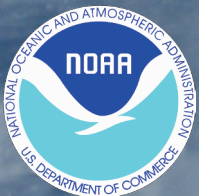


# National Hurricane Center 2017 Forecast Verification (Preliminary)

John Cangialosi , Christopher Landsea (NHC)

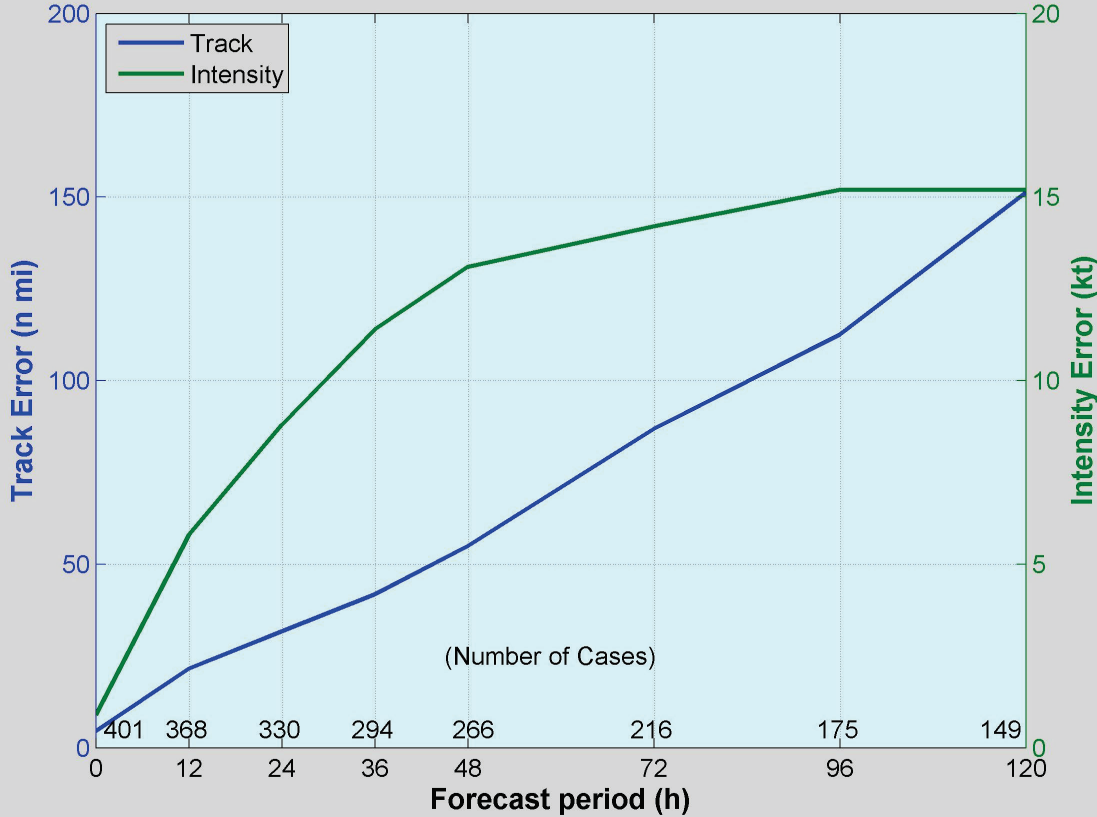




# 2017 Atlantic Verification



NHC Official Forecasts - 2017 Atlantic Basin



VT (h)	NT	TRACK (n mi)	INT (kt)
000	401	4.5	0.9
012	368	21.6	5.8
024	330	31.6	8.7
036	294	41.8	11.3
048	266	55.0	13.0
072	216	86.9	14.2
096	175	112.6	15.1
120	149	151.1	15.2

Values in green exceed all-time records.

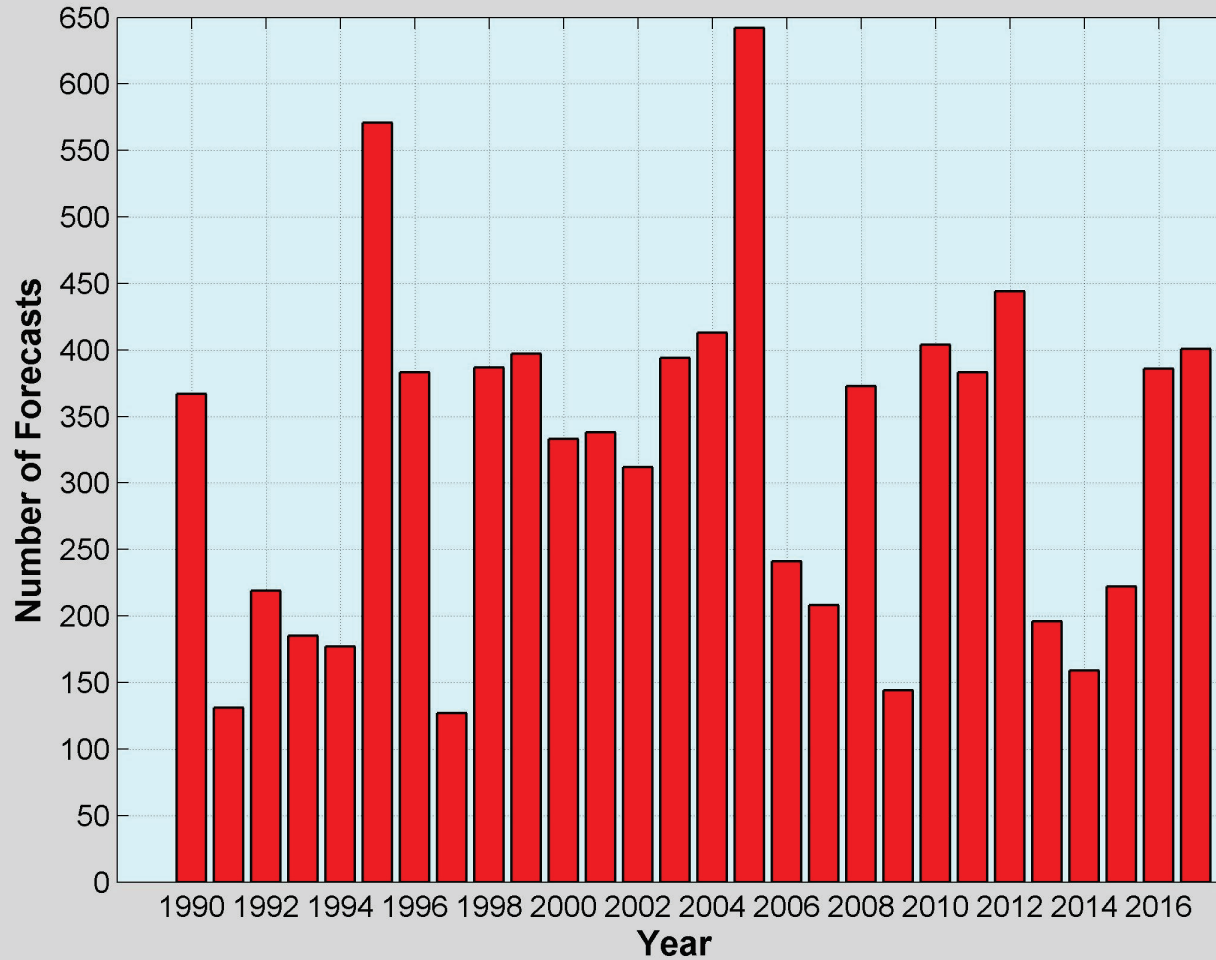
Great year for track prediction!



# Sample Size since 1990



Number of NHC Official Forecasts By Year  
Atlantic Basin



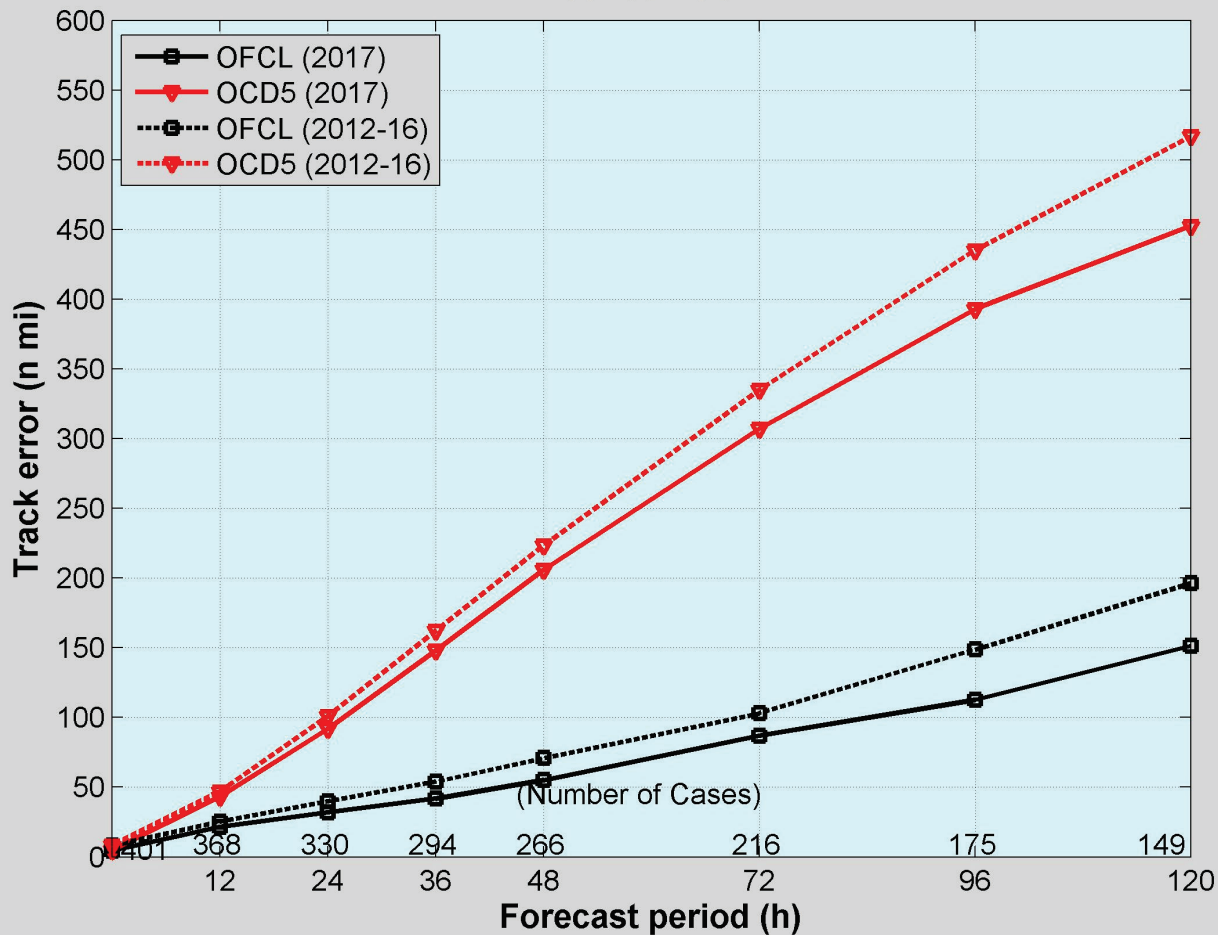
*2017 was the busiest year since 2012. The number of forecasts is above the mean (319).*





# Atlantic Track Errors vs. 5-yr Mean

NHC Official vs. CLIPER5 Forecasts  
Atlantic Basin



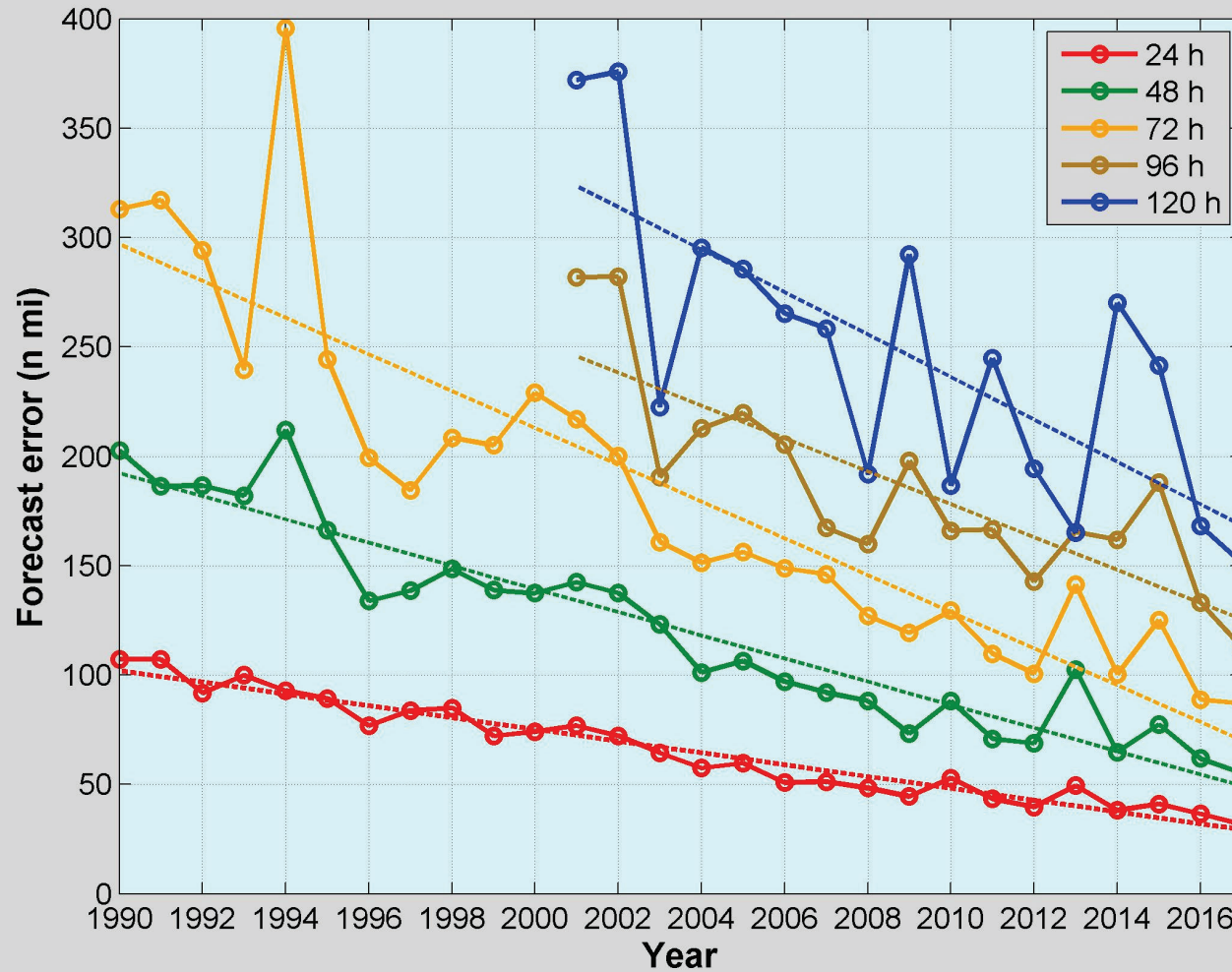
*Official track forecast errors were lower than their 5-yr means, but OCD5 errors were also lower than its mean, indicative that the season was a little easier to predict than normal for track.*





# Atlantic Track Error Trends

NHC Official Track Error Trend  
Atlantic Basin

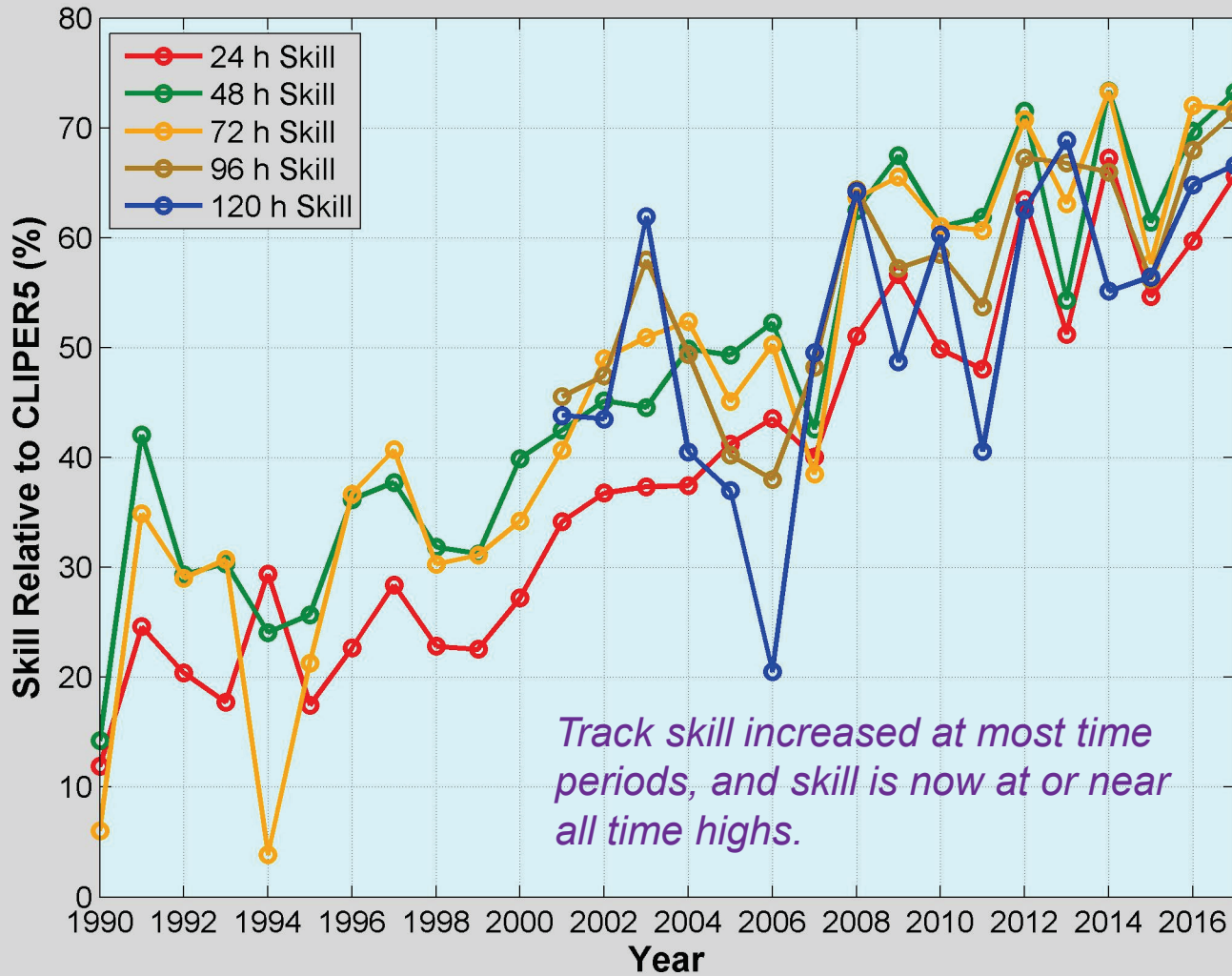


Track errors decreased at all time periods in 2017, and the trends have shown significant improvements over the long term. In fact, errors are about 60% smaller compared to 15 years ago.



# Atlantic Track Skill Trends

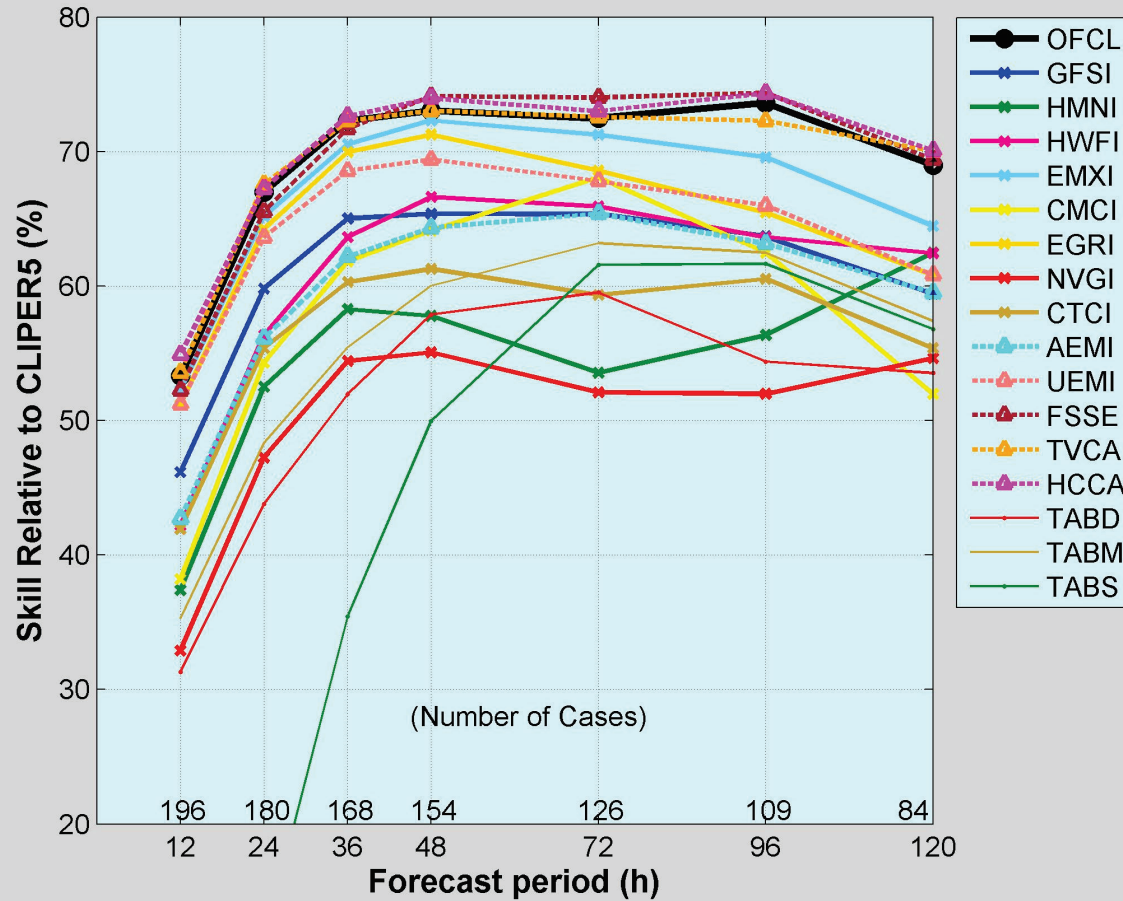
NHC Official Track Skill Trend  
Atlantic Basin





# 2017 Track Guidance

Track Forecast Skill (Early Models)  
2017 - Atlantic Basin



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

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

EGRI and UEMI were next best models.

GFSI, HWFI, AEMI, CMC1 were fair performers (near the middle of the pack).

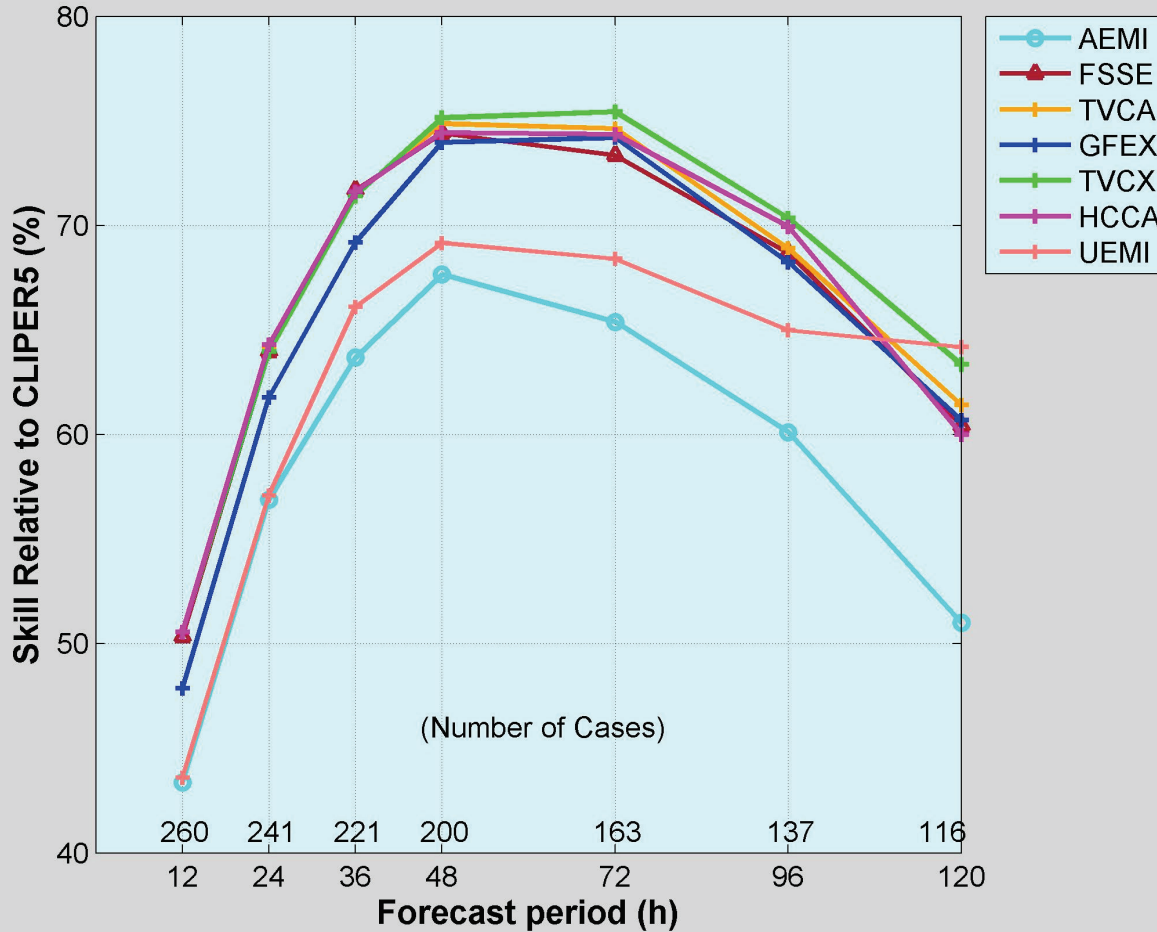
NVGI, HMNI, and CTCI trailed in 2017.





# 2017 Consensus Guidance

Track Forecast Skill (Consensus Models)  
2017 - Atlantic Basin



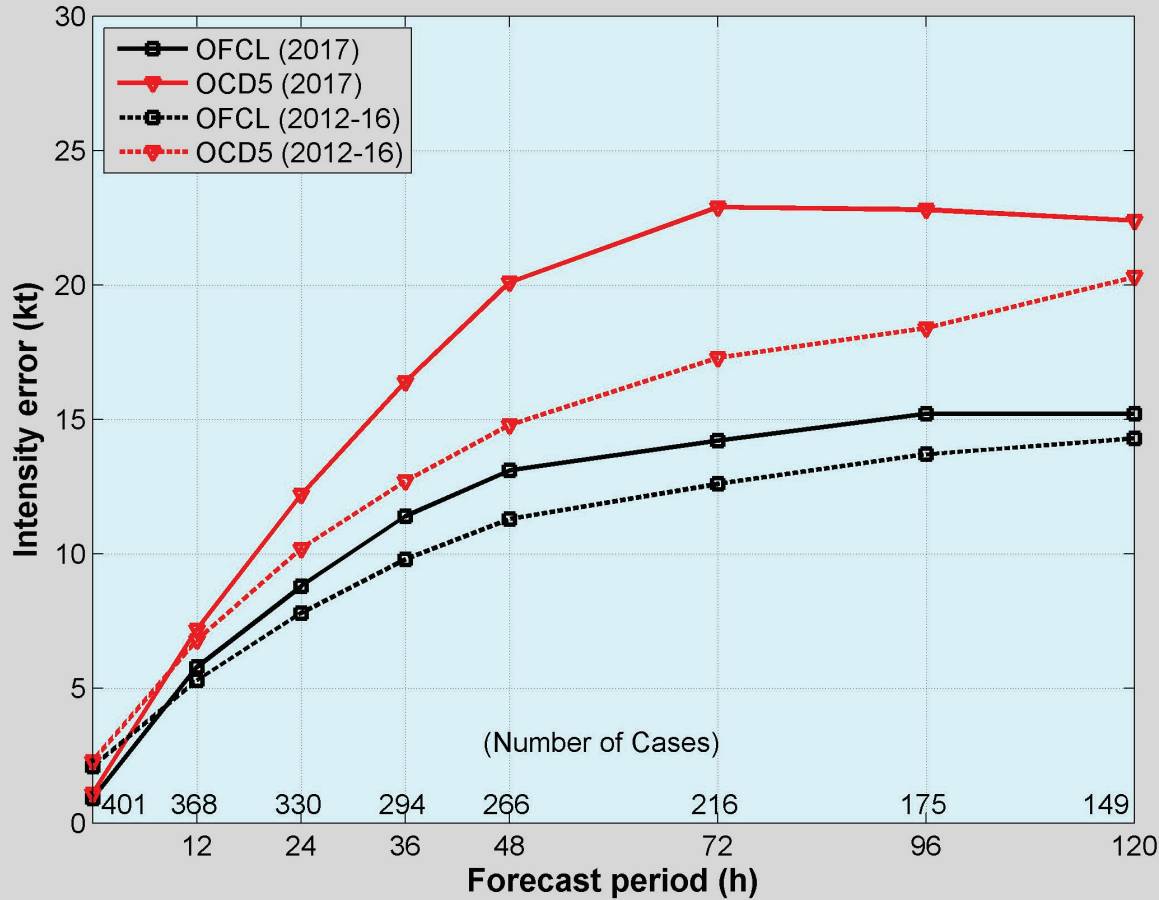
*Skill of FSSE, HCCA, TVCX, and GFEX very close to one another, but TVCX is best at 48 h and beyond.*

*UEMI and AEMI have less skill, but UEMI was more competitive.*



# Atlantic Intensity Errors vs. 5-Year Mean

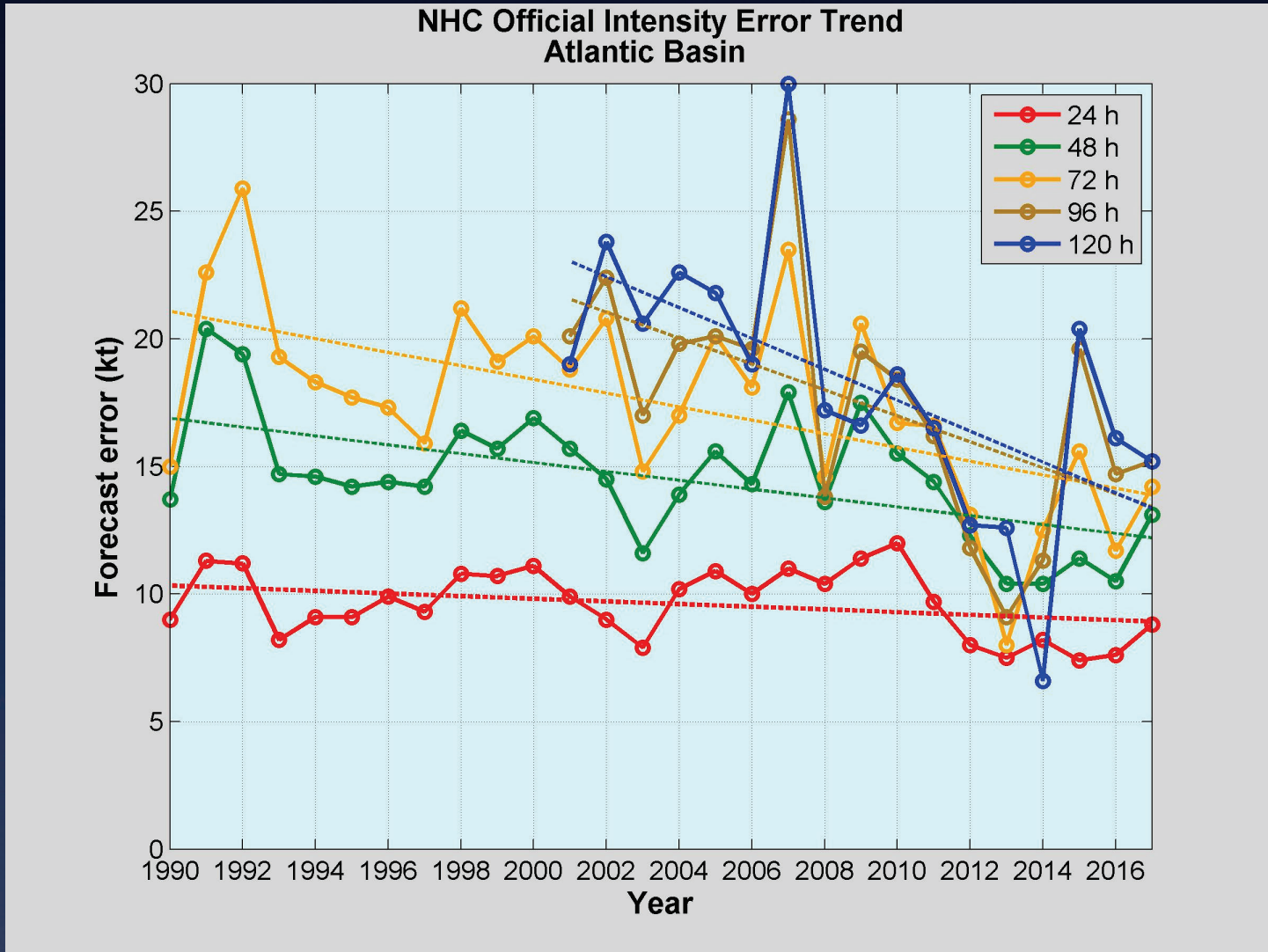
NHC Official vs. Decay-SHIFOR Forecasts  
Atlantic Basin



*Official forecast errors were higher than the 5-yr mean, but OCD5 errors were also higher than its mean, indicative that the season's storms were more difficult to forecast intensity than average.*



# Atlantic Intensity Error Trends



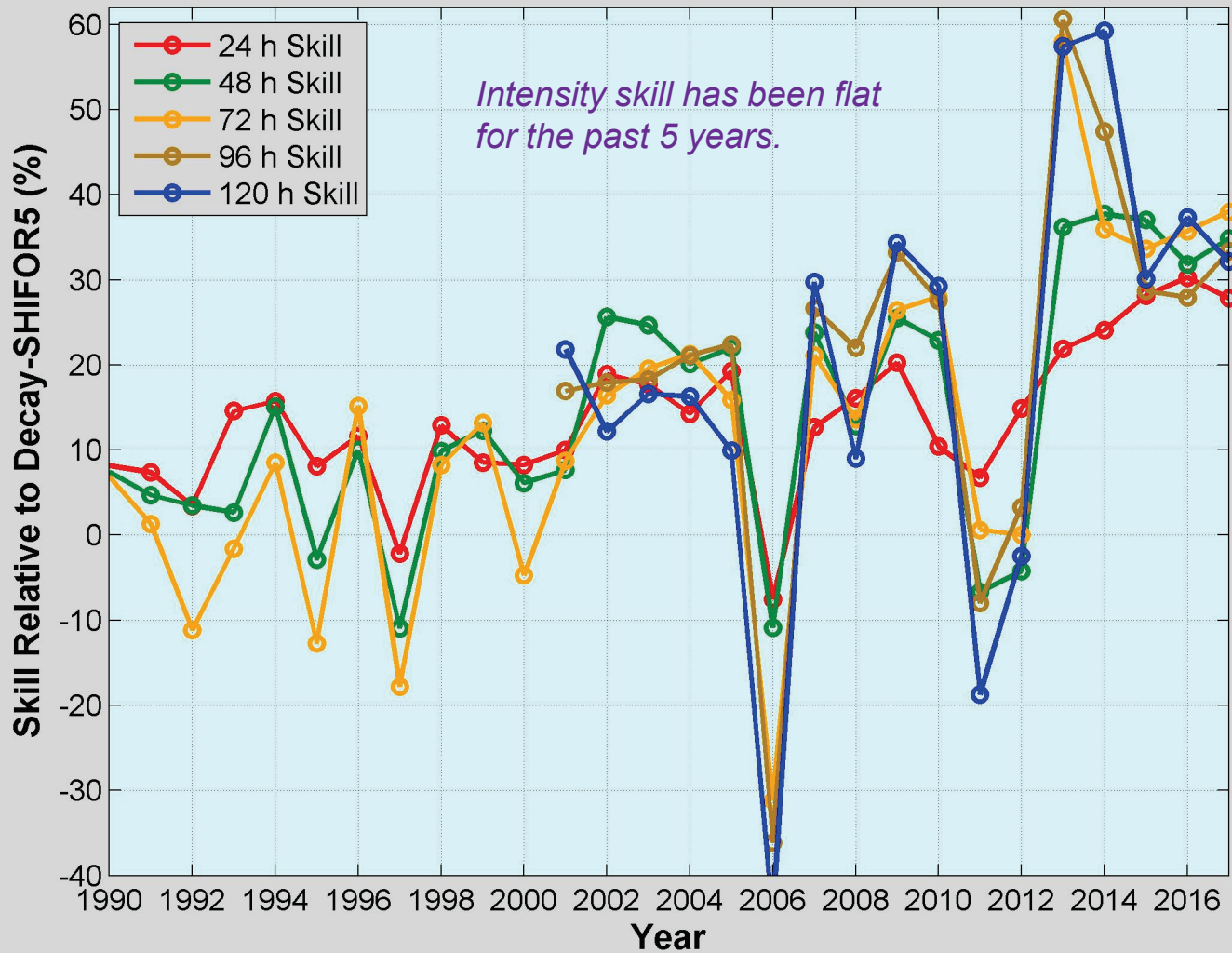
Errors increased at most time periods in 2017. Long term trends show slow improvement in intensity forecasts.





# Atlantic Intensity Skill Trends

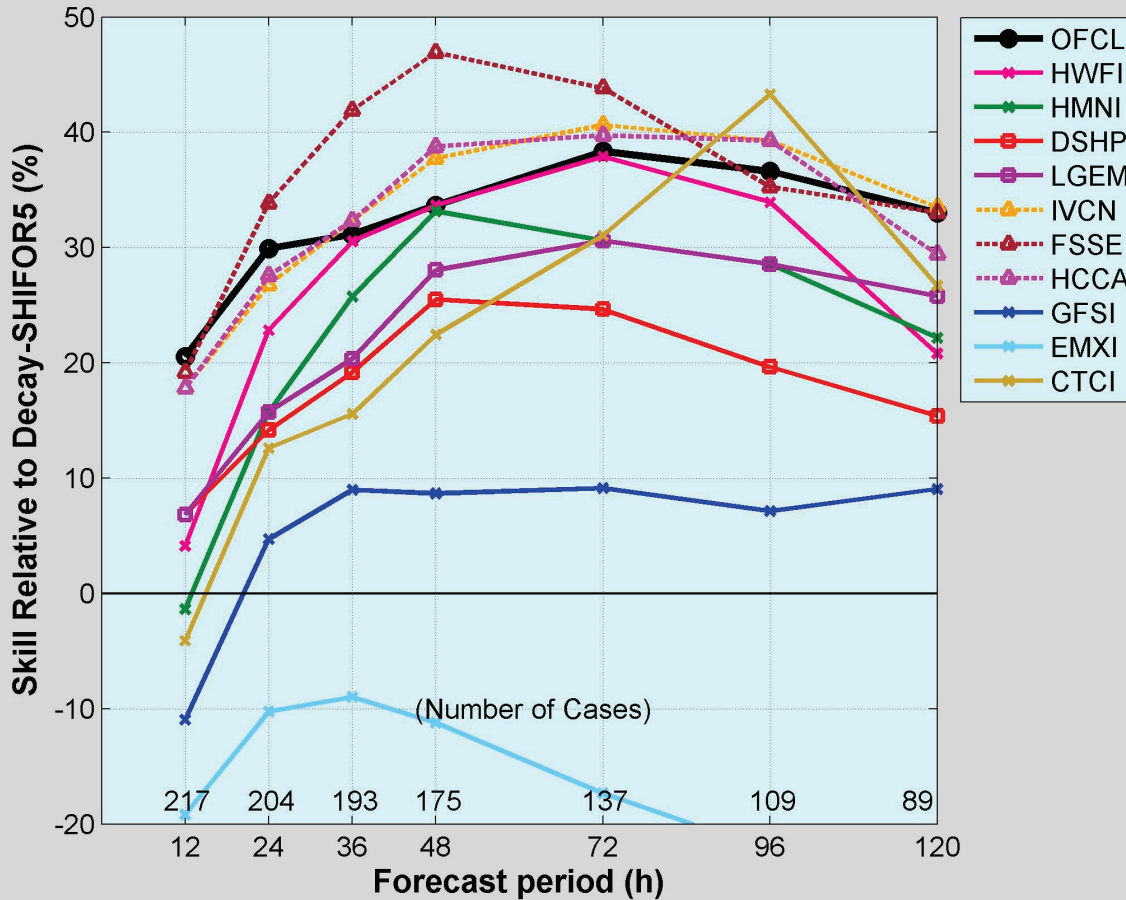
NHC Official Intensity Skill Trend  
Atlantic Basin





# 2017 Intensity Guidance

Intensity Forecast Skill (Early Models)  
2017 - Atlantic Basin



Official forecasts skillful at all times, but were beat by the consensus models at most time periods.

FSSE best model from 24 to 72 h.

HWFI was a strong performer, best individual model.

HMNI not as good as HWFI, but beat statistical aids.

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

CTCI showed increased skill with time. Strong performer from days 3 to 5.

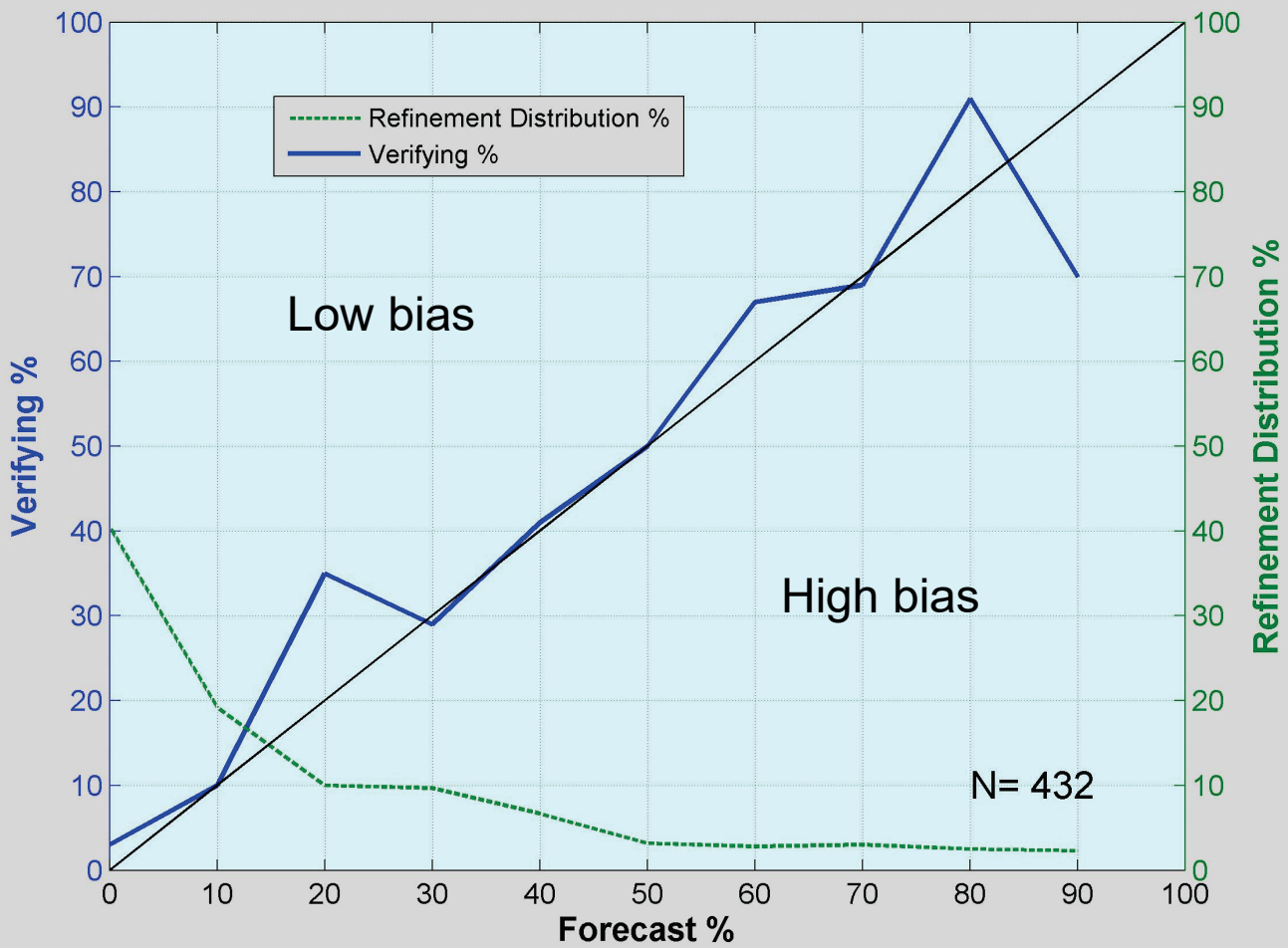
GFSI had some skill, but not competitive. EMXI not skillful.



# 2-day Genesis Forecast Verification



48-h Genesis Forecasts - 2017 Atlantic Basin



*48-h genesis forecasts are very well calibrated. Much improved from previous years.*

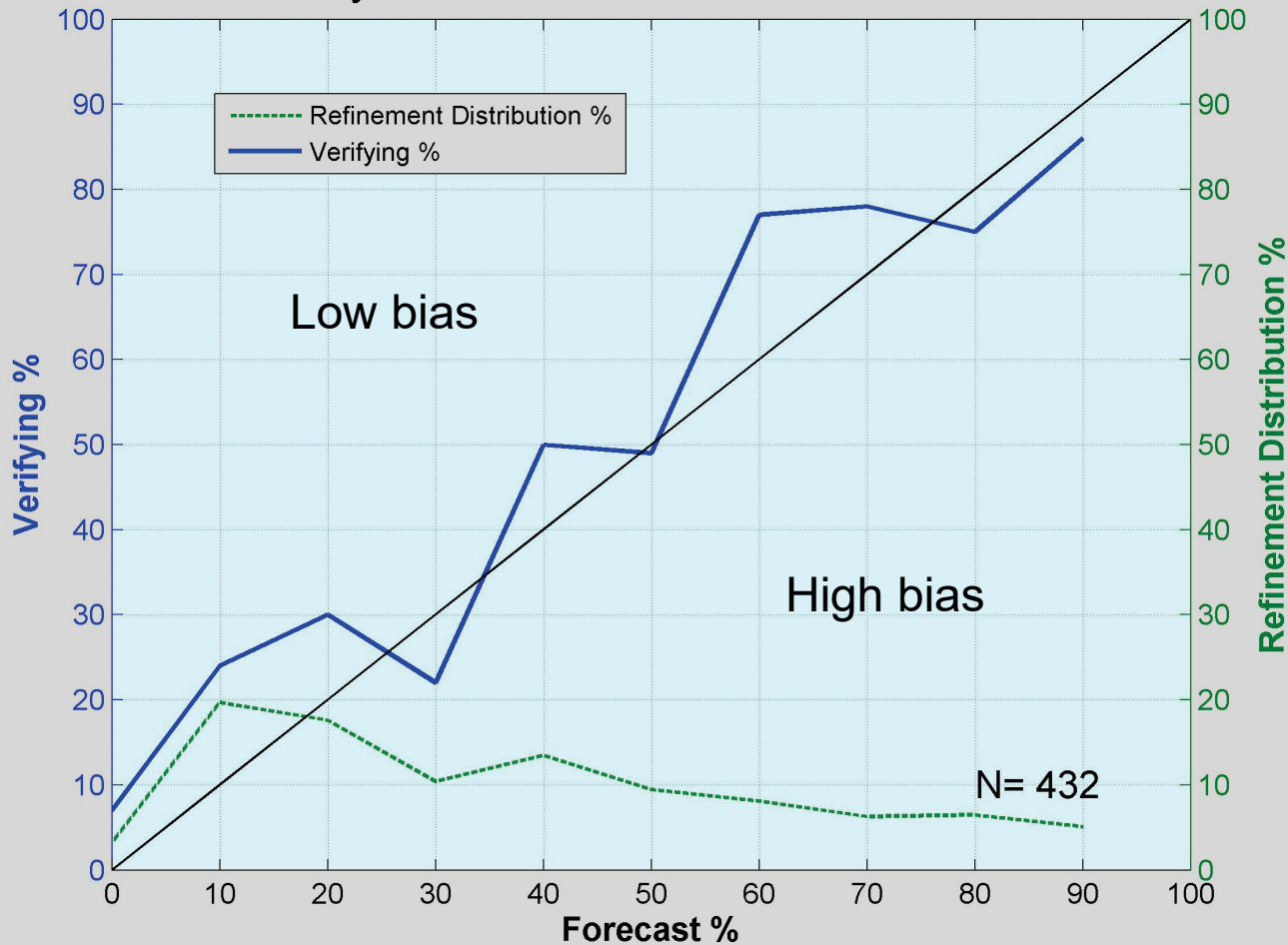




# 5-day Genesis Forecast Verification



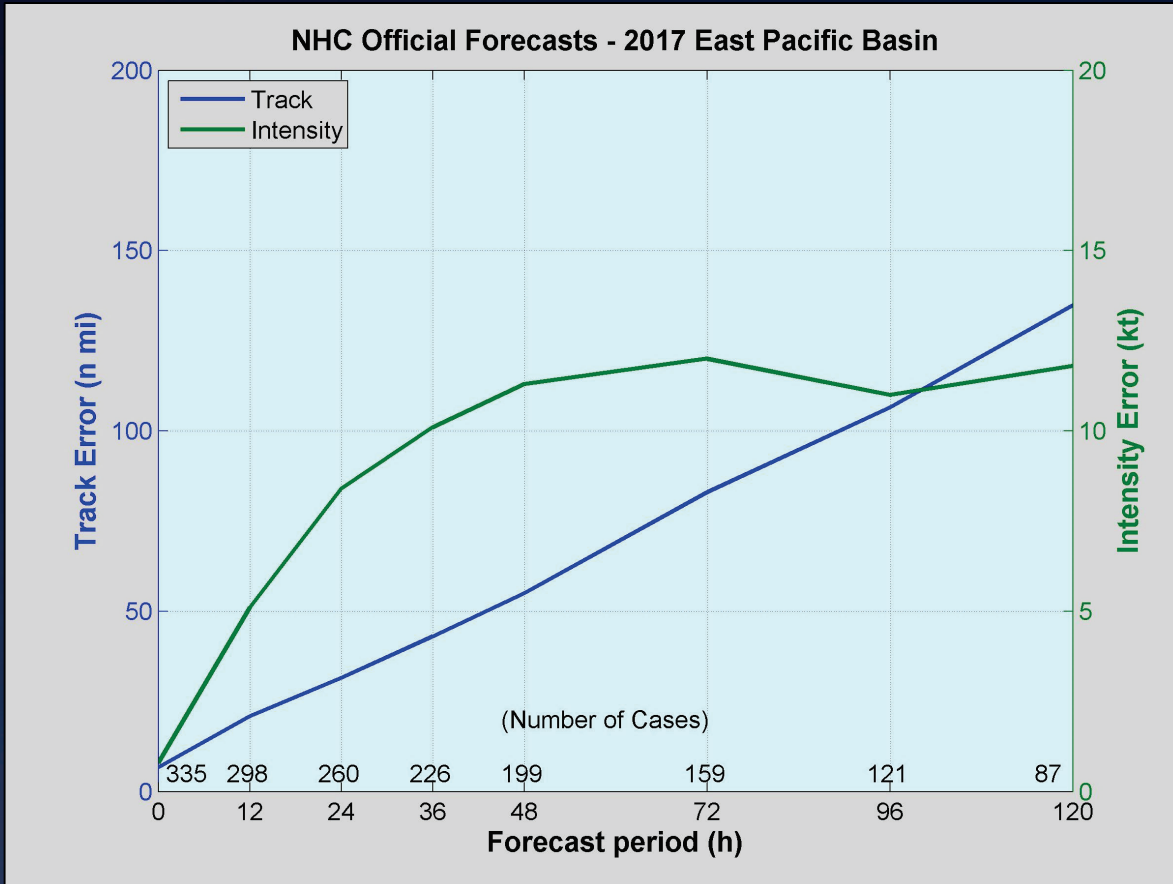
5-day Genesis Forecasts - 2017 Atlantic Basin



*Similar to the 2-day predictions, the 5-day genesis forecasts showed little bias at all ranges in 2017.*



# 2017 East Pacific Verification



VT (h)	NT	TRACK (n mi)	IN (kt)
000	335	6.7	0.8
012	298	20.9	5.1
024	260	31.5	8.4
036	226	43.0	10.1
048	199	55.0	11.3
072	159	83.0	12.0
096	121	106.5	11.0
120	87	134.9	11.8

*Value in green exceeded all-time record.*

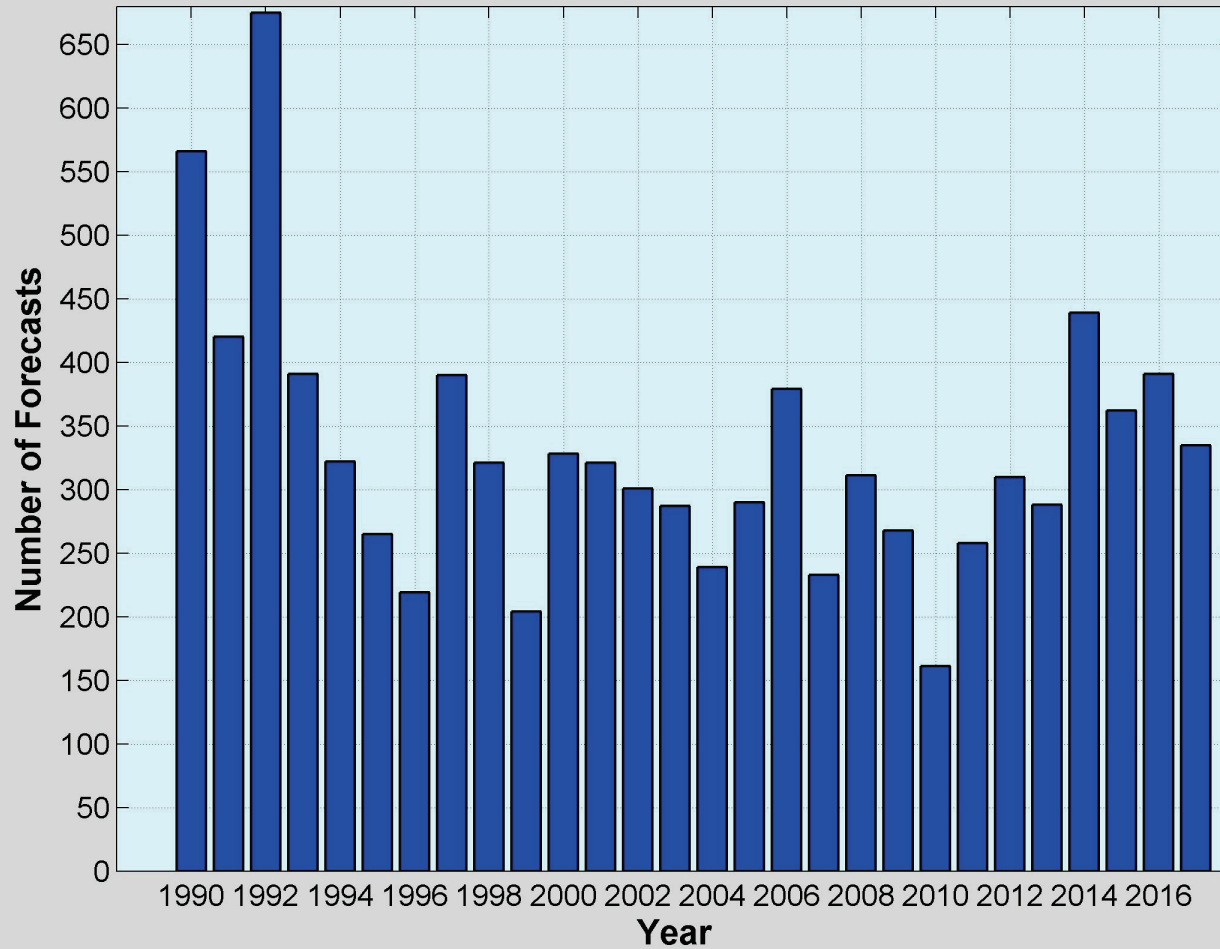
*Great year for intensity forecasting!*



# Sample Size since 1990



Number of NHC Official Forecasts By Year  
East Pacific Basin

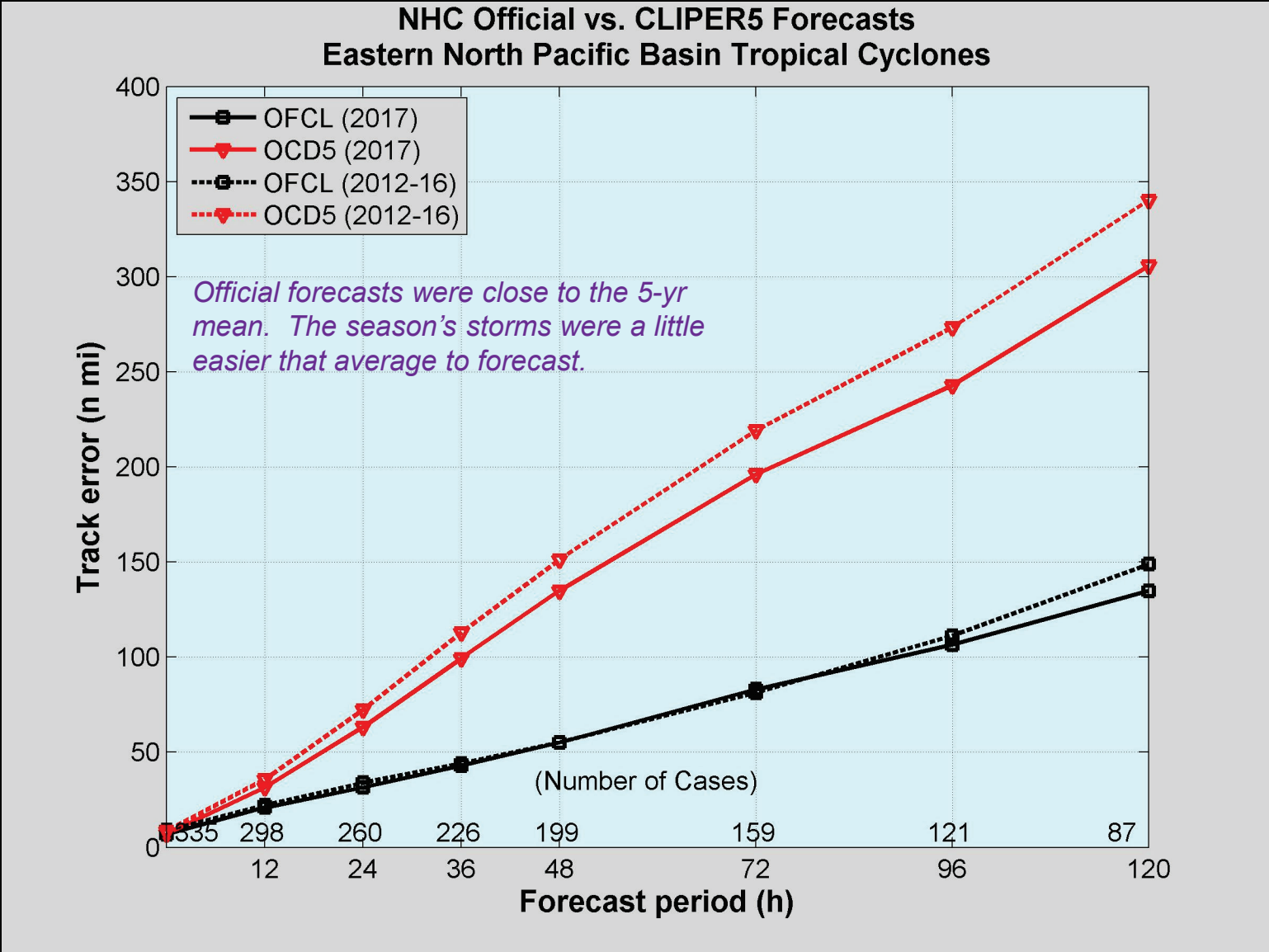


*Less forecasts were issued in 2017 than last year, but the number of forecasts is still slightly above the mean.*





# Eastern Pacific Track Errors vs. 5-Year Mean

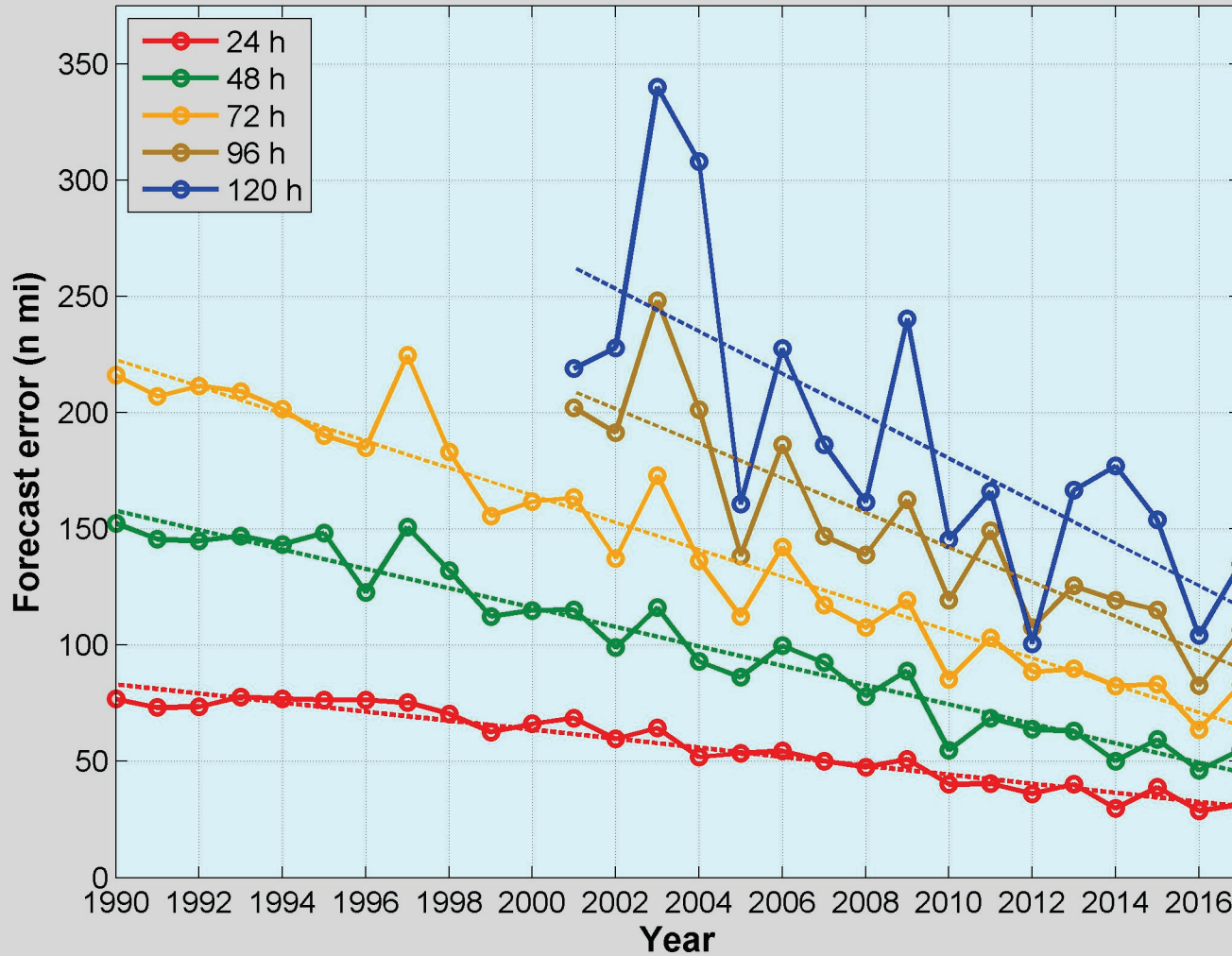




# EPAC Track Error Trends



NHC Official Track Error Trend  
Eastern North Pacific Basin Tropical Cyclones

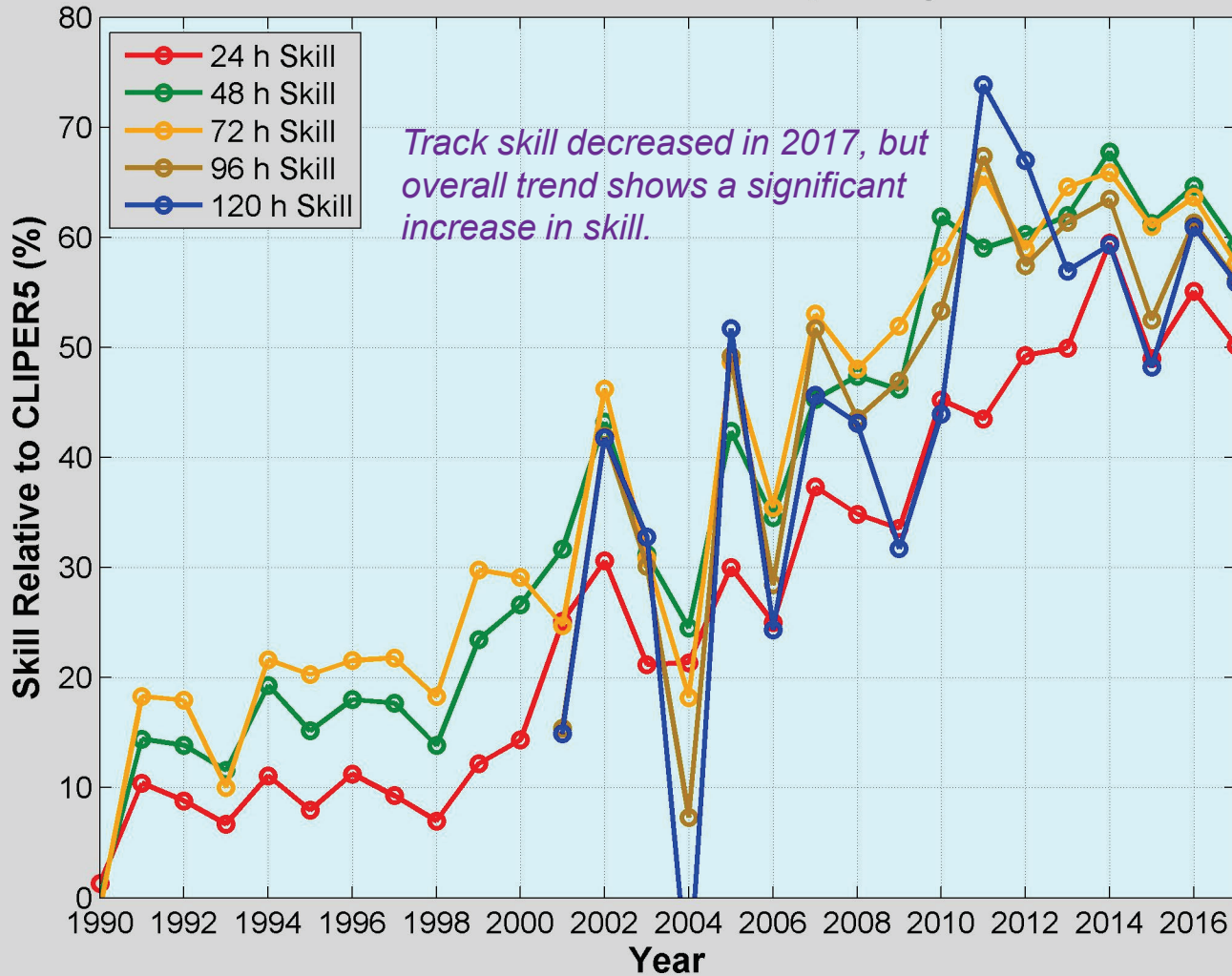


*In 2017 there was a slight increase in errors at all lead times, but track errors have decreased substantially over the long term.*



# EPAC Track Skill Trends

## NHC Official Track Skill Trend Eastern North Pacific Basin Tropical Cyclones

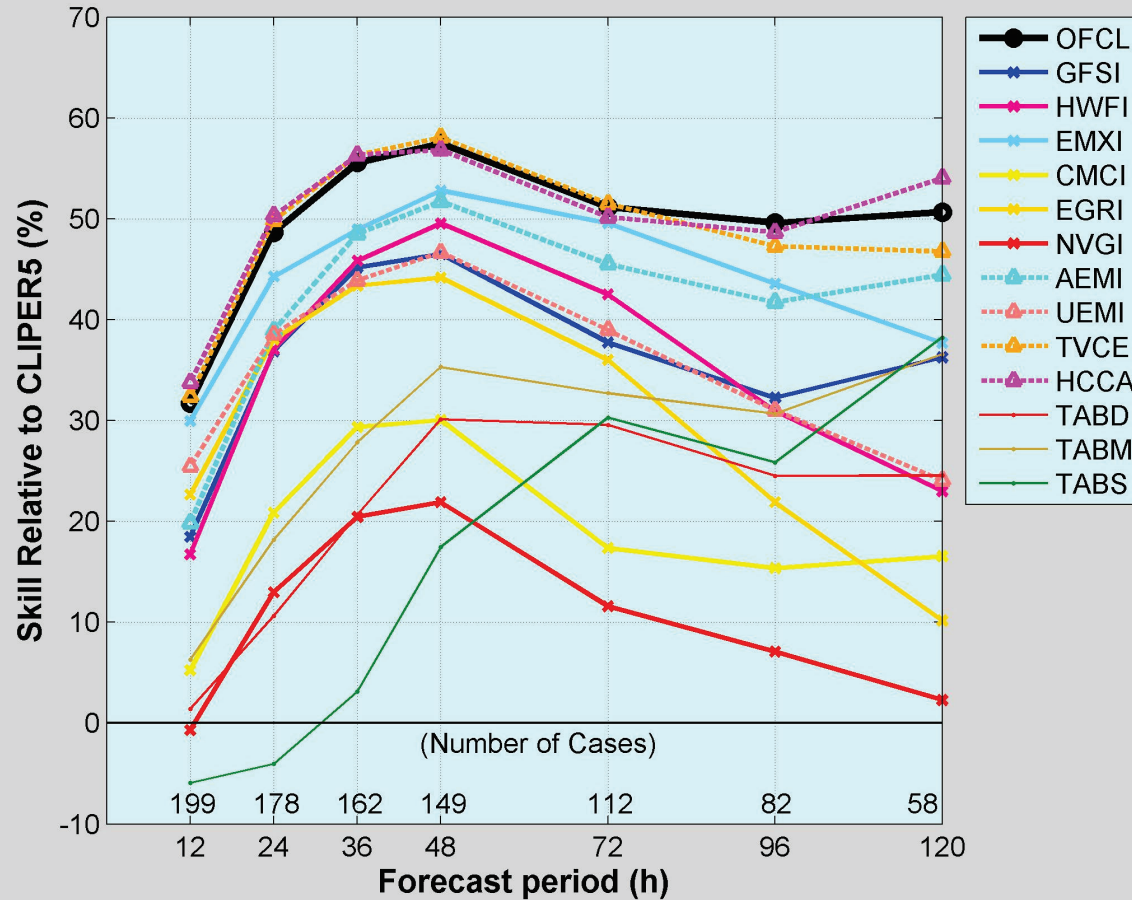






# 2017 Track Guidance

Track Forecast Skill (Early Models)  
2017 - East Pacific Basin



Official forecasts very skillful, near the best models – TVCE, HCCA.

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

AEMI close to EMXI, and slightly better than it at 120 h.

GFSI, HWFI, EGRI, UEMI are in the middle of the pack.

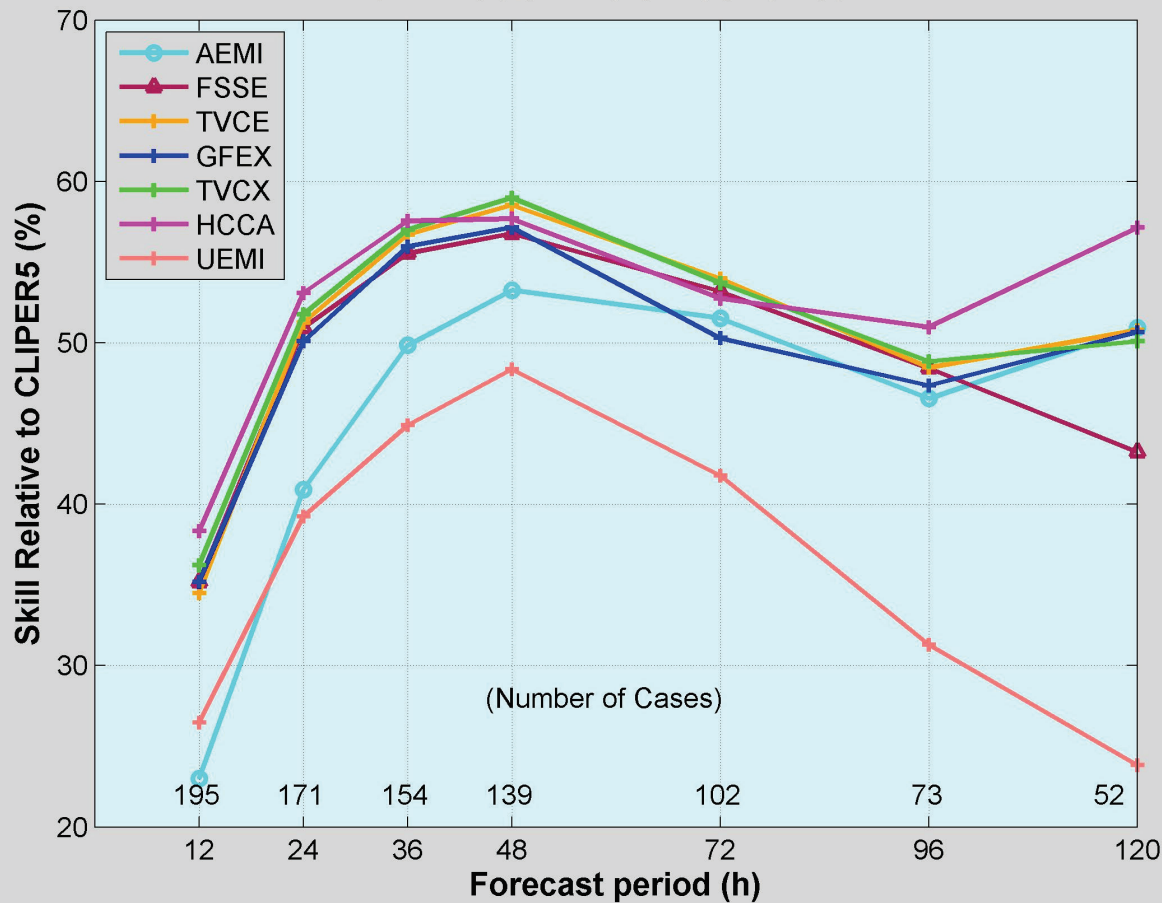
CMCI and NVGI, trailed.

Not enough sample to verify FSSE, CTCI, HMNI



# 2017 Consensus Guidance

Track Forecast Skill (Consensus Models)  
2017 - Eastern North Pacific Basin



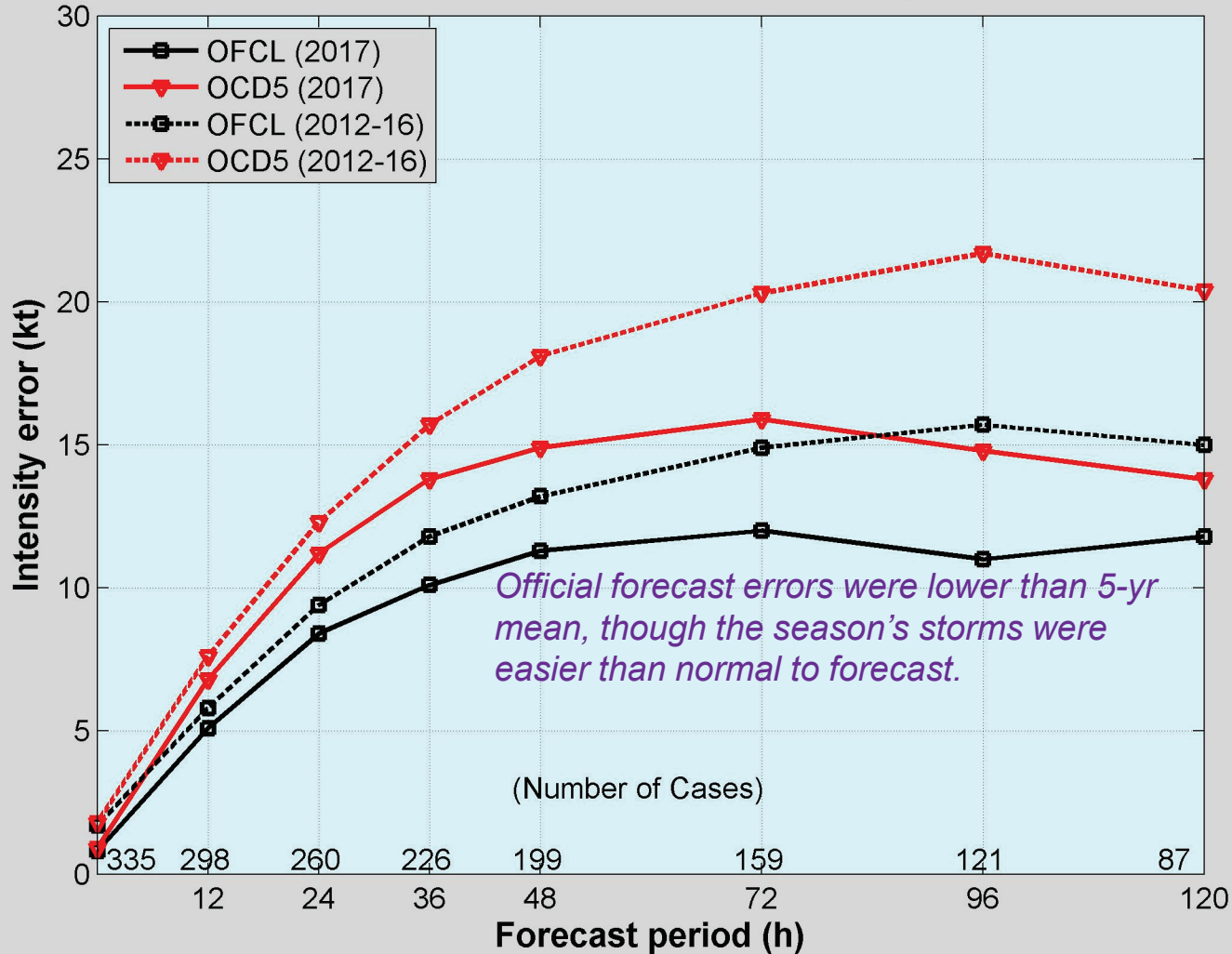
*Skill of FSSE, HCCA, TVCX, and GFEX very close to one another, but HCCA is best at 96 and 120 h.*

*UEMI and AEMI have less skill, but AEMI was much more competitive.*



# EPAC Intensity Errors vs. 5-Year Mean

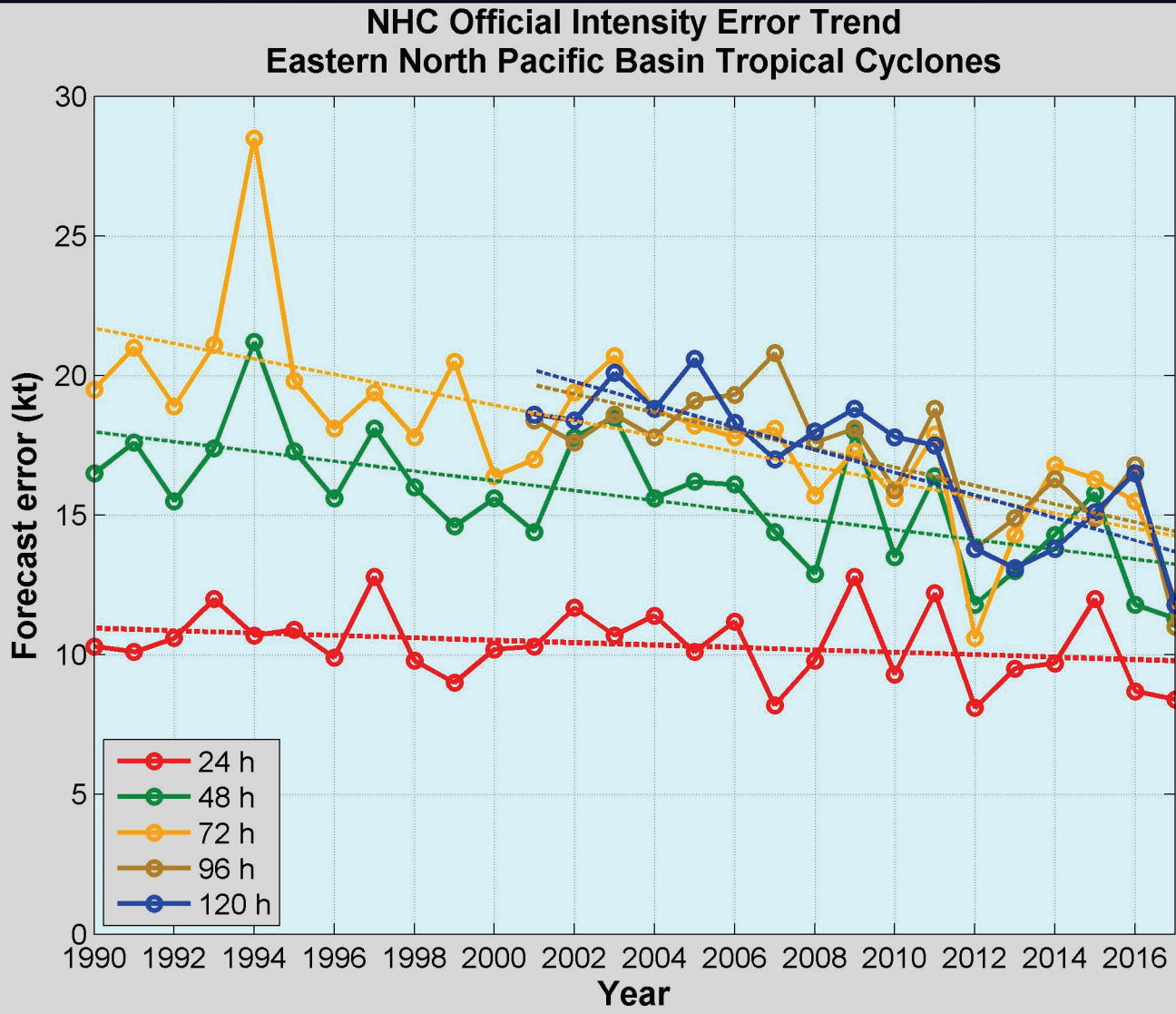
## NHC Official vs. Decay-SHIFOR5 Forecasts Eastern North Pacific Basin Tropical Cyclones







# EPAC Intensity Error Trends

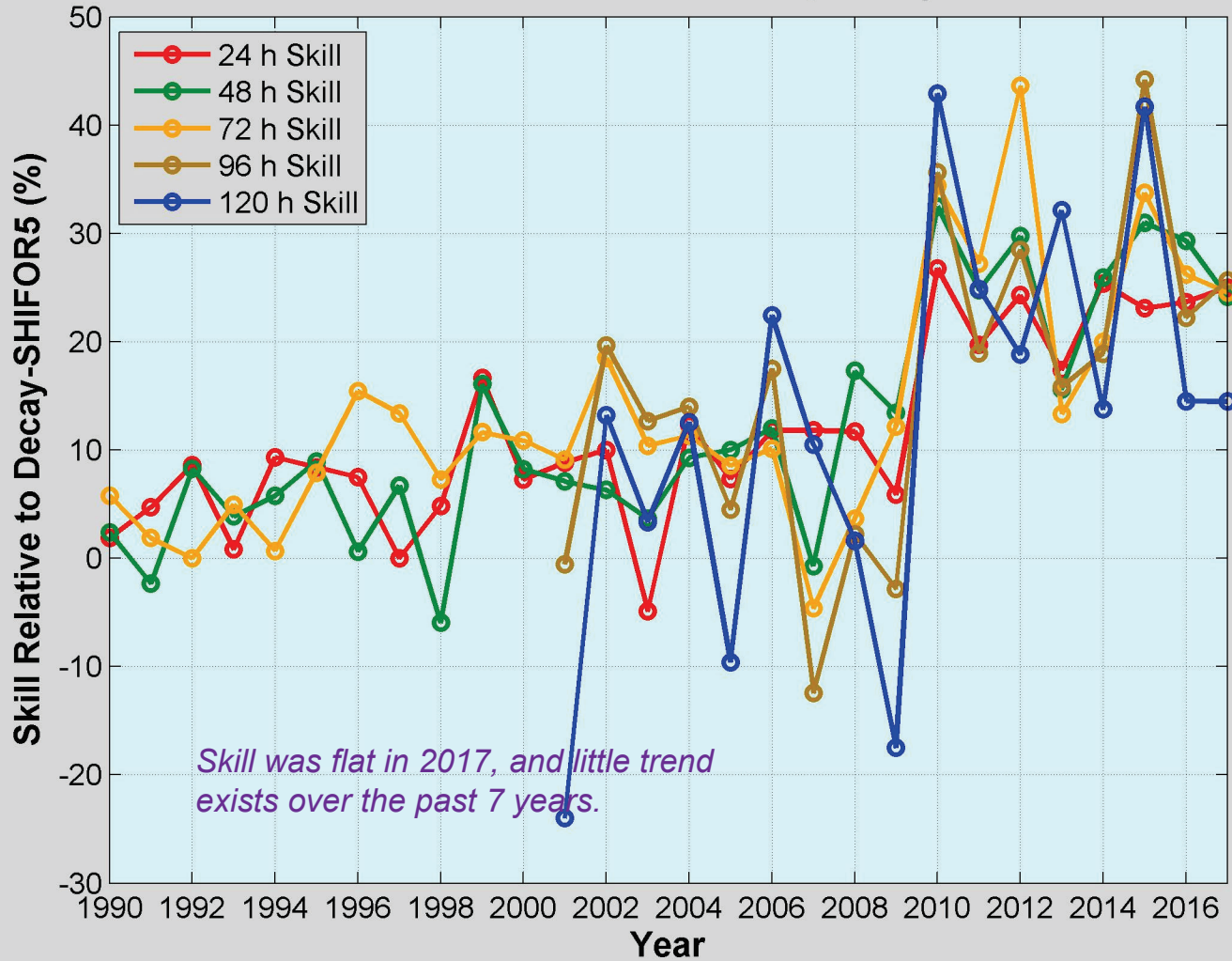


Errors went up down in 2017. No trend at 24 h, helping the slow downward long-term trend at most periods.



# EPAC Intensity Skill Trends

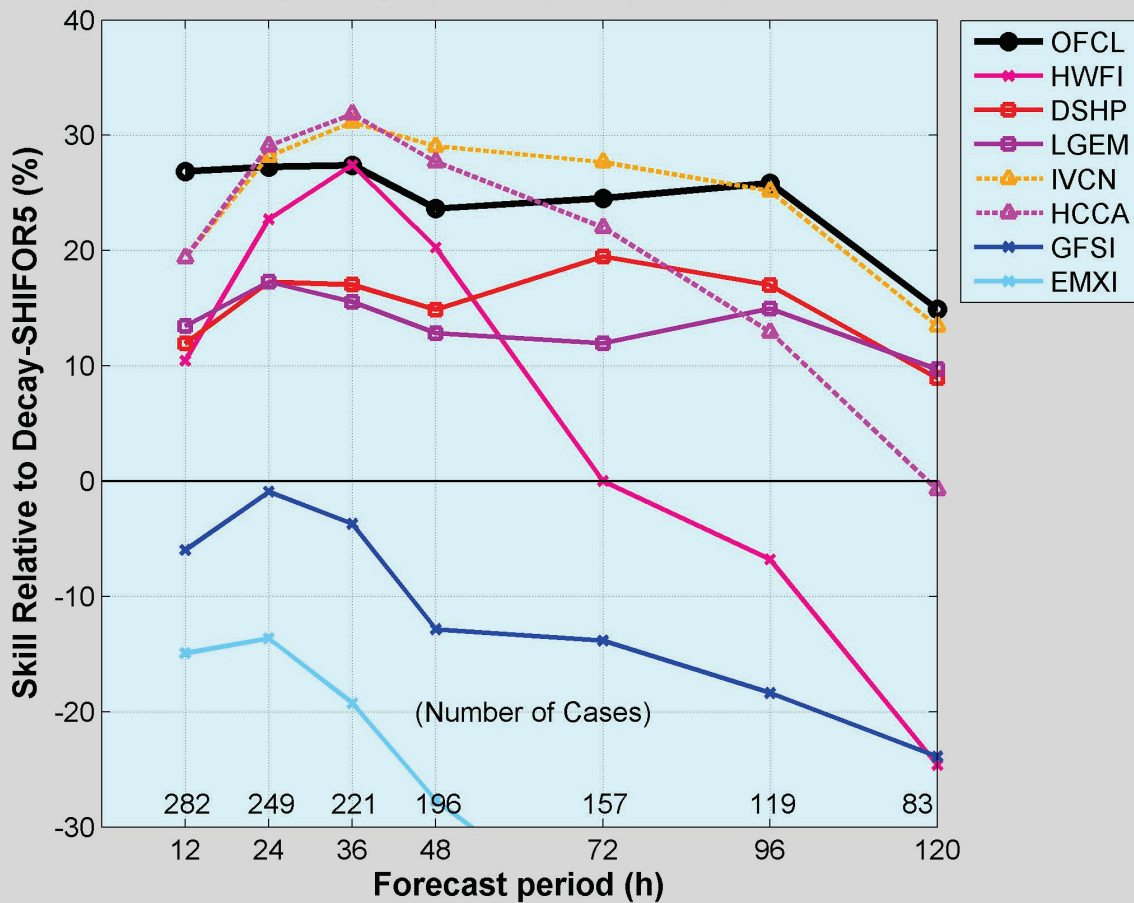
NHC Official Intensity Skill Trend  
Eastern North Pacific Basin Tropical Cyclones





# 2017 Intensity Guidance

Intensity Forecast Skill (Early Models)  
2017 - Eastern North Pacific Basin



Official forecasts performed as good as or better than the best models (IVCN, HCCA).

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

DSHP and LGEM both skillful throughout and were fair performers.

GFSI and EMXI not skillful.

Not enough of a sample to verify FSSE, HMNI, CTCI

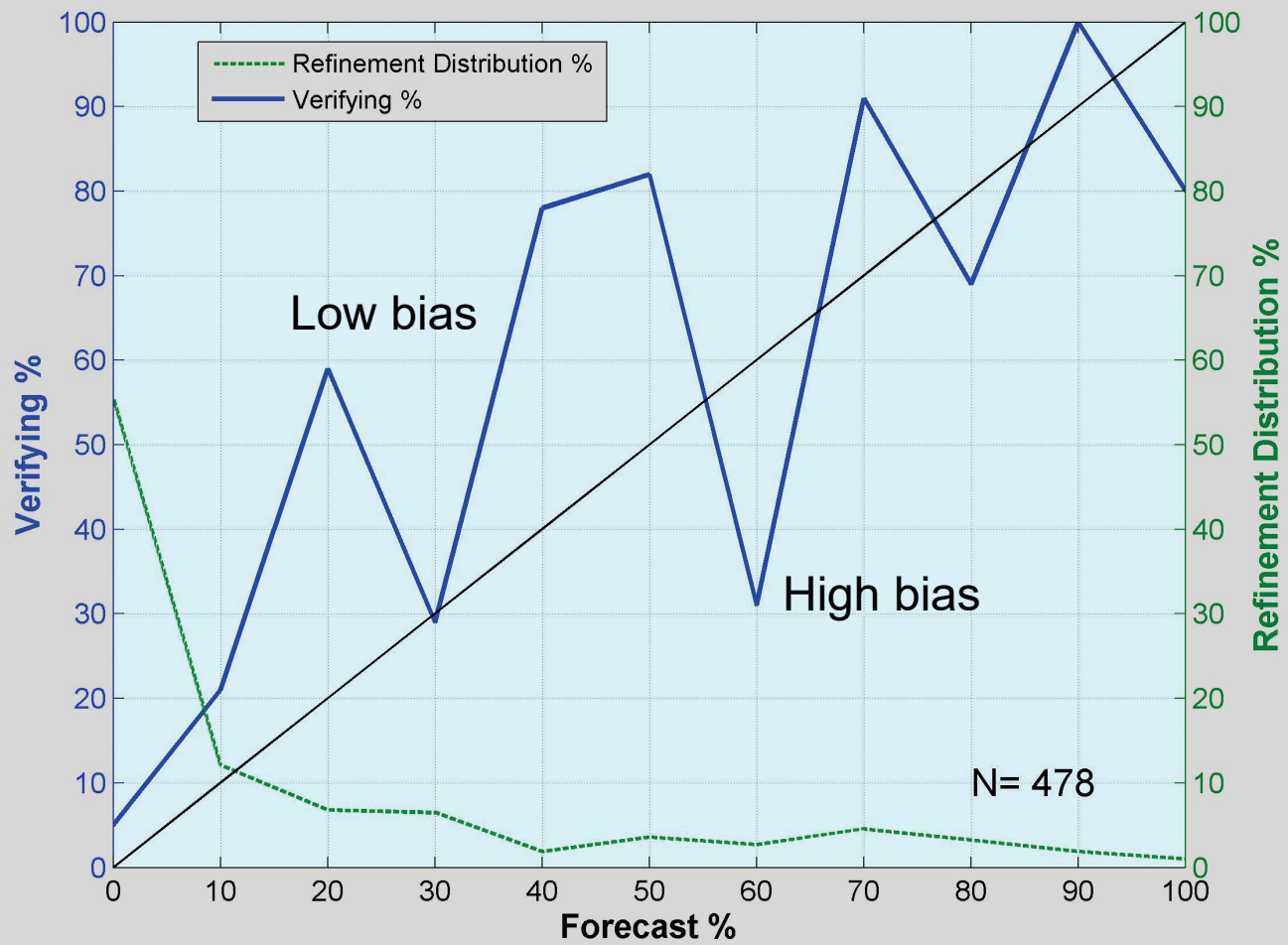




# 2-day Genesis Forecast Verification



48-h Genesis Forecasts - 2017 East Pacific Basin



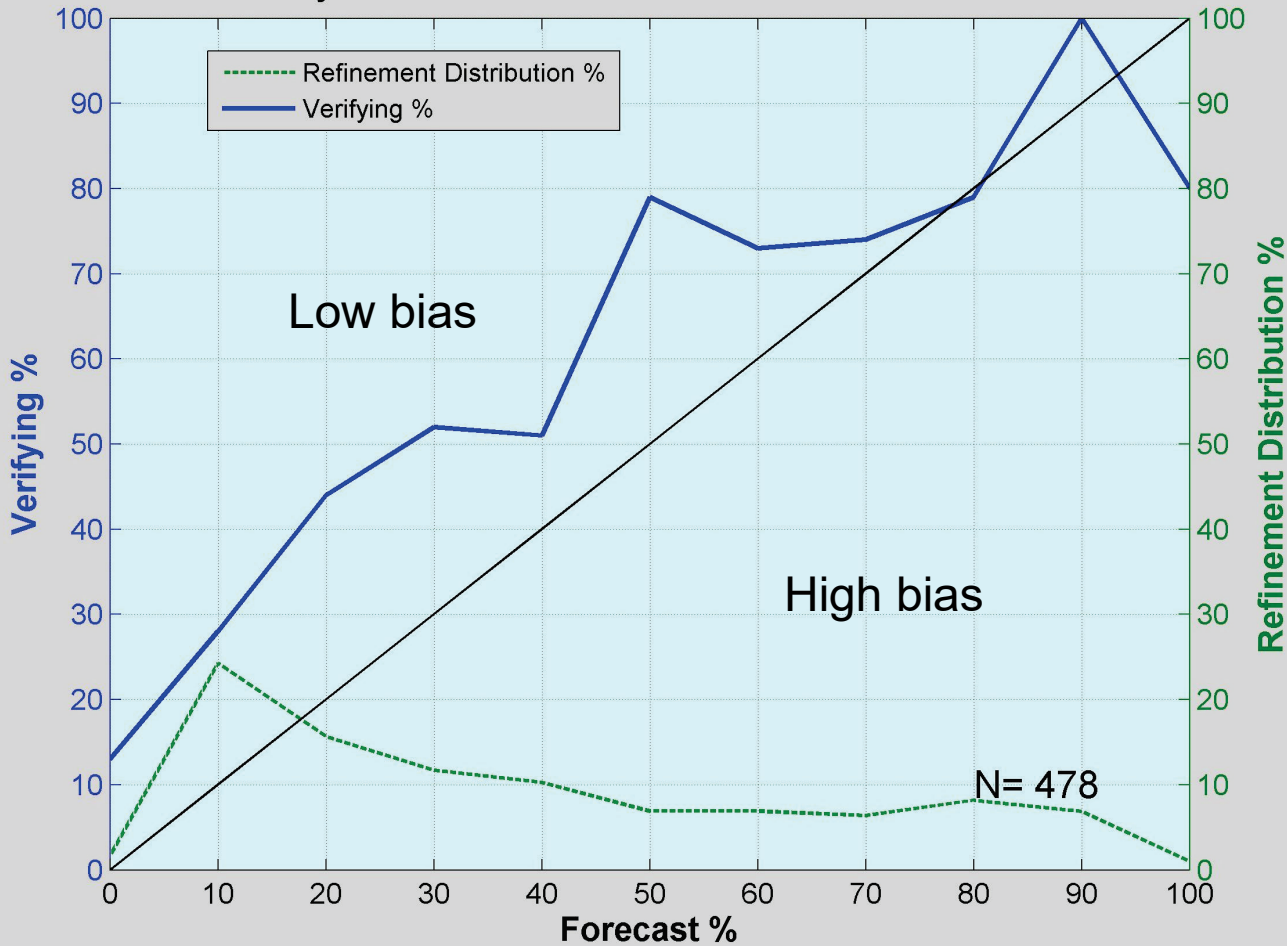
*Significant noise, not nearly as good as Atlantic genesis predictions.*



# 5-day Genesis Forecast Verification



5-day Genesis Forecasts - 2017 East Pacific Basin



*Slight low bias at most probabilities.*



# Highlights

- \* Great year in the Atlantic for track, but tough year for intensity prediction likely due to the rapidly intensifying hurricanes.
- \* Great year in the East Pacific for intensity, but track errors increased from records set in 2016.
- \* Consensus models performed best for track and intensity in both basins, EMXI best individual model for track.
- \* Genesis forecasts were very well calibrated in the Atlantic.