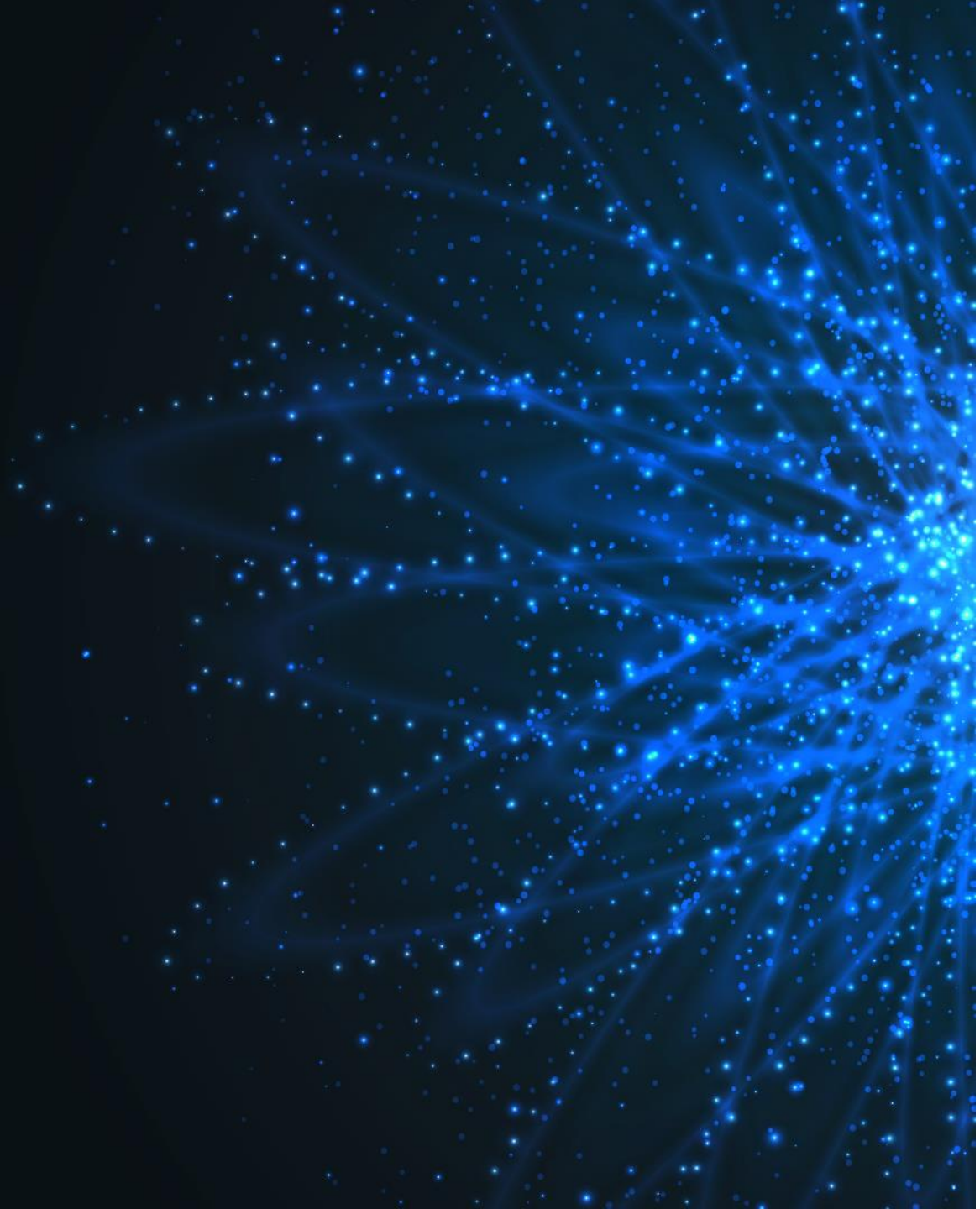

SATELLITE IRRADIANCE MODEL ACCURACY IMPROVEMENTS: ACCESS TO LATEST INPUTS AND >20-YEAR VALIDATION

2020 PV Systems Symposium Webinar

June 24, 2020

Clean Power Research®

SolarAnywhere®

Data

Reduce risk on your solar project

Get the most accurate, bankable solar resource data.

SystemCheck®

Validate PV system performance

Automatically monitor and assess performance of PV systems and fleets.

FleetView®

Effectively integrate solar into your grid

Plan for solar adoption on your distribution system with site-to-feeder-specific PV production.

Forecast

Forecast solar power

Reliably predict production from utility-scale PV with the most accurate, solar-specific forecast.

Today’s presentation

- Motivation
- Input and validation data
- V3.4 model performance
- Key results

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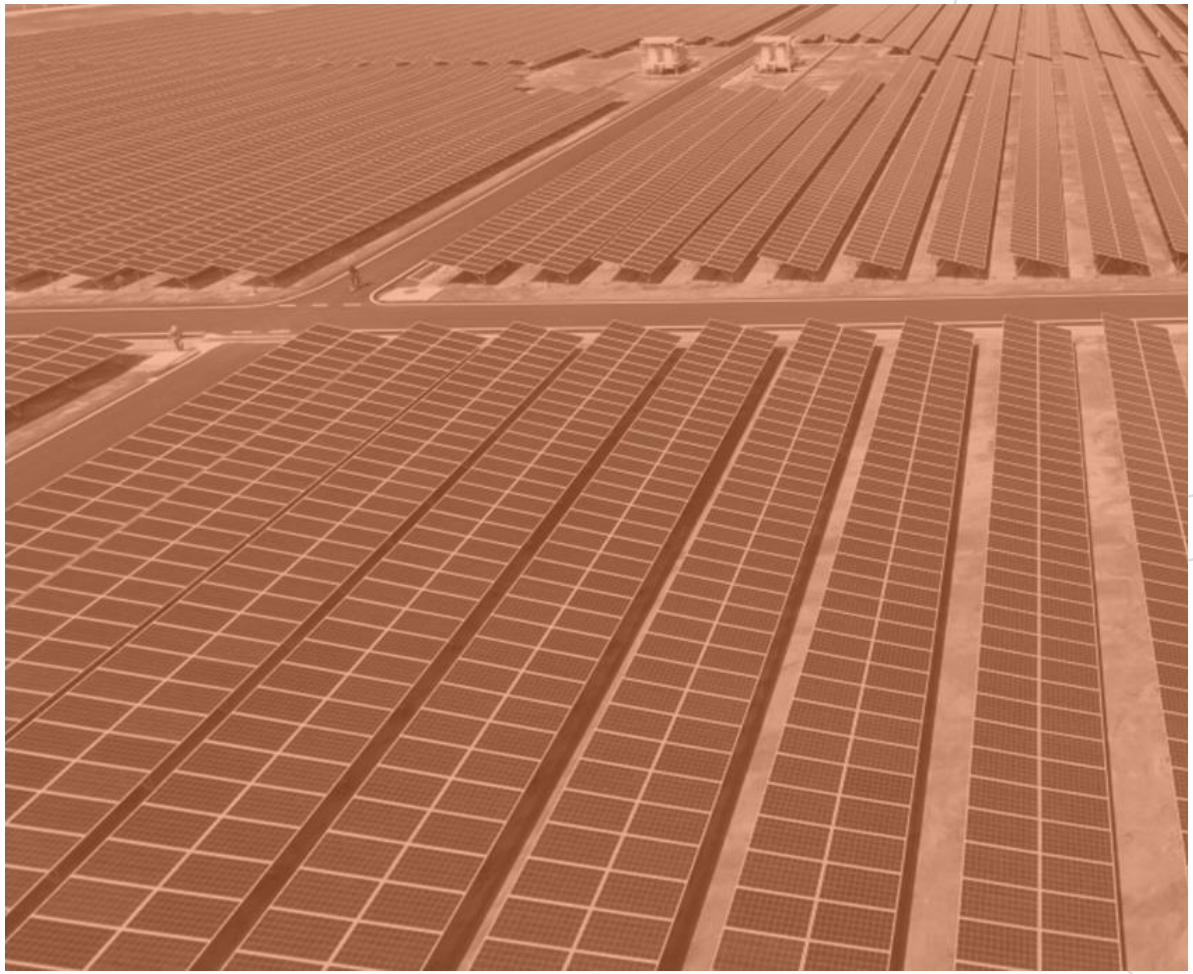
Need for consistent and real-time solar data is increasing



- Benchmarking performance
- Solar resource tuning
- Weather trends

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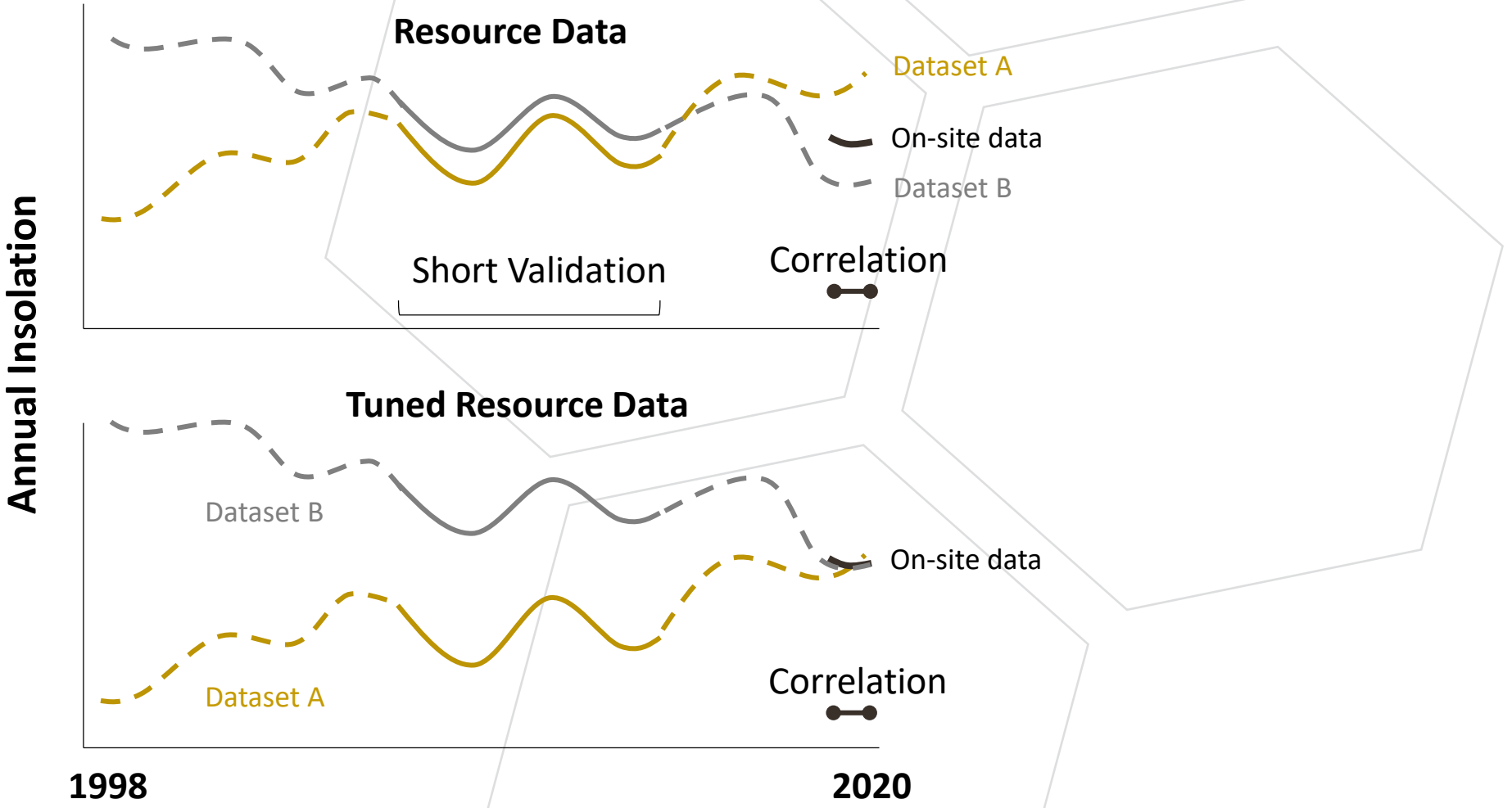
Why temporal consistency matters



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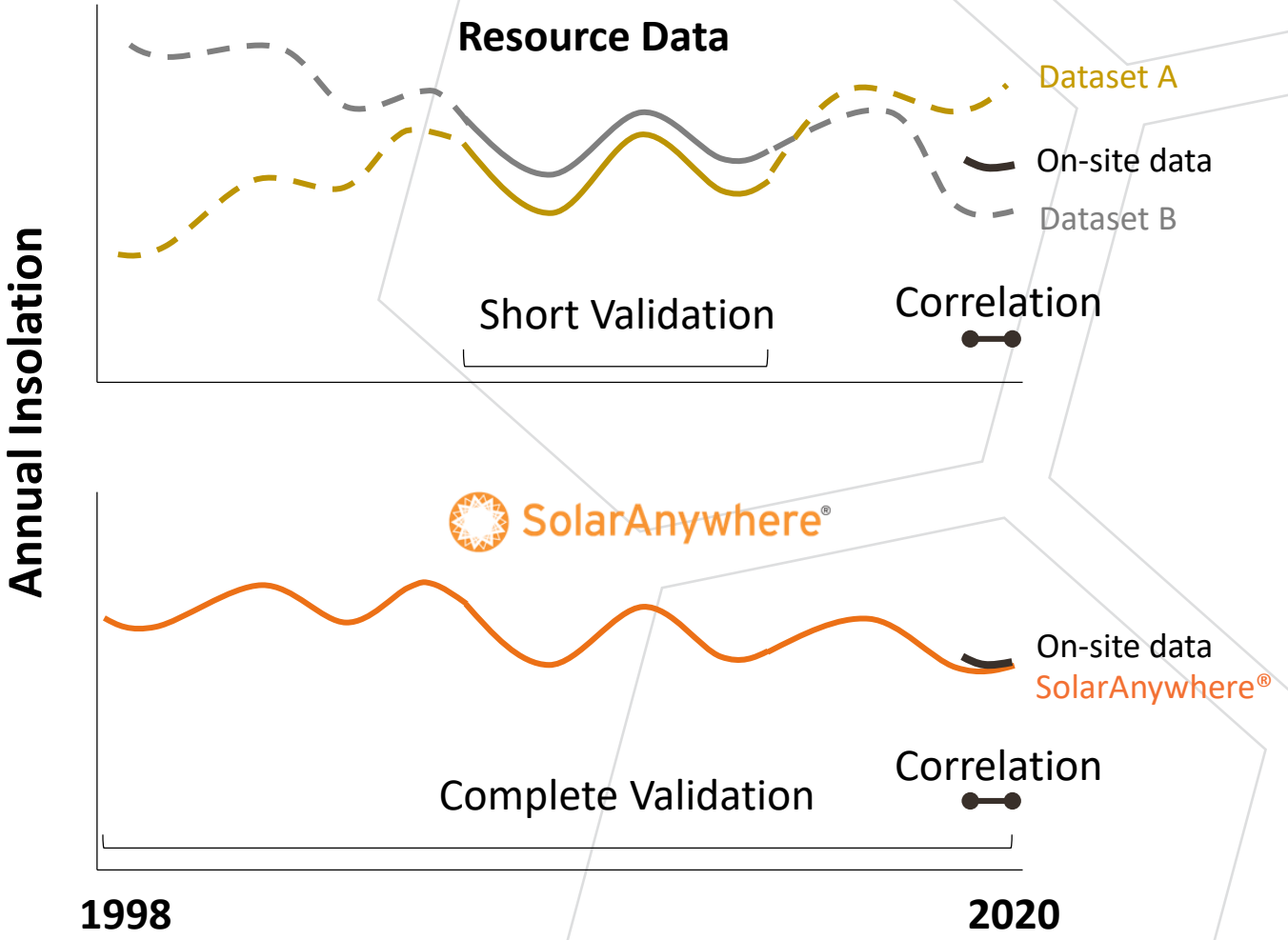
Why temporal consistency matters



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Quality and volume of data enable more accurate models

- New satellites
- Numerical weather models
- 20+ years of ground measurements
- Leveraging software techniques

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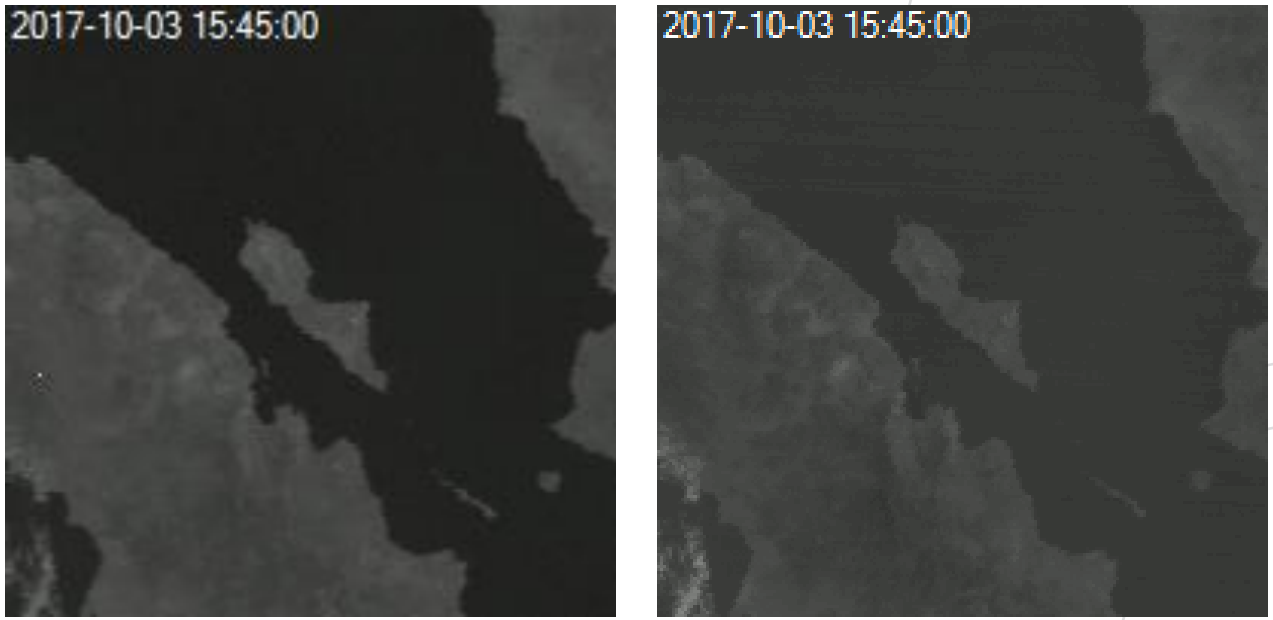
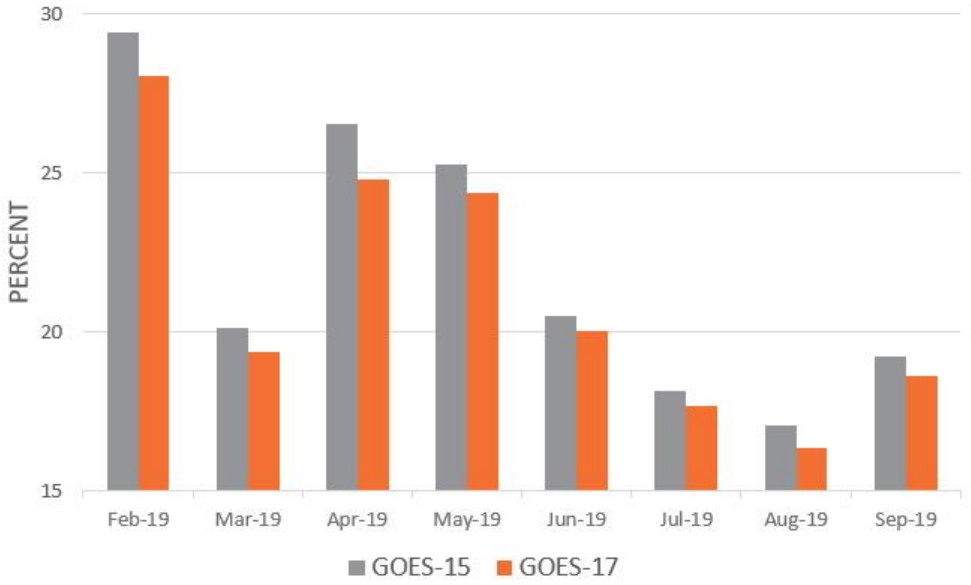
New satellites offer better performance

Comparison of GOES-13 and GOES-16



Half Hourly RMSE of GHI for Western Validation Stations



However, maintaining consistency is critical

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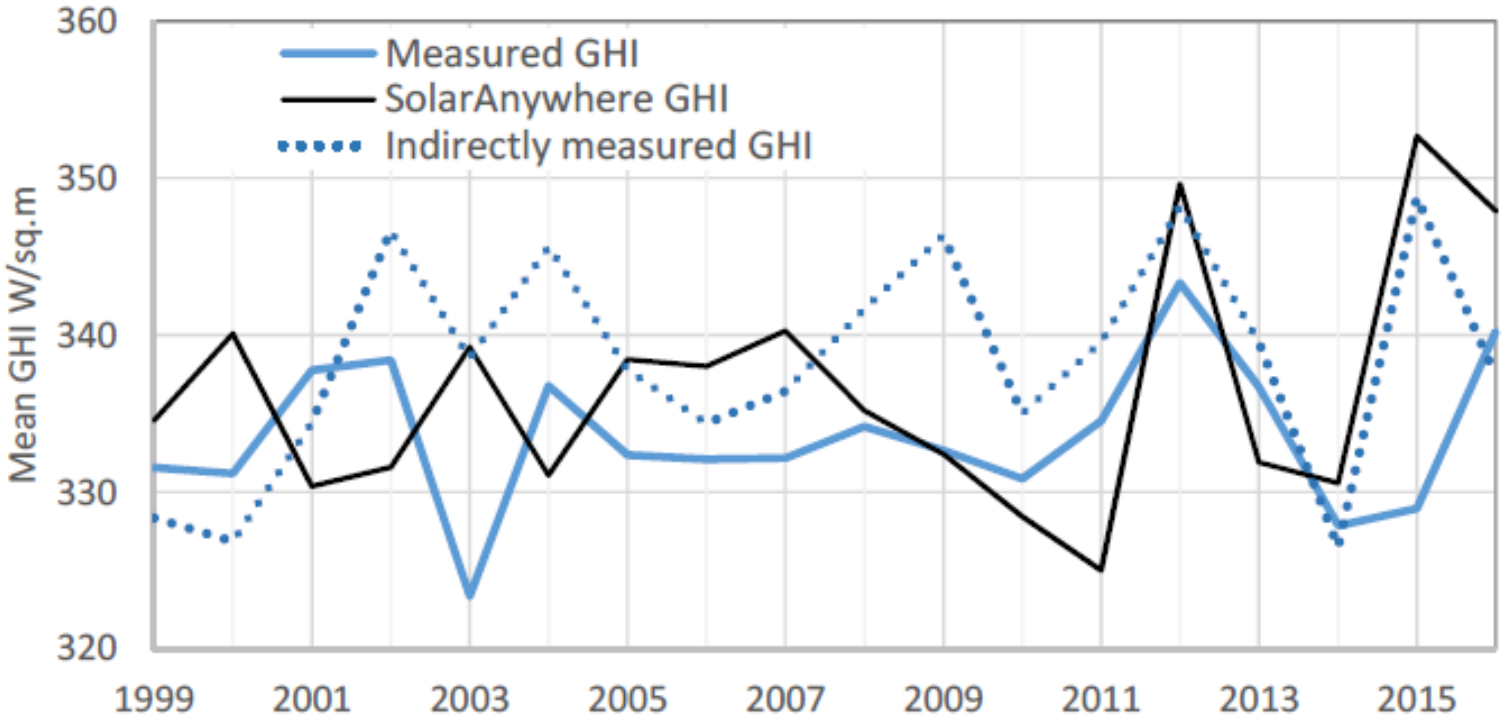
Ground measurements provide an excellent long-term reference, but different biases must be considered



Detecting Calibration Drift at Ground Truth Stations
A Demonstration of Satellite Irradiance Models' Accuracy

Richard Perez[1], James Schlemmer[1], Adam Kankiewicz[2], John Dise[2], Alemu Tadese[2] & Thomas Hoff[2]
[1] Atmospheric Sciences Research Center, SUNY, Albany, New York, 12203, USA
[2] Clean Power Research, Napa, California, 94558, USA

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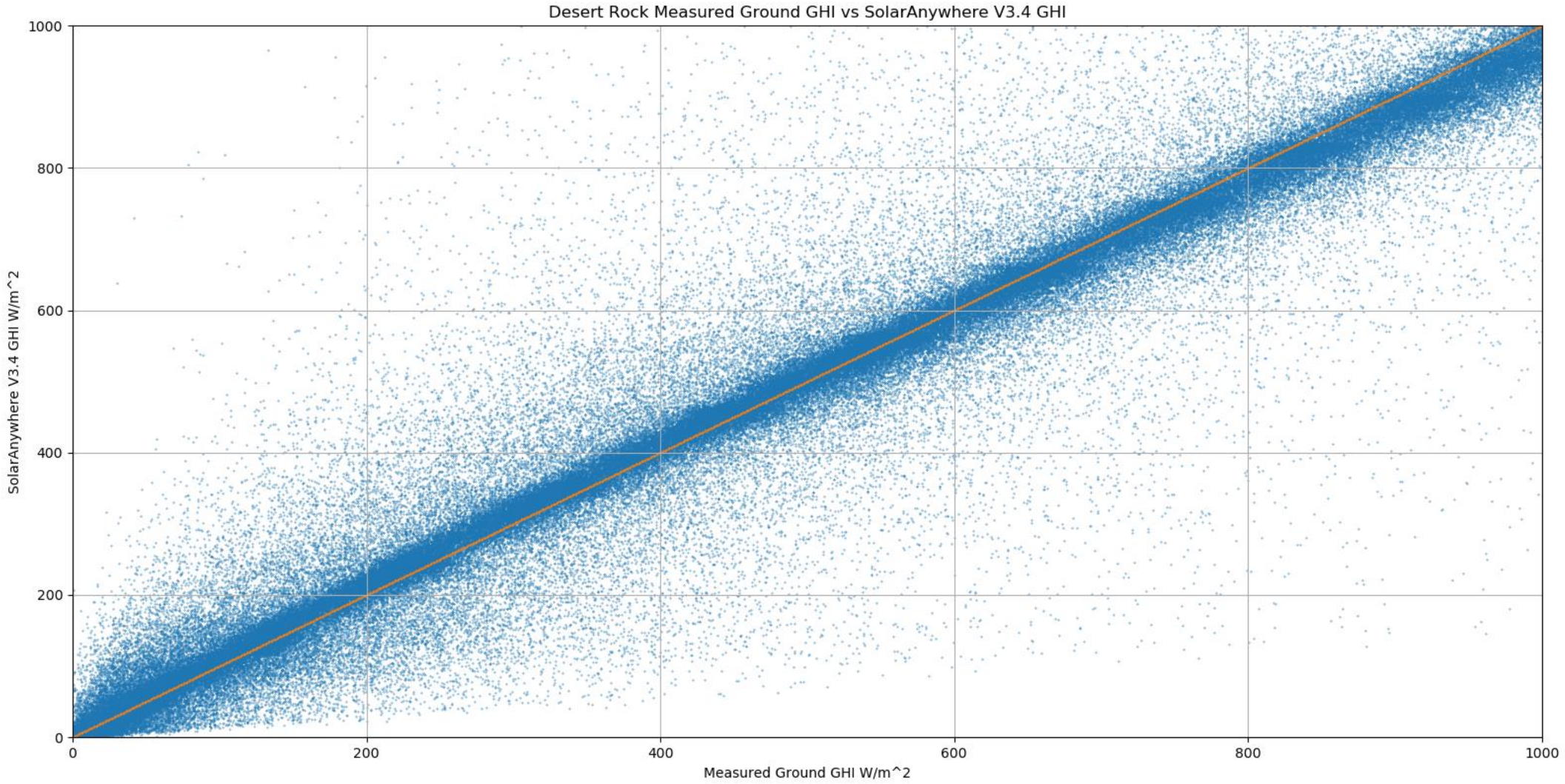
Directional response present in pyranometer data



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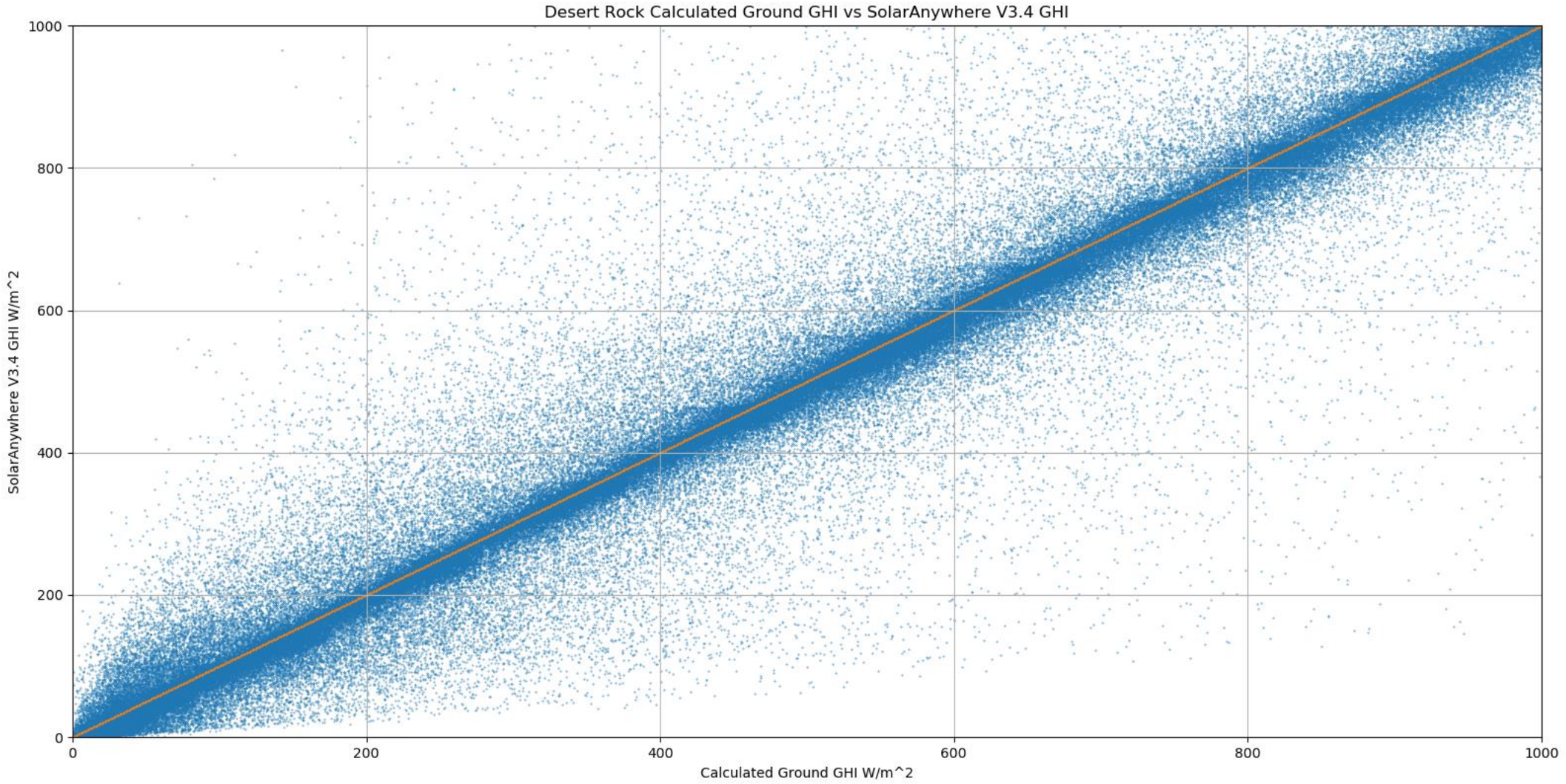
Indirectly measured GHI shows better alignment of clear sky irradiance



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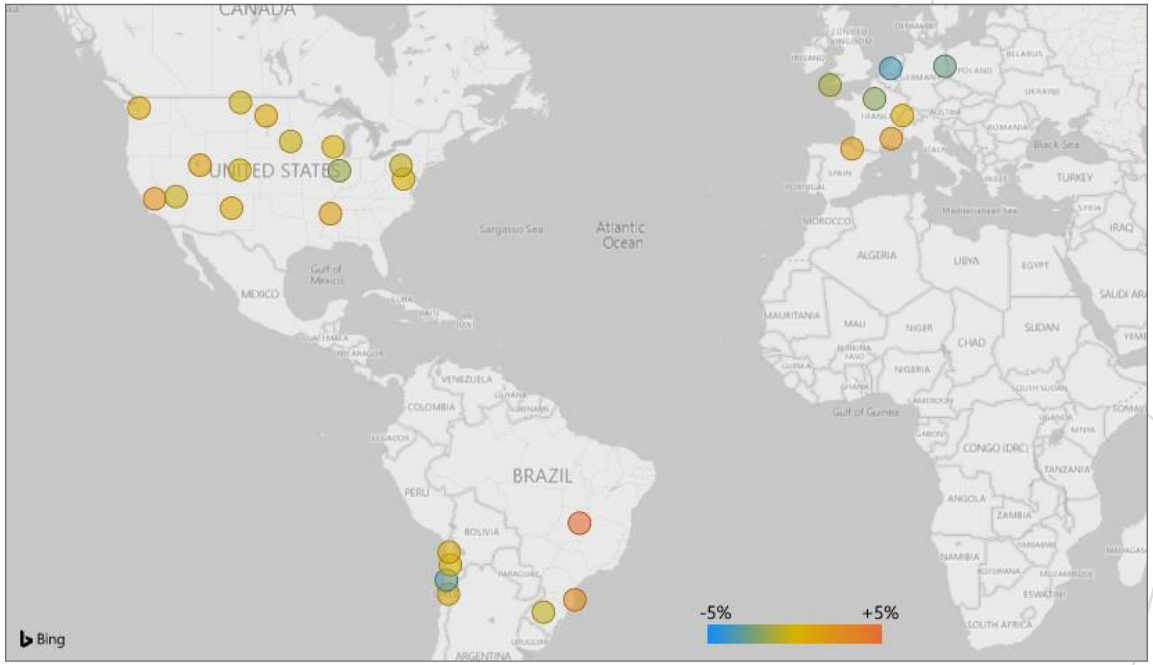
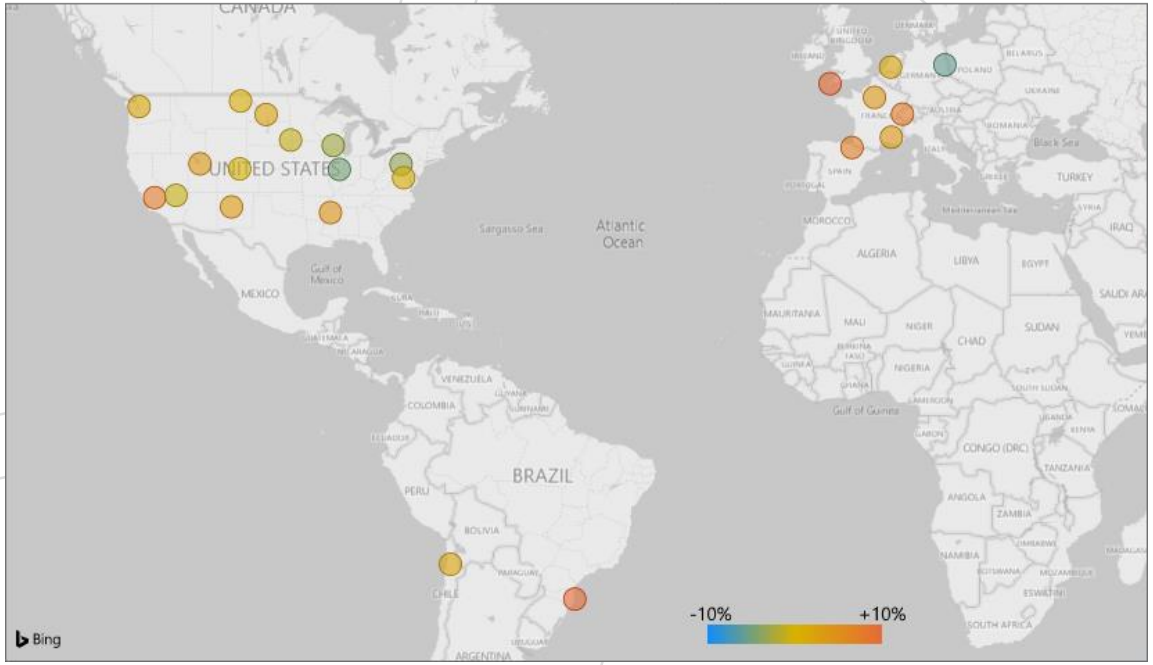
Long-term bias errors provide a quick view of accuracy

Global Horizontal Irradiance (GHI)



Direct Normal Irradiance (DNI)



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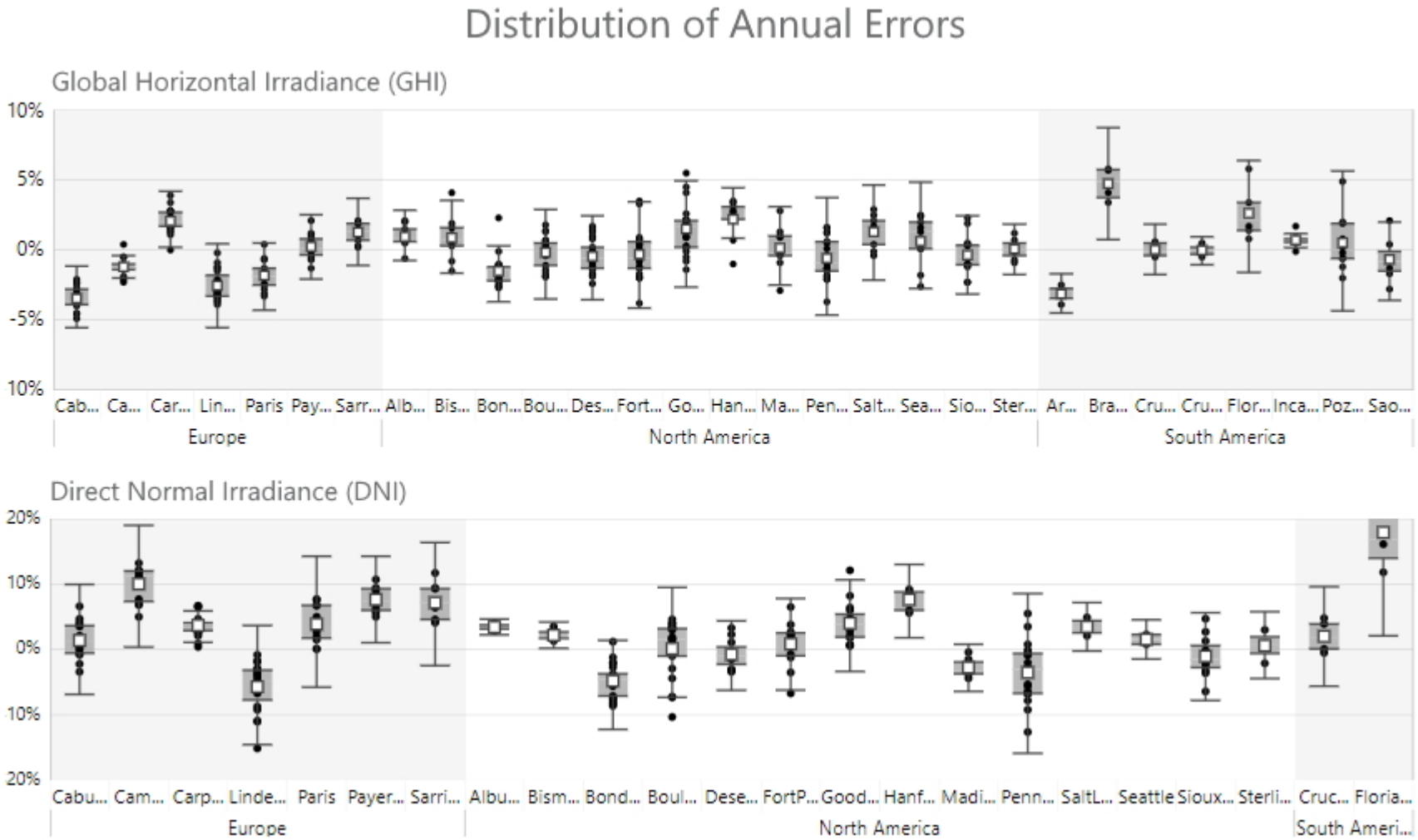
https://www.solaranywhere.com/validation/leadership-bankability/data-validation/

Annual statistics are more important for many use cases



https://www.solaranywhere.com/validation/leadership-bankability/data-validation/

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SolarAnywhere v3.4 shows 18% reduction in distribution of annual errors in North America…

	Annual			
	rMBE	Standard Dev.	95% C.I.	Ref. Years
North America	+0.1%	1.6%	[-3.1%, +3.3%]	207
South America	+0.6%	2.2%	[-3.6%, +4.9%]	48
Europe	-0.8%	2.2%	[-5.0%, +3.4%]	107
All	-0.1%	1.9%	[-3.9%, +3.7%]	362

https://www.solaranywhere.com/validation/leadership-bankability/data-validation/

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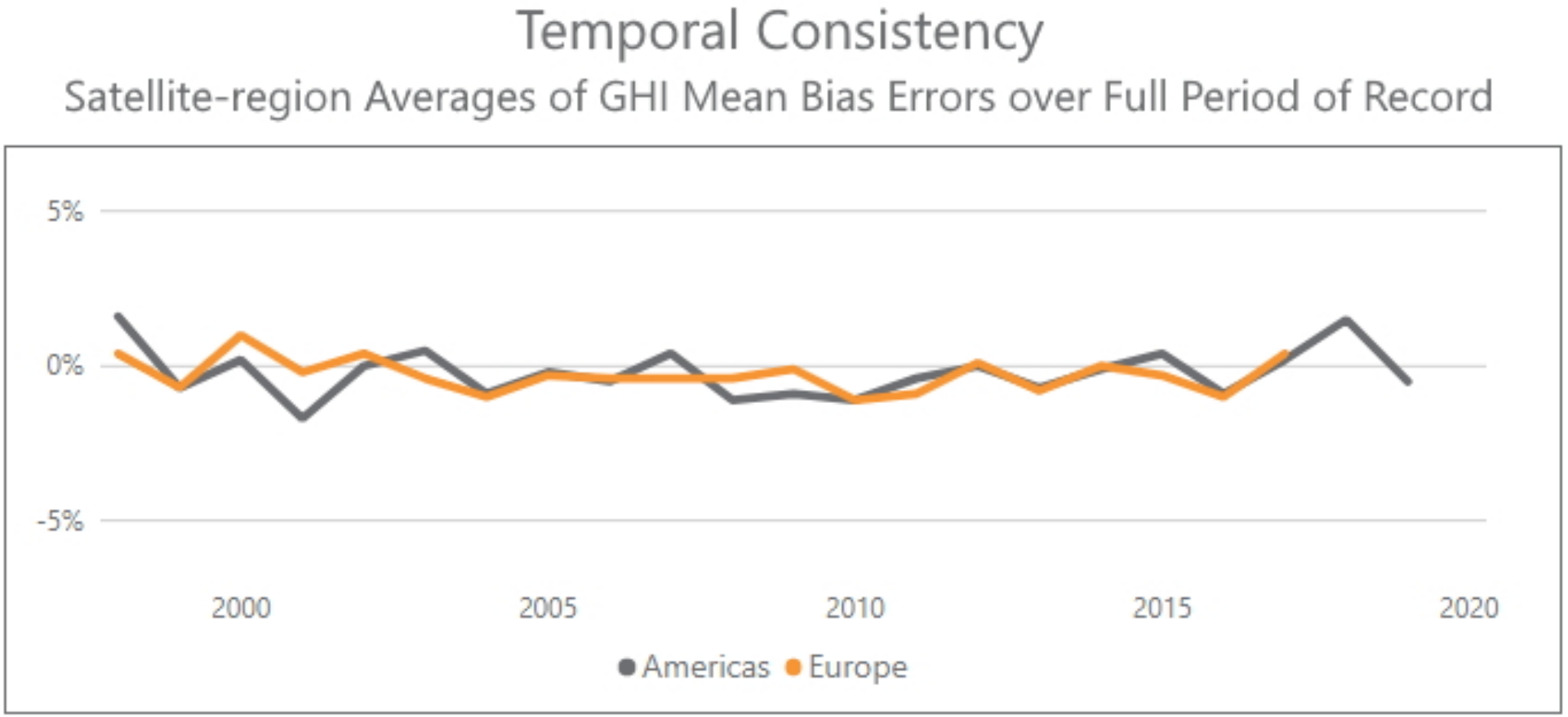
… and excellent consistency



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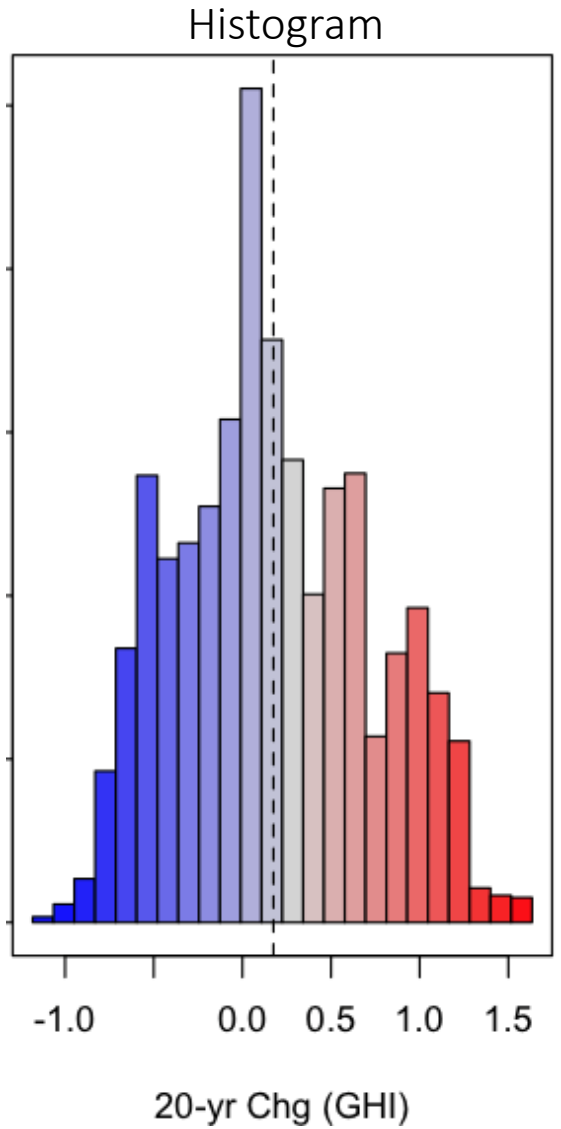
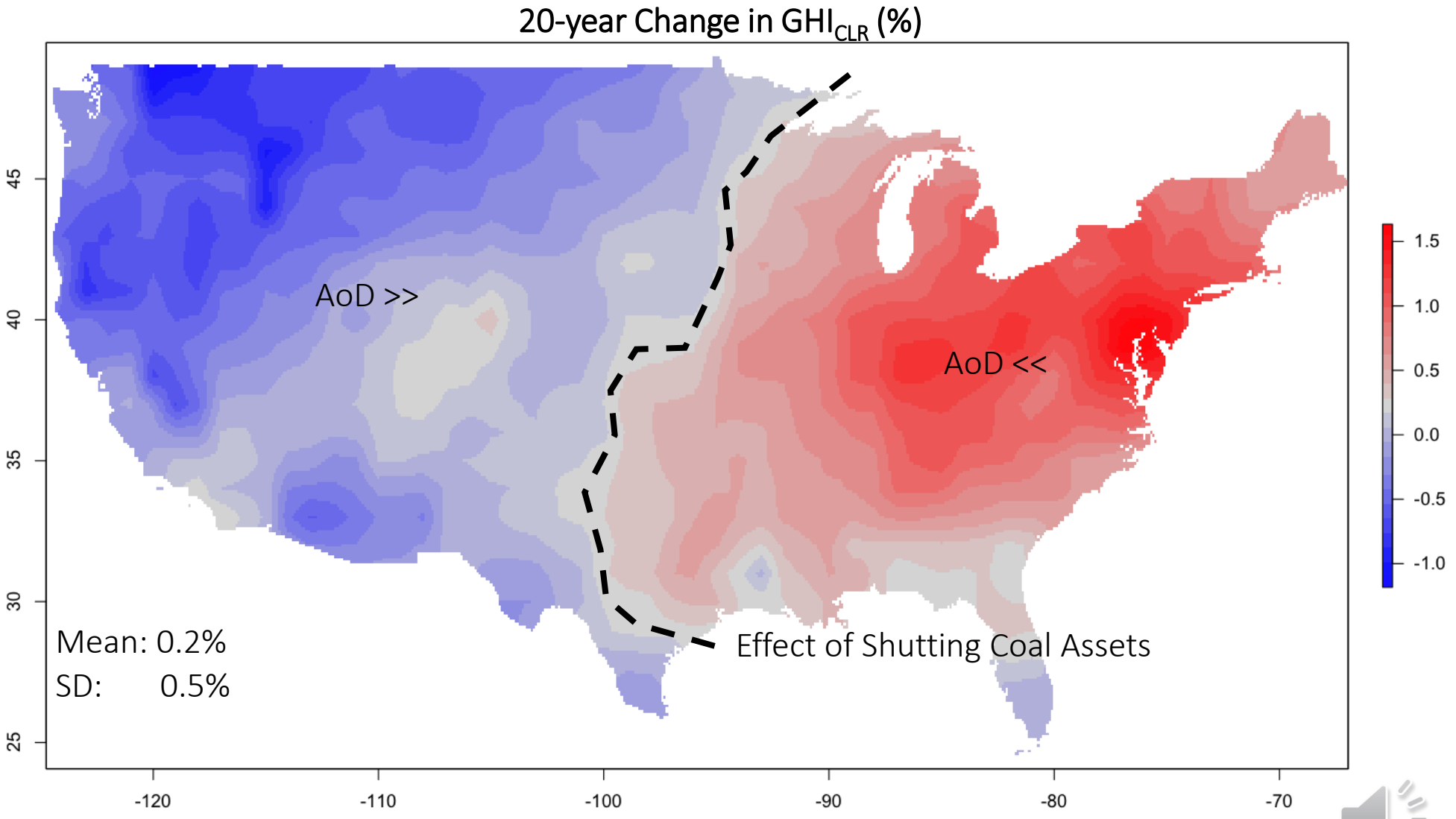
$\Delta GHI_{CLR\ (20\text{-}yr)}$

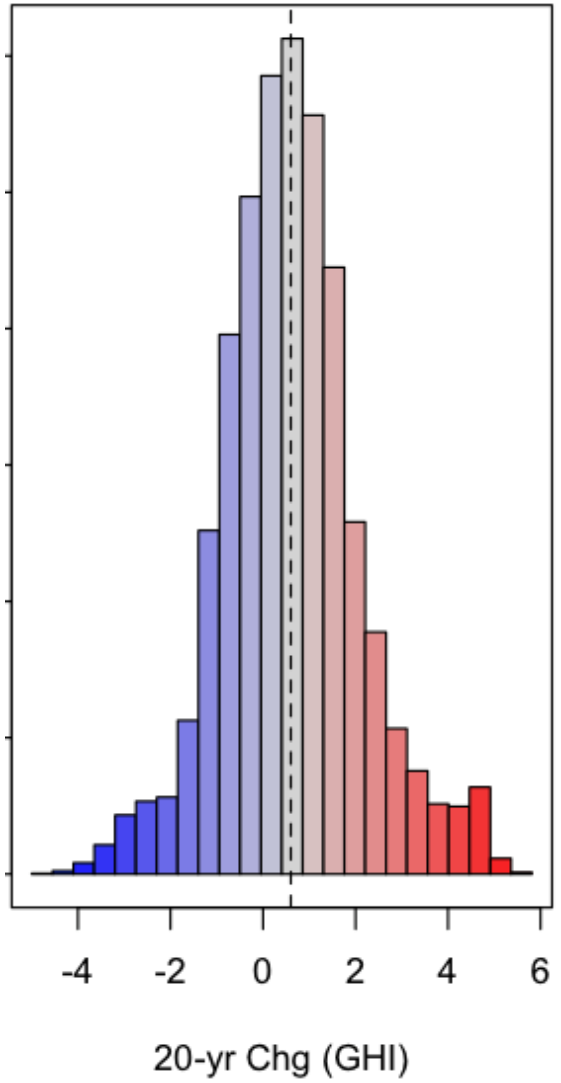




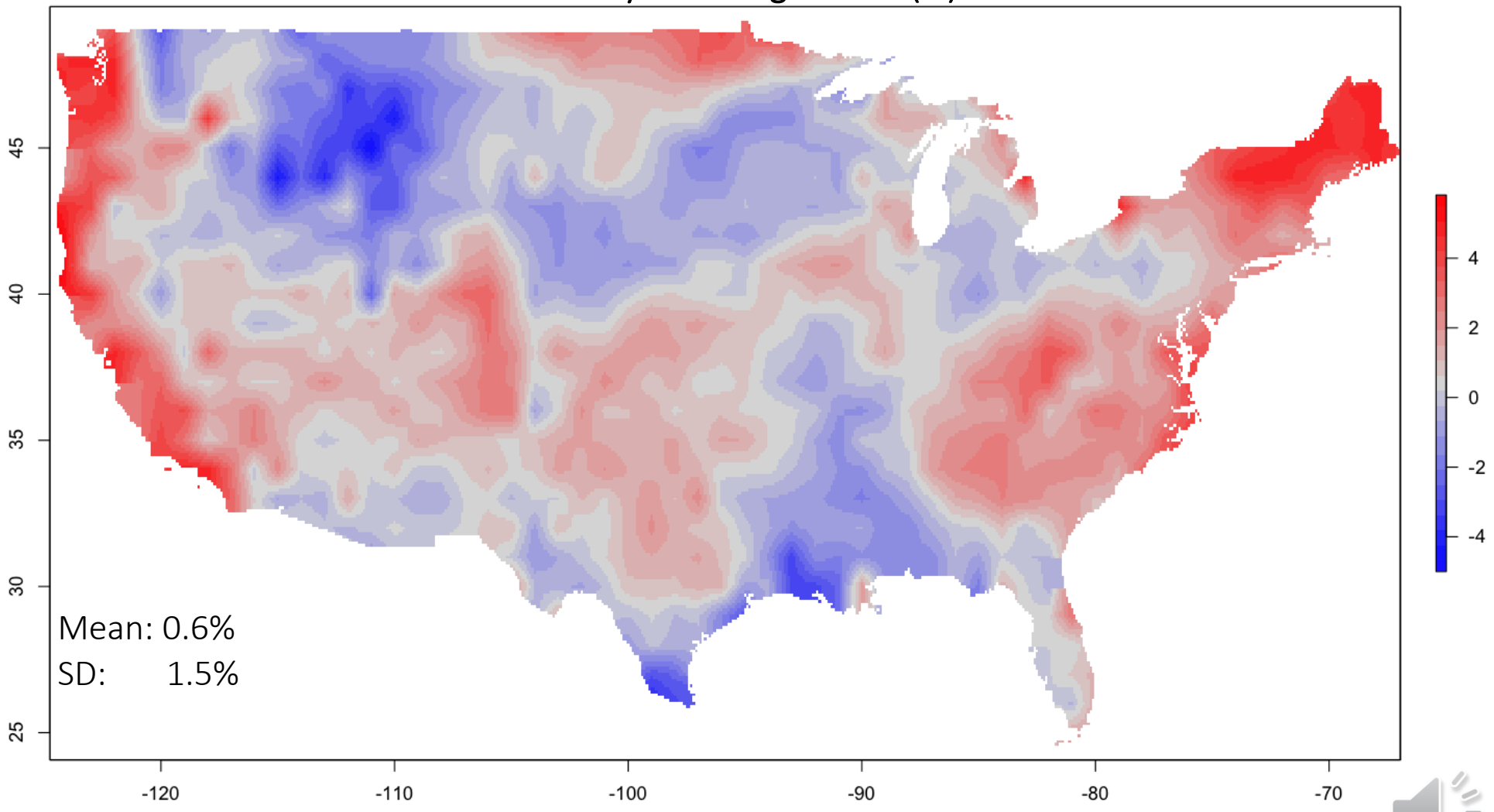
M. Perez et al., Observed recent trends in the solar resource across North America: changing cloud cover, AOD, and the implications for PV yield, IEEE PVSC 2020.

$\Delta GHI_{20\text{-}yr}$

Histogram



20-year Change in GHI (%)



M. Perez et al., Observed recent trends in the solar resource across North America: changing cloud cover, AOD, and the implications for PV yield, IEEE PVSC 2020.

Thank you

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