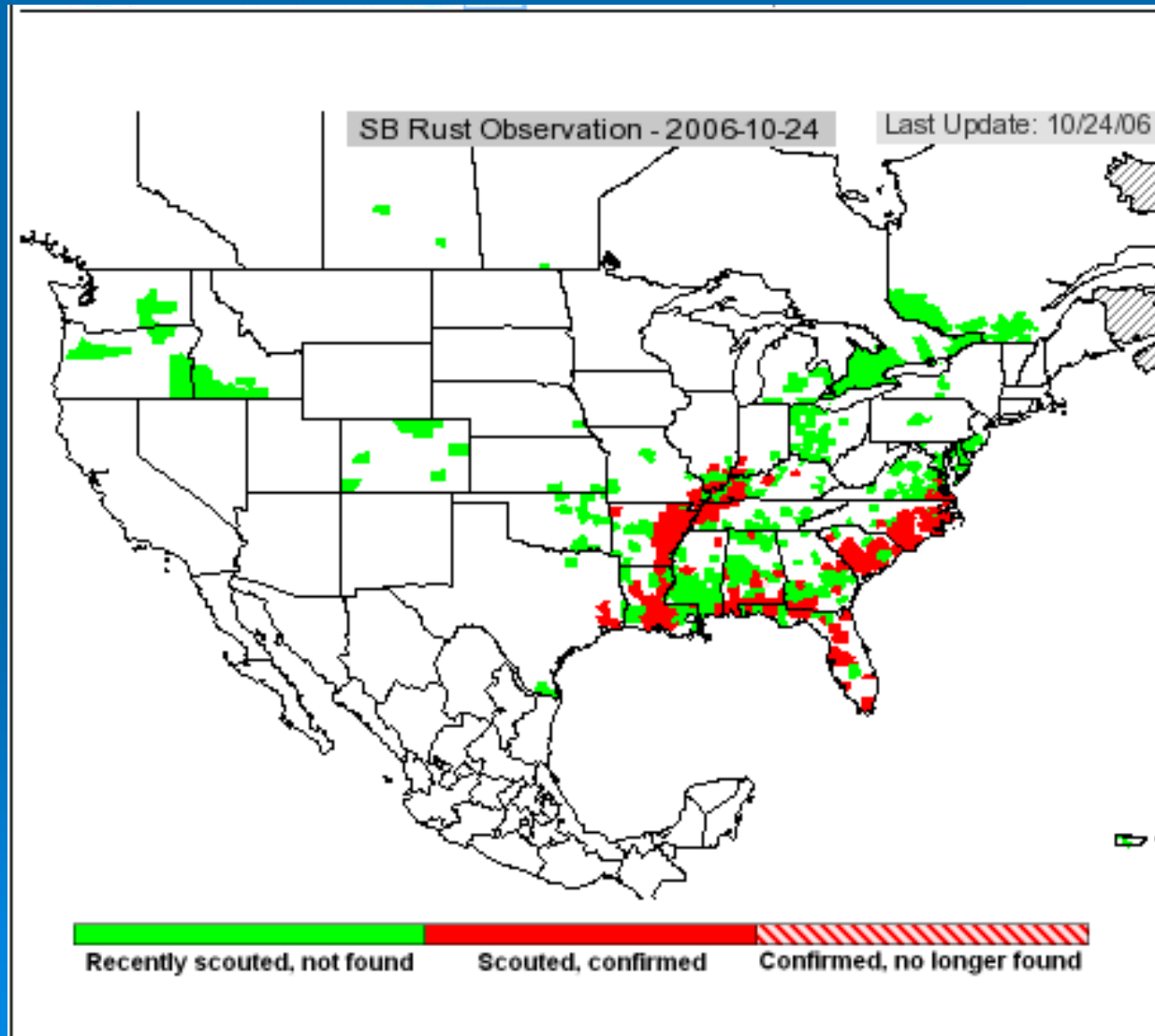
HYSPLIT Ensemble Approach

- Takes into account small spatial variations in the model
- Computes trajectories for 27 starting locations for each specified location
- Three vertical levels
- Nine locations for each level

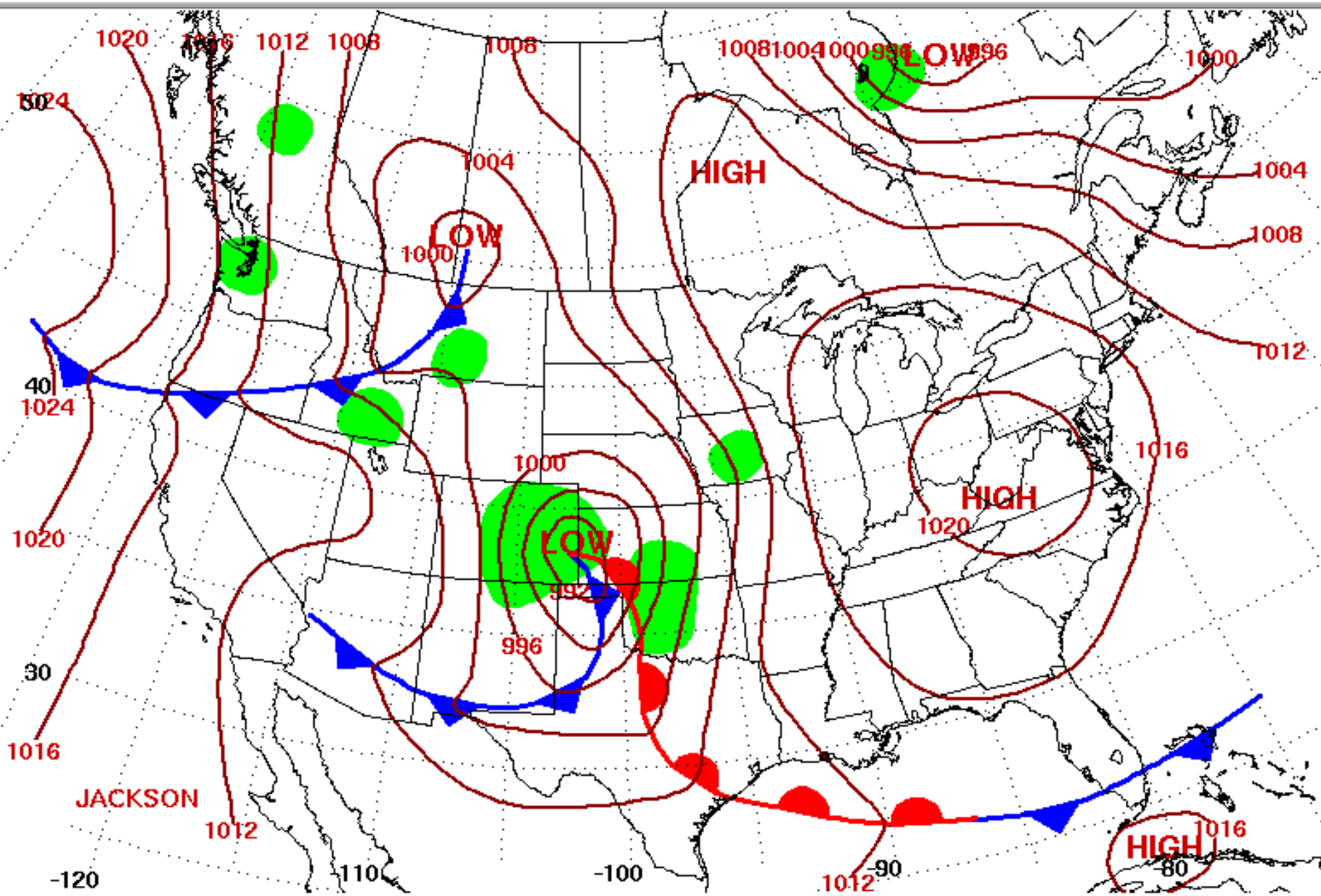
Soybean Rust 22 September 2006



Soybean Rust 24 October 2006

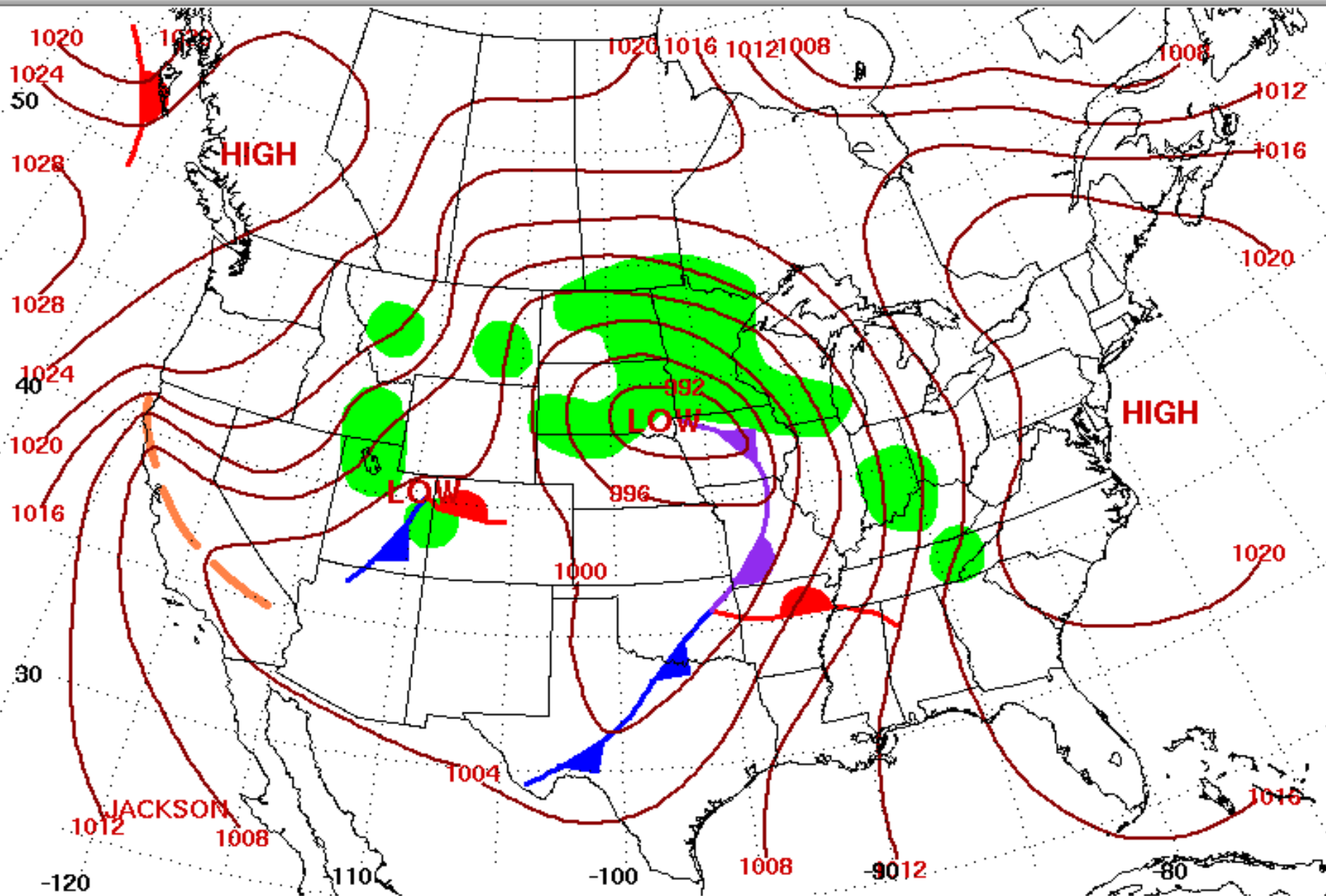


THURSDAY SEPTEMBER 21, 2006



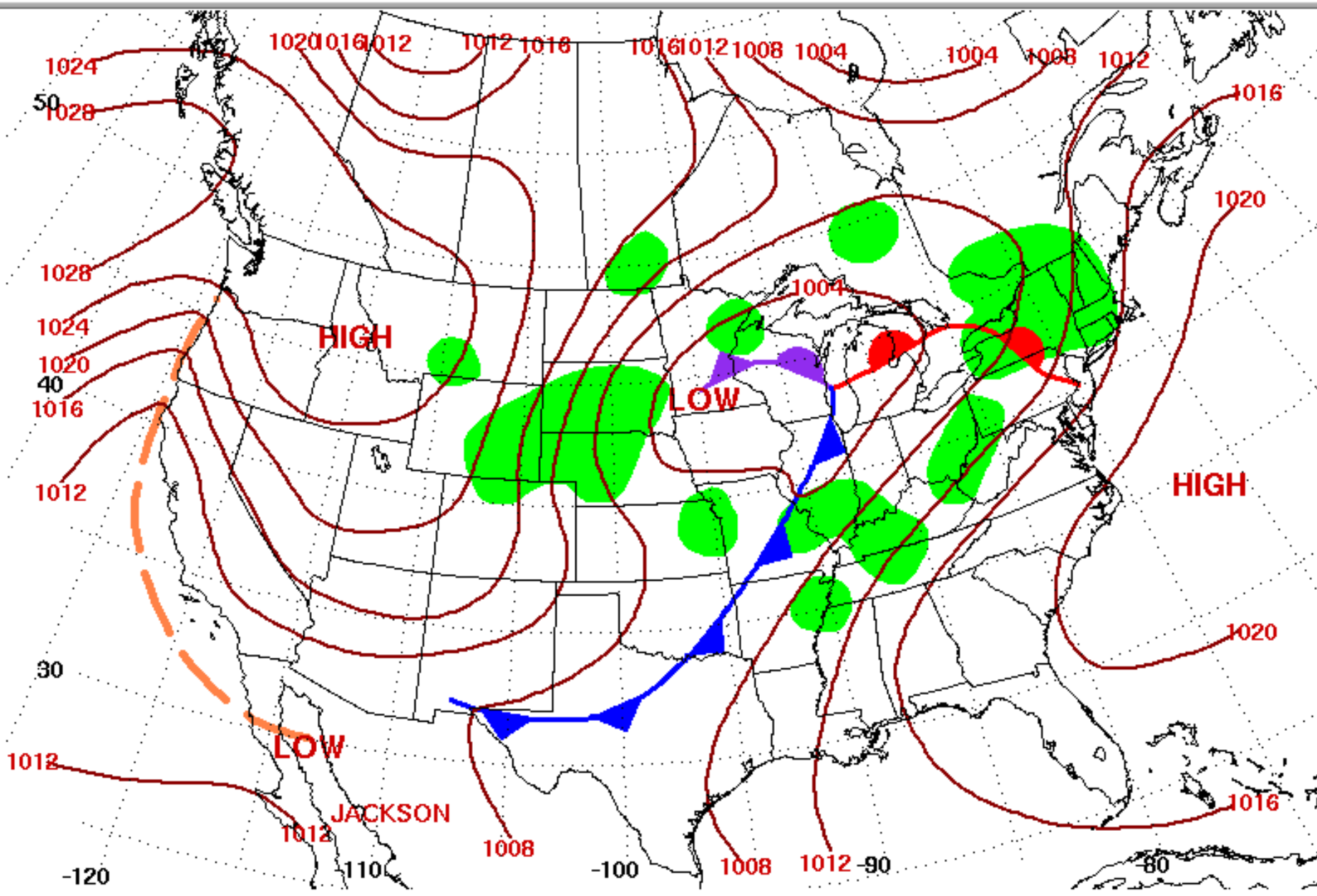
Surface Weather Map at 7:00 A.M. E.S.T.

FRIDAY SEPTEMBER 22, 2006



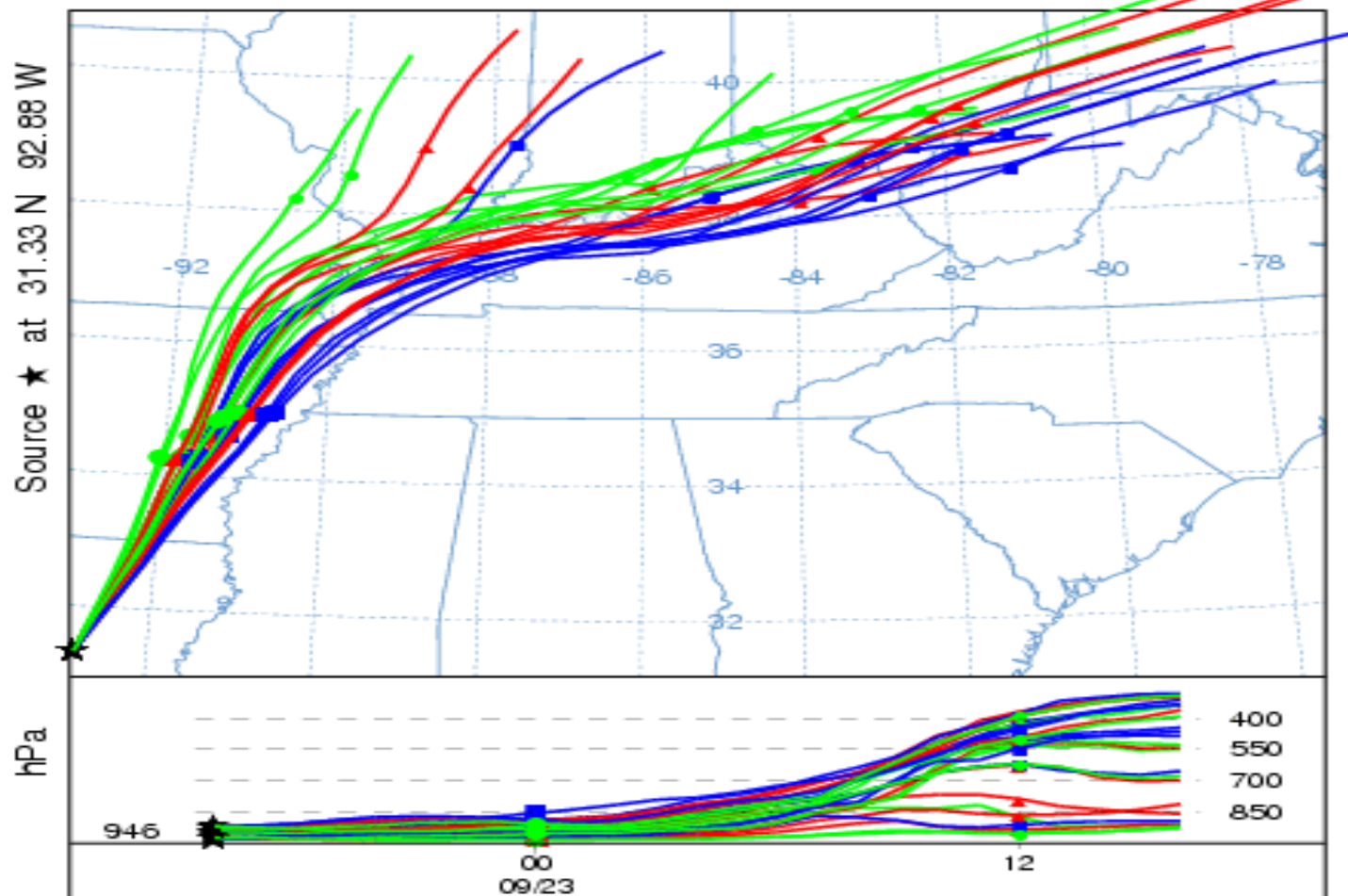
Surface Weather Map at 7:00 A.M. E.S.T.

SATURDAY SEPTEMBER 23, 2006

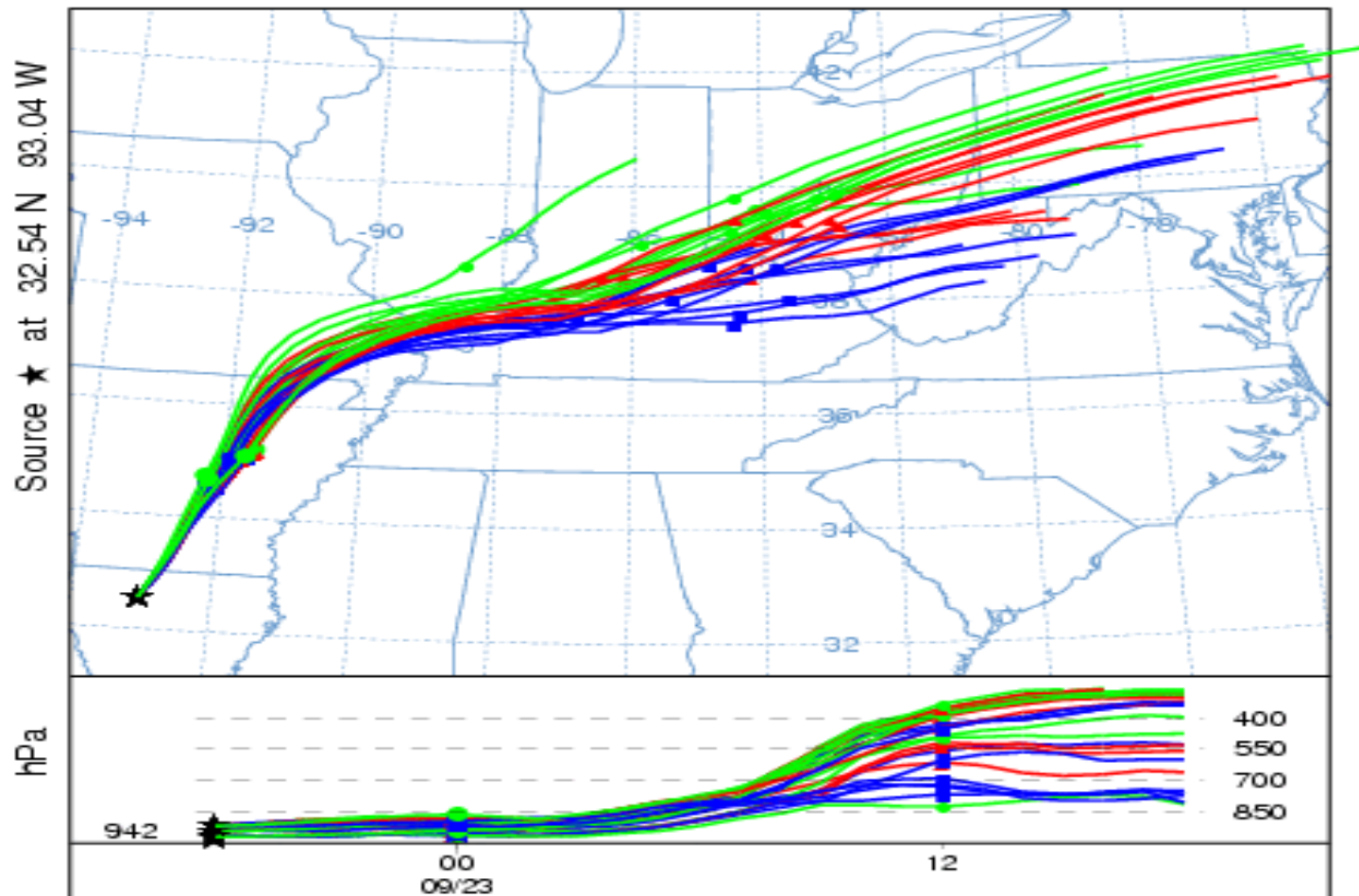


Surface Weather Map at 7:00 A.M. E.S.T.

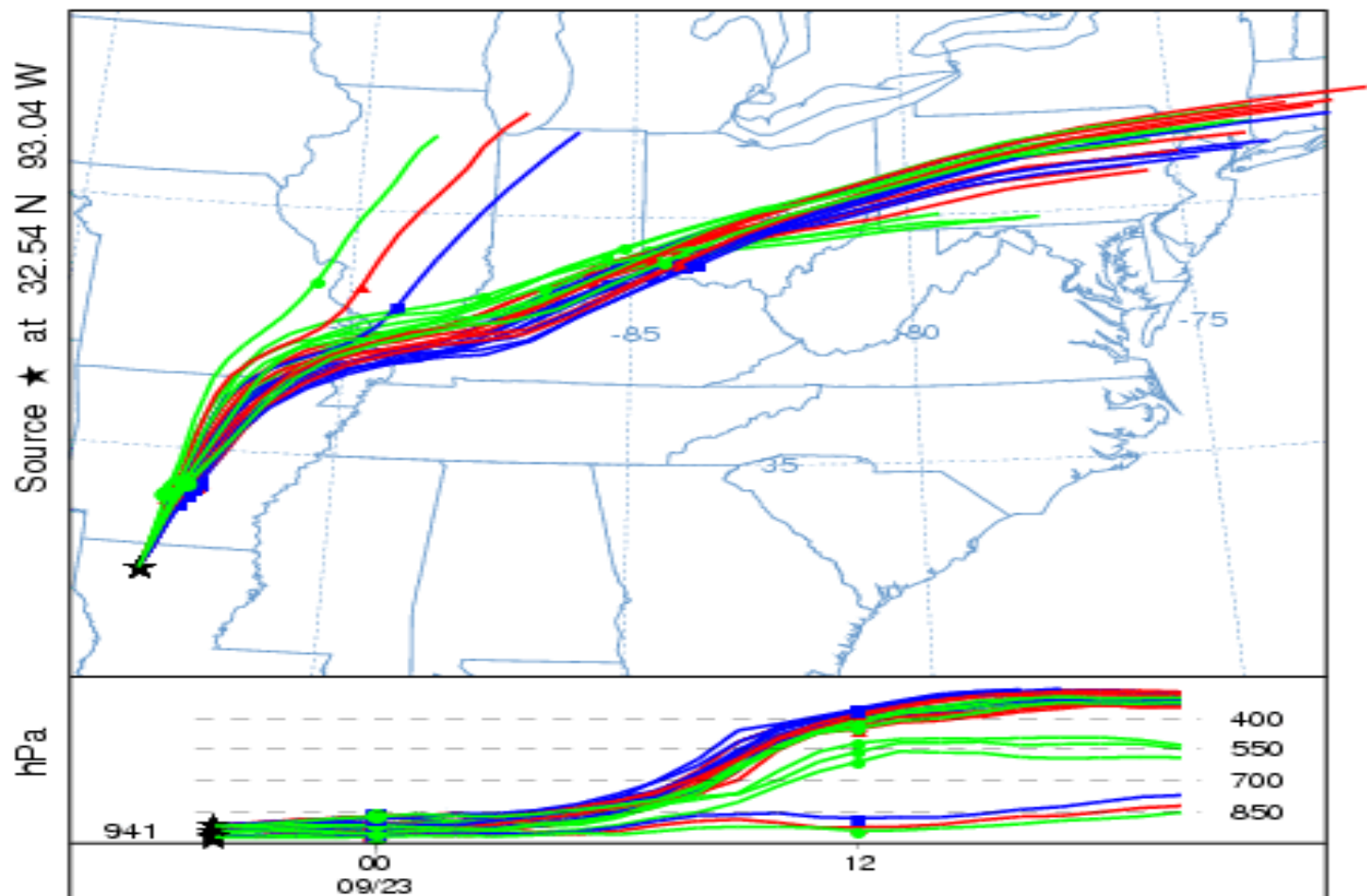
NOAA HYSPLIT MODEL
Forward trajectories starting at 16 UTC 22 Sep 06
EDAS Meteorological Data



NOAA HYSPLIT MODEL
Forward trajectories starting at 18 UTC 22 Sep 06
EDAS Meteorological Data



NOAA HYSPLIT MODEL
Forward trajectories starting at 20 UTC 22 Sep 06
EDAS Meteorological Data

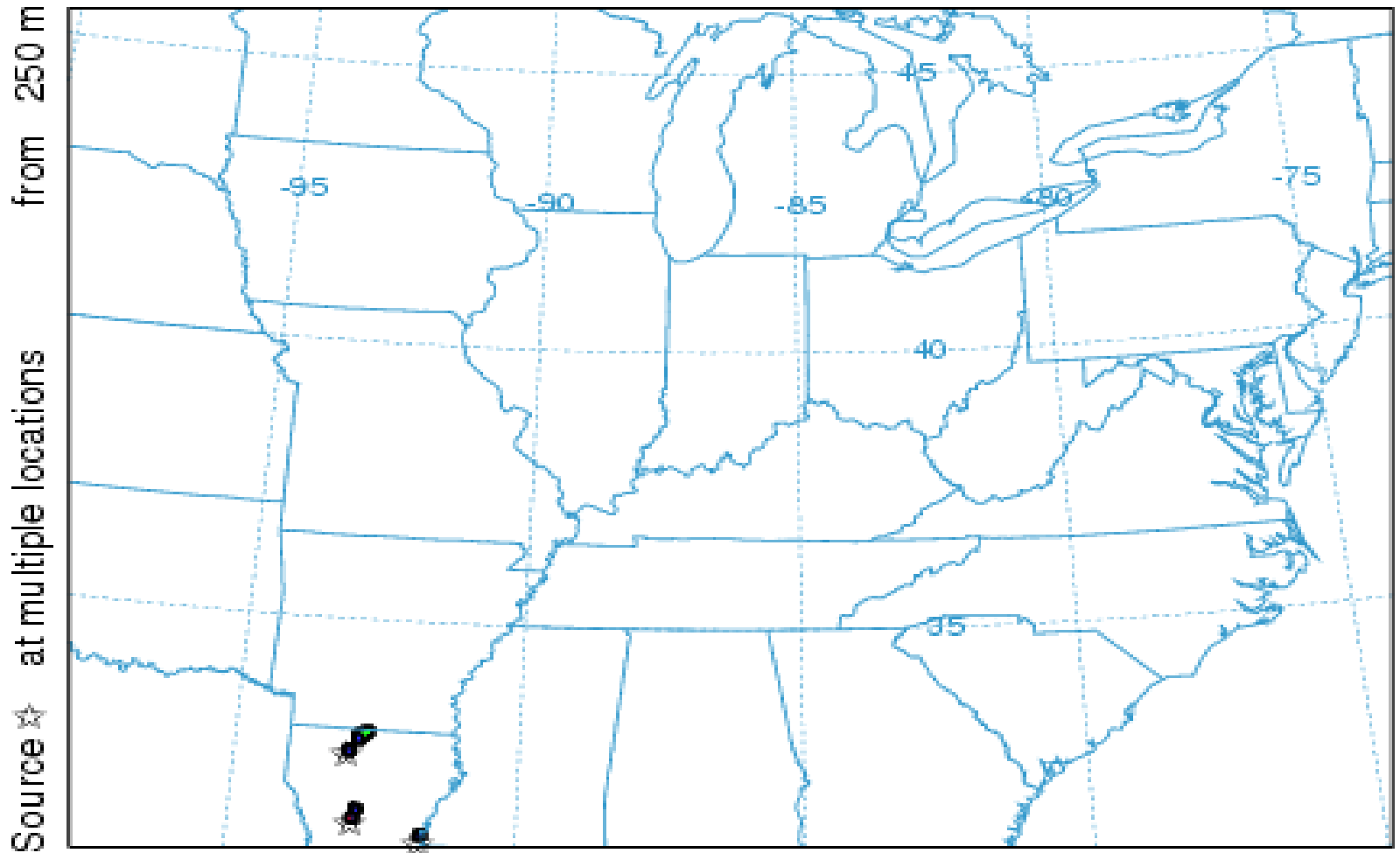


NOAA HYSPLIT MODEL

Deposition (/m²) at ground-level

Integrated from 1600 22 Sep to 1700 22 Sep 06 (UTC)

sbr Release started at 1600 22 Sep 06 (UTC)



1.0E-09

1.0E-11

1.0E-13

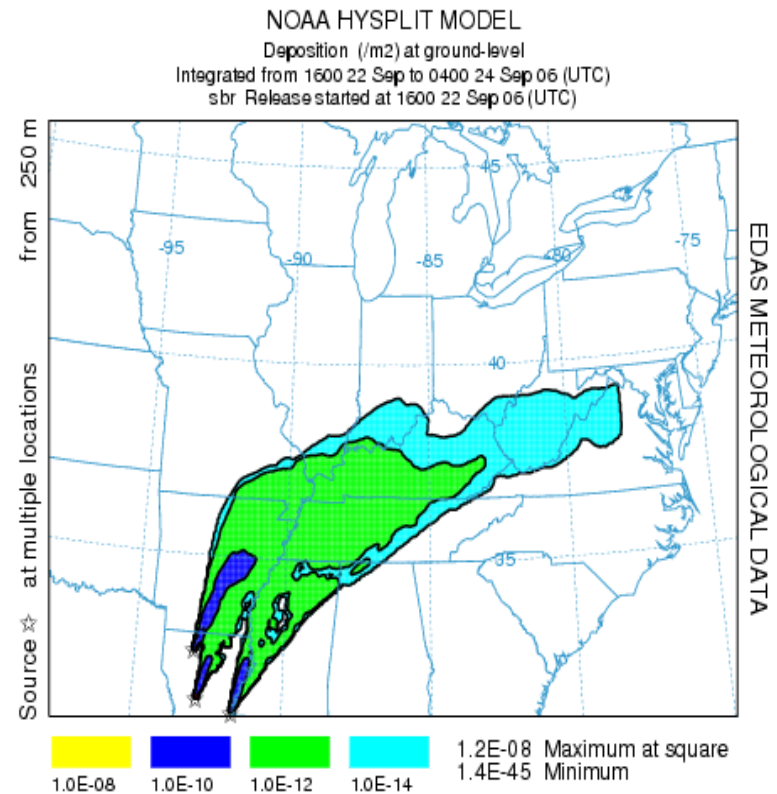
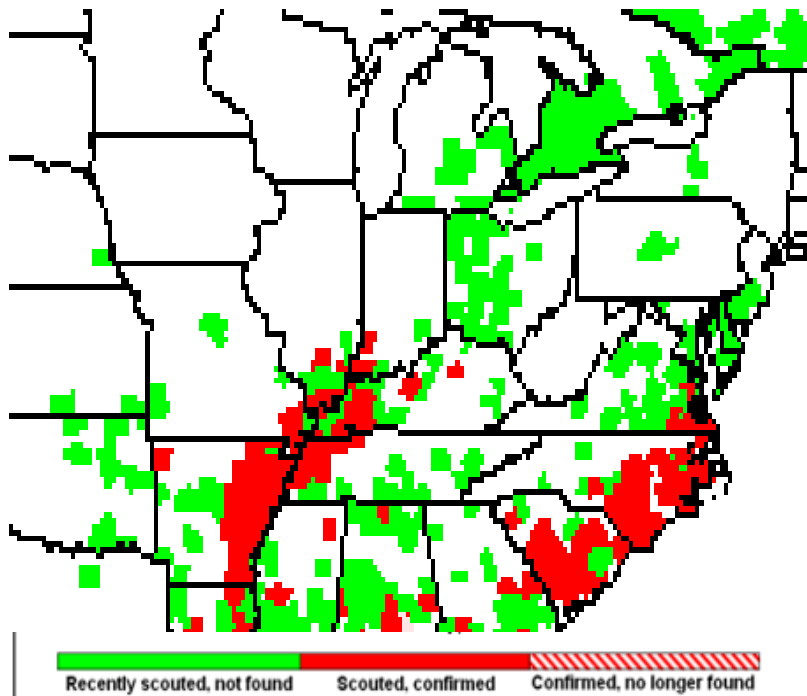
1.0E-15

6.7E-10 Maximum at square

2.8E-13 Minimum

EDAS METEOROLOGICAL DATA

Hysplit Model Deposition Versus Infection Observations



Future Plans for the Ensemble HYSPLIT Forecasting Model

- Conduct historical model runs to assess the risk of soybean rust dispersion in North America
- Output to be directly integrated with other Soybean Rust prediction models
- Development of derivative products from HYSPLIT model results
- Development of support materials to assist individuals in using model products

Thank You

