19th Conference on Mountain Meteorology Virtual Meeting

13 July 2020

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

Paul Frisbie, Science Operations Officer,
NWS Elko, Nevada

Brian Brong, Science Operations Officer,
NWS Reno, Nevada

Speaker Goals

Deterministic Guidance to Probabilistic Guidance

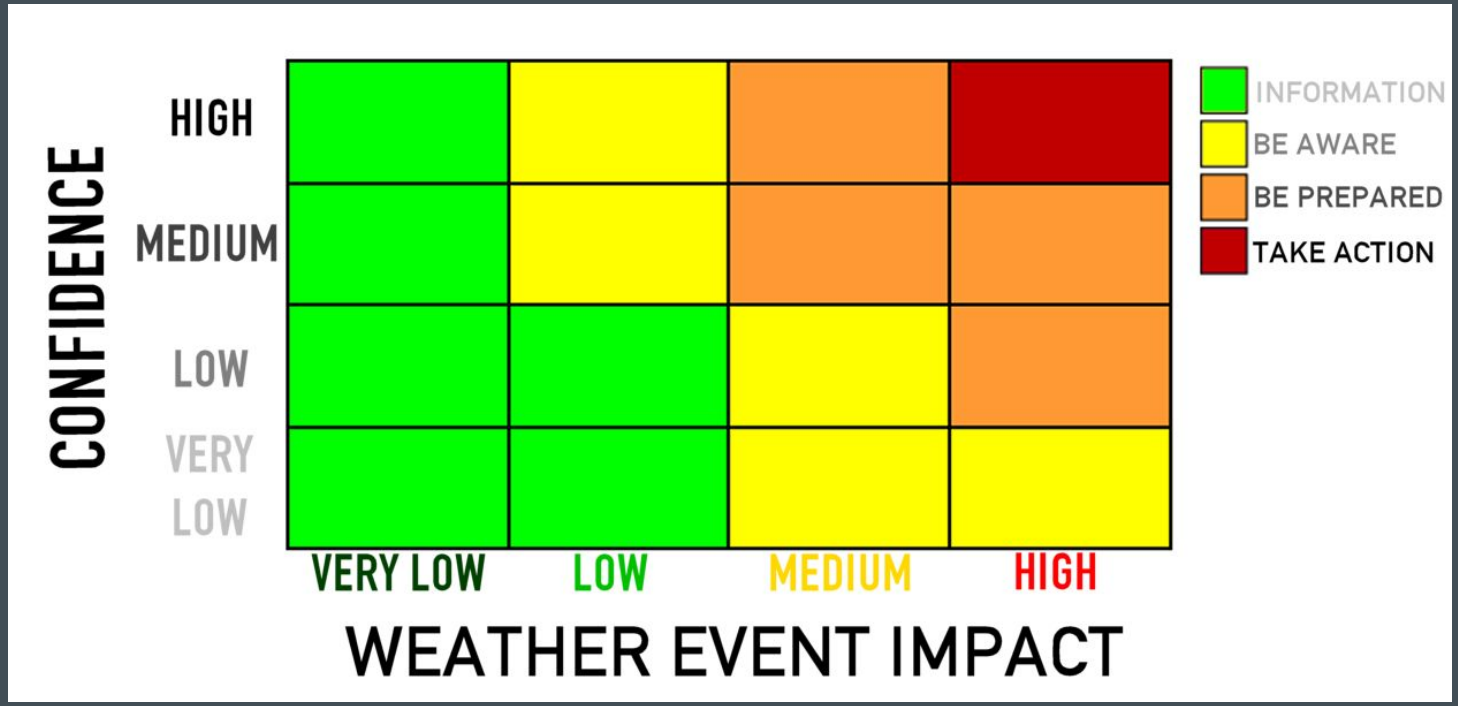
- Ensemble Interpretation for Mountainous Terrain
  - Show Challenges
  - Potential Strategies for Improvement
  - Decision Support needs for NWS Core Partners
- “Typical” Winter Weather System in the Great Basin - 29 February 2020
  - Note: “Nothing Special” about this event, except to say it’s “Average”
  - 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

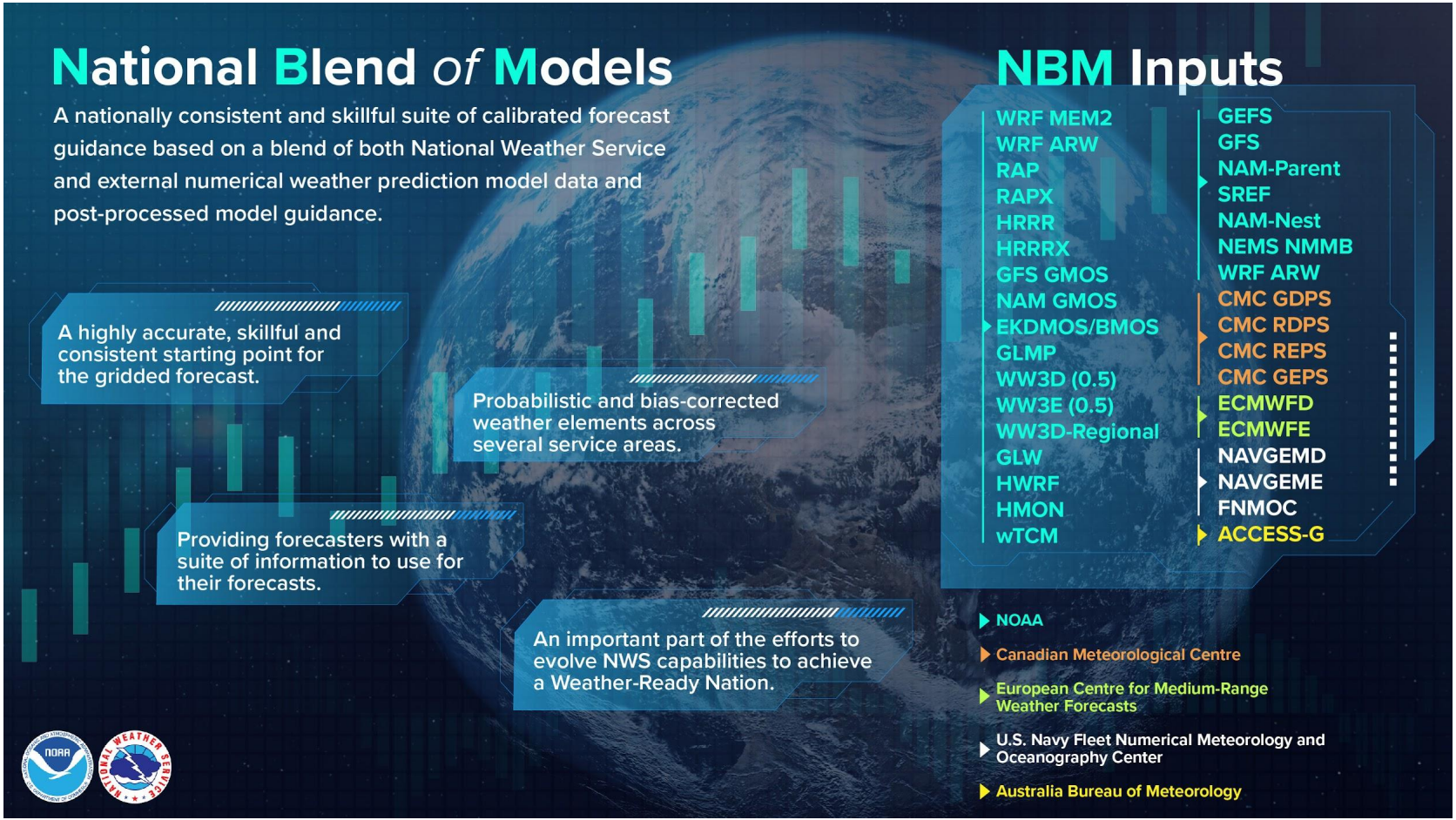
What meteorologists may have said:

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

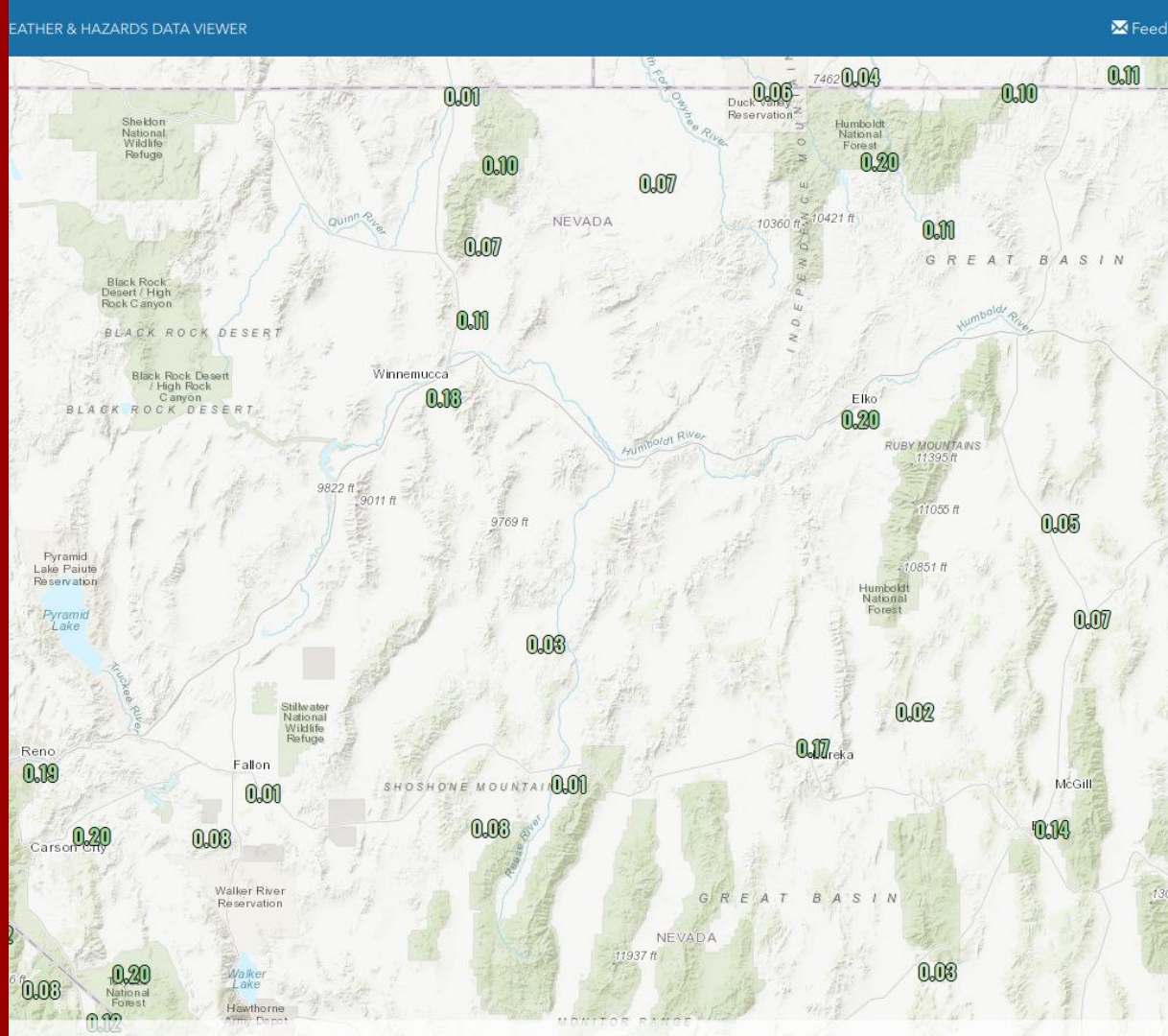
Today:


CONFIDENCE
HIGH
MEDIUM
LOW
VERY LOW
VERY LOW
LOW
MEDIUM
HIGH
WEATHER EVENT IMPACT
INFORMATION
BE AWARE
BE PREPARED
TAKE ACTION

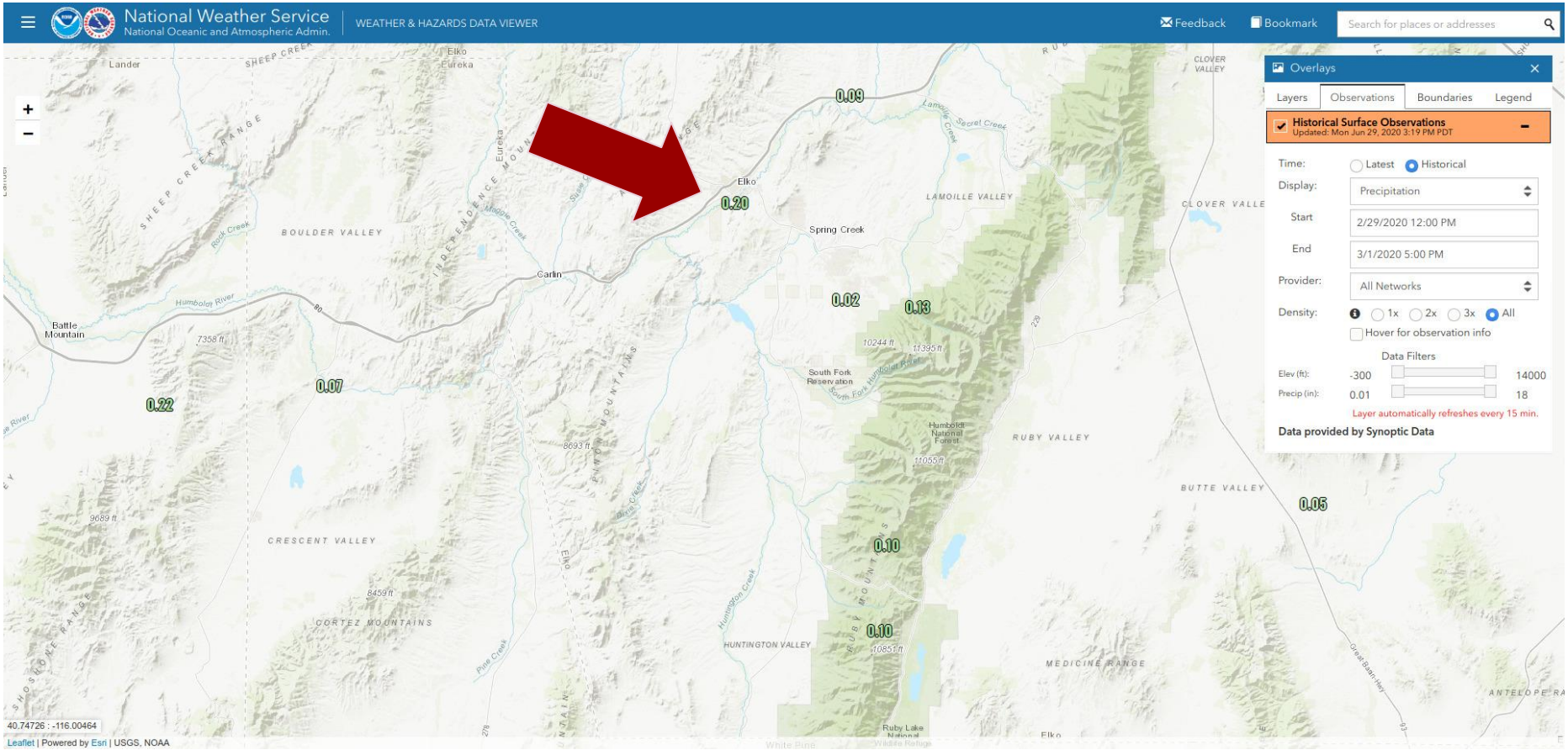
Data Source Used



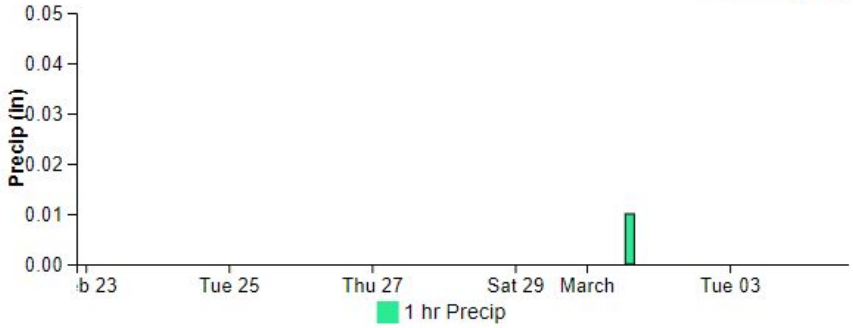
Case Example: 29 February 2020 Northern Nevada Precipitation Amounts

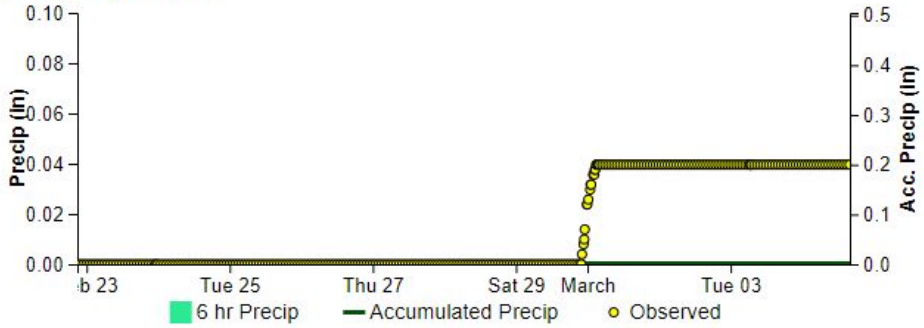


Probabilistic Information will be on KEKO (Pcpn: 0.20”)

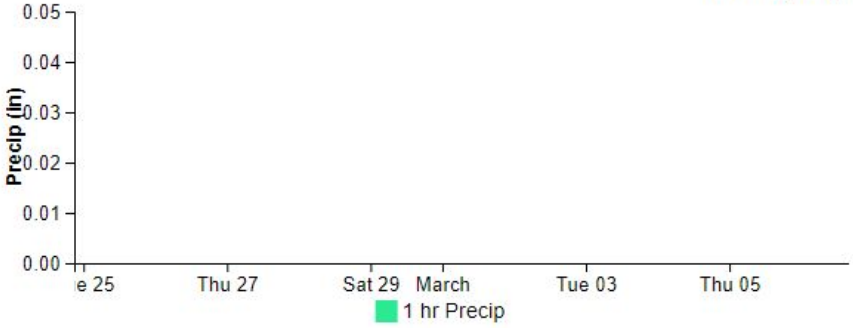


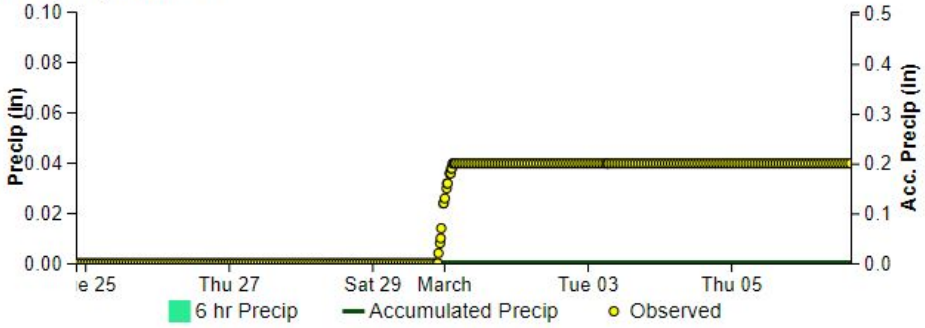
KEKO
Saturday 08 pm, February 22, 2020 PST



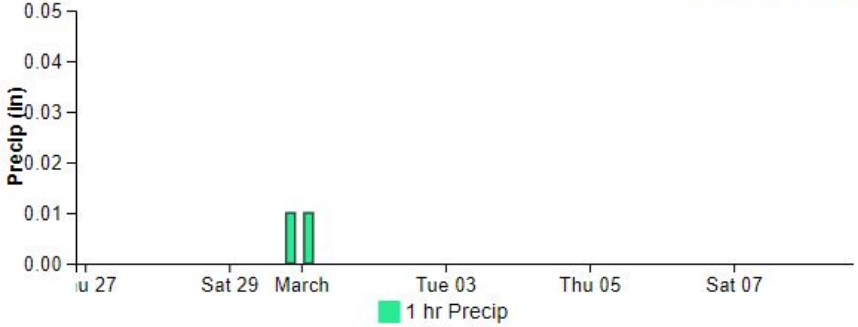


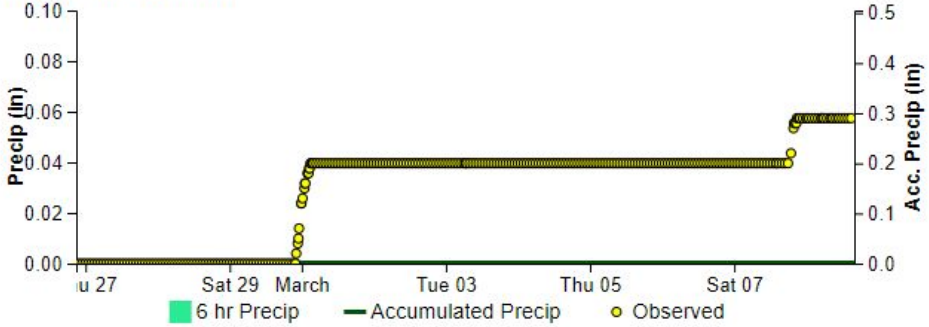
KEKO
Monday 08 pm, February 24, 2020 PST



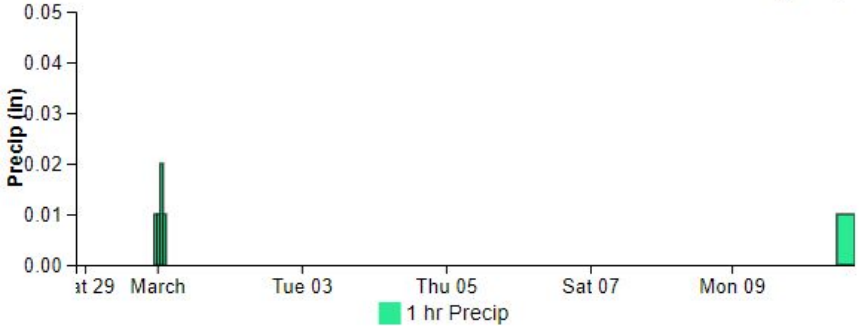


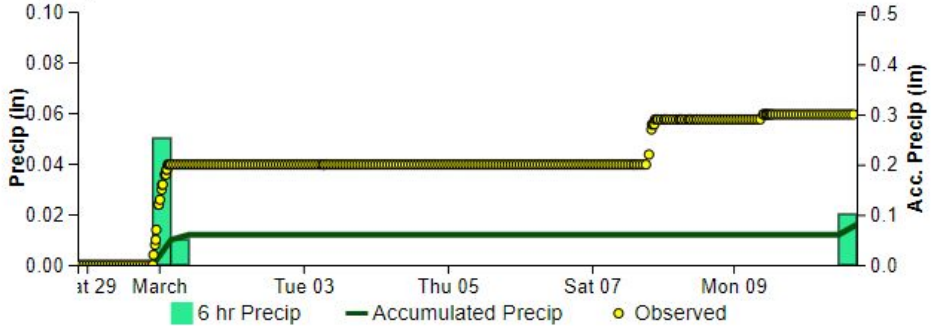
KEKO
Wednesday 08 pm, February 26, 2020 PST





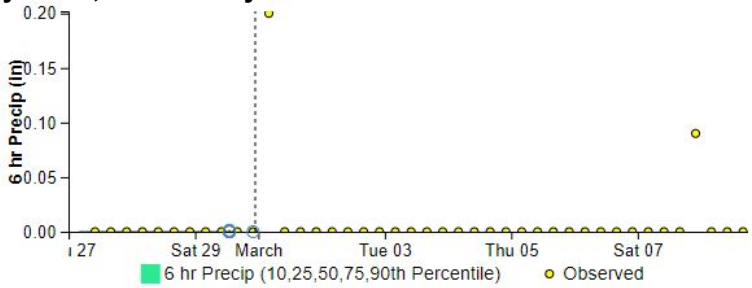
KEKO
Friday 08 pm, February 28, 2020 PST

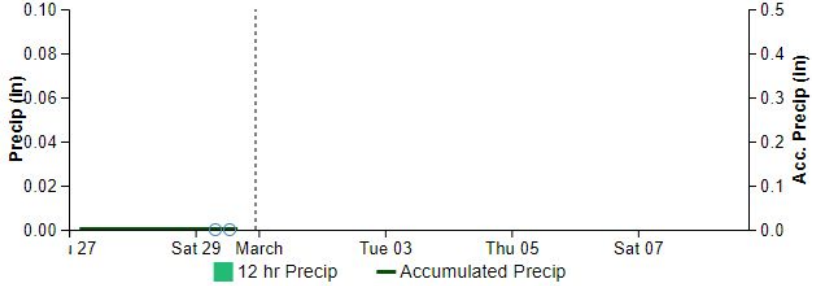


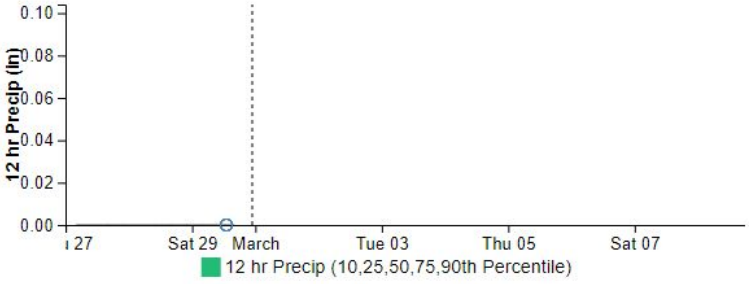


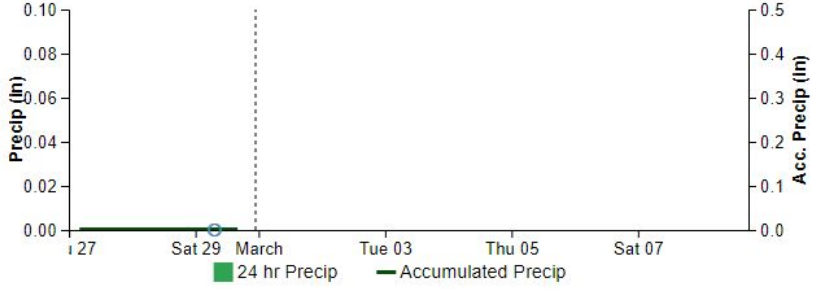
KEKO

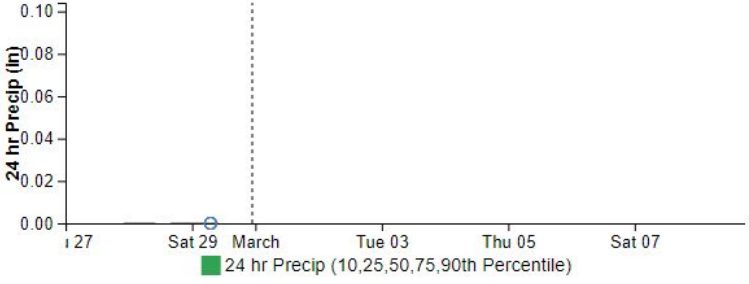
Thursday 11PM, 27 February 2020 PST

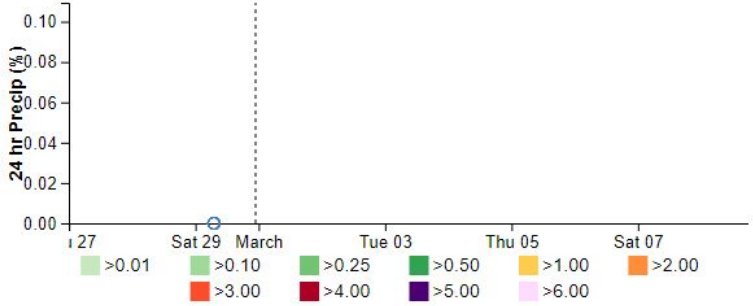






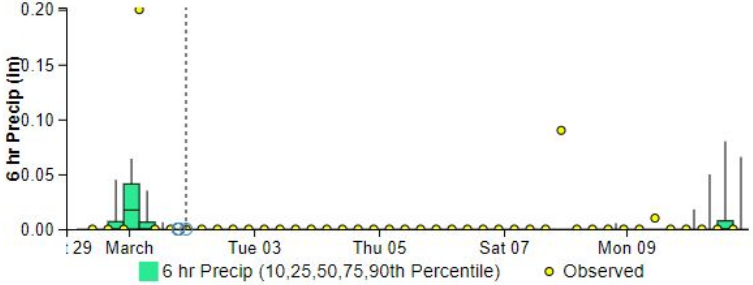


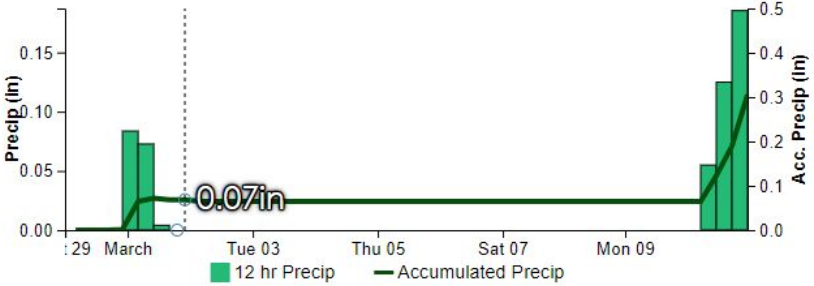


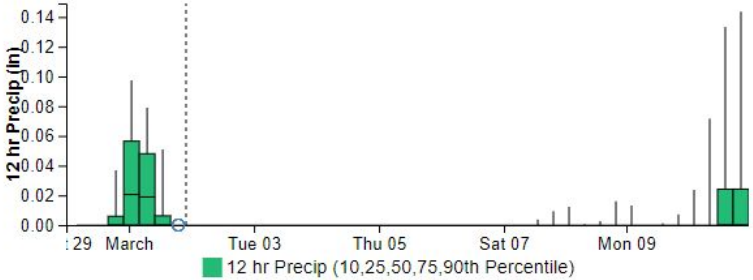


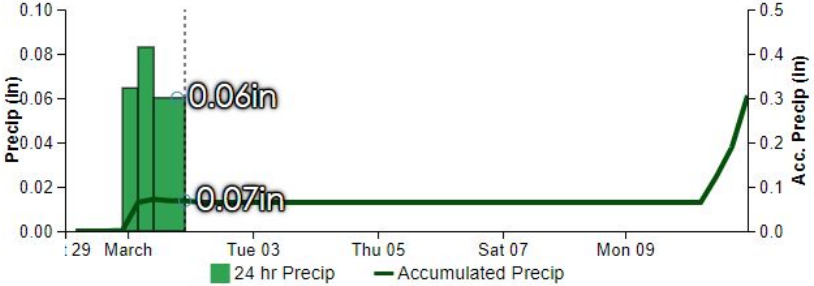
KEKO

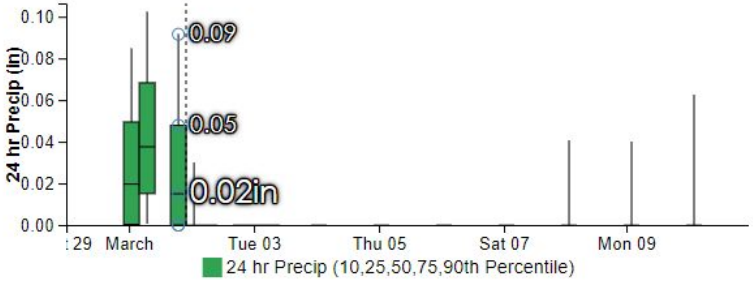
Friday 11 PM, 28 February 2020 PST

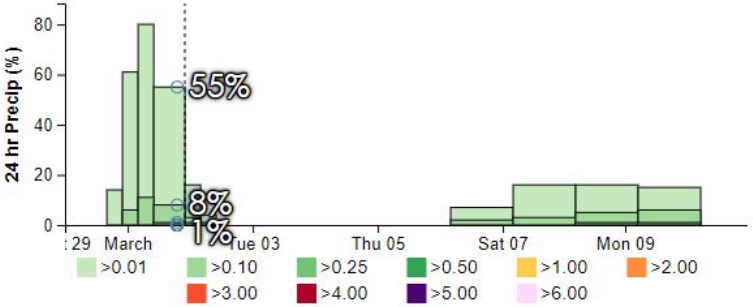






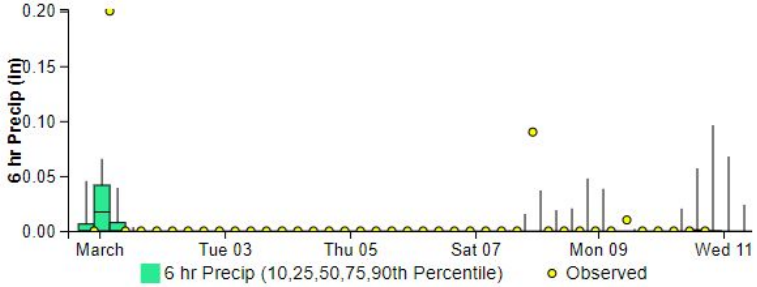


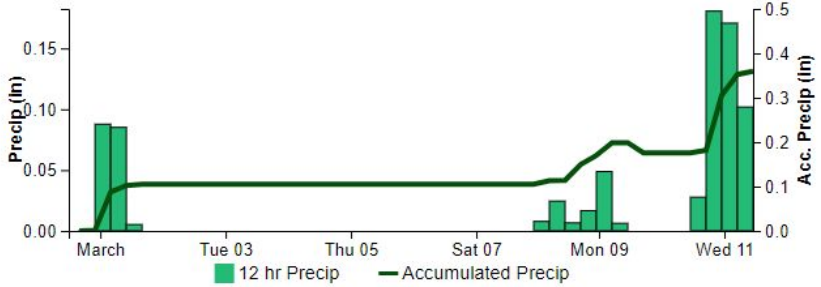


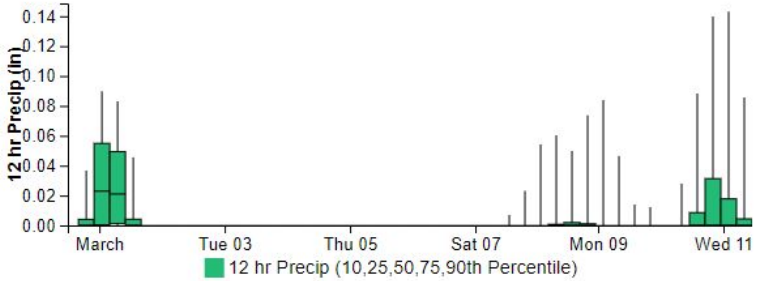


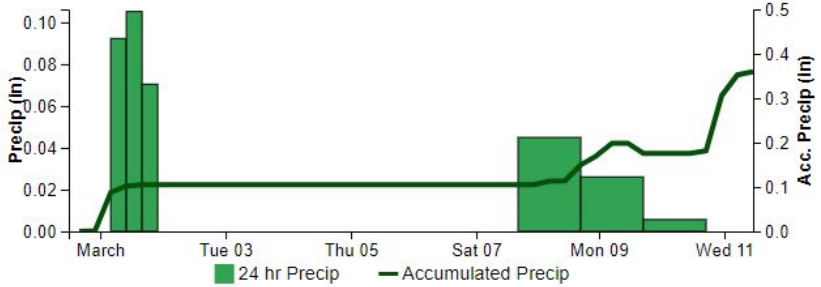
KEKO

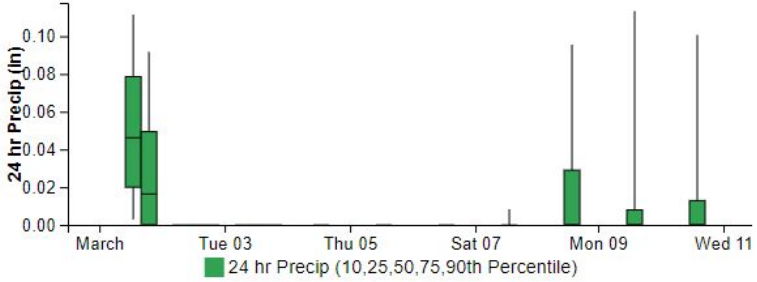
Saturday 11AM, 29 February 2020 PST

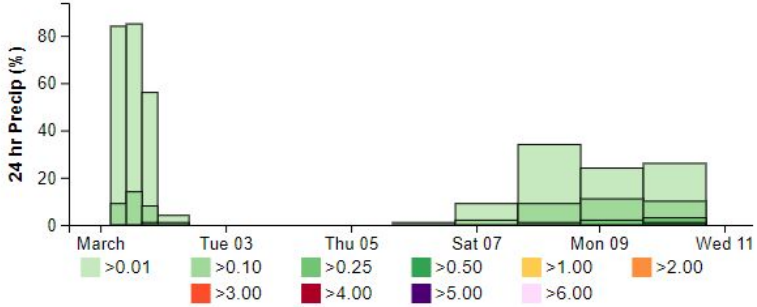












What does the “deterministic forecast” mean?

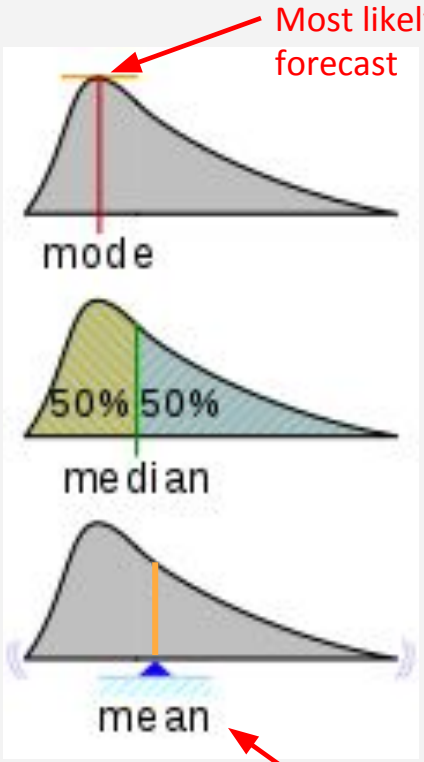
Despite popular conception, deterministic forecasts are often not the most likely forecast!

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