# Automated ensemble sensitive regions for MPEX operations

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Sensitive field tests

- Based on forecast outcomes on the inner nest domain
- Seeking to identify forecast outcomes that appear favorable for:
    - upsonde targeting
    - potential for ensemble sensitivity response
- Score grid zones by linear combination of favorable factors, eliminate unfavorable grid zones
- **Dependent** on model precip forecasts

MPEX sensitivity region
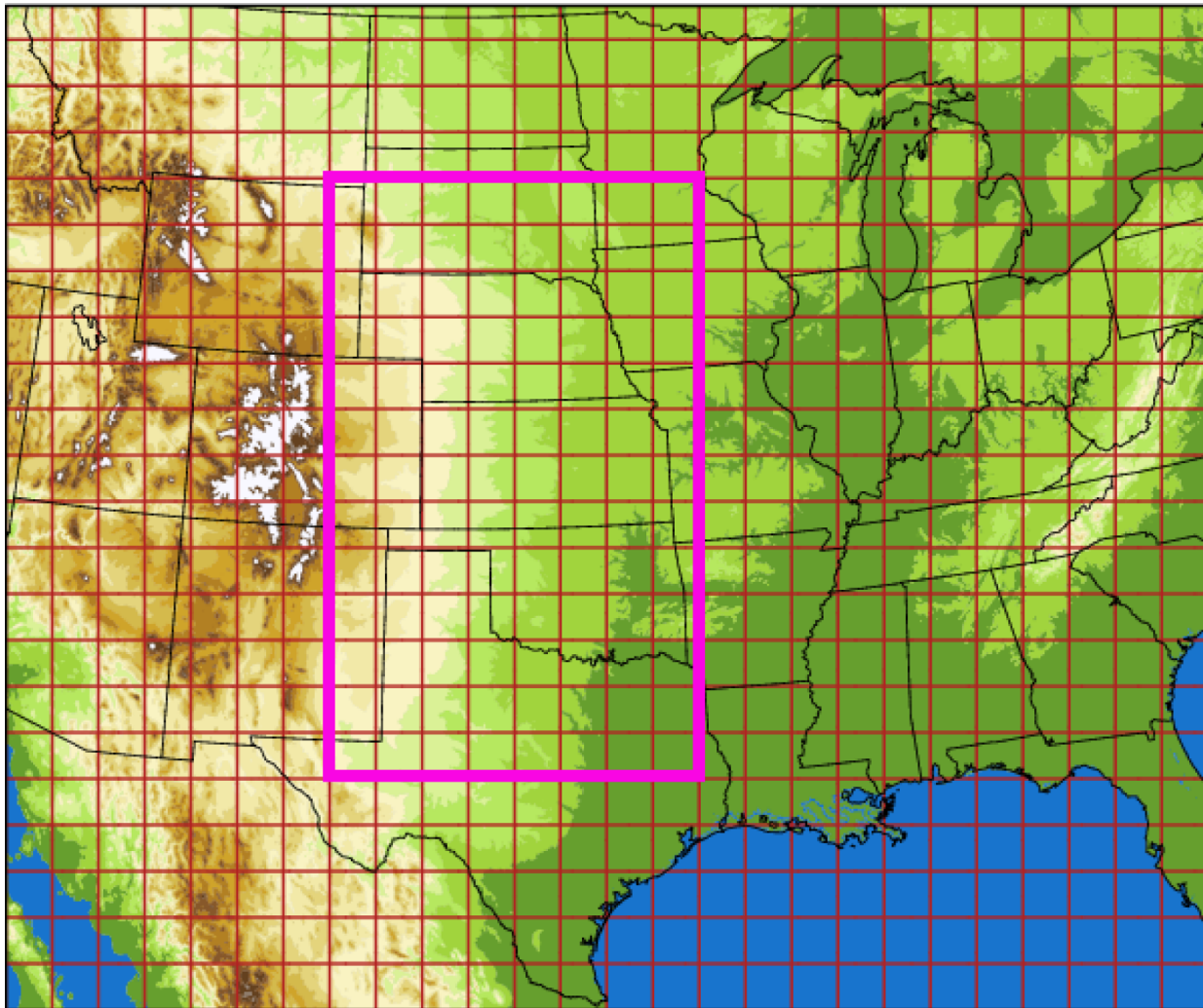
Each red box 40x40 grid points on convection permitting domain: 120x120 km

Magenta box outlines region of potential upsonde operations

Automated detection Screening criteria:

Min: Precipitation with accumulation >= 3 mm/hr during the previous forecast hour

Max: If accumulating precip coverage in zone > 35%, skip assuming widespread rain.

Automated targeting considerations - upsonde

- Find grid zones favorable for discrete organized convection, or where explicitly forecast:
    - MLCAPE > 500 J/Kg @ > 75% of grid points
    - 0-6 km bulk shear > 20 m/s @ 75% of grid points
    - Maximum updraft > 15 m/s @ 20 grid points
    - Pos. updraft helicity > 80 m^2/s^2 @ 20 grid points

# Favorable factors for ensemble sensitivity

- Find grid zones that may be favorable for sensitivity calculations owing to large precip variance and mid-level temperature variance
  - Precip variance >= 5 (mm/hr)^2
  - Either 700 or 500 mb temperature variance > 1 K^2

- Score is just sum of favorable factors
  - 0-6 range

Underlain – accumulated precip variance contours, ranging from light to dark gray
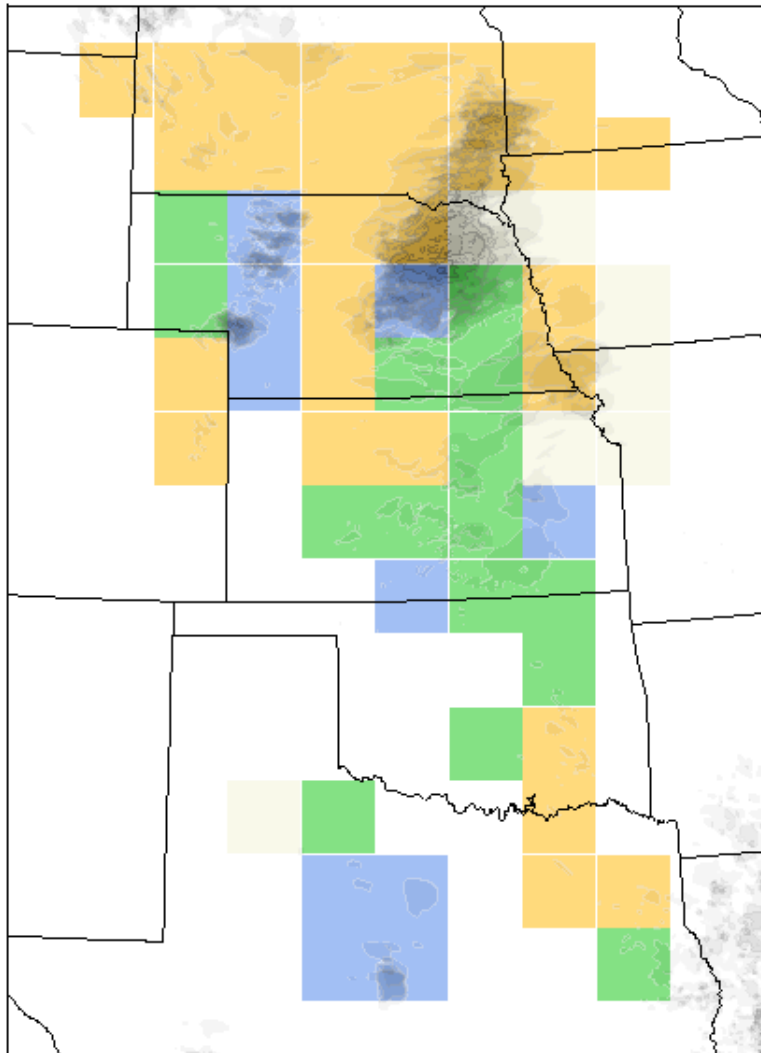Overlay – automated factor scoring, higher number assumes more favorable grid zones

Forecast valid: 2012-05-30_19:00:00
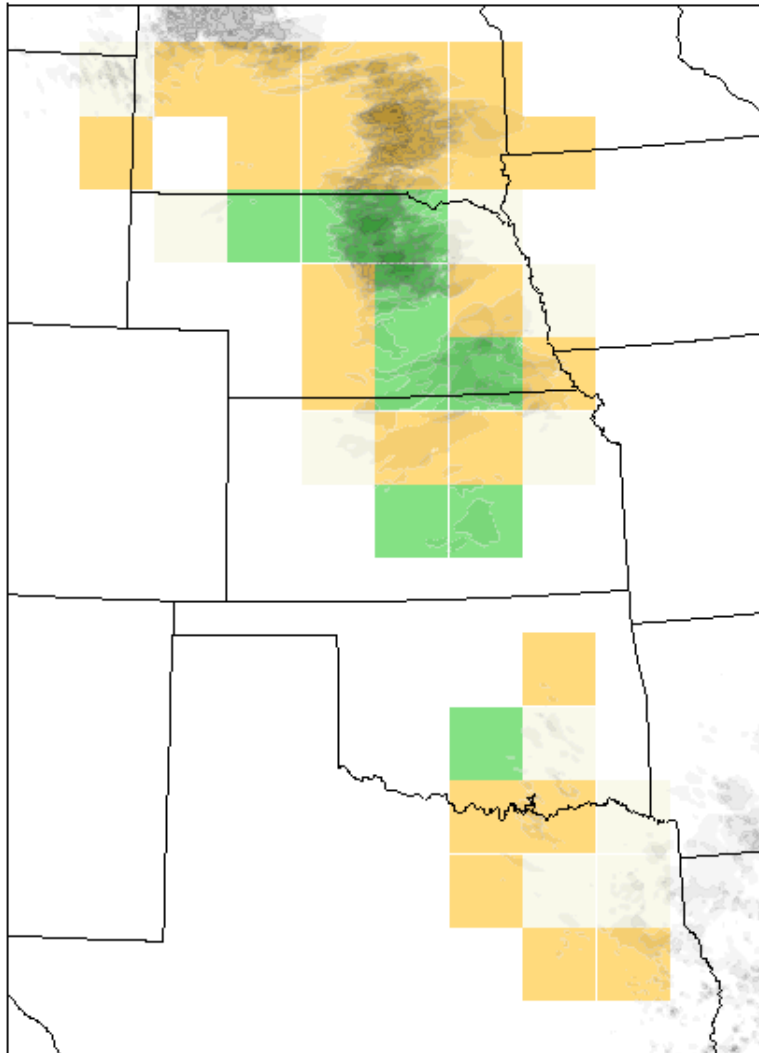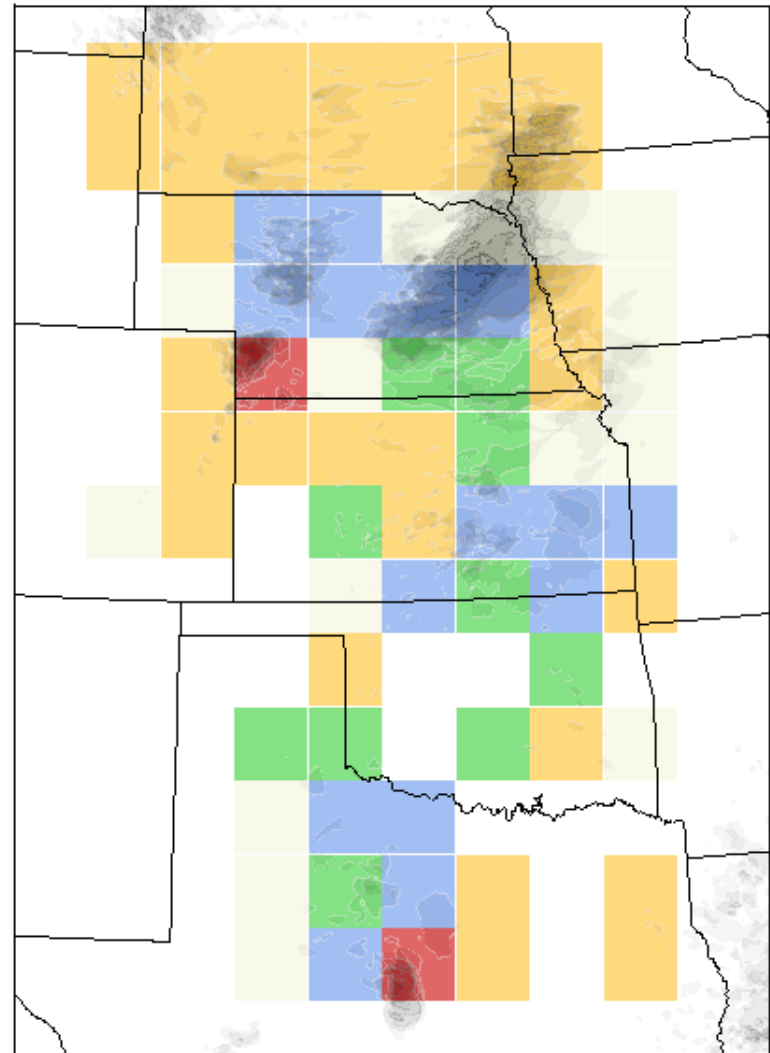
Forecast valid: 2012-05-30_20:00:00
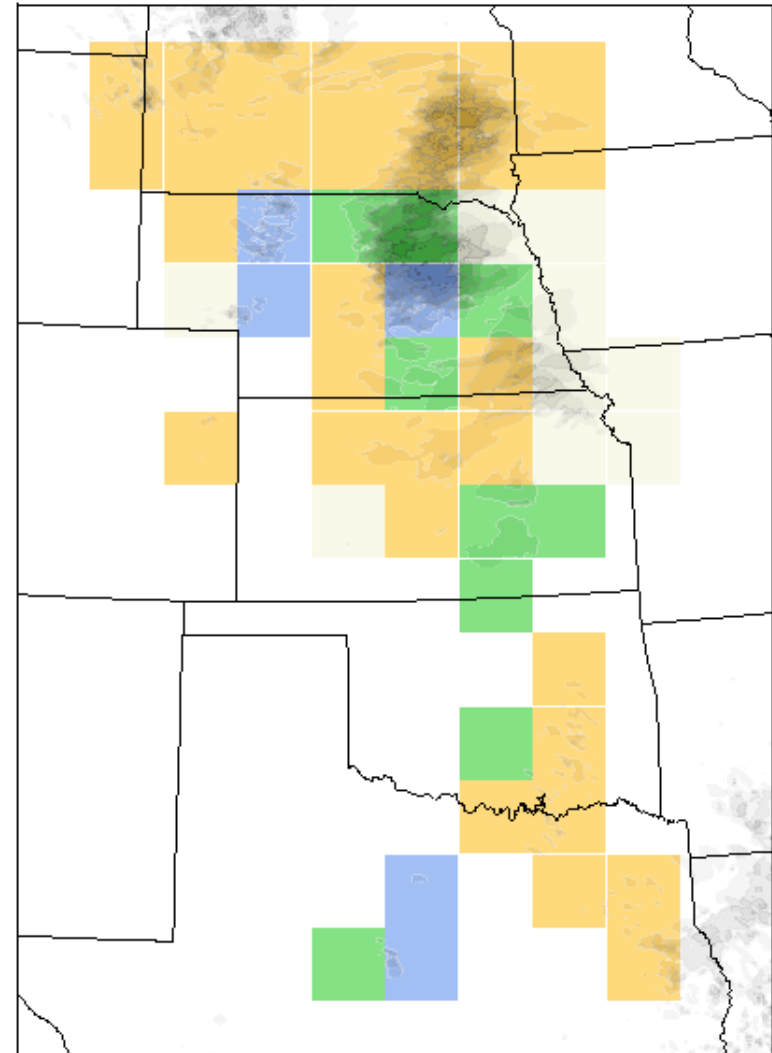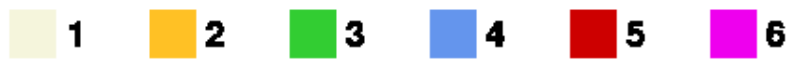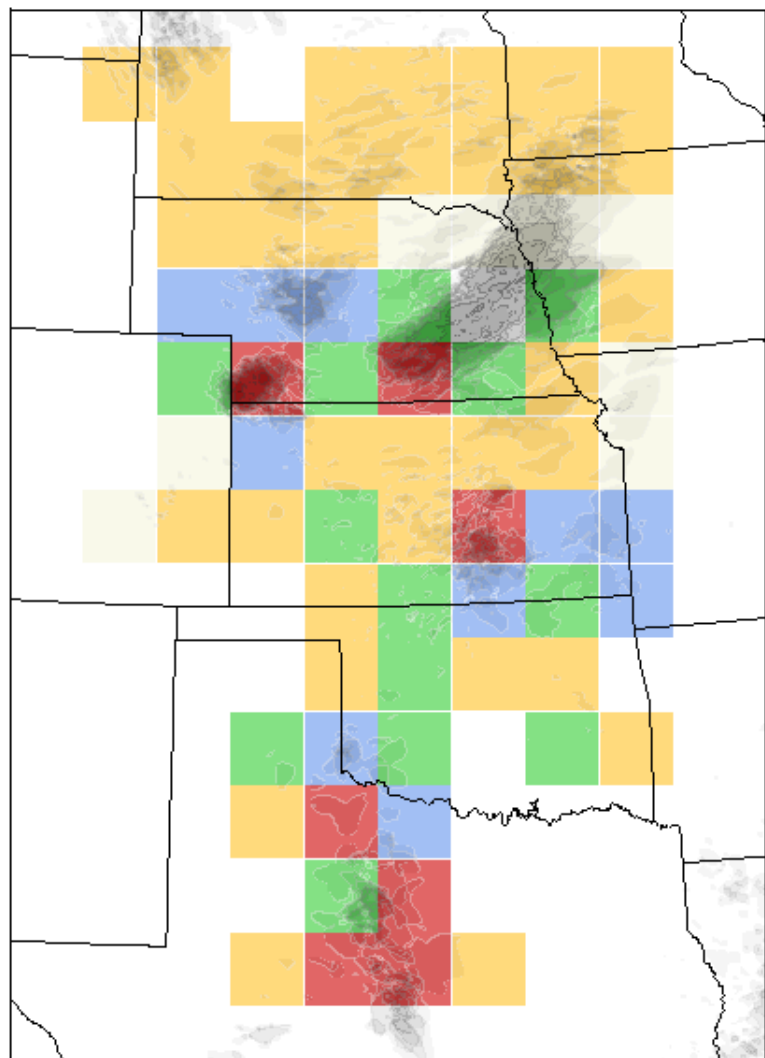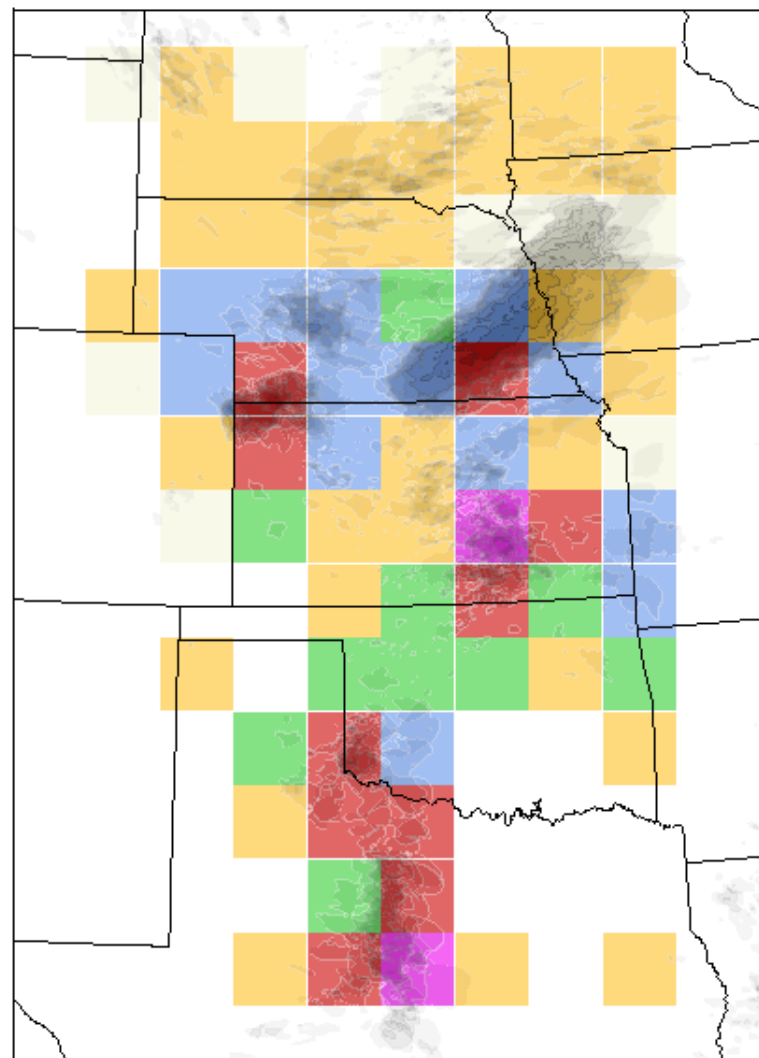
1 2 3 4 5 6
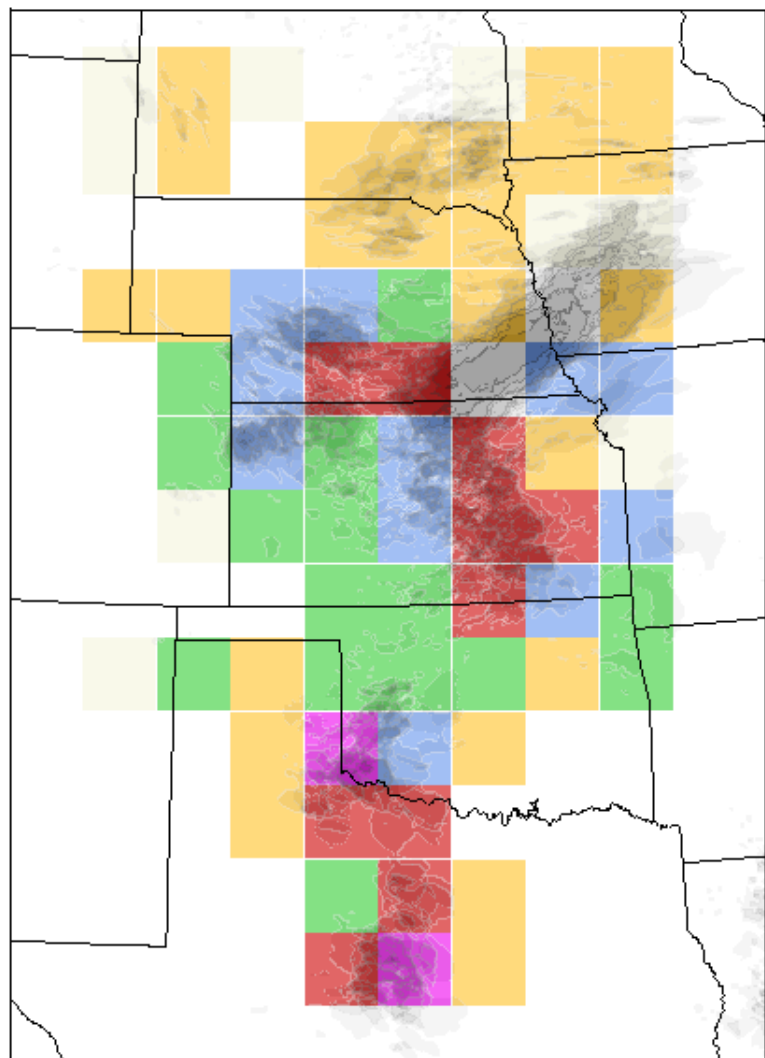
Forecast valid: 2012-05-30_21:00:00   Forecast valid: 2012-05-30_22:00:00

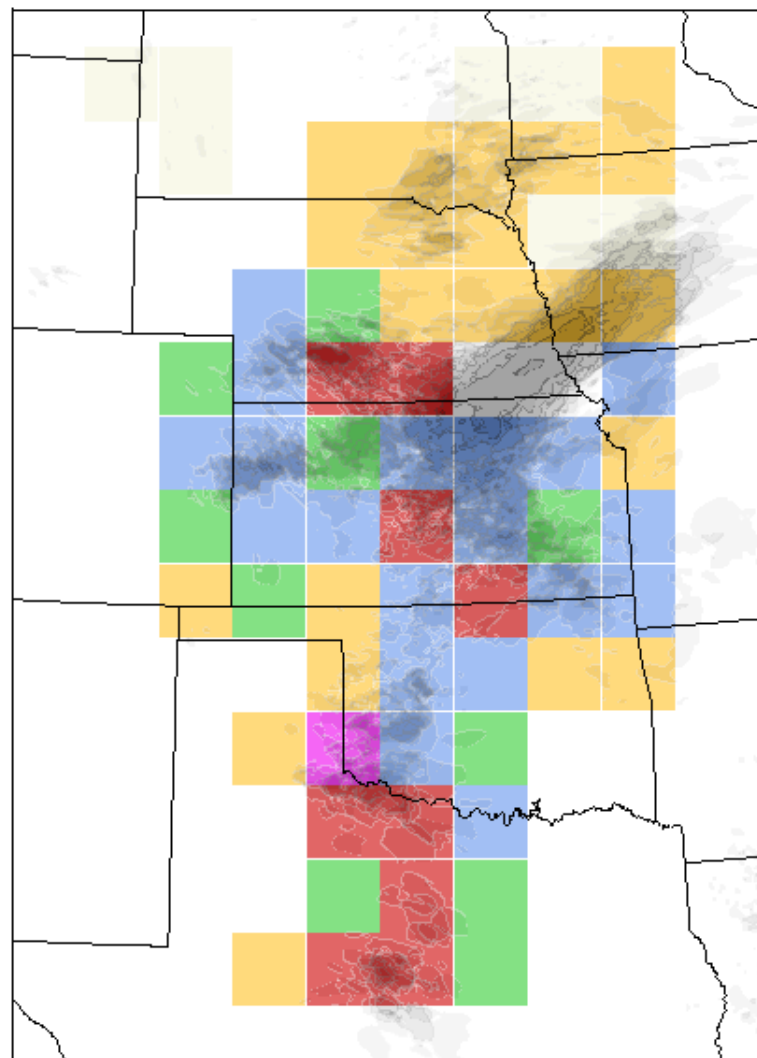Forecast valid: 2012-05-30_23:00:00

Forecast valid: 2012-05-31_00:00:00

| | 1 | | 2 | | 3 | | 4 | | 5 | | 6 |

Forecast valid: 2012-05-31_01:00:00

Forecast valid: 2012-05-31_02:00:00

- See other example cases:
  - http://www.image.ucar.edu/wrfdart/rt2012/ensf/

- Would like to have approach for identifying sensitivity calculation candidate locations where model does not forecast precipitation development, but may be of interest for targeting (i.e. we think the model forecast misses initiation)

- Discussion