

Zone 3 CRPS

July 07, 2020

This report of solar forecast accuracy was automatically generated using the [Solar Forecast Arbiter](#). Please see our GitHub repository for [known issues](#) with the reports or to create a new issue.

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1 Report Metadata

- Name: Zone 3 CRPS
- Start: 2020-01-01 08:00:00+00:00
- End: 2020-06-30 23:59:00+00:00
- Generated at: 2020-07-07 01:19:04+00:00

2 Data

This report includes forecast and observation data available from 2020-01-01 08:00:00+00:00 to 2020-06-30 23:59:00+00:00.

2.1 Observations and Forecasts

The table below shows the observation, forecast, and reference forecast triplets analyzed in this report. The reference forecast is listed as *None* if it was not selected during the report configuration. The table includes the unprocessed observation, forecast, and reference forecast *interval label* (beginning, ending, instantaneous) and *interval length*. If these quantities do not match, the Solar Forecast Arbiter must align and/or resample the data before computing error statistics. The Solar Forecast Arbiter aligns the observation data to the forecast data. Reference forecasts must have the same interval label, length, and type as the associated forecasts. The aligned and resampled parameters are also shown below, including a unique name for the aligned and resampled observation/forecast pair that appears in the metrics plots, tables, and CSV download.

Plots showing the realigned and resampled time series for the observation and forecast data as well as the distribution of forecast versus observation data are available on the web version of this report available [here](#).

Table 1: Table of data alignment parameters.

Aligned Pairs			Observations			Forecasts			Reference Forecasts		
Name	Interval Label	Interval Length	Name	Interval Label	Interval Length	Name	Interval Label	Interval Length	Name	Interval Label	Interval Length
Desert Rock NV Day Ahead GEFS ghi	ending	60.0 min	Desert Rock NV ghi	ending	1.0 min	Desert Rock NV Day Ahead GEFS ghi	ending	60.0 min	None		
Albuquerque New Mexico Day Ahead GEFS ghi	ending	60.0 min	Albuquerque New Mexico ghi	ending	1.0 min	Albuquerque New Mexico Day Ahead GEFS ghi	ending	60.0 min	None		
Hanford California Day Ahead GEFS ghi	ending	60.0 min	Hanford California ghi	ending	1.0 min	Hanford California Day Ahead GEFS ghi	ending	60.0 min	None		
University of Arizona OASIS Day Ahead GEFS ghi	ending	60.0 min	University of Arizona OASIS ghi	ending	1.0 min	University of Arizona OASIS Day Ahead GEFS ghi	ending	60.0 min	None		
University of Nevada Las Vegas Day Ahead GEFS ghi	ending	60.0 min	University of Nevada Las Vegas ghi	ending	1.0 min	University of Nevada Las Vegas Day Ahead GEFS ghi	ending	60.0 min	None		

2.2 Data Validation

The Solar Forecast Arbiter applied its data validation toolkit to the observation data. The table below shows the selected filters and the number of observations that were removed from each forecast/observation pair.

These intervals were removed from the raw time series before resampling and realignment. For more details on the data validation results for each observation, please see the observation page linked to in the table above.

Data providers may elect to reupload data to fix issues identified by the validation toolkit. The metrics computed in this report will remain unchanged, however, a user may generate a new report after the data provider submits new data. The online version of this report verifies that the data was not modified after the metrics were computed.

Table 2: Table of data validation results.

		Quality Flag
Aligned Pair	Observation	NIGHTTIME
Desert Rock NV Day Ahead GEFS ghi	Desert Rock NV ghi	133058
Albuquerque New Mexico Day Ahead GEFS ghi	Albuquerque New Mexico ghi	133092
Hanford California Day Ahead GEFS ghi	Hanford California ghi	133075
University of Arizona OASIS Day Ahead GEFS ghi	University of Arizona OASIS ghi	133240
University of Nevada Las Vegas Day Ahead GEFS ghi	University of Nevada Las Vegas ghi	133071

2.3 Data Resampling and Alignment

The Solar Forecast Arbiter’s preprocessing applies the following operations to the data:

1. Apply the data validation tests and exclude the matched data.
2. For deterministic forecasts with interval lengths that are longer than the observations interval lengths,
 - (a) Resample the observations to the forecast using the mean.
 - (b) Remove resampled observation data if more than 10% of the points in the resampled interval are missing. For example, if 1-minute observations are resampled to 60-minute means, then a 60 minute period must have no more than 6 minutes of missing data.
3. Remove times that do not exist in both the resampled observations, the forecasts, and, if selected, the reference forecasts.

The table below summarizes the data preprocessing results.

Users may wish to fix the data issues by having new or missing data uploaded. The metrics computed in this report will remain unchanged, however, a user may generate a new report after the data provider submits new data.

Table 3: Table of data preprocessing results.

	TOTAL FLAGGED VALUES DISCARDED	Number of points				
		Total Forecast Values Dropped	Probabilistic- Forecast Values Discarded by Alignment	Observation Values Discarded by Alignment	Probabilistic- Forecast Undefined Values	Observation Undefined Values
Desert Rock NV Day Ahead GEFS ghi	133429	0	1832	220	0	0
Albuquerque New Mexico Day Ahead GEFS ghi	133128	0	1901	149	0	0
Hanford California Day Ahead GEFS ghi	135454	0	1889	201	0	0
University of Arizona OASIS Day Ahead GEFS ghi	133240	0	1868	159	0	0
University of Nevada Las Vegas Day Ahead GEFS ghi	133072	0	1834	206	0	0

3 Metrics

The table below shows the normalization, deadband, and cost parameters used in calculating the metrics. The *normalization* factor is applied when calculating the metrics NMAE, NMBE, and NRMSE. The normalization is in the same units as the forecast and observation. By default, AC power forecasts are normalized by AC capacity and DC power forecasts are normalized by DC capacity. Normalization for all other forecasts is undefined, and the metric values are set to **nan**. The *deadband* accounts for observation uncertainty by setting the error (forecast - observation) equal to 0 for any point that is within the deadband. The error is unchanged for any point that is outside the deadband. The deadband is specified as a percentage of the observation value at each time. A value of **None** indicates that no deadband was applied for that observation/forecast pair. The deadband is accounted for in the following metrics: MAE, MBE, RMSE, MAPE, NMAE, NMBE, NRMSE, Skill, Cost. It is ignored for all other metrics. The Cost metric is calculated using the set of cost models defined by *cost parameters*. See the [solarforecastarbiter-core documentation](#) for a description of how these cost parameters are used to calculate Cost.

Table 4: Table of metrics metadata.

Name	Normalization	Deadband(%)	Cost Parameters
Desert Rock NV Day Ahead GEFS ghi	nan	None	
Albuquerque New Mexico Day Ahead GEFS ghi	nan	None	
Hanford California Day Ahead GEFS ghi	nan	None	
University of Arizona OASIS Day Ahead GEFS ghi	nan	None	
University of Nevada Las Vegas Day Ahead GEFS ghi	nan	None	

A table of metrics over the entire study period and metric figures are shown below. Metrics may be downloaded in CSV format through the HTML version of this report available [here](#).

Table 5: Table of Total metrics.

Forecast	CRPS
Desert Rock NV Day Ahead GEFS ghi	21.7
Albuquerque New Mexico Day Ahead GEFS ghi	29.6
Hanford California Day Ahead GEFS ghi	19.3
University of Arizona OASIS Day Ahead GEFS ghi	17.5
University of Nevada Las Vegas Day Ahead GEFS ghi	18.3

3.1 Total Analysis

Metric totals for the entire selected period.

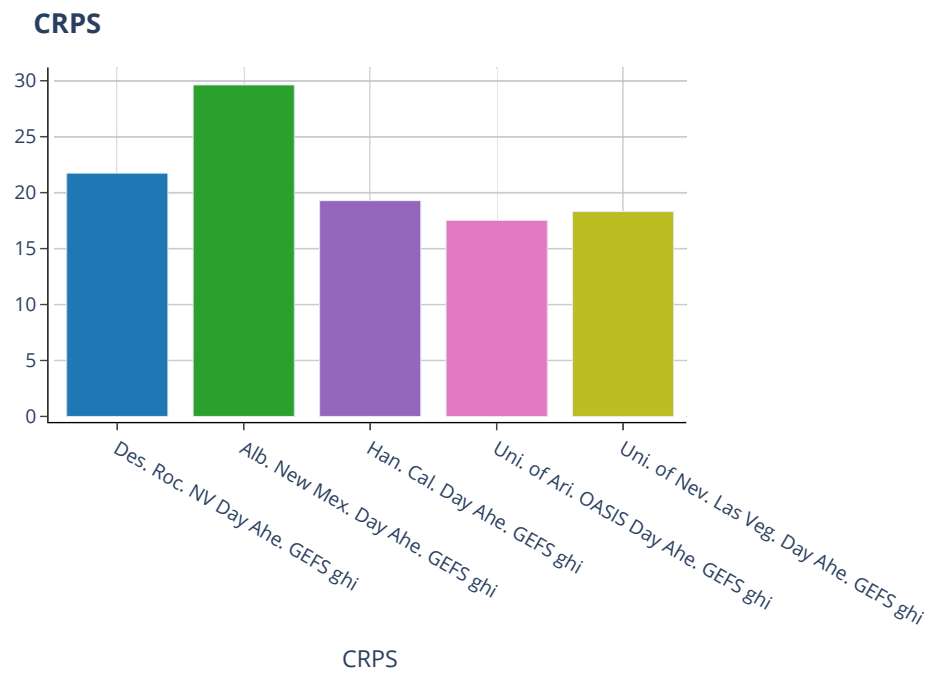


Figure 1: Total CRPS for all forecasts.

3.2 Year Analysis

Metrics per year.

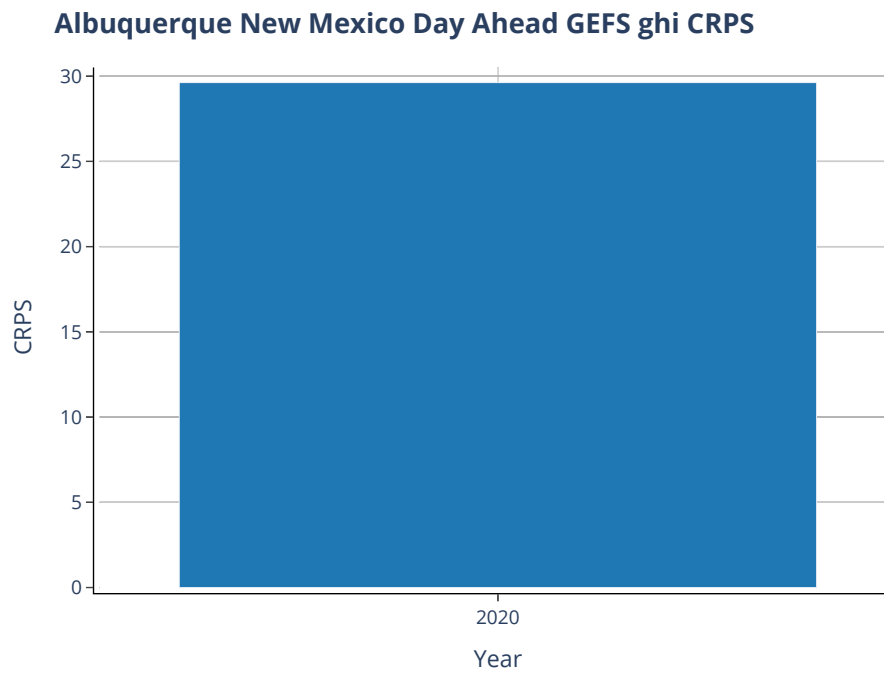


Figure 2: CRPS by year for Albuquerque New Mexico Day Ahead GEFS ghi.

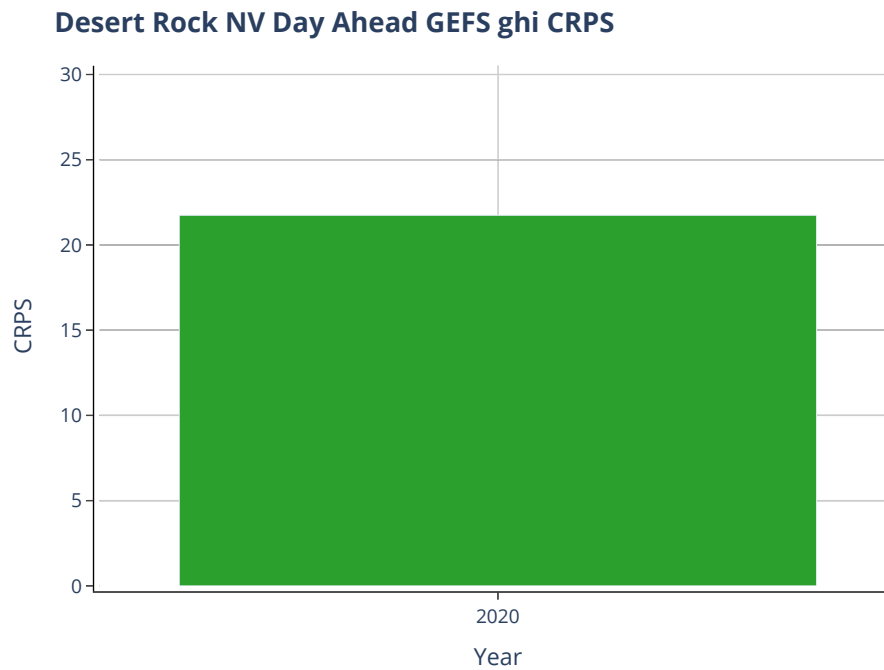


Figure 3: CRPS by year for Desert Rock NV Day Ahead GEFS ghi.

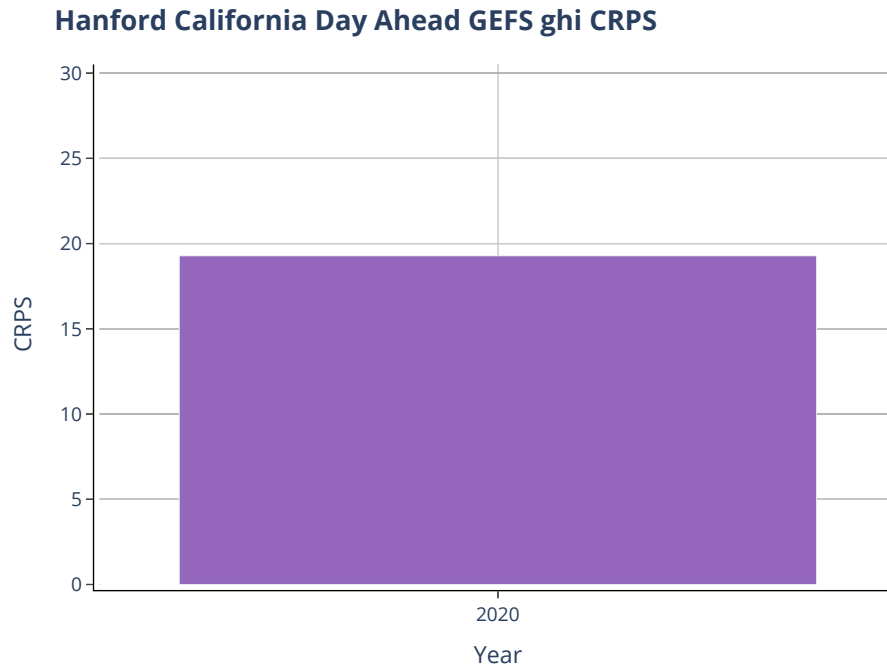


Figure 4: CRPS by year for Hanford California Day Ahead GEFS ghi.

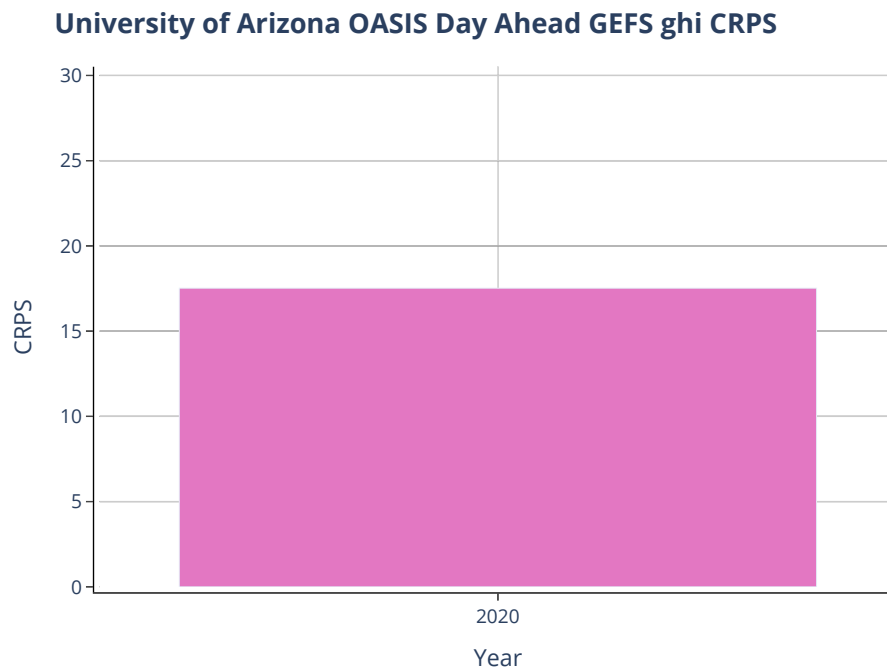


Figure 5: CRPS by year for University of Arizona OASIS Day Ahead GEFS ghi.

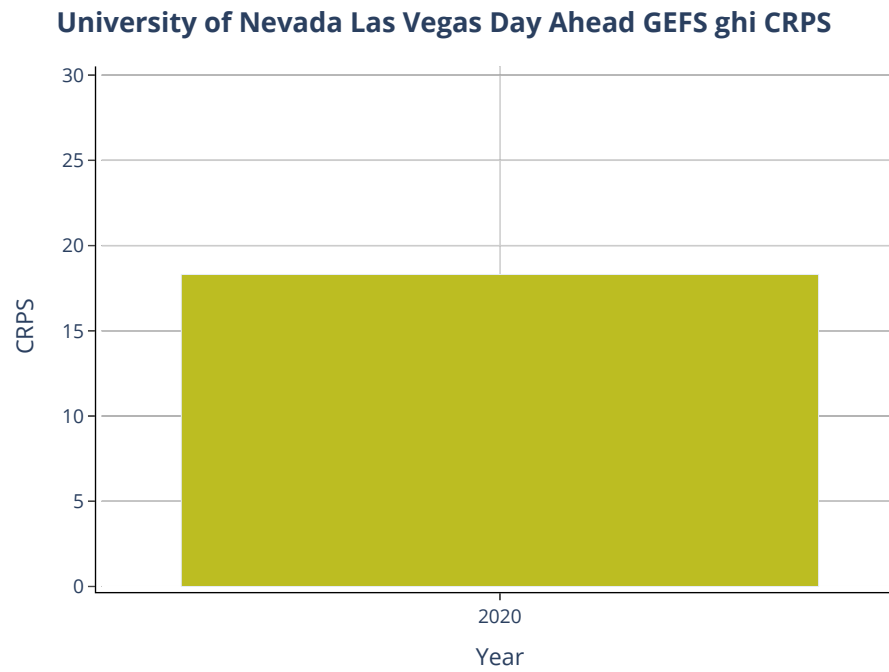


Figure 6: CRPS by year for University of Nevada Las Vegas Day Ahead GEFS ghi.

3.3 Month Of The Year Analysis

Metrics per month.

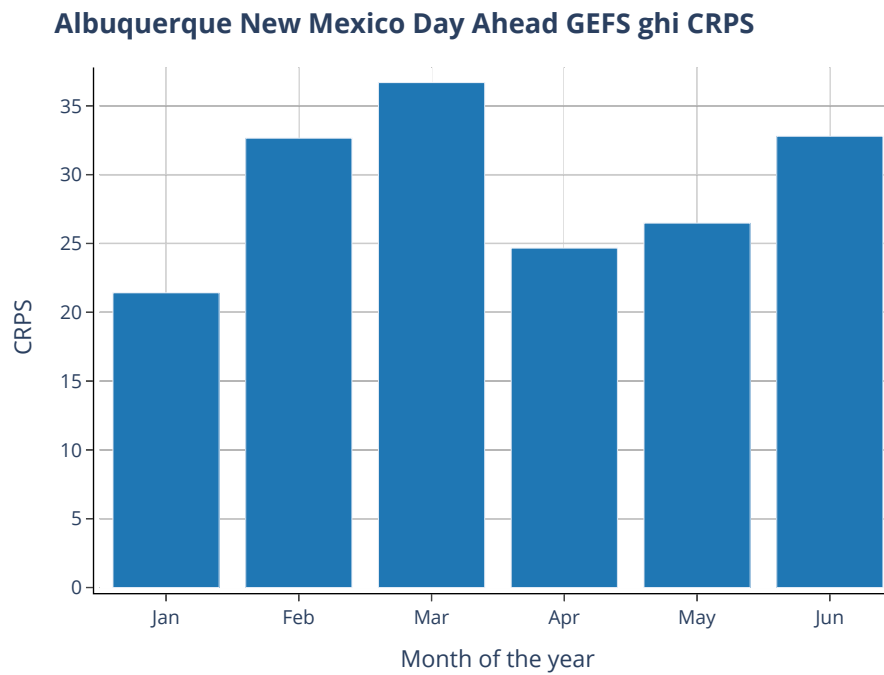


Figure 7: CRPS by month of the year for Albuquerque New Mexico Day Ahead GEFS ghi.

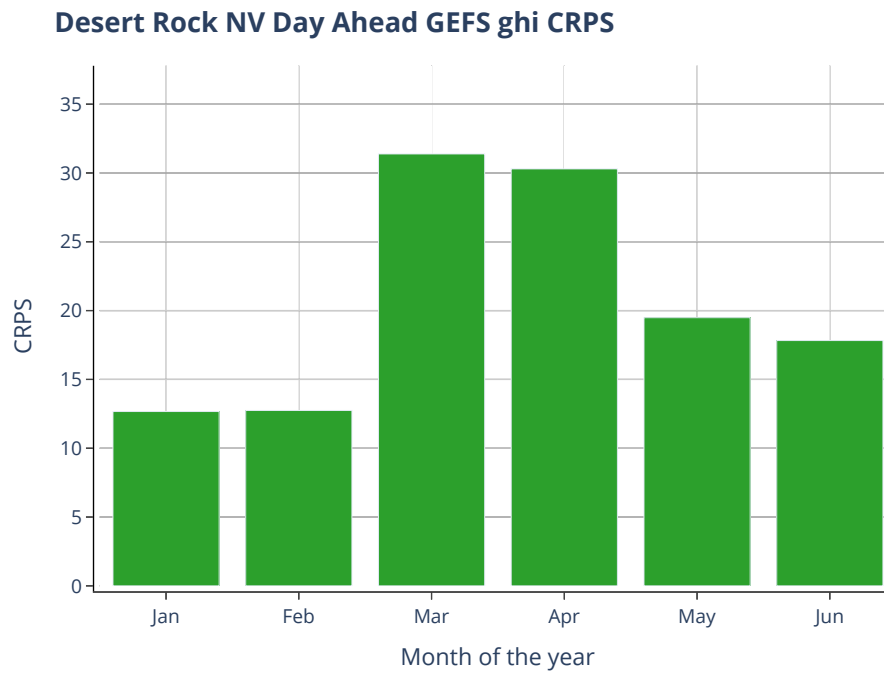


Figure 8: CRPS by month of the year for Desert Rock NV Day Ahead GEFS ghi.

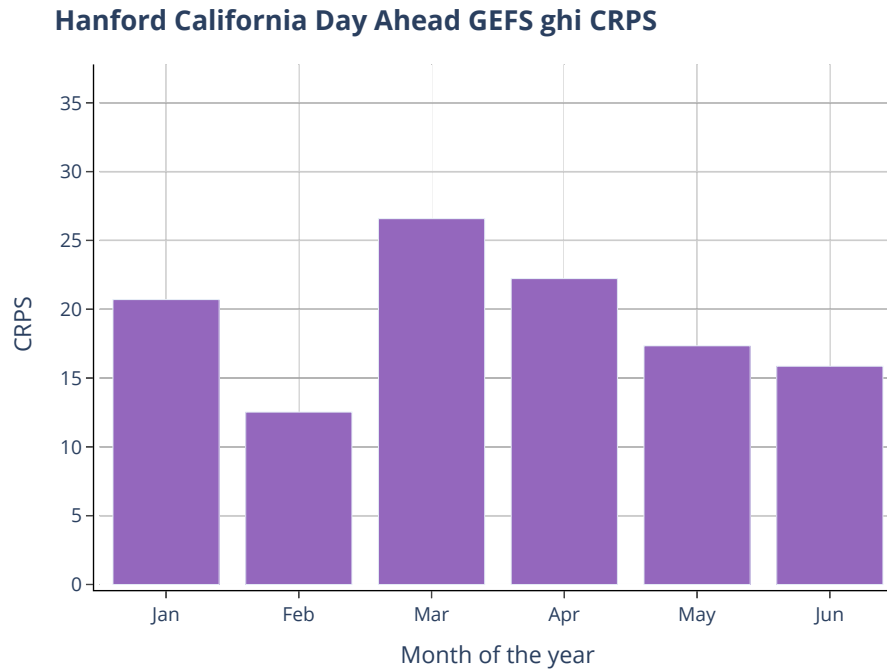


Figure 9: CRPS by month of the year for Hanford California Day Ahead GEFS ghi.

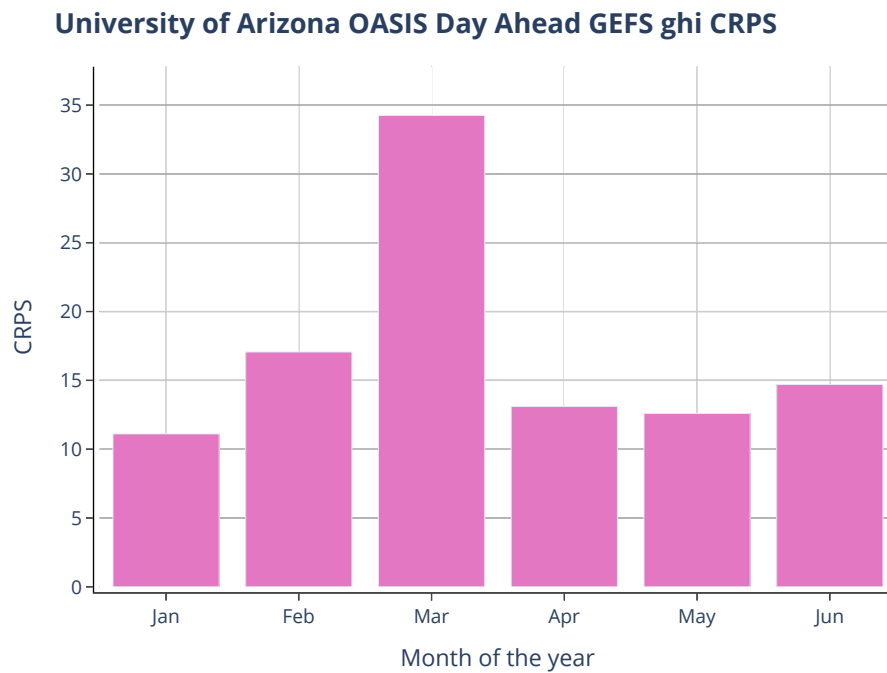


Figure 10: CRPS by month of the year for University of Arizona OASIS Day Ahead GEFS ghi.

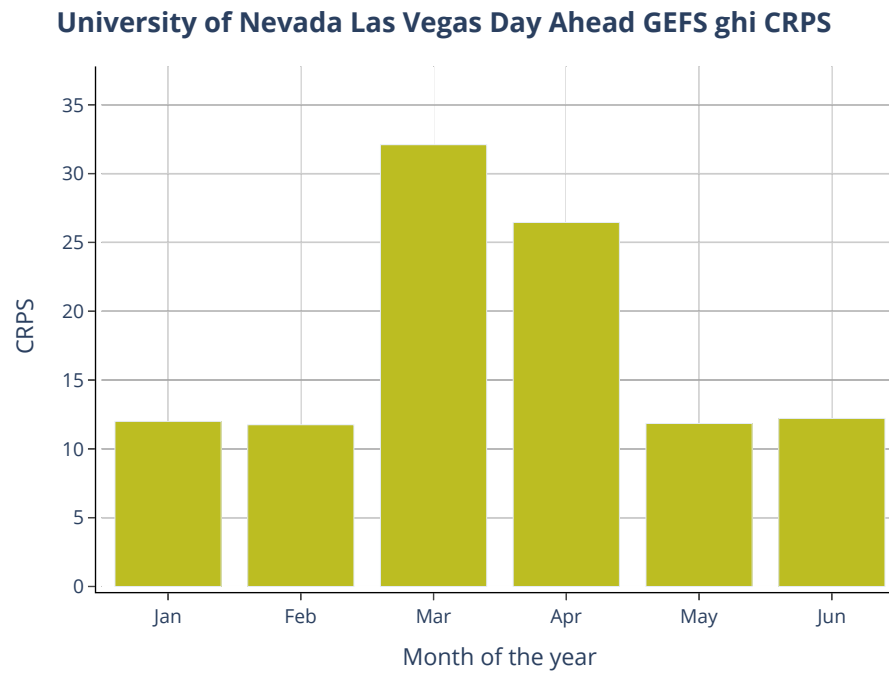


Figure 11: CRPS by month of the year for University of Nevada Las Vegas Day Ahead GEFS ghi.

3.4 Hour Of The Day Analysis

Metrics per hour of the day.

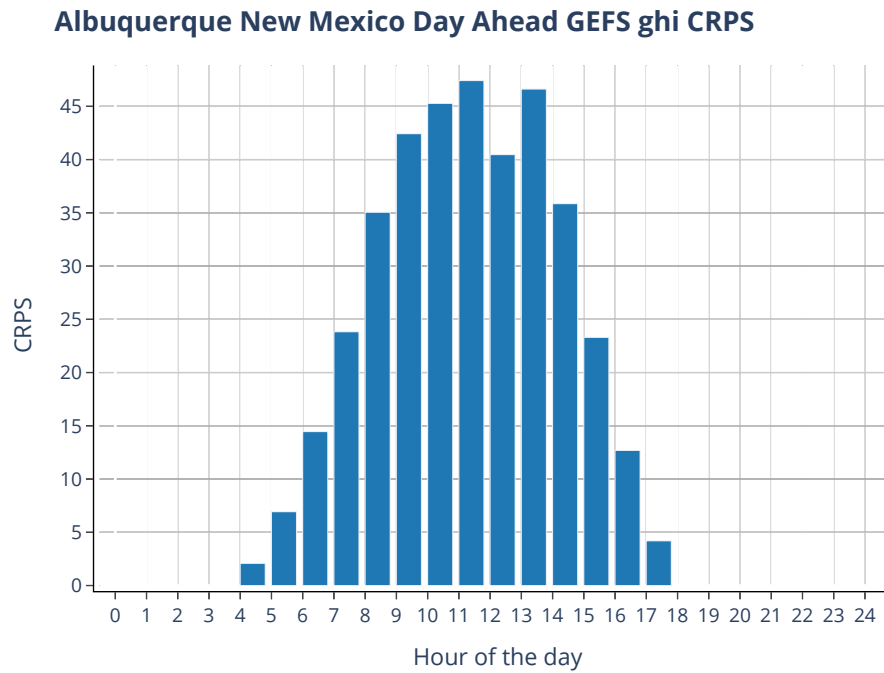


Figure 12: CRPS by hour of the day for Albuquerque New Mexico Day Ahead GEFS ghi.

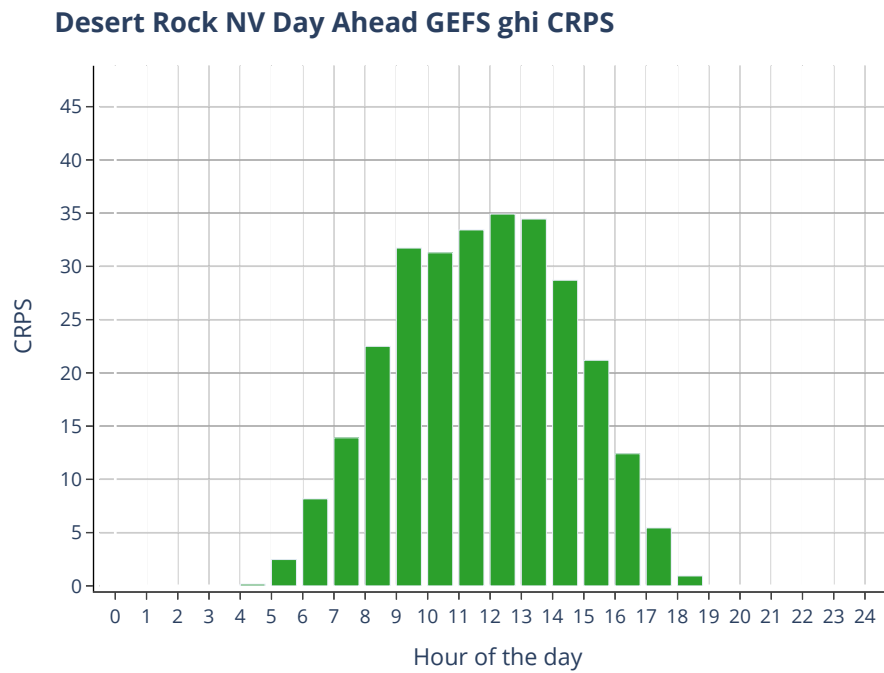


Figure 13: CRPS by hour of the day for Desert Rock NV Day Ahead GEFS ghi.

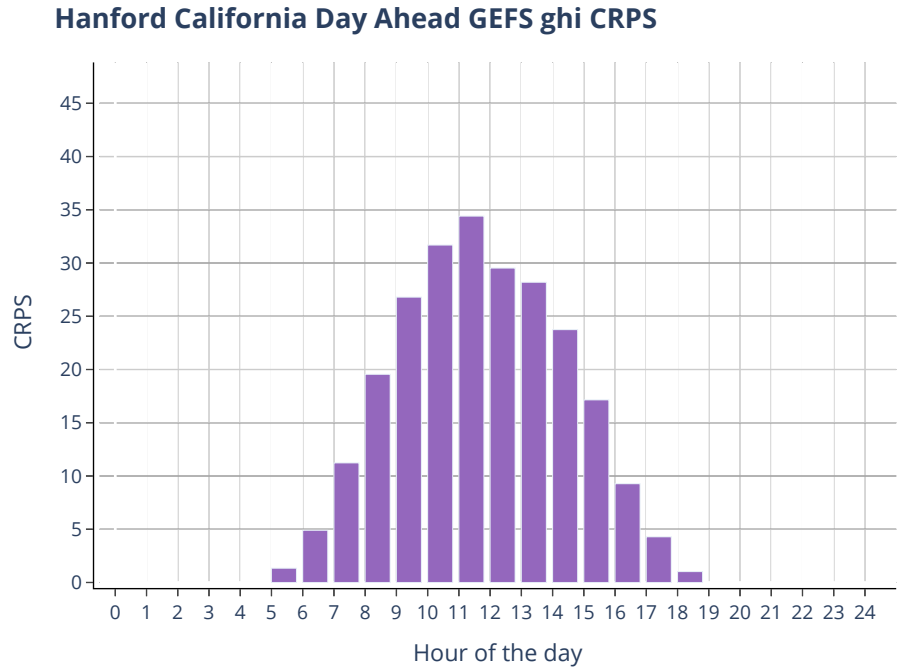


Figure 14: CRPS by hour of the day for Hanford California Day Ahead GEFS ghi.

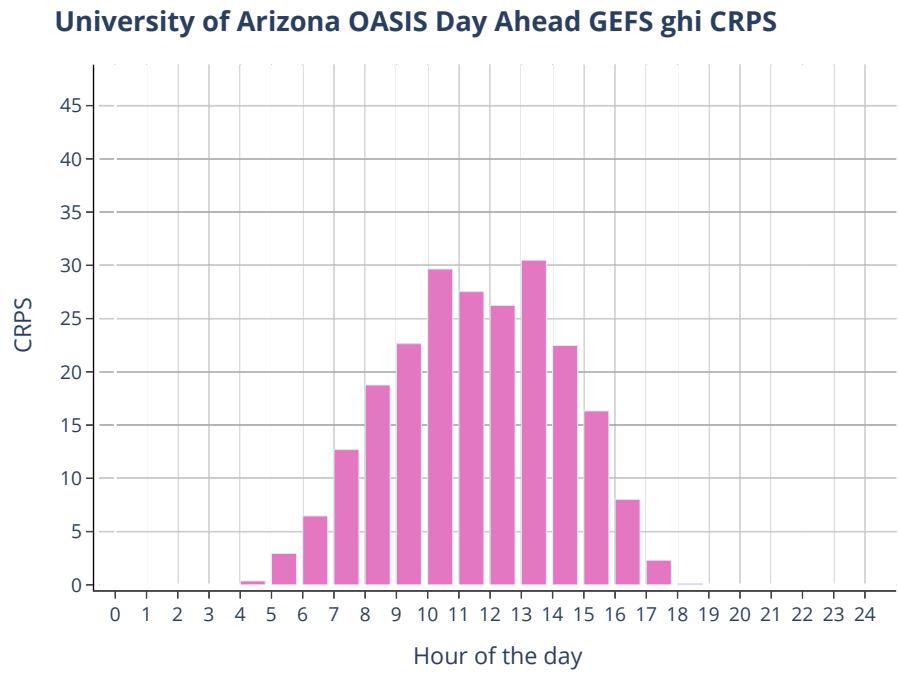


Figure 15: CRPS by hour of the day for University of Arizona OASIS Day Ahead GEFS ghi.

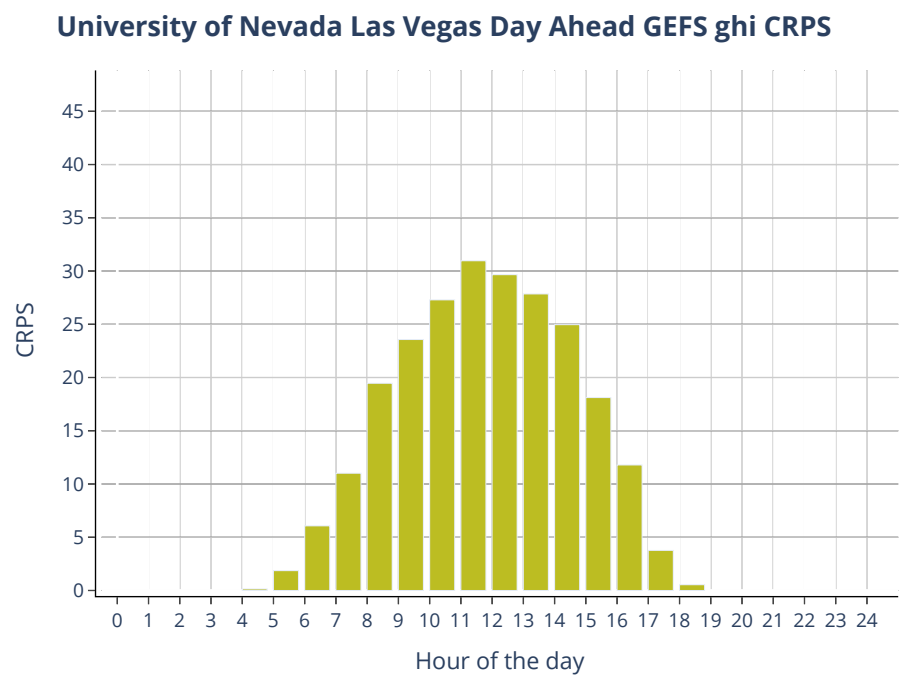


Figure 16: CRPS by hour of the day for University of Nevada Las Vegas Day Ahead GEFS ghi.

3.5 Date Analysis

Metrics per individual date.

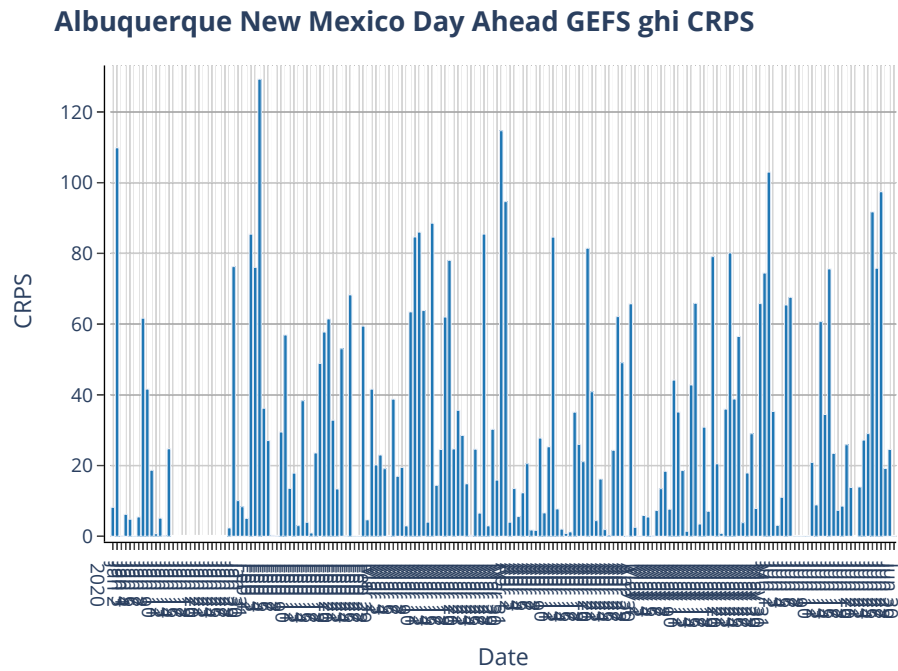


Figure 17: CRPS by date for Albuquerque New Mexico Day Ahead GEFS ghi.

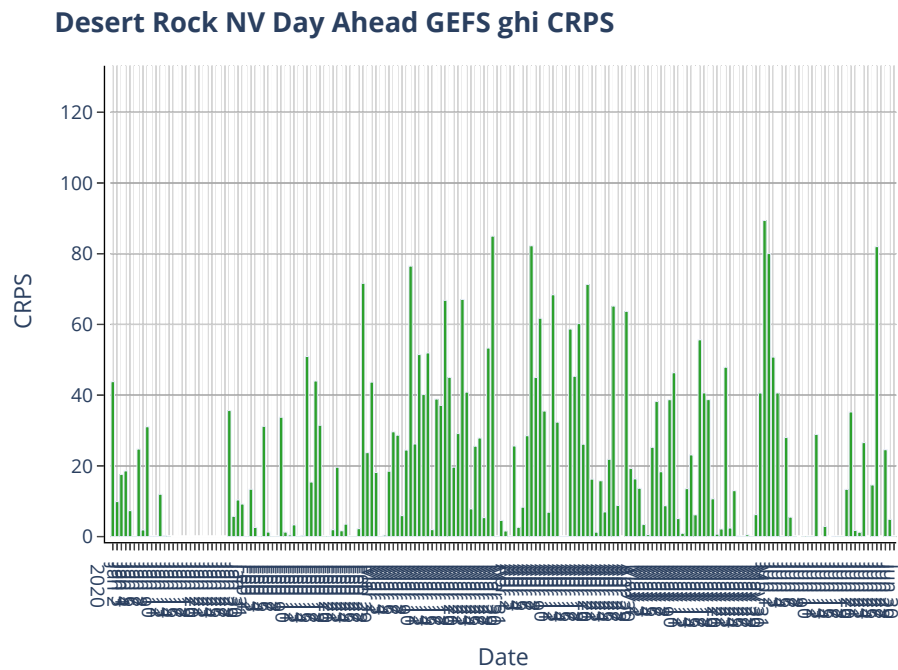


Figure 18: CRPS by date for Desert Rock NV Day Ahead GEFS ghi.

Hanford California Day Ahead GEFS ghi CRPS

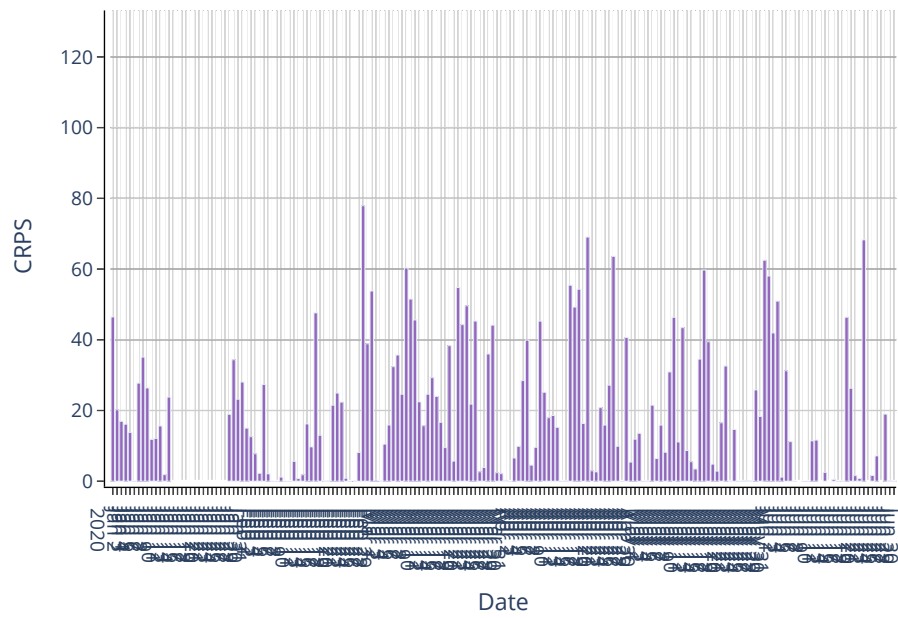


Figure 19: CRPS by date for Hanford California Day Ahead GEFS ghi.

University of Arizona OASIS Day Ahead GEFS ghi CRPS

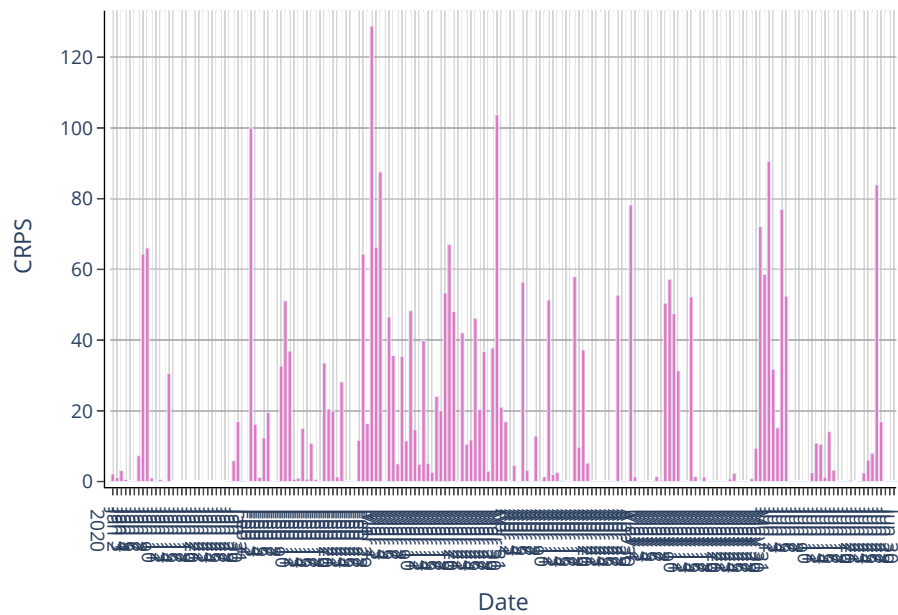


Figure 20: CRPS by date for University of Arizona OASIS Day Ahead GEFS ghi.

University of Nevada Las Vegas Day Ahead GEFS ghi CRPS

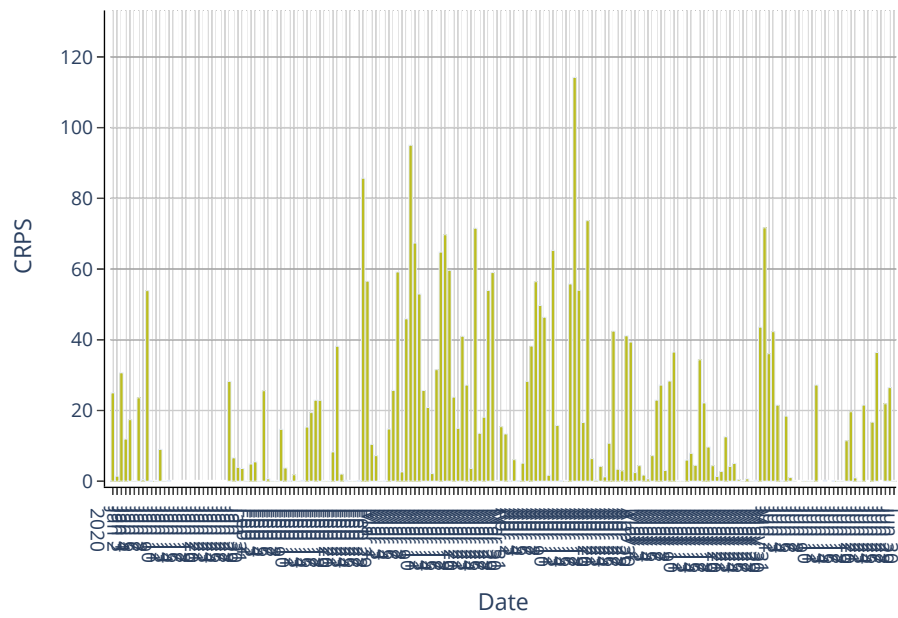


Figure 21: CRPS by date for University of Nevada Las Vegas Day Ahead GEFS ghi.

4 Versions

This report was created using open source software packages. The relevant packages and their versions are listed below. Readers are encouraged to study the source code to understand exactly how the data was processed.

Table 6: Table of package versions

Package	Version
solarforecastarbiter	1.0rc1
pvlib	0.7.2
pandas	1.0.3
numpy	1.18.2
scipy	1.4.1
statsmodels	0.11.0
plotly	4.5.3
bokeh	1.4.0
netcdf4	1.5.3
xarray	0.15.0
tables	3.6.1
numexpr	2.7.1
bottleneck	None
jinja2	2.11.2
python	3.7.8
platform	Linux-3.10.0-957.5.1.el7.x86_64-x86_64-with-debian-10.4
LaTeX	2020-02-02
pdfTeX	This is pdfTeX, Version 3.14159265-2.6-1.40.21 (TeX Live 2020) kpathsea version 6.3.2