

**19th Conference on Mountain
Meteorology Virtual Meeting**

13 July 2020



**The Challenges on Using Ensemble Data
and Providing
Probabilistic QPF Guidance in Mountainous
Terrain**

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Speaker Goals

Deterministic Guidance to Probabilistic Guidance

- Ensemble Interpretation for Mountainous Terrain
 - Show Challenges
 - Potential Strategies for Improvement
 - Decision Support needs for NWS Core Partners

- “Typical” Winter Weather System in the Great Basin - 29 February 2020
 - Note: “Nothing Special” about this event, except to say it’s “Average”
 - What worked in terms of Probabilistic Guidance
 - Address Limitations (What needs to improve)
 - Customer Needs - Have low thresholds (when it comes to snowfall!)

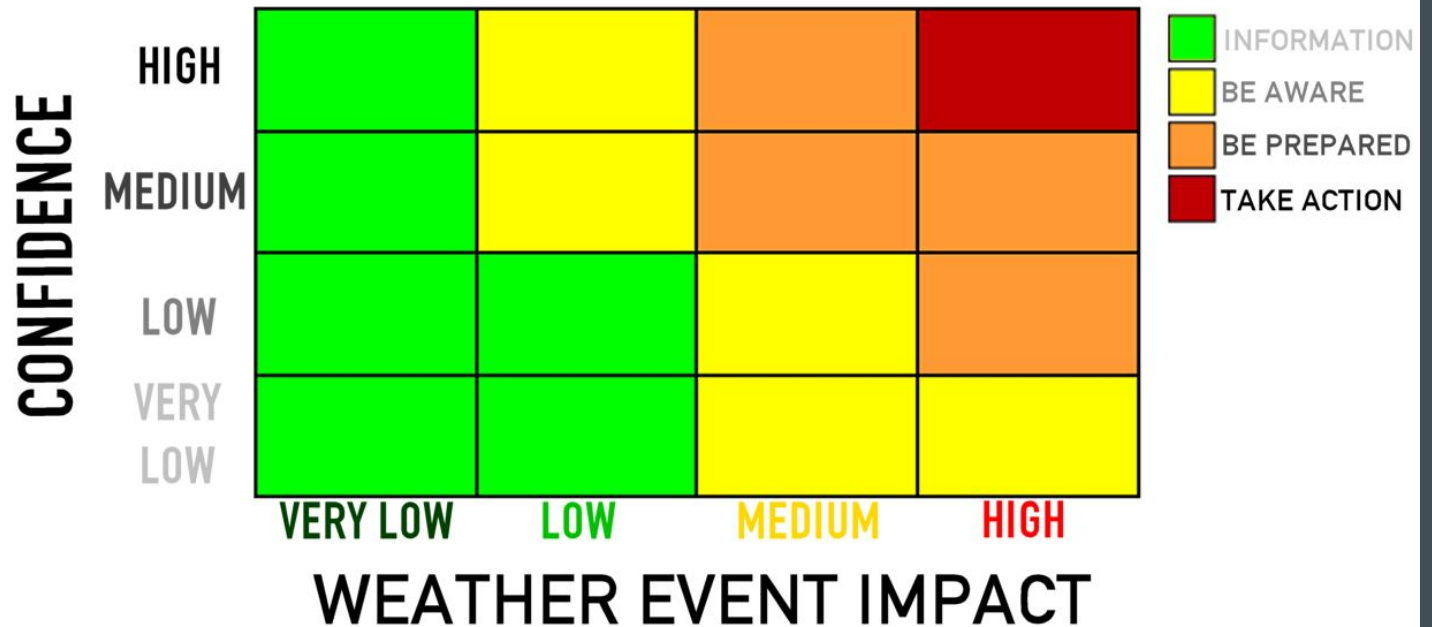
1990s Deterministic Approach

What meteorologists may have said:

“But the northern valleys received 6 inches of snow. We were close!”



Today:



Data Source Used

National Blend of Models

A nationally consistent and skillful suite of calibrated forecast guidance based on a blend of both National Weather Service and external numerical weather prediction model data and post-processed model guidance.

A highly accurate, skillful and consistent starting point for the gridded forecast.

Probabilistic and bias-corrected weather elements across several service areas.

Providing forecasters with a suite of information to use for their forecasts.

An important part of the efforts to evolve NWS capabilities to achieve a Weather-Ready Nation.

NBM Inputs

WRF MEM2	GEFS
WRF ARW	GFS
RAP	NAM-Parent
RAPX	SREF
HRRR	NAM-Nest
HRRRX	NEMS NMMB
GFS GMOS	WRF ARW
NAM GMOS	CMC GDPS
EKDMOS/BMOS	CMC RDPS
GLMP	CMC REPS
WW3D (0.5)	CMC GEPS
WW3E (0.5)	ECMWFD
WW3D-Regional	ECMWFE
GLW	NAVGMED
HWRF	NAVGEML
HMON	FNMOCL
wTCM	ACCESS-G

▶ NOAA

▶ Canadian Meteorological Centre

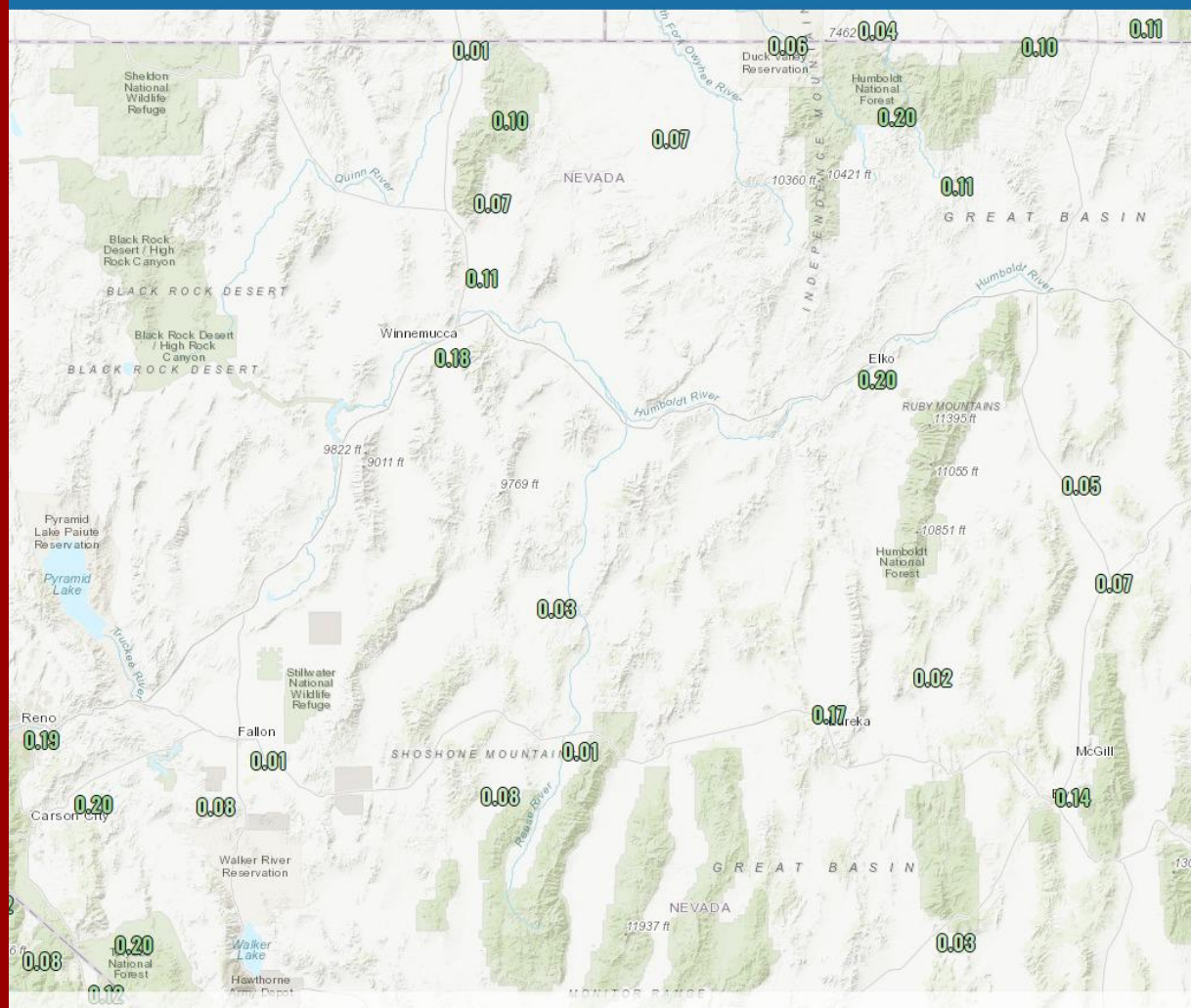
▶ European Centre for Medium-Range Weather Forecasts

▶ U.S. Navy Fleet Numerical Meteorology and Oceanography Center

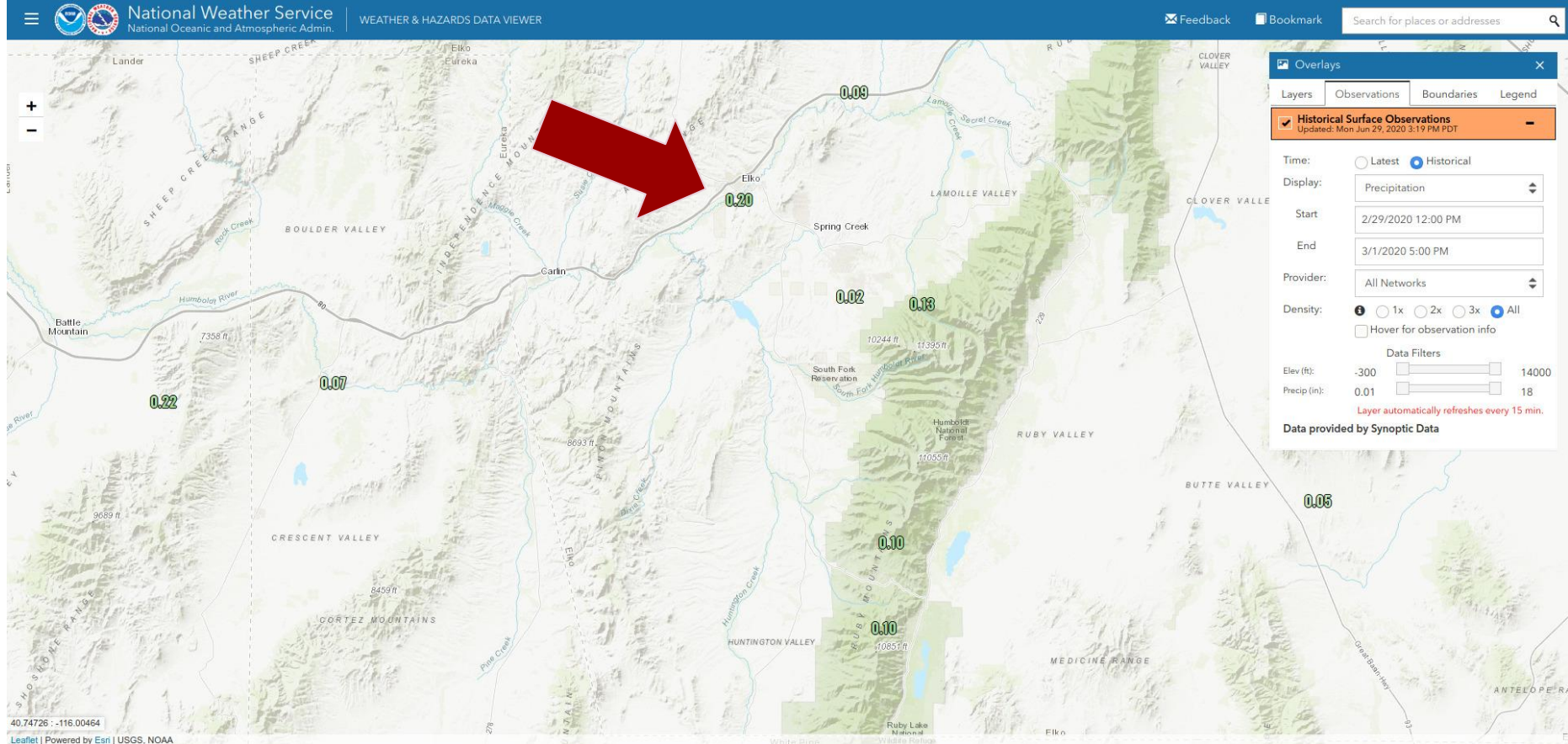
▶ Australia Bureau of Meteorology



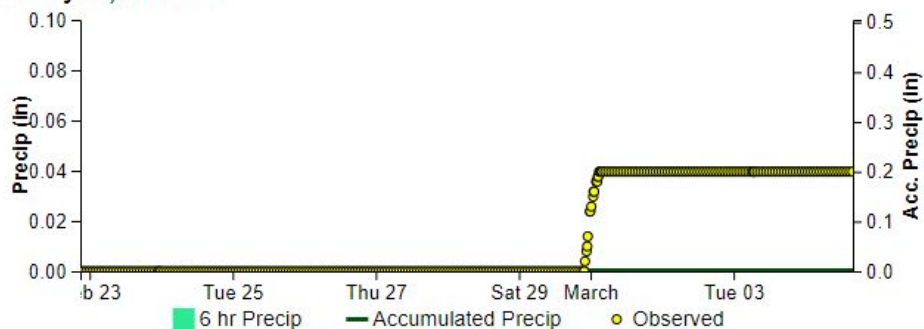
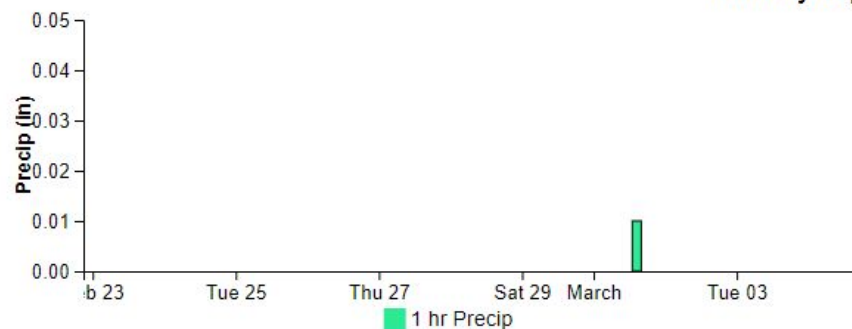
Case Example: 29 February 2020 Northern Nevada Precipitation Amounts



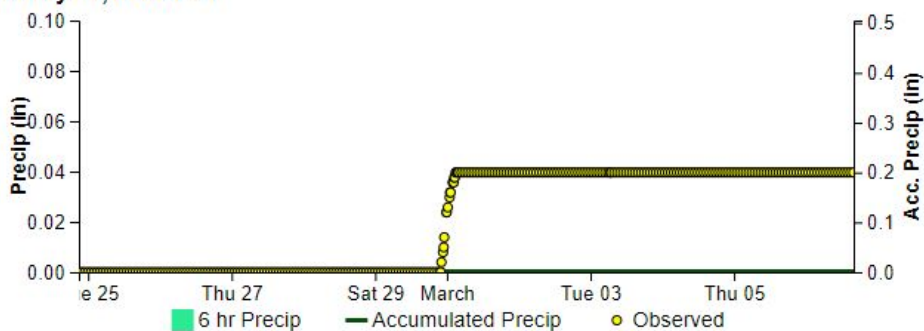
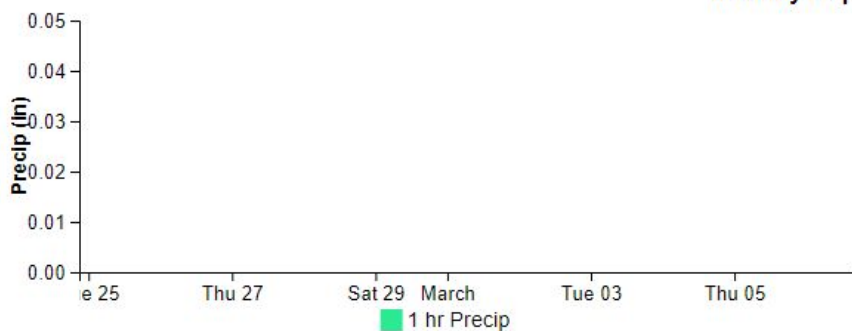
Probabilistic Information will be on KEKO (Pcprn: 0.20")



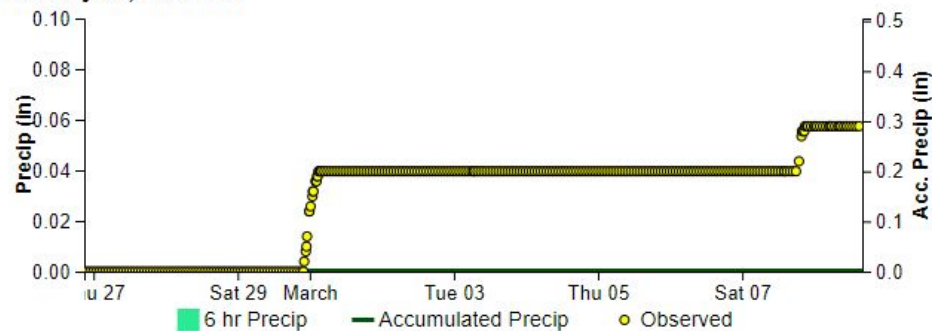
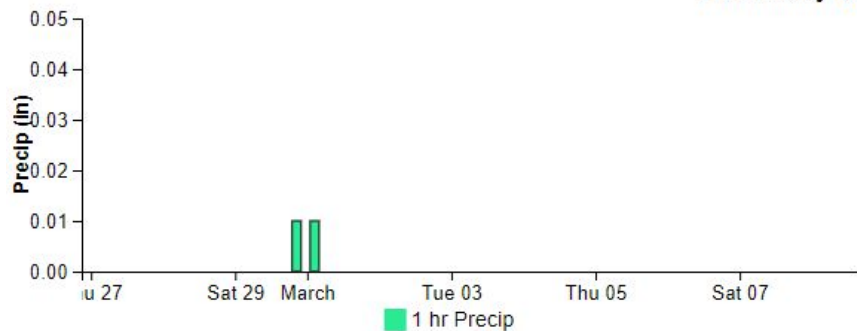
KEKO
Saturday 08 pm, February 22, 2020 PST



KEKO
Monday 08 pm, February 24, 2020 PST

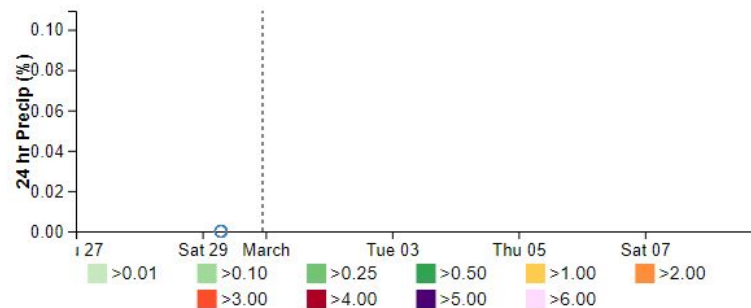
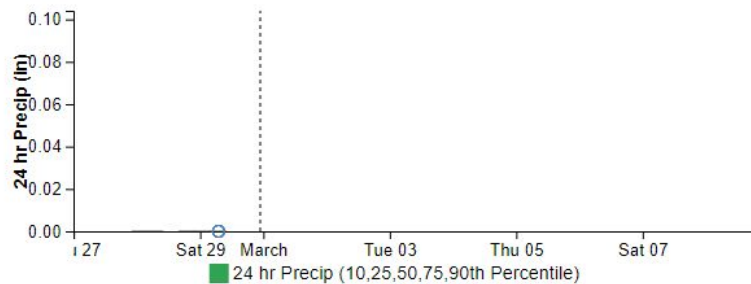
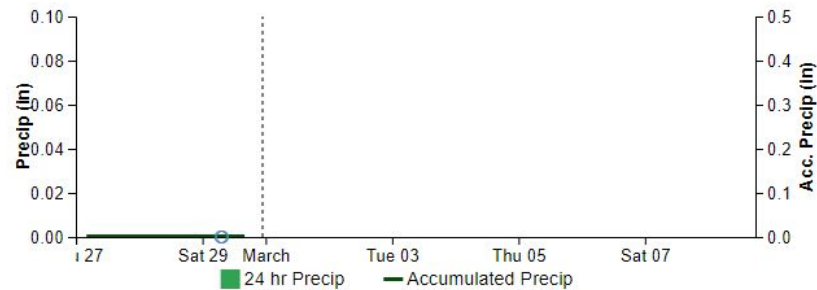
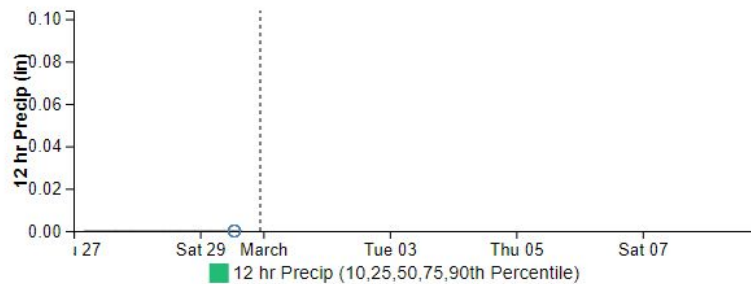
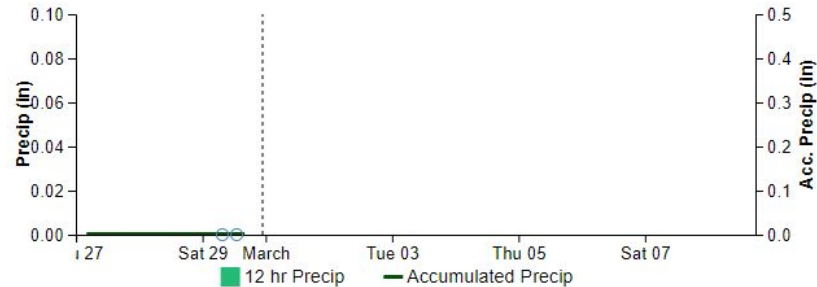
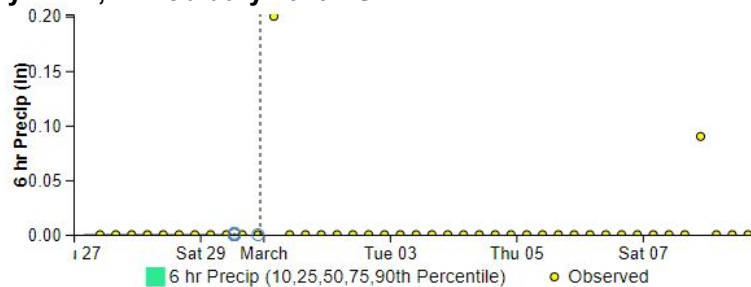


KEKO
Wednesday 08 pm, February 26, 2020 PST



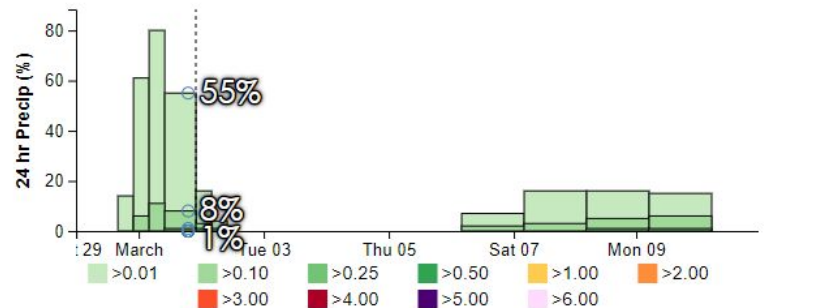
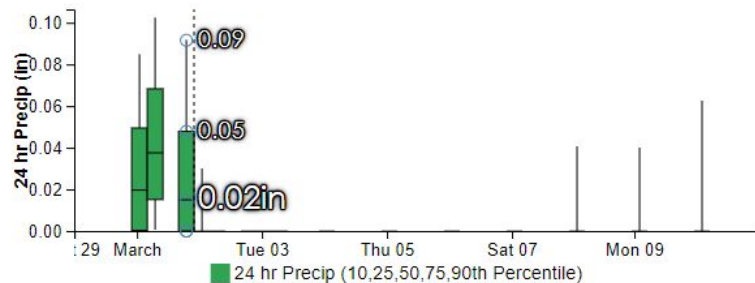
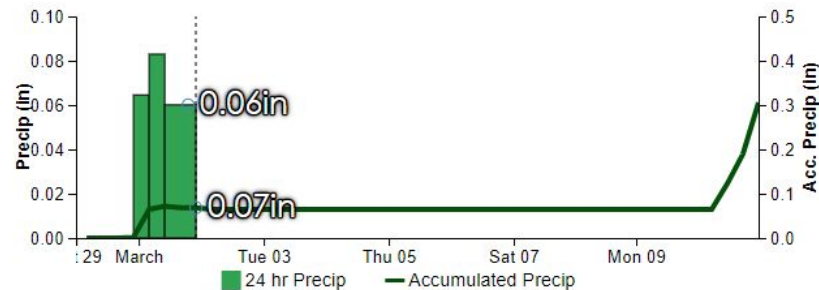
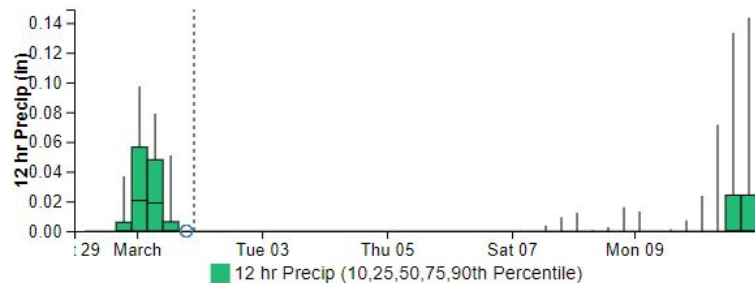
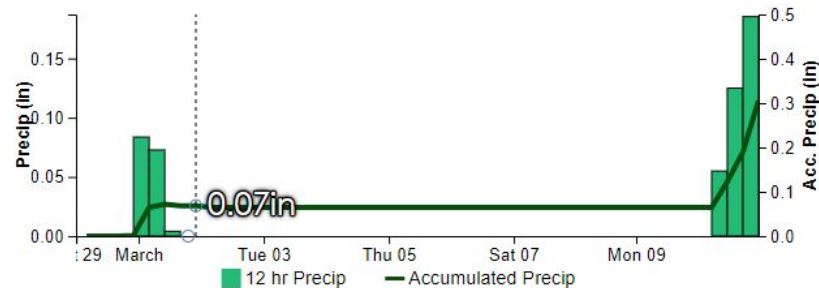
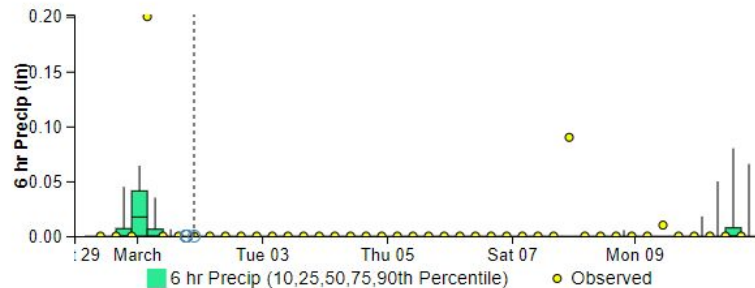
KEKO

Thursday 11PM, 27 February 2020 PST



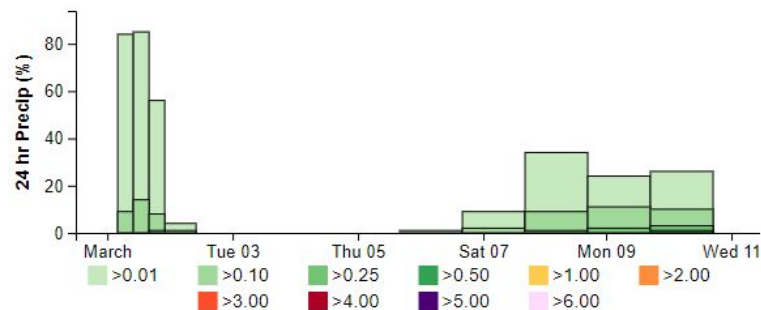
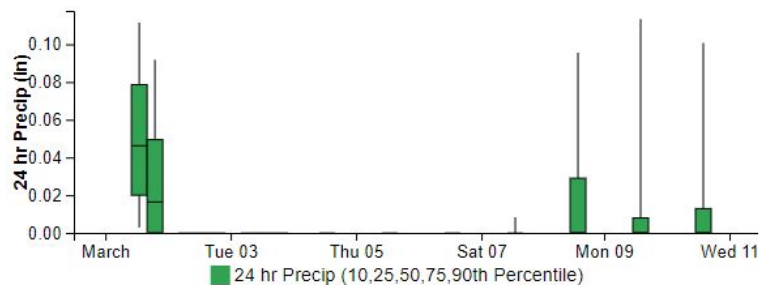
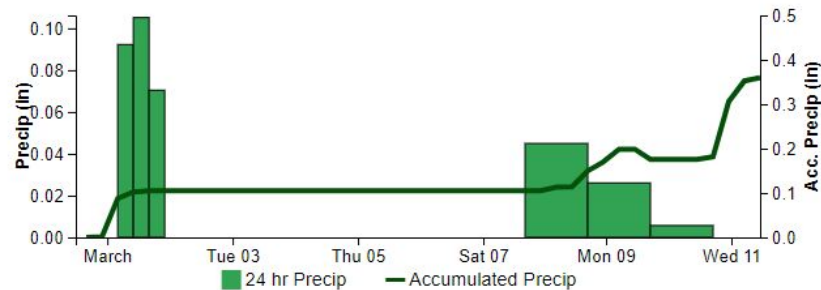
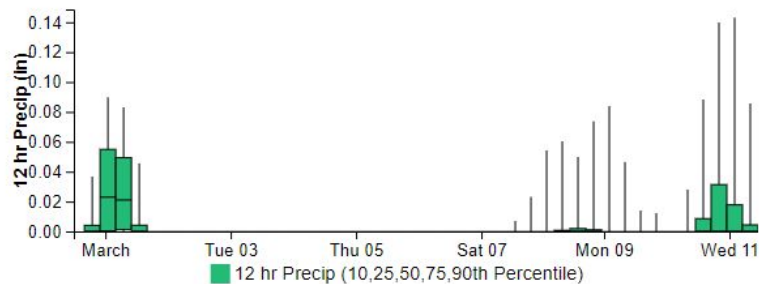
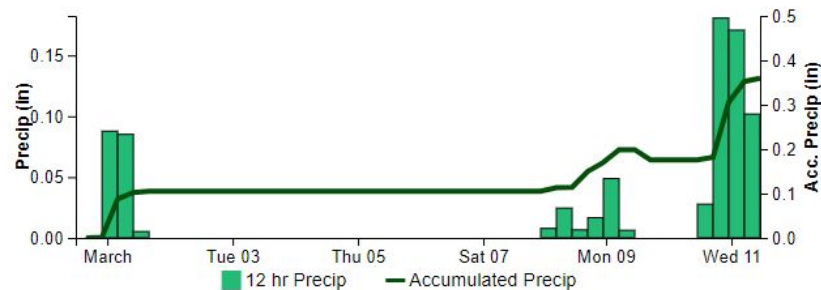
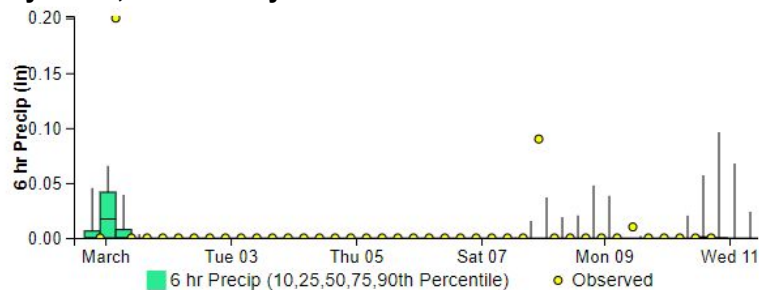
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Friday 11 PM, 28 February 2020 PST



KEKO

Saturday 11AM, 29 February 2020 PST



What does the “deterministic forecast” mean?

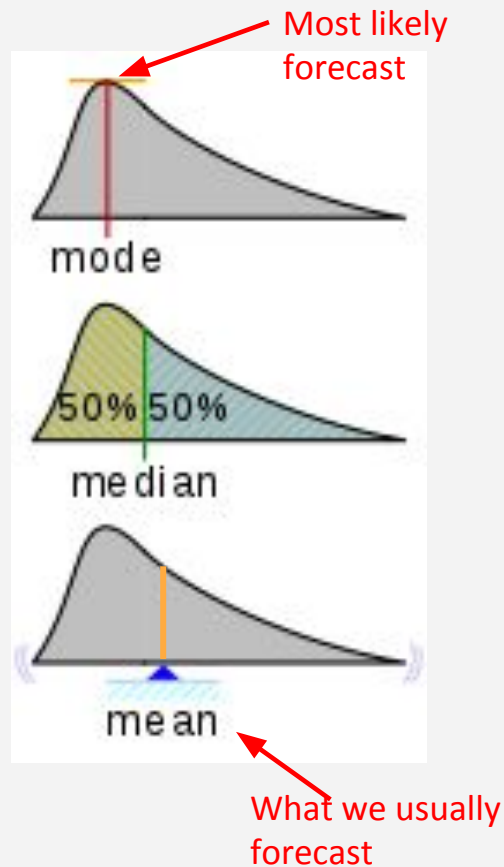
Despite popular conception, deterministic forecasts are often not the most likely forecast!

We commonly use blended averages to make deterministic forecasts, which is good when you verify with MAE. We hedge toward the outliers!

The best deterministic forecast depends on the question you are trying to answer.

Many of our partners have a different best deterministic forecast!

Thankfully, probabilistic guidance allows us to customize it.



Deterministic Approach is a Tougher Challenge

- Terrain Blocking
- Orographic Components
- Potential Instability

Probabilistic Guidance is a bridge to an Easier Solution

- Variance is Expected
- Easier does not mean Easy



Talking Points

What Worked

- Low confidence (this is not a bad thing)
- Trend: QPF increased with time
- Valuable: Higher Resolution Data improved Confidence
- Probabilistic QPF showed skill at the low end

Growing Pains

- 90th Percentile (poor skill in low QPF events)
- High End QPF can be exceeded (lower skill)
- Low QPF events - low skill 3-7 days out
- Downscaling will Improve