

SCE Weather Forecast Model Performance Summary 2025

Introduction

SCE evaluates weather model forecast accuracy in summary reports to help inform continuous improvement efforts around increasing situational awareness.

Beginning in 2023 SCE decided to provide a summary of forecast accuracy to the public for key fire weather variables at the start of the year covering the previous year.

The following slides report circuit-level weather forecast accuracy for sustained wind speed, wind gust speed, dew point depression, and fire potential index (FPI).

Verification Methodology

Mean absolute error (MAE) is a common metric used throughout meteorology to assess forecast accuracy.

SCE calculates MAE by comparing circuit-level forecasts to available observations from SCE and public weather station networks installed nearby a circuit.

The average absolute difference between forecast-observation pairs provides the MAE value.

For sustained wind speed, wind gust speed, dewpoint depression, and FPI, the observations providing the maximum value on a circuit for a given time period are used for comparison to the circuit-maximum forecasts.

Verification Methodology

SCE runs weather model systems comprising traditional numerical weather prediction models distilled into ensemble sub-systems. SCE also processes public weather models from the National Weather Service. These collective models also drive five machine learning forecast systems.

These systems are detailed below and verification statistics are provided on the following slides for each model source.

Model Name	Forecast Horizon	Purpose	Initial and Lateral Boundary condition Source
Control Model (2km Deterministic)	7 Days	Provide 7-day forecast	NCEP 0.25-degree GFS
1km ECMWF (EC) Ensemble	4.5 Days	Provide high resolution Ensemble forecast	ECMWF IFS
1km GFS+ECMWF Ensemble	4.5 Days	Provide high resolution Ensemble forecast	NCEP 0.25-degree GFS and ECMWF IFS
2 km Ensemble	4.5 Days	Ensemble forecast	NCEP 12-km NAM
1km GFS Ensemble	4.5 Days	Provide high resolution Ensemble forecast	NCEP 0.25-degree GFS
Machine Learning (2 km Deterministic ML)	7 Days	Bias correct control model forecast	2km Deterministic
1 km Ensemble ML	4.5 Days	Provide high resolution bias corrected ensemble forecast	1-km GFS Ensemble and 1-km ECMWF Ensemble
1 km EC Ensemble ML	4.5 Days	Provide high resolution bias corrected ensemble forecast	1-km ECMWF Ensemble
1 km GFS Ensemble ML	4.5 Days	Provide high resolution bias corrected ensemble forecast.	1-km GFS Ensemble
NAM ML	3 Days	Provide high resolution bias corrected public model forecast.	NCEP 3-km NAM
NBM	7 Days	Provide 7-day public forecast	Various global and regional models (GFS, ECMWF, GDPS, etc.)

Sustained Wind Speed

Forecast Day	2km Deterministic	1km EC Ensemble	1-km GFS+EC Ensemble	2-km Ensemble	1-km GFS Ensemble	2-km Deterministic ML	1-km Ensemble ML	1-km EC Ensemble ML	1-km GFS Ensemble ML	NAM ML	NBM
1	2.59	2.58	2.49	2.71	2.54	1.38	1.26	1.32	1.33	2.89	3.46
2	2.64	2.63	2.53	2.75	2.60	1.44	1.30	1.36	1.38	2.94	3.45
3	2.69	2.66	2.56	2.79	2.64	1.50	1.35	1.40	1.44		3.45
4	2.77	2.65	2.53	2.89	2.64	1.57	1.37	1.42	1.46		3.47
5	2.86					1.66					3.44
6	2.97					1.75					3.41
7	3.07					1.85					3.19

Table: Sustained wind speed forecast mean absolute error (MPH) by forecast horizon; comprised of 01/01/2025-12/31/2025 data.

Wind Gust Speed

Forecast Day	2-km Deterministic	1-km EC Ensemble	1-km GFS+EC Ensemble	2-km Ensemble	1-km GFS Ensemble	2-km Deterministic ML	1-km Ensemble ML	1-km EC Ensemble ML	1-km GFS Ensemble ML	NAM ML	NBM
1	3.77	3.40	3.40	3.90	3.69	2.28	2.07	2.18	2.21	4.38	5.32
2	3.95	3.51	3.49	3.99	3.79	2.41	2.15	2.25	2.31	4.47	5.30
3	4.09	3.60	3.56	4.10	3.90	2.52	2.26	2.34	2.43		5.33
4	4.28	3.71	3.62	4.30	3.96	2.67	2.31	2.39	2.48		5.37
5	4.47					2.83					5.33
6	4.73					3.02					5.31
7	4.95					3.22					5.15

Table: Wind gust speed forecast mean absolute error (MPH) by forecast horizon; comprised of 01/01/2025-12/31/2025 data.

Dewpoint Depression

Forecast Day	2-km Deterministic	1-km EC Ensemble	1-km GFS+EC Ensemble	2-km Ensemble	1-km GFS Ensemble	2-km Deterministic ML	1-km Ensemble ML	1-km EC Ensemble ML	1-km GFS Ensemble ML	NAM ML	NBM
1	5.85	6.99	6.58	5.29	6.54	5.09	3.65	3.87	3.86	7.01	7.71
2	6.23	7.89	7.12	5.44	6.83	5.43	3.77	4.08	4.04	7.62	7.85
3	6.56	8.42	7.45	5.63	7.09	5.73	4.06	4.39	4.42		7.99
4	7.00	8.59	7.56	5.46	7.26	6.18	4.37	4.68	4.80		8.22
5	7.45					6.66					8.45
6	8.18					7.33					8.74
7	9.09					8.17					8.63

Table: Maximum dewpoint depression forecast mean absolute error (°F) by forecast horizon; comprised of 01/01/2025-12/31/2025 data.

Fire Potential Index

Forecast Day	2-km Deterministic	1-km EC Ensemble	1-km GFS+EC Ensemble	2-km Ensemble	1-km GFS Ensemble	2-km Deterministic ML	1-km Ensemble ML	1-km EC Ensemble ML	1-km GFS Ensemble ML	NAM ML	NBM
1	1.12	1.12	1.12	1.26	1.12	2.07	1.03	1.03	1.04	1.20	1.30
2	1.16	1.15	1.15	1.24	1.16	2.11	1.06	1.06	1.08	1.22	1.24
3	1.18	1.18	1.18	1.25	1.19	2.14	1.09	1.08	1.11		1.26
4	1.22	1.21	1.21	1.34	1.22	2.17	1.14	1.13	1.15		1.29
5	1.26					2.21					1.31
6	1.30					2.25					1.35
7	1.34					2.29					1.35

Table: Fire potential index forecast mean absolute error (unitless) by forecast horizon; comprised of 01/01/2025-12/31/2025 data.