U.S. DEPARTMENT OF ENERGY | Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

SOLAR ENERGY TECHNOLOGIES OFFICE

American-Made Challenges

SOLAR FORECASTING PRIZE

2022 METEOROLOGY & MARKET DESIGN FOR GRID SERVICES WORKSHOP

Denver, June 2022

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The First Solar Forecasting Prize

- American-Made Challenges
- Announced by Sec. Granholm at SPI 2021
- Promote development and use of probabilistic forecasting tools
- Day-ahead forecasts evaluated:
  - from Feb 14 to March 13
  - at 10 locations in the U.S.
  - using the Solar Forecast Arbiter
- Commercialization Plan
- Award up to
  - 5 winners ($50k each)
  - 5 runners-up ($25k each)

Solar Forecasting Prize – Results

American-Made
SOLAR FORECASTING PRIZE RESULTS

Team Name	Location	Winner Status
Leaptran	San Antonio, TX	Winner
Nimbus AI	Honolulu, HI	Winner
Northview Weather	Danville, VT	Winner
UM (University of Michigan) CLaSP Solar Forecast Team	Ann Arbor, MI	Winner
WenYuan Tang	Apex, NC	Winner
Matt Motoki	Aiea, HI	Runner-Up
Syracuse University Team	Syracuse, NY	Runner-Up

Total Awarded	$300,000

Can you beat the benchmark forecast?

	Number of days (out of 28) beating the benchmark										
	IL	MS	CA	HI	NY	UT	WA	VA	CO	FL	average
Competitors	17	22	23	17	20	22	16	21	19	18	19.5
	18	20	22	21	22	17	10	24	21	17	19.2
	17	18	22	22	19	18	11	23	17	16	18.3
	18	22	17	10	19	18	13	23	19	17	17.6
	17	18	17	14	22	17	11	14	15	9	15.4
	17	16	19	24	15	16	14	18	18	15	17.2
	17	19	11	4	20	17	16	17	16	9	14.6
	13	18	17	2	10	14	21	12	16	20	14.3
	12	15	17	5	15	16	9	13	10	16	12.8
	13	11	20	24	13	13	7	13	19	13	14.6
	14	17	17	17	17	13	11	17	16	13	15.2
	11	6	19	18	8	9	8	12	11	12	11.4
	16	18	13	1	18	15	11	17	16	7	13.2
	11	7	7	4	11	9	14	8	9	18	9.8
	10	6	12	11	9	9	10	12	10	9	9.8
	5	9	7	3	10	6	8	10	8	7	7.3
	6	15	11	3	10	8	12	12	4	4	8.5
	4	4	1	3	6	1	6	3	0	4	3.2

	IL	MS	CA	HI	NY	UT	WA	VA	CO	FL
top-5 average	17.4	20	20.2	16.8	20.4	18.4	12.2	21	18.2	15.4
top-18 average	13.1	14.5	15.1	11.3	14.7	13.2	11.6	14.9	13.6	12.4

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Solar Forecasting 2

Probablistic Solar Power Forecasting

2022 METEOROLOGY & MARKET DESIGN FOR GRID SERVICES WORKSHOP

Denver, June 2022

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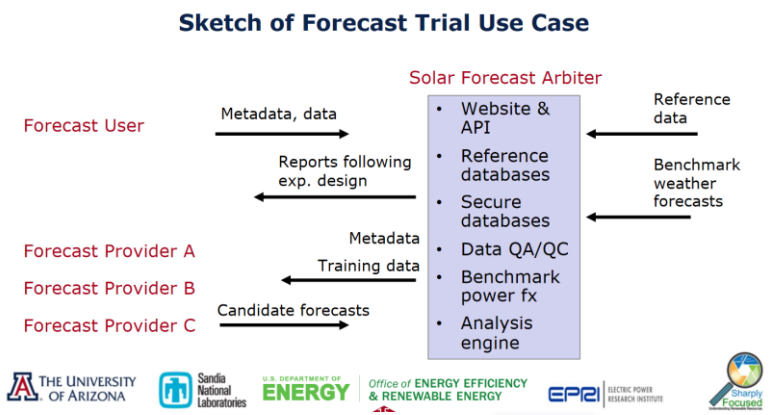
Solar Forecasting 2 Program (2018-2022)

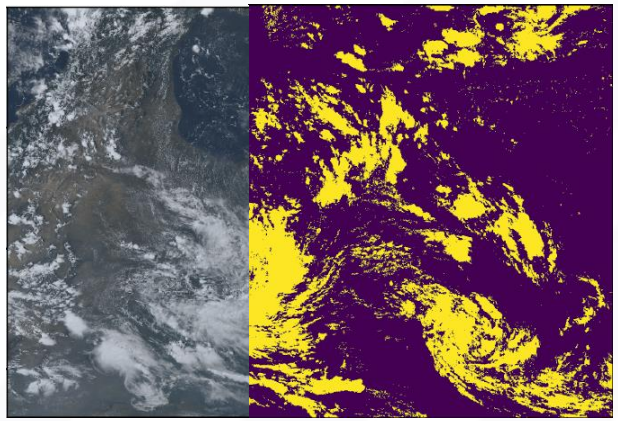
- 8 funded projects (~$15M, incl. cost share)
- 3 Topic Areas

Evaluate



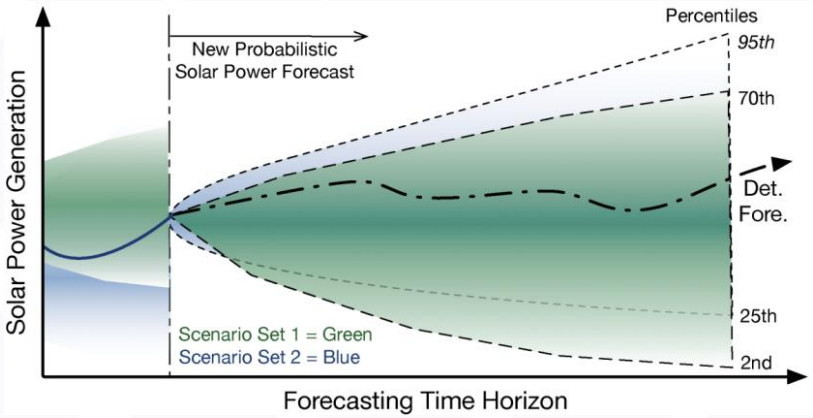
- Complete and cloud-ready
- Transition to EPRI

Improve radiation forecast



- Up to ~20% forecast skill over North American Model
- WRF-Solar v.2

Improve probabilistic power forecast



- Up to 40% forecast skill over Persistence Ensemble
- ERCOT adopts probabilistic forecasts

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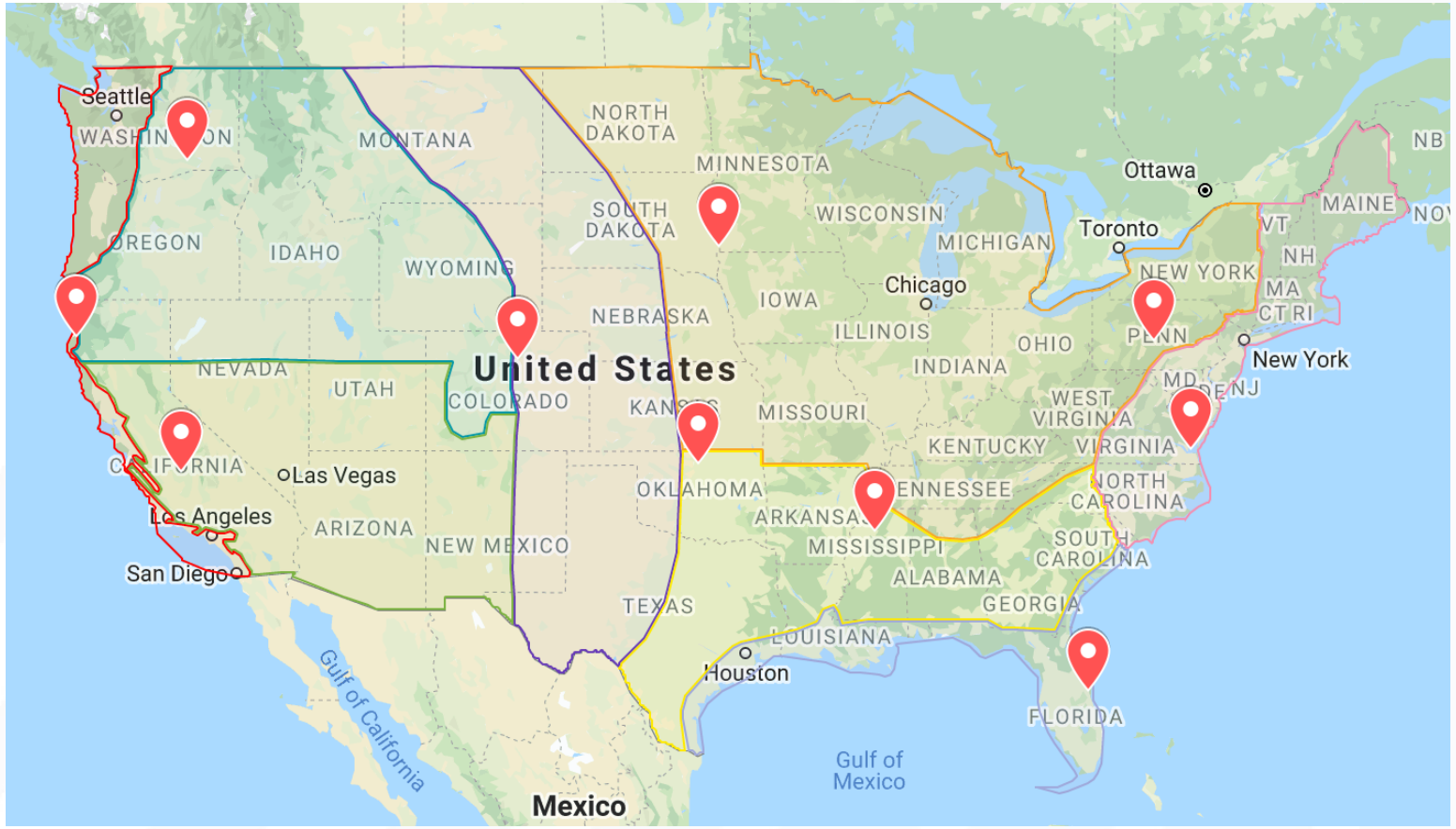
Site selection

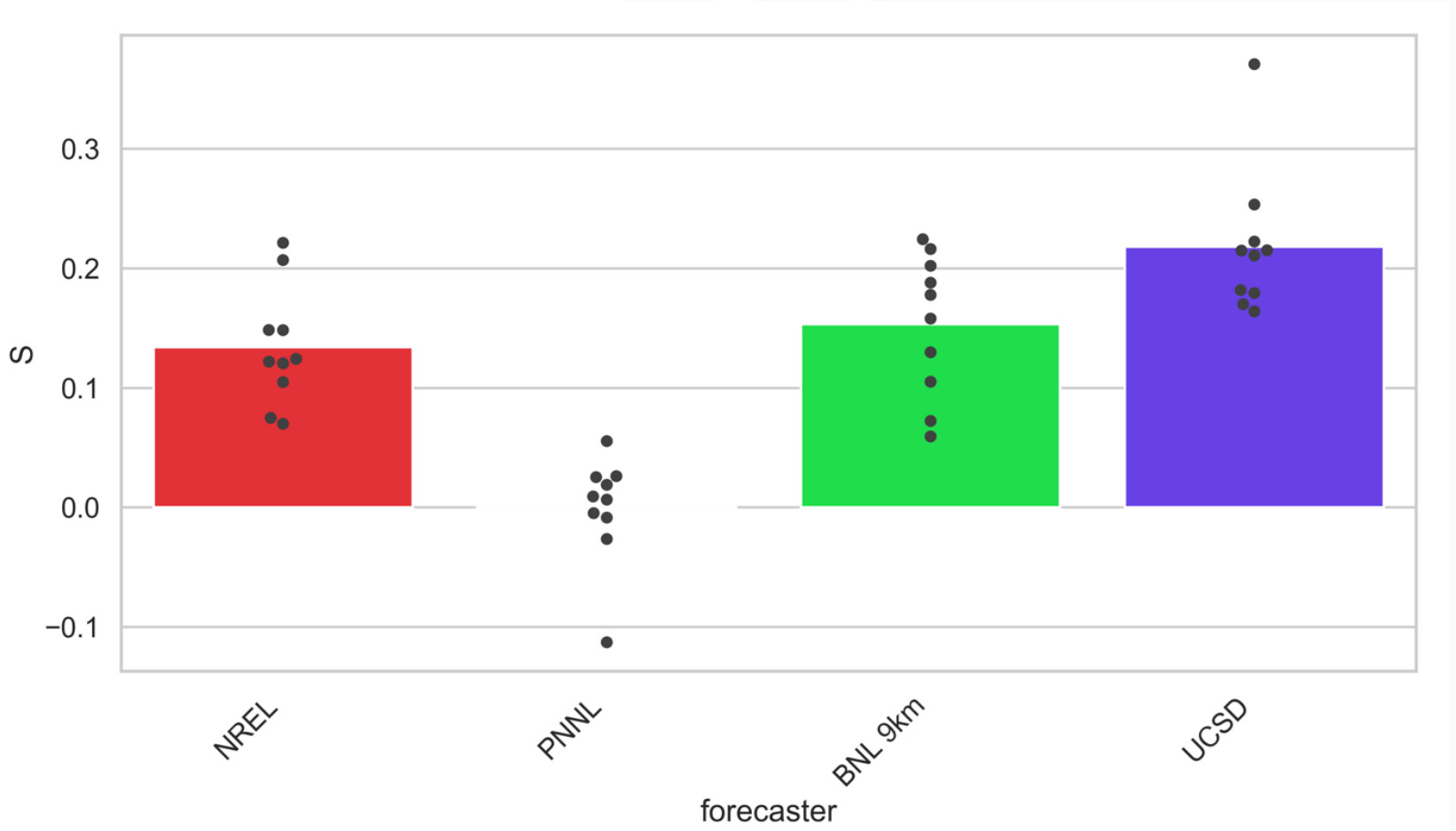
- TA2/3 sites

- 10 sites
- At least 1 site per SFA climate zone
- Table Mountain, CO. SURFRAD
- Hanford, CA. SOLRAD
- Humboldt State, CA. MIDC
- Richland, WA. PNNL
- Sioux Falls, SD. SURFRAD
- Lamont, OK. ARM
- Goodwin Creek, MS. SURFRAD
- Cocoa Beach, FL. DOE RTC
- Langley, VA. NASA
- Penn State, PA. SURFRAD



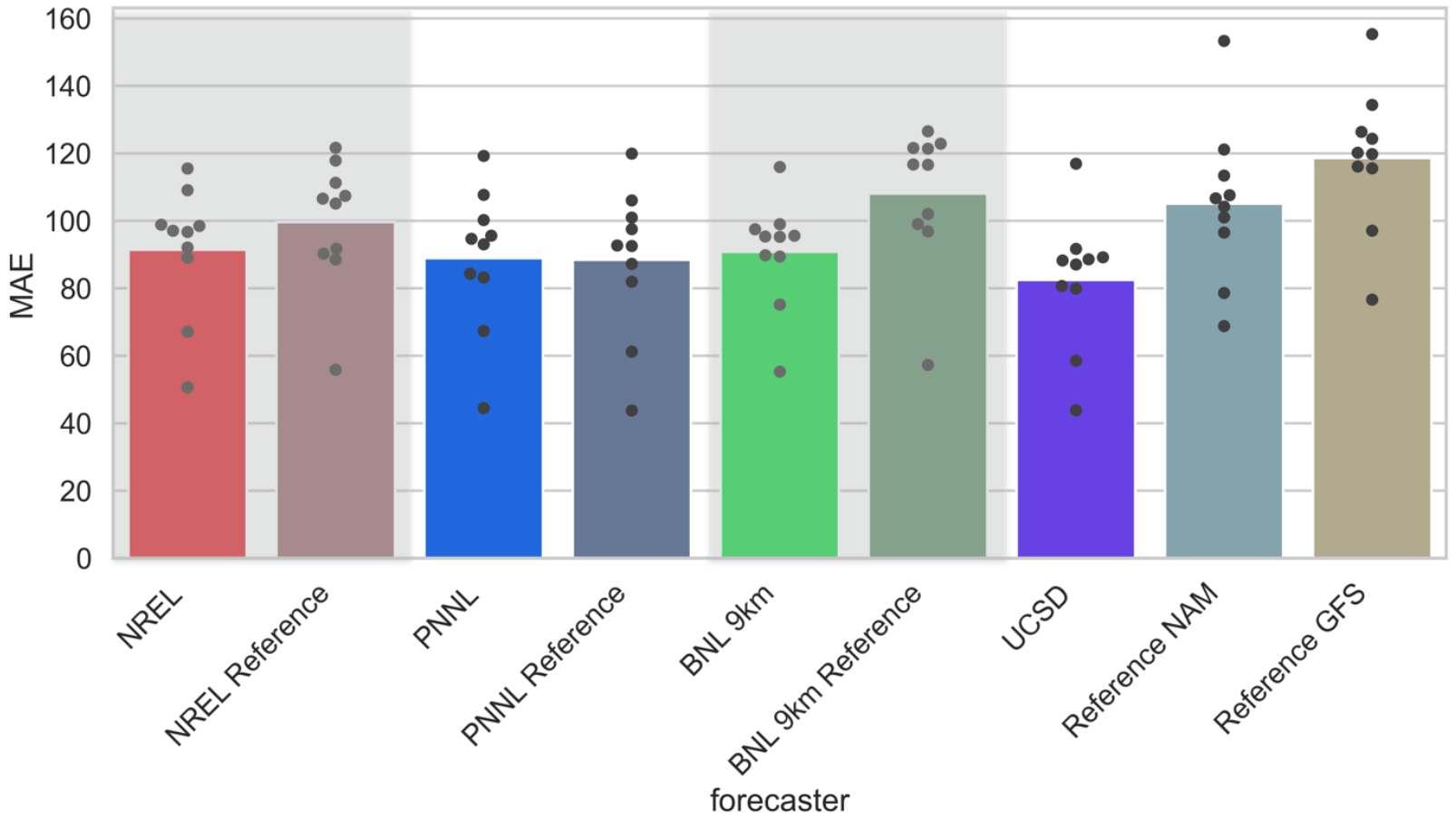
Topic Area 2 results

- Total **GHI skill** scores for 2018
- Bars = average skill across all sites
- Points = skill at each site



Topic Area 2 results

- Total TA2 **GHI MAE** scores for 2018
- Bars = average MAE across all sites
- Points = MAE at each site



Topic Area 3 Results

- Total CRPS Skill at 9/10 sites

GHI

forecaster	EPRI	JHU	NREL
Cocoa Beach	4.2		24.1
Goodwin Creek	15.1		55.3
Hanford CA	33.5		41.0
Humboldt State	30.5		40.1
Lamont OK	31.1		44.9
Penn State	37.3		49.0
Richland WA	43.8		53.1
Sioux Falls	41.8		55.9
Table Mountain	30.4		40.7
mean	29.7		44.9

DNI

forecaster	EPRI	JHU	NREL
Cocoa Beach	23.1	26.0	25.6
Goodwin Creek	28.8	38.9	58.3
Hanford CA	28.1	-6.7	20.7
Humboldt State	42.7	36.4	44.7
Lamont OK	42.7	26.3	44.7
Penn State	50.2	53.4	55.6
Richland WA	50.3	25.0	52.0
Sioux Falls	44.5	40.6	56.4
Table Mountain	38.5	18.8	41.2
mean	38.8	28.7	44.4