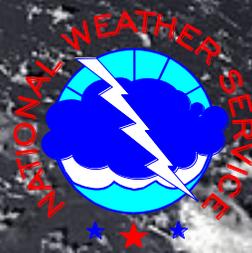




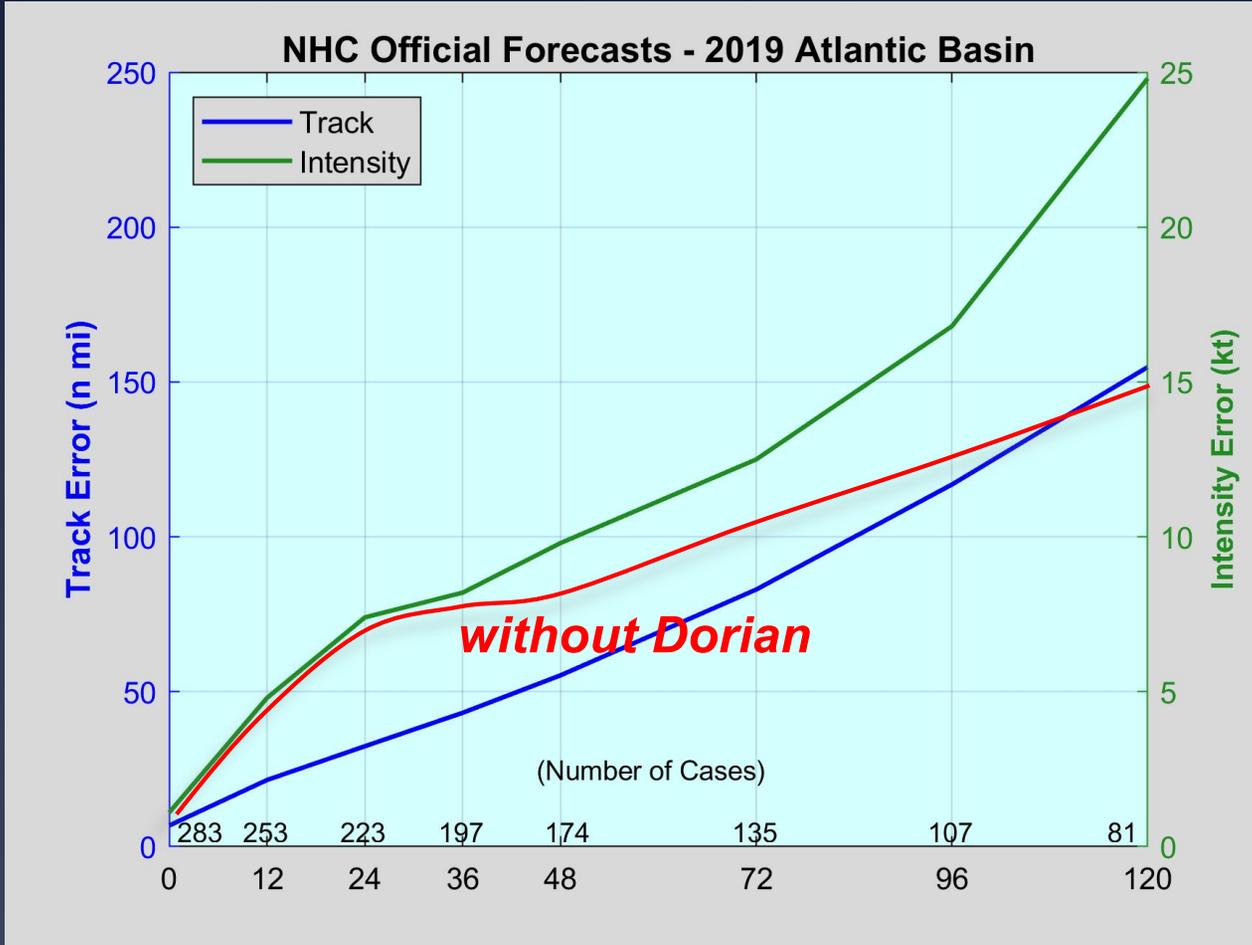
National Hurricane Center 2019 Forecast Verification (Preliminary)



John P. Cangialosi
National Hurricane Center



2019 Atlantic Verification



VT (h)	NT	TRACK (n mi)	INT (kt)
000	283	6.8	1.1
012	253	21.5	4.8
024	223	32.4	7.4
036	197	43.2	8.2
048	174	55.3	9.8
072	135	83.0	12.5
096	107	116.9	16.8
120	81	154.8	24.8

Values in green exceed all-time records.

Great year for track prediction, close battle with 2017.

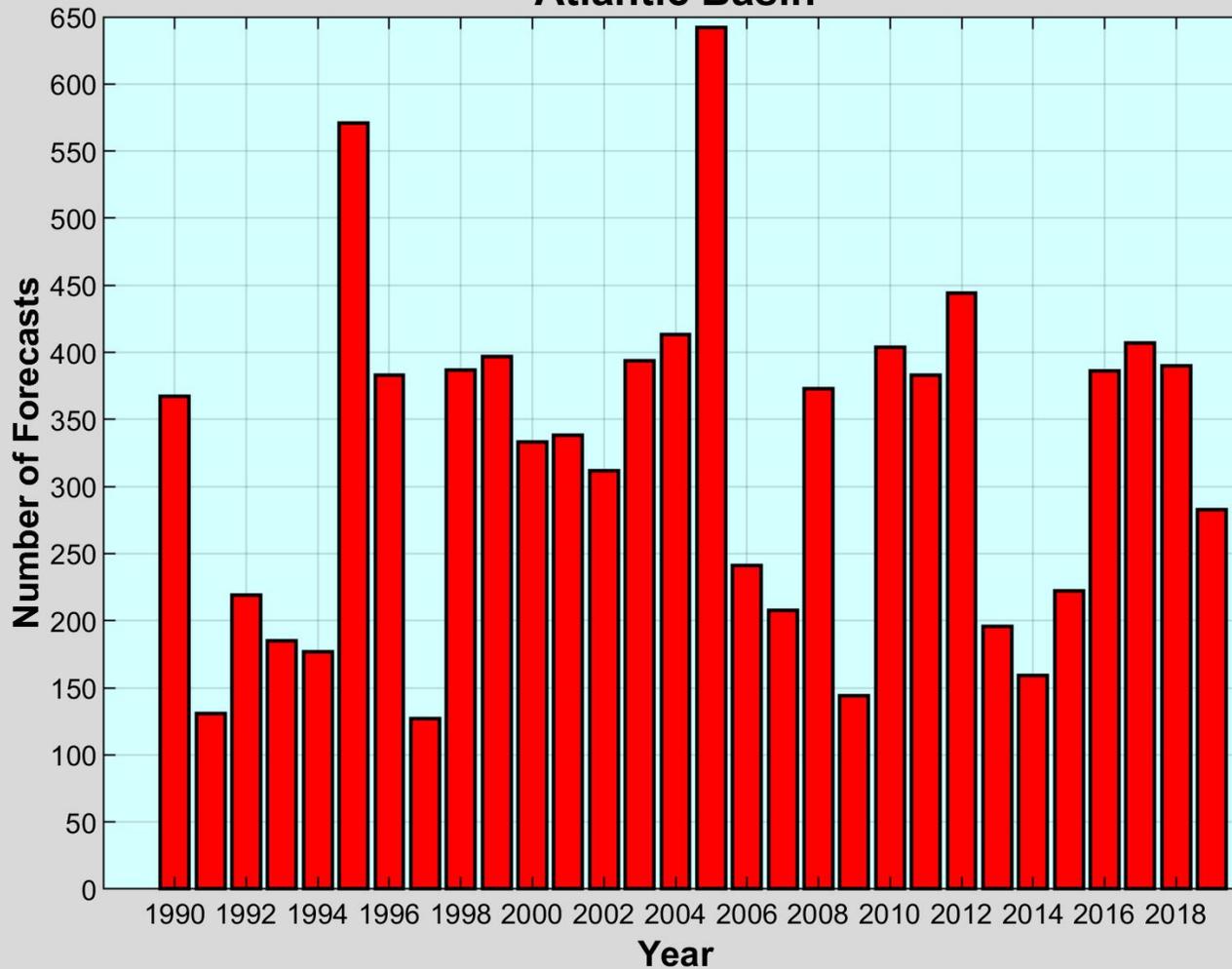
Stats don't include Olga, Pablo, and Rebekah



Sample Size since 1990



Number of NHC Official Forecasts By Year
Atlantic Basin



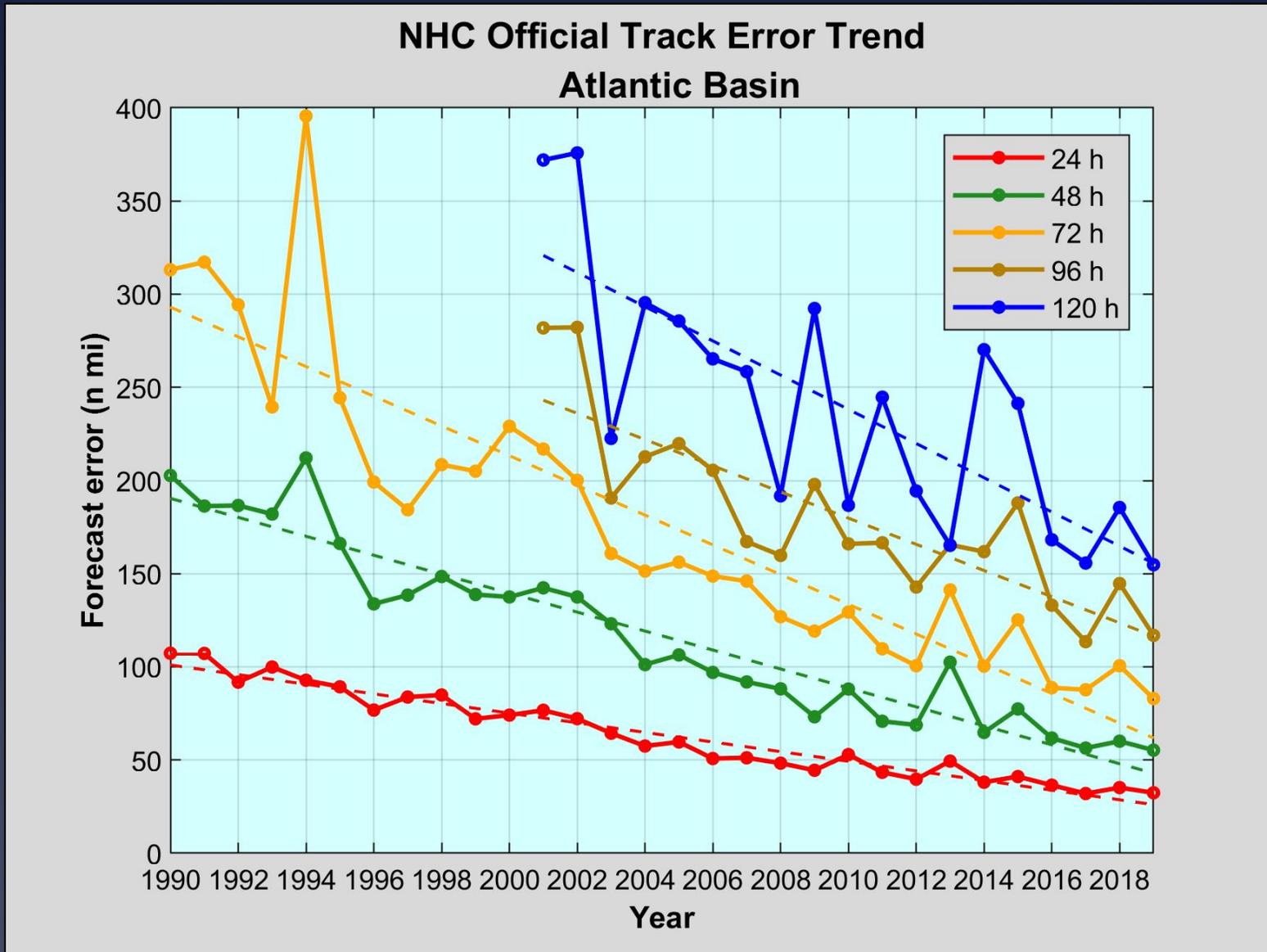
** NHC issued 299 TC forecasts in 2019.*

** 2019 was not as busy as 2016-18.*

** Below the mean from 1990-2019 (320).*



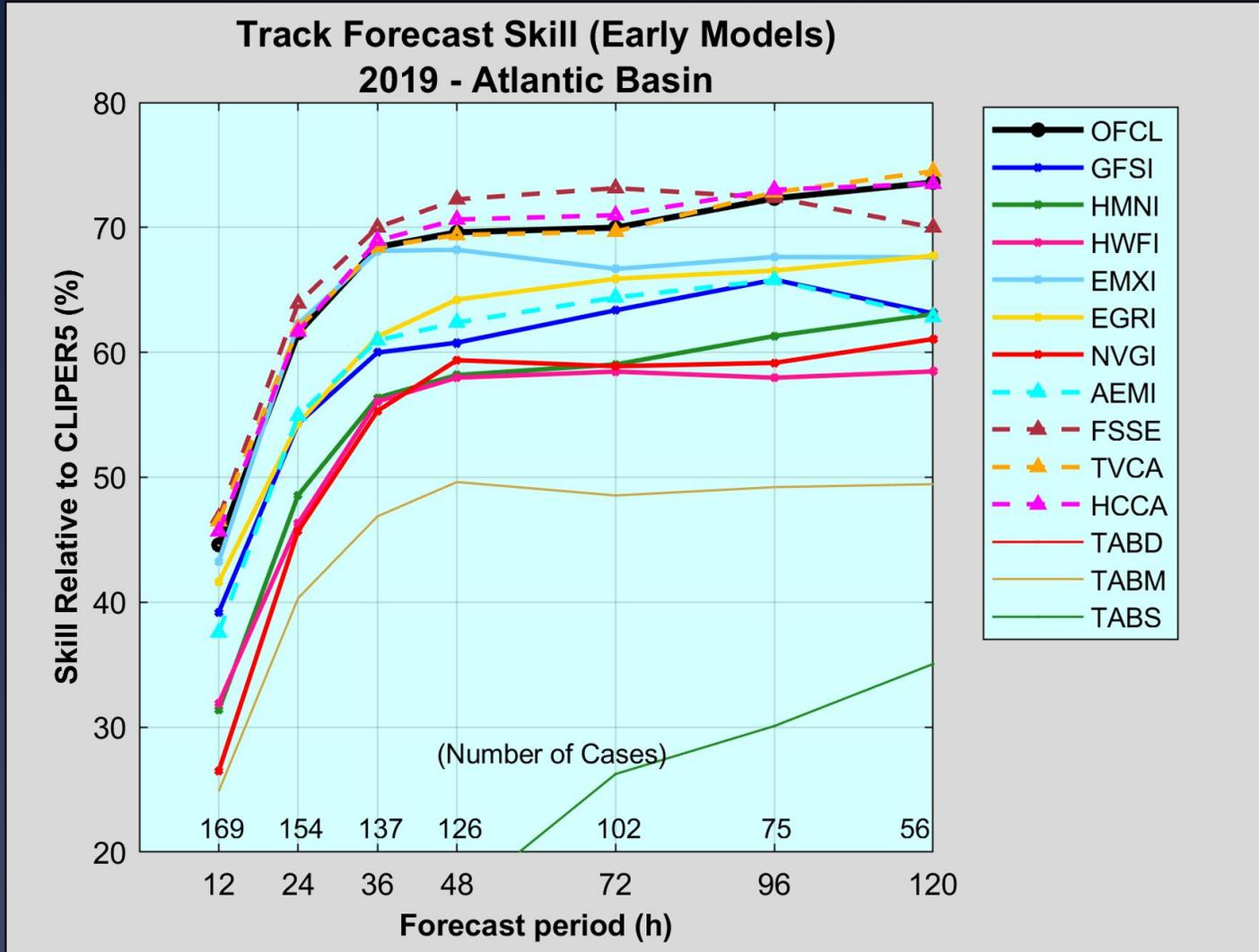
Atlantic Track Error Trends



Track errors decreased at all time periods in 2019, and the trends have shown significant improvements over the long term.



2019 Track Guidance



Official forecasts were very skillful and near the consensus aids (FSSE, HCCA, TVCA).

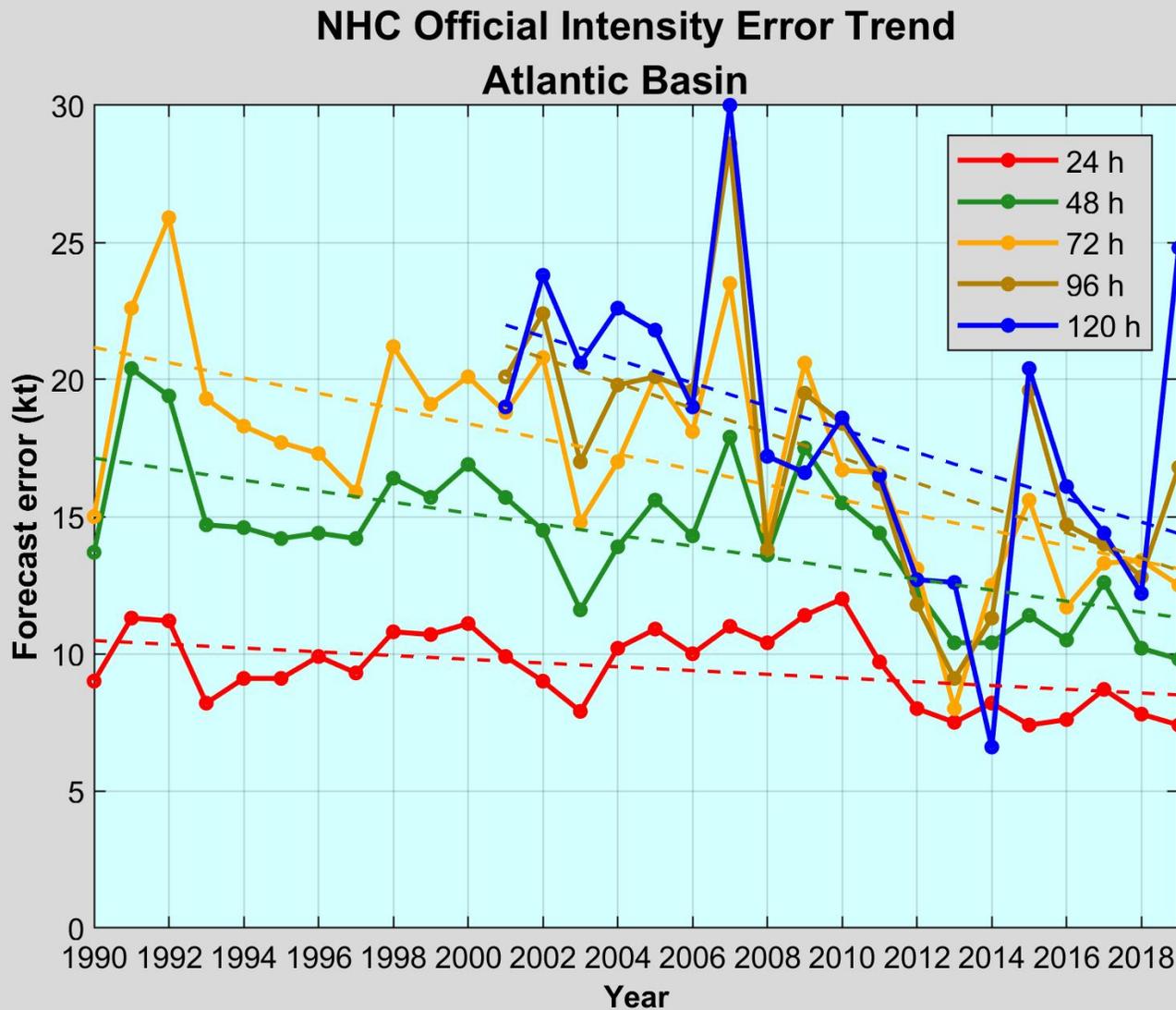
EMXI best individual model, but not as good as the NHC forecasts or consensus models.

EGRI was the second best model, followed by AEMI and GFSI.

NVGI, HMNI, and HWFI trailed in 2019.



Atlantic Intensity Error Trends

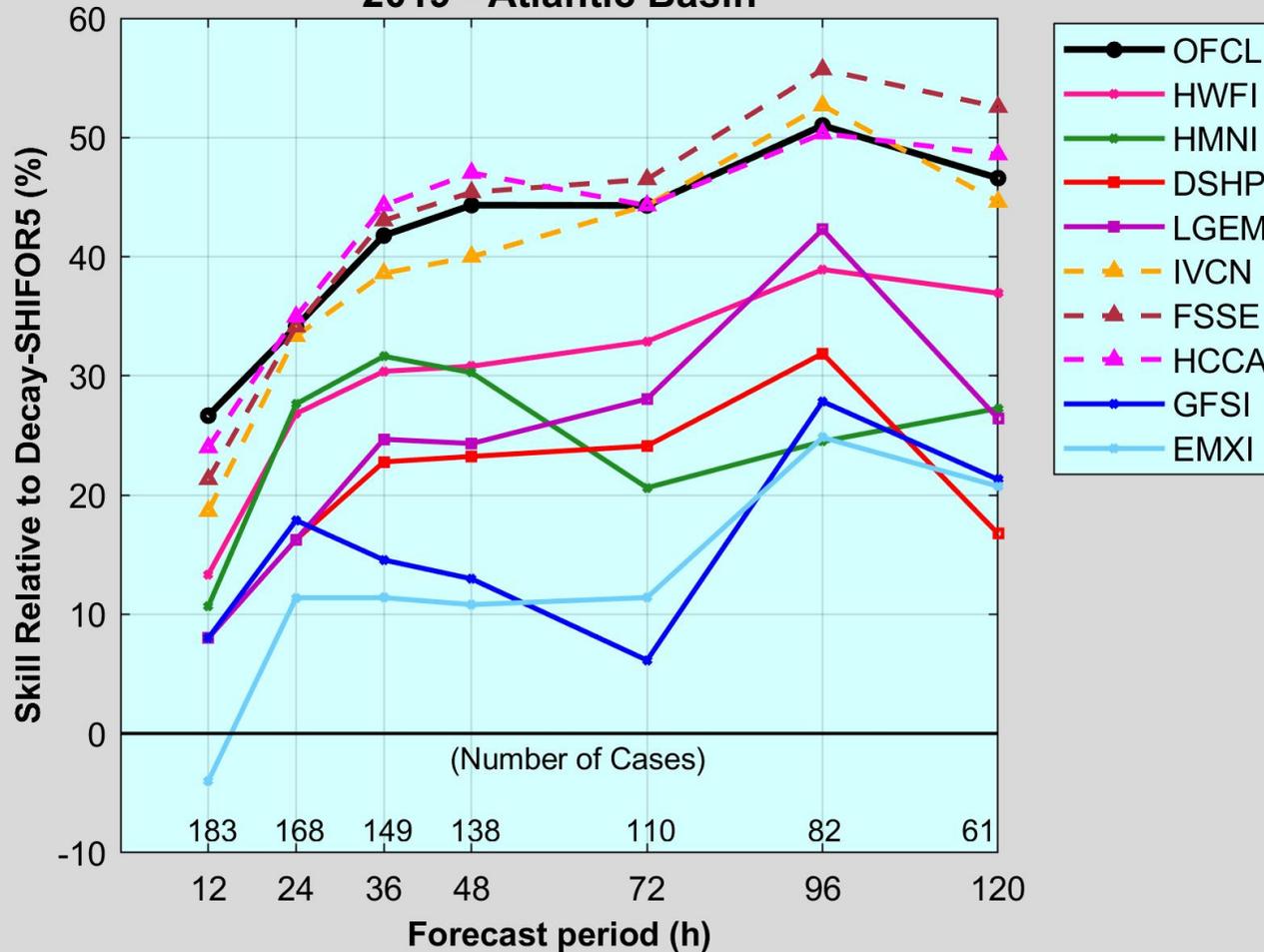


Errors decreased for the short leads, but large spike upward occurred at 96 and 120 h. Second largest annual error at 120 h – again mostly because of Dorian



2019 Intensity Guidance

Intensity Forecast Skill (Early Models)
2019 - Atlantic Basin



Official forecasts very skillful, near the consensus aids.

HCCA best model from 12 to 48 h, FSSE best from 72 to 120 h.

HWFI was a strong performer, best individual model at most times

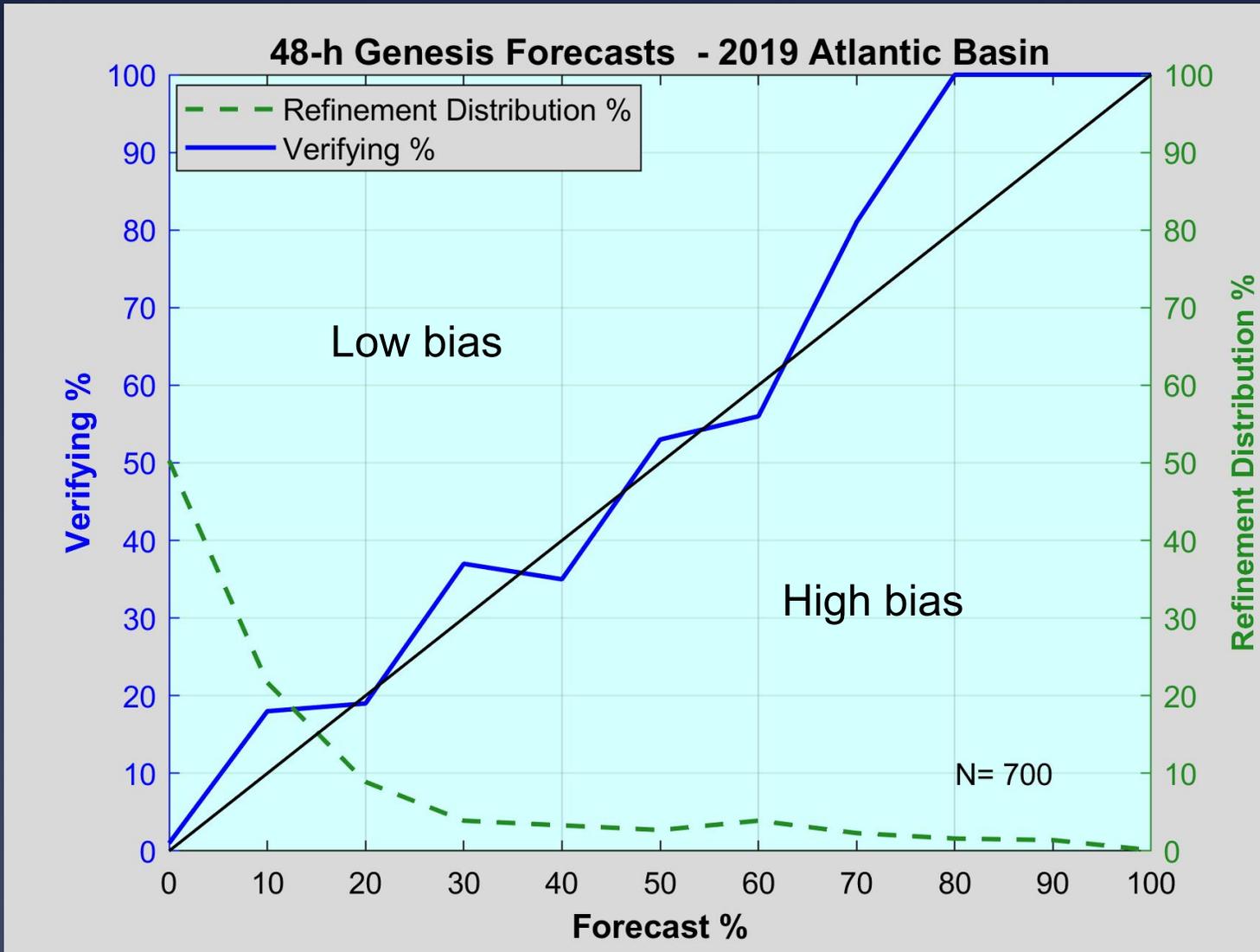
HMNI competitive with HWFI early, but trailed late.

DSHP and LGEM were fair performers, but not as good as HWFI and consensus models.

GFSI and EMXI had some skill, but not competitive with the remainder of the guidance.



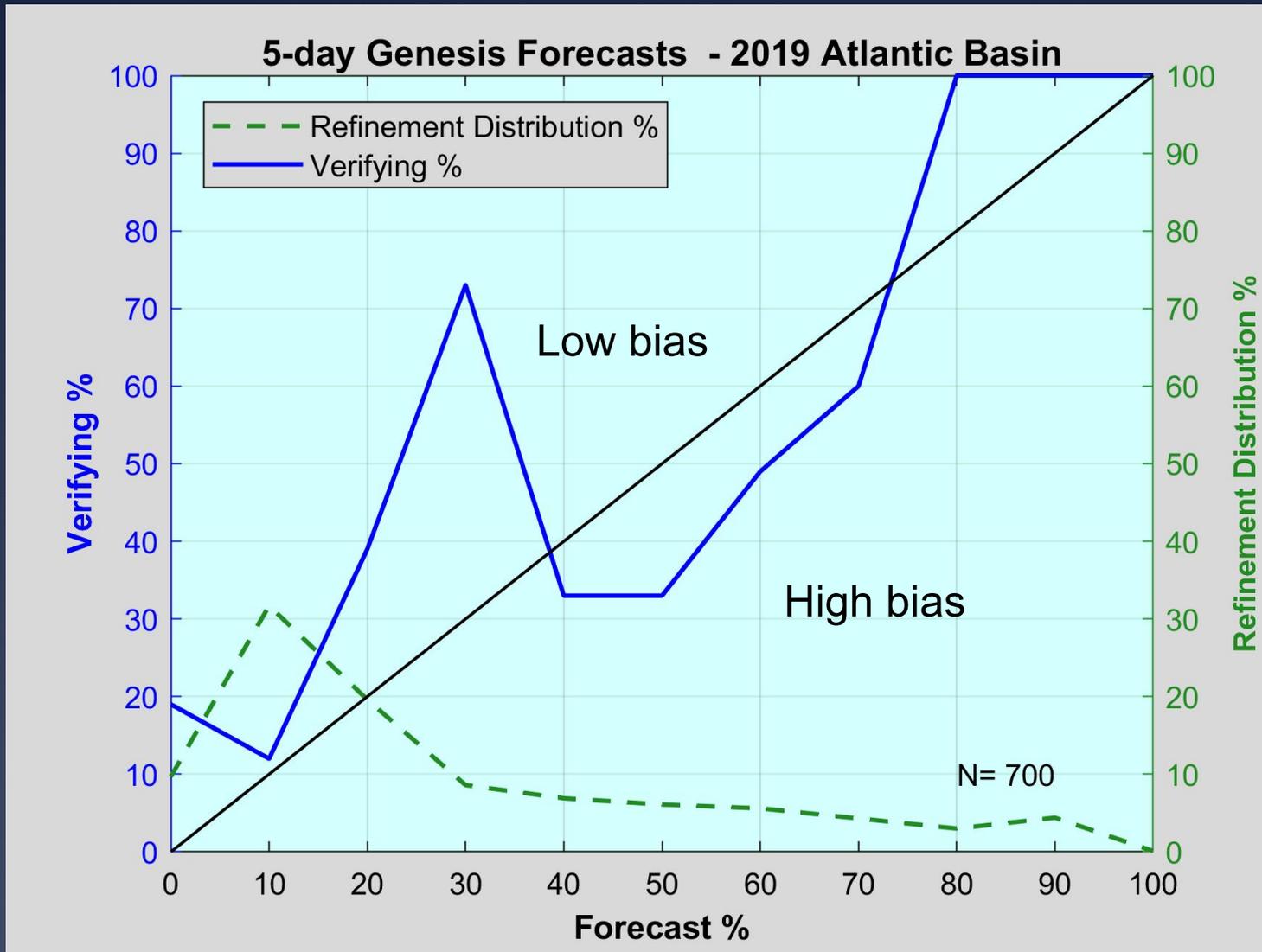
2-day Genesis Forecast Verification



48-h genesis forecasts are very well calibrated. Slight low bias at the high probabilities



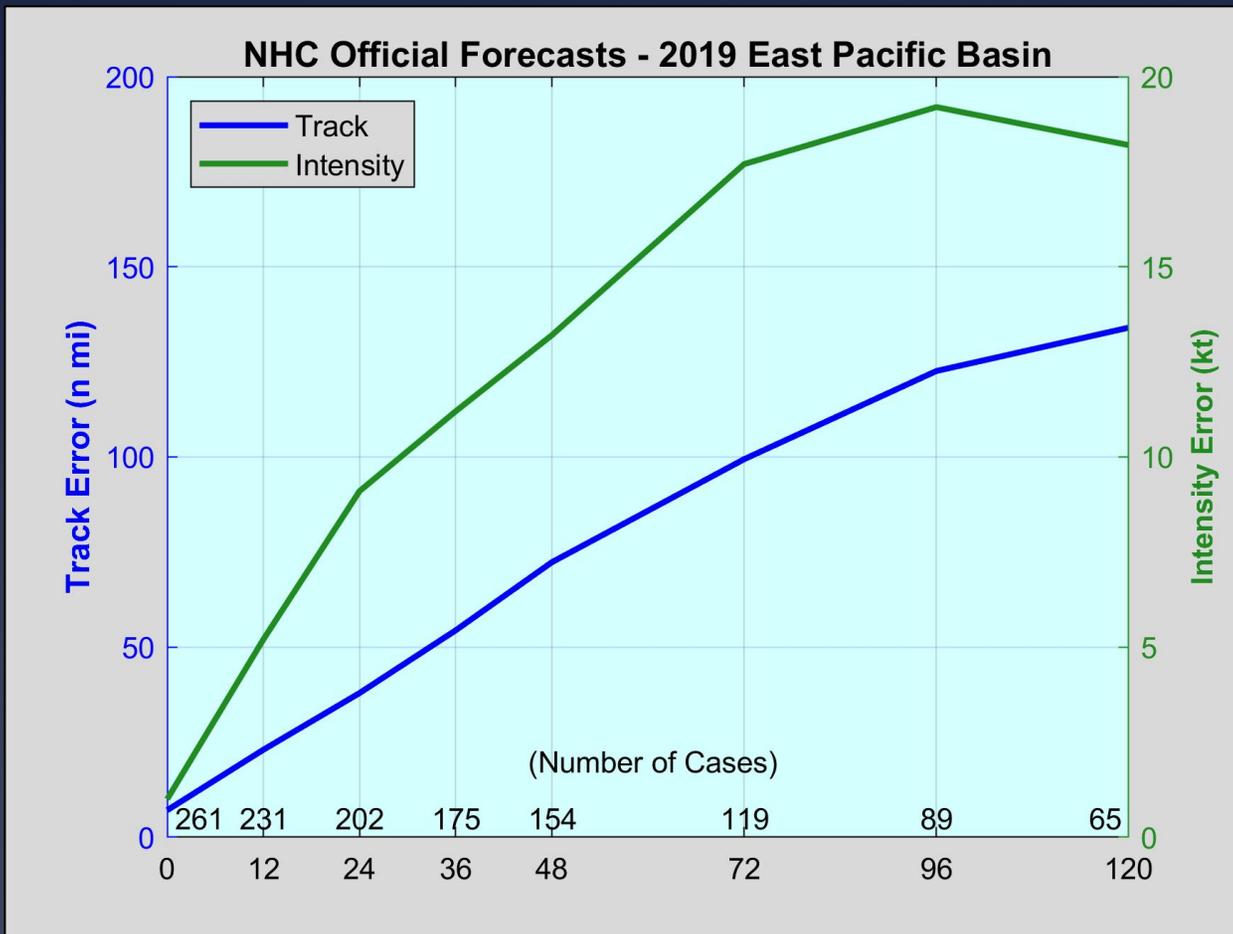
5-day Genesis Forecast Verification



Noisy, low bias at 20 and 30%.



2019 East Pacific Verification



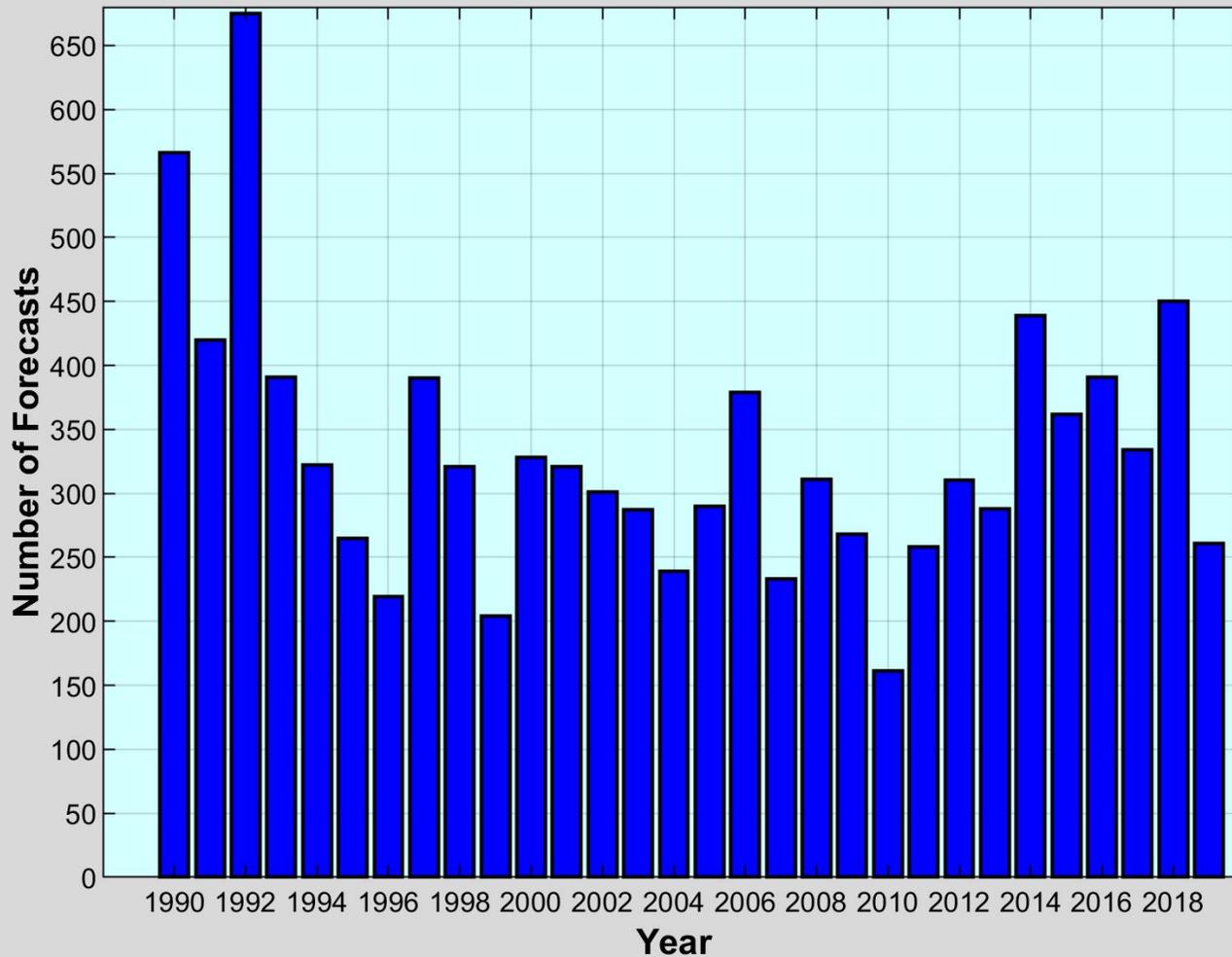
VT (h)	NT	TRACK (n mi)	IN (kt)
000	261	7.5	1.0
012	231	23.4	5.2
024	201	38.0	9.1
036	174	54.5	11.2
048	153	72.1	13.3
072	119	99.4	17.7
096	89	122.6	19.2
120	65	134.0	18.2

No records broken



Sample Size since 1990

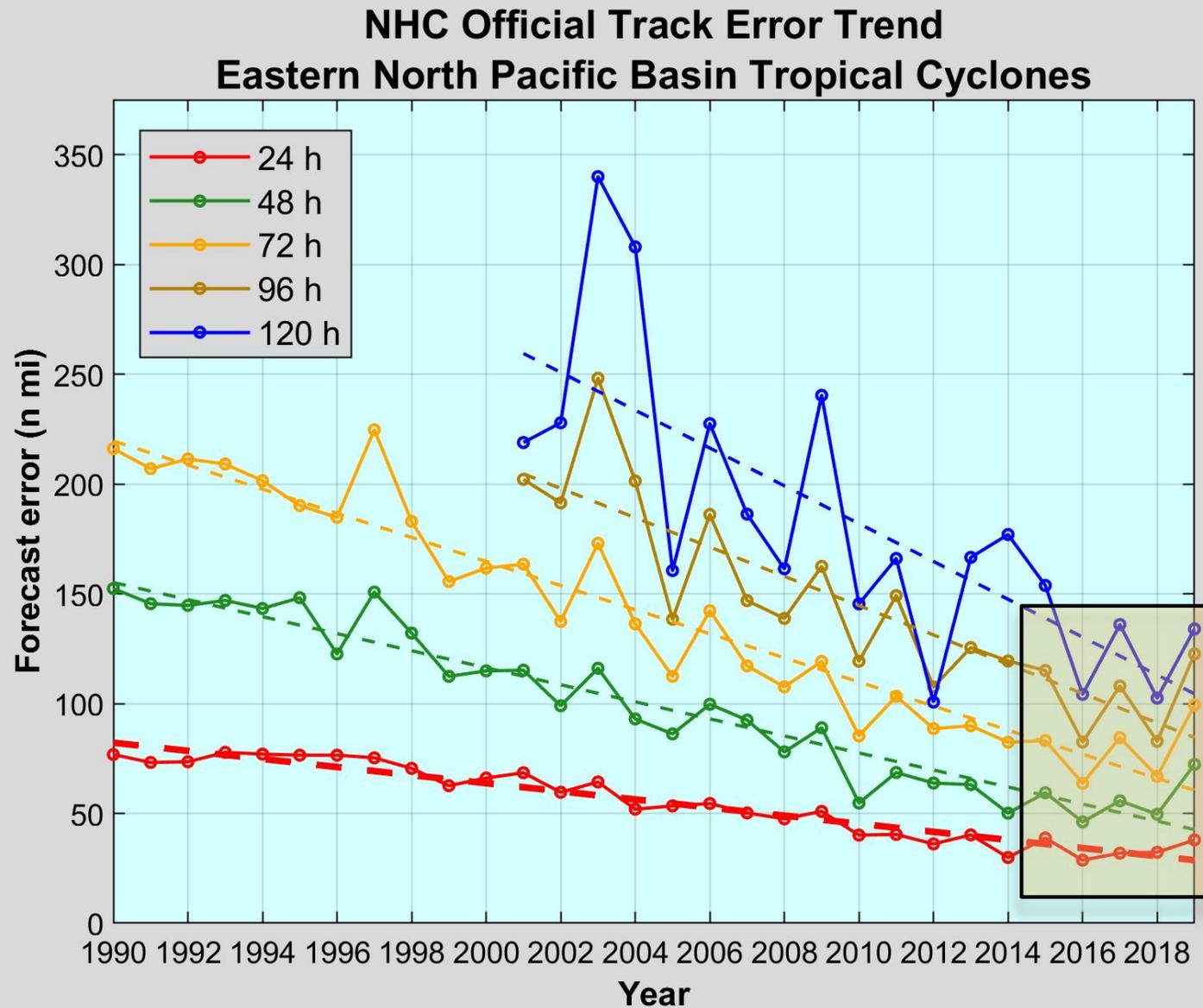
Number of NHC Official Forecasts By Year
East Pacific Basin



Quietest year since 2011.



EPAC Track Error Trends



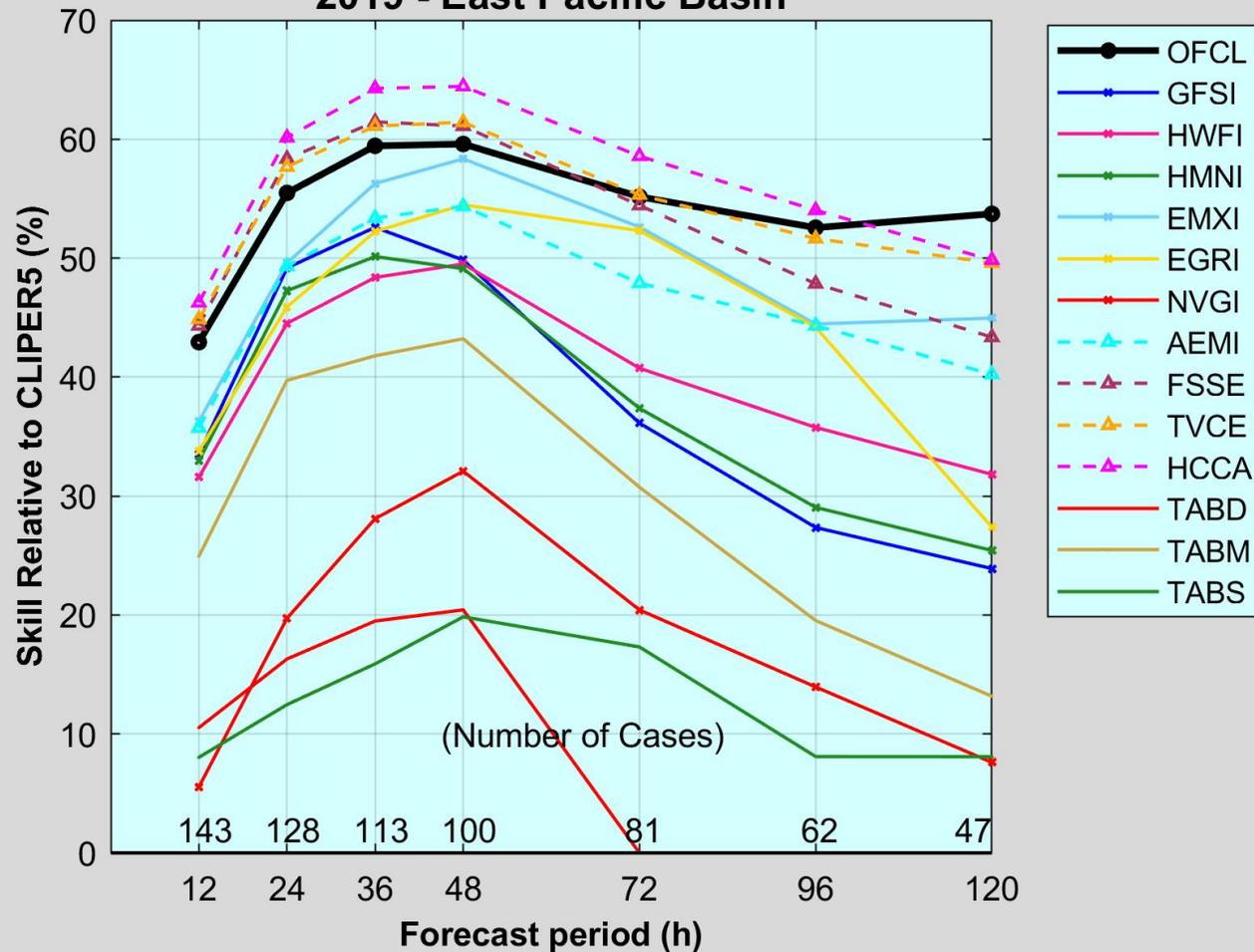
Track errors increased in 2019 at all times, making the recent trends appear a little flat. Still impressive long-term improvements though.



2019 Track Guidance



Track Forecast Skill (Early Models)
2019 - East Pacific Basin



Official forecasts very good, but a little less skill than the consensus models in the short term.

EMXI best individual model, but less skill than the official forecasts and consensus models.

AEMI close to, but not quite as good as, EMXI.

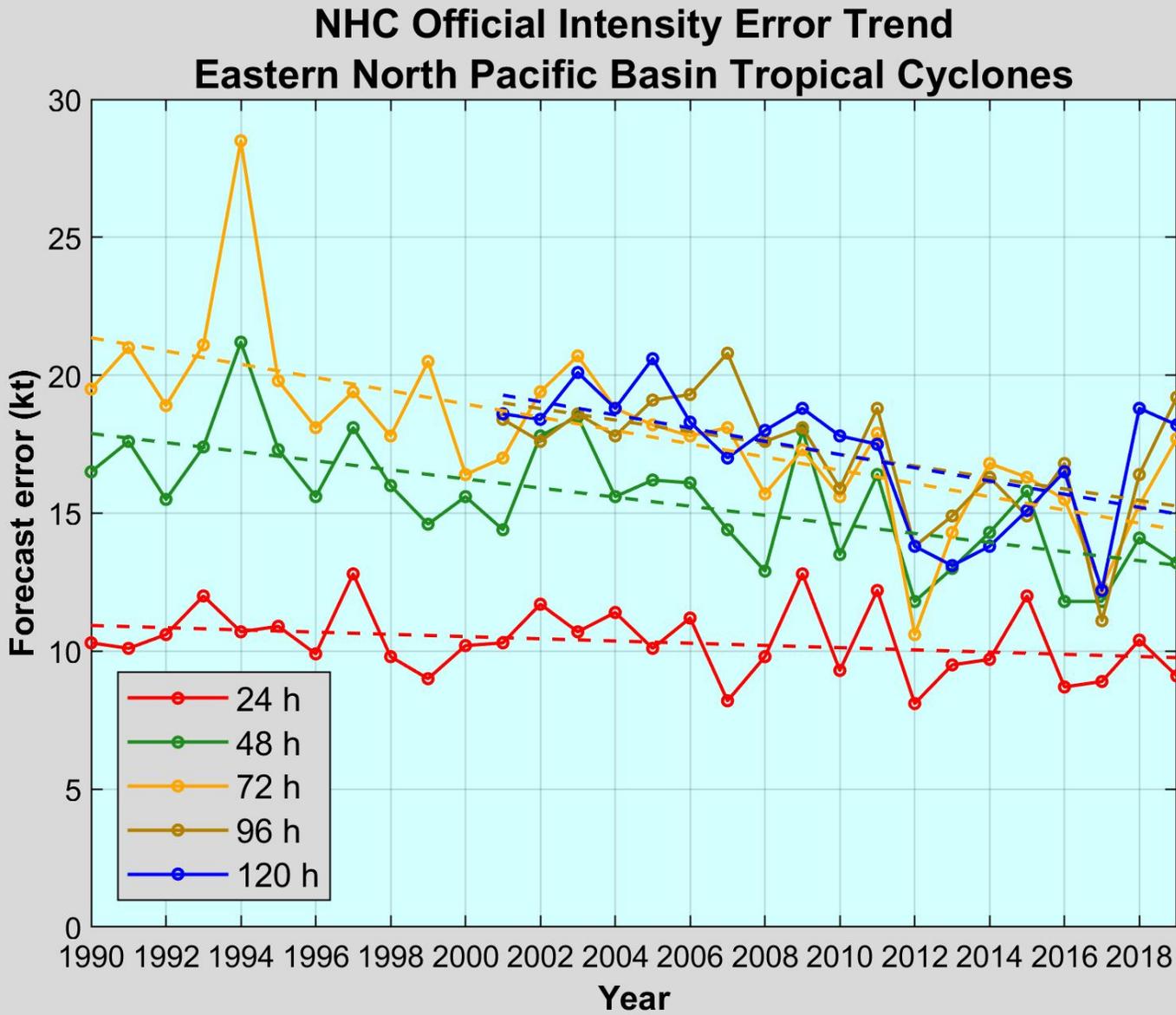
EGRI was a strong performer through 96 h, second place model at times.

GFSI, HWFI, HMNI are in the middle of the pack.

NVGI trailed.



EPAC Intensity Error Trends

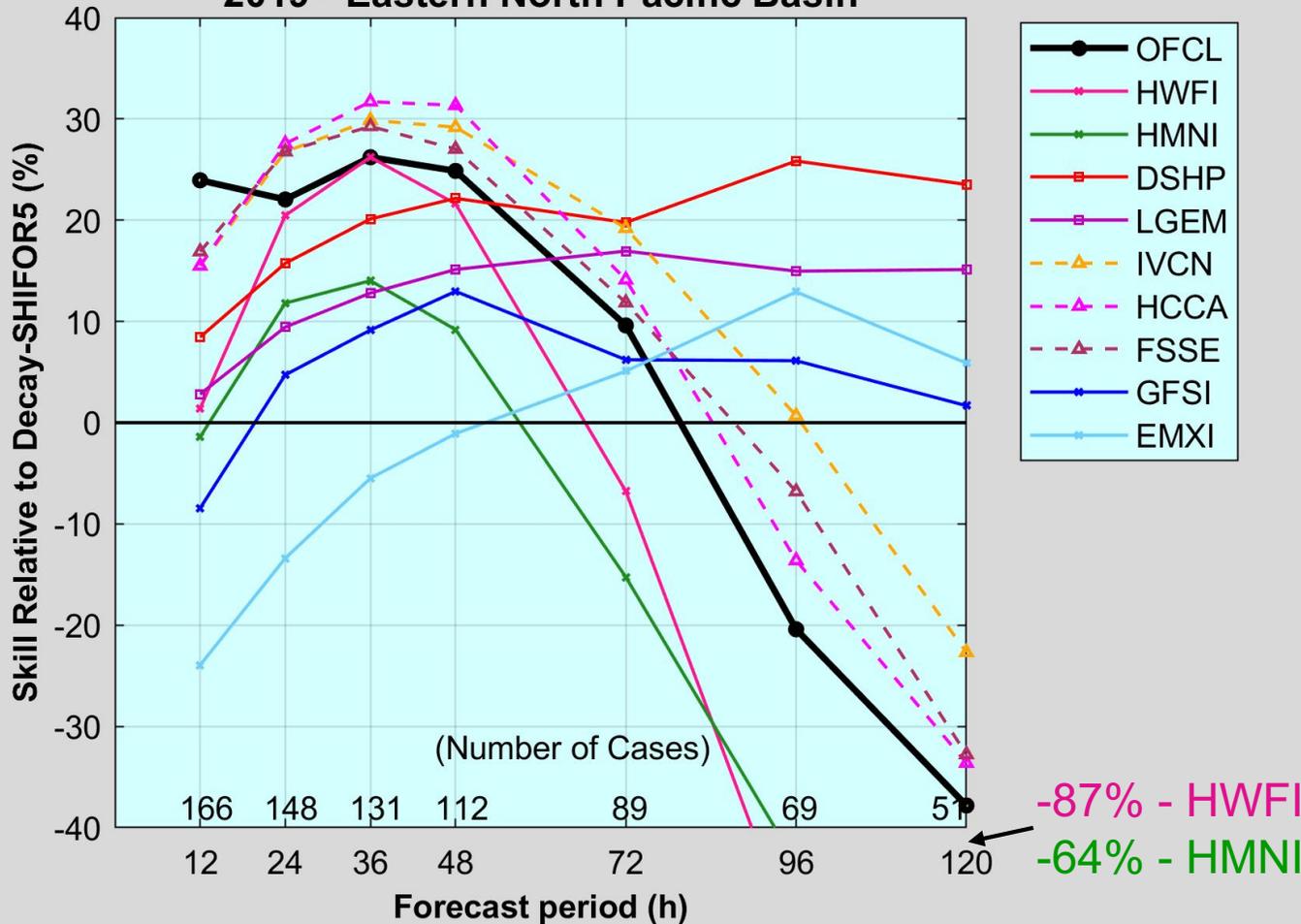


Errors went down in 2019 at the short leads, and there is a slow downward long-term trend at most periods.



2019 Intensity Guidance

Intensity Forecast Skill (Early Models) 2019 - Eastern North Pacific Basin



Official forecasts better than the guidance early, but not quite as good as the consensus aids after that. No skill at 96 and 120 h!

IVCN, FSSE, and HCCA best models early, but trailed late.

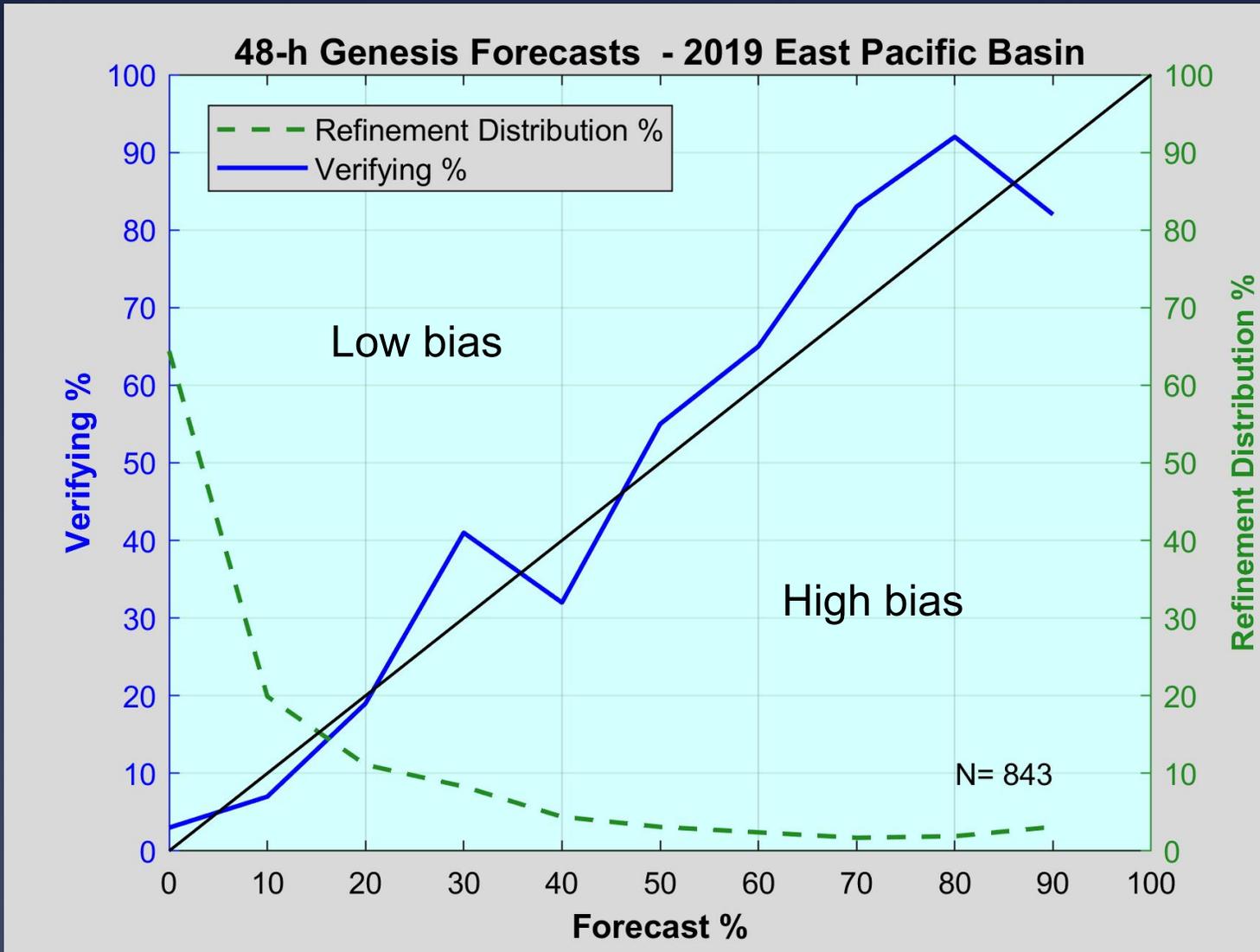
HWFI was a strong performer through 48 h, but skill dropped off sharply after that.

DSHP and LGEM only models that were skillful throughout and were best at 96 and 120 h.

GFSI and EMXI not very skillful early, but among the better guidance at the long leads.



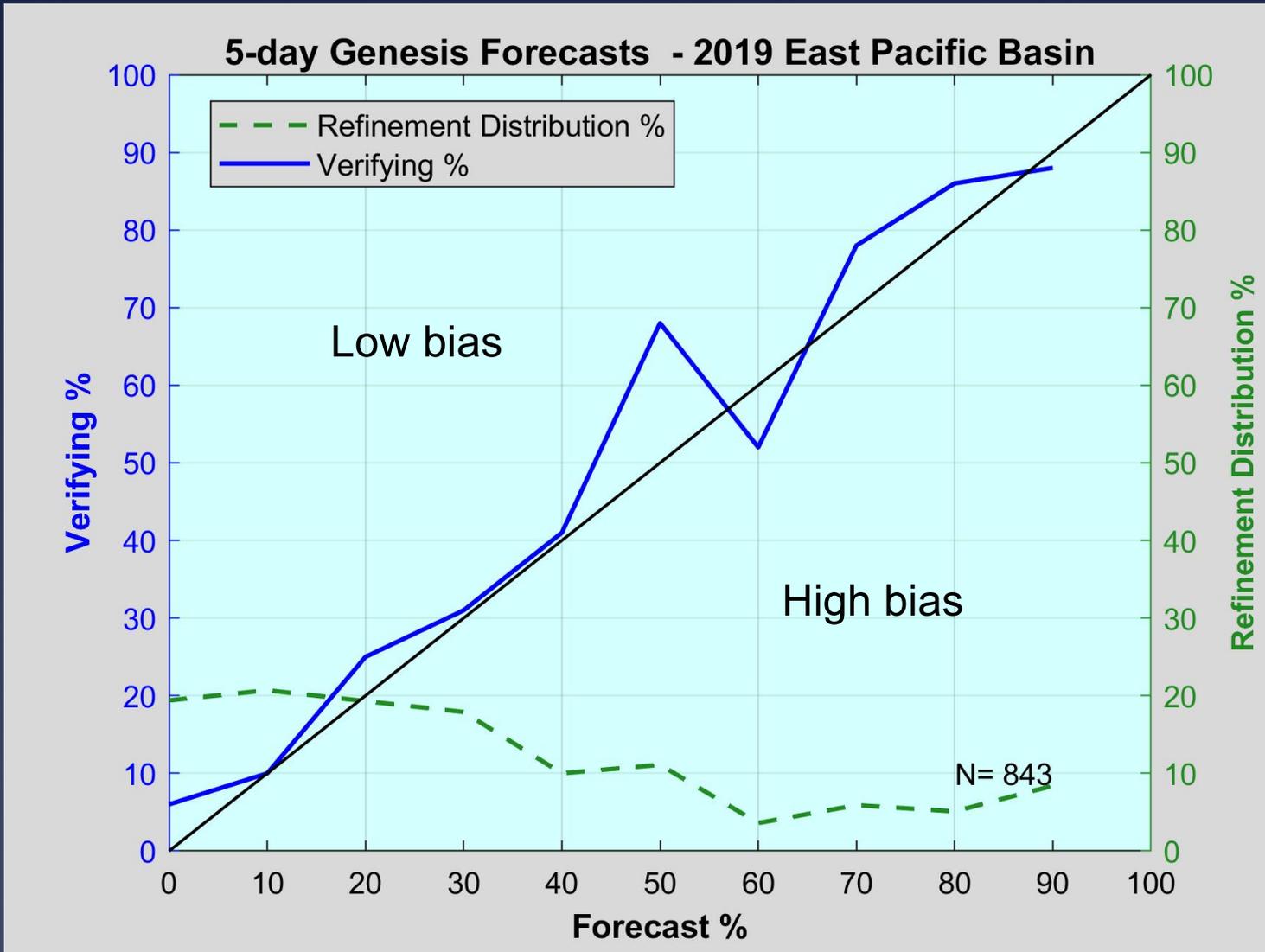
2-day Genesis Forecast Verification



Well-calibrated, reliable predictions



5-day Genesis Forecast Verification



Well-calibrated, except at 50%.



Highlights

- * Great year in the Atlantic for track, but tough year for intensity due mostly to Dorian.
- * No records broken in the east Pacific this year.
- * Consensus models generally performed best for track and intensity in both basins, and EMXI best individual model for track.
- * Genesis forecasts generally well calibrated in both basins.