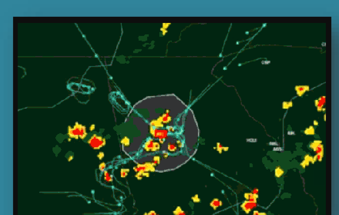
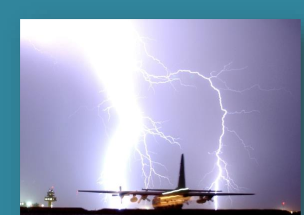
Assessing the CamPoP tool in LAS Tracon Airspace

James Oh, Los Angeles CWSU & Chris Outler, NWS Las Vegas

Purpose

Forecasting near term thunderstorm potential has proven challenging among forecasters because both convection-allowing and parameterized models struggle to pinpoint where and when activity will occur. The suite of parameterized models and MOS guidance sources currently used to generate the near-term forecast often underestimate convective coverage. On the other hand, convection-allowing model Probability of Precipitation (PoP) forecast grids often exhibit extremely high values that are usually displaced slightly in time and space from the observed convection.

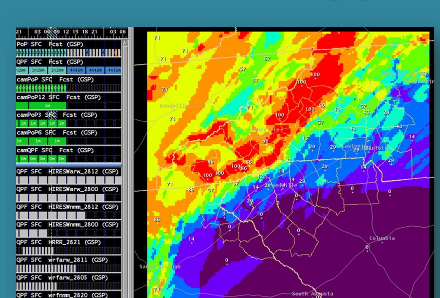

Flight paths being disrupted in Atlanta airspace (left), lightning strikes near busy airfield (center), flights deviating around thunderstorms in Denver airspace (right).

The CamPoP ("convection-allowing model PoP") smart tool was developed to aid forecasters in determining where and when thunderstorms will occur by using a consensus approach. The tool generates PoP forecast grids showing the percentage of convection-allowing models with non-zero Quantitative Precipitation Forecasts (QPF) in any particular grid box at any particular time. For example, 100% would mean all 8 models and 3 time lagged HRRR runs agree on QPF of 0.01" or greater at a given time and location.

This allows forecasters to zero in on areas of maximum threat for daily convection, and anticipate trends and uncertainty that exist within the forecast using a probabilistic approach. Therefore, CWSU forecasters can express greater confidence in thunderstorm potential to FAA customers for safer and more efficient flight planning.

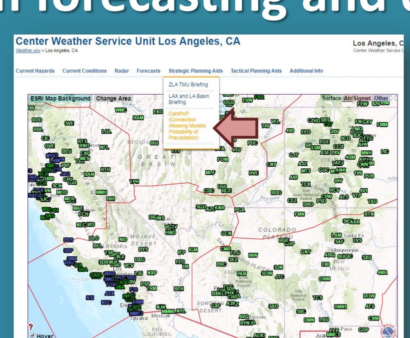
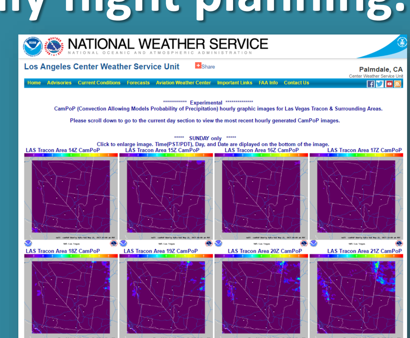
Development

Developed in Greenville-Spartanburg, SC forecast office, the tool quickly became a strong utility for forecasts to assess convection potential. For example, CamPoP was used by WFO GSP to support NASA's IPHEx (Intergrated Precipitation and Hydrology Experiment) in 2014 and received very positive feedback from the NASA team and supported their daily flight planning.



CamPoP image from GSP office (left) versus storm total precipitation for the same period (Center). NASA's IPHEx experiment logo.

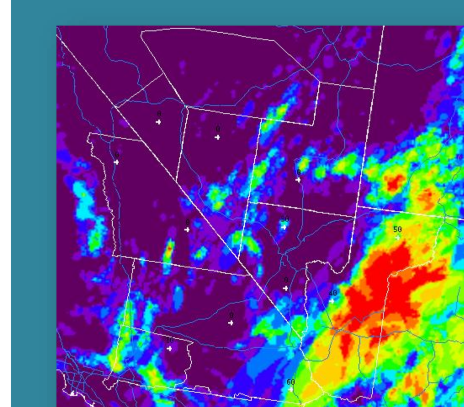
CamPoP has since been implemented in the Mojave Desert region and is being run out of the NWS Las Vegas office. The CamPoP grids are generated hourly in GFE and are then converted to web-based images so that meteorologists in Los Angeles CWSU can use them as an extra tool for short term thunderstorm forecasting and daily flight planning.

Los Angeles CWSU webpage with CamPoP link (left) and the CamPoP webpage (right).

CamPoP Components

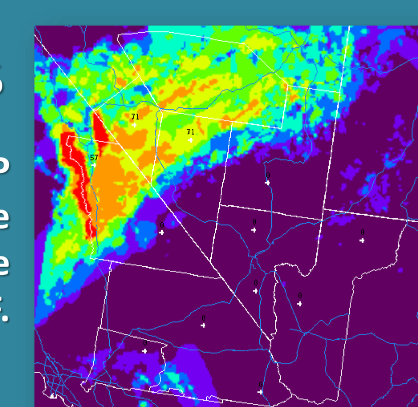
The CamPoP tool is generated by using 8 different convection allowing models and three time lagged HRRR runs to create a consensus of precipitation probability.



0% — 100%

0 CamPoP indicates none of the models are forecasting QPF.

100 CamPoP indicates all of the models are forecasting QPF.

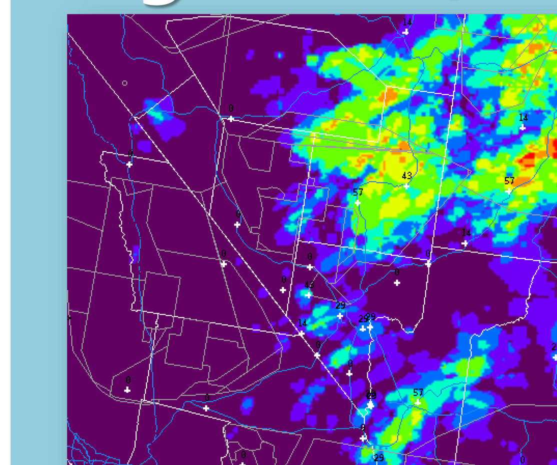


CAM	Grid Spacing	Vertical Levels	Run Frequencies	Forecast Length
HRRR	3km	50	hourly	18 hours
NAMNEST	3km	60	6 hourly	84 hours
HIRESWnmm	3.6km	40	12 hourly	48 hours
HIRESWarw	3km	40	12 hourly	48 hours
VEFARWNAM[1]	3.5km	50	12 hourly	60 hours
VEFNMMNAM[1]	4km	45	12 hourly	60 hours
VEFNMMGFS[1]	4km	45	12 hourly	60 hours
VEFARWGFS*	9km	45	12 hourly	204 hours

*Non-convective allowing multiscale parameterized model.
[1]Model only included in CamPoP through 2017.

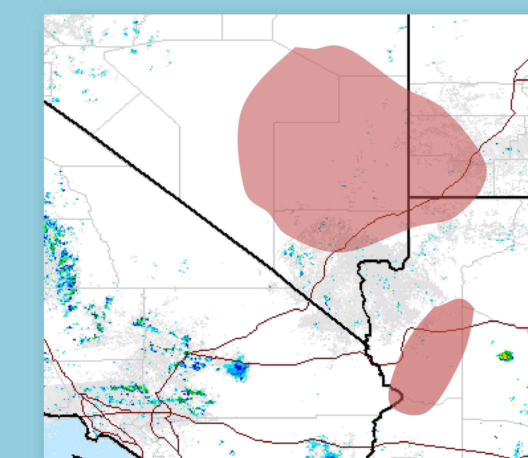
Case Examples

August 2nd, 2018

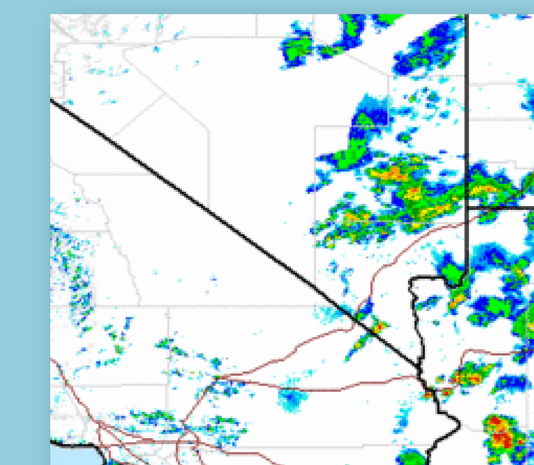


2000Z run of CamPoP valid for 0200Z Aug 3rd, 2018. (6 hour lead time).

Verification

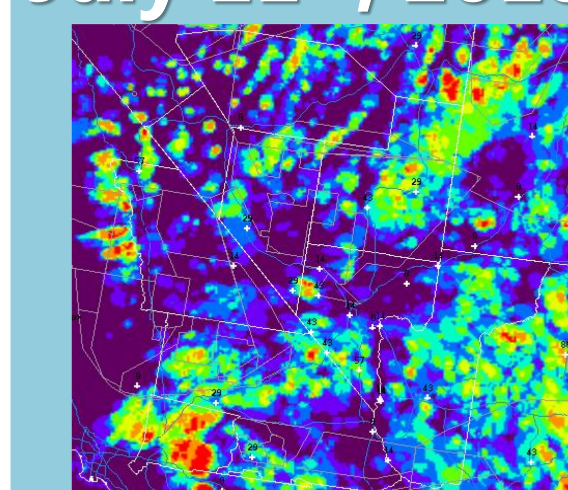


CamPoP depicted an area of thunderstorms in Southern NV and NW Arizona (shaded areas).



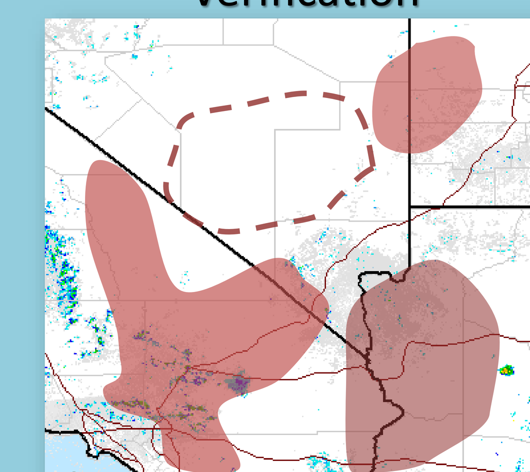
0218Z Radar Composite on August 3rd.

July 11th, 2018

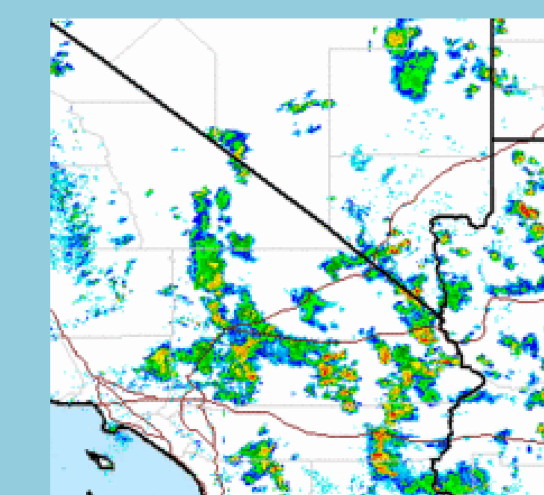


1900Z run of CamPoP valid for 2200Z July 11th, 2018. (3 hour lead time).

Verification

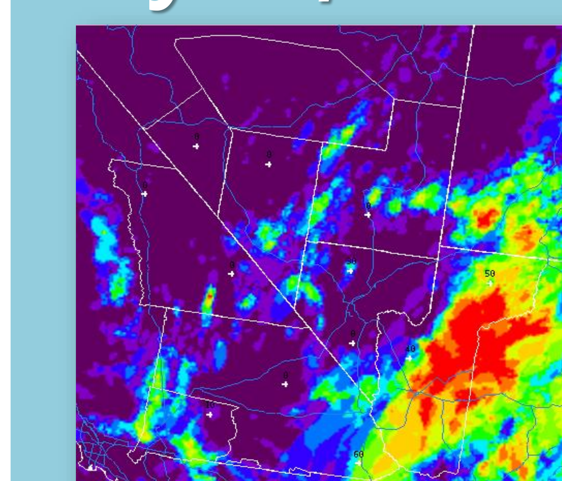


CamPoP accurately forecast the areas of greatest storm concentration (shaded areas), while also suggesting more isolated activity (dotted areas).



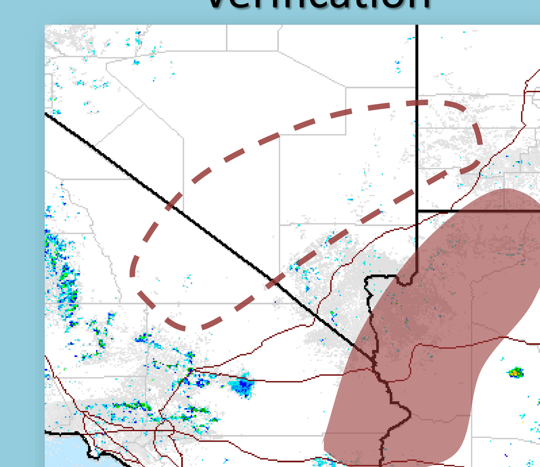
2208Z Radar Composite on July 11th.

May 9th, 2017



1700Z run of CamPoP valid for 2200Z May 9th, 2017. (5 hour lead time).

Verification



CamPoP accurately forecast the precipitation band across NW Arizona (shaded areas), along with the terrain driven activity further north (dotted areas).

2157Z radar image depicting good agreement with the CamPoP forecast.

Limitations & Additional Work

Some limitations of the CamPoP tool include lack of differentiation between non-convective and convective precipitation. Therefore some additional interrogation on the meteorologists part is required to assess the thunderstorm threat. Additionally, the number of available models decreases further in time, so the accuracy can become degraded at longer lead times.

Being an experimental forecasting tool, additional case reviews are required to further assess the CamPoP's performance.