Briefing on mosaic quantile regression analysis

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Joint ISO Board of Governors and WEIM Governing Body meeting
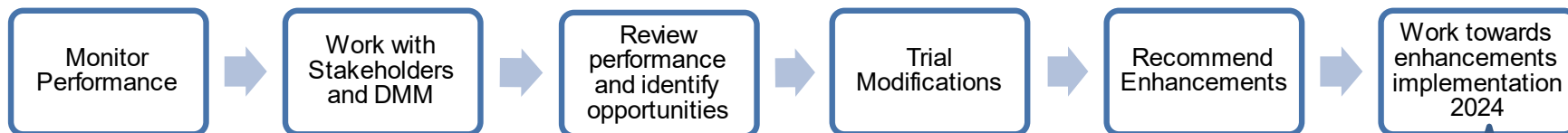General Session
February 7, 2024

Background

In February of 2023, per stakeholder request, the ISO enhanced the uncertainty modeling methodology to incorporate **weather forecast information** in lieu of history only when determining flexible product requirements (FRP).

- Mosaic methodology incorporated into:

Real-Time (WEIM)	Day-Ahead
FRP Requirements	RUC Uncertainty
Resource Sufficiency Evaluation	Future Imbalance Reserve (IR) Requirements

- Since the Change

Monitor Performance	→	Work with Stakeholders and DMM	→	Review performance and identify opportunities	→	Trial Modifications	→	Recommend Enhancements	→	Work towards enhancements implementation 2024

We are here

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Analysis focused on evaluating concerns with use of mosaic methodology

Mosaic performance concerns

- Limited sample size
- Historical data utilized
- Weekend performance

Policy related questions

- Is use of mosaic best across different market features?
- Does change in mosaic based requirements create issues?

Other listed concerns to be covered at a later date

- How to analyze performance
- Awareness of requirements in future time horizon
- Application of thresholds limits

Results show mosaic offers improvements over other methodologies but identifies opportunities for enhancement

Conclusions of Review

- Overall mosaic based requirements better capture realized uncertainty

- Smoother distribution of requirements

- Lower average requirements leading to lower cost

Enhancement Opportunities

- Weekend performance underperforms relative to weekday performance

- Performance coverage is slightly below targeted 95% coverage.

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Analysis reveals further modifications needed to improve the mosaic methodology

- Eliminating day type and changing historical sampling improve mosaic performance in FRP uncertainty requirements

  - Eliminating day-type split will improve weekend coverage and overall performance

 - New forward-backward sample approach benefit real-time and day-ahead applications

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Next steps

Description	Benefit	Anticipated Timeline
Change day-type within the mosaic methodology	Weekend model performance	Q1 2024
Change existing model parameters – in relation to **historical sample data** utilized	Overall model performance especially during seasonal transition	System change needed; working with IT to determine timeline
Use of mosaic within **market** features	TBD	RSEE 3 Stakeholder Initiative
Limit hourly changes to mosaic input for RSE	Potential to reduce RSE failures	RSEE 3 Stakeholder Initiative
Posting **future requirements** for further stakeholder visibility	Customer awareness	Further assessing need with customers
Dynamic **threshold** simulations and potential modification	TBD	TBD

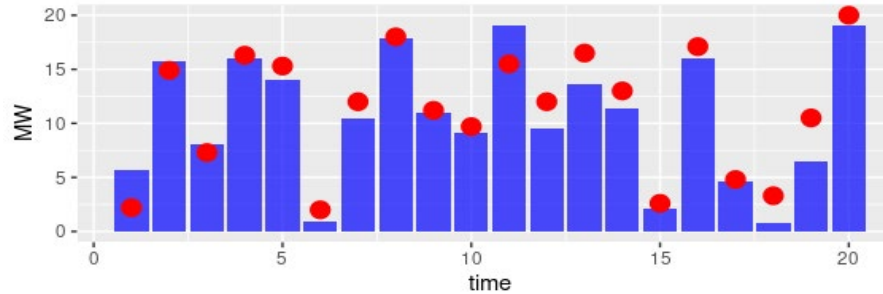California ISO | WEIM

APPENDIX
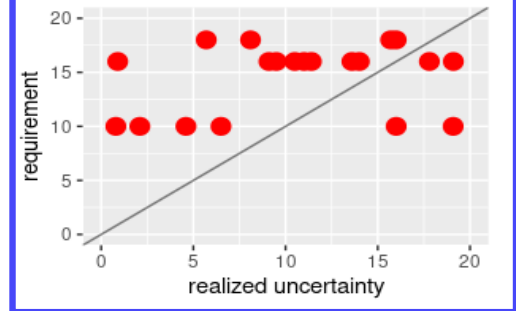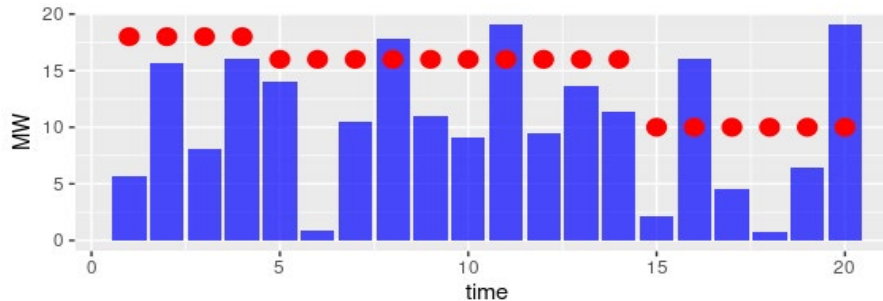
PERFORMANCE ANALYSIS

Informativeness

(1) Perfect predictor
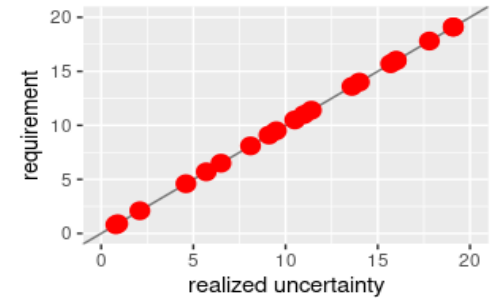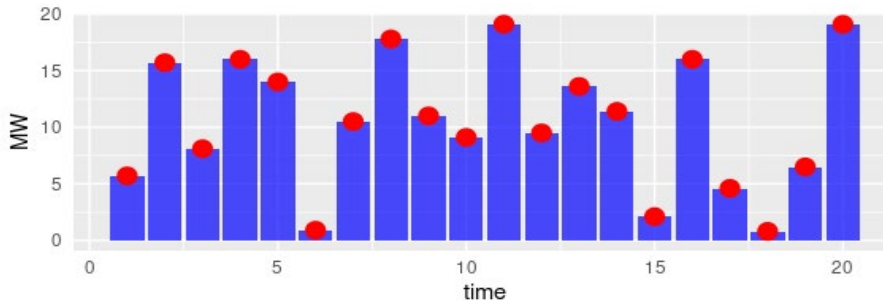
(2) Dynamic predictor
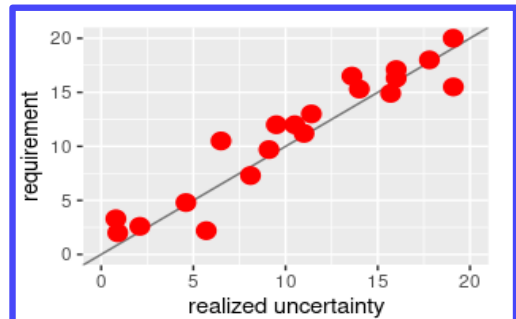
(3) Static predictor

- predictor
- uncertainty
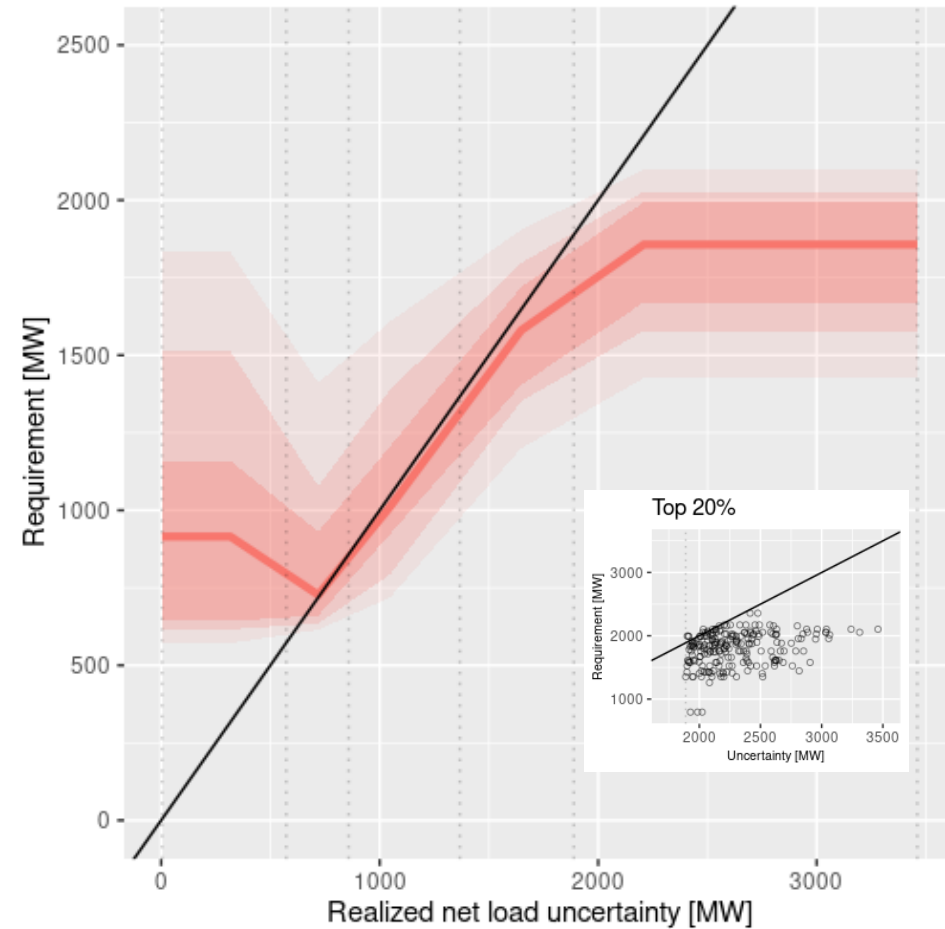
Equivalent coverage
Difference in *informativeness*

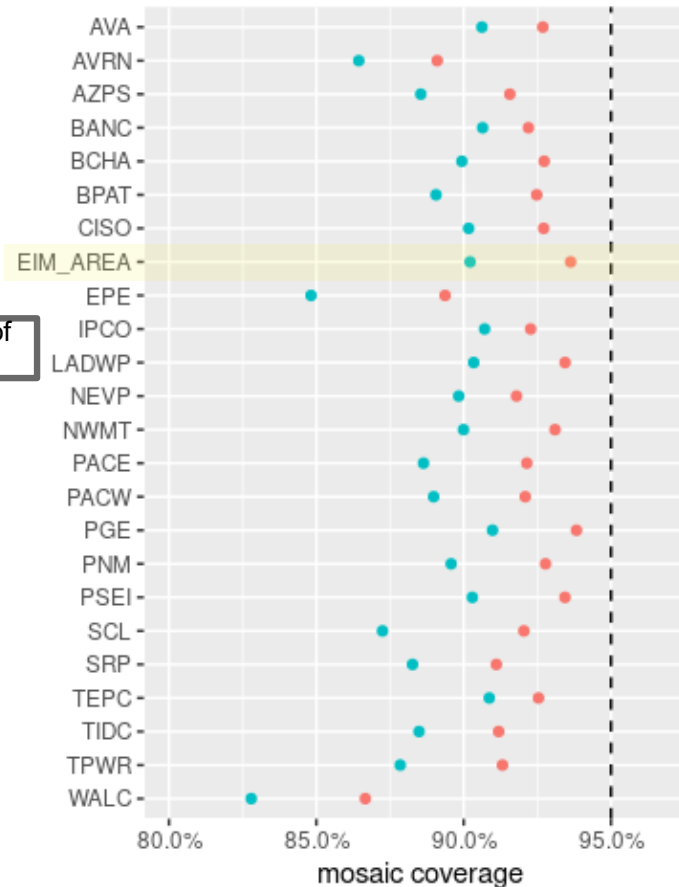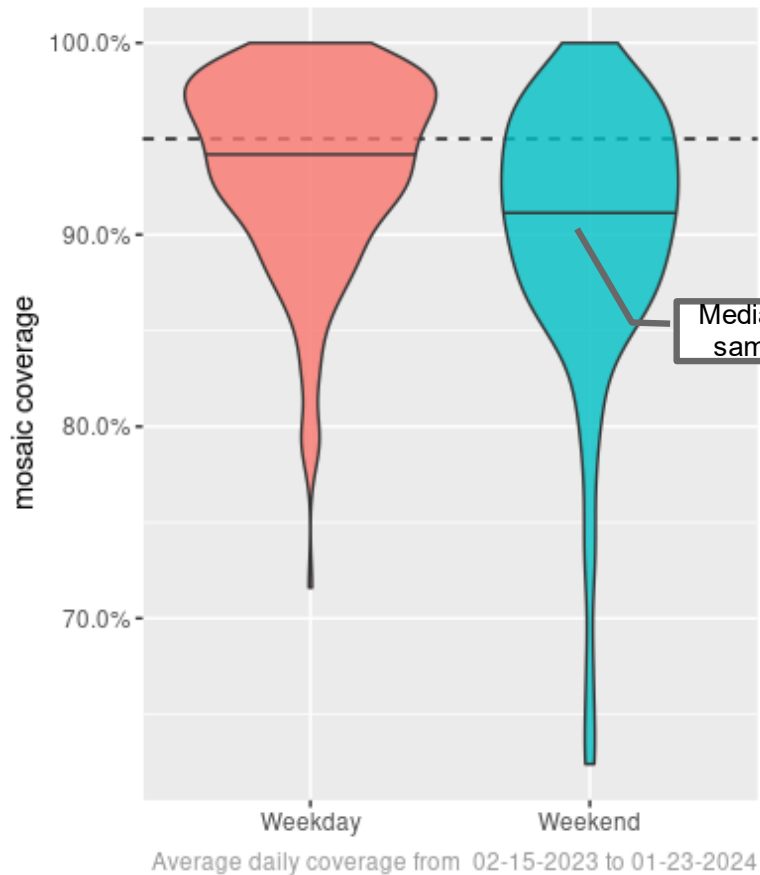California ISO | WEIM

Mosaic better captures realized uncertainty at critical times
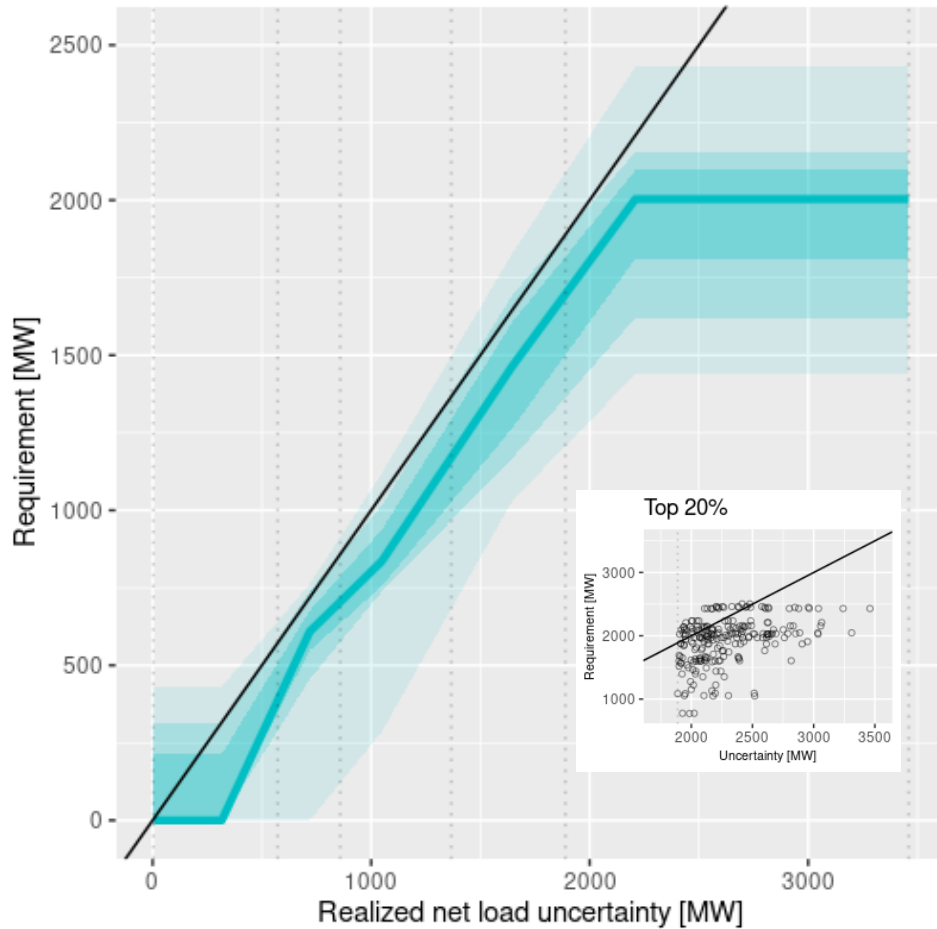
Both plots draw from instances where uncertainty exceeds the requirement provided by either mosaic and/or histogram.

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Mosaic **coverage** is greater on weekdays than weekends

EIM AREA

Average daily coverage from 02-15-2023 to 01-23-2024

Median of sample
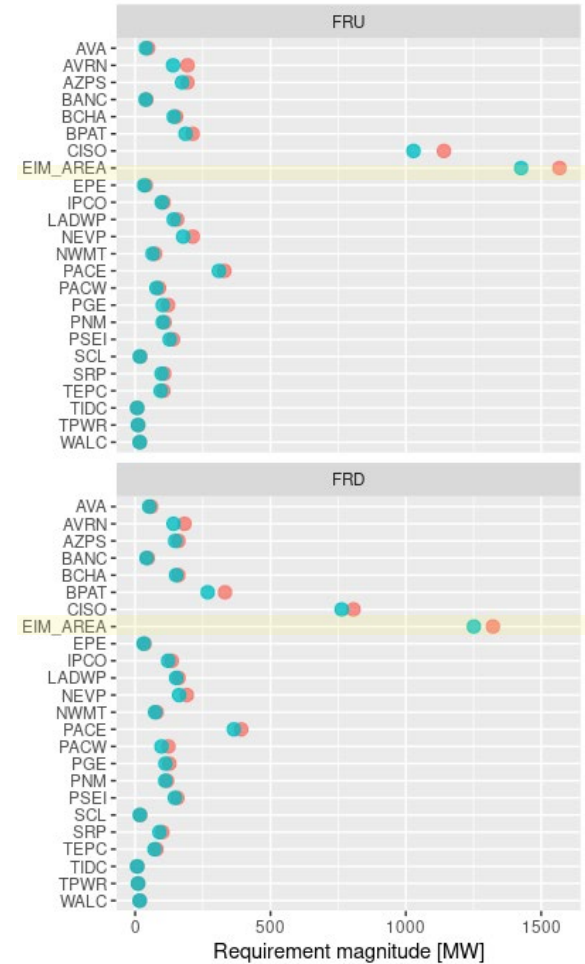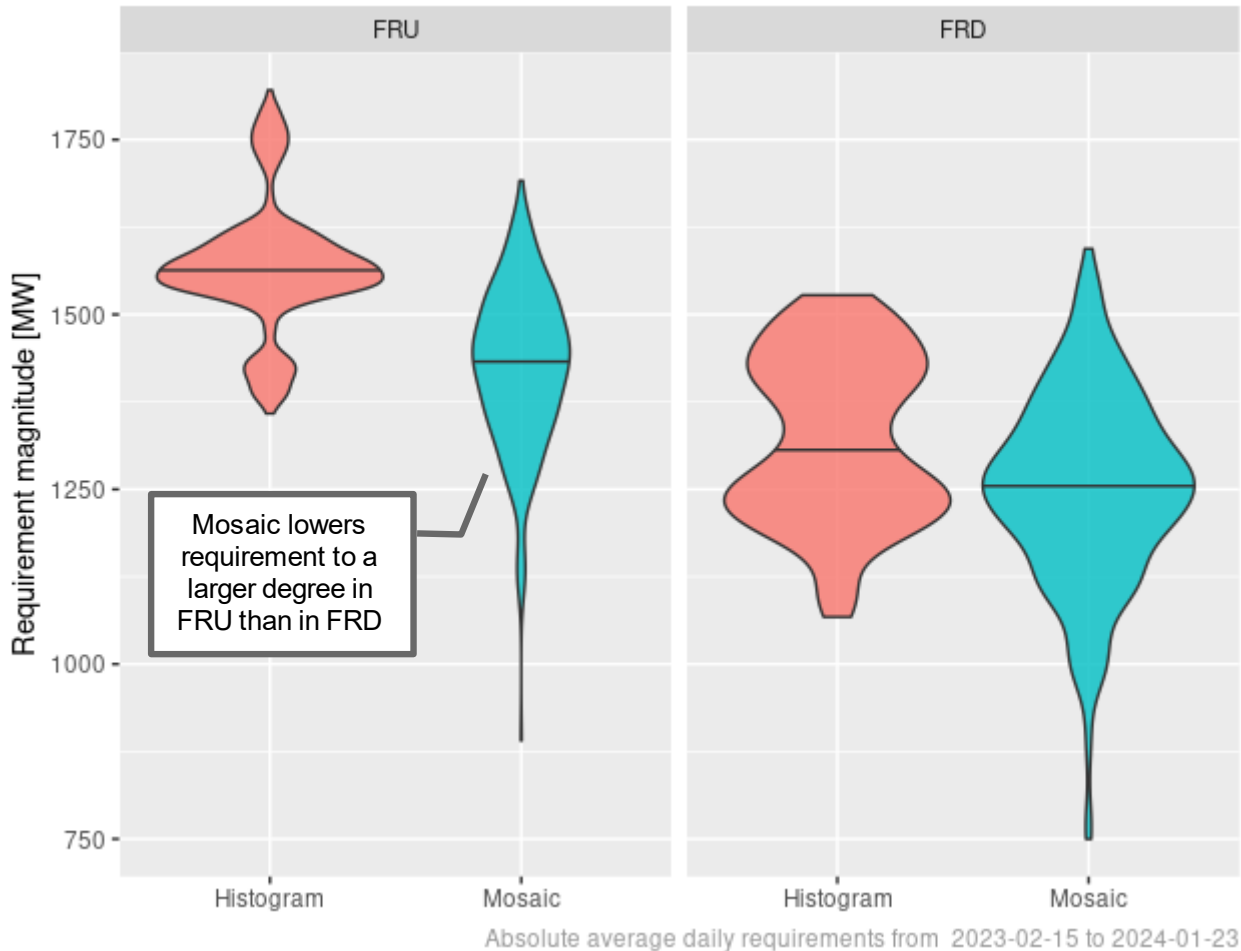
Weekend coverage suffers from smaller sample size.

In a 180 day lookback sample, we get about **128 weekdays** and **51 weekend** days.

Plot notes:
- Violin plots show distribution of daily average coverage.
- Target coverage is 95% for combined FRU and FRD

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Mosaic offers less **requirements** but is more accurate at tails

Requirement comparison for EIM AREA

Mosaic lowers requirement to a larger degree in FRU than in FRD

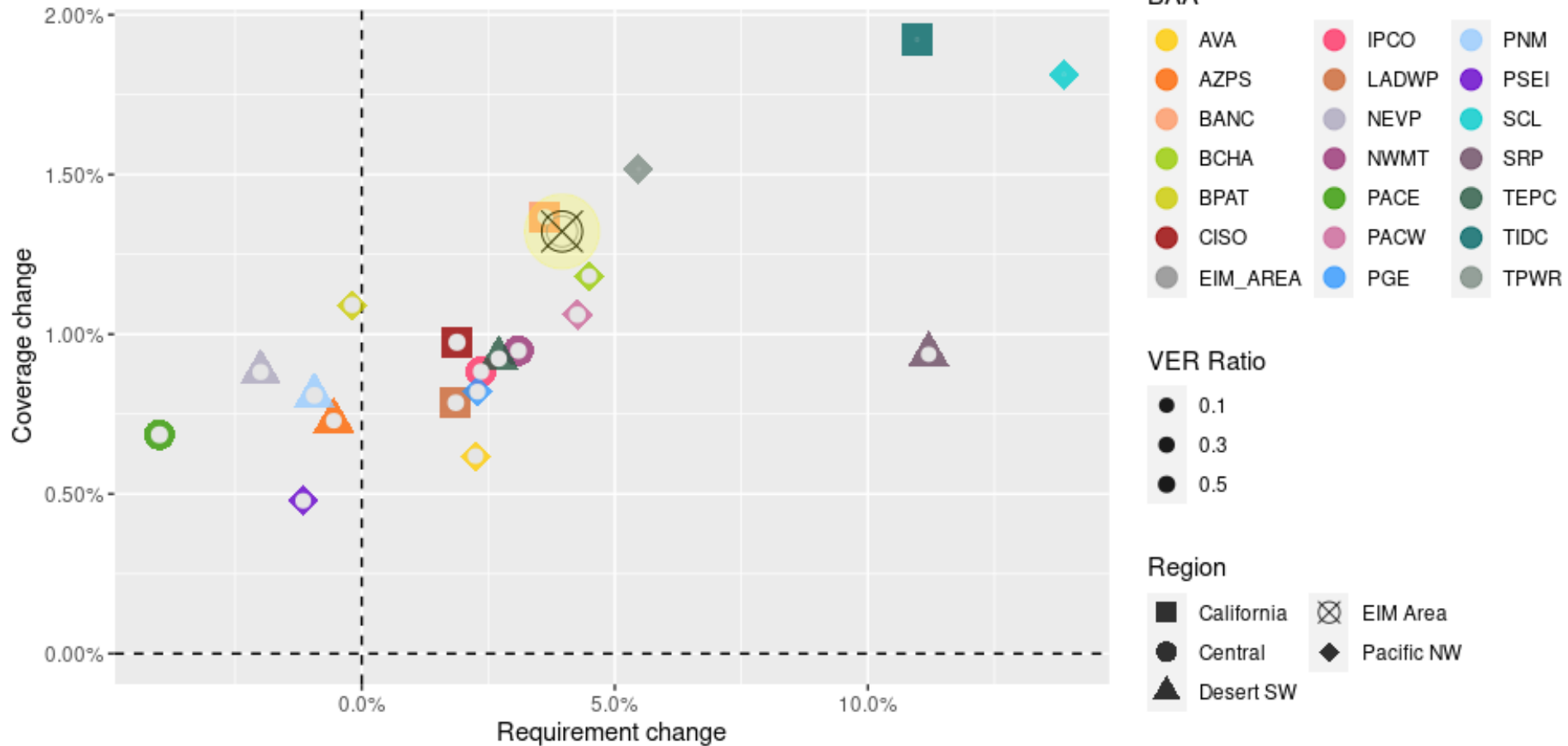Absolute average daily requirements from 2023-02-15 to 2024-01-23

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ENHANCEMENT PERFORMANCE

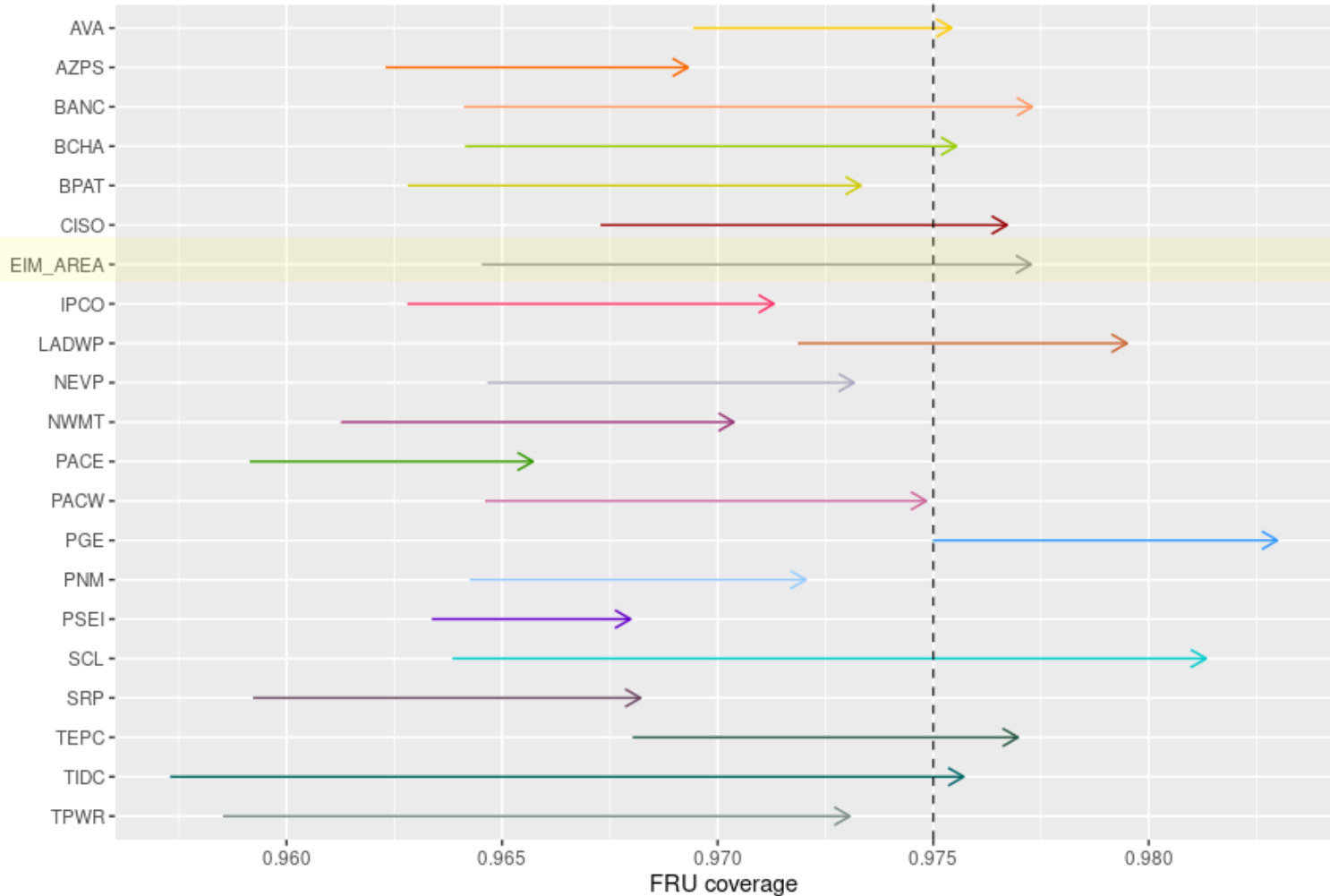# Removing day type and modifying historical sample data improves coverage

Remove day-type and change to symmetric sampling

Data from 05-23-2023 to 01-17-2024

Enhancements improve coverage toward target for all BAAs

Remove day-type and change to symmetric sampling

Data from 05-23-2023 to 01-17-2024

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Improvement shown from status quo -> day type removal -> symmetric

simulation data from 20230523 to 20240116