Test Report:

Third Party Case Study: Power Generation for Mitrex Panels with Vertical Installation

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21081 Test Report: Multi-Site PVsyst Simulations of Mitrex M140LS01F612 and M260GR01F612 Modules

Report Number: 21081-PR-E-014

Report Date: 2022-04-11

Test Period: 2022-01-24 to 2022-04-06

Project ID: 21081 (CFV), PO-000476 (Customer PO)

Customer: Hadi Khatibzadehazad / Mitrex
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Project Summary

CFV Solar conducted PVsyst simulations for two types of Mitrex cladded modules (M140LS01F612, M260GR01F612) The simulations were conducted for single modules installed at an inclination of 90° (vertical) facing in one of four different cardinal directions, east, west, north, and south. The modules were coupled with a microinverter. The simulations were conducted for sites in Toronto, New York, Miami, and Los Angeles.

The PAN files used in the simulations were generated at CFV Labs using measured IEC 61853-2:2011 temperature and irradiance test data. Optimized PAN files were recreated for the specified module types with PANOpt®, CFV's proprietary software.

For each of the 32 simulations, yearly summary data for incident irradiance, DC module output and AC grid powers are presented. Monthly breakdowns of the data are also provided.

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Procedures

PAN Files

The PAN files used for these simulations were generated using IEC 61853-2:2011 temperature and irradiance matrix test data acquired at CFV Labs. Optimized PAN files were recreated for the specified module types with PANOpt®, CFV's proprietary software. Details of the PAN file generation and test data is provided to the customer in separate reports.

PVsyst Simulations

Simulations were conducted using PVsyst version 7.2.12. Variants of the simulations are shown in the table below. The modules selected are described in the previous section. The microinverters that were selected for the simulations were chosen from the same manufacturer and with nominal powers that prevent clipping under the simulated conditions. The choice of microinverter grid voltage has no effect on the DC characteristics of the simulation (modules, or arrays).

Simulation Summary

Site	Orientations	Module	Inverter
Toronto	North, South, East, West	M140LS01F612	Enphase M 210 84 208
		M260GR01F612	Enphase M250-72-2LL-x-208
New York		M140LS01F612	Enphase M 210 84 208
		M260GR01F612	Enphase M250-72-2LL-x-208
Los Angeles		M140LS01F612	Enphase M 210 84 208
		M260GR01F612	Enphase M250-72-2LL-x-208
Miami		M140LS01F612	Enphase M 210 84 208
		M260GR01F612	Enphase M250-72-2LL-x-208

Site Information Summary

Site	Latitude	Longitude	Albedo	Meteo File
Toronto	+43.68 °N	-79.63 °W	0.20 (default)	Toronto_Centennial Park_NREL_TMY.MET (NREL NSRDB Typ. Met. Year PSMv3_1998to 2016 - TMY)
New York	+40.64 °N	-73.78 °W	0.20 (default)	New York City_Inwood_NREL_TMY.MET (NREL NSRDB Typ. Met. Year PSMv3_1998 to 2TMY)
Los Angeles	+33.94 °N	-118.41 °W	0.20 (default)	Los Angeles_Westchester_NREL_TMY.MET (NREL NSRDB Typ. Met. Year PSMv3_1998 to 2TMY)
Miami	+25.65 °N	-80.43 °W	0.20 (default)	Miami_Country Walk_NREL_TMY.MET (NREL NSRDB Typ. Met. Year PSMv3_1998 to 2TMY)

Module Summary

Manufacturer	Model	Nominal Power (STC)	Pmpp (50°C)	U mpp (50°C)	I mpp (50°C)	Area (m^2)
Mitrex	M140LS01F612	140 Wp	128 Wp	37	3.5	2.2
Mitrex	M260GR01F612	260 Wp	238 Wp	37	6.4	2.2

Inverter Summary

Manufacturer	Model	Inv. Nom Power (kWac)	Operating Voltage (V)
Enphase	M 210 84 208	0.21 kW	31-50
Enphase	M250-72-2LL-x-208	0.25 kW	16-48

Array Loss Settings

Parameter	Value
Array Soiling Losses – Loss Fraction	3.0 %
Module Quality Loss – Loss Fraction	0.0 %
IAM Loss Factor – Effect	Fresnel smooth glass, n=1.526
IAM Loss Factor – 0°	1.000
IAM Loss Factor – 30°	0.998
IAM Loss Factor – 50°	0.981
IAM Loss Factor – 60°	0.948
IAM Loss Factor – 70°	0.862
IAM Loss Factor – 75°	0.776
IAM Loss Factor – 80°	0.636
IAM Loss Factor – 85°	0.403
IAM Loss Factor – 90°	0.000
Thermal Loss Factor – Uc (const)	15.0 W/m^2K
Thermal Loss Factor – Uv (wind)	0.0 $W/m^2K/m/s$
Module Mismatch Losses – Loss Fraction	0.0 %
DC Wiring Losses – Global Array res.	170 mΩ
DC Wiring Losses – Loss Fraction	1.5 % at STC
Inv. Output Line Up to Injection Point	208 Vac mono
AC Wiring – Loss Fraction	1.5 % at STC

Results

PVsyst Simulations

A total of 32 simulations were performed, one for each module/microinverter system in one of four orientations at each of the four sites (2 modules * 4 orientations * 4 sites).

The main results of each of the simulations are summarized in the tables and plots below.

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Site: Toronto

Annual production values are presented below along with plots showing a histogram of the irradiance values for each orientation and plots of selected transposed irradiance components with both solar azimuth and hour. Structural features in the data plots such as gaps in the solar position and irradiance with solar azimuth plots are an artifact of the hourly simulations.

Yearly Summary

Orientation	GlobInc (kwh/m2)	Mitrex M140LS01F612			Mitrex M260GR01F612		
		EArray (kWh)	E_Grid (kWh)	Perf. Ratio	EArray (kWh)	E_Grid (kWh)	Perf. Ratio
North	382.80	41.537	36.649	0.684	77.870	73.909	0.743
South	1076.61	123.488	114.712	0.761	233.677	223.110	0.797
East	843.12	97.250	89.736	0.760	183.791	175.376	0.800
West	846.65	96.924	89.398	0.754	183.140	174.761	0.794

Monthly Data - North

Month	GlobInc (kwh/m2)	Mitrex M140LS01F612			Mitrex M260GR01F612		
		EArray (kWh)	E_Grid (kWh)	Perf. Ratio	EArray (kWh)	E_Grid (kWh)	Perf. Ratio
Jan	14.41	1.582	1.307	0.648	2.925	2.693	0.719
Feb	19.60	2.242	1.944	0.709	4.182	3.934	0.772
Mar	28.14	3.246	2.850	0.724	6.066	5.742	0.785
Apr	36.90	4.185	3.723	0.721	7.845	7.468	0.778
May	52.35	5.726	5.164	0.705	10.779	10.323	0.758
Jun	58.77	6.319	5.722	0.696	11.909	11.430	0.748
Jul	56.09	5.883	5.299	0.675	11.083	10.627	0.729
Aug	41.48	4.351	3.854	0.664	8.169	7.790	0.722
Sep	29.20	3.135	2.729	0.667	5.872	5.546	0.731
Oct	20.10	2.138	1.817	0.646	3.988	3.722	0.712
Nov	14.40	1.534	1.281	0.635	2.849	2.638	0.705
Dec	11.37	1.197	0.958	0.602	2.203	1.997	0.675

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Monthly Data - South

Month	GlobInc (kwh/m2)	Mitrex M140LS01F612 Enphase M 210 84 208			Mitrex M260GR01F612 Enphase M250-72-2LL-x-208		
		EArray (kWh)	E_Grid (kWh)	Perf. Ratio	EArray (kWh)	E_Grid (kWh)	Perf. Ratio
Jan	84.43	10.579	9.862	0.834	19.964	19.032	0.867
Feb	92.80	11.504	10.744	0.827	21.727	20.737	0.859
Mar	114.22	13.721	12.820	0.802	25.958	24.810	0.835
Apr	94.82	10.879	10.107	0.761	20.606	19.688	0.799
May	85.81	9.260	8.540	0.711	17.544	16.759	0.751
Jun	78.49	8.159	7.485	0.681	15.460	14.756	0.723
Jul	82.71	8.471	7.785	0.672	16.070	15.335	0.713
Aug	100.47	10.606	9.832	0.699	20.114	19.231	0.736
Sep	108.98	12.133	11.302	0.741	22.974	21.964	0.775
Oct	87.72	10.195	9.496	0.773	19.303	18.432	0.808
Nov	75.30	9.143	8.519	0.808	17.281	16.491	0.842
Dec	70.86	8.837	8.219	0.829	16.675	15.875	0.862

Monthly Data - East

Month	GlobInc (kwh/m2)	Mitrex M140LS01F612 Enphase M 210 84 208			Mitrex M260GR01F612 Enphase M250-72-2LL-x-208		
		EArray (kWh)	E_Grid (kWh)	Perf. Ratio	EArray (kWh)	E_Grid (kWh)	Perf. Ratio
Jan	32.41	3.847	3.476	0.766	7.247	6.862	0.814
Feb	44.17	5.337	4.895	0.791	10.071	9.589	0.835
Mar	76.85	9.305	8.610	0.800	17.556	16.753	0.838
Apr	80.35	9.522	8.805	0.783	17.988	17.176	0.822
May	98.76	11.403	10.565	0.764	21.560	20.615	0.803
Jun	108.27	12.325	11.441	0.755	23.330	22.313	0.793
Jul	105.35	11.794	10.934	0.741	22.330	21.347	0.779
Aug	104.88	11.729	10.882	0.741	22.191	21.218	0.778
Sep	79.69	9.063	8.374	0.751	17.125	16.353	0.789
Oct	52.62	6.011	5.511	0.748	11.358	10.808	0.790
Nov	34.49	3.994	3.632	0.752	7.540	7.161	0.799
Dec	25.27	2.921	2.612	0.738	5.496	5.180	0.788

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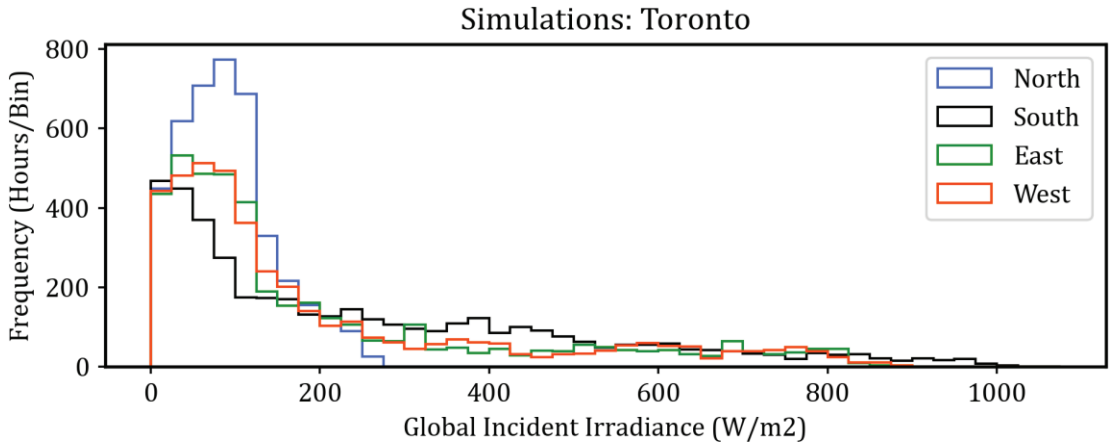
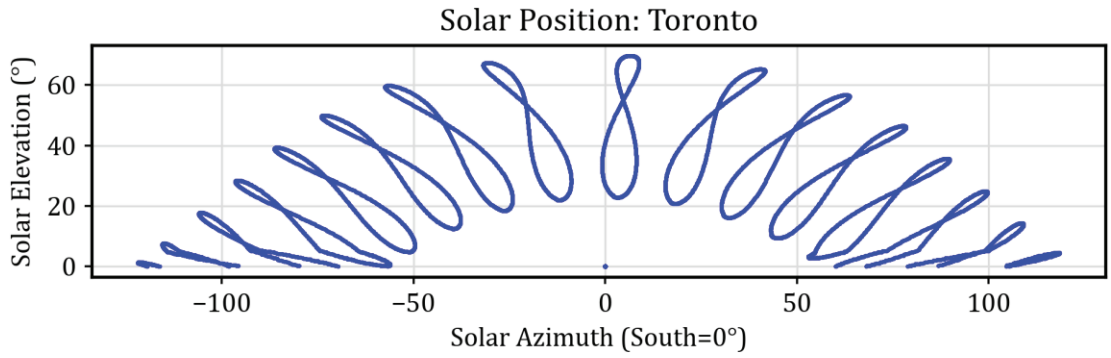
Monthly Data - West

Month	GlobInc (kwh/m2)	Mitrex M140LS01F612			Mitrex M260GR01F612		
		EArray (kWh)	E_Grid (kWh)	Perf. Ratio	EArray (kWh)	E_Grid (kWh)	Perf. Ratio
Jan	34.22	4.076	3.692	0.770	7.677	7.278	0.818
Feb	47.26	5.712	5.252	0.794	10.782	10.274	0.836
Mar	73.62	8.834	8.165	0.792	16.671	15.900	0.831
Apr	84.05	9.881	9.143	0.777	18.660	17.824	0.816
May	102.00	11.655	10.804	0.757	22.043	21.071	0.795
Jun	107.00	12.070	11.183	0.747	22.823	21.827	0.785
Jul	112.88	12.599	11.690	0.740	23.845	22.804	0.777
Aug	100.68	11.187	10.373	0.736	21.168	20.250	0.774
Sep	79.87	8.962	8.284	0.741	16.942	16.178	0.779
Oct	46.89	5.289	4.822	0.735	9.987	9.494	0.779
Nov	31.01	3.526	3.184	0.734	6.646	6.299	0.781
Dec	27.15	3.133	2.806	0.738	5.896	5.561	0.788





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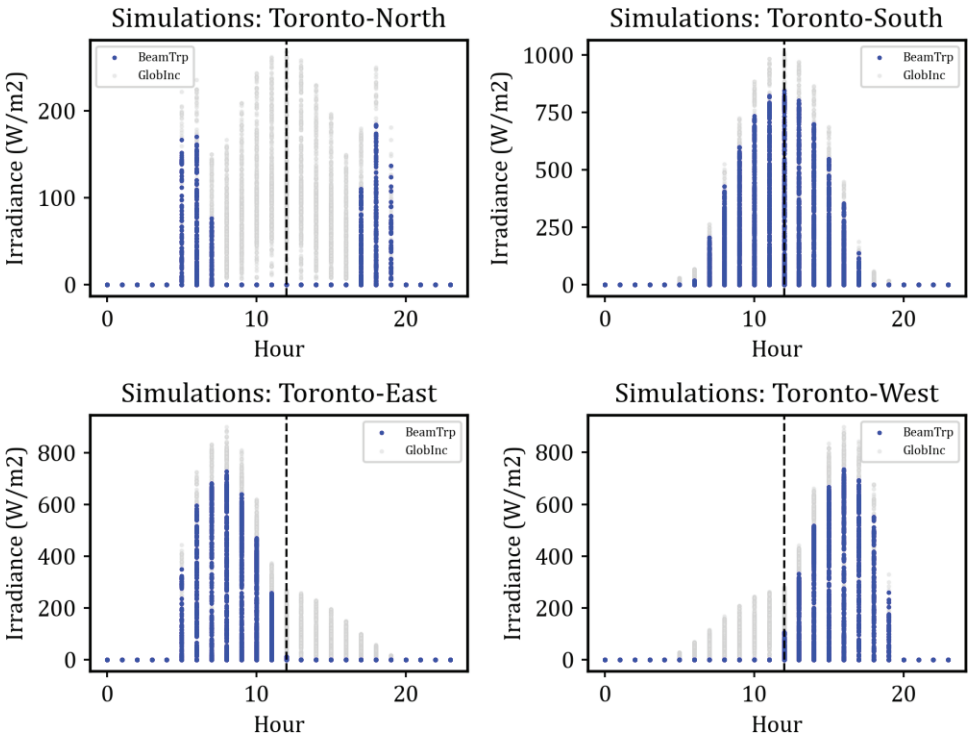

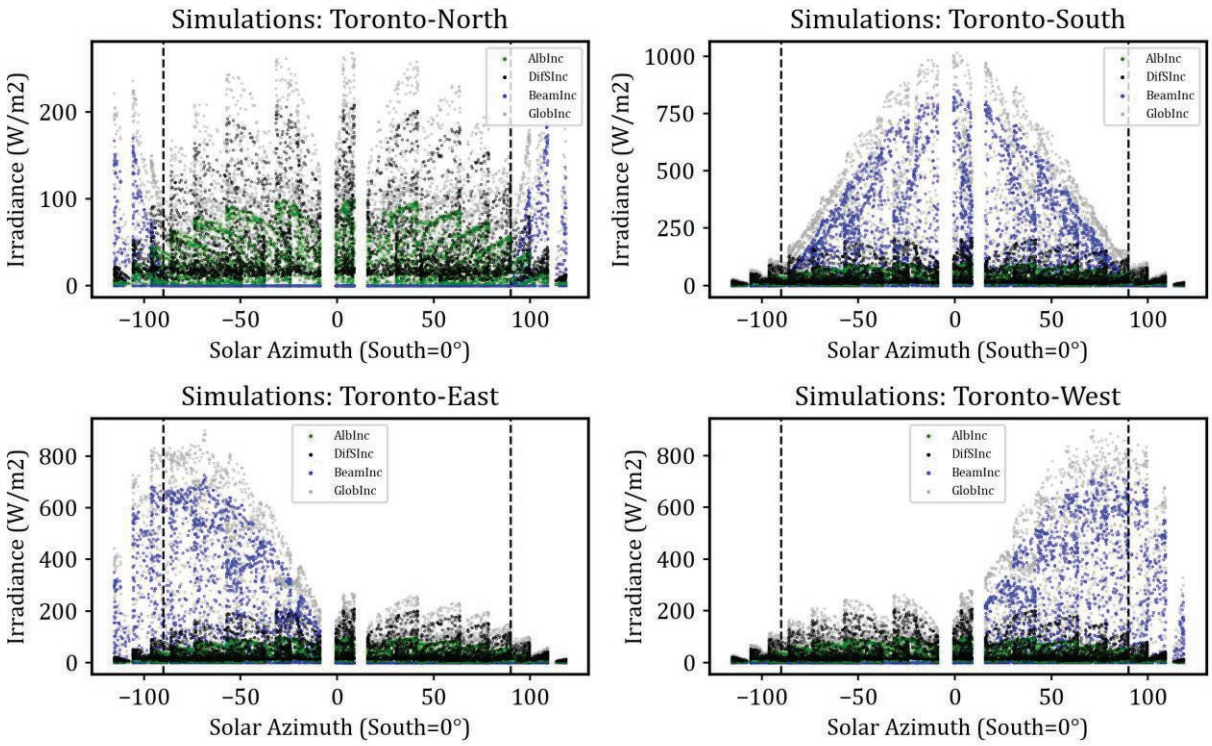

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Site: New York

Annual production values are presented below along with plots showing a histogram of the irradiance values for each orientation and plots of selected transposed irradiance components with both solar azimuth and hour. Structural features in the data plots such as gaps in the solar position and irradiance with solar azimuth plots are an artifact of the hourly simulations.

Yearly Summary

Orientation	GlobInc (kwh/m2)	Mitrex M140LS01F612			Mitrex M260GR01F612		
		EArray (kWh)	E_Grid (kWh)	Perf. Ratio	EArray (kWh)	E_Grid (kWh)	Perf. Ratio
North	402.99	43.765	38.785	0.687	82.133	77.987	0.744
South	1149.35	131.227	122.074	0.759	248.416	237.396	0.794
East	871.73	99.647	92.043	0.754	188.465	180.007	0.794
West	880.21	100.336	92.715	0.752	189.781	181.306	0.792

Monthly Data – North Orientation

Month	GlobInc (kwh/m2)	Mitrex M140LS01F612			Mitrex M260GR01F612		
		EArray (kWh)	E_Grid (kWh)	Perf. Ratio	EArray (kWh)	E_Grid (kWh)	Perf. Ratio
Jan	15.68	1.719	1.440	0.656	3.186	2.950	0.724
Feb	19.93	2.250	1.944	0.696	4.193	3.942	0.761
Mar	31.45	3.606	3.190	0.725	6.755	6.404	0.783
Apr	37.46	4.180	3.729	0.711	7.850	7.469	0.767
May	56.07	6.190	5.609	0.715	11.667	11.161	0.766
Jun	58.14	6.244	5.670	0.697	11.782	11.290	0.747
Jul	56.45	5.933	5.357	0.678	11.180	10.714	0.730
Aug	42.30	4.439	3.948	0.667	8.343	7.951	0.723
Sep	32.52	3.528	3.110	0.683	6.617	6.278	0.743
Oct	22.61	2.425	2.082	0.658	4.536	4.251	0.723
Nov	16.48	1.765	1.478	0.641	3.273	3.041	0.710
Dec	13.90	1.486	1.228	0.631	2.751	2.536	0.702

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Monthly Data - South Orientation

Month	GlobInc (kwh/m2)	Mitrex M140LS01F612			Mitrex M260GR01F612		
		EArray (kWh)	E_Grid (kWh)	Perf. Ratio	EArray (kWh)	E_Grid (kWh)	Perf. Ratio
Jan	103.01	12.775	11.931	0.827	24.099	22.980	0.858
Feb	104.44	12.777	11.961	0.818	24.171	23.106	0.851
Mar	112.23	13.341	12.458	0.793	25.268	24.159	0.828
Apr	94.72	10.624	9.879	0.745	20.140	19.260	0.782
May	82.50	8.873	8.172	0.708	16.816	16.062	0.749
Jun	73.45	7.562	6.922	0.673	14.312	13.669	0.716
Jul	81.71	8.313	7.624	0.666	15.745	15.036	0.708
Aug	90.63	9.475	8.766	0.691	17.977	17.185	0.729
Sep	106.32	11.753	10.957	0.736	22.282	21.322	0.771
Oct	121.24	14.025	13.127	0.773	26.556	25.406	0.806
Nov	91.55	10.975	10.253	0.800	20.763	19.844	0.834
Dec	87.54	10.736	10.024	0.818	20.287	19.365	0.851

Monthly Data - East Orientation

Month	GlobInc (kwh/m2)	Mitrex M140LS01F612			Mitrex M260GR01F612		
		EArray (kWh)	E_Grid (kWh)	Perf. Ratio	EArray (kWh)	E_Grid (kWh)	Perf. Ratio
Jan	37.73	4.423	4.020	0.761	8.341	7.916	0.807
Feb	49.44	5.872	5.403	0.781	11.096	10.583	0.823
Mar	75.96	9.045	8.374	0.787	17.106	16.339	0.827
Apr	89.19	10.421	9.666	0.774	19.701	18.834	0.812
May	95.99	11.018	10.209	0.760	20.864	19.952	0.799
Jun	101.26	11.448	10.620	0.749	21.681	20.748	0.788
Jul	107.78	11.989	11.121	0.737	22.699	21.723	0.775
Aug	100.01	11.108	10.301	0.736	21.018	20.099	0.773
Sep	78.63	8.812	8.148	0.740	16.663	15.926	0.779
Oct	66.30	7.551	6.968	0.751	14.284	13.630	0.791
Nov	38.50	4.418	4.021	0.746	8.341	7.932	0.792
Dec	30.93	3.542	3.192	0.737	6.672	6.323	0.786

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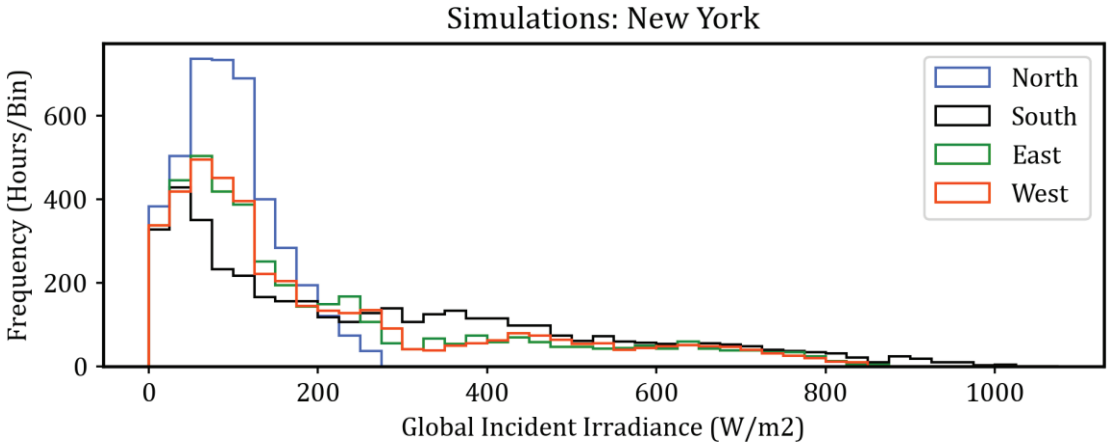
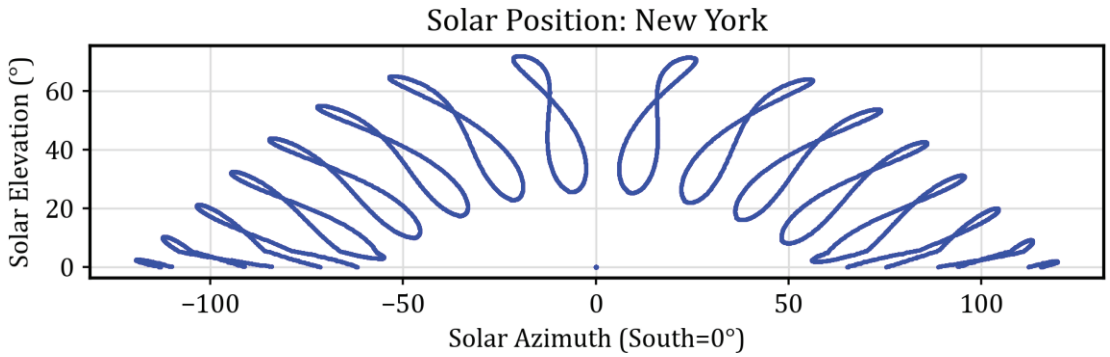
Monthly Data - West Orientation

Month	GlobInc (kwh/m2)	Mitrex M140LS01F612			Mitrex M260GR01F612		
		EArray (kWh)	E_Grid (kWh)	Perf. Ratio	EArray (kWh)	E_Grid (kWh)	Perf. Ratio
Jan	43.57	5.151	4.715	0.773	9.719	9.248	0.816
Feb	51.34	6.068	5.587	0.777	11.464	10.933	0.819
Mar	73.31	8.652	7.999	0.779	16.350	15.621	0.820
Apr	87.32	10.146	9.411	0.770	19.187	18.342	0.808
May	101.69	11.693	10.847	0.762	22.134	21.173	0.801
Jun	98.82	11.108	10.298	0.744	21.038	20.133	0.784
Jul	108.88	12.077	11.204	0.735	22.867	21.884	0.773
Aug	94.82	10.480	9.707	0.731	19.835	18.969	0.769
Sep	83.41	9.358	8.668	0.742	17.706	16.932	0.781
Oct	63.08	7.158	6.602	0.747	13.546	12.925	0.788
Nov	40.37	4.607	4.197	0.743	8.696	8.273	0.788
Dec	33.60	3.837	3.481	0.740	7.240	6.873	0.787





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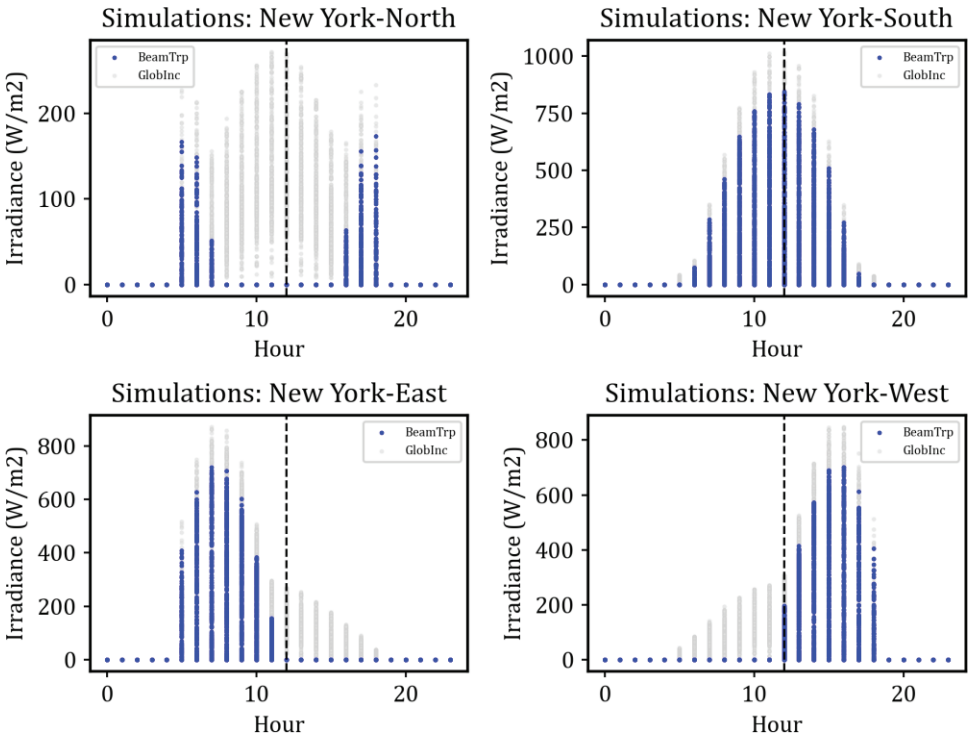

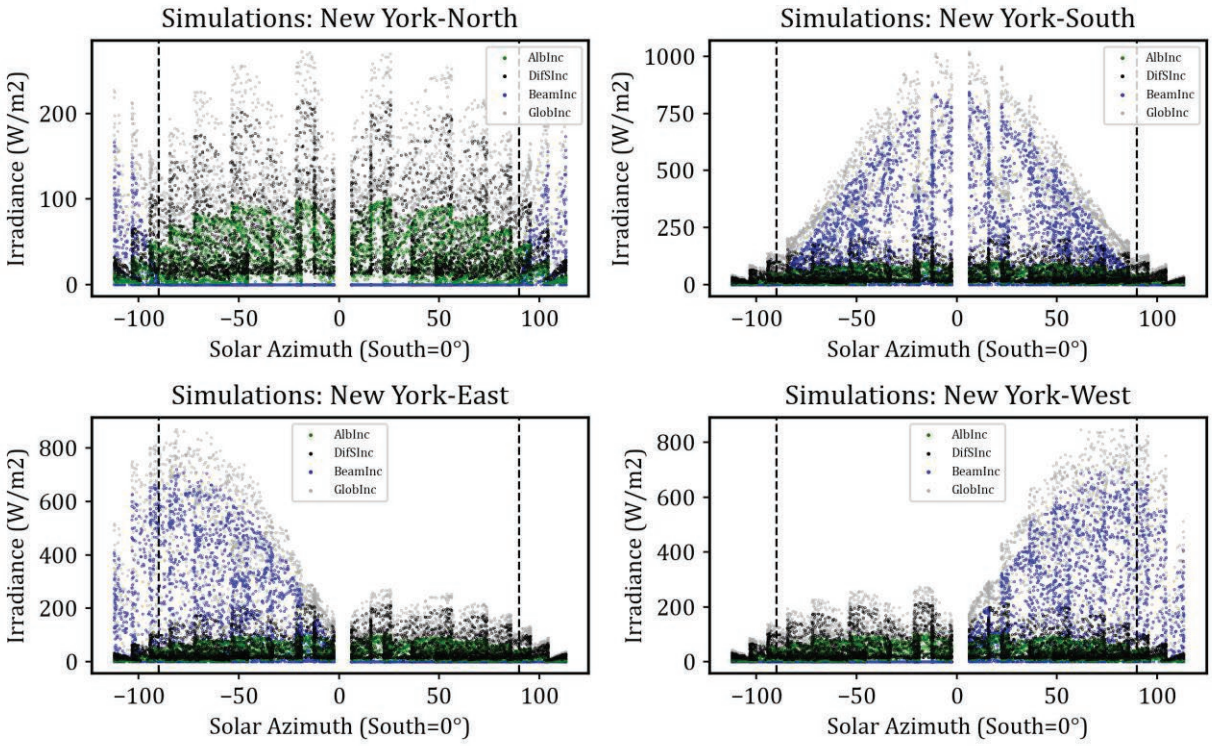

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Site: Miami

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Yearly Summary

Orientation	GlobInc (kwh/m2)	Mitrex M140LS01F612			Mitrex M260GR01F612		
		EArray (kWh)	E_Grid (kWh)	Perf. Ratio	EArray (kWh)	E_Grid (kWh)	Perf. Ratio
North	481.33	50.238	44.906	0.666	94.631	90.150	0.720
South	1161.81	125.231	116.386	0.716	237.275	227.044	0.752
East	1125.91	124.721	115.860	0.735	236.173	225.963	0.772
West	1011.21	111.242	103.024	0.728	210.645	201.426	0.766

Monthly Data - North Orientation

Month	GlobInc (kwh/m2)	Mitrex M140LS01F612			Mitrex M260GR01F612		
		EArray (kWh)	E_Grid (kWh)	Perf. Ratio	EArray (kWh)	E_Grid (kWh)	Perf. Ratio
Jan	24.63	2.595	2.251	0.653	4.894	4.589	0.717
Feb	26.40	2.840	2.474	0.669	5.315	5.023	0.732
Mar	35.97	3.919	3.486	0.692	7.362	7.014	0.750
Apr	42.54	4.494	4.021	0.675	8.468	8.069	0.730
May	55.23	5.602	5.071	0.656	10.571	10.137	0.706
Jun	62.78	6.419	5.860	0.667	12.137	11.633	0.713
Jul	63.07	6.382	5.810	0.658	12.058	11.566	0.705
Aug	50.76	5.229	4.715	0.664	9.866	9.429	0.714
Sep	37.39	3.970	3.533	0.675	7.484	7.109	0.731
Oct	34.15	3.652	3.247	0.679	6.874	6.535	0.736
Nov	24.08	2.551	2.204	0.654	4.767	4.494	0.718
Dec	24.30	2.584	2.233	0.656	4.835	4.551	0.720

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Monthly Data - South Orientation

Month	GlobInc (kwh/m2)	Mitrex M140LS01F612			Mitrex M260GR01F612		
		EArray (kWh)	E_Grid (kWh)	Perf. Ratio	EArray (kWh)	E_Grid (kWh)	Perf. Ratio
Jan	144.19	16.464	15.433	0.764	31.166	29.834	0.796
Feb	126.89	14.174	13.291	0.748	26.873	25.756	0.781
Mar	116.47	12.364	11.561	0.709	23.479	22.517	0.744
Apr	78.88	7.742	7.141	0.647	14.698	14.051	0.685
May	53.08	5.195	4.672	0.629	9.799	9.336	0.677
Jun	50.04	5.260	4.740	0.677	9.920	9.465	0.728
Jul	52.66	5.328	4.789	0.650	10.047	9.571	0.699
Aug	64.13	6.244	5.681	0.633	11.818	11.267	0.676
Sep	81.49	8.260	7.640	0.670	15.690	15.005	0.708
Oct	111.79	12.213	11.413	0.729	23.182	22.204	0.764
Nov	139.39	15.655	14.699	0.753	29.673	28.423	0.784
Dec	142.82	16.332	15.328	0.767	30.930	29.615	0.798

Monthly Data - East Orientation

Month	GlobInc (kwh/m2)	Mitrex M140LS01F612			Mitrex M260GR01F612		
		EArray (kWh)	E_Grid (kWh)	Perf. Ratio	EArray (kWh)	E_Grid (kWh)	Perf. Ratio
Jan	76.74	8.625	7.989	0.744	16.332	15.609	0.782
Feb	83.71	9.384	8.716	0.744	17.753	16.980	0.780
Mar	103.73	11.611	10.806	0.744	21.962	21.017	0.779
Apr	109.95	12.223	11.386	0.740	23.136	22.142	0.775
May	113.32	12.554	11.683	0.736	23.780	22.756	0.772
Jun	97.75	10.758	9.986	0.730	20.388	19.517	0.768
Jul	109.57	12.053	11.205	0.730	22.843	21.868	0.768
Aug	115.76	12.733	11.863	0.732	24.130	23.097	0.767
Sep	91.97	10.067	9.341	0.725	19.057	18.232	0.762
Oct	77.97	8.539	7.903	0.724	16.169	15.459	0.763
Nov	74.66	8.225	7.623	0.729	15.569	14.890	0.767
Dec	70.77	7.949	7.359	0.743	15.052	14.397	0.782

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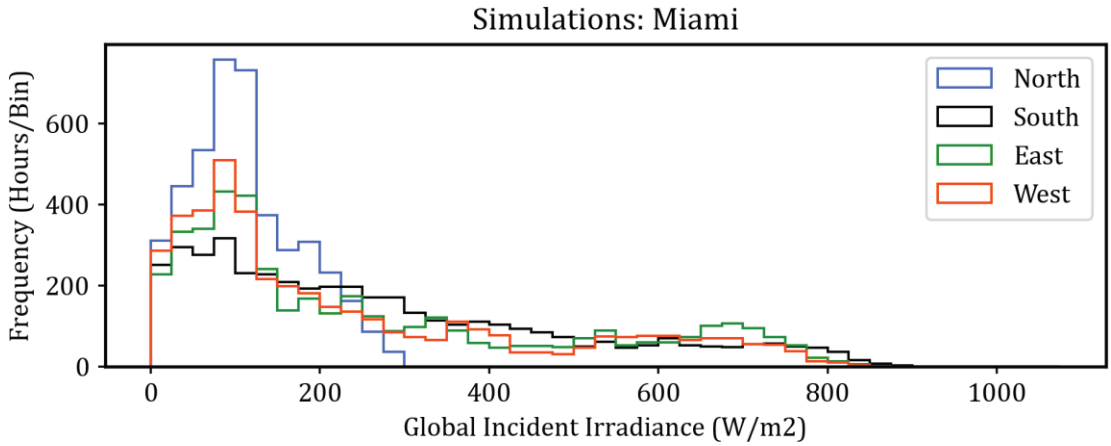
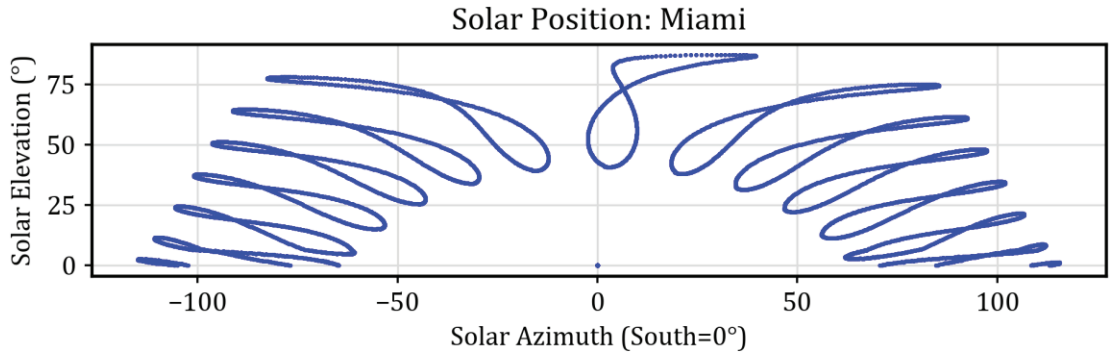
Monthly Data - West Orientation

Month	GlobInc (kwh/m2)	Mitrex M140LS01F612			Mitrex M260GR01F612		
		EArray (kWh)	E_Grid (kWh)	Perf. Ratio	EArray (kWh)	E_Grid (kWh)	Perf. Ratio
Jan	67.62	7.543	6.968	0.736	14.301	13.646	0.776
Feb	77.20	8.636	8.003	0.741	16.338	15.619	0.778
Mar	101.75	11.344	10.559	0.741	21.464	20.544	0.777
Apr	106.43	11.721	10.892	0.731	22.179	21.206	0.766
May	95.12	10.423	9.655	0.725	19.730	18.878	0.763
Jun	88.07	9.636	8.919	0.723	18.260	17.479	0.763
Jul	96.87	10.595	9.816	0.724	20.073	19.211	0.763
Aug	82.79	9.012	8.317	0.718	17.071	16.319	0.758
Sep	78.56	8.521	7.876	0.716	16.149	15.431	0.755
Oct	78.90	8.629	7.989	0.723	16.338	15.632	0.762
Nov	73.27	8.061	7.463	0.728	15.258	14.586	0.766
Dec	64.63	7.122	6.567	0.726	13.484	12.876	0.766





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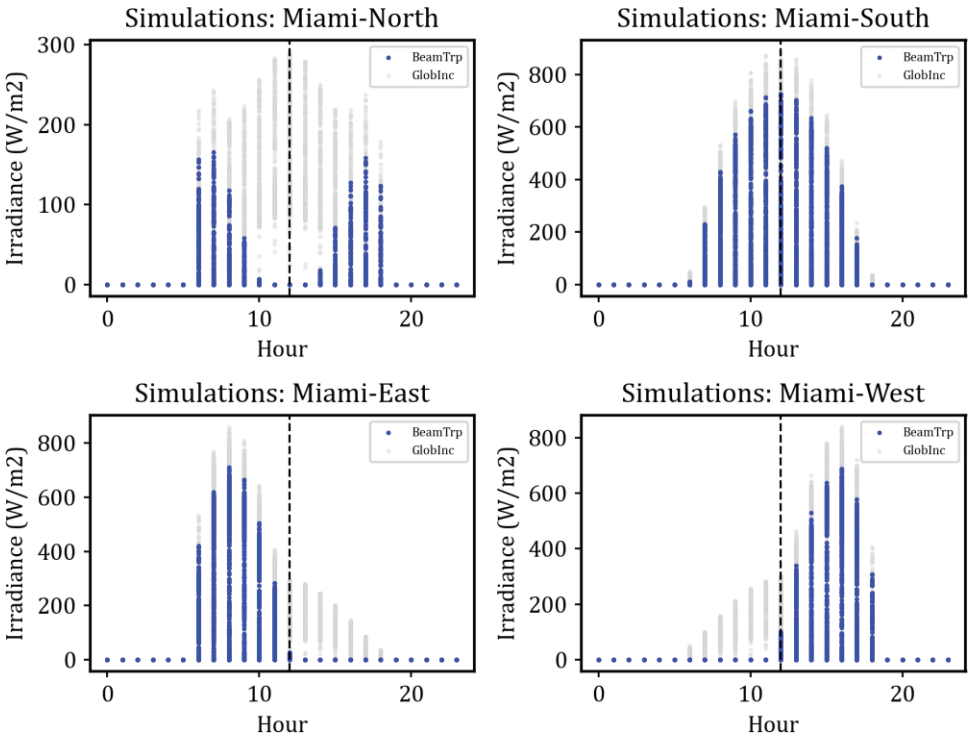

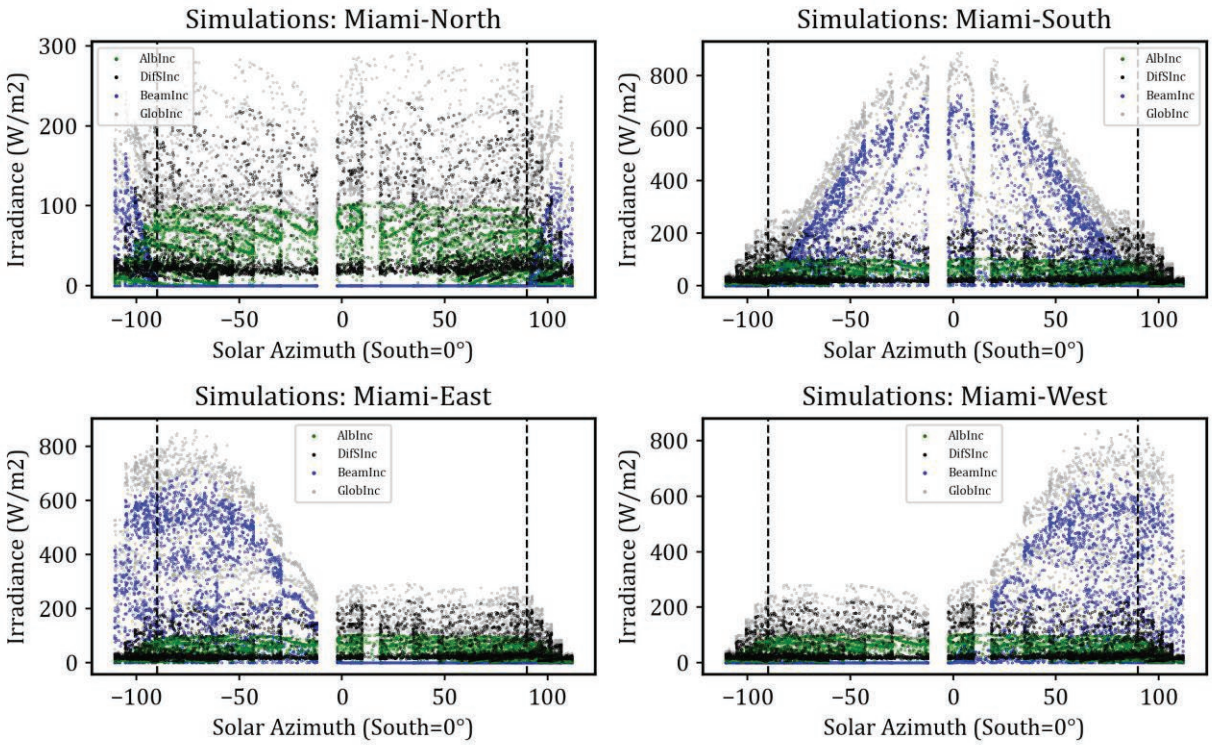

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Annual production values are presented below along with plots showing a histogram of the irradiance values for each orientation and plots of selected transposed irradiance components with both solar azimuth and hour. Structural features in the data plots such as gaps in the solar position and irradiance with solar azimuth plots are an artifact of the hourly simulations.

Yearly Summary

Orientation	GlobInc (kwh/m2)	Mitrex M140LS01F612			Mitrex M260GR01F612		
		EArray (kWh)	E_Grid (kWh)	Perf. Ratio	EArray (kWh)	E_Grid (kWh)	Perf. Ratio
North	409.08	42.868	37.783	0.660	80.410	76.378	0.718
South	1376.36	150.098	139.905	0.726	284.120	271.674	0.759
East	1016.86	113.307	104.902	0.737	214.316	204.825	0.775
West	1192.10	133.102	123.672	0.741	251.759	240.689	0.777

Monthly Data - North Orientation

Month	GlobInc (kwh/m2)	Mitrex M140LS01F612			Mitrex M260GR01F612		
		EArray (kWh)	E_Grid (kWh)	Perf. Ratio	EArray (kWh)	E_Grid (kWh)	Perf. Ratio
Jan	17.61	1.852	1.534	0.622	3.440	3.178	0.694
Feb	21.37	2.316	1.998	0.668	4.322	4.073	0.733
Mar	30.87	3.388	2.970	0.687	6.355	6.014	0.749
Apr	37.79	4.048	3.591	0.679	7.593	7.239	0.737
May	53.08	5.548	4.996	0.672	10.443	10.007	0.725
Jun	59.96	6.225	5.645	0.672	11.737	11.258	0.722
Jul	57.06	5.849	5.277	0.660	11.014	10.573	0.713
Aug	41.02	4.188	3.703	0.645	7.857	7.497	0.703
Sep	30.29	3.197	2.790	0.658	5.989	5.674	0.720
Oct	24.76	2.608	2.232	0.644	4.876	4.577	0.711
Nov	19.41	2.026	1.716	0.631	3.776	3.525	0.699
Dec	15.85	1.622	1.331	0.600	3.008	2.764	0.671

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Monthly Data - South Orientation

Month	GlobInc (kwh/m2)	Mitrex M140LS01F612			Mitrex M260GR01F612		
		EArray (kWh)	E_Grid (kWh)	Perf. Ratio	EArray (kWh)	E_Grid (kWh)	Perf. Ratio
Jan	156.02	18.115	17.002	0.778	34.229	32.726	0.807
Feb	142.46	16.382	15.384	0.771	31.007	29.678	0.801
Mar	125.37	14.003	13.082	0.745	26.541	25.390	0.779
Apr	94.06	9.783	9.081	0.690	18.566	17.764	0.726
May	74.87	7.399	6.767	0.646	14.003	13.363	0.686
Jun	60.11	5.795	5.217	0.620	10.931	10.393	0.665
Jul	68.66	6.540	5.927	0.617	12.361	11.774	0.660
Aug	91.19	9.071	8.393	0.657	17.222	16.469	0.695
Sep	113.73	11.969	11.170	0.702	22.720	21.755	0.736
Oct	144.81	16.061	15.057	0.743	30.428	29.143	0.774
Nov	154.91	17.704	16.621	0.766	33.484	32.038	0.795
Dec	150.16	17.277	16.203	0.771	32.629	31.183	0.799

Monthly Data - East Orientation

Month	GlobInc (kwh/m2)	Mitrex M140LS01F612			Mitrex M260GR01F612		
		EArray (kWh)	E_Grid (kWh)	Perf. Ratio	EArray (kWh)	E_Grid (kWh)	Perf. Ratio
Jan	61.10	6.903	6.363	0.744	13.064	12.456	0.784
Feb	70.76	8.018	7.436	0.751	15.164	14.494	0.788
Mar	83.29	9.418	8.711	0.747	17.804	17.002	0.785
Apr	97.23	10.913	10.124	0.744	20.627	19.730	0.780
May	106.39	11.978	11.117	0.746	22.655	21.679	0.784
Jun	92.13	10.208	9.420	0.730	19.300	18.443	0.770
Jul	110.98	12.261	11.374	0.732	23.208	22.205	0.770
Aug	99.04	10.849	10.051	0.725	20.518	19.623	0.762
Sep	93.23	10.198	9.462	0.725	19.286	18.439	0.761
Oct	82.79	9.207	8.523	0.735	17.414	16.641	0.773
Nov	61.36	6.806	6.276	0.731	12.875	12.286	0.770
Dec	58.55	6.549	6.044	0.737	12.399	11.827	0.777

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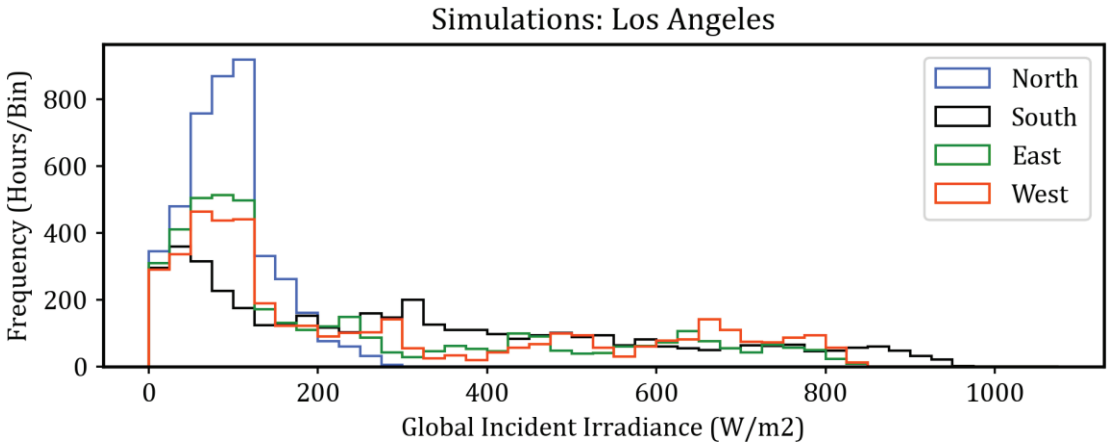
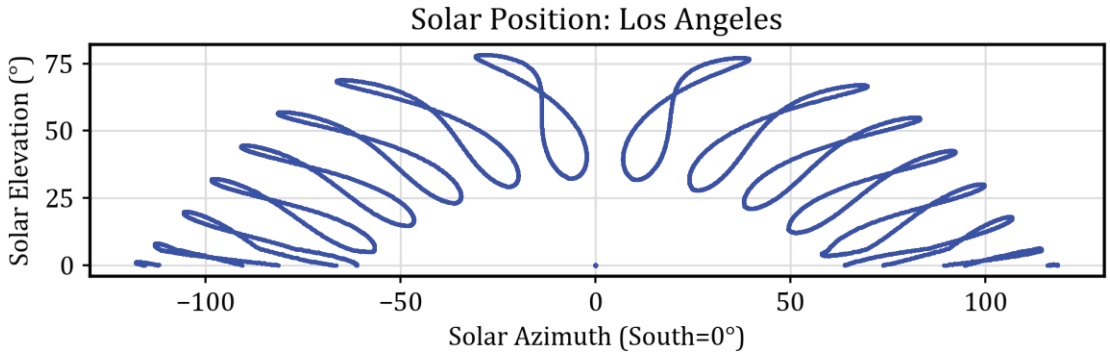
Monthly Data - West Orientation

Month	GlobInc (kwh/m2)	Mitrex M140LS01F612			Mitrex M260GR01F612		
		EArray (kWh)	E_Grid (kWh)	Perf. Ratio	EArray (kWh)	E_Grid (kWh)	Perf. Ratio
Jan	66.87	7.546	6.971	0.745	14.277	13.623	0.784
Feb	72.83	8.206	7.607	0.746	15.516	14.829	0.783
Mar	96.41	10.945	10.167	0.753	20.700	19.791	0.790
Apr	112.36	12.645	11.779	0.749	23.916	22.881	0.783
May	128.65	14.497	13.491	0.749	27.411	26.212	0.784
Jun	139.27	15.567	14.513	0.744	29.443	28.160	0.778
Jul	128.83	14.247	13.258	0.735	26.959	25.796	0.770
Aug	127.41	14.035	13.080	0.733	26.543	25.396	0.767
Sep	101.33	11.143	10.354	0.730	21.072	20.154	0.765
Oct	88.81	9.837	9.127	0.734	18.616	17.787	0.770
Nov	71.80	8.038	7.448	0.741	15.215	14.542	0.779
Dec	57.52	6.396	5.876	0.730	12.093	11.520	0.770





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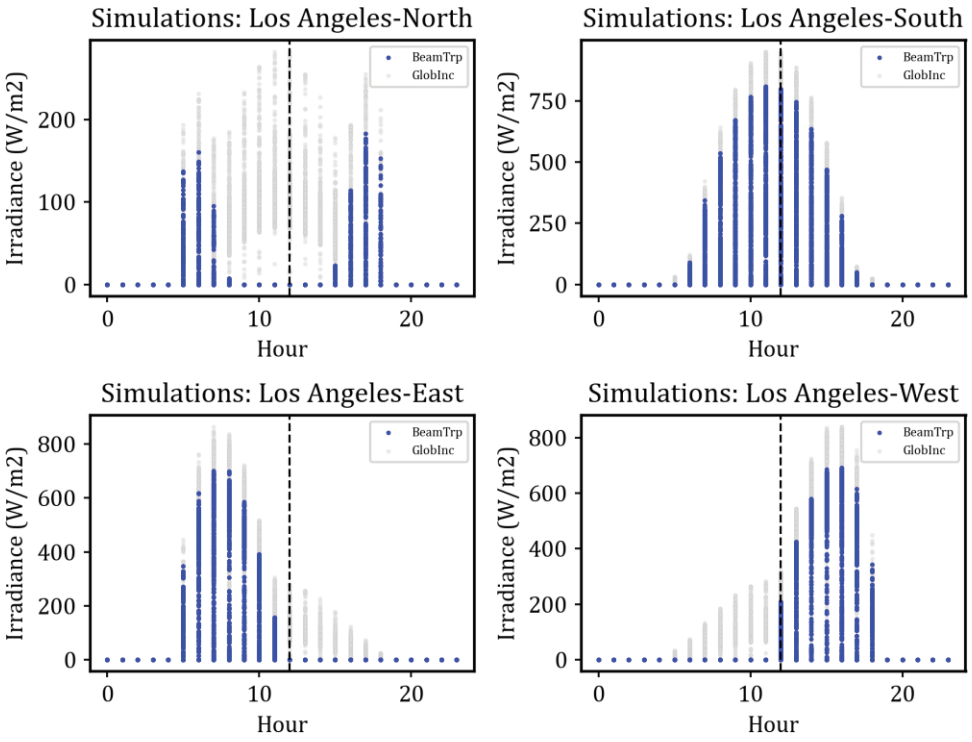

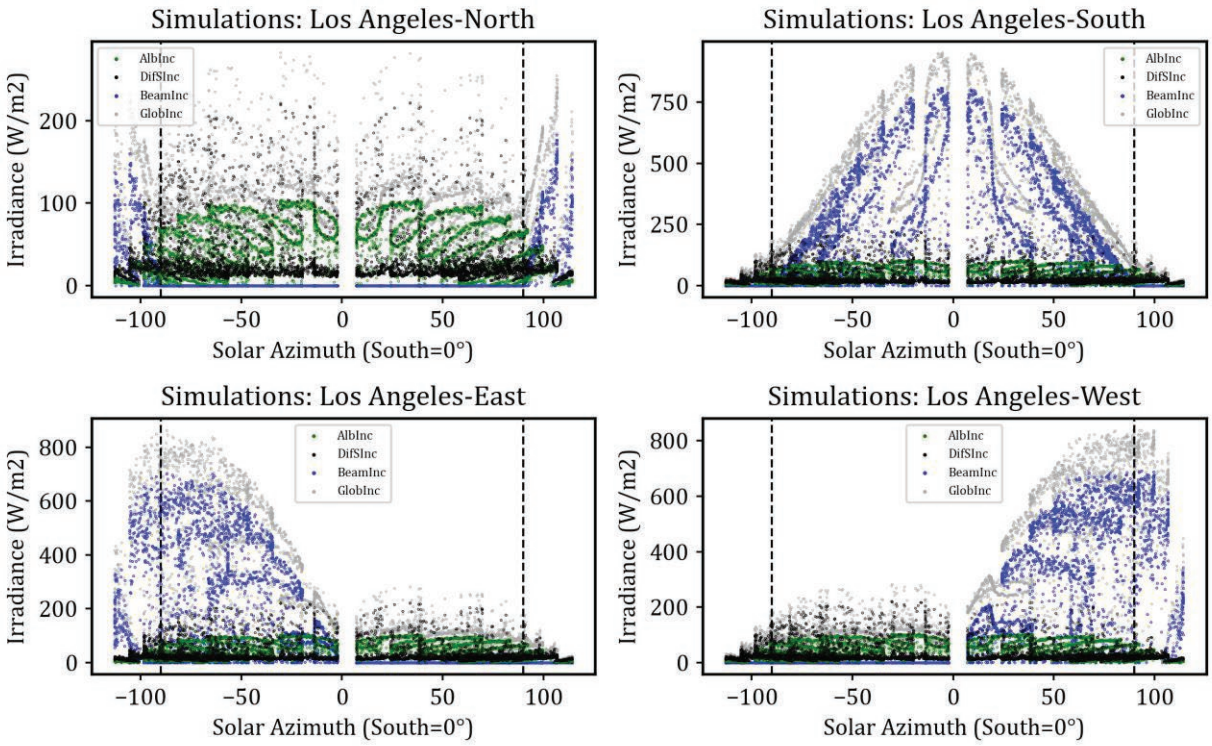

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