frederick.g.samplatsky@noaa.gov

LAMP Convection / Total Lightning Probability and "Potential" Guidance: An Experimental High-Resolution Upgrade

Jess Charba , Fred Samplatsky , Phil Shafer , Judy Ghirardelli, Andy Kochenash [1]

Meteorological Development Laboratory (MDL), NWS, Silver Spring, MD

[1] KBRwyle, Inc, Science, Technology and Engineering Group, Silver Spring, MD

A 41

Key Points

Automated 1-25 h guidance for aviation, fire weather, and public safety

Presently-operational 2-h convection and lightning guidance has insufficient spatial and temporal resolution

Developed experimental 1-h convection and lightning guidance with higher resolution (hi-res), which incorporates new hi-res datasets

Presently being evaluated by field users

Early feedback very favorable

How is Convection or Total Lightning (TL) Event Defined?

Convection = ≥ 40 dBZ reflec. or ≥ 1 total lightning (TL=cloud+ground) flash within 1-h period and 20-km gridboxes spaced 10-km apart

TL = lightning component of convection definition

Use MRMS and Earth Networks TL data (not previously used in LAMP)

How is Convection or TL Probability Produced?

Use regression equations stratified hourly, seasonally, and geographically

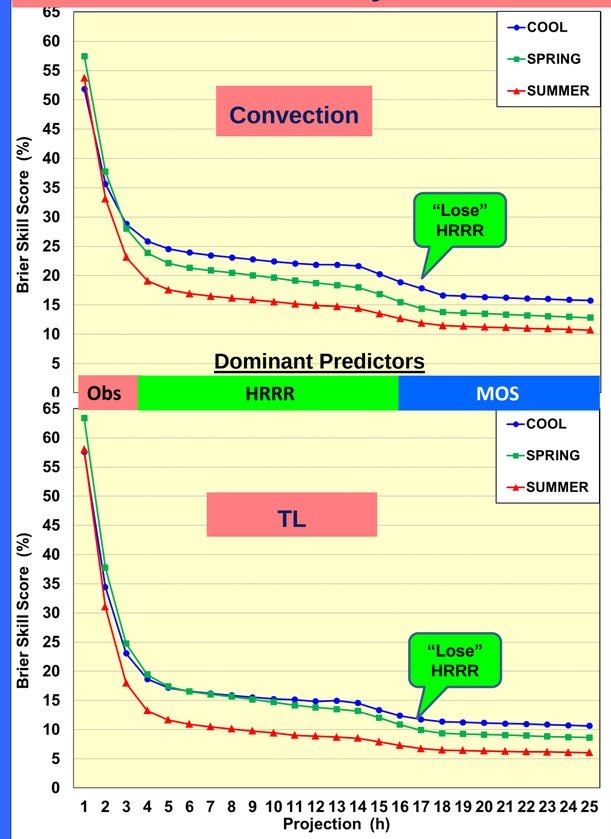
Equations developed and applied on 10-km grid

Predictors based on –

- latest fine scale MRMS and TL initial and advected observations grids (obs) *
- fine scale HRRR model output *
- large scale GFS- and NAM-based MOS convection or TL probability

* not previously used in LAMP

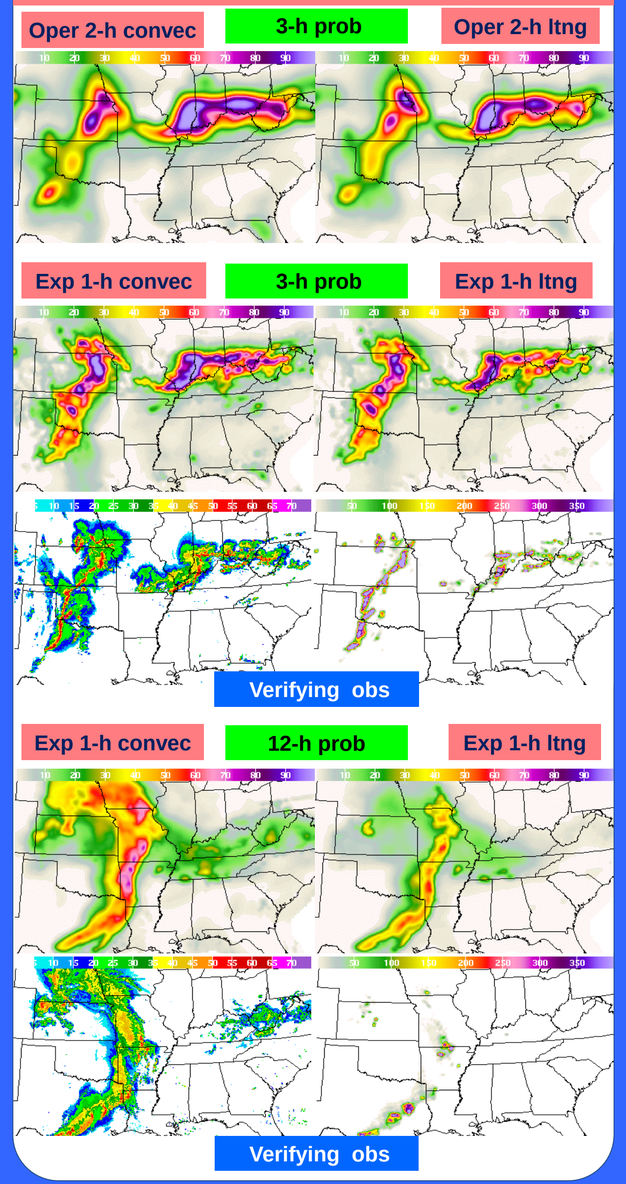
1-h Probability Skill



BSS features –

- Very high skill in 1st few projections due to obs
- HRRR yields substantial skill to 17 hours; HRRR not used afterward
- HRRR contribution to skill larger for convection than TL
- Skill generally highest in cool season, weakest for summer
- Obs skill highest during spring
- GFS/NAM MOS skill relatively weak

2016/04/26 21z Example



Features in example case -

- Exp. 1-h convection and lightning probs show higher spatial detail than 2-h operational probs
- Fine detail from obs for short projections is extended to longer projections by HRRR
- Convection prob coverage and sharpness is higher than for TL

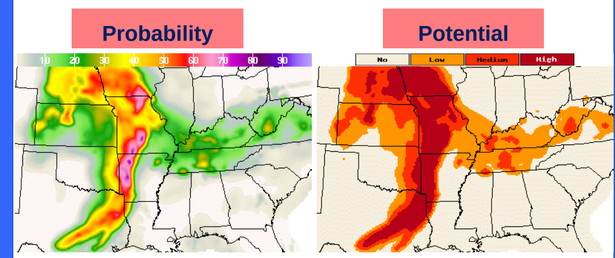
From Probability to Potential

Specify 4 potential categories from 3 pre-derived probability thresholds

Thresholds derived by optimizing CSI constrained with prescribed bias range –

- ≥ low potential bias = 2.70 – 2.83
- ≥ medium potential bias = 1.03 – 1.13
- = high potential bias = 0.38 – 0.43

Example



Conclusions / Plans

Achieved hi-res (1-h) objective in convection and TL guidance without sacrificing skill

Hi-res achieved by applying fine-scale MRMS and TL obs plus fine-scale HRRR model output

Expect experimental guidance to replace operational in early 2017

Websites

Convection = http://www.nws.noaa.gov/mdl/lamp/cnv1h.php
Total lightning = http://www.nws.noaa.gov/mdl/lamp/ltg1h.php

Contact: jerome.charba@noaa.gov or frederick.g.samplatsky@noaa.gov